HARVEY TOOL™

Your Specials Are Our Standards™

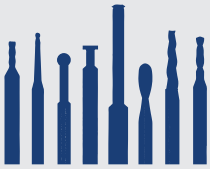
Over 20,000 Miniature & Specialty Cutting Tools

182 Unique Product Lines
All Tools Stocked
Same-Day Shipping

Spring 2018 Catalog
800-645-5609
www.harveytool.com

THINK HARVEY TOOL FIRST

FOR

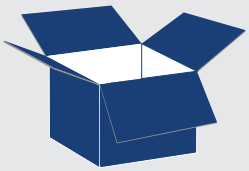


Unique Selection

We offer a comprehensive selection of over 20,000 miniature and specialty cutting tools that are all *fully stocked*. The breadth and depth of our products help solve the industry's toughest machining challenges.

Quality Products

We are committed to designing unique geometries that optimize cutting performance for a variety of materials and applications. We introduce hundreds of new tools into the market every 6 months, offering our customers the solutions they need most.



Same-Day Shipping

Our fully stocked inventory is ready to ship the same day. We offer second day delivery at ground pricing, and any overnight orders ship until 7:00 p.m. EST. For additional shipping information and stock availability, please visit www.harveytool.com.

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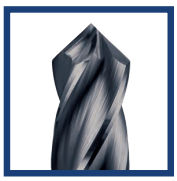

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OVER 1,400 NEW TOOLS

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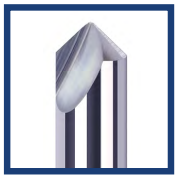

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Marking Cutters Tip Radius for Non-Ferrous Materials

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Keyseat Cutters Square for Hardened Steels

WHAT WE OFFER

Miniature End Mills		Select from over **6,500** miniature end mills down to .001” cutter diameter, available in a variety of styles and profiles.
Material-Specific End Mills		Achieve the best results in exotic alloys, medium alloys, free machining steels, aluminum alloys, graphite, plastics, composites, and more with over **4,400** high performance end mills.
Undercutting End Mills		Nearly **800** options, with **3** different wrap angles: 300°, 270°, and 220°.
Drill/End Mills		Over **400** options, with cutter diameters from 1/32” to 1”.
Chamfer Cutters		Over **850** options, with diameters from 1/32” to 3/4” and **21** different angles per side.
Engraving Cutters		Nearly **800** options, available with **16** included angles and a variety of styles.
Double Angle Shank Cutters		Over **400** options in multiple styles and reach lengths and **11** included angles.
Keyseat Cutters		Over **1,900** options, with cutter diameters from 1/16” to 1-1/2”.
Corner Rounding End Mills		Nearly **850** options, with over **100** radii from .003” to 5/8”.
Dovetail Cutters		**500** options, with **15** included angles.
Holemaking & Threading		Solve a variety of holemaking challenges from spotting to threading with over **2,700** options that include miniature drills, reamers, countersinks, counterbores, and single-form, multi-form, and tri-form threadmills.

All tool images appearing in this catalog are illustrations of exemplary tools.

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MINIATURE END MILLS

MATERIAL-SPECIFIC DESIGNS

SPECIALTY PROFILES

SPECIALTY PROFILES (CONT.)

HOLEMAKING & THREADING

INFORMATION & TECHNICAL RESOURCES

BROWSE THESE TOOLING SOLUTIONS ON PAGES 6 & 7!

Mold Tool & Die

Corner Conditioning

Finishing

Deburring

FEATURED SOLUTIONS

Mold Tool & Die Solutions

Building complex cavities requires **high performance tooling** that can mill **precise contours** while leaving **superior part finish**. Harvey Tool offers a selection of **tapered end mills** with unique geometries that are perfect for tackling the tough machining requirements of the **die and mold making** industries.

Corner Conditioning Solutions

Whether prepping a corner for functional or aesthetic reasons, Harvey Tool has a variety of unique and **hard-to-find profiles** for machining **corner requirements** and features. With multiple **angle options, reaches, and styles**, we are confident that our tools can solve any corner conditioning challenge.

FEATURED SOLUTIONS

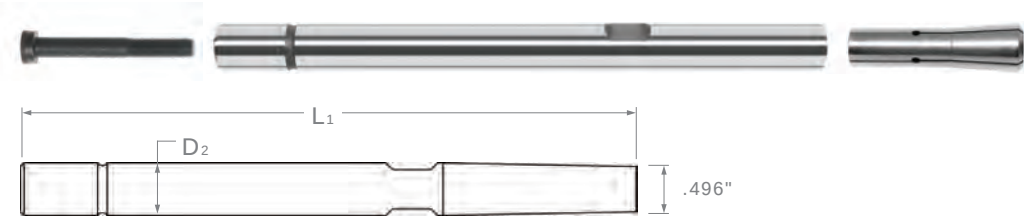
Finishing Solutions

Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances** and **reduce witness marks**.

Deburring Solutions

Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine**, providing better finish, **reduced part and labor costs**, and increased capacity.

EXTENDED REACH TOOL HOLDER



- Center gripping collet with threaded draw screw
- More accurate than traditional single-set screw type holders
- High precision concentricity and rigidity
- Maximum T.I.R. of .0002" from shank to collet pocket
- Quick tool changes
- Coolant through capable
- Wrench included
- Collet not included — choose from many sizes
- Two offsetting flats to maintain T.I.R.
- Use with mills, lathes, and grinders

Center Gripping Collet Design.
Choose from Six Sizes!

Tool Holders

SHANK DIAMETER	OVERALL LENGTH	TOOL HOLDERS (Collet Not Included)	
D_2	L_1	TOOL #	PRICE
1/2	3	36730	196.40
1/2	5	36750	206.90
1/2	6	36760	219.10

Collets

mm & in

COLLET SIZE	TOOL #	PRICE
1/8	36810	65.40
3/16	36820	65.40
1/4	36830	65.40
3 mm	36840	65.40
4 mm	36850	65.40
6 mm	36860	65.40

MINIATURE END MILLS

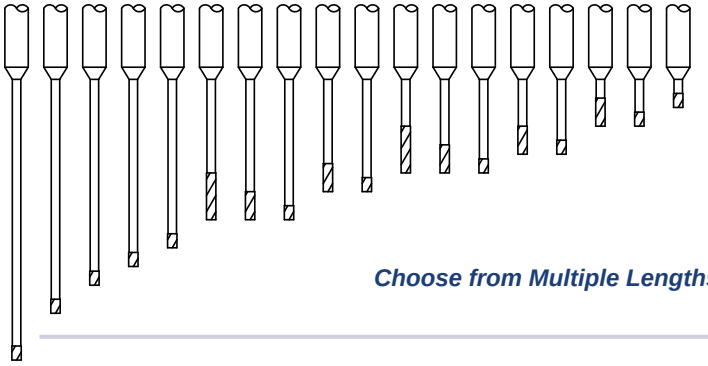
SQUARE

BALL

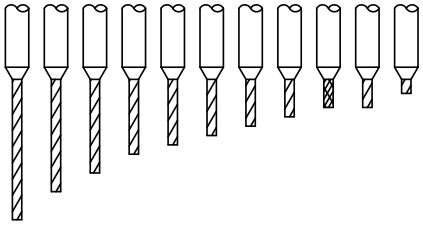
CORNER RADIUS

TAPERED

OVERALL REACHES



LENGTHS OF CUT



Choose from Multiple Lengths of Cut and Overall Reaches!

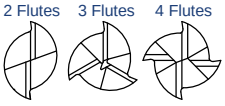
Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard

- **Cutter diameter down to .001"**
- Center cutting
- Solid carbide
- CNC ground in the USA



Stub Flute & Standard Length

SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.001	**.001** (1.5x)	1/8	1-1/2	13901			48.10								
.001	**.003** (3x)	1/8	1-1/2	72001			48.10								
.002	**.003** (1.5x)	1/8	1-1/2	13902			41.70								
.002	**.006** (3x)	1/8	1-1/2	72002			41.70								
.003	**.004** (1.5x)	1/8	1-1/2	13903			36.10								
.003	**.009** (3x)	1/8	1-1/2	72003			36.10								
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	13904			31.10								
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	72004			31.10								
.005	**.007** (1.5x)	1/8	1-1/2	13905		14005*	28.10	13905-C3		14005-C3*	32.30				
.005	**.015** (3x)	1/8	1-1/2	72005		73005*	28.10	72005-C3		73005-C3*	32.30				
.006	**.009** (1.5x)	1/8	1-1/2	13906		14006*	28.70	13906-C3		14006-C3*	32.90				NEW
.006	**.018** (3x)	1/8	1-1/2	72006		73006*	28.70	72006-C3		73006-C3*	32.90				NEW
.007	**.010** (1.5x)	1/8	1-1/2	13907		14007*	28.70	13907-C3		14007-C3*	32.90				NEW
.007	**.021** (3x)	1/8	1-1/2	72007		73007*	28.70	72007-C3		73007-C3*	32.90				NEW
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	13908		14008*	28.70	13908-C3		14008-C3*	32.90				
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	72008		73008*	28.70	72008-C3		73008-C3*	32.90				
.009	**.013** (1.5x)	1/8	1-1/2	13909		14009*	28.70	13909-C3		14009-C3*	32.90				NEW
.009	**.027** (3x)	1/8	1-1/2	72009		73009*	28.70	72009-C3		73009-C3*	32.90				NEW
.010	**.015** (1.5x)	1/8	1-1/2	13910	823010	14010	22.70	13910-C3	823010-C3	14010-C3	26.90		14010-C4	33.40	
.010	**.030** (3x)	1/8	1-1/2	72010	836310	73010	22.70	72010-C3	836310-C3	73010-C3	26.90	72010-C4	73010-C4	33.40	
.011	**.016** (1.5x)	1/8	1-1/2	13911		14011	23.10	13911-C3		14011-C3	27.30				
.011	**.033** (3x)	1/8	1-1/2	72011		73011	23.10	72011-C3		73011-C3	27.30		73011-C4	33.80	
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	13912		14012	23.10	13912-C3		14012-C3	27.30				
.012 (.3 mm)	**.036** (3x)	1/8	1-1/2	72012		73012	23.10	72012-C3		73012-C3	27.30	72012-C4	73012-C4	33.80	
.013	**.019** (1.5x)	1/8	1-1/2	13913		14013	23.10	13913-C3		14013-C3	27.30				NEW
.013	**.039** (3x)	1/8	1-1/2	72013		73013	23.10	72013-C3		73013-C3	27.30		73013-C4	33.80	NEW
.014	**.021** (1.5x)	1/8	1-1/2	13914		14014	23.10	13914-C3		14014-C3	27.30				NEW
.014	**.042** (3x)	1/8	1-1/2	72014		73014	23.10	72014-C3		73014-C3	27.30		73014-C4	33.80	NEW
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	13915	823015	14015	19.90	13915-C3	823015-C3	14015-C3	24.10	13915-C4	14015-C4	30.60	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	72015	836315	73015	19.90	72015-C3	836315-C3	73015-C3	24.10	72015-C4	73015-C4	30.60	
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	13916		14016	20.90	13916-C3		14016-C3	25.10				NEW
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	72016		73016	20.90	72016-C3		73016-C3	25.10		73016-C4	31.60	NEW
.017	**.026** (1.5x)	1/8	1-1/2	13917		14017	20.90	13917-C3		14017-C3	25.10				NEW
.017	**.051** (3x)	1/8	1-1/2	72017		73017	20.90	72017-C3		73017-C3	25.10		73017-C4	31.60	NEW
.018	**.027** (1.5x)	1/8	1-1/2	13918		14018	20.90	13918-C3		14018-C3	25.10				NEW
.018	**.054** (3x)	1/8	1-1/2	72018		73018	20.90	72018-C3		73018-C3	25.10		73018-C4	31.60	
.019	**.029** (1.5x)	1/8	1-1/2	13919		14019	20.90	13919-C3		14019-C3	25.10				NEW
.019	**.057** (3x)	1/8	1-1/2	72019		73019	20.90	72019-C3		73019-C3	25.10		73019-C4	31.60	NEW

Coated sizes down to .005"!

SPEEDS & FEEDS ONLINE!

*End cutting (not center cutting).

continued on next page

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	13920	823020	14020	19.10	13920-C3	823020-C3	14020-C3	23.30		14020-C4	29.80
	.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	72020	836320	73020	19.10	72020-C3	836320-C3	73020-C3	23.30	72020-C4	73020-C4	29.80
NEW	.021	**.031** (1.5x)	1/8	1-1/2	13921		14021	19.90	13921-C3		14021-C3	24.10			
NEW	.021	**.063** (3x)	1/8	1-1/2	72021		73021	19.90	72021-C3		73021-C3	24.10		73021-C4	30.60
NEW	.022	**.033** (1.5x)	1/8	1-1/2	13922		14022	19.90	13922-C3		14022-C3	24.10			
NEW	.022	**.066** (3x)	1/8	1-1/2	72022		73022	19.90	72022-C3		73022-C3	24.10		73022-C4	30.60
NEW	.023	**.035** (1.5x)	1/8	1-1/2	13923		14023	19.90	13923-C3		14023-C3	24.10			
NEW	.023	**.069** (3x)	1/8	1-1/2	72023		73023	19.90	72023-C3		73023-C3	24.10		73023-C4	30.60
NEW	.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	13924		14024	19.90	13924-C3		14024-C3	24.10			
NEW	.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	72024		73024	19.90	72024-C3		73024-C3	24.10		73024-C4	30.60
	.025	**.037** (1.5x)	1/8	1-1/2	13925	823025	14025	17.70	13925-C3	823025-C3	14025-C3	21.90		14025-C4	28.40
	.025	**.075** (3x)	1/8	1-1/2	72025	836325	73025	17.70	72025-C3	836325-C3	73025-C3	21.90	72025-C4	73025-C4	28.40
NEW	.026	**.039** (1.5x)	1/8	1-1/2	13926		14026	18.50	13926-C3		14026-C3	22.70			
NEW	.026	**.078** (3x)	1/8	1-1/2	72026		73026	18.50	72026-C3		73026-C3	22.70		73026-C4	29.20
NEW	.027	**.041** (1.5x)	1/8	1-1/2	13927		14027	18.50	13927-C3		14027-C3	22.70			
NEW	.027	**.081** (3x)	1/8	1-1/2	72027		73027	18.50	72027-C3		73027-C3	22.70		73027-C4	29.20
NEW	.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	13928		14028	18.50	13928-C3		14028-C3	22.70			
NEW	.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	72028		73028	18.50	72028-C3		73028-C3	22.70		73028-C4	29.20
NEW	.029	**.043** (1.5x)	1/8	1-1/2	13929		14029	18.50	13929-C3		14029-C3	22.70			
NEW	.029	**.087** (3x)	1/8	1-1/2	72029		73029	18.50	72029-C3		73029-C3	22.70		73029-C4	29.20
	.030	**.045** (1.5x)	1/8	1-1/2	13930	823030	14030	17.70	13930-C3	823030-C3	14030-C3	21.90		14030-C4	28.40
	.030	**.090** (3x)	1/8	1-1/2	72030	836330	73030	17.70	72030-C3	836330-C3	73030-C3	21.90	72030-C4	73030-C4	28.40
	.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	13931	823031	14031	17.70	13931-C3	823031-C3	14031-C3	21.90	13931-C4	14031-C4	28.40
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	72031	836331	73031	17.70	72031-C3	836331-C3	73031-C3	21.90	72031-C4	73031-C4	28.40
NEW	.032	**.048** (1.5x)	1/8	1-1/2	13932		14032	18.50	13932-C3		14032-C3	22.70			
NEW	.032	**.096** (3x)	1/8	1-1/2	72032		73032	18.50	72032-C3		73032-C3	22.70			
NEW	.033	**.049** (1.5x)	1/8	1-1/2	13933		14033	18.50	13933-C3		14033-C3	22.70			
NEW	.033	**.099** (3x)	1/8	1-1/2	72033		73033	18.50	72033-C3		73033-C3	22.70			
NEW	.034	**.051** (1.5x)	1/8	1-1/2	13934		14034	18.50	13934-C3		14034-C3	22.70			
NEW	.034	**.102** (3x)	1/8	1-1/2	72034		73034	18.50	72034-C3		73034-C3	22.70			
	.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	13935	823035	14035	15.40	13935-C3	823035-C3	14035-C3	19.60		14035-C4	26.10
	.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	72035	836335	73035	15.40	72035-C3	836335-C3	73035-C3	19.60	72035-C4	73035-C4	26.10
NEW	.036	**.054** (1.5x)	1/8	1-1/2	13936		14036	15.90	13936-C3		14036-C3	20.10			
NEW	.036	**.108** (3x)	1/8	1-1/2	72036		73036	15.90	72036-C3		73036-C3	20.10			
NEW	.037	**.055** (1.5x)	1/8	1-1/2	13937		14037	15.90	13937-C3		14037-C3	20.10			
NEW	.037	**.111** (3x)	1/8	1-1/2	72037		73037	15.90	72037-C3		73037-C3	20.10			
NEW	.038	**.057** (1.5x)	1/8	1-1/2	13938		14038	15.90	13938-C3		14038-C3	20.10			
	.038	**.114** (3x)	1/8	1-1/2	72038		73038	15.90	72038-C3		73038-C3	20.10			
NEW	.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	13939	823039	14039	15.70	13939-C3	823039-C3	14039-C3	19.90			
	.039 (1 mm)	**.117** (3x)	1/8	1-1/2	72039	836339	73039	15.70	72039-C3	836339-C3	73039-C3	19.90		73039-C4	26.10
	.040	**.060** (1.5x)	1/8	1-1/2	13940	823040	14040	15.40	13940-C3	823040-C3	14040-C3	19.60		14040-C4	26.10
	.040	**.120** (3x)	1/8	1-1/2	72040	836340	73040	15.40	72040-C3	836340-C3	73040-C3	19.60	72040-C4	73040-C4	26.10
NEW	.041	**.062** (1.5x)	1/8	1-1/2	13941		14041	15.90	13941-C3		14041-C3	20.10			
NEW	.041	**.123** (3x)	1/8	1-1/2	72041		73041	15.90	72041-C3		73041-C3	20.10			

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.042	**.063** (1.5x)	1/8	1-1/2	13942		14042	15.90	13942-C3		14042-C3	20.10				NEW
.042	**.126** (3x)	1/8	1-1/2	72042		73042	15.90	72042-C3		73042-C3	20.10				NEW
.043 (1.1 mm)	**.065** (1.5x)	1/8	1-1/2	13943		14043	15.90	13943-C3		14043-C3	20.10				NEW
.043 (1.1 mm)	**.129** (3x)	1/8	1-1/2	72043		73043	15.90	72043-C3		73043-C3	20.10				NEW
.044	**.066** (1.5x)	1/8	1-1/2	13944		14044	15.90	13944-C3		14044-C3	20.10				NEW
.044	**.132** (3x)	1/8	1-1/2	72044		73044	15.90	72044-C3		73044-C3	20.10				NEW
.045	**.067** (1.5x)	1/8	1-1/2	13945	823045	14045	15.40	13945-C3	823045-C3	14045-C3	19.60		14045-C4	26.10	
.045	**.135** (3x)	1/8	1-1/2	72045	836345	73045	15.40	72045-C3	836345-C3	73045-C3	19.60	72045-C4	73045-C4	26.10	
.046	**.138** (3x)	1/8	1-1/2	72046		73046	15.90	72046-C3		73046-C3	20.10				NEW
.047 (3/64)	**.070** (1.5x)	1/8	1-1/2	13947	823047	14047	15.40	13947-C3	823047-C3	14047-C3	19.60		14047-C4	26.10	
.047 (3/64)	**.141** (3x)	1/8	1-1/2	72047	836347	73047	15.40	72047-C3	836347-C3	73047-C3	19.60	72047-C4	73047-C4	26.10	
.048	**.144** (3x)	1/8	1-1/2	72048		73048	15.90	72048-C3		73048-C3	20.10				
.049	**.147** (3x)	1/8	1-1/2	72049		73049	15.90	72049-C3		73049-C3	20.10				
.050	**.075** (1.5x)	1/8	1-1/2	13950	823050	14050	15.40	13950-C3	823050-C3	14050-C3	19.60		14050-C4	26.10	
.050	**.150** (3x)	1/8	1-1/2	72050	836350	73050	15.40	72050-C3	836350-C3	73050-C3	19.60	72050-C4	73050-C4	26.10	
.051 (1.3 mm)	**.153** (3x)	1/8	1-1/2	72051		73051	15.90	72051-C3		73051-C3	20.10				NEW
.052	**.156** (3x)	1/8	1-1/2	72052		73052	15.90	72052-C3		73052-C3	20.10				
.053	**.159** (3x)	1/8	1-1/2	72053		73053	15.90	72053-C3		73053-C3	20.10				NEW
.054	**.162** (3x)	1/8	1-1/2	72054		73054	15.90	72054-C3		73054-C3	20.10				NEW
.055 (1.4 mm)	**.082** (1.5x)	1/8	1-1/2	13955	823055	14055	15.40	13955-C3	823055-C3	14055-C3	19.60		14055-C4	26.10	
.055 (1.4 mm)	**.165** (3x)	1/8	1-1/2	72055	836355	73055	15.40	72055-C3	836355-C3	73055-C3	19.60	72055-C4	73055-C4	26.10	
.056	**.168** (3x)	1/8	1-1/2	72056		73056	15.90	72056-C3		73056-C3	20.10				NEW
.057	**.171** (3x)	1/8	1-1/2	72057		73057	15.90	72057-C3		73057-C3	20.10				NEW
.058	**.174** (3x)	1/8	1-1/2	72058		73058	15.90	72058-C3		73058-C3	20.10				NEW
.059 (1.5 mm)	**.177** (3x)	1/8	1-1/2	72059		73059	15.90	72059-C3		73059-C3	20.10				NEW
.060	**.090** (1.5x)	1/8	1-1/2	13960	823060	14060	15.40	13960-C3	823060-C3	14060-C3	19.60		14060-C4	26.10	
.060	**.180** (3x)	1/8	1-1/2	72060	836360	73060	15.40	72060-C3	836360-C3	73060-C3	19.60	72060-C4	73060-C4	26.10	
.061	**.183** (3x)	1/8	1-1/2			73061	15.90			73061-C3	20.10				NEW
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	13962	823062	14062	13.90	13962-C3	823062-C3	14062-C3	18.10	13962-C4	14062-C4	24.60	
.062 (1/16)	**.186** (3x)	1/8	1-1/2	72062	836362	73062	13.90	72062-C3	836362-C3	73062-C3	18.10	72062-C4	73062-C4	24.60	
.063 (1.6 mm)	**.189** (3x)	1/8	1-1/2			73063	15.90			73063-C3	20.10				NEW
.064	**.192** (3x)	1/8	1-1/2			73064	15.90			73064-C3	20.10				NEW
.065	**.097** (1.5x)	1/8	1-1/2	13965		14065	13.90	13965-C3		14065-C3	18.10				
.065	**.195** (3x)	1/8	1-1/2	72065		73065	13.90	72065-C3		73065-C3	18.10	72065-C4	73065-C4	24.60	
.066	**.198** (3x)	1/8	1-1/2			73066	15.90			73066-C3	20.10				NEW
.067 (1.7 mm)	**.201** (3x)	1/8	1-1/2			73067	15.90			73067-C3	20.10				NEW
.068	**.204** (3x)	1/8	1-1/2			73068	15.90			73068-C3	20.10				NEW
.069	**.207** (3x)	1/8	1-1/2			73069	15.90			73069-C3	20.10				NEW
.070	**.105** (1.5x)	1/8	1-1/2	13970	823070	14070	13.90	13970-C3	823070-C3	14070-C3	18.10				
.070	**.210** (3x)	1/8	1-1/2	72070	836370	73070	13.90	72070-C3	836370-C3	73070-C3	18.10	72070-C4	73070-C4	24.60	
.071 (1.8 mm)	**.213** (3x)	1/8	1-1/2			73071	15.90			73071-C3	20.10				NEW
.072	**.216** (3x)	1/8	1-1/2			73072	15.90			73072-C3	20.10				NEW
.073	**.219** (3x)	1/8	1-1/2			73073	15.90			73073-C3	20.10				NEW
.074	**.222** (3x)	1/8	1-1/2			73074	15.90			73074-C3	20.10				NEW

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Square – Stub & Standard (cont.)

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	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.075	**.112** (1.5x)	1/8	1-1/2	13975		14075	13.90	13975-C3		14075-C3	18.10			
	.075	**.225** (3x)	1/8	1-1/2	72075		73075	13.90	72075-C3		73075-C3	18.10		73075-C4	24.60
NEW	.076	**.228** (3x)	1/8	1-1/2			73076	15.90			73076-C3	20.10			
NEW	.077	**.231** (3x)	1/8	1-1/2			73077	15.90			73077-C3	20.10			
	.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	13978	823078	14078	13.90	13978-C3	823078-C3	14078-C3	18.10		14078-C4	24.60
	.078 (5/64)	**.234** (3x)	1/8	1-1/2	72078	836378	73078	13.90	72078-C3	836378-C3	73078-C3	18.10	72078-C4	73078-C4	24.60
NEW	.079	**.237** (3x)	1/8	1-1/2			73079	15.90			73079-C3	20.10			
	.080	**.120** (1.5x)	1/8	1-1/2	13980	823080	14080	13.90	13980-C3	823080-C3	14080-C3	18.10			
	.080	**.240** (3x)	1/8	1-1/2	72080	836380	73080	13.90	72080-C3	836380-C3	73080-C3	18.10	72080-C4	73080-C4	24.60
NEW	.081	**.243** (3x)	1/8	1-1/2			73081	15.90			73081-C3	20.10			
NEW	.082	**.246** (3x)	1/8	1-1/2			73082	15.90			73082-C3	20.10			
NEW	.083 (2.1 mm)	**.249** (3x)	1/8	1-1/2			73083	15.90			73083-C3	20.10			
NEW	.084	**.252** (3x)	1/8	1-1/2			73084	15.90			73084-C3	20.10			
	.085	**.127** (1.5x)	1/8	1-1/2	13985		14085	13.90	13985-C3		14085-C3	18.10			
	.085	**.255** (3x)	1/8	1-1/2	72085		73085	13.90	72085-C3		73085-C3	18.10		73085-C4	24.60
NEW	.086	**.258** (3x)	1/8	1-1/2			73086	15.90			73086-C3	20.10			
NEW	.087 (2.2 mm)	**.261** (3x)	1/8	1-1/2			73087	15.90			73087-C3	20.10			
NEW	.088	**.264** (3x)	1/8	1-1/2			73088	15.90			73088-C3	20.10			
NEW	.089	**.267** (3x)	1/8	1-1/2			73089	15.90			73089-C3	20.10			
	.090	**.135** (1.5x)	1/8	1-1/2	13990	823090	14090	13.90	13990-C3	823090-C3	14090-C3	18.10			
	.090	**.270** (3x)	1/8	1-1/2	72090	836390	73090	13.90	72090-C3	836390-C3	73090-C3	18.10	72090-C4	73090-C4	24.60
NEW	.091 (2.3 mm)	**.273** (3x)	1/8	1-1/2			73091	15.90			73091-C3	20.10			
NEW	.092	**.276** (3x)	1/8	1-1/2			73092	15.90			73092-C3	20.10			
	.093 (3/32)	**.139** (1.5x)	1/8	1-1/2	13993	823093	14093	13.90	13993-C3	823093-C3	14093-C3	18.10	13993-C4	14093-C4	24.60
	.093 (3/32)	**.279** (3x)	1/8	1-1/2	72093	836393	73093	13.90	72093-C3	836393-C3	73093-C3	18.10	72093-C4	73093-C4	24.60
NEW	.094 (2.4 mm)	**.282** (3x)	1/8	1-1/2			73094	15.90			73094-C3	20.10			
	.095	**.142** (1.5x)	1/8	1-1/2	13995		14095	13.90	13995-C3		14095-C3	18.10			
	.095	**.285** (3x)	1/8	1-1/2	72095		73095	13.90	72095-C3		73095-C3	18.10		73095-C4	24.60
NEW	.096	**.288** (3x)	1/8	1-1/2			73096	15.90			73096-C3	20.10			
NEW	.097	**.291** (3x)	1/8	1-1/2			73097	15.90			73097-C3	20.10			
NEW	.098 (2.5 mm)	**.294** (3x)	1/8	1-1/2			73098	15.90			73098-C3	20.10			
NEW	.099	**.297** (3x)	1/8	1-1/2			73099	15.90			73099-C3	20.10			
	.100	**.150** (1.5x)	1/8	1-1/2	13999	823100	14099	13.90	13999-C3	823100-C3	14099-C3	18.10			
	.100	**.300** (3x)	1/8	1-1/2	72100	836400	73100	13.90	72100-C3	836400-C3	73100-C3	18.10	72100-C4	73100-C4	24.60
NEW	.101	**.303** (3x)	1/8	1-1/2			73101	15.90			73101-C3	20.10			
NEW	.102 (2.6 mm)	**.306** (3x)	1/8	1-1/2			73102	15.90			73102-C3	20.10			
NEW	.103	**.309** (3x)	1/8	1-1/2			73103	15.90			73103-C3	20.10			
NEW	.104	**.312** (3x)	1/8	1-1/2			73104	15.90			73104-C3	20.10			
	.105	**.158** (1.5x)	1/8	1-1/2	50200		50300	13.90	50200-C3		50300-C3	18.10			
	.105	**.315** (3x)	1/8	1-1/2	72105		73105	13.90	72105-C3		73105-C3	18.10		73105-C4	24.60
NEW	.106 (2.7 mm)	**.318** (3x)	1/8	1-1/2			73106	15.90			73106-C3	20.10			
NEW	.107	**.321** (3x)	1/8	1-1/2			73107	15.90			73107-C3	20.10			
NEW	.108	**.324** (3x)	1/8	1-1/2			73108	15.90			73108-C3	20.10			
NEW	.109 (7/64)	**.164** (1.5x)	1/8	1-1/2	50201	823102	50301	13.90	50201-C3	823102-C3	50301-C3	18.10			
NEW	.109 (7/64)	**.327** (3x)	1/8	1-1/2	72109	836402	73109	13.90	72109-C3	836402-C3	73109-C3	18.10			

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.110	**.165** (1.5x)	1/8	1-1/2	50202		50302	13.90	50202-C3		50302-C3	18.10				
.110	**.330** (3x)	1/8	1-1/2	72110		73110	13.90	72110-C3		73110-C3	18.10		73110-C4	24.60	
.111 (2.8 mm)	**.333** (3x)	1/8	1-1/2			73111	15.90			73111-C3	20.10				NEW
.112	**.336** (3x)	1/8	1-1/2			73112	15.90			73112-C3	20.10				NEW
.113	**.339** (3x)	1/8	1-1/2			73113	15.90			73113-C3	20.10				NEW
.114 (2.9 mm)	**.341** (3x)	1/8	1-1/2			73114	15.90			73114-C3	20.10				NEW
.115	**.173** (1.5x)	1/8	1-1/2	50203		50303	13.90	50203-C3		50303-C3	18.10				
.115	**.345** (3x)	1/8	1-1/2	72115		73115	13.90	72115-C3		73115-C3	18.10		73115-C4	24.60	
.116	**.348** (3x)	1/8	1-1/2			73116	15.90			73116-C3	20.10				NEW
.117	**.351** (3x)	1/8	1-1/2			73117	15.90			73117-C3	20.10				NEW
.118 (3 mm)	**.177** (1.5x)	1/8	1-1/2	50204	823105	50304	14.10	50204-C3	823105-C3	50304-C3	18.30				
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	72118	836405	73118	14.10	72118-C3	836405-C3	73118-C3	18.30		73118-C4	24.80	
.119	**.357** (3x)	1/8	1-1/2			73119	15.90			73119-C3	20.10				NEW
.120	**.180** (1.5x)	1/8	1-1/2	50205		50305	13.90	50205-C3		50305-C3	18.10				
.120	**.360** (3x)	1/8	1-1/2	72120		73120	13.90	72120-C3		73120-C3	18.10		73120-C4	24.60	

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	50208	823108	50308	13.90	50208-C3	823108-C3	50308-C3	18.10		50308-C4	24.60	
.125 (1/8)	**.375** (3x)	1/8	1-1/2	72125	836408	73125	13.90	72125-C3	836408-C3	73125-C3	18.10	72125-C4	73125-C4	24.60	
.140 (9/64)	**.220** (1.5x)	3/16	2	50209		50309	15.10	50209-C3		50309-C3	19.60				NEW
.140 (9/64)	**.562** (4x)	3/16	2	72140		73140	15.10	72140-C3		73140-C3	19.60				NEW
.156 (5/32)	**.281** (1.5x)	3/16	2	50210	823110	50310	15.10	50210-C3	823110-C3	50310-C3	19.60		50310-C4	29.80	NEW
.156 (5/32)	**.562** (3x)	3/16	2	72156	836410	73156	15.10	72156-C3	836410-C3	73156-C3	19.60	72156-C4	73156-C4	29.80	
.172 (11/64)	**.625** (3x)	3/16	2	72172		73172	15.10	72172-C3		73172-C3	19.60				NEW
.187 (3/16)	**.312** (1.5x)	3/16	2	50212	823112	50312	15.10	50212-C3	823112-C3	50312-C3	19.60		50312-C4	29.80	
.187 (3/16)	**.625** (3x)	3/16	2	72187	836412	73187	15.10	72187-C3	836412-C3	73187-C3	19.60	72187-C4	73187-C4	29.80	
.203 (13/64)	**.625** (3x)	1/4	2-1/2	72190		73190	16.40	72190-C3		73190-C3	22.60				NEW
.218 (7/32)	**.330** (1.5x)	1/4	2-1/2	50214	823114	50314	16.40	50214-C3	823114-C3	50314-C3	22.60				
.218 (7/32)	**.625** (3x)	1/4	2-1/2	72193	836414	73193	16.40	72193-C3	836414-C3	73193-C3	22.60				
.234 (15/64)	**.750** (3x)	1/4	2-1/2	72195		73195	16.40	72195-C3		73195-C3	22.60				NEW
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	50216	823116	50316	16.40	50216-C3	823116-C3	50316-C3	22.60		50316-C4	33.10	
.250 (1/4)	**.750** (3x)	1/4	2-1/2	72199	836416	73199	16.40	72199-C3	836416-C3	73199-C3	22.60	72199-C4	73199-C4	33.10	
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2	50220		50320	22.40	50220-C3		50320-C3	29.60				NEW
.312 (5/16)	**.812** (3x)	5/16	2-1/2	15120		15220	22.40	15120-C3		15220-C3	29.60		15220-C4	42.60	NEW
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2	50224		50324	29.90	50224-C3		50324-C3	38.10				NEW
.375 (3/8)	**1.000** (3x)	3/8	2-1/2	15124		15224	29.90	15124-C3		15224-C3	38.10		15224-C4	50.10	NEW
.500 (1/2)	**1.000** (2x)	1/2	3	15132		15232	51.40	15132-C3		15232-C3	63.60		15232-C4	75.70	NEW

SPEEDS & FEEDS ONLINE!

MINIATURE END MILLS

Square – Long Flute

Stocked in 8 Lengths of Cut!

- **Long flute and long shank design for deep cavities**
- Mills deep pockets
- Center cutting
- Solid carbide
- CNC ground in the USA

SQUARE

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.010	**.040** (4x)	3	1/8	2-1/2	888410	34.70	888410-C3	38.90		
	.010	**.050** (5x)	3	1/8	2-1/2	12710	34.70	12710-C3	38.90	12710-C4	45.40
	.010	**.060** (6x)	3	1/8	2-1/2	894210	41.70	894210-C3	45.90		
	.010	**.070** (7x)	3	1/8	2-1/2	897910	48.70	897910-C3	52.90		
	.010	**.080** (8x)	3	1/8	2-1/2	33610	59.10	33610-C3	63.30		
	.010	**.100** (10x)	3	1/8	2-1/2	951310	65.20	951310-C3	69.40		
	.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	888415	31.90	888415-C3	36.10		
	.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	31815	31.90	31815-C3	36.10	31815-C4	42.60
NEW	.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	834115	33.40	834115-C3	37.60		
	.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	894215	38.20	894215-C3	42.40		
	.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	897915	44.50	897915-C3	48.70		
	.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	33615	55.90	33615-C3	60.10	33615-C4	66.60
NEW	.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	826815	57.20	826815-C3	61.40		
	.015 (1/64)	**.156** (10x)	3	1/8	2-1/2	951315	62.20	951315-C3	66.40		
	.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	34915	68.50	34915-C3	72.70		
	.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	888420	27.40	888420-C3	31.60		
	.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12720	27.40	12720-C3	31.60	12720-C4	38.10
	.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	894220	32.90	894220-C3	37.10		
	.020 (.5 mm)	**.140** (7x)	3	1/8	2-1/2	897920	38.20	897920-C3	42.40		
	.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	33620	53.50	33620-C3	57.70		
	.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	951320	59.70	951320-C3	63.90		
	.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	34920	65.90	34920-C3	70.10		
	.025	**.100** (4x)	3	1/8	2-1/2	888425	26.10	888425-C3	30.30		
	.025	**.125** (5x)	3	1/8	2-1/2	12725	26.10	12725-C3	30.30	12725-C4	36.80
	.025	**.150** (6x)	3	1/8	2-1/2	894225	31.40	894225-C3	35.60		
	.025	**.175** (7x)	3	1/8	2-1/2	897925	36.50	897925-C3	40.70		
	.025	**.203** (8x)	3	1/8	2-1/2	33625	52.10	33625-C3	56.30		
	.025	**.250** (10x)	3	1/8	2-1/2	951325	55.10	951325-C3	59.30		
	.025	**.312** (12x)	3	1/8	2-1/2	34925	58.40	34925-C3	62.60		
	.030	**.150** (5x)	3	1/8	2-1/2	12730	25.10	12730-C3	29.30	12730-C4	35.80
	.030	**.250** (8x)	3	1/8	2-1/2	33630	49.40	33630-C3	53.60		
	.030	**.312** (10x)	3	1/8	2-1/2	951330	52.70	951330-C3	56.90		
	.030	**.375** (12x)	3	1/8	2-1/2	34930	55.40	34930-C3	59.60		
	.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	888431	25.10	888431-C3	29.30		
	.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	31831	25.10	31831-C3	29.30	31831-C4	35.80
NEW	.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	834131	26.40	834131-C3	30.60		
	.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	894231	30.10	894231-C3	34.30		
	.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	897931	35.10	897931-C3	39.30		
	.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	33631	49.40	33631-C3	53.60	33631-C4	60.10
NEW	.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	826831	50.90	826831-C3	55.10		

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Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	951331	52.20	951331-C3	56.40			
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	34931	55.40	34931-C3	59.60	34931-C4	66.10	
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	35831	72.40	35831-C3	76.60			
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12735	25.10	12735-C3	29.30	12735-C4	35.80	
.035 (.9 mm)	**.280** (8x)	3	1/8	2-1/2	33635	49.40	33635-C3	53.60			
.035 (.9 mm)	**.350** (10X)	3	1/8	2-1/2	951335	52.20	951335-C3	56.40			
.035 (.9 mm)	**.425** (12x)	3	1/8	2-1/2	34935	56.10	34935-C3	60.30			
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	31839	25.50	31839-C3	29.70	31839-C4	36.20	
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	33639	49.90	33639-C3	54.10			
.039 (1 mm)	**.400** (10x)	3	1/8	2-1/2	951339	52.70	951339-C3	56.90			
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	34939	56.40	34939-C3	60.60			
.040	**.160** (4x)	3	1/8	2-1/2	888440	25.10	888440-C3	29.30			
.040	**.200** (5x)	3	1/8	2-1/2	12740	25.10	12740-C3	29.30	12740-C4	35.80	
.040	**.240** (6x)	3	1/8	2-1/2	894240	30.10	894240-C3	34.30			
.040	**.281** (7x)	3	1/8	2-1/2	897940	35.10	897940-C3	39.30			
.040	**.325** (8x)	3	1/8	2-1/2	33640	49.40	33640-C3	53.60			
.040	**.400** (10x)	3	1/8	2-1/2	951340	52.20	951340-C3	56.40			
.040	**.480** (12x)	3	1/8	2-1/2	34940	55.40	34940-C3	59.60			
.045	**.225** (5x)	3	1/8	2-1/2	12745	25.10	12745-C3	29.30	12745-C4	35.80	
.045	**.375** (8x)	3	1/8	2-1/2	33645	49.40	33645-C3	53.60			
.045	**.450** (10x)	3	1/8	2-1/2	951345	52.20	951345-C3	56.40			
.045	**.550** (12x)	3	1/8	2-1/2	34945	56.10	34945-C3	60.30			
.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	888447	25.10	888447-C3	29.30			
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	31847	25.10	31847-C3	29.30	31847-C4	35.80	
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	834147	26.40	834147-C3	30.60			NEW
.047 (3/64)	**.281** (6x)	3	1/8	2-1/2	894247	30.10	894247-C3	34.30			
.047 (3/64)	**.328** (7x)	3	1/8	2-1/2	897947	35.10	897947-C3	39.30			
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	33647	48.50	33647-C3	52.70	33647-C4	59.20	
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	826847	49.90	826847-C3	54.10			NEW
.047 (3/64)	**.480** (10x)	3	1/8	2-1/2	951347	52.20	951347-C3	56.40			
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	34947	55.40	34947-C3	59.60	34947-C4	66.10	
.047 (3/64)	**.710** (15x)	3	1/8	2-1/2	35847	68.10	35847-C3	72.30			
.050	**.203** (4x)	3	1/8	2-1/2	888450	25.10	888450-C3	29.30			
.050	**.250** (5x)	3	1/8	2-1/2	31850	25.10	31850-C3	29.30			
.050	**.300** (6x)	3	1/8	2-1/2	12750	25.10	12750-C3	29.30	12750-C4	35.80	
.050	**.350** (7x)	3	1/8	2-1/2	897950	35.10	897950-C3	39.30			
.050	**.400** (8x)	3	1/8	2-1/2	33650	49.40	33650-C3	53.60			
.050	**.500** (10x)	3	1/8	2-1/2	951350	52.70	951350-C3	56.90			
.050	**.600** (12x)	3	1/8	2-1/2	34950	55.40	34950-C3	59.60			
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	31855	22.40	31855-C3	26.60			
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12755	25.10	12755-C3	29.30	12755-C4	35.80	
.055 (1.4 mm)	**.560** (10x)	3	1/8	2-1/2	951355	38.90	951355-C3	43.10			
.055 (1.4 mm)	**.660** (12x)	3	1/8	2-1/2	34955	56.10	34955-C3	60.30			
.060	**.312** (5x)	3	1/8	2-1/2	31860	22.40	31860-C3	26.60			
.060	**.500** (8x)	3	1/8	2-1/2	12760	25.50	12760-C3	29.70	12760-C4	36.20	
.060	**.625** (10x)	3	1/8	2-1/2	951360	44.10	951360-C3	48.30			
.060	**.720** (12x)	3	1/8	2-1/2	34960	56.10	34960-C3	60.30			

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Square – Long Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	888462	22.40	888462-C3	26.60		
	.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	31862	22.40	31862-C3	26.60	31862-C4	33.10
NEW	.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	834162	24.30	834162-C3	28.50		
	.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	894262	23.40	894262-C3	27.60		
	.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	897962	24.50	897962-C3	28.70		
	.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	33662	25.50	33662-C3	29.70	33662-C4	36.20
NEW	.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	826862	26.90	826862-C3	31.10		
	.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	951362	31.90	951362-C3	36.10		
	.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	34962	43.40	34962-C3	47.60	34962-C4	54.10
	.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	35862	60.10	35862-C3	64.30	35862-C4	70.80
	.065	**.325** (5x)	3	1/8	2-1/2	31865	22.40	31865-C3	26.60		
	.065	**.500** (8x)	3	1/8	2-1/2	12765	25.10	12765-C3	29.30	12765-C4	35.80
	.065	**.650** (10x)	3	1/8	2-1/2	951365	38.90	951365-C3	43.10		
	.070	**.375** (5x)	3	1/8	2-1/2	31870	22.40	31870-C3	26.60		
	.070	**.500** (7x)	3	1/8	2-1/2	12770	25.10	12770-C3	29.30	12770-C4	35.80
	.070	**.700** (10x)	3	1/8	2-1/2	951370	38.90	951370-C3	43.10		
	.070	**.850** (12x)	3	1/8	2-1/2	34970	43.90	34970-C3	48.10		
	.075	**.375** (5x)	3	1/8	2-1/2	31875	22.40	31875-C3	26.60		
	.075	**.500** (7x)	3	1/8	2-1/2	12775	25.10	12775-C3	29.30	12775-C4	35.80
	.075	**.750** (10x)	3	1/8	2-1/2	951375	38.90	951375-C3	43.10		
	.075	**.900** (12x)	3	1/8	2-1/2	34975	43.90	34975-C3	48.10		
	.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	888478	22.40	888478-C3	26.60		
	.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	31878	22.40	31878-C3	26.60	31878-C4	33.10
NEW	.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	834178	24.30	834178-C3	28.50		
	.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	894278	23.40	894278-C3	27.60		
	.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	897978	24.50	897978-C3	28.70		
	.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	33678	25.50	33678-C3	29.70	33678-C4	36.20
NEW	.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	826878	27.90	826878-C3	32.10		
	.078 (5/64)	**.800** (10x)	3	1/8	2-1/2	951378	31.50	951378-C3	35.70		
	.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	34978	43.40	34978-C3	47.60	34978-C4	54.10
	.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	35878	60.10	35878-C3	64.30	35878-C4	70.80
	.080	**.406** (5x)	3	1/8	2-1/2	31880	22.40	31880-C3	26.60		
	.080	**.750** (9x)	3	1/8	2-1/2	12780	25.50	12780-C3	29.70	12780-C4	36.20
	.080	**.960** (12x)	3	1/8	2-1/2	34980	43.90	34980-C3	48.10		
	.085	**.425** (5x)	3	1/8	2-1/2	31885	22.40	31885-C3	26.60		
	.085	**.750** (9x)	3	1/8	2-1/2	12785	25.50	12785-C3	29.70	12785-C4	36.20
	.090	**.450** (5x)	3	1/8	2-1/2	31890	22.40	31890-C3	26.60		
	.090	**.750** (8x)	3	1/8	2-1/2	12790	25.50	12790-C3	29.70	12790-C4	36.20
	.090	**.900** (10x)	3	1/8	2-1/2	951390	38.90	951390-C3	43.10		
	.090	**1.080** (12x)	3	1/8	2-1/2	34990	43.90	34990-C3	48.10		
	.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	888493	22.40	888493-C3	26.60		
	.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	31893	22.40	31893-C3	26.60	31893-C4	33.10
NEW	.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	834193	24.30	834193-C3	28.50		
	.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	894293	23.40	894293-C3	27.60		
	.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	897993	24.50	897993-C3	28.70		
	.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	33693	25.50	33693-C3	29.70	33693-C4	36.20
NEW	.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	826893	27.90	826893-C3	32.10		

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Square – Long Flute (cont.)

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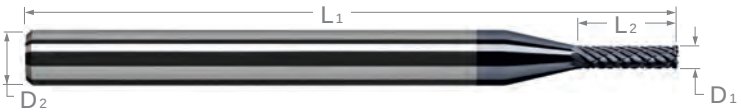
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	951393	31.50	951393-C3	35.70		
.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	34993	43.40	34993-C3	47.60	34993-C4	54.10
.093 (3/32)	**1.400** (15x)	3	1/8	3	35893	62.40	35893-C3	66.60	35893-C4	73.90
.095	**.500** (5x)	3	1/8	2-1/2	31895	22.40	31895-C3	26.60		
.095	**.750** (8x)	3	1/8	2-1/2	12795	25.10	12795-C3	29.30	12795-C4	35.80
.095	**.950** (10x)	3	1/8	2-1/2	951395	38.90	951395-C3	43.10		
.100	**.500** (5x)	3	1/8	2-1/2	31899	22.40	31899-C3	26.60		
.100	**.750** (7.5x)	3	1/8	2-1/2	12799	25.10	12799-C3	29.30	12799-C4	35.80
.100	**1.000** (10x)	3	1/8	2-1/2	951600	38.90	951600-C3	43.10		
.100	**1.200** (12x)	3	1/8	2-1/2	34999	43.90	34999-C3	48.10		
.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	31902	22.40	31902-C3	26.60	31902-C4	33.10
.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	33702	25.40	33702-C3	29.60		
.109 (7/64)	**1.125** (10x)	3	1/8	2-1/2	951602	44.10	951602-C3	48.30		
.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	31905	22.70	31905-C3	26.90	31905-C4	33.40
.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	33705	25.70	33705-C3	29.90		
.118 (3 mm)	**1.187** (10x)	3	1/8	2-1/2	951605	44.40	951605-C3	48.60		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	888508	22.10	888508-C3	26.30		
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	31908	22.10	31908-C3	26.30	31908-C4	32.80
.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	834208	24.40	834208-C3	28.60		NEW
.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	894308	22.70	894308-C3	26.90		
.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	898008	23.20	898008-C3	27.40		
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	33708	23.70	33708-C3	27.90	33708-C4	34.40
.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	826908	26.10	826908-C3	30.30		NEW
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	951608	40.50	951608-C3	44.70		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35008	46.10	35008-C3	50.30	35008-C4	58.10
.125 (1/8)	**1.875** (15x)	3	1/8	3	35908	62.40	35908-C3	66.60	35908-C4	73.90
.140 (9/64)	**.750** (5x)	4	3/16	3	31909	24.40	31909-C3	28.90		
.140 (9/64)	**1.125** (8x)	4	3/16	3	33709	42.70	33709-C3	47.20		
.140 (9/64)	**1.450** (10x)	4	3/16	3	951609	50.70	951609-C3	55.20		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12510	24.40	12510-C3	28.90	12510-C4	39.10
.156 (5/32)	**1.250** (8x)	4	3/16	3	33710	42.70	33710-C3	47.20		
.156 (5/32)	**1.570** (10x)	4	3/16	3	951610	50.70	951610-C3	55.20		
.156 (5/32)	**1.875** (12x)	4	3/16	4	35010	58.70	35010-C3	64.90	35010-C4	74.40
.187 (3/16)	**1.125** (6x)	4	3/16	3	12512	24.40	12512-C3	28.90	77012	39.10
.187 (3/16)	**1.500** (8x)	4	3/16	3	33712	42.70	33712-C3	47.20		
.187 (3/16)	**1.875** (10x)	4	3/16	4	951612	50.70	951612-C3	56.90		
.187 (3/16)	**2.250** (12x)	4	3/16	4	35012	58.70	35012-C3	64.90		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12516	27.70	12516-C3	34.90	77016	44.40
.250 (1/4)	**2.000** (8x)	4	1/4	4	33716	45.70	33716-C3	52.90		
.250 (1/4)	**2.500** (10x)	4	1/4	4	951616	54.90	951616-C3	62.10		
.250 (1/4)	**3.000** (12x)	4	1/4	6	35016	64.50	35016-C3	72.70		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12520	39.90	12520-C3	48.60		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12524	42.40	12524-C3	53.60		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12532	59.70	12532-C3	71.90		

SPEEDS & FEEDS ONLINE!

MINIATURE END MILLS

Square – Deburring End Mill



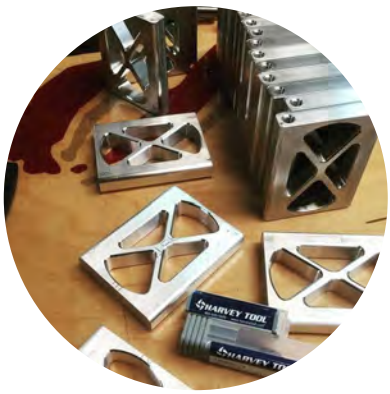
End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High number of flutes allows for faster speeds and feeds
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	6	3	1/8	2-1/2	60715	30.50	60715-C3	34.70
.031 (1/32)	**.093** (3x)	6	3	1/8	2-1/2	60731	23.40	60731-C3	27.60
.047 (3/64)	**.141** (3x)	8	4	1/8	2-1/2	60747	22.50	60747-C3	26.70
.062 (1/16)	**.186** (3x)	8	4	1/8	2-1/2	60762	22.50	60762-C3	26.70
.078 (5/64)	**.234** (3x)	10	5	1/8	2-1/2	60778	22.50	60778-C3	26.70
.093 (3/32)	**.279** (3x)	12	6	1/8	2-1/2	60793	22.50	60793-C3	26.70

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	14	7	1/8	2-1/2	60808	21.40	60808-C3	25.60

SPEEDS & FEEDS ONLINE!



★★★★★

"Aluminum parts coming to life…using a few @harveytool radius cutters."

— @josh.cnccreations

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Standard Flute

Reduced Neck Diameter to Avoid Heeling

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.010	.030	**.050** (5x)	1/8	1-1/2	944510	956810	42.70	944510-C3	956810-C3	46.90	NEW
.010	.030	**.080** (8x)	1/8	1-1/2	76210	76410	42.70	76210-C3	76410-C3	46.90	NEW
.010	.030	**.125** (12x)	1/8	1-1/2	952010	992510	45.10	952010-C3	992510-C3	49.30	NEW
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2	944515	956815	34.70	944515-C3	956815-C3	38.90	NEW
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2	76215	76415	34.70	76215-C3	76415-C3	38.90	NEW
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2	952015	992515	35.90	952015-C3	992515-C3	40.10	NEW
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2	944520	956820	33.20	944520-C3	956820-C3	37.40	NEW
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2	76220	76420	33.20	76220-C3	76420-C3	37.40	NEW
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2	952020	992520	34.70	952020-C3	992520-C3	38.90	NEW
.025	.075	**.125** (5x)	1/8	1-1/2	944525	956825	31.90	944525-C3	956825-C3	36.10	NEW
.025	.075	**.213** (8x)	1/8	1-1/2	76225	76425	31.90	76225-C3	76425-C3	36.10	NEW
.025	.075	**.312** (12x)	1/8	1-1/2	952025	992525	33.20	952025-C3	992525-C3	37.40	NEW
.030	.090	**.156** (5x)	1/8	1-1/2	944530	956830	31.90	944530-C3	956830-C3	36.10	NEW
.030	.090	**.270** (9x)	1/8	1-1/2	76230	76430	31.90	76230-C3	76430-C3	36.10	NEW
.030	.090	**.375** (12x)	1/8	1-1/2	952030	992530	32.90	952030-C3	992530-C3	37.10	NEW
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2	944531	956831	31.90	944531-C3	956831-C3	36.10	NEW
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2	76231	76431	31.90	76231-C3	76431-C3	36.10	NEW
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2	952031	992531	32.90	952031-C3	992531-C3	37.10	NEW
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2	829131	838631	34.80	829131-C3	838631-C3	39.00	NEW
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2	944535	956835	31.90	944535-C3	956835-C3	36.10	NEW
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2	76235	76435	31.90	76235-C3	76435-C3	36.10	NEW
.035 (.9 mm)	.105	**.425** (12x)	1/8	1-1/2	952035	992535	32.90	952035-C3	992535-C3	37.10	NEW
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2	944539	956839	31.90	944539-C3	956839-C3	36.10	NEW
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2	960839	972239	31.90	960839-C3	972239-C3	36.10	NEW
.040	.120	**.203** (5x)	1/8	1-1/2	944540	956840	31.90	944540-C3	956840-C3	36.10	NEW
.040	.120	**.360** (9x)	1/8	1-1/2	76240	76440	31.90	76240-C3	76440-C3	36.10	NEW
.040	.120	**.480** (12x)	1/8	1-1/2	952040	992540	32.90	952040-C3	992540-C3	37.10	NEW
.045	.135	**.225** (5x)	1/8	1-1/2	944545	956845	31.40	944545-C3	956845-C3	35.60	NEW
.045	.135	**.405** (9x)	1/8	1-1/2	76245	76445	31.40	76245-C3	76445-C3	35.60	NEW
.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2	944547	956847	31.40	944547-C3	956847-C3	35.60	NEW
.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2	76247	76447	32.10	76247-C3	76447-C3	36.30	NEW
.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2	952047	992547	32.10	952047-C3	992547-C3	36.30	NEW
.050	.150	**.250** (5x)	1/8	1-1/2	944550	956850	31.40	944550-C3	956850-C3	35.60	NEW
.050	.150	**.400** (8x)	1/8	1-1/2	960850	972250	32.10	960850-C3	972250-C3	36.30	NEW
.050	.150	**.500** (10x)	1/8	1-1/2	76250	76450	32.10	76250-C3	76450-C3	36.30	NEW
.050	.150	**.600** (12x)	1/8	2	952050	992550	34.20	952050-C3	992550-C3	38.40	NEW
.055 (1.4 mm)	.165	**.275** (5x)	1/8	1-1/2	944555	956855	32.10	944555-C3	956855-C3	36.30	NEW
.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2	76255	76455	32.10	76255-C3	76455-C3	36.30	NEW

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
NEW	.060	.180	**.312** (5x)	1/8	1-1/2	944560	956860	31.40	944560-C3	956860-C3	35.60
NEW	.060	.180	**.500** (8x)	1/8	1-1/2	76260	76460	31.40	76260-C3	76460-C3	35.60
NEW	.060	.180	**.720** (12x)	1/8	2	952060	992560	32.10	952060-C3	992560-C3	36.30
NEW	.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2	944562	956862	31.40	944562-C3	956862-C3	35.60
NEW	.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2	76262	76462	31.40	76262-C3	76462-C3	35.60
NEW	.062 (1/16)	.186	**.625** (10x)	1/8	2	849662	846162	32.10	849662-C3	846162-C3	36.30
NEW	.062 (1/16)	.186	**.750** (12x)	1/8	2	952062	992562	32.10	952062-C3	992562-C3	36.30
NEW	.062 (1/16)	.186	**.950** (15x)	1/8	2	829162	838662	34.20	829162-C3	838662-C3	38.40
NEW	.065	.195	**.500** (8x)	1/8	1-1/2	76265	76465	31.40	76265-C3	76465-C3	35.60
NEW	.070	.210	**.500** (7x)	1/8	1-1/2	76270	76470	31.40	76270-C3	76470-C3	35.60
NEW	.070	.210	**.850** (12x)	1/8	2	952070	992570	32.10	952070-C3	992570-C3	36.30
NEW	.075	.225	**.500** (7x)	1/8	1-1/2	76275	76475	31.40	76275-C3	76475-C3	35.60
NEW	.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2	76278	76478	31.40	76278-C3	76478-C3	35.60
NEW	.078 (5/64)	.234	**.940** (12x)	1/8	2	952078	992578	32.10	952078-C3	992578-C3	36.30
NEW	.080	.240	**.500** (6x)	1/8	1-1/2	76280	76480	31.40	76280-C3	76480-C3	35.60
NEW	.080	.240	**.960** (12x)	1/8	2	952080	992580	32.10	952080-C3	992580-C3	36.30
NEW	.085	.255	**.500** (6x)	1/8	1-1/2	76285	76485	31.40	76285-C3	76485-C3	35.60
NEW	.090	.270	**.625** (7x)	1/8	1-1/2	76290	76490	31.40	76290-C3	76490-C3	35.60
NEW	.090	.270	**1.080** (12x)	1/8	2	952090	992590	32.10	952090-C3	992590-C3	36.30
NEW	.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2	944593	956893	31.40	944593-C3	956893-C3	35.60
NEW	.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2	76293	76493	31.40	76293-C3	76493-C3	35.60
NEW	.093 (3/32)	.279	**.950** (10x)	1/8	2	849693	846193	32.10	849693-C3	846193-C3	36.30
NEW	.093 (3/32)	.279	**1.125** (12x)	1/8	2	952093	992593	32.10	952093-C3	992593-C3	36.30
NEW	.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2	829193	838693	34.20	829193-C3	838693-C3	38.40
NEW	.095	.285	**.625** (6x)	1/8	1-1/2	76295	76495	31.40	76295-C3	76495-C3	35.60
NEW	.100	.300	**.625** (6x)	1/8	1-1/2	76300	76500	31.40	76300-C3	76500-C3	35.60
NEW	.100	.300	**1.200** (12x)	1/8	2-1/2	952100	992600	32.10	952100-C3	992600-C3	36.30
NEW	.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2	944605	956905	31.40	944605-C3	956905-C3	35.60
NEW	.118 (3 mm)	.354	**.950** (8x)	1/8	2	960905	972305	31.40	960905-C3	972305-C3	35.60
	D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
NEW	.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	944608	956908	31.40	944608-C3	956908-C3	35.60
NEW	.125 (1/8)	.375	**1.000** (8x)	1/8	2	960908	972308	31.40	960908-C3	972308-C3	35.60
NEW	.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2	849708	846208	33.90	849708-C3	846208-C3	38.10
NEW	.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	952108	992608	33.90	952108-C3	992608-C3	38.10
NEW	.125 (1/8)	.375	**1.875** (15x)	1/8	3	829208	838708	36.10	829208-C3	838708-C3	40.30
NEW	.187 (3/16)	.562	**1.000** (5x)	3/16	2	944612	956912	37.10	944612-C3	956912-C3	41.60
NEW	.187 (3/16)	.562	**1.500** (8x)	3/16	2-1/2	960912	972312	37.10	960912-C3	972312-C3	41.60
NEW	.187 (3/16)	.562	**1.875** (10x)	3/16	3	849712	846212	38.60	849712-C3	846212-C3	43.10
NEW	.250 (1/4)	.750	**1.250** (5x)	1/4	2-1/2	944616	956916	41.50	944616-C3	956916-C3	47.70
NEW	.250 (1/4)	.750	**2.000** (8x)	1/4	4	960916	972316	41.50	960916-C3	972316-C3	48.70

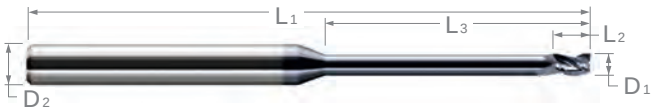
SPEEDS & FEEDS ONLINE!

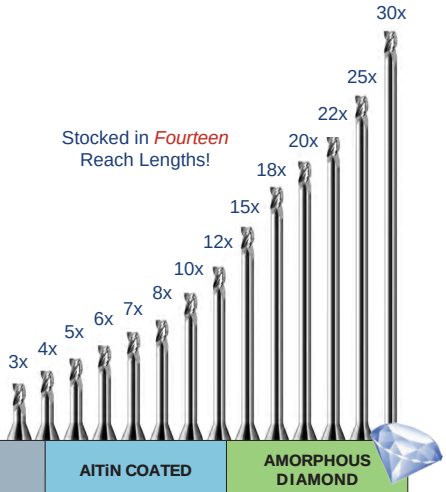
Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute





- **Long length design for deep cavities, up to 10" overall length**
- Stub flutes for maximum rigidity
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.010	.015	**.030** (3x)	3	1/8	2-1/2	47810	41.70	47810-C3	45.90		
.010	.015	**.050** (5x)	3	1/8	2-1/2	33210	41.70	33210-C3	45.90	33210-C4	52.40
.010	.015	**.080** (8x)	3	1/8	2-1/2	34610	42.70	34610-C3	46.90	34610-C4	53.40
.010	.015	**.100** (10x)	3	1/8	2-1/2	982110	44.90	982110-C3	49.10		
.010	.015	**.125** (12x)	3	1/8	2-1/2	35410	44.90	35410-C3	49.10	35410-C4	55.60
.010	.015	**.150** (15x)	3	1/8	2-1/2	48910	52.10	48910-C3	56.30		
.010	.015	**.180** (18x)	3	1/8	2-1/2	977310	57.90	977310-C3	62.10		
.011	.016	**.055** (5x)	3	1/8	2-1/2	33211	41.70	33211-C3	45.90		
.011	.016	**.088** (8x)	3	1/8	2-1/2	34611	42.70	34611-C3	46.90		
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33212	41.70	33212-C3	45.90		
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34612	42.70	34612-C3	46.90		
.013	.019	**.065** (5x)	3	1/8	2-1/2	33213	41.70	33213-C3	45.90		
.013	.019	**.104** (8x)	3	1/8	2-1/2	34613	42.70	34613-C3	46.90		
.014	.021	**.070** (5x)	3	1/8	2-1/2	33214	41.70	33214-C3	45.90		
.014	.021	**.112** (8x)	3	1/8	2-1/2	34614	42.70	34614-C3	46.90		
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47815	34.70	47815-C3	38.90	47815-C4	45.40
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	945515	34.70	945515-C3	38.90		
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33215	34.70	33215-C3	38.90	33215-C4	45.40
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	937015	34.70	937015-C3	38.90		
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	934815	34.70	934815-C3	38.90		
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34615	34.70	34615-C3	38.90	34615-C4	45.40
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	982115	35.90	982115-C3	40.10	982115-C4	46.60
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35415	35.90	35415-C3	40.10	35415-C4	46.60
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	48915	40.70	48915-C3	44.90	48915-C4	51.40
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	977315	46.90	977315-C3	51.10		
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	58315	49.70	58315-C3	53.90		
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	38015	63.50	38015-C3	67.70	***25x Diameter!***	
.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33216	35.70	33216-C3	39.90		
.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34616	35.70	34616-C3	39.90		
.017	.026	**.085** (5x)	3	1/8	2-1/2	33217	35.70	33217-C3	39.90		
.017	.026	**.136** (8x)	3	1/8	2-1/2	34617	35.70	34617-C3	39.90		
.018	.027	**.090** (5x)	3	1/8	2-1/2	33218	35.70	33218-C3	39.90		
.018	.027	**.144** (8x)	3	1/8	2-1/2	34618	35.70	34618-C3	39.90		
.019	.029	**.095** (5x)	3	1/8	2-1/2	33219	35.70	33219-C3	39.90		
.019	.029	**.152** (8x)	3	1/8	2-1/2	34619	35.70	34619-C3	39.90		

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Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47820	33.20	47820-C3	37.40		
	.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	945520	33.20	945520-C3	37.40		
	.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33220	33.20	33220-C3	37.40	33220-C4	43.90
	.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	937020	33.20	937020-C3	37.40		
	.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	934820	33.20	934820-C3	37.40		
	.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34620	33.20	34620-C3	37.40	34620-C4	43.90
	.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	982120	34.70	982120-C3	38.90	982120-C4	45.40
	.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35420	34.70	35420-C3	38.90	35420-C4	45.40
	.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	48920	39.10	48920-C3	43.30	48920-C4	49.80
NEW	.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	977320	43.70	977320-C3	47.90		
	.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	58320	47.50	58320-C3	51.70		
	.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	38020	61.20	38020-C3	65.40	***25x Diameter!***	
	.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	972020	62.10	972020-C3	66.30	***30x Diameter!***	
	.021	.031	**.105** (5x)	3	1/8	2-1/2	33221	34.70	33221-C3	38.90		
	.021	.031	**.168** (8x)	3	1/8	2-1/2	34621	34.70	34621-C3	38.90		
	.022	.033	**.110** (5x)	3	1/8	2-1/2	33222	34.70	33222-C3	38.90		
	.022	.033	**.176** (8x)	3	1/8	2-1/2	34622	34.70	34622-C3	38.90		
	.023	.035	**.115** (5x)	3	1/8	2-1/2	33223	34.70	33223-C3	38.90		
	.023	.035	**.187** (8x)	3	1/8	2-1/2	34623	34.70	34623-C3	38.90		
	.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33224	34.70	33224-C3	38.90		
	.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34624	34.70	34624-C3	38.90		
	.025	.037	**.075** (3x)	3	1/8	2-1/2	47825	31.90	47825-C3	36.10		
	.025	.037	**.125** (5x)	3	1/8	2-1/2	33225	31.90	33225-C3	36.10	33225-C4	42.60
	.025	.037	**.203** (8x)	3	1/8	2-1/2	34625	31.90	34625-C3	36.10	34625-C4	42.60
	.025	.037	**.250** (10x)	3	1/8	2-1/2	982125	32.90	982125-C3	37.10		
	.025	.037	**.312** (12x)	3	1/8	2-1/2	35425	32.90	35425-C3	37.10	35425-C4	43.60
	.025	.037	**.375** (15x)	3	1/8	2-1/2	48925	38.40	48925-C3	42.60	48925-C4	49.10
NEW	.025	.037	**.450** (18x)	3	1/8	2-1/2	977325	43.10	977325-C3	47.30		
	.025	.037	**.500** (20x)	3	1/8	2-1/2	58325	46.90	58325-C3	51.10		
	.025	.037	**.625** (25x)	3	1/8	2-1/2	38025	60.70	38025-C3	64.90	***25x Diameter!***	
	.026	.039	**.130** (5x)	3	1/8	2-1/2	33226	32.70	33226-C3	36.90		
	.026	.039	**.208** (8x)	3	1/8	2-1/2	34626	32.70	34626-C3	36.90		
	.027	.041	**.135** (5x)	3	1/8	2-1/2	33227	32.70	33227-C3	36.90		
	.027	.041	**.216** (8x)	3	1/8	2-1/2	34627	32.70	34627-C3	36.90		
	.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33228	32.70	33228-C3	36.90		
	.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34628	32.70	34628-C3	36.90		
	.029	.043	**.145** (5x)	3	1/8	2-1/2	33229	32.70	33229-C3	36.90		
	.029	.043	**.232** (8x)	3	1/8	2-1/2	34629	32.70	34629-C3	36.90		
	.030	.045	**.090** (3x)	3	1/8	2-1/2	47830	31.90	47830-C3	36.10		
	.030	.045	**.156** (5x)	3	1/8	2-1/2	33230	31.90	33230-C3	36.10	33230-C4	42.60
	.030	.045	**.250** (8x)	3	1/8	2-1/2	34630	31.90	34630-C3	36.10	34630-C4	42.60
	.030	.045	**.312** (10x)	3	1/8	2-1/2	982130	32.90	982130-C3	37.10		
	.030	.045	**.375** (12x)	3	1/8	2-1/2	35430	32.90	35430-C3	37.10	35430-C4	43.60
	.030	.045	**.450** (15x)	3	1/8	2-1/2	48930	38.40	48930-C3	42.60		
NEW	.030	.045	**.540** (18x)	3	1/8	2-1/2	977330	43.10	977330-C3	47.30		
	.030	.045	**.600** (20x)	3	1/8	2-1/2	58330	46.90	58330-C3	51.10		
	.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47831	31.90	47831-C3	36.10	47831-C4	42.60
	.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	945531	31.90	945531-C3	36.10		

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33231	31.90	33231-C3	36.10	33231-C4	42.60
.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	937031	31.90	937031-C3	36.10		
.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	934831	31.90	934831-C3	36.10		
.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34631	31.90	34631-C3	36.10	34631-C4	42.60
.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	982131	32.90	982131-C3	37.10	982131-C4	43.60
.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35431	32.90	35431-C3	37.10	35431-C4	43.60
.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	48931	38.40	48931-C3	42.60	48931-C4	49.10
.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	977331	46.90	977331-C3	51.10		
.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	58331	46.90	58331-C3	51.10		
.031 (1/32)	.046	**.687** (22x)	3	1/8	2-1/2	969631	51.70	969631-C3	55.90		
.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	38031	60.70	38031-C3	64.90	***25x Diameter!***	
.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	972031	68.50	972031-C3	72.70	***30x Diameter!***	
.035 (.9 mm)	.052	**.105** (3x)	3	1/8	2-1/2	47835	31.90	47835-C3	36.10		
.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33235	31.90	33235-C3	36.10	33235-C4	42.60
.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34635	31.90	34635-C3	36.10	34635-C4	42.60
.035 (.9 mm)	.052	**.350** (10x)	3	1/8	2-1/2	982135	32.90	982135-C3	37.10		
.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35435	32.90	35435-C3	37.10	35435-C4	43.60
.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	48935	38.40	48935-C3	42.60		
.035 (.9 mm)	.052	**.700** (20x)	3	1/8	2-1/2	58335	46.90	58335-C3	51.10		
.039 (1 mm)	.059	**.117** (3x)	3	1/8	2-1/2	47839	31.90	47839-C3	36.10		
.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33239	31.90	33239-C3	36.10	33239-C4	42.60
.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34639	31.90	34639-C3	36.10	34639-C4	42.60
.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	982139	32.50	982139-C3	36.70		
.039 (1 mm)	.059	**.480** (12x)	3	1/8	2-1/2	35439	33.70	35439-C3	37.90		
.039 (1 mm)	.059	**.600** (15x)	3	1/8	2-1/2	48939	39.20	48939-C3	43.40		
.039 (1 mm)	.059	**.700** (18x)	3	1/8	2-1/2	977339	39.90	977339-C3	44.10		NEW
.040	.060	**.120** (3x)	3	1/8	2-1/2	47840	31.90	47840-C3	36.10		
.040	.060	**.203** (5x)	3	1/8	2-1/2	33240	31.90	33240-C3	36.10	33240-C4	42.60
.040	.060	**.325** (8x)	3	1/8	2-1/2	34640	31.90	34640-C3	36.10	34640-C4	42.60
.040	.060	**.400** (10x)	3	1/8	2-1/2	982140	32.90	982140-C3	37.10		
.040	.060	**.480** (12x)	3	1/8	2-1/2	35440	32.90	35440-C3	37.10	35440-C4	43.60
.040	.060	**.600** (15x)	3	1/8	2-1/2	48940	38.40	48940-C3	42.60		
.040	.060	**.720** (18x)	3	1/8	2-1/2	977340	46.90	977340-C3	51.10		
.040	.060	**.800** (20x)	3	1/8	2-1/2	58340	46.90	58340-C3	51.10		
.040	.060	**1.000** (25x)	3	1/8	2-1/2	38040	60.70	38040-C3	64.90	***25x Diameter!***	
.045	.067	**.135** (3x)	3	1/8	2-1/2	47845	31.40	47845-C3	35.60		
.045	.067	**.225** (5x)	3	1/8	2-1/2	33245	31.40	33245-C3	35.60	33245-C4	42.10
.045	.067	**.375** (8x)	3	1/8	2-1/2	34645	31.40	34645-C3	35.60	34645-C4	42.10
.045	.067	**.450** (10x)	3	1/8	2-1/2	982145	32.40	982145-C3	36.60		
.045	.067	**.550** (12x)	3	1/8	2-1/2	35445	32.40	35445-C3	36.60	35445-C4	43.10
.045	.067	**.680** (15x)	3	1/8	2-1/2	48945	36.50	48945-C3	40.70		
.045	.067	**.900** (20x)	3	1/8	2-1/2	58345	44.10	58345-C3	48.30		
.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47847	31.40	47847-C3	35.60		
.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	945547	31.40	945547-C3	35.60		
.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33247	31.40	33247-C3	35.60	33247-C4	42.10
.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	937047	31.40	937047-C3	35.60		
.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	934847	31.40	934847-C3	35.60		

SPEEDS & FEEDS ONLINE!

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Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34647	31.40	34647-C3	35.60	34647-C4	42.10
.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	982147	32.40	982147-C3	36.60		
.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35447	32.40	35447-C3	36.60	35447-C4	43.10
.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	48947	36.50	48947-C3	40.70		
.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	977347	44.10	977347-C3	48.30		
.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	58347	44.10	58347-C3	48.30		
.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	38047	53.50	38047-C3	57.70	***25x Diameter!***	
.047 (3/64)	.070	**1.406** (30x)	3	1/8	2-1/2	972047	67.20	972047-C3	71.40	***30x Diameter!***	
.050	.075	**.150** (3x)	3	1/8	2-1/2	47850	31.40	47850-C3	35.60		
.050	.075	**.250** (5x)	3	1/8	2-1/2	33250	31.40	33250-C3	35.60	33250-C4	42.10
.050	.075	**.400** (8x)	3	1/8	2-1/2	34650	31.40	34650-C3	35.60	34650-C4	42.10
.050	.075	**.500** (10x)	3	1/8	2-1/2	982150	32.40	982150-C3	36.60		
.050	.075	**.600** (12x)	3	1/8	2-1/2	35450	32.40	35450-C3	36.60	35450-C4	43.10
.050	.075	**.750** (15x)	3	1/8	2-1/2	48950	36.50	48950-C3	40.70		
.050	.075	**.900** (18x)	3	1/8	2-1/2	977350	44.10	977350-C3	48.30		
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47855	31.40	47855-C3	35.60		
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33255	31.40	33255-C3	35.60	33255-C4	42.10
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34655	31.40	34655-C3	35.60	34655-C4	42.10
.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	982155	32.40	982155-C3	36.60		
.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35455	32.40	35455-C3	36.60	35455-C4	43.10
.055 (1.4 mm)	.082	**.825** (15x)	3	1/8	2-1/2	48955	36.50	48955-C3	40.70		
.055 (1.4 mm)	.082	**1.000** (18x)	3	1/8	2-1/2	977355	44.10	977355-C3	48.30		
.060	.090	**.180** (3x)	3	1/8	2-1/2	47860	31.40	47860-C3	35.60		
.060	.090	**.312** (5x)	3	1/8	2-1/2	33260	31.40	33260-C3	35.60	33260-C4	42.10
.060	.090	**.500** (8x)	3	1/8	2-1/2	34660	31.40	34660-C3	35.60	34660-C4	42.10
.060	.090	**.625** (10x)	3	1/8	2-1/2	982160	32.40	982160-C3	36.60		
.060	.090	**.720** (12x)	3	1/8	2-1/2	35460	32.40	35460-C3	36.60	35460-C4	43.10
.060	.090	**.900** (15x)	3	1/8	2-1/2	48960	36.50	48960-C3	40.70		
.060	.090	**1.062** (18x)	3	1/8	2-1/2	977360	44.10	977360-C3	48.30		
.060	.090	**1.200** (20x)	3	1/8	2-1/2	58360	44.10	58360-C3	48.30		
.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47862	31.40	47862-C3	35.60	47862-C4	42.10
.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	945562	31.40	945562-C3	35.60		
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33262	31.40	33262-C3	35.60	33262-C4	42.10
.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	937062	31.40	937062-C3	35.60		
.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	934862	31.40	934862-C3	35.60		
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34662	31.40	34662-C3	35.60	34662-C4	42.10
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	982162	32.40	982162-C3	36.60	982162-C4	43.10
.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35462	32.40	35462-C3	36.60	35462-C4	43.10
.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	48962	36.50	48962-C3	40.70	48962-C4	47.20
.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	977362	44.10	977362-C3	48.30		
.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	58362	44.10	58362-C3	48.30		
.062 (1/16)	.093	**1.375** (22x)	3	1/8	3	969662	49.70	969662-C3	53.90		
.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	38062	53.50	38062-C3	57.70	***25x Diameter!***	
.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	972062	67.20	972062-C3	71.40	***30x Diameter!***	
.065	.097	**.195** (3x)	3	1/8	2-1/2	47865	31.40	47865-C3	35.60		
.065	.097	**.325** (5x)	3	1/8	2-1/2	33265	31.40	33265-C3	35.60		
.065	.097	**.530** (8x)	3	1/8	2-1/2	34665	31.40	34665-C3	35.60	34665-C4	42.10

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.065	.097	**.650** (10x)	3	1/8	2-1/2	982165	32.40	982165-C3	36.60		
.065	.097	**.800** (12x)	3	1/8	2-1/2	35465	32.40	35465-C3	36.60		
.070	.105	**.210** (3x)	3	1/8	2-1/2	47870	31.40	47870-C3	35.60		
.070	.105	**.375** (5x)	3	1/8	2-1/2	33270	31.40	33270-C3	35.60		
.070	.105	**.570** (8x)	3	1/8	2-1/2	34670	31.40	34670-C3	35.60	34670-C4	42.10
.070	.105	**.700** (10x)	3	1/8	2-1/2	982170	32.40	982170-C3	36.60		
.070	.105	**.850** (12x)	3	1/8	2-1/2	35470	32.40	35470-C3	36.60		
.070	.105	**1.062** (15x)	3	1/8	2-1/2	48970	36.50	48970-C3	40.70		
.075	.112	**.225** (3x)	3	1/8	2-1/2	47875	31.40	47875-C3	35.60		
.075	.112	**.375** (5x)	3	1/8	2-1/2	33275	31.40	33275-C3	35.60		
.075	.112	**.625** (8x)	3	1/8	2-1/2	34675	31.40	34675-C3	35.60	34675-C4	42.10
.075	.112	**.750** (10x)	3	1/8	2-1/2	982175	32.40	982175-C3	36.60		
.075	.112	**.900** (12x)	3	1/8	2-1/2	35475	32.40	35475-C3	36.60		
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47878	31.40	47878-C3	35.60		
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	945578	31.40	945578-C3	35.60		
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33278	31.40	33278-C3	35.60	33278-C4	42.10
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	937078	31.40	937078-C3	35.60		
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	934878	31.40	934878-C3	35.60		
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34678	31.40	34678-C3	35.60	34678-C4	42.10
.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	982178	32.40	982178-C3	36.60		
.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35478	32.40	35478-C3	36.60	35478-C4	43.10
.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	48978	36.50	48978-C3	40.70		
.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	977378	44.10	977378-C3	48.30		
.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	58378	44.10	58378-C3	48.30		
.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	38078	53.50	38078-C3	57.70	***25x Diameter!***	
.078 (5/64)	.117	**2.343** (30x)	3	1/8	4	972078	67.20	972078-C3	71.70	***30x Diameter!***	
.080	.120	**.240** (3x)	3	1/8	2-1/2	47880	31.40	47880-C3	35.60		
.080	.120	**.406** (5x)	3	1/8	2-1/2	33280	31.40	33280-C3	35.60		
.080	.120	**.650** (8x)	3	1/8	2-1/2	34680	31.40	34680-C3	35.60	34680-C4	42.10
.080	.120	**.960** (12x)	3	1/8	2-1/2	35480	32.40	35480-C3	36.60		
.085	.127	**.425** (5x)	3	1/8	2-1/2	33285	31.40	33285-C3	35.60		
.085	.127	**.700** (8x)	3	1/8	2-1/2	34685	31.40	34685-C3	35.60	34685-C4	42.10
.085	.127	**1.020** (12x)	3	1/8	2-1/2	35485	32.40	35485-C3	36.60		
.090	.135	**.270** (3x)	3	1/8	2-1/2	47890	31.40	47890-C3	35.60		
.090	.135	**.450** (5x)	3	1/8	2-1/2	33290	31.40	33290-C3	35.60		
.090	.135	**.750** (8x)	3	1/8	2-1/2	34690	31.40	34690-C3	35.60	34690-C4	42.10
.090	.135	**1.080** (12x)	3	1/8	2-1/2	35490	32.40	35490-C3	36.60		
.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47893	31.40	47893-C3	35.60		
.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	945593	31.40	945593-C3	35.60		
.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33293	31.40	33293-C3	35.60	33293-C4	42.10
.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	937093	31.40	937093-C3	35.60		
.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	934893	31.40	934893-C3	35.60		
.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34693	31.40	34693-C3	35.60	34693-C4	42.10
.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	982193	32.40	982193-C3	36.60		
.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35493	32.40	35493-C3	36.60	35493-C4	43.10
.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	48993	38.70	48993-C3	42.90	48993-C4	49.40

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	977393	46.40	977393-C3	50.60		
	.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	58393	48.70	58393-C3	53.20		
NEW	.093 (3/32)	.139	**2.062** (22x)	3	1/8	4	969693	51.10	969693-C3	55.60		
	.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	38093	55.70	38093-C3	60.20	***25x Diameter!***	
	.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	972093	74.40	972093-C3	78.90	***30x Diameter!***	
	.095	.142	**.500** (5x)	3	1/8	2-1/2	33295	31.40	33295-C3	35.60		
	.095	.142	**.750** (8x)	3	1/8	2-1/2	34695	31.40	34695-C3	35.60	34695-C4	42.10
	.095	.142	**1.150** (12x)	3	1/8	2-1/2	35495	32.40	35495-C3	36.60		
	.100	.150	**.300** (3x)	3	1/8	2-1/2	978400	31.40	978400-C3	35.60		
	.100	.150	**.500** (5x)	3	1/8	2-1/2	33300	31.40	33300-C3	35.60		
	.100	.150	**.800** (8x)	3	1/8	2-1/2	34700	31.40	34700-C3	35.60	34700-C4	42.10
	.100	.150	**1.000** (10x)	3	1/8	2-1/2	982200	32.40	982200-C3	36.60		
	.100	.150	**1.200** (12x)	3	1/8	2-1/2	35499	32.40	35499-C3	36.60		
	.100	.150	**1.500** (15x)	3	1/8	3	49000	38.70	49000-C3	42.90		
NEW	.100	.150	**1.812** (18x)	3	1/8	4	977400	46.90	977400-C3	51.40		
	.105	.158	**.530** (5x)	3	1/8	2-1/2	33301	31.40	33301-C3	35.60		
	.105	.158	**.850** (8x)	3	1/8	2-1/2	34701	31.40	34701-C3	35.60		
	.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33302	31.40	33302-C3	35.60		
	.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34702	31.40	34702-C3	35.60		
	.109 (7/64)	.163	**1.125** (10x)	3	1/8	2-1/2	982202	32.40	982202-C3	36.60		
	.109 (7/64)	.163	**1.312** (12x)	3	1/8	3	35502	32.90	35502-C3	37.10		
	.110	.165	**.570** (5x)	3	1/8	2-1/2	33303	31.40	33303-C3	35.60		
	.110	.165	**.900** (8x)	3	1/8	2-1/2	34703	31.40	34703-C3	35.60		
	.115	.173	**.600** (5x)	3	1/8	2-1/2	33304	31.40	33304-C3	35.60		
	.115	.173	**.950** (8x)	3	1/8	2-1/2	34704	31.40	34704-C3	35.60		
	.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33305	31.40	33305-C3	35.60		
	.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34705	31.40	34705-C3	35.60		
	.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	982205	32.90	982205-C3	37.10		
	.118 (3 mm)	.177	**1.420** (12x)	3	1/8	3	35505	32.90	35505-C3	37.40		
	.118 (3 mm)	.177	**1.770** (15x)	3	1/8	3	49005	39.40	49005-C3	43.60		
NEW	.118 (3 mm)	.177	**2.125** (18x)	3	1/8	4	977405	47.40	977405-C3	51.90		
	.120	.180	**.625** (5x)	3	1/8	2-1/2	33306	31.40	33306-C3	35.60		
	.120	.180	**1.000** (8x)	3	1/8	2-1/2	34706	31.40	34706-C3	35.60		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	3	1/8	2-1/2	978408	31.40	978408-C3	35.60		
.125 (1/8)	.187	**.500** (4x)	3	1/8	2-1/2	945608	31.40	945608-C3	35.60		
.125 (1/8)	.187	**.625** (5x)	3	1/8	2-1/2	33308	31.40	33308-C3	35.60	33308-C4	42.10
.125 (1/8)	.187	**.750** (6x)	3	1/8	2-1/2	937108	31.40	937108-C3	35.60		
.125 (1/8)	.187	**.875** (7x)	3	1/8	2-1/2	934908	31.40	934908-C3	35.60		
.125 (1/8)	.187	**1.000** (8x)	3	1/8	2-1/2	34708	31.40	34708-C3	35.60	34708-C4	42.10
.125 (1/8)	.187	**1.250** (10x)	3	1/8	2-1/2	982208	33.90	982208-C3	38.10		
.125 (1/8)	.187	**1.500** (12x)	3	1/8	3	35508	33.90	35508-C3	38.10	35508-C4	46.90
.125 (1/8)	.187	**1.875** (15x)	3	1/8	3	49008	38.70	49008-C3	42.90		
.125 (1/8)	.187	**2.250** (18x)	3	1/8	4	977408	46.40	977408-C3	50.90		
.125 (1/8)	.187	**2.500** (20x)	3	1/8	4	58408	46.40	58408-C3	50.90		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	.187	**2.750** (22x)	3	1/8	4	969708	50.70	969708-C3	55.20			NEW
.125 (1/8)	.187	**3.125** (25x)	3	1/8	4	38108	55.70	38108-C3	60.20	***25x Diameter!***		
.125 (1/8)	.187	**3.750** (30x)	3	1/8	6	973608	63.90	973608-C3	69.50	***30x Diameter!***		
.140 (9/64)	.220	**.425** (3x)	3	3/16	3	978409	37.10	978409-C3	41.60			
.140 (9/64)	.220	**.750** (5x)	3	3/16	3	33309	37.10	33309-C3	41.60			
.140 (9/64)	.220	**1.125** (8x)	3	3/16	3	34709	37.10	34709-C3	41.60			
.140 (9/64)	.220	**1.450** (10x)	3	3/16	3	982209	39.70	982209-C3	44.20			
.140 (9/64)	.220	**1.680** (12x)	3	3/16	4	35509	42.40	35509-C3	48.60			NEW
.156 (5/32)	.234	**.470** (3x)	3	3/16	3	978410	37.10	978410-C3	41.60			
.156 (5/32)	.234	**.750** (5x)	3	3/16	3	33310	37.10	33310-C3	41.60			
.156 (5/32)	.234	**1.250** (8x)	3	3/16	3	34710	37.10	34710-C3	41.60			
.156 (5/32)	.234	**1.570** (10x)	3	3/16	3	982210	39.70	982210-C3	44.20			
.156 (5/32)	.234	**1.875** (12x)	3	3/16	4	35510	39.70	35510-C3	45.90			
.156 (5/32)	.234	**2.375** (15x)	3	3/16	4	49010	42.40	49010-C3	48.60			
.156 (5/32)	.234	**2.812** (18x)	3	3/16	6	977410	58.40	977410-C3	66.60			
.187 (3/16)	.281	**.570** (3x)	3	3/16	3	978412	37.10	978412-C3	41.60			
.187 (3/16)	.281	**.750** (4x)	3	3/16	3	945612	37.10	945612-C3	41.60			
.187 (3/16)	.281	**1.000** (5x)	3	3/16	3	33312	37.10	33312-C3	41.60	33312-C4	51.80	
.187 (3/16)	.281	**1.156** (6x)	3	3/16	3	937112	37.10	937112-C3	41.60			
.187 (3/16)	.281	**1.312** (7x)	3	3/16	3	934912	37.10	934912-C3	41.60			
.187 (3/16)	.281	**1.500** (8x)	3	3/16	3	34712	37.10	34712-C3	41.60	34712-C4	51.80	
.187 (3/16)	.281	**1.875** (10x)	3	3/16	4	982212	39.70	982212-C3	45.90			
.187 (3/16)	.281	**2.250** (12x)	3	3/16	4	35512	39.70	35512-C3	45.90	35512-C4	55.40	
.187 (3/16)	.281	**2.812** (15x)	3	3/16	4	49012	42.40	49012-C3	48.60			
.187 (3/16)	.281	**3.375** (18x)	3	3/16	6	977412	58.40	977412-C3	66.60			
.187 (3/16)	.281	**3.750** (20x)	3	3/16	6	58412	58.40	58412-C3	66.60			
.187 (3/16)	.281	**4.125** (22x)	3	3/16	6	969712	59.70	969712-C3	67.90			NEW
.203 (13/64)	.312	**1.015** (5x)	3	1/4	4	33313	46.40	33313-C3	53.60			
.203 (13/64)	.312	**1.625** (8x)	3	1/4	4	34713	46.40	34713-C3	53.60			
.218 (7/32)	.330	**1.125** (5x)	3	1/4	4	33314	46.40	33314-C3	53.60			
.218 (7/32)	.330	**1.750** (8x)	3	1/4	4	34714	46.40	34714-C3	53.60			
.218 (7/32)	.330	**2.187** (10x)	3	1/4	4	982214	47.50	982214-C3	54.70			NEW
.250 (1/4)	.375	**.750** (3x)	3	1/4	4	978416	41.50	978416-C3	48.70			
.250 (1/4)	.375	**1.000** (4x)	3	1/4	4	945616	41.50	945616-C3	48.70			
.250 (1/4)	.375	**1.250** (5x)	3	1/4	4	33316	41.50	33316-C3	48.70	33316-C4	58.20	
.250 (1/4)	.375	**1.500** (6x)	3	1/4	4	937116	41.50	937116-C3	48.70			
.250 (1/4)	.375	**1.750** (7x)	3	1/4	4	934916	41.50	934916-C3	48.70			
.250 (1/4)	.375	**2.000** (8x)	3	1/4	4	34716	41.50	34716-C3	48.70	34716-C4	58.20	
.250 (1/4)	.375	**2.500** (10x)	3	1/4	4	982216	46.90	982216-C3	54.10			
.250 (1/4)	.375	**3.000** (12x)	3	1/4	6	35516	50.10	35516-C3	58.30	35516-C4	74.30	
.250 (1/4)	.375	**3.750** (15x)	3	1/4	6	49016	51.90	49016-C3	60.10			
.250 (1/4)	.375	**4.375** (17.5x)	4	1/4	6	991916	77.90	991916-C3	86.10			
.250 (1/4)	.375	**4.375** (17.5x)	4	1/4	8	960516	103.40	960516-C3	115.60			
.250 (1/4)	.375	**5.000** (20x)	3	1/4	8	58416	103.40	58416-C3	115.60			

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

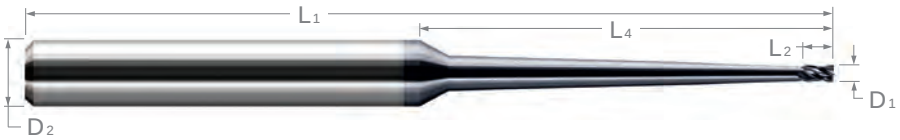
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.312 (5/16)	.470	**1.625** (5x)	3	5/16	4	33320	68.90	33320-C3	77.60		
.312 (5/16)	.470	**2.500** (8x)	3	5/16	4	34720	68.90	34720-C3	77.60		
.312 (5/16)	.470	**4.343** (14x)	4	5/16	6	991920	92.90	991920-C3	105.10		
.375 (3/8)	.570	**2.000** (5x)	3	3/8	4	33324	68.90	33324-C3	80.10		
.375 (3/8)	.570	**3.000** (8x)	3	3/8	6	34724	94.70	34724-C3	106.90		
.375 (3/8)	.562	**4.312** (11.5x)	4	3/8	6	991924	104.90	991924-C3	117.60		
.375 (3/8)	.562	**4.312** (11.5x)	4	3/8	8	960524	123.90	960524-C3	141.10		
.437 (7/16)	.656	**5.875** (13.5x)	4	7/16	8	991928	182.40	991928-C3	207.60		
.500 (1/2)	.750	**5.750** (11.5x)	4	1/2	8	991932	182.70	991932-C3	207.90		
.500 (1/2)	.750	**5.750** (11.5x)	4	1/2	10	960532	267.90	960532-C3	293.10		
.625 (5/8)	.937	**5.687** (9x)	4	5/8	8	991940	310.10	991940-C3	332.30		
.750 (3/4)	1.125	**5.625** (7.5x)	4	3/4	8	991948	381.50	991948-C3	407.30		

SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

MINIATURE END MILLS

Square – Tapered Reach (Clearance Cutters)



- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Maximum Reach & Maximum Rigidity!

SQUARE

CUTTER DIA.	LOC	OVERALL REACH	EFF. WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED			AlTiN NANO COATED		
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.015	.023	**1/2**	6.4°	1/8	2-1/2	.060	.080	.125	.375	.395	.420		990215	64.10		990215-C6	70.30
.031	.047	**1/2**	5.4°	1/8	2-1/2	.115	.155	.235	.385	.410	.440		990231	49.40		990231-C6	55.60
.031	.047	**1**	6.3°	1/4	4	.115	.155	.235	.755	.800	.850	26631	30831	59.40	26631-C6	30831-C6	68.60
.031	.047	**1-1/2**	4.2°	1/4	4	.115	.155	.235	1.260	1.355	1.470	28331	31231	64.20	28331-C6	31231-C6	73.40
.031	.047	**2**	3.1°	1/4	4	.115	.155	.235	1.765	1.965	-	17431	913131	68.90	17431-C6	913131-C6	78.10
.047	.071	**1/2**	4.5°	1/8	2-1/2	.180	.245	.370	.395	.430	.470		990247	49.40		990247-C6	55.60
.047	.071	**1**	5.9°	1/4	4	.180	.245	.370	.765	.815	.870	26647	30847	59.40	26647-C6	30847-C6	68.60
.047	.071	**1-1/2**	3.9°	1/4	4	.180	.245	.370	1.275	1.380	-	28347	31247	64.20	28347-C6	31247-C6	73.40
.062	.093	**1/2**	3.7°	1/8	2-1/2	.220	.295	.375	.410	.460	-		990262	47.90		990262-C6	54.10
.062	.093	**1**	5.4°	1/4	4	.220	.295	.445	.775	.825	.890	26662	30862	57.70	26662-C6	30862-C6	66.90
.062	.093	**1-1/2**	3.7°	1/4	4	.220	.295	.445	1.285	1.410	-	28362	31262	62.40	28362-C6	31262-C6	71.60
.062	.093	**2**	2.6°	1/4	4	.220	.295	.445	1.805	-	-	17462	913162	67.10	17462-C6	913162-C6	76.30
.078	.118	**1**	5.0°	1/4	4	.305	.405	.610	.785	.845	.915	26678	30878	57.70	26678-C6	30878-C6	66.90
.078	.118	**1-1/2**	3.4°	1/4	4	.305	.405	.610	1.305	1.445	-	28378	31278	62.40	28378-C6	31278-C6	71.60
.093	.140	**1**	4.6°	1/4	4	.340	.455	.685	.795	.865	.945	26693	30893	58.50	26693-C6	30893-C6	67.70
.093	.140	**1-1/2**	3.1°	1/4	4	.340	.455	.685	1.320	-	-	28393	31293	61.90	28393-C6	31293-C6	71.10
.093	.140	**2**	2.2°	1/4	4	.340	.455	.685	1.890	-	-	17493	913193	65.40	17493-C6	913193-C6	74.60
.125	.188	**1**	3.7°	1/4	4	.450	.600	.760	.835	.930	-	26708	30908	58.50	26708-C6	30908-C6	67.70
.125	.188	**1-1/2**	2.5°	1/4	4	.450	.600	.905	1.395	-	-	28408	31308	61.90	28408-C6	31308-C6	71.10
.125	.188	**2**	1.7°	1/4	4	.450	.600	.905	-	-	-	17508	913208	65.40	17508-C6	913208-C6	74.60
.156	.234	**1**	2.8°	1/4	4	.525	.705	.780	.895	-	-	26710	30910	58.50	26710-C6	30910-C6	67.70
.156	.234	**1-1/2**	1.9°	1/4	4	.525	.705	1.060	-	-	-	28410	31310	61.90	28410-C6	31310-C6	71.10
.187	.281	**1-1/2**	1.3°	1/4	4	.605	.805	1.215	-	-	-	28412	31312	61.90	28412-C6	31312-C6	71.10
.250	.375	**1-1/2**	2.5°	3/8	4	.760	1.015	1.275	1.425	-	-	28416	31316	79.90	28416-C6	31316-C6	90.10

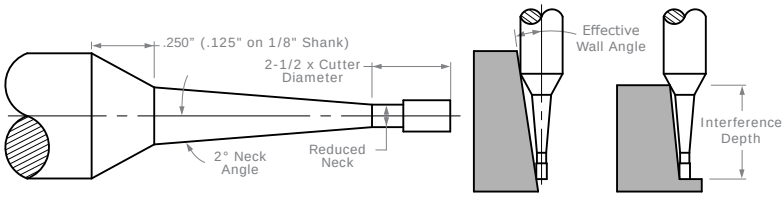
SPEEDS & FEEDS ONLINE!

*Values are approximate and may vary due to tolerancing.

Click for detailed interference charts with more angles

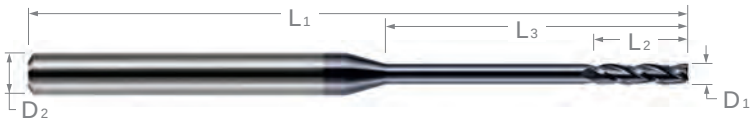
Effective Wall Angle:
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

Interference Depth:
At a given angle, the depth at which the cutter interferes with the workpiece.



MINIATURE END MILLS

Square – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut is ≥ 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.010	.050	**.100** (10x)	1/8	2-1/2	13610	43.90	13610-C3	48.10	10010	55.40
.010	.050	**.150** (15x)	1/8	2-1/2	948210	54.40	948210-C3	58.60		
.015 (1/64)	.075	**.150** (10x)	1/8	2-1/2	13615	36.10	13615-C3	40.30	10015	47.20
.015 (1/64)	.075	**.225** (15x)	1/8	2-1/2	948215	46.70	948215-C3	50.90		
.020 (.5 mm)	.100	**.200** (10x)	1/8	2-1/2	13620	34.70	13620-C3	38.90	10020	45.90
.020 (.5 mm)	.100	**.300** (15x)	1/8	2-1/2	948220	45.10	948220-C3	49.30		
.025	.125	**.250** (10x)	1/8	2-1/2	13625	33.40	13625-C3	37.60	10025	44.70
.030	.150	**.300** (10x)	1/8	2-1/2	13630	33.40	13630-C3	37.60	10030	44.70
.030	.150	**.450** (15x)	1/8	2-1/2	948230	43.70	948230-C3	47.90		
.031 (1/32)	.155	**.310** (10x)	1/8	2-1/2	13631	33.40	13631-C3	37.60	10031	44.70
.031 (1/32)	.155	**.470** (15x)	1/8	2-1/2	948231	43.70	948231-C3	47.90		
.035 (.9 mm)	.175	**.350** (10x)	1/8	2-1/2	13635	33.40	13635-C3	37.60	10035	44.70
.040	.200	**.400** (10x)	1/8	2-1/2	13640	33.40	13640-C3	37.60	10040	44.70
.040	.200	**.600** (15x)	1/8	2-1/2	948240	43.70	948240-C3	47.90		
.045	.225	**.450** (10x)	1/8	2-1/2	13645	32.70	13645-C3	36.90	10045	43.90
.047 (3/64)	.250	**.500** (10x)	1/8	2-1/2	13647	32.70	13647-C3	36.90	10047	43.90
.047 (3/64)	.250	**.710** (15x)	1/8	2-1/2	948247	41.40	948247-C3	45.60		
.050	.300	**.500** (10x)	1/8	2-1/2	956350	32.70	956350-C3	36.90		
.050	.300	**.600** (12x)	1/8	2-1/2	13650	32.70	13650-C3	36.90	10050	43.90
.050	.300	**.750** (15x)	1/8	2-1/2	948250	41.40	948250-C3	45.60		
.055 (1.4 mm)	.385	**.770** (14x)	1/8	2-1/2	13655	32.70	13655-C3	36.90	10055	43.90
.060	.312	**.625** (10x)	1/8	2-1/2	956360	32.70	956360-C3	36.90		
.060	.500	**1.000** (16x)	1/8	2-1/2	13660	32.90	13660-C3	37.10	10060	44.90
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	956362	32.70	956362-C3	36.90		
.062 (1/16)	.500	**1.000** (16x)	1/8	2-1/2	13662	32.90	13662-C3	37.10	10062	44.90
.065	.500	**1.000** (15x)	1/8	2-1/2	13665	32.70	13665-C3	36.90	10065	43.90
.070	.500	**1.000** (14x)	1/8	2-1/2	13670	32.70	13670-C3	36.90	10070	43.90
.075	.500	**1.000** (13x)	1/8	2-1/2	13675	32.70	13675-C3	36.90	10075	43.90
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	956378	32.70	956378-C3	36.90		
.078 (5/64)	.500	**1.000** (12x)	1/8	2-1/2	13678	32.70	13678-C3	36.90	10078	43.90
.078 (5/64)	.406	**1.187** (15x)	1/8	2-1/2	948278	41.40	948278-C3	45.60		

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

MINIATURE END MILLS

Square – Long Reach, Long Flute (cont.)

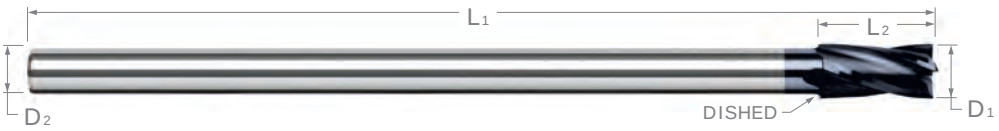
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.080	.750	**1.250** (15x)	1/8	2-1/2	13680	32.90	13680-C3	37.10	10080	44.40
.085	.750	**1.250** (14x)	1/8	2-1/2	13685	32.90	13685-C3	37.10	10085	44.40
.090	.750	**1.250** (13x)	1/8	2-1/2	13690	32.90	13690-C3	37.10	10090	44.40
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	956393	32.70	956393-C3	36.90		
.093 (3/32)	.750	**1.250** (13x)	1/8	2-1/2	13693	32.90	13693-C3	37.10	10093	44.40
.093 (3/32)	.500	**1.400** (15x)	1/8	3	948293	41.40	948293-C3	45.60		
.095	.750	**1.250** (13x)	1/8	2-1/2	13695	32.70	13695-C3	36.90	10095	43.90
.100	.750	**1.250** (12x)	1/8	2-1/2	13700	32.70	13700-C3	36.90	10100	43.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	956408	32.70	956408-C3	36.90		
.125 (1/8)	1.000	**1.500** (12x)	1/8	2-1/2	13708	32.90	13708-C3	37.10	10108	44.40
.125 (1/8)	.625	**1.875** (15x)	1/8	3	948308	43.90	948308-C3	48.10		
.187 (3/16)	1.125	**1.625** (8x)	3/16	3	13712	38.70	13712-C3	42.90	10112	54.10
.250 (1/4)	1.500	**2.000** (8x)	1/4	4	13716	43.10	13716-C3	47.30	10116	60.50

SPEEDS & FEEDS ONLINE!

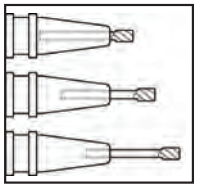
END MILLS

Square – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	3/16	2	**3 mm**	2-1/2	907808	76.90	907808-C3	81.10
1/8	3/16	4	**3 mm**	2-1/2	943208	79.10	943208-C3	83.30
5/32	15/64	2	**1/8**	2-1/2	907810	76.90	907810-C3	81.40
5/32	15/64	4	**1/8**	2-1/2	943210	79.10	943210-C3	83.60
5/32	15/64	4	**1/8**	4	920610	83.70	920610-C3	89.90
3/16	9/32	2	**1/8**	2-1/2	907812	76.90	907812-C3	81.40
3/16	9/32	4	**1/8**	2-1/2	943212	79.10	943212-C3	83.60
3/16	9/32	4	**5/32**	4	920613	83.70	920613-C3	89.90
1/4	3/8	2	**3/16**	3	907816	83.40	907816-C3	89.60
1/4	3/8	4	**3/16**	3	943216	85.70	943216-C3	92.90
1/4	3/8	4	**3/16**	4	920616	112.40	920616-C3	119.60
5/16	15/32	4	**1/4**	4	943220	105.10	943220-C3	113.80
5/16	15/32	4	**1/4**	6	920620	134.40	920620-C3	147.10
3/8	9/16	4	**5/16**	4	943224	124.20	943224-C3	135.40
3/8	9/16	4	**5/16**	6	920624	146.50	920624-C3	159.20
1/2	3/4	4	**7/16**	6	943232	190.90	943232-C3	203.10
5/8	15/16	4	**1/2**	6	943240	247.90	943240-C3	266.10
3/4	1-1/8	4	**5/8**	6	943248	305.90	943248-C3	325.10

SPEEDS & FEEDS ONLINE!

For Ball Reduced Shank, please see page 50.

For Corner Radius Reduced Shank, please see page 67.

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard

- **Cutter diameter down to .002"**
- Center cutting
- Solid carbide
- CNC ground in the USA

Stub Flute & Standard Length

BALL

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D1 +.0005" −.0005"	L2 +.010" −.000"	D2	L1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.002	**.003** (1.5x)	1/8	1-1/2	24502			57.70								
.002	**.006** (3x)	1/8	1-1/2	74002			57.70								
.003	**.004** (1.5x)	1/8	1-1/2	24503			51.10								
.003	**.009** (3x)	1/8	1-1/2	74003			51.10								
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	24504			45.90								
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	74004			45.90								
.005	**.007** (1.5x)	1/8	1-1/2	24505		24605	41.50	24505-C3		24605-C3	45.70				NEW
.005	**.015** (3x)	1/8	1-1/2	74005		74305	41.50	74005-C3		74305-C3	45.70				NEW
.006	**.009** (1.5x)	1/8	1-1/2	24506		24606	42.70			24606-C3	46.90				NEW
.006	**.018** (3x)	1/8	1-1/2	74006		74306	42.70			74306-C3	46.90				NEW
.007	**.010** (1.5x)	1/8	1-1/2	24507		24607	42.70			24607-C3	46.90				NEW
.007	**.021** (3x)	1/8	1-1/2	74007		74307	42.70			74307-C3	46.90				NEW
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	24508		24608	42.70	24508-C3		24608-C3	46.90				NEW
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	74008		74308	42.70	74008-C3		74308-C3	46.90				NEW
.009	**.013** (1.5x)	1/8	1-1/2	24509		24609	42.70			24609-C3	46.90				NEW
.009	**.027** (3x)	1/8	1-1/2	74009		74309	42.70			74309-C3	46.90				NEW
.010	**.015** (1.5x)	1/8	1-1/2	24510		24610	34.20	24510-C3		24610-C3	38.40		24610-C4	44.90	
.010	**.030** (3x)	1/8	1-1/2	74010		74310	34.20	74010-C3		74310-C3	38.40	74010-C4	74310-C4	44.90	
.011	**.016** (1.5x)	1/8	1-1/2	24511		24611	34.70			24611-C3	38.90				
.011	**.033** (3x)	1/8	1-1/2	74011		74311	34.70			74311-C3	38.90				
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	24512		24612	34.70			24612-C3	38.90				
.012 (.3 mm)	**.036** (3x)	1/8	1-1/2	74012		74312	34.70			74312-C3	38.90				
.013	**.019** (1.5x)	1/8	1-1/2	24513		24613	34.70			24613-C3	38.90				
.013	**.039** (3x)	1/8	1-1/2	74013		74313	34.70			74313-C3	38.90				
.014	**.021** (1.5x)	1/8	1-1/2	24514		24614	34.70			24614-C3	38.90				
.014	**.042** (3x)	1/8	1-1/2	74014		74314	34.70			74314-C3	38.90				
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	24515	823415	24615	26.70	24515-C3	823415-C3	24615-C3	30.90		24615-C4	37.40	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	74015	835915	74315	26.70	74015-C3	835915-C3	74315-C3	30.90	74015-C4	74315-C4	37.40	
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	24516		24616	27.90			24616-C3	32.10				
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	74016		74316	27.90			74316-C3	32.10				
.017	**.026** (1.5x)	1/8	1-1/2	24517		24617	27.90			24617-C3	32.10				
.017	**.051** (3x)	1/8	1-1/2	74017		74317	27.90			74317-C3	32.10				
.018	**.027** (1.5x)	1/8	1-1/2	24518		24618	27.90			24618-C3	32.10				
.018	**.054** (3x)	1/8	1-1/2	74018		74318	27.90			74318-C3	32.10				
.019	**.029** (1.5x)	1/8	1-1/2	24519		24619	27.90			24619-C3	32.10				
.019	**.057** (3x)	1/8	1-1/2	74019		74319	27.90			74319-C3	32.10				
.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	24520		24620	25.70	24520-C3		24620-C3	29.90		24620-C4	36.40	
.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	74020		74320	25.70	74020-C3		74320-C3	29.90	74020-C4	74320-C4	36.40	

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CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.021	**.031** (1.5x)	1/8	1-1/2	24521		24621	26.70			24621-C3	30.90			
.021	**.063** (3x)	1/8	1-1/2	74021		74321	26.70			74321-C3	30.90			
.022	**.033** (1.5x)	1/8	1-1/2	24522		24622	26.70			24622-C3	30.90			
.022	**.066** (3x)	1/8	1-1/2	74022		74322	26.70			74322-C3	30.90			
.023	**.035** (1.5x)	1/8	1-1/2	24523		24623	26.70			24623-C3	30.90			
.023	**.069** (3x)	1/8	1-1/2	74023		74323	26.70			74323-C3	30.90			
.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	24524		24624	26.70			24624-C3	30.90			
.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	74024		74324	26.70			74324-C3	30.90			
.025	**.037** (1.5x)	1/8	1-1/2	24525		24625	23.20	24525-C3		24625-C3	27.40		24625-C4	33.90
.025	**.075** (3x)	1/8	1-1/2	74025		74325	23.20	74025-C3		74325-C3	27.40	74025-C4	74325-C4	33.90
.026	**.039** (1.5x)	1/8	1-1/2	24526		24626	24.20			24626-C3	28.40			
.026	**.078** (3x)	1/8	1-1/2	74026		74326	24.20			74326-C3	28.40			
.027	**.041** (1.5x)	1/8	1-1/2	24527		24627	24.20			24627-C3	28.40			
.027	**.081** (3x)	1/8	1-1/2	74027		74327	24.20			74327-C3	28.40			
.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	24528		24628	24.20			24628-C3	28.40			
.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	74028		74328	24.20			74328-C3	28.40			
.029	**.043** (1.5x)	1/8	1-1/2	24529		24629	24.20			24629-C3	28.40			
.029	**.087** (3x)	1/8	1-1/2	74029		74329	24.20			74329-C3	28.40			
.030	**.045** (1.5x)	1/8	1-1/2	24530		24630	21.20	24530-C3		24630-C3	25.40		24630-C4	31.90
.030	**.090** (3x)	1/8	1-1/2	74030		74330	21.20	74030-C3		74330-C3	25.40	74030-C4	74330-C4	31.90
.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	24531	823431	24631	21.20	24531-C3	823431-C3	24631-C3	25.40		24631-C4	31.90
.031 (1/32)	**.093** (3x)	1/8	1-1/2	74031	835931	74331	21.20	74031-C3	835931-C3	74331-C3	25.40	74031-C4	74331-C4	31.90
.032	**.048** (1.5x)	1/8	1-1/2	24532		24632	22.10			24632-C3	26.30			
.032	**.096** (3x)	1/8	1-1/2	74032		74332	22.10			74332-C3	26.30			
.033	**.049** (1.5x)	1/8	1-1/2	24533		24633	22.10			24633-C3	26.30			
.033	**.099** (3x)	1/8	1-1/2	74033		74333	22.10			74333-C3	26.30			
.034	**.051** (1.5x)	1/8	1-1/2	24534		24634	22.10			24634-C3	26.30			
.034	**.102** (3x)	1/8	1-1/2	74034		74334	22.10			74334-C3	26.30			
.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	24535		24635	20.10	24535-C3		24635-C3	24.30		24635-C4	30.80
.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	74035		74335	20.10	74035-C3		74335-C3	24.30	74035-C4	74335-C4	30.80
.036	**.054** (1.5x)	1/8	1-1/2	24536		24636	20.90			24636-C3	25.10			
.036	**.108** (3x)	1/8	1-1/2	74036		74336	20.90			74336-C3	25.10			
.037	**.055** (1.5x)	1/8	1-1/2	24537		24637	20.90			24637-C3	25.10			
.037	**.111** (3x)	1/8	1-1/2	74037		74337	20.90			74337-C3	25.10			
.038	**.057** (1.5x)	1/8	1-1/2	24538		24638	20.90			24638-C3	25.10			
.038	**.114** (3x)	1/8	1-1/2	74038		74338	20.90			74338-C3	25.10			
.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	24539	823439	24639	20.50		823439-C3	24639-C3	24.70			
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	74039	835939	74339	20.50	74039-C3	835939-C3	74339-C3	24.70			
.040	**.060** (1.5x)	1/8	1-1/2	24540		24640	20.10	24540-C3		24640-C3	24.30		24640-C4	30.80
.040	**.120** (3x)	1/8	1-1/2	74040		74340	20.10	74040-C3		74340-C3	24.30	74040-C4	74340-C4	30.80
.041	**.123** (3x)	1/8	1-1/2	74041		74341	20.90			74341-C3	25.10			
.042	**.126** (3x)	1/8	1-1/2	74042		74342	20.90			74342-C3	25.10			
.043 (1.1 mm)	**.129** (3x)	1/8	1-1/2	74043		74343	20.90			74343-C3	25.10			
.044	**.132** (3x)	1/8	1-1/2	74044		74344	20.90			74344-C3	25.10			
.045	**.067** (1.5x)	1/8	1-1/2	24545		24645	20.10			24645-C3	24.30		24645-C4	30.80
.045	**.135** (3x)	1/8	1-1/2	74045		74345	20.10	74045-C3		74345-C3	24.30	74045-C4	74345-C4	30.80

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NEW SIZES!

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CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.046	**.138** (3x)	1/8	1-1/2	74046		74346	20.90			74346-C3	25.10			
.047 (3/64)	**.070** (1.5x)	1/8	1-1/2	24547	823447	24647	20.10	24547-C3	823447-C3	24647-C3	24.30		24647-C4	30.80
.047 (3/64)	**.141** (3x)	1/8	1-1/2	74047	835947	74347	20.10	74047-C3	835947-C3	74347-C3	24.30	74047-C4	74347-C4	30.80
.048	**.144** (3x)	1/8	1-1/2	74048		74348	20.90			74348-C3	25.10			
.049	**.147** (3x)	1/8	1-1/2	74049		74349	20.90			74349-C3	25.10			
.050	**.075** (1.5x)	1/8	1-1/2	24550		24650	20.10			24650-C3	24.30		24650-C4	30.80
.050	**.150** (3x)	1/8	1-1/2	74050		74350	20.10	74050-C3		74350-C3	24.30	74050-C4	74350-C4	30.80
.051 (1.3 mm)	**.153** (3x)	1/8	1-1/2	74051		74351	20.90			74351-C3	25.10			
.052	**.156** (3x)	1/8	1-1/2	74052		74352	20.90			74352-C3	25.10			
.053	**.159** (3x)	1/8	1-1/2	74053		74353	20.90			74353-C3	25.10			
.054	**.162** (3x)	1/8	1-1/2	74054		74354	20.90			74354-C3	25.10			
.055 (1.4 mm)	**.082** (1.5x)	1/8	1-1/2	24555		24655	20.10			24655-C3	24.30		24655-C4	30.80
.055 (1.4 mm)	**.165** (3x)	1/8	1-1/2	74055		74355	20.10	74055-C3		74355-C3	24.30	74055-C4	74355-C4	30.80
.056	**.168** (3x)	1/8	1-1/2	74056		74356	20.90			74356-C3	25.10			
.057	**.171** (3x)	1/8	1-1/2	74057		74357	20.90			74357-C3	25.10			
.058	**.174** (3x)	1/8	1-1/2	74058		74358	20.90			74358-C3	25.10			
.059 (1.5 mm)	**.177** (3x)	1/8	1-1/2	74059		74359	20.90			74359-C3	25.10			
.060	**.090** (1.5x)	1/8	1-1/2	24560		24660	20.10			24660-C3	24.30		24660-C4	30.80
.060	**.180** (3x)	1/8	1-1/2	74060		74360	20.10	74060-C3		74360-C3	24.30	74060-C4	74360-C4	30.80
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	24562	823462	24662	19.70	24562-C3	823462-C3	24662-C3	23.90		24662-C4	30.40
.062 (1/16)	**.186** (3x)	1/8	1-1/2	74062	835962	74362	19.70	74062-C3	835962-C3	74362-C3	23.90	74062-C4	74362-C4	30.40
.065	**.097** (1.5x)	1/8	1-1/2	24565		24665	19.70			24665-C3	23.90			
.065	**.195** (3x)	1/8	1-1/2	74065		74365	19.70			74365-C3	23.90	74065-C4	74365-C4	30.40
.070	**.105** (1.5x)	1/8	1-1/2	24570		24670	19.70			24670-C3	23.90			
.070	**.210** (3x)	1/8	1-1/2	74070		74370	19.70			74370-C3	23.90	74070-C4	74370-C4	30.40
.075	**.112** (1.5x)	1/8	1-1/2	24575		24675	19.70			24675-C3	23.90			
.075	**.225** (3x)	1/8	1-1/2	74075		74375	19.70			74375-C3	23.90			
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	24578	823478	24678	19.70	24578-C3	823478-C3	24678-C3	23.90		24678-C4	30.40
.078 (5/64)	**.234** (3x)	1/8	1-1/2	74078	835978	74378	19.70	74078-C3	835978-C3	74378-C3	23.90	74078-C4	74378-C4	30.40
.080	**.120** (1.5x)	1/8	1-1/2	24580		24680	19.70			24680-C3	23.90			
.080	**.240** (3x)	1/8	1-1/2	74080		74380	19.70			74380-C3	23.90	74080-C4	74380-C4	30.40
.085	**.127** (1.5x)	1/8	1-1/2	24585		24685	19.70			24685-C3	23.90			
.085	**.255** (3x)	1/8	1-1/2	74085		74385	19.70			74385-C3	23.90			
.090	**.135** (1.5x)	1/8	1-1/2	24590		24690	19.70			24690-C3	23.90			
.090	**.270** (3x)	1/8	1-1/2	74090		74390	19.70			74390-C3	23.90	74090-C4	74390-C4	30.40
.093 (3/32)	**.139** (1.5x)	1/8	1-1/2	24593	823493	24693	19.70	24593-C3	823493-C3	24693-C3	23.90		24693-C4	30.40
.093 (3/32)	**.279** (3x)	1/8	1-1/2	74093	835993	74393	19.70	74093-C3	835993-C3	74393-C3	23.90	74093-C4	74393-C4	30.40
.095	**.142** (1.5x)	1/8	1-1/2	24595		24695	19.70			24695-C3	23.90			
.095	**.285** (3x)	1/8	1-1/2	74095		74395	19.70			74395-C3	23.90			
.100	**.150** (1.5x)	1/8	1-1/2	24599		24699	19.70			24699-C3	23.90			
.100	**.300** (3x)	1/8	1-1/2	74100		74400	19.70			74400-C3	23.90	74100-C4	74400-C4	30.40
.105	**.158** (1.5x)	1/8	1-1/2	50900		51000	19.70			51000-C3	23.90			
.105	**.315** (3x)	1/8	1-1/2	74105		74405	19.70			74405-C3	23.90			
.109 (7/64)	**.164** (1.5x)	1/8	1-1/2	50901	823502	51001	19.70	50901-C3	823502-C3	51001-C3	23.90			
.109 (7/64)	**.375** (3x)	1/8	1-1/2	74109	836002	74409	19.70	74109-C3	836002-C3	74409-C3	23.90			

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CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED				AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.110	**.165** (1.5x)	1/8	1-1/2	50902		51002	19.70			51002-C3	23.90			
.110	**.330** (3x)	1/8	1-1/2	74110		74410	19.70			74410-C3	23.90			
.115	**.173** (1.5x)	1/8	1-1/2	50903		51003	19.70			51003-C3	23.90			
.115	**.345** (3x)	1/8	1-1/2	74115		74415	19.70			74415-C3	23.90			
.118 (3 mm)	**.177** (1.5x)	1/8	1-1/2	50904	823505	51004	20.10		823505-C3	51004-C3	24.30			
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	74118	836005	74418	20.10	74118-C3	836005-C3	74418-C3	24.30			
.120	**.180** (1.5x)	1/8	1-1/2	50905		51005	19.70			51005-C3	23.90			
.120	**.360** (3x)	1/8	1-1/2	74120		74420	19.70			74420-C3	23.90			
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	50908	823508	51008	19.70		823508-C3	51008-C3	23.90		51008-C4	30.40
.125 (1/8)	**.375** (3x)	1/8	1-1/2	74125	836008	74425	19.70	74125-C3	836008-C3	74425-C3	23.90	74125-C4	74425-C4	30.40
.140 (9/64)	**.220** (1.5x)	3/16	2	50909		51009	20.10			51009-C3	24.60			
.140 (9/64)	**.562** (3x)	3/16	2	74140		74440	20.10	74140-C3		74440-C3	24.60			
.156 (5/32)	**.281** (1.5x)	3/16	2	50910	823510	51010	20.10		823510-C3	51010-C3	24.60			
NEW .156 (5/32)	**.562** (3x)	3/16	2	74156	836010	74456	20.90	74156-C3	836010-C3	74456-C3	25.40			
NEW .172 (11/64)	**.625** (3x)	3/16	2			74472	23.40			74472-C3	27.90			
.187 (3/16)	**.312** (1.5x)	3/16	2	50912	823512	51012	20.90		823512-C3	51012-C3	25.40		51012-C4	35.60
NEW .187 (3/16)	**.625** (3x)	3/16	2	74187	836012	74487	20.90	74187-C3	836012-C3	74487-C3	25.40	74187-C4	74487-C4	35.60
NEW .203 (13/64)	**.625** (3x)	1/4	2-1/2			74490	25.60			74490-C3	31.80			
.218 (7/32)	**.330** (1.5x)	1/4	2-1/2	50914	823514	51014	23.10		823514-C3	51014-C3	29.30			
.218 (7/32)	**.625** (3x)	1/4	2-1/2	74193	836014	74493	23.10	74193-C3	836014-C3	74493-C3	29.30			
NEW .234 (15/64)	**.750** (3x)	1/4	2-1/2			74495	25.60			74495-C3	31.80			
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	50916	823516	51016	23.10		823516-C3	51016-C3	29.30		51016-C4	39.80
NEW .250 (1/4)	**.750** (3x)	1/4	2-1/2	74199	836016	74499	23.10	74199-C3	836016-C3	74499-C3	29.30	74199-C4	74499-C4	39.80
NEW .312 (5/16)	**.470** (1.5x)	5/16	2-1/2			51020	29.90			51020-C3	37.10			
NEW .312 (5/16)	**.812** (3x)	5/16	2-1/2			74620	29.90			74620-C3	37.10			
NEW .375 (3/8)	**.570** (1.5x)	3/8	2-1/2			51024	37.20			51024-C3	45.40			
NEW .375 (3/8)	**1.000** (3x)	3/8	2-1/2			74624	37.20			74624-C3	45.40			
NEW .500 (1/2)	**1.000** (2x)	1/2	3			74632	57.20			74632-C3	69.40			

SPEEDS & FEEDS ONLINE!

★★★★★

"Is it Christmas already? ….another handful of miniature #harveytool cutters!!"

— @constntparty

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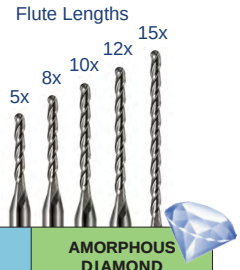
MINIATURE END MILLS

Ball – Long Flute

- **Long flute and long shank design for deep cavities**
- Mills deep pockets
- Center cutting
- Solid carbide
- CNC ground in the USA



BALL

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.010	**.050** (5x)	3	1/8	2-1/2	12810	40.20	12810-C3	44.40	12810-C4	50.90
.010	**.080** (8x)	3	1/8	2-1/2	34010	67.50	34010-C3	71.70		
.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	32215	37.10	32215-C3	41.30	32215-C4	47.80
.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	34015	64.70	34015-C3	68.90	34015-C4	75.40
.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	35115	79.90	35115-C3	84.10		
.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12820	31.90	12820-C3	36.10	12820-C4	42.60
.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	34020	60.10	34020-C3	64.30		
.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	35120	75.20	35120-C3	79.40		
.025	**.125** (5x)	3	1/8	2-1/2	12825	30.20	12825-C3	34.40	12825-C4	40.90
.025	**.203** (8x)	3	1/8	2-1/2	34025	58.70	34025-C3	62.90		
.030	**.150** (5x)	3	1/8	2-1/2	12830	29.40	12830-C3	33.60	12830-C4	40.10
.030	**.250** (8x)	3	1/8	2-1/2	34030	57.10	34030-C3	61.30		
.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	32231	29.40	32231-C3	33.60	32231-C4	40.10
.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	34031	57.10	34031-C3	61.30	34031-C4	67.80
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	957231	60.70	957231-C3	64.90		
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	35131	64.20	35131-C3	68.40	35131-C4	74.90
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	36031	80.20	36031-C3	84.40		
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12835	29.40	12835-C3	33.60	12835-C4	40.10
.035 (.9 mm)	**.281** (8x)	3	1/8	2-1/2	34035	57.10	34035-C3	61.30		
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	32239	29.40	32239-C3	33.60		
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	34039	57.10	34039-C3	61.30		
.040	**.200** (5x)	3	1/8	2-1/2	12840	29.40	12840-C3	33.60	12840-C4	40.10
.040	**.325** (8x)	3	1/8	2-1/2	34040	57.10	34040-C3	61.30		
.040	**.480** (12x)	3	1/8	2-1/2	35140	64.20	35140-C3	68.40		
.045	**.225** (5x)	3	1/8	2-1/2	12845	29.40	12845-C3	33.60	12845-C4	40.10
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	32247	29.40	32247-C3	33.60	32247-C4	40.10
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	34047	53.90	34047-C3	58.10	34047-C4	64.60
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	35147	64.20	35147-C3	68.40	35147-C4	74.90
.050	**.300** (6x)	3	1/8	2-1/2	12850	29.40	12850-C3	33.60	12850-C4	40.10
.050	**.400** (8x)	3	1/8	2-1/2	34050	57.10	34050-C3	61.30		
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	32255	26.10	32255-C3	30.30		
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12855	29.40	12855-C3	33.60	12855-C4	40.10
.060	**.312** (5x)	3	1/8	2-1/2	32260	26.10	32260-C3	30.30		
.060	**.500** (8x)	3	1/8	2-1/2	12860	29.70	12860-C3	33.90	12860-C4	40.40

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Ball – Long Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	32262	26.10	32262-C3	30.30	32262-C4	36.80
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	34062	29.40	34062-C3	33.60	34062-C4	40.10
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	957262	39.90	957262-C3	44.10		
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	35162	50.40	35162-C3	54.60	35162-C4	61.10
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	36062	68.70	36062-C3	72.90	36062-C4	79.40
.065	**.500** (8x)	3	1/8	2-1/2	12865	29.10	12865-C3	33.30	12865-C4	39.80
.070	**.500** (7x)	3	1/8	2-1/2	12870	29.10	12870-C3	33.30	12870-C4	39.80
.075	**.500** (7x)	3	1/8	2-1/2	12875	29.10	12875-C3	33.30	12875-C4	39.80
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	32278	26.10	32278-C3	30.30	32278-C4	36.80
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	34078	29.40	34078-C3	33.60	34078-C4	40.10
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	35178	50.40	35178-C3	54.60	35178-C4	61.10
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	36078	68.70	36078-C3	72.90	36078-C4	79.40
.080	**.750** (9x)	3	1/8	2-1/2	12880	29.40	12880-C3	33.60	12880-C4	40.10
.085	**.750** (9x)	3	1/8	2-1/2	12885	29.40	12885-C3	33.60	12885-C4	40.10
.090	**.750** (8x)	3	1/8	2-1/2	12890	29.40	12890-C3	33.60	12890-C4	40.10
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	32293	26.10	32293-C3	30.30	32293-C4	36.80
.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	34093	29.40	34093-C3	33.60	34093-C4	40.10
.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	957293	39.90	957293-C3	44.10		
.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	35193	50.40	35193-C3	54.60	35193-C4	61.10
.093 (3/32)	**1.400** (15x)	3	1/8	3	36093	70.40	36093-C3	74.60	36093-C4	81.10
.095	**.750** (8x)	3	1/8	2-1/2	12895	29.10	12895-C3	33.30	12895-C4	39.80
.100	**.500** (5x)	3	1/8	2-1/2	32299	26.10	32299-C3	30.30		
.100	**.750** (7.5x)	3	1/8	2-1/2	12899	29.10	12899-C3	33.30	12899-C4	39.80
.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	32302	26.10	32302-C3	30.30		
.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	34102	29.40	34102-C3	33.60		
.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	32305	26.10	32305-C3	30.30		
.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	34105	29.40	34105-C3	33.60		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	32308	24.20	32308-C3	28.40	32308-C4	34.90
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	34108	26.70	34108-C3	30.90	34108-C4	37.40
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	957308	39.40	957308-C3	43.60		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35208	52.40	35208-C3	56.60	35208-C4	63.10
.125 (1/8)	**1.875** (15x)	3	1/8	3	36108	70.40	36108-C3	74.60	36108-C4	81.10
.140 (9/64)	**.750** (5x)	4	3/16	3	12609	28.40	12609-C3	32.90		
.140 (9/64)	**1.125** (8x)	4	3/16	3	34109	31.70	34109-C3	36.20		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12610	28.40	12610-C3	32.90	12610-C4	43.10
.156 (5/32)	**1.250** (8x)	4	3/16	3	34110	31.70	34110-C3	36.20		
.187 (3/16)	**1.125** (6x)	4	3/16	3	12612	28.40	12612-C3	32.90	77112	43.10
.187 (3/16)	**1.500** (8x)	4	3/16	3	34112	31.70	34112-C3	36.20		
.187 (3/16)	**1.875** (10x)	4	3/16	3	957312	44.40	957312-C3	48.90		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12616	31.90	12616-C3	39.10	77116	48.60
.250 (1/4)	**2.000** (8x)	4	1/4	4	34116	35.40	34116-C3	42.60		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12620	43.70	12620-C3	52.40		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12624	54.90	12624-C3	66.10		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12632	66.70	12632-C3	78.90		

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.010	.030	**.050** (5x)	1/8	1-1/2	948610	982810	58.40	982810-C3	62.60
.010	.030	**.080** (8x)	1/8	1-1/2	76610	76810	58.40	76810-C3	62.60
.010	.030	**.125** (12x)	1/8	1-1/2	950210	991110	59.40	991110-C3	63.60
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2	948615	982815	45.40	982815-C3	49.60
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2	76615	76815	46.20	76815-C3	50.40
.015 (1/64)	.045	**.156** (10x)	1/8	1-1/2		851015	47.90	851015-C3	52.10
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2	950215	991115	47.90	991115-C3	52.10
.015 (1/64)	.045	**.225** (15x)	1/8	1-1/2		861215	49.40	861215-C3	53.60
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2	948620	982820	44.50	982820-C3	48.70
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2	76620	76820	44.50	76820-C3	48.70
.020 (.5 mm)	.060	**.200** (10x)	1/8	1-1/2		851020	45.90	851020-C3	50.10
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2	950220	991120	45.90	991120-C3	50.10
.020 (.5 mm)	.060	**.300** (15x)	1/8	1-1/2		861220	47.50	861220-C3	51.70
.025	.075	**.125** (5x)	1/8	1-1/2	948625	982825	40.70	982825-C3	44.90
.025	.075	**.213** (8x)	1/8	1-1/2	76625	76825	40.70	76825-C3	44.90
.025	.075	**.312** (12x)	1/8	1-1/2	950225	991125	42.10	991125-C3	46.30
.030	.090	**.156** (5x)	1/8	1-1/2	948630	982830	40.70	982830-C3	44.90
.030	.090	**.270** (9x)	1/8	1-1/2	76630	76830	40.70	76830-C3	44.90
.030	.090	**.375** (12x)	1/8	1-1/2	950230	991130	42.10	991130-C3	46.30
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2	948631	982831	39.90	982831-C3	44.10
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2	76631	76831	40.70	76831-C3	44.90
.031 (1/32)	.093	**.312** (10x)	1/8	1-1/2		851031	42.10	851031-C3	46.30
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2	950231	991131	42.10	991131-C3	46.30
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2		861231	43.70	861231-C3	47.90
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2	948635	982835	39.90	982835-C3	44.10
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2	76635	76835	40.70	76835-C3	44.90
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2	948639	982839	39.90	982839-C3	44.10
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2	903839	904439	40.70	904439-C3	44.90
.040	.120	**.203** (5x)	1/8	1-1/2	948640	982840	39.90	982840-C3	44.10
.040	.120	**.360** (9x)	1/8	1-1/2	76640	76840	40.70	76840-C3	44.90
.040	.120	**.480** (12x)	1/8	1-1/2	950240	991140	42.10	991140-C3	46.30
.045	.135	**.405** (9x)	1/8	1-1/2	76645	76845	39.40	76845-C3	43.60
.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2	948647	982847	38.70	982847-C3	42.90
.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2	76647	76847	39.40	76847-C3	43.60
.047 (3/64)	.141	**.480** (10x)	1/8	1-1/2		851047	40.70	851047-C3	44.90
.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2	950247	991147	40.70	991147-C3	44.90
.047 (3/64)	.141	**.710** (15x)	1/8	2		861247	42.40	861247-C3	46.60

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.050	.150	**.250** (5x)	1/8	1-1/2	948650	982850	38.70	982850-C3	42.90
.050	.150	**.500** (10x)	1/8	1-1/2	76650	76850	39.40	76850-C3	43.60
.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2	76655	76855	39.40	76855-C3	43.60
.060	.180	**.500** (8x)	1/8	1-1/2	76660	76860	39.40	76860-C3	43.60
.060	.180	**.720** (12x)	1/8	2	950260	991160	40.70	991160-C3	44.90
.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2	948662	982862	38.70	982862-C3	42.90
.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2	76662	76862	39.40	76862-C3	43.60
.062 (1/16)	.186	**.625** (10x)	1/8	2		851062	40.70	851062-C3	44.90
.062 (1/16)	.186	**.750** (12x)	1/8	2	950262	991162	40.70	991162-C3	44.90
.062 (1/16)	.186	**.950** (15x)	1/8	2		861262	42.40	861262-C3	46.60
.065	.195	**.500** (8x)	1/8	1-1/2	76665	76865	39.40	76865-C3	43.60
.070	.210	**.500** (7x)	1/8	1-1/2	76670	76870	39.40	76870-C3	43.60
.075	.225	**.500** (7x)	1/8	1-1/2	76675	76875	39.40	76875-C3	43.60
.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2	76678	76878	39.40	76878-C3	43.60
.078 (5/64)	.234	**.800** (10x)	1/8	2		851078	40.70	851078-C3	44.90
.078 (5/64)	.234	**.940** (12x)	1/8	2	950278	991178	40.70	991178-C3	44.90
.078 (5/64)	.234	**1.187** (15x)	1/8	2-1/2		861278	42.40	861278-C3	46.60
.080	.240	**.500** (6x)	1/8	1-1/2	76680	76880	39.40	76880-C3	43.60
.085	.255	**.500** (6x)	1/8	1-1/2	76685	76885	38.70	76885-C3	42.90
.090	.270	**.625** (7x)	1/8	1-1/2	76690	76890	39.40	76890-C3	43.60
.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2	948693	982893	39.40	982893-C3	43.60
.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2	76693	76893	39.40	76893-C3	43.60
.093 (3/32)	.279	**.950** (10x)	1/8	2		851093	40.70	851093-C3	44.90
.093 (3/32)	.279	**1.125** (12x)	1/8	2	950293	991193	40.70	991193-C3	44.90
.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2		861293	42.40	861293-C3	46.60
.095	.285	**.625** (6x)	1/8	1-1/2	76695	76895	39.40	76895-C3	43.60
.100	.300	**.625** (6x)	1/8	1-1/2	76700	76900	39.40	76900-C3	43.60
.109 (7/64)	.327	**.570** (5x)	1/8	1-1/2	948602	982902	39.40	982902-C3	43.60
.109 (7/64)	.327	**.900** (8x)	1/8	2	903802	904402	40.70	904402-C3	44.90
.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2	948705	982905	39.40	982905-C3	43.60
.118 (3 mm)	.354	**.950** (8x)	1/8	2	903805	904405	40.70	904405-C3	44.90
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	948708	982908	39.40	982908-C3	43.60
.125 (1/8)	.375	**1.000** (8x)	1/8	2	76708	76908	39.40	76908-C3	43.60
.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2		851108	41.90	851108-C3	46.10
.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	950308	991208	41.90	991208-C3	46.10
.125 (1/8)	.375	**1.875** (15x)	1/8	3		861308	44.70	861308-C3	48.90
.187 (3/16)	.570	**1.000** (5x)	3/16	2	948712	982912	45.40	982912-C3	49.90
.187 (3/16)	.570	**1.500** (8x)	3/16	2-1/2	76712	76912	45.40	76912-C3	49.90
.250 (1/4)	.750	**1.250** (5x)	1/4	2-1/2	948716	982916	49.70	982916-C3	55.90
.250 (1/4)	.750	**2.000** (8x)	1/4	4	76716	76916	49.70	76916-C3	56.90

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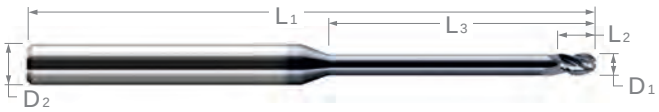
MINIATURE END MILLS

Ball – Long Reach, Stub Flute



Reduced Neck Diameter to Avoid Heeling

- **Long length design for deep cavities, up to 8" overall length**
- Stub flutes for maximum rigidity
- Length of cut = 1½ x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

BALL

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005" −.0005"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.010	.015	**.030** (3x)	3	1/8	2-1/2	47910	53.50	47910-C3	57.70			
.010	.015	**.050** (5x)	3	1/8	2-1/2	33410	53.50	33410-C3	57.70	33410-C4	64.20	
.010	.015	**.080** (8x)	3	1/8	2-1/2	34210	54.10	34210-C3	58.30	34210-C4	64.80	
.010	.015	**.100** (10x)	3	1/8	2-1/2	966010	56.40	966010-C3	60.60			
.010	.015	**.125** (12x)	3	1/8	2-1/2	35610	56.40	35610-C3	60.60	35610-C4	67.10	
.010	.015	**.150** (15x)	3	1/8	2-1/2	49210	63.50	49210-C3	67.70	49210-C4	74.20	
.010	.015	**.180** (18x)	3	1/8	2-1/2	970710	70.70	970710-C3	74.90			
.011	.016	**.055** (5x)	3	1/8	2-1/2	33411	53.50	33411-C3	57.70			NEW
.011	.016	**.088** (8x)	3	1/8	2-1/2	34211	54.10	34211-C3	58.30			NEW
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33412	53.50	33412-C3	57.70			NEW
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34212	54.10	34212-C3	58.30			NEW
.013	.019	**.065** (5x)	3	1/8	2-1/2	33413	53.50	33413-C3	57.70			NEW
.013	.019	**.104** (8x)	3	1/8	2-1/2	34213	54.10	34213-C3	58.30			NEW
.014	.021	**.070** (5x)	3	1/8	2-1/2	33414	53.50	33414-C3	57.70			NEW
.014	.021	**.112** (8x)	3	1/8	2-1/2	34214	54.10	34214-C3	58.30			NEW
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47915	44.90	47915-C3	49.10			
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	844415	44.90	844415-C3	49.10			
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33415	44.90	33415-C3	49.10	33415-C4	55.60	
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	860615	44.90	860615-C3	49.10			
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	868215	44.90	868215-C3	49.10			
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34215	45.70	34215-C3	49.90	34215-C4	56.40	
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	966015	46.90	966015-C3	51.10	966015-C4	57.60	
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35615	46.90	35615-C3	51.10	35615-C4	57.60	
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	49215	51.90	49215-C3	56.10	49215-C4	62.60	
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	970715	59.10	970715-C3	63.30			
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	59415	59.10	59415-C3	63.30	59415-C4	69.80	
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	40115	74.90	40115-C3	79.10	***25x Diameter!***		
.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33416	46.90	33416-C3	51.10			NEW
.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34216	47.90	34216-C3	52.10			NEW
.017	.026	**.085** (5x)	3	1/8	2-1/2	33417	46.90	33417-C3	51.10			NEW
.017	.026	**.136** (8x)	3	1/8	2-1/2	34217	47.90	34217-C3	52.10			NEW
.018	.027	**.090** (5x)	3	1/8	2-1/2	33418	46.90	33418-C3	51.10			NEW
.018	.027	**.144** (8x)	3	1/8	2-1/2	34218	47.90	34218-C3	52.10			NEW
.019	.029	**.095** (5x)	3	1/8	2-1/2	33419	46.90	33419-C3	51.10			NEW
.019	.029	**.152** (8x)	3	1/8	2-1/2	34219	47.90	34219-C3	52.10			NEW
.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47920	43.40	47920-C3	47.60			
.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	844420	43.40	844420-C3	47.60			
.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33420	43.40	33420-C3	47.60	33420-C4	54.10	

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	860620	43.40	860620-C3	47.60		
	.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	868220	43.40	868220-C3	47.60		
	.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34220	44.40	34220-C3	48.60	34220-C4	55.10
	.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	966020	45.50	966020-C3	49.70		
	.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35620	45.50	35620-C3	49.70	35620-C4	56.20
	.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	49220	50.40	49220-C3	54.60	49220-C4	61.10
	.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	970720	58.70	970720-C3	62.90		
	.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	59420	58.70	59420-C3	62.90	59420-C4	69.40
	.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	40120	73.10	40120-C3	77.30	***25x Diameter!***	
	.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	922720	83.70	922720-C3	87.90	***30x Diameter!***	
NEW	.021	.031	**.105** (5x)	3	1/8	2-1/2	33421	46.90	33421-C3	51.10		
NEW	.021	.031	**.168** (8x)	3	1/8	2-1/2	34221	47.90	34221-C3	52.10		
NEW	.022	.033	**.110** (5x)	3	1/8	2-1/2	33422	46.90	33422-C3	51.10		
NEW	.022	.033	**.176** (8x)	3	1/8	2-1/2	34222	47.90	34222-C3	52.10		
NEW	.023	.035	**.115** (5x)	3	1/8	2-1/2	33423	46.90	33423-C3	51.10		
NEW	.023	.035	**.187** (8x)	3	1/8	2-1/2	34223	47.90	34223-C3	52.10		
NEW	.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33424	46.90	33424-C3	51.10		
NEW	.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34224	47.90	34224-C3	52.10		
	.025	.037	**.075** (3x)	3	1/8	2-1/2	47925	38.70	47925-C3	42.90		
	.025	.037	**.125** (5x)	3	1/8	2-1/2	33425	37.70	33425-C3	41.90	33425-C4	48.40
	.025	.037	**.203** (8x)	3	1/8	2-1/2	34225	38.20	34225-C3	42.40	34225-C4	48.90
	.025	.037	**.250** (10x)	3	1/8	2-1/2	966025	39.90	966025-C3	44.10		
	.025	.037	**.312** (12x)	3	1/8	2-1/2	35625	39.40	35625-C3	43.60	35625-C4	50.10
	.025	.037	**.375** (15x)	3	1/8	2-1/2	49225	45.10	49225-C3	49.30	49225-C4	55.80
NEW	.026	.039	**.130** (5x)	3	1/8	2-1/2	33426	46.90	33426-C3	51.10		
NEW	.026	.039	**.208** (8x)	3	1/8	2-1/2	34226	47.90	34226-C3	52.10		
NEW	.027	.041	**.135** (5x)	3	1/8	2-1/2	33427	46.90	33427-C3	51.10		
NEW	.027	.041	**.216** (8x)	3	1/8	2-1/2	34227	47.90	34227-C3	52.10		
NEW	.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33428	46.90	33428-C3	51.10		
NEW	.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34228	47.90	34228-C3	52.10		
NEW	.029	.043	**.145** (5x)	3	1/8	2-1/2	33429	46.90	33429-C3	51.10		
NEW	.029	.043	**.232** (8x)	3	1/8	2-1/2	34229	47.90	34229-C3	52.10		
	.030	.045	**.090** (3x)	3	1/8	2-1/2	47930	38.70	47930-C3	42.90		
	.030	.045	**.156** (5x)	3	1/8	2-1/2	33430	37.70	33430-C3	41.90	33430-C4	48.40
	.030	.045	**.250** (8x)	3	1/8	2-1/2	34230	38.20	34230-C3	42.40	34230-C4	48.90
	.030	.045	**.312** (10x)	3	1/8	2-1/2	966030	39.40	966030-C3	43.60		
	.030	.045	**.375** (12x)	3	1/8	2-1/2	35630	39.40	35630-C3	43.60	35630-C4	50.10
	.030	.045	**.450** (15x)	3	1/8	2-1/2	49230	45.10	49230-C3	49.30	49230-C4	55.80
	.030	.045	**.540** (18x)	3	1/8	2-1/2	970730	53.20	970730-C3	57.40		
	.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47931	37.70	47931-C3	41.90	47931-C4	48.40
	.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	844431	37.70	844431-C3	41.90		
	.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33431	37.70	33431-C3	41.90	33431-C4	48.40
	.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	860631	37.70	860631-C3	41.90		
	.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	868231	37.70	868231-C3	41.90		
	.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34231	38.20	34231-C3	42.40	34231-C4	48.90
	.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	966031	39.40	966031-C3	43.60	966031-C4	50.10

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35631	39.40	35631-C3	43.60	35631-C4	50.10
.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	49231	45.10	49231-C3	49.30	49231-C4	55.80
.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	970731	53.20	970731-C3	57.40	970731-C4	63.90
.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	59431	53.20	59431-C3	57.40	59431-C4	63.90
.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	40131	63.70	40131-C3	67.90	40131-C4	74.40
.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	922731	72.40	922731-C3	76.60	***30x Diameter!***	
.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33435	37.70	33435-C3	41.90	33435-C4	48.40
.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34235	38.20	34235-C3	42.40	34235-C4	48.90
.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35635	39.40	35635-C3	43.60	35635-C4	50.10
.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	49235	45.10	49235-C3	49.30		
.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33439	37.70	33439-C3	41.90		
.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34239	38.70	34239-C3	42.90		
.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	966039	39.90	966039-C3	44.10		
.040	.060	**.120** (3x)	3	1/8	2-1/2	47940	37.70	47940-C3	41.90		
.040	.060	**.203** (5x)	3	1/8	2-1/2	33440	37.70	33440-C3	41.90	33440-C4	48.40
.040	.060	**.325** (8x)	3	1/8	2-1/2	34240	38.20	34240-C3	42.40	34240-C4	48.90
.040	.060	**.400** (10x)	3	1/8	2-1/2	966040	39.90	966040-C3	44.10	966040-C4	50.60
.040	.060	**.480** (12x)	3	1/8	2-1/2	35640	39.40	35640-C3	43.60	35640-C4	50.10
.040	.060	**.600** (15x)	3	1/8	2-1/2	49240	45.10	49240-C3	49.30	49240-C4	55.80
.040	.060	**.720** (18x)	3	1/8	2-1/2	970740	53.20	970740-C3	57.40		
.040	.060	**.800** (20x)	3	1/8	2-1/2	59440	53.20	59440-C3	57.40	59440-C4	63.90
.040	.060	**1.000** (25x)	3	1/8	2-1/2	40140	63.70	40140-C3	67.90	***25x Diameter!***	
.045	.067	**.225** (5x)	3	1/8	2-1/2	33445	36.70	33445-C3	40.90	33445-C4	47.40
.045	.067	**.375** (8x)	3	1/8	2-1/2	34245	37.40	34245-C3	41.60	34245-C4	48.10
.045	.067	**.550** (12x)	3	1/8	2-1/2	35645	38.40	35645-C3	42.60	35645-C4	49.10
.045	.067	**.680** (15x)	3	1/8	2-1/2	49245	42.70	49245-C3	46.90		
.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47947	36.70	47947-C3	40.90		
.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	844447	36.70	844447-C3	40.90		
.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33447	36.70	33447-C3	40.90	33447-C4	47.40
.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	860647	36.70	860647-C3	40.90		
.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	868247	36.70	868247-C3	40.90		
.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34247	37.40	34247-C3	41.60	34247-C4	48.10
.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	966047	38.40	966047-C3	42.60	966047-C4	49.10
.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35647	38.40	35647-C3	42.60	35647-C4	49.10
.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	49247	42.70	49247-C3	46.90	49247-C4	53.40
.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	970747	50.10	970747-C3	54.30		
.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	59447	50.10	59447-C3	54.30	59447-C4	60.80
.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	40147	61.40	40147-C3	65.60	***25x Diameter!***	
.050	.075	**.150** (3x)	3	1/8	2-1/2	47950	36.70	47950-C3	40.90		
.050	.075	**.250** (5x)	3	1/8	2-1/2	33450	36.70	33450-C3	40.90	33450-C4	47.40
.050	.075	**.400** (8x)	3	1/8	2-1/2	34250	37.40	34250-C3	41.60	34250-C4	48.10
.050	.075	**.500** (10x)	3	1/8	2-1/2	966050	38.40	966050-C3	42.60		
.050	.075	**.600** (12x)	3	1/8	2-1/2	35650	38.40	35650-C3	42.60	35650-C4	49.10
.050	.075	**.750** (15x)	3	1/8	2-1/2	49250	42.70	49250-C3	46.90		

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47955	36.70	47955-C3	40.90		
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33455	36.70	33455-C3	40.90	33455-C4	47.40
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34255	37.40	34255-C3	41.60	34255-C4	48.10
.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	966055	38.40	966055-C3	42.60		
.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35655	38.40	35655-C3	42.60	35655-C4	49.10
.060	.090	**.180** (3x)	3	1/8	2-1/2	47960	36.70	47960-C3	40.90		
.060	.090	**.312** (5x)	3	1/8	2-1/2	33460	36.70	33460-C3	40.90	33460-C4	47.40
.060	.090	**.500** (8x)	3	1/8	2-1/2	34260	37.40	34260-C3	41.60	34260-C4	48.10
.060	.090	**.625** (10x)	3	1/8	2-1/2	966060	38.40	966060-C3	42.60		
.060	.090	**.720** (12x)	3	1/8	2-1/2	35660	38.40	35660-C3	42.60	35660-C4	49.10
.060	.090	**.900** (15x)	3	1/8	2-1/2	49260	42.70	49260-C3	46.90		
.060	.090	**1.062** (18x)	3	1/8	2-1/2	970760	50.10	970760-C3	54.30		
.060	.090	**1.200** (20x)	3	1/8	2-1/2	59460	50.10	59460-C3	54.30		
.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47962	36.70	47962-C3	40.90	47962-C4	47.40
.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	844462	36.70	844462-C3	40.90		
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33462	36.70	33462-C3	40.90	33462-C4	47.40
.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	860662	36.70	860662-C3	40.90		
.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	868262	36.70	868262-C3	40.90		
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34262	37.40	34262-C3	41.60	34262-C4	48.10
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	966062	38.40	966062-C3	42.60	966062-C4	49.10
.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35662	38.40	35662-C3	42.60	35662-C4	49.10
.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	49262	42.70	49262-C3	46.90	49262-C4	53.40
.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	970762	50.10	970762-C3	54.30	970762-C4	60.80
.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	59462	50.10	59462-C3	54.30	59462-C4	60.80
.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	40162	61.40	40162-C3	65.90	40162-C4	72.10
.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	922762	75.90	922762-C3	80.10	***30x Diameter!***	
.065	.097	**.325** (5x)	3	1/8	2-1/2	33465	36.70	33465-C3	40.90		
.065	.097	**.530** (8x)	3	1/8	2-1/2	34265	37.40	34265-C3	41.60	34265-C4	48.10
.070	.105	**.375** (5x)	3	1/8	2-1/2	33470	36.70	33470-C3	40.90		
.070	.105	**.570** (8x)	3	1/8	2-1/2	34270	37.40	34270-C3	41.60	34270-C4	48.10
.075	.112	**.375** (5x)	3	1/8	2-1/2	33475	36.70	33475-C3	40.90		
.075	.112	**.625** (8x)	3	1/8	2-1/2	34275	37.40	34275-C3	41.60	34275-C4	48.10
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47978	36.70	47978-C3	40.90		
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	844478	36.70	844478-C3	40.90		
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33478	36.70	33478-C3	40.90	33478-C4	47.40
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	860678	36.70	860678-C3	40.90		
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	868278	36.70	868278-C3	40.90		
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34278	37.40	34278-C3	41.60	34278-C4	48.10
.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	966078	38.40	966078-C3	42.60		
.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35678	38.40	35678-C3	42.60	35678-C4	49.10
.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	49278	42.70	49278-C3	46.90	49278-C4	53.40
.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	970778	50.10	970778-C3	54.30		
.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	59478	50.10	59478-C3	54.30		
.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	40178	61.40	40178-C3	65.60	***25x Diameter!***	

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.080	.120	**.406** (5x)	3	1/8	2-1/2	33480	36.70	33480-C3	40.90		
.080	.120	**.650** (8x)	3	1/8	2-1/2	34280	37.40	34280-C3	41.60	34280-C4	48.10
.085	.127	**.425** (5x)	3	1/8	2-1/2	33485	36.70	33485-C3	40.90		
.085	.127	**.700** (8x)	3	1/8	2-1/2	34285	37.40	34285-C3	41.60	34285-C4	48.10
.090	.135	**.450** (5x)	3	1/8	2-1/2	33490	36.70	33490-C3	40.90		
.090	.135	**.750** (8x)	3	1/8	2-1/2	34290	37.40	34290-C3	41.60	34290-C4	48.10
.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47993	36.70	47993-C3	40.90		
.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	844493	36.70	844493-C3	40.90		
.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33493	36.70	33493-C3	40.90	33493-C4	47.40
.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	860693	36.70	860693-C3	40.90		
.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	868293	36.70	868293-C3	40.90		
.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34293	37.40	34293-C3	41.60	34293-C4	48.10
.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	966093	38.40	966093-C3	42.60	966093-C4	49.10
.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35693	38.40	35693-C3	42.60	35693-C4	49.10
.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	49293	44.90	49293-C3	49.10	49293-C4	55.60
.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	970793	53.10	970793-C3	57.30		
.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	59493	55.40	59493-C3	59.90		
.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	40193	63.50	40193-C3	68.10	***25x Diameter!***	
.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	922793	82.70	922793-C3	87.20	***30x Diameter!***	
.095	.142	**.500** (5x)	3	1/8	2-1/2	33495	36.70	33495-C3	40.90		
.095	.142	**.750** (8x)	3	1/8	2-1/2	34295	37.40	34295-C3	41.60	34295-C4	48.10
.100	.150	**.300** (3x)	3	1/8	2-1/2	978500	36.70	978500-C3	40.90		
.100	.150	**.500** (5x)	3	1/8	2-1/2	33500	36.70	33500-C3	40.90		
.100	.150	**.800** (8x)	3	1/8	2-1/2	34300	37.40	34300-C3	41.60	34300-C4	48.10
.100	.150	**1.000** (10x)	3	1/8	2-1/2	966100	38.40	966100-C3	42.60		
.100	.150	**1.200** (12x)	3	1/8	2-1/2	35700	38.40	35700-C3	42.60		
.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33502	36.70	33502-C3	40.90		
.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34302	37.40	34302-C3	41.60		
.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33505	36.70	33505-C3	40.90		
.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34305	37.40	34305-C3	41.60		
.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	966105	38.40	966105-C3	42.60		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	3	1/8	2-1/2	978508	36.70	978508-C3	40.90	978508-C4	47.40
.125 (1/8)	.187	**.500** (4x)	3	1/8	2-1/2	844508	36.70	844508-C3	40.90		
.125 (1/8)	.187	**.625** (5x)	3	1/8	2-1/2	33508	36.70	33508-C3	40.90	33508-C4	47.40
.125 (1/8)	.187	**.750** (6x)	3	1/8	2-1/2	860708	36.70	860708-C3	40.90		
.125 (1/8)	.187	**.875** (7x)	3	1/8	2-1/2	868308	36.70	868308-C3	40.90		
.125 (1/8)	.187	**1.000** (8x)	3	1/8	2-1/2	34308	37.40	34308-C3	41.60	34308-C4	48.10
.125 (1/8)	.187	**1.250** (10x)	3	1/8	2-1/2	966108	40.10	966108-C3	44.30	966108-C4	50.80
.125 (1/8)	.187	**1.500** (12x)	3	1/8	3	35708	40.10	35708-C3	44.30	35708-C4	50.80
.125 (1/8)	.187	**1.875** (15x)	3	1/8	3	49308	44.90	49308-C3	49.10	49308-C4	55.60
.125 (1/8)	.187	**2.250** (18x)	3	1/8	4	970808	53.10	970808-C3	57.60	970808-C4	63.80
.125 (1/8)	.187	**2.500** (20x)	3	1/8	4	59508	53.10	59508-C3	57.60	59508-C4	68.80
.125 (1/8)	.187	**3.125** (25x)	3	1/8	4	959108	64.40	959108-C3	68.90	***25x Diameter!***	
.125 (1/8)	.187	**3.750** (30x)	3	1/8	6	922808	77.10	922808-C3	82.70	***30x Diameter!***	

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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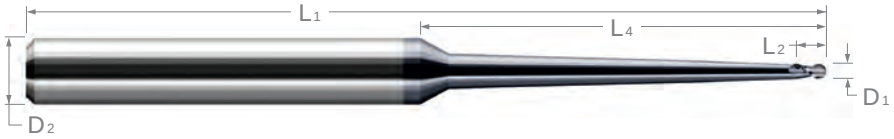
	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.140 (9/64)	.220	**.750** (5x)	3	3/16	3	33509	40.50	33509-C3	45.10		
	.140 (9/64)	.220	**1.125** (8x)	3	3/16	3	34309	41.20	34309-C3	45.70		
	.140 (9/64)	.220	**1.450** (10x)	3	3/16	3	966109	43.90	966109-C3	48.40		
	.156 (5/32)	.234	**.470** (3x)	3	3/16	3	978510	40.50	978510-C3	45.10		
	.156 (5/32)	.234	**.750** (5x)	3	3/16	3	33510	40.50	33510-C3	45.10		
	.156 (5/32)	.234	**1.250** (8x)	3	3/16	3	34310	41.20	34310-C3	45.70	34310-C4	55.90
	.156 (5/32)	.234	**1.570** (10x)	3	3/16	3	966110	43.90	966110-C3	48.40		
	.156 (5/32)	.234	**1.875** (12x)	3	3/16	4	35710	43.90	35710-C3	50.10		
	.156 (5/32)	.234	**2.375** (15x)	3	3/16	4	49310	46.40	49310-C3	52.60		
	.187 (3/16)	.281	**1.000** (5x)	3	3/16	3	33512	40.50	33512-C3	45.10	33512-C4	55.20
	.187 (3/16)	.281	**1.500** (8x)	3	3/16	3	34312	41.20	34312-C3	45.70	34312-C4	55.90
	.187 (3/16)	.281	**1.875** (10x)	3	3/16	4	966112	43.90	966112-C3	50.10	966112-C4	59.60
	.187 (3/16)	.281	**2.250** (12x)	3	3/16	4	35712	43.90	35712-C3	50.10	35712-C4	59.60
	.187 (3/16)	.281	**2.812** (15x)	3	3/16	4	49312	46.40	49312-C3	52.60	49312-C4	62.10
	.187 (3/16)	.281	**3.375** (18x)	3	3/16	6	970812	62.10	970812-C3	70.30		
NEW	.218 (7/32)	.330	**1.125** (5x)	3	1/4	4	33514	46.70	33514-C3	53.90		
NEW	.218 (7/32)	.330	**1.750** (8x)	3	1/4	4	34314	47.50	34314-C3	54.70		
	.250 (1/4)	.375	**.750** (3x)	3	1/4	4	978516	44.70	978516-C3	51.90		
	.250 (1/4)	.375	**1.250** (5x)	3	1/4	4	33516	44.70	33516-C3	51.90	33516-C4	61.40
	.250 (1/4)	.375	**2.000** (8x)	3	1/4	4	34316	45.50	34316-C3	52.70	34316-C4	62.20
	.250 (1/4)	.375	**2.500** (10x)	3	1/4	4	966116	50.90	966116-C3	58.10		
	.250 (1/4)	.375	**3.000** (12x)	3	1/4	6	35716	53.50	35716-C3	61.70	35716-C4	77.70
	.250 (1/4)	.375	**3.750** (15x)	3	1/4	6	49316	55.90	49316-C3	64.10		
	.250 (1/4)	.375	**4.375** (17.5x)	4	1/4	6	14916	83.70	14916-C3	91.90		
	.250 (1/4)	.375	**5.000** (20x)	3	1/4	8	59516	109.20	59516-C3	121.40		
	.312 (5/16)	.470	**4.343** (14x)	4	5/16	6	14920	101.10	14920-C3	113.30		
	.375 (3/8)	.570	**2.000** (5x)	3	3/8	4	33524	77.90	33524-C3	89.10		
	.375 (3/8)	.570	**3.000** (8x)	3	3/8	6	34324	104.40	34324-C3	117.10		
	.375 (3/8)	.562	**4.312** (11.5x)	4	3/8	6	14924	114.70	14924-C3	127.40		
	.500 (1/2)	.750	**5.750** (11.5x)	4	1/2	8	14932	199.50	14932-C3	224.70		
	.625 (5/8)	.937	**5.687** (9x)	4	5/8	8	14940	333.90				
	.750 (3/4)	1.125	**5.625** (7.5x)	4	3/4	8	14948	405.10				

SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters)



- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Maximum Reach & Maximum Rigidity!

CUTTER DIA.	LOC	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED		AlTiN NANO COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.015	.023	1/2	6.4°	1/8	2-1/2	.060	.080	.120	.375	.395	.420	29815	63.20	29815-C6	69.40	29815-C4	73.90
.015	.023	1	6.7°	1/4	4	.060	.080	.120	.765	.950	-	17715	72.40	17715-C6	81.60		
.031	.047	1/2	5.5°	1/8	2-1/2	.115	.150	.220	.380	.405	.435	29831	49.40	29831-C6	55.60	29831-C4	60.10
.031	.047	1	6.3°	1/4	4	.115	.150	.220	.755	.800	.850	17731	59.50	17731-C6	68.70	17731-C4	76.20
.031	.047	1-1/2	4.2°	1/4	4	.115	.150	.220	1.260	1.355	1.465	24831	64.20	24831-C6	73.40	24831-C4	80.90
.031	.047	2	3.2°	1/4	4	.115	.150	.220	1.765	1.960	-	18831	69.40	18831-C6	78.60	18831-C4	86.10
.047	.071	1/2	4.7°	1/8	2-1/2	.180	.235	.350	.395	.425	.465	29847	49.40	29847-C6	55.60	29847-C4	60.10
.047	.071	1	5.9°	1/4	4	.180	.235	.350	.765	.810	.865	17747	59.50	17747-C6	68.70	17747-C4	76.20
.047	.071	1-1/2	3.9°	1/4	4	.180	.235	.350	1.270	1.375	-	24847	64.20	24847-C6	73.40	24847-C4	80.90
.047	.071	2	2.9°	1/4	4	.180	.235	.350	1.780	-	-	18847	69.40	18847-C6	78.60	18847-C4	86.10
.062	.093	1/2	3.8°	1/8	2-1/2	.220	.285	.370	.405	.450	-	29862	47.90	29862-C6	54.10	29862-C4	58.60
.062	.093	1	5.5°	1/4	4	.220	.285	.415	.770	.820	.880	17762	57.70	17762-C6	66.90	17762-C4	74.40
.062	.093	1-1/2	3.7°	1/4	4	.220	.285	.415	1.280	1.400	-	24862	61.90	24862-C6	71.10	24862-C4	78.60
.062	.093	2	2.7°	1/4	4	.220	.285	.415	1.795	-	-	18862	67.70	18862-C6	76.90	18862-C4	84.40
.078	.118	1	5.1°	1/4	4	.305	.395	.575	.780	.840	.905	17778	57.70	17778-C6	66.90	17778-C4	74.40
.078	.118	1-1/2	3.4°	1/4	4	.305	.395	.575	1.295	1.435	-	24878	61.90	24878-C6	71.10	24878-C4	78.60
.078	.118	2	2.5°	1/4	4	.305	.395	.575	1.830	-	-	18878	67.70	18878-C6	76.90	18878-C4	84.40
.093	.140	1	4.7°	1/4	4	.340	.440	.640	.790	.855	.930	17793	58.50	17793-C6	67.70	17793-C4	75.20
.093	.140	1-1/2	3.1°	1/4	4	.340	.440	.640	1.310	1.475	-	24893	61.90	24893-C6	71.10	24893-C4	78.60
.093	.140	2	2.3°	1/4	4	.340	.440	.640	1.870	-	-	18893	65.90	18893-C6	75.10	18893-C4	82.60
.125	.188	1	3.8°	1/4	4	.450	.580	.750	.820	.910	-	17808	58.50	17808-C6	67.70	17808-C4	75.20
.125	.188	1-1/2	2.5°	1/4	4	.450	.580	.840	1.375	-	-	24908	61.90	24908-C6	71.10	24908-C4	78.60
.125	.188	2	1.8°	1/4	4	.450	.580	.840	-	-	-	18908	65.90	18908-C6	75.10	18908-C4	82.60
.125	.188	2-1/2	2.2°	5/16	4	.450	.580	.840	2.395	-	-	21408	69.20	21408-C6	79.40		
.156	.234	1	2.9°	1/4	4	.525	.680	.775	.875	-	-	17810	58.50	17810-C6	67.70	17810-C4	75.20
.156	.234	1-1/2	1.9°	1/4	4	.525	.680	.980	-	-	-	24910	61.90	24910-C6	71.10	24910-C4	78.60
.156	.234	2	1.4°	1/4	4	.540	.710	1.085	-	-	-	18910	65.90	18910-C6	75.10	18910-C4	82.60
.187	.281	1-1/2	1.3°	1/4	4	.605	.775	1.120	-	-	-	24912	63.50	24912-C6	72.70	24912-C4	80.20
.187	.281	2	2.7°	3/8	4	.605	.775	1.120	1.845	-	-	18912	88.50	18912-C6	98.70	18912-C4	108.70
.187	.281	2-1/2	2.2°	3/8	4	.605	.775	1.120	2.405	-	-	21412	91.40	21412-C6	101.60		
.250	.375	1-1/2	2.6°	3/8	4	.760	.975	1.260	1.395	-	-	24916	81.40	24916-C6	91.60	24916-C4	101.60
.250	.375	2	1.8°	3/8	4	.760	.975	1.405	-	-	-	18916	88.50	18916-C6	98.70	18916-C4	108.70
.250	.375	2-1/2	1.5°	3/8	4	.760	.975	1.405	-	-	-	21416	91.40	21416-C6	101.60		
.312	.468	2	2.7°	1/2	4	.915	1.170	1.685	1.860	-	-	18920	119.90	18920-C6	134.10	18920-C4	144.10
.375	.563	2	1.8°	1/2	4	1.075	1.370	1.770	-	-	-	18924	119.90	18924-C6	134.10	18924-C4	144.10

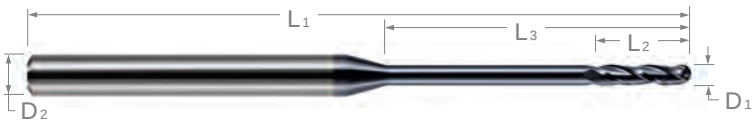
SPEEDS & FEEDS ONLINE!

*Values are approximate and may vary due to tolerancing.

Click for detailed interference charts with more angles

MINIATURE END MILLS

Ball – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut ≥ 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

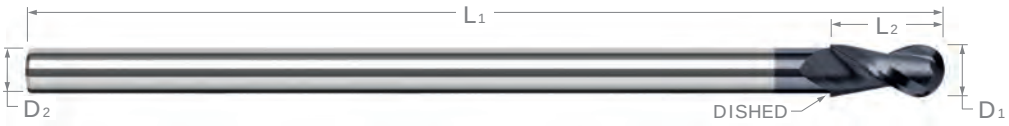
BALL

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.010	.050	.100 (10x)	1/8	2-1/2	13810	54.90	13810-C3	59.10	10210	66.90
.015 (1/64)	.075	.150 (10x)	1/8	2-1/2	13815	46.90	13815-C3	51.10	10215	58.20
.020 (.5 mm)	.100	.200 (10x)	1/8	2-1/2	13820	45.40	13820-C3	49.60	10220	56.90
.025	.125	.250 (10x)	1/8	2-1/2	13825	39.20	13825-C3	43.40	10225	50.70
.030	.150	.300 (10x)	1/8	2-1/2	13830	39.20	13830-C3	43.40	10230	50.70
.031 (1/32)	.155	.310 (10x)	1/8	2-1/2	13831	39.20	13831-C3	43.40	10231	50.70
.035 (.9 mm)	.175	.350 (10x)	1/8	2-1/2	13835	39.20	13835-C3	43.40	10235	50.70
.040	.200	.400 (10x)	1/8	2-1/2	13840	39.20	13840-C3	43.40	10240	50.70
.045	.225	.450 (10x)	1/8	2-1/2	13845	38.40	13845-C3	42.60	10245	49.90
.047 (3/64)	.250	.500 (10x)	1/8	2-1/2	13847	38.40	13847-C3	42.60	10247	49.90
.050	.300	.600 (12x)	1/8	2-1/2	13850	38.40	13850-C3	42.60	10250	49.90
.055 (1.4 mm)	.385	.770 (14x)	1/8	2-1/2	13855	38.40	13855-C3	42.60	10255	49.90
.060	.500	1.000 (16x)	1/8	2-1/2	13860	39.10	13860-C3	43.30	10260	51.10
.062 (1/16)	.500	1.000 (16x)	1/8	2-1/2	13862	39.10	13862-C3	43.30	10262	51.10
.065	.500	1.000 (15x)	1/8	2-1/2	13865	38.40	13865-C3	42.60	10265	49.90
.070	.500	1.000 (14x)	1/8	2-1/2	13870	38.40	13870-C3	42.60	10270	49.90
.075	.500	1.000 (13x)	1/8	2-1/2	13875	38.40	13875-C3	42.60	10275	49.90
.078 (5/64)	.500	1.000 (12x)	1/8	2-1/2	13878	38.40	13878-C3	42.60	10278	49.90
.080	.750	1.250 (15x)	1/8	2-1/2	13880	38.40	13880-C3	42.60	10280	50.40
.085	.750	1.250 (14x)	1/8	2-1/2	13885	38.40	13885-C3	42.60	10285	50.40
.090	.750	1.250 (13x)	1/8	2-1/2	13890	38.40	13890-C3	42.60	10290	50.40
.093 (3/32)	.750	1.250 (13x)	1/8	2-1/2	13893	38.40	13893-C3	42.60	10293	50.40
.095	.750	1.250 (13x)	1/8	2-1/2	13895	38.40	13895-C3	42.60	10295	49.90
.100	.750	1.250 (12x)	1/8	2-1/2	14800	38.40	14800-C3	42.60	10300	49.90
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	1.000	1.500 (12x)	1/8	2-1/2	14808	38.40	14808-C3	42.60	10308	50.40
.187 (3/16)	1.125	1.625 (8x)	3/16	3	14812	41.50	14812-C3	46.10	10312	57.20
.250 (1/4)	1.500	2.000 (8x)	1/4	4	14816	46.50	14816-C3	50.70	10316	64.40

SPEEDS & FEEDS ONLINE!

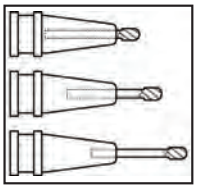
MINIATURE END MILLS

Ball – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½ x diameter
- 2 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
1/8	3/16	**3 mm**	2-1/2	24708	83.70	24708-C3	87.90
5/32	15/64	**1/8**	2-1/2	24710	83.70	24710-C3	88.20
3/16	9/32	**1/8**	2-1/2	24712	83.70	24712-C3	88.20
3/16	9/32	**5/32**	2-1/2	24713	86.40	24713-C3	90.90
1/4	3/8	**3/16**	3	24716	90.70	24716-C3	96.90
5/16	15/32	**1/4**	4	24720	111.40	24720-C3	120.10
3/8	9/16	**5/16**	4	24724	131.50	24724-C3	142.70
7/16	21/32	**3/8**	6	24728	193.70	24728-C3	207.40
1/2	3/4	**7/16**	6	24732	202.40	24732-C3	217.20
5/8	15/16	**1/2**	6	24740	262.40	24740-C3	280.60
3/4	1-1/8	**5/8**	6	24748	324.20	24748-C3	343.40

SPEEDS & FEEDS ONLINE!

For Square Reduced Shank, please see page 33.

For Corner Radius Reduced Shank, please see page 67.

MINIATURE END MILLS

Corner Radius – Stub & Standard

Stub Flute & Standard Length

- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.008	**.002**	.012 (1.5x)	1/8	1-1/2		856008	44.90	856008-C3	49.10		
.008	**.002**	.024 (3x)	1/8	1-1/2		854208	44.90	854208-C3	49.10		
.010	**.003**	.015 (1.5x)	1/8	1-1/2		987510	40.70	987510-C3	44.90		
.010	**.003**	.030 (3x)	1/8	1-1/2		47210	40.70	47210-C3	44.90		
.015 (1/64)	**.003**	.023 (1.5x)	1/8	1-1/2		987515	40.70	987515-C3	44.90		
.015 (1/64)	**.003**	.045 (3x)	1/8	1-1/2	45415	47215	40.70	47215-C3	44.90	47215-C4	51.40
.015 (1/64)	**.005**	.023 (1.5x)	1/8	1-1/2		993815	40.70	993815-C3	44.90		
.015 (1/64)	**.005**	.045 (3x)	1/8	1-1/2	44715	26315	40.70	26315-C3	44.90		
.020 (.5 mm)	**.003**	.030 (1.5x)	1/8	1-1/2		987520	38.90	987520-C3	43.10		
.020 (.5 mm)	**.003**	.060 (3x)	1/8	1-1/2		47220	38.90	47220-C3	43.10		
.020 (.5 mm)	**.005**	.030 (1.5x)	1/8	1-1/2		993820	38.90	993820-C3	43.10		
.020 (.5 mm)	**.005**	.060 (3x)	1/8	1-1/2	44720	26320	38.90	26320-C3	43.10	26320-C4	49.60
.025	**.003**	.075 (3x)	1/8	1-1/2		47225	35.50	47225-C3	39.70		
.025	**.005**	.038 (1.5x)	1/8	1-1/2		993825	35.50	993825-C3	39.70		
.025	**.005**	.075 (3x)	1/8	1-1/2	44725	26325	35.50	26325-C3	39.70	26325-C4	46.20
.025	**.008**	.075 (3x)	1/8	1-1/2		953025	35.50	953025-C3	39.70		
.030	**.003**	.090 (3x)	1/8	1-1/2		47230	32.90	47230-C3	37.10		
.030	**.005**	.045 (1.5x)	1/8	1-1/2		993830	32.90	993830-C3	37.10		
.030	**.005**	.090 (3x)	1/8	1-1/2	44730	26330	32.90	26330-C3	37.10	26330-C4	43.60
.030	**.008**	.090 (3x)	1/8	1-1/2		953030	32.90	953030-C3	37.10		
.030	**.010**	.045 (1.5x)	1/8	1-1/2		994530	32.90	994530-C3	37.10		
.030	**.010**	.090 (3x)	1/8	1-1/2	45230	27230	32.90	27230-C3	37.10	27230-C4	43.60
.031 (1/32)	**.003**	.047 (1.5x)	1/8	1-1/2		987531	32.90	987531-C3	37.10		
.031 (1/32)	**.003**	.093 (3x)	1/8	1-1/2		47231	32.90	47231-C3	37.10		
.031 (1/32)	**.005**	.047 (1.5x)	1/8	1-1/2		993831	32.90	993831-C3	37.10		
.031 (1/32)	**.005**	.093 (3x)	1/8	1-1/2	44731	26331	32.90	26331-C3	37.10	26331-C4	43.60
.031 (1/32)	**.008**	.047 (1.5x)	1/8	1-1/2		913731	32.90	913731-C3	37.10		
.031 (1/32)	**.008**	.093 (3x)	1/8	1-1/2		953031	32.90	953031-C3	37.10		
.031 (1/32)	**.010**	.047 (1.5x)	1/8	1-1/2		994531	32.90	994531-C3	37.10		
.031 (1/32)	**.010**	.093 (3x)	1/8	1-1/2	45231	27231	32.90	27231-C3	37.10	27231-C4	43.60
.035 (.9 mm)	**.005**	.053 (1.5x)	1/8	1-1/2		993835	27.70	993835-C3	31.90		
.035 (.9 mm)	**.005**	.105 (3x)	1/8	1-1/2	44735	26335	27.70	26335-C3	31.90	26335-C4	38.40
.035 (.9 mm)	**.010**	.053 (1.5x)	1/8	1-1/2		994535	27.70	994535-C3	31.90		
.035 (.9 mm)	**.010**	.105 (3x)	1/8	1-1/2	45235	27235	27.70	27235-C3	31.90	27235-C4	38.40
NEW .039 (1 mm)	**.003**	.117 (3x)	1/8	1-1/2		47239	21.50	47239-C3	25.70		
.039 (1 mm)	**.005**	.059 (1.5x)	1/8	1-1/2		993839	21.50	993839-C3	25.70		
.039 (1 mm)	**.005**	.117 (3x)	1/8	1-1/2		26339	21.50	26339-C3	25.70		
.039 (1 mm)	**.008**	.117 (3x)	1/8	1-1/2		953039	21.50	953039-C3	25.70		
.039 (1 mm)	**.010**	.059 (1.5x)	1/8	1-1/2		994539	21.50	994539-C3	25.70		
.039 (1 mm)	**.010**	.117 (3x)	1/8	1-1/2		27239	21.50	27239-C3	25.70		

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.040	**.003**	.120 (3x)	1/8	1-1/2		47240	21.10	47240-C3	25.30			
.040	**.005**	.060 (1.5x)	1/8	1-1/2		993840	21.10	993840-C3	25.30			
.040	**.005**	.120 (3x)	1/8	1-1/2	44740	26340	21.10	26340-C3	25.30	26340-C4	31.80	
.040	**.008**	.120 (3x)	1/8	1-1/2		953040	21.10	953040-C3	25.30			
.040	**.010**	.060 (1.5x)	1/8	1-1/2		994540	21.10	994540-C3	25.30			
.040	**.010**	.120 (3x)	1/8	1-1/2	45240	27240	21.10	27240-C3	25.30	27240-C4	31.80	
.045	**.005**	.068 (1.5x)	1/8	1-1/2		993845	21.10	993845-C3	25.30			
.045	**.005**	.135 (3x)	1/8	1-1/2	44745	26345	21.10	26345-C3	25.30	26345-C4	31.80	
.045	**.010**	.068 (1.5x)	1/8	1-1/2		994545	21.10	994545-C3	25.30			
.045	**.010**	.135 (3x)	1/8	1-1/2	45245	27245	21.10	27245-C3	25.30	27245-C4	31.80	
.045	**.015**	.068 (1.5x)	1/8	1-1/2		997945	21.10	997945-C3	25.30			
.045	**.015**	.135 (3x)	1/8	1-1/2	45545	28145	21.10	28145-C3	25.30	28145-C4	31.80	
.047 (3/64)	**.003**	.071 (1.5x)	1/8	1-1/2		987547	21.10	987547-C3	25.30			
.047 (3/64)	**.003**	.141 (3x)	1/8	1-1/2		47247	21.10	47247-C3	25.30			
.047 (3/64)	**.005**	.071 (1.5x)	1/8	1-1/2		993847	21.10	993847-C3	25.30			
.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	44747	26347	21.10	26347-C3	25.30	26347-C4	31.80	
.047 (3/64)	**.008**	.141 (3x)	1/8	1-1/2		953047	21.10	953047-C3	25.30			
.047 (3/64)	**.010**	.071 (1.5x)	1/8	1-1/2		994547	21.10	994547-C3	25.30			
.047 (3/64)	**.010**	.141 (3x)	1/8	1-1/2	45247	27247	21.10	27247-C3	25.30	27247-C4	31.80	
.047 (3/64)	**.012**	.141 (3x)	1/8	1-1/2		966947	21.10	966947-C3	25.30			
.047 (3/64)	**.015**	.071 (1.5x)	1/8	1-1/2		997947	21.10	997947-C3	25.30			
.047 (3/64)	**.015**	.141 (3x)	1/8	1-1/2	45547	28147	21.10	28147-C3	25.30	28147-C4	31.80	
.050	**.003**	.150 (3x)	1/8	1-1/2		47250	21.10	47250-C3	25.30			
.050	**.005**	.075 (1.5x)	1/8	1-1/2		993850	21.10	993850-C3	25.30			
.050	**.005**	.150 (3x)	1/8	1-1/2	44750	26350	21.10	26350-C3	25.30	26350-C4	31.80	
.050	**.008**	.150 (3x)	1/8	1-1/2		953050	21.10	953050-C3	25.30			
.050	**.010**	.075 (1.5x)	1/8	1-1/2		994550	21.10	994550-C3	25.30			
.050	**.010**	.150 (3x)	1/8	1-1/2	45250	27250	21.10	27250-C3	25.30	27250-C4	31.80	
.050	**.015**	.075 (1.5x)	1/8	1-1/2		997950	21.10	997950-C3	25.30			
.050	**.015**	.150 (3x)	1/8	1-1/2	45550	28150	21.10	28150-C3	25.30	28150-C4	31.80	
.055 (1.4 mm)	**.003**	.165 (3x)	1/8	1-1/2		47255	21.10	47255-C3	25.30			NEW
.055 (1.4 mm)	**.005**	.083 (1.5x)	1/8	1-1/2		993855	21.10	993855-C3	25.30			
.055 (1.4 mm)	**.005**	.165 (3x)	1/8	1-1/2	44755	26355	21.10	26355-C3	25.30	26355-C4	31.80	
.055 (1.4 mm)	**.008**	.165 (3x)	1/8	1-1/2		953055	21.10	953055-C3	25.30			NEW
.055 (1.4 mm)	**.010**	.083 (1.5x)	1/8	1-1/2		994555	21.10	994555-C3	25.30			
.055 (1.4 mm)	**.010**	.165 (3x)	1/8	1-1/2	45255	27255	21.10	27255-C3	25.30	27255-C4	31.80	
.055 (1.4 mm)	**.015**	.083 (1.5x)	1/8	1-1/2		997955	21.10	997955-C3	25.30			
.055 (1.4 mm)	**.015**	.165 (3x)	1/8	1-1/2	45555	28155	21.10	28155-C3	25.30	28155-C4	31.80	
.060	**.003**	.180 (3x)	1/8	1-1/2		47260	21.10	47260-C3	25.30			
.060	**.005**	.090 (1.5x)	1/8	1-1/2		993860	21.10	993860-C3	25.30			
.060	**.005**	.180 (3x)	1/8	1-1/2	44760	26360	21.10	26360-C3	25.30	26360-C4	31.80	
.060	**.008**	.180 (3x)	1/8	1-1/2		953060	21.10	953060-C3	25.30			
.060	**.010**	.090 (1.5x)	1/8	1-1/2		994560	21.10	994560-C3	25.30			
.060	**.010**	.180 (3x)	1/8	1-1/2	45260	27260	21.10	27260-C3	25.30	27260-C4	31.80	
.060	**.015**	.090 (1.5x)	1/8	1-1/2		997960	21.10	997960-C3	25.30			
.060	**.015**	.180 (3x)	1/8	1-1/2	45560	28160	21.10	28160-C3	25.30	28160-C4	31.80	

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	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	.060	**.020**	.090 (1.5x)	1/8	1-1/2		966460	21.10	966460-C3	25.30		
	.060	**.020**	.180 (3x)	1/8	1-1/2		51660	21.10	51660-C3	25.30		
	.062 (1/16)	**.003**	.093 (1.5x)	1/8	1-1/2		987562	21.10	987562-C3	25.30		
	.062 (1/16)	**.003**	.186 (3x)	1/8	1-1/2		47262	21.10	47262-C3	25.30		
	.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2		993862	21.10	993862-C3	25.30		
	.062 (1/16)	**.005**	.186 (3x)	1/8	1-1/2	44762	26362	21.10	26362-C3	25.30	26362-C4	31.80
	.062 (1/16)	**.008**	.093 (1.5x)	1/8	1-1/2		913762	21.10	913762-C3	25.30		
	.062 (1/16)	**.008**	.186 (3x)	1/8	1-1/2		953062	21.10	953062-C3	25.30		
	.062 (1/16)	**.010**	.093 (1.5x)	1/8	1-1/2		994562	21.10	994562-C3	25.30		
	.062 (1/16)	**.010**	.186 (3x)	1/8	1-1/2	45262	27262	21.10	27262-C3	25.30	27262-C4	31.80
	.062 (1/16)	**.012**	.093 (1.5x)	1/8	1-1/2		904862	21.10	904862-C3	25.30		
	.062 (1/16)	**.012**	.186 (3x)	1/8	1-1/2		966962	21.10	966962-C3	25.30		
	.062 (1/16)	**.015**	.093 (1.5x)	1/8	1-1/2		997962	21.10	997962-C3	25.30		
	.062 (1/16)	**.015**	.186 (3x)	1/8	1-1/2	45562	28162	21.10	28162-C3	25.30	28162-C4	31.80
	.062 (1/16)	**.020**	.093 (1.5x)	1/8	1-1/2		966462	21.10	966462-C3	25.30		
	.062 (1/16)	**.020**	.186 (3x)	1/8	1-1/2	51362	51662	21.10	51662-C3	25.30	51662-C4	31.80
	.065	**.005**	.098 (1.5x)	1/8	1-1/2		993865	21.10	993865-C3	25.30		
	.065	**.005**	.195 (3x)	1/8	1-1/2	44765	26365	21.10	26365-C3	25.30	26365-C4	31.80
	.065	**.010**	.098 (1.5x)	1/8	1-1/2		994565	21.10	994565-C3	25.30		
	.065	**.010**	.195 (3x)	1/8	1-1/2	45265	27265	21.10	27265-C3	25.30	27265-C4	31.80
	.065	**.015**	.195 (3x)	1/8	1-1/2	45565	28165	21.10	28165-C3	25.30	28165-C4	31.80
	.065	**.020**	.195 (3x)	1/8	1-1/2		51665	21.10	51665-C3	25.30		
NEW	.070	**.003**	.210 (3x)	1/8	1-1/2		47270	21.10	47270-C3	25.30		
	.070	**.005**	.105 (1.5x)	1/8	1-1/2		993870	21.10	993870-C3	25.30		
	.070	**.005**	.210 (3x)	1/8	1-1/2	44770	26370	21.10	26370-C3	25.30	26370-C4	31.80
NEW	.070	**.008**	.210 (3x)	1/8	1-1/2		953070	21.10	953070-C3	25.30		
	.070	**.010**	.105 (1.5x)	1/8	1-1/2		994570	21.10	994570-C3	25.30		
	.070	**.010**	.210 (3x)	1/8	1-1/2	45270	27270	21.10	27270-C3	25.30	27270-C4	31.80
	.070	**.015**	.210 (3x)	1/8	1-1/2	45570	28170	21.10	28170-C3	25.30	28170-C4	31.80
	.070	**.020**	.210 (3x)	1/8	1-1/2		51670	21.10	51670-C3	25.30		
	.075	**.005**	.113 (1.5x)	1/8	1-1/2		993875	21.10	993875-C3	25.30		
	.075	**.005**	.225 (3x)	1/8	1-1/2	44775	26375	21.10	26375-C3	25.30	26375-C4	31.80
	.075	**.010**	.113 (1.5x)	1/8	1-1/2		994575	21.10	994575-C3	25.30		
	.075	**.010**	.225 (3x)	1/8	1-1/2	45275	27275	21.10	27275-C3	25.30	27275-C4	31.80
	.075	**.015**	.225 (3x)	1/8	1-1/2	45575	28175	21.10	28175-C3	25.30	28175-C4	31.80
	.078 (5/64)	**.003**	.234 (3x)	1/8	1-1/2		47278	21.10	47278-C3	25.30		
	.078 (5/64)	**.005**	.117 (1.5x)	1/8	1-1/2		993878	21.10	993878-C3	25.30		
	.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	44778	26378	21.10	26378-C3	25.30	26378-C4	31.80
	.078 (5/64)	**.008**	.117 (1.5x)	1/8	1-1/2		913778	21.10	913778-C3	25.30		
	.078 (5/64)	**.008**	.234 (3x)	1/8	1-1/2		953078	21.10	953078-C3	25.30		
	.078 (5/64)	**.010**	.117 (1.5x)	1/8	1-1/2		994578	21.10	994578-C3	25.30		
	.078 (5/64)	**.010**	.234 (3x)	1/8	1-1/2	45278	27278	21.10	27278-C3	25.30	27278-C4	31.80
	.078 (5/64)	**.012**	.234 (3x)	1/8	1-1/2		966978	21.10	966978-C3	25.30		
	.078 (5/64)	**.015**	.117 (1.5x)	1/8	1-1/2		997978	21.10	997978-C3	25.30		
	.078 (5/64)	**.015**	.234 (3x)	1/8	1-1/2	45578	28178	21.10	28178-C3	25.30	28178-C4	31.80
	.078 (5/64)	**.020**	.117 (1.5x)	1/8	1-1/2		966478	21.10	966478-C3	25.30		

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.078 (5/64)	**.020**	.234 (3x)	1/8	1-1/2	51378	51678	21.10	51678-C3	25.30	51678-C4	31.80	
.078 (5/64)	**.025**	.117 (1.5x)	1/8	1-1/2		964078	21.10	964078-C3	25.30			
.078 (5/64)	**.025**	.234 (3x)	1/8	1-1/2		957178	21.10	957178-C3	25.30			
.080	**.003**	.240 (3x)	1/8	1-1/2		47280	21.10	47280-C3	25.30			NEW
.080	**.005**	.120 (1.5x)	1/8	1-1/2		993880	21.10	993880-C3	25.30			
.080	**.005**	.240 (3x)	1/8	1-1/2	44780	26380	21.10	26380-C3	25.30	26380-C4	31.80	
.080	**.008**	.240 (3x)	1/8	1-1/2		953080	21.10	953080-C3	25.30			NEW
.080	**.010**	.120 (1.5x)	1/8	1-1/2		994580	21.10	994580-C3	25.30			
.080	**.010**	.240 (3x)	1/8	1-1/2	45280	27280	21.10	27280-C3	25.30	27280-C4	31.80	
.080	**.015**	.240 (3x)	1/8	1-1/2	45580	28180	21.10	28180-C3	25.30	28180-C4	31.80	
.080	**.020**	.240 (3x)	1/8	1-1/2		51680	21.10	51680-C3	25.30			
.085	**.005**	.128 (1.5x)	1/8	1-1/2		993885	21.10	993885-C3	25.30			
.085	**.005**	.255 (3x)	1/8	1-1/2	44785	26385	21.10	26385-C3	25.30	26385-C4	31.80	
.085	**.010**	.128 (1.5x)	1/8	1-1/2		994585	21.10	994585-C3	25.30			
.085	**.010**	.255 (3x)	1/8	1-1/2	45285	27285	21.10	27285-C3	25.30	27285-C4	31.80	
.085	**.015**	.255 (3x)	1/8	1-1/2	45585	28185	21.10	28185-C3	25.30	28185-C4	31.80	
.090	**.003**	.270 (3x)	1/8	1-1/2		47290	21.10	47290-C3	25.30			NEW
.090	**.005**	.135 (1.5x)	1/8	1-1/2		993890	21.10	993890-C3	25.30			
.090	**.005**	.270 (3x)	1/8	1-1/2	44790	26390	21.10	26390-C3	25.30	26390-C4	31.80	
.090	**.008**	.270 (3x)	1/8	1-1/2		953090	21.10	953090-C3	25.30			NEW
.090	**.010**	.135 (1.5x)	1/8	1-1/2		994590	21.10	994590-C3	25.30			
.090	**.010**	.270 (3x)	1/8	1-1/2	45290	27290	21.10	27290-C3	25.30	27290-C4	31.80	
.090	**.015**	.135 (1.5x)	1/8	1-1/2		997990	21.10	997990-C3	25.30			NEW
.090	**.015**	.270 (3x)	1/8	1-1/2	45590	28190	21.10	28190-C3	25.30	28190-C4	31.80	
.090	**.020**	.135 (1.5x)	1/8	1-1/2		966490	21.10	966490-C3	25.30			NEW
.090	**.020**	.270 (3x)	1/8	1-1/2		51690	21.10	51690-C3	25.30			
.090	**.030**	.135 (1.5x)	1/8	1-1/2		958890	21.10	958890-C3	25.30			NEW
.090	**.030**	.270 (3x)	1/8	1-1/2		28690	21.10	28690-C3	25.30			
.093 (3/32)	**.003**	.140 (1.5x)	1/8	1-1/2		987593	21.10	987593-C3	25.30			NEW
.093 (3/32)	**.003**	.279 (3x)	1/8	1-1/2		47293	21.10	47293-C3	25.30			
.093 (3/32)	**.005**	.140 (1.5x)	1/8	1-1/2		993893	21.10	993893-C3	25.30			
.093 (3/32)	**.005**	.279 (3x)	1/8	1-1/2	44793	26393	21.10	26393-C3	25.30	26393-C4	31.80	
.093 (3/32)	**.008**	.140 (1.5x)	1/8	1-1/2		913793	21.10	913793-C3	25.30			
.093 (3/32)	**.008**	.279 (3x)	1/8	1-1/2		953093	21.10	953093-C3	25.30			
.093 (3/32)	**.010**	.140 (1.5x)	1/8	1-1/2		994593	21.10	994593-C3	25.30			
.093 (3/32)	**.010**	.279 (3x)	1/8	1-1/2	45293	27293	21.10	27293-C3	25.30	27293-C4	31.80	
.093 (3/32)	**.012**	.140 (1.5x)	1/8	1-1/2		904893	21.10	904893-C3	25.30			
.093 (3/32)	**.012**	.279 (3x)	1/8	1-1/2		966993	21.10	966993-C3	25.30			
.093 (3/32)	**.015**	.140 (1.5x)	1/8	1-1/2		997993	21.10	997993-C3	25.30			
.093 (3/32)	**.015**	.279 (3x)	1/8	1-1/2	45593	28193	21.10	28193-C3	25.30	28193-C4	31.80	
.093 (3/32)	**.020**	.140 (1.5x)	1/8	1-1/2		966493	21.10	966493-C3	25.30			
.093 (3/32)	**.020**	.279 (3x)	1/8	1-1/2	51393	51693	21.10	51693-C3	25.30	51693-C4	31.80	
.093 (3/32)	**.025**	.140 (1.5x)	1/8	1-1/2		964093	21.10	964093-C3	25.30			
.093 (3/32)	**.025**	.279 (3x)	1/8	1-1/2		957193	21.10	957193-C3	25.30			
.093 (3/32)	**.030**	.140 (1.5x)	1/8	1-1/2		958893	21.10	958893-C3	25.30			
.093 (3/32)	**.030**	.279 (3x)	1/8	1-1/2	73993	28693	21.10	28693-C3	25.30			

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	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	.095	**.005**	.143 (1.5x)	1/8	1-1/2		993895	21.10	993895-C3	25.30		
	.095	**.005**	.285 (3x)	1/8	1-1/2	44795	26395	21.10	26395-C3	25.30	26395-C4	31.80
	.095	**.010**	.143 (1.5x)	1/8	1-1/2		994595	21.10	994595-C3	25.30		
	.095	**.010**	.285 (3x)	1/8	1-1/2	45295	27295	21.10	27295-C3	25.30	27295-C4	31.80
	.095	**.015**	.285 (3x)	1/8	1-1/2	45595	28195	21.10	28195-C3	25.30	28195-C4	31.80
	.095	**.020**	.285 (3x)	1/8	1-1/2		51695	21.10	51695-C3	25.30		
	.095	**.030**	.285 (3x)	1/8	1-1/2		28695	21.10	28695-C3	25.30		
	.100	**.005**	.150 (1.5x)	1/8	1-1/2		993899	21.10	993899-C3	25.30		
	.100	**.005**	.300 (3x)	1/8	1-1/2	44799	26399	21.10	26399-C3	25.30	26399-C4	31.80
	.100	**.008**	.300 (3x)	1/8	1-1/2		953099	21.10	953099-C3	25.30		
	.100	**.010**	.150 (1.5x)	1/8	1-1/2		994599	21.10	994599-C3	25.30		
	.100	**.010**	.300 (3x)	1/8	1-1/2	45299	27299	21.10	27299-C3	25.30	27299-C4	31.80
	.100	**.015**	.150 (1.5x)	1/8	1-1/2		997999	21.10	997999-C3	25.30		
	.100	**.015**	.300 (3x)	1/8	1-1/2	45599	28199	21.10	28199-C3	25.30	28199-C4	31.80
	.100	**.020**	.150 (1.5x)	1/8	1-1/2		966499	21.10	966499-C3	25.30		
	.100	**.020**	.300 (3x)	1/8	1-1/2		51699	21.10	51699-C3	25.30		
	.100	**.030**	.150 (1.5x)	1/8	1-1/2		958899	21.10	958899-C3	25.30		
	.100	**.030**	.300 (3x)	1/8	1-1/2		28699	21.10	28699-C3	25.30		
NEW	.109 (7/64)	**.003**	.327 (3x)	1/8	1-1/2		10802	21.10	10802-C3	25.30		
	.109 (7/64)	**.005**	.164 (1.5x)	1/8	1-1/2		941402	21.10	941402-C3	25.30		
	.109 (7/64)	**.005**	.327 (3x)	1/8	1-1/2		72902	21.10	72902-C3	25.30		
NEW	.109 (7/64)	**.008**	.327 (3x)	1/8	1-1/2		75502	21.10	75502-C3	25.30		
	.109 (7/64)	**.010**	.164 (1.5x)	1/8	1-1/2		936902	21.10	936902-C3	25.30		
	.109 (7/64)	**.010**	.327 (3x)	1/8	1-1/2		75802	21.10	75802-C3	25.30		
	.109 (7/64)	**.015**	.164 (1.5x)	1/8	1-1/2		935002	21.10	935002-C3	25.30		
	.109 (7/64)	**.015**	.327 (3x)	1/8	1-1/2		74202	21.10	74202-C3	25.30		
	.109 (7/64)	**.020**	.164 (1.5x)	1/8	1-1/2		872002	21.10	872002-C3	25.30		
	.109 (7/64)	**.020**	.327 (3x)	1/8	1-1/2		986302	21.10	986302-C3	25.30		
	.109 (7/64)	**.030**	.164 (1.5x)	1/8	1-1/2		892402	21.10	892402-C3	25.30		
	.109 (7/64)	**.030**	.327 (3x)	1/8	1-1/2		937602	21.10	937602-C3	25.30		
	.118 (3 mm)	**.005**	.177 (1.5x)	1/8	1-1/2		941405	21.50	941405-C3	25.70		
	.118 (3 mm)	**.005**	.354 (3x)	1/8	1-1/2		72905	21.50	72905-C3	25.70		
	.118 (3 mm)	**.008**	.354 (3x)	1/8	1-1/2		916705	21.50	916705-C3	25.70		
	.118 (3 mm)	**.010**	.177 (1.5x)	1/8	1-1/2		936905	21.50	936905-C3	25.70		
	.118 (3 mm)	**.010**	.354 (3x)	1/8	1-1/2		75805	21.50	75805-C3	25.70		
	.118 (3 mm)	**.015**	.177 (1.5x)	1/8	1-1/2		935005	21.50	935005-C3	25.70		
	.118 (3 mm)	**.015**	.354 (3x)	1/8	1-1/2		74205	21.50	74205-C3	25.70		
	.118 (3 mm)	**.020**	.177 (1.5x)	1/8	1-1/2		872005	21.50	872005-C3	25.70		
	.118 (3 mm)	**.020**	.354 (3x)	1/8	1-1/2		986305	21.50	986305-C3	25.70		
	.118 (3 mm)	**.030**	.177 (1.5x)	1/8	1-1/2		892405	21.50	892405-C3	25.70		
	.118 (3 mm)	**.030**	.354 (3x)	1/8	1-1/2		937605	21.50	937605-C3	25.70		
	.118 (3 mm)	**.040**	.354 (3x)	1/8	1-1/2		874005	21.50	874005-C3	25.70		

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.125 (1/8)	**.003**	.187 (1.5x)	1/8	1-1/2		980203	21.10	980203-C3	25.30			
.125 (1/8)	**.003**	.500 (4x)	1/8	1-1/2		32403	21.10	32403-C3	25.30			
.125 (1/8)	**.005**	.187 (1.5x)	1/8	1-1/2		980205	21.10	980205-C3	25.30			
.125 (1/8)	**.005**	.500 (4x)	1/8	1-1/2	46405	32405	21.10	32405-C3	25.30	32405-C4	31.80	
.125 (1/8)	**.008**	.187 (1.5x)	1/8	1-1/2		980208	21.10	980208-C3	25.30			
.125 (1/8)	**.008**	.500 (4x)	1/8	1-1/2		32408	21.10	32408-C3	25.30			
.125 (1/8)	**.010**	.187 (1.5x)	1/8	1-1/2		980210	21.10	980210-C3	25.30			
.125 (1/8)	**.010**	.500 (4x)	1/8	1-1/2	46410	32410	21.10	32410-C3	25.30	32410-C4	31.80	
.125 (1/8)	**.012**	.187 (1.5x)	1/8	1-1/2		980212	21.10	980212-C3	25.30			
.125 (1/8)	**.012**	.500 (4x)	1/8	1-1/2		32412	21.10	32412-C3	25.30			
.125 (1/8)	**.015**	.187 (1.5x)	1/8	1-1/2		980215	21.10	980215-C3	25.30			
.125 (1/8)	**.015**	.500 (4x)	1/8	1-1/2	46415	32415	21.10	32415-C3	25.30	32415-C4	31.80	
.125 (1/8)	**.020**	.187 (1.5x)	1/8	1-1/2		980220	21.10	980220-C3	25.30			
.125 (1/8)	**.020**	.500 (4x)	1/8	1-1/2	46420	32420	21.10	32420-C3	25.30	32420-C4	31.80	
.125 (1/8)	**.025**	.187 (1.5x)	1/8	1-1/2		980225	21.10	980225-C3	25.30			
.125 (1/8)	**.025**	.500 (4x)	1/8	1-1/2	46425	32425	21.10	32425-C3	25.30			
.125 (1/8)	**.030**	.187 (1.5x)	1/8	1-1/2		980230	21.10	980230-C3	25.30			
.125 (1/8)	**.030**	.500 (4x)	1/8	1-1/2	46430	32430	21.10	32430-C3	25.30	32430-C4	31.80	
.125 (1/8)	**.040**	.187 (1.5x)	1/8	1-1/2		980240	21.10	980240-C3	25.30			
.125 (1/8)	**.040**	.500 (4x)	1/8	1-1/2	46440	32440	21.10	32440-C3	25.30			
.125 (1/8)	**.045**	.187 (1.5x)	1/8	1-1/2		980245	21.10	980245-C3	25.30			
.125 (1/8)	**.045**	.500 (4x)	1/8	1-1/2		32445	21.10	32445-C3	25.30			
.140 (9/64)	**.005**	.220 (1.5x)	3/16	2		857105	25.50	857105-C3	30.10			NEW
.140 (9/64)	**.005**	.425 (3x)	3/16	2		966705	25.50	966705-C3	30.10			
.140 (9/64)	**.010**	.220 (1.5x)	3/16	2		857110	25.50	857110-C3	30.10			
.140 (9/64)	**.010**	.425 (3x)	3/16	2		966710	25.50	966710-C3	30.10			
.140 (9/64)	**.015**	.220 (1.5x)	3/16	2		857115	25.50	857115-C3	30.10			
.140 (9/64)	**.015**	.425 (3x)	3/16	2		966715	25.50	966715-C3	30.10			
.140 (9/64)	**.020**	.220 (1.5x)	3/16	2		857120	25.50	857120-C3	30.10			NEW
.140 (9/64)	**.020**	.425 (3x)	3/16	2		966720	25.50	966720-C3	30.10			
.140 (9/64)	**.030**	.220 (1.5x)	3/16	2		857130	25.50	857130-C3	30.10			
.140 (9/64)	**.030**	.425 (3x)	3/16	2		966730	25.50	966730-C3	30.10			
.140 (9/64)	**.040**	.220 (1.5x)	3/16	2		857140	25.50	857140-C3	30.10			
.140 (9/64)	**.040**	.425 (3x)	3/16	2		966740	25.50	966740-C3	30.10			NEW
.140 (9/64)	**.045**	.220 (1.5x)	3/16	2		857145	25.50	857145-C3	30.10			
.140 (9/64)	**.045**	.425 (3x)	3/16	2		966745	25.50	966745-C3	30.10			NEW
.156 (5/32)	**.005**	.235 (1.5x)	3/16	2		954805	23.40	954805-C3	27.90			
.156 (5/32)	**.005**	.562 (3x)	3/16	2		75205	23.40	75205-C3	27.90			
.156 (5/32)	**.010**	.235 (1.5x)	3/16	2		954810	23.40	954810-C3	27.90			
.156 (5/32)	**.010**	.562 (3x)	3/16	2	71910	75210	23.40	75210-C3	27.90			
.156 (5/32)	**.015**	.235 (1.5x)	3/16	2		954815	23.40	954815-C3	27.90			
.156 (5/32)	**.015**	.562 (3x)	3/16	2	71915	75215	23.40	75215-C3	27.90			
.156 (5/32)	**.020**	.235 (1.5x)	3/16	2		954820	23.40	954820-C3	27.90			
.156 (5/32)	**.020**	.562 (3x)	3/16	2		75220	23.40	75220-C3	27.90	75220-C4	38.10	
.156 (5/32)	**.030**	.235 (1.5x)	3/16	2		954830	23.40	954830-C3	27.90			
.156 (5/32)	**.030**	.562 (3x)	3/16	2	71930	75230	23.40	75230-C3	27.90	75230-C4	38.10	

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Corner Radius – Stub & Standard (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.156 (5/32)	**.040**	.235 (1.5x)	3/16	2		954840	23.40	954840-C3	27.90		
.156 (5/32)	**.040**	.562 (3x)	3/16	2		75240	23.40	75240-C3	27.90		
.156 (5/32)	**.045**	.235 (1.5x)	3/16	2		954845	23.40	954845-C3	27.90		
.156 (5/32)	**.045**	.562 (3x)	3/16	2		75245	23.40	75245-C3	27.90		
.172 (11/64)	**.010**	.515 (3x)	3/16	2		855310	23.40	855310-C3	27.90		
.172 (11/64)	**.030**	.515 (3x)	3/16	2		855330	23.40	855330-C3	27.90		
.187 (3/16)	**.005**	.285 (1.5x)	3/16	2		937905	23.40	937905-C3	27.90		
.187 (3/16)	**.005**	.625 (3x)	3/16	2	46705	34805	23.40	34805-C3	27.90		
.187 (3/16)	**.008**	.285 (1.5x)	3/16	2		937908	23.40	937908-C3	27.90		
.187 (3/16)	**.008**	.625 (3x)	3/16	2		34808	23.40	34808-C3	27.90		
.187 (3/16)	**.010**	.285 (1.5x)	3/16	2		937910	23.40	937910-C3	27.90		
.187 (3/16)	**.010**	.625 (3x)	3/16	2	46710	34810	23.40	34810-C3	27.90	34810-C4	38.10
.187 (3/16)	**.012**	.625 (3x)	3/16	2		34812	23.40	34812-C3	27.90		
.187 (3/16)	**.015**	.285 (1.5x)	3/16	2		937915	23.40	937915-C3	27.90		
.187 (3/16)	**.015**	.625 (3x)	3/16	2	46715	34815	23.40	34815-C3	27.90	34815-C4	38.10
.187 (3/16)	**.020**	.285 (1.5x)	3/16	2		937920	23.40	937920-C3	27.90		
.187 (3/16)	**.020**	.625 (3x)	3/16	2	46720	34820	23.40	34820-C3	27.90		
.187 (3/16)	**.025**	.625 (3x)	3/16	2	46725	34825	23.40	34825-C3	27.90		
.187 (3/16)	**.030**	.285 (1.5x)	3/16	2		937930	23.40	937930-C3	27.90		
.187 (3/16)	**.030**	.625 (3x)	3/16	2	46730	34830	23.40	34830-C3	27.90	34830-C4	38.10
.187 (3/16)	**.040**	.285 (1.5x)	3/16	2		937940	23.40	937940-C3	27.90		
.187 (3/16)	**.040**	.625 (3x)	3/16	2	46740	34840	23.40	34840-C3	27.90		
.187 (3/16)	**.045**	.285 (1.5x)	3/16	2		937945	23.40	937945-C3	27.90		
.187 (3/16)	**.045**	.625 (3x)	3/16	2	46745	34845	23.40	34845-C3	27.90	34845-C4	38.10
.187 (3/16)	**.050**	.625 (3x)	3/16	2		34850	23.40	34850-C3	27.90		
.187 (3/16)	**.060**	.285 (1.5x)	3/16	2		937960	23.40	937960-C3	27.90		
.187 (3/16)	**.060**	.625 (3x)	3/16	2	46760	34860	23.40	34860-C3	27.90		
.203 (13/64)	**.010**	.610 (3x)	1/4	2-1/2		865610	28.70	865610-C3	34.90		
.203 (13/64)	**.030**	.610 (3x)	1/4	2-1/2		865630	28.70	865630-C3	34.90		
.218 (7/32)	**.010**	.660 (3x)	1/4	2-1/2		863910	28.70	863910-C3	34.90		
.218 (7/32)	**.030**	.660 (3x)	1/4	2-1/2		863930	28.70	863930-C3	34.90		
.234 (15/64)	**.010**	.705 (3x)	1/4	2-1/2		863510	28.70	863510-C3	34.90		
.234 (15/64)	**.030**	.705 (3x)	1/4	2-1/2		863530	28.70	863530-C3	34.90		
.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2		941105	28.70	941105-C3	34.90		
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2		36205	28.70	36205-C3	34.90		
.250 (1/4)	**.008**	.375 (1.5x)	1/4	2-1/2		941108	28.70	941108-C3	34.90		
.250 (1/4)	**.008**	.750 (3x)	1/4	2-1/2		36208	28.70	36208-C3	34.90		
.250 (1/4)	**.010**	.375 (1.5x)	1/4	2-1/2		941110	28.70	941110-C3	34.90		
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	47410	36210	28.70	36210-C3	34.90	36210-C4	45.40
.250 (1/4)	**.012**	.750 (3x)	1/4	2-1/2		36212	28.70	36212-C3	34.90		
.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2		941115	28.70	941115-C3	34.90		
.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	47415	36215	28.70	36215-C3	34.90	36215-C4	45.40
.250 (1/4)	**.020**	.375 (1.5x)	1/4	2-1/2		941120	28.70	941120-C3	34.90		
.250 (1/4)	**.020**	.750 (3x)	1/4	2-1/2	47420	36220	28.70	36220-C3	34.90	36220-C4	45.40

SPEEDS & FEEDS ONLINE!
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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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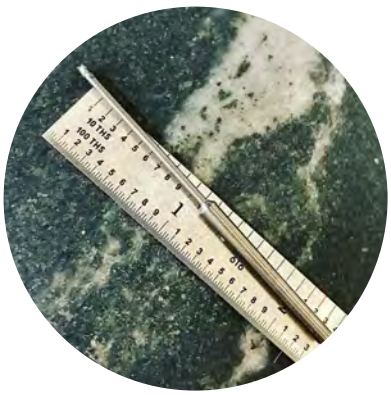
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	**.025**	.375 (1.5x)	1/4	2-1/2		941125	28.70	941125-C3	34.90		
.250 (1/4)	**.025**	.750 (3x)	1/4	2-1/2		36225	28.70	36225-C3	34.90		
.250 (1/4)	**.030**	.375 (1.5x)	1/4	2-1/2		941130	28.70	941130-C3	34.90		
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	47430	36230	28.70	36230-C3	34.90	36230-C4	45.40
.250 (1/4)	**.040**	.375 (1.5x)	1/4	2-1/2		941140	28.70	941140-C3	34.90		
.250 (1/4)	**.040**	.750 (3x)	1/4	2-1/2		36240	28.70	36240-C3	34.90		
.250 (1/4)	**.045**	.375 (1.5x)	1/4	2-1/2		941145	28.70	941145-C3	34.90		
.250 (1/4)	**.045**	.750 (3x)	1/4	2-1/2	47445	36245	28.70	36245-C3	34.90	36245-C4	45.40
.250 (1/4)	**.050**	.750 (3x)	1/4	2-1/2		36250	28.70	36250-C3	34.90		
.250 (1/4)	**.060**	.375 (1.5x)	1/4	2-1/2		941160	28.70	941160-C3	34.90		
.250 (1/4)	**.060**	.750 (3x)	1/4	2-1/2	47460	36260	28.70	36260-C3	34.90	36260-C4	45.40
.250 (1/4)	**.075**	.375 (1.5x)	1/4	2-1/2		941175	28.70	941175-C3	34.90		
.250 (1/4)	**.075**	.750 (3x)	1/4	2-1/2		36275	28.70	36275-C3	34.90		
.312 (5/16)	**.005**	1.000 (3x)	5/16	2-1/2		945105	32.10	945105-C3	39.30		
.312 (5/16)	**.010**	1.000 (3x)	5/16	2-1/2		945110	32.10	945110-C3	39.30		
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2		945130	32.10	945130-C3	39.30		
.312 (5/16)	**.060**	1.000 (3x)	5/16	2-1/2		945160	32.10	945160-C3	39.30		
.375 (3/8)	**.005**	1.000 (3x)	3/8	2-1/2		72805	43.70	72805-C3	51.90		
.375 (3/8)	**.010**	1.000 (3x)	3/8	2-1/2		72810	43.70	72810-C3	51.90		
.375 (3/8)	**.015**	1.000 (3x)	3/8	2-1/2		72815	43.70	72815-C3	51.90		
.375 (3/8)	**.020**	1.000 (3x)	3/8	2-1/2		72820	43.70	72820-C3	51.90		
.375 (3/8)	**.030**	.570 (1.5x)	3/8	2-1/2		915230	43.70	915230-C3	51.90		
.375 (3/8)	**.030**	1.000 (3x)	3/8	2-1/2		72830	43.70	72830-C3	51.90	72830-C4	63.90
.375 (3/8)	**.040**	1.000 (3x)	3/8	2-1/2		72840	43.70	72840-C3	51.90		
.375 (3/8)	**.045**	1.000 (3x)	3/8	2-1/2		72845	43.70	72845-C3	51.90		
.375 (3/8)	**.060**	1.000 (3x)	3/8	2-1/2		72860	43.70	72860-C3	51.90		
.500 (1/2)	**.010**	1.000 (2x)	1/2	3		74510	67.40	74510-C3	79.60		
.500 (1/2)	**.015**	1.000 (2x)	1/2	3		74515	67.40	74515-C3	79.60		
.500 (1/2)	**.020**	1.000 (2x)	1/2	3		74520	67.40	74520-C3	79.60		
.500 (1/2)	**.030**	1.000 (2x)	1/2	3		74530	67.40	74530-C3	79.60	74530-C4	91.70
.500 (1/2)	**.045**	1.000 (2x)	1/2	3		74545	67.40	74545-C3	79.60		
.500 (1/2)	**.060**	1.000 (2x)	1/2	3		74560	67.40	74560-C3	79.60		

SPEEDS & FEEDS ONLINE!



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MINIATURE END MILLS

Corner Radius – Long Flute

- **Long flute and long shank design for deep cavities**
- Mills deep pockets
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Flute Lengths

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.015 (1/64)	**.003**	**.078** (5x)	4	1/8	2-1/2	981415	61.20	981415-C3	65.40
.015 (1/64)	**.003**	**.125** (8x)	4	1/8	2-1/2	933615	70.20	933615-C3	74.40
.020 (.5 mm)	**.005**	**.100** (5x)	4	1/8	2-1/2	959620	55.10	959620-C3	59.30
.020 (.5 mm)	**.005**	**.160** (8x)	4	1/8	2-1/2	949820	63.70	949820-C3	67.90
.025	**.005**	**.125** (5x)	4	1/8	2-1/2	959625	52.50	959625-C3	56.70
.025	**.005**	**.203** (8x)	4	1/8	2-1/2	949825	61.10	949825-C3	65.30
.031 (1/32)	**.005**	**.156** (5x)	4	1/8	2-1/2	959631	50.90	959631-C3	55.10
.031 (1/32)	**.005**	**.250** (8x)	4	1/8	2-1/2	949831	59.40	949831-C3	63.60
.031 (1/32)	**.008**	**.156** (5x)	4	1/8	2-1/2	884231	50.90	884231-C3	55.10
.031 (1/32)	**.008**	**.250** (8x)	4	1/8	2-1/2	887431	59.40	887431-C3	63.60
.031 (1/32)	**.010**	**.156** (5x)	4	1/8	2-1/2	964331	50.90	964331-C3	55.10
.031 (1/32)	**.010**	**.250** (8x)	4	1/8	2-1/2	938031	59.40	938031-C3	63.60
.039 (1 mm)	**.005**	**.203** (5x)	4	1/8	2-1/2	959639	48.40	959639-C3	52.60
.039 (1 mm)	**.005**	**.325** (8x)	4	1/8	2-1/2	949839	53.70	949839-C3	57.90
.039 (1 mm)	**.010**	**.203** (5x)	4	1/8	2-1/2	964339	48.40	964339-C3	52.60
.039 (1 mm)	**.010**	**.325** (8x)	4	1/8	2-1/2	938039	53.70	938039-C3	57.90
.047 (3/64)	**.005**	**.250** (5x)	4	1/8	2-1/2	959647	26.70	959647-C3	30.90
.047 (3/64)	**.005**	**.375** (8x)	4	1/8	2-1/2	949847	30.10	949847-C3	34.30
.047 (3/64)	**.010**	**.250** (5x)	4	1/8	2-1/2	964347	26.70	964347-C3	30.90
.047 (3/64)	**.010**	**.375** (8x)	4	1/8	2-1/2	938047	30.10	938047-C3	34.30
.047 (3/64)	**.015**	**.250** (5x)	4	1/8	2-1/2	885047	26.70	885047-C3	30.90
.047 (3/64)	**.015**	**.375** (8x)	4	1/8	2-1/2	888247	30.10	888247-C3	34.30
.062 (1/16)	**.005**	**.312** (5x)	4	1/8	2-1/2	959662	26.70	959662-C3	30.90
.062 (1/16)	**.005**	**.500** (8x)	4	1/8	2-1/2	949862	30.10	949862-C3	34.30
.062 (1/16)	**.008**	**.312** (5x)	4	1/8	2-1/2	884262	26.70	884262-C3	30.90
.062 (1/16)	**.008**	**.500** (8x)	4	1/8	2-1/2	887462	30.10	887462-C3	34.30
.062 (1/16)	**.010**	**.312** (5x)	4	1/8	2-1/2	964362	26.70	964362-C3	30.90
.062 (1/16)	**.010**	**.500** (8x)	4	1/8	2-1/2	938062	30.10	938062-C3	34.30
.062 (1/16)	**.015**	**.312** (5x)	4	1/8	2-1/2	885062	26.70	885062-C3	30.90
.062 (1/16)	**.015**	**.500** (8x)	4	1/8	2-1/2	888262	30.10	888262-C3	34.30
.062 (1/16)	**.020**	**.312** (5x)	4	1/8	2-1/2	885862	26.70	885862-C3	30.90
.062 (1/16)	**.020**	**.500** (8x)	4	1/8	2-1/2	889062	30.10	889062-C3	34.30

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.078 (5/64)	**.005**	**.406** (5x)	4	1/8	2-1/2	959678	26.70	959678-C3	30.90
.078 (5/64)	**.005**	**.625** (8x)	4	1/8	2-1/2	949878	30.10	949878-C3	34.30
.078 (5/64)	**.010**	**.406** (5x)	4	1/8	2-1/2	964378	26.70	964378-C3	30.90
.078 (5/64)	**.010**	**.625** (8x)	4	1/8	2-1/2	938078	30.10	938078-C3	34.30
.078 (5/64)	**.015**	**.406** (5x)	4	1/8	2-1/2	885078	26.70	885078-C3	30.90
.078 (5/64)	**.015**	**.625** (8x)	4	1/8	2-1/2	888278	30.10	888278-C3	34.30
.078 (5/64)	**.020**	**.406** (5x)	4	1/8	2-1/2	885878	26.70	885878-C3	30.90
.078 (5/64)	**.020**	**.625** (8x)	4	1/8	2-1/2	889078	30.10	889078-C3	34.30
.093 (3/32)	**.005**	**.500** (5x)	4	1/8	2-1/2	959693	26.70	959693-C3	30.90
.093 (3/32)	**.005**	**.750** (8x)	4	1/8	2-1/2	949893	30.10	949893-C3	34.30
.093 (3/32)	**.008**	**.500** (5x)	4	1/8	2-1/2	884293	26.70	884293-C3	30.90
.093 (3/32)	**.008**	**.750** (8x)	4	1/8	2-1/2	887493	30.10	887493-C3	34.30
.093 (3/32)	**.010**	**.500** (5x)	4	1/8	2-1/2	964393	26.70	964393-C3	30.90
.093 (3/32)	**.010**	**.750** (8x)	4	1/8	2-1/2	938093	30.10	938093-C3	34.30
.093 (3/32)	**.015**	**.500** (5x)	4	1/8	2-1/2	885093	26.70	885093-C3	30.90
.093 (3/32)	**.015**	**.750** (8x)	4	1/8	2-1/2	888293	30.10	888293-C3	34.30
.093 (3/32)	**.020**	**.500** (5x)	4	1/8	2-1/2	885893	26.70	885893-C3	30.90
.093 (3/32)	**.020**	**.750** (8x)	4	1/8	2-1/2	889093	30.10	889093-C3	34.30
.093 (3/32)	**.030**	**.500** (5x)	4	1/8	2-1/2	886693	26.70	886693-C3	30.90
.093 (3/32)	**.030**	**.750** (8x)	4	1/8	2-1/2	889893	30.10	889893-C3	34.30
.118 (3 mm)	**.005**	**.625** (5x)	4	1/8	2-1/2	912505	26.70	912505-C3	30.90
.118 (3 mm)	**.005**	**.950** (8x)	4	1/8	2-1/2	905305	30.10	905305-C3	34.30
.118 (3 mm)	**.010**	**.625** (5x)	4	1/8	2-1/2	912605	26.70	912605-C3	30.90
.118 (3 mm)	**.010**	**.950** (8x)	4	1/8	2-1/2	905405	30.10	905405-C3	34.30
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.005**	**.625** (5x)	4	1/8	2-1/2	950905	25.10	950905-C3	29.30
.125 (1/8)	**.005**	**1.000** (8x)	4	1/8	2-1/2	981905	27.70	981905-C3	31.90
.125 (1/8)	**.010**	**.625** (5x)	4	1/8	2-1/2	950910	25.10	950910-C3	29.30
.125 (1/8)	**.010**	**1.000** (8x)	4	1/8	2-1/2	981910	27.70	981910-C3	31.90
.125 (1/8)	**.015**	**.625** (5x)	4	1/8	2-1/2	950915	25.10	950915-C3	29.30
.125 (1/8)	**.015**	**1.000** (8x)	4	1/8	2-1/2	981915	27.70	981915-C3	31.90
.125 (1/8)	**.020**	**.625** (5x)	4	1/8	2-1/2	950920	25.10	950920-C3	29.30
.125 (1/8)	**.020**	**1.000** (8x)	4	1/8	2-1/2	981920	27.70	981920-C3	31.90
.125 (1/8)	**.030**	**.625** (5x)	4	1/8	2-1/2	950930	25.10	950930-C3	29.30
.125 (1/8)	**.030**	**1.000** (8x)	4	1/8	2-1/2	981930	27.70	981930-C3	31.90
.187 (3/16)	**.010**	**1.000** (5x)	4	3/16	3	932410	29.70	932410-C3	34.20
.187 (3/16)	**.030**	**1.000** (5x)	4	3/16	3	932430	29.70	932430-C3	34.20
.250 (1/4)	**.010**	**1.250** (5x)	4	1/4	4	917110	33.20	917110-C3	40.40
.250 (1/4)	**.030**	**1.250** (5x)	4	1/4	4	917130	33.20	917130-C3	40.40

SPEEDS & FEEDS ONLINE!

MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute

- Corner radius for improved strength
- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

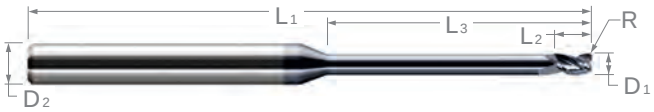
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.031 (1/32)	**.005**	.093	**.156** (5x)	1/8	1-1/2	864131	875231	39.90	875231-C3	44.10
.031 (1/32)	**.005**	.093	**.250** (8x)	1/8	1-1/2	865731	876831	40.70	876831-C3	44.90
.031 (1/32)	**.010**	.093	**.156** (5x)	1/8	1-1/2	864931	876031	39.90	876031-C3	44.10
.031 (1/32)	**.010**	.093	**.250** (8x)	1/8	1-1/2	866531	877631	40.70	877631-C3	44.90
.047 (3/64)	**.005**	.141	**.250** (5x)	1/8	1-1/2	864147	875247	38.70	875247-C3	42.90
.047 (3/64)	**.005**	.141	**.375** (8x)	1/8	1-1/2	865747	876847	39.40	876847-C3	43.60
.047 (3/64)	**.010**	.141	**.250** (5x)	1/8	1-1/2	864947	876047	38.70	876047-C3	42.90
.047 (3/64)	**.010**	.141	**.375** (8x)	1/8	1-1/2	866547	877647	39.40	877647-C3	43.60
.062 (1/16)	**.005**	.186	**.312** (5x)	1/8	1-1/2	864162	875262	38.70	875262-C3	42.90
.062 (1/16)	**.005**	.186	**.500** (8x)	1/8	1-1/2	865762	876862	39.40	876862-C3	43.60
.062 (1/16)	**.010**	.186	**.312** (5x)	1/8	1-1/2	864962	876062	38.70	876062-C3	42.90
.062 (1/16)	**.010**	.186	**.500** (8x)	1/8	1-1/2	866562	877662	39.40	877662-C3	43.60
.078 (5/64)	**.005**	.234	**.406** (5x)	1/8	1-1/2	864178	875278	38.70	875278-C3	42.90
.078 (5/64)	**.005**	.234	**.625** (8x)	1/8	2	865778	876878	39.90	876878-C3	44.10
.078 (5/64)	**.010**	.234	**.406** (5x)	1/8	1-1/2	864978	876078	38.70	876078-C3	42.90
.078 (5/64)	**.010**	.234	**.625** (8x)	1/8	2	866578	877678	39.90	877678-C3	44.10
.093 (3/32)	**.005**	.279	**.500** (5x)	1/8	1-1/2	864193	875293	39.40	875293-C3	43.60
.093 (3/32)	**.005**	.279	**.750** (8x)	1/8	2	865793	876893	39.90	876893-C3	44.10
.093 (3/32)	**.010**	.279	**.500** (5x)	1/8	1-1/2	864993	876093	39.40	876093-C3	43.60
.093 (3/32)	**.010**	.279	**.750** (8x)	1/8	2	866593	877693	39.90	877693-C3	44.10
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.005**	.375	**.625** (5x)	1/8	1-1/2	864208	875308	39.40	875308-C3	43.60
.125 (1/8)	**.005**	.375	**1.000** (8x)	1/8	2	865808	876908	39.40	876908-C3	43.60
.125 (1/8)	**.010**	.375	**.625** (5x)	1/8	1-1/2	865008	876108	39.40	876108-C3	43.60
.125 (1/8)	**.010**	.375	**1.000** (8x)	1/8	2	866608	877708	39.40	877708-C3	43.60

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

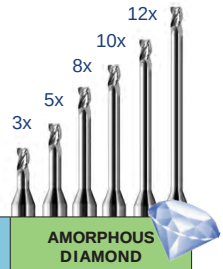
Corner Radius – Long Reach, Stub Flute



- **Long length design for deep cavities, up to 8" overall length**
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

Stocked in *Six* Reach Lengths!



CORNER RADIUS

CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005" −.0005"	R +.001" −.001"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.010	**.003**	.015	**.050** (5x)	3	1/8	2-1/2	968210	49.50	968210-C3	53.70			NEW
.010	**.003**	.015	**.080** (8x)	3	1/8	2-1/2	972710	50.40	972710-C3	54.60			NEW
.015 (1/64)	**.003**	.022	**.078** (5x)	3	1/8	2-1/2	968215	44.50	968215-C3	48.70			
.015 (1/64)	**.003**	.022	**.125** (8x)	3	1/8	2-1/2	972715	45.40	972715-C3	49.60			
.015 (1/64)	**.005**	.022	**.078** (5x)	3	1/8	2-1/2	37115	44.50	37115-C3	48.70			NEW
.015 (1/64)	**.005**	.022	**.125** (8x)	3	1/8	2-1/2	38315	45.40	38315-C3	49.60			NEW
.020 (.5 mm)	**.005**	.030	**.100** (5x)	3	1/8	2-1/2	37120	43.10	37120-C3	47.30			
.020 (.5 mm)	**.005**	.030	**.160** (8x)	3	1/8	2-1/2	38320	44.10	38320-C3	48.30			
.020 (.5 mm)	**.005**	.030	**.200** (10x)	3	1/8	2-1/2	917820	45.20	917820-C3	49.40			
.025	**.005**	.037	**.125** (5x)	3	1/8	2-1/2	37125	43.10	37125-C3	47.30			
.025	**.005**	.037	**.203** (8x)	3	1/8	2-1/2	38325	44.10	38325-C3	48.30			
.025	**.005**	.037	**.250** (10x)	3	1/8	2-1/2	917825	45.20	917825-C3	49.40			
.030	**.005**	.045	**.156** (5x)	3	1/8	2-1/2	37130	37.10	37130-C3	41.30			
.030	**.005**	.045	**.250** (8x)	3	1/8	2-1/2	38330	37.90	38330-C3	42.10			
.031 (1/32)	**.003**	.046	**.156** (5x)	3	1/8	2-1/2	968231	37.10	968231-C3	41.30			
.031 (1/32)	**.003**	.046	**.250** (8x)	3	1/8	2-1/2	972731	37.90	972731-C3	42.10			
.031 (1/32)	**.005**	.046	**.156** (5x)	3	1/8	2-1/2	37131	37.10	37131-C3	41.30	37131-C4	47.80	
.031 (1/32)	**.005**	.046	**.250** (8x)	3	1/8	2-1/2	38331	37.90	38331-C3	42.10	38331-C4	48.60	
.031 (1/32)	**.005**	.046	**.312** (10x)	3	1/8	2-1/2	917831	39.20	917831-C3	43.40			
.031 (1/32)	**.005**	.046	**.375** (12x)	3	1/8	2-1/2	39431	39.20	39431-C3	43.40	39431-C4	49.90	
.031 (1/32)	**.008**	.046	**.156** (5x)	3	1/8	2-1/2	912731	37.10	912731-C3	41.30			
.031 (1/32)	**.008**	.046	**.250** (8x)	3	1/8	2-1/2	909331	37.90	909331-C3	42.10			
.031 (1/32)	**.010**	.046	**.093** (3x)	3	1/8	2-1/2	925631	37.10	925631-C3	41.30			
.031 (1/32)	**.010**	.046	**.156** (5x)	3	1/8	2-1/2	41531	37.10	41531-C3	41.30			
.031 (1/32)	**.010**	.046	**.250** (8x)	3	1/8	2-1/2	41731	37.90	41731-C3	42.10			
.031 (1/32)	**.010**	.046	**.312** (10x)	3	1/8	2-1/2	953731	39.20	953731-C3	43.40			
.031 (1/32)	**.010**	.046	**.375** (12x)	3	1/8	2-1/2	41931	39.20	41931-C3	43.40			
.031 (1/32)	**.010**	.046	**.470** (15x)	3	1/8	2-1/2	947831	45.10	947831-C3	49.30			
.039 (1 mm)	**.005**	.059	**.203** (5x)	3	1/8	2-1/2	37139	37.10	37139-C3	41.30			
.039 (1 mm)	**.005**	.059	**.325** (8x)	3	1/8	2-1/2	38339	37.90	38339-C3	42.10			
.039 (1 mm)	**.010**	.059	**.325** (8x)	3	1/8	2-1/2	41739	37.90	41739-C3	42.10			
.040	**.005**	.060	**.203** (5x)	3	1/8	2-1/2	37140	37.10	37140-C3	41.30			
.040	**.005**	.060	**.325** (8x)	3	1/8	2-1/2	38340	37.90	38340-C3	42.10			
.040	**.010**	.060	**.203** (5x)	3	1/8	2-1/2	41540	37.10	41540-C3	41.30			
.040	**.010**	.060	**.325** (8x)	3	1/8	2-1/2	41740	37.90	41740-C3	42.10			
.047 (3/64)	**.005**	.070	**.250** (5x)	3	1/8	2-1/2	37147	36.40	37147-C3	40.60	37147-C4	47.10	
.047 (3/64)	**.005**	.070	**.375** (8x)	3	1/8	2-1/2	38347	37.10	38347-C3	41.30	38347-C4	47.80	
.047 (3/64)	**.005**	.070	**.480** (10x)	3	1/8	2-1/2	917847	38.40	917847-C3	42.60			
.047 (3/64)	**.005**	.070	**.570** (12x)	3	1/8	2-1/2	39447	38.40	39447-C3	42.60	39447-C4	49.10	

SPEEDS & FEEDS ONLINE!

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.047 (3/64)	**.010**	.070	**.141** (3x)	3	1/8	2-1/2	925647	36.40	925647-C3	40.60		
	.047 (3/64)	**.010**	.070	**.250** (5x)	3	1/8	2-1/2	41547	36.40	41547-C3	40.60		
	.047 (3/64)	**.010**	.070	**.375** (8x)	3	1/8	2-1/2	41747	37.10	41747-C3	41.30		
	.047 (3/64)	**.010**	.070	**.480** (10x)	3	1/8	2-1/2	953747	38.40	953747-C3	42.60		
	.047 (3/64)	**.010**	.070	**.570** (12x)	3	1/8	2-1/2	41947	37.90	41947-C3	42.10		
	.047 (3/64)	**.010**	.070	**.710** (15x)	3	1/8	2-1/2	947847	43.10	947847-C3	47.30		
	.047 (3/64)	**.015**	.070	**.250** (5x)	3	1/8	2-1/2	42747	36.40	42747-C3	40.60		
	.047 (3/64)	**.015**	.070	**.375** (8x)	3	1/8	2-1/2	42947	37.10	42947-C3	41.30		
	.050	**.005**	.075	**.250** (5x)	3	1/8	2-1/2	37150	36.40	37150-C3	40.60		
	.050	**.005**	.075	**.400** (8x)	3	1/8	2-1/2	38350	37.10	38350-C3	41.30		
	.050	**.010**	.075	**.250** (5x)	3	1/8	2-1/2	41550	36.40	41550-C3	40.60		
	.050	**.010**	.075	**.400** (8x)	3	1/8	2-1/2	41750	37.10	41750-C3	41.30		
	.060	**.005**	.090	**.312** (5x)	3	1/8	2-1/2	37160	36.40	37160-C3	40.60		
	.060	**.005**	.090	**.500** (8x)	3	1/8	2-1/2	38360	37.10	38360-C3	41.30		
	.060	**.010**	.090	**.312** (5x)	3	1/8	2-1/2	41560	36.40	41560-C3	40.60		
	.060	**.010**	.090	**.500** (8x)	3	1/8	2-1/2	41760	37.10	41760-C3	41.30		
NEW	.060	**.015**	.090	**.500** (8x)	3	1/8	2-1/2	42960	37.10	42960-C3	41.30		
NEW	.060	**.020**	.090	**.500** (8x)	3	1/8	2-1/2	970160	37.10	970160-C3	41.30		
	.062 (1/16)	**.003**	.093	**.312** (5x)	3	1/8	2-1/2	968262	36.40	968262-C3	40.60		
	.062 (1/16)	**.003**	.093	**.500** (8x)	3	1/8	2-1/2	972762	37.10	972762-C3	41.30		
	.062 (1/16)	**.005**	.093	**.312** (5x)	3	1/8	2-1/2	37162	36.40	37162-C3	40.60		
	.062 (1/16)	**.005**	.093	**.500** (8x)	3	1/8	2-1/2	38362	37.10	38362-C3	41.30		
	.062 (1/16)	**.005**	.093	**.625** (10x)	3	1/8	2-1/2	917862	38.40	917862-C3	42.60		
	.062 (1/16)	**.005**	.093	**.750** (12x)	3	1/8	2-1/2	39462	38.40	39462-C3	42.60		
	.062 (1/16)	**.008**	.093	**.312** (5x)	3	1/8	2-1/2	912762	36.40	912762-C3	40.60		
	.062 (1/16)	**.008**	.093	**.500** (8x)	3	1/8	2-1/2	909362	37.10	909362-C3	41.30		
	.062 (1/16)	**.010**	.093	**.187** (3x)	3	1/8	2-1/2	925662	36.40	925662-C3	40.60		
	.062 (1/16)	**.010**	.093	**.312** (5x)	3	1/8	2-1/2	41562	36.40	41562-C3	40.60	41562-C4	47.10
	.062 (1/16)	**.010**	.093	**.500** (8x)	3	1/8	2-1/2	41762	37.10	41762-C3	41.30	41762-C4	47.80
	.062 (1/16)	**.010**	.093	**.625** (10x)	3	1/8	2-1/2	953762	38.40	953762-C3	42.60		
	.062 (1/16)	**.010**	.093	**.750** (12x)	3	1/8	2-1/2	41962	38.40	41962-C3	42.60	41962-C4	49.10
	.062 (1/16)	**.010**	.093	**.950** (15x)	3	1/8	2-1/2	947862	43.10	947862-C3	47.30		
	.062 (1/16)	**.012**	.093	**.312** (5x)	3	1/8	2-1/2	901962	36.40	901962-C3	40.60		
	.062 (1/16)	**.012**	.093	**.500** (8x)	3	1/8	2-1/2	913562	37.10	913562-C3	41.30		
	.062 (1/16)	**.015**	.093	**.312** (5x)	3	1/8	2-1/2	42762	36.40	42762-C3	40.60		
	.062 (1/16)	**.015**	.093	**.500** (8x)	3	1/8	2-1/2	42962	37.10	42962-C3	41.30		
	.062 (1/16)	**.015**	.093	**.625** (10x)	3	1/8	2-1/2	965662	38.40	965662-C3	42.60		
	.062 (1/16)	**.015**	.093	**.750** (12x)	3	1/8	2-1/2	43162	38.40	43162-C3	42.60		
	.062 (1/16)	**.020**	.093	**.312** (5x)	3	1/8	2-1/2	953562	36.40	953562-C3	40.60		
	.062 (1/16)	**.020**	.093	**.500** (8x)	3	1/8	2-1/2	970162	37.10	970162-C3	41.30		
	.062 (1/16)	**.020**	.093	**.625** (10x)	3	1/8	2-1/2	923262	38.40	923262-C3	42.60		
	.062 (1/16)	**.020**	.093	**.750** (12x)	3	1/8	2-1/2	872662	38.40	872662-C3	42.90		
	.070	**.005**	.105	**.375** (5x)	3	1/8	2-1/2	37170	36.40	37170-C3	40.60		
	.070	**.005**	.105	**.570** (8x)	3	1/8	2-1/2	38370	37.10	38370-C3	41.30		
	.070	**.010**	.105	**.375** (5x)	3	1/8	2-1/2	41570	36.40	41570-C3	40.60		
	.070	**.010**	.105	**.570** (8x)	3	1/8	2-1/2	41770	37.10	41770-C3	41.30		

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.078 (5/64)	**.005**	.117	**.406** (5x)	3	1/8	2-1/2	37178	36.40	37178-C3	40.60		
.078 (5/64)	**.005**	.117	**.625** (8x)	3	1/8	2-1/2	38378	37.10	38378-C3	41.30		
.078 (5/64)	**.005**	.117	**.800** (10x)	3	1/8	2-1/2	917878	38.40	917878-C3	42.60		
.078 (5/64)	**.005**	.117	**.940** (12x)	3	1/8	2-1/2	39478	38.40	39478-C3	42.60		
.078 (5/64)	**.010**	.117	**.406** (5x)	3	1/8	2-1/2	41578	36.40	41578-C3	40.60	41578-C4	47.10
.078 (5/64)	**.010**	.117	**.625** (8x)	3	1/8	2-1/2	41778	37.10	41778-C3	41.30	41778-C4	47.80
.078 (5/64)	**.010**	.117	**.800** (10x)	3	1/8	2-1/2	953778	38.40	953778-C3	42.60		
.078 (5/64)	**.010**	.117	**.940** (12x)	3	1/8	2-1/2	41978	38.40	41978-C3	42.60	41978-C4	49.10
.078 (5/64)	**.015**	.117	**.234** (3x)	3	1/8	2-1/2	944978	36.40	944978-C3	40.60		
.078 (5/64)	**.015**	.117	**.406** (5x)	3	1/8	2-1/2	42778	36.40	42778-C3	40.60		
.078 (5/64)	**.015**	.117	**.625** (8x)	3	1/8	2-1/2	42978	37.10	42978-C3	41.30		
.078 (5/64)	**.015**	.117	**.800** (10x)	3	1/8	2-1/2	965678	38.40	965678-C3	42.60		
.078 (5/64)	**.015**	.117	**.940** (12x)	3	1/8	2-1/2	43178	38.40	43178-C3	42.60		
.078 (5/64)	**.015**	.117	**1.187** (15x)	3	1/8	2-1/2	939378	43.10	939378-C3	47.30		
.078 (5/64)	**.020**	.117	**.406** (5x)	3	1/8	2-1/2	953578	36.40	953578-C3	40.60		
.078 (5/64)	**.020**	.117	**.625** (8x)	3	1/8	2-1/2	970178	37.10	970178-C3	41.30		
.078 (5/64)	**.020**	.117	**.800** (10x)	3	1/8	2-1/2	923278	38.40	923278-C3	42.60		
.080	**.005**	.120	**.406** (5x)	3	1/8	2-1/2	37180	36.40	37180-C3	40.60		
.080	**.005**	.120	**.650** (8x)	3	1/8	2-1/2	38380	37.10	38380-C3	41.30		
.080	**.010**	.120	**.406** (5x)	3	1/8	2-1/2	41580	36.40	41580-C3	40.60		
.080	**.010**	.120	**.650** (8x)	3	1/8	2-1/2	41780	37.10	41780-C3	41.30		
.090	**.005**	.135	**.450** (5x)	3	1/8	2-1/2	37190	36.40	37190-C3	40.60		
.090	**.005**	.135	**.750** (8x)	3	1/8	2-1/2	38390	37.10	38390-C3	41.30		
.090	**.010**	.135	**.450** (5x)	3	1/8	2-1/2	41590	36.40	41590-C3	40.60		
.090	**.010**	.135	**.750** (8x)	3	1/8	2-1/2	41790	37.10	41790-C3	41.30		
.093 (3/32)	**.003**	.139	**.500** (5x)	3	1/8	2-1/2	968293	36.40	968293-C3	40.60		
.093 (3/32)	**.003**	.139	**.750** (8x)	3	1/8	2-1/2	972793	37.10	972793-C3	41.30		
.093 (3/32)	**.005**	.139	**.500** (5x)	3	1/8	2-1/2	37193	36.40	37193-C3	40.60		
.093 (3/32)	**.005**	.139	**.750** (8x)	3	1/8	2-1/2	38393	37.10	38393-C3	41.30		
.093 (3/32)	**.005**	.139	**.950** (10x)	3	1/8	2-1/2	917893	38.40	917893-C3	42.60		
.093 (3/32)	**.005**	.139	**1.125** (12x)	3	1/8	2-1/2	39493	38.40	39493-C3	42.60		
.093 (3/32)	**.008**	.139	**.500** (5x)	3	1/8	2-1/2	912793	36.40	912793-C3	40.60		
.093 (3/32)	**.008**	.139	**.750** (8x)	3	1/8	2-1/2	909393	37.10	909393-C3	41.30		
.093 (3/32)	**.010**	.139	**.500** (5x)	3	1/8	2-1/2	41593	36.40	41593-C3	40.60		
.093 (3/32)	**.010**	.139	**.750** (8x)	3	1/8	2-1/2	41793	37.10	41793-C3	41.30		
.093 (3/32)	**.010**	.139	**.950** (10x)	3	1/8	2-1/2	953793	38.40	953793-C3	42.60		
.093 (3/32)	**.010**	.139	**1.125** (12x)	3	1/8	2-1/2	41993	38.40	41993-C3	42.60		
.093 (3/32)	**.012**	.139	**.500** (5x)	3	1/8	2-1/2	901993	36.40	901993-C3	40.60		
.093 (3/32)	**.012**	.139	**.750** (8x)	3	1/8	2-1/2	913593	37.10	913593-C3	41.30		
.093 (3/32)	**.015**	.139	**.279** (3x)	3	1/8	2-1/2	944993	36.40	944993-C3	40.60		
.093 (3/32)	**.015**	.139	**.500** (5x)	3	1/8	2-1/2	42793	36.40	42793-C3	40.60	42793-C4	47.10
.093 (3/32)	**.015**	.139	**.750** (8x)	3	1/8	2-1/2	42993	37.10	42993-C3	41.30	42993-C4	47.80
.093 (3/32)	**.015**	.139	**.950** (10x)	3	1/8	2-1/2	965693	38.40	965693-C3	42.60		
.093 (3/32)	**.015**	.139	**1.125** (12x)	3	1/8	2-1/2	43193	38.40	43193-C3	42.60	43193-C4	49.10
.093 (3/32)	**.015**	.139	**1.400** (15x)	3	1/8	3	939393	43.10	939393-C3	47.30		
.093 (3/32)	**.020**	.139	**.500** (5x)	3	1/8	2-1/2	953593	36.40	953593-C3	40.60		
.093 (3/32)	**.020**	.139	**.750** (8x)	3	1/8	2-1/2	970193	37.10	970193-C3	41.30		
.093 (3/32)	**.020**	.139	**.950** (10x)	3	1/8	2-1/2	923293	38.40	923293-C3	42.60		

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.093 (3/32)	**.030**	.139	**.500** (5x)	3	1/8	2-1/2	42193	36.40	42193-C3	40.60		
	.093 (3/32)	**.030**	.139	**.750** (8x)	3	1/8	2-1/2	42393	37.10	42393-C3	41.30		
	.093 (3/32)	**.030**	.139	**.950** (10x)	3	1/8	2-1/2	921493	38.40	921493-C3	42.60		
	.100	**.005**	.150	**.500** (5x)	3	1/8	2-1/2	37200	36.40	37200-C3	40.60		
	.100	**.005**	.150	**.800** (8x)	3	1/8	2-1/2	38400	37.10	38400-C3	41.30		
	.100	**.010**	.150	**.500** (5x)	3	1/8	2-1/2	41600	36.40	41600-C3	40.60		
	.100	**.010**	.150	**.800** (8x)	3	1/8	2-1/2	41800	37.10	41800-C3	41.30		
	.109 (7/64)	**.005**	.163	**.570** (5x)	3	1/8	2-1/2	37202	36.40	37202-C3	40.60		
	.109 (7/64)	**.005**	.163	**.900** (8x)	3	1/8	2-1/2	38402	37.10	38402-C3	41.30		
	.109 (7/64)	**.010**	.163	**.570** (5x)	3	1/8	2-1/2	41602	36.40	41602-C3	40.60		
	.109 (7/64)	**.010**	.163	**.900** (8x)	3	1/8	2-1/2	41802	37.10	41802-C3	41.30		
	.118 (3 mm)	**.005**	.177	**.950** (8x)	3	1/8	2-1/2	38405	37.10	38405-C3	41.30		
	.118 (3 mm)	**.010**	.177	**.950** (8x)	3	1/8	2-1/2	41805	37.10	41805-C3	41.30		

	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	.125 (1/8)	**.005**	.187	**.625** (5x)	3	1/8	2-1/2	37208	36.40	37208-C3	40.60	37208-C4	47.10
	.125 (1/8)	**.005**	.187	**1.000** (8x)	3	1/8	2-1/2	38408	37.10	38408-C3	41.30		
	.125 (1/8)	**.005**	.187	**1.250** (10x)	3	1/8	2-1/2	917908	39.90	917908-C3	44.10		
	.125 (1/8)	**.005**	.187	**1.500** (12x)	3	1/8	3	39508	39.90	39508-C3	44.10		
	.125 (1/8)	**.008**	.187	**.625** (5x)	3	1/8	2-1/2	912808	36.40	912808-C3	40.60		
	.125 (1/8)	**.008**	.187	**1.000** (8x)	3	1/8	2-1/2	909408	37.10	909408-C3	41.30		
NEW	.125 (1/8)	**.010**	.187	**.375** (3x)	3	1/8	2-1/2	925708	36.40	925708-C3	40.60		
NEW	.125 (1/8)	**.010**	.187	**.625** (5x)	3	1/8	2-1/2	41608	36.40	41608-C3	40.60	41608-C4	47.10
	.125 (1/8)	**.010**	.187	**1.000** (8x)	3	1/8	2-1/2	41808	37.10	41808-C3	41.30		
	.125 (1/8)	**.010**	.187	**1.250** (10x)	3	1/8	2-1/2	953808	39.90	953808-C3	44.10		
	.125 (1/8)	**.010**	.187	**1.500** (12x)	3	1/8	3	42008	39.90	42008-C3	44.10		
	.125 (1/8)	**.010**	.187	**1.875** (15x)	3	1/8	3	947908	45.10	947908-C3	49.30		
	.125 (1/8)	**.015**	.187	**.625** (5x)	3	1/8	2-1/2	42808	36.40	42808-C3	40.60	42808-C4	47.10
	.125 (1/8)	**.015**	.187	**1.000** (8x)	3	1/8	2-1/2	43008	37.10	43008-C3	41.30	43008-C4	47.80
	.125 (1/8)	**.015**	.187	**1.250** (10x)	3	1/8	2-1/2	965708	39.90	965708-C3	44.10		
	.125 (1/8)	**.015**	.187	**1.500** (12x)	3	1/8	3	43208	39.90	43208-C3	44.10	43208-C4	50.60
	.125 (1/8)	**.015**	.187	**1.875** (15x)	3	1/8	3	939408	45.10	939408-C3	49.30		
NEW	.125 (1/8)	**.020**	.187	**.625** (5x)	3	1/8	2-1/2	953608	36.40	953608-C3	40.60	953608-C4	47.10
	.125 (1/8)	**.020**	.187	**1.000** (8x)	3	1/8	2-1/2	970208	37.10	970208-C3	41.30		
	.125 (1/8)	**.020**	.187	**1.250** (10x)	3	1/8	2-1/2	923308	39.90	923308-C3	44.10		
NEW	.125 (1/8)	**.025**	.187	**.625** (5x)	3	1/8	2-1/2	839908	36.40	839908-C3	40.60		
NEW	.125 (1/8)	**.025**	.187	**1.000** (8x)	3	1/8	2-1/2	840208	37.10	840208-C3	41.30		
NEW	.125 (1/8)	**.030**	.187	**.375** (3x)	3	1/8	2-1/2	827108	36.40	827108-C3	40.60		
NEW	.125 (1/8)	**.030**	.187	**.625** (5x)	3	1/8	2-1/2	42208	36.40	42208-C3	40.60	42208-C4	47.10
	.125 (1/8)	**.030**	.187	**1.000** (8x)	3	1/8	2-1/2	42408	37.10	42408-C3	41.30		
	.125 (1/8)	**.030**	.187	**1.250** (10x)	3	1/8	2-1/2	921508	39.90	921508-C3	44.10		
	.125 (1/8)	**.030**	.187	**1.500** (12x)	3	1/8	3	42608	39.90	42608-C3	44.10		
	.125 (1/8)	**.030**	.187	**1.875** (15x)	3	1/8	3	919708	45.10	919708-C3	49.30		
	.125 (1/8)	**.040**	.187	**.625** (5x)	3	1/8	2-1/2	930208	36.40	930208-C3	40.60		
	.125 (1/8)	**.040**	.187	**1.000** (8x)	3	1/8	2-1/2	924308	37.10	924308-C3	41.30		
	.140 (9/64)	**.010**	.220	**.750** (5x)	3	3/16	3	41609	36.40	41609-C3	40.90		
	.140 (9/64)	**.010**	.220	**1.125** (8x)	3	3/16	3	41809	37.10	41809-C3	41.60		
	.140 (9/64)	**.015**	.220	**.750** (5x)	3	3/16	3	42809	36.40	42809-C3	40.90		
	.140 (9/64)	**.015**	.220	**1.125** (8x)	3	3/16	3	43009	37.10	43009-C3	41.60		

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

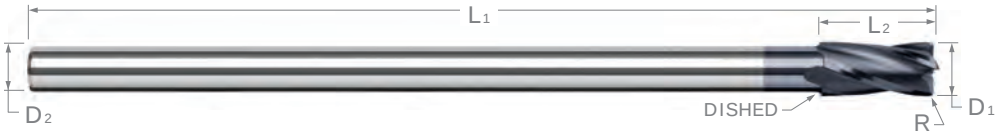
continued from previous page

CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.156 (5/32)	**.010**	.234	**.750** (5x)	3	3/16	3	41610	40.10	41610-C3	44.60			
.156 (5/32)	**.010**	.234	**1.250** (8x)	3	3/16	3	41810	40.70	41810-C3	45.20			
.156 (5/32)	**.010**	.234	**1.570** (10x)	3	3/16	3	953810	43.40	953810-C3	47.90			
.156 (5/32)	**.015**	.234	**.750** (5x)	3	3/16	3	42810	40.10	42810-C3	44.60			
.156 (5/32)	**.015**	.234	**1.250** (8x)	3	3/16	3	43010	40.70	43010-C3	45.20			
.156 (5/32)	**.015**	.234	**1.570** (10x)	3	3/16	3	965710	43.40	965710-C3	47.90			
.156 (5/32)	**.020**	.234	**.750** (5x)	3	3/16	3	953610	40.10	953610-C3	44.60			
.156 (5/32)	**.020**	.234	**1.250** (8x)	3	3/16	3	970210	40.70	970210-C3	45.20			
.156 (5/32)	**.030**	.234	**.750** (5x)	3	3/16	3	42210	40.10	42210-C3	44.60			
.156 (5/32)	**.030**	.234	**1.250** (8x)	3	3/16	3	42410	40.70	42410-C3	45.20			
.187 (3/16)	**.005**	.281	**1.000** (5x)	3	3/16	3	37212	40.10	37212-C3	44.60			NEW
.187 (3/16)	**.010**	.281	**1.000** (5x)	3	3/16	3	41612	40.10	41612-C3	44.60			
.187 (3/16)	**.010**	.281	**1.500** (8x)	3	3/16	3	41812	40.70	41812-C3	45.20			
.187 (3/16)	**.015**	.281	**1.000** (5x)	3	3/16	3	42812	40.10	42812-C3	44.60	42812-C4	54.80	
.187 (3/16)	**.015**	.281	**1.500** (8x)	3	3/16	3	43012	40.70	43012-C3	45.20	43012-C4	55.40	
.187 (3/16)	**.015**	.281	**1.875** (10x)	3	3/16	4	965712	43.40	965712-C3	49.60			
.187 (3/16)	**.015**	.281	**2.250** (12x)	3	3/16	4	43212	43.40	43212-C3	49.60	43212-C4	59.10	
.187 (3/16)	**.020**	.281	**1.000** (5x)	3	3/16	3	953612	40.10	953612-C3	44.60			
.187 (3/16)	**.020**	.281	**1.500** (8x)	3	3/16	3	970212	40.70	970212-C3	45.20			
.187 (3/16)	**.030**	.281	**1.000** (5x)	3	3/16	3	42212	40.10	42212-C3	44.60			
.187 (3/16)	**.030**	.281	**1.500** (8x)	3	3/16	3	42412	40.70	42412-C3	45.20			
.187 (3/16)	**.030**	.281	**1.875** (10x)	3	3/16	4	921512	43.40	921512-C3	49.60			
.187 (3/16)	**.030**	.281	**2.250** (12x)	3	3/16	4	42612	43.40	42612-C3	49.60			
.187 (3/16)	**.045**	.281	**1.000** (5x)	3	3/16	3	978812	40.10	978812-C3	44.60			
.187 (3/16)	**.045**	.281	**1.500** (8x)	3	3/16	3	961812	40.70	961812-C3	45.20			
.187 (3/16)	**.060**	.281	**1.000** (5x)	3	3/16	3	949112	40.10	949112-C3	44.60			
.187 (3/16)	**.060**	.281	**1.500** (8x)	3	3/16	3	866012	40.70	866012-C3	45.20			
.250 (1/4)	**.005**	.375	**1.250** (5x)	3	1/4	4	37216	44.40	37216-C3	51.60			
.250 (1/4)	**.010**	.375	**1.250** (5x)	3	1/4	4	41616	44.40	41616-C3	51.60			
.250 (1/4)	**.015**	.375	**1.250** (5x)	3	1/4	4	42816	44.40	42816-C3	51.60			
.250 (1/4)	**.015**	.375	**2.000** (8x)	3	1/4	4	43016	45.10	43016-C3	52.30			
.250 (1/4)	**.015**	.375	**3.000** (12x)	3	1/4	6	43216	50.70	43216-C3	58.90			
.250 (1/4)	**.015**	.375	**4.375** (17.5x)	4	1/4	6	24016	79.90	24016-C3	88.10			
.250 (1/4)	**.020**	.375	**1.250** (5x)	3	1/4	4	953616	44.40	953616-C3	51.60			
.250 (1/4)	**.020**	.375	**2.000** (8x)	3	1/4	4	970216	45.10	970216-C3	52.30			
.250 (1/4)	**.030**	.375	**1.250** (5x)	3	1/4	4	42216	44.40	42216-C3	51.60	42216-C4	61.10	
.250 (1/4)	**.030**	.375	**2.000** (8x)	3	1/4	4	42416	45.10	42416-C3	52.30	42416-C4	61.80	
.250 (1/4)	**.030**	.375	**3.000** (12x)	3	1/4	6	42616	50.70	42616-C3	58.90	42616-C4	74.90	
.250 (1/4)	**.045**	.375	**1.250** (5x)	3	1/4	4	978816	44.40	978816-C3	51.60			
.250 (1/4)	**.060**	.375	**1.250** (5x)	3	1/4	4	949116	44.40	949116-C3	51.60			
.312 (5/16)	**.015**	.470	**1.625** (5x)	3	5/16	4	42820	70.50	42820-C3	79.20			
.312 (5/16)	**.015**	.470	**2.500** (8x)	3	5/16	4	43020	71.40	43020-C3	80.10			
.312 (5/16)	**.015**	.470	**4.343** (14x)	4	5/16	6	24020	94.20	24020-C3	106.40			
.375 (3/8)	**.030**	.562	**2.000** (5x)	3	3/8	4	42224	74.70	42224-C3	85.90			
.375 (3/8)	**.030**	.562	**3.000** (8x)	3	3/8	4	42424	100.70	42424-C3	111.90			
.375 (3/8)	**.030**	.562	**4.312** (11.5x)	4	3/8	6	24024	106.90	24024-C3	119.60			
.500 (1/2)	**.030**	.750	**5.750** (11.5x)	4	1/2	8	24032	185.90	24032-C3	211.10			
.625 (5/8)	**.030**	.937	**5.687** (9x)	4	5/8	8	24040	313.70	24040-C3	335.90			
.750 (3/4)	**.030**	1.125	**5.625** (7.5x)	4	3/4	8	24048	387.10	24048-C3	412.90			

SPEEDS & FEEDS ONLINE!

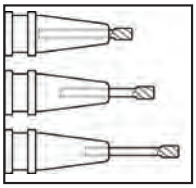
END MILLS

Corner Radius – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Center cutting
- 4 flutes
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
1/8	.015	3/16	**3 mm**	2-1/2	829008	79.10	829008-C3	83.30
5/32	.010	15/64	**1/8**	2-1/2	17610	79.10	17610-C3	83.60
5/32	.015	15/64	**1/8**	2-1/2	829010	79.10	829010-C3	83.60
3/16	.015	9/32	**1/8**	2-1/2	17612	79.10	17612-C3	83.60
3/16	.015	9/32	**5/32**	2-1/2	17613	81.50	17613-C3	86.10
3/16	.030	9/32	**1/8**	2-1/2	844912	81.50	844912-C3	86.10
1/4	.015	3/8	**3/16**	3	17616	85.70	17616-C3	91.90
1/4	.030	3/8	**3/16**	3	844916	85.70	844916-C3	91.90
5/16	.015	15/32	**1/4**	4	17620	104.50	17620-C3	113.20
5/16	.030	15/32	**1/4**	4	844920	104.50	844920-C3	113.20
3/8	.015	9/16	**5/16**	4	829024	124.20	829024-C3	135.40
3/8	.030	9/16	**5/16**	4	17624	124.20	17624-C3	135.40
7/16	.015	21/32	**3/8**	6	829028	182.50	829028-C3	196.20
7/16	.030	21/32	**3/8**	6	17628	182.50	17628-C3	196.20
1/2	.015	3/4	**7/16**	6	829032	190.90	829032-C3	205.70
1/2	.030	3/4	**7/16**	6	17632	190.90	17632-C3	205.70
5/8	.030	15/16	**1/2**	6	17640	247.90	17640-C3	266.10
3/4	.030	1-1/8	**5/8**	6	17648	305.90	17648-C3	325.10

SPEEDS & FEEDS ONLINE!

For Square Reduced Shank, please see page 33.

For Ball Reduced Shank, please see page 50.

★★★★★

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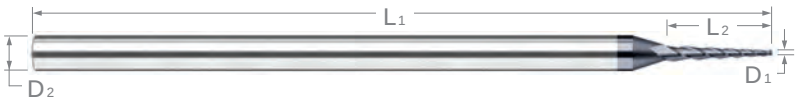
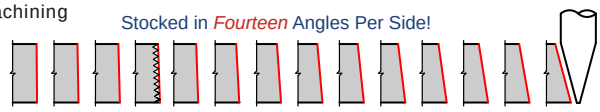
MINIATURE END MILLS

Tapered - Square



- Length of cut up to 10x end diameter
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in *Fourteen* Angles Per Side!



ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
0.5°	.015 (1/64)	.078 (5x)	1/8	1-1/2	997015	37.70	997015-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20515	61.90	20515-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	997030	32.70	997030-C6	38.90
	.030	.300 (10x)	3/16	3	20530	56.20	20530-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	997045	32.70	997045-C6	38.90
	.045	.450 (10x)	3/16	3	20545	56.20	20545-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	997060	32.70	997060-C6	38.90
	.060	.600 (10x)	3/16	3	20560	56.20	20560-C6	62.90
	.075	.750 (10x)	3/16	3	20575	56.20	20575-C6	62.90
	.090	.500 (5x)	1/8	1-1/2	997090	32.70	997090-C6	38.90
	.090	.900 (10x)	1/4	4	20590	61.10	20590-C6	70.30
	.125 (1/8)	.625 (5x)	3/16	2	997099	50.70	997099-C6	57.40
	.125 (1/8)	1.250 (10x)	1/4	4	20599	61.10	20599-C6	70.30
1.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	992715	37.70	992715-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20615	61.90	20615-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	992730	32.70	992730-C6	38.90
	.030	.300 (10x)	3/16	3	20630	56.20	20630-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	992745	32.70	992745-C6	38.90
	.045	.450 (10x)	3/16	3	20645	56.20	20645-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	992760	32.70	992760-C6	38.90
	.060	.600 (10x)	3/16	3	20660	56.20	20660-C6	62.90
	.075	.750 (10x)	3/16	3	20675	56.20	20675-C6	62.90
	.090	.500 (5x)	1/8	1-1/2	992790	32.70	992790-C6	38.90
	.090	.900 (10x)	1/4	4	20690	61.10	20690-C6	70.30
	.125 (1/8)	.625 (5x)	3/16	2	992799	50.70	992799-C6	57.40
	.125 (1/8)	1.250 (10x)	1/4	4	20699	61.10	20699-C6	70.30
1.5°	.015 (1/64)	.078 (5x)	1/8	1-1/2	991815	37.70	991815-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20715	61.90	20715-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	991830	32.70	991830-C6	38.90
	.030	.300 (10x)	3/16	3	20730	56.20	20730-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	991845	32.70	991845-C6	38.90
	.045	.450 (10x)	3/16	3	20745	56.20	20745-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	991860	32.70	991860-C6	38.90
	.060	.600 (10x)	3/16	3	20760	56.20	20760-C6	62.90
	.075	.750 (10x)	1/4	4	20775	62.20	20775-C6	71.40
	.090	.500 (5x)	1/8	1-1/2	991890	32.70	991890-C6	38.90
	.090	.900 (10x)	1/4	4	20790	61.10	20790-C6	70.30
	.125 (1/8)	1.250 (10x)	1/4	4	20799	61.10	20799-C6	70.30

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
1.8° (N.P.T.)	.200	.625 (3x)	1/4	2	912282	51.40	912282-C6	60.60
	.300	.900 (3x)	3/8	2-1/2	912286	64.20	912286-C6	74.40
	.400	1.250 (3x)	1/2	3	912292	86.20	912292-C6	99.40
2.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	991015	37.70	991015-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20815	61.90	20815-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	991030	32.70	991030-C6	38.90
	.030	.300 (10x)	3/16	3	20830	56.20	20830-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	991045	32.70	991045-C6	38.90
	.045	.450 (10x)	3/16	3	20845	56.20	20845-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	991060	32.70	991060-C6	38.90
	.060	.600 (10x)	3/16	3	20860	56.20	20860-C6	62.90
	.075	.750 (10x)	1/4	4	20875	62.20	20875-C6	71.40
	.090	.500 (5x)	1/8	1-1/2	991090	32.70	991090-C6	38.90
	.090	.900 (10x)	1/4	4	20890	61.10	20890-C6	70.30
	.125 (1/8)	.625 (5x)	3/16	2	991099	50.70	991099-C6	57.40
	.125 (1/8)	1.250 (10x)	1/4	4	20899	61.10	20899-C6	70.30
3.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	990415	37.70	990415-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	20915	61.90	20915-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	990430	32.70	990430-C6	38.90
	.030	.300 (10x)	3/16	3	20930	56.20	20930-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	990445	32.70	990445-C6	38.90
	.045	.450 (10x)	3/16	3	20945	56.20	20945-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	990460	32.70	990460-C6	38.90
	.060	.600 (10x)	3/16	3	20960	56.20	20960-C6	62.90
	.075	.750 (10x)	1/4	4	20975	62.20	20975-C6	71.40
	.090	.500 (5x)	3/16	2	990490	50.70	990490-C6	57.40
	.090	.900 (10x)	1/4	4	20990	61.10	20990-C6	70.30
	.125 (1/8)	.625 (5x)	1/4	2-1/2	990499	74.70	990499-C6	83.90
	.125 (1/8)	1.190 (10x)	1/4	4	20999	61.10	20999-C6	70.30
4.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	996215	61.90	996215-C6	68.10
	.030	.300 (10x)	3/16	3	996230	56.20	996230-C6	62.90
	.045	.450 (10x)	3/16	3	996245	56.20	996245-C6	62.90
	.060	.600 (10x)	3/16	3	996260	56.20	996260-C6	62.90
	.075	.750 (10x)	1/4	4	996275	62.20	996275-C6	71.40
	.090	.900 (10x)	1/4	4	996290	62.20	996290-C6	71.40
	.125 (1/8)	1.250 (10x)	3/8	4	996299	84.10	996299-C6	94.30
5.0°	.010	.050 (5x)	1/8	1-1/2	989610	44.70	989610-C6	50.90
	.010	.100 (10x)	1/8	2-1/2	27110	67.50	27110-C6	73.70
	.015 (1/64)	.078 (5x)	1/8	1-1/2	989615	37.70	989615-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	27115	61.90	27115-C6	68.10
	.020	.100 (5x)	1/8	1-1/2	989620	36.90	989620-C6	43.10
	.020	.200 (10x)	1/8	2-1/2	27120	60.90	27120-C6	67.10
	.030	.156 (5x)	1/8	1-1/2	989630	32.70	989630-C6	38.90
	.030	.300 (10x)	3/16	3	27130	56.20	27130-C6	62.90

SPEEDS & FEEDS ONLINE!
continued on next page

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
5.0°	.045	.250 (5x)	1/8	1-1/2	989645	32.70	989645-C6	38.90
	.045	.450 (10x)	3/16	3	27145	56.20	27145-C6	62.90
	.060	.312 (5x)	1/8	1-1/2	989660	32.70	989660-C6	38.90
	.060	.600 (10x)	3/16	3	27160	56.20	27160-C6	62.90
	.075	.375 (5x)	3/16	2	989675	50.70	989675-C6	57.40
	.075	.750 (10x)	1/4	4	27175	62.20	27175-C6	71.40
	.090	.500 (5x)	3/16	2	989690	50.70	989690-C6	57.40
	.090	.900 (10x)	1/4	4	27190	61.10	27190-C6	70.30
	.125 (1/8)	.625 (5x)	1/4	2-1/2	989699	74.70	989699-C6	83.90
	.125 (1/8)	1.250 (10x)	3/8	4	27199	82.50	27199-C6	92.70
	.187 (3/16)	1.000 (5x)	3/8	2-1/2	989681	82.50	989681-C6	92.70
	.250 (1/4)	1.250 (5x)	1/2	3	989684	111.40	989684-C6	124.60
6.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	993315	63.70	993315-C6	69.90
	.030	.300 (10x)	3/16	3	993330	59.10	993330-C6	65.80
	.045	.450 (10x)	3/16	3	993345	59.10	993345-C6	65.80
	.060	.600 (10x)	3/16	3	993360	59.10	993360-C6	65.80
	.090	.500 (5x)	1/4	2-1/2	904390	74.70	904390-C6	83.90
	.125 (1/8)	.625 (5x)	5/16	2-1/2	904399	71.70	904399-C6	81.90
7.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	922615	37.70	922615-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	28015	61.90	28015-C6	68.10
	.030	.156 (5x)	1/8	1-1/2	922630	32.70	922630-C6	38.90
	.030	.300 (10x)	3/16	3	28030	56.20	28030-C6	62.90
	.045	.250 (5x)	1/8	1-1/2	922645	32.70	922645-C6	38.90
	.045	.450 (10x)	3/16	3	28045	56.20	28045-C6	62.90
	.060	.312 (5x)	3/16	2	922660	50.70	922660-C6	57.40
	.060	.600 (10x)	1/4	4	28060	61.10	28060-C6	70.30
	.075	.750 (10x)	3/8	4	28075	84.10	28075-C6	94.30
	.090	.500 (5x)	1/4	2-1/2	922690	61.10	922690-C6	70.30
	.090	.900 (10x)	3/8	4	28090	83.40	28090-C6	93.60
	.125 (1/8)	.625 (5x)	5/16	2-1/2	922699	71.70	922699-C6	81.90
8.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	995415	63.70	995415-C6	69.90
	.030	.300 (10x)	3/16	3	995430	59.10	995430-C6	65.80
	.045	.450 (10x)	3/16	3	995445	59.10	995445-C6	65.80
	.060	.600 (10x)	1/4	4	995460	63.10	995460-C6	72.30
	.090	.500 (5x)	1/4	2-1/2	903790	61.10	903790-C6	70.30
	.125 (1/8)	.625 (5x)	5/16	2-1/2	903799	71.70	903799-C6	81.90
9.0°	.015 (1/64)	.150 (10x)	1/8	2-1/2	992115	63.70	992115-C6	69.90
	.030	.300 (10x)	3/16	3	992130	59.10	992130-C6	65.80
	.045	.450 (10x)	3/16	3	992145	59.10	992145-C6	65.80
	.060	.600 (10x)	1/4	4	992160	63.10	992160-C6	72.30
	.090	.500 (5x)	1/4	2-1/2	902490	61.10	902490-C6	70.30
	.125 (1/8)	.625 (5x)	3/8	2-1/2	902499	82.50	902499-C6	92.70

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Tapered – Square (cont.)

continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
10.0°	.010	.050 (5x)	1/8	1-1/2	988210	44.70	988210-C6	50.90
	.010	.100 (10x)	1/8	2-1/2	29410	67.50	29410-C6	73.70
	.015 (1/64)	.078 (5x)	1/8	1-1/2	988215	37.70	988215-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	2-1/2	29415	61.90	29415-C6	68.10
	.020	.100 (5x)	1/8	1-1/2	988220	37.70	988220-C6	43.90
	.020	.200 (10x)	1/8	2-1/2	29420	60.90	29420-C6	67.10
	.030	.156 (5x)	1/8	1-1/2	988230	32.70	988230-C6	38.90
	.030	.300 (10x)	3/16	3	29430	56.20	29430-C6	62.90
	.045	.250 (5x)	3/16	2	988245	56.20	988245-C6	62.90
	.045	.450 (10x)	1/4	4	29445	62.20	29445-C6	71.40
	.060	.312 (5x)	3/16	2	988260	56.20	988260-C6	62.90
	.060	.600 (10x)	3/8	4	29460	82.50	29460-C6	92.70
	.075	.375 (5x)	1/4	2-1/2	988275	59.10	988275-C6	68.30
	.075	.750 (10x)	3/8	4	29475	84.10	29475-C6	94.30
	.090	.500 (5x)	5/16	2-1/2	988290	69.90	988290-C6	80.10
	.125 (1/8)	.625 (5x)	3/8	2-1/2	988299	82.50	988299-C6	92.70
	.187 (3/16)	.890 (5x)	1/2	3	988281	111.40	988281-C6	124.60
	.250 (1/4)	1.065 (5x)	5/8	3-1/2	988284	119.70	988284-C6	134.90
15.0°	.015 (1/64)	.078 (5x)	1/8	1-1/2	919515	37.70	919515-C6	43.90
	.015 (1/64)	.150 (10x)	1/8	1-1/2	41115	59.10	41115-C6	65.30
	.030	.156 (5x)	1/8	1-1/2	919530	37.70	919530-C6	43.90
	.030	.294 (10x)	3/16	2	41130	57.90	41130-C6	64.60
	.045	.250 (5x)	3/16	2	919545	50.70	919545-C6	57.40
	.045	.383 (8x)	1/4	2-1/2	41145	61.90	41145-C6	71.10
	.060	.312 (5x)	1/4	2-1/2	919560	60.90	919560-C6	70.10
	.060	.588 (10x)	3/8	2-1/2	41160	84.10	41160-C6	94.30
	.075	.750 (10x)	1/2	3	41175	116.90	41175-C6	130.10
	.090	.765 (8x)	1/2	3	41190	114.70	41190-C6	127.90
	.125 (1/8)	.700 (5x)	1/2	3	41199	114.70	41199-C6	127.90

SPEEDS & FEEDS ONLINE!

For larger angles, please see Chamfer Cutters on page 221.

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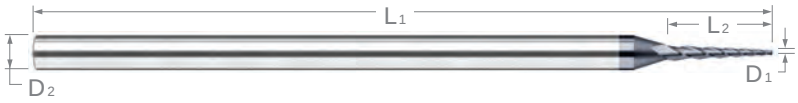
NEW ANGLES!

MINIATURE END MILLS

Tapered – Ball



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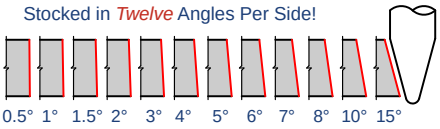

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 +0°30′ −0°30′	D_1 +.0005″ −.0005″	L_2 +.020″ −.000″	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
0.5°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21515	66.10	21515-C6	72.30
	.030	**.300** (10x)	3/16	3	21530	61.70	21530-C6	68.40
	.045	**.450** (10x)	3/16	3	21545	62.90	21545-C6	69.60
	.060	**.600** (10x)	3/16	3	21560	61.70	21560-C6	68.40
	.090	**.900** (10x)	1/4	4	21590	65.10	21590-C6	74.30
	.125 (1/8)	**1.250** (10x)	1/4	4	21599	65.10	21599-C6	74.30
1.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21615	66.10	21615-C6	72.30
	.030	**.156** (5x)	1/8	1-1/2	879830	36.40	879830-C6	42.60
	.030	**.300** (10x)	3/16	3	21630	61.70	21630-C6	68.40
	.045	**.450** (10x)	3/16	3	21645	62.90	21645-C6	69.60
	.060	**.312** (5x)	1/8	1-1/2	879860	36.40	879860-C6	42.60
	.060	**.600** (10x)	3/16	3	21660	61.70	21660-C6	68.40
	.090	**.900** (10x)	1/4	4	21690	65.10	21690-C6	74.30
	.125 (1/8)	**1.250** (10x)	1/4	4	21699	65.10	21699-C6	74.30
1.5°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21715	66.10	21715-C6	72.30
	.030	**.300** (10x)	3/16	3	21730	61.70	21730-C6	68.40
	.045	**.450** (10x)	3/16	3	21745	62.90	21745-C6	69.60
	.060	**.600** (10x)	3/16	3	21760	61.70	21760-C6	68.40
	.090	**.900** (10x)	1/4	4	21790	65.10	21790-C6	74.30
	.125 (1/8)	**1.250** (10x)	1/4	4	21799	65.10	21799-C6	74.30
2.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21815	66.10	21815-C6	72.30
	.030	**.300** (10x)	3/16	3	21830	61.70	21830-C6	68.40
	.045	**.450** (10x)	3/16	3	21845	62.90	21845-C6	69.60
	.060	**.600** (10x)	3/16	3	21860	61.70	21860-C6	68.40
	.090	**.900** (10x)	1/4	4	21890	65.10	21890-C6	74.30
	.125 (1/8)	**1.250** (10x)	1/4	4	21899	65.10	21899-C6	74.30
3.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	21915	66.10	21915-C6	72.30
	.030	**.156** (5x)	1/8	1-1/2	880230	36.40	880230-C6	42.60
	.030	**.300** (10x)	3/16	3	21930	61.70	21930-C6	68.40
	.045	**.450** (10x)	3/16	3	21945	62.90	21945-C6	69.60
	.060	**.312** (5x)	1/8	1-1/2	880260	36.40	880260-C6	42.60
	.060	**.600** (10x)	3/16	3	21960	61.70	21960-C6	68.40
	.090	**.900** (10x)	1/4	4	21990	65.10	21990-C6	74.30
	.125 (1/8)	**1.190** (10x)	1/4	4	21999	65.10	21999-C6	74.30

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE END MILLS

Tapered – Ball (cont.)

continued from previous page

	ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
NEW	4.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	840415	66.10	840415-C6	72.30
NEW		.030	**.300** (10x)	3/16	3	840430	61.70	840430-C6	68.40
NEW		.060	**.600** (10x)	3/16	3	840460	61.70	840460-C6	68.40
NEW		.090	**.900** (10x)	1/4	4	840490	65.10	840490-C6	74.30
	5.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	32615	66.10	32615-C6	72.30
		.030	**.156** (5x)	1/8	1-1/2	880630	36.40	880630-C6	42.60
		.030	**.300** (10x)	3/16	3	32630	61.70	32630-C6	68.40
		.045	**.450** (10x)	3/16	3	32645	62.90	32645-C6	69.60
		.060	**.312** (5x)	1/8	1-1/2	880660	36.40	880660-C6	42.60
		.060	**.600** (10x)	3/16	3	32660	61.70	32660-C6	68.40
		.090	**.900** (10x)	1/4	4	32690	65.10	32690-C6	74.30
		.125 (1/8)	**1.250** (10x)	3/8	4	32699	86.70	32699-C6	96.90
NEW	6.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	835615	66.10	835615-C6	72.30
NEW		.030	**.300** (10x)	3/16	3	835630	61.70	835630-C6	68.40
NEW		.060	**.600** (10x)	3/16	3	835660	65.10	835660-C6	74.30
NEW		.090	**.900** (10x)	3/8	4	835690	86.70	835690-C6	96.90
	7.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	34415	66.10	34415-C6	72.30
		.030	**.300** (10x)	3/16	3	34430	61.70	34430-C6	68.40
		.045	**.450** (10x)	3/16	3	34445	62.90	34445-C6	69.60
		.060	**.600** (10x)	1/4	4	34460	65.10	34460-C6	74.30
		.090	**.900** (10x)	3/8	4	34490	86.70	34490-C6	96.90
NEW	8.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	853815	66.10	853815-C6	72.30
NEW		.030	**.300** (10x)	3/16	3	853830	61.70	853830-C6	68.40
NEW		.060	**.600** (10x)	1/4	4	853860	65.10	853860-C6	74.30
NEW		.090	**.900** (10x)	3/8	4	853890	86.70	853890-C6	96.90
	10.0°	.015 (1/64)	**.150** (10x)	1/8	2-1/2	35315	66.10	35315-C6	72.30
		.030	**.156** (5x)	1/8	1-1/2	881030	36.40	881030-C6	42.60
		.030	**.300** (10x)	3/16	3	35330	61.70	35330-C6	68.40
		.045	**.450** (10x)	1/4	4	35345	66.10	35345-C6	75.30
		.060	**.312** (5x)	3/16	2	881060	59.70	881060-C6	66.40
		.060	**.600** (10x)	3/8	4	35360	86.70	35360-C6	96.90
NEW		.090	**.500** (5x)	5/16	2-1/2	881090	96.40	881090-C6	104.60
NEW		.125 (1/8)	**.625** (5x)	3/8	2-1/2	881099	118.60	881099-C6	126.80
NEW		.187 (3/16)	**.937** (5x)	1/2	3	881081	134.50	881081-C6	146.60
NEW		.250 (1/4)	**1.177** (5x)	5/8	3-1/2	881084	145.90	881084-C6	158.10
	15.0°	.015 (1/64)	**.150** (10x)	1/8	1-1/2	916115	68.10	916115-C6	74.30
		.030	**.300** (10x)	3/16	2	916130	63.50	916130-C6	70.20
		.045	**.402** (9x)	1/4	2-1/2	916145	68.10	916145-C6	77.30
		.060	**.600** (10x)	3/8	2-1/2	916160	89.40	916160-C6	99.60

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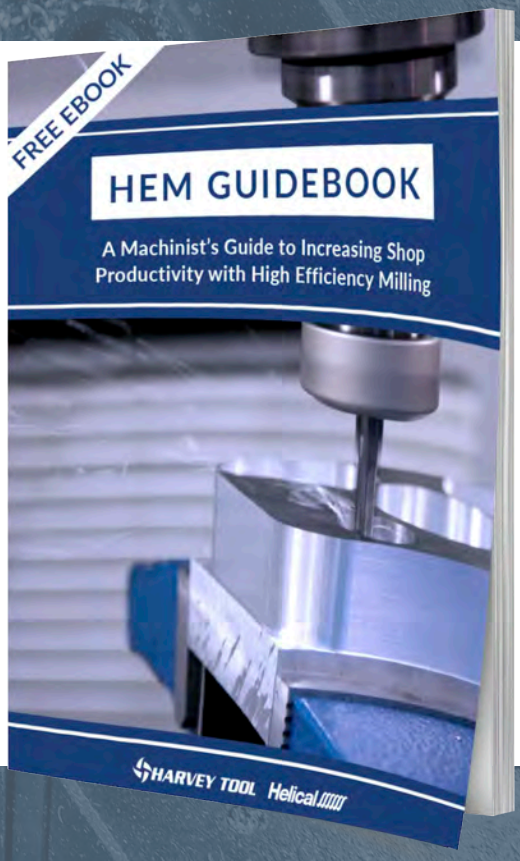

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End Mills for Composites 195

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Square – For Steels Up to 55 Rc

5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE	
.015 (1/64)		.0150	**.023** (1.5x)	1/4	2-1/2	907415-C6	65.40	NEW
.015 (1/64)		.0150	**.045** (3x)	1/4	2-1/2	915915-C6	65.40	NEW
.020		.0200	**.030** (1.5x)	1/4	2-1/2	907420-C6	65.40	NEW
.020		.0200	**.060** (3x)	1/4	2-1/2	915920-C6	65.40	NEW
.025		.0250	**.038** (1.5x)	1/4	2-1/2	907425-C6	65.40	NEW
.025		.0250	**.075** (3x)	1/4	2-1/2	915925-C6	65.40	NEW
.030		.0300	**.045** (1.5x)	1/4	2-1/2	907430-C6	59.40	NEW
.030		.0300	**.090** (3x)	1/4	2-1/2	915930-C6	59.40	NEW
.031 (1/32)		.0310	**.047** (1.5x)	1/4	2-1/2	907431-C6	55.10	
.031 (1/32)		.0310	**.093** (3x)	1/4	2-1/2	915931-C6	55.10	
.031 (1/32)		.0310	**.156** (5x)	1/4	2-1/2	885231-C6	60.10	
.035		.0350	**.053** (1.5x)	1/4	2-1/2	907435-C6	55.40	NEW
.035		.0350	**.105** (3x)	1/4	2-1/2	915935-C6	55.40	NEW
.039		.0390	**.117** (3x)	1/4	2-1/2	915939-C6	55.40	
	1.0 mm	.0393	**3.00 mm** (3x)	6 mm	63 mm	897822-C6	58.40	
.040		.0400	**.060** (1.5x)	1/4	2-1/2	907440-C6	55.10	NEW
.040		.0400	**.120** (3x)	1/4	2-1/2	915940-C6	55.10	
.045		.0450	**.068** (1.5x)	1/4	2-1/2	907445-C6	55.40	NEW
.045		.0450	**.135** (3x)	1/4	2-1/2	915945-C6	55.40	NEW
.047 (3/64)		.0470	**.071** (1.5x)	1/4	2-1/2	907447-C6	55.10	
.047 (3/64)		.0470	**.141** (3x)	1/4	2-1/2	915947-C6	55.10	
.047 (3/64)		.0470	**.250** (5x)	1/4	2-1/2	885247-C6	60.10	
.050		.0500	**.075** (1.5x)	1/4	2-1/2	907450-C6	55.10	NEW
.050		.0500	**.150** (3x)	1/4	2-1/2	915950-C6	55.10	
.055		.0550	**.083** (1.5x)	1/4	2-1/2	907455-C6	55.40	NEW
.055		.0550	**.165** (3x)	1/4	2-1/2	915955-C6	55.40	NEW
.060		.0600	**.090** (1.5x)	1/4	2-1/2	907460-C6	55.10	NEW
.060		.0600	**.180** (3x)	1/4	2-1/2	915960-C6	55.10	
.062 (1/16)		.0620	**.093** (1.5x)	1/4	2-1/2	907462-C6	55.10	
.062 (1/16)		.0620	**.186** (3x)	1/4	2-1/2	915962-C6	55.10	
.062 (1/16)		.0620	**.312** (5x)	1/4	2-1/2	885262-C6	60.10	
.070		.0700	**.105** (1.5x)	1/4	2-1/2	907470-C6	57.70	NEW
.070		.0700	**.210** (3x)	1/4	2-1/2	915970-C6	57.70	
.078 (5/64)		.0780	**.117** (1.5x)	1/4	2-1/2	907478-C6	57.70	
.078 (5/64)		.0780	**.234** (3x)	1/4	2-1/2	915978-C6	57.70	
.078 (5/64)		.0780	**.406** (5x)	1/4	2-1/2	885278-C6	62.70	
	2.0 mm	.0787	**6.00 mm** (3x)	6 mm	63 mm	897845-C6	61.10	

SPEEDS & FEEDS ONLINE!

continued on next page

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

mm & in continued from previous page

	CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED 5 FL	PRICE
NEW	.080		.0800	**.120** (1.5x)	1/4	2-1/2	907480-C6	57.70
	.080		.0800	**.240** (3x)	1/4	2-1/2	915980-C6	57.70
NEW	.090		.0900	**.135** (1.5x)	1/4	2-1/2	907490-C6	57.70
	.090		.0900	**.270** (3x)	1/4	2-1/2	915990-C6	57.70
	.093 (3/32)		.0930	**.140** (1.5x)	1/4	2-1/2	907493-C6	58.40
	.093 (3/32)		.0930	**.279** (3x)	1/4	2-1/2	915993-C6	58.40
	.093 (3/32)		.0930	**.500** (5x)	1/4	2-1/2	885293-C6	63.40
NEW	.100		.1000	**.150** (1.5x)	1/4	2-1/2	907500-C6	58.40
	.100		.1000	**.300** (3x)	1/4	2-1/2	916000-C6	58.40
NEW	.109 (7/64)		.1090	**.164** (1.5x)	1/4	2-1/2	907502-C6	58.40
	.109 (7/64)		.1090	**.327** (3x)	1/4	2-1/2	916002-C6	58.90
NEW	.118		.1180	**.177** (1.5x)	1/4	2-1/2	907505-C6	59.10
	.118		.1180	**.354** (3x)	1/4	2-1/2	916005-C6	59.40
		3.0 mm	.1181	**9.00 mm** (3x)	6 mm	63 mm	897857-C6	62.40

	D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
	.125 (1/8)		.1250	**.187** (1.5x)	1/4	2-1/2	907508-C6	59.10
	.125 (1/8)		.1250	**.375** (3x)	1/4	2-1/2	916008-C6	59.10
	.125 (1/8)		.1250	**.625** (5x)	1/4	2-1/2	885308-C6	64.10
NEW	.140 (9/64)		.1406	**.220** (1.5x)	1/4	2-1/2	907509-C6	62.20
NEW	.140 (9/64)		.1406	**.425** (3x)	1/4	2-1/2	916009-C6	62.20
	.156 (5/32)		.1562	**.235** (1.5x)	1/4	2-1/2	907510-C6	59.10
	.156 (5/32)		.1562	**.468** (3x)	1/4	2-1/2	916010-C6	59.10
	.156 (5/32)		.1562	**.750** (5x)	1/4	3	885310-C6	64.10
	.187 (3/16)		.1875	**.285** (1.5x)	1/4	2-1/2	907512-C6	61.50
	.187 (3/16)		.1875	**.562** (3x)	1/4	2-1/2	916012-C6	61.50
	.187 (3/16)		.1875	**1.000** (5x)	1/4	3	885312-C6	67.70
		6.0 mm	.2362	**18.00 mm** (3x)	6 mm	63 mm	897866-C6	65.10
	.250 (1/4)		.2500	**.375** (1.5x)	1/4	2-1/2	907516-C6	68.40
	.250 (1/4)		.2500	**.750** (3x)	1/4	2-1/2	916016-C6	68.40
	.250 (1/4)		.2500	**1.250** (5x)	1/4	4	885316-C6	74.50
	.312 (5/16)		.3125	**.470** (1.5x)	5/16	2-1/2	907520-C6	74.70
	.312 (5/16)		.3125	**1.000** (3x)	5/16	2-1/2	916020-C6	74.70
	.375 (3/8)		.3750	**.570** (1.5x)	3/8	2-1/2	907524-C6	86.10
	.375 (3/8)		.3750	**1.125** (3x)	3/8	2-1/2	916024-C6	86.10
	.500 (1/2)		.5000	**.750** (1.5x)	1/2	3	907532-C6	104.10
	.500 (1/2)		.5000	**1.500** (3x)	1/2	3	916032-C6	104.10

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (End Mills for Hardened Steels – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Depth of Cut Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00007	.00010	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	1 x Dia	.30 x Dia
			Profiling	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00065	.00082	.00098	.00131	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	1 x Dia	.15 x Dia
			Profiling	.00002	.00005	.00007	.00009	.00012	.00014	.00019	.00028	.00038	.00047	.00057	.00076	.15 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc

5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Corner radius for improved strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	R +.001″ −.001″ / +.025mm −.025mm	L_2 +.010″ −.000″ / +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.031 (1/32)		.0310	**.005**	.047 (1.5x)	1/4	2-1/2	920431-C6	55.10
.031 (1/32)		.0310	**.005**	.093 (3x)	1/4	2-1/2	933231-C6	55.10
.031 (1/32)		.0310	**.005**	.156 (5x)	1/4	2-1/2	851731-C6	60.10
.031 (1/32)		.0310	**.010**	.093 (3x)	1/4	2-1/2	852131-C6	55.10
.039		.0390	**.005**	.117 (3x)	1/4	2-1/2	933239-C6	55.40
	1.0 mm	.0393	**.20 mm**	3.00 mm (3x)	6 mm	63 mm	894622-C6	58.40
.040		.0400	**.005**	.120 (3x)	1/4	2-1/2	933240-C6	55.40
.047 (3/64)		.0470	**.005**	.071 (1.5x)	1/4	2-1/2	920447-C6	55.10
.047 (3/64)		.0470	**.005**	.141 (3x)	1/4	2-1/2	933247-C6	55.10
.047 (3/64)		.0470	**.005**	.250 (5x)	1/4	2-1/2	851747-C6	60.10
.047 (3/64)		.0470	**.010**	.141 (3x)	1/4	2-1/2	852147-C6	55.10
.050		.0500	**.005**	.150 (3x)	1/4	2-1/2	933250-C6	55.40
.060		.0600	**.005**	.180 (3x)	1/4	2-1/2	933260-C6	55.40
.062 (1/16)		.0620	**.005**	.093 (1.5x)	1/4	2-1/2	920462-C6	55.10
.062 (1/16)		.0620	**.005**	.186 (3x)	1/4	2-1/2	933262-C6	55.10
.062 (1/16)		.0620	**.005**	.312 (5x)	1/4	2-1/2	851762-C6	60.10
.062 (1/16)		.0620	**.010**	.186 (3x)	1/4	2-1/2	852162-C6	55.10
.070		.0700	**.005**	.210 (3x)	1/4	2-1/2	933270-C6	58.10
.078 (5/64)		.0780	**.005**	.117 (1.5x)	1/4	2-1/2	920478-C6	57.70
.078 (5/64)		.0780	**.005**	.234 (3x)	1/4	2-1/2	933278-C6	57.70
.078 (5/64)		.0780	**.005**	.406 (5x)	1/4	2-1/2	851778-C6	62.70
.078 (5/64)		.0780	**.010**	.234 (3x)	1/4	2-1/2	852178-C6	57.70
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	6 mm	63 mm	894645-C6	61.10
.080		.0800	**.005**	.240 (3x)	1/4	2-1/2	933280-C6	58.90
.090		.0900	**.005**	.270 (3x)	1/4	2-1/2	933290-C6	58.90
.093 (3/32)		.0930	**.005**	.140 (1.5x)	1/4	2-1/2	920493-C6	58.40
.093 (3/32)		.0930	**.005**	.279 (3x)	1/4	2-1/2	933293-C6	58.40
.093 (3/32)		.0930	**.005**	.500 (5x)	1/4	2-1/2	851793-C6	63.40
.093 (3/32)		.0930	**.010**	.279 (3x)	1/4	2-1/2	852193-C6	58.40
.093 (3/32)		.0930	**.030**	.279 (3x)	1/4	2-1/2	853293-C6	58.40
.100		.1000	**.005**	.300 (3x)	1/4	2-1/2	933300-C6	58.90
.109 (7/64)		.1090	**.005**	.327 (3x)	1/4	2-1/2	933302-C6	58.40
.118		.1180	**.005**	.354 (3x)	1/4	2-1/2	933305-C6	59.40
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	6 mm	63 mm	894657-C6	62.40

SPEEDS & FEEDS ONLINE!

continued on next page

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc

mm & in

continued from previous page

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.125 (1/8)		.1250	**.005**	.187 (1.5x)	1/4	2-1/2	920508-C6	59.10
.125 (1/8)		.1250	**.005**	.375 (3x)	1/4	2-1/2	933308-C6	59.10
.125 (1/8)		.1250	**.005**	.625 (5x)	1/4	2-1/2	851808-C6	64.10
.125 (1/8)		.1250	**.015**	.375 (3x)	1/4	2-1/2	852808-C6	59.10
.125 (1/8)		.1250	**.030**	.375 (3x)	1/4	2-1/2	853308-C6	59.10
.156 (5/32)		.1562	**.005**	.235 (1.5x)	1/4	2-1/2	920510-C6	59.10
.156 (5/32)		.1562	**.005**	.468 (3x)	1/4	2-1/2	933310-C6	59.10
.156 (5/32)		.1562	**.005**	.750 (5x)	1/4	3	851810-C6	64.10
.156 (5/32)		.1562	**.015**	.468 (3x)	1/4	2-1/2	852810-C6	59.10
.156 (5/32)		.1562	**.030**	.468 (3x)	1/4	2-1/2	853310-C6	59.10
.187 (3/16)		.1875	**.005**	.285 (1.5x)	1/4	2-1/2	920512-C6	61.50
.187 (3/16)		.1875	**.005**	.562 (3x)	1/4	2-1/2	933312-C6	61.50
.187 (3/16)		.1875	**.005**	1.000 (5x)	1/4	3	851812-C6	67.70
.187 (3/16)		.1875	**.015**	.562 (3x)	1/4	2-1/2	852812-C6	61.50
.187 (3/16)		.1875	**.030**	.562 (3x)	1/4	2-1/2	853312-C6	61.50
	6.0 mm	.2362	**.20 mm**	18.00 mm (3x)	6 mm	63 mm	894666-C6	65.10
.250 (1/4)		.2500	**.005**	.375 (1.5x)	1/4	2-1/2	920516-C6	68.40
.250 (1/4)		.2500	**.005**	.750 (3x)	1/4	2-1/2	933316-C6	68.40
.250 (1/4)		.2500	**.005**	1.250 (5x)	1/4	4	851816-C6	74.50
.250 (1/4)		.2500	**.015**	.750 (3x)	1/4	2-1/2	852816-C6	68.40
.250 (1/4)		.2500	**.030**	.750 (3x)	1/4	2-1/2	853316-C6	68.40

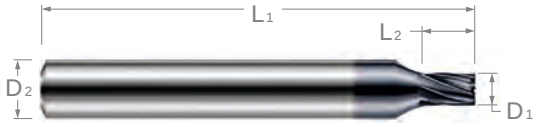
SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 77

NEW!

END MILLS FOR HARDENED STEELS

Square – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

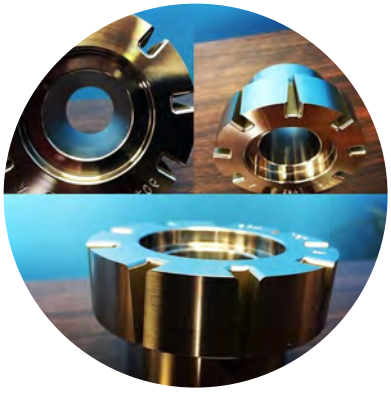
- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE	
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	835131-C6	57.60	NEW
.031 (1/32)	.093 (3x)	1/4	2-1/2	854831-C6	57.60	NEW
.047 (3/64)	.141 (3x)	1/4	2-1/2	854847-C6	57.60	NEW
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	835162-C6	57.60	NEW
.062 (1/16)	.186 (3x)	1/4	2-1/2	854862-C6	57.60	NEW
.078 (5/64)	.234 (3x)	1/4	2-1/2	854878-C6	60.70	NEW
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	835193-C6	61.40	NEW
.093 (3/32)	.279 (3x)	1/4	2-1/2	854893-C6	61.40	NEW

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE	
.125 (1/8)	.187 (1.5x)	1/4	2-1/2	835208-C6	62.10	NEW
.125 (1/8)	.375 (3x)	1/4	2-1/2	854808-C6	62.10	NEW
.187 (3/16)	.285 (1.5x)	1/4	2-1/2	835212-C6	64.70	NEW
.187 (3/16)	.562 (3x)	1/4	2-1/2	854812-C6	64.70	NEW
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	835216-C6	71.90	NEW
.250 (1/4)	.750 (3x)	1/4	2-1/2	854816-C6	71.90	NEW

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 82



★★★★★

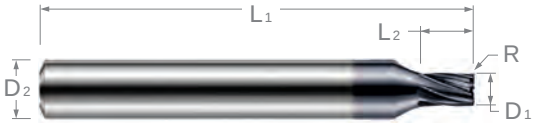
"Taper much? All slots and ID hole tapered. That's not a hand polished finish either, @harveytool endmills get the credit for the finish on the radii. Turned out beautifully."

— @intri_cut

Follow us on Instagram @harveytool!

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Corner radius for improved strength
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2 (h6)	L_1	7 FL	PRICE
NEW	.030	**.005**	.045 (1.5x)	1/4	2-1/2	903130-C6	62.90
NEW	.030	**.005**	.090 (3x)	1/4	2-1/2	910830-C6	62.90
	.031 (1/32)	**.005**	.047 (1.5x)	1/4	2-1/2	903131-C6	60.90
	.031 (1/32)	**.005**	.093 (3x)	1/4	2-1/2	910831-C6	60.90
NEW	.040	**.005**	.120 (3x)	1/4	2-1/2	910840-C6	62.90
NEW	.047 (3/64)	**.005**	.071 (1.5x)	1/4	2-1/2	903147-C6	60.90
	.047 (3/64)	**.005**	.141 (3x)	1/4	2-1/2	910847-C6	60.90
NEW	.050	**.005**	.150 (3x)	1/4	2-1/2	910850-C6	62.90
NEW	.060	**.005**	.180 (3x)	1/4	2-1/2	910860-C6	62.90
	.062 (1/16)	**.005**	.093 (1.5x)	1/4	2-1/2	903162-C6	60.90
	.062 (1/16)	**.005**	.186 (3x)	1/4	2-1/2	910862-C6	60.90
NEW	.070	**.005**	.210 (3x)	1/4	2-1/2	910870-C6	62.90
NEW	.078 (5/64)	**.005**	.117 (1.5x)	1/4	2-1/2	903178-C6	63.90
	.078 (5/64)	**.005**	.234 (3x)	1/4	2-1/2	910878-C6	63.90
NEW	.080	**.005**	.240 (3x)	1/4	2-1/2	910880-C6	65.90
NEW	.090	**.005**	.270 (3x)	1/4	2-1/2	910890-C6	65.90
	.093 (3/32)	**.005**	.140 (1.5x)	1/4	2-1/2	903193-C6	64.50
	.093 (3/32)	**.005**	.279 (3x)	1/4	2-1/2	910893-C6	64.50
NEW	.100	**.005**	.300 (3x)	1/4	2-1/2	910900-C6	65.90
NEW	.109 (7/64)	**.005**	.327 (3x)	1/4	2-1/2	910902-C6	65.90
NEW	.118	**.005**	.354 (3x)	1/4	2-1/2	910905-C6	65.90

	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2 (h6)	L_1	7 FL	PRICE
	.125 (1/8)	**.005**	.187 (1.5x)	1/4	2-1/2	903208-C6	65.40
	.125 (1/8)	**.005**	.375 (3x)	1/4	2-1/2	910908-C6	65.40
	.125 (1/8)	**.015**	.187 (1.5x)	1/4	2-1/2	879108-C6	65.40
	.125 (1/8)	**.015**	.375 (3x)	1/4	2-1/2	882308-C6	65.40
NEW	.140 (9/64)	**.005**	.425 (3x)	1/4	2-1/2	910909-C6	67.50
NEW	.156 (5/32)	**.005**	.235 (1.5x)	1/4	2-1/2	903210-C6	65.40
	.156 (5/32)	**.005**	.468 (3x)	1/4	2-1/2	910910-C6	65.40
	.187 (3/16)	**.005**	.285 (1.5x)	1/4	2-1/2	903212-C6	68.10
	.187 (3/16)	**.005**	.562 (3x)	1/4	2-1/2	910912-C6	68.10
	.187 (3/16)	**.015**	.285 (1.5x)	1/4	2-1/2	879112-C6	68.10
	.187 (3/16)	**.015**	.562 (3x)	1/4	2-1/2	882312-C6	68.10

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2	903216-C6	75.70
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	910916-C6	75.70
.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2	879116-C6	75.70
.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	882316-C6	75.70
.312 (5/16)	**.015**	1.000 (3x)	5/16	2-1/2	882320-C6	78.70
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2	883520-C6	78.70
.375 (3/8)	**.015**	1.125 (3x)	3/8	2-1/2	882324-C6	85.10
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	883524-C6	85.10
.500 (1/2)	**.015**	1.500 (3x)	1/2	3	882332-C6	94.40
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	883532-C6	94.40

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (End Mills for Hardened Steels – For Steels 45 - 68Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00047	.00062	.00078	.00094	.00125	.15 x Dia	.25 x Dia
			Finishing	.00005	.00009	.00014	.00019	.00024	.00028	.00038	.00056	.00076	.00094	.00113	.00151	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00006	.00009	.00012	.00016	.00019	.00025	.00037	.00050	.00062	.00075	.00100	.12 x Dia	.20 x Dia
			Finishing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Finishers – Ball

Stub Flute and Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- Reduced neck diameter to avoid heeling
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE
.008		.0080	.006	**.012** (1.5x)	1/4	2-1/2	37808-C6	84.70
.008		.0080	.006	**.025** (3x)	1/4	2-1/2	31408-C6	84.70
.008		.0080	.006	**.040** (5x)	1/4	2-1/2	38708-C6	88.90
.010		.0100	.008	**.015** (1.5x)	1/4	2-1/2	37810-C6	76.90
.010		.0100	.008	**.031** (3x)	1/4	2-1/2	31410-C6	76.90
.010		.0100	.008	**.050** (5x)	1/4	2-1/2	38710-C6	80.50
.015 (1/64)		.0150	.012	-	1/4	2-1/2	958315-C6	68.70
.015 (1/64)		.0150	.012	**.023** (1.5x)	1/4	2-1/2	37815-C6	65.10
.015 (1/64)		.0150	.012	**.047** (3x)	1/4	2-1/2	31415-C6	65.10
.015 (1/64)		.0150	.012	**.078** (5x)	1/4	2-1/2	38715-C6	67.50
.015 (1/64)		.0150	.012	**.125** (8x)	1/4	2-1/2	32015-C6	71.40
.015 (1/64)		.0150	.012	**.187** (12x)	1/4	2-1/2	33815-C6	82.90
.020		.0200	.016	-	1/4	2-1/2	958320-C6	68.70
.020		.0200	.016	**.031** (1.5x)	1/4	2-1/2	37820-C6	65.10
.020		.0200	.016	**.062** (3x)	1/4	2-1/2	31420-C6	65.10
.020		.0200	.016	**.100** (5x)	1/4	2-1/2	38720-C6	67.50
.020		.0200	.016	**.160** (8x)	1/4	2-1/2	32020-C6	68.10
.025		.0250	.020	**.038** (1.5x)	1/4	2-1/2	37825-C6	65.10
.025		.0250	.020	**.075** (3x)	1/4	2-1/2	31425-C6	65.10
.025		.0250	.020	**.125** (5x)	1/4	2-1/2	38725-C6	67.50
.031 (1/32)		.0310	.025	-	1/4	2-1/2	958331-C6	59.10
.031 (1/32)		.0310	.025	**.047** (1.5x)	1/4	2-1/2	37831-C6	55.70
.031 (1/32)		.0310	.025	**.093** (3x)	1/4	2-1/2	31431-C6	55.70
.031 (1/32)		.0310	.025	**.156** (5x)	1/4	2-1/2	38731-C6	60.90
.031 (1/32)		.0310	.025	**.250** (8x)	1/4	2-1/2	32031-C6	64.20
.031 (1/32)		.0310	.025	**.312** (10x)	1/4	2-1/2	919131-C6	71.10
.031 (1/32)		.0310	.025	**.375** (12x)	1/4	2-1/2	33831-C6	71.10
.031 (1/32)		.0310	.025	**.470** (15x)	1/4	2-1/2	973231-C6	81.70
.039		.0390	.031	-	1/4	2-1/2	958339-C6	59.10
.039		.0390	.031	**.062** (1.5x)	1/4	2-1/2	37839-C6	55.70
.039		.0390	.031	**.117** (3x)	1/4	2-1/2	31439-C6	55.70
.039		.0390	.031	**.203** (5x)	1/4	2-1/2	38739-C6	60.90
.039		.0390	.031	**.312** (8x)	1/4	2-1/2	32039-C6	64.20
.039		.0390	.031	**.468** (12x)	1/4	2-1/2	33839-C6	71.10
	1.0 mm	.0393	.80 mm	**3.00 mm** (3x)	6 mm	63 mm	882922-C6	60.90
	1.0 mm	.0393	.80 mm	**5.00 mm** (5x)	6 mm	63 mm	881722-C6	65.90
.040		.0400	.032	**.062** (1.5x)	1/4	2-1/2	37840-C6	55.70
.040		.0400	.032	**.125** (3x)	1/4	2-1/2	31440-C6	55.70

SPEEDS & FEEDS ONLINE!

continued on next page

END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE
.047 (3/64)		.0470	.038	-	1/4	2-1/2	958347-C6	59.10
.047 (3/64)		.0470	.038	**.071** (1.5x)	1/4	2-1/2	37847-C6	55.70
.047 (3/64)		.0470	.038	**.141** (3x)	1/4	2-1/2	31447-C6	55.70
.047 (3/64)		.0470	.038	**.250** (5x)	1/4	2-1/2	38747-C6	60.90
.047 (3/64)		.0470	.038	**.375** (8x)	1/4	2-1/2	32047-C6	64.20
.047 (3/64)		.0470	.038	**.470** (10x)	1/4	2-1/2	919147-C6	71.10
.047 (3/64)		.0470	.038	**.564** (12x)	1/4	2-1/2	33847-C6	71.10
.047 (3/64)		.0470	.038	**.710** (15x)	1/4	2-1/2	973247-C6	81.70
.050		.0500	.040	**.078** (1.5x)	1/4	2-1/2	37850-C6	55.70
.050		.0500	.040	**.150** (3x)	1/4	2-1/2	31450-C6	55.70
.060		.0600	.048	**.093** (1.5x)	1/4	2-1/2	37860-C6	55.70
.060		.0600	.048	**.180** (3x)	1/4	2-1/2	31460-C6	55.70
.062 (1/16)		.0620	.050	-	1/4	2-1/2	958362-C6	59.10
.062 (1/16)		.0620	.050	**.093** (1.5x)	1/4	2-1/2	37862-C6	55.70
.062 (1/16)		.0620	.050	**.187** (3x)	1/4	2-1/2	31462-C6	55.70
.062 (1/16)		.0620	.050	**.312** (5x)	1/4	2-1/2	38762-C6	60.90
.062 (1/16)		.0620	.050	**.500** (8x)	1/4	2-1/2	32062-C6	64.20
.062 (1/16)		.0620	.050	**.625** (10x)	1/4	2-1/2	919162-C6	77.40
.062 (1/16)		.0620	.050	**.750** (12x)	1/4	4	33862-C6	77.40
.062 (1/16)		.0620	.050	**.950** (15x)	1/4	4	973262-C6	88.20
.078 (5/64)		.0780	.062	-	1/4	2-1/2	958378-C6	59.10
.078 (5/64)		.0780	.062	**.117** (1.5x)	1/4	2-1/2	37878-C6	55.70
.078 (5/64)		.0780	.062	**.234** (3x)	1/4	2-1/2	31478-C6	55.70
.078 (5/64)		.0780	.062	**.406** (5x)	1/4	2-1/2	38778-C6	60.90
.078 (5/64)		.0780	.062	**.625** (8x)	1/4	2-1/2	32078-C6	64.20
.078 (5/64)		.0780	.062	**.781** (10x)	1/4	2-1/2	919178-C6	77.40
.078 (5/64)		.0780	.062	**.937** (12x)	1/4	4	33878-C6	77.40
.078 (5/64)		.0780	.062	**1.187** (15x)	1/4	4	973278-C6	88.20
	2.0 mm	.0787	1.60 mm	**6.00 mm** (3x)	6 mm	63 mm	882945-C6	60.90
	2.0 mm	.0787	1.60 mm	**10.00 mm** (5x)	6 mm	63 mm	881745-C6	65.90
.093 (3/32)		.0930	.074	-	1/4	2-1/2	958393-C6	59.10
.093 (3/32)		.0930	.074	**.140** (1.5x)	1/4	2-1/2	37893-C6	55.70
.093 (3/32)		.0930	.074	**.281** (3x)	1/4	2-1/2	31493-C6	55.70
.093 (3/32)		.0930	.074	**.500** (5x)	1/4	2-1/2	38793-C6	60.90
.093 (3/32)		.0930	.074	**.750** (8x)	1/4	2-1/2	32093-C6	64.20
.093 (3/32)		.0930	.074	**.937** (10x)	1/4	4	919193-C6	77.40
.093 (3/32)		.0930	.074	**1.125** (12x)	1/4	4	33893-C6	77.40
.093 (3/32)		.0930	.074	**1.400** (15x)	1/4	4	973293-C6	88.20
.118		.1180	.094	**.177** (1.5x)	1/4	2-1/2	37905-C6	62.40
.118		.1180	.094	**.354** (3x)	1/4	2-1/2	31505-C6	62.40
.118		.1180	.094	**.625** (5x)	1/4	2-1/2	38805-C6	70.90
	3.0 mm	.1181	2.40 mm	**9.00 mm** (3x)	6 mm	63 mm	882957-C6	67.50
	3.0 mm	.1181	2.40 mm	**15.00 mm** (5x)	6 mm	63 mm	881757-C6	76.10
.125 (1/8)		.1250	.100	-	1/4	2-1/2	958408-C6	65.90
.125 (1/8)		.1250	.100	**.187** (1.5x)	1/4	2-1/2	37908-C6	62.40
.125 (1/8)		.1250	.100	**.375** (3x)	1/4	2-1/2	31508-C6	62.40
.125 (1/8)		.1250	.100	**.625** (5x)	1/4	2-1/2	38808-C6	70.90
.125 (1/8)		.1250	.100	**1.000** (8x)	1/4	2-1/2	32108-C6	75.10
.125 (1/8)		.1250	.100	**1.250** (10x)	1/4	4	919208-C6	83.70
.125 (1/8)		.1250	.100	**1.500** (12x)	1/4	4	33908-C6	83.70
.125 (1/8)		.1250	.100	**1.875** (15x)	1/4	4	973308-C6	94.50

SPEEDS & FEEDS ONLINE!

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE
.156 (5/32)		.1560	.125	**.235** (1.5x)	1/4	2-1/2	37910-C6	62.40
.156 (5/32)		.1560	.125	**.470** (3x)	1/4	2-1/2	31510-C6	62.40
.156 (5/32)		.1560	.125	**.750** (5x)	1/4	2-1/2	38810-C6	70.90
.187 (3/16)		.1870	.150	-	1/4	2-1/2	958412-C6	65.90
.187 (3/16)		.1870	.150	**.285** (1.5x)	1/4	2-1/2	37912-C6	62.40
.187 (3/16)		.1870	.150	**.570** (3x)	1/4	2-1/2	31512-C6	62.40
.187 (3/16)		.1870	.150	**1.000** (5x)	1/4	2-1/2	38812-C6	70.90
.187 (3/16)		.1870	.150	**1.500** (8x)	1/4	4	32112-C6	82.90
.187 (3/16)		.1870	.150	**2.250** (12x)	1/4	4	33912-C6	94.50
	6.0 mm	.2362	4.80 mm	**18.00 mm** (3x)	6 mm	63 mm	882966-C6	67.50
	6.0 mm	.2362	4.80 mm	**30.00 mm** (5x)	6 mm	63 mm	881766-C6	76.10
.250 (1/4)		.2500	.200	-	1/4	2-1/2	958416-C6	65.90
.250 (1/4)		.2500	.200	**.375** (1.5x)	1/4	2-1/2	37916-C6	62.40
.250 (1/4)		.2500	.200	**.750** (3x)	1/4	2-1/2	31516-C6	70.90
.250 (1/4)		.2500	.200	**1.250** (5x)	1/4	2-1/2	38816-C6	70.90
.250 (1/4)		.2500	.200	**2.000** (8x)	1/4	4	32116-C6	82.90
.312 (5/16)		.3120	.250	**.470** (1.5x)	5/16	2-1/2	37920-C6	81.70
.312 (5/16)		.3120	.250	**1.000** (3x)	5/16	2-1/2	31520-C6	86.40
.375 (3/8)		.3750	.300	**.570** (1.5x)	3/8	2-1/2	37924-C6	87.90
.375 (3/8)		.3750	.300	**1.125** (3x)	3/8	2-1/2	31524-C6	92.70

SPEEDS & FEEDS ONLINE!

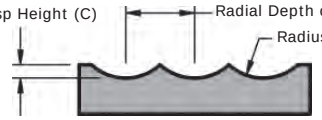
GUIDELINES FOR MILLING HARDENED STEELS

- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

SPEEDS & FEEDS (End Mills for Hardened Steels – Ball)

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial*	Axial
45-55 Rc	700	Finishing (.8x Reach)	.00028	.00058	.00088	.00116	.00146	.00174	.00234	.00350	.00468	.00584	.00702	.00936	.10 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00027	.00056	.00084	.00111	.00140	.00167	.00224	.00335	.00449	.00560	.00673	.00897	.10 x Dia	.04 x Dia
		Finishing (3x Reach)	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429	.00535	.00644	.00858	.10 x Dia	.04 x Dia
		Finishing (5x Reach)	.00023	.00048	.00073	.00097	.00122	.00145	.00195	.00292	.00390	.00487	.00585	.00780	.10 x Dia	.04 x Dia
		Finishing (8x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.10 x Dia	.03 x Dia
		Finishing (10x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.10 x Dia	.02 x Dia
		Finishing (12x Reach)	.00016	.00034	.00051	.00068	.00085	.00102	.00137	.00204	.00273	.00341	.00410	.00546	.08 x Dia	.02 x Dia
		Finishing (15x Reach)	.00015	.00031	.00048	.00063	.00079	.00094	.00127	.00190	.00254	.00316	.00380	.00507	.08 x Dia	.01 x Dia
56-68 Rc	600	Finishing (.8x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.07 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.07 x Dia	.04 x Dia
		Finishing (3x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.07 x Dia	.04 x Dia
		Finishing (5x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.07 x Dia	.04 x Dia
		Finishing (8x Reach)	.00016	.00034	.00052	.00068	.00086	.00102	.00137	.00205	.00275	.00343	.00412	.00549	.07 x Dia	.03 x Dia
		Finishing (10x Reach)	.00015	.00031	.00047	.00062	.0078	.00093	.00125	.00187	.00250	.00312	.00374	.00499	.07 x Dia	.02 x Dia
		Finishing (12x Reach)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	.00273	.00328	.00437	.06 x Dia	.02 x Dia
		Finishing (15x Reach)	.00012	.00025	.00038	.00050	.00063	.00075	.00101	.00152	.00203	.00253	.00304	.00406	.06 x Dia	.01 x Dia

* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish



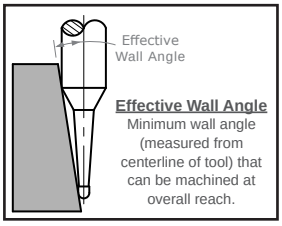
$$P = 2\,[R^2-(C-R)^2]^{½}$$

$$C = R-[R^2-(P^2/4)]^{½}$$

END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0000″ −.0006″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0.5°	.031 (1/32)	.025	I	**.093**	**.757**	8.4°	1/4	2-1/2	998703-C6	58.90
	.031 (1/32)	.025	I	**.156**	**.817**	7.8°	1/4	2-1/2	998706-C6	63.90
	.031 (1/32)	.025	I	**.250**	**.906**	7.0°	1/4	2-1/2	998709-C6	66.10
	.047 (3/64)	.038	I	**.156**	**.772**	7.7°	1/4	2-1/2	998712-C6	58.90
	.047 (3/64)	.038	I	**.250**	**.862**	6.9°	1/4	2-1/2	998715-C6	63.90
	.047 (3/64)	.038	I	**.375**	**.981**	6.1°	1/4	2-1/2	998718-C6	66.10
	.062 (1/16)	.050	I	**.312**	**.879**	6.4°	1/4	2-1/2	998721-C6	58.90
	.062 (1/16)	.050	I	**.500**	**1.057**	5.3°	1/4	2-1/2	998724-C6	63.90
	.062 (1/16)	.050	I	**.750**	**1.295**	4.3°	1/4	2-1/2	998727-C6	66.10
	.078 (5/64)	.062	I	**.437**	**.953**	5.4°	1/4	2-1/2	998730-C6	58.90
	.078 (5/64)	.062	I	**.625**	**1.131**	4.5°	1/4	2-1/2	998733-C6	63.90
	.078 (5/64)	.062	I	**1.000**	**1.488**	3.4°	1/4	3	998736-C6	73.10
	.093 (3/32)	.074	I	**.500**	**.971**	4.9°	1/4	2-1/2	998739-C6	58.90
	.093 (3/32)	.074	I	**.750**	**1.208**	3.9°	1/4	2-1/2	998742-C6	63.90
	.093 (3/32)	.074	I	**1.125**	**1.565**	3.0°	1/4	3	998745-C6	73.10
	.125 (1/8)	.100	I	**.625**	**1.000**	3.9°	1/4	2-1/2	998748-C6	64.40
	.125 (1/8)	.100	I	**1.000**	**1.357**	2.8°	1/4	2-1/2	998751-C6	64.40
	.125 (1/8)	.100	I	**1.500**	**1.832**	2.1°	1/4	3	998754-C6	73.10

SPEEDS & FEEDS ONLINE!

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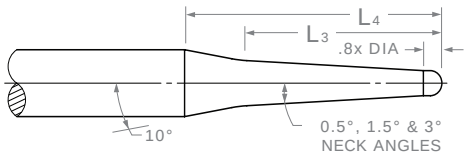
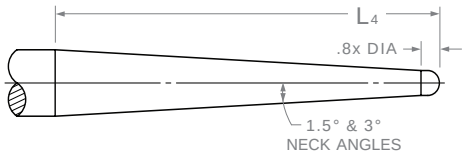
TYPE I



TYPE II



END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
1.5°	.031 (1/32)	.025	I	**.250**	**.875**	7.3°	1/4	2-1/2	997407-C6	63.90
	.031 (1/32)	.025	I	**.500**	**1.088**	5.9°	1/4	2-1/2	997414-C6	66.10
	.047 (3/64)	.038	I	**.375**	**.938**	6.4°	1/4	2-1/2	997421-C6	63.90
	.062 (1/16)	.050	I	**.500**	**1.004**	5.6°	1/4	2-1/2	997428-C6	63.90
	.062 (1/16)	.050	I	**1.000**	**1.429**	3.9°	1/4	3	997435-C6	73.10
	.078 (5/64)	.062	I	**.625**	**1.066**	4.8°	1/4	2-1/2	997442-C6	63.90
	.078 (5/64)	.062	I	**1.250**	**1.599**	3.2°	1/4	3	997449-C6	73.10
	.093 (3/32)	.074	I	**.750**	**1.132**	4.2°	1/4	2-1/2	997456-C6	63.90
	.093 (3/32)	.074	I	**1.500**	**1.771**	2.7°	1/4	3	997463-C6	73.10
	.125 (1/8)	.100	I	**1.000**	**1.258**	3.0°	1/4	2-1/2	997470-C6	64.40
	.125 (1/8)	.100	II	**2.487**	**2.487**	1.5°	1/4	4	997477-C6	73.50
3.0°	.031 (1/32)	.025	I	**.312**	**.714**	8.9°	1/4	2-1/2	994907-C6	65.70
	.031 (1/32)	.025	I	**.750**	**1.067**	6.0°	1/4	2-1/2	994914-C6	67.70
	.047 (3/64)	.038	I	**.875**	**1.140**	5.2°	1/4	2-1/2	994921-C6	65.70
	.047 (3/64)	.038	I	**1.250**	**1.442**	4.1°	1/4	3	994928-C6	73.10
	.062 (1/16)	.050	I	**.875**	**1.114**	5.0°	1/4	2-1/2	994935-C6	65.70
	.062 (1/16)	.050	II	**1.844**	**1.844**	3.0°	1/4	3	994942-C6	73.10
	.078 (5/64)	.062	I	**1.125**	**1.288**	4.0°	1/4	2-1/2	994949-C6	65.70
	.078 (5/64)	.062	II	**1.703**	**1.703**	3.0°	1/4	3	994956-C6	73.10
	.093 (3/32)	.074	I	**1.000**	**1.162**	4.1°	1/4	2-1/2	994963-C6	65.70
	.093 (3/32)	.074	II	**1.572**	**1.572**	3.0°	1/4	3	994970-C6	73.10
	.125 (1/8)	.100	II	**1.293**	**1.293**	2.9°	1/4	2-1/2	994977-C6	72.20
	.125 (1/8)	.100	II	**2.485**	**2.485**	3.0°	3/8	4	994984-C6	104.70

SPEEDS & FEEDS ONLINE!

END MILLS FOR HARDENED STEELS

Finishers – Corner Radius

Reduced Neck Diameter to Avoid Heeling

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE	
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.010	**.002**	.008	**.015** (1.5x)	1/4	2-1/2	40210-C6	79.70		
.010	**.002**	.008	**.031** (3x)	1/4	2-1/2	30610-C6	79.70		
.015 (1/64)	**.002**	.012	**.023** (1.5x)	1/4	2-1/2	40215-C6	62.40	951415-C6	63.40
.015 (1/64)	**.002**	.012	**.047** (3x)	1/4	2-1/2	30615-C6	62.40		
.015 (1/64)	**.002**	.012	**.078** (5x)	1/4	2-1/2	40615-C6	70.40		
.015 (1/64)	**.002**	.012	**.125** (8x)	1/4	2-1/2	31015-C6	70.90		
.015 (1/64)	**.002**	.012	**.187** (12x)	1/4	2-1/2	33015-C6	78.70		
.020	**.004**	.016	**.031** (1.5x)	1/4	2-1/2	40220-C6	62.40	951420-C6	63.40
.020	**.004**	.016	**.062** (3x)	1/4	2-1/2	30620-C6	62.40		
.020	**.004**	.016	**.100** (5x)	1/4	2-1/2	40620-C6	67.50		
.025	**.004**	.020	**.038** (1.5x)	1/4	2-1/2	40225-C6	62.40		
.025	**.004**	.020	**.075** (3x)	1/4	2-1/2	30625-C6	62.40		
.025	**.004**	.020	**.125** (5x)	1/4	2-1/2	40625-C6	67.50		
.031 (1/32)	**.005**	.025	**.047** (1.5x)	1/4	2-1/2	40231-C6	55.10	951431-C6	56.10
.031 (1/32)	**.005**	.025	**.093** (3x)	1/4	2-1/2	30631-C6	55.10	938731-C6	56.10
.031 (1/32)	**.005**	.025	**.156** (5x)	1/4	2-1/2	40631-C6	59.70	996331-C6	60.90
.031 (1/32)	**.005**	.025	**.250** (8x)	1/4	2-1/2	31031-C6	63.10	999031-C6	64.20
.031 (1/32)	**.005**	.025	**.375** (12x)	1/4	2-1/2	33031-C6	67.40		
.031 (1/32)	**.005**	.025	**.470** (15x)	1/4	2-1/2	942431-C6	78.90		
.031 (1/32)	**.010**	.025	**.093** (3x)	1/4	2-1/2	982631-C6	57.10		
.031 (1/32)	**.010**	.025	**.156** (5x)	1/4	2-1/2	957431-C6	61.70		
.039 (1 mm)	**.005**	.031	**.062** (1.5x)	1/4	2-1/2	40239-C6	55.10		
.039 (1 mm)	**.005**	.031	**.117** (3x)	1/4	2-1/2	30639-C6	55.10	938739-C6	56.10
.039 (1 mm)	**.005**	.031	**.203** (5x)	1/4	2-1/2	40639-C6	59.70	996339-C6	60.90
.039 (1 mm)	**.005**	.031	**.312** (8x)	1/4	2-1/2	31039-C6	63.10		
.039 (1 mm)	**.005**	.031	**.468** (12x)	1/4	2-1/2	33039-C6	67.40		
.047 (3/64)	**.008**	.038	**.071** (1.5x)	1/4	2-1/2	40247-C6	55.10		
.047 (3/64)	**.008**	.038	**.141** (3x)	1/4	2-1/2	30647-C6	55.10	938747-C6	56.10
.047 (3/64)	**.008**	.038	**.250** (5x)	1/4	2-1/2	40647-C6	59.70	996347-C6	60.90
.047 (3/64)	**.008**	.038	**.375** (8x)	1/4	2-1/2	31047-C6	63.10	999047-C6	64.20
.047 (3/64)	**.008**	.038	**.564** (12x)	1/4	2-1/2	33047-C6	67.40		
.047 (3/64)	**.008**	.038	**.710** (15x)	1/4	2-1/2	942447-C6	78.90		

SPEEDS & FEEDS ONLINE!

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE	
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.062 (1/16)	**.010**	.050	**.093** (1.5x)	1/4	2-1/2	40262-C6	55.10	951462-C6	56.10
.062 (1/16)	**.010**	.050	**.187** (3x)	1/4	2-1/2	30662-C6	55.10	938762-C6	56.10
.062 (1/16)	**.010**	.050	**.312** (5x)	1/4	2-1/2	40662-C6	59.70	996362-C6	60.90
.062 (1/16)	**.010**	.050	**.500** (8x)	1/4	2-1/2	31062-C6	63.10	999062-C6	64.20
.062 (1/16)	**.010**	.050	**.750** (12x)	1/4	4	33062-C6	75.70	924162-C6	76.70
.062 (1/16)	**.010**	.050	**.950** (15x)	1/4	4	942462-C6	86.90		
.062 (1/16)	**.020**	.050	**.187** (3x)	1/4	2-1/2	991562-C6	57.10		
.062 (1/16)	**.020**	.050	**.312** (5x)	1/4	2-1/2	953162-C6	61.70		
.078 (5/64)	**.010**	.062	**.117** (1.5x)	1/4	2-1/2	40278-C6	55.10		
.078 (5/64)	**.010**	.062	**.234** (3x)	1/4	2-1/2	30678-C6	55.10	938778-C6	56.10
.078 (5/64)	**.010**	.062	**.406** (5x)	1/4	2-1/2	40678-C6	59.70	996378-C6	60.90
.078 (5/64)	**.010**	.062	**.625** (8x)	1/4	2-1/2	31078-C6	63.10	999078-C6	64.20
.078 (5/64)	**.010**	.062	**.937** (12x)	1/4	4	33078-C6	75.70		
.093 (3/32)	**.015**	.074	**.140** (1.5x)	1/4	2-1/2	40293-C6	55.10	951493-C6	56.10
.093 (3/32)	**.015**	.074	**.281** (3x)	1/4	2-1/2	30693-C6	55.10	938793-C6	56.10
.093 (3/32)	**.015**	.074	**.500** (5x)	1/4	2-1/2	40693-C6	59.70	996393-C6	60.90
.093 (3/32)	**.015**	.074	**.750** (8x)	1/4	2-1/2	31093-C6	63.10	999093-C6	64.20
.093 (3/32)	**.015**	.074	**1.125** (12x)	1/4	4	33093-C6	75.70	924193-C6	76.70
.093 (3/32)	**.030**	.074	**.281** (3x)	1/4	2-1/2	963393-C6	57.10		
.093 (3/32)	**.030**	.074	**.500** (5x)	1/4	2-1/2	946393-C6	61.70		
.118 (3 mm)	**.015**	.094	**.177** (1.5x)	1/4	2-1/2	40305-C6	59.10		
.118 (3 mm)	**.015**	.094	**.354** (3x)	1/4	2-1/2	30705-C6	59.10		
.125 (1/8)	**.015**	.100	**.187** (1.5x)	1/4	2-1/2	40308-C6	59.10	951508-C6	60.10
.125 (1/8)	**.015**	.100	**.375** (3x)	1/4	2-1/2	30708-C6	59.10	938808-C6	60.10
.125 (1/8)	**.015**	.100	**.625** (5x)	1/4	2-1/2	40708-C6	64.90	996408-C6	70.90
.125 (1/8)	**.015**	.100	**1.000** (8x)	1/4	2-1/2	31108-C6	68.70	999108-C6	74.70
.125 (1/8)	**.015**	.100	**1.500** (12x)	1/4	4	33108-C6	81.10	924208-C6	87.40
.125 (1/8)	**.030**	.100	**.375** (3x)	1/4	2-1/2	963408-C6	61.10		
.125 (1/8)	**.030**	.100	**.625** (5x)	1/4	2-1/2	946408-C6	67.10		

SPEEDS & FEEDS ONLINE!

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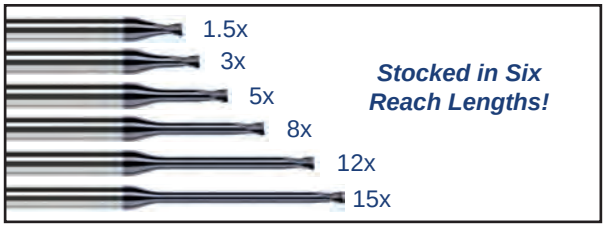


END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 4 FLUTE	
D_1 +.000″ −.001″	R +.0005″ −.0005″	L_2 +.020″ −.000″	L_3 +.020″ −.000″	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.156 (5/32)	**.015**	.125	**.235** (1.5x)	1/4	2-1/2	40310-C6	59.10		
.156 (5/32)	**.015**	.125	**.470** (3x)	1/4	2-1/2	30710-C6	59.10		
.187 (3/16)	**.015**	.150	**.285** (1.5x)	1/4	2-1/2	40312-C6	59.10	951512-C6	60.10
.187 (3/16)	**.015**	.150	**.570** (3x)	1/4	2-1/2	30712-C6	59.10	938812-C6	60.10
.187 (3/16)	**.015**	.150	**1.000** (5x)	1/4	2-1/2	40712-C6	64.90	996412-C6	70.90
.187 (3/16)	**.015**	.150	**1.500** (8x)	1/4	4	31112-C6	77.50		
.187 (3/16)	**.015**	.150	**2.250** (12x)	1/4	4	33112-C6	86.90		
.187 (3/16)	**.060**	.150	**.570** (3x)	1/4	2-1/2	939212-C6	67.90	934412-C6	73.70
.250 (1/4)	**.015**	.200	**.375** (1.5x)	1/4	2-1/2	40316-C6	59.10	951516-C6	60.10
.250 (1/4)	**.015**	.200	**.750** (3x)	1/4	2-1/2	30716-C6	61.90	938816-C6	67.70
.250 (1/4)	**.015**	.200	**1.250** (5x)	1/4	2-1/2	40716-C6	64.90		
.250 (1/4)	**.015**	.200	**2.000** (8x)	1/4	4	31116-C6	77.50		
.250 (1/4)	**.060**	.200	**.750** (3x)	1/4	2-1/2	939216-C6	67.90	934416-C6	73.70
.312 (5/16)	**.030**	.250	**1.000** (3x)	5/16	2-1/2			938820-C6	74.70
.375 (3/8)	**.030**	.300	**1.125** (3x)	3/8	2-1/2			938824-C6	86.10

SPEEDS & FEEDS ONLINE!

GUIDELINES FOR MILLING HARDENED STEELS

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

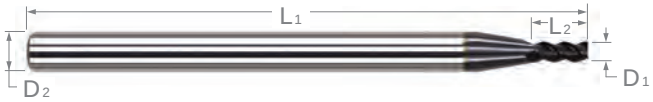
SPEEDS & FEEDS (End Mills for Hardened Steels – Corner Radius)

Important Note: Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
45-55 Rc	700	Finishing (1.5x Reach)	.00013	.00028	.00042	.00056	.00070	.00083	.00112	.00168	.00224	.00280	.00336	.00449	.35 x Dia	.02 x Dia
		Finishing (3x Reach)	.00013	.00027	.00040	.00053	.00067	.00080	.00107	.00160	.00215	.00268	.00322	.00429	.35 x Dia	.02 x Dia
		Finishing (5x Reach)	.00012	.00024	.00037	.00048	.00061	.00073	.00098	.00146	.00195	.00243	.00293	.00390	.35 x Dia	.02 x Dia
		Finishing (8x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.35 x Dia	.02 x Dia
		Finishing (12x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00068	.00102	.00137	.00170	.00205	.00273	.35 x Dia	.02 x Dia
		Finishing (15x Reach)	.00008	.00016	.00024	.00031	.00040	.00047	.00063	.00095	.00127	.00158	.00190	.00254	.35 x Dia	.01 x Dia
56-68 Rc	600	Finishing (1.5x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00269	.00359	.25 x Dia	.02 x Dia
		Finishing (3x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.25 x Dia	.02 x Dia
		Finishing (5x Reach)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	.00195	.00234	.00312	.25 x Dia	.02 x Dia
		Finishing (8x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00137	.00171	.00206	.00275	.25 x Dia	.02 x Dia
		Finishing (12x Reach)	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00109	.00136	.00164	.00218	.25 x Dia	.02 x Dia
		Finishing (15x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00076	.00101	.00127	.00152	.00203	.25 x Dia	.01 x Dia

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Square



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078		**.60 mm** (3x)	3	4 mm	50 mm	942804-C6	52.10
	.010	.0100		**.015** (1.5x)	3	1/8	1-1/2	973710-C6	49.10
	.010	.0100		**.030** (3x)	3	1/8	1-1/2	967010-C6	48.90
	.010	.0100		**.050** (5x)	3	1/8	2-1/2	990710-C6	56.50
NEW	.015 (1/64)	.0150		**.012** (0.8x)	3	1/8	1-1/2	888015-C6	39.70
	.015 (1/64)	.0150		**.023** (1.5x)	3	1/8	1-1/2	973715-C6	40.40
	.015 (1/64)	.0150		**.045** (3x)	3	1/8	1-1/2	967015-C6	40.10
	.015 (1/64)	.0150		**.078** (5x)	3	1/8	2-1/2	990715-C6	49.20
	.4 mm	.0157		**1.20 mm** (3x)	3	4 mm	50 mm	942809-C6	38.50
NEW	.5 mm	.0196		**.40 mm** (0.8x)	3	4 mm	50 mm	848011-C6	38.10
	.5 mm	.0196		**.75 mm** (1.5x)	3	4 mm	50 mm	954511-C6	38.50
	.5 mm	.0196		**1.50 mm** (3x)	3	4 mm	50 mm	942811-C6	38.50
NEW	.020	.0200		**.016** (0.8x)	3	1/8	1-1/2	888020-C6	34.80
	.020	.0200		**.030** (1.5x)	3	1/8	1-1/2	973720-C6	35.40
	.020	.0200		**.060** (3x)	3	1/8	1-1/2	967020-C6	35.20
	.020	.0200		**.100** (5x)	3	1/8	2-1/2	990720-C6	41.70
	.6 mm	.0236		**1.80 mm** (3x)	3	4 mm	50 mm	942813-C6	37.40
	.025	.0250		**.038** (1.5x)	3	1/8	1-1/2	973725-C6	34.10
	.025	.0250		**.075** (3x)	3	1/8	1-1/2	967025-C6	33.90
	.025	.0250		**.125** (5x)	3	1/8	2-1/2	990725-C6	40.40
	.030	.0300		**.045** (1.5x)	3	1/8	1-1/2	973730-C6	34.10
	.030	.0300		**.090** (3x)	3	1/8	1-1/2	967030-C6	33.90
	.030	.0300		**.156** (5x)	3	1/8	2-1/2	990730-C6	40.40
	.031 (1/32)	.0310		**.025** (0.8x)	3	1/8	1-1/2	888031-C6	30.40
	.031 (1/32)	.0310		**.047** (1.5x)	3	1/8	1-1/2	973731-C6	29.10
	.031 (1/32)	.0310		**.093** (3x)	3	1/8	1-1/2	967031-C6	28.90
	.031 (1/32)	.0310		**.156** (5x)	3	1/8	2-1/2	990731-C6	36.70
	.8 mm	.0314		**2.40 mm** (3x)	3	4 mm	50 mm	942818-C6	32.40
NEW	.035	.0350		**.028** (0.8x)	3	1/8	1-1/2	888035-C6	28.50
	.035	.0350		**.053** (1.5x)	3	1/8	1-1/2	973735-C6	29.10
	.035	.0350		**.105** (3x)	3	1/8	1-1/2	967035-C6	28.90
	.035	.0350		**.187** (5x)	3	1/8	2-1/2	990735-C6	36.70
NEW	1.0 mm	.0393		**.80 mm** (0.8x)	3	4 mm	50 mm	848022-C6	31.90
	1.0 mm	.0393		**1.50 mm** (1.5x)	3	4 mm	50 mm	954522-C6	32.40
	1.0 mm	.0393		**3.00 mm** (3x)	3	4 mm	50 mm	942822-C6	32.40
	1.0 mm	.0393		**5.00 mm** (5x)	3	4 mm	50 mm	910522-C6	40.10
NEW	.040	.0400		**.032** (0.8x)	3	1/8	1-1/2	888040-C6	28.50
	.040	.0400		**.060** (1.5x)	3	1/8	1-1/2	973740-C6	29.10

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.040		.0400	**.120** (3x)	3	1/8	1-1/2	967040-C6	28.90	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	990740-C6	36.70	
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	973745-C6	29.10	
.045		.0450	**.135** (3x)	3	1/8	1-1/2	967045-C6	28.90	
.045		.0450	**.225** (5x)	3	1/8	2-1/2	990745-C6	36.70	
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	888047-C6	31.70	
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	973747-C6	29.10	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	967047-C6	28.90	
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	990747-C6	36.70	
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	942827-C6	32.40	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	973750-C6	29.10	
.050		.0500	**.150** (3x)	3	1/8	1-1/2	967050-C6	28.90	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	990750-C6	36.70	
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	973755-C6	29.10	
.055		.0550	**.165** (3x)	3	1/8	1-1/2	967055-C6	28.90	
.055		.0550	**.275** (5x)	3	1/8	2-1/2	990755-C6	36.70	
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	942831-C6	30.50	
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	954533-C6	30.50	
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	942833-C6	30.50	
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	910533-C6	38.40	
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	973760-C6	29.10	
.060		.0600	**.180** (3x)	3	1/8	1-1/2	967060-C6	28.90	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	990760-C6	36.70	
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	888062-C6	29.90	
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	973762-C6	27.20	
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	967062-C6	27.10	
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	990762-C6	35.20	
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	942836-C6	31.20	
.065		.0650	**.195** (3x)	3	1/8	1-1/2	967065-C6	31.20	NEW
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	973770-C6	27.20	
.070		.0700	**.210** (3x)	3	1/8	1-1/2	967070-C6	27.10	
.070		.0700	**.375** (5x)	3	1/8	2-1/2	990770-C6	35.20	
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	942840-C6	31.20	
.075		.0750	**.225** (3x)	3	1/8	1-1/2	967075-C6	31.20	NEW
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	888078-C6	29.90	
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	973778-C6	27.20	
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	967078-C6	27.10	
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	990778-C6	35.20	
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	954545-C6	30.50	
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	942845-C6	30.50	
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	910545-C6	38.40	
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	973780-C6	27.20	
.080		.0800	**.240** (3x)	3	1/8	1-1/2	967080-C6	27.10	
.080		.0800	**.406** (5x)	3	1/8	2-1/2	990780-C6	35.20	
.085		.0850	**.255** (3x)	3	1/8	1-1/2	967085-C6	31.20	NEW
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	973790-C6	27.20	
.090		.0900	**.270** (3x)	3	1/8	1-1/2	967090-C6	27.10	

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Square (cont.)

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	CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE
	.090		.0900	**.450** (5x)	3	1/8	2-1/2	990790-C6	35.20
	.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	888093-C6	29.90
	.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	973793-C6	27.20
	.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	967093-C6	27.10
	.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	990793-C6	35.20
NEW	.095		.0950	**.285** (3x)	3	1/8	1-1/2	967095-C6	30.50
		2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	954551-C6	30.50
		2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	942851-C6	30.50
		2.5 mm	.0984	**12.00 mm** (5x)	3	4 mm	50 mm	910551-C6	38.40
	.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	973800-C6	27.20
	.100		.1000	**.300** (3x)	3	1/8	1-1/2	967100-C6	27.10
	.100		.1000	**.500** (5x)	3	1/8	2-1/2	990800-C6	35.20
	.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	973802-C6	27.20
	.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	967102-C6	27.10
	.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	990802-C6	35.20
NEW		3.0 mm	.1181	**2.40 mm** (0.8x)	3	4 mm	50 mm	848057-C6	30.10
		3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	954557-C6	30.50
		3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	942857-C6	30.50
		3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	910557-C6	38.40

	D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	888108-C6	29.90
	.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	973808-C6	27.20
	.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	967108-C6	27.10
	.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	990808-C6	35.20
	.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	973809-C6	29.50
	.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	967109-C6	29.40
	.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	990809-C6	37.40
NEW	.156 (5/32)		.1562	**.125** (0.8x)	4	3/16	2	888110-C6	28.90
	.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	973810-C6	29.50
	.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	967110-C6	29.40
	.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	990810-C6	37.40
NEW		4.0 mm	.1574	**12.00 mm** (3x)	4	6 mm	63 mm	942861-C6	38.50
	.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	888112-C6	32.20
	.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	973812-C6	29.50
	.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	967112-C6	29.40
	.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	990812-C6	37.40
NEW	.218 (7/32)		.2187	**.660** (3x)	4	1/4	2-1/2	967114-C6	38.50
		6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	942866-C6	38.50
	.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	888116-C6	39.50
	.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	973816-C6	36.90
	.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	967116-C6	36.70
	.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	990816-C6	44.70
NEW	.312 (5/16)		.3125	**1.000** (3x)	4	5/16	2-1/2	967120-C6	51.50
NEW	.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	967124-C6	59.60
NEW	.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	973832-C6	76.90

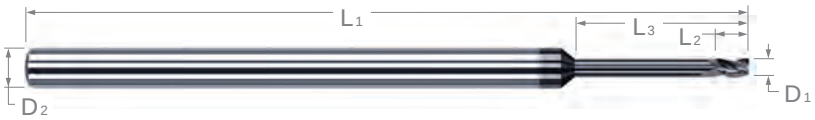
SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 107

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Square – Long Reach, Stub Flute



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.010		.0100	.015	**.050** (5x)	3	1/8	2-1/2	985310-C6	59.90
.010		.0100	.015	**.080** (8x)	3	1/8	2-1/2	978210-C6	61.10
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	985315-C6	51.70
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	978215-C6	52.70
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	985320-C6	49.50
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	978220-C6	50.50
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	985325-C6	49.50
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	978225-C6	50.50
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	985330-C6	49.50
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	978230-C6	50.50
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	940531-C6	44.90
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	985331-C6	45.90
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	978231-C6	46.90
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	935731-C6	49.50
.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	901331-C6	51.10
.031 (1/32)		.0310	.047	**.470** (15x)	3	1/8	2-1/2	851531-C6	52.10
.035		.0350	.053	**.187** (5x)	3	1/8	2-1/2	985335-C6	44.90
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	905022-C6	47.70
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	911422-C6	47.90
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	985340-C6	44.90
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	978240-C6	45.90
.045		.0450	.068	**.225** (5x)	3	1/8	2-1/2	985345-C6	44.90
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	985347-C6	44.90
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	978247-C6	45.90
.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	935747-C6	48.20
.050		.0500	.075	**.250** (5x)	3	1/8	2-1/2	985350-C6	44.90
.055		.0550	.083	**.275** (5x)	3	1/8	2-1/2	985355-C6	44.90
.060		.0600	.090	**.312** (5x)	3	1/8	2-1/2	985360-C6	44.90
.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	978260-C6	45.90
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	940562-C6	44.90
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	985362-C6	45.90
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	978262-C6	46.90
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	935762-C6	49.50
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	901362-C6	51.10
.062 (1/16)		.0620	.093	**.950** (15x)	3	1/8	2-1/2	851562-C6	52.10

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Square – Long Reach, Stub Flute (cont.)

mm & in continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	OVERALL REACH L_3 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	985378-C6	44.90
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	978278-C6	45.90
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	935778-C6	48.20
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	905045-C6	48.40
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	911445-C6	48.90
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	940593-C6	44.90
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	985393-C6	45.90
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	978293-C6	46.90
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	935793-C6	49.50
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	901393-C6	51.10
.093 (3/32)		.0930	.140	**1.400** (15x)	3	1/8	3	851593-C6	52.10
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	985400-C6	44.90
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	978300-C6	45.90
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	985402-C6	44.90
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	978302-C6	45.90
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	905057-C6	44.90
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	911457-C6	45.10

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	940608-C6	44.90
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	985408-C6	45.90
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	978308-C6	46.90
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	935808-C6	49.50
.156 (5/32)	.1562	.235	**.750** (5x)	4	3/16	3	985410-C6	49.50
.156 (5/32)	.1562	.235	**1.250** (8x)	4	3/16	3	978310-C6	50.50
.187 (3/16)	.1875	.285	**1.000** (5x)	4	3/16	3	985412-C6	49.50
.187 (3/16)	.1875	.285	**1.500** (8x)	4	3/16	3	978312-C6	50.50
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	985416-C6	55.20
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	978316-C6	56.40

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Exotic Alloys)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00004	.00009	.00013	.00017	.00022	.00026	.00033	.00049	.00066
Roughing	.00005	.00011	.00017	.00022	.00028	.00033	.00042	.00063	.00084
Finishing	.00007	.00014	.00022	.00029	.00036	.00043	.00055	.00082	.00110
Max	.00008	.00017	.00026	.00034	.00043	.00052	.00066	.00099	.00132

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .28x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .28x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

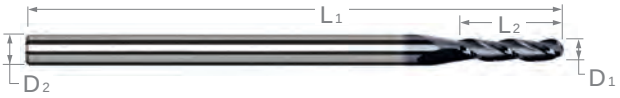
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	975304-C6	56.70
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	944210-C6	55.20
.010		.0100	**.030** (3x)	3	1/8	1-1/2	970510-C6	55.20
.010		.0100	**.050** (5x)	3	1/8	2-1/2	930610-C6	63.90
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	944215-C6	46.90
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	970515-C6	46.90
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	930615-C6	55.40
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	975309-C6	46.90
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	975311-C6	42.50
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	944220-C6	41.90
.020		.0200	**.060** (3x)	3	1/8	1-1/2	970520-C6	41.90
.020		.0200	**.100** (5x)	3	1/8	2-1/2	930620-C6	46.10
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	975313-C6	41.20
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	944225-C6	40.70
.025		.0250	**.075** (3x)	3	1/8	1-1/2	970525-C6	40.70
.025		.0250	**.125** (5x)	3	1/8	2-1/2	930625-C6	44.90
.030		.0300	**.090** (3x)	3	1/8	1-1/2	970530-C6	35.90
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	848131-C6	35.30 NEW
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	944231-C6	35.70
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	970531-C6	35.70
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	930631-C6	43.20
	.8 mm	.0314	**1.20 mm** (1.5x)	3	4 mm	50 mm	968018-C6	36.20
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	975318-C6	36.20
.035		.0350	**.105** (3x)	3	1/8	1-1/2	970535-C6	35.90
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	968022-C6	36.20
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	975322-C6	36.20
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	911322-C6	43.40
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	944240-C6	35.70
.040		.0400	**.120** (3x)	3	1/8	1-1/2	970540-C6	35.70
.040		.0400	**.203** (5x)	3	1/8	2-1/2	930640-C6	43.40
.045		.0450	**.135** (3x)	3	1/8	1-1/2	970545-C6	35.90
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	944247-C6	35.70
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	970547-C6	35.70
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	930647-C6	43.40
	1.2 mm	.0472	**1.80 mm** (1.5x)	3	4 mm	50 mm	968027-C6	36.20
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	975327-C6	36.20

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball (cont.)

mm & in continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT		FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″	+.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.050		.0500	**.075**	(1.5x)	3	1/8	1-1/2	944250-C6	35.70
	.050		.0500	**.150**	(3x)	3	1/8	1-1/2	970550-C6	35.70
	.050		.0500	**.250**	(5x)	3	1/8	2-1/2	930650-C6	43.40
	.055		.0550	**.165**	(3x)	3	1/8	1-1/2	970555-C6	35.90
		1.4 mm	.0551	**2.10 mm**	(1.5x)	3	4 mm	50 mm	968031-C6	36.20
		1.4 mm	.0551	**4.00 mm**	(3x)	3	4 mm	50 mm	975331-C6	36.20
		1.5 mm	.0590	**2.20 mm**	(1.5x)	3	4 mm	50 mm	968033-C6	36.20
		1.5 mm	.0590	**4.50 mm**	(3x)	3	4 mm	50 mm	975333-C6	36.20
		1.5 mm	.0590	**7.50 mm**	(5x)	3	4 mm	50 mm	911333-C6	43.40
	.060		.0600	**.090**	(1.5x)	3	1/8	1-1/2	944260-C6	35.70
	.060		.0600	**.180**	(3x)	3	1/8	1-1/2	970560-C6	35.70
	.060		.0600	**.312**	(5x)	3	1/8	2-1/2	930660-C6	43.40
NEW	.062 (1/16)		.0620	**.050**	(0.8x)	3	1/8	1-1/2	848162-C6	33.30
	.062 (1/16)		.0620	**.093**	(1.5x)	3	1/8	1-1/2	944262-C6	33.70
	.062 (1/16)		.0620	**.186**	(3x)	3	1/8	1-1/2	970562-C6	33.70
	.062 (1/16)		.0620	**.312**	(5x)	3	1/8	2-1/2	930662-C6	41.40
		1.6 mm	.0629	**2.40 mm**	(1.5x)	3	4 mm	50 mm	968036-C6	34.10
		1.6 mm	.0629	**5.00 mm**	(3x)	3	4 mm	50 mm	975336-C6	34.10
	.070		.0700	**.105**	(1.5x)	3	1/8	1-1/2	944270-C6	34.10
	.070		.0700	**.210**	(3x)	3	1/8	1-1/2	970570-C6	34.10
		1.8 mm	.0708	**2.70 mm**	(1.5x)	3	4 mm	50 mm	968040-C6	34.10
		1.8 mm	.0708	**5.50 mm**	(3x)	3	4 mm	50 mm	975340-C6	34.10
	.078 (5/64)		.0780	**.118**	(1.5x)	3	1/8	1-1/2	944278-C6	33.70
	.078 (5/64)		.0780	**.234**	(3x)	3	1/8	1-1/2	970578-C6	33.70
	.078 (5/64)		.0780	**.406**	(5x)	3	1/8	2-1/2	930678-C6	41.10
		2.0 mm	.0787	**3.00 mm**	(1.5x)	3	4 mm	50 mm	968045-C6	34.10
		2.0 mm	.0787	**6.00 mm**	(3x)	3	4 mm	50 mm	975345-C6	34.10
		2.0 mm	.0787	**10.00 mm**	(5x)	3	4 mm	50 mm	911345-C6	41.20
	.080		.0800	**.120**	(1.5x)	3	1/8	1-1/2	944280-C6	34.10
	.080		.0800	**.240**	(3x)	3	1/8	1-1/2	970580-C6	34.10
	.090		.0900	**.135**	(1.5x)	3	1/8	1-1/2	944290-C6	34.10
	.090		.0900	**.270**	(3x)	3	1/8	1-1/2	970590-C6	34.10
NEW	.093 (3/32)		.0930	**.074**	(0.8x)	3	1/8	1-1/2	848193-C6	33.30
	.093 (3/32)		.0930	**.140**	(1.5x)	3	1/8	1-1/2	944293-C6	33.70
	.093 (3/32)		.0930	**.279**	(3x)	3	1/8	1-1/2	970593-C6	33.70
	.093 (3/32)		.0930	**.500**	(5x)	3	1/8	2-1/2	930693-C6	41.40
		2.5 mm	.0984	**3.70 mm**	(1.5x)	3	4 mm	50 mm	968051-C6	35.90
		2.5 mm	.0984	**7.50 mm**	(3x)	3	4 mm	50 mm	975351-C6	35.90
	.100		.1000	**.150**	(1.5x)	3	1/8	1-1/2	944300-C6	33.90
	.100		.1000	**.300**	(3x)	3	1/8	1-1/2	970600-C6	33.90
	.100		.1000	**.500**	(5x)	3	1/8	2-1/2	930700-C6	41.50
	.109 (7/64)		.1090	**.327**	(3x)	3	1/8	1-1/2	970602-C6	35.90
		3.0 mm	.1181	**4.50 mm**	(1.5x)	3	4 mm	50 mm	968057-C6	34.10
		3.0 mm	.1181	**9.00 mm**	(3x)	3	4 mm	50 mm	975357-C6	34.10
		3.0 mm	.1181	**15.00 mm**	(5x)	3	4 mm	50 mm	911357-C6	41.20

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball (cont.)

mm & in

continued from previous page

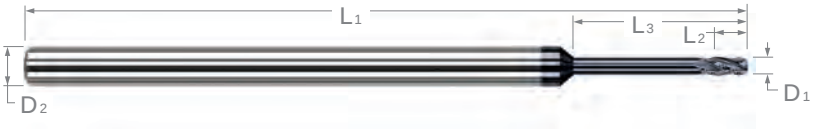
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	848208-C6	33.30	NEW
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	944308-C6	33.70	
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	970608-C6	33.70	
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	930708-C6	41.40	
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	970609-C6	43.40	
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	944310-C6	35.90	
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	970610-C6	35.90	
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	930710-C6	43.70	
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	848212-C6	35.50	NEW
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	944312-C6	35.90	
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	970612-C6	35.90	
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	930712-C6	43.70	
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	975372-C6	45.10	
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	848216-C6	42.90	NEW
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	944316-C6	43.40	
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	970616-C6	43.40	
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	930716-C6	51.20	

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 107

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Suitable for steels up to 45Rc
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

IMPROVES PERFORMANCE

Contour Profiling

Tipped Multi-Axis Machining

mm & in

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	OVERALL REACH L_3 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED 4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	63615-C6	58.50
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56115-C6	59.70
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	64815-C6	63.50
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	988709-C6	61.40
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	974009-C6	62.40
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	981309-C6	66.90
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	988711-C6	59.40
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	974011-C6	60.40
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	981311-C6	64.70
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	976511-C6	67.50
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	63620-C6	55.90
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56120-C6	57.10
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	64820-C6	61.20
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	988713-C6	57.90
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	974013-C6	59.10
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	981313-C6	63.10
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	63625-C6	54.50
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56125-C6	55.70
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	64825-C6	59.90
.031 (1/32)		.0310	.047	**.093** (3x)	4	1/8	1-1/2	929031-C6	49.90
.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	63631-C6	51.20
.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	56131-C6	52.40
.031 (1/32)		.0310	.047	**.312** (10x)	4	1/8	2-1/2	887231-C6	53.40
.031 (1/32)		.0310	.047	**.375** (12x)	4	1/8	2-1/2	64831-C6	54.10
.031 (1/32)		.0310	.047	**.470** (15x)	4	1/8	2-1/2	953331-C6	56.70
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	988718-C6	54.10
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	974018-C6	55.20
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	981318-C6	56.70

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			L_2	L_3		D_2 (h6)	L_1	4 FL	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm	+.010″ −.000″ +.25mm −.00mm					
.035		.0350	.052	**.187** (5x)	4	1/8	2-1/2	63635-C6	51.20
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	988722-C6	54.10
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	974022-C6	55.20
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	981322-C6	56.70
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	976522-C6	59.40
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	63640-C6	51.20
.045		.0450	.067	**.225** (5x)	4	1/8	2-1/2	63645-C6	50.90
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	63647-C6	51.20
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56147-C6	52.40
.047 (3/64)		.0470	.070	**.480** (10x)	4	1/8	2-1/2	887247-C6	53.40
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	64847-C6	54.10
.050		.0500	.075	**.250** (5x)	4	1/8	2-1/2	63650-C6	50.90
.055		.0550	.082	**.275** (5x)	4	1/8	2-1/2	63655-C6	50.90
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	988733-C6	54.10
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	974033-C6	55.20
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	981333-C6	56.70
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	976533-C6	59.40
.060		.0600	.090	**.312** (5x)	4	1/8	2-1/2	63660-C6	51.20
.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	929062-C6	49.90
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	63662-C6	51.20
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56162-C6	52.40
.062 (1/16)		.0620	.093	**.625** (10x)	4	1/8	2-1/2	887262-C6	53.40
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	64862-C6	54.10
.062 (1/16)		.0620	.093	**.950** (15x)	4	1/8	2-1/2	953362-C6	56.70
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	63678-C6	51.20
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56178-C6	52.40
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	64878-C6	54.10
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	988745-C6	53.90
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	974045-C6	55.10
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	981345-C6	56.70
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	976545-C6	59.40
.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	929093-C6	49.90
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	63693-C6	51.20
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56193-C6	52.40
.093 (3/32)		.0930	.139	**.950** (10x)	4	1/8	2-1/2	887293-C6	53.40
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	64893-C6	54.10
.093 (3/32)		.0930	.139	**1.400** (15x)	4	1/8	3	953393-C6	56.70
.100		.1000	.150	**.500** (5x)	4	1/8	2-1/2	63700-C6	50.70
.100		.1000	.150	**.800** (8x)	4	1/8	2-1/2	56200-C6	51.70
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	988757-C6	51.20
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	4	4 mm	50 mm	974057-C6	52.40

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER		LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	929108-C6	49.90
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	63708-C6	50.90
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56208-C6	51.90
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	3	887308-C6	53.40
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	64908-C6	54.10
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	63710-C6	55.10
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56210-C6	56.10
.156 (5/32)	.1562	.234	**1.570** (10x)	4	3/16	4	887310-C6	58.70
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	63712-C6	55.90
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56212-C6	57.20
.187 (3/16)	.1875	.281	**1.875** (10x)	4	3/16	4	887312-C6	59.80
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	63716-C6	61.90
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56216-C6	63.10
.250 (1/4)	.2500	.375	**2.500** (10x)	4	1/4	6	887316-C6	73.40

SPEEDS & FEEDS ONLINE!

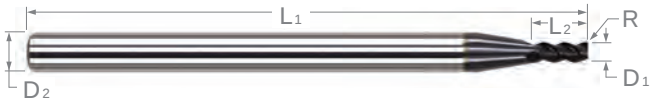
PLEASE SEE SPEEDS & FEEDS ON PAGE 95

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE	
	.2 mm	.0078	.30 mm (1.5x)	**.05 mm**	3	4 mm	50 mm	984104-C6	52.20	
	.2 mm	.0078	.60 mm (3x)	**.05 mm**	3	4 mm	50 mm	979304-C6	52.20	
.010		.0100	.015 (1.5x)	**.003**	3	1/8	1-1/2	52210-C6	49.10	
.010		.0100	.030 (3x)	**.003**	3	1/8	1-1/2	46810-C6	49.50	
	.3 mm	.0118	.45 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	984106-C6	50.90	
	.3 mm	.0118	.90 mm (3x)	**.08 mm**	3	4 mm	50 mm	979306-C6	50.90	
.015 (1/64)		.0150	.012 (0.8x)	**.003**	3	1/8	1-1/2	954215-C6	43.20	NEW
.015 (1/64)		.0150	.022 (1.5x)	**.003**	3	1/8	1-1/2	52215-C6	40.90	
.015 (1/64)		.0150	.045 (3x)	**.003**	3	1/8	1-1/2	46815-C6	40.90	
.015 (1/64)		.0150	.078 (5x)	**.003**	3	1/8	2-1/2	53615-C6	49.40	
.015 (1/64)		.0150	.045 (3x)	**.005**	3	1/8	1-1/2	936415-C6	46.40	NEW
	.4 mm	.0157	.60 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	984109-C6	43.70	
	.4 mm	.0157	1.20 mm (3x)	**.08 mm**	3	4 mm	50 mm	979309-C6	43.70	
	.5 mm	.0196	.75 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984111-C6	39.10	
	.5 mm	.0196	1.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	979311-C6	39.10	
	.5 mm	.0196	2.50 mm (5x)	**.10 mm**	3	4 mm	50 mm	965811-C6	47.70	
.020		.0200	.016 (0.8x)	**.004**	3	1/8	1-1/2	954220-C6	38.20	NEW
.020		.0200	.030 (1.5x)	**.004**	3	1/8	1-1/2	52220-C6	35.90	
.020		.0200	.060 (3x)	**.004**	3	1/8	1-1/2	46820-C6	35.90	
.020		.0200	.100 (5x)	**.004**	3	1/8	2-1/2	53620-C6	43.90	
	.6 mm	.0236	.90 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984113-C6	37.90	
	.6 mm	.0236	1.80 mm (3x)	**.10 mm**	3	4 mm	50 mm	979313-C6	37.90	
.025		.0250	.020 (0.8x)	**.004**	3	1/8	1-1/2	954225-C6	37.20	NEW
.025		.0250	.038 (1.5x)	**.004**	3	1/8	1-1/2	52225-C6	34.90	
.025		.0250	.075 (3x)	**.004**	3	1/8	1-1/2	46825-C6	34.90	
.025		.0250	.125 (5x)	**.004**	3	1/8	2-1/2	53625-C6	42.50	
	.7 mm	.0275	2.10 mm (3x)	**.10 mm**	3	4 mm	50 mm	979315-C6	37.90	
.030		.0300	.045 (1.5x)	**.005**	3	1/8	1-1/2	52230-C6	34.90	
.030		.0300	.090 (3x)	**.005**	3	1/8	1-1/2	46830-C6	34.90	
.031 (1/32)		.0310	.047 (1.5x)	**.003**	3	1/8	1-1/2	853631-C6	31.90	NEW
.031 (1/32)		.0310	.093 (3x)	**.003**	3	1/8	1-1/2	923631-C6	29.40	
.031 (1/32)		.0310	.025 (0.8x)	**.005**	3	1/8	1-1/2	954231-C6	29.70	
.031 (1/32)		.0310	.047 (1.5x)	**.005**	3	1/8	1-1/2	52231-C6	29.70	
.031 (1/32)		.0310	.093 (3x)	**.005**	3	1/8	1-1/2	46831-C6	29.70	
.031 (1/32)		.0310	.156 (5x)	**.005**	3	1/8	2-1/2	53631-C6	36.90	
.031 (1/32)		.0310	.047 (1.5x)	**.008**	3	1/8	1-1/2	847831-C6	32.10	
.031 (1/32)		.0310	.093 (3x)	**.008**	3	1/8	1-1/2	848431-C6	32.10	

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE
	.031 (1/32)		.0310	.047 (1.5x)	**.010**	3	1/8	1-1/2	912931-C6	31.90
	.031 (1/32)		.0310	.093 (3x)	**.010**	3	1/8	1-1/2	950731-C6	32.10
	.031 (1/32)		.0310	.156 (5x)	**.010**	3	1/8	2-1/2	869831-C6	39.40
		.8 mm	.0314	1.20 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984118-C6	32.90
		.8 mm	.0314	2.40 mm (3x)	**.10 mm**	3	4 mm	50 mm	979318-C6	32.90
	.035		.0350	.053 (1.5x)	**.005**	3	1/8	1-1/2	52235-C6	29.70
	.035		.0350	.105 (3x)	**.005**	3	1/8	1-1/2	46835-C6	29.70
	.035		.0350	.187 (5x)	**.005**	3	1/8	2-1/2	53635-C6	36.90
	.035		.0350	.105 (3x)	**.010**	3	1/8	1-1/2	950735-C6	32.10
		.9 mm	.0354	2.70 mm (3x)	**.10 mm**	3	4 mm	50 mm	979320-C6	32.90
		1.0 mm	.0393	1.50 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984122-C6	32.90
		1.0 mm	.0393	3.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	979322-C6	32.90
		1.0 mm	.0393	5.00 mm (5x)	**.10 mm**	3	4 mm	50 mm	965822-C6	39.10
		1.0 mm	.0393	3.00 mm (3x)	**.30 mm**	3	4 mm	50 mm	843322-C6	32.90
NEW	.040		.0400	.032 (0.8x)	**.005**	3	1/8	1-1/2	954240-C6	31.90
	.040		.0400	.060 (1.5x)	**.005**	3	1/8	1-1/2	52240-C6	29.70
	.040		.0400	.120 (3x)	**.005**	3	1/8	1-1/2	46840-C6	29.70
	.040		.0400	.203 (5x)	**.005**	3	1/8	2-1/2	53640-C6	36.90
	.040		.0400	.120 (3x)	**.010**	3	1/8	1-1/2	950740-C6	32.10
		1.1 mm	.0433	3.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	979324-C6	32.90
	.045		.0450	.068 (1.5x)	**.005**	3	1/8	1-1/2	52245-C6	29.70
	.045		.0450	.135 (3x)	**.005**	3	1/8	1-1/2	46845-C6	29.70
	.045		.0450	.225 (5x)	**.005**	3	1/8	2-1/2	53645-C6	36.90
NEW	.047 (3/64)		.0470	.141 (3x)	**.003**	3	1/8	1-1/2	923647-C6	29.40
	.047 (3/64)		.0470	.038 (0.8x)	**.005**	3	1/8	1-1/2	954247-C6	29.70
	.047 (3/64)		.0470	.071 (1.5x)	**.005**	3	1/8	1-1/2	52247-C6	29.70
	.047 (3/64)		.0470	.141 (3x)	**.005**	3	1/8	1-1/2	46847-C6	29.70
	.047 (3/64)		.0470	.250 (5x)	**.005**	3	1/8	2-1/2	53647-C6	36.90
	.047 (3/64)		.0470	.071 (1.5x)	**.010**	3	1/8	1-1/2	912947-C6	31.90
	.047 (3/64)		.0470	.141 (3x)	**.010**	3	1/8	1-1/2	950747-C6	32.10
	.047 (3/64)		.0470	.071 (1.5x)	**.015**	3	1/8	1-1/2	975647-C6	29.70
	.047 (3/64)		.0470	.141 (3x)	**.015**	3	1/8	1-1/2	964147-C6	32.10
		1.2 mm	.0472	1.80 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984127-C6	32.90
		1.2 mm	.0472	3.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	979327-C6	32.90
NEW	.050		.0500	.040 (0.8x)	**.005**	3	1/8	1-1/2	954250-C6	31.90
	.050		.0500	.075 (1.5x)	**.005**	3	1/8	1-1/2	52250-C6	29.40
	.050		.0500	.150 (3x)	**.005**	3	1/8	1-1/2	46850-C6	29.40
	.050		.0500	.250 (5x)	**.005**	3	1/8	2-1/2	53650-C6	36.90
	.050		.0500	.075 (1.5x)	**.010**	3	1/8	1-1/2	912950-C6	31.90
	.050		.0500	.150 (3x)	**.010**	3	1/8	1-1/2	950750-C6	32.10
	.050		.0500	.075 (1.5x)	**.015**	3	1/8	1-1/2	975650-C6	32.10
	.050		.0500	.150 (3x)	**.015**	3	1/8	1-1/2	964150-C6	29.70
		1.3 mm	.0511	4.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	979329-C6	32.90
	.055		.0550	.083 (1.5x)	**.005**	3	1/8	1-1/2	52255-C6	29.40
	.055		.0550	.165 (3x)	**.005**	3	1/8	1-1/2	46855-C6	29.40
	.055		.0550	.275 (5x)	**.005**	3	1/8	2-1/2	53655-C6	36.90
	.055		.0550	.083 (1.5x)	**.010**	3	1/8	1-1/2	912955-C6	31.90

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NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE	
.055		.0550	.165 (3x)	**.010**	3	1/8	1-1/2	950755-C6	32.10	
.055		.0550	.083 (1.5x)	**.015**	3	1/8	1-1/2	975655-C6	32.10	
.055		.0550	.165 (3x)	**.015**	3	1/8	1-1/2	964155-C6	32.10	
	1.4 mm	.0551	2.10 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	984131-C6	32.90	
	1.4 mm	.0551	4.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	979331-C6	32.90	
	1.5 mm	.0590	2.20 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984133-C6	30.90	
	1.5 mm	.0590	4.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	979333-C6	30.90	
	1.5 mm	.0590	7.50 mm (5x)	**.20 mm**	3	4 mm	50 mm	965833-C6	37.70	
.060		.0600	.090 (1.5x)	**.005**	3	1/8	1-1/2	908860-C6	29.40	
.060		.0600	.180 (3x)	**.005**	3	1/8	1-1/2	936460-C6	29.40	
.060		.0600	.048 (0.8x)	**.010**	3	1/8	1-1/2	954260-C6	31.90	NEW
.060		.0600	.090 (1.5x)	**.010**	3	1/8	1-1/2	52260-C6	29.40	
.060		.0600	.180 (3x)	**.010**	3	1/8	1-1/2	46860-C6	29.40	
.060		.0600	.312 (5x)	**.010**	3	1/8	2-1/2	53660-C6	36.90	
.060		.0600	.090 (1.5x)	**.015**	3	1/8	1-1/2	975660-C6	29.70	
.060		.0600	.180 (3x)	**.015**	3	1/8	1-1/2	964160-C6	29.70	
.060		.0600	.090 (1.5x)	**.020**	3	1/8	1-1/2	931760-C6	29.40	
.060		.0600	.180 (3x)	**.020**	3	1/8	1-1/2	959260-C6	29.40	
.062 (1/16)		.0620	.186 (3x)	**.003**	3	1/8	1-1/2	923662-C6	27.70	
.062 (1/16)		.0620	.093 (1.5x)	**.005**	3	1/8	1-1/2	908862-C6	27.70	
.062 (1/16)		.0620	.186 (3x)	**.005**	3	1/8	1-1/2	936462-C6	27.70	
.062 (1/16)		.0620	.312 (5x)	**.005**	3	1/8	2-1/2	869062-C6	35.20	
.062 (1/16)		.0620	.093 (1.5x)	**.008**	3	1/8	1-1/2	847862-C6	27.70	
.062 (1/16)		.0620	.186 (3x)	**.008**	3	1/8	1-1/2	848462-C6	27.70	
.062 (1/16)		.0620	.050 (0.8x)	**.010**	3	1/8	1-1/2	954262-C6	27.70	
.062 (1/16)		.0620	.093 (1.5x)	**.010**	3	1/8	1-1/2	52262-C6	27.70	
.062 (1/16)		.0620	.186 (3x)	**.010**	3	1/8	1-1/2	46862-C6	27.70	
.062 (1/16)		.0620	.312 (5x)	**.010**	3	1/8	2-1/2	53662-C6	35.40	
.062 (1/16)		.0620	.093 (1.5x)	**.015**	3	1/8	1-1/2	975662-C6	27.70	
.062 (1/16)		.0620	.186 (3x)	**.015**	3	1/8	1-1/2	964162-C6	27.70	
.062 (1/16)		.0620	.093 (1.5x)	**.020**	3	1/8	1-1/2	931762-C6	30.40	
.062 (1/16)		.0620	.186 (3x)	**.020**	3	1/8	1-1/2	959262-C6	33.40	
.062 (1/16)		.0620	.312 (5x)	**.020**	3	1/8	2-1/2	870662-C6	35.40	
	1.6 mm	.0629	2.40 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984136-C6	30.90	
	1.6 mm	.0629	5.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	979336-C6	30.90	
	1.7 mm	.0669	5.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	979338-C6	30.90	
.070		.0700	.105 (1.5x)	**.010**	3	1/8	1-1/2	52270-C6	27.70	
.070		.0700	.210 (3x)	**.010**	3	1/8	1-1/2	46870-C6	27.70	
	1.8 mm	.0708	2.70 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984140-C6	30.90	
	1.8 mm	.0708	5.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	979340-C6	30.90	
	1.9 mm	.0748	5.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	979342-C6	30.90	
.078 (5/64)		.0780	.234 (3x)	**.003**	3	1/8	1-1/2	923678-C6	28.20	NEW
.078 (5/64)		.0780	.117 (1.5x)	**.005**	3	1/8	1-1/2	908878-C6	27.70	
.078 (5/64)		.0780	.234 (3x)	**.005**	3	1/8	1-1/2	936478-C6	27.70	
.078 (5/64)		.0780	.062 (0.8x)	**.010**	3	1/8	1-1/2	954278-C6	27.70	
.078 (5/64)		.0780	.117 (1.5x)	**.010**	3	1/8	1-1/2	52278-C6	27.70	
.078 (5/64)		.0780	.234 (3x)	**.010**	3	1/8	1-1/2	46878-C6	27.70	

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Corner Radius (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE
	.078 (5/64)		.0780	.406 (5x)	**.010**	3	1/8	2-1/2	53678-C6	35.20
	.078 (5/64)		.0780	.117 (1.5x)	**.015**	3	1/8	1-1/2	975678-C6	30.70
	.078 (5/64)		.0780	.234 (3x)	**.015**	3	1/8	1-1/2	964178-C6	30.40
	.078 (5/64)		.0780	.117 (1.5x)	**.020**	3	1/8	1-1/2	931778-C6	33.40
	.078 (5/64)		.0780	.234 (3x)	**.020**	3	1/8	1-1/2	959278-C6	33.40
NEW	.078 (5/64)		.0780	.406 (5x)	**.020**	3	1/8	2-1/2	870678-C6	41.30
		2.0 mm	.0787	3.00 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984145-C6	30.90
		2.0 mm	.0787	6.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	979345-C6	30.90
		2.0 mm	.0787	10.00 mm (5x)	**.20 mm**	3	4 mm	50 mm	965845-C6	37.70
		2.0 mm	.0787	6.00 mm (3x)	**.50 mm**	3	4 mm	50 mm	842545-C6	30.90
	.080		.0800	.120 (1.5x)	**.010**	3	1/8	1-1/2	52280-C6	27.70
	.080		.0800	.240 (3x)	**.010**	3	1/8	1-1/2	46880-C6	27.70
	.090		.0900	.135 (1.5x)	**.010**	3	1/8	1-1/2	52290-C6	27.70
	.090		.0900	.270 (3x)	**.010**	3	1/8	1-1/2	46890-C6	27.70
NEW	.093 (3/32)		.0930	.279 (3x)	**.003**	3	1/8	1-1/2	923693-C6	27.20
	.093 (3/32)		.0930	.140 (1.5x)	**.005**	3	1/8	1-1/2	908893-C6	27.70
	.093 (3/32)		.0930	.279 (3x)	**.005**	3	1/8	1-1/2	936493-C6	27.70
	.093 (3/32)		.0930	.500 (5x)	**.005**	3	1/8	2-1/2	869093-C6	35.10
	.093 (3/32)		.0930	.140 (1.5x)	**.008**	3	1/8	1-1/2	847893-C6	27.70
	.093 (3/32)		.0930	.279 (3x)	**.008**	3	1/8	1-1/2	848493-C6	27.70
	.093 (3/32)		.0930	.074 (0.8x)	**.010**	3	1/8	1-1/2	954293-C6	27.70
	.093 (3/32)		.0930	.140 (1.5x)	**.010**	3	1/8	1-1/2	52293-C6	27.70
	.093 (3/32)		.0930	.279 (3x)	**.010**	3	1/8	1-1/2	46893-C6	27.70
	.093 (3/32)		.0930	.500 (5x)	**.010**	3	1/8	2-1/2	53693-C6	35.20
	.093 (3/32)		.0930	.140 (1.5x)	**.015**	3	1/8	1-1/2	975693-C6	27.70
	.093 (3/32)		.0930	.279 (3x)	**.015**	3	1/8	1-1/2	964193-C6	27.70
	.093 (3/32)		.0930	.140 (1.5x)	**.020**	3	1/8	1-1/2	931793-C6	27.70
	.093 (3/32)		.0930	.279 (3x)	**.020**	3	1/8	1-1/2	959293-C6	27.70
	.093 (3/32)		.0930	.140 (1.5x)	**.030**	3	1/8	1-1/2	929393-C6	33.50
	.093 (3/32)		.0930	.279 (3x)	**.030**	3	1/8	1-1/2	943893-C6	33.50
	.093 (3/32)		.0930	.500 (5x)	**.030**	3	1/8	2-1/2	871493-C6	40.90
		2.5 mm	.0984	3.70 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984151-C6	27.70
		2.5 mm	.0984	7.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	979351-C6	30.90
		2.5 mm	.0984	12.00 mm (5x)	**.20 mm**	3	4 mm	50 mm	965851-C6	37.70
	.100		.1000	.150 (1.5x)	**.005**	3	1/8	1-1/2	908800-C6	27.70
	.100		.1000	.300 (3x)	**.005**	3	1/8	1-1/2	936500-C6	27.70
	.100		.1000	.150 (1.5x)	**.010**	3	1/8	1-1/2	52300-C6	27.70
	.100		.1000	.300 (3x)	**.010**	3	1/8	1-1/2	46900-C6	27.70
	.100		.1000	.500 (5x)	**.010**	3	1/8	2-1/2	53700-C6	35.40
	.100		.1000	.150 (1.5x)	**.015**	3	1/8	1-1/2	907700-C6	30.70
	.100		.1000	.300 (3x)	**.015**	3	1/8	1-1/2	964200-C6	30.70
	.100		.1000	.150 (1.5x)	**.020**	3	1/8	1-1/2	931800-C6	33.40
	.100		.1000	.300 (3x)	**.020**	3	1/8	1-1/2	959300-C6	33.40
	.100		.1000	.150 (1.5x)	**.030**	3	1/8	1-1/2	929400-C6	33.50
	.100		.1000	.300 (3x)	**.030**	3	1/8	1-1/2	943900-C6	33.50
	.109 (7/64)		.1090	.327 (3x)	**.005**	3	1/8	1-1/2	936502-C6	27.70
	.109 (7/64)		.1090	.327 (3x)	**.010**	3	1/8	1-1/2	46902-C6	27.70
	.109 (7/64)		.1090	.327 (3x)	**.015**	3	1/8	1-1/2	964202-C6	30.70

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NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	AlTiN NANO COATED PRICE	
.118		.1180	.177 (1.5x)	**.010**	3	1/8	1-1/2	52305-C6	27.70	
.118		.1180	.354 (3x)	**.010**	3	1/8	1-1/2	46905-C6	27.70	
	3.0 mm	.1181	4.50 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	984157-C6	30.90	
	3.0 mm	.1181	9.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	979357-C6	30.90	
	3.0 mm	.1181	15.00 mm (5x)	**.20 mm**	3	4 mm	50 mm	965857-C6	37.70	
	3.0 mm	.1181	9.00 mm (3x)	**1.00 mm**	3	4 mm	50 mm	842157-C6	36.20	

D_1 +.000″ −.002″	D_1 +.00mm −.04mm	D_1 decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)		.1250	.187 (1.5x)	**.005**	4	1/8	1-1/2	908908-C6	27.70	
.125 (1/8)		.1250	.375 (3x)	**.005**	4	1/8	1-1/2	936508-C6	27.70	
.125 (1/8)		.1250	.187 (1.5x)	**.008**	4	1/8	1-1/2	847908-C6	27.70	
.125 (1/8)		.1250	.375 (3x)	**.008**	4	1/8	1-1/2	848508-C6	27.70	
.125 (1/8)		.1250	.187 (1.5x)	**.010**	4	1/8	1-1/2	913008-C6	27.70	
.125 (1/8)		.1250	.375 (3x)	**.010**	4	1/8	1-1/2	950808-C6	27.70	
.125 (1/8)		.1250	.100 (0.8x)	**.015**	4	1/8	1-1/2	954308-C6	27.70	
.125 (1/8)		.1250	.187 (1.5x)	**.015**	4	1/8	1-1/2	52308-C6	27.70	
.125 (1/8)		.1250	.375 (3x)	**.015**	4	1/8	1-1/2	46908-C6	27.70	
.125 (1/8)		.1250	.625 (5x)	**.015**	4	1/8	2-1/2	53708-C6	35.40	
.125 (1/8)		.1250	.187 (1.5x)	**.020**	4	1/8	1-1/2	931808-C6	33.40	
.125 (1/8)		.1250	.375 (3x)	**.020**	4	1/8	1-1/2	959308-C6	33.40	
.125 (1/8)		.1250	.187 (1.5x)	**.030**	4	1/8	1-1/2	929408-C6	33.50	
.125 (1/8)		.1250	.375 (3x)	**.030**	4	1/8	1-1/2	943908-C6	33.50	
.125 (1/8)		.1250	.625 (5x)	**.030**	4	1/8	2-1/2	871508-C6	41.20	
.125 (1/8)		.1250	.375 (3x)	**.040**	4	1/8	1-1/2	844008-C6	33.40	NEW
.140 (9/64)		.1406	.220 (1.5x)	**.015**	4	3/16	2	52309-C6	32.90	NEW
.140 (9/64)		.1406	.425 (3x)	**.015**	4	3/16	2	46909-C6	32.90	NEW
.140 (9/64)		.1406	.750 (5x)	**.015**	4	3/16	3	53709-C6	41.10	NEW
.156 (5/32)		.1562	.470 (3x)	**.005**	4	3/16	2	936510-C6	29.90	
.156 (5/32)		.1562	.235 (1.5x)	**.010**	4	3/16	2	913010-C6	29.90	NEW
.156 (5/32)		.1562	.470 (3x)	**.010**	4	3/16	2	950810-C6	29.90	
.156 (5/32)		.1562	.125 (0.8x)	**.015**	4	3/16	2	954310-C6	29.90	
.156 (5/32)		.1562	.235 (1.5x)	**.015**	4	3/16	2	52310-C6	29.90	
.156 (5/32)		.1562	.470 (3x)	**.015**	4	3/16	2	46910-C6	29.90	
.156 (5/32)		.1562	.750 (5x)	**.015**	4	3/16	3	53710-C6	38.40	
.156 (5/32)		.1562	.470 (3x)	**.030**	4	3/16	2	943910-C6	29.90	NEW
	4.0 mm	.1574	6.00 mm (1.5x)	**.40 mm**	4	6 mm	63 mm	984161-C6	33.10	
	4.0 mm	.1574	12.00 mm (3x)	**.40 mm**	4	6 mm	63 mm	979361-C6	33.10	
.187 (3/16)		.1875	.285 (1.5x)	**.005**	4	3/16	2	908910-C6	29.90	
.187 (3/16)		.1875	.562 (3x)	**.005**	4	3/16	2	936512-C6	29.90	
.187 (3/16)		.1875	1.000 (5x)	**.005**	4	3/16	3	869112-C6	38.10	NEW
.187 (3/16)		.1875	.285 (1.5x)	**.010**	4	3/16	2	913012-C6	29.90	
.187 (3/16)		.1875	.562 (3x)	**.010**	4	3/16	2	950812-C6	29.90	
.187 (3/16)		.1875	.150 (0.8x)	**.015**	4	3/16	2	954312-C6	29.90	
.187 (3/16)		.1875	.285 (1.5x)	**.015**	4	3/16	2	52312-C6	29.90	
.187 (3/16)		.1875	.562 (3x)	**.015**	4	3/16	2	46912-C6	29.90	
.187 (3/16)		.1875	1.000 (5x)	**.015**	4	3/16	3	53712-C6	38.40	

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius (cont.)

mm & in continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE
	.187 (3/16)		.1875	.285 (1.5x)	**.020**	4	3/16	2	931812-C6	35.40
	.187 (3/16)		.1875	.562 (3x)	**.020**	4	3/16	2	959312-C6	35.40
	.187 (3/16)		.1875	.285 (1.5x)	**.030**	4	3/16	2	929412-C6	35.70
	.187 (3/16)		.1875	.562 (3x)	**.030**	4	3/16	2	943912-C6	35.40
NEW	.187 (3/16)		.1875	1.000 (5x)	**.030**	4	3/16	3	871512-C6	38.10
NEW	.187 (3/16)		.1875	.562 (3x)	**.045**	4	3/16	2	864512-C6	35.40
NEW	.187 (3/16)		.1875	.562 (3x)	**.060**	4	3/16	2	885612-C6	35.40
		5.0 mm	.1968	7.50 mm (1.5x)	**.40 mm**	4	6 mm	63 mm	984164-C6	33.10
		5.0 mm	.1968	15.00 mm (3x)	**.40 mm**	4	6 mm	63 mm	979364-C6	33.10
		6.0 mm	.2362	9.00 mm (1.5x)	**.40 mm**	4	6 mm	63 mm	984166-C6	33.10
		6.0 mm	.2362	18.00 mm (3x)	**.40 mm**	4	6 mm	63 mm	979366-C6	33.10
	.250 (1/4)		.2500	.375 (1.5x)	**.005**	4	1/4	2-1/2	908916-C6	37.40
	.250 (1/4)		.2500	.750 (3x)	**.005**	4	1/4	2-1/2	936516-C6	37.40
	.250 (1/4)		.2500	.375 (1.5x)	**.010**	4	1/4	2-1/2	913016-C6	37.40
	.250 (1/4)		.2500	.750 (3x)	**.010**	4	1/4	2-1/2	950816-C6	37.40
	.250 (1/4)		.2500	.200 (0.8x)	**.015**	4	1/4	2-1/2	954316-C6	37.70
	.250 (1/4)		.2500	.375 (1.5x)	**.015**	4	1/4	2-1/2	52316-C6	37.70
	.250 (1/4)		.2500	.750 (3x)	**.015**	4	1/4	2-1/2	46916-C6	37.70
	.250 (1/4)		.2500	1.250 (5x)	**.015**	4	1/4	4	53716-C6	47.50
	.250 (1/4)		.2500	.375 (1.5x)	**.020**	4	1/4	2-1/2	931816-C6	42.90
	.250 (1/4)		.2500	.750 (3x)	**.020**	4	1/4	2-1/2	959316-C6	42.90
	.250 (1/4)		.2500	.375 (1.5x)	**.030**	4	1/4	2-1/2	929416-C6	43.20
	.250 (1/4)		.2500	.750 (3x)	**.030**	4	1/4	2-1/2	943916-C6	42.90
NEW	.250 (1/4)		.2500	.750 (3x)	**.045**	4	1/4	2-1/2	864516-C6	42.90
NEW	.250 (1/4)		.2500	.750 (3x)	**.060**	4	1/4	2-1/2	885616-C6	42.90
	.312 (5/16)		.3125	.470 (1.5x)	**.015**	4	5/16	2-1/2	52320-C6	54.40
	.312 (5/16)		.3125	1.000 (3x)	**.015**	4	5/16	2-1/2	46920-C6	54.40
	.375 (3/8)		.3750	.570 (1.5x)	**.015**	4	3/8	2-1/2	52324-C6	62.70
	.375 (3/8)		.3750	1.125 (3x)	**.015**	4	3/8	2-1/2	46924-C6	62.70
	.500 (1/2)		.5000	.750 (1.5x)	**.030**	4	1/2	3	52332-C6	80.90

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix for Exotic Alloys)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 115%; for 1.5x, increase to 108%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00005	.00011	.00016	.00021	.00027	.00032	.00041	.00062	.00083
Roughing	.00007	.00014	.00021	.00027	.00034	.00041	.00053	.00079	.00105
Finishing	.00009	.00018	.00027	.00036	.00045	.00054	.00069	.00103	.00138
Max	.00010	.00021	.00033	.00043	.00054	.00064	.00083	.00123	.00165

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .4x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .4x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

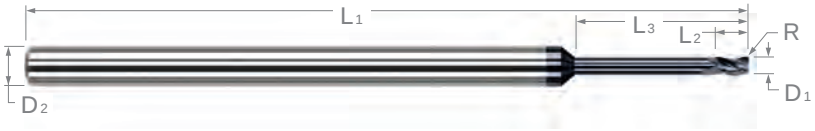
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius – Long Reach, Stub Flute



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

Reduced Neck Diameter to Avoid Heeling

mm & in

CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.015 (1/64)		.0150	.022	**.003**	.045 (3x)	3	1/8	1-1/2	947615-C6	52.40	
.015 (1/64)		.0150	.022	**.003**	.078 (5x)	3	1/8	2-1/2	64415-C6	52.40	
.015 (1/64)		.0150	.022	**.003**	.125 (8x)	3	1/8	2-1/2	54815-C6	53.50	
.015 (1/64)		.0150	.022	**.003**	.187 (12x)	3	1/8	2-1/2	63015-C6	58.50	
.015 (1/64)		.0150	.022	**.003**	.225 (15x)	3	1/8	2-1/2	968915-C6	61.40	
	.4 mm	.0157	.60 mm	**.08 mm**	2.0 mm (5x)	3	4 mm	50 mm	980709-C6	56.40	
	.4 mm	.0157	.60 mm	**.08 mm**	3.2 mm (8x)	3	4 mm	50 mm	975009-C6	57.50	
	.4 mm	.0157	.60 mm	**.08 mm**	4.8 mm (12x)	3	4 mm	50 mm	987309-C6	61.40	
	.5 mm	.0196	.75 mm	**.10 mm**	2.5 mm (5x)	3	4 mm	50 mm	980711-C6	54.10	
	.5 mm	.0196	.75 mm	**.10 mm**	4.0 mm (8x)	3	4 mm	50 mm	975011-C6	55.20	
	.5 mm	.0196	.75 mm	**.10 mm**	6.0 mm (12x)	3	4 mm	50 mm	987311-C6	59.70	
	.5 mm	.0196	.75 mm	**.10 mm**	8.0 mm (16x)	3	4 mm	50 mm	971511-C6	62.40	
.020		.0200	.030	**.004**	.060 (3x)	3	1/8	1-1/2	947620-C6	49.90	NEW
.020		.0200	.030	**.004**	.100 (5x)	3	1/8	2-1/2	64420-C6	50.10	
.020		.0200	.030	**.004**	.160 (8x)	3	1/8	2-1/2	54820-C6	51.20	
.020		.0200	.030	**.004**	.250 (12x)	3	1/8	2-1/2	63020-C6	56.40	
	.6 mm	.0236	.90 mm	**.10 mm**	3.0 mm (5x)	3	4 mm	50 mm	980713-C6	53.10	
	.6 mm	.0236	.90 mm	**.10 mm**	4.8 mm (8x)	3	4 mm	50 mm	975013-C6	54.10	
	.6 mm	.0236	.90 mm	**.10 mm**	7.2 mm (12x)	3	4 mm	50 mm	987313-C6	57.70	
.025		.0250	.038	**.004**	.075 (3x)	3	1/8	1-1/2	947625-C6	48.40	NEW
.025		.0250	.038	**.004**	.125 (5x)	3	1/8	2-1/2	64425-C6	48.90	
.025		.0250	.038	**.004**	.203 (8x)	3	1/8	2-1/2	54825-C6	49.90	
.025		.0250	.038	**.004**	.312 (12x)	3	1/8	2-1/2	63025-C6	55.10	
.031 (1/32)		.0310	.047	**.005**	.093 (3x)	3	1/8	1-1/2	947631-C6	46.40	
.031 (1/32)		.0310	.047	**.005**	.156 (5x)	3	1/8	2-1/2	64431-C6	46.40	
.031 (1/32)		.0310	.047	**.005**	.250 (8x)	3	1/8	2-1/2	54831-C6	47.50	
.031 (1/32)		.0310	.047	**.005**	.312 (10x)	3	1/8	2-1/2	932531-C6	48.50	
.031 (1/32)		.0310	.047	**.005**	.375 (12x)	3	1/8	2-1/2	63031-C6	49.50	
.031 (1/32)		.0310	.047	**.005**	.470 (15x)	3	1/8	2-1/2	968931-C6	52.20	
.031 (1/32)		.0310	.047	**.010**	.156 (5x)	3	1/8	2-1/2	917331-C6	46.10	
.031 (1/32)		.0310	.047	**.010**	.250 (8x)	3	1/8	2-1/2	908631-C6	47.50	
	.8 mm	.0314	1.20 mm	**.10 mm**	4.0 mm (5x)	3	4 mm	50 mm	980718-C6	48.90	
	.8 mm	.0314	1.20 mm	**.10 mm**	6.5 mm (8x)	3	4 mm	50 mm	975018-C6	50.10	
	.8 mm	.0314	1.20 mm	**.10 mm**	9.5 mm (12x)	3	4 mm	50 mm	987318-C6	51.40	
.035		.0350	.053	**.005**	.105 (3x)	3	1/8	1-1/2	947635-C6	46.10	NEW

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

mm & in continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.035		.0350	.053	**.005**	.187 (5x)	3	1/8	2-1/2	64435-C6	46.40
	.035		.0350	.053	**.005**	.281 (8x)	3	1/8	2-1/2	54835-C6	47.50
	.035		.0350	.053	**.005**	.350 (10x)	3	1/8	2-1/2	932535-C6	49.50
		1.0 mm	.0393	1.50 mm	**.10 mm**	5.0 mm (5x)	3	4 mm	50 mm	980722-C6	48.90
		1.0 mm	.0393	1.50 mm	**.10 mm**	8.0 mm (8x)	3	4 mm	50 mm	975022-C6	50.10
		1.0 mm	.0393	1.50 mm	**.10 mm**	12.0 mm (12x)	3	4 mm	50 mm	987322-C6	51.40
		1.0 mm	.0393	1.50 mm	**.10 mm**	16.0 mm (16x)	3	4 mm	50 mm	971522-C6	54.40
NEW	.040		.0400	.060	**.005**	.120 (3x)	3	1/8	2-1/2	947640-C6	46.10
	.040		.0400	.060	**.005**	.203 (5x)	3	1/8	2-1/2	64440-C6	46.40
	.040		.0400	.060	**.005**	.325 (8x)	3	1/8	2-1/2	54840-C6	47.50
NEW	.045		.0450	.068	**.005**	.135 (3x)	3	1/8	1-1/2	947645-C6	45.70
	.045		.0450	.068	**.005**	.225 (5x)	3	1/8	2-1/2	64445-C6	45.90
	.045		.0450	.068	**.005**	.375 (8x)	3	1/8	2-1/2	54845-C6	47.10
	.047 (3/64)		.0470	.070	**.005**	.141 (3x)	3	1/8	1-1/2	947647-C6	46.40
	.047 (3/64)		.0470	.070	**.005**	.250 (5x)	3	1/8	2-1/2	64447-C6	46.40
	.047 (3/64)		.0470	.070	**.005**	.375 (8x)	3	1/8	2-1/2	54847-C6	47.50
	.047 (3/64)		.0470	.070	**.005**	.570 (12x)	3	1/8	2-1/2	63047-C6	49.50
	.047 (3/64)		.0470	.070	**.005**	.710 (15x)	3	1/8	2-1/2	968947-C6	52.20
NEW	.050		.0500	.075	**.005**	.150 (3x)	3	1/8	1-1/2	947650-C6	45.70
	.050		.0500	.075	**.005**	.250 (5x)	3	1/8	2-1/2	64450-C6	45.90
	.050		.0500	.075	**.005**	.400 (8x)	3	1/8	2-1/2	54850-C6	47.10
	.055		.0550	.083	**.005**	.275 (5x)	3	1/8	2-1/2	64455-C6	45.90
	.055		.0550	.083	**.005**	.450 (8x)	3	1/8	2-1/2	54855-C6	47.10
		1.5 mm	.0590	2.20 mm	**.20 mm**	7.5 mm (5x)	3	4 mm	50 mm	980733-C6	48.90
		1.5 mm	.0590	2.20 mm	**.20 mm**	12.0 mm (8x)	3	4 mm	50 mm	975033-C6	50.10
		1.5 mm	.0590	2.20 mm	**.20 mm**	18.0 mm (12x)	3	4 mm	50 mm	987333-C6	51.40
		1.5 mm	.0590	2.20 mm	**.20 mm**	24.0 mm (16x)	3	4 mm	63 mm	971533-C6	54.40
	.060		.0600	.090	**.010**	.312 (5x)	3	1/8	2-1/2	64460-C6	46.40
	.060		.0600	.090	**.010**	.500 (8x)	3	1/8	2-1/2	54860-C6	47.50
	.060		.0600	.090	**.010**	.625 (10x)	3	1/8	2-1/2	932560-C6	49.50
	.062 (1/16)		.0620	.093	**.005**	.312 (5x)	3	1/8	2-1/2	919862-C6	46.10
	.062 (1/16)		.0620	.093	**.005**	.500 (8x)	3	1/8	2-1/2	915362-C6	47.50
NEW	.062 (1/16)		.0620	.093	**.005**	.625 (10x)	3	1/8	2-1/2	884462-C6	48.10
	.062 (1/16)		.0620	.093	**.010**	.186 (3x)	3	1/8	1-1/2	947662-C6	46.10
	.062 (1/16)		.0620	.093	**.010**	.312 (5x)	3	1/8	2-1/2	64462-C6	46.40
	.062 (1/16)		.0620	.093	**.010**	.500 (8x)	3	1/8	2-1/2	54862-C6	47.50
	.062 (1/16)		.0620	.093	**.010**	.625 (10x)	3	1/8	2-1/2	932562-C6	48.50
	.062 (1/16)		.0620	.093	**.010**	.750 (12x)	3	1/8	2-1/2	63062-C6	49.50
	.062 (1/16)		.0620	.093	**.010**	.950 (15x)	3	1/8	2-1/2	968962-C6	52.20
	.062 (1/16)		.0620	.093	**.015**	.312 (5x)	3	1/8	2-1/2	902662-C6	46.10
	.062 (1/16)		.0620	.093	**.015**	.500 (8x)	3	1/8	2-1/2	912062-C6	47.50
	.078 (5/64)		.0780	.117	**.010**	.234 (3x)	3	1/8	1-1/2	947678-C6	46.10
	.078 (5/64)		.0780	.117	**.010**	.406 (5x)	3	1/8	2-1/2	64478-C6	46.40
	.078 (5/64)		.0780	.117	**.010**	.625 (8x)	3	1/8	2-1/2	54878-C6	47.50
	.078 (5/64)		.0780	.117	**.010**	.940 (12x)	3	1/8	2-1/2	63078-C6	49.50
	.078 (5/64)		.0780	.117	**.010**	1.187 (15x)	3	1/8	2-1/2	968978-C6	52.20

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

mm & in

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	2.0 mm	.0787	3.00 mm	**.20 mm**	10.0 mm (5x)	3	4 mm	50 mm	980745-C6	48.90
	2.0 mm	.0787	3.00 mm	**.20 mm**	16.0 mm (8x)	3	4 mm	50 mm	975045-C6	50.10
	2.0 mm	.0787	3.00 mm	**.20 mm**	24.0 mm (12x)	3	4 mm	63 mm	987345-C6	51.40
	2.0 mm	.0787	3.00 mm	**.20 mm**	32.0 mm (16x)	3	4 mm	63 mm	971545-C6	54.40
.093 (3/32)		.0930	.139	**.005**	.500 (5x)	3	1/8	2-1/2	919893-C6	46.10
.093 (3/32)		.0930	.139	**.005**	.750 (8x)	3	1/8	2-1/2	915393-C6	47.50
.093 (3/32)		.0930	.139	**.010**	.279 (3x)	3	1/8	1-1/2	947693-C6	46.10
.093 (3/32)		.0930	.139	**.010**	.500 (5x)	3	1/8	2-1/2	64493-C6	46.40
.093 (3/32)		.0930	.139	**.010**	.750 (8x)	3	1/8	2-1/2	54893-C6	47.50
.093 (3/32)		.0930	.139	**.010**	.950 (10x)	3	1/8	2-1/2	932593-C6	48.50
.093 (3/32)		.0930	.139	**.010**	1.125 (12x)	3	1/8	2-1/2	63093-C6	49.50
.093 (3/32)		.0930	.139	**.010**	1.400 (15x)	3	1/8	3	968993-C6	52.20
.093 (3/32)		.0930	.139	**.015**	.500 (5x)	3	1/8	2-1/2	902693-C6	46.10
.093 (3/32)		.0930	.139	**.015**	.750 (8x)	3	1/8	2-1/2	912093-C6	47.50
.093 (3/32)		.0930	.139	**.030**	.500 (5x)	3	1/8	2-1/2	910193-C6	46.10
.093 (3/32)		.0930	.139	**.030**	.750 (8x)	3	1/8	2-1/2	906493-C6	47.50
.100		.1000	.150	**.010**	.500 (5x)	3	1/8	2-1/2	64500-C6	45.90
.100		.1000	.150	**.010**	.800 (8x)	3	1/8	2-1/2	54900-C6	47.10
	3.0 mm	.1181	4.50 mm	**.20 mm**	15.0 mm (5x)	3	4 mm	50 mm	980757-C6	46.40
	3.0 mm	.1181	4.50 mm	**.20 mm**	24.0 mm (8x)	3	4 mm	50 mm	975057-C6	46.50

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)	.1250	.187	**.010**	.625 (5x)	4	1/8	2-1/2	917408-C6	45.70	
.125 (1/8)	.1250	.187	**.010**	1.000 (8x)	4	1/8	2-1/2	908708-C6	47.10	
.125 (1/8)	.1250	.187	**.015**	.375 (3x)	4	1/8	1-1/2	947708-C6	44.10	
.125 (1/8)	.1250	.187	**.015**	.625 (5x)	4	1/8	2-1/2	64508-C6	45.90	
.125 (1/8)	.1250	.187	**.015**	1.000 (8x)	4	1/8	2-1/2	54908-C6	47.10	
.125 (1/8)	.1250	.187	**.015**	1.250 (10x)	4	1/8	2-1/2	932608-C6	48.50	
.125 (1/8)	.1250	.187	**.015**	1.500 (12x)	4	1/8	3	63108-C6	49.50	
.125 (1/8)	.1250	.187	**.030**	.625 (5x)	4	1/8	2-1/2	910208-C6	45.70	
.125 (1/8)	.1250	.187	**.030**	1.000 (8x)	4	1/8	2-1/2	906508-C6	47.10	
.156 (5/32)	.1562	.235	**.015**	.750 (5x)	4	3/16	3	64510-C6	50.70	
.156 (5/32)	.1562	.235	**.015**	1.250 (8x)	4	3/16	3	54910-C6	51.70	
.156 (5/32)	.1562	.235	**.015**	1.875 (12x)	4	3/16	4	63110-C6	62.10	
.187 (3/16)	.1875	.281	**.015**	1.000 (5x)	4	3/16	3	64512-C6	51.20	
.187 (3/16)	.1875	.281	**.015**	1.500 (8x)	4	3/16	3	54912-C6	52.40	
.187 (3/16)	.1875	.281	**.015**	2.250 (12x)	4	3/16	4	63112-C6	62.10	
.187 (3/16)	.1875	.281	**.030**	1.000 (5x)	4	3/16	3	910212-C6	50.90	NEW
.187 (3/16)	.1875	.281	**.030**	1.500 (8x)	4	3/16	3	906512-C6	52.10	NEW
.250 (1/4)	.2500	.375	**.015**	1.250 (5x)	4	1/4	4	64516-C6	56.90	
.250 (1/4)	.2500	.375	**.015**	2.000 (8x)	4	1/4	4	54916-C6	57.90	
.250 (1/4)	.2500	.375	**.015**	3.000 (12x)	4	1/4	6	63116-C6	69.50	
.250 (1/4)	.2500	.375	**.030**	1.250 (5x)	4	1/4	4	910216-C6	56.50	NEW
.250 (1/4)	.2500	.375	**.030**	2.000 (8x)	4	1/4	4	906516-C6	57.50	NEW

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 95

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square

Up to 7 Flutes!

- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
		.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	967604-C6	48.90
		.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	974504-C6	56.10
		.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	976104-C6	57.50
NEW	.010		.0100	**.030** (3x)	4	1/8	1-1/2	57810-C6	50.10
NEW	.010		.0100	**.050** (5x)	4	1/8	2-1/2	62610-C6	57.50
		.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	967606-C6	45.10
	.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	946115-C6	39.90
	.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	57815-C6	39.90
	.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	62615-C6	49.50
	.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	59015-C6	50.90
	.015 (1/64)		.0150	**.156** (10x)	4	1/8	2-1/2	941815-C6	57.10
		.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	967609-C6	42.90
		.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	974509-C6	50.20
		.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	976109-C6	51.70
		.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	967611-C6	42.90
		.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	974511-C6	49.50
		.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	976111-C6	50.90
	.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	946120-C6	39.10
	.020		.0200	**.060** (3x)	4	1/8	1-1/2	57820-C6	39.10
	.020		.0200	**.100** (5x)	4	1/8	2-1/2	62620-C6	49.20
	.020		.0200	**.160** (8x)	4	1/8	2-1/2	59020-C6	50.70
	.020		.0200	**.200** (10x)	4	1/8	2-1/2	941820-C6	56.70
		.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	967613-C6	42.70
		.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	974513-C6	49.50
		.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	976113-C6	50.90
	.025		.0250	**.075** (3x)	4	1/8	1-1/2	57825-C6	36.70
	.025		.0250	**.125** (5x)	4	1/8	2-1/2	62625-C6	47.50
	.025		.0250	**.203** (8x)	4	1/8	2-1/2	59025-C6	48.90
	.025		.0250	**.250** (10x)	4	1/8	2-1/2	941825-C6	55.10
		.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	967615-C6	42.70
	.030		.0300	**.090** (3x)	6	1/8	1-1/2	57830-C6	36.70
	.030		.0300	**.156** (5x)	6	1/8	2-1/2	62630-C6	47.50

SPEEDS & FEEDS ONLINE!

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NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE	
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm						
.031 (1/32)		.0310	**.047** (1.5x)	6	1/8	1-1/2	946131-C6	32.90	
.031 (1/32)		.0310	**.093** (3x)	6	1/8	1-1/2	57831-C6	32.90	
.031 (1/32)		.0310	**.156** (5x)	6	1/8	2-1/2	62631-C6	45.40	
.031 (1/32)		.0310	**.250** (8x)	6	1/8	2-1/2	59031-C6	46.70	
.031 (1/32)		.0310	**.312** (10x)	6	1/8	2-1/2	941831-C6	52.90	
.031 (1/31)		.0310	**.375** (12x)	6	1/8	2-1/2	69131-C6	56.70	
	.8 mm	.0314	**2.40 mm** (3x)	6	4 mm	50 mm	967618-C6	38.50	
	.8 mm	.0314	**4.00 mm** (5x)	6	4 mm	50 mm	974518-C6	45.10	
	.8 mm	.0314	**6.50 mm** (8x)	6	4 mm	50 mm	976118-C6	46.50	
.035		.0350	**.105** (3x)	6	1/8	1-1/2	57835-C6	35.40	NEW
.035		.0350	**.187** (5x)	6	1/8	2-1/2	62635-C6	35.40	NEW
	.9 mm	.0354	**2.70 mm** (3x)	6	4 mm	50 mm	967620-C6	37.50	
	1.0 mm	.0393	**1.50 mm** (1.5x)	6	4 mm	50 mm	846722-C6	37.50	
	1.0 mm	.0393	**3.00 mm** (3x)	6	4 mm	50 mm	967622-C6	37.50	
	1.0 mm	.0393	**5.00 mm** (5x)	6	4 mm	50 mm	974522-C6	46.40	
	1.0 mm	.0393	**8.00 mm** (8x)	6	4 mm	50 mm	976122-C6	47.70	
	1.0 mm	.0393	**10.00 mm** (10x)	6	4 mm	50 mm	938322-C6	53.70	
.040		.0400	**.060** (1.5x)	6	1/8	1-1/2	946140-C6	32.90	
.040		.0400	**.120** (3x)	6	1/8	1-1/2	57840-C6	32.90	
.040		.0400	**.203** (5x)	6	1/8	2-1/2	62640-C6	45.40	
.040		.0400	**.325** (8x)	6	1/8	2-1/2	59040-C6	46.70	
	1.1 mm	.0433	**3.00 mm** (3x)	6	4 mm	50 mm	967624-C6	37.50	
.045		.0450	**.135** (3x)	6	1/8	1-1/2	57845-C6	35.40	NEW
.045		.0450	**.225** (5x)	6	1/8	2-1/2	62645-C6	35.40	NEW
.047 (3/64)		.0470	**.071** (1.5x)	6	1/8	1-1/2	946147-C6	33.70	
.047 (3/64)		.0470	**.141** (3x)	6	1/8	1-1/2	57847-C6	32.90	
.047 (3/64)		.0470	**.250** (5x)	6	1/8	2-1/2	62647-C6	45.40	
.047 (3/64)		.0470	**.375** (8x)	6	1/8	2-1/2	59047-C6	46.70	
.047 (3/64)		.0470	**.480** (10x)	6	1/8	2-1/2	941847-C6	52.90	
.047 (3/64)		.0470	**.570** (12x)	6	1/8	2-1/2	69147-C6	56.70	
	1.2 mm	.0472	**3.50 mm** (3x)	6	4 mm	50 mm	967627-C6	37.50	
	1.2 mm	.0472	**6.00 mm** (5x)	6	4 mm	50 mm	974527-C6	46.40	
	1.2 mm	.0472	**9.50 mm** (8x)	6	4 mm	50 mm	976127-C6	47.70	
.050		.0500	**.075** (1.5x)	7	1/8	1-1/2	946150-C6	33.70	NEW
.050		.0500	**.150** (3x)	7	1/8	1-1/2	57850-C6	32.90	
.050		.0500	**.250** (5x)	7	1/8	2-1/2	62650-C6	45.40	
.050		.0500	**.400** (8x)	7	1/8	2-1/2	59050-C6	46.70	
	1.3 mm	.0511	**4.00 mm** (3x)	7	4 mm	50 mm	967629-C6	37.50	
.055		.0550	**.165** (3x)	7	1/8	1-1/2	57855-C6	34.90	NEW
.055		.0550	**.275** (5x)	7	1/8	2-1/2	62655-C6	34.90	NEW
	1.4 mm	.0551	**4.00 mm** (3x)	7	4 mm	50 mm	967631-C6	37.50	
	1.4 mm	.0551	**7.00 mm** (5x)	7	4 mm	50 mm	974531-C6	46.40	
	1.4 mm	.0551	**11.00 mm** (8x)	7	4 mm	50 mm	976131-C6	47.70	
	1.5 mm	.0590	**2.20 mm** (1.5x)	7	4 mm	50 mm	846733-C6	36.20	
	1.5 mm	.0590	**4.50 mm** (3x)	7	4 mm	50 mm	967633-C6	36.20	

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
		1.5 mm	.0590	**7.50 mm** (5x)	7	4 mm	50 mm	974533-C6	45.10
		1.5 mm	.0590	**12.00 mm** (8x)	7	4 mm	50 mm	976133-C6	46.40
		1.5 mm	.0590	**15.00 mm** (10x)	7	4 mm	50 mm	938333-C6	54.90
NEW	.060		.0600	**.090** (1.5x)	7	1/8	1-1/2	946160-C6	32.40
	.060		.0600	**.180** (3x)	7	1/8	1-1/2	57860-C6	32.40
	.060		.0600	**.312** (5x)	7	1/8	2-1/2	62660-C6	41.90
	.060		.0600	**.500** (8x)	7	1/8	2-1/2	59060-C6	43.40
	.062 (1/16)		.0620	**.093** (1.5x)	7	1/8	1-1/2	946162-C6	32.40
	.062 (1/16)		.0620	**.186** (3x)	7	1/8	1-1/2	57862-C6	32.40
	.062 (1/16)		.0620	**.312** (5x)	7	1/8	2-1/2	62662-C6	42.90
	.062 (1/16)		.0620	**.500** (8x)	7	1/8	2-1/2	59062-C6	44.20
	.062 (1/16)		.0620	**.625** (10x)	7	1/8	2-1/2	941862-C6	53.70
	.062 (1/16)		.0620	**.750** (12x)	7	1/8	2-1/2	69162-C6	60.40
	.062 (1/16)		.0620	**.950** (15x)	7	1/8	2-1/2	68762-C6	75.90
		1.6 mm	.0629	**5.00 mm** (3x)	7	4 mm	50 mm	967636-C6	36.20
		1.6 mm	.0629	**8.00 mm** (5x)	7	4 mm	50 mm	974536-C6	45.10
		1.6 mm	.0629	**13.00 mm** (8x)	7	4 mm	50 mm	976136-C6	46.40
		1.7 mm	.0669	**5.00 mm** (3x)	7	4 mm	50 mm	967638-C6	36.20
	.070		.0700	**.210** (3x)	7	1/8	1-1/2	57870-C6	30.70
	.070		.0700	**.375** (5x)	7	1/8	2-1/2	62670-C6	42.90
	.070		.0700	**.570** (8x)	7	1/8	2-1/2	59070-C6	44.20
		1.8 mm	.0708	**5.50 mm** (3x)	7	4 mm	50 mm	967640-C6	36.20
		1.8 mm	.0708	**9.00 mm** (5x)	7	4 mm	50 mm	974540-C6	45.10
		1.8 mm	.0708	**14.00 mm** (8x)	7	4 mm	50 mm	976140-C6	46.40
		1.9 mm	.0748	**5.50 mm** (3x)	7	4 mm	50 mm	967642-C6	36.20
	.078 (5/64)		.0780	**.117** (1.5x)	7	1/8	1-1/2	946178-C6	30.70
	.078 (5/64)		.0780	**.234** (3x)	7	1/8	1-1/2	57878-C6	30.70
	.078 (5/64)		.0780	**.406** (5x)	7	1/8	2-1/2	62678-C6	42.90
	.078 (5/64)		.0780	**.625** (8x)	7	1/8	2-1/2	59078-C6	44.20
	.078 (5/64)		.0780	**.800** (10x)	7	1/8	2-1/2	941878-C6	53.70
	.078 (5/64)		.0780	**.940** (12x)	7	1/8	2-1/2	69178-C6	60.40
	.078 (5/64)		.0780	**1.187** (15x)	7	1/8	2-1/2	68778-C6	75.90
		2.0 mm	.0787	**3.00 mm** (1.5x)	7	4 mm	50 mm	846745-C6	36.20
		2.0 mm	.0787	**6.00 mm** (3x)	7	4 mm	50 mm	967645-C6	36.20
		2.0 mm	.0787	**10.00 mm** (5x)	7	4 mm	50 mm	974545-C6	44.90
		2.0 mm	.0787	**16.00 mm** (8x)	7	4 mm	50 mm	976145-C6	46.10
NEW	.080		.0800	**.120** (1.5x)	7	1/8	1-1/2	946180-C6	32.40
	.080		.0800	**.240** (3x)	7	1/8	1-1/2	57880-C6	30.70
	.080		.0800	**.406** (5x)	7	1/8	2-1/2	62680-C6	42.90
	.080		.0800	**.650** (8x)	7	1/8	2-1/2	59080-C6	44.20
	.090		.0900	**.270** (3x)	7	1/8	1-1/2	57890-C6	30.70
	.090		.0900	**.450** (5x)	7	1/8	2-1/2	62690-C6	42.90
	.090		.0900	**.750** (8x)	7	1/8	2-1/2	59090-C6	44.20

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ / +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE	
.093 (3/32)		.0930	**.140** (1.5x)	7	1/8	1-1/2	946193-C6	30.70	
.093 (3/32)		.0930	**.279** (3x)	7	1/8	1-1/2	57893-C6	30.70	
.093 (3/32)		.0930	**.500** (5x)	7	1/8	2-1/2	62693-C6	42.90	
.093 (3/32)		.0930	**.750** (8x)	7	1/8	2-1/2	59093-C6	44.20	
.093 (3/32)		.0930	**.950** (10x)	7	1/8	2-1/2	941893-C6	53.70	
.093 (3/32)		.0930	**1.125** (12x)	7	1/8	2-1/2	69193-C6	60.40	
.093 (3/32)		.0930	**1.400** (15x)	7	1/8	3	68793-C6	76.20	
	2.5 mm	.0984	**7.50 mm** (3x)	7	4 mm	50 mm	967651-C6	36.20	
.100		.1000	**.150** (1.5x)	7	1/8	1-1/2	960100-C6	30.90	
.100		.1000	**.300** (3x)	7	1/8	1-1/2	57900-C6	30.70	
.100		.1000	**.500** (5x)	7	1/8	2-1/2	62700-C6	42.90	
.100		.1000	**.800** (8x)	7	1/8	2-1/2	59100-C6	44.20	
.109 (7/64)		.1090	**.327** (3x)	7	1/8	1-1/2	57902-C6	30.70	
.109 (7/64)		.1090	**.570** (5x)	7	1/8	2-1/2	62702-C6	42.90	
	3.0 mm	.1181	**4.50 mm** (1.5x)	7	4 mm	50 mm	846757-C6	36.20	
	3.0 mm	.1181	**9.00 mm** (3x)	7	4 mm	50 mm	967657-C6	36.20	
	3.0 mm	.1181	**15.00 mm** (5x)	7	4 mm	50 mm	974557-C6	37.40	
	3.0 mm	.1181	**24.00 mm** (8x)	7	4 mm	50 mm	976157-C6	39.80	NEW

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)	.1250	**.187** (1.5x)	7	1/8	1-1/2	960108-C6	29.40	
.125 (1/8)	.1250	**.375** (3x)	7	1/8	1-1/2	57908-C6	28.90	
.125 (1/8)	.1250	**.625** (5x)	7	1/8	2-1/2	62708-C6	42.10	
.125 (1/8)	.1250	**1.000** (8x)	7	1/8	2-1/2	59108-C6	43.50	
.125 (1/8)	.1250	**1.250** (10x)	7	1/8	2-1/2	941908-C6	53.10	
.125 (1/8)	.1250	**1.500** (12x)	7	1/8	3	69208-C6	59.90	
.125 (1/8)	.1250	**1.875** (15x)	7	1/8	3	68808-C6	75.90	
.140 (9/64)	.1406	**.425** (3x)	7	3/16	2	57909-C6	40.40	
.140 (9/64)	.1406	**.750** (5x)	7	3/16	3	62709-C6	42.10	
.140 (9/64)	.1406	**1.125** (8x)	7	3/16	3	59109-C6	43.20	NEW
.156 (5/32)	.1562	**.235** (1.5x)	7	3/16	2	960110-C6	33.40	
.156 (5/32)	.1562	**.470** (3x)	7	3/16	2	57910-C6	32.90	
.156 (5/32)	.1562	**.750** (5x)	7	3/16	3	62710-C6	44.40	
.156 (5/32)	.1562	**1.250** (8x)	7	3/16	3	59110-C6	45.70	NEW
.187 (3/16)	.1875	**.285** (1.5x)	7	3/16	2	960112-C6	33.40	
.187 (3/16)	.1875	**.570** (3x)	7	3/16	2	57912-C6	32.90	
.187 (3/16)	.1875	**1.000** (5x)	7	3/16	3	62712-C6	44.40	
.187 (3/16)	.1875	**1.500** (8x)	7	3/16	3	59112-C6	45.90	
6.0 mm	.2362	**18.00 mm** (3x)	7	6 mm	63 mm	967666-C6	40.80	NEW
6.0 mm	.2362	**30.00 mm** (5x)	7	6 mm	63 mm	974566-C6	43.20	NEW
.250 (1/4)	.2500	**.375** (1.5x)	7	1/4	2-1/2	960116-C6	43.40	
.250 (1/4)	.2500	**.750** (3x)	7	1/4	2-1/2	57916-C6	42.70	
.250 (1/4)	.2500	**1.250** (5x)	7	1/4	4	62716-C6	54.40	
.250 (1/4)	.2500	**2.000** (8x)	7	1/4	4	59116-C6	55.90	

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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	CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
NEW	.312 (5/16)	.3125	**.470** (1.5x)	7	5/16	2-1/2	960120-C6	58.50
NEW	.312 (5/16)	.3125	**1.000** (3x)	7	5/16	2-1/2	57920-C6	57.90
NEW	.375 (3/8)	.3750	**.570** (1.5x)	7	3/8	2-1/2	960124-C6	66.50
	.375 (3/8)	.3750	**1.125** (3x)	7	3/8	2-1/2	57924-C6	65.90
NEW	.375 (3/8)	.3750	**2.000** (5x)	7	3/8	4	62724-C6	83.70
NEW	.500 (1/2)	.5000	**.750** (1.5x)	7	1/2	3	960132-C6	85.40
	.500 (1/2)	.5000	**1.500** (3x)	7	1/2	3	57932-C6	85.40

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Finishers for Exotic Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
	300 - 350	350	Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
	350 - 400	250	Finishing (1.5x LOC)	.00009	.00019	.00029	.00038	.00048	.00057	.00077	.00115	.00154	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00140	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00005	.00010	.00014	.00019	.00024	.00029	.00039	.00058	.00077	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00009	.00014	.00018	.00023	.00027	.00036	.00054	.00073	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00016	.00020	.00023	.00032	.00047	.00063	< .02x Dia	.5x - 15x Dia
	400 - 540	200	Finishing (1.5x LOC)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00125	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00007	.00014	.00021	.00028	.00035	.00042	.00057	.00085	.00114	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00004	.00008	.00012	.00016	.00020	.00023	.00031	.00047	.00063	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00007	.00011	.00015	.00018	.00022	.00030	.00044	.00059	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00007	.00011	.00014	.00018	.00021	.00028	.00043	.00057	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00013	.00016	.00019	.00026	.00038	.00051	< .02x Dia	.5x - 15x Dia
Titanium: All alloys	275 - 300	300	Finishing (1.5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00078	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00003	.00005	.00008	.00011	.00013	.00016	.00021	.00032	.00043	< .05x Dia	.5x - 8x Dia
	300 - 350	200	Finishing (10x LOC)	-	.00005	.00008	.00010	.00013	.00015	.00020	.00030	.00040	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00005	.00007	.00010	.00012	.00014	.00019	.00029	.00039	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00009	.00011	.00013	.00017	.00026	.00035	< .02x Dia	.5x - 15x Dia
	350 - 400	150	Finishing (1.5x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00051	.00068	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00046	.00062	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00003	.00006	.00009	.00012	.00015	.00017	.00023	.00035	.00047	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	< .05x Dia	.5x - 8x Dia
	400 - 425	100	Finishing (10x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00032	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00007	.00009	.00010	.00014	.00021	.00028	< .02x Dia	.5x - 15x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	150	Finishing (1.5x LOC)	.00002	.00004	.00007	.00009	.00011	.00013	.00018	.00027	.00036	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00033	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00015	.00020	< .05x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00011	.00015	< .03x Dia	.5x - 8x Dia
	300 - 350	100	Finishing (10x LOC)	-	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00002	.00002	.00003	.00004	.00005	.00007	.00010	.00013	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00003	.00004	.00004	.00006	.00009	.00011	< .01x Dia	.5x - 15x Dia
	350 - 400	80	Finishing (1.5x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00003	.00005	.00006	.00008	.00010	.00013	.00019	.00026	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .05x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00009	.00012	< .03x Dia	.5x - 8x Dia
	400 - 425	60	Finishing (10x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00006	.00008	.00011	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00010	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00002	.00003	.00003	.00005	.00007	.00009	< .01x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square – Long Reach

- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.045	**.078** (5x)	4	1/8	2-1/2	940715-C6	52.70
.015 (1/64)		.0150	.045	**.125** (8x)	4	1/8	2-1/2	962115-C6	54.50
.015 (1/64)		.0150	.045	**.187** (12x)	4	1/8	2-1/2	951815-C6	57.50
.020		.0200	.060	**.160** (8x)	4	1/8	2-1/2	962120-C6	47.70
.025		.0250	.075	**.203** (8x)	4	1/8	2-1/2	962125-C6	47.70
.031 (1/32)		.0310	.093	**.156** (5x)	6	1/8	2-1/2	940731-C6	46.40
.031 (1/32)		.0310	.093	**.250** (8x)	6	1/8	2-1/2	962131-C6	47.70
.031 (1/32)		.0310	.093	**.375** (12x)	6	1/8	2-1/2	951831-C6	50.70
	1.0 mm	.0393	3.00 mm	**8.0 mm** (8x)	6	4 mm	50 mm	924722-C6	48.20
.040		.0400	.120	**.325** (8x)	6	1/8	2-1/2	962140-C6	47.70
.047 (3/64)		.0470	.141	**.250** (5x)	6	1/8	2-1/2	940747-C6	46.40
.047 (3/64)		.0470	.141	**.375** (8x)	6	1/8	2-1/2	962147-C6	47.70
.047 (3/64)		.0470	.141	**.570** (12x)	6	1/8	2-1/2	951847-C6	50.70
.050		.0500	.150	**.400** (8x)	7	1/8	2-1/2	962150-C6	47.70
	1.5 mm	.0590	4.50 mm	**12.0 mm** (8x)	7	4 mm	50 mm	924733-C6	48.20
.060		.0600	.180	**.500** (8x)	7	1/8	2-1/2	962160-C6	47.70
.062 (1/16)		.0620	.186	**.312** (5x)	7	1/8	2-1/2	940762-C6	44.40
.062 (1/16)		.0620	.186	**.500** (8x)	7	1/8	2-1/2	962162-C6	45.70
.062 (1/16)		.0620	.186	**.750** (12x)	7	1/8	2-1/2	951862-C6	48.70
.070		.0700	.210	**.570** (8x)	7	1/8	2-1/2	962170-C6	45.70
.078 (5/64)		.0780	.234	**.406** (5x)	7	1/8	2-1/2	940778-C6	44.40
.078 (5/64)		.0780	.234	**.625** (8x)	7	1/8	2-1/2	962178-C6	45.70
.078 (5/64)		.0780	.234	**.940** (12x)	7	1/8	2-1/2	951878-C6	48.70
	2.0 mm	.0787	6.00 mm	**16.0 mm** (8x)	7	4 mm	50 mm	924745-C6	46.10
.080		.0800	.240	**.650** (8x)	7	1/8	2-1/2	962180-C6	45.70
.090		.0900	.270	**.750** (8x)	7	1/8	2-1/2	962190-C6	45.70
.093 (3/32)		.0930	.279	**.500** (5x)	7	1/8	2-1/2	940793-C6	44.40
.093 (3/32)		.0930	.279	**.750** (8x)	7	1/8	2-1/2	962193-C6	45.70
.093 (3/32)		.0930	.279	**1.125** (12x)	7	1/8	2-1/2	951893-C6	48.70
.100		.1000	.300	**.800** (8x)	7	1/8	2-1/2	962200-C6	45.70
	3.0 mm	.1181	9.00 mm	**24.0 mm** (8x)	7	4 mm	50 mm	924757-C6	46.10

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square – Long Reach (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.375	**.625** (5x)	7	1/8	2-1/2	940808-C6	42.90
.125 (1/8)	.1250	.375	**1.000** (8x)	7	1/8	2-1/2	962208-C6	44.10
.125 (1/8)	.1250	.375	**1.500** (12x)	7	1/8	3	951908-C6	46.90
.156 (5/32)	.1562	.470	**1.250** (8x)	7	3/16	3	962210-C6	44.10
.187 (3/16)	.1875	.570	**1.000** (5x)	7	3/16	3	940812-C6	45.40
.250 (1/4)	.2500	.750	**1.250** (5x)	7	1/4	4	940816-C6	54.90

SPEEDS & FEEDS ONLINE!

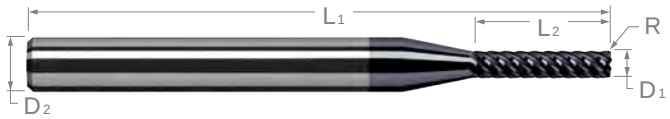
SPEEDS & FEEDS (Finishers – Long Reach for Exotic Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	<.10x Dia	.5x - 3x Dia
	300 - 350	350	Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	<.05x Dia	.5x - 3x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	<.05x Dia	.5x - 3x Dia
	350 - 400	250	Finishing (5x Reach)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00126	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00006	.00013	.00020	.00026	.00033	.00039	.00052	.00078	.00105	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00071	.00095	<.05x Dia	.5x - 3x Dia
	400 - 540	200	Finishing (5x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00077	.00102	<.10x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00005	.00011	.00016	.00021	.00027	.00032	.00042	.00064	.00085	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00005	.00010	.00014	.00019	.00024	.00029	.00038	.00057	.00077	<.05x Dia	.5x - 3x Dia
Titanium: All alloys	275 - 300	300	Finishing (5x Reach)	.00004	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	<.10x Dia	.5x - 3x Dia
	300 - 350	200	Finishing (8x Reach)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	<.05x Dia	.5x - 3x Dia
	350 - 400	150	Finishing (5x Reach)	.00003	.00007	.00010	.00014	.00017	.00021	.00028	.00042	.00056	<.10x Dia	.5x - 3x Dia
	400 - 425	100	Finishing (8x Reach)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00035	.00046	<.07x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00031	.00042	<.05x Dia	.5x - 3x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	150	Finishing (5x Reach)	.00002	.00004	.00005	.00007	.00009	.00011	.00015	.00022	.00029	<.10x Dia	.5x - 3x Dia
	300 - 350	100	Finishing (8x Reach)	.00001	.00002	.00003	.00004	.00005	.00007	.00009	.00013	.00018	<.05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	<.03x Dia	.5x - 3x Dia
	350 - 400	80	Finishing (5x Reach)	.00001	.00003	.00004	.00006	.00007	.00009	.00012	.00018	.00023	<.10x Dia	.5x - 3x Dia
	400 - 425	60	Finishing (8x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00011	.00014	<.05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00011	<.03x Dia	.5x - 3x Dia

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Corner Radius



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	R $^{+.001''}_{-.001''}$		D_2 (h6)	L_1	TOOL #	PRICE
.031 (1/32)	.093 (3x)	**.005**	6	1/8	1-1/2	873031-C6	34.90
.031 (1/32)	.156 (5x)	**.005**	6	1/8	2-1/2	874631-C6	47.50
.047 (3/64)	.141 (3x)	**.005**	6	1/8	1-1/2	873047-C6	34.90
.047 (3/64)	.250 (5x)	**.005**	6	1/8	2-1/2	874647-C6	47.50
.047 (3/64)	.141 (3x)	**.010**	6	1/8	1-1/2	882647-C6	34.90
.047 (3/64)	.250 (5x)	**.010**	6	1/8	2-1/2	885447-C6	47.50
.062 (1/16)	.186 (3x)	**.005**	7	1/8	1-1/2	873062-C6	34.70
.062 (1/16)	.312 (5x)	**.005**	7	1/8	2-1/2	874662-C6	45.40
.062 (1/16)	.186 (3x)	**.010**	7	1/8	1-1/2	882662-C6	34.70
.062 (1/16)	.312 (5x)	**.010**	7	1/8	2-1/2	885462-C6	45.40
.078 (5/64)	.234 (3x)	**.005**	7	1/8	1-1/2	873078-C6	33.10
.078 (5/64)	.406 (5x)	**.005**	7	1/8	2-1/2	874678-C6	45.40
.078 (5/64)	.234 (3x)	**.010**	7	1/8	1-1/2	882678-C6	33.10
.078 (5/64)	.406 (5x)	**.010**	7	1/8	2-1/2	885478-C6	45.40
.093 (3/32)	.279 (3x)	**.005**	7	1/8	1-1/2	873093-C6	33.10
.093 (3/32)	.500 (5x)	**.005**	7	1/8	2-1/2	874693-C6	45.40
.093 (3/32)	.279 (3x)	**.010**	7	1/8	1-1/2	882693-C6	33.10
.093 (3/32)	.500 (5x)	**.010**	7	1/8	2-1/2	885493-C6	45.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	R $^{+.001''}_{-.001''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.187 (1.5x)	**.005**	7	1/8	1-1/2	872308-C6	31.70
.125 (1/8)	.375 (3x)	**.005**	7	1/8	1-1/2	873108-C6	31.40
.125 (1/8)	.187 (1.5x)	**.010**	7	1/8	1-1/2	880108-C6	31.70
.125 (1/8)	.375 (3x)	**.010**	7	1/8	1-1/2	882708-C6	31.40
.125 (1/8)	.187 (1.5x)	**.030**	7	1/8	1-1/2	890508-C6	31.70
.125 (1/8)	.375 (3x)	**.030**	7	1/8	1-1/2	892708-C6	31.40
.187 (3/16)	.285 (1.5x)	**.005**	7	3/16	2	872312-C6	35.70
.187 (3/16)	.570 (3x)	**.005**	7	3/16	2	873112-C6	35.20
.187 (3/16)	.285 (1.5x)	**.010**	7	3/16	2	880112-C6	35.70
.187 (3/16)	.570 (3x)	**.010**	7	3/16	2	882712-C6	35.20
.187 (3/16)	.285 (1.5x)	**.030**	7	3/16	2	890512-C6	35.70
.187 (3/16)	.570 (3x)	**.030**	7	3/16	2	892712-C6	35.20
.250 (1/4)	.375 (1.5x)	**.005**	7	1/4	2-1/2	872316-C6	45.90
.250 (1/4)	.750 (3x)	**.005**	7	1/4	2-1/2	873116-C6	45.10
.250 (1/4)	.375 (1.5x)	**.010**	7	1/4	2-1/2	880116-C6	45.90
.250 (1/4)	.750 (3x)	**.010**	7	1/4	2-1/2	882716-C6	45.10
.250 (1/4)	.375 (1.5x)	**.030**	7	1/4	2-1/2	890516-C6	45.90
.250 (1/4)	.750 (3x)	**.030**	7	1/4	2-1/2	892716-C6	45.10

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 115

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	964910-C3	48.10
.010		.0100	**.030** (3x)	3	1/8	1-1/2	958510-C3	47.70
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	964915-C3	39.10
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	958515-C3	39.10
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	952615-C3	47.90
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	945911-C3	37.50
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	964920-C3	34.40
.020		.0200	**.060** (3x)	3	1/8	1-1/2	958520-C3	34.10
.020		.0200	**.100** (5x)	3	1/8	2-1/2	952620-C3	42.10
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	964925-C3	33.10
.025		.0250	**.075** (3x)	3	1/8	1-1/2	958525-C3	32.90
.025		.0250	**.125** (5x)	3	1/8	2-1/2	952625-C3	40.90
.030		.0300	**.090** (3x)	3	1/8	1-1/2	958530-C3	32.90
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	964931-C3	27.90
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	958531-C3	27.90
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	952631-C3	35.70
.035		.0350	**.105** (3x)	3	1/8	1-1/2	958535-C3	27.90
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	945922-C3	31.20
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	964940-C3	28.10
.040		.0400	**.120** (3x)	3	1/8	1-1/2	958540-C3	27.90
.040		.0400	**.203** (5x)	3	1/8	2-1/2	952640-C3	35.90
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	964945-C3	28.10
.045		.0450	**.135** (3x)	3	1/8	1-1/2	958545-C3	27.90
.045		.0450	**.225** (5x)	3	1/8	2-1/2	952645-C3	35.90
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	964947-C3	27.90
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	958547-C3	27.90
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	952647-C3	35.70
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	964950-C3	28.10
.050		.0500	**.150** (3x)	3	1/8	1-1/2	958550-C3	27.90
.055		.0550	**.165** (3x)	3	1/8	1-1/2	958555-C3	27.90
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	945933-C3	29.40
.060		.0600	**.180** (3x)	3	1/8	1-1/2	958560-C3	28.90
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	964962-C3	26.10
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	958562-C3	26.10
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	952662-C3	34.10
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	964970-C3	26.20
.070		.0700	**.210** (3x)	3	1/8	1-1/2	958570-C3	26.10
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	964978-C3	26.10
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	958578-C3	26.10
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	952678-C3	34.10

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square (cont.)

mm & in continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	PRICE
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	945945-C3	29.40
.080		.0800	**.240** (3x)	3	1/8	1-1/2	958580-C3	26.10
.090		.0900	**.270** (3x)	3	1/8	1-1/2	958590-C3	26.10
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	964993-C3	26.10
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	958593-C3	26.10
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	952693-C3	34.10
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	965000-C3	26.20
.100		.1000	**.300** (3x)	3	1/8	1-1/2	958600-C3	26.10
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	965002-C3	26.20
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	958602-C3	26.10
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	945957-C3	29.40

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	965008-C3	26.10
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	958608-C3	26.10
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	952708-C3	34.10
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	965009-C3	35.40
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	958609-C3	35.20
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	965010-C3	28.10
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	958610-C3	28.10
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	952710-C3	36.40
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	965012-C3	28.10
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	958612-C3	28.10
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	952712-C3	36.40
	6.0 mm	.2362	**18 mm** (3x)	4	6 mm	63 mm	945972-C3	29.40
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	965016-C3	35.70
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	958616-C3	35.70

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix for Medium Alloy Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00008	.00017	.00026	.00035	.00043	.00052	.00066	.00099	.00133
Roughing	.00010	.00021	.00032	.00042	.00052	.00062	.00080	.00120	.00160
Finishing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00193
Max	.00016	.00032	.00049	.00064	.00081	.00097	.00124	.00185	.00248

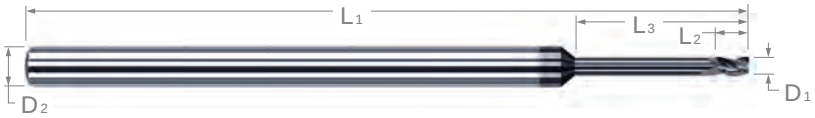
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	936115-C3	50.90
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	933815-C3	52.10
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	936120-C3	48.90
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	933820-C3	50.10
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	936125-C3	47.70
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	933825-C3	48.90
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	936130-C3	44.90
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	933830-C3	45.90
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	945331-C3	43.70
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	936131-C3	44.90
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	933831-C3	45.90
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	931131-C3	48.20
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	886422-C3	47.50
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	887122-C3	48.70
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	936140-C3	47.50
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	933840-C3	48.70
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	936147-C3	44.90
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	933847-C3	45.90
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	945362-C3	43.70
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	936162-C3	44.70
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	933862-C3	45.90
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	931162-C3	48.20
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	936178-C3	44.70
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	933878-C3	45.90
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	886445-C3	47.50
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	887145-C3	48.70
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	945393-C3	43.70
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	936193-C3	44.70
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	933893-C3	45.90
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	931193-C3	48.20

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute (cont.)

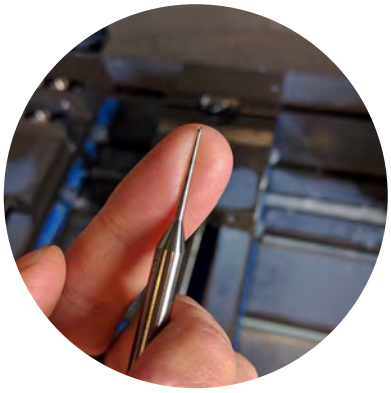
mm & in continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	936200-C3	47.50
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	933900-C3	48.70
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	936202-C3	47.50
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	933902-C3	48.70
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	886457-C3	48.50
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	887157-C3	49.70

D_1 +.000″ −.002″		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	945408-C3	43.70
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	936208-C3	44.10
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	933908-C3	45.40
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	931208-C3	46.10
.156 (5/32)	.1562	.235	**.750** (5x)	4	3/16	3	936210-C3	48.90
.187 (3/16)	.1875	.285	**1.000** (5x)	4	3/16	3	936212-C3	48.90
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	936216-C3	54.70

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 126



★★★★★

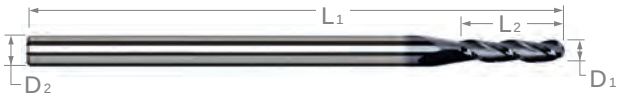
"#HarveyTool worked perfectly. Prevented a huge headache. Harvey Tool has always come through for all our challenging geometries and parts. That particular tool saved us a couple hours' time because we were able to work around featuring constraints and eliminated a complete setup on some short lead time prototypes. Thanks for the great tools, keep it up."

— @cguidoc

Follow us on Instagram @harveytool!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
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mm & in

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
		.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	974804-C3	55.40
	.010		.0100	**.030** (3x)	3	1/8	1-1/2	971810-C3	54.10
	.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	963015-C3	45.70
	.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	971815-C3	45.70
		.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	974809-C3	48.10
		.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	974811-C3	41.40
	.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	963020-C3	41.40
	.020		.0200	**.060** (3x)	3	1/8	1-1/2	971820-C3	41.10
		.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	974813-C3	40.10
	.025		.0250	**.075** (3x)	3	1/8	1-1/2	971825-C3	39.70
NEW	.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	883931-C3	36.90
	.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	963031-C3	34.40
	.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	971831-C3	34.40
	.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	888631-C3	43.10
		.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	974818-C3	34.90
		1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	929222-C3	34.90
		1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	974822-C3	34.90
	.040		.0400	**.120** (3x)	3	1/8	1-1/2	971840-C3	34.40
NEW	.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	883947-C3	37.70
	.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	963047-C3	34.40
	.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	971847-C3	34.40
		1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	974827-C3	34.90
	.050		.0500	**.150** (3x)	3	1/8	1-1/2	971850-C3	34.40
		1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	974831-C3	34.90
		1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	974833-C3	32.90
	.060		.0600	**.180** (3x)	3	1/8	1-1/2	971860-C3	34.40
NEW	.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	883962-C3	34.90
	.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	963062-C3	32.50
	.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	971862-C3	32.50
	.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	888662-C3	41.10
		1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	974836-C3	32.90
	.070		.0700	**.210** (3x)	3	1/8	1-1/2	971870-C3	32.50
		1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	974840-C3	32.90
NEW	.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	883978-C3	36.70
	.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	963078-C3	32.50
	.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	971878-C3	32.50

SPEEDS & FEEDS ONLINE!

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	974845-C3	32.90	
.080		.0800	**.240** (3x)	3	1/8	1-1/2	971880-C3	32.50	
.090		.0900	**.270** (3x)	3	1/8	1-1/2	971890-C3	32.50	
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	883993-C3	34.90	NEW
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	963093-C3	32.50	
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	971893-C3	32.50	
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	888693-C3	41.10	
.100		.1000	**.300** (3x)	3	1/8	1-1/2	971900-C3	32.50	
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	971902-C3	32.50	
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	929257-C3	33.10	
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	974857-C3	33.10	

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)	.1250	**.100** (0.8x)	4	1/8	1-1/2	884008-C3	34.90	NEW
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	963108-C3	32.50	
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	971908-C3	32.50	
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	888708-C3	41.10	
.140 (9/64)	.1406	**.425** (3x)	4	3/16	2	971909-C3	43.10	
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	963110-C3	34.70	
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	971910-C3	34.70	
.187 (3/16)	.1875	**.150** (0.8x)	4	3/16	2	884012-C3	37.20	NEW
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	963112-C3	34.70	
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	971912-C3	34.70	
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	963116-C3	42.40	
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	971916-C3	42.40	

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 120

★★★★★

"When you have a large [quantity] of parts made out of 440c stainless steel and there's a lot of small details to deburr, I recommend you check out the #HarveyTool catalog and find something to help you with the deburring problem! Save your hands from cuts! Harvey Tool 46015-c1 .015 radius edge cutter, I use them on all my parts, easy to program and they last forever. Thanks #HarveyTool."

— Matt D. (Riverton, UT)

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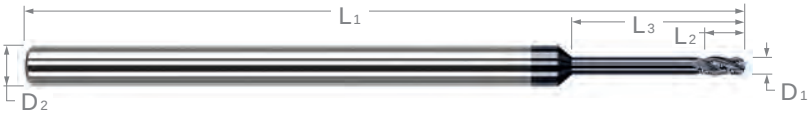
VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute



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- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

IMPROVES PERFORMANCE

Contour Profiling

Tipped Multi-Axis Machining

MEDIUM ALLOY STEELS

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	64215-C3	57.50
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56615-C3	58.50
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	65415-C3	62.10
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	984709-C3	60.40
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	971009-C3	61.40
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	988309-C3	66.40
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	984711-C3	58.10
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	971011-C3	59.40
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	988311-C3	64.20
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	979511-C3	66.90
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	64220-C3	54.90
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56620-C3	55.90
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	65420-C3	60.10
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	984713-C3	56.90
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	971013-C3	57.90
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	988313-C3	61.70
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	64225-C3	53.50
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56625-C3	54.50
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	65425-C3	58.90
.031 (1/32)		.0310	.046	**.156** (5x)	4	1/8	2-1/2	64231-C3	50.10
.031 (1/32)		.0310	.046	**.250** (8x)	4	1/8	2-1/2	56631-C3	51.20
.031 (1/32)		.0310	.046	**.375** (12x)	4	1/8	2-1/2	65431-C3	53.10
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	984718-C3	53.10
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	971018-C3	54.10
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	988318-C3	55.90
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	984722-C3	53.10
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	971022-C3	54.10
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	988322-C3	55.90
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	979522-C3	58.50
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	64247-C3	50.10
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56647-C3	51.20
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	65447-C3	53.10

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	984733-C3	53.10
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	971033-C3	54.10
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	988333-C3	55.90
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	979533-C3	58.50
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	64262-C3	50.10
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56662-C3	51.20
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	65462-C3	53.10
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	64278-C3	50.10
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56678-C3	51.20
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	65478-C3	53.10
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	984745-C3	53.10
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	971045-C3	54.10
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	988345-C3	55.90
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	979545-C3	58.50
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	64293-C3	50.10
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56693-C3	51.20
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	65493-C3	53.10
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	984757-C3	50.70

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	64308-C3	49.50
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56708-C3	50.70
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	65508-C3	53.10
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	64310-C3	54.50
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56710-C3	55.70
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	64312-C3	55.10
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56712-C3	56.10
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	64316-C3	60.70
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56716-C3	61.90

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Medium Alloy Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

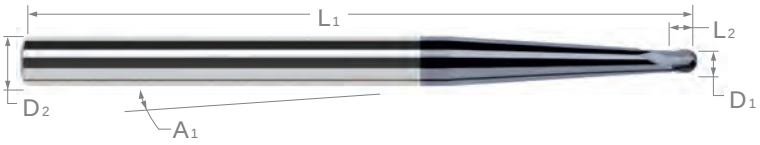
	Chip Load Per Tooth (IPT) By Cutter Diameter								
	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00007	.00014	.00021	.00028	.00035	.00041	.00053	.00079	.00106
Roughing	.00008	.00017	.00025	.00033	.00042	.00050	.00064	.00096	.00128
Finishing	.00010	.00020	.00030	.00040	.00050	.00060	.00077	.00115	.00154
Max	.00012	.00026	.00039	.00052	.00065	.00077	.00099	.00148	.00198

Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .35x Dia
Roughing: .35x Dia	Roughing: .5x - 1x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

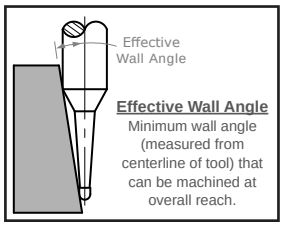
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters)



Excellent in Readily Machinable Mold Steels, Stainless Steels, & Tool Steels



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

- Very short length of cut and solid tapered neck for maximum rigidity
- Ideal for contour machining of mold and die cavities
- 35° helix for increased cutting performance
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0° (straight neck)	.062 (1/16)	.050	I	.500	**.610**	6.2°	3/16	2	882843-C6	51.20
	.062 (1/16)	.050	I	1.000	**1.110**	3.3°	3/16	2-1/2	882850-C6	55.90
	.093 (3/32)	.074	I	.750	**.833**	3.4°	3/16	2	882864-C6	51.20
	.093 (3/32)	.074	I	1.125	**1.208**	2.3°	3/16	2-1/2	882871-C6	55.90
	.125 (1/8)	.100	I	1.000	**1.058**	1.8°	3/16	2-1/2	882877-C6	55.90
	.125 (1/8)	.100	I	1.750	**1.808**	1.0°	3/16	3	882885-C6	57.70
1°	.062 (1/16)	.050	I	.500	**.595**	6.3°	3/16	2	927543-C6	50.90
	.062 (1/16)	.050	I	1.000	**1.080**	3.4°	3/16	2-1/2	927550-C6	55.50
	.093 (3/32)	.074	I	.750	**.811**	3.5°	3/16	2	927564-C6	50.90
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	927571-C6	55.50
	.125 (1/8)	.100	I	1.000	**1.027**	1.8°	3/16	2	927577-C6	52.90
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	927585-C6	57.40
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	927587-C6	67.40
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	927592-C6	71.90
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	19001-C6	57.20
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	19008-C6	57.20
	.031 (1/32)	.025	I	.250	**.375**	12.2°	3/16	2	19015-C6	56.40
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	19022-C6	56.40
	.039 (1 mm)	.031	I	.375	**.488**	8.9°	3/16	2	19025-C6	53.40
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	19029-C6	53.40
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	19036-C6	53.40
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	19043-C6	50.90
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	19050-C6	55.50
	.062 (1/16)	.050	I	1.500	**1.543**	2.4°	3/16	3	19053-C6	57.70
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	19057-C6	50.90
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	19064-C6	50.90
	.093 (3/32)	.074	I	1.500	**1.517**	1.9°	3/16	2-1/2	19066-C6	55.50
	.093 (3/32)	.074	II	1.878	**1.878**	1.5°	3/16	3	19068-C6	57.70
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	19071-C6	52.90
	.125 (1/8)	.100	II	2.487	**2.487**	1.4°	1/4	4	19078-C6	62.10
	.187 (3/16)	.150	II	1.343	**1.343**	1.4°	1/4	2-1/2	19085-C6	56.90
	.250 (1/4)	.200	II	1.393	**1.393**	1.4°	5/16	2-1/2	19092-C6	73.20

SPEEDS & FEEDS ONLINE!

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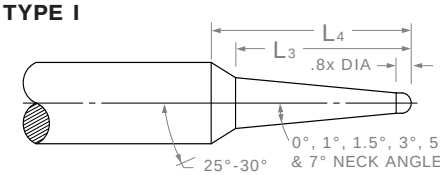
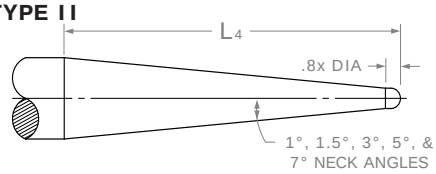
TYPE I



TYPE II



Click Tool # for stock, speeds & feeds, & other technical info

HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
	.015 (1/64)	.012	I	.156	**.292**	16.8°	3/16	2-1/2	36901-C6	61.50
	.015 (1/64)	.012	I	.375	**.491**	10.1°	3/16	2-1/2	66643-C6	57.70
	.015 (1/64)	.012	I	.875	**.946**	5.3°	3/16	2-1/2	66648-C6	57.70
	.020	.016	I	.250	**.374**	13.0°	3/16	2-1/2	36904-C6	61.50
	.020	.016	I	.500	**.601**	8.1°	3/16	2-1/2	36907-C6	61.50
	.025	.020	I	.250	**.370**	12.8°	3/16	2-1/2	36910-C6	61.20
	.025	.020	I	.500	**.597**	7.9°	3/16	2-1/2	36913-C6	61.20
	.031 (1/32)	.025	I	.312	**.421**	10.9°	3/16	2-1/2	36916-C6	61.20
	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	67046-C6	50.70
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	36931-C6	50.70
	.039 (1 mm)	.031	I	.375	**.472**	9.2°	3/16	2-1/2	36917-C6	61.20
	.039 (1 mm)	.031	I	.750	**.813**	5.4°	3/16	2-1/2	36919-C6	61.20
	.039 (1 mm)	.031	II	1.448	**1.448**	3.0°	3/16	2-1/2	36921-C6	61.20
	.047 (3/64)	.038	I	.375	**.466**	9.0°	3/16	2-1/2	36922-C6	58.50
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	67348-C6	47.90
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	36947-C6	47.90
	.050	.040	I	.500	**.577**	7.1°	3/16	2-1/2	36925-C6	58.50
	.060	.048	I	.625	**.683**	5.6°	3/16	2-1/2	36928-C6	58.50
	.062 (1/16)	.050	I	.375	**.454**	8.4°	3/16	2-1/2	36934-C6	55.20
3°	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	66946-C6	47.90
	.062 (1/16)	.050	I	.875	**.909**	4.1°	3/16	2-1/2	36937-C6	55.20
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	36962-C6	47.90
	.062 (1/16)	.050	II	1.843	**1.843**	3.0°	1/4	3	37362-C6	63.10
	.078 (5/64)	.062	I	.500	**.555**	6.1°	3/16	2-1/2	36940-C6	55.20
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	36978-C6	46.50
	.093 (3/32)	.074	I	.625	**.657**	4.5°	3/16	2	36943-C6	50.90
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	36993-C6	42.40
	.093 (3/32)	.074	II	1.572	**1.572**	3.0°	1/4	3	37393-C6	61.50
	.100	.080	II	1.511	**1.511**	2.9°	1/4	3	37400-C6	63.50
	.109 (7/64)	.087	II	1.432	**1.432**	2.9°	1/4	3	37402-C6	63.50
	.118 (3 mm)	.094	II	1.354	**1.354**	2.9°	1/4	2-1/2	37405-C6	63.50
	.125 (1/8)	.100	I	.875	**.913**	4.2°	1/4	2-1/2	36946-C6	60.70
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	37408-C6	57.90
	.125 (1/8)	.100	II	2.485	**2.485**	3.0°	3/8	4	37708-C6	90.50
	.156 (5/32)	.125	II	1.020	**1.020**	2.8°	1/4	2-1/2	37410-C6	63.10
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	37412-C6	62.50
	.187 (3/16)	.150	II	1.343	**1.343**	2.9°	5/16	2-1/2	36949-C6	73.20
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	37712-C6	90.50
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	37716-C6	75.40
	.015 (1/64)	.012	I	.375	**.469**	10.6°	3/16	2	66664-C6	52.20
	.015 (1/64)	.012	II	.998	**.998**	5.0°	3/16	2	38515-C6	51.90
	.020	.016	I	.562	**.624**	7.8°	3/16	2	38907-C6	56.70
	.020	.016	II	.973	**.973**	5.0°	3/16	2	38520-C6	56.40
5°	.025	.020	I	.562	**.621**	7.6°	3/16	2	38914-C6	56.70
	.025	.020	II	.949	**.949**	5.0°	3/16	2	38525-C6	56.40
	.031 (1/32)	.025	I	.375	**.457**	10.1°	3/16	2	67065-C6	46.40
	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	38531-C6	46.40
	.039 (1 mm)	.031	I	.625	**.664**	6.6°	3/16	2	38921-C6	56.40

SPEEDS & FEEDS ONLINE!

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HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 +0°00′ −0°30′	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
5°	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	38547-C6	46.40
	.047 (3/64)	.038	II	1.198	**1.198**	5.0°	1/4	2-1/2	38947-C6	62.50
	.050	.040	II	.826	**.826**	4.9°	3/16	2	38928-C6	46.70
	.060	.048	II	.777	**.777**	4.9°	3/16	2	38935-C6	46.70
	.060	.048	II	1.134	**1.134**	4.9°	1/4	2-1/2	38960-C6	62.50
	.062 (1/16)	.050	I	.375	**.434**	8.8°	3/16	2	66963-C6	43.70
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	38562-C6	43.70
	.062 (1/16)	.050	II	1.124	**1.124**	5.0°	1/4	2-1/2	38962-C6	62.50
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	38978-C6	59.70
	.093 (3/32)	.074	II	.972	**.972**	4.9°	1/4	2-1/2	38993-C6	59.70
	.093 (3/32)	.074	II	1.686	**1.686**	5.0°	3/8	3	39293-C6	79.10
	.100	.080	II	.937	**.937**	4.8°	1/4	2-1/2	39000-C6	60.10
	.109 (7/64)	.087	II	.893	**.893**	4.7°	1/4	2-1/2	39002-C6	60.10
	.118 (3 mm)	.094	II	.849	**.849**	4.7°	1/4	2-1/2	39005-C6	60.10
	.125 (1/8)	.100	I	.500	**.548**	7.3°	1/4	2-1/2	38942-C6	57.20
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	39008-C6	56.90
	.125 (1/8)	.100	II	1.529	**1.529**	4.9°	3/8	3	39308-C6	76.40
	.156 (5/32)	.125	II	.661	**.661**	4.5°	1/4	2-1/2	39010-C6	59.70
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	39312-C6	73.20
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	**4**	922312-C6	81.70
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	39316-C6	73.20
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	**4**	922316-C6	81.70
7°	.015 (1/64)	.012	I	.187	**.299**	16.5°	3/16	2	66678-C6	52.20
	.015 (1/64)	.012	II	.714	**.714**	7.0°	3/16	2	40015-C6	52.20
	.020	.016	II	.698	**.698**	6.9°	3/16	2	40020-C6	52.20
	.031 (1/32)	.025	I	.250	**.338**	13.6°	3/16	2	67078-C6	46.40
	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	40031-C6	46.70
	.031 (1/32)	.025	II	.917	**.917**	6.9°	1/4	2-1/2	40431-C6	59.70
	.039 (1 mm)	.031	II	.636	**.636**	6.9°	3/16	2	40007-C6	46.70
	.047 (3/64)	.038	I	.375	**.425**	9.9°	3/16	2	40014-C6	46.70
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	40047-C6	46.70
	.047 (3/64)	.038	II	.864	**.864**	6.9°	1/4	2-1/2	40447-C6	59.70
	.060	.048	II	.822	**.822**	6.8°	1/4	2-1/2	40460-C6	59.70
	.062 (1/16)	.050	I	.500	**.567**	9.9°	1/4	2-1/2	66980-C6	59.70
	.062 (1/16)	.050	II	.815	**.815**	6.9°	1/4	2-1/2	40462-C6	59.70
	.062 (1/16)	.050	II	1.324	**1.324**	6.9°	3/8	2-1/2	40862-C6	75.70
	.078 (5/64)	.062	II	1.272	**1.272**	6.9°	3/8	2-1/2	40878-C6	75.70
	.093 (3/32)	.074	II	.714	**.714**	6.7°	1/4	2-1/2	40493-C6	56.90
	.093 (3/32)	.074	II	1.223	**1.223**	6.9°	3/8	2-1/2	40893-C6	75.70
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	40508-C6	54.20
	.125 (1/8)	.100	II	1.118	**1.118**	6.8°	3/8	2-1/2	40908-C6	73.20
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	40912-C6	73.20
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	**4**	917212-C6	81.70

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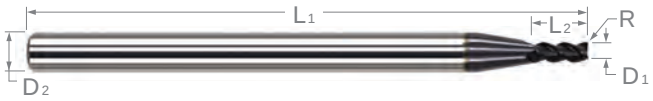
NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	.30 mm (1.5x)	**.05 mm**	3	4 mm	50 mm	985604-C3	50.90
	.2 mm	.0078	.60 mm (3x)	**.05 mm**	3	4 mm	50 mm	976804-C3	50.90
.010		.0100	.015 (1.5x)	**.003**	3	1/8	1-1/2	52610-C3	48.10
.010		.0100	.030 (3x)	**.003**	3	1/8	1-1/2	45610-C3	48.10
	.3 mm	.0118	.90 mm (3x)	**.08 mm**	3	4 mm	50 mm	976806-C3	49.90
.015 (1/64)		.0150	.022 (1.5x)	**.003**	3	1/8	1-1/2	52615-C3	39.70
.015 (1/64)		.0150	.045 (3x)	**.003**	3	1/8	1-1/2	45615-C3	39.70
.015 (1/64)		.0150	.078 (5x)	**.003**	3	1/8	2-1/2	53815-C3	48.20
	.4 mm	.0157	.60 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	985609-C3	42.50
	.4 mm	.0157	1.20 mm (3x)	**.08 mm**	3	4 mm	50 mm	976809-C3	42.50
	.5 mm	.0196	.75 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985611-C3	38.10
	.5 mm	.0196	1.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	976811-C3	38.10
.020		.0200	.030 (1.5x)	**.004**	3	1/8	1-1/2	52620-C3	34.90
.020		.0200	.060 (3x)	**.004**	3	1/8	1-1/2	45620-C3	34.90
.020		.0200	.100 (5x)	**.004**	3	1/8	2-1/2	53820-C3	42.70
	.6 mm	.0236	.90 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985613-C3	36.90
	.6 mm	.0236	1.80 mm (3x)	**.10 mm**	3	4 mm	50 mm	976813-C3	36.90
.025		.0250	.038 (1.5x)	**.004**	3	1/8	1-1/2	52625-C3	33.70
.025		.0250	.075 (3x)	**.004**	3	1/8	1-1/2	45625-C3	33.70
.025		.0250	.125 (5x)	**.004**	3	1/8	2-1/2	53825-C3	41.40
	.7 mm	.0275	2.10 mm (3x)	**.10 mm**	3	4 mm	50 mm	976815-C3	36.90
.031 (1/32)		.0310	.047 (1.5x)	**.005**	3	1/8	1-1/2	52631-C3	28.50
.031 (1/32)		.0310	.093 (3x)	**.005**	3	1/8	1-1/2	45631-C3	28.50
.031 (1/32)		.0310	.156 (5x)	**.005**	3	1/8	2-1/2	53831-C3	35.70
.031 (1/32)		.0310	.093 (3x)	**.010**	3	1/8	1-1/2	907231-C3	28.40
	.8 mm	.0314	1.20 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985618-C3	31.70
	.8 mm	.0314	2.40 mm (3x)	**.10 mm**	3	4 mm	50 mm	976818-C3	31.70
.035		.0350	.053 (1.5x)	**.005**	3	1/8	1-1/2	52635-C3	28.50
.035		.0350	.105 (3x)	**.005**	3	1/8	1-1/2	45635-C3	28.50
.035		.0350	.187 (5x)	**.005**	3	1/8	2-1/2	53835-C3	35.70
	.9 mm	.0354	2.70 mm (3x)	**.10 mm**	3	4 mm	50 mm	976820-C3	31.70

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.0 mm	.0393	1.50 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985622-C3	31.70
	1.0 mm	.0393	3.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	976822-C3	31.70
.040		.0400	.060 (1.5x)	**.005**	3	1/8	1-1/2	52640-C3	28.50
.040		.0400	.120 (3x)	**.005**	3	1/8	1-1/2	45640-C3	28.50
.040		.0400	.203 (5x)	**.005**	3	1/8	2-1/2	53840-C3	35.70
	1.1 mm	.0433	3.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	976824-C3	31.70
.045		.0450	.068 (1.5x)	**.005**	3	1/8	1-1/2	52645-C3	28.50
.045		.0450	.135 (3x)	**.005**	3	1/8	1-1/2	45645-C3	28.50
.045		.0450	.225 (5x)	**.005**	3	1/8	2-1/2	53845-C3	35.70
.047 (3/64)		.0470	.071 (1.5x)	**.005**	3	1/8	1-1/2	52647-C3	28.50
.047 (3/64)		.0470	.141 (3x)	**.005**	3	1/8	1-1/2	45647-C3	28.50
.047 (3/64)		.0470	.250 (5x)	**.005**	3	1/8	2-1/2	53847-C3	35.70
.047 (3/64)		.0470	.141 (3x)	**.010**	3	1/8	1-1/2	907247-C3	28.40
.047 (3/64)		.0470	.141 (3x)	**.015**	3	1/8	1-1/2	903447-C3	28.40
	1.2 mm	.0472	1.80 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985627-C3	31.70
	1.2 mm	.0472	3.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	976827-C3	31.70
.050		.0500	.075 (1.5x)	**.005**	3	1/8	1-1/2	52650-C3	28.40
.050		.0500	.150 (3x)	**.005**	3	1/8	1-1/2	45650-C3	28.40
.050		.0500	.250 (5x)	**.005**	3	1/8	2-1/2	53850-C3	35.70
	1.3 mm	.0511	4.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	976829-C3	31.70
.055		.0550	.083 (1.5x)	**.005**	3	1/8	1-1/2	52655-C3	28.40
.055		.0550	.165 (3x)	**.005**	3	1/8	1-1/2	45655-C3	28.40
.055		.0550	.275 (5x)	**.005**	3	1/8	2-1/2	53855-C3	35.70
	1.4 mm	.0551	2.10 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	985631-C3	31.70
	1.4 mm	.0551	4.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	976831-C3	31.70
	1.5 mm	.0590	2.20 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985633-C3	29.90
	1.5 mm	.0590	4.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	976833-C3	29.90
.060		.0600	.090 (1.5x)	**.010**	3	1/8	1-1/2	52660-C3	28.40
.060		.0600	.180 (3x)	**.010**	3	1/8	1-1/2	45660-C3	28.40
.060		.0600	.312 (5x)	**.010**	3	1/8	2-1/2	53860-C3	35.70
NEW .062 (1/16)		.0620	.093 (1.5x)	**.005**	3	1/8	1-1/2	881862-C3	26.50
.062 (1/16)		.0620	.186 (3x)	**.005**	3	1/8	1-1/2	913862-C3	26.50
.062 (1/16)		.0620	.093 (1.5x)	**.010**	3	1/8	1-1/2	52662-C3	26.50
.062 (1/16)		.0620	.186 (3x)	**.010**	3	1/8	1-1/2	45662-C3	26.50
.062 (1/16)		.0620	.312 (5x)	**.010**	3	1/8	2-1/2	53862-C3	34.40
.062 (1/16)		.0620	.186 (3x)	**.015**	3	1/8	1-1/2	903462-C3	26.50
.062 (1/16)		.0620	.186 (3x)	**.020**	3	1/8	1-1/2	931362-C3	26.50
	1.6 mm	.0629	2.40 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985636-C3	29.90
	1.6 mm	.0629	5.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	976836-C3	29.90
	1.7 mm	.0669	5.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	976838-C3	29.90
.070		.0700	.105 (1.5x)	**.010**	3	1/8	1-1/2	52670-C3	26.50
.070		.0700	.210 (3x)	**.010**	3	1/8	1-1/2	45670-C3	26.50
	1.8 mm	.0708	2.70 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985640-C3	29.90
	1.8 mm	.0708	5.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	976840-C3	29.90

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	TOOL #	PRICE	
	1.9 mm	.0748	5.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	976842-C3	29.90	
.078 (5/64)		.0780	.234 (3x)	**.005**	3	1/8	1-1/2	913878-C3	26.50	
.078 (5/64)		.0780	.118 (1.5x)	**.010**	3	1/8	1-1/2	52678-C3	26.50	
.078 (5/64)		.0780	.234 (3x)	**.010**	3	1/8	1-1/2	45678-C3	26.50	
.078 (5/64)		.0780	.406 (5x)	**.010**	3	1/8	2-1/2	53878-C3	34.40	
.078 (5/64)		.0780	.234 (3x)	**.015**	3	1/8	1-1/2	903478-C3	26.50	
.078 (5/64)		.0780	.234 (3x)	**.020**	3	1/8	1-1/2	931378-C3	26.50	
	2.0 mm	.0787	3.00 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985645-C3	29.90	
	2.0 mm	.0787	6.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	976845-C3	29.90	
.080		.0800	.240 (3x)	**.010**	3	1/8	1-1/2	45680-C3	26.50	
.090		.0900	.270 (3x)	**.010**	3	1/8	1-1/2	45690-C3	26.50	
.093 (3/32)		.0930	.279 (3x)	**.005**	3	1/8	1-1/2	913893-C3	26.50	
.093 (3/32)		.0930	.140 (1.5x)	**.010**	3	1/8	1-1/2	52693-C3	26.50	
.093 (3/32)		.0930	.279 (3x)	**.010**	3	1/8	1-1/2	45693-C3	26.50	
.093 (3/32)		.0930	.500 (5x)	**.010**	3	1/8	2-1/2	53893-C3	34.40	
.093 (3/32)		.0930	.279 (3x)	**.015**	3	1/8	1-1/2	903493-C3	26.50	
.093 (3/32)		.0930	.279 (3x)	**.020**	3	1/8	1-1/2	931393-C3	26.50	
.093 (3/32)		.0930	.279 (3x)	**.030**	3	1/8	1-1/2	927893-C3	31.10	
	2.5 mm	.0984	3.70 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985651-C3	29.90	
	2.5 mm	.0984	7.50 mm (3x)	**.20 mm**	3	4 mm	50 mm	976851-C3	29.90	
.100		.1000	.150 (1.5x)	**.010**	3	1/8	1-1/2	52700-C3	26.50	
.100		.1000	.300 (3x)	**.010**	3	1/8	1-1/2	45700-C3	26.50	
.100		.1000	.500 (5x)	**.010**	3	1/8	2-1/2	53900-C3	34.10	NEW
.109 (7/64)		.1090	.164 (1.5x)	**.010**	3	1/8	1-1/2	52702-C3	26.50	NEW
.109 (7/64)		.1090	.327 (3x)	**.010**	3	1/8	1-1/2	45702-C3	26.50	NEW
	3.0 mm	.1181	4.50 mm (1.5x)	**.20 mm**	3	4 mm	50 mm	985657-C3	29.90	
	3.0 mm	.1181	9.00 mm (3x)	**.20 mm**	3	4 mm	50 mm	976857-C3	29.90	

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″		D_2 (h6)	L_1	TOOL #	PRICE	
.125 (1/8)	.1250	.375 (3x)	**.005**	4	1/8	1-1/2	913908-C3	26.50	
.125 (1/8)	.1250	.375 (3x)	**.010**	4	1/8	1-1/2	907308-C3	26.50	
.125 (1/8)	.1250	.187 (1.5x)	**.015**	4	1/8	1-1/2	52708-C3	26.50	
.125 (1/8)	.1250	.375 (3x)	**.015**	4	1/8	1-1/2	45708-C3	26.50	
.125 (1/8)	.1250	.625 (5x)	**.015**	4	1/8	2-1/2	53908-C3	34.40	
.125 (1/8)	.1250	.375 (3x)	**.020**	4	1/8	1-1/2	931408-C3	26.50	
.125 (1/8)	.1250	.375 (3x)	**.030**	4	1/8	1-1/2	927908-C3	32.10	
.140 (9/64)	.1406	.220 (1.5x)	**.015**	4	3/16	2	52709-C3	31.80	NEW
.140 (9/64)	.1406	.425 (3x)	**.015**	4	3/16	2	45709-C3	31.80	NEW
.156 (5/32)	.1562	.235 (1.5x)	**.015**	4	3/16	2	52710-C3	28.70	
.156 (5/32)	.1562	.470 (3x)	**.015**	4	3/16	2	45710-C3	28.70	
.156 (5/32)	.1562	.750 (5x)	**.015**	4	3/16	3	53910-C3	37.20	
.187 (3/16)	.1875	.285 (1.5x)	**.015**	4	3/16	2	52712-C3	28.70	
.187 (3/16)	.1875	.562 (3x)	**.015**	4	3/16	2	45712-C3	28.70	
.187 (3/16)	.1875	1.000 (5x)	**.015**	4	3/16	3	53912-C3	37.20	

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER		LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	L_2 $^{+.030''}_{-.000''}$	R $^{+.001''}_{-.001''}$		D_2 (h6)	L_1	TOOL #	PRICE
.250 (1/4)	.2500	.375 (1.5x)	**.015**	4	1/4	2-1/2	52716-C3	36.20
.250 (1/4)	.2500	.750 (3x)	**.015**	4	1/4	2-1/2	45716-C3	36.20
.250 (1/4)	.2500	1.250 (5x)	**.015**	4	1/4	4	53916-C3	46.10
.312 (5/16)	.3125	.470 (1.5x)	**.015**	4	5/16	2-1/2	52720-C3	53.10
.312 (5/16)	.3125	1.000 (3x)	**.015**	4	5/16	2-1/2	45720-C3	53.10
.375 (3/8)	.3750	.570 (1.5x)	**.015**	4	3/8	2-1/2	52724-C3	61.70
.375 (3/8)	.3750	1.125 (3x)	**.015**	4	3/8	2-1/2	45724-C3	61.70
.500 (1/2)	.5000	.750 (1.5x)	**.030**	4	1/2	3	52732-C3	79.90

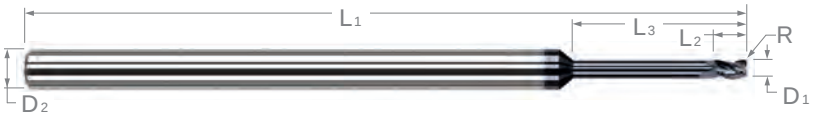
SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 120

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- Corner radius for improved strength
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.022	**.003**	.078 (5x)	3	1/8	2-1/2	62415-C3	51.40
.015 (1/64)		.0150	.022	**.003**	.125 (8x)	3	1/8	2-1/2	55015-C3	52.40
.015 (1/64)		.0150	.022	**.003**	.187 (12x)	3	1/8	2-1/2	63815-C3	57.50
	.4 mm	.0157	.60 mm	**.08 mm**	2.0 mm (5x)	3	4 mm	50 mm	986709-C3	55.20
	.4 mm	.0157	.60 mm	**.08 mm**	3.2 mm (8x)	3	4 mm	50 mm	978009-C3	56.40
	.4 mm	.0157	.60 mm	**.08 mm**	4.8 mm (12x)	3	4 mm	50 mm	982309-C3	61.10
	.5 mm	.0196	.75 mm	**.10 mm**	2.5 mm (5x)	3	4 mm	50 mm	986711-C3	53.10
	.5 mm	.0196	.75 mm	**.10 mm**	4.0 mm (8x)	3	4 mm	50 mm	978011-C3	54.10
	.5 mm	.0196	.75 mm	**.10 mm**	6.0 mm (12x)	3	4 mm	50 mm	982311-C3	59.10
	.5 mm	.0196	.75 mm	**.10 mm**	8.0 mm (16x)	3	4 mm	50 mm	975511-C3	61.90
.020		.0200	.030	**.004**	.100 (5x)	3	1/8	2-1/2	62420-C3	48.90
.020		.0200	.030	**.004**	.160 (8x)	3	1/8	2-1/2	55020-C3	50.10
.020		.0200	.030	**.004**	.250 (12x)	3	1/8	2-1/2	63820-C3	55.40
	.6 mm	.0236	.90 mm	**.10 mm**	3.0 mm (5x)	3	4 mm	50 mm	986713-C3	51.90
	.6 mm	.0236	.90 mm	**.10 mm**	4.8 mm (8x)	3	4 mm	50 mm	978013-C3	53.10
	.6 mm	.0236	.90 mm	**.10 mm**	7.2 mm (12x)	3	4 mm	50 mm	982313-C3	56.70
.025		.0250	.038	**.004**	.125 (5x)	3	1/8	2-1/2	62425-C3	47.70
.025		.0250	.038	**.004**	.203 (8x)	3	1/8	2-1/2	55025-C3	48.90
.025		.0250	.038	**.004**	.312 (12x)	3	1/8	2-1/2	63825-C3	53.90
.031 (1/32)		.0310	.047	**.005**	.156 (5x)	3	1/8	2-1/2	62431-C3	45.10
.031 (1/32)		.0310	.047	**.005**	.250 (8x)	3	1/8	2-1/2	55031-C3	46.10
.031 (1/32)		.0310	.047	**.005**	.375 (12x)	3	1/8	2-1/2	63831-C3	48.20
	.8 mm	.0314	1.20 mm	**.10 mm**	4.0 mm (5x)	3	4 mm	50 mm	986718-C3	47.90
	.8 mm	.0314	1.20 mm	**.10 mm**	6.5 mm (8x)	3	4 mm	50 mm	978018-C3	48.90
	.8 mm	.0314	1.20 mm	**.10 mm**	9.5 mm (12x)	3	4 mm	50 mm	982318-C3	50.70
.035		.0350	.053	**.005**	.187 (5x)	3	1/8	2-1/2	62435-C3	45.40
	1.0 mm	.0393	1.50 mm	**.10 mm**	5.0 mm (5x)	3	4 mm	50 mm	986722-C3	47.90
	1.0 mm	.0393	1.50 mm	**.10 mm**	8.0 mm (8x)	3	4 mm	50 mm	978022-C3	48.90
	1.0 mm	.0393	1.50 mm	**.10 mm**	12.0 mm (12x)	3	4 mm	50 mm	982322-C3	50.70
	1.0 mm	.0393	1.50 mm	**.10 mm**	16.0 mm (16x)	3	4 mm	50 mm	975522-C3	53.50
.040		.0400	.060	**.005**	.203 (5x)	3	1/8	2-1/2	62440-C3	45.40
.045		.0450	.068	**.005**	.225 (5x)	3	1/8	2-1/2	62445-C3	45.40

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute (cont.)

mm & in continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	OVERALL REACH L_3 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	PRICE
.047 (3/64)		.0470	.070	**.005**	.250 (5x)	3	1/8	2-1/2	62447-C3	45.40
.047 (3/64)		.0470	.070	**.005**	.375 (8x)	3	1/8	2-1/2	55047-C3	46.10
.047 (3/64)		.0470	.070	**.005**	.570 (12x)	3	1/8	2-1/2	63847-C3	48.20
.050		.0500	.075	**.005**	.250 (5x)	3	1/8	2-1/2	62450-C3	44.90
.055		.0550	.083	**.005**	.275 (5x)	3	1/8	2-1/2	62455-C3	44.90
	1.5 mm	.0590	2.20 mm	**.20 mm**	7.5 mm (5x)	3	4 mm	50 mm	986733-C3	47.90
	1.5 mm	.0590	2.20 mm	**.20 mm**	12.0 mm (8x)	3	4 mm	50 mm	978033-C3	48.90
	1.5 mm	.0590	2.20 mm	**.20 mm**	18.0 mm (12x)	3	4 mm	50 mm	982333-C3	50.70
	1.5 mm	.0590	2.20 mm	**.20 mm**	24.0 mm (16x)	3	4 mm	63 mm	975533-C3	53.50
.060		.0600	.090	**.010**	.312 (5x)	3	1/8	2-1/2	62460-C3	45.40
.062 (1/16)		.0620	.093	**.010**	.312 (5x)	3	1/8	2-1/2	62462-C3	45.10
.062 (1/16)		.0620	.093	**.010**	.500 (8x)	3	1/8	2-1/2	55062-C3	46.10
.062 (1/16)		.0620	.093	**.010**	.750 (12x)	3	1/8	2-1/2	63862-C3	48.20
.078 (5/64)		.0780	.117	**.010**	.406 (5x)	3	1/8	2-1/2	62478-C3	45.10
.078 (5/64)		.0780	.117	**.010**	.625 (8x)	3	1/8	2-1/2	55078-C3	46.10
.078 (5/64)		.0780	.117	**.010**	.940 (12x)	3	1/8	2-1/2	63878-C3	48.20
	2.0 mm	.0787	3.00 mm	**.20 mm**	10.0 mm (5x)	3	4 mm	50 mm	986745-C3	47.90
	2.0 mm	.0787	3.00 mm	**.20 mm**	16.0 mm (8x)	3	4 mm	50 mm	978045-C3	48.90
	2.0 mm	.0787	3.00 mm	**.20 mm**	24.0 mm (12x)	3	4 mm	63 mm	982345-C3	50.70
	2.0 mm	.0787	3.00 mm	**.20 mm**	32.0 mm (16x)	3	4 mm	63 mm	975545-C3	53.50
.093 (3/32)		.0930	.139	**.010**	.500 (5x)	3	1/8	2-1/2	62493-C3	45.10
.093 (3/32)		.0930	.139	**.010**	.750 (8x)	3	1/8	2-1/2	55093-C3	46.10
.093 (3/32)		.0930	.139	**.010**	1.125 (12x)	3	1/8	2-1/2	63893-C3	48.20
.100		.1000	.150	**.010**	.500 (5x)	3	1/8	2-1/2	62500-C3	44.90
	3.0 mm	.1181	4.50 mm	**.20 mm**	15.0 mm (5x)	3	4 mm	50 mm	986757-C3	45.40

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187	**.015**	.625 (5x)	4	1/8	2-1/2	62508-C3	44.90
.125 (1/8)	.1250	.187	**.015**	1.000 (8x)	4	1/8	2-1/2	55108-C3	45.90
.125 (1/8)	.1250	.187	**.015**	1.500 (12x)	4	1/8	3	63908-C3	48.20
.156 (5/32)	.1562	.235	**.015**	.750 (5x)	4	3/16	3	62510-C3	49.10
.156 (5/32)	.1562	.235	**.015**	1.250 (8x)	4	3/16	3	55110-C3	50.10
.156 (5/32)	.1562	.235	**.015**	1.875 (12x)	4	3/16	4	63910-C3	61.90
.187 (3/16)	.1875	.281	**.015**	1.000 (5x)	4	3/16	3	62512-C3	49.50
.187 (3/16)	.1875	.281	**.015**	1.500 (8x)	4	3/16	3	55112-C3	50.70
.187 (3/16)	.1875	.281	**.015**	2.250 (12x)	4	3/16	4	63912-C3	61.90
.250 (1/4)	.2500	.375	**.015**	1.250 (5x)	4	1/4	4	62516-C3	55.10
.250 (1/4)	.2500	.375	**.015**	2.000 (8x)	4	1/4	4	55116-C3	56.10
.250 (1/4)	.2500	.375	**.015**	3.000 (12x)	4	1/4	6	63916-C3	68.40

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 126

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square

Down to .2 mm!

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- Can be used in light duty roughing and profiling applications
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	977704-C6	47.70
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	980104-C6	55.10
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	981704-C6	56.40
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	977706-C6	44.10
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	24315-C6	38.70
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	53315-C6	48.10
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	62815-C6	49.50
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	977709-C6	41.90
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	980109-C6	49.50
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	981709-C6	50.70
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	977711-C6	41.90
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	980111-C6	48.20
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	981711-C6	49.50
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	935920-C6	38.10
.020		.0200	**.060** (3x)	4	1/8	1-1/2	24320-C6	38.10
.020		.0200	**.100** (5x)	4	1/8	2-1/2	53320-C6	47.70
.020		.0200	**.160** (8x)	4	1/8	2-1/2	62820-C6	48.50
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	977713-C6	41.40
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	980113-C6	48.20
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	981713-C6	49.90
.025		.0250	**.038** (1.5x)	4	1/8	1-1/2	935925-C6	35.70
.025		.0250	**.075** (3x)	4	1/8	1-1/2	24325-C6	35.70
.025		.0250	**.125** (5x)	4	1/8	2-1/2	53325-C6	46.10
.025		.0250	**.203** (8x)	4	1/8	2-1/2	62825-C6	47.10
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	977715-C6	41.40
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935931-C6	31.70
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	24331-C6	31.70
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	53331-C6	44.40
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	62831-C6	45.10
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	882431-C6	51.70
.031 (1/32)		.0310	**.375** (12x)	5	1/8	2-1/2	68531-C6	55.70

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

mm & in continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	CUTTER DIAMETER D_1 +.00mm −.02mm	CUTTER DIAMETER D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ / +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	AlTiN NANO COATED PRICE
	.8 mm	.0314	**2.40 mm** (3x)	5	4 mm	50 mm	977718-C6	36.40
	.8 mm	.0314	**4.00 mm** (5x)	5	4 mm	50 mm	980118-C6	45.40
	.8 mm	.0314	**6.50 mm** (8x)	5	4 mm	50 mm	981718-C6	46.70
	.9 mm	.0354	**2.70 mm** (3x)	5	4 mm	50 mm	977720-C6	36.40
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	977722-C6	36.40
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	980122-C6	45.40
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	981722-C6	46.70
.040		.0400	**.060** (1.5x)	5	1/8	1-1/2	935940-C6	32.10
.040		.0400	**.120** (3x)	5	1/8	1-1/2	24340-C6	31.70
.040		.0400	**.203** (5x)	5	1/8	2-1/2	53340-C6	44.40
.040		.0400	**.325** (8x)	5	1/8	2-1/2	62840-C6	45.10
	1.1 mm	.0433	**3.00 mm** (3x)	5	4 mm	50 mm	977724-C6	36.40
.047 (3/64)		.0470	**.071** (1.5x)	5	1/8	1-1/2	935947-C6	31.70
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	24347-C6	31.70
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	53347-C6	44.40
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	62847-C6	45.10
.047 (3/64)		.0470	**.480** (10x)	5	1/8	2-1/2	882447-C6	51.70
.047 (3/64)		.0470	**.570** (12x)	5	1/8	2-1/2	68547-C6	55.70
	1.2 mm	.0472	**3.50 mm** (3x)	5	4 mm	50 mm	977727-C6	36.40
	1.2 mm	.0472	**6.00 mm** (5x)	5	4 mm	50 mm	980127-C6	45.40
	1.2 mm	.0472	**9.50 mm** (8x)	5	4 mm	50 mm	981727-C6	46.70
.050		.0500	**.075** (1.5x)	5	1/8	1-1/2	935950-C6	32.10
.050		.0500	**.150** (3x)	5	1/8	1-1/2	24350-C6	31.70
.050		.0500	**.250** (5x)	5	1/8	2-1/2	53350-C6	44.40
.050		.0500	**.400** (8x)	5	1/8	2-1/2	62850-C6	45.10
	1.3 mm	.0511	**4.00 mm** (3x)	5	4 mm	50 mm	977729-C6	36.40
	1.4 mm	.0551	**4.00 mm** (3x)	5	4 mm	50 mm	977731-C6	36.40
	1.4 mm	.0551	**7.00 mm** (5x)	5	4 mm	50 mm	980131-C6	45.40
	1.4 mm	.0551	**11.00 mm** (8x)	5	4 mm	50 mm	981731-C6	46.70
	1.5 mm	.0590	**4.50 mm** (3x)	5	4 mm	50 mm	977733-C6	35.20
	1.5 mm	.0590	**7.50 mm** (5x)	5	4 mm	50 mm	980133-C6	44.10
	1.5 mm	.0590	**12.00 mm** (8x)	5	4 mm	50 mm	981733-C6	45.70
.060		.0600	**.090** (1.5x)	5	1/8	1-1/2	935960-C6	32.10
.060		.0600	**.180** (3x)	5	1/8	1-1/2	24360-C6	31.70
.060		.0600	**.312** (5x)	5	1/8	2-1/2	53360-C6	44.40
.060		.0600	**.500** (8x)	5	1/8	2-1/2	62860-C6	45.10
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935962-C6	29.90
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	24362-C6	29.90
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	53362-C6	41.70
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	62862-C6	42.40
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	882462-C6	52.70
.062 (1/16)		.0620	**.750** (12x)	5	1/8	2-1/2	68562-C6	59.40
.062 (1/16)		.0620	**.950** (15x)	5	1/8	2-1/2	68962-C6	74.90
	1.6 mm	.0629	**5.00 mm** (3x)	5	4 mm	50 mm	977736-C6	35.20
	1.6 mm	.0629	**8.00 mm** (5x)	5	4 mm	50 mm	980136-C6	44.40
	1.6 mm	.0629	**13.00 mm** (8x)	5	4 mm	50 mm	981736-C6	45.10

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

mm & in continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.7 mm	.0669	**5.00 mm** (3x)	5	4 mm	50 mm	977738-C6	35.20
.070		.0700	**.210** (3x)	5	1/8	1-1/2	24370-C6	29.90
.070		.0700	**.375** (5x)	5	1/8	2-1/2	53370-C6	41.70
.070		.0700	**.570** (8x)	5	1/8	2-1/2	62870-C6	42.40
	1.8 mm	.0708	**5.50 mm** (3x)	5	4 mm	50 mm	977740-C6	35.20
	1.8 mm	.0708	**9.00 mm** (5x)	5	4 mm	50 mm	980140-C6	44.10
	1.8 mm	.0708	**14.00 mm** (8x)	5	4 mm	50 mm	981740-C6	45.70
	1.9 mm	.0748	**5.50 mm** (3x)	5	4 mm	50 mm	977742-C6	35.20
.078 (5/64)		.0780	**.117** (1.5x)	5	1/8	1-1/2	935978-C6	29.90
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	24378-C6	29.90
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	53378-C6	41.70
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	62878-C6	42.40
.078 (5/64)		.0780	**.800** (10x)	5	1/8	2-1/2	882478-C6	52.70
.078 (5/64)		.0780	**.940** (12x)	5	1/8	2-1/2	68578-C6	59.40
.078 (5/64)		.0780	**1.187** (15x)	5	1/8	2-1/2	68978-C6	74.90
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	977745-C6	35.20
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	980145-C6	44.10
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	981745-C6	45.70
.080		.0800	**.120** (1.5x)	5	1/8	1-1/2	935980-C6	30.10
.080		.0800	**.240** (3x)	5	1/8	1-1/2	24380-C6	29.90
.080		.0800	**.406** (5x)	5	1/8	2-1/2	53380-C6	41.70
.080		.0800	**.650** (8x)	5	1/8	2-1/2	62880-C6	42.40
.090		.0900	**.270** (3x)	5	1/8	1-1/2	24390-C6	29.90
.090		.0900	**.450** (5x)	5	1/8	2-1/2	53390-C6	41.70
.090		.0900	**.750** (8x)	5	1/8	2-1/2	62890-C6	42.40
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935993-C6	29.90
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	24393-C6	29.90
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	53393-C6	41.70
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	62893-C6	42.40
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	882493-C6	52.70
.093 (3/32)		.0930	**1.125** (12x)	5	1/8	2-1/2	68593-C6	59.40
.093 (3/32)		.0930	**1.400** (15x)	5	1/8	3	68993-C6	75.40
	2.5 mm	.0984	**7.50 mm** (3x)	5	4 mm	50 mm	977751-C6	35.20
.100		.1000	**.150** (1.5x)	5	1/8	1-1/2	936000-C6	30.10
.100		.1000	**.300** (3x)	5	1/8	1-1/2	24399-C6	29.90
.100		.1000	**.500** (5x)	5	1/8	2-1/2	53399-C6	41.70
.100		.1000	**.800** (8x)	5	1/8	2-1/2	53400-C6	42.40
.109 (7/64)		.1090	**.327** (3x)	5	1/8	1-1/2	24402-C6	30.10
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	63502-C6	41.70
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	977757-C6	35.20
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	980157-C6	43.70
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	981757-C6	45.90

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	936008-C6	28.40
.125 (1/8)	.1250	**.500** (4x)	5	1/8	1-1/2	24408-C6	28.40
.125 (1/8)	.1250	**.750** (6x)	5	1/8	2-1/2	63508-C6	40.90
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	53408-C6	41.70
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	882508-C6	51.40
.125 (1/8)	.1250	**1.500** (12x)	5	1/8	3	68608-C6	58.50
.125 (1/8)	.1250	**1.875** (15x)	5	1/8	3	69008-C6	74.70
.140 (9/64)	.1406	**.500** (3x)	5	3/16	2	24409-C6	39.40
.140 (9/64)	.1406	**.750** (5x)	5	3/16	3	63509-C6	40.90
.156 (5/32)	.1562	**.235** (1.5x)	5	3/16	2	936010-C6	32.40
.156 (5/32)	.1562	**.562** (3x)	5	3/16	2	24410-C6	32.40
.156 (5/32)	.1562	**.875** (5x)	5	3/16	3	63510-C6	43.50
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	53410-C6	44.20
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	936012-C6	32.40
.187 (3/16)	.1875	**.625** (3x)	5	3/16	2	24412-C6	32.40
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	63512-C6	43.50
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	53412-C6	44.20
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	936016-C6	41.20
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	24416-C6	41.20
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	63516-C6	53.10
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	53416-C6	54.10
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	24424-C6	65.50
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	24432-C6	85.10

SPEEDS & FEEDS ONLINE!

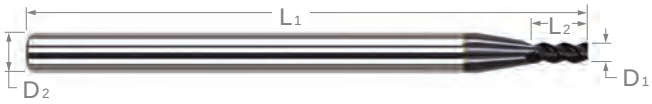
SPEEDS & FEEDS (High-Helix Finisher for Medium Alloy Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	600	Finishing (3x LOC)	.00018	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300	< .10x Dia	.5x - 3x Dia
	250 - 275	550	Finishing (5x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	< .05x Dia	.5x - 8x Dia
			Finishing (12x LOC)	-	.00019	.00028	.00037	.00047	.00056	.00075	.00112	.00150	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00033	.00042	.00050	.00068	.00101	.00135	< .02x Dia	.5x - 15x Dia
	275 - 300	500	Finishing (3x LOC)	.00017	.00034	.00052	.00068	.00086	.00102	.00138	.00206	.00275	< .10x Dia	.5x - 3x Dia
			Finishing (5x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00009	.00019	.00028	.00038	.00047	.00056	.00076	.00113	.00151	< .05x Dia	.5x - 8x Dia
			Finishing (12x LOC)	-	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00031	.00039	.00046	.00062	.00093	.00124	< .02x Dia	.5x - 15x Dia
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	225 - 250	500	Finishing (3x LOC)	.00015	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250	< .10x Dia	.5x - 3x Dia
	250 - 275	500	Finishing (5x LOC)	.00011	.00023	.00035	.00047	.00059	.00070	.00094	.00140	.00188	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .05x Dia	.5x - 8x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00028	.00035	.00042	.00056	.00084	.00113	< .02x Dia	.5x - 15x Dia
Tool Steels: A, L, O, P, W series	275 - 300	500	Finishing (3x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .10x Dia	.5x - 3x Dia
	300 - 350	500	Finishing (5x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00084	.00126	.00169	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 8x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00025	.00032	.00038	.00051	.00076	.00101	< .02x Dia	.5x - 15x Dia

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	939815-C3	38.40
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	945715-C3	38.40
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	952411-C3	37.50
.020		.0200	**.060** (3x)	3	1/8	1-1/2	945720-C3	34.70
.025		.0250	**.075** (3x)	3	1/8	1-1/2	945725-C3	33.50
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	939831-C3	27.90
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	945731-C3	27.90
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	900531-C3	35.70
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	926022-C3	31.20
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	952422-C3	31.20
.040		.0400	**.120** (3x)	3	1/8	1-1/2	945740-C3	28.70
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	939847-C3	27.90
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	945747-C3	27.90
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	952433-C3	29.40
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	939862-C3	26.10
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	945762-C3	26.10
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	900562-C3	34.10
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	939878-C3	26.10
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	945778-C3	26.10
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	952445-C3	29.40
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	939893-C3	26.10
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	945793-C3	26.10
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	900593-C3	34.10
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	926057-C3	29.40
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	952457-C3	29.40

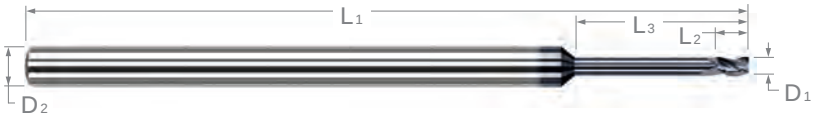
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	939908-C3	26.10
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	945808-C3	26.10
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	900608-C3	34.10
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	939910-C3	28.10
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	945810-C3	28.10
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	939912-C3	28.10
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	945812-C3	28.10
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	939916-C3	35.70
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	945816-C3	35.70

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 143

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute



- Optimized for free machining varieties of carbon steels and stainless steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	.023	**.078** (5x)	3	1/8	2-1/2	915015-C3	49.90
.015 (1/64)	.023	**.125** (8x)	3	1/8	2-1/2	920215-C3	50.90
.020	.030	**.100** (5x)	3	1/8	2-1/2	915020-C3	48.10
.020	.030	**.160** (8x)	3	1/8	2-1/2	920220-C3	49.10
.025	.038	**.125** (5x)	3	1/8	2-1/2	915025-C3	46.70
.025	.038	**.203** (8x)	3	1/8	2-1/2	920225-C3	47.90
.031 (1/32)	.047	**.093** (3x)	3	1/8	1-1/2	927331-C3	43.70
.031 (1/32)	.047	**.156** (5x)	3	1/8	2-1/2	915031-C3	44.10
.031 (1/32)	.047	**.250** (8x)	3	1/8	2-1/2	920231-C3	45.10
.031 (1/32)	.047	**.312** (10x)	3	1/8	2-1/2	909531-C3	46.70
.047 (3/64)	.071	**.250** (5x)	3	1/8	2-1/2	915047-C3	44.10
.047 (3/64)	.071	**.375** (8x)	3	1/8	2-1/2	920247-C3	45.10
.062 (1/16)	.093	**.186** (3x)	3	1/8	1-1/2	927362-C3	43.70
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	915062-C3	43.70
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	920262-C3	44.90
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	909562-C3	46.70
.078 (5/64)	.118	**.406** (5x)	3	1/8	2-1/2	915078-C3	43.70
.078 (5/64)	.118	**.625** (8x)	3	1/8	2-1/2	920278-C3	44.90
.093 (3/32)	.140	**.279** (3x)	3	1/8	1-1/2	927393-C3	43.70
.093 (3/32)	.140	**.500** (5x)	3	1/8	2-1/2	915093-C3	43.70
.093 (3/32)	.140	**.750** (8x)	3	1/8	2-1/2	920293-C3	44.90
.093 (3/32)	.140	**.950** (10x)	3	1/8	2-1/2	909593-C3	46.70

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	4	1/8	1-1/2	927408-C3	43.70
.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	915108-C3	43.70
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	920308-C3	44.90
.125 (1/8)	.187	**1.250** (10x)	4	1/8	2-1/2	909608-C3	46.70
.156 (5/32)	.235	**.750** (5x)	4	3/16	3	915110-C3	47.70
.187 (3/16)	.285	**1.000** (5x)	4	3/16	3	915112-C3	47.70
.250 (1/4)	.375	**1.250** (5x)	4	1/4	4	915116-C3	53.50

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Free Machining Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X,, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00010	.00021	.00031	.00041	.00052	.00062	.00079	.00118	.00158	.00207	.00249	.00332
Roughing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00192	.00252	.00302	.00403
Finishing	.00014	.00030	.00045	.00060	.00075	.00090	.00115	.00172	.00230	.00301	.00362	.00483
Max	.00019	.00039	.00058	.00077	.00097	.00116	.00148	.00221	.00296	.00388	.00466	.00622

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .35x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .35x Dia

Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

★★★★★

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— @LowTidePutters

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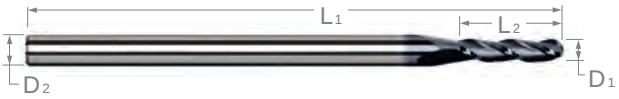
VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Ball



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	3	1/8	1-1/2	950015-C3	45.70
.031 (1/32)	**.047** (1.5x)	3	1/8	1-1/2	911531-C3	34.40
.031 (1/32)	**.093** (3x)	3	1/8	1-1/2	950031-C3	34.40
.047 (3/64)	**.141** (3x)	3	1/8	1-1/2	950047-C3	34.40
.062 (1/16)	**.093** (1.5x)	3	1/8	1-1/2	911562-C3	34.40
.062 (1/16)	**.186** (3x)	3	1/8	1-1/2	950062-C3	32.50
.078 (5/64)	**.234** (3x)	3	1/8	1-1/2	950078-C3	32.50
.093 (3/32)	**.140** (1.5x)	3	1/8	1-1/2	911593-C3	32.50
.093 (3/32)	**.279** (3x)	3	1/8	1-1/2	950093-C3	32.50
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	**.187** (1.5x)	4	1/8	1-1/2	911608-C3	32.50
.125 (1/8)	**.375** (3x)	4	1/8	1-1/2	950108-C3	32.50
.156 (5/32)	**.470** (3x)	4	3/16	2	950110-C3	34.70
.187 (3/16)	**.562** (3x)	4	3/16	2	950112-C3	34.70
.250 (1/4)	**.750** (3x)	4	1/4	2-1/2	950116-C3	42.40

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix for Free Machining Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00013	.00026	.00040	.00053	.00067	.00079	.00099	.00148	.00198	.00259	.00311	.00415
Roughing	.00016	.00032	.00049	.00064	.00081	.00096	.00120	.00180	.00240	.00314	.00378	.00504
Finishing	.00019	.00039	.00058	.00077	.00097	.00116	.00144	.00215	.00288	.00377	.00453	.00604
Max	.00024	.00050	.00075	.00099	.00125	.00149	.00185	.00277	.00370	.00485	.00583	.00777

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

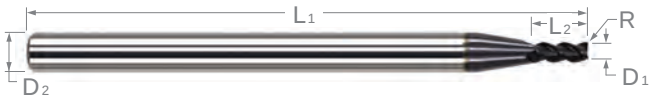
Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

Click Tool # for stock, speeds & feeds, & other technical info

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.25mm −.25mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.023 (1.5x)	**.002**	3	1/8	1-1/2	969415-C3	39.70
.015 (1/64)		.0150	.045 (3x)	**.002**	3	1/8	1-1/2	971215-C3	39.70
.015 (1/64)		.0150	.078 (5x)	**.002**	3	1/8	2-1/2	980315-C3	48.20
.015 (1/64)		.0150	.045 (3x)	**.005**	3	1/8	1-1/2	859815-C3	39.40
.020		.0200	.060 (3x)	**.002**	3	1/8	1-1/2	971220-C3	34.90
.020		.0200	.060 (3x)	**.005**	3	1/8	1-1/2	859820-C3	34.70
.025		.0250	.075 (3x)	**.002**	3	1/8	1-1/2	971225-C3	33.70
.025		.0250	.075 (3x)	**.005**	3	1/8	1-1/2	859825-C3	33.50
.031 (1/32)		.0310	.047 (1.5x)	**.003**	3	1/8	1-1/2	969431-C3	28.50
.031 (1/32)		.0310	.093 (3x)	**.003**	3	1/8	1-1/2	971231-C3	28.50
.031 (1/32)		.0310	.156 (5x)	**.003**	3	1/8	2-1/2	980331-C3	35.70
.031 (1/32)		.0310	.093 (3x)	**.005**	3	1/8	1-1/2	859831-C3	28.40
.031 (1/32)		.0310	.093 (3x)	**.010**	3	1/8	1-1/2	856631-C3	30.50
	1.0 mm	.0393	3.00 mm (3x)	**.08 mm**	3	4 mm	50 mm	901822-C3	31.50
.040		.0400	.120 (3x)	**.003**	3	1/8	1-1/2	971240-C3	28.50
.040		.0400	.120 (3x)	**.005**	3	1/8	1-1/2	859840-C3	28.40
.047 (3/64)		.0470	.071 (1.5x)	**.003**	3	1/8	1-1/2	969447-C3	28.50
.047 (3/64)		.0470	.141 (3x)	**.003**	3	1/8	1-1/2	971247-C3	28.50
.047 (3/64)		.0470	.250 (5x)	**.003**	3	1/8	2-1/2	980347-C3	35.70
.047 (3/64)		.0470	.141 (3x)	**.005**	3	1/8	1-1/2	859847-C3	28.40
.047 (3/64)		.0470	.141 (3x)	**.010**	3	1/8	1-1/2	856647-C3	28.40
.047 (3/64)		.0470	.141 (3x)	**.015**	3	1/8	1-1/2	857447-C3	30.50
.050		.0500	.150 (3x)	**.003**	3	1/8	1-1/2	971250-C3	28.40
.050		.0500	.150 (3x)	**.005**	3	1/8	1-1/2	859850-C3	28.40
.060		.0600	.180 (3x)	**.005**	3	1/8	1-1/2	971260-C3	28.40
.060		.0600	.180 (3x)	**.010**	3	1/8	1-1/2	856660-C3	28.40
.062 (1/16)		.0620	.093 (1.5x)	**.005**	3	1/8	1-1/2	969462-C3	26.50
.062 (1/16)		.0620	.186 (3x)	**.005**	3	1/8	1-1/2	971262-C3	26.50
.062 (1/16)		.0620	.312 (5x)	**.005**	3	1/8	2-1/2	980362-C3	34.40
.062 (1/16)		.0620	.186 (3x)	**.010**	3	1/8	1-1/2	856662-C3	26.50
.062 (1/16)		.0620	.186 (3x)	**.020**	3	1/8	1-1/2	858262-C3	28.50
.078 (5/64)		.0780	.118 (1.5x)	**.005**	3	1/8	1-1/2	969478-C3	26.50
.078 (5/64)		.0780	.234 (3x)	**.005**	3	1/8	1-1/2	971278-C3	26.50
.078 (5/64)		.0780	.406 (5x)	**.005**	3	1/8	2-1/2	980378-C3	34.40
.078 (5/64)		.0780	.234 (3x)	**.010**	3	1/8	1-1/2	856678-C3	26.50
.078 (5/64)		.0780	.234 (3x)	**.020**	3	1/8	1-1/2	858278-C3	28.50

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.25mm −.25mm		D_2 (h6)	L_1	TOOL #	PRICE
	2.0 mm	.0787	6.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	901845-C3	29.70
.093 (3/32)		.0930	.140 (1.5x)	**.005**	3	1/8	1-1/2	969493-C3	26.50
.093 (3/32)		.0930	.279 (3x)	**.005**	3	1/8	1-1/2	971293-C3	26.50
.093 (3/32)		.0930	.500 (5x)	**.005**	3	1/8	2-1/2	980393-C3	34.40
.093 (3/32)		.0930	.279 (3x)	**.010**	3	1/8	1-1/2	856693-C3	26.50
.093 (3/32)		.0930	.279 (3x)	**.030**	3	1/8	1-1/2	859093-C3	28.50
.100		.1000	.300 (3x)	**.005**	3	1/8	1-1/2	971300-C3	26.50
	3.0 mm	.1181	9.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	901857-C3	29.70

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187 (1.5x)	**.005**	4	1/8	1-1/2	969508-C3	26.50
.125 (1/8)	.1250	.375 (3x)	**.005**	4	1/8	1-1/2	971308-C3	26.50
.125 (1/8)	.1250	.625 (5x)	**.005**	4	1/8	2-1/2	980408-C3	34.40
.125 (1/8)	.1250	.375 (3x)	**.010**	4	1/8	1-1/2	856708-C3	26.50
.125 (1/8)	.1250	.375 (3x)	**.030**	4	1/8	1-1/2	859108-C3	28.50
.156 (5/32)	.1562	.235 (1.5x)	**.010**	4	3/16	2	969510-C3	28.70
.156 (5/32)	.1562	.470 (3x)	**.010**	4	3/16	2	971310-C3	28.70
.156 (5/32)	.1562	.750 (5x)	**.010**	4	3/16	3	980410-C3	37.20
.187 (3/16)	.1875	.285 (1.5x)	**.010**	4	3/16	2	969512-C3	28.70
.187 (3/16)	.1875	.562 (3x)	**.010**	4	3/16	2	971312-C3	28.70
.187 (3/16)	.1875	1.000 (5x)	**.010**	4	3/16	3	980412-C3	37.20
.250 (1/4)	.2500	.375 (1.5x)	**.010**	4	1/4	2-1/2	969516-C3	36.20
.250 (1/4)	.2500	.750 (3x)	**.010**	4	1/4	2-1/2	971316-C3	36.20
.250 (1/4)	.2500	1.250 (5x)	**.010**	4	1/4	4	980416-C3	46.10
.312 (5/16)	.3125	.470 (1.5x)	**.010**	4	5/16	2-1/2	969520-C3	53.10
.312 (5/16)	.3125	1.000 (3x)	**.010**	4	5/16	2-1/2	971320-C3	53.10
.375 (3/8)	.3750	.570 (1.5x)	**.010**	4	3/8	2-1/2	969524-C3	61.70
.375 (3/8)	.3750	1.125 (3x)	**.010**	4	3/8	2-1/2	971324-C3	61.70
.500 (1/2)	.5000	.750 (1.5x)	**.015**	4	1/2	3	969532-C3	79.90

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 143

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square

- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	967815-C3	38.70
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	972415-C3	48.10
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	983615-C3	48.50
.020		.0200	**.060** (3x)	4	1/8	1-1/2	967820-C3	38.10
.020		.0200	**.100** (5x)	4	1/8	2-1/2	972420-C3	47.70
.025		.0250	**.075** (3x)	4	1/8	1-1/2	967825-C3	35.70
.025		.0250	**.125** (5x)	4	1/8	2-1/2	972425-C3	46.10
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935131-C3	31.70
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	967831-C3	31.70
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	972431-C3	44.40
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	983631-C3	45.10
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	921922-C3	36.40
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	916422-C3	45.40
.040		.0400	**.120** (3x)	5	1/8	1-1/2	967840-C3	32.40
.040		.0400	**.203** (5x)	5	1/8	2-1/2	972440-C3	44.90
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	967847-C3	31.70
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	972447-C3	44.40
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	983647-C3	45.10
.050		.0500	**.150** (3x)	5	1/8	1-1/2	967850-C3	32.40
.050		.0500	**.250** (5x)	5	1/8	2-1/2	972450-C3	44.90
.060		.0600	**.180** (3x)	5	1/8	1-1/2	967860-C3	32.40
.060		.0600	**.312** (5x)	5	1/8	2-1/2	972460-C3	44.90
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935162-C3	29.90
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	967862-C3	29.90
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	972462-C3	41.70
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	983662-C3	42.40
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	967878-C3	29.90
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	972478-C3	41.70
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	983678-C3	42.40
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	921945-C3	35.20
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	916445-C3	44.10

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935193-C3	29.90
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	967893-C3	29.90
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	972493-C3	41.70
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	983693-C3	42.40
.100		.1000	**.300** (3x)	5	1/8	1-1/2	967900-C3	30.40
.100		.1000	**.500** (5x)	5	1/8	2-1/2	972500-C3	41.70
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	921957-C3	35.20
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	916457-C3	44.10

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	935208-C3	28.40
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	967908-C3	28.40
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	972508-C3	40.90
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	983708-C3	41.70
.156 (5/32)	.1562	**.470** (3x)	5	3/16	2	967910-C3	32.40
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	972510-C3	43.50
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	967912-C3	32.40
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	972512-C3	43.50
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	983712-C3	44.20
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	967916-C3	41.20
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	972516-C3	53.10
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	983716-C3	54.10

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (High-Helix Finisher for Free Machining Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Carbon Steels: 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx	100 - 125	500	Finishing (1.5x LOC)	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413	< .10x Dia	.5x - 1.5x Dia
	125 - 150	425	Finishing (3x LOC)	.00023	.00047	.00071	.00093	.00117	.00140	.00188	.00281	.00375	< .10x Dia	.5x - 3x Dia
	150 - 175	400	Finishing (5x LOC)	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00210	.00281	< .07x Dia	.5x - 5x Dia
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se	175 - 200	375												
	200 - 225	350	Finishing (8x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .05x Dia	.5x - 8x Dia

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.010		.0100	**.030** (3x)	3	1/8	1-1/2	942210	43.40	942210-C8	48.10			
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	968715	35.10	968715-C8	39.70			
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	942215	34.90	942215-C8	39.70	942215-C4	44.50	
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	923015	44.20	923015-C8	48.80			
	0.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	900411	34.90	900411-C8	41.10			NEW
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	968720	30.90	968720-C8	35.50			
.020		.0200	**.060** (3x)	3	1/8	1-1/2	942220	30.70	942220-C8	35.50	942220-C4	40.30	
.020		.0200	**.100** (5x)	3	1/8	2-1/2	923020	39.90	923020-C8	44.40			
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	968725	30.90	968725-C8	35.50			
.025		.0250	**.075** (3x)	3	1/8	1-1/2	942225	30.70	942225-C8	35.50	942225-C4	40.30	
.025		.0250	**.125** (5x)	3	1/8	2-1/2	923025	39.90	923025-C8	44.40			
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	968730	30.90	968730-C8	35.50			
.030		.0300	**.090** (3x)	3	1/8	1-1/2	942230	30.70	942230-C8	35.50	942230-C4	40.30	
.030		.0300	**156** (5x)	3	1/8	2-1/2	923030	39.90	923030-C8	44.40			
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	968731	24.70	968731-C8	29.30	968731-C4	34.10	
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	942231	24.50	942231-C8	29.30	942231-C4	34.10	
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	923031	33.70	923031-C8	38.30	923031-C4	44.90	
.035		.0350	**.105** (3x)	3	1/8	1-1/2	942235	28.70	942235-C8	34.90			NEW
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	900422	26.90	900422-C8	31.60	900422-C4	41.60	NEW
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	968740	24.70	968740-C8	29.30			
.040		.0400	**.120** (3x)	3	1/8	1-1/2	942240	24.50	942240-C8	29.30	942240-C4	34.10	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	923040	33.70	923040-C8	38.30			
.045		.0450	**.135** (3x)	3	1/8	1-1/2	942245	24.50	942245-C8	30.70			NEW
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	968747	24.70	968747-C8	29.30	968747-C4	34.10	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	942247	24.50	942247-C8	29.30	942247-C4	34.10	
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	923047	33.70	923047-C8	38.30	923047-C4	44.90	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	968750	24.70	968750-C8	29.30			
.050		.0500	**.150** (3x)	3	1/8	1-1/2	942250	24.50	942250-C8	29.30	942250-C4	34.10	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	923050	33.70	923050-C8	38.30			
.055		.0550	**.165** (3x)	3	1/8	1-1/2	942255	24.50	942255-C8	30.70			NEW
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	900433	28.50	900433-C8	34.70			NEW
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	968760	22.90	968760-C8	29.30			
.060		.0600	**.180** (3x)	3	1/8	1-1/2	942260	24.50	942260-C8	29.30	942260-C4	34.10	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	923060	33.70	923060-C8	38.30			
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	968762	22.90	968762-C8	27.40	968762-C4	32.20	
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	942262	22.70	942262-C8	27.40	942262-C4	32.20	
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	923062	31.70	923062-C8	36.30	923062-C4	42.90	

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

mm & in continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
	D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	968770	22.90	968770-C8	29.30		
	.070		.0700	**.210** (3x)	3	1/8	1-1/2	942270	22.70	942270-C8	27.40	942270-C4	32.20
	.070		.0700	**.375** (5x)	3	1/8	2-1/2	923070	31.70	923070-C8	36.30		
	.078 (5/64)		.0780	**.117** (1.5x)	3	1/8	1-1/2	968778	22.90	968778-C8	27.40	968778-C4	32.20
	.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	942278	22.70	942278-C8	27.40	942278-C4	32.20
	.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	923078	31.70	923078-C8	36.30	923078-C4	42.90
NEW		2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	900445	25.10	900445-C8	29.70	900445-C4	39.80
	.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	968780	22.90	968780-C8	29.30		
	.080		.0800	**.240** (3x)	3	1/8	1-1/2	942280	22.70	942280-C8	27.40	942280-C4	32.20
	.080		.0800	**.406** (5x)	3	1/8	2-1/2	923080	31.70	923080-C8	36.30		
	.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	968790	22.90	968790-C8	29.30		
	.090		.0900	**.270** (3x)	3	1/8	1-1/2	942290	22.70	942290-C8	27.40	942290-C4	32.20
	.090		.0900	**.450** (5x)	3	1/8	2-1/2	923090	31.70	923090-C8	36.30		
	.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	968793	22.90	968793-C8	27.40	968793-C4	32.20
	.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	942293	22.70	942293-C8	27.40	942293-C4	32.20
	.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	923093	31.70	923093-C8	36.30	923093-C4	42.90
NEW		2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	900451	26.70	900451-C8	32.90		
	.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	968800	22.90	968800-C8	27.40		
	.100		.1000	**.300** (3x)	3	1/8	1-1/2	942300	22.70	942300-C8	27.40	942300-C4	32.20
	.100		.1000	**.500** (5x)	3	1/8	2-1/2	923100	31.70	923100-C8	36.30		
	.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	968802	22.90	968802-C8	27.40		
	.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	942302	22.70	942302-C8	27.40	942302-C4	32.20
	.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	923102	31.70	923102-C8	36.30		
NEW		3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	900457	25.10	900457-C8	29.70	900457-C4	39.80
	D1 +.000″ −.002″		decimal equivalent	L2 +.030″ −.000″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.125 (1/8)		.1250	**.187** (1.5x)	3	1/8	1-1/2	968808	22.90	968808-C8	27.40	968808-C4	32.20
	.125 (1/8)		.1250	**.375** (3x)	3	1/8	1-1/2	942308	22.70	942308-C8	27.40	942308-C4	32.20
	.125 (1/8)		.1250	**.625** (5x)	3	1/8	2-1/2	923108	31.70	923108-C8	36.30	923108-C4	42.90
	.140 (9/64)		.1406	**.425** (3x)	3	3/16	2	942309	23.70	942309-C8	29.30		
	.156 (5/32)		.1562	**.235** (1.5x)	3	3/16	2	968810	23.90	968810-C8	29.30	968810-C4	37.90
	.156 (5/32)		.1562	**.469** (3x)	3	3/16	2	942310	23.70	942310-C8	29.30	942310-C4	37.90
	.156 (5/32)		.1562	**.750** (5x)	3	3/16	3	923110	32.90	923110-C8	38.20		
	.187 (3/16)		.1875	**.285** (1.5x)	3	3/16	2	968812	23.90	968812-C8	29.30	968812-C4	37.90
	.187 (3/16)		.1875	**.562** (3x)	3	3/16	2	942312	23.70	942312-C8	29.30	942312-C4	37.90
	.187 (3/16)		.1875	**1.000** (5x)	3	3/16	3	923112	32.90	923112-C8	38.20	923112-C4	48.10
NEW		6.0 mm	.2362	**18.00 mm** (3x)	3	6 mm	63 mm	900466	34.70	900466-C8	40.90		
	.250 (1/4)		.2500	**.375** (1.5x)	3	1/4	2-1/2	968816	29.70	968816-C8	36.60	968816-C4	45.40
	.250 (1/4)		.2500	**.750** (3x)	3	1/4	2-1/2	942316	29.40	942316-C8	36.60	942316-C4	45.40
	.250 (1/4)		.2500	**1.250** (5x)	3	1/4	4	923116	38.90	923116-C8	45.90	923116-C4	56.20
NEW	.312 (5/16)		.3125	**1.000** (3x)	3	5/16	2-1/2	942320	37.20	942320-C8	51.40		
NEW	.375 (3/8)		.3750	**1.125** (3x)	3	3/8	2-1/2	942324	40.40	942324-C8	57.60		
NEW	.500 (1/2)		.5000	**.750** (1.5x)	3	1/2	3	968832	42.80	968832-C8	62.90		

SPEEDS & FEEDS ONLINE!

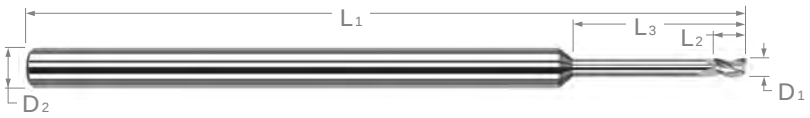
PLEASE SEE SPEEDS & FEEDS ON PAGE 160

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.015 (1/64)	.023	**.078** (5x)	3	1/8	2-1/2	930815	45.40	930815-C8	51.60			
.015 (1/64)	.023	**.125** (8x)	3	1/8	2-1/2	927115	46.50	927115-C8	52.70			
.020	.030	**.100** (5x)	3	1/8	2-1/2	930820	43.50	930820-C8	49.70			
.020	.030	**.160** (8x)	3	1/8	2-1/2	927120	44.70	927120-C8	50.90			
.020	.030	**.200** (10x)	3	1/8	2-1/2	919320	46.40	919320-C8	52.60			
.025	.038	**.125** (5x)	3	1/8	2-1/2	930825	42.40	930825-C8	48.60			
.025	.038	**.203** (8x)	3	1/8	2-1/2	927125	43.50	927125-C8	49.70			
.030	.045	**.250** (8x)	3	1/8	2-1/2	927130	43.50	927130-C8	49.70			NEW
.031 (1/32)	.047	**.093** (3x)	3	1/8	1-1/2	924531	39.40	924531-C8	45.60			
.031 (1/32)	.047	**.156** (5x)	3	1/8	2-1/2	930831	39.70	930831-C8	45.90	930831-C4	50.40	NEW
.031 (1/32)	.047	**.250** (8x)	3	1/8	2-1/2	927131	40.70	927131-C8	46.90	927131-C4	51.40	NEW
.031 (1/32)	.047	**.312** (10x)	3	1/8	2-1/2	919331	42.40	919331-C8	48.60			
.031 (1/32)	.047	**.375** (12x)	3	1/8	2-1/2	879231	43.90	879231-C8	50.10			NEW
.040	.060	**.325** (8x)	3	1/8	2-1/2	927140	42.70	927140-C8	48.90			NEW
.047 (3/64)	.071	**.250** (5x)	3	1/8	2-1/2	930847	39.70	930847-C8	45.90			
.047 (3/64)	.071	**.375** (8x)	3	1/8	2-1/2	927147	40.70	927147-C8	46.90			
.047 (3/64)	.071	**.480** (10x)	3	1/8	2-1/2	919347	42.70	919347-C8	48.90			
.050	.075	**.400** (8x)	3	1/8	2-1/2	927150	44.20	927150-C8	50.40			NEW
.060	.090	**.500** (8x)	3	1/8	2-1/2	927160	44.20	927160-C8	50.40			NEW
.062 (1/16)	.093	**.186** (3x)	3	1/8	1-1/2	924562	39.40	924562-C8	45.60			
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	930862	39.40	930862-C8	45.60	930862-C4	50.10	NEW
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	927162	40.40	927162-C8	46.60	927162-C4	51.10	NEW
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	919362	42.40	919362-C8	48.60			
.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	879262	43.90	879262-C8	50.10			NEW
.078 (5/64)	.118	**.406** (5x)	3	1/8	2-1/2	930878	39.40	930878-C8	45.60			
.078 (5/64)	.118	**.625** (8x)	3	1/8	2-1/2	927178	40.40	927178-C8	46.60			
.078 (5/64)	.118	**.800** (10x)	3	1/8	2-1/2	919378	42.70	919378-C8	48.90			
.093 (3/32)	.140	**.279** (3x)	3	1/8	1-1/2	924593	39.40	924593-C8	45.60			
.093 (3/32)	.140	**.500** (5x)	3	1/8	2-1/2	930893	39.40	930893-C8	45.60	930893-C4	50.10	NEW
.093 (3/32)	.140	**.750** (8x)	3	1/8	2-1/2	927193	40.40	927193-C8	46.60	927193-C4	51.10	NEW
.093 (3/32)	.140	**.950** (10x)	3	1/8	2-1/2	919393	42.40	919393-C8	48.60			
.093 (3/32)	.140	**1.125** (12x)	3	1/8	2-1/2	879293	43.90	879293-C8	50.10			NEW
.100	.150	**.800** (8x)	3	1/8	2-1/2	927200	44.20	927200-C8	50.40			NEW
.109 (7/64)	.164	**.900** (8x)	3	1/8	2-1/2	927202	44.20	927202-C8	50.40			NEW

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.125 (1/8)	.187	**.375** (3x)	3	1/8	1-1/2	924608	39.40	924608-C8	45.60		
NEW	.125 (1/8)	.187	**.625** (5x)	3	1/8	2-1/2	930908	39.40	930908-C8	45.60	930908-C4	50.10
NEW	.125 (1/8)	.187	**1.000** (8x)	3	1/8	2-1/2	927208	40.40	927208-C8	46.60	927208-C4	51.10
	.125 (1/8)	.187	**1.250** (10x)	3	1/8	2-1/2	919408	42.40	919408-C8	48.60		
NEW	.125 (1/8)	.187	**1.500** (12x)	3	1/8	3	879308	43.90	879308-C8	50.10		
NEW	.140 (9/64)	.220	**1.125** (8x)	3	3/16	3	927209	46.70	927209-C8	52.90		
	.156 (5/32)	.235	**.750** (5x)	3	3/16	3	930910	43.50	930910-C8	49.70		
	.156 (5/32)	.235	**1.250** (8x)	3	3/16	3	927210	44.70	927210-C8	50.90		
	.187 (3/16)	.285	**1.000** (5x)	3	3/16	3	930912	43.50	930912-C8	49.70		
	.187 (3/16)	.285	**1.500** (8x)	3	3/16	3	927212	44.70	927212-C8	50.90		
	.250 (1/4)	.375	**1.250** (5x)	3	1/4	4	930916	46.40	930916-C8	53.90		
	.250 (1/4)	.375	**2.000** (8x)	3	1/4	4	927216	47.40	927216-C8	54.90		

SPEEDS & FEEDS ONLINE!

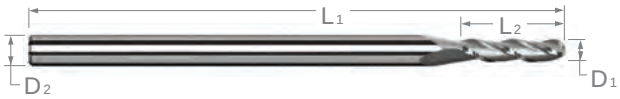
PLEASE SEE SPEEDS & FEEDS ON PAGE 162

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	977504	50.70	977504-C8	57.20			
.010		.0100	**.030** (3x)	3	1/8	1-1/2	989710	51.90	989710-C8	58.10			NEW
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	958115	41.90	958115-C8	48.10			
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	989715	41.90	989715-C8	48.10			
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	977509	41.10	977509-C8	47.60			
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	977511	36.70	977511-C8	43.20			
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	958120	36.70	958120-C8	42.90			NEW
.020		.0200	**.060** (3x)	3	1/8	1-1/2	989720	36.70	989720-C8	42.90			
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	977513	34.90	977513-C8	41.40			
.025		.0250	**.075** (3x)	3	1/8	1-1/2	989725	35.40	989725-C8	41.60			
.030		.0300	**.090** (3x)	3	1/8	1-1/2	989730	31.10	989730-C8	36.60			NEW
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	958131	30.70	958131-C8	36.90			
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	989731	30.40	989731-C8	36.60	989731-C4	41.10	NEW
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	850031	37.70	850031-C8	43.90			
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	977518	29.90	977518-C8	36.40			
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	908322	29.90	908322-C8	36.40			
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	977522	29.90	977522-C8	36.40			
.040		.0400	**.120** (3x)	3	1/8	1-1/2	989740	32.40	989740-C8	38.60			
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	958147	30.70	958147-C8	36.90			
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	989747	30.40	989747-C8	36.60			
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	850047	37.70	850047-C8	43.90			
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	977527	29.90	977527-C8	36.40			
.050		.0500	**.150** (3x)	3	1/8	1-1/2	989750	31.20	989750-C8	36.90			NEW
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	977531	29.90	977531-C8	36.40			
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	977533	28.10	977533-C8	34.60			
.060		.0600	**.180** (3x)	3	1/8	1-1/2	989760	30.40	989760-C8	36.60			
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	958162	28.70	958162-C8	34.90			
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	989762	28.70	989762-C8	34.90	989762-C4	39.40	NEW
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	850062	35.90	850062-C8	42.10			
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	977536	28.10	977536-C8	34.60			
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	977540	28.10	977540-C8	34.60			
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	958178	28.70	958178-C8	34.90			
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	989778	28.70	989778-C8	34.90			
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	850078	35.90	850078-C8	42.10			
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	908345	28.10	908345-C8	34.60			
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	977545	28.10	977545-C8	34.60			

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball (cont.)

mm & in

continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
	D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	958193	28.70	958193-C8	34.90		
NEW	.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	989793	28.70	989793-C8	34.90	989793-C4	39.40
	.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	850093	35.90	850093-C8	42.10		
	.100		.1000	**.300** (3x)	3	1/8	1-1/2	989800	28.70	989800-C8	34.90		
NEW	.109 (7/64)		.1094	**.327** (3x)	3	1/8	1-1/2	989802	29.40	989802-C8	34.10		
		3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	977557	28.90	977557-C8	34.90		

	D1 +.000″ −.002″	decimal equivalent	L2 +.030″ −.000″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.125 (1/8)	.1250	**.187** (1.5x)	3	1/8	1-1/2	958208	28.70	958208-C8	34.90		
NEW	.125 (1/8)	.1250	**.375** (3x)	3	1/8	1-1/2	989808	28.70	989808-C8	34.90	989808-C4	39.40
	.125 (1/8)	.1250	**.625** (5x)	3	1/8	2-1/2	850108	35.90	850108-C8	42.10		
	.156 (5/32)	.1562	**.235** (1.5x)	3	3/16	2	958210	29.70	958210-C8	35.90		
	.156 (5/32)	.1562	**.470** (3x)	3	3/16	2	989810	29.70	989810-C8	35.90		
	.187 (3/16)	.1875	**.285** (1.5x)	3	3/16	2	958212	29.70	958212-C8	35.90		
NEW	.187 (3/16)	.1875	**.562** (3x)	3	3/16	2	989812	29.70	989812-C8	35.90	989812-C4	44.40
	.250 (1/4)	.2500	**.375** (1.5x)	3	1/4	2-1/2	958216	35.40	958216-C8	42.10		
NEW	.250 (1/4)	.2500	**.750** (3x)	3	1/4	2-1/2	989816	35.40	989816-C8	42.10	989816-C4	52.10

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 160

★★★★★

"#HarveyTool plastic cutting end mills FTW. Love the finish these leave. We were having some wall and floor finish issues using 2 flute aluminum endmills. Gave these a try and problem fixed. Also, the feeds and speeds recommendations on the site worked out perfect."

— @jcmfginc

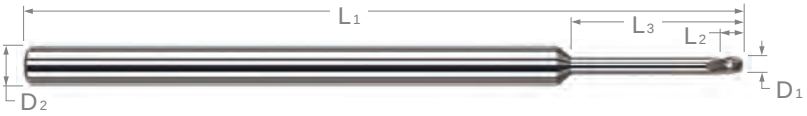
Follow us on Instagram @harveytool!

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) improves performance in off-center contour milling applications
- Reduced neck diameter to avoid heeling
- Ball end for profiling
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIA.			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.015 (1/64)		.0150	.022	**.078** (5x)	3	1/8	2-1/2	947015	45.70	947015-C8	51.90			
.015 (1/64)		.0150	.022	**.125** (8x)	3	1/8	2-1/2	54415	53.10	54415-C8	59.30			
.020			.030	**.100** (5x)	3	1/8	2-1/2	947020	49.10	947020-C8	55.30			NEW
.020			.030	**.160** (8x)	3	1/8	2-1/2	54420	50.10	54420-C8	56.30			NEW
.025			.037	**.125** (5x)	3	1/8	2-1/2	947025	47.90	947025-C8	54.10			NEW
.025			.037	**.203** (8x)	3	1/8	2-1/2	54425	48.90	54425-C8	55.10			NEW
.031 (1/32)		.0310	.046	**.156** (5x)	3	1/8	2-1/2	947031	45.10	947031-C8	51.30			
.031 (1/32)		.0310	.046	**.250** (8x)	3	1/8	2-1/2	54431	45.70	54431-C8	51.90	54431-C4	56.40	
.031 (1/32)		.0310	.046	**.312** (10x)	3	1/8	2-1/2	925131	48.50	925131-C8	54.70			
.031 (1/32)		.0310	.046	**.375** (12x)	3	1/8	2-1/2	879431	52.10	879431-C8	58.30			NEW
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	851322	50.70	851322-C8	57.20			
.047 (3/64)		.0470	.070	**.250** (5x)	3	1/8	2-1/2	947047	45.10	947047-C8	51.30			
.047 (3/64)		.0470	.070	**.375** (8x)	3	1/8	2-1/2	54447	45.70	54447-C8	51.90	54447-C4	56.40	
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	947062	45.10	947062-C8	51.30			
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	54462	45.70	54462-C8	51.90	54462-C4	56.40	
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	925162	48.50	925162-C8	54.70			
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879462	50.80	879462-C8	57.10			NEW
.078 (5/64)		.0780	.117	**.406** (5x)	3	1/8	2-1/2	947078	45.10	947078-C8	51.30			
.078 (5/64)		.0780	.117	**.625** (8x)	3	1/8	2-1/2	54478	45.70	54478-C8	51.90	54478-C4	56.40	
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	851345	45.70	851345-C8	52.20			
.093 (3/32)		.0930	.139	**.500** (5x)	3	1/8	2-1/2	947093	45.10	947093-C8	51.30			
.093 (3/32)		.0930	.139	**.750** (8x)	3	1/8	2-1/2	54493	45.70	54493-C8	51.90	54493-C4	56.40	
.093 (3/32)		.0930	.139	**.950** (10x)	3	1/8	2-1/2	925193	48.50	925193-C8	54.70			
.093 (3/32)		.0930	.139	**1.125** (12x)	3	1/8	2-1/2	879493	52.10	879493-C8	58.60			NEW
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	851357	50.70	851357-C8	57.20			

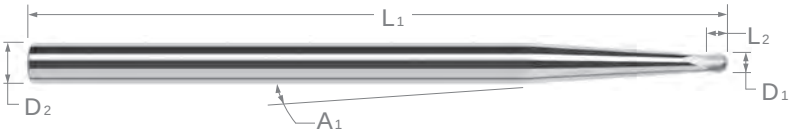
D1 +.000″ −.002″	decimal equivalent	L2 +.030″ −.000″	L3 +.030″ −.000″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	947108	44.20	947108-C8	50.40			
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	54508	45.10	54508-C8	51.30	54508-C4	55.80	
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	925208	48.50	925208-C8	54.70			
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879508	50.80	879508-C8	57.10			NEW
.156 (5/32)	.1562	.234	**.750** (5x)	3	3/16	3	947110	49.90	947110-C8	56.10			
.156 (5/32)	.1562	.234	**1.250** (8x)	3	3/16	3	54510	50.10	54510-C8	56.30			
.187 (3/16)	.1875	.281	**1.000** (5x)	3	3/16	3	947112	49.90	947112-C8	56.10			
.187 (3/16)	.1875	.281	**1.500** (8x)	3	3/16	3	54512	50.40	54512-C8	56.60	54512-C4	64.30	
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	947116	51.70	947116-C8	59.20			
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	54516	52.70	54516-C8	60.20	54516-C4	69.40	

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 162

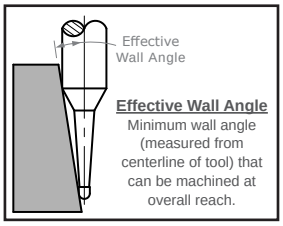
HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters)



Excellent in Aluminum & Other Non-Ferrous Materials

- Very short length of cut and solid tapered neck for maximum rigidity
- 1°, 1.5°, 3°, 5°, and 7° neck angles to address common draft angles for molds
- 45° helix, large flute valley, and sharper cutting edge for faster chip removal and better finish
- Offered with TiB_2 coating to minimize galling and enhance performance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 +0°00′ −0°30′	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
1°	.062 (1/16)	.050	I	.500	**.595**	6.3°	3/16	2	925049	45.90	925049-C8	52.10
	.062 (1/16)	.050	I	1.000	**1.080**	3.4°	3/16	2-1/2	925056	45.90	925056-C8	52.10
	.093 (3/32)	.074	I	.750	**.811**	3.5°	3/16	2	925070	43.50	925070-C8	49.70
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	925072	45.40	925072-C8	51.60
	.125 (1/8)	.100	I	1.000	**1.027**	1.8°	3/16	2	925091	55.50	925091-C8	61.70
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	925077	57.40	925077-C8	63.60
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	925087	57.90	925087-C8	65.40
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	925092	61.90	925092-C8	79.10
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	997807	51.40	997807-C8	57.60
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	997814	51.40	997814-C8	57.60
	.031 (1/32)	.025	I	.250	**.375**	12.2°	3/16	2	997821	47.20	997821-C8	53.40
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	997828	47.20	997828-C8	53.40
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	997835	46.50	997835-C8	52.70
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	997842	46.50	997842-C8	52.70
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	997849	45.90	997849-C8	52.10
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	997856	45.90	997856-C8	52.10
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	997863	44.40	997863-C8	50.60
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	997870	43.50	997870-C8	49.70
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	997877	55.50	997877-C8	61.70
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	997887	56.10	997887-C8	62.80
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	997892	60.10	997892-C8	74.30

SPEEDS & FEEDS ONLINE!

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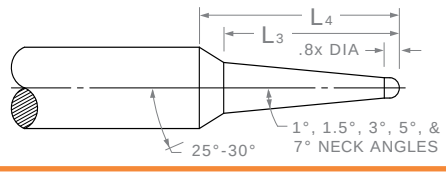
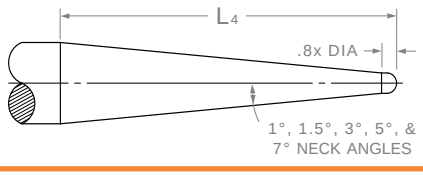
TYPE I



TYPE II



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters) (cont.)

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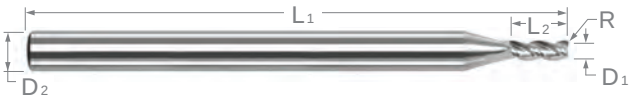
NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
3°	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	996607	48.40	996607-C8	54.60
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	996614	48.40	996614-C8	54.60
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	996621	45.70	996621-C8	51.90
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	996628	45.70	996628-C8	51.90
	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	996635	45.70	996635-C8	51.90
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	996642	45.70	996642-C8	51.90
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	996649	44.40	996649-C8	50.60
	.093 (3/32)	.074	II	.976	**.976**	2.9°	3/16	2	996656	40.10	996656-C8	46.30
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	996663	55.50	996663-C8	62.20
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	996670	60.10	996670-C8	66.80
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	996674	62.50	996674-C8	82.70
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	996692	61.20	996692-C8	78.40
5°	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	996007	44.10	996007-C8	50.30
	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	996014	44.10	996014-C8	50.30
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	996021	41.40	996021-C8	47.60
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	996028	57.40	996028-C8	64.10
	.093 (3/32)	.074	II	.971	**.971**	4.9°	1/4	2-1/2	996035	57.40	996035-C8	64.10
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	996042	59.70	996042-C8	66.40
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	996087	61.20	996087-C8	78.40
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	996092	61.20	996092-C8	78.40
7°	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	995607	44.10	995607-C8	50.30
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	995614	44.10	995614-C8	50.30
	.062 (1/16)	.050	II	.816	**.816**	6.9°	1/4	2-1/2	995621	57.40	995621-C8	64.10
	.078 (5/64)	.062	II	.762	**.762**	6.8°	1/4	2-1/2	995628	57.40	995628-C8	64.10
	.093 (3/32)	.074	II	.713	**.713**	6.7°	1/4	2-1/2	995635	54.50	995635-C8	61.20
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	995642	51.90	995642-C8	58.60
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	995687	61.20	995687-C8	78.40

SPEEDS & FEEDS ONLINE!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

TiB_2 Titanium Diboride	Best used in Non-Abrasive Aluminum Alloys and Magnesium Alloys! Extremely low affinity to aluminum. Prevents build-up on cutting edge and chip packing, extending tool life.
Amorphous Diamond	Outstanding performance in Copper, Brass, Bronze and High Silicon Aluminum! Improves wear resistance and lubricity. Thin film coating maintains sharp edge, improving performance and finish.

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
		.2 mm	.0078	.30 mm (1.5x)	**.03 mm**	3	4 mm	50 mm	986204	46.40	986204-C8	52.90		
		.2 mm	.0078	.60 mm (3x)	**.03 mm**	3	4 mm	50 mm	973504	46.40	973504-C8	52.90		
NEW	.010		.0100	.030 (3x)	**.002**	3	1/8	1-1/2	50010	38.40	50010-C8	44.90		
		.3 mm	.0118	.90 mm (3x)	**.05 mm**	3	4 mm	50 mm	973506	45.10	973506-C8	51.60		
	.015 (1/64)		.0150	.022 (1.5x)	**.002**	3	1/8	1-1/2	61715	35.90	61715-C8	42.10		
	.015 (1/64)		.0150	.045 (3x)	**.002**	3	1/8	1-1/2	50015	35.90	50015-C8	42.10	50015-C4	46.60
	.015 (1/64)		.0150	.078 (5x)	**.002**	3	1/8	2-1/2	53015	42.70	53015-C8	48.90	53015-C4	53.40
		.4 mm	.0157	.60 mm (1.5x)	**.05 mm**	3	4 mm	50 mm	986209	37.90	986209-C8	44.40		
		.4 mm	.0157	1.20 mm (3x)	**.05 mm**	3	4 mm	50 mm	973509	37.90	973509-C8	44.40		
		.5 mm	.0196	.75 mm (1.5x)	**.05 mm**	3	4 mm	50 mm	986211	33.50	986211-C8	40.10		
		.5 mm	.0196	1.50 mm (3x)	**.05 mm**	3	4 mm	50 mm	973511	33.50	973511-C8	40.10		
	.020		.0200	.030 (1.5x)	**.002**	3	1/8	1-1/2	61720	30.90	61720-C8	37.10		
	.020		.0200	.060 (3x)	**.002**	3	1/8	1-1/2	50020	30.90	50020-C8	37.10	50020-C4	41.60
	.020		.0200	.100 (5x)	**.002**	3	1/8	2-1/2	53020	37.70	53020-C8	43.90	53020-C4	48.40
		.6 mm	.0236	.90 mm (1.5x)	**.05 mm**	3	4 mm	50 mm	986213	32.10	986213-C8	38.60		
		.6 mm	.0236	1.80 mm (3x)	**.05 mm**	3	4 mm	50 mm	973513	32.10	973513-C8	38.60		
	.025		.0250	.038 (1.5x)	**.002**	3	1/8	1-1/2	61725	29.70	61725-C8	35.50		
	.025		.0250	.075 (3x)	**.002**	3	1/8	1-1/2	50025	29.70	50025-C8	35.50	50025-C4	40.40
	.025		.0250	.125 (5x)	**.002**	3	1/8	2-1/2	53025	36.50	53025-C8	42.70	53025-C4	47.20
		.7 mm	.0275	2.10 mm (3x)	**.08 mm**	3	4 mm	50 mm	973515	32.10	973515-C8	38.60		
	.031 (1/32)		.0310	.047 (1.5x)	**.003**	3	1/8	1-1/2	61731	24.70	61731-C8	30.50		
	.031 (1/32)		.0310	.093 (3x)	**.003**	3	1/8	1-1/2	50031	24.70	50031-C8	30.50	50031-C4	35.40
	.031 (1/32)		.0310	.156 (5x)	**.003**	3	1/8	2-1/2	53031	31.20	53031-C8	37.40	53031-C4	41.90
	.031 (1/32)		.0310	.093 (3x)	**.005**	3	1/8	1-1/2	901531	24.50	901531-C8	30.30		
	.031 (1/32)		.0310	.093 (3x)	**.010**	3	1/8	1-1/2	904631	24.50	904631-C8	30.30		
		.8 mm	.0314	1.20 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	986218	27.10	986218-C8	33.60		
		.8 mm	.0314	2.40 mm (3x)	**.08 mm**	3	4 mm	50 mm	973518	27.10	973518-C8	33.60		
	.035		.0350	.053 (1.5x)	**.003**	3	1/8	1-1/2	61735	24.70	61735-C8	30.50		
	.035		.0350	.105 (3x)	**.003**	3	1/8	1-1/2	50035	24.70	50035-C8	30.50		
		.9 mm	.0354	2.7 mm (3x)	**.08 mm**	3	4 mm	50 mm	973520	27.10	973520-C8	33.60		
		1.0 mm	.0393	1.50 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	986222	27.10	986222-C8	33.60		
		1.0 mm	.0393	3.00 mm (3x)	**.08 mm**	3	4 mm	50 mm	973522	27.10	973522-C8	33.60		

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.040		.0400	.060 (1.5x)	**.003**	3	1/8	1-1/2	61740	24.70	61740-C8	30.50			
.040		.0400	.120 (3x)	**.003**	3	1/8	1-1/2	50040	24.70	50040-C8	30.50			
.040		.0400	.203 (5x)	**.003**	3	1/8	2-1/2	53040	31.20	53040-C8	37.40			
	1.1 mm	.0433	3.00 mm (3x)	**.08 mm**	3	4 mm	50 mm	973524	27.10	973524-C8	33.60			
.045		.0450	.135 (3x)	**.003**	3	1/8	1-1/2	50045	24.70	50045-C8	30.50			
.047 (3/64)		.0470	.070 (1.5x)	**.003**	3	1/8	1-1/2	61747	24.70	61747-C8	30.50			
.047 (3/64)		.0470	.141 (3x)	**.003**	3	1/8	1-1/2	50047	24.70	50047-C8	30.50	50047-C4	35.40	
.047 (3/64)		.0470	.250 (5x)	**.003**	3	1/8	2-1/2	53047	31.20	53047-C8	37.40	53047-C4	41.90	
.047 (3/64)		.0470	.141 (3x)	**.005**	3	1/8	1-1/2	901547	24.50	901547-C8	30.30			
.047 (3/64)		.0470	.141 (3x)	**.010**	3	1/8	1-1/2	904647	24.50	904647-C8	30.30			
.047 (3/64)		.0470	.141 (3x)	**.015**	3	1/8	1-1/2	912347	24.50	912347-C8	30.30			
	1.2 mm	.0472	1.80 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	986227	27.10	986227-C8	33.60			
	1.2 mm	.0472	3.50 mm (3x)	**.08 mm**	3	4 mm	50 mm	973527	27.10	973527-C8	33.60			
.050		.0500	.075 (1.5x)	**.003**	3	1/8	1-1/2	61750	24.50	61750-C8	30.30			
.050		.0500	.150 (3x)	**.003**	3	1/8	1-1/2	50050	24.50	50050-C8	30.30			
.050		.0500	.250 (5x)	**.003**	3	1/8	2-1/2	53050	31.20	53050-C8	37.40			
	1.3 mm	.0511	4.00 mm (3x)	**.08 mm**	3	4 mm	50 mm	973529	27.10	973529-C8	33.60			
.055		.0550	.083 (1.5x)	**.003**	3	1/8	1-1/2	61755	24.50	61755-C8	30.30			
.055		.0550	.165 (3x)	**.003**	3	1/8	1-1/2	50055	24.50	50055-C8	30.30			
.055		.0550	.275 (5x)	**.003**	3	1/8	2-1/2	53055	31.20	53055-C8	37.40			
	1.4 mm	.0551	2.10 mm (1.5x)	**.08 mm**	3	4 mm	50 mm	986231	27.10	986231-C8	33.60			
	1.4 mm	.0551	4.00 mm (3x)	**.08 mm**	3	4 mm	50 mm	973531	27.10	973531-C8	33.60			
	1.5 mm	.0590	2.20 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	986233	25.10	986233-C8	31.60			
	1.5 mm	.0590	4.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	973533	25.10	973533-C8	31.60			
.060		.0600	.090 (1.5x)	**.005**	3	1/8	1-1/2	61760	24.50	61760-C8	30.30			
.060		.0600	.180 (3x)	**.005**	3	1/8	1-1/2	50060	24.50	50060-C8	30.30			
.060		.0600	.312 (5x)	**.005**	3	1/8	2-1/2	53060	31.20	53060-C8	37.40			
.060		.0600	.180 (3x)	**.010**	3	1/8	1-1/2	904660	31.20	904660-C8	37.40			NEW
.062 (1/16)		.0620	.093 (1.5x)	**.005**	3	1/8	1-1/2	61762	22.70	61762-C8	28.50	61762-C4	33.40	
.062 (1/16)		.0620	.186 (3x)	**.005**	3	1/8	1-1/2	50062	22.70	50062-C8	28.50	50062-C4	33.40	
.062 (1/16)		.0620	.312 (5x)	**.005**	3	1/8	2-1/2	53062	29.50	53062-C8	35.70	53062-C4	40.20	
.062 (1/16)		.0620	.093 (1.5x)	**.010**	3	1/8	1-1/2	878562	23.50	878562-C8	29.70			NEW
.062 (1/16)		.0620	.186 (3x)	**.010**	3	1/8	1-1/2	904662	22.70	904662-C8	28.50			
.062 (1/16)		.0620	.186 (3x)	**.015**	3	1/8	1-1/2	912362	22.70	912362-C8	28.50			
.062 (1/16)		.0620	.186 (3x)	**.020**	3	1/8	1-1/2	925862	22.70	925862-C8	28.50			
	1.6 mm	.0629	2.40 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	986236	25.10	986236-C8	31.60			
	1.6 mm	.0629	5.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	973536	25.10	973536-C8	31.60			
	1.7 mm	.0669	5.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	973538	25.10	973538-C8	31.60			
.070		.0700	.210 (3x)	**.005**	3	1/8	1-1/2	50070	23.20	50070-C8	29.10			
	1.8 mm	.0708	2.70 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	986240	25.10	986240-C8	31.60			
	1.8 mm	.0708	5.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	973540	25.10	973540-C8	31.60			

SPEEDS & FEEDS ONLINE!

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
	D1 +.0005″ −.0005″	D1 +.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
		1.9 mm	.0748	5.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	973542	25.10	973542-C8	31.60		
	.078 (5/64)		.0780	.117 (1.5x)	**.005**	3	1/8	1-1/2	61778	22.70	61778-C8	28.50	61778-C4	33.40
	.078 (5/64)		.0780	.234 (3x)	**.005**	3	1/8	1-1/2	50078	22.70	50078-C8	28.50	50078-C4	33.40
	.078 (5/64)		.0780	.406 (5x)	**.005**	3	1/8	2-1/2	53078	29.50	53078-C8	35.70	53078-C4	40.20
NEW	.078 (5/64)		.0780	.117 (1.5x)	**.010**	3	1/8	1-1/2	878578	23.50	878578-C8	29.70		
	.078 (5/64)		.0780	.234 (3x)	**.010**	3	1/8	1-1/2	904678	22.70	904678-C8	28.50		
	.078 (5/64)		.0780	.234 (3x)	**.015**	3	1/8	1-1/2	912378	22.70	912378-C8	28.50		
	.078 (5/64)		.0780	.234 (3x)	**.020**	3	1/8	1-1/2	925878	22.70	925878-C8	28.50		
		2.0 mm	.0787	3.00 mm (1.5x)	**.10 mm**	3	4 mm	50 mm	986245	25.10	986245-C8	31.60		
		2.0 mm	.0787	6.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	973545	25.10	973545-C8	31.60		
	.080		.0800	.240 (3x)	**.005**	3	1/8	1-1/2	50080	23.20	50080-C8	29.10		
	.090		.0900	.270 (3x)	**.005**	3	1/8	1-1/2	50090	23.20	50090-C8	29.10		
	.093 (3/32)		.0930	.139 (1.5x)	**.005**	3	1/8	1-1/2	61793	22.70	61793-C8	28.50	61793-C4	33.40
	.093 (3/32)		.0930	.279 (3x)	**.005**	3	1/8	1-1/2	50093	22.70	50093-C8	28.50	50093-C4	33.40
	.093 (3/32)		.0930	.500 (5x)	**.005**	3	1/8	2-1/2	53093	29.50	53093-C8	35.70	53093-C4	40.20
NEW	.093 (3/32)		.0930	.139 (1.5x)	**.010**	3	1/8	1-1/2	878593	23.50	878593-C8	29.70		
	.093 (3/32)		.0930	.279 (3x)	**.010**	3	1/8	1-1/2	904693	22.70	904693-C8	28.50		
	.093 (3/32)		.0930	.279 (3x)	**.015**	3	1/8	1-1/2	912393	22.70	912393-C8	28.50		
NEW	.093 (3/32)		.0930	.139 (1.5x)	**.020**	3	1/8	1-1/2	889493	23.50	889493-C8	29.70		
	.093 (3/32)		.0930	.279 (3x)	**.020**	3	1/8	1-1/2	925893	22.70	925893-C8	28.50		
NEW	.093 (3/32)		.0930	.139 (1.5x)	**.030**	3	1/8	1-1/2	893893	23.50	893893-C8	29.70		
	.093 (3/32)		.0930	.279 (3x)	**.030**	3	1/8	1-1/2	904193	22.70	904193-C8	28.50		
		2.5 mm	.0984	7.50 mm (3x)	**.10 mm**	3	4 mm	50 mm	973551	25.10	973551-C8	31.60		
	.100		.1000	.150 (1.5x)	**.005**	3	1/8	1-1/2	61800	22.70	61800-C8	28.50		
	.100		.1000	.300 (3x)	**.005**	3	1/8	1-1/2	50100	22.70	50100-C8	28.50		
		3.0 mm	.1181	9.00 mm (3x)	**.10 mm**	3	4 mm	50 mm	973557	25.10	973557-C8	31.60		

	D1 +.000″ −.002″	decimal equivalent	L2 +.030″ −.000″	R +.001″ −.001″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.125 (1/8)	.1250	.187 (1.5x)	**.005**	3	1/8	1-1/2	61808	22.70	61808-C8	28.50	61808-C4	33.40
	.125 (1/8)	.1250	.375 (3x)	**.005**	3	1/8	1-1/2	50108	22.70	50108-C8	28.50	50108-C4	33.40
	.125 (1/8)	.1250	.625 (5x)	**.005**	3	1/8	2-1/2	53108	29.50	53108-C8	35.70	53108-C4	40.20
NEW	.125 (1/8)	.1250	.187 (1.5x)	**.010**	3	1/8	1-1/2	878608	23.50	878608-C8	29.70		
	.125 (1/8)	.1250	.375 (3x)	**.010**	3	1/8	1-1/2	904708	22.70	904708-C8	28.50		
	.125 (1/8)	.1250	.375 (3x)	**.015**	3	1/8	1-1/2	912408	22.70	912408-C8	28.50		
NEW	.125 (1/8)	.1250	.187 (1.5x)	**.020**	3	1/8	1-1/2	889508	25.70	889508-C8	31.90		
	.125 (1/8)	.1250	.375 (3x)	**.020**	3	1/8	1-1/2	925908	22.70	925908-C8	28.50		
NEW	.125 (1/8)	.1250	.187 (1.5x)	**.030**	3	1/8	1-1/2	893908	25.70	893908-C8	31.90		
	.125 (1/8)	.1250	.375 (3x)	**.030**	3	1/8	1-1/2	904208	22.70	904208-C8	28.50		
NEW	.125 (1/8)	.1250	.375 (3x)	**.040**	3	1/8	1-1/2	892808	25.70	892808-C8	31.90		
	.156 (5/32)	.1562	.235 (1.5x)	**.005**	3	3/16	2	61810	23.70	61810-C8	29.90		
	.156 (5/32)	.1562	.470 (3x)	**.005**	3	3/16	2	50110	23.70	50110-C8	29.90	50110-C4	38.40
	.156 (5/32)	.1562	.750 (5x)	**.005**	3	3/16	3	53110	32.50	53110-C8	38.70		
	.187 (3/16)	.1875	.285 (1.5x)	**.005**	3	3/16	2	61812	23.70	61812-C8	29.90	61812-C4	38.40
	.187 (3/16)	.1875	.562 (3x)	**.005**	3	3/16	2	50112	23.70	50112-C8	29.90	50112-C4	38.40
	.187 (3/16)	.1875	1.000 (5x)	**.005**	3	3/16	3	53112	32.50	53112-C8	38.70	53112-C4	44.10

SPEEDS & FEEDS ONLINE!

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.187 (3/16)	.1875	.562 (3x)	**.010**	3	3/16	2	904712	35.20	904712-C8	41.40			NEW
.187 (3/16)	.1875	.562 (3x)	**.015**	3	3/16	2	912412	35.20	912412-C8	41.40			NEW
.187 (3/16)	.1875	.562 (3x)	**.020**	3	3/16	2	925912	35.20	925912-C8	41.40			NEW
.187 (3/16)	.1875	.562 (3x)	**.030**	3	3/16	2	904212	35.20	904212-C8	41.40			NEW
.250 (1/4)	.2500	.750 (3x)	**.005**	3	1/4	2-1/2	901616	31.20	901616-C8	37.40			NEW
.250 (1/4)	.2500	.375 (1.5x)	**.010**	3	1/4	2-1/2	61816	29.40	61816-C8	36.10	61816-C4	46.10	
.250 (1/4)	.2500	.750 (3x)	**.010**	3	1/4	2-1/2	50116	29.40	50116-C8	36.10	50116-C4	46.10	
.250 (1/4)	.2500	1.250 (5x)	**.010**	3	1/4	4	53116	39.70	53116-C8	47.20	53116-C4	56.40	
.250 (1/4)	.2500	.750 (3x)	**.015**	3	1/4	2-1/2	912416	31.20	912416-C8	37.90			NEW
.250 (1/4)	.2500	.750 (3x)	**.020**	3	1/4	2-1/2	925916	31.20	925916-C8	37.90			NEW
.250 (1/4)	.2500	.750 (3x)	**.030**	3	1/4	2-1/2	904216	31.20	904216-C8	37.90			NEW

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix for Aluminum & Non-Ferrous Alloys)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x increase to 115%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00023	.00048	.00072	.00095	.00120	.00143	.00193	.00288	.00385
	Magnesium Alloys: All alloys	1500	Finishing	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413
	Zinc Alloys: All alloys	800	Max	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	500	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500			**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .5x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia				
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550										
TiB$_2$	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00030	.00062	.00094	.00124	.00156	.00186	.00250	.00374	.00501
	Magnesium Alloys: All alloys	2000	Finishing	.00032	.00066	.00101	.00133	.00167	.00199	.00268	.00401	.00536
	Zinc Alloys: All alloys	1100	Max	.00034	.00071	.00108	.00142	.00178	.00213	.00286	.00428	.00572
					Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .5x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia				
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00025	.00053	.00080	.00105	.00132	.00158	.00212	.00317	.00424
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00027	.00056	.00085	.00113	.00142	.00169	.00227	.00339	.00454
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00029	.00060	.00091	.00120	.00151	.00180	.00242	.00362	.00484
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	1500	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800			**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia				
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750										

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Small corner radius for improved strength
- 3 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

mm & in

	CUTTER DIAMETER			LENGTH OF CUT	CORNER RADIUS	OVERALL REACH		FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED	
	D1 +.0005″ −.0005″	D1 +.00mm −.02mm	D1 decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	R +.001″ −.001″ +.025mm −.025mm	L3 +.010″ −.000″ +.25mm −.00mm			D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE
	.015 (1/64)		.0150	.023	**.002**	.078	(5x)	3	1/8	2-1/2	956515	46.70	956515-C8	52.90
	.015 (1/64)		.0150	.023	**.002**	.125	(8x)	3	1/8	2-1/2	961315	47.90	961315-C8	54.10
	.020		.0200	.030	**.002**	.100	(5x)	3	1/8	2-1/2	956520	44.40	956520-C8	50.60
	.025		.0250	.038	**.002**	.125	(5x)	3	1/8	2-1/2	956525	43.20	956525-C8	49.40
	.031 (1/32)		.0310	.047	**.003**	.156	(5x)	3	1/8	2-1/2	956531	40.40	956531-C8	46.60
	.031 (1/32)		.0310	.047	**.003**	.250	(8x)	3	1/8	2-1/2	961331	41.40	961331-C8	47.60
	.031 (1/32)		.0310	.047	**.003**	.312	(10x)	3	1/8	2-1/2	861031	42.90	861031-C8	49.10
	.031 (1/32)		.0310	.047	**.003**	.375	(12x)	3	1/8	2-1/2	949631	43.90	949631-C8	50.10
NEW	.031 (1/32)		.0310	.047	**.010**	.250	(8x)	3	1/8	2-1/2	876231	41.40	876231-C8	47.60
		1.0 mm	.0393	1.50 mm	**.08 mm**	5.0 mm	(5x)	3	4 mm	50 mm	907622	42.90	907622-C8	49.40
	.040		.0400	.060	**.003**	.203	(5x)	3	1/8	2-1/2	956540	40.70	956540-C8	46.90
	.040		.0400	.060	**.003**	.325	(8x)	3	1/8	2-1/2	961340	41.40	961340-C8	47.60
	.047 (3/64)		.0470	.071	**.003**	.250	(5x)	3	1/8	2-1/2	956547	40.40	956547-C8	46.60
	.047 (3/64)		.0470	.071	**.003**	.375	(8x)	3	1/8	2-1/2	961347	41.40	961347-C8	47.60
	.047 (3/64)		.0470	.071	**.003**	.570	(12x)	3	1/8	2-1/2	949647	43.90	949647-C8	50.10
NEW	.047 (3/64)		.0470	.071	**.010**	.375	(8x)	3	1/8	2-1/2	876247	41.40	876247-C8	47.60
	.062 (1/16)		.0620	.093	**.005**	.312	(5x)	3	1/8	2-1/2	956562	40.40	956562-C8	46.60
	.062 (1/16)		.0620	.093	**.005**	.500	(8x)	3	1/8	2-1/2	961362	41.40	961362-C8	47.60
	.062 (1/16)		.0620	.093	**.005**	.625	(10x)	3	1/8	2-1/2	861062	42.90	861062-C8	49.10
	.062 (1/16)		.0620	.093	**.005**	.750	(12x)	3	1/8	2-1/2	949662	43.90	949662-C8	50.10
NEW	.062 (1/16)		.0620	.093	**.005**	.950	(12x)	3	1/8	2-1/2	886862	43.90	886862-C8	50.10
NEW	.062 (1/16)		.0620	.093	**.010**	.500	(8x)	3	1/8	2-1/2	876262	41.40	876262-C8	47.60
	.078 (5/64)		.0780	.118	**.005**	.406	(5x)	3	1/8	2-1/2	956578	40.40	956578-C8	46.60
	.078 (5/64)		.0780	.118	**.005**	.625	(8x)	3	1/8	2-1/2	961378	41.40	961378-C8	47.60
	.078 (5/64)		.0780	.118	**.005**	.940	(12x)	3	1/8	2-1/2	949678	43.90	949678-C8	50.10
NEW	.078 (5/64)		.0780	.118	**.010**	.625	(8x)	3	1/8	2-1/2	876278	41.40	876278-C8	47.60
		2.0 mm	.0787	3.00 mm	**.10 mm**	10.0 mm	(5x)	3	4 mm	50 mm	907645	42.90	907645-C8	49.40
	.093 (3/32)		.0930	.140	**.005**	.500	(5x)	3	1/8	2-1/2	956593	40.40	956593-C8	46.60
	.093 (3/32)		.0930	.140	**.005**	.750	(8x)	3	1/8	2-1/2	961393	41.40	961393-C8	47.60
	.093 (3/32)		.0930	.140	**.005**	.950	(10x)	3	1/8	2-1/2	861093	42.90	861093-C8	49.10
	.093 (3/32)		.0930	.140	**.005**	1.125	(12x)	3	1/8	2-1/2	949693	43.90	949693-C8	50.10
NEW	.093 (3/32)		.0930	.140	**.005**	1.400	(15x)	3	1/8	3	886893	46.20	886893-C8	52.40
NEW	.093 (3/32)		.0930	.140	**.010**	.750	(8x)	3	1/8	2-1/2	876293	41.40	876293-C8	47.60
NEW	.093 (3/32)		.0930	.140	**.030**	.750	(8x)	3	1/8	2-1/2	891893	41.40	891893-C8	47.60
		3.0 mm	.1181	4.50 mm	**.10 mm**	15.0 mm	(5x)	3	4 mm	50 mm	907657	40.40	907657-C8	46.90

SPEEDS & FEEDS ONLINE!

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER		LENGTH OF CUT	CORNER RADIUS	OVERALL REACH		FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	R +.001″ −.001″	L_3 +.030″ −.000″			D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	
.125 (1/8)	.1250	.187	**.005**	.625	(5x)	3	1/8	2-1/2	956608	39.70	956608-C8	45.90	
.125 (1/8)	.1250	.187	**.005**	1.000	(8x)	3	1/8	2-1/2	961408	40.70	961408-C8	46.90	
.125 (1/8)	.1250	.187	**.005**	1.250	(10x)	3	1/8	2-1/2	861108	42.90	861108-C8	49.10	
.125 (1/8)	.1250	.187	**.005**	1.500	(12x)	3	1/8	3	949708	43.90	949708-C8	50.10	
.125 (1/8)	.1250	.187	**.005**	1.875	(15x)	3	1/8	3	886908	46.20	886908-C8	52.40	NEW
.125 (1/8)	.1250	.187	**.010**	1.000	(8x)	3	1/8	2-1/2	876308	40.70	876308-C8	46.90	NEW
.125 (1/8)	.1250	.187	**.030**	1.000	(8x)	3	1/8	2-1/2	891908	40.70	891908-C8	46.90	NEW
.156 (5/32)	.1562	.235	**.005**	.750	(5x)	3	3/16	3	956610	44.70	956610-C8	50.90	
.156 (5/32)	.1562	.235	**.005**	1.250	(8x)	3	3/16	3	961410	45.90	961410-C8	52.10	
.187 (3/16)	.1875	.285	**.005**	1.000	(5x)	3	3/16	3	956612	44.70	956612-C8	50.90	
.187 (3/16)	.1875	.285	**.005**	1.500	(8x)	3	3/16	3	961412	45.90	961412-C8	52.10	
.187 (3/16)	.1875	.285	**.005**	2.250	(12x)	3	3/16	4	949712	57.20	949712-C8	63.90	
.250 (1/4)	.2500	.375	**.010**	1.250	(5x)	3	1/4	4	956616	46.70	956616-C8	54.20	
.250 (1/4)	.2500	.375	**.010**	2.000	(8x)	3	1/4	4	961416	47.70	961416-C8	55.20	
.250 (1/4)	.2500	.375	**.010**	3.000	(12x)	3	1/4	6	949716	60.10	949716-C8	70.80	

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Variable Helix – Long Reach, Stub Flute for Aluminum Alloys)

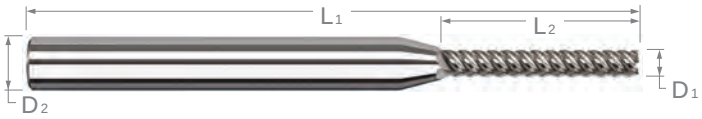
Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Magnesium Alloys: All alloys	1500	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Zinc Alloys: All alloys	800	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00013	.00026	.00040	.00052	.00066	.00079	.00106	.00158	.00211
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	Roughing	.00015	.00031	.00046	.00061	.00077	.00092	.00123	.00184	.00246
			Finishing	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Max	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00211	.00282
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia			
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550										
TiB2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00024	.00050	.00075	.00099	.00125	.00149	.00200	.00299	.00400
	Magnesium Alloys: All alloys	2000	Finishing	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Zinc Alloys: All alloys	1100	Max	.00027	.00057	.00086	.00113	.00143	.00170	.00229	.00342	.00458
						Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia		
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00014	.00029	.00044	.00058	.00072	.00086	.00116	.00174	.00232
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500	Roughing	.00016	.00034	.00051	.00067	.00085	.00101	.00136	.00203	.00271
			Finishing	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Max	.00019	.00038	.00058	.00077	.00097	.00115	.00155	.00232	.00310
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .3x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .3x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia		
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800										
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750										

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	66715	42.10	66715-C8	48.30
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	67115	42.70	67115-C8	48.90
.020		.0200	**.100** (5x)	4	1/8	2-1/2	66720	41.10	66720-C8	47.30
.020		.0200	**.160** (8x)	4	1/8	2-1/2	67120	42.40	67120-C8	48.60
.025		.0250	**.125** (5x)	4	1/8	2-1/2	66725	39.90	66725-C8	46.10
.025		.0250	**.203** (8x)	4	1/8	2-1/2	67125	40.90	67125-C8	47.10
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	948831	27.20	948831-C8	33.40
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	66731	38.10	66731-C8	44.30
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	67131	39.10	67131-C8	45.30
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	917631	49.90	917631-C8	56.10
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	915522	39.10	915522-C8	45.60
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	907122	40.40	907122-C8	46.90
.040		.0400	**.203** (5x)	5	1/8	2-1/2	66740	38.10	66740-C8	44.30
.040		.0400	**.325** (8x)	5	1/8	2-1/2	67140	39.10	67140-C8	45.30
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	948847	27.20	948847-C8	33.40
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	66747	38.10	66747-C8	44.30
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	67147	39.10	67147-C8	45.30
.050		.0500	**.250** (5x)	5	1/8	2-1/2	66750	38.10	66750-C8	44.30
.050		.0500	**.400** (8x)	5	1/8	2-1/2	67150	39.10	67150-C8	45.30
.060		.0600	**.312** (5x)	5	1/8	2-1/2	66760	35.40	66760-C8	41.60
.060		.0600	**.500** (8x)	5	1/8	2-1/2	67160	36.40	67160-C8	42.60
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	948862	25.40	948862-C8	31.60
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	66762	35.40	66762-C8	41.60
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	67162	36.40	67162-C8	42.60
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	917662	53.50	917662-C8	59.70
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	948878	25.40	948878-C8	31.60
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	66778	35.40	66778-C8	41.60
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	67178	36.40	67178-C8	42.60
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	915545	37.90	915545-C8	44.40
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	907145	39.10	907145-C8	45.60

SPEEDS & FEEDS ONLINE!

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	UNCOATED TOOL #	UNCOATED PRICE	TiB_2 COATED TOOL #	TiB_2 COATED PRICE
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	948893	25.40	948893-C8	31.60
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	66793	35.40	66793-C8	41.60
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	67193	36.40	67193-C8	42.60
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	917693	53.50	917693-C8	59.70
.100		.1000	**.500** (5x)	5	1/8	2-1/2	66800	35.40	66800-C8	41.60
.100		.1000	**.800** (8x)	5	1/8	2-1/2	67200	36.40	67200-C8	42.60
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	66802	35.40	66802-C8	41.60
.109 (7/64)		.1090	**.900** (8x)	5	1/8	2-1/2	67202	36.40	67202-C8	42.60
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	915557	37.90	915557-C8	44.40
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	907157	39.10	907157-C8	45.60

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	948908	23.70	948908-C8	29.90
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	66808	34.70	66808-C8	40.90
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	67208	35.70	67208-C8	41.90
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	917708	52.90	917708-C8	59.10
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	66810	37.10	66810-C8	43.30
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	67210	38.40	67210-C8	44.60
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	948912	27.90	948912-C8	34.10
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	66812	37.10	66812-C8	43.30
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	67212	38.40	67212-C8	44.60
.187 (3/16)	.1875	**1.875** (10x)	5	3/16	4	917712	53.70	917712-C8	60.40
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	948916	36.70	948916-C8	43.40
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	66816	45.10	66816-C8	52.60
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	67216	46.10	67216-C8	53.60

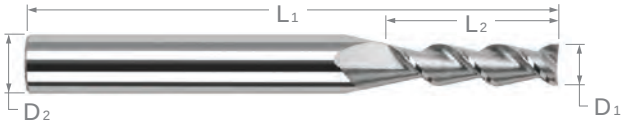
SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (High Helix Finisher for Aluminum & Non-Ferrous Alloys)

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT)	.015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Finishing (3x LOC)	.00027	.00056	.00085	.00112	.00140	.00167	.00225	.00337	.00450	.12x Dia	.5x - 3x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000												
	Magnesium Alloys: All alloys	1500												
	Zinc Alloys: All alloys	800												
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Finishing (5x LOC)	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.09x Dia	.5x - 5x Dia
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500												
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225												
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500												
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Finishing (8x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	.07x Dia	.5x - 8x Dia
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225												
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing (10x LOC)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.05x Dia	.5x - 10x Dia
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx) Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing (3x LOC)	.00035	.00073	.00110	.00145	.00183	.00218	.00293	.00438	.00585	.12x Dia	.5x - 3x Dia
		1400	Finishing (5x LOC)	.00026	.00054	.00082	.00109	.00137	.00163	.00219	.00328	.00439	.09x Dia	.5x - 5x Dia
	Magnesium Alloys: All alloys	2000	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia
	Zinc Alloys: All alloys	1100	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square



◄ *Down to .010"!*

- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

OUTSTANDING IN ALUMINUM!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.010	**.030** (3x)	1/8	1-1/2	24110	27.70			24110-C8	33.90
.015 (1/64)	**.045** (3x)	1/8	1-1/2	24115	26.90			24115-C8	33.10
.020	**.060** (3x)	1/8	1-1/2	24120	25.20			24120-C8	31.40
.025	**.075** (3x)	1/8	1-1/2	24125	23.50			24125-C8	29.70
.030	**.090** (3x)	1/8	1-1/2	24130	20.40			24130-C8	26.60
.031 (1/32)	**.093** (3x)	1/8	1-1/2	24131	20.40	24131-C7	25.20	24131-C8	26.60
.031 (1/32)	**.156** (5x)	1/8	2-1/2	932031	26.10			932031-C8	32.30
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	24139	20.40			24139-C8	26.60
.040	**.120** (3x)	1/8	1-1/2	24140	20.40	24140-C7	25.20	24140-C8	26.60
.040	**.203** (5x)	1/8	2-1/2	932040	26.10			932040-C8	32.30
.047 (3/64)	**.141** (3x)	1/8	1-1/2	24147	20.40	24147-C7	25.20	24147-C8	26.60
.047 (3/64)	**.250** (5x)	1/8	2-1/2	932047	26.10			932047-C8	32.30
.050	**.150** (3x)	1/8	1-1/2	24150	20.40	24150-C7	25.20	24150-C8	26.60
.050	**.250** (5x)	1/8	2-1/2	932050	26.10			932050-C8	32.30
.060	**.180** (3x)	1/8	1-1/2	24160	20.40	24160-C7	25.20	24160-C8	26.60
.060	**.312** (5x)	1/8	2-1/2	932060	26.90			932060-C8	33.10
.062 (1/16)	**.186** (3x)	1/8	1-1/2	24162	17.90	24162-C7	22.70	24162-C8	24.10
.062 (1/16)	**.312** (5x)	1/8	2-1/2	932062	26.90			932062-C8	33.10
.070	**.210** (3x)	1/8	1-1/2	24170	17.90	24170-C7	22.70	24170-C8	24.10
.078 (5/64)	**.234** (3x)	1/8	1-1/2	24178	17.90	24178-C7	22.70	24178-C8	24.10
.078 (5/64)	**.406** (5x)	1/8	2-1/2	932078	26.90			932078-C8	33.10
.080	**.240** (3x)	1/8	1-1/2	24180	17.90	24180-C7	22.70	24180-C8	24.10
.090	**.270** (3x)	1/8	1-1/2	24190	17.90	24190-C7	22.70	24190-C8	24.10
.093 (3/32)	**.279** (3x)	1/8	1-1/2	24193	17.90	24193-C7	22.70	24193-C8	24.10
.093 (3/32)	**.500** (5x)	1/8	2-1/2	932093	26.90			932093-C8	33.10
.100	**.300** (3x)	1/8	1-1/2	24199	17.90	24199-C7	22.70	24199-C8	24.10
NEW .109 (7/64)	**.327** (3x)	1/8	1-1/2	24202	26.90			24202-C8	33.10
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	24205	26.70			24205-C8	32.90

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	935608	17.10			935608-C8	23.30
.125 (1/8)	**.500** (4x)	1/8	1-1/2	24208	17.10	24208-C7	21.90	24208-C8	23.30
.125 (1/8)	**.625** (5x)	1/8	2-1/2	932108	22.10			932108-C8	28.30

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
.140 (9/64)	**.500** (3x)	3/16	2	24209	21.70			24209-C8	27.90	NEW
.156 (5/32)	**.235** (1.5x)	3/16	2	935610	19.40			935610-C8	25.60	
.156 (5/32)	**.562** (3x)	3/16	2	24210	19.40			24210-C8	25.60	
.156 (5/32)	**.750** (5x)	3/16	3	932110	21.70			932110-C8	27.90	NEW
.187 (3/16)	**.285** (1.5x)	3/16	2	935612	19.40			935612-C8	25.60	
.187 (3/16)	**.625** (3x)	3/16	2	24212	19.40	24212-C7	24.60	24212-C8	25.60	
.187 (3/16)	**1.000** (5x)	3/16	3	932112	21.70			932112-C8	27.90	NEW
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	935616	23.90			935616-C8	31.20	
.250 (1/4)	**.750** (3x)	1/4	2-1/2	24216	23.70	24216-C7	31.10	24216-C8	31.20	
.250 (1/4)	**1.250** (5x)	1/4	4	932116	27.10			932116-C8	34.60	NEW

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (45° Helix – 2 Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com

SERIES	MATERIAL	SFM
Uncoated	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	750
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	225
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550
	Magnesium Alloys	1500
	Zinc Alloys	800
ZrN	**Aluminum Alloys (High Silicon):**	
	Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000
	Wrought - 5% - 8% Si (4xxx)	2200
	Wrought - 8% - 12% Si (4xxx)	1700
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	800
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750
	Magnesium Alloys	2000
	Zinc Alloys	1100
TiB_2	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	1000
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400
	Magnesium Alloys	2000
	Zinc Alloys	1100

CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250
Roughing	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300
Finishing	.00025	.00038	.00050	.00062	.00074	.00100	.00150	.00200

Radial Depth of Cut*:
Slotting: 1x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Finishing: 1x - 3x Dia

CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER

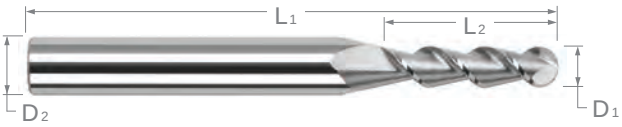
	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00039	.00059	.00078	.00098	.00116	.00156	.00234	.00313
Roughing	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Finishing	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250

Radial Depth of Cut*:
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Ball



- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

OUTSTANDING IN ALUMINUM!

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	.015 (1/64)	**.045** (3x)	1/8	1-1/2	27815	30.40			27815-C8	36.60
	.020	**.060** (3x)	1/8	1-1/2	27820	28.90			27820-C8	35.10
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	27831	23.50	27831-C7	28.30	27831-C8	29.70
NEW	.031 (1/32)	**.156** (5x)	1/8	2-1/2	887631	28.90			887631-C8	35.10
	.040	**.120** (3x)	1/8	1-1/2	27840	23.50	27840-C7	28.30	27840-C8	29.70
	.047 (3/64)	**.141** (3x)	1/8	1-1/2	27847	23.50	27847-C7	28.30	27847-C8	29.70
	.050	**.150** (3x)	1/8	1-1/2	27850	23.50	27850-C7	28.30	27850-C8	29.70
	.060	**.180** (3x)	1/8	1-1/2	27860	23.50	27860-C7	28.30	27860-C8	29.70
	.062 (1/16)	**.186** (3x)	1/8	1-1/2	27862	22.20	27862-C7	27.10	27862-C8	28.40
NEW	.062 (1/16)	**.312** (5x)	1/8	2-1/2	887662	28.90			887662-C8	35.10
	.070	**.210** (3x)	1/8	1-1/2	27870	22.20	27870-C7	27.10	27870-C8	28.40
	.078 (5/64)	**.234** (3x)	1/8	1-1/2	27878	22.20	27878-C7	27.10	27878-C8	28.40
	.080	**.240** (3x)	1/8	1-1/2	27880	22.20	27880-C7	27.10	27880-C8	28.40
	.090	**.270** (3x)	1/8	1-1/2	27890	22.20	27890-C7	27.10	27890-C8	28.40
	.093 (3/32)	**.279** (3x)	1/8	1-1/2	27893	22.20	27893-C7	27.10	27893-C8	28.40
NEW	.093 (3/32)	**.500** (5x)	1/8	2-1/2	887693	28.90			887693-C8	35.10
	.100	**.300** (3x)	1/8	1-1/2	27899	22.20	27899-C7	27.10	27899-C8	28.40
	.118 (3 mm)	**.354** (3x)	1/8	1-1/2	27905	30.20			27905-C8	36.40
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	.125 (1/8)	**.500** (4x)	1/8	1-1/2	27908	21.40	27908-C7	26.20	27908-C8	27.60
NEW	.125 (1/8)	**.625** (5x)	1/8	2-1/2	887708	26.60			887708-C8	32.80
	.156 (5/32)	**.562** (3x)	3/16	2	27910	23.20			27910-C8	29.40
	.187 (3/16)	**.625** (3x)	3/16	2	27912	23.20	27912-C7	28.40	27912-C8	29.40
	.250 (1/4)	**.750** (3x)	1/4	2-1/2	27916	26.20	27916-C7	33.60	27916-C8	34.30

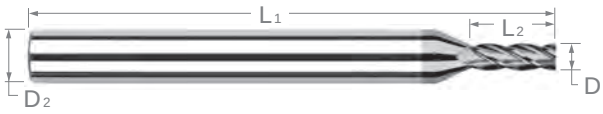
SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 166

Click Tool # for stock, speeds & feeds, & other technical info

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square



◀ *Outstanding in Graphite!*

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life up to 50x
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2	962715	77.90
.015 (1/64)	**.045** (3x)	1/8	1-1/2	995715	77.90
.015 (1/64)	**.078** (5x)	1/8	2-1/2	936615	88.10
.020	**.060** (3x)	1/8	1-1/2	995720	77.90
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	962731	77.90
.031 (1/32)	**.093** (3x)	1/8	1-1/2	995731	77.90
.031 (1/32)	**.156** (5x)	1/8	2-1/2	936631	88.10
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	995739	77.90
.040	**.120** (3x)	1/8	1-1/2	995740	77.90
.040	**.203** (5x)	1/8	2-1/2	936640	88.10
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	962747	77.90
.047 (3/64)	**.141** (3x)	1/8	1-1/2	995747	77.90
.047 (3/64)	**.250** (5x)	1/8	2-1/2	936647	88.10
.050	**.150** (3x)	1/8	1-1/2	995750	77.90
.050	**.250** (5x)	1/8	2-1/2	936650	88.10
.060	**.180** (3x)	1/8	1-1/2	995760	77.90
.060	**.312** (5x)	1/8	2-1/2	936660	88.10
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	962762	77.20
.062 (1/16)	**.186** (3x)	1/8	1-1/2	995762	77.20
.062 (1/16)	**.312** (5x)	1/8	2-1/2	936662	87.70
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2	962778	77.20
.078 (5/64)	**.234** (3x)	1/8	1-1/2	995778	77.20
.078 (5/64)	**.406** (5x)	1/8	2-1/2	936678	87.70
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	962793	77.20
.093 (3/32)	**.279** (3x)	1/8	1-1/2	995793	77.20
.093 (3/32)	**.500** (5x)	1/8	2-1/2	936693	87.70
.100	**.300** (3x)	1/8	1-1/2	995800	77.20
.109 (7/64)	**.327** (3x)	1/8	1-1/2	995802	77.20
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	995805	77.20

SPEEDS & FEEDS ONLINE!

continued on next page

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square (cont.)

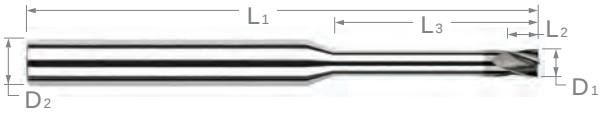
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	962808	78.50
.125 (1/8)	**.375** (3x)	1/8	1-1/2	995808	78.50
.125 (1/8)	**.625** (5x)	1/8	2-1/2	936708	88.10
.140 (9/64)	**.425** (3x)	3/16	2	995809	98.70
.156 (5/32)	**.235** (1.5x)	3/16	2	962810	98.70
.156 (5/32)	**.470** (3x)	3/16	2	995810	98.70
.187 (3/16)	**.285** (1.5x)	3/16	2	962812	98.70
.187 (3/16)	**.570** (3x)	3/16	2	995812	98.70
.187 (3/16)	**1.000** (5x)	3/16	3	936712	125.50
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	962816	131.50
.250 (1/4)	**.750** (3x)	1/4	2-1/2	995816	131.50
.250 (1/4)	**1.250** (5x)	1/4	4	936716	141.40
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2	962820	146.10
.312 (5/16)	**1.000** (3x)	5/16	2-1/2	995820	146.10
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2	962824	157.90
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	995824	166.50
.500 (1/2)	**.750** (1.5x)	1/2	3	962832	254.40
.500 (1/2)	**1.500** (3x)	1/2	3	995832	261.90

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Stub Flute



◄ *Outstanding in Graphite!*

Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life up to 50x
- Reduced neck for clearance and maximum rigidity
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

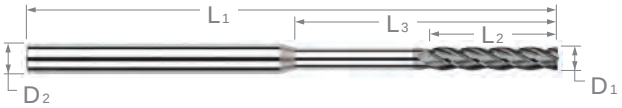
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	943015	109.20
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	960215	109.20
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	974615	111.90
.020	.030	**.100** (5x)	1/8	2-1/2	943020	109.20
.020	.030	**.160** (8x)	1/8	2-1/2	960220	109.20
.020	.030	**.250** (12x)	1/8	2-1/2	974620	111.90
.025	.038	**.125** (5x)	1/8	2-1/2	943025	109.20
.025	.038	**.203** (8x)	1/8	2-1/2	960225	109.20
.025	.038	**.312** (12x)	1/8	2-1/2	974625	111.90
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	943031	109.20
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	960231	109.20
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	974631	111.90
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	943039	109.20
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	960239	109.20
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	943047	109.20
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	960247	109.20
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	974647	111.90
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	943062	99.40
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	960262	99.40
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	974662	102.40
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	943078	99.40
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	960278	99.40
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	974678	102.40
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	943093	99.40
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	960293	99.40
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	974693	102.40
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	943105	99.40
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	960305	99.40

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	943108	101.50
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	960308	101.50
.125 (1/8)	.187	**1.500** (12x)	1/8	3	974708	104.40
.187 (3/16)	.285	**1.000** (5x)	3/16	3	943112	139.10
.187 (3/16)	.285	**1.500** (8x)	3/16	3	960312	139.10
.250 (1/4)	.375	**1.250** (5x)	1/4	4	943116	154.70
.250 (1/4)	.375	**2.000** (8x)	1/4	4	960316	154.70
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	977924	190.10
.500 (1/2)	.750	**1.500** (3x)	1/2	3	977932	284.90

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Long Flute



◀ *Outstanding in Graphite!*

- True crystalline CVD diamond on solid carbide substrate
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- Maximum abrasion resistance increases tool life up to 50x
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36315	125.10
.020	.100	**.200** (10x)	1/8	2-1/2	36320	125.10
.025	.125	**.250** (10x)	1/8	2-1/2	36325	125.10
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36331	125.10
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36347	125.10
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36362	114.50
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36378	114.50
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36393	114.50
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36408	122.20
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36412	161.20
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36416	179.20

SPEEDS & FEEDS ONLINE!

★★★★★

" the coolest 5 Axis CNC machined titanium wedding rings ever made with #HarveyTool"

— @titanringdesigns

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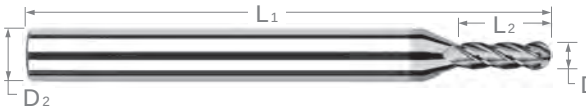
DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball



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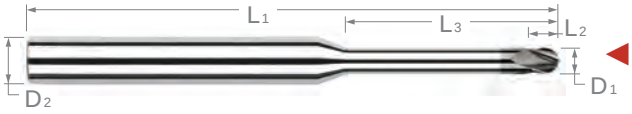
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2	914415	84.90
.015 (1/64)	**.045** (3x)	1/8	1-1/2	999315	84.90
.015 (1/64)	**.078** (5x)	1/8	2-1/2	940915	94.90
.020	**.030** (1.5x)	1/8	1-1/2	914420	84.90
.020	**.060** (3x)	1/8	1-1/2	999320	84.90
.020	**.100** (5x)	1/8	2-1/2	940920	94.90
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	914431	84.90
.031 (1/32)	**.093** (3x)	1/8	1-1/2	999331	84.90
.031 (1/32)	**.156** (5x)	1/8	2-1/2	940931	94.90
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	999339	84.90
.040	**.120** (3x)	1/8	1-1/2	999340	84.90
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	914447	84.90
.047 (3/64)	**.141** (3x)	1/8	1-1/2	999347	84.90
.047 (3/64)	**.250** (5x)	1/8	2-1/2	940947	94.90
.050	**.150** (3x)	1/8	1-1/2	999350	84.90
.060	**.180** (3x)	1/8	1-1/2	999360	84.90
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	914462	82.10
.062 (1/16)	**.186** (3x)	1/8	1-1/2	999362	82.10
.062 (1/16)	**.312** (5x)	1/8	2-1/2	940962	92.40
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2	914478	82.10
.078 (5/64)	**.234** (3x)	1/8	1-1/2	999378	82.10
.078 (5/64)	**.406** (5x)	1/8	2-1/2	940978	92.40
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	914493	82.10
.093 (3/32)	**.279** (3x)	1/8	1-1/2	999393	82.10
.093 (3/32)	**.500** (5x)	1/8	2-1/2	940993	92.40
.100	**.300** (3x)	1/8	1-1/2	999400	82.10
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	999405	82.10
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	914508	83.40
.125 (1/8)	**.375** (3x)	1/8	1-1/2	999408	83.40
.125 (1/8)	**.625** (5x)	1/8	2-1/2	941008	94.70
.156 (5/32)	**.470** (3x)	3/16	2	999410	103.40
.187 (3/16)	**.285** (1.5x)	3/16	2	914512	103.40
.187 (3/16)	**.570** (3x)	3/16	2	999412	103.40
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	914516	136.70
.250 (1/4)	**.750** (3x)	1/4	2-1/2	999416	136.70
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2	914524	168.90
.500 (1/2)	**.750** (1.5x)	1/2	3	914532	267.70

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute



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Reduced Neck Diameter
to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	61015	114.10
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	62015	114.10
.015 (1/64)	.023	**.156** (10x)	1/8	2-1/2	939515	117.10
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	65215	117.10
.015 (1/64)	.023	**.225** (15x)	1/8	2-1/2	76015	123.10
.015 (1/64)	.023	**.270** (18x)	1/8	2-1/2	841815	128.90
.020	.030	**.100** (5x)	1/8	2-1/2	61020	114.10
.020	.030	**.160** (8x)	1/8	2-1/2	62020	114.10
.020	.030	**.200** (10x)	1/8	2-1/2	939520	117.10
.020	.030	**.250** (12x)	1/8	2-1/2	65220	117.10
.020	.030	**.300** (15x)	1/8	2-1/2	76020	123.10
.020	.030	**.360** (18x)	1/8	2-1/2	841820	128.90
.025	.038	**.125** (5x)	1/8	2-1/2	61025	114.10
.025	.038	**.203** (8x)	1/8	2-1/2	62025	114.10
.025	.038	**.312** (12x)	1/8	2-1/2	65225	117.10
.025	.038	**.375** (15x)	1/8	2-1/2	76025	123.10
.030	.045	**.250** (8x)	1/8	2-1/2	62030	114.10
.031 (1/32)	.047	**.093** (3x)	1/8	1-1/2	922231	102.70
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	61031	114.10
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	62031	114.10
.031 (1/32)	.047	**.312** (10x)	1/8	2-1/2	939531	117.10
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	65231	117.10
.031 (1/32)	.047	**.470** (15x)	1/8	2-1/2	76031	123.10
.031 (1/32)	.047	**.565** (18x)	1/8	2-1/2	841831	128.90
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	61039	114.10
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	62039	114.10
.040	.060	**.203** (5x)	1/8	2-1/2	61040	114.10
.040	.060	**.325** (8x)	1/8	2-1/2	62040	114.10
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	61047	114.10
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	62047	114.10
.047 (3/64)	.071	**.480** (10x)	1/8	2-1/2	939547	117.10
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	65247	117.10
.047 (3/64)	.071	**.710** (15x)	1/8	2-1/2	76047	123.10
.047 (3/64)	.071	**.850** (18x)	1/8	2-1/2	841847	128.90
.050	.075	**.250** (5x)	1/8	2-1/2	61050	114.10
.050	.075	**.400** (8x)	1/8	2-1/2	62050	114.10

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute (cont.)

continued from previous page

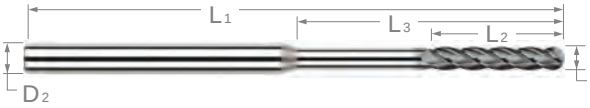
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.060	.090	**.312** (5x)	1/8	2-1/2	61060	114.10
.060	.090	**.500** (8x)	1/8	2-1/2	62060	114.10
.062 (1/16)	.093	**.186** (3x)	1/8	1-1/2	922262	90.70
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	61062	102.40
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	62062	102.40
.062 (1/16)	.093	**.625** (10x)	1/8	2-1/2	939562	105.40
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	65262	105.40
.062 (1/16)	.093	**.950** (15x)	1/8	2-1/2	76062	110.90
.062 (1/16)	.093	**1.125** (18x)	1/8	2-1/2	841862	116.40
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	61078	102.40
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	62078	102.40
.078 (5/64)	.117	**.800** (10x)	1/8	2-1/2	939578	105.40
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	65278	105.40
.078 (5/64)	.117	**1.187** (15x)	1/8	2-1/2	76078	110.90
.078 (5/64)	.117	**1.400** (18x)	1/8	2-1/2	841878	116.40
.093 (3/32)	.140	**.279** (3x)	1/8	1-1/2	922293	90.70
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	61093	102.40
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	62093	102.40
.093 (3/32)	.140	**.950** (10x)	1/8	2-1/2	939593	105.40
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	65293	105.40
.093 (3/32)	.140	**1.400** (15x)	1/8	2-1/2	76093	110.90
.093 (3/32)	.140	**1.675** (18x)	1/8	3	841893	116.40
.100	.150	**.800** (8x)	1/8	2-1/2	62100	102.40
.109 (7/64)	.164	**.900** (8x)	1/8	2-1/2	62102	102.40
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	61105	102.40
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	62105	102.40

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.375** (3x)	1/8	1-1/2	64008	100.20
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	61108	111.70
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	62108	111.70
.125 (1/8)	.187	**1.250** (10x)	1/8	2-1/2	939608	114.90
.125 (1/8)	.187	**1.500** (12x)	1/8	3	65308	114.90
.125 (1/8)	.187	**1.875** (15x)	1/8	3	944108	120.90
.125 (1/8)	.187	**2.250** (18x)	1/8	4	841908	128.10
.140 (9/64)	.220	**1.125** (8x)	3/16	3	62109	144.10
.156 (5/32)	.235	**.750** (5x)	3/16	3	61110	144.10
.156 (5/32)	.235	**1.250** (8x)	3/16	3	62110	144.10
.187 (3/16)	.285	**1.000** (5x)	3/16	3	61112	144.10
.187 (3/16)	.285	**1.500** (8x)	3/16	3	62112	144.10
.187 (3/16)	.285	**2.250** (12x)	3/16	4	65312	151.70
.250 (1/4)	.375	**1.250** (5x)	1/4	4	61116	160.10
.250 (1/4)	.375	**2.000** (8x)	1/4	4	62116	160.10
.250 (1/4)	.375	**3.000** (12x)	1/4	6	65316	167.10
.312 (5/16)	.470	**2.500** (8x)	5/16	4	62120	174.50
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	64024	201.10
.500 (1/2)	.750	**1.500** (3x)	1/2	3	64032	298.70

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Long Flute



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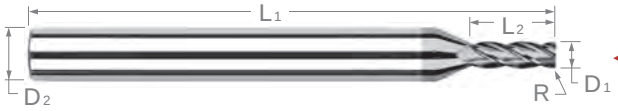
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36515	133.70
.020	.100	**.200** (10x)	1/8	2-1/2	36520	133.70
.025	.125	**.250** (10x)	1/8	2-1/2	36525	133.70
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36531	133.70
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36547	133.70
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36562	120.10
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36578	120.10
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36593	120.10
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36608	127.70
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36612	168.70
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36616	187.20

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius



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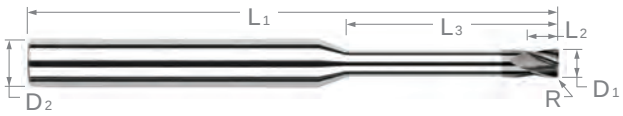
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.003**	**.045** (3x)	1/8	1-1/2	942015	84.90
.031 (1/32)	**.005**	**.093** (3x)	1/8	1-1/2	955431	84.90
.047 (3/64)	**.005**	**.141** (3x)	1/8	1-1/2	955447	84.90
.062 (1/16)	**.010**	**.186** (3x)	1/8	1-1/2	977162	82.10
.078 (5/64)	**.010**	**.234** (3x)	1/8	1-1/2	977178	82.10
.093 (3/32)	**.010**	**.279** (3x)	1/8	1-1/2	977193	82.10
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.015**	**.375** (3x)	1/8	1-1/2	938608	83.40
.187 (3/16)	**.030**	**.570** (3x)	3/16	2	906312	103.40
.250 (1/4)	**.030**	**.750** (3x)	1/4	2-1/2	906316	136.70

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius – Long Reach, Stub Flute



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D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	**.003**	.023	**.078** (5x)	1/8	2-1/2	61615	114.10
.015 (1/64)	**.003**	.023	**.125** (8x)	1/8	2-1/2	61915	114.10
.015 (1/64)	**.003**	.023	**.187** (12x)	1/8	2-1/2	62215	117.10
.020	**.005**	.030	**.100** (5x)	1/8	2-1/2	62920	114.10
.020	**.005**	.030	**.160** (8x)	1/8	2-1/2	63220	114.10
.020	**.005**	.030	**.250** (12x)	1/8	2-1/2	64120	117.10
.025	**.005**	.038	**.125** (5x)	1/8	2-1/2	62925	114.10
.025	**.005**	.038	**.203** (8x)	1/8	2-1/2	63225	114.10
.025	**.005**	.038	**.312** (12x)	1/8	2-1/2	64125	117.10
.031 (1/32)	**.005**	.047	**.156** (5x)	1/8	2-1/2	62931	114.10
.031 (1/32)	**.005**	.047	**.250** (8x)	1/8	2-1/2	63231	114.10
.031 (1/32)	**.005**	.047	**.375** (12x)	1/8	2-1/2	64131	117.10
.039 (1 mm)	**.005**	.059	**.203** (5x)	1/8	2-1/2	62939	114.10
.039 (1 mm)	**.005**	.059	**.325** (8x)	1/8	2-1/2	63239	114.10
.047 (3/64)	**.005**	.071	**.250** (5x)	1/8	2-1/2	62947	114.10
.047 (3/64)	**.005**	.071	**.375** (8x)	1/8	2-1/2	63247	114.10
.047 (3/64)	**.005**	.071	**.570** (12x)	1/8	2-1/2	64147	117.10
.062 (1/16)	**.010**	.093	**.312** (5x)	1/8	2-1/2	65062	102.40
.062 (1/16)	**.010**	.093	**.500** (8x)	1/8	2-1/2	66562	102.40
.062 (1/16)	**.010**	.093	**.750** (12x)	1/8	2-1/2	65962	105.40
.078 (5/64)	**.010**	.117	**.406** (5x)	1/8	2-1/2	65078	102.40
.078 (5/64)	**.010**	.117	**.625** (8x)	1/8	2-1/2	66578	102.40
.078 (5/64)	**.010**	.117	**.940** (12x)	1/8	2-1/2	65978	105.40
.093 (3/32)	**.010**	.140	**.500** (5x)	1/8	2-1/2	65093	102.40
.093 (3/32)	**.010**	.140	**.750** (8x)	1/8	2-1/2	66593	102.40
.093 (3/32)	**.010**	.140	**1.125** (12x)	1/8	2-1/2	65993	105.40
.118 (3 mm)	**.010**	.177	**.625** (5x)	1/8	2-1/2	916305	102.40
.118 (3 mm)	**.010**	.177	**.950** (8x)	1/8	2-1/2	914705	102.40

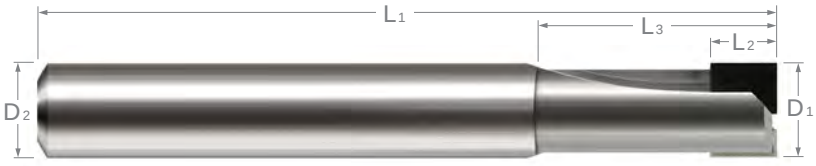
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.015**	.187	**.625** (5x)	1/8	2-1/2	66208	111.70
.125 (1/8)	**.015**	.187	**1.000** (8x)	1/8	2-1/2	64708	111.70
.125 (1/8)	**.015**	.187	**1.500** (12x)	1/8	3	66408	114.90
.187 (3/16)	**.030**	.285	**1.000** (5x)	3/16	3	63312	144.10
.187 (3/16)	**.030**	.285	**1.500** (8x)	3/16	3	65612	144.10
.250 (1/4)	**.030**	.375	**1.250** (5x)	1/4	4	63316	160.10
.250 (1/4)	**.030**	.375	**2.000** (8x)	1/4	4	65616	160.10

SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Square



Also Stocked in Single Flute Style

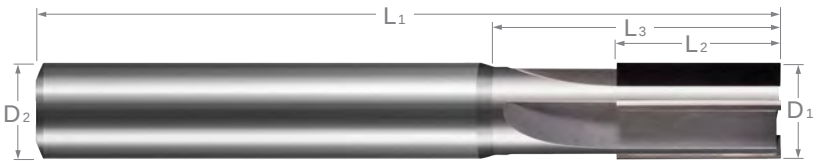
- PCD diamond brazed on solid carbide body allows for up to 50x improved life over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	1	1/8	1-1/2	12106	211.70
3 mm	1/4	**1/2**	1	1/8	1-1/2	1213M	211.70
1/8	1/4	**1/2**	1	1/8	1-1/2	12108	211.70
5/32	1/4	**1/2**	1	3/16	2	12110	236.50
3/16	1/4	**5/8**	2	3/16	2	12112	236.50
1/4	1/4	**3/4**	2	1/4	2-1/2	12116	256.70
5/16	1/4	**13/16**	2	5/16	2-1/2	12120	280.90
3/8	1/4	**15/16**	2	3/8	2-1/2	12124	301.20
1/2	1/4	**1**	2	1/2	3	12132	384.10
5/8	3/8	**1**	2	5/8	3-1/2	12140	474.40
3/4	3/8	**1-1/8**	2	3/4	4	12148	577.70

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Square – 4 Flute



Up to 50x Improved Life Over Carbide!

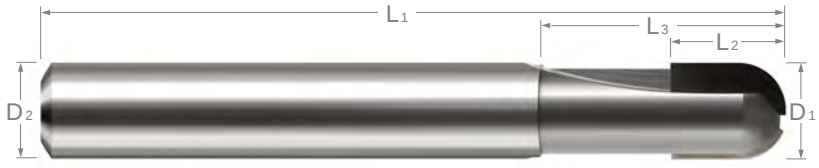
- Long length of cut and four flutes are ideal for finishing operations
- PCD diamond brazed on solid carbide body allows for up to 50x improved life over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- End cutting (not center cutting)

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.050″ −.000″		D_2	L_1	4 FL	PRICE
1/4	1/2	**1**	4	1/4	2-1/2	914116	413.40
5/16	1/2	**1-1/16**	4	5/16	2-1/2	914120	456.90
3/8	3/4	**1-7/16**	4	3/8	3	914124	522.40
1/2	1	**1-3/4**	4	1/2	3	914132	616.20
5/8	1	**1-3/4**	4	5/16	3-1/2	914140	722.10
3/4	1-1/4	**2**	4	3/4	4	914148	843.90

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Ball



Also Stocked in Single Flute Style

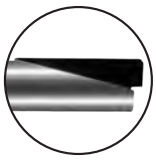
- PCD diamond brazed on solid carbide body allows for up to 50x improved life over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.050''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	1	1/8	1-1/2	12006	256.70
1/8	1/4	**1/2**	1	1/8	1-1/2	12008	256.70
3/16	1/4	**5/8**	2	3/16	2	12012	274.90
1/4	5/16	**3/4**	2	1/4	2-1/2	12016	288.40
3/8	7/16	**15/16**	2	3/8	2-1/2	12024	356.40
1/2	1/2	**1**	2	1/2	3	12032	413.20
5/8	1/2	**1**	2	5/8	3-1/2	12040	503.10
3/4	5/8	**1-1/8**	2	3/4	4	12048	606.40

SPEEDS & FEEDS ONLINE!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Corner Radius



Also Stocked in Single Flute Style

- PCD diamond brazed on solid carbide body allows for up to 50x improved life over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

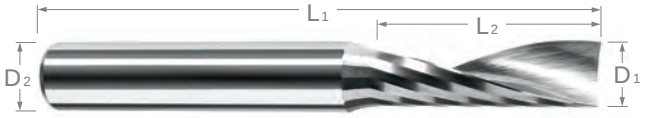
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.050''}_{-.000''}$	R $^{+.001''}_{-.001''}$		D_2	L_1	TOOL #	PRICE
3/32	3/16	**3/8**	**.010**	1	1/8	1-1/2	12206	256.70
1/8	1/4	**1/2**	**.015**	1	1/8	1-1/2	12208	256.70
3/16	1/4	**5/8**	**.015**	2	3/16	2	12212	274.90
1/4	1/4	**3/4**	**.030**	2	1/4	2-1/2	12216	288.40
3/8	1/4	**15/16**	**.030**	2	3/8	2-1/2	12224	356.40
1/2	1/4	**1**	**.030**	2	1/2	3	12232	413.20

SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

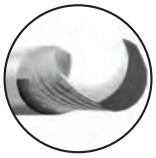
END MILLS FOR PLASTICS

Square Upcut – Single Flute



2x the Material Removal with Improved Finish Over Standard End Mills!

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Select sizes available with oversized, router-style shanks
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA



Single Spiral Upcut Flute

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2			51431	31.40	51431-C4	42.10
1/32	**5/32** (5x)	1/8	1-1/2			52431	38.50		
3/64	**9/64** (3x)	1/8	1-1/2			51447	28.10	51447-C4	38.80
3/64	**1/4** (5x)	1/8	1-1/2			52447	32.50		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	51162	22.90	51462	22.90	51462-C4	33.60
1/16*	**1/4** (4x)	1/4*	2	14104-20	32.70	14204-20	32.70		
1/16	**5/16** (5x)	1/8	2	51862	27.10	52462	27.10	52462-C4	37.80
5/64	**15/64** (3x)	1/8	1-1/2	51178	22.90	51478	22.90	51478-C4	33.60
5/64*	**5/16** (4x)	1/4*	2	14105-20	32.70	14205-20	32.70		
5/64	**13/32** (5x)	1/8	2	51878	27.10	52478	27.10	52478-C4	37.80
3/32	**9/32** (3x)	1/8	1-1/2	51193	22.90	51493	22.90	51493-C4	33.60
3/32*	**3/8** (4x)	1/4*	2	14106-20	32.70	14206-20	32.70		
3/32	**1/2** (5x)	1/8	2	51893	27.10	52493	27.10	52493-C4	37.80
1/8*	**1/4** (2x)	1/4*	2	14108-10	31.10	14208-10	31.10	892026-C4	42.60
1/8	**3/8** (3x)	1/8	1-1/2	51208	22.90	51508	22.90	51508-C4	33.60
1/8*	**1/2** (4x)	1/4*	2	14108-20	31.10	14208-20	31.10	892028-C4	42.60
1/8	**5/8** (5x)	1/8	2	51908	27.10	52508	27.10	52508-C4	37.80
5/32*	**5/8** (4x)	1/4*	2	14110-20	31.10	14210-20	31.10		
5/32	**3/4** (5x)	3/16	3			52510	36.10		
3/16*	**3/8** (2x)	1/4*	2	14112-10	31.10	14212-10	31.10		
3/16	**9/16** (3x)	3/16	2	51212	29.40	51512	29.40	51512-C4	44.10
3/16*	**5/8** (3x)	1/4*	2	14112-20	31.10	14212-20	31.10		
3/16	**1** (5x)	3/16	3	51912	36.10	52512	36.10	52512-C4	50.80
1/4	**3/8** (1.5x)	1/4	2-1/2	883116	31.10	883816	31.10		
1/4	**3/4** (3x)	1/4	2-1/2	51216	31.10	51516	31.10	51516-C4	47.80
1/4	**1** (4x)	1/4	3	878316	40.20	897416	40.20		
1/4	**1-1/4** (5x)	1/4	3	51916	40.20	52516	40.20	52516-C4	56.90
3/8	**9/16** (1.5x)	3/8	2-1/2	883124	63.10	883824	63.10		
3/8	**1-1/8** (3x)	3/8	2-1/2	51224	63.10	51524	63.10	51524-C4	83.30
3/8	**2** (5x)	3/8	4	51924	69.90	52524	69.90		
1/2	**3/4** (1.5x)	1/2	3	883132	107.40	883832	107.40		
1/2	**1-1/2** (3x)	1/2	3	51232	107.40	51532	107.40	51532-C4	131.70
1/2	**2-5/8** (5x)	1/2	5	51932	177.40	52532	177.40		

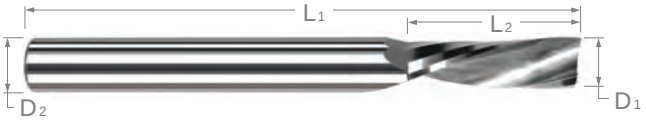
SPEEDS & FEEDS ONLINE!

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

PLEASE SEE SPEEDS & FEEDS ON PAGE 181

END MILLS FOR PLASTICS

Square Downcut – Single Flute



Prevents Fraying, Chip Out, and Lifting

- **Prevents fraying and chipout of top edge of work piece**
- Prevents lifting on vacuum tables
- Left hand spiral, right hand cut
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Resists chip welding
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	929762	33.90
1/16	**1/4** (4x)	1/4	2	44862	35.70
5/64	**5/16** (4x)	1/4	2	44878	35.70
3/32	**3/8** (4x)	1/4	2	44893	35.70
1/8	**3/8** (3x)	1/8	1-1/2	929808	32.50
1/8	**1/2** (4x)	1/4	2	44908	34.10
5/32	**5/8** (4x)	1/4	2	44910	34.10
3/16	**9/16** (3x)	3/16	2	929812	32.50
3/16	**5/8** (3x)	1/4	2	44912	34.10
1/4	**3/4** (3x)	1/4	2-1/2	44916	34.10
1/4	**1-1/4** (5x)	1/4	3	935416	62.50
3/8	**1-1/8** (3x)	3/8	3	44924	58.40
3/8	**2** (5x)	3/8	4	935424	100.10
1/2	**1-1/2** (3x)	1/2	4	44932	137.50
1/2	**2-5/8** (5x)	1/2	5	935432	211.10

SPEEDS & FEEDS ONLINE!

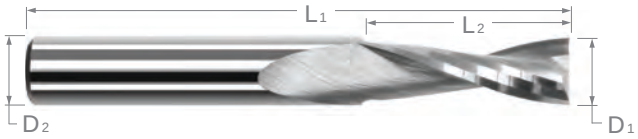
SPEEDS & FEEDS (Single Flute Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/ Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/ Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

mm & in

CUTTER DIAMETER		LENGTH OF CUT		SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″		D_2	L_1	2 FL	PRICE	2 FL	PRICE
.008	.0080	**.024**	(3x)	1/8	1-1/2	48608	55.70		
.008	.0080	**.040**	(5x)	1/8	1-1/2	49808	56.10		
.010	.0010	**.030**	(3x)	1/8	1-1/2	48610	53.10		
.010	.0010	**.050**	(5x)	1/8	1-1/2	49810	60.40		
1/64	.0156	**.023**	(1.5x)	1/8	1-1/2	957615	45.40		
1/64	.0156	**3/64**	(3x)	1/8	1-1/2	48615	45.40		
1/64	.0156	**5/64**	(5x)	1/8	1-1/2	49815	52.70		
1/64	.0156	**1/8**	(8x)	1/8	1-1/2	60215	59.20		
.020	.0200	**.030**	(1.5x)	1/8	1-1/2	957620	34.70		
.020	.0200	**.060**	(3x)	1/8	1-1/2	48620	34.70		
.020	.0200	**.100**	(5x)	1/8	1-1/2	49820	42.10		
.020	.0200	**.160**	(8x)	1/8	1-1/2	60220	48.50		
.020	.0200	**.200**	(10x)	1/8	1-1/2	938920	48.10		
.025	.0250	**.038**	(1.5x)	1/8	1-1/2	957625	34.70		
.025	.0250	**.075**	(3x)	1/8	1-1/2	48625	34.70		
.025	.0250	**1/8**	(5x)	1/8	1-1/2	49825	41.90		
.025	.0250	**13/64**	(8x)	1/8	1-1/2	60225	48.50		
.030	.0300	**.090**	(3x)	1/8	1-1/2	48630	34.70		
.030	.0300	**.156**	(5x)	1/8	1-1/2	49830	42.10		
1/32	.0312	**3/64**	(1.5x)	1/8	1-1/2	957631	34.40		
1/32	.0312	**3/32**	(3x)	1/8	1-1/2	48631	34.40	48631-C4	45.10
1/32	.0312	**5/32**	(5x)	1/8	1-1/2	49831	41.90	49831-C4	52.60
1/32	.0312	**1/4**	(8x)	1/8	1-1/2	60231	48.10	60231-C4	58.80
1/32	.0312	**5/16**	(10x)	1/8	1-1/2	938931	48.10		
.035	.0350	**.105**	(3x)	1/8	1-1/2	48635	34.70		
.039 (1 mm)	.0394	**.118**	(3x)	1/8	1-1/2	48639	34.90		
.039 (1 mm)	.0394	**13/64**	(5x)	1/8	1-1/2	49839	34.90		
.040	.0400	**.060**	(1.5x)	1/8	1-1/2	957640	34.70		
.040	.0400	**.120**	(3x)	1/8	1-1/2	48640	34.70		
.040	.0400	**13/64**	(5x)	1/8	1-1/2	49840	42.10		
.040	.0400	**.325**	(8x)	1/8	2	60240	48.50		
.045	.0450	**.135**	(3x)	1/8	1-1/2	48645	34.70		
3/64	.0469	**.071**	(1.5x)	1/8	1-1/2	957647	29.10		
3/64	.0469	**9/64**	(3x)	1/8	1-1/2	48647	29.10	48647-C4	39.80
3/64	.0469	**1/4**	(5x)	1/8	1-1/2	49847	33.90	49847-C4	44.60
3/64	.0469	**3/8**	(8x)	1/8	2	60247	40.70		

SPEEDS & FEEDS ONLINE!

continued on next page

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

mm & in

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CUTTER DIAMETER		LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.050	.0500	**.150** (3x)	1/8	1-1/2	48650	29.40		
.050	.0500	**.250** (5x)	1/8	1-1/2	49850	34.10		
.055	.0550	**.165** (3x)	1/8	1-1/2	48655	29.40		
.060	.0600	**.180** (3x)	1/8	1-1/2	48660	29.40		
.060	.0600	**5/16** (5x)	1/8	1-1/2	49860	34.10		

D_1 +.000″ −.002″ +.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	.0625	**3/32** (1.5x)	1/8	1-1/2	957662	25.70		
1/16	.0625	**3/16** (3x)	1/8	1-1/2	48662	25.70	48662-C4	36.40
1/16	.0625	**5/16** (5x)	1/8	2	49862	30.40	49862-C4	41.10
1/16	.0625	**1/2** (8x)	1/8	2	60262	37.50	60262-C4	48.20
1/16	.0625	**5/8** (10x)	1/8	2	938962	37.50		
5/64	.0781	**.117** (1.5x)	1/8	1-1/2	957678	25.70		
5/64	.0781	**15/64** (3x)	1/8	1-1/2	48678	25.70	48678-C4	36.40
5/64	.0781	**13/32** (5x)	1/8	2	49878	30.40	49878-C4	41.10
5/64	.0781	**5/8** (8x)	1/8	2	60278	37.50		
5/64	.0781	**.800** (10x)	1/8	3	938978	37.50		
3/32	.0937	**9/64** (1.5x)	1/8	1-1/2	957693	25.70		
3/32	.0937	**9/32** (3x)	1/8	1-1/2	48693	25.70	48693-C4	36.40
3/32	.0937	**1/2** (5x)	1/8	2	49893	30.40	49893-C4	41.10
3/32	.0937	**3/4** (8x)	1/8	2	60293	37.50	60293-C4	48.20
3/32	.0937	**.950** (10x)	1/8	2	938993	37.50		
.100	.1000	**.150** (1.5x)	1/8	1-1/2	957700	25.70		
.100	.1000	**.300** (3x)	1/8	1-1/2	48700	25.70		
.100	.1000	**1/2** (5x)	1/8	2	49900	30.70		
.100	.1000	**.800** (8x)	1/8	2	60300	37.70		
7/64	.1090	**21/64** (3x)	1/8	1-1/2	48707	25.70		
.118 (3 mm)	.1181	**.177** (1.5x)	1/8	1-1/2	957706	25.70		
.118 (3 mm)	.1181	**.354** (3x)	1/8	1-1/2	48706	25.70		
.118 (3 mm)	.1181	**.625** (5x)	1/8	2	49906	30.70		
.118 (3 mm)	.1181	**.950** (8x)	1/8	2	60306	37.70		
1/8	.1250	**3/16** (1.5x)	1/8	1-1/2	957708	25.70	957708-C4	36.40
1/8	.1250	**3/8** (3x)	1/8	1-1/2	48708	25.70	48708-C4	36.40
1/8	.1250	**5/8** (5x)	1/8	2	49908	30.40	49908-C4	41.10
1/8	.1250	**1** (8x)	1/8	2	60308	37.50	60308-C4	48.20
1/8	.1250	**1-1/4** (10x)	1/8	2-1/2	939008	37.50	939008-C4	48.20
9/64	.1406	**27/64** (3x)	3/16	2	48709	33.90		
5/32	.1562	**15/64** (1.5x)	3/16	2	957710	33.90		
5/32	.1562	**15/32** (3x)	3/16	2	48710	33.90	48710-C4	48.60
5/32	.1562	**3/4** (5x)	3/16	3	49910	41.70	49910-C4	56.40
5/32	.1562	**1-1/4** (8x)	3/16	3	60310	45.90		
3/16	.1875	**9/32** (1.5x)	3/16	2	957712	33.90	957712-C4	48.60
3/16	.1875	**9/16** (3x)	3/16	2	48712	33.90	48712-C4	48.60
3/16	.1875	**1** (5x)	3/16	3	49912	41.70	49912-C4	56.40
3/16	.1875	**1-1/2** (8x)	3/16	3	60312	45.90		
3/16	.1875	**1-7/8** (10x)	3/16	3	939012	45.90		

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

mm & in

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT		SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	D_1 +.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″	L_2 +.75mm −.00mm	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/4		.2500	**3/8**	(1.5x)	1/4	2-1/2	957716	41.70	957716-C4	58.40
1/4		.2500	**3/4**	(3x)	1/4	2-1/2	48716	41.70	48716-C4	58.40
1/4		.2500	**1-1/4**	(5x)	1/4	3	49916	47.90	49916-C4	64.60
1/4		.2500	**2**	(8x)	1/4	4	60316	59.90	60316-C4	76.60
1/4		.2500	**2-1/2**	(10x)	1/4	4	939016	59.90		
	6.0 mm	.2362	**18.00 mm**	(3x)	6 mm	63 mm	886566	66.40		
5/16		.3125	**15/32**	(1.5x)	5/16	2-1/2	957720	62.10		
5/16		.3125	**1**	(3x)	5/16	2-1/2	48720	62.10		
5/16		.3125	**1-5/8**	(5x)	5/16	4	49920	80.40		
	8.0 mm	.3149	**24.00 mm**	(3x)	8 mm	63 mm	886570	88.90		
3/8		.3750	**9/16**	(1.5x)	3/8	3	957724	71.70	957724-C4	91.90
3/8		.3750	**1-1/8**	(3x)	3/8	3	48724	71.70	48724-C4	91.90
3/8		.3750	**2**	(5x)	3/8	4	49924	82.70		
3/8		.3750	**3**	(8x)	3/8	6	60324	93.40		
	10.0 mm	.3937	**30.00 mm**	(3x)	10 mm	75 mm	886573	79.70		
	12.0 mm	.4724	**36.00 mm**	(3x)	12 mm	89 mm	886576	82.70		
1/2		.5000	**3/4**	(1.5x)	1/2	4	957732	126.20	957732-C4	150.40
1/2		.5000	**1-1/2**	(3x)	1/2	4	48732	126.20	48732-C4	150.40
1/2		.5000	**2-5/8**	(5x)	1/2	5	49932	150.20		
1/2		.5000	**4**	(8x)	1/2	7	60332	172.90		
5/8		.6250	**15/16**	(1.5x)	5/8	4	957740	182.40		
3/4		.7500	**1-1/8**	(1.5x)	3/4	4	957748	237.50		
3/4		.7500	**2-1/4**	(3x)	3/4	4	48748	237.50		

SPEEDS & FEEDS ONLINE!

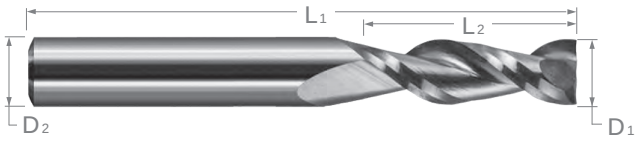
SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%; for 8x, reduce to 54%; for 10x, reduce to 40%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (High Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Higher helix (approx. 40°) for faster chip removal and better finish
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
	D_1 $^{+.000''}_{-.001''}$	D_1 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
NEW	1/32	**3/32** (3x)	1/8	1-1/2	898131	43.80

	D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
NEW	1/16	**3/16** (3x)	1/8	1-1/2	898162	32.20
NEW	3/32	**9/32** (3x)	1/8	1-1/2	898193	32.20
NEW	1/8	**3/8** (3x)	1/8	1-1/2	898208	32.20
NEW	5/32	**15/32** (3x)	3/16	2	898210	45.70
NEW	3/16	**9/16** (3x)	3/16	2	898212	43.60
NEW	1/4	**3/4** (3x)	1/4	2-1/2	898216	49.90
NEW	3/8	**1-1/8** (3x)	3/8	3	898224	75.50
NEW	1/2	**1-1/2** (3x)	1/2	4	898232	130.30

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - High Helix)

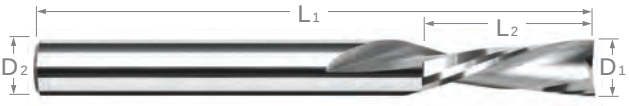
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For complete speed and feed charts, please see www.harveytool.com.

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0009	.0018	.0028	.0037	.0046	.0055	.0074	.0111	.0148	.0157	.0189	.0252	.0315	.0377	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0009	.0018	.0028	.0037	.0046	.0055	.0074	.0111	.0148	.0157	.0189	.0252	.0315	.0377	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0029	.0039	.0059	.0079	.0084	.0101	.0134	.0168	.0201	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0030	.0038	.0045	.0061	.0091	.0121	.0128	.0154	.0206	.0257	.0309	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0012	.0018	.0024	.0030	.0036	.0048	.0072	.0097	.0102	.0123	.0164	.0205	.0246	1 x Dia	1 x Dia
			Profile	.0009	.0018	.0028	.0037	.0046	.0055	.0074	.0111	.0148	.0157	.0189	.0252	.0315	.0377	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0029	.0039	.0059	.0079	.0084	.0101	.0134	.0168	.0201	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0030	.0038	.0045	.0061	.0091	.0121	.0128	.0154	.0206	.0257	.0309	.35 x Dia	1 x Dia

Click Tool # for stock, speeds & feeds, & other technical info

END MILLS FOR PLASTICS

Square Downcut – 2 Flute



- **Prevents fraying and chip out of top of workpiece**
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.010	**.030** (3x)	1/8	1-1/2	998510	54.90		
1/64	**.023** (1.5x)	1/8	1-1/2	966215	50.10		
1/64	**3/64** (3x)	1/8	1-1/2	998515	50.10		
1/64	**5/64** (5x)	1/8	1-1/2	999815	57.50		
.020	**.060** (3x)	1/8	1-1/2	998520	39.10		
1/32	**3/64** (1.5x)	1/8	1-1/2	966231	39.10		
1/32	**3/32** (3x)	1/8	1-1/2	998531	39.10	998531-C4	49.80
1/32	**5/32** (5x)	1/8	1-1/2	999831	46.50		
.040	**.120** (3x)	1/8	1-1/2	998540	39.10		
3/64	**.071** (1.5x)	1/8	1-1/2	966247	33.70		
3/64	**9/64** (3x)	1/8	1-1/2	998547	33.70		
3/64	**1/4** (5x)	1/8	1-1/2	999847	38.70		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	966262	30.20		
1/16	**3/16** (3x)	1/8	1-1/2	998562	30.20	998562-C4	40.90
1/16	**5/16** (5x)	1/8	2	999862	40.40		
1/16	**1/2** (8x)	1/8	2	978962	67.40		
5/64	**.117** (1.5x)	1/8	1-1/2	966278	30.20		
5/64	**15/64** (3x)	1/8	1-1/2	998578	30.20		
5/64	**13/32** (5x)	1/8	2	999878	40.40		
5/64	**5/8** (8x)	1/8	2	978978	67.40		
3/32	**9/64** (1.5x)	1/8	1-1/2	966293	30.20		
3/32	**9/32** (3x)	1/8	1-1/2	998593	30.20	998593-C4	40.90
3/32	**1/2** (5x)	1/8	2	999893	40.40		
3/32	**3/4** (8x)	1/8	2	978993	67.40		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	998606	30.20		
1/8	**3/16** (1.5x)	1/8	1-1/2	966308	30.20		
1/8	**3/8** (3x)	1/8	1-1/2	998608	30.20	998608-C4	40.90
1/8	**5/8** (5x)	1/8	2	999908	40.40		
1/8	**1** (8x)	1/8	2-1/2	979008	67.40		
5/32	**15/64** (1.5x)	3/16	2	966310	41.10		
5/32	**15/32** (3x)	3/16	2	998610	41.10		
5/32	**3/4** (5x)	3/16	3	999910	48.50		
3/16	**9/32** (1.5x)	3/16	2	966312	41.10		
3/16	**9/16** (3x)	3/16	2	998612	41.10	998612-C4	55.80
3/16	**1** (5x)	3/16	3	999912	48.50		
3/16	**1-1/2** (8x)	3/16	3	979012	72.20		

SPEEDS & FEEDS ONLINE!

continued on next page

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/4	**3/8** (1.5x)	1/4	2-1/2	966316	48.50		
1/4	**3/4** (3x)	1/4	2-1/2	998616	48.50	998616-C4	65.20
1/4	**1-1/4** (5x)	1/4	3	999916	53.10		
1/4	**2** (8x)	1/4	4	979016	78.20		
5/16	**1** (3x)	5/16	2-1/2	998620	72.70		
3/8	**9/16** (1.5x)	3/8	3	966324	82.50		
3/8	**1-1/8** (3x)	3/8	3	998624	82.50	998624-C4	102.70
3/8	**2** (5x)	3/8	4	999924	96.90		
1/2	**3/4** (1.5x)	1/2	4	966332	148.70		
1/2	**1-1/2** (3x)	1/2	4	998632	148.70	998632-C4	172.90
1/2	**2-5/8** (5x)	1/2	5	999932	164.90		

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 184

Plastic Cutting End Mills vs. Metal Cutting End Mills

Improved Finish - Sharper edge provides for cleaner cut and less plowing action. Chips curl faster, transferring heat to the chip, not the part.
Increased Stock Removal - Large flute opening gives more chip clearance, avoids chip welding, and improves chip evacuation.

Feature	Typical Metal Working End Mills	Plastic Cutting End Mills
Flute Rake	8° – 12°	25° – 32°
Axial/End Gash Rake	2° – 4°	8° – 12°
OD Primary Relief	12° – 18°	18° – 26°
OD Secondary Relief	18° – 26°	35° – 45°
Core Diameter	56% – 60%	40% – 44%
Typical Cross Section	 2 FLUTE STANDARD	 SINGLE FLUTE 2 FLUTE 2 STRAIGHT FLUTE

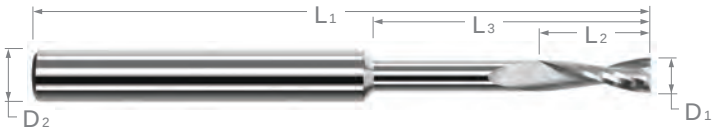
Data presented is intended to be general guidelines for understanding how plastic end mill geometry compares to metal working tools. Actual values will change based on diameter, application and specific tool.

Check Out All of Our Plastic Cutting Solutions!

Click Tool # for stock, speeds & feeds, & other technical info

END MILLS FOR PLASTICS

Square Upcut – Long Reach – 2 Flute



- High rake, high relief design with large flute valley maximizes chip removal and performance
- Center cutting design improves plunging and ramping
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/64	3/64	**1/8** (8x)	1/8	1-1/2	989015	58.20
1/64	3/64	**3/16** (12x)	1/8	1-1/2	994115	61.10
.020	.060	**.160** (8x)	1/8	1-1/2	989020	47.20
.020	.060	**1/4** (12x)	1/8	1-1/2	994120	49.90
1/32	3/32	**5/32** (5x)	1/8	1-1/2	961531	45.90
1/32	3/32	**1/4** (8x)	1/8	1-1/2	989031	47.20
1/32	3/32	**3/8** (12x)	1/8	1-1/2	994131	49.90
1/32	3/32	**15/32** (15x)	1/8	1-1/2	979731	52.90
.040	.120	**.325** (8x)	1/8	1-1/2	989040	47.20
.040	.120	**.480** (12x)	1/8	1-1/2	994140	49.90
3/64	9/64	**3/8** (8x)	1/8	1-1/2	989047	41.90
3/64	9/64	**9/16** (12x)	1/8	1-1/2	994147	44.70

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	3/16	**5/16** (5x)	1/8	1-1/2	961562	37.50
1/16	3/16	**1/2** (8x)	1/8	1-1/2	989062	38.50
1/16	3/16	**3/4** (12x)	1/8	2	994162	41.20
1/16	3/16	**15/16** (15x)	1/8	2	979762	44.20
5/64	15/64	**5/8** (8x)	1/8	2	989078	38.50
5/64	15/64	**15/16** (12x)	1/8	2	994178	41.20
3/32	9/32	**1/2** (5x)	1/8	1-1/2	961593	37.50
3/32	9/32	**3/4** (8x)	1/8	2	989093	38.50
3/32	9/32	**1-1/8** (12x)	1/8	2	994193	41.20
3/32	9/32	**1-13/32** (15x)	1/8	2-1/2	979793	44.20
1/8	3/8	**5/8** (5x)	1/8	1-1/2	961608	37.50
1/8	3/8	**1** (8x)	1/8	2	989108	38.50
1/8	3/8	**1-1/2** (12x)	1/8	2-1/2	994208	41.20
1/8	3/8	**1-7/8** (15x)	1/8	3	979808	44.20
5/32	15/32	**1-1/4** (8x)	3/16	2-1/2	989110	46.40
5/32	15/32	**1-7/8** (12x)	3/16	4	994210	54.10
3/16	9/16	**1-1/2** (8x)	3/16	2-1/2	989112	46.40
3/16	9/16	**2-1/4** (12x)	3/16	4	994212	54.10
1/4	3/4	**2** (8x)	1/4	4	989116	55.10
1/4	3/4	**3** (12x)	1/4	6	994216	65.70

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 190

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute

- Ball end for profiling complex shapes
- Ball end has increased rake and relief for improved cutting action at tip of ball
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/64	**3/64** (3x)	1/8	1-1/2	49515	50.70		
1/64	**5/64** (5x)	1/8	1-1/2	71315	59.70		
.020	**.060** (3x)	1/8	1-1/2	49520	39.70		
.020	**.100** (5x)	1/8	1-1/2	71320	48.50		
.025	**.075** (3x)	1/8	1-1/2	49525	39.70		
.025	**1/8** (5x)	1/8	1-1/2	71325	48.50		
1/32	**3/64** (1.5x)	1/8	1-1/2	962331	39.70		
1/32	**3/32** (3x)	1/8	1-1/2	49531	39.70	49531-C4	50.40
1/32	**5/32** (5x)	1/8	1-1/2	71331	48.10		
1/32	**1/4** (8x)	1/8	1-1/2	955731	56.90		
.039 (1 mm)	**.118** (3x)	1/8	1-1/2	49539	40.20		
3/64	**9/64** (3x)	1/8	1-1/2	49547	33.70		
3/64	**1/4** (5x)	1/8	1-1/2	71347	41.70		

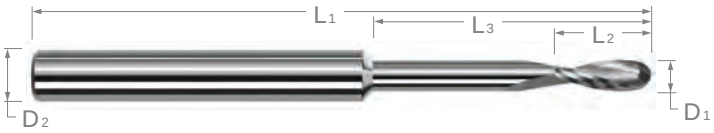
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	962362	29.70		
1/16	**3/16** (3x)	1/8	1-1/2	49562	29.70	49562-C4	40.40
1/16	**5/16** (5x)	1/8	2	71362	36.20		
1/16	**1/2** (8x)	1/8	2	955762	54.10		
5/64	**15/64** (3x)	1/8	1-1/2	49578	29.70		
5/64	**13/32** (5x)	1/8	2	71378	36.20		
3/32	**9/32** (3x)	1/8	1-1/2	49593	29.70	49593-C4	40.40
3/32	**1/2** (5x)	1/8	2	71393	36.20		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	49605	29.90		
1/8	**3/16** (1.5x)	1/8	1-1/2	962408	29.70		
1/8	**3/8** (3x)	1/8	1-1/2	49608	29.70	49608-C4	40.40
1/8	**5/8** (5x)	1/8	2	71408	36.20		
1/8	**1** (8x)	1/8	2	955808	54.10		
5/32	**15/32** (3x)	3/16	2	49610	39.10		
3/16	**9/32** (1.5x)	3/16	2	962412	39.10		
3/16	**9/16** (3x)	3/16	2	49612	39.10	49612-C4	53.80
3/16	**1** (5x)	3/16	3	71412	47.50		
1/4	**3/8** (1.5x)	1/4	2-1/2	962416	50.10		
1/4	**3/4** (3x)	1/4	2-1/2	49616	50.10	49616-C4	66.80
1/4	**1-1/4** (5x)	1/4	3	71416	57.40		
3/8	**9/16** (1.5x)	3/8	3	962424	80.10		
3/8	**1-1/8** (3x)	3/8	3	49624	80.10	49624-C4	100.30
3/8	**2** (5x)	3/8	4	71424	91.40		
1/2	**3/4** (1.5x)	1/2	4	962432	138.20		
1/2	**1-1/2** (3x)	1/2	4	49632	138.20	49632-C4	162.40
1/2	**2-5/8** (5x)	1/2	5	71432	163.90		

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 184

END MILLS FOR PLASTICS

Ball Upcut – Long Reach – 2 Flute



- Ball end has increased rake and relief for improved cutting action at tip of ball
- Reduced neck diameter to avoid heeling
- Ball end for profiling complex shapes
- Length of cut = 3x diameter
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	PRICE
1/32	3/32	**5/32** (5x)	1/8	1-1/2	964531	50.90
1/32	3/32	**1/4** (8x)	1/8	1-1/2	976231	52.40
3/64	9/64	**1/4** (5x)	1/8	1-1/2	964547	45.10
3/64	9/64	**3/8** (8x)	1/8	1-1/2	976247	46.20

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	PRICE
1/16	3/16	**5/16** (5x)	1/8	1-1/2	964562	41.10
1/16	3/16	**1/2** (8x)	1/8	1-1/2	976262	42.50
5/64	15/64	**13/32** (5x)	1/8	1-1/2	964578	41.10
5/64	15/64	**5/8** (8x)	1/8	2	976278	42.50
3/32	9/32	**1/2** (5x)	1/8	1-1/2	964593	41.10
3/32	9/32	**3/4** (8x)	1/8	2	976293	42.50
1/8	3/8	**5/8** (5x)	1/8	1-1/2	964608	41.10
1/8	3/8	**1** (8x)	1/8	2	976308	42.50
3/16	9/16	**1** (5x)	3/16	2	964612	50.20
1/4	3/4	**1-1/4** (5x)	1/4	2-1/2	964616	60.70

SPEEDS & FEEDS ONLINE!

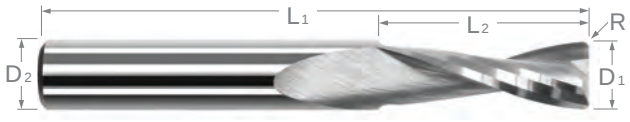
SPEEDS & FEEDS (Square & Ball – Long Reach Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 5x, increase to 130%). For longer reaches, table values of IPT and DOC must be reduced (for 12x, reduce to 80%; for 15x, reduce to 67%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute



- High rake, high relief design with large flute valley maximizes chip removal and performance
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

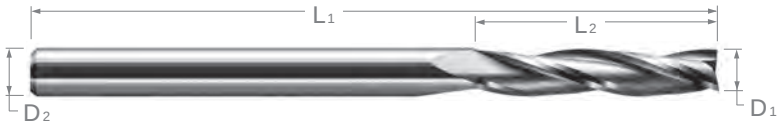
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	.005	**3/16** (3x)	1/8	1-1/2	54062	29.70
1/16	.010	**3/16** (3x)	1/8	1-1/2	55462	29.70
1/16	.010	**5/16** (5x)	1/8	2	861862	36.50
1/16	.015	**3/16** (3x)	1/8	1-1/2	69362	29.70
1/16	.015	**5/16** (5x)	1/8	2	862462	36.50
3/32	.005	**9/32** (3x)	1/8	1-1/2	54093	29.70
3/32	.010	**9/32** (3x)	1/8	1-1/2	55493	29.70
3/32	.010	**1/2** (5x)	1/8	2	861893	36.50
3/32	.015	**9/32** (3x)	1/8	1-1/2	69393	29.70
3/32	.015	**1/2** (5x)	1/8	2	862493	36.50
3/32	.020	**9/32** (3x)	1/8	1-1/2	69893	29.70
3/32	.030	**9/32** (3x)	1/8	1-1/2	70693	29.70
1/8	.005	**3/8** (3x)	1/8	1-1/2	54108	29.70
1/8	.010	**3/8** (3x)	1/8	1-1/2	55508	29.70
1/8	.010	**5/8** (5x)	1/8	2	861908	36.50
1/8	.015	**3/8** (3x)	1/8	1-1/2	56408	29.70
1/8	.015	**5/8** (5x)	1/8	2	862508	36.50
1/8	.020	**3/8** (3x)	1/8	1-1/2	69908	29.70
1/8	.030	**3/8** (3x)	1/8	1-1/2	70708	29.70
1/8	.030	**5/8** (5x)	1/8	2	863108	36.50
3/16	.005	**9/16** (3x)	3/16	2	54112	39.10
3/16	.010	**9/16** (3x)	3/16	2	55512	39.10
3/16	.015	**9/16** (3x)	3/16	2	56412	39.10
3/16	.020	**9/16** (3x)	3/16	2	69912	39.10
3/16	.030	**9/16** (3x)	3/16	2	70712	39.10
3/16	.030	**1** (5x)	3/16	3	863112	47.90
1/4	.010	**3/4** (3x)	1/4	2-1/2	55516	50.10
1/4	.015	**3/4** (3x)	1/4	2-1/2	56416	50.10
1/4	.020	**3/4** (3x)	1/4	2-1/2	69916	50.10
1/4	.030	**3/4** (3x)	1/4	2-1/2	70716	50.10
1/4	.030	**1-1/4** (5x)	1/4	4	863116	57.70
3/8	.015	**1-1/8** (3x)	3/8	3	56424	78.50
3/8	.030	**1-1/8** (3x)	3/8	3	70724	78.50
1/2	.015	**1-1/2** (3x)	1/2	4	56432	135.70
1/2	.030	**1-1/2** (3x)	1/2	4	70732	135.70

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 184

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix)



Specialized Wiper Flat Geometry for Improved Finish

- 3 flute design strengthens rigidity and improves wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	915631	44.40
1/32	**5/32** (5x)	1/8	1-1/2	986431	44.40
1/32	**1/4** (8x)	1/8	1-1/2	992331	45.40
3/64	**1/4** (5x)	1/8	1-1/2	986447	34.10
3/64	**3/8** (8x)	1/8	2	992347	35.10

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	915662	28.10
1/16	**5/16** (5x)	1/8	2	986462	32.90
1/16	**1/2** (8x)	1/8	2	992362	34.10
1/16	**5/8** (10x)	1/8	2	871662	43.10
5/64	**13/32** (5x)	1/8	2	986478	32.90
5/64	**5/8** (8x)	1/8	2	992378	34.10
3/32	**9/32** (3x)	1/8	1-1/2	915693	28.10
3/32	**1/2** (5x)	1/8	2	986493	32.90
3/32	**3/4** (8x)	1/8	2	992393	34.10
1/8	**3/8** (3x)	1/8	1-1/2	915708	28.10
1/8	**5/8** (5x)	1/8	2	986508	32.90
1/8	**1** (8x)	1/8	2	992408	34.10
1/8	**1-1/4** (10x)	1/8	2-1/2	871708	43.10
3/16	**9/16** (3x)	3/16	2	915712	43.50
3/16	**1** (5x)	3/16	3	986512	45.40
3/16	**1-1/2** (8x)	3/16	3	992412	51.20
1/4	**3/8** (1.5x)	1/4	2-1/2	869316	43.40
1/4	**3/4** (3x)	1/4	2-1/2	915716	45.40
1/4	**1-1/4** (5x)	1/4	3	986516	51.40
1/4	**2** (8x)	1/4	4	992416	63.70
3/8	**9/16** (1.5x)	3/8	3	869324	72.90
3/8	**1-1/8** (3x)	3/8	3	915724	75.70
1/2	**3/4** (1.5x)	1/2	4	869332	126.70
1/2	**1-1/2** (3x)	1/2	4	915732	131.50

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Un-filled	Unfilled	800-1200	Semi-Roughing	.00032	.00067	.00101	.00133	.00168	.00200	.00269	.00402	.00538	.00571	.00686	.00914	.01143	.01371	.35 x Dia	1 x Dia
			Finishing	.00011	.00022	.00033	.00044	.00055	.00066	.00088	.00132	.00177	.00187	.00225	.00300	.00375	.00451	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00032	.00067	.00101	.00133	.00168	.00200	.00269	.00402	.00538	.00571	.00686	.00914	.01143	.01371	.35 x Dia	1 x Dia
			Finishing	.00011	.00022	.00033	.00044	.00055	.00066	.00088	.00132	.00177	.00187	.00225	.00300	.00375	.00451	.10 x Dia	5 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440	.00467	.00561	.00748	.00935	.01122	.35 x Dia	1 x Dia
			Finishing	.00009	.00018	.00027	.00036	.00045	.00054	.00072	.00108	.00145	.00153	.00184	.00246	.00307	.00369	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00032	.00067	.00101	.00133	.00168	.00200	.00269	.00402	.00538	.00571	.00686	.00914	.01143	.01371	.35 x Dia	1 x Dia
			Finishing	.00011	.00022	.00033	.00044	.00055	.00066	.00088	.00132	.00177	.00187	.00225	.00300	.00375	.00451	.10 x Dia	5 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440	.00467	.00561	.00748	.00935	.01122	.35 x Dia	1 x Dia
			Finishing	.00009	.00018	.00027	.00036	.00045	.00054	.00072	.00108	.00145	.00153	.00184	.00246	.00307	.00369	.10 x Dia	5 x Dia

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix)

Specialized Wiper Flat Geometry for Improved Finish

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	3 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	902131	43.90
1/32	**5/32** (5x)	1/8	1-1/2	941231	45.70
1/32	**1/4** (8x)	1/8	1-1/2	900731	46.70
3/64	**1/4** (5x)	1/8	1-1/2	941247	35.10

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	3 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	902162	32.40
1/16	**5/16** (5x)	1/8	2	941262	34.10
1/16	**1/2** (8x)	1/8	2	900762	35.10
1/16	**5/8** (10x)	1/8	2	854662	37.20
5/64	**13/32** (5x)	1/8	2	941278	34.10
3/32	**9/32** (3x)	1/8	1-1/2	902193	32.40
3/32	**1/2** (5x)	1/8	2	941293	34.10
3/32	**3/4** (8x)	1/8	2	900793	35.10
1/8	**3/8** (3x)	1/8	1-1/2	902208	32.40
1/8	**5/8** (5x)	1/8	2	941308	34.10
1/8	**1** (8x)	1/8	2	900808	35.10
1/8	**1-1/4** (10x)	1/8	2-1/2	854708	37.20
3/16	**9/64** (3x)	3/16	2	902212	43.70
3/16	**1** (5x)	3/16	3	941312	45.40
3/16	**1-1/2** (8x)	3/16	3	900812	46.50
1/4	**3/8** (1.5x)	1/4	2-1/2	852016	48.10
1/4	**3/4** (3x)	1/4	2-1/2	902216	49.90
1/4	**1-1/4** (5x)	1/4	3	941316	51.40
1/4	**2** (8x)	1/4	4	900816	63.70
3/8	**9/16** (1.5x)	3/8	3	852024	73.90
3/8	**1-1/8** (3x)	3/8	3	902224	75.70
1/2	**3/4** (1.5x)	1/2	4	852032	125.70
1/2	**1-1/2** (3x)	1/2	4	902232	130.40

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Un-filled	Unfilled	800-1200	Semi-Roughing	.00039	.00080	.00121	.00160	.00201	.00240	.00323	.00483	.00645	.00685	.00823	.01097	.01371	.01646	.35 x Dia	1 x Dia
			Finishing	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00159	.00212	.00225	.00270	.00360	.00451	.00541	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00039	.00080	.00121	.00160	.00201	.00240	.00323	.00483	.00645	.00685	.00823	.01097	.01371	.01646	.35 x Dia	1 x Dia
			Finishing	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00159	.00212	.00225	.00270	.00360	.00451	.00541	.10 x Dia	5 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00032	.00065	.00099	.00131	.00165	.00196	.00264	.00395	.00528	.00560	.00673	.00898	.01122	.01346	.35 x Dia	1 x Dia
			Finishing	.00010	.00022	.00033	.00043	.00054	.00065	.00087	.00130	.00173	.00184	.00221	.00295	.00369	.00442	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00039	.00080	.00121	.00160	.00201	.00240	.00323	.00483	.00645	.00685	.00823	.01097	.01371	.01646	.35 x Dia	1 x Dia
			Finishing	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00159	.00212	.00225	.00270	.00360	.00451	.00541	.10 x Dia	5 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00032	.00065	.00099	.00131	.00165	.00196	.00264	.00395	.00528	.00560	.00673	.00898	.01122	.01346	.35 x Dia	1 x Dia
			Finishing	.00010	.00022	.00033	.00043	.00054	.00065	.00087	.00130	.00173	.00184	.00221	.00295	.00369	.00442	.10 x Dia	5 x Dia

Click Tool # for stock, speeds & feeds, & other technical info

NEW!

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (Slow Helix)

- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA

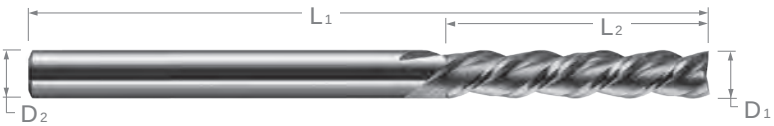
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	
1/8	**5/8** (5x)	1/8	2	880508	35.80	NEW
3/16	**1** (5x)	3/16	3	880512	47.10	NEW
1/4	**1-1/4** (5x)	1/4	3	880516	53.20	NEW
3/8	**1-1/8** (3x)	3/8	3	878124	77.60	NEW
1/2	**1-1/2** (3x)	1/2	4	878132	131.20	NEW

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 192

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (High Helix)



- 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Design is ideally suited for thin-walled applications
- Solid carbide
- Center cutting
- CNC ground in the USA

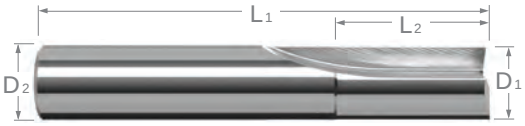
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	
1/8	**5/8** (5x)	1/8	2	864408	34.60	NEW
3/16	**1** (5x)	3/16	3	864412	47.10	NEW
1/4	**1-1/4** (5x)	1/4	3	864416	53.20	NEW
3/8	**1-1/8** (3x)	3/8	3	873824	77.60	NEW
1/2	**1-1/2** (3x)	1/2	4	873832	132.20	NEW

SPEEDS & FEEDS ONLINE!

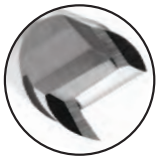
PLEASE SEE SPEEDS & FEEDS ON PAGE 193

END MILLS FOR COMPOSITES

Square – 2 Straight Flutes



- Designed to mill abrasive, glass-filled plastics with reinforcing fiber and other additives
- Straight flute design improves finish and minimizes fraying of fiber-reinforced and layered materials by not "pulling" fibers
- Behind center design with high positive rake for smoother cuts
- Eccentric relief for improved edge life
- Allows shallow ramping, not suited for plunge cutting
- Select sizes available with oversized, router-style shanks
- Solid carbide
- CNC ground in the USA



2 Straight Flutes
(End View)

CUTTER DIAMETER	LENGTH OF CUT		SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**1/8**	(2x)	1/4*	2	14604	34.10	14604-C4	50.80
1/16	**3/16**	(3x)	1/8	1-1/2	69562	30.10	69562-C4	40.80
1/16	**5/16**	(5x)	1/8	2	70462	34.70	70462-C4	45.40
5/64*	**5/32**	(2x)	1/4*	2	14605	34.10	14605-C4	50.80
5/64	**1/4**	(3x)	1/8	1-1/2	69578	30.10	69578-C4	40.80
5/64	**13/32**	(5x)	1/8	2	70478	34.70	70478-C4	45.40
3/32*	**3/16**	(2x)	1/4*	2	14606	34.10	14606-C4	50.80
3/32	**5/16**	(3x)	1/8	1-1/2	69593	30.10	69593-C4	40.80
3/32	**1/2**	(5x)	1/8	2	70493	34.70	70493-C4	45.40
1/8*	**1/4**	(2x)	1/4*	2	14608	34.10	14608-C4	50.80
1/8	**3/8**	(3x)	1/8	1-1/2	69608	30.10	69608-C4	40.80
1/8	**5/8**	(5x)	1/8	2	70508	34.70	70508-C4	45.40
3/16	**5/8**	(3x)	3/16	2	69612	31.90	69612-C4	46.60
3/16*	**5/8**	(3x)	1/4*	2	14612	34.10	14612-C4	50.80
3/16	**1**	(5x)	3/16	3	70512	37.70	70512-C4	52.40
1/4*	**3/4**	(3x)	1/4	2-1/2	14616	31.20	14616-C4	47.90
1/4	**1-1/4**	(5x)	1/4	3	70516	43.20	70516-C4	59.90
3/8*	**7/8**	(2x)	3/8	2-1/2	14624	58.10	14624-C4	78.30
3/8	**2**	(5x)	3/8	4	70524	71.40		
1/2*	**1**	(2x)	1/2	3	14632	92.10	14632-C4	116.40
1/2	**2-1/2**	(5x)	1/2	4	70532	113.70		

SPEEDS & FEEDS ONLINE!

*Cutter diameter tolerance is +.000/-.004". Tools are ground on oversized, router-style shank.

SPEEDS & FEEDS (2 Straight Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia

END MILLS FOR COMPOSITES

Compression Cutter

Prevents Burrs & Delamination!

- Counteracting flute geometries compress material inwardly to avoid burrs, tear out, and delamination
- Produces enhanced edge finish on top and bottom of workpiece
- Offered in two diamond coatings for increased tool life in a variety of abrasive composite materials
- Stocked in 2, 4, and 6 flute configurations for rough and finish machining
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERLAP CENTER	OVERLAP LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND		CVD DIAMOND	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.001″ −.001″	L_4		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	3/32	**1/32**	.006	2	1/8	1-1/2	994331-C4	55.90	995031	102.10
3/64	9/64	**3/64**	.009	2	1/8	1-1/2	994347-C4	55.90	995047	102.10
1/16	3/16	**1/16**	.013	2	1/8	1-1/2	994362-C4	53.70	995062	99.70
5/64	1/4	**5/64**	.016	2	1/8	1-1/2	994378-C4	53.70	995078	99.70
3/32	9/32	**3/32**	.019	2	1/8	1-1/2	994393-C4	53.70	995093	99.70
1/8	3/8	**1/8**	.025	2	1/8	1-1/2	994408-C4	52.40	995108	97.40
1/8	3/8	**1/8**	.028	4	1/8	1-1/2	993708-C4	55.10	997708	101.70
3/16	9/16	**3/16**	.038	2	3/16	2	994412-C4	61.20	995112	113.20
3/16	9/16	**3/16**	.041	4	3/16	2	993712-C4	64.50	997712	119.40
1/4	3/4	**1/4**	.050	2	1/4	2-1/2	994416-C4	72.20	995116	133.90
1/4	3/4	**1/4**	.055	4	1/4	2-1/2	993716-C4	75.70	997716	139.90
5/16	1	**5/16**	.075	6	5/16	2-1/2	920120-C4	90.90	918820	162.50
3/8	1-1/8	**3/8**	.090	6	3/8	2-1/2	920124-C4	108.40	918824	215.10
1/2	1-1/2	**1/2**	.120	6	1/2	3	920132-C4	182.10	918832	310.10

SPEEDS & FEEDS ONLINE!

Choosing the Right Diamond

AMORPHOUS DIAMOND

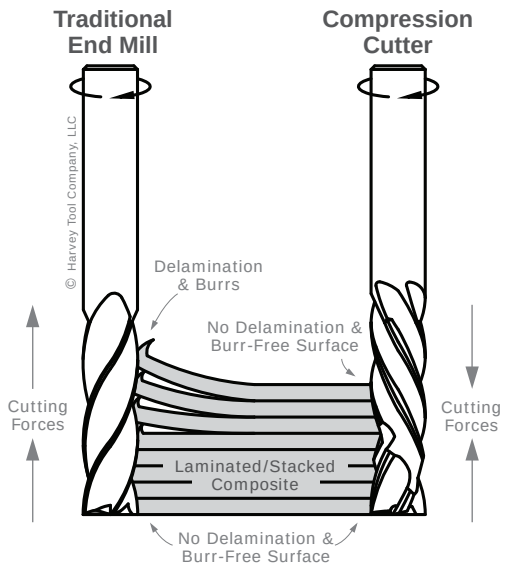
A PVD amorphous diamond coating which improves lubricity and wear resistance. Coating is thin relative to CVD diamond, preventing edge rounding. Sharp edges improve results (performance and finish) over CVD in certain abrasive materials.

Thin coating maintains sharper edge.

CVD DIAMOND

True Crystalline CVD diamond is grown directly into a carbide end mill. This dramatically improves hardness, which improves abrasion resistance and extends tool life up to 50x, allowing higher feed rates than uncoated carbide. Ideal for machining abrasive composite materials with high fiber or fill concentration (G10, FR4, etc.) Diamond layer is approximately 5 times thicker than Amorphous Diamond, improving wear resistance. Well suited for high production environments.

Thicker diamond layer for increased wear resistance.



Traditional End Mills: Upward lifting force causes burrs and delamination at the top of the part.

Compression Cutters: Counteracting cutting forces compress the material and stabilize the workpiece, creating a superior finish on the top and bottom of the part.

END MILLS FOR COMPOSITES

Chipbreaker Cutter

Bur-Style End

- Optimized geometry with chipbreakers efficiently shears fibers and shortens chips for improved chip removal
- Suited for roughing and profiling in composite materials with high fiber or fill concentration (G10, FR4, etc.)
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	**3/32** (3x)	4	1/8	1-1/2	969231	43.50	969231-C4	54.20
3/64	**9/64** (3x)	4	1/8	1-1/2	969247	43.50	969247-C4	54.20
1/16	**3/16** (3x)	4	1/8	1-1/2	969262	41.70	969262-C4	52.40
5/64	**15/64** (3x)	4	1/8	1-1/2	969278	41.70	969278-C4	52.40
3/32	**9/32** (3x)	4	1/8	1-1/2	969293	41.70	969293-C4	52.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**3/8** (3x)	6	1/8	1-1/2	969308	40.20	969308-C4	50.90
1/8	**5/8** (5x)	6	1/8	1-1/2	884908	42.70	884908-C4	53.40
3/16	**9/16** (3x)	6	3/16	2	969312	44.40	969312-C4	59.10
3/16	**1** (5x)	6	3/16	2	884912	46.90	884912-C4	61.60
1/4	**3/4** (3x)	6	1/4	2-1/2	969316	53.10	969316-C4	69.80
1/4	**1-1/4** (5x)	6	1/4	2-1/2	884916	55.70	884916-C4	72.40
3/8	**1-1/8** (3x)	8	3/8	3	969324	87.20	969324-C4	107.40
1/2	**1-1/2** (3x)	8	1/2	4	969332	153.70	969332-C4	177.90

SPEEDS & FEEDS ONLINE!

★★★★★

"Shout out to #HarveyTool on another great product. When I started cutting composites, I knew exactly where to turn. Their Tech support answered all my questions (even the dumb ones) and the tool performed flawlessly. The improvement in surface finish with this 10 flute finisher is amazing. Thanks again @harveytool"

— @venomdefense

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NEW SIZES!

END MILLS FOR COMPOSITES

Diamond Cut – End Mill Style

End Mill Style

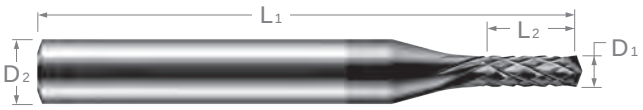
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Center cutting (two flutes to center) on end with downcut geometry on OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT		RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.062 (1/16)	**.186**	(3x)	6	8	1/8	1-1/2	920962	33.90	920962-C4	44.60	
.078 (5/64)	**.234**	(3x)	7	9	1/8	1-1/2	920978	33.90	920978-C4	44.60	
.093 (3/32)	**.279**	(3x)	7	9	1/8	1-1/2	920993	33.90	920993-C4	44.60	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	**.375**	(3x)	8	10	1/8	1-1/2	921008	33.90	921008-C4	44.60	
.125 (1/8)	**.625**	(5x)	8	10	1/8	1-1/2	894508	36.70	894508-C4	47.40	NEW
.187 (3/16)	**.563**	(3x)	9	11	3/16	2	921012	40.50	921012-C4	55.20	
.187 (3/16)	**1.000**	(5x)	9	11	3/16	2	894512	44.10	894512-C4	58.80	NEW
.250 (1/4)	**.750**	(3x)	10	12	1/4	2-1/2	921016	55.90	921016-C4	72.60	
.250 (1/4)	**1.250**	(5x)	10	12	1/4	2-1/2	894516	60.70	894516-C4	77.40	NEW
.312 (5/16)	**1.000**	(3x)	10	12	5/16	2-1/2	921020	72.40	921020-C4	92.60	NEW
.375 (3/8)	**1.125**	(3x)	11	13	3/8	2-1/2	921024	87.70	921024-C4	107.90	NEW
.500 (1/2)	**1.500**	(3x)	12	14	1/2	3	921032	148.40	921032-C4	172.70	NEW

SPEEDS & FEEDS ONLINE!

END MILLS FOR COMPOSITES

Diamond Cut – Drill Mill Style



Drill Style

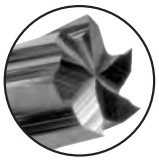
- 140° point angle allows for efficient plunging through composite sheet material
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Downcut geometry on OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	908062	36.20	908062-C4	46.90
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	908078	36.20	908078-C4	46.90
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	908093	36.20	908093-C4	46.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	908108	36.20	908108-C4	46.90
.187 (3/16)	**.563** (3x)	9	11	3/16	2	908112	42.70	908112-C4	57.40
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	908116	58.70	908116-C4	75.40

SPEEDS & FEEDS ONLINE!

END MILLS FOR COMPOSITES

Finisher



Bur-Style End

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	**3/32** (3x)	4	1/8	1-1/2	944731	43.90	944731-C4	54.60
3/64	**9/64** (3x)	4	1/8	1-1/2	944747	43.90	944747-C4	54.60
1/16	**3/16** (3x)	6	1/8	1-1/2	944762	41.90	944762-C4	52.60
1/16	**5/16** (5x)	6	1/8	1-1/2	889262	43.90	889262-C4	54.60
5/64	**15/64** (3x)	6	1/8	1-1/2	944778	41.90	944778-C4	52.60
3/32	**9/32** (3x)	6	1/8	1-1/2	944793	41.90	944793-C4	52.60
3/32	**1/2** (5x)	6	1/8	1-1/2	889293	43.90	889293-C4	54.60

D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**3/8** (3x)	8	1/8	1-1/2	944808	40.50	944808-C4	51.20
1/8	**5/8** (5x)	8	1/8	2	889208	42.50	889208-C4	53.20
3/16	**9/16** (3x)	8	3/16	2	944812	44.70	944812-C4	59.40
3/16	**1** (5x)	8	3/16	2-1/2	889212	46.90	889212-C4	61.60
1/4	**3/4** (3x)	8	1/4	2-1/2	944816	53.50	944816-C4	70.20
1/4	**1-1/4** (5x)	8	1/4	2-1/2	889216	65.10	889216-C4	81.80
3/8	**1-1/8** (3x)	10	3/8	3	944824	87.90	944824-C4	108.10
1/2	**1-1/2** (3x)	10	1/2	4	944832	154.70	944832-C4	178.90

SPEEDS & FEEDS ONLINE!

★★★★★

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— @boone_freeman

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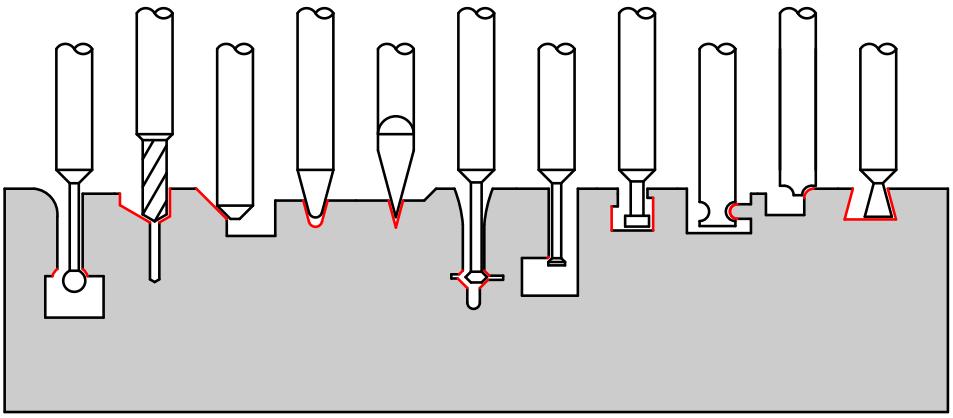
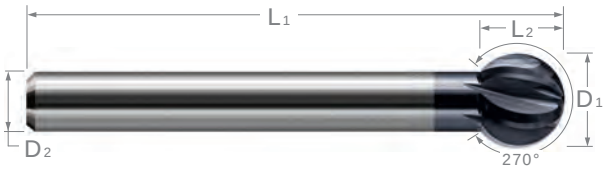
Machine a Variety of Difficult Profiles!



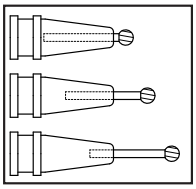
UNDERCUTTING END MILLS

270° Reduced Shank



- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

Chuck at Any Depth!

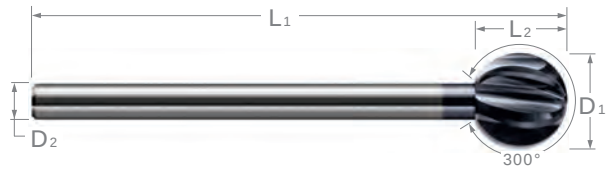


CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.217	6	4 mm	3-1/2	956116	202.40	956116-C3	209.60
3/8	.324	6	6 mm	3-1/2	956124	208.50	956124-C3	216.70
1/2	.432	6	5/16	4	956132	219.10	956132-C3	231.30
5/8	.546	6	3/8	4	956140	251.10	956140-C3	264.30
3/4	.645	6	1/2	5	956148	361.20	956148-C3	374.40
1	.873	6	5/8	5	956164	511.10	956164-C3	533.30

SPEEDS & FEEDS ONLINE!

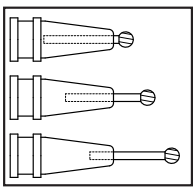
UNDERCUTTING END MILLS

300° Reduced Shank



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

Chuck at Any Depth!

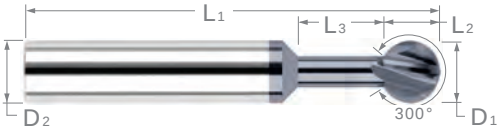


CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.232	6	3 mm	3-1/2	947416	216.90	947416-C3	224.10
3/8	.355	6	4 mm	3-1/2	947424	222.20	947424-C3	230.40
1/2	.472	6	3/16	4	947432	232.70	947432-C3	244.90
5/8	.589	6	1/4	4	947440	264.70	947440-C3	277.90
3/4	.706	6	5/16	5	947448	374.90	947448-C3	389.10
1	.939	6	7/16	5	947464	523.90	947464-C3	546.10

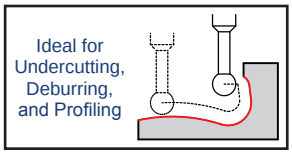
SPEEDS & FEEDS ONLINE!

UNDERCUTTING END MILLS

300°



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA



CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	.028	.010	**.031**	2	1/8	1-1/2	983931	57.70	983931-C3	61.90
1/32	.028	.010	**.062**	2	1/8	1-1/2	979131	57.70	979131-C3	61.90
1 mm	.036	.014	**.047**	2	1/8	1-1/2	98391M	57.70	98391M-C3	61.90
1 mm	.036	.014	**.078**	2	1/8	1-1/2	97911M	57.70	97911M-C3	61.90
3/64	.043	.018	**.062**	2	1/8	1-1/2	983947	57.70	983947-C3	61.90
3/64	.043	.018	**.093**	2	1/8	1-1/2	979147	57.70	979147-C3	61.90
3/64	.043	.018	**.125**	2	1/8	1-1/2	940047	57.70	940047-C3	61.90
1/16	.057	.024	**.031**	2	1/8	1-1/2	989562	40.90	989562-C3	45.10
1/16	.057	.024	**.078**	2	1/8	1-1/2	983962	40.90	983962-C3	45.10
1/16	.057	.024	**.125**	2	1/8	1-1/2	979162	40.90	979162-C3	45.10
1/16	.057	.024	**.187**	2	1/8	1-1/2	940062	40.90	940062-C3	45.10
5/64	.072	.031	**.047**	2	1/8	1-1/2	989578	40.90	989578-C3	45.10
5/64	.072	.031	**.093**	2	1/8	1-1/2	983978	40.90	983978-C3	45.10
5/64	.072	.031	**.156**	2	1/8	1-1/2	979178	40.90	979178-C3	45.10
5/64	.072	.031	**.218**	2	1/8	1-1/2	940078	40.90	940078-C3	45.10
3/32	.086	.038	**.062**	2	1/8	1-1/2	989593	40.90	989593-C3	45.10
3/32	.086	.038	**.125**	2	1/8	1-1/2	983993	40.90	983993-C3	45.10
3/32	.086	.038	**.156**	2	1/8	1-1/2	926893	40.90	926893-C3	45.10
3/32	.086	.038	**.218**	2	1/8	1-1/2	979193	40.90	979193-C3	45.10
3/32	.086	.038	**.281**	2	1/8	1-1/2	940093	40.90	940093-C3	45.10
7/64	.101	.047	**.156**	2	1/8	1-1/2	984007	41.40	984007-C3	45.60
7/64	.101	.047	**.250**	2	1/8	1-1/2	979207	41.40	979207-C3	45.60
3 mm	.110	.051	**.078**	2	1/8	1-1/2	98953M	40.90	98953M-C3	45.10
3 mm	.110	.051	**.156**	2	1/8	1-1/2	98393M	40.90	98393M-C3	45.10
3 mm	.110	.051	**.218**	2	1/8	1-1/2	92683M	40.90	92683M-C3	45.10
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.116	.053	**.047**	4	1/8	1-1/2	943608	30.40	943608-C3	34.60
1/8	.116	.053	**.093**	4	1/8	1-1/2	990608	33.50	990608-C3	37.70
1/8	.116	.053	**.125**	4	1/8	1-1/2	933008	35.90	933008-C3	40.10
1/8	.116	.053	**.187**	4	1/8	1-1/2	984008	39.10	984008-C3	43.30
1/8	.116	.053	**.281**	4	1/8	1-1/2	979208	43.50	979208-C3	47.70
1/8	.116	.053	**.375**	4	1/8	1-1/2	940108	47.90	940108-C3	52.10
1/8	.116	.053	**.500**	4	1/8	1-1/2	952308	51.40	952308-C3	55.60
1/8	.116	.053	**.625**	4	1/8	2	911908	69.20	911908-C3	73.40
1/8	.116	.053	**.750**	4	1/8	3	877908	71.40	877908-C3	75.60

SPEEDS & FEEDS ONLINE!

continued on next page

UNDERCUTTING END MILLS

300° (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
9/64	.130	.062	**.218**	4	3/16	2	984009	46.90	984009-C3	51.40
9/64	.130	.062	**.312**	4	3/16	2	979209	52.40	979209-C3	56.90
5/32	.145	.071	**.047**	4	3/16	2	943610	42.10	943610-C3	46.60
5/32	.145	.071	**.125**	4	3/16	2	990610	42.10	990610-C3	46.60
5/32	.145	.071	**.250**	4	3/16	2	984010	47.70	984010-C3	52.20
5/32	.145	.071	**.375**	4	3/16	2	979210	55.10	979210-C3	59.60
5/32	.145	.071	**.500**	4	3/16	2	940110	58.20	940110-C3	62.70
5/32	.145	.071	**.625**	4	3/16	2	952310	59.40	952310-C3	63.90
3/16	.174	.082	**.062**	4	3/16	2	943612	42.10	943612-C3	46.60
3/16	.174	.082	**.125**	4	3/16	2	990612	42.10	990612-C3	46.60
3/16	.174	.082	**.250**	4	3/16	2	984012	47.70	984012-C3	52.20
3/16	.174	.082	**.312**	4	3/16	2	926912	51.40	926912-C3	55.90
3/16	.174	.082	**.437**	4	3/16	2	979212	55.10	979212-C3	59.60
3/16	.174	.082	**.625**	4	3/16	2	940112	57.20	940112-C3	61.70
3/16	.174	.082	**.750**	4	3/16	2	952312	59.90	952312-C3	64.40
3/16	.174	.082	**1.000**	4	3/16	2-1/2	911912	63.70	911912-C3	68.20
5 mm	.182	.086	**.156**	4	1/4	2-1/2	99065M	58.10	99065M-C3	64.30
5 mm	.182	.086	**.250**	4	1/4	2-1/2	98405M	60.90	98405M-C3	67.10
7/32	.203	.098	**.156**	4	1/4	2-1/2	990614	58.10	990614-C3	64.30
7/32	.203	.098	**.312**	4	1/4	2-1/2	984014	64.70	984014-C3	70.90
6 mm	.220	.106	**.156**	4	1/4	2-1/2	99066M	57.50	99066M-C3	63.70
6 mm	.220	.106	**.312**	4	1/4	2-1/2	98406M	64.70	98406M-C3	70.90
6 mm	.220	.106	**.437**	4	1/4	2-1/2	92696M	66.90	92696M-C3	73.10
6 mm	.220	.106	**.562**	4	1/4	2-1/2	97926M	70.50	97926M-C3	76.70
1/4	.233	.112	**.093**	4	1/4	2-1/2	943616	56.40	943616-C3	62.60
1/4	.233	.112	**.187**	4	1/4	2-1/2	990616	56.40	990616-C3	62.60
1/4	.233	.112	**.250**	4	1/4	2-1/2	933016	59.40	933016-C3	65.60
1/4	.233	.112	**.375**	4	1/4	2-1/2	984016	62.10	984016-C3	68.30
1/4	.233	.112	**.500**	4	1/4	2-1/2	926916	68.50	926916-C3	74.70
1/4	.233	.112	**.625**	4	1/4	2-1/2	979216	75.10	979216-C3	81.30
1/4	.233	.112	**.750**	4	1/4	2-1/2	940116	80.10	940116-C3	86.30
1/4	.233	.112	**1.000**	4	1/4	2-1/2	952316	85.90	952316-C3	92.10
1/4	.233	.112	**1.250**	4	1/4	3	911916	92.70	911916-C3	98.90
1/4	.233	.112	**1.500**	4	1/4	4	877916	99.40	877916-C3	106.60
9/32	.262	.127	**.187**	4	5/16	2-1/2	990618	79.50	990618-C3	86.70
9/32	.262	.127	**.375**	4	5/16	2-1/2	984018	93.40	984018-C3	100.60
5/16	.291	.143	**.250**	4	5/16	2-1/2	990620	76.90	990620-C3	84.10
5/16	.291	.143	**.437**	4	5/16	2-1/2	984020	91.40	984020-C3	98.60
5/16	.291	.143	**.750**	4	5/16	2-1/2	979220	102.70	979220-C3	109.90
5/16	.291	.143	**1.000**	4	5/16	2-1/2	940120	114.20	940120-C3	121.40

SPEEDS & FEEDS ONLINE!

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UNDERCUTTING END MILLS

300° (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.349	.172	**.156**	4	3/8	2-1/2	943624	80.70	943624-C3	88.90
3/8	.349	.172	**.250**	4	3/8	2-1/2	990624	82.10	990624-C3	90.30
3/8	.349	.172	**.500**	4	3/8	2-1/2	984024	96.40	984024-C3	104.60
3/8	.349	.172	**.687**	4	3/8	2-1/2	926924	103.90	926924-C3	112.10
3/8	.349	.172	**1.000**	4	3/8	3	979224	111.90	979224-C3	120.10
3/8	.349	.172	**1.250**	4	3/8	3	940124	117.10	940124-C3	125.30
3/8	.349	.172	**1.500**	4	3/8	4	952324	135.90	952324-C3	147.10
10 mm	.366	.181	**.312**	4	7/16	2-3/4	990625	101.10	990625-C3	111.30
10 mm	.366	.181	**.562**	4	7/16	2-3/4	984025	120.40	984025-C3	130.60
1/2	.466	.230	**.187**	4	1/2	3	943632	124.20	943632-C3	136.40
1/2	.466	.230	**.312**	4	1/2	3	990632	125.10	990632-C3	137.30
1/2	.466	.230	**.750**	4	1/2	3	984032	142.10	984032-C3	154.30
1/2	.466	.230	**1.000**	4	1/2	3	926932	153.70	926932-C3	165.90
1/2	.466	.230	**1.250**	4	1/2	4	979232	172.50	979232-C3	184.70
1/2	.466	.230	**1.625**	4	1/2	4	940132	172.50	940132-C3	184.70
1/2	.466	.230	**2.000**	4	1/2	4	952332	189.40	952332-C3	201.60

SPEEDS & FEEDS ONLINE!

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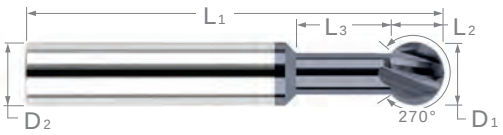
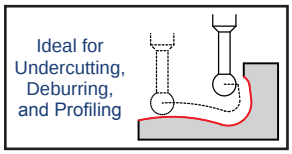
NEW SIZES!

UNDERCUTTING END MILLS

270°





Stocked in Multiple Reach Lengths

- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
.0200	.017	.012	**.016**	2	1/8	1-1/2	974220	62.70	974220-C3	66.90	
.0200	.017	.012	**.031**	2	1/8	1-1/2	52820	62.70	52820-C3	66.90	
.0200	.017	.012	**.047**	2	1/8	1-1/2	23200	66.70	23200-C3	70.90	
.0200	.017	.012	**.062**	2	1/8	1-1/2	54620	68.90	54620-C3	73.10	
.0250	.021	.014	**.031**	2	1/8	1-1/2	974225	55.20	974225-C3	59.40	
.0250	.021	.014	**.047**	2	1/8	1-1/2	52825	55.20	52825-C3	59.40	
.0250	.021	.014	**.062**	2	1/8	1-1/2	23201	59.40	23201-C3	63.60	
.0250	.021	.014	**.078**	2	1/8	1-1/2	54625	61.50	54625-C3	65.70	
1/32	.027	.016	**.015**	2	1/8	1-1/2	931502	50.70	931502-C3	54.90	
1/32	.027	.016	**.031**	2	1/8	1-1/2	23102	50.70	23102-C3	54.90	
1/32	.027	.016	**.047**	2	1/8	1-1/2	974231	50.70	974231-C3	54.90	
1/32	.027	.016	**.062**	2	1/8	1-1/2	52831	50.70	52831-C3	54.90	
1/32	.027	.016	**.078**	2	1/8	1-1/2	39731	50.70	39731-C3	54.90	
1/32	.027	.016	**.093**	2	1/8	1-1/2	23202	52.10	23202-C3	56.30	
1/32	.027	.016	**.125**	2	1/8	1-1/2	54631	59.40	54631-C3	63.60	
1/32	.027	.016	**.187**	2	1/8	1-1/2	55202	59.40	55202-C3	63.60	
.0394 (1 mm)	.033	.024	**.047**	2	1/8	1-1/2	2311M	50.70	2311M-C3	54.90	
.0394 (1 mm)	.033	.024	**.062**	2	1/8	1-1/2	97421M	50.70	97421M-C3	54.90	
.0394 (1 mm)	.033	.024	**.078**	2	1/8	1-1/2	5281M	50.70	5281M-C3	54.90	
.0394 (1 mm)	.033	.024	**.093**	2	1/8	1-1/2	3971M	50.70	3971M-C3	54.90	
.0394 (1 mm)	.033	.024	**.125**	2	1/8	1-1/2	2321M	57.90	2321M-C3	62.10	
.0394 (1 mm)	.033	.024	**.187**	2	1/8	1-1/2	54639	59.40	54639-C3	63.60	
.0394 (1 mm)	.033	.024	**.250**	2	1/8	1-1/2	5521M	65.70	5521M-C3	69.90	
3/64	.040	.029	**.047**	2	1/8	1-1/2	23103	50.70	23103-C3	54.90	NEW
3/64	.040	.029	**.062**	2	1/8	1-1/2	974247	50.70	974247-C3	54.90	
3/64	.040	.029	**.093**	2	1/8	1-1/2	52847	50.70	52847-C3	54.90	
3/64	.040	.029	**.125**	2	1/8	1-1/2	39703	50.70	39703-C3	54.90	
3/64	.040	.029	**.156**	2	1/8	1-1/2	23203	59.40	23203-C3	63.60	
3/64	.040	.029	**.250**	2	1/8	1-1/2	54647	59.40	54647-C3	63.60	
3/64	.040	.029	**.375**	2	1/8	1-1/2	55203	62.40	55203-C3	66.60	
3/64	.040	.029	**.437**	2	1/8	2	867747	68.70	867747-C3	72.90	NEW
1/16	.053	.037	**.031**	2	1/8	1-1/2	931504	33.70	931504-C3	37.90	
1/16	.053	.037	**.062**	2	1/8	1-1/2	23104	33.70	23104-C3	37.90	
1/16	.053	.037	**.093**	2	1/8	1-1/2	52862	33.70	52862-C3	37.90	
1/16	.053	.037	**.125**	2	1/8	1-1/2	39704	35.10	39704-C3	39.30	
1/16	.053	.037	**.187**	2	1/8	1-1/2	23204	35.10	23204-C3	39.30	
1/16	.053	.037	**.250**	2	1/8	1-1/2	54662	43.40	54662-C3	47.60	
1/16	.053	.037	**.312**	2	1/8	1-1/2	909062	43.40	909062-C3	47.60	
1/16	.053	.037	**.375**	2	1/8	1-1/2	55204	43.40	55204-C3	47.60	
1/16	.053	.037	**.437**	2	1/8	2	867762	49.70	867762-C3	53.90	

SPEEDS & FEEDS ONLINE!

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UNDERCUTTING END MILLS

270° (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
NEW	5/64	.067	.045	**.031**	2	1/8	1-1/2	931505	34.40	931505-C3	38.60
	5/64	.067	.045	**.062**	2	1/8	1-1/2	23105	34.40	23105-C3	38.60
	5/64	.067	.045	**.125**	2	1/8	1-1/2	52878	34.40	52878-C3	38.60
	5/64	.067	.045	**.187**	2	1/8	1-1/2	39705	35.90	39705-C3	40.10
	5/64	.067	.045	**.250**	2	1/8	1-1/2	23205	36.90	23205-C3	41.10
	5/64	.067	.045	**.375**	2	1/8	2	54678	44.10	54678-C3	48.30
	5/64	.067	.045	**.500**	2	1/8	2	55205	44.10	55205-C3	48.30
NEW	5/64	.067	.045	**.625**	2	1/8	2	867778	44.10	867778-C3	48.30
NEW	3/32	.079	.054	**.031**	2	1/8	1-1/2	931506	34.40	931506-C3	38.60
	3/32	.079	.054	**.062**	2	1/8	1-1/2	23106	34.40	23106-C3	38.60
	3/32	.079	.054	**.125**	2	1/8	1-1/2	974293	34.40	974293-C3	38.60
	3/32	.079	.054	**.187**	2	1/8	1-1/2	905106	34.40	905106-C3	38.60
	3/32	.079	.054	**.250**	2	1/8	1-1/2	52893	34.40	52893-C3	38.60
	3/32	.079	.054	**.312**	2	1/8	1-1/2	39706	37.50	39706-C3	41.70
	3/32	.079	.054	**.375**	2	1/8	1-1/2	23206	37.50	23206-C3	41.70
	3/32	.079	.054	**.437**	2	1/8	2	41306	44.10	41306-C3	48.30
	3/32	.079	.054	**.500**	2	1/8	2	54693	44.10	54693-C3	48.30
	3/32	.079	.054	**.625**	2	1/8	2	55206	50.70	55206-C3	54.90
	7/64	.093	.064	**.187**	2	1/8	1-1/2	905107	33.70	905107-C3	37.90
	7/64	.093	.064	**.250**	2	1/8	1-1/2	52907	33.70	52907-C3	37.90
	7/64	.093	.064	**.375**	2	1/8	1-1/2	39707	36.90	39707-C3	41.10
	7/64	.093	.064	**.500**	2	1/8	2	23207	43.40	23207-C3	47.60
NEW	7/64	.093	.064	**1.000**	2	1/8	3	29507	49.70	29507-C3	53.90
	.1181 (3 mm)	.100	.070	**.093**	2	1/8	1-1/2	2313M	33.70	2313M-C3	37.90
	.1181 (3 mm)	.100	.070	**.187**	2	1/8	1-1/2	90513M	33.70	90513M-C3	37.90
	.1181 (3 mm)	.100	.070	**.250**	2	1/8	1-1/2	5283M	33.70	5283M-C3	37.90
	.1181 (3 mm)	.100	.070	**.375**	2	1/8	1-1/2	3973M	36.90	3973M-C3	41.10
	.1181 (3 mm)	.100	.070	**.500**	2	1/8	2	2323M	43.40	2323M-C3	47.60

	D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/8	.107	.076	**.062**	4	1/8	1-1/2	931508	29.70	931508-C3	33.90
	1/8	.107	.076	**.125**	4	1/8	1-1/2	23108	29.70	23108-C3	33.90
	1/8	.107	.076	**.250**	4	1/8	1-1/2	52908	31.40	52908-C3	35.60
	1/8	.107	.076	**.375**	4	1/8	1-1/2	39708	32.10	39708-C3	36.30
	1/8	.107	.076	**.500**	4	1/8	1-1/2	23208	34.40	23208-C3	38.60
	1/8	.107	.076	**.625**	4	1/8	2	922908	36.70	922908-C3	40.90
	1/8	.107	.076	**.750**	4	1/8	2	41308	36.70	41308-C3	40.90
	1/8	.107	.076	**1.000**	4	1/8	3	29508	39.90	29508-C3	44.10
	1/8	.107	.076	**1.250**	4	1/8	3	960608	42.70	960608-C3	46.90
	1/8	.107	.076	**1.500**	4	1/8	3	55208	45.40	55208-C3	49.60
	1/8	.107	.076	**1.750**	4	1/8	3	929608	47.70	929608-C3	51.90
NEW	9/64	.119	.084	**.125**	4	3/16	2	23109	35.40	23109-C3	39.90
	9/64	.119	.084	**.250**	4	3/16	2	52909	38.40	52909-C3	42.90
	9/64	.119	.084	**.500**	4	3/16	2	23209	43.20	23209-C3	47.70
	9/64	.119	.084	**.750**	4	3/16	2	41309	46.40	41309-C3	50.90
	5/32	.133	.098	**.078**	4	3/16	2	931510	35.40	931510-C3	39.90
	5/32	.133	.098	**.125**	4	3/16	2	23110	35.40	23110-C3	39.90
	5/32	.133	.098	**.250**	4	3/16	2	52910	38.40	52910-C3	42.90
	5/32	.133	.098	**.375**	4	3/16	2	39710	40.40	39710-C3	44.90
	5/32	.133	.098	**.500**	4	3/16	2	23210	43.20	23210-C3	47.70

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

UNDERCUTTING END MILLS

270° (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
5/32	.133	.098	**.750**	4	3/16	2	41310	46.40	41310-C3	50.90	
5/32	.133	.098	**1.000**	4	3/16	3	29510	50.10	29510-C3	54.60	
5/32	.133	.098	**1.500**	4	3/16	3	55210	52.30	55210-C3	56.80	NEW
3/16	.160	.117	**.078**	4	3/16	2	931512	35.40	931512-C3	39.90	
3/16	.160	.117	**.125**	4	3/16	2	23112	35.40	23112-C3	39.90	
3/16	.160	.117	**.250**	4	3/16	2	52912	38.40	52912-C3	42.90	
3/16	.160	.117	**.375**	4	3/16	2	39712	40.40	39712-C3	44.90	
3/16	.160	.117	**.500**	4	3/16	2	23212	41.90	23212-C3	46.40	
3/16	.160	.117	**.750**	4	3/16	2	41312	46.40	41312-C3	50.90	
3/16	.160	.117	**1.000**	4	3/16	3	29512	50.10	29512-C3	54.60	
3/16	.160	.117	**1.250**	4	3/16	3	960612	52.20	960612-C3	56.70	
3/16	.160	.117	**1.500**	4	3/16	3	55212	54.10	55212-C3	58.60	
3/16	.160	.117	**1.750**	4	3/16	3	929612	63.90	929612-C3	68.40	
.1969 (5 mm)	.167	.119	**.250**	4	1/4	2-1/2	5295M	49.50	5295M-C3	55.70	
.1969 (5 mm)	.167	.119	**.500**	4	1/4	2-1/2	2325M	50.70	2325M-C3	56.90	
.1969 (5 mm)	.167	.119	**1.000**	4	1/4	4	2955M	57.50	2955M-C3	64.70	
7/32	.186	.138	**.250**	4	1/4	2-1/2	52914	53.10	52914-C3	59.30	
7/32	.186	.138	**.500**	4	1/4	2-1/2	23214	55.20	23214-C3	61.40	
7/32	.186	.138	**.750**	4	1/4	2-1/2	41314	57.70	41314-C3	63.90	
.2362 (6 mm)	.201	.148	**.250**	4	1/4	2-1/2	97436M	49.10	97436M-C3	55.30	NEW
.2362 (6 mm)	.201	.148	**.375**	4	1/4	2-1/2	5296M	49.10	5296M-C3	55.30	
.2362 (6 mm)	.201	.148	**.500**	4	1/4	2-1/2	3976M	51.70	3976M-C3	57.90	
.2362 (6 mm)	.201	.148	**.750**	4	1/4	2-1/2	2326M	54.90	2326M-C3	61.10	
.2362 (6 mm)	.201	.148	**1.250**	4	1/4	4	2956M	62.40	2956M-C3	69.60	
.2362 (6 mm)	.201	.148	**2.000**	4	1/4	4	96066M	72.90	96066M-C3	80.10	
1/4	.213	.158	**.078**	4	1/4	2-1/2	931516	47.20	931516-C3	53.40	
1/4	.213	.158	**.125**	4	1/4	2-1/2	23116	47.20	23116-C3	53.40	
1/4	.213	.158	**.250**	4	1/4	2-1/2	974316	49.50	974316-C3	55.70	
1/4	.213	.158	**.375**	4	1/4	2-1/2	52916	50.10	52916-C3	56.30	
1/4	.213	.158	**.500**	4	1/4	2-1/2	39716	51.70	39716-C3	57.90	
1/4	.213	.158	**.625**	4	1/4	2-1/2	927616	52.20	927616-C3	58.40	
1/4	.213	.158	**.750**	4	1/4	2-1/2	23216	54.90	23216-C3	61.10	
1/4	.213	.158	**1.125**	4	1/4	2-1/2	41316	57.10	41316-C3	63.30	
1/4	.213	.158	**1.500**	4	1/4	4	29516	63.50	29516-C3	70.70	
1/4	.213	.158	**2.000**	4	1/4	4	960616	67.40	960616-C3	74.60	
1/4	.213	.158	**2.250**	4	1/4	4	55216	71.40	55216-C3	78.60	
1/4	.213	.158	**2.500**	4	1/4	4	929616	94.10	929616-C3	101.30	
9/32	.240	.180	**.375**	4	5/16	2-1/2	52918	66.70	52918-C3	73.90	
9/32	.240	.180	**.750**	4	5/16	2-1/2	23218	68.70	23218-C3	75.90	
5/16	.266	.201	**.187**	4	5/16	2-1/2	23120	63.10	23120-C3	70.30	
5/16	.266	.201	**.375**	4	5/16	2-1/2	52920	65.70	52920-C3	72.90	
5/16	.266	.201	**.500**	4	5/16	2-1/2	39720	67.20	39720-C3	74.40	
5/16	.266	.201	**.750**	4	5/16	2-1/2	23220	70.90	23220-C3	78.10	
5/16	.266	.201	**1.125**	4	5/16	4	41320	80.40	41320-C3	89.10	
5/16	.266	.201	**1.500**	4	5/16	4	29520	85.90	29520-C3	94.60	
5/16	.266	.201	**2.000**	4	5/16	4	960620	91.10	960620-C3	99.80	
5/16	.266	.201	**2.250**	4	5/16	4	55220	92.70	55220-C3	101.40	
5/16	.266	.201	**2.500**	4	5/16	4	929620	92.70	929620-C3	101.40	NEW

SPEEDS & FEEDS ONLINE!

continued on next page

UNDERCUTTING END MILLS

270° (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	3/8	.320	.241	**.093**	4	3/8	2-1/2	931524	68.10	931524-C3	76.30
	3/8	.320	.241	**.187**	4	3/8	2-1/2	23124	68.10	23124-C3	76.30
	3/8	.320	.241	**.375**	4	3/8	2-1/2	52924	69.70	52924-C3	77.90
	3/8	.320	.241	**.500**	4	3/8	2-1/2	39724	69.70	39724-C3	77.90
	3/8	.320	.241	**.750**	4	3/8	2-1/2	23224	70.90	23224-C3	79.10
	3/8	.320	.241	**1.125**	4	3/8	4	41324	87.70	41324-C3	98.90
	3/8	.320	.241	**1.500**	4	3/8	4	29524	90.10	29524-C3	101.30
	3/8	.320	.241	**2.000**	4	3/8	4	960624	93.20	960624-C3	104.40
	3/8	.320	.241	**2.250**	4	3/8	4	55224	95.70	55224-C3	106.90
	3/8	.320	.241	**2.500**	4	3/8	4	929624	99.70	929624-C3	110.90
	.3937 (10 mm)	.335	.252	**.375**	4	7/16	2-3/4	52925	98.50	52925-C3	108.70
	.3937 (10 mm)	.335	.252	**.750**	4	7/16	2-3/4	23225	98.90	23225-C3	109.10
	7/16	.373	.285	**.500**	4	7/16	2-3/4	52928	95.50	52928-C3	105.70
	7/16	.373	.285	**1.000**	4	7/16	2-3/4	23228	98.90	23228-C3	109.10
	.4724 (12 mm)	.403	.308	**.500**	4	1/2	3	52931	124.40	52931-C3	136.60
	.4724 (12 mm)	.403	.308	**1.000**	4	1/2	3	23231	131.40	23231-C3	143.60
	1/2	.427	.323	**.187**	4	1/2	3	23132	96.90	23132-C3	109.10
	1/2	.427	.323	**.500**	4	1/2	3	52932	98.70	52932-C3	110.90
	1/2	.427	.323	**1.000**	4	1/2	3	23232	101.90	23232-C3	114.10
	1/2	.427	.323	**1.500**	4	1/2	6	41332	171.70	41332-C3	183.90
	1/2	.427	.323	**2.000**	4	1/2	6	29532	175.70	29532-C3	187.90
	1/2	.427	.323	**2.500**	4	1/2	6	960632	177.50	960632-C3	189.70
	1/2	.427	.323	**3.000**	4	1/2	6	55232	187.70	55232-C3	199.90
	1/2	.427	.323	**3.500**	4	1/2	6	929632	197.70	929632-C3	209.90
NEW	5/8	.533	.412	**1.000**	4	5/8	3-1/2	39740	204.70	39740-C3	216.90
	5/8	.533	.412	**1.500**	4	5/8	3-1/2	23240	204.70	23240-C3	216.90
	3/4	.640	.500	**1.500**	4	3/4	4	23248	281.70	23248-C3	294.90

SPEEDS & FEEDS ONLINE!

★★★★★

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— @rydelfab

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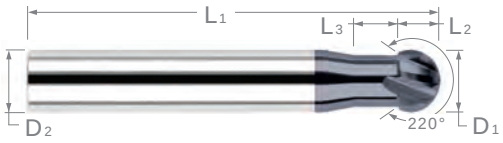
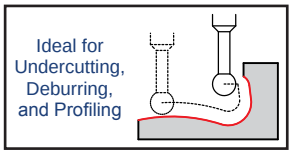
UNDERCUTTING END MILLS

220°





- 220° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Reach Lengths

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/32	.021	.023	**.093**	2	1/8	1-1/2	22802	51.20	22802-C3	55.40
1 mm	.026	.030	**.125**	2	1/8	1-1/2	2281M	57.10	2281M-C3	61.30
3/64	.031	.035	**.156**	2	1/8	1-1/2	22803	51.20	22803-C3	55.40
1/16	.042	.047	**.062**	2	1/8	1-1/2	22704	34.90	22704-C3	39.10
1/16	.042	.047	**.187**	2	1/8	1-1/2	22804	36.40	22804-C3	40.60
5/64	.052	.059	**.062**	2	1/8	1-1/2	22705	34.90	22705-C3	39.10
5/64	.052	.059	**.250**	2	1/8	1-1/2	22805	36.40	22805-C3	40.60
3/32	.063	.070	**.062**	2	1/8	1-1/2	22706	34.90	22706-C3	39.10
3/32	.063	.070	**.375**	2	1/8	1-1/2	22806	36.90	22806-C3	41.10
3 mm	.079	.090	**.500**	2	1/8	2	2283M	37.50	2283M-C3	41.70
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.084	.094	**.125**	4	1/8	1-1/2	22708	30.10	22708-C3	34.30
1/8	.084	.094	**.500**	4	1/8	1-1/2	22808	33.90	22808-C3	38.10
1/8	.084	.094	**1.000**	4	1/8	3	22908	39.10	22908-C3	43.30
1/8	.084	.094	**1.500**	4	1/8	3	971608	47.70	971608-C3	51.90
5/32	.105	.125	**.500**	4	3/16	2	22810	42.50	22810-C3	47.10
3/16	.126	.141	**.125**	4	3/16	2	22712	35.70	22712-C3	40.20
3/16	.126	.141	**.500**	4	3/16	2	22812	42.50	22812-C3	47.10
3/16	.126	.141	**1.000**	4	3/16	3	22912	49.10	22912-C3	53.60
6 mm	.158	.172	**.750**	4	1/4	2-1/2	2286M	53.70	2286M-C3	59.90
1/4	.168	.188	**.125**	4	1/4	2-1/2	22716	47.90	22716-C3	54.10
1/4	.168	.188	**.750**	4	1/4	2-1/2	22816	53.70	22816-C3	59.90
1/4	.168	.188	**1.500**	4	1/4	4	22916	62.40	22916-C3	69.60
1/4	.168	.188	**2.250**	4	1/4	4	971616	81.40	971616-C3	88.60
5/16	.210	.235	**.187**	4	5/16	2-1/2	22720	63.90	22720-C3	71.10
5/16	.210	.235	**.750**	4	5/16	2-1/2	22820	69.70	22820-C3	76.90
5/16	.210	.235	**1.500**	4	5/16	4	22920	84.20	22920-C3	92.90
3/8	.252	.281	**.187**	4	3/8	2-1/2	22724	68.70	22724-C3	76.90
3/8	.252	.281	**.750**	4	3/8	2-1/2	22824	73.10	22824-C3	81.30
3/8	.252	.281	**1.500**	4	3/8	4	22924	88.40	22924-C3	99.60
3/8	.252	.281	**2.250**	4	3/8	4	971624	122.70	971624-C3	133.90
1/2	.336	.375	**.187**	4	1/2	3	22732	98.10	22732-C3	110.30
1/2	.336	.375	**1.000**	4	1/2	3	22832	105.20	22832-C3	117.40
1/2	.336	.375	**2.000**	4	1/2	6	22932	172.70	22932-C3	184.90

SPEEDS & FEEDS ONLINE!

UNDERCUTTING END MILLS

270° High Helix

High Helix for Improved Performance!

270° Spherical Ball

- 45° helix for faster chip removal and better finish
- 270° spherical ball
- Center cutting
- Designed for undercutting, deburring, and multi-axis machining
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/16	.053	.037	**.093**	2	1/8	1-1/2	951162	40.40	951162-C3	44.60	951162-C8	46.60
1/16	.053	.037	**.187**	2	1/8	1-1/2	966562	41.70	966562-C3	45.90	966562-C8	47.90
1/16	.053	.037	**.250**	2	1/8	1-1/2	970462	50.90	970462-C3	55.10	970462-C8	57.10
5/64	.067	.045	**.125**	2	1/8	1-1/2	951178	40.40	951178-C3	44.60	951178-C8	46.60
5/64	.067	.045	**.250**	2	1/8	1-1/2	966578	41.70	966578-C3	45.90	966578-C8	47.90
5/64	.067	.045	**.375**	2	1/8	2	970478	50.90	970478-C3	55.10	970478-C8	57.10
3/32	.079	.054	**.250**	2	1/8	1-1/2	951193	40.40	951193-C3	44.60	951193-C8	46.60
3/32	.079	.054	**.375**	2	1/8	1-1/2	966593	44.20	966593-C3	48.40	966593-C8	50.40
3/32	.079	.054	**.500**	2	1/8	2	970493	50.90	970493-C3	55.10	970493-C8	57.10
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	.107	.076	**.125**	4	1/8	1-1/2	934108	35.40	934108-C3	39.60	934108-C8	41.60
1/8	.107	.076	**.250**	4	1/8	1-1/2	951208	36.90	951208-C3	41.10	951208-C8	43.10
1/8	.107	.076	**.500**	4	1/8	1-1/2	994708	40.40	994708-C3	44.60	994708-C8	46.60
1/8	.107	.076	**1.000**	4	1/8	3	997108	45.70	997108-C3	49.90	997108-C8	51.90
1/8	.107	.076	**1.500**	4	1/8	3	928808	48.70	928808-C3	52.90	928808-C8	54.90
5/32	.133	.098	**.500**	4	3/16	2	994710	51.40	994710-C3	55.90	994710-C8	57.60
5/32	.133	.098	**1.000**	4	3/16	3	997110	58.70	997110-C3	63.20	997110-C8	64.90
3/16	.160	.117	**.250**	4	3/16	2	951212	45.40	951212-C3	49.90	951212-C8	51.60
3/16	.160	.117	**.500**	4	3/16	2	994712	49.10	994712-C3	53.60	994712-C8	55.30
3/16	.160	.117	**.750**	4	3/16	2	897712	51.40	897712-C3	55.90	897712-C8	57.60
3/16	.160	.117	**1.000**	4	3/16	3	997112	58.70	997112-C3	63.20	997112-C8	64.90
3/16	.160	.117	**1.250**	4	3/16	3	893512	61.70	893512-C3	66.20	893512-C8	67.90
1/4	.213	.158	**.125**	4	1/4	2-1/2	934116	63.20	934116-C3	69.40	934116-C8	69.90
1/4	.213	.158	**.375**	4	1/4	2-1/2	951216	66.10	951216-C3	72.30	951216-C8	72.80
1/4	.213	.158	**.750**	4	1/4	2-1/2	994716	72.40	994716-C3	78.60	994716-C8	79.10
1/4	.213	.158	**1.125**	4	1/4	2-1/2	897716	74.50	897716-C3	80.70	897716-C8	81.20
1/4	.213	.158	**1.500**	4	1/4	4	997116	79.70	997116-C3	86.90	997116-C8	87.20
1/4	.213	.158	**2.250**	4	1/4	4	928816	88.10	928816-C3	95.30	928816-C8	95.60
5/16	.266	.201	**.750**	4	5/16	2-1/2	994720	84.10	994720-C3	91.30	994720-C8	98.30
5/16	.266	.201	**1.500**	4	5/16	4	997120	99.90	997120-C3	108.60	997120-C8	117.10
3/8	.320	.241	**.375**	4	3/8	2-1/2	951224	94.40	951224-C3	102.60	951224-C8	111.60
3/8	.320	.241	**.750**	4	3/8	2-1/2	994724	95.40	994724-C3	103.60	994724-C8	112.60
3/8	.320	.241	**1.125**	4	3/8	4	897724	102.50	897724-C3	113.70	897724-C8	122.70
3/8	.320	.241	**1.500**	4	3/8	4	997124	105.10	997124-C3	116.30	997124-C8	125.30
1/2	.427	.323	**.500**	4	1/2	3	951232	134.70	951232-C3	146.90	951232-C8	154.90
1/2	.427	.323	**1.000**	4	1/2	3	994732	138.10	994732-C3	150.30	994732-C8	158.30
1/2	.427	.323	**1.500**	4	1/2	6	897732	198.70	897732-C3	210.90	897732-C8	234.90
1/2	.427	.323	**2.000**	4	1/2	6	997132	203.90	997132-C3	216.10	997132-C8	240.10
1/2	.427	.323	**3.000**	4	1/2	6	928832	227.50	928832-C3	239.70	928832-C8	263.70

SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

UNDERCUTTING END MILLS

270° Deburring Undercut

High Number of Flutes

- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High number of flutes allows for faster speeds and feeds
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Reach Lengths

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.031 (1/32)	.026	.014	**.031**	12	10	1/8	1-1/2	899631	59.40	899631-C3	63.60
.031 (1/32)	.026	.014	**.062**	12	10	1/8	1-1/2	980531	59.40	980531-C3	63.60
.031 (1/32)	.026	.014	**.093**	12	10	1/8	1-1/2	926431	61.20	926431-C3	65.40
.031 (1/32)	.026	.014	**.125**	12	10	1/8	1-1/2	883231	63.20	883231-C3	67.40
.039 (1 mm)	.033	.019	**.047**	12	10	1/8	1-1/2	89961M	59.40	89961M-C3	63.60
.039 (1 mm)	.033	.019	**.125**	12	10	1/8	1/1/2	92641M	63.20	92641M-C3	67.40
.047 (3/64)	.040	.024	**.093**	12	10	1/8	1-1/2	980547	59.40	980547-C3	63.60
.047 (3/64)	.040	.024	**.125**	12	10	1/8	1-1/2	890847	61.20	890847-C3	65.40
.047 (3/64)	.040	.024	**.156**	12	10	1/8	1-1/2	926447	61.20	926447-C3	65.40
.047 (3/64)	.040	.024	**.250**	12	10	1/8	1-1/2	883247	63.20	883247-C3	67.40
.062 (1/16)	.053	.032	**.062**	15	12	1/8	1-1/2	899662	44.70	899662-C3	48.90
.062 (1/16)	.053	.032	**.093**	15	12	1/8	1-1/2	980562	44.70	980562-C3	48.90
.062 (1/16)	.053	.032	**.125**	15	12	1/8	1-1/2	890862	46.10	890862-C3	50.30
.062 (1/16)	.053	.032	**.187**	15	12	1/8	1-1/2	926462	46.10	926462-C3	50.30
.062 (1/16)	.053	.032	**.250**	15	12	1/8	1-1/2	883262	47.70	883262-C3	51.90
.078 (5/64)	.067	.035	**.062**	15	12	1/8	1-1/2	899678	44.70	899678-C3	48.90
.078 (5/64)	.067	.035	**.125**	15	12	1/8	1-1/2	980578	44.70	980578-C3	48.90
.078 (5/64)	.067	.035	**.250**	15	12	1/8	1-1/2	926478	46.10	926478-C3	50.30
.078 (5/64)	.067	.035	**.375**	15	12	1/8	2	883278	46.90	883278-C3	51.10
.093 (3/32)	.079	.038	**.062**	15	12	1/8	1-1/2	899693	47.40	899693-C3	51.60
.093 (3/32)	.079	.038	**.125**	15	12	1/8	1-1/2	895393	47.40	895393-C3	51.60
.093 (3/32)	.079	.038	**.250**	15	12	1/8	1-1/2	980593	47.40	980593-C3	51.60
.093 (3/32)	.079	.038	**.375**	15	12	1/8	1-1/2	926493	48.70	926493-C3	52.90
.093 (3/32)	.079	.038	**.500**	15	12	1/8	2	883293	53.90	883293-C3	58.10
.118 (3 mm)	.101	.056	**.250**	15	12	1/8	1-1/2	98053M	49.40	98053M-C3	53.60
.118 (3 mm)	.101	.056	**.500**	15	12	1/8	2	92643M	52.40	92643M-C3	56.60
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.107	.059	**.125**	16	13	1/8	1-1/2	899708	45.70	899708-C3	49.90
.125 (1/8)	.107	.059	**.250**	16	13	1/8	1-1/2	980608	47.40	980608-C3	51.60
.125 (1/8)	.107	.059	**.375**	16	13	1/8	1-1/2	890908	48.10	890908-C3	52.30
.125 (1/8)	.107	.059	**.500**	16	13	1/8	2	926508	49.10	926508-C3	53.30
.125 (1/8)	.107	.059	**.750**	16	13	1/8	2	886108	51.40	886108-C3	55.60
.125 (1/8)	.107	.059	**1.000**	16	13	1/8	3	883308	54.50	883308-C3	58.70

SPEEDS & FEEDS ONLINE!

continued on next page

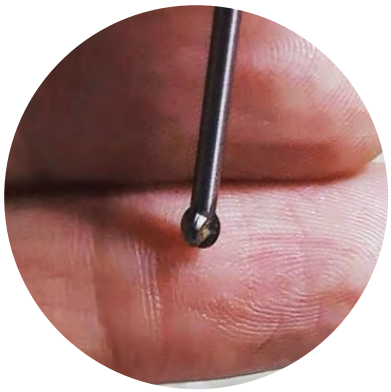
UNDERCUTTING END MILLS

270° Deburring Undercut

continued from previous page

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.187 (3/16)	.160	.097	**.125**	16	13	3/16	2	899712	48.70	899712-C3	53.20
.187 (3/16)	.160	.097	**.250**	16	13	3/16	2	980612	51.40	980612-C3	55.90
.187 (3/16)	.160	.097	**.375**	16	13	3/16	2	890912	53.10	890912-C3	57.60
.187 (3/16)	.160	.097	**.500**	16	13	3/16	2	926512	55.90	926512-C3	60.40
.187 (3/16)	.160	.097	**.750**	16	13	3/16	2	886112	60.40	886112-C3	64.90
.187 (3/16)	.160	.097	**1.000**	16	13	3/16	3	883312	63.50	883312-C3	68.10
.250 (1/4)	.213	.136	**.125**	16	13	1/4	2-1/2	899716	60.90	899716-C3	67.10
.250 (1/4)	.213	.136	**.375**	16	13	1/4	2-1/2	980616	61.50	980616-C3	67.70
.250 (1/4)	.213	.136	**.500**	16	13	1/4	2-1/2	890916	63.10	890916-C3	69.30
.250 (1/4)	.213	.136	**.750**	16	13	1/4	2-1/2	926516	66.10	926516-C3	72.30
.250 (1/4)	.213	.136	**1.125**	16	13	1/4	2-1/2	886116	68.20	886116-C3	74.40

SPEEDS & FEEDS ONLINE!



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"This little guy just hit it's 1,200th detent. I was worried about making it through one! Great job Harvey Tool."

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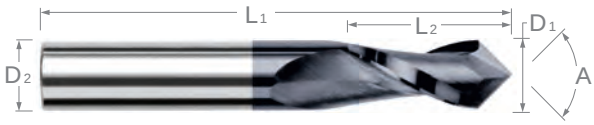
DRILL / END MILLS

Mill Style – 2 Flute

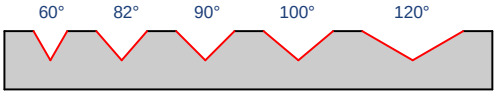


MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°	82°, 90°, 100°, 120°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 2 flutes
- Solid carbide
- CNC ground in the USA



Stocked in *Five* Included Angles!

OUTSTANDING IN ALUMINUM!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
60°	1/32	3/32	.003	1/8	1-1/2	991702	28.10	991702-C3	32.30		
	1/16	3/16	.005	1/8	1-1/2	991704	28.10	991704-C3	32.30		
	3/32	3/8	.005	1/8	1-1/2	991706	28.10	991706-C3	32.30		
	1/8	1/2	.005	1/8	1-1/2	991708	28.10	991708-C3	32.30	991708-C8	34.30
	5/32	9/16	.006	3/16	2	991710	29.10	991710-C3	33.60		
	3/16	5/8	.006	3/16	2	991712	29.10	991712-C3	33.60		
	1/4	3/4	.006	1/4	2-1/2	991716	41.20	991716-C3	47.40	991716-C8	47.90
	5/16	13/16	.007	5/16	2-1/2	991720	43.20	991720-C3	50.40		
	3/8	7/8	.008	3/8	2-1/2	991724	51.70	991724-C3	59.90	991724-C8	68.90
	1/2	1	.008	1/2	3	991732	81.90	991732-C3	94.10	991732-C8	102.10
	5/8	1-1/4	.009	5/8	3-1/2	991740	125.10	991740-C3	137.30		
	3/4	1-1/2	.010	3/4	4	991748	189.70	991748-C3	202.90		
82°	1/16	3/16	.005	1/8	1-1/2	949404	29.10	949404-C3	33.30		
	3/32	3/8	.005	1/8	1-1/2	949406	29.10	949406-C3	33.30		
	1/8	1/2	.005	1/8	1-1/2	949408	29.10	949408-C3	33.30		
	3/16	5/8	.006	3/16	2	949412	29.90	949412-C3	34.40		
	1/4	3/4	.006	1/4	2-1/2	949416	42.50	949416-C3	48.70		
	3/8	7/8	.008	3/8	2-1/2	949424	53.40	949424-C3	61.60		
	1/2	1	.008	1/2	3	949432	84.40	949432-C3	96.60		
90°	1/64	3/64	.002	1/8	1-1/2	15301-2	28.10	72201-C3	32.30		
	1/32	3/32	.003	1/8	1-1/2	15302-2	28.10	72231-C3	32.30	72231-C8	34.30
	3/64	9/64	.004	1/8	1-1/2	15303-2	28.10	72247-C3	32.30		
	1/16	3/16	.005	1/8	1-1/2	15304-2	28.10	72262-C3	32.30	72262-C8	34.30
	5/64	1/4	.005	1/8	1-1/2	15305-2	28.10	72278-C3	32.30	72278-C8	34.30
	3/32	3/8	.005	1/8	1-1/2	15306-2	28.10	72293-C3	32.30	72293-C8	34.30
	7/64	3/8	.005	1/8	1-1/2	15307-2	28.10	72302-C3	32.30		
	3 mm	3/8	.005	1/8	1-1/2	1533M-2	28.10	72305-C3	32.30		

SPEEDS & FEEDS ONLINE!

continued on next page

DRILL / END MILLS

Mill Style – 2 Flute (cont.)

continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
90°	1/8	1/2	.005	1/8	1-1/2	15308-2	28.10	72308-C3	32.30	72308-C8	34.30
	5/32	9/16	.006	3/16	2	15310-2	29.10	72310-C3	33.60		
	3/16	5/8	.006	3/16	2	15312-2	29.10	72312-C3	33.60	72312-C8	35.30
	1/4	3/4	.006	1/4	2-1/2	15316-2	41.20	72316-C3	47.40	72316-C8	47.90
	5/16	13/16	.007	5/16	2-1/2	15320-2	43.20	72320-C3	50.40	72320-C8	57.40
	3/8	7/8	.008	3/8	2-1/2	15324-2	51.70	72324-C3	59.90	72324-C8	68.90
	1/2	1	.008	1/2	3	15332-2	81.90	72332-C3	94.10	72332-C8	102.10
	5/8	1-1/4	.009	5/8	3-1/2	15340-2	125.10	72340-C3	137.30		
	3/4	1-1/2	.010	3/4	4	15348-2	189.70	72348-C3	202.90		
100°	1/8	1/2	.005	1/8	1-1/2	928508	29.10	928508-C3	33.30		
	3/16	5/8	.006	3/16	2	928512	29.90	928512-C3	34.40		
	1/4	3/4	.006	1/4	2-1/2	928516	42.50	928516-C3	48.70		
	3/8	7/8	.008	3/8	2-1/2	928524	53.40	928524-C3	61.60		
	1/2	1	.008	1/2	3	928532	84.40	928532-C3	96.60		
120°	1/16	3/16	.005	1/8	1-1/2	985504	29.90	985504-C3	34.10		
	3/32	3/8	.005	1/8	1-1/2	985506	29.90	985506-C3	34.10		
	1/8	1/2	.005	1/8	1-1/2	985508	29.90	985508-C3	34.10		
	3/16	5/8	.006	3/16	2	985512	30.70	985512-C3	35.20		
	1/4	3/4	.006	1/4	2-1/2	985516	43.10	985516-C3	49.30		
	5/16	13/16	.007	5/16	2-1/2	985520	44.90	985520-C3	52.10		
	3/8	7/8	.008	3/8	2-1/2	985524	53.40	985524-C3	61.60		
	1/2	1	.008	1/2	3	985532	83.40	985532-C3	95.60		

SPEEDS & FEEDS ONLINE!

Drill / End Mills

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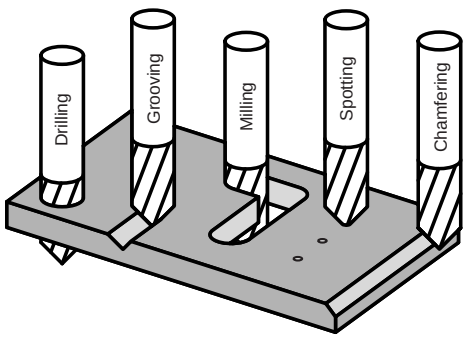

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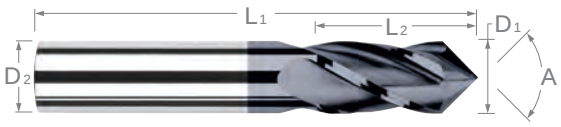
NEW SIZES!

DRILL / END MILLS

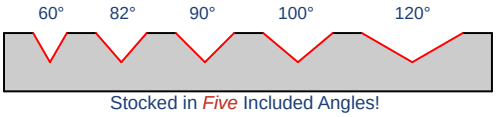
Mill Style – 4 Flute



MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°	82°, 90°, 100°, 120°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty



Stocked in *Five* Included Angles!

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 4 flutes (two flutes to center, two flutes cut back)
- Solid carbide
- CNC ground in the USA

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	4 FL	PRICE	4 FL	PRICE	
60°	1/32	3/32	.003	1/8	1-1/2	15402	28.10	15402-C3	32.30	
	3/64	9/64	.004	1/8	1-1/2	15403	28.10	15403-C3	32.30	
	1/16	3/16	.005	1/8	1-1/2	15404	28.10	15404-C3	32.30	
	5/64	1/4	.005	1/8	1-1/2	15405	28.10	15405-C3	32.30	
	3/32	3/8	.005	1/8	1-1/2	15406	28.10	15406-C3	32.30	
	7/64	3/8	.005	1/8	1-1/2	15407	29.10	15407-C3	33.30	NEW
	3 mm	3/8	.005	1/8	1-1/2	1543M	30.40	1543M-C3	34.60	NEW
	1/8	1/2	.005	1/8	1-1/2	15408	28.10	15408-C3	32.30	
	9/64	9/16	.006	3/16	2	15409	29.10	15409-C3	33.60	NEW
	5/32	9/16	.006	3/16	2	15410	29.10	15410-C3	33.60	
	3/16	5/8	.006	3/16	2	15412	29.10	15412-C3	33.60	
	1/4	3/4	.006	1/4	2-1/2	15416	41.20	15416-C3	47.40	
	5/16	13/16	.007	5/16	2-1/2	15420	43.20	15420-C3	50.40	
	3/8	7/8	.008	3/8	2-1/2	15424	51.70	15424-C3	59.90	
	7/16	1	.008	7/16	2-3/4	15428	80.10	15428-C3	90.30	
	1/2	1	.008	1/2	3	15432	81.90	15432-C3	94.10	
	5/8	1-1/4	.009	5/8	3-1/2	15440	125.10	15440-C3	137.30	
	3/4	1-1/2	.010	3/4	4	15448	189.70	15448-C3	202.90	
	1	2	.010	1	4	15464	285.70	15464-C3	305.90	NEW
82°	1/16	3/16	.005	1/8	1-1/2	26504	30.70	26504-C3	34.90	
	5/64	1/4	.005	1/8	1-1/2	26505	30.70	26505-C3	34.90	
	3/32	3/8	.005	1/8	1-1/2	26506	30.70	26506-C3	34.90	
	1/8	1/2	.005	1/8	1-1/2	26508	30.70	26508-C3	34.90	
	5/32	9/16	.006	3/16	2	26510	31.70	26510-C3	36.20	
	3/16	5/8	.006	3/16	2	26512	31.70	26512-C3	36.20	
	1/4	3/4	.006	1/4	2-1/2	26516	44.20	26516-C3	50.40	
	5/16	13/16	.007	5/16	2-1/2	26520	46.10	26520-C3	53.30	
	3/8	7/8	.008	3/8	2-1/2	26524	55.10	26524-C3	63.30	
	1/2	1	.008	1/2	3	26532	86.10	26532-C3	98.30	
	5/8	1-1/4	.009	5/8	3-1/2	26540	130.40	26540-C3	142.60	
	3/4	1-1/2	.010	3/4	4	26548	197.10	26548-C3	210.30	

SPEEDS & FEEDS ONLINE!

continued on next page

DRILL / END MILLS

Mill Style – 4 Flute (cont.)

continued from previous page

	INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
	A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	90°	1/32	3/32	.003	1/8	1-1/2	15302	28.10			15302-C3	32.30
NEW		1 mm	1/8	.003	1/8	1-1/2	1531M	30.40			1531M-C3	34.60
		3/64	9/64	.004	1/8	1-1/2	15303	28.10			15303-C3	32.30
		1/16	3/16	.005	1/8	1-1/2	15304	28.10	15304-C1	30.90	15304-C3	32.30
		5/64	1/4	.005	1/8	1-1/2	15305	28.10	15305-C1	30.90	15305-C3	32.30
		3/32	3/8	.005	1/8	1-1/2	15306	28.10	15306-C1	30.90	15306-C3	32.30
		7/64	3/8	.005	1/8	1-1/2	15307	28.10			15307-C3	32.30
		3 mm	3/8	.005	1/8	1-1/2	1533M	28.10			1533M-C3	32.30
		1/8	1/2	.005	1/8	1-1/2	15308	28.10	15308-C1	30.90	15308-C3	32.30
		9/64	9/16	.006	3/16	2	15309	29.10			15309-C3	33.60
		5/32	9/16	.006	3/16	2	15310	29.10			15310-C3	33.60
		3/16	5/8	.006	3/16	2	15312	29.10	15312-C1	32.30	15312-C3	33.60
NEW		6 mm	3/4	.006	1/4	2-1/2	1536M	43.40			1536M-C3	49.60
		1/4	3/4	.006	1/4	2-1/2	15316	41.20	15316-C1	44.60	15316-C3	47.40
		5/16	13/16	.007	5/16	2-1/2	15320	43.20	15320-C1	47.90	15320-C3	50.40
		3/8	7/8	.008	3/8	2-1/2	15324	51.70	15324-C1	56.60	15324-C3	59.90
		7/16	1	.008	7/16	2-3/4	15328	80.10			15328-C3	90.30
		1/2	1	.008	1/2	3	15332	81.90	15332-C1	87.40	15332-C3	94.10
		5/8	1-1/4	.009	5/8	3-1/2	15340	125.10	15340-C1	132.30	15340-C3	137.30
		3/4	1-1/2	.010	3/4	4	15348	189.70	15348-C1	197.90	15348-C3	202.90
		1	2	.010	1	4	15364	285.70			15364-C3	305.90
	100°	1/16	3/16	.005	1/8	1-1/2	27404	30.70			27404-C3	34.90
		5/64	1/4	.005	1/8	1-1/2	27405	30.70			27405-C3	34.90
		3/32	3/8	.005	1/8	1-1/2	27406	30.70			27406-C3	34.90
		1/8	1/2	.005	1/8	1-1/2	27408	30.70			27408-C3	34.90
		5/32	9/16	.006	3/16	2	27410	31.70			27410-C3	36.20
		3/16	5/8	.006	3/16	2	27412	31.70			27412-C3	36.20
		1/4	3/4	.006	1/4	2-1/2	27416	44.20			27416-C3	50.40
		5/16	13/16	.007	5/16	2-1/2	27420	46.10			27420-C3	53.30
		3/8	7/8	.008	3/8	2-1/2	27424	55.10			27424-C3	63.30
		1/2	1	.008	1/2	3	27432	86.10			27432-C3	98.30
		5/8	1-1/4	.009	5/8	3-1/2	27440	130.40			27440-C3	142.60
		3/4	1-1/2	.010	3/4	4	27448	197.10			27448-C3	210.30
	120°	1/16	3/16	.005	1/8	1-1/2	988104	29.90			988104-C3	34.10
		3/32	3/8	.005	1/8	1-1/2	988106	29.90			988106-C3	34.10
NEW		7/64	3/8	.005	1/8	1-1/2	988107	29.10			988107-C3	33.30
NEW		3 mm	3/8	.005	1/8	1-1/2	98813M	30.40			98813M-C3	34.60
		1/8	1/2	.005	1/8	1-1/2	988108	29.90			988108-C3	34.10
NEW		9/64	9/16	.006	3/16	2	988109	30.70			988109-C3	35.20
		5/32	9/16	.006	3/16	2	988110	30.70			988110-C3	35.20
		3/16	5/8	.006	3/16	2	988112	30.70			988112-C3	35.20
		1/4	3/4	.006	1/4	2-1/2	988116	43.10			988116-C3	49.30
		5/16	13/16	.007	5/16	2-1/2	988120	44.90			988120-C3	52.10
		3/8	7/8	.008	3/8	2-1/2	988124	53.40			988124-C3	61.60
		1/2	1	.008	1/2	3	988132	83.40			988132-C3	95.60
		5/8	1-1/4	.009	5/8	3-1/2	988140	126.50			988140-C3	138.70
		3/4	1-1/2	.010	3/4	4	988148	191.20			988148-C3	204.40
NEW		1	2	.010	1	4	988164	287.20			988164-C3	307.40

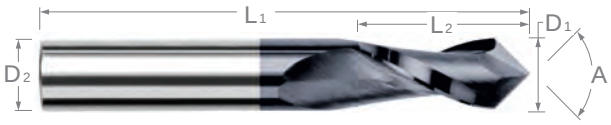
SPEEDS & FEEDS ONLINE!

Click Tool # for stock, speeds & feeds, & other technical info

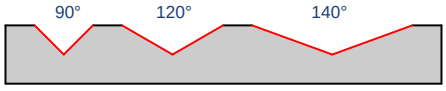
NEW SIZES!

DRILL / END MILLS

Drill Style – 2 Flute



- Designed for drilling and milling applications
- 2 flutes
- Solid carbide
- CNC ground in the USA

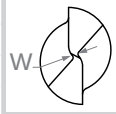


Stocked in *Three* Included Angles!

DRILL STYLE

Cammed relief with split point with "S" style gash to thin web.

Recommended For	
Chamfering	Light Duty
O.D. Milling	Yes
Drilling	Yes
Spotting	Yes



INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	2 FL	PRICE	2 FL	PRICE	
90°	1/32	3/32	.003	1/8	1-1/2	46502	30.40	46502-C3	34.60	
	1 mm	1/8	.003	1/8	1-1/2	4651M	32.70	4651M-C3	36.90	NEW
	3/64	9/64	.004	1/8	1-1/2	46503	30.40	46503-C3	34.60	
	1/16	3/16	.005	1/8	1-1/2	46504	30.40	46504-C3	34.60	
	5/64	1/4	.005	1/8	1-1/2	46505	30.40	46505-C3	34.60	
	3/32	3/8	.005	1/8	1-1/2	46506	30.40	46506-C3	34.60	
	7/64	3/8	.005	1/8	1-1/2	46507	30.40	46507-C3	34.60	
	3 mm	3/8	.005	1/8	1-1/2	4653M	32.70	4653M-C3	36.90	NEW
	1/8	1/2	.005	1/8	1-1/2	46508	30.40	46508-C3	34.60	
	5/32	9/16	.006	3/16	2	46510	30.70	46510-C3	35.20	
	3/16	5/8	.006	3/16	2	46512	30.70	46512-C3	35.20	
	1/4	3/4	.006	1/4	2-1/2	46516	43.10	46516-C3	49.30	
	5/16	13/16	.007	5/16	2-1/2	46520	44.90	46520-C3	52.10	
	3/8	7/8	.008	3/8	2-1/2	46524	53.40	46524-C3	61.60	
	7/16	1	.008	7/16	2-3/4	46528	81.70	46528-C3	91.90	
	1/2	1	.008	1/2	3	46532	83.40	46532-C3	95.60	
	5/8	1-1/4	.010	5/8	3-1/2	46540	126.50	46540-C3	138.70	
	3/4	1-1/2	.012	3/4	4	46548	191.20	46548-C3	204.40	
	1	2	.015	1	4	46564	282.90	46564-C3	303.10	NEW
120°	1/32	3/32	.003	1/8	1-1/2	12902	30.40	12902-C3	34.60	NEW
	1 mm	1/8	.003	1/8	1-1/2	1291M	32.70	1291M-C3	36.90	NEW
	3/64	9/64	.004	1/8	1-1/2	12903	30.40	12903-C3	34.60	NEW
	1/16	3/16	.005	1/8	1-1/2	12904	30.40	12904-C3	34.60	
	5/64	1/4	.005	1/8	1-1/2	12905	30.40	12905-C3	34.60	
	3/32	3/8	.005	1/8	1-1/2	12906	30.40	12906-C3	34.60	
	3 mm	3/8	.005	1/8	1-1/2	1293M	32.70	1293M-C3	36.90	NEW
	1/8	1/2	.005	1/8	1-1/2	12908	30.40	12908-C3	34.60	
	5/32	9/16	.006	3/16	2	12910	30.70	12910-C3	35.20	
	3/16	5/8	.006	3/16	2	12912	30.70	12912-C3	35.20	
	1/4	3/4	.006	1/4	2-1/2	12916	43.10	12916-C3	49.30	
	5/16	13/16	.007	5/16	2-1/2	12920	44.90	12920-C3	52.10	
	3/8	7/8	.008	3/8	2-1/2	12924	53.40	12924-C3	61.60	
	7/16	1	.008	7/16	2-3/4	12928	81.70	12928-C3	91.90	
	1/2	1	.008	1/2	3	12932	83.40	12932-C3	95.60	
	5/8	1-1/4	.010	5/8	3-1/2	12940	126.50	12940-C3	138.70	
	3/4	1-1/2	.012	3/4	4	12948	191.20	12948-C3	204.40	
	1	2	.015	1	4	12964	282.90	12964-C3	303.10	NEW

SPEEDS & FEEDS ONLINE!

continued on next page

DRILL / END MILLS

Drill Style – 2 Flute (cont.)

continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE
140°	1/16	3/16	.005	1/8	1-1/2	950504	30.70	950504-C3	34.90
	5/64	1/4	.005	1/8	1-1/2	950505	30.70	950505-C3	34.90
	3/32	3/8	.005	1/8	1-1/2	950506	30.70	950506-C3	34.90
	1/8	1/2	.005	1/8	1-1/2	950508	30.70	950508-C3	34.90
	3/16	5/8	.006	3/16	2	950512	31.70	950512-C3	36.20
	1/4	3/4	.006	1/4	2-1/2	950516	44.20	950516-C3	50.40
	5/16	13/16	.007	5/16	2-1/2	950520	46.10	950520-C3	53.30
	3/8	7/8	.008	3/8	2-1/2	950524	55.10	950524-C3	63.30
	1/2	1	.008	1/2	3	950532	86.10	950532-C3	98.30
	5/8	1-1/4	.010	5/8	3-1/2	950540	130.40	950540-C3	142.60
	3/4	1-1/2	.012	3/4	4	950548	197.10	950548-C3	210.30

SPEEDS & FEEDS ONLINE!

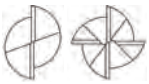
DRILL / END MILLS

Cobalt – Mill Style – 2 & 4 Flute

- M-42 steel (8% cobalt)
- 90° included angle point
- CNC ground in the USA

MILL STYLE

END VIEW:



Flat Relief with end mill style gash to thin web

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	Non-Ferrous Only
Spotting	Light Duty

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES*	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	TOOL #	PRICE
90°	1/8	3/8	4	3/8	2-5/16	14308	54.20
	1/8	3/8	2	3/8	2-5/16	14308-2	54.20
	3/16	1/2	4	3/8	2-3/8	14312	54.20
	1/4	5/8	4	3/8	2-1/2	14316	54.20
	1/4	5/8	2	3/8	2-1/2	14316-2	54.20
	5/16	3/4	4	3/8	2-1/2	14320	54.20
	3/8	3/4	4	3/8	2-1/2	14324	54.20
	3/8	3/4	2	3/8	2-1/2	14324-2	54.20
	7/16	1	4	3/8	2-11/16	14328	63.90
	1/2	1-1/4	4	1/2	3-1/4	14332	63.90
	1/2	1-1/4	2	1/2	3-1/4	14332-2	63.90
	5/8	1-5/8	4	5/8	3-3/4	14340	93.50
	3/4	1-5/8	4	3/4	3-7/8	14348	109.90
	1	1-7/8	4	3/4	4-1/8	14364-A	160.10
	1	2	4	1	4-1/2	14364	160.10

SPEEDS & FEEDS ONLINE!

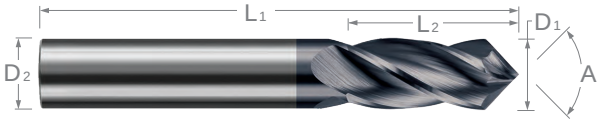
*2 flute style is two flutes to center. 4 flute style is two flutes to center and two flutes cut back.

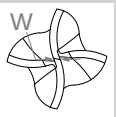
Click Tool # for stock, speeds & feeds, & other technical info

NEW!

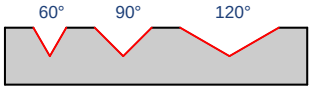
DRILL / END MILLS

Helical Tip – 4 Flute



HELICAL TIP		
Recommended For		
Chamfering	Yes	
O.D. Milling	Yes	
Drilling	No	
Spotting	Light Duty	

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 4 flutes (two flutes to center, two flutes cut back)
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Stocked in *Three* Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2 (h6)	L1	4 FL	PRICE	
60°	1/8	1/2	.008	1/8	1-1/2	899208-C6	46.20	NEW
	3/16	5/8	.009	3/16	2	899212-C6	51.10	NEW
	1/4	3/4	.009	1/4	2-1/2	899216-C6	64.90	NEW
	3/8	7/8	.012	3/8	2-1/2	899224-C6	80.20	NEW
	1/2	1	.012	1/2	3	899232-C6	102.50	NEW
90°	1/8	1/2	.008	1/8	1-1/2	881108-C6	46.20	NEW
	3/16	5/8	.009	3/16	2	881112-C6	51.10	NEW
	1/4	3/4	.009	1/4	2-1/2	881116-C6	64.90	NEW
	3/8	7/8	.012	3/8	2-1/2	881124-C6	80.20	NEW
	1/2	1	.012	1/2	3	881132-C6	102.50	NEW
120°	1/8	1/2	.008	1/8	1-1/2	865408-C6	46.20	NEW
	3/16	5/8	.009	3/16	2	865412-C6	51.10	NEW
	1/4	3/4	.009	1/4	2-1/2	865416-C6	64.90	NEW
	3/8	7/8	.012	3/8	2-1/2	865424-C6	80.20	NEW
	1/2	1	.012	1/2	3	865432-C6	102.50	NEW

SPEEDS & FEEDS ONLINE!

★★★★★

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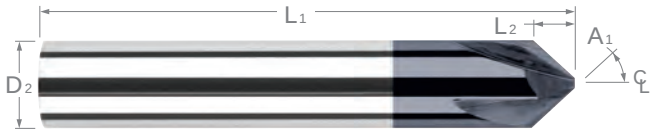
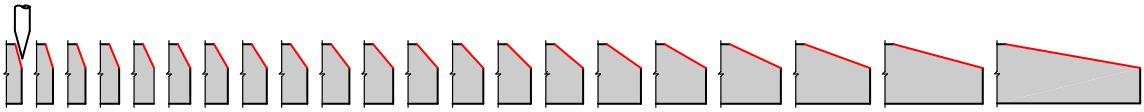
CHAMFER CUTTERS

Pointed & Flat End



Available in 2, 3, 4 & 6 Flutes!

- Choose from two styles:
  - Pointed: 2 flute style for deburring and chamfering in narrow grooves, slots and small holes
  - Flat End: (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
- Solid carbide
- CNC ground in the USA



Stocked in *21* Angles Per Side, Ranging from 15°-80°!

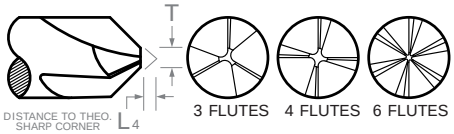
ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
15°	1/8	2	.010	I	.215		1-1/2		18715	17.70	18715-C3	21.90	18715-C8	23.90
	1/8	2	.010	I	.215		3	*LONG!*	50615	19.90	50615-C3	24.10		
	1/8	3	.040	II	.159	.075	1-1/2		968615	17.70	968615-C3	21.90		
	3/16	2	.010	I	.350		2		72415	22.90	72415-C3	27.40		
	3/16	2	.010	I	.350		4	*LONG!*	986915	31.90	986915-C3	38.10		
	3/16	3	.040	II	.275	.075	2		978115	26.20	978115-C3	30.70		
	1/4	2	.010	I	.448		2-1/2		47615	32.90	47615-C3	39.10	47615-C8	40.40
	1/4	3	.060	II	.355	.112	2-1/2		18515	32.90	18515-C3	39.10		
	1/4	3	.060	II	.355	.112	4	*LONG!*	48515	39.50	48515-C3	44.10		
	5/16	3	.060	II	.471	.112	2-1/2		977015	38.70	977015-C3	45.90		
	3/8	2	.010	I	.700		2-1/2		72515	44.10	72515-C3	52.30		
	3/8	3	.060	II	.588	.112	2-1/2		18415	44.10	18415-C3	52.30		
	3/8	3	.060	II	.588	.112	4	*LONG!*	981215	59.70	981215-C3	70.90		
	1/2	2	.010	I	.933		3		960415	74.10	960415-C3	86.30		
	1/2	4	.080	II	.784	.149	3		18315	65.40	18315-C3	77.60		
NEW	5/8	6	.080	II	1.017	.149	3-1/2		952815	107.90	952815-C3	120.10		
NEW	3/4	6	.100	II	1.213	.187	4		949315	161.40	949315-C3	174.60		
17.5°	1/8	2	.010	I	.198		1-1/2		18718	18.20	18718-C3	22.40		
	1/4	2	.010	I	.396		2-1/2		47618	33.10	47618-C3	39.30		
	1/4	3	.060	II	.301	.095	2-1/2		18518	33.10	18518-C3	39.30		
	1/2	4	.080	II	.666	.127	3		18318	65.90	18318-C3	78.10		

SPEEDS & FEEDS ONLINE!

continued on next page

TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)

TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

continued from previous page

ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
20°	1/8	2	.010	I	.158		1-1/2		18720	17.70	18720-C3	21.90	18720-C8	23.90
	1/8	2	.010	I	.158		3	*LONG!*	50620	19.90	50620-C3	24.10		
	1/8	3	.040	II	.117	.055	1-1/2		968620	17.70	968620-C3	21.90		
	3/16	2	.010	I	.258		2		72420	22.90	72420-C3	27.40		
	3/16	2	.010	I	.258		4	*LONG!*	986920	31.90	986920-C3	38.10		
	3/16	3	.040	II	.203	.055	2		978120	26.20	978120-C3	30.70		
	1/4	2	.010	I	.330		2-1/2		47620	32.90	47620-C3	39.10	47620-C8	40.40
	1/4	3	.060	II	.261	.082	2-1/2		18520	32.90	18520-C3	39.10	18520-C8	40.40
	1/4	3	.060	II	.261	.082	4	*LONG!*	48520	39.50	48520-C3	44.10		
	3/8	2	.010	I	.515		2-1/2		72520	44.10	72520-C3	52.30		
	3/8	3	.060	II	.433	.082	2-1/2		18420	44.10	18420-C3	52.30		
	3/8	3	.060	II	.433	.082	4	*LONG!*	981220	59.70	981220-C3	70.90		
	1/2	2	.010	I	.687		3		960420	74.10	960420-C3	86.30		
	1/2	4	.080	II	.577	.110	3		18320	65.40	18320-C3	77.60		
22.5°	1/8	2	.010	I	.139		1-1/2		18723	17.70	18723-C3	21.90	18723-C8	23.90
	1/8	3	.040	II	.103	.048	1-1/2		968623	17.70	968623-C3	21.90		
	3/16	2	.010	I	.226		2		72423	23.10	72423-C3	27.60		
	3/16	3	.040	II	.178	.048	2		978123	23.10	978123-C3	27.60		
	1/4	2	.010	I	.292		2-1/2		47623	33.10	47623-C3	39.30		
	1/4	3	.060	II	.229	.072	2-1/2		18523	33.10	18523-C3	39.30		
	3/8	2	.010	I	.453		2-1/2		72523	44.50	72523-C3	52.70		
	3/8	3	.060	II	.386	.072	2-1/2		18423	44.50	18423-C3	52.70		
	1/2	2	.010	I	.604		3		960423	70.70	960423-C3	82.90		
	1/2	4	.080	II	.513	.097	3		18323	62.40	18323-C3	74.60		
25°	1/8	2	.010	I	.123		1-1/2		18725	17.70	18725-C3	21.90	18725-C8	23.90
	1/8	3	.040	II	.091	.043	1-1/2		968625	17.70	968625-C3	21.90		
	3/16	2	.010	I	.201		2		72425	22.90	72425-C3	27.40		
	3/16	3	.040	II	.158	.043	2		978125	22.90	978125-C3	27.40		
	1/4	2	.010	I	.260		2-1/2		47625	33.10	47625-C3	39.30		
	1/4	3	.060	II	.204	.064	2-1/2		18525	32.90	18525-C3	39.10		
	3/8	2	.010	I	.402		2-1/2		72525	44.10	72525-C3	52.30		
	3/8	3	.060	II	.343	.064	2-1/2		18425	44.10	18425-C3	52.30		
	1/2	2	.010	I	.536		3		960425	69.90	960425-C3	82.10		
	1/2	4	.080	II	.450	.086	3		18325	61.70	18325-C3	73.90		
27.5°	1/8	2	.010	I	.120		1-1/2		18728	18.20	18728-C3	22.40		
	1/4	2	.010	I	.240		2-1/2		47628	33.10	47628-C3	39.30		
	1/4	3	.060	II	.182	.058	2-1/2		18528	33.10	18528-C3	39.30		
	1/2	4	.080	II	.403	.077	3		18328	62.40	18328-C3	74.60		
30°	1/8	2	.010	I	.100		1-1/2		18730	17.70	18730-C3	21.90	18730-C8	23.90
	1/8	2	.010	I	.100		3	*LONG!*	50630	19.90	50630-C3	24.10		
	1/8	3	.040	II	.074	.035	1-1/2		968630	17.70	968630-C3	21.90		
	3/16	2	.010	I	.162		2		72430	22.90	72430-C3	27.40		
	3/16	2	.010	I	.162		4	*LONG!*	986930	31.90	986930-C3	38.10		
	3/16	3	.040	II	.128	.035	2		978130	28.40	978130-C3	32.90		

SPEEDS & FEEDS ONLINE!

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
		1/4	2	.010	I	.208		2-1/2		47630	32.90	47630-C3	39.10	47630-C8	40.40
		1/4	3	.060	II	.165	.052	2-1/2		18530	32.90	18530-C3	39.10	18530-C8	40.40
		1/4	3	.060	II	.165	.052	4	*LONG!*	48530	39.50	48530-C3	44.10		
		5/16	3	.060	II	.219	.052	2-1/2		977030	38.70	977030-C3	45.90		
		3/8	2	.010	I	.325		2-1/2		72530	44.10	72530-C3	52.30		
	30°	3/8	3	.060	II	.273	.052	2-1/2		18430	44.10	18430-C3	52.30		
		3/8	3	.060	II	.273	.052	4	*LONG!*	981230	59.70	981230-C3	70.90		
		1/2	2	.010	I	.433		3		960430	69.90	960430-C3	82.10		
		1/2	4	.080	II	.364	.069	3		18330	61.70	18330-C3	73.90		
NEW		5/8	6	.080	II	.472	.069	3-1/2		952830	107.90	952830-C3	120.10		
NEW		3/4	6	.100	II	.563	.087	4		949330	161.40	949330-C3	174.60		
	32.5°	1/8	2	.010	I	.098		1-1/2		18733	18.20	18733-C3	22.40		
		1/8	2	.010	I	.089		1-1/2		18735	17.70	18735-C3	21.90		
		1/8	3	.040	II	.061	.029	1-1/2		968635	17.70	968635-C3	21.90		
		3/16	2	.010	I	.134		2		72435	22.90	72435-C3	27.40		
		3/16	3	.040	II	.105	.029	2		978135	22.90	978135-C3	27.40		
	35°	1/4	2	.010	I	.173		2-1/2		47635	41.70	47635-C3	47.90		
		1/4	3	.060	II	.136	.043	2-1/2		18535	32.90	18535-C3	39.10		
		3/8	2	.010	I	.268		2-1/2		72535	44.10	72535-C3	52.30		
		3/8	3	.060	II	.229	.043	2-1/2		18435	44.10	18435-C3	52.30		
		1/2	2	.010	I	.357		3		960435	69.90	960435-C3	82.10		
		1/2	4	.080	II	.304	.057	3		18335	61.70	18335-C3	73.90		
		1/8	2	.010	I	.081		1-1/2		18738	18.20	18738-C3	22.40		
	37.5°	1/4	2	.010	I	.163		2-1/2		47638	42.10	47638-C3	48.30		
		1/4	3	.060	II	.124	.039	2-1/2		18538	33.10	18538-C3	39.30		
		1/2	4	.080	II	.274	.052	3		18338	62.40	18338-C3	74.60		
		1/8	2	.010	I	.074		1-1/2		18740	17.70	18740-C3	21.90		
NEW		1/8	3	.040	II	.051	.024	1-1/2		968640	17.70	968640-C3	21.90		
		3/16	2	.010	I	.112		2		72440	22.90	72440-C3	27.40		
	40°	1/4	2	.010	I	.144		2-1/2		47640	41.70	47640-C3	47.90		
		1/4	3	.060	II	.113	.036	2-1/2		18540	32.90	18540-C3	39.10		
		3/8	3	.060	II	.191	.036	2-1/2		18440	44.10	18440-C3	52.30		
		1/2	4	.080	II	.253	.048	3		18340	61.70	18340-C3	73.90		
		1/8	2	.010	I	.066		1-1/2		18741	18.70	18741-C3	22.90	18741-C8	24.90
		1/8	3	.040	II	.049	.023	1-1/2		968641	18.70	968641-C3	22.90		
		3/16	2	.010	I	.108		2		72441	24.20	72441-C3	28.70		
		3/16	3	.040	II	.085	.023	2		978141	24.10	978141-C3	28.60		
	41°	1/4	2	.010	I	.139		2-1/2		47641	34.20	47641-C3	40.40		
		1/4	3	.060	II	.109	.035	2-1/2		18541	34.90	18541-C3	41.10		
		3/8	2	.010	I	.216		2-1/2		72541	46.70	72541-C3	54.90		
		3/8	3	.060	II	.184	.035	2-1/2		18441	46.70	18441-C3	54.90		
		1/2	2	.010	I	.288		3		960441	70.70	960441-C3	82.90		
		1/2	4	.080	II	.242	.046	3		18341	65.40	18341-C3	77.60		
	42.5°	1/8	2	.010	I	.068		1-1/2		18743	18.20	18743-C3	22.40		

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
	3 mm	2	.25 mm	I	1.50 mm		38 mm		900245	19.70	900245-C3	23.90			
	3 mm	3	1.00 mm	II	1.00 mm	.500 mm	38 mm		899545	19.70	899545-C3	23.90			
	1/8	2	.010	I	.058		1-1/2		18745	17.70	18745-C3	21.90	18745-C8	23.90	
	1/8	2	.010	I	.058		3	*LONG!*	50645	19.90	50645-C3	24.10			
	1/8	3	.040	II	.043	.020	1-1/2		968645	17.70	968645-C3	21.90			
	4 mm	2	.25 mm	I	2.00 mm		50 mm		878445	25.10	878445-C3	29.60			
	4 mm	3	1.00 mm	II	1.50 mm	.500 mm	50 mm		863845	25.10	863845-C3	29.60			
	3/16	2	.010	I	.094		2		72445	23.10	72445-C3	27.60	72445-C8	29.30	
	3/16	2	.010	I	.094		4	*LONG!*	986945	31.90	986945-C3	38.10			
	3/16	3	.040	II	.074	.020	2		978145	28.40	978145-C3	32.90			
	6 mm	2	.25 mm	I	3.00 mm		63 mm		840045	34.90	840045-C3	41.10			
	6 mm	3	1.50 mm	II	2.25 mm	.750 mm	63 mm		837745	34.90	837745-C3	41.10			
	1/4	2	.010	I	.120		2-1/2		47645	32.90	47645-C3	39.10	47645-C8	40.40	
	1/4	3	.060	II	.095	.030	2-1/2		18545	33.10	18545-C3	39.30	18545-C8	40.40	
	1/4	3	.060	II	.095	.030	4	*LONG!*	48545	39.50	48545-C3	44.10			
45°	1/4	4	.060	II	.095	.030	2-1/2		876445	38.70	876445-C3	45.90			NEW
	5/16	2	.010	I	.156		2-1/2		880345	38.70	880345-C3	45.90			NEW
	5/16	3	.060	II	.126	.030	2-1/2		977045	38.70	977045-C3	45.90			
	8 mm	3	1.50 mm	II	3.25 mm	.750 mm	63 mm		868845	46.10	868845-C3	53.30			
	3/8	2	.010	I	.188		2-1/2		72545	44.10	72545-C3	52.30	72545-C8	61.30	
	3/8	3	.060	II	.158	.030	2-1/2		18445	44.10	18445-C3	52.30	18445-C8	61.30	
	3/8	3	.060	II	.158	.030	4	*LONG!*	981245	59.70	981245-C3	70.90			
	3/8	4	.060	II	.158	.030	2-1/2		895145	48.10	895145-C3	56.30			NEW
	10 mm	4	1.50 mm	II	4.25 mm	.750 mm	75 mm		871045	72.10	871045-C3	84.30			
	12 mm	4	1.50 mm	II	5.25 mm	.750 mm	75 mm		881245	72.10	881245-C3	84.30			
	1/2	2	.010	I	.250		3		960445	69.90	960445-C3	82.10			
	1/2	4	.080	II	.210	.040	3		18345	61.70	18345-C3	73.90	18345-C8	81.90	
	1/2	4	.080	II	.210	.040	6	*LONG!*	982445	99.90	982445-C3	112.10			
	5/8	6	.080	II	.273	.040	3-1/2		952845	107.90	952845-C3	120.10			
	3/4	6	.100	II	.325	.050	4		949345	161.40	949345-C3	174.60			
	1	6	.120	II	.440	.060	4		884745	286.60	884745-C3	306.80			NEW
	1/8	2	.010	I	.048		1-1/2		18750	17.70	18750-C3	21.90	18750-C8	23.90	
	1/8	3	.040	II	.036	.017	1-1/2		968650	17.70	968650-C3	21.90			
	3/16	2	.010	I	.079		2		72450	22.90	72450-C3	27.40			
	3/16	3	.040	II	.062	.017	2		978150	28.40	978150-C3	32.90			
	1/4	2	.010	I	.102		2-1/2		47650	32.90	47650-C3	39.10			
50°	1/4	3	.060	II	.080	.025	2-1/2		18550	32.90	18550-C3	39.10			
	3/8	2	.010	I	.157		2-1/2		72550	44.10	72550-C3	52.30			
	3/8	3	.060	II	.134	.025	2-1/2		18450	44.10	18450-C3	52.30			
	1/2	2	.010	I	.210		3		960450	69.90	960450-C3	82.10			
	1/2	4	.080	II	.173	.034	3		18350	61.70	18350-C3	73.90			
	1/8	2	.010	I	.044		1-1/2		18755	18.70	18755-C3	22.90			
	3/16	2	.010	I	.066		2		72455	23.10	72455-C3	27.60			
	1/4	2	.010	I	.085		2-1/2		47655	43.70	47655-C3	49.90			
55°	1/4	3	.060	II	.067	.021	2-1/2		18555	34.20	18555-C3	40.40			
	3/8	3	.060	II	.112	.021	2-1/2		18455	44.50	18455-C3	52.70			
	1/2	4	.080	II	.149	.028	3		18355	64.10	18355-C3	76.30			

SPEEDS & FEEDS ONLINE!

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	60°	1/8	2	.010	I	.036		1-1/2		18760	17.70	18760-C3	21.90	18760-C8	23.90
		1/8	2	.010	I	.036		3	*LONG!*	50660	19.90	50660-C3	24.40		
		1/8	3	.040	II	.025	.012	1-1/2		968660	17.70	968660-C3	21.90		
		3/16	2	.010	I	.054		2		72460	22.90	72460-C3	27.40		
		3/16	3	.040	II	.043	.012	2		978160	28.40	978160-C3	32.90		
		1/4	2	.010	I	.070		2-1/2		47660	32.90	47660-C3	39.10		
		1/4	3	.060	II	.055	.017	2-1/2		18560	32.90	18560-C3	39.10		
		1/4	3	.060	II	.055	.017	4	*LONG!*	48560	39.50	48560-C3	44.10		
		5/16	3	.060	II	.073	.017	2-1/2		977060	38.70	977060-C3	45.90		
		3/8	2	.010	I	.108		2-1/2		72560	44.10	72560-C3	52.30		
		3/8	3	.060	II	.091	.017	2-1/2		18460	44.10	18460-C3	52.30		
		1/2	2	.010	I	.144		3		960460	69.90	960460-C3	82.10		
		1/2	4	.080	II	.121	.023	3		18360	61.70	18360-C3	73.90		
NEW		5/8	6	.080	II	.157	.023	3-1/2		952860	107.90	952860-C3	120.10		
NEW		3/4	6	.100	II	.188	.029	4		949360	161.40	949360-C3	174.70		
	65°	1/8	2	.010	I	.029		1-1/2		18765	17.70	18765-C3	21.90		
		3/16	2	.010	I	.044		2		72465	23.10	72465-C3	27.60		
		1/4	2	.010	I	.056		2-1/2		47665	42.10	47665-C3	48.30		
		1/4	3	.060	II	.044	.014	2-1/2		18565	33.10	18565-C3	39.30		
		3/8	3	.060	II	.075	.014	2-1/2		18465	44.50	18465-C3	52.70		
		1/2	4	.080	II	.099	.019	3		18365	62.40	18365-C3	74.60		
	70°	1/8	2	.010	I	.023		1-1/2		18770	17.70	18770-C3	21.90		
		3/16	2	.010	I	.034		2		72470	22.90	72470-C3	27.40		
		1/4	2	.010	I	.044		2-1/2		47670	41.70	47670-C3	47.90		
		1/4	3	.060	II	.035	.011	2-1/2		18570	32.90	18570-C3	39.10		
		1/2	4	.080	II	.077	.015	3		18370	61.70	18370-C3	73.90		
	75°	1/8	2	.010	I	.015		1-1/2		18775	18.70	18775-C3	22.90	18775-C8	24.90
		1/8	3	.040	II	.011	.005	1-1/2		968675	18.70	968675-C3	22.90		
		3/16	2	.010	I	.025		2		72475	24.20	72475-C3	28.70		
		3/16	3	.040	II	.020	.005	2		978175	28.50	978175-C3	33.10		
		1/4	2	.010	I	.032		2-1/2		47675	34.20	47675-C3	40.40		
		1/4	3	.060	II	.025	.008	2-1/2		18575	34.90	18575-C3	41.10		
		3/8	2	.010	I	.050		2-1/2		72575	46.70	72575-C3	54.90		
		3/8	3	.060	II	.043	.008	2-1/2		18475	46.70	18475-C3	54.90		
		1/2	2	.010	I	.067		3		960475	74.20	960475-C3	86.40		
		1/2	4	.080	II	.056	.011	3		18375	65.40	18375-C3	77.60		
NEW	80°	1/8	2	.010	I	.011		1-1/2		18780	19.20	18780-C3	23.40		
NEW		1/4	3	.060	II	.017	.005	2-1/2		18580	26.10	18580-C3	32.30		
NEW		1/2	4	.080	II	.037	.007	3		18380	80.60	18380-C3	92.80		

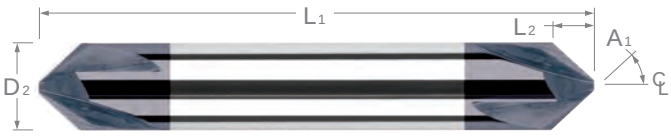
SPEEDS & FEEDS ONLINE!

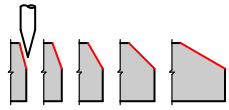
Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End – Double-Ended





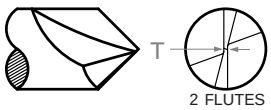
Stocked in *Five* Angles Per Side!

Double-ended Solid carbide CNC ground in the USA

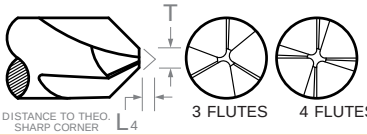
ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE	
15°	1/8	2	.010	I	.233		1-1/2	988415	33.50	988415-C3	38.70	
	1/4	2	.010	I	.467		2-1/2	977615	49.10	977615-C3	57.30	
	3/8	2	.010	I	.700		3	998315	71.20	998315-C3	83.40	
	3/8	3	.060	II	.588	.112	2-1/2	934015	82.10	934015-C3	94.30	
	1/2	4	.080	II	.784	.149	3	18615	98.90	18615-C3	115.70	
20°	1/8	2	.010	I	.172		1-1/2	988420	33.50	988420-C3	38.70	
	1/4	2	.010	I	.343		2-1/2	977620	49.10	977620-C3	57.30	
	3/8	2	.010	I	.515		2-1/2	998320	71.20	998320-C3	83.40	
	3/8	3	.060	II	.433	.082	2-1/2	934020	82.10	934020-C3	94.30	
	1/2	4	.080	II	.577	.110	3	18620	98.90	18620-C3	115.70	
30°	1/8	2	.010	I	.108		1-1/2	988430	28.40	988430-C3	33.60	
	1/4	2	.010	I	.217		2-1/2	977630	43.90	977630-C3	52.10	
	1/4	3	.060	II	.165	.052	2-1/2	891030	54.90	891030-C3	63.10	NEW
	3/8	2	.010	I	.325		2-1/2	998330	65.90	998330-C3	78.10	
	3/8	3	.060	II	.273	.052	2-1/2	934030	76.90	934030-C3	89.10	
	1/2	2	.010	I	.433		3	905830	89.10	905830-C3	105.90	NEW
	1/2	4	.080	II	.364	.069	3	18630	96.70	18630-C3	113.50	
45°	1/8	2	.010	I	.063		1-1/2	988445	28.40	988445-C3	33.60	
	1/8	3	.040	II	.043	.020	1-1/2	873945	39.20	873945-C3	44.40	NEW
	3/16	2	.010	I	.094		2	902345	28.40	902345-C3	34.60	
	3/16	3	.040	II	.074	.020	2	897145	39.20	897145-C3	45.40	
	1/4	2	.010	I	.125		2-1/2	977645	43.90	977645-C3	52.10	
	1/4	3	.060	II	.095	.030	2-1/2	891045	54.90	891045-C3	63.10	
	5/16	3	.060	II	.126	.030	2-1/2	966645	60.40	966645-C3	70.60	
	3/8	2	.010	I	.188		2-1/2	998345	65.90	998345-C3	78.10	
	3/8	3	.060	II	.158	.030	2-1/2	934045	76.90	934045-C3	89.10	
	1/2	2	.010	I	.250		3	905845	89.10	905845-C3	105.90	
	1/2	4	.080	II	.210	.040	3	18645	96.70	18645-C3	113.50	
	5/8	4	.080	II	.273	.040	3-1/2	976445	139.90	976445-C3	158.10	
	3/4	4	.100	II	.325	.050	4	984645	177.70	984645-C3	198.80	
60°	1/8	2	.010	I	.036		1-1/2	988460	28.40	988460-C3	33.60	
	1/4	2	.010	I	.072		2-1/2	977660	43.90	977660-C3	52.10	
	1/4	3	.060	II	.055	.017	2-1/2	891060	54.90	891060-C3	63.10	NEW
	3/8	2	.010	I	.108		2-1/2	998360	65.90	998360-C3	78.10	
	3/8	3	.060	II	.091	.017	2-1/2	934060	76.90	934060-C3	89.10	
	1/2	2	.010	I	.144		3	905860	89.10	905860-C3	105.90	NEW
	1/2	4	.080	II	.121	.023	3	18660	96.70	18660-C3	113.50	

SPEEDS & FEEDS ONLINE!

TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)

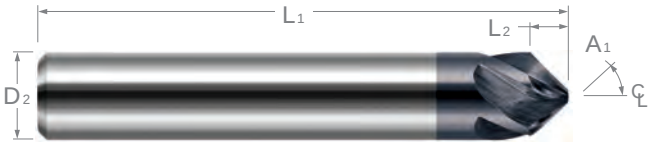


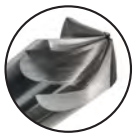
TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



CHAMFER CUTTERS

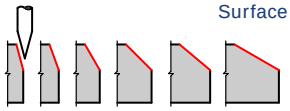
Flat End – Helical Flutes





Free Cutting Action for Excellent Surface Finish

- **Specialized helical flute design for superior performance**
- Free cutting action provides excellent surface finish and chip evacuation
- Offered in Type I pointed and Type II flat end (non-cutting) styles
- 2, 3, 4, and 5 flute options
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Stocked in *Six* Angles Per Side!

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE
15°	1/4	3	.060	II	.355	.116	2-1/2	831316	35.80	831316-C3	41.80
	1/4	5	.060	II	.355	.116	2-1/2	832516	37.90	832516-C3	43.90
	3/8	3	.070	II	.569	.134	2-1/2	831324	47.90	831324-C3	55.90
	3/8	5	.070	II	.569	.134	2-1/2	832524	49.90	832524-C3	57.90
	1/2	3	.080	II	.784	.153	3	831332	67.10	831332-C3	78.10
	1/2	5	.080	II	.784	.153	3	832532	69.20	832532-C3	80.20
20°	1/4	3	.060	II	.261	.085	2-1/2	844616	35.80	844616-C3	41.80
	1/4	5	.060	II	.261	.085	2-1/2	851416	37.90	851416-C3	43.90
	3/8	3	.070	II	.419	.099	2-1/2	844624	47.90	844624-C3	55.90
	3/8	5	.070	II	.419	.099	2-1/2	851424	49.90	851424-C3	57.90
	1/2	3	.080	II	.577	.113	3	844632	67.10	844632-C3	78.10
	1/2	5	.080	II	.577	.113	3	851432	69.20	851432-C3	80.20
NEW	1/8	2	.010	I	.100		1-1/2	900108	21.10	900108-C3	25.30
	1/8	3	.040	II	.074	.036	1-1/2	916508	21.10	916508-C3	25.30
	1/8	5	.040	II	.074	.036	1-1/2	899008	23.20	899008-C3	27.40
NEW	3/16	2	.010	I	.154		2	900112	28.40	900112-C3	32.90
	3/16	3	.050	II	.119	.045	2	916512	28.40	916512-C3	32.90
NEW	3/16	4	.010	I	.154		2	889712	30.40	889712-C3	34.90
	3/16	5	.050	II	.119	.045	2	899012	30.40	899012-C3	34.90
NEW	1/4	2	.010	I	.208		2-1/2	900116	35.80	900116-C3	41.80
30°	1/4	3	.060	II	.164	.054	2-1/2	916516	35.80	916516-C3	41.80
NEW	1/4	4	.010	I	.208		2-1/2	889716	37.90	889716-C3	43.90
	1/4	5	.060	II	.164	.054	2-1/2	899016	37.90	899016-C3	43.90
NEW	3/8	2	.010	I	.316		2-1/2	900124	47.90	900124-C3	55.90
	3/8	3	.070	II	.264	.062	2-1/2	916524	47.90	916524-C3	55.90
NEW	3/8	4	.010	I	.316		2-1/2	889724	47.90	889724-C3	55.90
	3/8	5	.070	II	.264	.062	2-1/2	899024	47.90	899024-C3	55.90
NEW	1/2	2	.010	I	.424		3	900132	67.10	900132-C3	78.10
	1/2	3	.080	II	.364	.071	3	916532	67.10	916532-C3	78.10

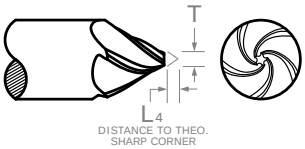
SPEEDS & FEEDS ONLINE!

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

continued on next page

TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)

TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

CHAMFER CUTTERS

Flat End – Helical Flutes (cont.)

continued from previous page

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		ALTiN COATED		
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE	
30°	1/2	4	.010	I	.424		3	889732	67.10	889732-C3	78.10	NEW
	1/2	5	.080	II	.364	.071	3	899032	67.10	899032-C3	78.10	
	5/8	3	.090	II	.463	.080	3	916540	69.20	916540-C3	80.20	
	5/8	5	.090	II	.463	.080	3	899040	117.50	899040-C3	129.50	
	3/4	3	.100	II	.562	.088	3	916548	166.50	916548-C3	179.50	
	3/4	4	.010	I	.641		3	889748	166.50	889748-C3	179.50	NEW
	3/4	5	.100	II	.562	.088	3	899048	168.60	899048-C3	181.60	
45°	1/8	2	.010	I	.058		1-1/2	860508	21.10	860508-C3	23.50	NEW
	1/8	3	.040	II	.043	.021	1-1/2	897208	21.10	897208-C3	25.30	
	1/8	5	.040	II	.043	.021	1-1/2	908408	23.20	908408-C3	27.40	
	3/16	2	.010	I	.089		2	860512	28.40	860512-C3	32.90	NEW
	3/16	3	.050	II	.069	.026	2	897212	28.40	897212-C3	32.90	
	3/16	4	.010	I	.089		2	859712	30.40	859712-C3	34.90	NEW
	3/16	5	.050	II	.069	.026	2	908412	30.40	908412-C3	34.90	
	1/4	2	.010	I	.120		2-1/2	860516	35.80	860516-C3	41.80	NEW
	1/4	3	.060	II	.095	.031	2-1/2	897216	35.80	897216-C3	41.80	
	1/4	4	.010	I	.120		2-1/2	859716	37.90	859716-C3	43.90	NEW
	1/4	5	.060	II	.095	.031	2-1/2	908416	37.90	908416-C3	43.90	
	3/8	2	.010	I	.183		2-1/2	860524	47.90	860524-C3	55.90	NEW
	3/8	3	.070	II	.153	.036	2-1/2	897224	47.90	897224-C3	55.90	
	3/8	4	.010	I	.183		2-1/2	859724	47.90	859724-C3	55.90	NEW
	3/8	5	.070	II	.153	.036	2-1/2	908424	47.90	908424-C3	55.90	
	1/2	2	.010	I	.245		3	860532	67.10	860532-C3	78.10	NEW
	1/2	3	.080	II	.210	.041	3	897232	67.10	897232-C3	78.10	
	1/2	4	.010	I	.245		3	859732	67.10	859732-C3	78.10	NEW
	1/2	5	.080	II	.210	.041	3	908432	67.10	908432-C3	78.10	
	5/8	3	.090	II	.268	.046	3	897240	115.40	897240-C3	127.40	
	5/8	5	.090	II	.268	.046	3	908440	117.50	908440-C3	129.50	
	3/4	3	.100	II	.325	.051	3	897248	166.50	897248-C3	179.50	
	3/4	4	.010	I	.368		3	859748	166.50	859748-C3	179.50	NEW
	3/4	5	.100	II	.325	.051	3	908448	168.60	908448-C3	181.60	
50°	1/4	3	.060	II	.080	.026	2-1/2	875016	35.80	875016-C3	41.80	
	1/4	5	.060	II	.080	.026	2-1/2	871116	37.90	871116-C3	43.90	
	3/8	3	.070	II	.128	.030	2-1/2	875024	47.90	875024-C3	55.90	
	3/8	5	.070	II	.128	.030	2-1/2	871124	49.90	871124-C3	57.90	
	1/2	3	.080	II	.176	.034	3	875032	67.10	875032-C3	78.10	
	1/2	5	.080	II	.176	.034	3	871132	69.20	871132-C3	80.20	
60°	1/8	2	.010	I	.033		1-1/2	872108	23.20	872108-C3	27.40	NEW
	3/16	2	.010	I	.051		2	872112	28.40	872112-C3	32.90	NEW
	3/16	4	.010	I	.051		2	888812	28.40	888812-C3	32.90	NEW
	1/4	2	.010	I	.069		2-1/2	872116	35.80	872116-C3	41.80	NEW
	1/4	3	.060	II	.057	.018	2-1/2	863416	35.80	863416-C3	41.80	
	1/4	4	.010	I	.069		2-1/2	888816	37.90	888816-C3	43.90	NEW
	1/4	5	.060	II	.057	.018	2-1/2	867616	37.90	867616-C3	43.90	
	3/8	2	.010	I	.105		2-1/2	872124	47.90	872124-C3	55.90	NEW
	3/8	3	.070	II	.091	.021	2-1/2	863424	47.90	863424-C3	55.90	

SPEEDS & FEEDS ONLINE!

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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CHAMFER CUTTERS

Flat End – Helical Flutes (cont.)

continued from previous page

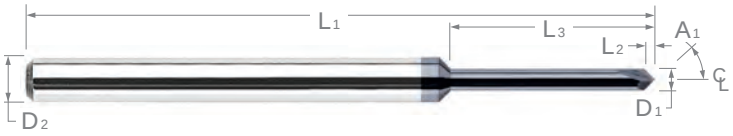
	ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE
NEW		3/8	4	.010	I	.105		2-1/2	888824	49.90	888824-C3	57.90
		3/8	5	.070	II	.091	.021	2-1/2	867624	49.90	867624-C3	57.90
NEW		1/2	2	.010	I	.141		2-1/2	872132	67.10	872132-C3	78.10
		1/2	3	.080	II	.126	.024	3	863432	67.10	863432-C3	78.10
NEW		1/2	4	.010	I	.141		2-1/2	888832	67.10	888832-C3	78.10
	60°	1/2	5	.080	II	.126	.024	3	867632	69.20	867632-C3	80.20
		5/8	3	.090	II	.157	.027	3	863440	115.40	863440-C3	127.40
		5/8	5	.090	II	.157	.027	3	867640	117.50	867640-C3	129.50
		3/4	3	.100	II	.195	.029	3	863448	166.50	863448-C3	179.50
NEW		3/4	4	.010	I	.212		3	888848	166.50	888848-C3	179.50
		3/4	5	.100	II	.195	.029	3	867648	168.60	867648-C3	181.60

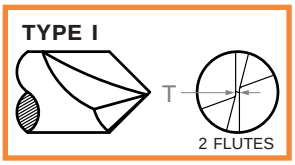
SPEEDS & FEEDS ONLINE!

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

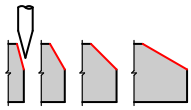
CHAMFER CUTTERS

Pointed – Long Reach





- **Reduced diameter for clearance along walls and in small features**
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- Available in multiple reaches and reduced diameters
- 2 flutes
- Solid carbide
- CNC ground in the USA



Stocked in *Four* Angles Per Side!

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000''}_{-.001''}$	L_3 $^{+.010''}_{-.000''}$	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE
15°	.031 (1/32)	.156 (5x)	.058	.005	1/8	2-1/2	56815	24.40		
	.031 (1/32)	.250 (8x)	.058	.005	1/8	2-1/2	57215	26.40		
	.062 (1/16)	.312 (5x)	.116	.006	1/8	2-1/2	54715	24.40		
	.062 (1/16)	.500 (8x)	.116	.006	1/8	2-1/2	55615	26.40		
	.093 (3/32)	.500 (5x)	.174	.006	1/8	2-1/2	52115	24.40		
	.093 (3/32)	.750 (8x)	.174	.006	1/8	2-1/2	53515	26.40		
30°	.031 (1/32)	.093 (3x)	.027	.005	1/8	1-1/2	994830	22.90	994830-C3	27.10
	.031 (1/32)	.156 (5x)	.027	.005	1/8	2-1/2	56830	24.40	56830-C3	28.60
	.031 (1/32)	.250 (8x)	.027	.005	1/8	2-1/2	57230	26.40	57230-C3	30.60
	.047 (3/64)	.250 (5x)	.041	.005	1/8	2-1/2	996830	24.10	996830-C3	28.30
	.062 (1/16)	.187 (3x)	.054	.006	1/8	1-1/2	998930	22.90	998930-C3	27.10
	.062 (1/16)	.312 (5x)	.054	.006	1/8	2-1/2	54730	24.40	54730-C3	28.60
	.062 (1/16)	.500 (8x)	.054	.006	1/8	2-1/2	55630	26.40	55630-C3	30.60
	.078 (5/64)	.406 (5x)	.068	.006	1/8	2-1/2	996930	24.10	996930-C3	28.30
	.093 (3/32)	.279 (3x)	.081	.006	1/8	1-1/2	995330	22.90	995330-C3	27.10
	.093 (3/32)	.500 (5x)	.081	.006	1/8	2-1/2	52130	24.40	52130-C3	28.60
	.093 (3/32)	.750 (8x)	.081	.006	1/8	2-1/2	53530	26.40	53530-C3	30.60
45°	.015 (1/64)	.078 (5x)	.008	.003	1/8	2-1/2	997545	26.40	997545-C3	30.60
	.015 (1/64)	.125 (8x)	.008	.003	1/8	2-1/2	995945	29.40	995945-C3	33.60
	.020	.100 (5x)	.010	.003	1/8	2-1/2	940245	25.90	940245-C3	30.10
	.020	.160 (8x)	.010	.003	1/8	2-1/2	948545	28.90	948545-C3	33.10
	.031 (1/32)	.093 (3x)	.016	.005	1/8	1-1/2	994845	23.20	994845-C3	27.40
	.031 (1/32)	.156 (5x)	.016	.005	1/8	2-1/2	56845	24.40	56845-C3	28.60
	.031 (1/32)	.250 (8x)	.016	.005	1/8	2-1/2	57245	26.40	57245-C3	30.60
	.031 (1/32)	.375 (12x)	.016	.005	1/8	2-1/2	998245	29.40	998245-C3	33.60
	.031 (1/32)	.470 (15x)	.016	.005	1/8	2-1/2	918245	31.70	918245-C3	35.90
	.047 (3/64)	.141 (3x)	.024	.005	1/8	1-1/2	911045	22.70	911045-C3	26.90
	.047 (3/64)	.250 (5x)	.024	.005	1/8	2-1/2	996845	24.50	996845-C3	28.70
	.047 (3/64)	.375 (8x)	.024	.005	1/8	2-1/2	999245	26.40	999245-C3	30.60
	.047 (3/64)	.570 (12x)	.024	.005	1/8	2-1/2	919045	28.90	919045-C3	33.10
	.062 (1/16)	.187 (3x)	.031	.006	1/8	1-1/2	998945	23.20	998945-C3	27.40
	.062 (1/16)	.312 (5x)	.031	.006	1/8	2-1/2	54745	24.40	54745-C3	28.60
	.062 (1/16)	.500 (8x)	.031	.006	1/8	2-1/2	55645	26.40	55645-C3	30.60
	.062 (1/16)	.750 (12x)	.031	.006	1/8	2-1/2	997245	29.40	997245-C3	33.60
	.062 (1/16)	.950 (15x)	.031	.006	1/8	2-1/2	913345	31.70	913345-C3	35.90

SPEEDS & FEEDS ONLINE!

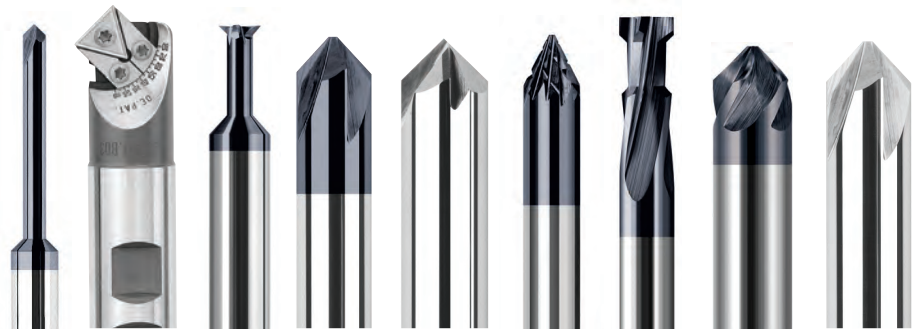
continued on next page

CHAMFER CUTTERS
Pointed Long Reach (cont.)

continued from previous page

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE
45°	.078 (5/64)	.234 (3x)	.039	.006	1/8	1-1/2	906645	22.70	906645-C3	26.90
	.078 (5/64)	.406 (5x)	.039	.006	1/8	2-1/2	996945	24.50	996945-C3	28.70
	.078 (5/64)	.625 (8x)	.039	.006	1/8	2-1/2	999545	26.40	999545-C3	30.60
	.078 (5/64)	.940 (12x)	.039	.006	1/8	2-1/2	924045	28.90	924045-C3	33.10
	.093 (3/32)	.279 (3x)	.047	.006	1/8	1-1/2	995345	23.20	995345-C3	27.40
	.093 (3/32)	.500 (5x)	.047	.006	1/8	2-1/2	52145	24.40	52145-C3	28.60
	.093 (3/32)	.750 (8x)	.047	.006	1/8	2-1/2	53545	26.40	53545-C3	30.60
	.093 (3/32)	1.125 (12x)	.047	.006	1/8	2-1/2	999645	29.40	999645-C3	33.60
	.093 (3/32)	1.400 (15x)	.047	.006	1/8	2-1/2	902845	31.70	902845-C3	35.90
60°	.031 (1/32)	.156 (5x)	.009	.005	1/8	2-1/2	56860	24.40		
	.031 (1/32)	.250 (8x)	.009	.005	1/8	2-1/2	57260	26.40		
	.062 (1/16)	.312 (5x)	.018	.006	1/8	2-1/2	54760	24.40		
	.062 (1/16)	.500 (8x)	.018	.006	1/8	2-1/2	55660	26.40		
	.093 (3/32)	.500 (5x)	.027	.006	1/8	2-1/2	52160	24.40		
	.093 (3/32)	.750 (8x)	.027	.006	1/8	2-1/2	53560	26.40		

SPEEDS & FEEDS ONLINE!



Check Out All of Our Chamfering Solutions!

★★★★★

"Because I don't have a lathe and thanks to the help of @ harveytool, making the buttons for these propeller spinners has been a breeze!"

— @titanringdesigns

Follow us on Instagram @harveytool!

Click Tool # for stock, speeds & feeds, & other technical info

CHAMFER CUTTERS

Back Chamfer Cutters

- Low profile design and greater radial projection ideal for generating chamfered features on the backside of small holes or slots
- Decrease costs by avoiding time-consuming changes to part set-ups
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide
- CNC ground in the USA

Left Hand Shear Flute & Right Hand Cut Evacuate Chips Away From Part

HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000"}_{-.001"}$	L_2	D_3	L_3 $^{+.010"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.055	.010	.033	.093	4	1/8	1-1/2	943355	54.40	943355-C3	58.60
.055	.010	.033	.156	4	1/8	1-1/2	938155	54.40	938155-C3	58.60
.055	.010	.033	.250	4	1/8	1-1/2	910355	53.90	910355-C3	58.10
.080	.014	.047	.140	4	1/8	1-1/2	943380	53.40	943380-C3	57.60
.080	.014	.047	.250	4	1/8	1-1/2	938180	53.40	938180-C3	57.60
.080	.014	.047	.375	4	1/8	1-1/2	910380	52.90	910380-C3	57.10
.115	.020	.068	.218	4	1/8	1-1/2	943410	52.20	943410-C3	56.40
.115	.020	.068	.375	4	1/8	1-1/2	938210	52.20	938210-C3	56.40
.115	.020	.068	.562	4	1/8	2	910410	53.90	910410-C3	58.10
D_1 $^{+.000"}_{-.002"}$	L_2	D_3	L_3 $^{+.030"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.135	.024	.081	.250	5	3/16	2	943420	60.70	943420-C3	65.20
.135	.024	.081	.406	5	3/16	2	938220	60.70	938220-C3	65.20
.135	.024	.081	.625	5	3/16	2	910420	60.10	910420-C3	64.60
.165	.029	.101	.312	5	3/16	2	943430	60.70	943430-C3	65.20
.165	.029	.101	.500	5	3/16	2	938230	60.70	938230-C3	65.20
.165	.029	.101	.750	5	3/16	2	910430	60.10	910430-C3	64.60
.210	.037	.130	.375	5	1/4	2-1/2	943440	68.70	943440-C3	74.90
.210	.037	.130	.625	5	1/4	2-1/2	938240	68.70	938240-C3	74.90
.210	.037	.130	1.000	5	1/4	2-1/2	910440	68.10	910440-C3	74.30
.250	.044	.156	.437	5	1/4	2-1/2	943416	68.70	943416-C3	74.90
.250	.044	.156	.750	5	1/4	2-1/2	938216	68.70	938216-C3	74.90
.250	.044	.156	1.250	5	1/4	3	910450	70.40	910450-C3	76.60
.312	.055	.196	.281	6	5/16	2-1/2	906120	72.70	906120-C3	79.90
.312	.055	.196	.562	6	5/16	2-1/2	943460	72.70	943460-C3	79.90
.312	.055	.196	1.500	6	5/16	3	910460	74.50	910460-C3	81.70
.375	.066	.237	.375	6	3/8	2-1/2	906124	78.40	906124-C3	86.60
.375	.066	.237	.750	6	3/8	2-1/2	943470	78.40	943470-C3	86.60
.375	.066	.237	1.870	6	3/8	4	910470	82.40	910470-C3	90.60
.500	.088	.317	.500	6	1/2	3	906132	107.90	906132-C3	120.10
.500	.088	.317	1.000	6	1/2	3	943480	107.90	943480-C3	120.10
.500	.088	.317	2.500	6	1/2	4	910480	111.70	910480-C3	123.90

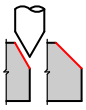
SPEEDS & FEEDS ONLINE!

CHAMFER CUTTERS

Deburring Chamfer Cutters

End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High number of flutes allows for faster speeds and feeds
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

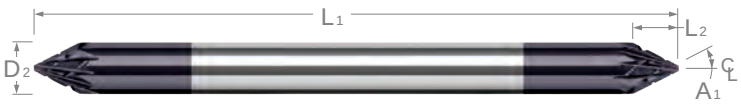


Stocked in *Two* Angles Per Side!

Single-Ended

ANGLE PER SIDE	LOC	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIA.	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	58130	22.50	58130-C3	26.70		
	.207	12	6	.012 (Max.)	1/4	2-1/2	994030	31.90	994030-C3	38.10		
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	58145	22.50	58145-C3	26.70	58145-C4	33.20
	.088	12	6	.012 (Max.)	3/16	2-1/2	891145	28.10	891145-C3	32.60	891145-C4	42.80
	.120	12	6	.012 (Max.)	1/4	2-1/2	994045	31.90	994045-C3	38.10	994045-C4	48.60

SPEEDS & FEEDS ONLINE!



Stocked in *One* Angle Per Side!

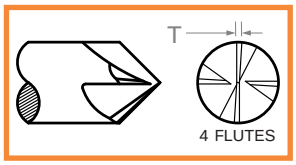
Double-Ended

ANGLE PER SIDE	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	898345	33.70	898345-C3	38.90
	.088	12	6	.012 (Max.)	3/16	2-1/2	879745	40.50	879745-C3	46.70
	.120	12	6	.012 (Max.)	1/4	2-1/2	867545	47.90	867545-C3	56.10

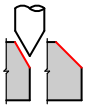
SPEEDS & FEEDS ONLINE!

CHAMFER CUTTERS

Cobalt – Pointed



- 4 flutes (2 flutes to center)
- M-42 steel (8% cobalt)
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- CNC ground in the USA



Stocked in *Two* Angles Per Side!

ANGLE PER SIDE	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2	$T_{(MAX.)}$	D_2	L_1	4 FL	PRICE
30°	.208	.010	1/4	2	18116	36.40
	.316	.010	3/8	2-1/2	18124	43.90
	.424	.010	1/2	3	18132	56.50
45°	.120	.010	1/4	2	18016	36.40
	.182	.010	3/8	2-1/2	18024	43.90
	.245	.010	1/2	3	18032	56.50

SPEEDS & FEEDS ONLINE!

CHAMFER CUTTERS

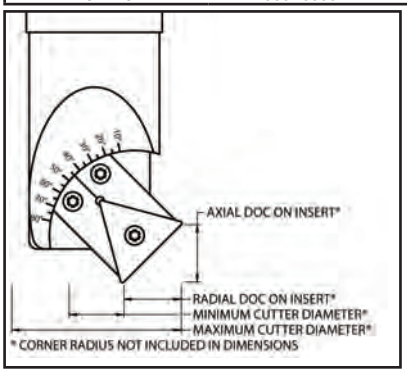
Adjustable Chamfer Cutters

- **Mills any angle from 10° to 80°**
- Change chamfer angle with quick adjustment
- TPMT-321 carbide insert (TiN coated) and wrench included

SHANK DIAMETER	OVERALL LENGTH	TOOL #	PRICE
3/4	3-3/4	81250	323.50
1	3-3/4	81260	323.50

DESCRIPTION	TOOL #	PRICE	
Insert with TiN Coating	60031	122.00	(Box of 10)
Clamp Plate (Replacement)	81245	18.90	(Each)
Screw (Replacement)	81247	7.10	(Each)
Seat Pocket (Replacement)	81249	68.90	(Each)

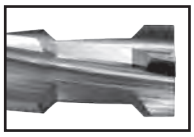
SPEEDS & FEEDS (Adjustable Chamfer Cutter)			
MATERIAL	SPEED (RPM)	FEED (Inches/Min)	DEPTH (Inches)
STEEL	600–2000	1″–4″	1/8″ MAX.
ALUMINUM	1000–6000 MAX.	3″–8″	1/8″ MAX.



Angle Setting on Tool	Minimum Diameter*	Maximum Diameter*	Radial DOC of Insert*	Axial DOC of Insert*
10°	0.0717	1.2466	0.587	0.104
15°	0.1149	1.2672	0.576	0.154
20°	0.1617	1.2828	0.561	0.204
25°	0.2119	1.2931	0.541	0.252
30°	0.2649	1.2981	0.517	0.298
35°	0.3205	1.2977	0.489	0.342
40°	0.3781	1.2920	0.457	0.383
45°	0.4374	1.2810	0.422	0.422
50°	0.4978	1.2647	0.383	0.457
55°	0.5590	1.2433	0.342	0.489
60°	0.6205	1.2170	0.298	0.517
65°	0.6818	1.1860	0.252	0.541
70°	0.7424	1.1504	0.204	0.561
75°	0.8018	1.1106	0.154	0.576
80°	0.8597	1.0669	0.104	0.587

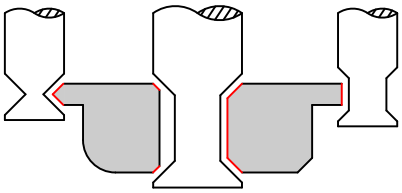
CHAMFER CUTTERS

Plate Chamfer Cutters



Cutting Along Entirety of Concave Form

- Tool designed to chamfer top and bottom in a single pass
- Cutting along entirety of concave form (L_2) only
- Minor diameter (D_3) relieved for light profiling and trimming edges
- 10° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA

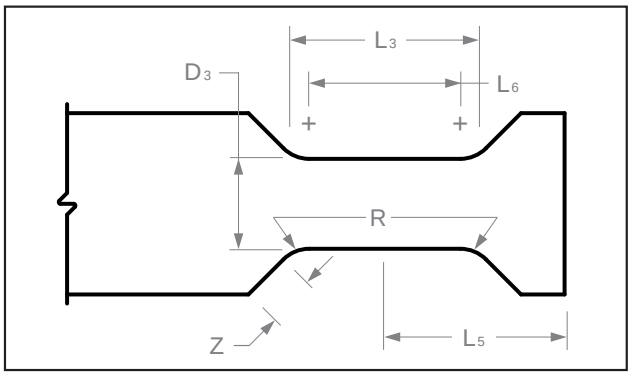


Capable of Performing Full Form Engagement, Light Profiling, & Edge Trimming

MAX OPENING WIDTH	MIN OPENING WIDTH	CHAMFER LENGTH	MINOR DIA.	MINOR DIA. LENGTH	RADIUS	END LENGTH	END TO CENTER	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
L_2 +.001" −.001"	L_3	Z	D_3 +.000" −.002"	L_6	R (MAX.)	L_4	L_5 +.001" −.001"	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.068	.037	**.022**	.091	.029	.006	.040	.074	1/8	1-1/2	955204	46.10	955204-C3	50.30
.074	.012	**.044**	.184	.001	.008	.060	.097	1/4	2-1/2	971104	50.90	971104-C3	57.10
.099	.037	**.044**	.184	.026	.008	.060	.110	1/4	2-1/2	971106	50.90	971106-C3	57.10
.135	.104	**.022**	.091	.096	.006	.040	.108	1/8	1-1/2	955208	46.10	955208-C3	50.30
.135	.073	**.044**	.184	.062	.008	.060	.128	1/4	2-1/2	971108	50.90	971108-C3	57.10
.197	.135	**.044**	.184	.124	.008	.060	.159	1/4	2-1/2	971112	50.90	971112-C3	57.10
.197	.105	**.065**	.278	.093	.008	.060	.159	3/8	2-1/2	980812	63.70	980812-C3	71.90
.260	.198	**.044**	.184	.187	.008	.060	.190	1/4	2-1/2	971116	50.90	971116-C3	57.10
.260	.137	**.087**	.372	.126	.008	.060	.190	1/2	3	965916	97.10	965916-C3	109.30
.385	.293	**.065**	.278	.281	.008	.060	.253	3/8	2-1/2	980824	63.70	980824-C3	71.90
.385	.262	**.087**	.372	.251	.008	.060	.253	1/2	3	965924	97.10	965924-C3	109.30
.510	.387	**.087**	.372	.376	.008	.060	.315	1/2	3	965932	97.10	965932-C3	109.30

SPEEDS & FEEDS ONLINE!

Click here for additional tool dimensions

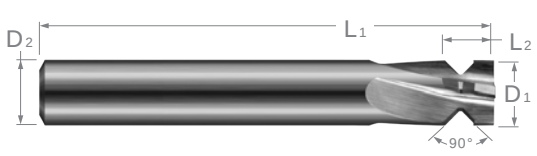


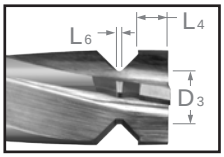
Click Tool # for stock, speeds & feeds, & other technical info

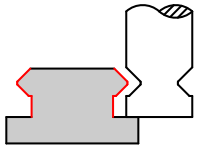
NEW!

PICATINNY FORM CUTTERS

Picatinny Rail Form Cutters







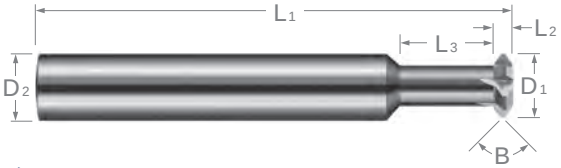
- Designed to the MIL-STD-1913 specifications
- Mill the entire Picatinny Rail in a single pass without tool changes
- Cutting on entirety of concave form and OD flat at end
- 4 helical flutes allow for better cutting action
- .005″ max radii for all internal corners
- Solid carbide
- CNC ground in the USA

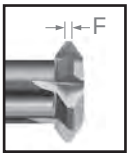
CUTTER DIAMETER	LENGTH OF CUT	MINOR DIAMETER	MINOR DIA. LENGTH	END LENGTH (TSC)	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
D_1 +.002″ −.000″	L_2 +.008″ −.000″	D_3 +.001″ −.001″	L_6	L_4	D_2	L_1	3 FL	PRICE	
.500 (1/2)	.377	.282	.021	.160	1/2	3	875632	124.40	NEW
.625 (5/8)	.377	.407	.021	.160	5/8	3-1/2	875640	142.40	NEW

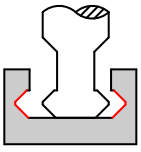
SPEEDS & FEEDS ONLINE!

PICATINNY FORM CUTTERS

Picatinny Attachment Cutters







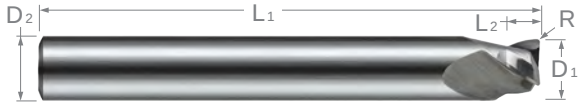
- Mill the inverse form for the Picatinny Rail used for attachments
- Cutting on entirety of angle and flat
- Short reaches for maximum strength
- 6 flutes
- Solid carbide
- CNC ground in the USA

INCLUDED ANGLE	CUTTER DIAMETER	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
B +1° −0°	D_1 +.000″ −.002″	F	L_2 +.002″ −.000″		L_3 +.030″ −.000″	D_2	L_1	6 FL	PRICE	
90°	.500 (1/2)	.021	.2075	1/4	.375	1/2	3	859232	111.70	NEW
	.625 (5/8)	.021	.2075	3/8	.500	5/8	3-1/2	859240	145.40	NEW

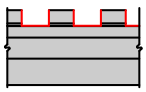
SPEEDS & FEEDS ONLINE!

PICATINNY FORM CUTTERS

Picatinny Recoil Groove End Mills



Stocked in sharp corner, .005", or .010" corner radius

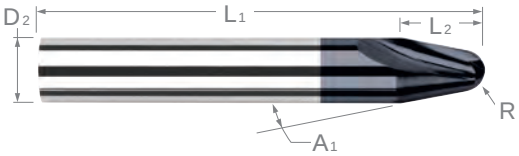


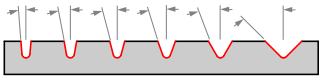
- Optimized for the grooves across the Picatinny Rail
- Diameter allows for a single pass to create the groove
- Stub flute length for improved strength
- Cutting on transition to allow for slight edge break at top of groove
- High helix and optimized geometry for improved performance
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
D_1 +.002″ −.000″	R +.001″ −.001″	L_2 +.008″ −.000″	D_2	L_1	3 FL	PRICE	
.206	SHARP!	.118	1/4	2-1/2	864806	29.90	NEW
.206	.005	.118	1/4	2-1/2	874406	32.90	NEW
.206	.010	.118	1/4	2-1/2	862606	32.90	NEW

SPEEDS & FEEDS ONLINE!

RUNNER CUTTERS





Stocked in *Six* Angles Per Side!

- Designed to mill 5°, 10°, 15°, 30°, or 45° channels in molds
- 2 helical flutes (12° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA

	ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
	5°	1/32	.390	1/8	1-1/2	936302	39.40	936302-C3	43.60
		3/64	.579	3/16	2	936303	43.40	936303-C3	47.90
		1/16	.422	3/16	2	936304	43.40	936304-C3	47.90
NEW		3/32	.812	5/16	2-1/2	936306	55.70	936306-C3	62.90
NEW		1/8	.834	3/8	2-1/2	936308	62.50	936308-C3	70.70
NEW	10°	.005	.331	1/8	1-1/2	75050	34.40	75050-C3	38.60
		.010	.307	1/8	1-1/2	75052	34.70	75052-C3	38.90
		1/64	.283	1/8	1-1/2	75000	34.70	75000-C3	38.90
		.020	.259	1/8	1-1/2	75001	34.70	75001-C3	38.90
		.025	.235	1/8	1-1/2	75054	34.70	75054-C3	38.90
		1/32	.384	3/16	2	75002	39.40	75002-C3	43.90
		.040	.341	3/16	2	75062	43.40	75062-C3	47.90
		3/64	.308	3/16	2	75003	43.40	75003-C3	47.90
		1/16	.414	1/4	2-1/2	75004	48.70	75004-C3	54.90
		5/64	.338	1/4	2-1/2	75005	49.90	75005-C3	56.10
		3/32	.444	5/16	2-1/2	75006	55.70	75006-C3	62.90
		7/64	.367	5/16	2-1/2	75007	55.90	75007-C3	63.10
		1/8	.469	3/8	2-1/2	75008	62.50	75008-C3	70.70
		5/32	.675	1/2	3	75010	73.50	75010-C3	85.70
NEW	15°	.005	.219	1/8	1-1/2	75150	35.20	75150-C3	39.40
		.010	.205	1/8	1-1/2	75152	34.70	75152-C3	38.90
		1/64	.190	1/8	1-1/2	75100	34.70	75100-C3	38.90
		.020	.176	1/8	1-1/2	75101	34.70	75101-C3	38.90
		.025	.162	1/8	1-1/2	75154	34.70	75154-C3	38.90
		1/32	.261	3/16	2	75102	39.40	75102-C3	43.90
		.040	.235	3/16	2	75162	43.40	75162-C3	47.90
		3/64	.215	3/16	2	75103	43.40	75103-C3	47.90
		1/16	.289	1/4	2-1/2	75104	48.70	75104-C3	54.90
		5/64	.243	1/4	2-1/2	75105	49.90	75105-C3	56.10
		3/32	.317	5/16	2-1/2	75106	55.70	75106-C3	62.90
		7/64	.271	5/16	2-1/2	75107	55.90	75107-C3	63.10
		1/8	.342	3/8	2-1/2	75108	62.50	75108-C3	70.70
		5/32	.486	1/2	3	75110	73.50	75110-C3	85.70

SPEEDS & FEEDS ONLINE!

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

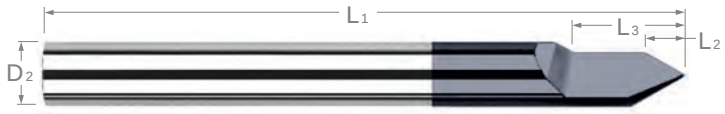
RUNNER CUTTERS

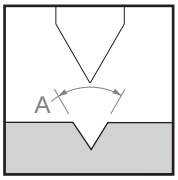
continued from previous page

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	
20°	.010	.152	1/8	1-1/2	979952	36.20	979952-C3	40.40	NEW
	1/64	.143	1/8	1-1/2	979900	34.70	979900-C3	38.90	
	.020	.133	1/8	1-1/2	979901	37.20	979901-C3	41.40	NEW
	.025	.124	1/8	1-1/2	979954	37.20	979954-C3	41.40	NEW
	1/32	.198	3/16	2	979902	39.40	979902-C3	43.90	
	3/64	.167	3/16	2	979903	43.40	979903-C3	47.90	
	1/16	.224	1/4	2-1/2	979904	48.70	979904-C3	54.90	
	5/64	.193	1/4	2-1/2	979905	49.90	979905-C3	56.10	
	3/32	.250	5/16	2-1/2	979906	55.70	979906-C3	62.90	
	1/8	.275	3/8	2-1/2	979908	62.50	979908-C3	70.70	
30°	1/64	.147	3/16	2	934500	49.90	934500-C3	54.40	NEW
	1/32	.186	1/4	2-1/2	934502	49.90	934502-C3	56.10	
	3/64	.224	5/16	2-1/2	934503	55.70	934503-C3	62.90	
	1/16	.263	3/8	2-1/2	934504	62.50	934504-C3	70.70	
45°	1/32	.143	5/16	2-1/2	856502	56.70	856502-C3	63.90	NEW
	3/64	.168	3/8	2-1/2	856503	63.70	856503-C3	71.90	NEW
	1/16	.224	1/2	3	856504	76.90	856504-C3	89.10	NEW

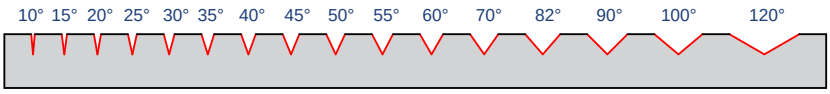
SPEEDS & FEEDS ONLINE!

ENGRAVING CUTTERS
Pointed





- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Sixteen* Included Angles!

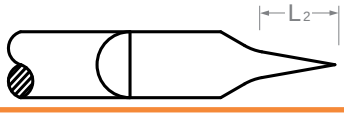
mm & in

INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.080	I	.200	1-1/2		996508	18.90	996508-C3	23.10		
	3/16	.080	I	1/4	2		996512	19.10	996512-C3	23.60		
	1/4	.080	I	5/16	2-1/2		996516	23.10	996516-C3	29.30		
15°	1/8	.080	I	.200	1-1/2		998108	18.90	998108-C3	23.10		
	3/16	.080	I	1/4	2		998112	19.10	998112-C3	23.60		
	1/4	.080	I	5/16	2-1/2		998116	23.10	998116-C3	29.30		
20°	1/8	.080	I	.200	1-1/2		999708	18.90	999708-C3	23.10		
	3/16	.080	I	1/4	2		999712	19.10	999712-C3	23.60		
	1/4	.080	I	5/16	2-1/2		999716	23.10	999716-C3	29.30		
25°	1/8	.080	I	.200	1-1/2		983808	18.90	983808-C3	23.10		
	3/16	.080	I	1/4	2		983812	19.10	983812-C3	23.60		
	1/4	.080	I	5/16	2-1/2		983816	23.10	983816-C3	29.30		
30°	1/8	.080	I	.200	1-1/2		981508	17.90	981508-C3	22.10		
	1/8	.233	II	3/8	1-1/2		25010	13.70	25010-C3	17.90	25010-C4	24.40
	1/8	.233	II	3/8	4	*LONG!*	941708	21.90	941708-C3	30.10		
	3/16	.350	II	3/8	2		25020	17.70	25020-C3	22.20		
	1/4	.466	II	1/2	2-1/2		25030	21.90	25030-C3	28.10		
35°	1/8	.198	II	3/8	1-1/2		853508	15.20	853508-C3	19.40		
40°	1/8	.080	I	.200	1-1/2		978608	18.70	978608-C3	22.90		
	1/8	.171	II	3/8	1-1/2		25110	14.20	25110-C3	18.40	25110-C4	24.90
	1/8	.171	II	3/8	4	*LONG!*	937808	22.90	937808-C3	31.10		
	3/16	.257	II	3/8	2		25120	18.90	25120-C3	23.40		
	1/4	.343	II	3/8	2-1/2		25130	22.90	25130-C3	29.10		
45°	1/8	.150	II	3/8	1-1/2		997308	14.10	997308-C3	18.30		
	3/16	.226	II	3/8	2		997312	18.10	997312-C3	22.60		
	1/4	.302	II	3/8	2-1/2		997316	22.50	997316-C3	28.70		
50°	1/8	.134	II	3/8	1-1/2		998408	14.20	998408-C3	18.40		
	3/16	.201	II	3/8	2		998412	18.50	998412-C3	23.10		
	1/4	.268	II	3/8	2-1/2		998416	23.10	998416-C3	29.30		
55°	1/8	.120	II	3/8	1-1/2		855508	15.20	855508-C3	19.40		

SPEEDS & FEEDS ONLINE!

continued on next page

TYPE I



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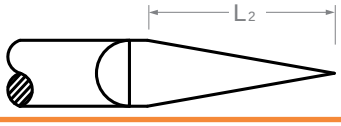


Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

ENGRAVING CUTTERS

Pointed (cont.)

mm & in

continued from previous page

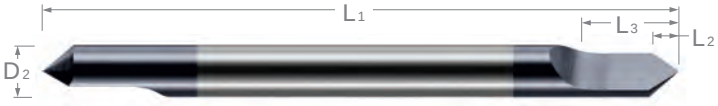
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
60°	3 mm	2.60 mm	II	10 mm	38 mm		898657	15.60	898657-C3	19.80			NEW
	1/8	.108	II	3/8	1-1/2		30010	13.70	30010-C3	17.90	30010-C4	24.40	
	1/8	.108	II	3/8	4	*LONG!*	30410	21.90	30410-C3	30.10			
	3/16	.162	II	3/8	2		30020	17.70	30020-C3	22.20	30020-C4	32.40	
	3/16	.162	II	3/8	4	*LONG!*	30420	28.90	30420-C3	37.10			
	6 mm	5.20 mm	II	10 mm	63 mm		898666	25.20	898666-C3	31.40			NEW
	1/4	.216	II	3/8	2-1/2		30030	21.90	30030-C3	28.10	30030-C4	38.60	
	1/4	.216	II	3/8	6	*LONG!*	30430	41.40	30430-C3	54.20			
70°	1/8	.089	II	3/8	1-1/2		937208	14.20	937208-C3	18.40			
	3/16	.134	II	3/8	2		937212	18.50	937212-C3	23.10			
	1/4	.179	II	3/8	2-1/2		937216	23.10	937216-C3	29.30			
82°	1/8	.072	II	3/8	1-1/2		971708	14.20	971708-C3	18.40			
	3/16	.108	II	3/8	2		971712	18.50	971712-C3	23.10			
	1/4	.144	II	3/8	2-1/2		971716	23.10	971716-C3	29.30			
90°	3 mm	1.50 mm	II	10 mm	38 mm		884157	15.60	884157-C3	19.80			NEW
	1/8	.062	II	3/8	1-1/2		30110	13.70	30110-C3	17.90	30110-C4	24.40	
	1/8	.062	II	3/8	4	*LONG!*	30510	21.90	30510-C3	30.10			
	3/16	.093	II	3/8	2		30120	17.70	30120-C3	22.20	30120-C4	32.40	
	3/16	.093	II	3/8	4	*LONG!*	30520	28.90	30520-C3	37.10			
	6 mm	3.00 mm	II	10 mm	63 mm		884166	25.20	884166-C3	31.40			NEW
	1/4	.125	II	3/8	2-1/2		30130	21.90	30130-C3	28.10	30130-C4	38.60	
	1/4	.125	II	3/8	6	*LONG!*	30530	41.40	30530-C3	54.20			
100°	1/8	.052	II	3/8	1-1/2		983508	14.20	983508-C3	18.40			
	3/16	.079	II	3/8	2		983512	18.50	983512-C3	23.10			
	1/4	.105	II	3/8	2-1/2		983516	23.10	983516-C3	29.30			
120°	1/8	.036	II	3/8	1-1/2		990508	13.70	990508-C3	17.90			
	3/16	.054	II	3/8	2		990512	17.70	990512-C3	22.20			
	1/4	.072	II	3/8	2-1/2		990516	21.90	990516-C3	28.10			

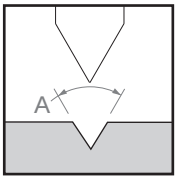
SPEEDS & FEEDS ONLINE!

Check Out All of Our Engraving Solutions!

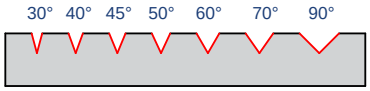
ENGRAVING CUTTERS

Pointed – Double-Ended





- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

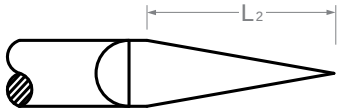


Stocked in *Seven* Included Angles!

INCLUDED ANGLE	DIAMETER	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.233	II	3/8	2	938408	23.50	938408-C3	28.70
	3/16	.350	II	3/8	2	938410	29.10	938410-C3	35.30
	1/4	.466	II	1/2	2-1/2	938412	34.70	938412-C3	42.90
40°	1/8	.172	II	3/8	2	854008	24.90	854008-C3	30.10
	3/16	.258	II	3/8	2	854010	30.50	854010-C3	36.70
	1/4	.343	II	3/8	2-1/2	854012	36.10	854012-C3	44.30
45°	1/8	.151	II	3/8	2	854508	24.90	854508-C3	30.10
	3/16	.226	II	3/8	2	854510	30.50	854510-C3	36.70
	1/4	.302	II	3/8	2-1/2	854512	36.10	854512-C3	44.30
50°	1/8	.134	II	3/8	2	855008	24.90	855008-C3	30.10
	3/16	.201	II	3/8	2	855010	30.50	855010-C3	36.70
	1/4	.268	II	3/8	2-1/2	855012	36.10	855012-C3	44.30
60°	1/8	.108	II	3/8	2	954608	23.50	954608-C3	28.70
	3/16	.162	II	3/8	2	954610	29.10	954610-C3	35.30
	1/4	.216	II	3/8	2-1/2	954612	34.70	954612-C3	42.90
70°	1/8	.089	II	3/8	2	857008	24.90	857008-C3	30.10
	3/16	.134	II	3/8	2	857010	30.50	857010-C3	36.70
	1/4	.179	II	3/8	2-1/2	857012	36.10	857012-C3	44.30
90°	1/8	.062	II	3/8	2	975108	23.50	975108-C3	28.70
	3/16	.093	II	3/8	2	975110	29.10	975110-C3	35.30
	1/4	.125	II	3/8	2-1/2	975112	34.70	975112-C3	42.90

SPEEDS & FEEDS ONLINE!

TYPE II

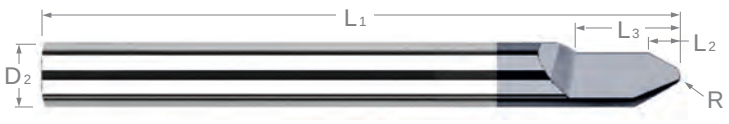


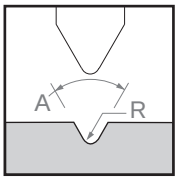
Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

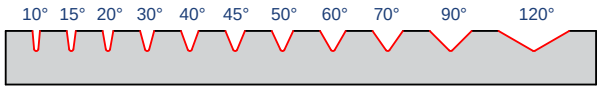
ENGRAVING CUTTERS

Tip Radius





- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA



Stocked in *Eleven* Included Angles!

INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
10°	1/8	.0050	.080	I	.200	1-1/2		940410	21.40	940410-C3	25.60			
	1/8	.0100	.080	I	.200	1-1/2		948010	21.40	948010-C3	25.60			
15°	1/8	.0050	.080	I	.200	1-1/2		952910	21.40	952910-C3	25.60			
	1/8	.0100	.080	I	.200	1-1/2		963510	21.40	963510-C3	25.60			
20°	1/8	.0050	.080	I	.200	1-1/2		989310	21.40	989310-C3	25.60			
	1/8	.0100	.080	I	.200	1-1/2		956010	21.40	956010-C3	25.60			
30°	1/8	.0025	.226	II	3/8	1-1/2		72715	20.20	72715-C3	24.40	72715-C4	30.90	
	1/8	.0050	.219	II	3/8	1-1/2		47510	20.20	47510-C3	24.40	47510-C4	30.90	
	1/8	.0100	.207	II	3/8	1-1/2		48810	20.20	48810-C3	24.40	48810-C4	30.90	
	1/8	.0150	.190	II	3/8	1-1/2		49710	20.20	49710-C3	24.40			
	1/8	.0200	.176	II	3/8	1-1/2		58610	20.20	58610-C3	24.40			
	1/8	.0300	.147	II	3/8	1-1/2		868910	20.20	868910-C3	24.40			NEW
	3/16	.0050	.336	II	3/8	2		47520	24.70	47520-C3	29.20			
	3/16	.0100	.321	II	3/8	2		48820	24.70	48820-C3	29.20			
	1/4	.0050	.452	II	1/2	2-1/2		47530	34.70	47530-C3	42.30			
	1/4	.0100	.438	II	1/2	2-1/2		48830	34.70	48830-C3	42.30			
40°	1/8	.0025	.167	II	3/8	1-1/2		72720	21.20	72720-C3	25.40			
	1/8	.0050	.162	II	3/8	1-1/2		57610	21.20	57610-C3	25.40			
	1/8	.0100	.152	II	3/8	1-1/2		58210	21.20	58210-C3	25.40			
	1/8	.0150	.143	II	3/8	1-1/2		59310	21.20	59310-C3	25.40			
	1/8	.0200	.133	II	3/8	1-1/2		60510	21.20	60510-C3	25.40			
45°	1/8	.0050	.143	II	3/8	1-1/2		946502	21.10	946502-C3	25.30			
	1/8	.0100	.135	II	3/8	1-1/2		957910	21.10	957910-C3	25.30			
50°	1/8	.0050	.127	II	3/8	1-1/2		845010	21.10	845010-C3	25.30			
	1/8	.0100	.120	II	3/8	1-1/2		847210	21.10	847210-C3	25.30			
60°	1/8	.0025	.106	II	3/8	1-1/2		72730	20.20	72730-C3	24.40	72730-C4	30.90	
	1/8	.0050	.103	II	3/8	1-1/2		48110	20.20	48110-C3	24.40	48110-C4	30.90	
	1/8	.0050	.103	II	3/8	4	LONG!	974910	36.20	974910-C3	40.90			
	1/8	.0075	.101	II	3/8	1-1/2		967310	20.20	967310-C3	24.40			
	1/8	.0100	.098	II	3/8	1-1/2		49410	20.20	49410-C3	24.40	49410-C4	30.90	
	1/8	.0150	.093	II	3/8	1-1/2		51710	20.20	51710-C3	24.40			
	1/8	.0200	.088	II	3/8	1-1/2		58910	20.20	58910-C3	24.40			
	1/8	.0300	.078	II	3/8	1-1/2		877010	20.20	877010-C3	24.40			NEW
	3/16	.0025	.160	II	3/8	2		964830	24.70	964830-C3	29.20			
	3/16	.0050	.157	II	3/8	2		48120	24.70	48120-C3	29.20			
	3/16	.0075	.155	II	3/8	2		967320	24.70	967320-C3	29.20			NEW

SPEEDS & FEEDS ONLINE!

continued on next page

ENGRAVING CUTTERS

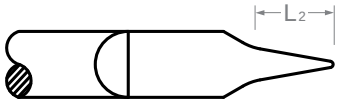
Tip Radius (cont.)

continued from previous page

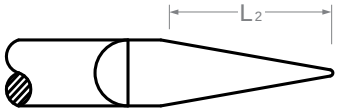
	INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	60°	3/16	.0100	.152	II	3/8	2		49420	24.70	49420-C3	29.20		
		3/16	.0150	.147	II	3/8	2		51720	24.70	51720-C3	29.20		
		3/16	.0200	.142	II	3/8	2		58920	24.70	58920-C3	29.20		
		1/4	.0025	.214	II	3/8	2-1/2		943730	27.10	943730-C3	33.30		
		1/4	.0050	.212	II	3/8	2-1/2		48130	27.10	48130-C3	33.30		
NEW		1/4	.0075	.209	II	3/8	2-1/2		967330	27.10	967330-C3	33.30		
		1/4	.0100	.207	II	3/8	2-1/2		49430	27.10	49430-C3	33.30		
		1/4	.0150	.202	II	3/8	2-1/2		51730	27.10	51730-C3	33.30		
		1/4	.0200	.196	II	3/8	2-1/2		58930	27.10	58930-C3	33.30		
	70°	1/8	.0050	.086	II	3/8	1-1/2		843810	21.10	843810-C3	25.30		
		1/8	.0100	.082	II	3/8	1-1/2		844710	21.10	844710-C3	25.30		
		1/8	.0025	.061	II	3/8	1-1/2		72745	20.20	72745-C3	24.40	72745-C4	30.90
		1/8	.0050	.060	II	3/8	1-1/2		48410	20.20	48410-C3	24.40	48410-C4	30.90
		1/8	.0050	.060	II	3/8	4	*LONG!*	986810	36.20	986810-C3	40.90		
		1/8	.0075	.059	II	3/8	1-1/2		959810	20.20	959810-C3	24.40		
		1/8	.0100	.058	II	3/8	1-1/2		49110	20.20	49110-C3	24.40	49110-C4	30.90
		1/8	.0150	.056	II	3/8	1-1/2		50810	20.20	50810-C3	24.40		
		1/8	.0200	.054	II	3/8	1-1/2		59910	20.20	59910-C3	24.40		
NEW		1/8	.0300	.050	II	3/8	1-1/2		891410	20.20	891410-C3	24.40		
	90°	3/16	.0025	.093	II	3/8	2		964845	24.70	964845-C3	29.20		
		3/16	.0050	.092	II	3/8	2		48420	24.70	48420-C3	29.20		
		3/16	.0100	.090	II	3/8	2		49120	24.70	49120-C3	29.20		
		3/16	.0150	.088	II	3/8	2		50820	24.70	50820-C3	29.20		
		3/16	.0200	.085	II	3/8	2		59920	24.70	59920-C3	29.20		
		1/4	.0025	.124	II	3/8	2-1/2		943745	27.10	943745-C3	33.30		
		1/4	.0050	.123	II	3/8	2-1/2		48430	27.10	48430-C3	33.30		
		1/4	.0100	.121	II	3/8	2-1/2		49130	27.10	49130-C3	33.30		
		1/4	.0150	.119	II	3/8	2-1/2		50830	27.10	50830-C3	33.30		
		1/4	.0200	.116	II	3/8	2-1/2		59930	27.10	59930-C3	33.30		
	120°	1/8	.0050	.035	II	3/8	1-1/2		947310	20.20	947310-C3	24.40		
		1/8	.0100	.035	II	3/8	1-1/2		939110	20.20	939110-C3	24.40		

SPEEDS & FEEDS ONLINE!

TYPE I

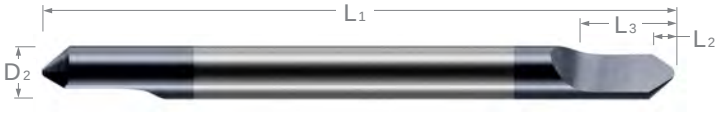


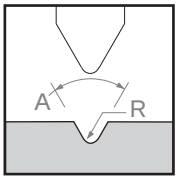
TYPE II



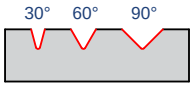
ENGRAVING CUTTERS

Tip Radius – Double-Ended





- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA

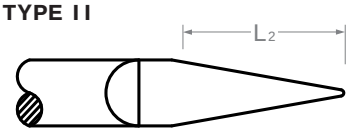


Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	R	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.0050	.219	II	3/8	2	834408	30.40	834408-C3	35.60
	1/8	.0100	.205	II	3/8	2	835008	30.40	835008-C3	35.60
	1/8	.0200	.176	II	3/8	2	836108	30.40	836108-C3	35.60
	1/4	.0050	.452	II	1/2	2-1/2	834416	39.90	834416-C3	48.10
	1/4	.0100	.438	II	1/2	2-1/2	835016	39.90	835016-C3	48.10
60°	1/8	.0050	.103	II	3/8	2	828208	30.40	828208-C3	35.60
	1/8	.0100	.098	II	3/8	2	828808	30.40	828808-C3	35.60
	1/8	.0200	.088	II	3/8	2	829908	30.40	829908-C3	35.60
	1/4	.0050	.212	II	3/8	2-1/2	828216	39.90	828216-C3	48.10
	1/4	.0100	.207	II	3/8	2-1/2	828816	39.90	828816-C3	48.10
90°	1/8	.0050	.060	II	3/8	2	818308	30.40	818308-C3	35.60
	1/8	.0100	.058	II	3/8	2	818908	30.40	818908-C3	35.60
	1/8	.0200	.054	II	3/8	2	820108	30.40	820108-C3	35.60
	1/4	.0050	.123	II	3/8	2-1/2	818316	39.90	818316-C3	48.10
	1/4	.0100	.121	II	3/8	2-1/2	818916	39.90	818916-C3	48.10

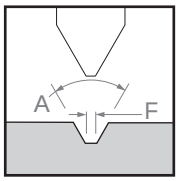
SPEEDS & FEEDS ONLINE!

TYPE II

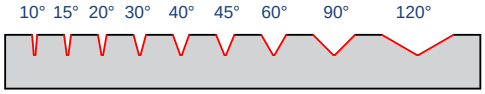


ENGRAVING CUTTERS

Tipped Off



- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



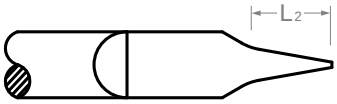
Stocked in *Nine* Included Angles!

	INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	10°	1/8	.005	.080	I	.200	1-1/2	993002	20.90	993002-C3	25.10		
		1/8	.010	.080	I	.200	1-1/2	993010	20.90	993010-C3	25.10		
NEW		1/8	.020	.080	I	.200	1-1/2	993052	20.90	993052-C3	25.10		
	15°	1/8	.005	.080	I	.200	1-1/2	990002	20.90	990002-C3	25.10		
		1/8	.010	.080	I	.200	1-1/2	990010	20.90	990010-C3	25.10		
NEW		1/8	.020	.080	I	.200	1-1/2	990052	20.90	990052-C3	25.10		
	20°	1/8	.005	.080	I	.200	1-1/2	987002	20.90	987002-C3	25.10		
		1/8	.010	.080	I	.200	1-1/2	987010	20.90	987010-C3	25.10		
NEW		1/8	.020	.080	I	.200	1-1/2	987052	20.90	987052-C3	25.10		
	30°	1/8	.005	.224	II	3/8	1-1/2	25202	15.50	25202-C3	19.70		
		1/8	.010	.215	II	3/8	1-1/2	25210	15.50	25210-C3	19.70	25210-C4	26.20
		1/8	.015	.205	II	3/8	1-1/2	25242	15.50	25242-C3	19.70		
		1/8	.020	.196	II	3/8	1-1/2	25252	15.50	25252-C3	19.70		
		3/16	.010	.331	II	3/8	2	25220	20.20	25220-C3	24.70		
NEW		3/16	.020	.313	II	3/8	2	25226	20.20	25226-C3	24.70		
		1/4	.005	.457	II	1/2	2-1/2	25228	23.40	25228-C3	29.60		
		1/4	.010	.448	II	1/2	2-1/2	25230	23.40	25230-C3	29.60		
NEW		1/4	.020	.429	II	1/2	2-1/2	25234	23.40	25234-C3	29.60		
	40°	1/8	.005	.165	II	3/8	1-1/2	25302	16.20	25302-C3	20.40		
		1/8	.010	.158	II	3/8	1-1/2	25310	16.20	25310-C3	20.40	25310-C4	26.90
		1/8	.015	.151	II	3/8	1-1/2	25342	16.20	25342-C3	20.40		
		1/8	.020	.144	II	3/8	1-1/2	25352	16.20	25352-C3	20.40		
		3/16	.010	.244	II	3/8	2	25320	21.20	25320-C3	25.70		
		1/4	.005	.337	II	3/8	2-1/2	25328	24.70	25328-C3	30.90		
		1/4	.010	.330	II	3/8	2-1/2	25330	24.70	25330-C3	30.90		
	45°	1/8	.005	.145	II	3/8	1-1/2	955002	16.10	955002-C3	20.30		
		1/8	.010	.139	II	3/8	1-1/2	955010	16.10	955010-C3	20.30		
		3/16	.010	.214	II	3/8	2	955020	21.10	955020-C3	25.60		
		1/4	.010	.290	II	3/8	2-1/2	955030	24.50	955030-C3	30.70		

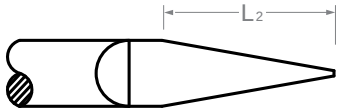
SPEEDS & FEEDS ONLINE!

continued on next page

TYPE I



TYPE II



Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

ENGRAVING CUTTERS

Tipped Off (cont.)

continued from previous page

INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
60°	1/8	.005	.104	II	3/8	1-1/2	50710	15.50	50710-C3	19.70	50710-C4	26.20	
	1/8	.010	.099	II	3/8	1-1/2	30210	15.50	30210-C3	19.70	30210-C4	26.20	
	1/8	.015	.095	II	3/8	1-1/2	18242	15.50	18242-C3	19.70			
	1/8	.020	.091	II	3/8	1-1/2	26910	15.50	26910-C3	19.70	26910-C4	26.20	
	1/8	.030	.082	II	3/8	1-1/2	27610	15.50	27610-C3	19.70	27610-C4	26.20	
	3/16	.005	.158	II	3/8	2	50720	20.20	50720-C3	24.70			
	3/16	.010	.153	II	3/8	2	30220	20.20	30220-C3	24.70			
	3/16	.020	.145	II	3/8	2	26920	20.20	26920-C3	24.70			
	3/16	.030	.136	II	3/8	2	27620	20.20	27620-C3	24.70			
	1/4	.005	.212	II	3/8	2-1/2	50730	23.40	50730-C3	29.60			
	1/4	.010	.207	II	3/8	2-1/2	30230	23.40	30230-C3	29.60			
	1/4	.020	.199	II	3/8	2-1/2	26930	23.40	26930-C3	29.60			
	1/4	.030	.191	II	3/8	2-1/2	27630	23.40	27630-C3	29.60			
90°	1/8	.005	.060	II	3/8	1-1/2	30302	15.50	30302-C3	19.70			
	1/8	.010	.057	II	3/8	1-1/2	30310	15.50	30310-C3	19.70	30310-C4	26.20	
	1/8	.015	.055	II	3/8	1-1/2	30342	15.50	30342-C3	19.70			
	1/8	.020	.053	II	3/8	1-1/2	30352	15.50	30352-C3	19.70			
	3/16	.010	.088	II	3/8	2	30320	20.20	30320-C3	24.70			
	3/16	.020	.084	II	3/8	2	30324	20.20	30324-C3	24.70			NEW
	1/4	.005	.123	II	3/8	2-1/2	30328	23.40	30328-C3	29.60			
	1/4	.010	.120	II	3/8	2-1/2	30330	23.40	30330-C3	29.60			
	1/4	.020	.115	II	3/8	2-1/2	30334	23.40	30334-C3	29.60			NEW
120°	1/8	.005	.035	II	3/8	1-1/2	954102	15.50	954102-C3	19.70			
	1/8	.010	.033	II	3/8	1-1/2	954110	15.50	954110-C3	19.70			

SPEEDS & FEEDS ONLINE!

★★★★★

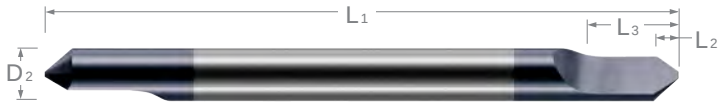
"Beyond amazed with these tools; .008 flat endmill and 30° .005 flat tipped off engraver are easily lasting over 300 and 500 mins respectively in 316L stainless. I was expecting new tools every 4 parts but I'm getting 10 out of them. I have never been anything less than blown away with @harveytool products."

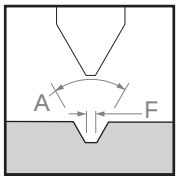
— @bmc293

Follow us on Instagram @harveytool!

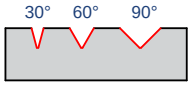
ENGRAVING CUTTERS

Tipped Off – Double-Ended





- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

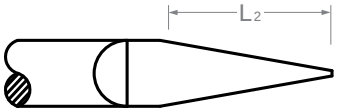


Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	**.005**	.224	II	3/8	2	834308	25.70	834308-C3	30.90
	1/8	**.010**	.215	II	3/8	2	834908	25.70	834908-C3	30.90
	1/8	**.015**	.205	II	3/8	2	835508	25.70	835508-C3	30.60
	1/8	**.020**	.196	II	3/8	2	836208	25.70	836208-C3	30.90
	1/4	**.010**	.448	II	1/2	2-1/2	834916	36.40	834916-C3	44.60
60°	1/8	**.005**	.104	II	3/8	2	828108	25.70	828108-C3	30.90
	1/8	**.010**	.100	II	3/8	2	828708	25.70	828708-C3	30.90
	1/8	**.015**	.095	II	3/8	2	829308	25.70	829308-C3	30.90
	1/8	**.020**	.091	II	3/8	2	829808	25.70	829808-C3	30.90
	1/4	**.010**	.208	II	3/8	2-1/2	828716	36.40	828716-C3	44.60
90°	1/8	**.005**	.060	II	3/8	2	818208	25.70	818208-C3	30.90
	1/8	**.010**	.058	II	3/8	2	818808	25.70	818808-C3	30.90
	1/8	**.015**	.055	II	3/8	2	819408	25.70	819408-C3	30.90
	1/8	**.020**	.053	II	3/8	2	820008	25.70	820008-C3	30.90
	1/4	**.010**	.120	II	3/8	2-1/2	818816	36.40	818816-C3	44.60

SPEEDS & FEEDS ONLINE!

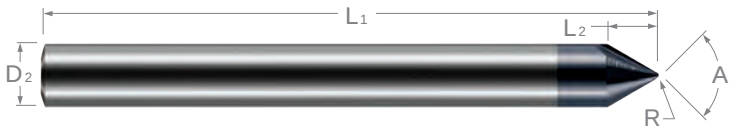
TYPE II



NEW!

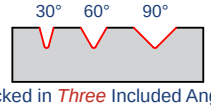
ENGRAVING CUTTERS

Tip Radius – 2 Flute – For Hardened Steels

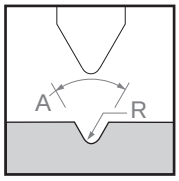


2 Shallow
Flute Design

- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tip radius end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA



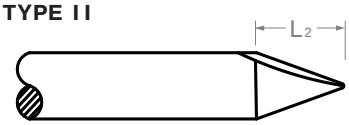
Stocked in *Three* Included Angles!



INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED		
A	D_2	R	L_2		L_1	2 FL	PRICE	
30°	1/8	.005	.218	II	1-1/2	858308-C6	25.90	NEW
	1/8	.010	.204	II	1-1/2	851208-C6	25.90	NEW
	1/4	.010	.437	II	2-1/2	851216-C6	39.70	NEW
60°	1/8	.005	.103	II	1-1/2	860008-C6	25.90	NEW
	1/8	.010	.098	II	1-1/2	877308-C6	25.90	NEW
	1/4	.010	.206	II	2-1/2	877316-C6	39.70	NEW
90°	1/8	.005	.060	II	1-1/2	853108-C6	25.90	NEW
	1/8	.010	.058	II	1-1/2	869408-C6	25.90	NEW
	1/4	.010	.120	II	2-1/2	869416-C6	39.70	NEW

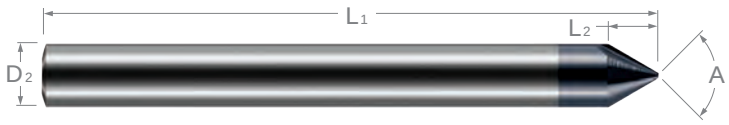
SPEEDS & FEEDS ONLINE!

TYPE II



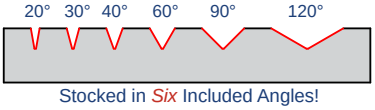
ENGRAVING CUTTERS

Tipped Off – 2 Flute – For Hardened Steels

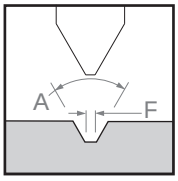


2 Shallow
Flute Design

- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tipped off end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA



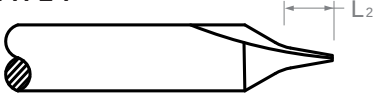
Stocked in *Six* Included Angles!



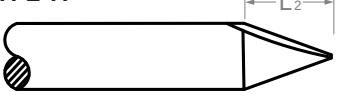
	INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
	A	D_2	F	L_2		L_1	2 FL	PRICE
NEW	20°	1/8	.010	.080	I	1-1/2	892508-C6	21.90
NEW		1/4	.010	.080	I	2-1/2	892516-C6	35.10
NEW	30°	1/8	.005	.223	II	1-1/2	896708-C6	20.90
NEW		1/8	.010	.214	II	1-1/2	882008-C6	20.90
NEW		1/8	.020	.195	II	1-1/2	879608-C6	20.90
NEW		3/16	.010	.331	II	2	882012-C6	25.20
NEW		1/4	.010	.447	II	2-1/2	882016-C6	33.40
NEW	40°	1/8	.010	.157	II	1-1/2	875108-C6	21.90
NEW		1/4	.010	.329	II	2-1/2	875116-C6	35.10
NEW	60°	1/8	.005	.103	II	1-1/2	866708-C6	20.90
NEW		1/8	.010	.099	II	1-1/2	889608-C6	20.90
NEW		1/8	.020	.090	II	1-1/2	892308-C6	20.90
NEW		3/16	.010	.153	II	2	889612-C6	25.20
NEW		1/4	.010	.207	II	2-1/2	889616-C6	33.40
NEW	90°	1/8	.005	.060	II	1-1/2	880908-C6	20.90
NEW		1/8	.010	.057	II	1-1/2	876508-C6	20.90
NEW		1/8	.020	.052	II	1-1/2	868408-C6	20.90
NEW		3/16	.010	.088	II	2	876512-C6	25.20
NEW		1/4	.010	.120	II	2-1/2	876516-C6	33.40
NEW	120°	1/8	.010	.033	II	1-1/2	865308-C6	20.90
NEW		1/4	.010	.069	II	2-1/2	865316-C6	33.40

SPEEDS & FEEDS ONLINE!

TYPE I

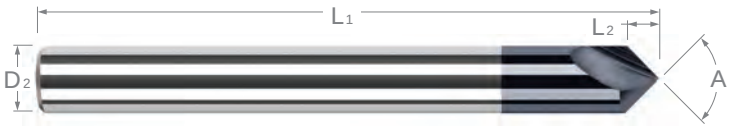


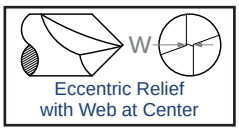
TYPE II



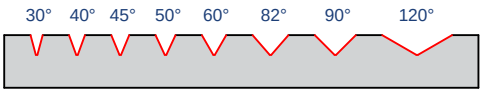
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials





- **Designed for milling legible part numbers in difficult-to-machine materials**
- Burr-free, two flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half-round style engravers
- Requires less RPM than half-round engravers
- Solid carbide
- CNC ground in the USA



Stocked in *Eight* Included Angles!

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A +1° −1°	D_2	W	L_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
30°	1/8	.003	.228	1-1/2		923908	16.90	923908-C3	21.10		
	1/8	.005	.224	1-1/2		47708	16.90	47708-C3	21.10	47708-C4	27.60
	1/8	.010	.215	1-1/2		996108	16.90	996108-C3	21.10		
	1/8	.015	.205	1-1/2		954008	16.90	954008-C3	21.10		
	3/16	.003	.344	2		923912	21.10	923912-C3	25.60		
	3/16	.005	.341	2		47712	21.10	47712-C3	25.60		
	3/16	.010	.331	2		996112	21.10	996112-C3	25.60		
	1/4	.003	.461	2-1/2		923916	29.50	923916-C3	35.70		
	1/4	.005	.457	2-1/2		47716	29.50	47716-C3	35.70		
	1/4	.010	.448	2-1/2		996116	29.50	996116-C3	35.70		
40°	1/8	.005	.165	1-1/2		995508	17.70	995508-C3	21.90	995508-C4	28.40
	1/8	.010	.158	1-1/2		996708	17.70	996708-C3	21.90		
	3/16	.005	.251	2		995512	22.40	995512-C3	26.90		
	3/16	.010	.244	2		996712	22.40	996712-C3	26.90		
	1/4	.005	.337	2-1/2		995516	31.20	995516-C3	37.40		
	1/4	.010	.330	2-1/2		996716	31.20	996716-C3	37.40		
45°	1/8	.005	.145	1-1/2		987408	17.40	987408-C3	21.60		
	3/16	.005	.220	2		987412	22.20	987412-C3	26.70		
	1/4	.005	.296	2-1/2		987416	31.10	987416-C3	37.30		
50°	1/8	.005	.129	1-1/2		976608	17.70	976608-C3	21.90		
	3/16	.005	.196	2		976612	22.20	976612-C3	26.70		
	1/4	.005	.263	2-1/2		976616	31.10	976616-C3	37.30		
60°	1/8	.003	.106	1-1/2		905708	16.90	905708-C3	21.10		
	1/8	.005	.104	1-1/2		29608	16.90	29608-C3	21.10	29608-C4	27.60
	1/8	.005	.104	3	*LONG!*	957808	20.70	957808-C3	24.90		
	1/8	.010	.100	1-1/2		48308	16.90	48308-C3	21.10	48308-C4	27.60
	1/8	.015	.095	1-1/2		948108	16.90	948108-C3	21.10		
	3/16	.003	.160	2		905712	21.10	905712-C3	25.60		
	3/16	.005	.158	2		29612	21.10	29612-C3	25.60	29612-C4	35.80
	3/16	.010	.154	2		48312	21.10	48312-C3	25.60		
	3/16	.015	.149	2		948112	21.10	948112-C3	25.60		

SPEEDS & FEEDS ONLINE!

continued on next page

ENGRAVING CUTTERS

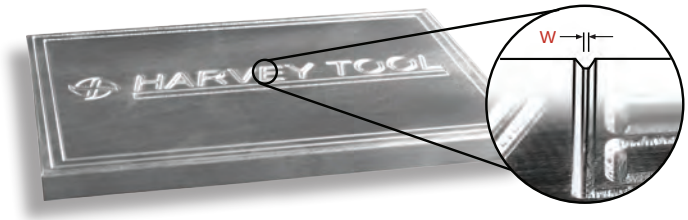
Marking Cutters for Ferrous Materials (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
60°	1/4	.003	.214	2-1/2		905716	29.50	905716-C3	35.70		
	1/4	.005	.212	2-1/2		29616	29.50	29616-C3	35.70	29616-C4	46.20
	1/4	.010	.208	2-1/2		48316	29.50	48316-C3	35.70		
	1/4	.015	.204	2-1/2		948116	29.50	948116-C3	35.70		
82°	1/8	.005	.069	1-1/2		974108	17.70	974108-C3	21.90		
90°	1/8	.003	.061	1-1/2		914608	16.90	914608-C3	21.10		
	1/8	.005	.060	1-1/2		23608	16.90	23608-C3	21.10	23608-C4	27.60
	1/8	.005	.060	3	*LONG!*	968108	20.70	968108-C3	24.90		
	1/8	.010	.058	1-1/2		50408	16.90	50408-C3	21.10	50408-C4	27.60
	1/8	.015	.055	1-1/2		939708	16.90	939708-C3	21.10		
	3/16	.003	.092	2		914612	21.10	914612-C3	25.60		
	3/16	.005	.091	2		23612	21.10	23612-C3	25.60	23612-C4	35.80
	3/16	.010	.089	2		50412	21.10	50412-C3	25.60		
	3/16	.015	.086	2		939712	21.10	939712-C3	25.60		
	1/4	.003	.124	2-1/2		914616	29.50	914616-C3	35.70		
	1/4	.005	.123	2-1/2		23616	29.50	23616-C3	35.70	23616-C4	46.20
	1/4	.010	.120	2-1/2		50416	29.50	50416-C3	35.70		
	1/4	.015	.118	2-1/2		939716	29.50	939716-C3	35.70		
120°	1/8	.003	.035	1-1/2		844808	16.90	844808-C3	21.10		
	1/8	.005	.035	1-1/2		23708	16.90	23708-C3	21.10	23708-C4	27.60
	1/8	.010	.033	1-1/2		998808	16.90	998808-C3	21.10		
	3/16	.005	.053	2		23712	21.10	23712-C3	25.60		
	3/16	.010	.051	2		998812	21.10	998812-C3	25.60		
	1/4	.005	.071	2-1/2		23716	29.50	23716-C3	35.70		
	1/4	.010	.069	2-1/2		998816	29.50	998816-C3	35.70		

SPEEDS & FEEDS ONLINE!

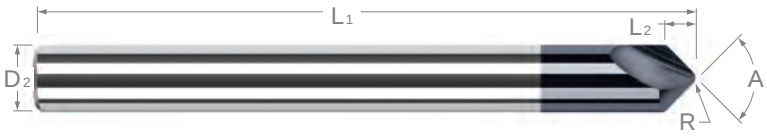
For Marking Cutters for Non-Ferrous Materials, please see page 253.

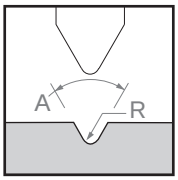


Produces Flat in Bottom of Groove

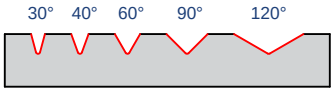
ENGRAVING CUTTERS

Marking Cutters – Tip Radius for Ferrous Materials





- **Designed for milling legible part numbers in difficult-to-machine materials**
- Radiused tip design for improved strength
- 2 flute cutting design has improved strength over single point engravers
- Produces radius in bottom of groove
- Solid carbide
- CNC ground in the USA



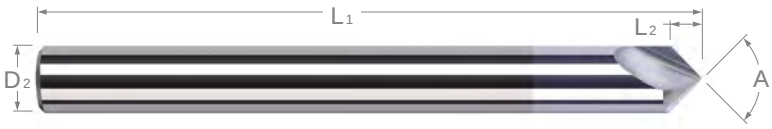
Stocked in *Five* Included Angles!

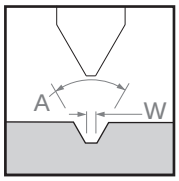
INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	.0050	.218	1-1/2	987615	20.90	987615-C3	25.10
	1/8	.0100	.204	1-1/2	961915	20.90	961915-C3	25.10
	1/8	.0150	.190	1-1/2	981815	20.90	981815-C3	25.10
	3/16	.0050	.335	2	958715	25.40	958715-C3	29.90
	3/16	.0100	.321	2	947215	25.40	947215-C3	29.90
	1/4	.0050	.452	2-1/2	966815	34.10	966815-C3	40.30
	1/4	.0100	.437	2-1/2	954915	34.10	954915-C3	40.30
40°	1/8	.0050	.162	1-1/2	987640	22.20	987640-C3	26.40
	1/8	.0100	.152	1-1/2	961940	22.20	961940-C3	26.40
	1/8	.0150	.142	1-1/2	981820	22.20	981820-C3	26.40
60°	1/8	.0050	.103	1-1/2	987630	20.90	987630-C3	25.10
	1/8	.0075	.100	1-1/2	926330	20.90	926330-C3	25.10
	1/8	.0100	.098	1-1/2	961930	20.90	961930-C3	25.10
	1/8	.0150	.093	1-1/2	981830	20.90	981830-C3	25.10
	1/8	.0200	.088	1-1/2	918430	20.90	918430-C3	25.10
	3/16	.0050	.157	2	958730	25.40	958730-C3	29.90
	3/16	.0100	.152	2	947230	25.40	947230-C3	29.90
	3/16	.0150	.147	2	914330	25.40	914330-C3	29.90
	1/4	.0050	.211	2-1/2	966830	34.10	966830-C3	40.30
	1/4	.0100	.206	2-1/2	954930	34.10	954930-C3	40.30
	1/4	.0150	.201	2-1/2	909730	34.10	909730-C3	40.30
90°	1/8	.0050	.060	1-1/2	987645	20.90	987645-C3	25.10
	1/8	.0075	.059	1-1/2	926345	20.90	926345-C3	25.10
	1/8	.0100	.058	1-1/2	961945	20.90	961945-C3	25.10
	1/8	.0150	.056	1-1/2	981845	20.90	981845-C3	25.10
	1/8	.0200	.054	1-1/2	918445	20.90	918445-C3	25.10
	3/16	.0050	.091	2	958745	25.40	958745-C3	29.90
	3/16	.0100	.089	2	947245	25.40	947245-C3	29.90
	3/16	.0150	.087	2	914345	25.40	914345-C3	29.90
	1/4	.0050	.122	2-1/2	966845	34.10	966845-C3	40.30
	1/4	.0100	.120	2-1/2	954945	34.10	954945-C3	40.30
	1/4	.0150	.118	2-1/2	909745	34.10	909745-C3	40.30
120°	1/8	.0050	.035	1-1/2	987660	20.90	987660-C3	25.10
	1/8	.0100	.034	1-1/2	961960	20.90	961960-C3	25.10

SPEEDS & FEEDS ONLINE!

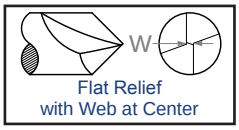
ENGRAVING CUTTERS

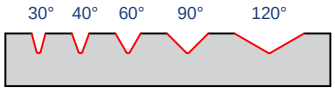
Marking Cutters for Non-Ferrous Materials





- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- 2 flute cutting design has improved strength over single point engravers
- Flat relief design for improved results in aluminum and other non-ferrous applications
- Produces flat in bottom of groove
- Solid carbide
- CNC ground in the USA





Stocked in *Five* Included Angles!

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB2 COATED	
A +1° −1°	D2	W	L2	L1	2 FL	PRICE	2 FL	PRICE
30°	1/8	.005	.230	1-1/2	993215	16.90	993215-C8	23.10
	1/8	.010	.228	1-1/2	963215	16.90	963215-C8	23.10
	1/8	.015	.225	1-1/2	902915	16.90	902915-C8	23.10
	3/16	.005	.347	2	987815	21.10	987815-C8	27.30
	1/4	.005	.464	2-1/2	967415	29.50	967415-C8	36.20
40°	1/8	.005	.170	1-1/2	993220	17.70	993220-C8	23.90
	1/8	.010	.168	1-1/2	963220	17.70	963220-C8	23.90
	3/16	.005	.255	2	987820	20.90	987820-C8	27.10
	1/4	.005	.339	2-1/2	967420	28.90	967420-C8	35.60
60°	1/8	.005	.107	1-1/2	993230	16.90	993230-C8	23.10
	1/8	.010	.106	1-1/2	963230	16.90	963230-C8	23.10
	1/8	.015	.104	1-1/2	902930	16.90	902930-C8	23.10
	3/16	.005	.161	2	987830	21.10	987830-C8	27.30
	3/16	.010	.160	2	921230	21.10	921230-C8	27.30
	1/4	.005	.215	2-1/2	967430	29.50	967430-C8	36.20
	1/4	.010	.214	2-1/2	918630	29.50	918630-C8	36.20
90°	1/8	.005	.062	1-1/2	993245	16.90	993245-C8	23.10
	1/8	.010	.061	1-1/2	963245	16.90	963245-C8	23.10
	1/8	.015	.060	1-1/2	902945	16.90	902945-C8	23.10
	3/16	.005	.093	2	987845	21.10	987845-C8	27.30
	3/16	.010	.092	2	921245	21.10	921245-C8	27.30
	1/4	.005	.124	2-1/2	967445	29.50	967445-C8	36.20
	1/4	.010	.123	2-1/2	918645	29.50	918645-C8	36.20
120°	1/8	.005	.036	1-1/2	993260	16.90	993260-C8	23.10
	1/8	.010	.035	1-1/2	963260	16.90	963260-C8	23.10

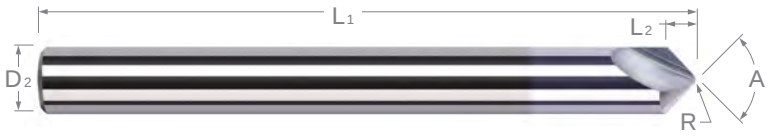
SPEEDS & FEEDS ONLINE!

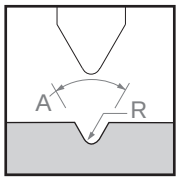
Click Tool # for stock, speeds & feeds, & other technical info

NEW!

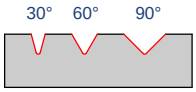
ENGRAVING CUTTERS

Marking Cutters – Tip Radius for Non-Ferrous Materials





- Designed for milling legible part numbers in non-ferrous and easy-to-machine materials
- Radiused tip design for improved strength
- Flat relief design for improved results
- Solid carbide
- CNC ground in the USA



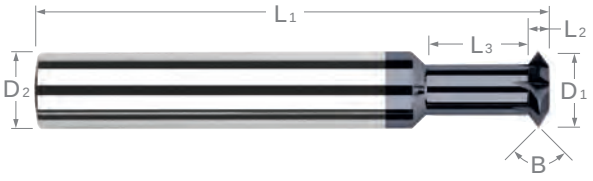
Stocked in *Three* Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED		
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE	
30°	1/8	**.005**	.219	1-1/2	847115	20.90	847115-C8	27.10	NEW
	1/8	**.010**	.205	1-1/2	854415	20.90	854415-C8	27.10	NEW
60°	1/8	**.005**	.103	1-1/2	847130	20.90	847130-C8	27.10	NEW
	1/8	**.010**	.098	1-1/2	854430	20.90	854430-C8	27.10	NEW
90°	1/8	**.005**	.060	1-1/2	847145	20.90	847145-C8	27.10	NEW
	1/8	**.010**	.058	1-1/2	854445	20.90	854445-C8	27.10	NEW

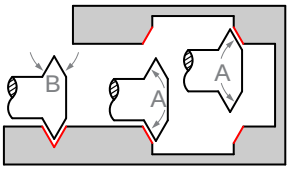
SPEEDS & FEEDS ONLINE!

DOUBLE ANGLE SHANK CUTTERS

Pointed



Great for Chamfering and Deburring

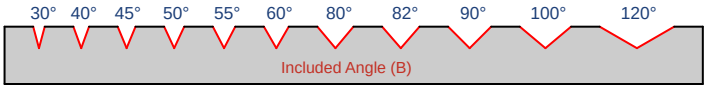


- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Included Angle Conversion

A = 180 - B	150°	140°	135°	130°	125°	120°	100°	98°	90°	80°	60°
B = 180 - A	30°	40°	45°	50°	55°	60°	80°	82°	90°	100°	120°

Click here for tool selection tips



Stocked in *Eleven* Included Angles!

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D1 +.000″ −.002″	L2		L3 +.020″ −.000″		D2	L1	TOOL #	PRICE	TOOL #	PRICE
30°	1/16	.008	1/32	**.093**	2	1/8	1-1/2	66062	45.10	66062-C3	49.30
	5/64	.010	.039	**.118**	2	1/8	1-1/2	66078	45.10	66078-C3	49.30
	3/32	.012	3/64	**.141**	2	1/8	1-1/2	66093	45.10	66093-C3	49.30
	1/8	.017	1/16	**.187**	4	1/8	1-1/2	66108	44.20	66108-C3	48.40
	1/8	.017	1/16	**.500**	4	1/8	1-1/2	934308	45.10	934308-C3	49.30
	3/16	.025	3/32	**.312**	4	3/16	2	66112	45.70	66112-C3	50.20
	1/4	.033	1/8	**.312**	4	1/4	2	66116	58.20	66116-C3	64.40
	1/4	.033	1/8	**.625**	4	1/4	2	921716	67.70	921716-C3	73.90
	3/8	.033	1/4	**.500**	6	3/8	2-1/2	66105	76.40	66105-C3	84.60
	3/8	.033	1/4	**1.500**	6	3/8	3-1/2	934324	90.90	934324-C3	99.10
	1/2	.050	5/16	**.500**	6	1/2	3	66110	105.10	66110-C3	117.30
	1/2	.050	5/16	**1.500**	6	1/2	4	934332	134.10	934332-C3	146.30
40°	1/4	.045	1/8	**.312**	4	1/4	2	29720	58.20	29720-C3	64.40
	1/4	.045	1/8	**.625**	4	1/4	2	918116	67.70	918116-C3	73.90
	3/8	.045	1/4	**.500**	6	3/8	2-1/2	909924	73.50	909924-C3	81.70
	3/8	.045	1/4	**1.500**	6	3/8	3-1/2	967505	91.40	967505-C3	99.60
	1/2	.068	5/16	**.500**	6	1/2	3	909932	100.10	909932-C3	112.30
	1/2	.068	5/16	**1.500**	6	1/2	4	967510	130.20	967510-C3	142.40
45°	1/8	.026	1/16	**.187**	4	1/8	1-1/2	905608	45.10	905608-C3	49.30
	3/16	.039	3/32	**.312**	4	3/16	2	905612	45.70	905612-C3	50.20
	1/4	.052	1/8	**.312**	4	1/4	2	29723	58.20	29723-C3	64.40
	1/4	.052	1/8	**.625**	4	1/4	2	917016	68.40	917016-C3	74.60
	3/8	.052	1/4	**.500**	6	3/8	2-1/2	905624	73.50	905624-C3	81.70
	3/8	.052	1/4	**1.500**	6	3/8	3-1/2	984905	91.40	984905-C3	99.60
	1/2	.078	5/16	**.500**	6	1/2	3	905632	100.10	905632-C3	112.30
	1/2	.078	5/16	**1.500**	6	1/2	4	984910	130.20	984910-C3	142.40

SPEEDS & FEEDS ONLINE!

*Carbide head with reduced steel shank

continued on next page

DOUBLE ANGLE SHANK CUTTERS

Pointed (cont.)

continued from previous page

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/8	.029	1/16	**.187**	4	1/8	1-1/2	985801	43.70	985801-C3	47.90
	1/8	.029	1/16	**.500**	4	1/8	1-1/2	974401	52.20	974401-C3	56.40
	3/16	.044	3/32	**.312**	4	3/16	2	985802	46.70	985802-C3	51.20
	3/16	.044	3/32	**.750**	4	3/16	2-1/2	974402	54.20	974402-C3	58.70
	1/4	.058	1/8	**.312**	4	1/4	2	29725	61.70	29725-C3	67.90
50°	1/4	.058	1/8	**1.000**	4	1/4	3	974403	71.50	974403-C3	77.70
	3/8	.058	1/4	**.500**	6	3/8	2-1/2	985805	75.90	985805-C3	84.10
	3/8	.058	1/4	**1.500**	6	3/8	3-1/2	974405	93.10	974405-C3	101.30
	1/2	.088	5/16	**.500**	6	1/2	3	985810	103.40	985810-C3	115.60
	1/2	.088	5/16	**1.500**	6	1/2	4	974410	132.70	974410-C3	144.90
55°	1/4	.065	1/8	**.312**	4	1/4	2	29728	61.70	29728-C3	67.90
	1/16	.018	1/32	**.093**	2	1/8	1-1/2	47362	43.90	47362-C3	48.10
	1/16	.018	1/32	**.156**	2	1/8	1-1/2	965562	43.90	965562-C3	48.10
	5/64	.023	.039	**.118**	2	1/8	1-1/2	47378	43.90	47378-C3	48.10
	3/32	.027	3/64	**.141**	2	1/8	1-1/2	47393	43.90	47393-C3	48.10
	3/32	.027	3/64	**.250**	2	1/8	1-1/2	965593	43.90	965593-C3	48.10
	1/8	.036	1/16	**.125**	4	1/8	1-1/2	937501	40.50	937501-C3	44.70
	1/8	.036	1/16	**.187**	4	1/8	1-1/2	16201	40.50	16201-C3	44.70
	1/8	.036	1/16	**.312**	4	1/8	1-1/2	984401	45.40	984401-C3	49.60
	1/8	.036	1/16	**.500**	4	1/8	2	27501	49.50	27501-C3	53.70
	1/8	.036	1/16	**.875**	4	1/8	2	981001	54.10	981001-C3	58.30
	5/32	.045	5/64	**.250**	4	3/16	2	16256	43.90	16256-C3	48.40
	5/32	.045	5/64	**.625**	4	3/16	2-1/2	27556	49.50	27556-C3	54.10
	3/16	.055	3/32	**.187**	4	3/16	2	937502	43.10	937502-C3	47.60
	3/16	.055	3/32	**.312**	4	3/16	2	16202	43.10	16202-C3	47.60
	3/16	.055	3/32	**.500**	4	3/16	2	984402	49.90	984402-C3	54.40
	3/16	.055	3/32	**.750**	4	3/16	2-1/2	27502	52.90	27502-C3	57.40
	1/4	.072	1/8	**.187**	4	1/4	2	937503	58.20	937503-C3	64.40
	1/4	.072	1/8	**.312**	4	1/4	2	16203	58.20	16203-C3	64.40
60°	1/4	.072	1/8	**.625**	4	1/4	2-1/2	984403	65.10	984403-C3	71.30
	1/4	.072	1/8	**1.000**	4	1/4	3	27503	69.40	27503-C3	75.60
	1/4	.072	1/8	**1.750**	4	1/4	3	981003	70.90	981003-C3	77.10
	5/16	.072	3/16	**.375**	6	5/16	2-1/2	16272	70.40	16272-C3	77.60
	5/16	.072	3/16	**.875**	6	5/16	2-1/2	984472	72.40	984472-C3	79.60
	3/8	.072	1/4	**.312**	6	3/8	2-1/2	937505	74.10	937505-C3	82.30
	3/8	.072	1/4	**.500**	6	3/8	2-1/2	16205	74.10	16205-C3	82.30
	3/8	.072	1/4	**1.000**	6	3/8	2-1/2	984405	83.40	984405-C3	91.60
	3/8	.072	1/4	**1.500**	6	3/8	3-1/2	27505	92.70	27505-C3	100.90
	1/2	.109	5/16	**.500**	6	1/2	3	16210	101.40	16210-C3	113.60
	1/2	.109	5/16	**1.000**	6	1/2	3	984410	110.50	984410-C3	122.70
	1/2	.109	5/16	**1.500**	6	1/2	4	27510	129.20	27510-C3	141.40
	1/2	.109	5/16	**2.000**	6	1/2	4	925510	132.50	925510-C3	144.70
	1/2	.109	5/16	**2.625**	6	1/2	4	981010	135.90	981010-C3	148.10
	5/8	.144	3/8	**.750**	6	5/8	3-1/2	16215	182.40	16215-C3	194.60
	3/4*	.144	-	**-**	8	1/2	3-1/2	16220*	136.90	16220-C3*	150.10
	3/4*	.144	-	**-**	8	1/2	6.144	27520*	143.30	27520-C3*	162.50
	1*	.217	-	**-**	8	5/8	4	16230*	150.60	16230-C3*	166.60

SPEEDS & FEEDS ONLINE!

*Carbide head with reduced steel shank

continued on next page

DOUBLE ANGLE SHANK CUTTERS

Pointed (cont.)

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INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
80°	1/4	.105	1/8	**.312**	4	1/4	2	29740	61.70	29740-C3	67.90
82°	1/4	.109	1/8	**.312**	4	1/4	2	29741	61.70	29741-C3	67.90
	3/8	.109	1/4	**1.500**	6	3/8	3-1/2	920805	97.40	920805-C3	105.60
	1/2	.163	5/16	**1.500**	6	1/2	4	920810	135.70	920810-C3	147.90
90°	1/16	.031	1/32	**.062**	2	1/8	1-1/2	946862	39.40	946862-C3	43.60
	1/16	.031	1/32	**.093**	2	1/8	1-1/2	19162	39.40	19162-C3	43.60
	1/16	.031	1/32	**.156**	2	1/8	1-1/2	45162	43.90	45162-C3	48.10
	1/16	.031	1/32	**.250**	2	1/8	1-1/2	71662	48.10	71662-C3	52.30
	1/16	.031	1/32	**.375**	2	1/8	1-1/2	963662	48.10	963662-C3	52.30
	5/64	.039	.039	**.078**	2	1/8	1-1/2	946878	39.40	946878-C3	43.60
	5/64	.039	.039	**.118**	2	1/8	1-1/2	19178	39.40	19178-C3	43.60
	5/64	.039	.039	**.187**	2	1/8	1-1/2	45178	43.90	45178-C3	48.10
	5/64	.039	.039	**.312**	2	1/8	1-1/2	71678	48.10	71678-C3	52.30
	5/64	.039	.039	**.500**	2	1/8	1-1/2	963678	48.10	963678-C3	52.30
	3/32	.047	3/64	**.093**	2	1/8	1-1/2	946893	39.40	946893-C3	43.60
	3/32	.047	3/64	**.141**	2	1/8	1-1/2	19193	39.40	19193-C3	43.60
	3/32	.047	3/64	**.250**	2	1/8	1-1/2	45193	43.90	45193-C3	48.10
	3/32	.047	3/64	**.375**	2	1/8	1-1/2	71693	48.10	71693-C3	52.30
	3/32	.047	3/64	**.625**	2	1/8	2	963693	49.90	963693-C3	54.10
	3/32	.047	3/64	**.750**	2	1/8	2	855793	51.90	855793-C3	56.10
	3 mm	.059	.059	**.187**	2	1/8	1-1/2	1913M	40.10	1913M-C3	44.30
	3 mm	.059	.059	**.312**	2	1/8	1-1/2	4513M	46.10	4513M-C3	50.30
	1/8	.062	1/16	**.125**	4	1/8	1-1/2	946901	39.40	946901-C3	43.60
	1/8	.062	1/16	**.187**	4	1/8	1-1/2	19201	39.40	19201-C3	43.60
	1/8	.062	1/16	**.312**	4	1/8	1-1/2	72601	44.40	72601-C3	48.60
	1/8	.062	1/16	**.500**	4	1/8	2	19501	51.20	19501-C3	55.40
	1/8	.062	1/16	**.625**	4	1/8	2	71701	52.90	71701-C3	57.10
	1/8	.062	1/16	**.875**	4	1/8	2	26801	55.70	26801-C3	59.90
	1/8	.062	1/16	**1.125**	4	1/8	2-1/2	963701	61.20	963701-C3	65.40
	5/32	.078	5/64	**.156**	4	3/16	2	946956	39.90	946956-C3	44.40
	5/32	.078	5/64	**.250**	4	3/16	2	19256	41.90	19256-C3	46.40
	5/32	.078	5/64	**.437**	4	3/16	2	72656	48.10	72656-C3	52.60
	5/32	.078	5/64	**.625**	4	3/16	2-1/2	19556	51.70	19556-C3	56.20
	5/32	.078	5/64	**1.125**	4	3/16	2-1/2	26856	57.90	26856-C3	62.40
	3/16	.093	3/32	**.187**	4	3/16	2	946902	40.40	946902-C3	44.90
	3/16	.093	3/32	**.312**	4	3/16	2	19202	41.20	19202-C3	45.70
	3/16	.093	3/32	**.500**	4	3/16	2	72602	48.90	72602-C3	53.40
	3/16	.093	3/32	**.750**	4	3/16	2-1/2	19502	51.90	19502-C3	56.40
	3/16	.093	3/32	**1.000**	4	3/16	2-1/2	71702	56.70	71702-C3	61.20
	3/16	.093	3/32	**1.312**	4	3/16	2-1/2	26802	58.20	26802-C3	62.70
	3/16	.093	3/32	**1.625**	4	3/16	3	963702	64.50	963702-C3	69.10
	6 mm	.118	.118	**.312**	4	1/4	2	19262	64.20	19262-C3	70.40
	6 mm	.118	.118	**1.000**	4	1/4	2-1/2	19562	68.50	19562-C3	74.70
	1/4	.125	1/8	**.187**	4	1/4	2	946903	49.50	946903-C3	55.70
	1/4	.125	1/8	**.312**	4	1/4	2	19203	50.40	19203-C3	56.60
	1/4	.125	1/8	**.625**	4	1/4	2-1/2	72603	55.90	72603-C3	62.10
	1/4	.125	1/8	**1.000**	4	1/4	3	19503	61.20	19503-C3	67.40
	1/4	.125	1/8	**1.312**	4	1/4	3	71703	65.40	71703-C3	71.60
	1/4	.125	1/8	**1.750**	4	1/4	3	26803	67.40	26803-C3	73.60
	1/4	.125	1/8	**2.125**	4	1/4	4	963703	72.90	963703-C3	80.10

SPEEDS & FEEDS ONLINE!

*Carbide head with reduced steel shank

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

DOUBLE ANGLE SHANK CUTTERS

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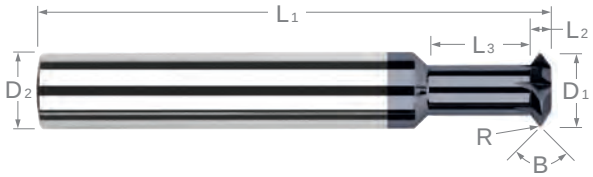
INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	5/16	.125	3/16	**.250**	6	5/16	2-1/2	946904	68.20	946904-C3	75.40
	5/16	.125	3/16	**.375**	6	5/16	2-1/2	19272	70.40	19272-C3	77.60
	5/16	.125	3/16	**.875**	6	5/16	2-1/2	72672	71.40	72672-C3	78.60
	5/16	.125	3/16	**1.250**	6	5/16	3	19572	76.40	19572-C3	83.60
	5/16	.125	3/16	**2.125**	6	5/16	3	26872	82.20	26872-C3	89.40
	3/8	.125	1/4	**.312**	6	3/8	2-1/2	946905	68.40	946905-C3	76.60
	3/8	.125	1/4	**.500**	6	3/8	2-1/2	19205	71.90	19205-C3	80.10
	3/8	.125	1/4	**1.000**	6	3/8	2-1/2	72605	80.10	72605-C3	88.30
	3/8	.125	1/4	**1.500**	6	3/8	3-1/2	19505	90.50	19505-C3	98.70
	3/8	.125	1/4	**2.000**	6	3/8	3-1/2	71705	94.90	71705-C3	103.10
	3/8	.125	1/4	**2.312**	6	3/8	3-1/2	26805	97.40	26805-C3	105.60
	3/8	.125	1/4	**2.625**	6	3/8	4	963705	103.10	963705-C3	114.30
90°	7/16	.157	9/32	**.500**	6	7/16	2-3/4	19208	106.10	19208-C3	118.30
	7/16	.157	9/32	**1.500**	6	7/16	3-1/2	19508	122.90	19508-C3	135.10
	1/2	.187	5/16	**.312**	6	1/2	3	946910	93.10	946910-C3	105.30
	1/2	.187	5/16	**.500**	6	1/2	3	19210	96.10	19210-C3	108.30
	1/2	.187	5/16	**1.000**	6	1/2	3	72610	104.90	72610-C3	117.10
	1/2	.187	5/16	**1.500**	6	1/2	4	19510	122.90	19510-C3	135.10
	1/2	.187	5/16	**2.000**	6	1/2	4	71710	127.40	71710-C3	139.60
	1/2	.187	5/16	**2.625**	6	1/2	4	26810	130.70	26810-C3	142.90
	1/2	.187	5/16	**3.125**	6	1/2	6	963710	136.70	963710-C3	148.90
	5/8	.250	3/8	**.750**	6	5/8	3-1/2	19215	182.90	19215-C3	195.10
	5/8	.250	3/8	**1.250**	6	5/8	3-1/2	72615	187.90	72615-C3	200.10
	3/4*	.250	-	**-**	8	1/2	3-1/2	19220*	136.40	19220-C3*	149.60
	3/4*	.250	-	**-**	8	1/2	6-1/4	19520*	142.70	19520-C3*	161.90
	1*	.375	-	**-**	8	5/8	4	19230*	150.90	19230-C3*	166.90
	1/8	.075	1/16	**.187**	4	1/8	1-1/2	983401	42.50	983401-C3	46.70
	1/8	.075	1/16	**.500**	4	1/8	1-1/2	969901	51.10	969901-C3	55.30
	3/16	.113	3/32	**.312**	4	3/16	2	983402	44.70	983402-C3	49.20
	3/16	.113	3/32	**.750**	4	3/16	2-1/2	969902	53.20	969902-C3	57.70
100°	1/4	.149	1/8	**.312**	4	1/4	2	29750	62.20	29750-C3	68.40
	1/4	.149	1/8	**1.000**	4	1/4	3	969903	71.20	969903-C3	77.40
	3/8	.149	1/4	**.500**	6	3/8	2-1/2	983405	73.40	983405-C3	81.60
	3/8	.149	1/4	**1.500**	6	3/8	3-1/2	969905	93.10	969905-C3	101.30
	1/2	.224	5/16	**.500**	6	1/2	3	983410	97.70	983410-C3	109.90
	1/2	.224	5/16	**1.500**	6	1/2	4	969910	126.40	969910-C3	138.60
	1/8	.109	1/16	**.125**	4	1/8	1-1/2	903608	40.50	903608-C3	44.70
	1/8	.109	1/16	**.187**	4	1/8	1-1/2	39108	40.50	39108-C3	44.70
	1/8	.109	1/16	**.500**	4	1/8	2	989401	48.10	989401-C3	52.30
	3/16	.163	3/32	**.187**	4	3/16	2	903612	43.50	903612-C3	48.10
	3/16	.163	3/32	**.312**	4	3/16	2	39112	44.20	39112-C3	48.70
	3/16	.163	3/32	**.750**	4	3/16	2-1/2	989402	51.70	989402-C3	56.20
	1/4	.216	1/8	**.187**	4	1/4	2	903616	57.50	903616-C3	63.70
120°	1/4	.216	1/8	**.312**	4	1/4	2	39116	58.20	39116-C3	64.40
	1/4	.216	1/8	**1.000**	4	1/4	3	989403	65.90	989403-C3	72.10
	3/8	.216	1/4	**.500**	6	3/8	2-1/2	39124	75.90	39124-C3	84.10
	3/8	.216	1/4	**1.000**	6	3/8	2-1/2	910724	84.20	910724-C3	92.40
	3/8	.216	1/4	**1.500**	6	3/8	3-1/2	989405	94.90	989405-C3	103.10
	1/2	.325	5/16	**.500**	6	1/2	3	39132	100.90	39132-C3	113.10
	1/2	.325	5/16	**1.000**	6	1/2	3	910732	109.50	910732-C3	121.70
	1/2	.325	5/16	**1.500**	6	1/2	4	989410	128.70	989410-C3	140.90

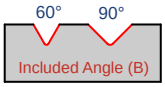
SPEEDS & FEEDS ONLINE!

*Carbide head with reduced steel shank

DOUBLE ANGLE SHANK CUTTERS

Tip Radius



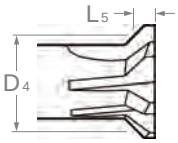


Stocked in *Two* Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B +1° −1°	D1 +.000″ −.002″	R +.001″ −.001″	L2		L3 +.020″ −.000″		D2	L1	TOOL #	PRICE	TOOL #	PRICE
	1/8	**.005**	.042	1/16	**.187**	4	1/8	1-1/2	922508	50.90	922508-C3	55.10
	3/16	**.005**	.060	3/32	**.312**	4	3/16	2	922512	53.50	922512-C3	58.10
	1/4	**.005**	.078	1/8	**.312**	4	1/4	2	922516	68.50	922516-C3	74.70
	1/4	**.010**	.084	1/8	**.312**	4	1/4	2	934716	68.50	934716-C3	74.70
60°	1/4	**.010**	.084	1/8	**1.000**	4	1/4	3	930516	76.90	930516-C3	83.10
	3/8	**.010**	.084	1/4	**.500**	6	3/8	2-1/2	934724	91.90	934724-C3	100.10
	3/8	**.015**	.089	1/4	**.500**	6	3/8	2-1/2	911224	91.90	911224-C3	100.10
	1/2	**.010**	.120	5/16	**.500**	6	1/2	3	934732	111.90	934732-C3	124.10
	1/2	**.015**	.126	5/16	**.500**	6	1/2	3	911232	111.90	911232-C3	124.10
	1/16	**.005**	.035	1/32	**.093**	2	1/8	1-1/2	45804	50.90	45804-C3	55.10
	5/64	**.005**	.043	.039	**.118**	2	1/8	1-1/2	45805	50.90	45805-C3	55.10
	3/32	**.005**	.050	3/64	**.141**	2	1/8	1-1/2	45806	50.90	45806-C3	55.10
	1/8	**.005**	.067	1/16	**.187**	4	1/8	1-1/2	45808	50.90	45808-C3	55.10
	1/8	**.005**	.067	1/16	**.500**	4	1/8	1-1/2	928708	62.70	928708-C3	66.90
	5/32	**.005**	.082	5/64	**.250**	4	3/16	2	45810	53.50	45810-C3	58.10
	5/32	**.005**	.082	5/64	**.625**	4	3/16	2-1/2	928710	59.90	928710-C3	64.40
	3/16	**.005**	.099	3/32	**.312**	4	3/16	2	45812	53.50	45812-C3	58.10
	3/16	**.005**	.099	3/32	**.750**	4	3/16	2-1/2	928712	59.90	928712-C3	64.40
	3/16	**.010**	.103	3/32	**.312**	4	3/16	2	46612	53.50	46612-C3	58.10
	1/4	**.005**	.129	1/8	**.312**	4	1/4	2	45816	61.70	45816-C3	67.90
	1/4	**.005**	.129	1/8	**.625**	4	1/4	2-1/2	898416	66.10	898416-C3	72.30
	1/4	**.005**	.129	1/8	**1.000**	4	1/4	3	928716	71.90	928716-C3	78.10
	1/4	**.010**	.133	1/8	**.312**	4	1/4	2	46616	61.70	46616-C3	67.90
	1/4	**.010**	.133	1/8	**.625**	4	1/4	2-1/2	890716	66.10	890716-C3	72.30
90°	1/4	**.010**	.133	1/8	**1.000**	4	1/4	3	931916	71.90	931916-C3	78.10
	5/16	**.005**	.130	3/16	**1.250**	6	5/16	3	928720	76.20	928720-C3	83.40
	5/16	**.010**	.134	3/16	**.375**	6	5/16	2-1/2	46620	77.50	46620-C3	84.70
	5/16	**.010**	.134	3/16	**1.250**	6	5/16	3	931920	78.40	931920-C3	85.60
	3/8	**.010**	.133	1/4	**.500**	6	3/8	2-1/2	46624	82.70	46624-C3	90.90
	3/8	**.010**	.133	1/4	**1.000**	6	3/8	2-1/2	890724	84.90	890724-C3	93.10
	3/8	**.010**	.133	1/4	**1.500**	6	3/8	3-1/2	931924	100.70	931924-C3	108.90
	3/8	**.015**	.137	1/4	**.500**	6	3/8	2-1/2	988624	82.70	988624-C3	90.90
	3/8	**.015**	.137	1/4	**1.000**	6	3/8	2-1/2	894124	84.90	894124-C3	93.10
	3/8	**.015**	.137	1/4	**1.500**	6	3/8	3-1/2	923524	100.70	923524-C3	108.90
	1/2	**.010**	.196	5/16	**.500**	6	1/2	3	46632	106.10	46632-C3	118.30
	1/2	**.010**	.196	5/16	**1.000**	6	1/2	3	890732	109.10	890732-C3	121.30
	1/2	**.010**	.196	5/16	**1.500**	6	1/2	4	931932	131.50	931932-C3	143.70
	1/2	**.015**	.200	5/16	**.500**	6	1/2	3	988632	106.10	988632-C3	118.30
	1/2	**.015**	.200	5/16	**1.000**	6	1/2	3	894132	109.10	894132-C3	121.30
	1/2	**.015**	.200	5/16	**1.500**	6	1/2	4	923532	131.50	923532-C3	143.70

BACK DEBURRING MILLS



- **Ideal for deburring on backside of small holes and tight pockets**
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide
- CNC ground in the USA

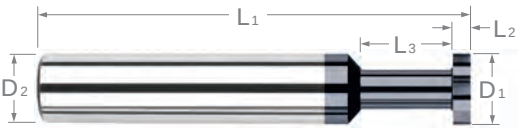
Reach Through Miniature Holes and Slots to Remove Burr on Backside of Part

HEAD DIA.	AXIAL LOC	NECK DIA.	NECK LENGTH	CHAMFER CENTER LENGTH	CHAMFER CENTER DIAMETER	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.028	.0029	.021	**.093**	.0215	.0261	3	1/8	2	846328	57.10	846328-C3	61.30
.028	.0029	.021	**.125**	.0215	.0261	3	1/8	2	65728	57.10	65728-C3	61.30
.028	.0029	.021	**.250**	.0215	.0261	3	1/8	2	57028	57.10	57028-C3	61.30
.040	.0048	.028	**.125**	.0324	.0362	4	1/8	2	846340	53.10	846340-C3	57.30
.040	.0048	.028	**.187**	.0324	.0362	4	1/8	2	65740	53.10	65740-C3	57.30
.040	.0048	.028	**.312**	.0324	.0362	4	1/8	2	57040	53.10	57040-C3	57.30
.055	.0045	.043	**.187**	.0423	.0515	4	1/8	2	846355	53.10	846355-C3	57.30
.055	.0045	.043	**.281**	.0423	.0515	4	1/8	2	65755	53.10	65755-C3	57.30
.055	.0045	.043	**.437**	.0423	.0515	4	1/8	2	57055	53.10	57055-C3	57.30
.080	.0077	.060	**.250**	.0638	.0733	5	1/8	2	846380	48.10	846380-C3	52.30
.080	.0077	.060	**.375**	.0638	.0733	5	1/8	2	65780	48.10	65780-C3	52.30
.080	.0077	.060	**.625**	.0638	.0733	5	1/8	2	57080	48.10	57080-C3	52.30
.115	.0111	.087	**.375**	.0655	.1049	5	1/8	2	846410	48.10	846410-C3	52.30
.115	.0111	.087	**.562**	.0655	.1049	5	1/8	2	65810	48.10	65810-C3	52.30
.115	.0111	.087	**1.000**	.0655	.1049	5	1/8	2	57110	48.10	57110-C3	52.30
D_1 +.000″ −.002″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.135	.0111	.107	**.437**	.0655	.1249	5	3/16	2	846420	48.90	846420-C3	53.60
.135	.0111	.107	**.625**	.0655	.1249	5	3/16	2-1/2	65820	49.50	65820-C3	54.30
.135	.0111	.107	**1.125**	.0655	.1249	5	3/16	2-1/2	57120	49.50	57120-C3	54.30
.165	.0191	.121	**.500**	.0695	.1469	6	3/16	2	846430	48.90	846430-C3	53.60
.165	.0191	.121	**.750**	.0695	.1469	6	3/16	2-1/2	65830	49.50	65830-C3	54.30
.165	.0191	.121	**1.375**	.0695	.1469	6	3/16	2-1/2	57130	49.50	57130-C3	54.30
.210	.0191	.166	**.625**	.0695	.1919	6	1/4	2	846440	52.20	846440-C3	58.40
.210	.0191	.166	**1.000**	.0695	.1919	6	1/4	3	65840	53.10	65840-C3	59.30
.210	.0191	.166	**1.750**	.0695	.1919	6	1/4	3	57140	53.10	57140-C3	59.30
.262	.0251	.206	**1.375**	.0925	.2379	8	5/16	3	65850	54.10	65850-C3	61.30
.262	.0251	.206	**2.125**	.0925	.2379	8	5/16	4	57150	61.70	57150-C3	70.40
.315	.0251	.259	**1.625**	.0925	.2909	8	3/8	3	65860	66.70	65860-C3	74.90
.315	.0251	.259	**2.500**	.0925	.2909	8	3/8	4	57160	74.40	57160-C3	85.60
.420	.0321	.350	**2.125**	.1160	.3889	10	7/16	4	65870	84.50	65870-C3	96.70
.420	.0321	.350	**3.375**	.1160	.3889	10	7/16	6	57170	97.10	57170-C3	110.80

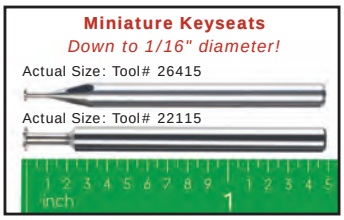
SPEEDS & FEEDS ONLINE!

KEYSEAT CUTTERS

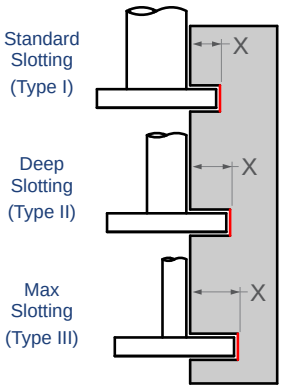
Square



- **Keyseat cutters down to 1/16″ diameter**
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Stocked in Multiple Radial Depths of Cut!



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/16	.010	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26410	44.20	26410-C3	48.40
	.015 (1/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26415	41.70	26415-C3	45.90
	.015 (1/64)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955115	48.90	955115-C3	53.10
	.020	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26420	41.70	26420-C3	45.90
	.025	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26425	41.70	26425-C3	45.90
	.030	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26430	41.70	26430-C3	45.90
	.031 (1/32)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26431	41.70	26431-C3	45.90
	.031 (1/32)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955131	48.90	955131-C3	53.10
	.039 (1 mm)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26439	41.70	26439-C3	45.90
	.047 (3/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26447	41.70	26447-C3	45.90
	.062 (1/16)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26462	41.70	26462-C3	45.90
	.062 (1/16)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955162	48.90	955162-C3	53.10
5/64	.010	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27310	43.50	27310-C3	47.70
	.015 (1/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27315	41.20	27315-C3	45.40
	.020	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27320	41.20	27320-C3	45.40
	.025	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27325	41.20	27325-C3	45.40
	.031 (1/32)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27331	41.20	27331-C3	45.40
	.031 (1/32)	1 mm	6 mm (3x)	.018	I	4	1/8	1-1/2	922031	48.20	922031-C3	52.40
	.039 (1 mm)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27339	41.20	27339-C3	45.40
	.047 (3/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27347	41.20	27347-C3	45.40
	.062 (1/16)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27362	41.20	27362-C3	45.40
3/32	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28210	43.10	28210-C3	47.30
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28215	40.50	28215-C3	44.70
	.020	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28220	40.50	28220-C3	44.70
	.020	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967720	40.50	967720-C3	44.70
	.025	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28225	40.50	28225-C3	44.70
	.030	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28230	40.50	28230-C3	44.70
	.031 (1/32)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901131	41.70	901131-C3	45.90
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28231	40.50	28231-C3	44.70
	.031 (1/32)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967731	47.50	967731-C3	51.70

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.039 (1 mm)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28239	40.50	28239-C3	44.70
	.040	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28240	40.50	28240-C3	44.70
	.047 (3/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28247	40.50	28247-C3	44.70
3/32	.047 (3/64)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967747	47.50	967747-C3	51.70
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28262	40.50	28262-C3	44.70
	.062 (1/16)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967762	47.50	967762-C3	51.70
	.093 (3/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28293	40.50	28293-C3	44.70
	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22110	41.40	22110-C3	45.60
	.010	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43510	48.20	43510-C3	52.40
	.015 (1/64)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982515	47.70	982515-C3	51.90
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22115	39.10	22115-C3	43.30
	.015 (1/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43515	45.90	43515-C3	50.10
	.020	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982520	47.70	982520-C3	51.90
	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22120	39.10	22120-C3	43.30
	.020	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43520	45.90	43520-C3	50.10
	.025	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982525	47.70	982525-C3	51.90
	.025	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22125	39.10	22125-C3	43.30
	.025	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43525	45.90	43525-C3	50.10
	.030	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22130	39.10	22130-C3	43.30
	.030	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43530	45.90	43530-C3	50.10
	.031 (1/32)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982531	47.70	982531-C3	51.90
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22131	39.10	22131-C3	43.30
	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43531	45.90	43531-C3	50.10
	.035	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22135	39.10	22135-C3	43.30
	.035	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43535	45.90	43535-C3	50.10
	.039 (1 mm)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22139	39.10	22139-C3	43.30
1/8	.039 (1 mm)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43539	45.90	43539-C3	50.10
	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22140	39.10	22140-C3	43.30
	.040	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43540	45.90	43540-C3	50.10
	.045	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22145	39.10	22145-C3	43.30
	.047 (3/64)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982547	47.70	982547-C3	51.90
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22147	39.10	22147-C3	43.30
	.047 (3/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43547	45.90	43547-C3	50.10
	.050	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22150	39.10	22150-C3	43.30
	.055	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22155	39.10	22155-C3	43.30
	.060	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22160	39.10	22160-C3	43.30
	.062 (1/16)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982562	47.70	982562-C3	51.90
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22162	39.10	22162-C3	43.30
	.062 (1/16)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43562	45.90	43562-C3	50.10
	.078 (5/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22178	39.10	22178-C3	43.30
	.078 (5/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43578	45.90	43578-C3	50.10
	.093 (3/32)	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	982593	47.70	982593-C3	51.90
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22193	39.10	22193-C3	43.30
	.093 (3/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43593	45.90	43593-C3	50.10
	.100	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22182	39.10	22182-C3	43.30
	.125 (1/8)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22195	39.10	22195-C3	43.30
	.125 (1/8)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43595	45.90	43595-C3	50.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.010	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69410	43.20	69410-C3	47.70
	.015 (1/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69415	41.10	69415-C3	45.60
	.015 (1/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956215	47.70	956215-C3	52.20
	.020	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69420	41.10	69420-C3	45.60
	.020	5/64	1/2 (3x)	.029	I	6	3/16	2	956220	47.70	956220-C3	52.20
	.025	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69425	41.10	69425-C3	45.60
	.025	5/64	1/2 (3x)	.029	I	6	3/16	2	956225	47.70	956225-C3	52.20
	.031 (1/32)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900331	49.50	900331-C3	54.10
	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69431	41.10	69431-C3	45.60
	.031 (1/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956231	47.70	956231-C3	52.20
	.039 (1 mm)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69439	41.10	69439-C3	45.60
	.040	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69440	41.10	69440-C3	45.60
5/32	.047 (3/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69447	41.10	69447-C3	45.60
	.047 (3/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956247	47.70	956247-C3	52.20
	.050	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69450	41.10	69450-C3	45.60
	.060	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69460	41.10	69460-C3	45.60
	.062 (1/16)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900362	49.50	900362-C3	54.10
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69462	41.10	69462-C3	45.60
	.062 (1/16)	5/64	1/2 (3x)	.029	I	6	3/16	2	956262	47.70	956262-C3	52.20
	.078 (5/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69478	41.10	69478-C3	45.60
	.078 (5/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956278	47.70	956278-C3	52.20
	.093 (3/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69493	41.10	69493-C3	45.60
	.093 (3/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956293	47.70	956293-C3	52.20
	.125 (1/8)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69495	41.10	69495-C3	45.60
	.125 (1/8)	5/64	1/2 (3x)	.029	I	6	3/16	2	956295	47.70	956295-C3	52.20
	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22210	43.10	22210-C3	47.60
	.015 (1/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980015	48.90	980015-C3	53.40
	.015 (1/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22215	40.40	22215-C3	44.90
	.015 (1/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43715	50.70	43715-C3	55.20
	.018	Please see page 277 for Retaining Ring sizes.										
	.020	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980020	48.90	980020-C3	53.40
	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22220	40.40	22220-C3	44.90
	.020	3/32	9/16 (3x)	.037	I	6	3/16	2	43720	50.70	43720-C3	55.20
	.025	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980025	48.90	980025-C3	53.40
	.025	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22225	40.40	22225-C3	44.90
3/16	.025	3/32	9/16 (3x)	.037	I	6	3/16	2	43725	50.70	43725-C3	55.20
	.029	Please see page 277 for Retaining Ring sizes.										
	.030	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22230	40.40	22230-C3	44.90
	.030	3/32	9/16 (3x)	.037	I	6	3/16	2	43730	50.70	43730-C3	55.20
	.031 (1/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980031	48.90	980031-C3	53.40
	.031 (1/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928931	48.90	928931-C3	53.40
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22231	40.40	22231-C3	44.90
	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43731	50.70	43731-C3	55.20
	.035	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22235	40.40	22235-C3	44.90
	.035	3/32	9/16 (3x)	.037	I	6	3/16	2	43735	50.70	43735-C3	55.20

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/16	.039 (1 mm)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22239	40.40	22239-C3	44.90
	.039 (1 mm)	3/32	9/16 (3x)	.037	I	6	3/16	2	43739	50.70	43739-C3	55.20
	.040	1/16	3/32 (.5x)	.052	II	6	3/16	2	980040	48.90	980040-C3	53.40
	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22240	40.40	22240-C3	44.90
	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	43740	50.70	43740-C3	55.20
	.045	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22246	40.40	22246-C3	44.90
	.045	3/32	9/16 (3x)	.037	I	6	3/16	2	43745	50.70	43745-C3	55.20
	.047 (3/64)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980047	48.90	980047-C3	53.40
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22247	40.40	22247-C3	44.90
	.047 (3/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43747	50.70	43747-C3	55.20
	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22250	40.40	22250-C3	44.90
	.050	3/32	9/16 (3x)	.037	I	6	3/16	2	43750	50.70	43750-C3	55.20
	.055	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22255	40.40	22255-C3	44.90
	.055	3/32	9/16 (3x)	.037	I	6	3/16	2	43755	50.70	43755-C3	55.20
	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22261	40.40	22261-C3	44.90
	.060	3/32	9/16 (3x)	.037	I	6	3/16	2	43760	50.70	43760-C3	55.20
	.062 (1/16)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980062	48.90	980062-C3	53.40
	.062 (1/16)	1/16	3/16 (1x)	.052	II	6	3/16	2	928962	48.90	928962-C3	53.40
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22262	40.40	22262-C3	44.90
	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	43762	50.70	43762-C3	55.20
	.078 (5/64)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980078	48.90	980078-C3	53.40
	.078 (5/64)	1/16	3/16 (1x)	.052	II	6	3/16	2	928978	48.90	928978-C3	53.40
	.078 (5/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22278	40.40	22278-C3	44.90
	.078 (5/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43778	50.70	43778-C3	55.20
	.093 (3/32)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980093	48.90	980093-C3	53.40
	.093 (3/32)	1/16	3/16 (1x)	.052	II	6	3/16	2	928993	48.90	928993-C3	53.40
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22293	40.40	22293-C3	44.90
	.093 (3/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43793	50.70	43793-C3	55.20
	.125 (1/8)	1/16	3/32 (.5x)	.052	II	6	3/16	2	980095	48.90	980095-C3	53.40
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22295	40.40	22295-C3	44.90
	.125 (1/8)	3/32	9/16 (3x)	.037	I	6	3/16	2	43795	50.70	43795-C3	55.20
	.156 (5/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22297	40.40	22297-C3	44.90
6 mm	.031 (1/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947531	45.40	947531-C3	51.60
	.039 (1 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947539	45.40	947539-C3	51.60
	.062 (1/16)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947562	45.40	947562-C3	51.60
	.093 (3/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947593	45.40	947593-C3	51.60
	.118 (3 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947588	45.40	947588-C3	51.60
	.125 (1/8)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947595	45.40	947595-C3	51.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.010	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22310	48.50	22310-C3	54.70
	.010	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43910	58.20	43910-C3	64.40
	.015 (1/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70815	54.10	70815-C3	60.30
	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22315	45.70	22315-C3	51.90
	.015 (1/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43915	55.70	43915-C3	61.90
	.020	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70820	47.20	70820-C3	53.40
	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22320	45.70	22320-C3	51.90
	.020	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43920	55.70	43920-C3	61.90
	.025	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22325	45.70	22325-C3	51.90
	.025	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43925	55.70	43925-C3	61.90
	.030	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22330	45.70	22330-C3	51.90
	.030	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43930	55.70	43930-C3	61.90
	.031 (1/32)	.050	5/64 (.3x)	.092	III	8	1/4	2-1/2	964731	75.40	964731-C3	81.60
	.031 (1/32)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70831	47.20	70831-C3	53.40
	.031 (1/32)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986131	61.70	986131-C3	67.90
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22331	45.70	22331-C3	51.90
	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43931	55.70	43931-C3	61.90
	.035	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22335	45.70	22335-C3	51.90
	.035	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43935	55.70	43935-C3	61.90
	.039 (1 mm)	Please see page 277 for Retaining Ring sizes.										
	.039 (1 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22339	45.70	22339-C3	51.90
1/4	.040	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70840	47.20	70840-C3	53.40
	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22340	45.70	22340-C3	51.90
	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43940	55.70	43940-C3	61.90
	.045	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22346	45.70	22346-C3	51.90
	.046	Please see page 277 for Retaining Ring sizes.										
	.047 (3/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70847	47.20	70847-C3	53.40
	.047 (3/64)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986147	61.70	986147-C3	67.90
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22347	45.70	22347-C3	51.90
	.047 (3/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43947	55.70	43947-C3	61.90
	.050	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70850	47.20	70850-C3	53.40
	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22350	45.70	22350-C3	51.90
	.050	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43950	55.70	43950-C3	61.90
	.055	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22355	45.70	22355-C3	51.90
	.055	1/8	3/4 (3x)	053	I	6	1/4	2-1/2	43955	55.70	43955-C3	61.90
	.060	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70860	47.20	70860-C3	53.40
	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22361	45.70	22361-C3	51.90
	.060	1/8	3/4 (3x)	053	I	6	1/4	2-1/2	43961	55.70	43961-C3	61.90
	.062 (1/16)	.050	5/64 (.3x)	.092	III	8	1/4	2-1/2	964762	75.40	964762-C3	81.60
	.062 (1/16)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70862	47.20	70862-C3	53.40
	.062 (1/16)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986162	61.70	986162-C3	67.90
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22362	45.70	22362-C3	51.90
	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43962	55.70	43962-C3	61.90
	.062 (1/16)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984262	64.50	984262-C3	70.70

SPEEDS & FEEDS ONLINE!

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.078 (5/64)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70878	47.20	70878-C3	53.40
	.078 (5/64)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986178	61.70	986178-C3	67.90
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22378	45.70	22378-C3	51.90
	.078 (5/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43978	55.70	43978-C3	61.90
	.093 (3/32)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70893	47.20	70893-C3	53.40
	.093 (3/32)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986193	61.70	986193-C3	67.90
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22393	45.70	22393-C3	51.90
	.093 (3/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43993	55.70	43993-C3	61.90
	.100	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22382	45.70	22382-C3	51.90
	.100	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43982	55.70	43982-C3	61.90
	.109 (7/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22384	45.70	22384-C3	51.90
1/4	.118 (3 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22388	45.70	22388-C3	51.90
	.125 (1/8)	5/64	1/8 (.5x)	.076	II	6	1/4	2-1/2	70895	47.20	70895-C3	53.40
	.125 (1/8)	5/64	1/4 (1x)	.076	II	6	1/4	2-1/2	986195	61.70	986195-C3	67.90
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22395	45.70	22395-C3	51.90
	.125 (1/8)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43995	55.70	43995-C3	61.90
	.125 (1/8)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984295	64.50	984295-C3	70.70
	.156 (5/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22397	45.70	22397-C3	51.90
	.156 (5/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43997	55.70	43997-C3	61.90
	.187 (3/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22398	45.70	22398-C3	51.90
	.187 (3/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43998	55.70	43998-C3	61.90
	.250 (1/4)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22399	45.70	22399-C3	51.90
	.010	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22401	63.90	22401-C3	71.10
	.015 (1/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22403	60.40	22403-C3	67.60
	.020	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22405	60.40	22405-C3	67.60
	.025	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22407	60.40	22407-C3	67.60
	.030	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22409	60.40	22409-C3	67.60
	.031 (1/32)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973410	65.70	973410-C3	72.90
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22410	60.40	22410-C3	67.60
	.031 (1/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69710	71.40	69710-C3	78.60
	.039 (1 mm)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22414	60.40	22414-C3	67.60
	.039 (1 mm)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69714	71.40	69714-C3	78.60
5/16	.040	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22415	60.40	22415-C3	67.60
	.047 (3/64)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973420	65.70	973420-C3	72.90
	.047 (3/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22420	60.40	22420-C3	67.60
	.050	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22422	60.40	22422-C3	67.60
	.056	Please see page 277 for Retaining Ring sizes.										
	.060	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22428	60.40	22428-C3	67.60
	.062 (1/16)	.063	3/32 (.3x)	.116	III	10	5/16	2-1/2	959430	85.40	959430-C3	92.60
	.062 (1/16)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973430	65.70	973430-C3	72.90
	.062 (1/16)	7/64	3/8 (1x)	.091	II	6	5/16	2-1/2	907930	79.90	907930-C3	87.10
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22430	60.40	22430-C3	67.60
	.062 (1/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69730	71.40	69730-C3	78.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
5/16	.078 (5/64)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973440	65.70	973440-C3	72.90
	.078 (5/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22440	60.40	22440-C3	67.60
	.078 (5/64)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69740	71.40	69740-C3	78.60
	.093 (3/32)	.063	3/32 (.3x)	.116	III	10	5/16	2-1/2	959450	85.40	959450-C3	92.60
	.093 (3/32)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973450	65.70	973450-C3	72.90
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22450	60.40	22450-C3	67.60
	.093 (3/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69750	71.40	69750-C3	78.60
	.100	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22452	60.40	22452-C3	67.60
	.125 (1/8)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973460	65.70	973460-C3	72.90
	.125 (1/8)	7/64	3/8 (1x)	.091	II	6	5/16	2-1/2	907960	79.90	907960-C3	87.10
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22455	60.40	22455-C3	67.60
	.125 (1/8)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69760	71.40	69760-C3	78.60
	.156 (5/32)	7/64	3/16 (.5x)	.091	II	6	5/16	2-1/2	973465	65.70	973465-C3	72.90
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22465	60.40	22465-C3	67.60
	.156 (5/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69765	71.40	69765-C3	78.60
	.187 (3/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22470	60.40	22470-C3	67.60
	.187 (3/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69770	71.40	69770-C3	78.60
	.250 (1/4)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22480	60.40	22480-C3	67.60
3/8	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22503	70.50	22503-C3	78.70
	.020	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71105	69.70	71105-C3	77.90
	.020	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22505	70.50	22505-C3	78.70
	.020	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70305	79.70	70305-C3	87.90
	.025	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22507	70.50	22507-C3	78.70
	.030	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22509	70.50	22509-C3	78.70
	.031 (1/32)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991310	88.40	991310-C3	96.60
	.031 (1/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71110	69.70	71110-C3	77.90
	.031 (1/32)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958910	84.10	958910-C3	92.30
	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22510	68.10	22510-C3	76.30
	.031 (1/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70310	79.70	70310-C3	87.90
	.035	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22512	68.10	22512-C3	76.30
	.039 (1 mm)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71114	69.70	71114-C3	77.90
	.039 (1 mm)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22514	68.10	22514-C3	76.30
	.039 (1 mm)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70314	79.70	70314-C3	87.90
	.040	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22515	68.10	22515-C3	76.30
	.040	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70315	79.70	70315-C3	87.90
	.045	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22518	68.10	22518-C3	76.30
	.047 (3/64)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71120	69.70	71120-C3	77.90
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22520	68.10	22520-C3	76.30
	.047 (3/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70320	79.70	70320-C3	87.90
	.050	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22522	68.10	22522-C3	76.30
	.055	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22525	68.10	22525-C3	76.30
	.060	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22528	68.10	22528-C3	76.30
	.060	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70328	79.70	70328-C3	87.90
	.062 (1/16)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991330	88.40	991330-C3	96.60
	.062 (1/16)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71130	69.70	71130-C3	77.90

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.062 (1/16)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958930	84.10	958930-C3	92.30
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22530	68.10	22530-C3	76.30
	.062 (1/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70330	79.70	70330-C3	87.90
	.068	Please see page 277 for Retaining Ring sizes.										
	.078 (5/64)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71140	69.70	71140-C3	77.90
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22540	68.10	22540-C3	76.30
	.078 (5/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70340	68.10	70340-C3	76.30
	.086	Please see page 277 for Retaining Ring sizes.										
	.093 (3/32)	.075	7/64 (.3x)	.142	III	10	3/8	2-1/2	991350	88.40	991350-C3	96.60
	.093 (3/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71150	69.70	71150-C3	77.90
	.093 (3/32)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958950	84.10	958950-C3	92.30
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22550	68.10	22550-C3	76.30
	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70350	79.70	70350-C3	87.90
	.100	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22552	68.10	22552-C3	76.30
	.125 (1/8)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71160	69.70	71160-C3	77.90
	.125 (1/8)	1/8	3/8 (1x)	.115	II	8	3/8	2-1/2	958960	84.10	958960-C3	92.30
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22560	68.10	22560-C3	76.30
	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70360	79.70	70360-C3	87.90
	.156 (5/32)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71165	69.70	71165-C3	77.90
	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22565	68.10	22565-C3	76.30
	.156 (5/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70365	79.70	70365-C3	87.90
	.187 (3/16)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71170	69.70	71170-C3	77.90
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22570	68.10	22570-C3	76.30
	.187 (3/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70370	79.70	70370-C3	87.90
	.250 (1/4)	1/8	3/16 (.5x)	.115	II	8	3/8	2-1/2	71180	69.70	71180-C3	77.90
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22580	68.10	22580-C3	76.30
	.250 (1/4)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70380	79.70	70380-C3	87.90
	.312 (5/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22585	68.10	22585-C3	76.30
7/16	.031 (1/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71810	90.90	71810-C3	101.10
	.047 (3/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71820	90.90	71820-C3	101.10
	.062 (1/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71830	90.90	71830-C3	101.10
	.078 (5/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71840	90.90	71840-C3	101.10
	.093 (3/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71850	90.90	71850-C3	101.10
	.125 (1/8)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71860	90.90	71860-C3	101.10
	.125 (1/8)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892960	102.70	892960-C3	112.90
	.156 (5/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71865	90.90	71865-C3	101.10
	.187 (3/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71870	90.90	71870-C3	101.10
	.187 (3/16)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892970	102.70	892970-C3	112.90
	.250 (1/4)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71880	90.90	71880-C3	101.10
	.250 (1/4)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892980	102.70	892980-C3	112.90
1/2	.015 (1/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22603	92.40	22603-C3	104.60
	.020	5/32	1/4 (.5x)	.162	II	8	1/2	3	71205	93.70	71205-C3	105.90
	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22605	92.40	22605-C3	104.60
	.025	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22607	92.40	22607-C3	104.60
	.025	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71507	103.90	71507-C3	116.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22609	92.40	22609-C3	104.60
	.031 (1/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71210	90.90	71210-C3	103.10
	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22610	89.40	22610-C3	101.60
	.031 (1/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71510	101.10	71510-C3	113.30
	.035	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22612	89.40	22612-C3	101.60
	.039 (1 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22614	89.40	22614-C3	101.60
	.040	5/32	1/4 (.5x)	.162	II	8	1/2	3	71215	90.90	71215-C3	103.10
	.040	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22615	89.40	22615-C3	101.60
	.040	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71515	101.10	71515-C3	113.30
	.045	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22618	89.40	22618-C3	101.60
	.045	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71518	101.10	71518-C3	113.30
	.047 (3/64)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71220	90.90	71220-C3	103.10
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22620	89.40	22620-C3	101.60
	.047 (3/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71520	101.10	71520-C3	113.30
	.050	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22622	89.40	22622-C3	101.60
	.050	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71522	101.10	71522-C3	113.30
	.055	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22625	89.40	22625-C3	101.60
	.055	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71525	101.10	71525-C3	113.30
	.060	5/32	1/4 (.5x)	.162	II	8	1/2	3	71228	90.90	71228-C3	103.10
	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22628	89.40	22628-C3	101.60
	.062 (1/16)	.100	5/32 (.3x)	.192	III	12	1/2	3	985230	110.50	985230-C3	122.70
	.062 (1/16)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71230	90.90	71230-C3	103.10
	.062 (1/16)	5/32	1/2 (1x)	.162	II	8	1/2	3	975730	107.70	975730-C3	119.90
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22630	89.40	22630-C3	101.60
	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71530	101.10	71530-C3	113.30
	.070	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22635	89.40	22635-C3	101.60
	.078 (5/64)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71240	90.90	71240-C3	103.10
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22640	89.40	22640-C3	101.60
	.078 (5/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71540	101.10	71540-C3	113.30
	.080	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22642	89.40	22642-C3	101.60
	.090	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22647	89.40	22647-C3	101.60
	.093 (3/32)	.100	5/32 (.3x)	.192	III	12	1/2	3	985250	110.50	985250-C3	122.70
	.093 (3/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71250	90.90	71250-C3	103.10
	.093 (3/32)	5/32	1/2 (1x)	.162	II	8	1/2	3	975750	107.70	975750-C3	119.90
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22650	89.40	22650-C3	101.60
	.093 (3/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71550	101.10	71550-C3	113.30
	.100	5/32	1/4 (.5x)	.162	II	8	1/2	3	71252	90.90	71252-C3	103.10
	.100	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22652	89.40	22652-C3	101.60
	.100	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71552	101.10	71552-C3	113.30
	.103	Please see page 277 for Retaining Ring sizes.										
	.109 (7/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22654	89.40	22654-C3	101.60
	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22657	89.40	22657-C3	101.60
	.118 (3 mm)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71557	101.10	71557-C3	113.30
	.120	Please see page 277 for Retaining Ring sizes.										
	.125 (1/8)	.100	5/32 (.3x)	.192	III	12	1/2	3	985260	110.50	985260-C3	122.70
	.125 (1/8)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71260	90.90	71260-C3	103.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.125 (1/8)	5/32	1/2 (1x)	.162	II	8	1/2	3	975760	107.70	975760-C3	119.90
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22660	89.40	22660-C3	101.60
	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71560	101.10	71560-C3	113.30
	.125 (1/8)	1/4	2 (4x)	.115	I	8	1/2	4	933160	150.90	933160-C3	163.10
	.140 (9/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22662	89.40	22662-C3	101.60
	.156 (5/32)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71265	90.90	71265-C3	103.10
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22665	89.40	22665-C3	101.60
	.156 (5/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71565	101.10	71565-C3	113.30
	.187 (3/16)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71270	90.90	71270-C3	103.10
1/2	.187 (3/16)	5/32	1/2 (1x)	.162	II	8	1/2	3	975770	107.70	975770-C3	119.90
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22670	89.40	22670-C3	101.60
	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71570	101.10	71570-C3	113.30
	.250 (1/4)	5/32	1/4 (.5x)	.162	II	8	1/2	3	71280	90.90	71280-C3	103.10
	.250 (1/4)	5/32	1/2 (1x)	.162	II	8	1/2	3	975780	107.70	975780-C3	119.90
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22680	89.40	22680-C3	101.60
	.250 (1/4)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71580	101.10	71580-C3	113.30
	.312 (5/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22685	89.40	22685-C3	101.60
	.312 (5/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71585	101.10	71585-C3	113.30
	.375 (3/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22687	89.40	22687-C3	101.60
	.031 (1/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70910	140.10	70910-C3	152.30
	.031 (1/32)	5/16	2 (3x)	.146	I	8	5/8	3-1/2	972910	181.20	972910-C3	193.40
	.047 (3/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70920	140.10	70920-C3	152.30
	.062 (1/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70930	140.10	70930-C3	152.30
	.078 (5/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70940	140.10	70940-C3	152.30
	.093 (3/32)	13/64	5/16 (.5x)	.201	II	8	5/8	3-1/2	950650	184.10	950650-C3	196.30
	.093 (3/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70950	140.10	70950-C3	152.30
	.093 (3/32)	5/16	2 (3x)	.146	I	8	5/8	4	972950	181.20	972950-C3	194.40
	.120	Please see page 277 for Retaining Ring sizes.										
	.125 (1/8)	13/64	5/16 (.5x)	.201	II	8	5/8	3-1/2	950660	184.10	950660-C3	196.30
	.125 (1/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70960	140.10	70960-C3	152.30
	.125 (1/8)	5/16	2 (3x)	.146	I	8	5/8	4	972960	181.20	972960-C3	194.40
5/8	.139	Please see page 277 for Retaining Ring sizes.										
	.156 (5/32)	13/64	5/16 (.5x)	.201	II	8	5/8	3-1/2	950665	184.10	950665-C3	196.30
	.156 (5/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70965	140.10	70965-C3	152.30
	.156 (5/32)	5/16	2 (3x)	.146	I	8	5/8	4	972965	181.20	972965-C3	194.40
	.187 (3/16)	13/64	5/16 (.5x)	.201	II	8	5/8	3-1/2	950670	184.10	950670-C3	196.30
	.187 (3/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70970	140.10	70970-C3	152.30
	.187 (3/16)	5/16	2 (3x)	.146	I	8	5/8	4	972970	181.20	972970-C3	194.40
	.250 (1/4)	13/64	5/16 (.5x)	.201	II	8	5/8	3-1/2	950680	184.10	950680-C3	196.30
	.250 (1/4)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70980	140.10	70980-C3	152.30
	.250 (1/4)	5/16	2 (3x)	.146	I	8	5/8	4	972980	181.20	972980-C3	193.40
	.312 (5/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70985	140.10	70985-C3	152.30
	.375 (3/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70987	140.10	70987-C3	152.30

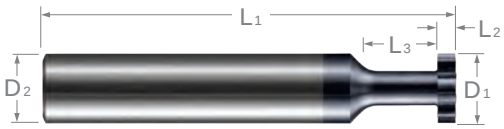
SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

For larger diameters and greater radial depths of cut, please see Large Diameter Keyseat Cutters on pages 274, 282, & 289.

KEYSEAT CUTTERS

Square for Hardened Steels



- Optimized for hardened steels 45-68Rc with high flute count and specialized internal geometry
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
	D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE
NEW	1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867415-C6	46.40
NEW		.031 (1/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867431-C6	46.40
NEW		.062 (1/16)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867462-C6	46.40
NEW		.093 (3/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867493-C6	46.40
NEW	3/16	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875931-C6	48.10
NEW		.062 (1/16)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875962-C6	48.10
NEW		.093 (3/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875993-C6	48.10
NEW	1/4	.015 (1/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860115-C6	54.30
NEW		.031 (1/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860131-C6	54.30
NEW		.047 (3/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860147-C6	54.30
NEW		.062 (1/16)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860162-C6	54.30
NEW		.078 (5/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860178-C6	54.30
NEW		.093 (3/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860193-C6	54.30
NEW		.125 (1/8)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860195-C6	54.30
NEW	5/16	.062 (1/16)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855630-C6	71.90
NEW		.093 (3/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855650-C6	71.90
NEW		.125 (1/8)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855660-C6	71.90
NEW	3/8	.031 (1/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894710-C6	80.90
NEW		.062 (1/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894730-C6	80.90
NEW		.093 (3/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894750-C6	80.90
NEW		.125 (1/8)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894760-C6	80.90
NEW		.187 (3/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894770-C6	80.90
NEW		.250 (1/4)	3/16	9/16 (1.5x)	.074	I	10	3/8	2-1/2	894780-C6	80.90
NEW	1/2	.031 (1/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891310-C6	109.90
NEW		.047 (3/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891320-C6	109.90
NEW		.062 (1/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891330-C6	109.90
NEW		.078 (5/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891340-C6	109.90
NEW		.093 (3/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891350-C6	109.90
NEW		.125 (1/8)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891360-C6	109.90
NEW		.156 (5/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891365-C6	109.90
NEW		.187 (3/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891370-C6	109.90
NEW		.250 (1/4)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891380-C6	109.90

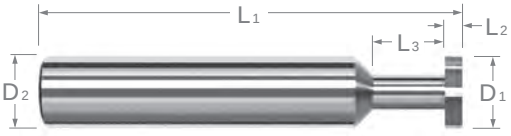
SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

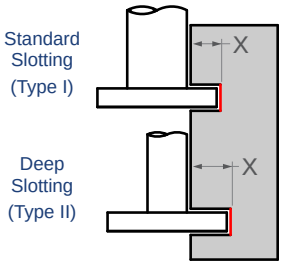
Square for Non-Ferrous Materials



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Large flute opening and sharper cutting edge
- Offered with TiB_2 coating to minimize galling
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

Large Flute Opening & Sharper Cutting Edge

Stocked in Multiple Radial Depths of Cut!



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849815	44.20	849815-C8	50.40
3/32	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849831	44.20	849831-C8	50.40
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849862	44.20	849862-C8	50.40
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962915	44.20	962915-C8	50.40
1/8	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962931	44.20	962931-C8	50.40
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962962	44.20	962962-C8	50.40
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962993	44.20	962993-C8	50.40
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998031	45.70	998031-C8	51.90
3/16	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998047	45.70	998047-C8	51.90
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998062	45.70	998062-C8	51.90
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998095	45.70	998095-C8	51.90
	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970315	50.70	970315-C8	57.40
	.020	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970320	50.70	970320-C8	57.40
	.025	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970325	50.70	970325-C8	57.40
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970331	50.70	970331-C8	57.40
	.040	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970340	50.70	970340-C8	57.40
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970347	50.70	970347-C8	57.40
1/4	.060	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970360	50.70	970360-C8	57.40
	.062 (1/16)	5/64	1/8 (.5x)	.076	II	4	1/4	2-1/2	909262	52.20	909262-C8	58.90
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970362	50.70	970362-C8	57.40
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970378	50.70	970378-C8	57.40
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970393	50.70	970393-C8	57.40
	.125 (1/8)	5/64	1/8 (.5x)	.076	II	4	1/4	2-1/2	909295	52.20	909295-C8	58.90
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970395	50.70	970395-C8	57.40
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984310	69.40	984310-C8	83.60
5/16	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984330	69.40	984330-C8	83.60
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984350	69.40	984350-C8	83.60
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984360	69.40	984360-C8	83.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square for Non-Ferrous Materials (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975210	77.70	975210-C8	94.90
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975220	77.70	975220-C8	94.90
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975230	77.70	975230-C8	94.90
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975240	77.70	975240-C8	94.90
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975250	77.70	975250-C8	94.90
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975260	77.70	975260-C8	94.90
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975270	77.70	975270-C8	94.90
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988910	102.40	988910-C8	122.60
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988920	102.40	988920-C8	122.60
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917530	103.70	917530-C8	123.90
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988930	102.40	988930-C8	122.60
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988940	102.40	988940-C8	122.60
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988950	102.40	988950-C8	122.60
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917560	103.70	917560-C8	123.90
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988960	102.40	988960-C8	122.60
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988965	102.40	988965-C8	122.60
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988970	102.40	988970-C8	122.60
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988980	102.40	988980-C8	122.60
5/8	.062 (1/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891730	146.70	891730-C8	176.10
	.078 (5/64)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891740	146.70	891740-C8	176.10
	.093 (3/32)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891750	146.70	891750-C8	176.10
	.125 (1/8)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891760	146.70	891760-C8	176.10
	.187 (3/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891770	146.70	891770-C8	176.10
	.250 (1/4)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891780	146.70	891780-C8	176.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

★★★★★

"We didn't have time to have a form tool ground for this job so we did a 3D under cut with a corner radius keyway cutter from @ harveytool. Harvey Tool makes some of the best odd size tools out there."

— @hdhmfg

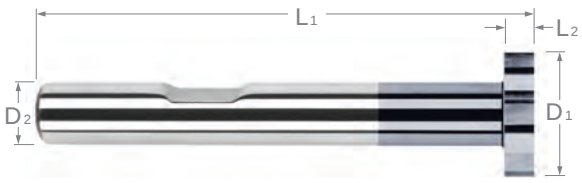
Follow us on Instagram @harveytool!

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

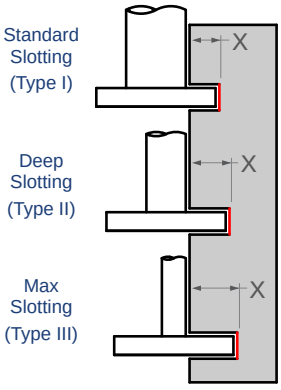
KEYSEAT CUTTERS

Square – Large Diameter



- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Weldon flat
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!



CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000″ −.002″	L_2 +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
	.031 (1/32)	.240	III	10	1/4**	3-1/32	899805	99.10	899805-C3	112.30	NEW
	.031 (1/32)	.177	II	10	3/8	3-1/32	984505	96.40	984505-C3	109.60	
	.031 (1/32)	.115	I	10	1/2	3-1/32	52005	95.70	52005-C3	108.90	
	.040	.177	II	10	3/8	3.040	984508	96.40	984508-C3	109.60	
	.040	.115	I	10	1/2	3.040	52008	95.70	52008-C3	108.90	
	.047 (3/64)	.240	III	10	1/4**	3-3/64	899810	99.10	899810-C3	112.30	NEW
	.047 (3/64)	.177	II	10	3/8	3-3/64	984510	96.40	984510-C3	109.60	
	.047 (3/64)	.115	I	10	1/2	3-3/64	52010	95.70	52010-C3	108.90	
	.050	.115	I	10	1/2	3.050	52011	95.70	52011-C3	108.90	
	.060	.115	I	10	1/2	3.060	52019	95.70	52019-C3	108.90	
	.062 (1/16)	.240	III	10	1/4**	3-1/16	899820	99.10	899820-C3	112.30	
	.062 (1/16)	.177	II	10	3/8	3-1/16	984520	96.40	984520-C3	109.60	
	.062 (1/16)	.115	I	10	1/2	3-1/16	52020	95.70	52020-C3	108.90	
	.078 (5/64)	.177	II	10	3/8	3-5/64	984530	96.40	984530-C3	109.60	
	.078 (5/64)	.115	I	10	1/2	3-5/64	52030	95.70	52030-C3	108.90	
3/4	.093 (3/32)	.240	III	10	1/4**	3-3/32	899840	99.10	899840-C3	112.30	
	.093 (3/32)	.177	II	10	3/8	3-3/32	984540	96.40	984540-C3	109.60	
	.093 (3/32)	.115	I	10	1/2	3-3/32	52040	95.70	52040-C3	108.90	
	.100	.115	I	10	1/2	3.100	52045	95.70	52045-C3	108.90	
	.118 (3 mm)	.115	I	10	1/2	3.118	52048	95.70	52048-C3	108.90	
	.125 (1/8)	.177	II	10	3/8	3-1/8	984550	96.40	984550-C3	109.60	
	.125 (1/8)	.115	I	10	1/2	3-1/8	52050	95.70	52050-C3	108.90	
	.156 (5/32)	.177	II	10	3/8	3-5/32	984555	96.40	984555-C3	109.60	
	.156 (5/32)	.115	I	10	1/2	3-5/32	52055	95.70	52055-C3	108.90	
	.174	Please see page 277 for Retaining Ring sizes.									
	.187 (3/16)	.177	II	10	3/8	3-3/16	984560	96.40	984560-C3	109.60	
	.187 (3/16)	.115	I	10	1/2	3-3/16	52060	95.70	52060-C3	108.90	
	.236 (6 mm)	.115	I	10	1/2	3.236	52066	101.90	52066-C3	115.10	
	.250 (1/4)	.177	II	10	3/8	3-1/4	984570	108.10	984570-C3	121.30	
	.250 (1/4)	.115	I	10	1/2	3-1/4	52070	108.10	52070-C3	121.30	
	.312 (5/16)	.115	I	10	1/2	3-5/16	52080	127.40	52080-C3	147.60	
	.375 (3/8)	.115	I	10	1/2	3-3/8	52090	132.70	52090-C3	152.90	

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck **No Weldon Flat

continued on next page

KEYSEAT CUTTERS

Square – Large Diameter (cont.)

continued from previous page

	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	7/8	.062 (1/16)	.177	I	12	1/2	3-1/16	961020	102.40	961020-C3	119.10
		.093 (3/32)	.177	I	12	1/2	3-3/32	961040	102.40	961040-C3	119.10
		.125 (1/8)	.240	II	12	3/8	3-1/8	890650	102.40	890650-C3	115.60
		.125 (1/8)	.177	I	12	1/2	3-1/8	961050	102.40	961050-C3	119.10
		.187 (3/16)	.240	II	12	3/8	3-3/16	890660	102.40	890660-C3	115.60
		.187 (3/16)	.177	I	12	1/2	3-3/16	961060	102.40	961060-C3	119.10
		.250 (1/4)	.240	II	12	3/8	3-1/4	890670	113.90	890670-C3	127.10
		.250 (1/4)	.177	I	12	1/2	3-1/4	961070	113.90	961070-C3	130.60
		.312 (5/16)	.177	I	12	1/2	3-5/16	961080	127.40	961080-C3	147.60
		.375 (3/8)	.177	I	12	1/2	3-3/8	961090	132.70	961090-C3	152.90
NEW	1	.031 (1/32)	.365	III	12	1/4**	3-1/32	914905	115.50	914905-C3	135.70
		.031 (1/32)	.302	II	12	3/8	3-1/32	982005	107.70	982005-C3	127.90
		.031 (1/32)	.240	I	12	1/2	3-1/32	55905	107.70	55905-C3	127.90
		.040	.240	I	12	1/2	3.040	55908	107.70	55908-C3	127.90
NEW		.047 (3/64)	.365	III	12	1/4**	3-3/64	914910	115.50	914910-C3	135.70
		.047 (3/64)	.302	II	12	3/8	3-3/64	982010	107.70	982010-C3	127.90
		.047 (3/64)	.240	I	12	1/2	3-3/64	55910	107.70	55910-C3	127.90
		.062 (1/16)	.365	III	12	1/4**	3-1/16	914920	115.50	914920-C3	135.70
		.062 (1/16)	.302	II	12	3/8	3-1/16	982020	107.70	982020-C3	127.90
		.062 (1/16)	.240	I	12	1/2	3-1/16	55920	107.70	55920-C3	127.90
NEW		.078 (5/64)	.365	III	12	1/4**	3-5/64	914930	115.50	914930-C3	135.70
		.078 (5/64)	.302	II	12	3/8	3-5/64	982030	107.70	982030-C3	127.90
		.078 (5/64)	.240	I	12	1/2	3-5/64	55930	107.70	55930-C3	127.90
		.093 (3/32)	.365	III	12	1/4**	3-3/32	914940	115.50	914940-C3	135.70
		.093 (3/32)	.302	II	12	3/8	3-3/32	982040	107.70	982040-C3	127.90
		.093 (3/32)	.240	I	12	1/2	3-3/32	55940	107.70	55940-C3	127.90
		.125 (1/8)	.365	III	12	1/4**	3-1/8	914950	115.50	914950-C3	135.70
		.125 (1/8)	.302	II	12	3/8	3-1/8	982050	107.70	982050-C3	127.90
		.125 (1/8)	.240	I	12	1/2	3-1/8	55950	107.70	55950-C3	127.90
		.156 (5/32)	.302	II	12	3/8	3-5/32	982055	107.70	982055-C3	127.90
		.156 (5/32)	.240	I	12	1/2	3-5/32	55955	107.70	55955-C3	127.90
		.187 (3/16)	.302	II	12	3/8	3-3/16	982060	107.70	982060-C3	127.90
		.187 (3/16)	.240	I	12	1/2	3-3/16	55960	107.70	55960-C3	127.90
		.209	Please see page 277 for Retaining Ring sizes.								
		.250 (1/4)	.302	II	12	3/8	3-1/4	982070	119.40	982070-C3	139.60
		.250 (1/4)	.240	I	12	1/2	3-1/4	55970	119.40	55970-C3	139.60
		.312 (5/16)	.302	II	12	3/8	3-5/16	982080	127.40	982080-C3	147.60
		.312 (5/16)	.240	I	12	1/2	3-5/16	55980	127.40	55980-C3	147.60
		.375 (3/8)	.302	II	12	3/8	3-3/8	982090	119.40	982090-C3	139.60
		.375 (3/8)	.240	I	12	1/2	3-3/8	55990	132.70	55990-C3	152.90
		.500 (1/2)	.240	I	12	1/2	3-1/2	55995	138.10	55995-C3	158.30
	1-1/4	.093 (3/32)	.240	I	14	3/4	3-11/32	973940	133.70	973940-C3	153.90
NEW		.125 (1/8)	.365	II	14	1/2	3-1/8	879950	133.70	879950-C3	153.90
		.125 (1/8)	.240	I	14	3/4	3-3/8	973950	133.70	973950-C3	153.90
NEW		.250 (1/4)	.365	II	14	1/2	3-1/4	879970	133.70	879970-C3	153.90
		.250 (1/4)	.240	I	14	3/4	3-1/2	973970	148.70	973970-C3	168.90
NEW		.375 (3/8)	.240	I	14	3/4	3-5/8	973990	160.40	973990-C3	180.60
NEW		.500 (1/2)	.240	I	14	3/4	3-3/4	973995	160.40	973995-C3	180.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck **No Weldon Flat

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

KEYSEAT CUTTERS

Square – Large Diameter (cont.)

continued from previous page

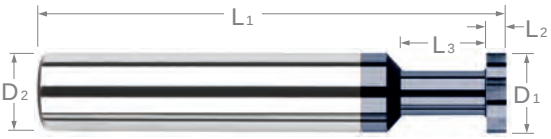
CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
	.062 (1/16)	**.490**	II	16	1/2	3-1/16	887020	142.40	887020-C3	167.60	NEW
	.062 (1/16)	.365	I	16	3/4	3-5/16	962020	142.40	962020-C3	167.60	
	.093 (3/32)	.365	I	16	3/4	3-11/32	962040	142.40	962040-C3	167.60	
	.125 (1/8)	**.552**	III	16	3/8	3-1/8	868750	142.40	868750-C3	167.60	NEW
	.125 (1/8)	**.490**	II	16	1/2	3-1/8	887050	142.40	887050-C3	167.60	
	.125 (1/8)	.365	I	16	3/4	3-3/8	962050	142.40	962050-C3	167.60	
	.187 (3/16)	**.552**	III	16	3/8	3-3/16	868760	142.40	868760-C3	167.60	NEW
1-1/2	.187 (3/16)	**.490**	II	16	1/2	3-3/16	887060	142.40	887060-C3	167.60	
	.187 (3/16)	.365	I	16	3/4	3-7/16	962060	142.40	962060-C3	167.60	
	.250 (1/4)	**.490**	II	16	1/2	3-1/4	887070	153.10	887070-C3	178.30	
	.250 (1/4)	.365	I	16	3/4	3-1/2	962070	153.10	962070-C3	178.30	
	.312 (5/16)	.365	I	16	3/4	3-9/16	962080	172.70	962080-C3	197.90	
	.375 (3/8)	.365	I	16	3/4	3-5/8	962090	197.70	962090-C3	222.90	
	.437 (7/16)	.365	I	16	3/4	3-11/16	962093	213.90	962093-C3	239.10	
	.500 (1/2)	.365	I	16	3/4	3-3/4	962095	229.90	962095-C3	255.10	

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck **No Weldon Flat

KEYSEAT CUTTERS

Retaining Ring Keyseats



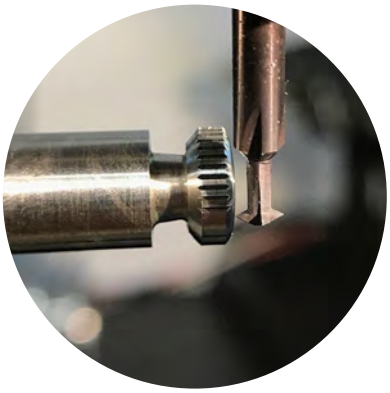
Designed for Milling ◀ Retaining / Snap Ring Grooves

- Designed to mill proper slot widths for common retaining ring sizes
- Cutter diameter, neck length, radial, and axial depths of cut optimized for internal retaining ring grooves per ANSI standards
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC**	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.002″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/16	.018	1/8	1/8	.021	6	3/16	2	23504	43.20	23504-C3	47.70
	.029	1/8	1/8	.021	6	3/16	2	23508	43.20	23508-C3	47.70
1/4	.039	5/32	5/32	.037	6	1/4	2-1/2	23512	51.20	23512-C3	57.40
	.046	5/32	5/32	.037	6	1/4	2-1/2	23516	51.20	23516-C3	57.40
5/16	.056	3/16	3/16	.052	6	5/16	2-1/2	23520	61.20	23520-C3	68.40
3/8	.068	3/16	1/4	.084	8	3/8	2-1/2	23524	71.40	23524-C3	79.60
	.086	3/16	1/4	.084	8	3/8	2-1/2	23528	71.40	23528-C3	79.60
1/2	.103	1/4	5/16	.115	8	1/2	3	23532	78.50	23532-C3	90.70
	.120	1/4	3/8	.115	8	1/2	3	23536	78.50	23536-C3	90.70
5/8	.120	5/16	1/2	.146	8	5/8	3-1/2	23540	146.10	23540-C3	158.30
	.139	5/16	1/2	.146	8	5/8	3-1/2	23544	146.10	23544-C3	158.30
3/4	.174	-	-	.177	10	3/8	3.174	23548*	105.40	23548-C3*	119.30
1	.209	-	-	.240	12	1/2	3.209	23564*	126.30	23564-C3*	146.60

SPEEDS & FEEDS ONLINE!

*Carbide head with reduced steel shank **Radial DOC accounts for max transition at neck



★★★★★

"Using my @harveytool 60 degree double angle cutter to mill some texture into a crown for a 1 in 30 piece."

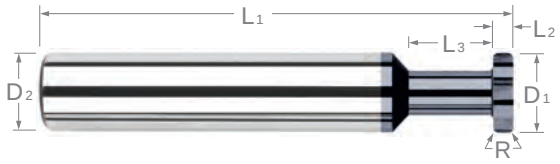
— @horological

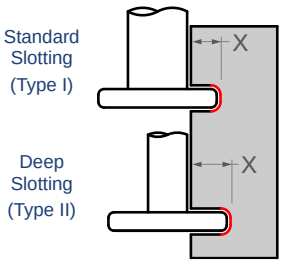
Follow us on Instagram @harveytool!

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Corner Radius





- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/16	.015 (1/64)	.005	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910615	51.20	910615-C3	55.40
	.031 (1/32)	.005	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910631	51.20	910631-C3	55.40
3/32	.031 (1/32)	.005	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902531	49.90	902531-C3	54.10
	.062 (1/16)	.005	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902562	49.90	902562-C3	54.10
	.062 (1/16)	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909162	49.90	909162-C3	54.10
1/8	.015 (1/64)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965115	48.50	965115-C3	52.70
	.020	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965120	48.50	965120-C3	52.70
	.025	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965125	48.50	965125-C3	52.70
	.031 (1/32)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965131	48.50	965131-C3	52.70
	.040	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965140	48.50	965140-C3	52.70
	.047 (3/64)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965147	48.50	965147-C3	52.70
	.062 (1/16)	.005	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965162	48.50	965162-C3	52.70
	.062 (1/16)	.010	.040	1/16 (.5x)	.032	II	6	1/8	1-1/2	837662	55.70	837662-C3	59.90
	.062 (1/16)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985962	48.50	985962-C3	52.70
	.078 (5/64)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985978	48.50	985978-C3	52.70
	.093 (3/32)	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985993	48.50	985993-C3	52.70
	.093 (3/32)	.015	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	960793	48.50	960793-C3	52.70
3/16	.015 (1/64)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954715	50.10	954715-C3	54.60
	.020	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954720	50.10	954720-C3	54.60
	.025	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954725	50.10	954725-C3	54.60
	.031 (1/32)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954731	50.10	954731-C3	54.60
	.040	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954740	50.10	954740-C3	54.60
	.047 (3/64)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954747	50.10	954747-C3	54.60
	.062 (1/16)	.005	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954762	50.10	954762-C3	54.60
	.062 (1/16)	.010	1/16	3/32 (.5x)	.052	II	6	3/16	2	837262	57.70	837262-C3	62.20
	.062 (1/16)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949962	50.10	949962-C3	54.60
	.078 (5/64)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949978	50.10	949978-C3	54.60
	.093 (3/32)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949993	50.10	949993-C3	54.60
	.093 (3/32)	.015	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937793	50.10	937793-C3	54.60
	.125 (1/8)	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949995	50.10	949995-C3	54.60
	.125 (1/8)	.015	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937795	50.10	937795-C3	54.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Corner Radius (cont.)

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CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.0005" −.0005"	R +.001" −.001"		L_3 +.020" −.000"	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981115	55.40	981115-C3	61.60
	.020	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981120	55.40	981120-C3	61.60
	.025	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981125	55.40	981125-C3	61.60
	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981131	55.40	981131-C3	61.60
	.031 (1/32)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916631	64.40	916631-C3	70.60
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972631	55.40	972631-C3	61.60
	.040	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981140	55.40	981140-C3	61.60
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981147	55.40	981147-C3	61.60
	.047 (3/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972647	55.40	972647-C3	61.60
	.050	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981150	55.40	981150-C3	61.60
	.060	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972660	55.40	972660-C3	61.60
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981162	54.40	981162-C3	60.60
	.062 (1/16)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911762	62.70	911762-C3	68.90
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972662	54.40	972662-C3	60.60
	.062 (1/16)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900062	64.40	900062-C3	70.60
1/4	.062 (1/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968462	54.40	968462-C3	60.60
	.078 (5/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972678	55.40	972678-C3	61.60
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981193	54.40	981193-C3	60.60
	.093 (3/32)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911793	62.70	911793-C3	68.90
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972693	54.40	972693-C3	60.60
	.093 (3/32)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900093	64.40	900093-C3	70.60
	.093 (3/32)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968493	54.40	968493-C3	60.60
	.093 (3/32)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904593	54.40	904593-C3	60.60
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981195	54.40	981195-C3	60.60
	.125 (1/8)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911795	62.70	911795-C3	68.90
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972695	54.40	972695-C3	60.60
	.125 (1/8)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900095	64.40	900095-C3	70.60
	.125 (1/8)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968495	54.40	968495-C3	60.60
	.125 (1/8)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904595	54.40	904595-C3	60.60
	.187 (3/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972697	54.40	972697-C3	60.60
	.187 (3/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968497	54.40	968497-C3	60.60
	.031 (1/32)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931610	79.70	931610-C3	86.90
	.031 (1/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921110	79.70	921110-C3	86.90
5/16	.062 (1/16)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931630	79.70	931630-C3	86.90
	.062 (1/16)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921130	79.70	921130-C3	86.90
	.093 (3/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921150	79.70	921150-C3	86.90
	.093 (3/32)	**.015**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	927750	79.70	927750-C3	86.90
	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987210	81.90	987210-C3	90.10
	.047 (3/64)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987220	81.90	987220-C3	90.10
	.062 (1/16)	**.005**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	836830	82.10	836830-C3	90.30
3/8	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987230	80.40	987230-C3	88.60
	.062 (1/16)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916830	82.10	916830-C3	90.30
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981630	80.40	981630-C3	88.60
	.062 (1/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970030	80.40	970030-C3	88.60

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Corner Radius (cont.)

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CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.078 (5/64)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981640	81.90	981640-C3	90.10
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987250	80.40	987250-C3	88.60
	.093 (3/32)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916850	82.10	916850-C3	90.30
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981650	80.40	981650-C3	88.60
	.093 (3/32)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903350	82.10	903350-C3	90.30
	.093 (3/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970050	80.40	970050-C3	88.60
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987260	80.40	987260-C3	88.60
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981660	80.40	981660-C3	88.60
	.125 (1/8)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903360	82.10	903360-C3	90.30
	.125 (1/8)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970060	80.40	970060-C3	88.60
	.125 (1/8)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905960	80.40	905960-C3	88.60
	.156 (5/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970065	83.40	970065-C3	91.60
	.156 (5/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905965	83.40	905965-C3	91.60
	.187 (3/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981670	81.90	981670-C3	90.10
	.187 (3/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970070	81.90	970070-C3	90.10
	.187 (3/16)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905970	81.90	905970-C3	90.10
	.250 (1/4)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970080	81.90	970080-C3	90.10
	.250 (1/4)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905980	81.90	905980-C3	90.10
1/2	.020	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976005	103.70	976005-C3	115.90
	.025	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976007	103.70	976007-C3	115.90
	.031 (1/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976010	103.70	976010-C3	115.90
	.031 (1/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987710	103.70	987710-C3	115.90
	.040	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976015	103.70	976015-C3	115.90
	.047 (3/64)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976020	103.70	976020-C3	115.90
	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976030	101.90	976030-C3	114.10
	.062 (1/16)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901030	103.20	901030-C3	115.40
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987730	101.90	987730-C3	114.10
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990330	101.90	990330-C3	114.10
	.078 (5/64)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901040	105.10	901040-C3	117.30
	.078 (5/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987740	103.70	987740-C3	115.90
	.078 (5/64)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990340	103.70	990340-C3	115.90

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Corner Radius (cont.)

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CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.093 (3/32)	.005	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976050	101.90	976050-C3	114.10
	.093 (3/32)	.010	5/32	1/4 (.5x)	.162	II	8	1/2	3	901050	103.20	901050-C3	115.40
	.093 (3/32)	.010	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987750	101.90	987750-C3	114.10
	.093 (3/32)	.015	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990350	101.90	990350-C3	114.10
	.093 (3/32)	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933750	101.90	933750-C3	114.10
	.093 (3/32)	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969150	103.70	969150-C3	115.90
	.125 (1/8)	.005	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976060	101.90	976060-C3	114.10
	.125 (1/8)	.010	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987760	101.90	987760-C3	114.10
	.125 (1/8)	.015	5/32	1/4 (.5x)	.162	II	8	1/2	3	913460	103.20	913460-C3	115.40
	.125 (1/8)	.015	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990360	101.90	990360-C3	114.10
	.125 (1/8)	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933760	101.90	933760-C3	114.10
	.125 (1/8)	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969160	103.70	969160-C3	115.90
	.125 (1/8)	.040	1/4	3/4 (1.5x)	.115	I	8	1/2	3	838060	103.70	838060-C3	115.90
	.156 (5/32)	.010	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987765	106.40	987765-C3	118.60
	.156 (5/32)	.015	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990365	106.40	990365-C3	118.60
	.187 (3/16)	.010	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987770	103.70	987770-C3	115.90
	.187 (3/16)	.015	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990370	103.70	990370-C3	115.90
	.187 (3/16)	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933770	103.70	933770-C3	115.90
	.187 (3/16)	.030	5/32	1/4 (.5x)	.162	II	8	1/2	3	926670	119.50	926670-C3	131.70
	.187 (3/16)	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969170	103.70	969170-C3	115.90
	.187 (3/16)	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926170	105.50	926170-C3	117.70
	.250 (1/4)	.010	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987780	101.90	987780-C3	114.10
	.250 (1/4)	.015	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990380	101.90	990380-C3	114.10
	.250 (1/4)	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933780	101.90	933780-C3	114.10
	.250 (1/4)	.030	5/32	1/4 (.5x)	.162	II	8	1/2	3	926680	103.20	926680-C3	115.40
	.250 (1/4)	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969180	101.90	969180-C3	114.10
	.250 (1/4)	.045	1/4	3/4 (1.5x)	.115	I	8	1/2	3	929580	101.90	929580-C3	114.10
	.250 (1/4)	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926180	101.90	926180-C3	114.10
5/8	.125 (1/8)	.010	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903960	152.50	903960-C3	164.70
	.125 (1/8)	.015	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911160	152.50	911160-C3	164.70
	.125 (1/8)	.030	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908560	152.50	908560-C3	164.70
	.187 (3/16)	.010	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903970	154.40	903970-C3	166.60
	.187 (3/16)	.015	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911170	154.40	911170-C3	166.60
	.187 (3/16)	.030	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908570	154.40	908570-C3	166.60
	.250 (1/4)	.010	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903980	152.50	903980-C3	164.70
	.250 (1/4)	.015	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911180	152.50	911180-C3	164.70
	.250 (1/4)	.030	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908580	152.50	908580-C3	164.70

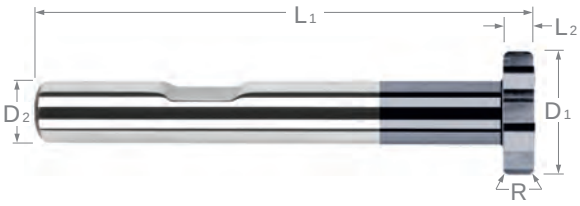
SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Corner Radius – Large Diameter



- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Weldon flat
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/4	.031 (1/32)	**.005**	.177	10	3/8	3-1/32	841505	108.40	841505-C3	121.60
	.062 (1/16)	**.005**	.177	10	3/8	3-1/16	841520	108.40	841520-C3	121.60
	.062 (1/16)	**.010**	.177	10	3/8	3-1/16	923820	108.40	923820-C3	121.60
	.078 (5/64)	**.005**	.177	10	3/8	3-5/64	841530	108.40	841530-C3	121.60
	.078 (5/64)	**.010**	.177	10	3/8	3-5/64	923830	108.40	923830-C3	121.60
	.093 (3/32)	**.005**	.177	10	3/8	3-3/32	841540	108.40	841540-C3	121.60
	.093 (3/32)	**.010**	.177	10	3/8	3-3/32	923840	108.40	923840-C3	121.60
	.093 (3/32)	**.030**	.177	10	3/8	3-3/32	905240	108.40	905240-C3	121.60
	.125 (1/8)	**.005**	.177	10	3/8	3-1/8	841550	108.40	841550-C3	121.60
	.125 (1/8)	**.010**	.177	10	3/8	3-1/8	923850	108.40	923850-C3	121.60
	.125 (1/8)	**.015**	.177	10	3/8	3-1/8	840950	108.40	840950-C3	121.60
	.125 (1/8)	**.030**	.177	10	3/8	3-1/8	905250	108.40	905250-C3	121.60
	.187 (3/16)	**.010**	.177	10	3/8	3-3/16	923860	114.90	923860-C3	128.10
	.187 (3/16)	**.015**	.177	10	3/8	3-3/16	840960	114.90	840960-C3	128.10
	.187 (3/16)	**.030**	.177	10	3/8	3-3/16	905260	114.90	905260-C3	128.10
	.250 (1/4)	**.010**	.177	10	3/8	3-1/4	923870	120.90	923870-C3	134.10
	.250 (1/4)	**.015**	.177	10	3/8	3-1/4	840970	120.90	840970-C3	134.10
	.250 (1/4)	**.030**	.177	10	3/8	3-1/4	905270	120.90	905270-C3	134.10
	.250 (1/4)	**.060**	.177	10	3/8	3-1/4	894070	120.90	894070-C3	134.10
1	.031 (1/32)	**.005**	.240	12	1/2	3-1/32	840305	120.20	840305-C3	140.40
	.062 (1/16)	**.005**	.240	12	1/2	3-1/16	840320	120.20	840320-C3	140.40
	.062 (1/16)	**.010**	.240	12	1/2	3-1/16	918520	120.20	918520-C3	140.40
	.078 (5/64)	**.005**	.240	12	1/2	3-5/64	840330	120.20	840330-C3	140.40
	.078 (5/64)	**.010**	.240	12	1/2	3-5/64	918530	120.20	918530-C3	140.40
	.093 (3/32)	**.005**	.240	12	1/2	3-3/32	840340	120.20	840340-C3	140.40
	.093 (3/32)	**.010**	.240	12	1/2	3-3/32	918540	120.20	918540-C3	140.40
	.093 (3/32)	**.030**	.240	12	1/2	3-3/32	910040	120.20	910040-C3	140.40
	.125 (1/8)	**.005**	.240	12	1/2	3-1/8	840350	120.20	840350-C3	140.40
	.125 (1/8)	**.010**	.240	12	1/2	3-1/8	918550	120.20	918550-C3	140.40
	.125 (1/8)	**.015**	.240	12	1/2	3-1/8	839750	120.20	839750-C3	140.40
	.125 (1/8)	**.030**	.240	12	1/2	3-1/8	910050	120.20	910050-C3	140.40
	.187 (3/16)	**.010**	.240	12	1/2	3-3/16	918560	126.90	918560-C3	147.10
	.187 (3/16)	**.015**	.240	12	1/2	3-3/16	839760	126.90	839760-C3	147.10
	.187 (3/16)	**.030**	.240	12	1/2	3-3/16	910060	126.90	910060-C3	147.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius – Large Diameter

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1	.250 (1/4)	**.010**	.240	12	1/2	3-1/4	918570	131.90	918570-C3	152.10
	.250 (1/4)	**.015**	.240	12	1/2	3-1/4	839770	131.90	839770-C3	152.10
	.250 (1/4)	**.030**	.240	12	1/2	3-1/4	910070	131.90	910070-C3	152.10
	.250 (1/4)	**.060**	.240	12	1/2	3-1/4	897570	131.90	897570-C3	152.10
	.375 (3/8)	**.010**	.240	12	1/2	3-3/8	918590	138.40	918590-C3	158.60
	.375 (3/8)	**.015**	.240	12	1/2	3-3/8	839790	138.40	839790-C3	158.60
	.375 (3/8)	**.030**	.240	12	1/2	3-3/8	910090	138.40	910090-C3	158.60
1-1/2	.125 (1/8)	**.010**	.365	16	3/4	3-3/8	839150	155.10	839150-C3	180.30
	.125 (1/8)	**.030**	.365	16	3/4	3-3/8	838550	155.10	838550-C3	180.30
	.187 (3/16)	**.010**	.365	16	3/4	3-7/16	839160	155.10	839160-C3	180.30
	.187 (3/16)	**.030**	.365	16	3/4	3-7/16	838560	155.10	838560-C3	180.30
	.250 (1/4)	**.010**	.365	16	3/4	3-1/2	839170	166.10	839170-C3	191.30
	.250 (1/4)	**.030**	.365	16	3/4	3-1/2	838570	166.10	838570-C3	191.30
	.375 (3/8)	**.010**	.365	16	3/4	3-5/8	839190	210.50	839190-C3	235.70
	.375 (3/8)	**.030**	.365	16	3/4	3-5/8	838590	210.50	838590-C3	235.70
	.500 (1/2)	**.010**	.365	16	3/4	3-3/4	839195	242.70	839195-C3	267.90
	.500 (1/2)	**.030**	.365	16	3/4	3-3/4	838595	242.70	838595-C3	267.90

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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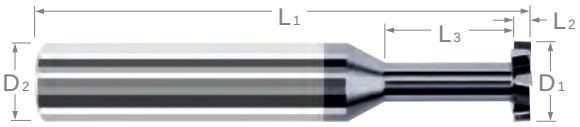
NEW SIZES!

KEYSEAT CUTTERS

Staggered Tooth – Square



- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Relieved to allow cutting on both sides of head
- Design improves shearing action and finish while minimizing chip dragging and recutting and decreasing vibration
- Tool can be offset to increase width of groove
- Solid carbide
- CNC ground in the USA

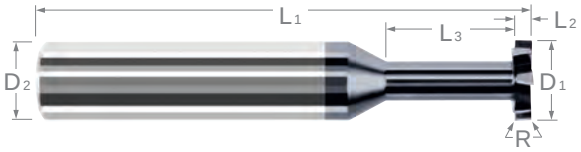
CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969815	55.10	969815-C3	59.30	
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969831	55.10	969831-C3	59.30	
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969847	55.10	969847-C3	59.30	
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969862	55.10	969862-C3	59.30	
3/16	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907062	65.40	907062-C3	69.90	
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907093	65.40	907093-C3	69.90	
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907095	65.40	907095-C3	69.90	NEW
1/4	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972131	76.20	972131-C3	82.40	
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972147	76.20	972147-C3	82.40	
	.062 (1/16)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878962	80.10	878962-C3	86.30	NEW
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972162	76.20	972162-C3	82.40	
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972193	76.20	972193-C3	82.40	
	.125 (1/8)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878995	82.70	878995-C3	88.90	NEW
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972195	78.70	972195-C3	84.90	
3/8	.062 (1/16)	1/8	3/16 (0.5x)	**.115**	II	8	3/8	2-1/2	867330	98.70	867330-C3	106.90	NEW
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915830	94.10	915830-C3	102.30	
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915850	94.10	915850-C3	102.30	NEW
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915860	94.10	915860-C3	102.30	
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915870	94.10	915870-C3	102.30	NEW
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915880	94.10	915880-C3	102.30	
1/2	.062 (1/16)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895030	128.70	895030-C3	140.90	NEW
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955630	122.40	955630-C3	134.60	
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955640	122.40	955640-C3	134.60	
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955650	122.40	955650-C3	134.60	
	.125 (1/8)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895060	128.70	895060-C3	140.90	NEW
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955660	122.40	955660-C3	134.60	
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955670	122.40	955670-C3	134.60	
	.250 (1/4)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895080	128.70	895080-C3	140.90	NEW
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955680	122.40	955680-C3	134.60	
5/8	.125 (1/8)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904960	173.10	904960-C3	185.30	
	.187 (3/16)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904970	173.10	904970-C3	185.30	
	.250 (1/4)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904980	173.10	904980-C3	185.30	

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

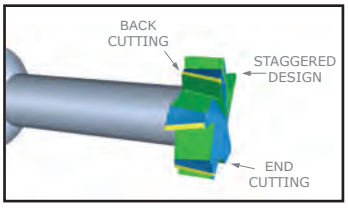
KEYSEAT CUTTERS

Staggered Tooth – Corner Radius



Staggered Tooth Design for Optimal Performance

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Design improves shearing action, minimizes chip dragging and recutting, decreases vibration, and improves side wall finish
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA



CUTTER DIA.	CUTTER WIDTH	RADII	NECK DIA.	NECK LENGTH	RADIAL DOC*	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.031 (1/32)	.005	1/16	3/16 (1.5x)	.022	6	1/8	1-1/2	43631	55.10	43631-C3	59.30
	.031 (1/32)	.005	1/16	3/8 (3x)	.022	6	1/8	1-1/2	989931	66.40	989931-C3	70.60
	.047 (3/64)	.005	1/16	3/16 (1.5x)	.022	6	1/8	1-1/2	43647	55.10	43647-C3	59.30
	.062 (1/16)	.005	1/16	3/16 (1.5x)	.022	6	1/8	1-1/2	43662	55.10	43662-C3	59.30
	.062 (1/16)	.005	1/16	3/8 (3x)	.022	6	1/8	1-1/2	989962	66.40	989962-C3	70.60
	.062 (1/16)	.010	1/16	3/16 (1.5x)	.022	6	1/8	1-1/2	44462	55.10	44462-C3	59.30
3/16	.031 (1/32)	.005	3/32	9/32 (1.5x)	.037	6	3/16	2	943531	61.10	943531-C3	65.60
	.047 (3/64)	.005	3/32	9/32 (1.5x)	.037	6	3/16	2	943547	61.10	943547-C3	65.60
	.062 (1/16)	.005	3/32	9/32 (1.5x)	.037	6	3/16	2	943562	61.10	943562-C3	65.60
	.062 (1/16)	.010	3/32	9/32 (1.5x)	.037	6	3/16	2	951762	61.10	951762-C3	65.60
1/4	.031 (1/32)	.005	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	43831	76.20	43831-C3	82.40
NEW	.031 (1/32)	.010	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	44531	76.20	44531-C3	82.40
	.047 (3/64)	.005	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	43847	76.20	43847-C3	82.40
	.047 (3/64)	.005	1/8	3/4 (3x)	.053	6	1/4	2-1/2	958047	88.10	958047-C3	94.30
	.062 (1/16)	.005	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	43862	76.20	43862-C3	82.40
	.062 (1/16)	.005	1/8	3/4 (3x)	.053	6	1/4	2-1/2	958062	88.10	958062-C3	94.30
	.062 (1/16)	.010	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	44562	76.20	44562-C3	82.40
	.093 (3/32)	.005	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	43893	76.20	43893-C3	82.40
	.093 (3/32)	.010	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	44593	76.20	44593-C3	82.40
	.125 (1/8)	.005	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	43895	76.20	43895-C3	82.40
	.125 (1/8)	.010	1/8	3/8 (1.5x)	.053	6	1/4	2-1/2	44595	76.20	44595-C3	82.40
NEW	.031 (1/32)	.005	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	967210	98.90	967210-C3	107.10
3/8	.062 (1/16)	.005	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	967230	98.90	967230-C3	107.10
	.062 (1/16)	.010	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	970930	98.90	970930-C3	107.10
	.093 (3/32)	.005	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	967250	98.90	967250-C3	107.10
	.093 (3/32)	.010	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	970950	98.90	970950-C3	107.10
	.125 (1/8)	005	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	967260	98.90	967260-C3	107.10
	.125 (1/8)	.010	3/16	9/16 (1.5x)	.084	8	3/8	2-1/2	970960	98.90	970960-C3	107.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

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NEW SIZES!

KEYSEAT CUTTERS

Staggered Tooth – Corner Radius (cont.)

continued from previous page

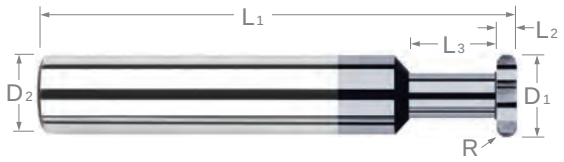
CUTTER DIA.	CUTTER WIDTH	RADII	NECK DIA.	NECK LENGTH	RADIAL DOC*	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/2	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	8	1/2	3	44330	122.40	44330-C3	134.60	
	.062 (1/16)	**.005**	1/4	1-1/2 (3x)	.115	8	1/2	3	976730	135.50	976730-C3	147.70	
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	8	1/2	3	44630	122.40	44630-C3	134.60	
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	8	1/2	3	921330	122.40	921330-C3	134.60	
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	8	1/2	3	44350	122.40	44350-C3	134.60	
	.093 (3/32)	**.005**	1/4	1-1/2 (3x)	.115	8	1/2	3	976750	135.50	976750-C3	147.70	
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	8	1/2	3	44650	122.40	44650-C3	134.60	
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	8	1/2	3	921350	122.40	921350-C3	134.60	
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	8	1/2	3	44360	122.40	44360-C3	134.60	
	.125 (1/8)	**.005**	1/4	1-1/2 (3x)	.115	8	1/2	3	976760	135.50	976760-C3	147.70	
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	8	1/2	3	44660	122.40	44660-C3	134.60	
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	8	1/2	3	921360	122.40	921360-C3	134.60	
	.187 (3/16)	**.005**	1/4	3/4 (1.5x)	.115	8	1/2	3	44370	122.40	44370-C3	134.60	NEW
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	8	1/2	3	44670	122.40	44670-C3	134.60	NEW
	.250 (1/4)	**.005**	1/4	3/4 (1.5x)	.115	8	1/2	3	44380	122.40	44380-C3	134.60	
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	8	1/2	3	44680	122.40	44680-C3	134.60	
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	8	1/2	3	921380	122.40	921380-C3	134.60	
5/8	.125 (1/8)	**.005**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	860460	172.90	860460-C3	185.10	NEW
	.125 (1/8)	**.010**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	872960	172.90	872960-C3	185.10	NEW
	.187 (3/16)	**.005**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	860470	172.90	860470-C3	185.10	NEW
	.187 (3/16)	**.010**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	872970	172.90	872970-C3	185.10	NEW
	.250 (1/4)	**.005**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	860480	172.90	860480-C3	185.10	NEW
	.250 (1/4)	**.010**	5/16	15/16 (1.5x)	.146	8	5/8	3-1/2	872980	172.90	872980-C3	185.10	NEW

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

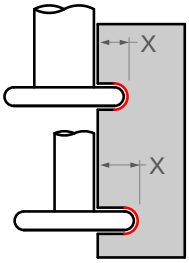
KEYSEAT CUTTERS

Full Radius



- Ground form relieved (can be reground without losing radius)
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

Full Radius



RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D1 +.000″ −.002″	L2		L3 +.020″ −.000″	X			D2	L1	TOOL #	PRICE	TOOL #	PRICE
.0075	**1/4**	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67707	86.90	67707-C3	93.10
.0100	**3/32**	.020	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976910	67.40	976910-C3	71.60
.0100	**1/8**	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67510	69.90	67510-C3	74.10
.0100	**5/32**	.020	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965310	73.50	965310-C3	78.10
.0100	**3/16**	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68310	80.70	68310-C3	85.20
.0100	**1/4**	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67710	86.90	67710-C3	93.10
.0100	**5/16**	.020	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944410	96.10	944410-C3	103.30
.0100	**3/8**	.020	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68410	103.20	68410-C3	111.40
.0156 (1/64)	**3/32**	.031 (1/32)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976915	60.10	976915-C3	64.30
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67515	62.20	67515-C3	66.40
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	895215	66.40	895215-C3	70.60
.0156 (1/64)	**5/32**	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965315	73.50	965315-C3	78.10
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68315	73.70	68315-C3	78.20
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	924415	86.10	924415-C3	90.60
.0156 (1/64)	**1/4**	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953915	80.40	953915-C3	86.60
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43315	79.20	43315-C3	85.40
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971415	91.70	971415-C3	97.90
.0156 (1/64)	**5/16**	.031 (1/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944415	88.20	944415-C3	95.40
.0156 (1/64)	**3/8**	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68415	95.50	68415-C3	103.70
.0156 (1/64)	**1/2**	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67915	98.40	67915-C3	110.60
.0200	**1/8**	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67520	62.20	67520-C3	66.40
.0200	**5/32**	.040	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965320	73.50	965320-C3	78.10
.0200	**3/16**	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68320	73.70	68320-C3	78.20
.0200	**3/16**	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	924420	86.10	924420-C3	90.60
.0200	**1/4**	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953920	80.40	953920-C3	86.60
.0200	**1/4**	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67720	80.10	67720-C3	86.30
.0200	**1/4**	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971420	91.70	971420-C3	97.90
.0200	**5/16**	.040	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944420	88.20	944420-C3	95.40
.0200	**3/8**	.040	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68420	96.40	68420-C3	104.60
.0200	**3/8**	.040	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968520	108.40	968520-C3	116.60
.0200	**1/2**	.040	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67920	98.90	67920-C3	111.10
.0250	**1/4**	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67725	80.10	67725-C3	86.30

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

KEYSEAT CUTTERS

Full Radius (cont.)

continued from previous page

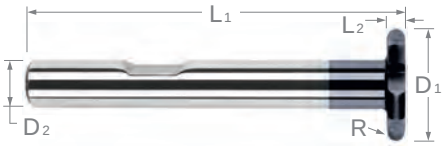
RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.0300	**5/32**	.060	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965330	73.50	965330-C3	78.10
.0300	**3/16**	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68330	73.70	68330-C3	78.20
.0300	**1/4**	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67730	80.10	67730-C3	86.30
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68331	73.70	68331-C3	78.20
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	924431	86.10	924431-C3	90.60
.0312 (1/32)	**1/4**	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953931	80.40	953931-C3	86.60
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43331	79.20	43331-C3	85.40
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971431	91.70	971431-C3	97.90
.0312 (1/32)	**5/16**	.062 (1/16)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944431	88.20	944431-C3	95.40
.0312 (1/32)	**3/8**	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68431	95.50	68431-C3	103.70
.0312 (1/32)	**1/2**	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898531	100.10	898531-C3	112.30
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67931	98.40	67931-C3	110.60
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942731	107.40	942731-C3	119.60
.0312 (1/32)	**5/8**	.062 (1/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43431	161.20	43431-C3	173.40
.0394 (1 mm)	**1/4**	.078 (2 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67739	80.10	67739-C3	86.30
.0394 (1 mm)	**5/16**	.078 (2 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944439	89.20	944439-C3	96.40
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43339	96.40	43339-C3	104.60
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968539	108.40	968539-C3	116.60
.0394 (1 mm)	**1/2**	.078 (2 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67939	98.90	67939-C3	111.10
.0469 (3/64)	**1/4**	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67747	79.20	67747-C3	85.40
.0469 (3/64)	**5/16**	.093 (3/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944447	88.20	944447-C3	95.40
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43347	95.50	43347-C3	103.70
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968547	108.40	968547-C3	116.60
.0469 (3/64)	**1/2**	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67947	98.40	67947-C3	110.60
.0469 (3/64)	**5/8**	.093 (3/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43447	161.20	43447-C3	173.40
.0500	**3/8**	.100	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68450	96.40	68450-C3	104.60
.0590 (1.5 mm)	**5/16**	.118 (3 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944459	89.20	944459-C3	96.40
.0590 (1.5 mm)	**3/8**	.118 (3 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68459	96.40	68459-C3	104.60
.0590 (1.5 mm)	**1/2**	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67959	98.90	67959-C3	111.10
.0625 (1/16)	**5/16**	.125 (1/8)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944462	88.20	944462-C3	95.40
.0625 (1/16)	**3/8**	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	6	3/8	2-1/2	949262	96.90	949262-C3	105.10
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43362	95.50	43362-C3	103.70
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968562	108.40	968562-C3	116.60
.0625 (1/16)	**1/2**	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898562	100.10	898562-C3	112.30
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67962	98.40	67962-C3	110.60
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942762	136.90	942762-C3	149.10
.0625 (1/16)	**5/8**	.125 (1/8)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43462	161.20	43462-C3	173.40
.0781 (5/64)	**3/8**	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68478	95.50	68478-C3	103.70
.0781 (5/64)	**1/2**	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898578	100.70	898578-C3	112.90
.0781 (5/64)	**1/2**	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43378	98.90	43378-C3	111.10
.0781 (5/64)	**5/8**	.156 (5/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43478	161.20	43478-C3	173.40
.0937 (3/32)	**1/2**	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898593	100.70	898593-C3	112.90
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43393	98.90	43393-C3	111.10
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942793	115.50	942793-C3	127.70
.0937 (3/32)	**5/8**	.187 (3/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43493	161.20	43493-C3	173.40
.1181 (3 mm)	**5/8**	.236 (6 mm)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	4343M	161.20	4343M-C3	173.40
.1250 (1/8)	**5/8**	.250 (1/4)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43408	161.20	43408-C3	173.40
.1250 (1/8)	**5/8**	.250 (1/4)	.300	2 (3x)	.152	I	6	5/8	4	983008	181.90	983008-C3	195.10

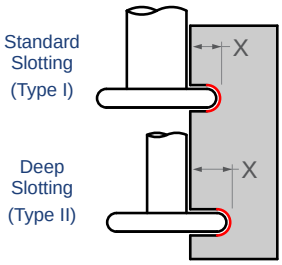
SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Full Radius – Large Diameter





- Ground form relieved (can be reground without losing radius)
- 6 flutes
- Both sides of cutter are dished for clearance
- Solid carbide head with steel shank
- CNC ground in the USA

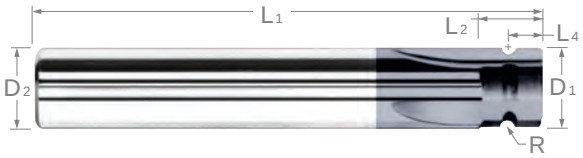
RADIUS	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
R +.001″ −.001″	D1 +.010″ −.000″	L2	X		D2	L1	6 FL	PRICE	6 FL	PRICE
.0156 (1/64)	3/4	.031 (1/32)	.177	II	3/8	3-1/32	965415	132.90	965415-C3	146.10
.0156 (1/64)	3/4	.031 (1/32)	.115	I	1/2	3-1/32	32901	123.10	32901-C3	136.30
.0156 (1/64)	1	.031 (1/32)	.240	I	1/2	3-1/32	942615	135.10	942615-C3	155.30
.0200	3/4	.040	.115	I	1/2	3.040	959720	123.10	959720-C3	136.30
.0200	1	.040	.240	I	1/2	3.040	942620	135.10	942620-C3	155.30
.0300	3/4	.060	.177	II	3/8	3.060	965430	132.90	965430-C3	146.10
.0312 (1/32)	3/4	.062 (1/16)	.177	II	3/8	3-1/16	965431	132.90	965431-C3	146.10
.0312 (1/32)	3/4	.062 (1/16)	.115	I	1/2	3-1/16	32902	123.10	32902-C3	136.30
.0312 (1/32)	1	.062 (1/16)	.240	I	1/2	3-1/16	942631	135.10	942631-C3	155.30
.0394 (1 mm)	3/4	.078 (2 mm)	.115	I	1/2	3.078	3291M	123.10	3291M-C3	136.30
.0394 (1 mm)	1	.078 (2 mm)	.240	I	1/2	3.078	94261M	135.10	94261M-C3	155.30
.0469 (3/64)	3/4	.093 (3/32)	.177	II	3/8	3-5/32	965447	132.90	965447-C3	146.10
.0469 (3/64)	3/4	.093 (3/32)	.115	I	1/2	3-3/32	32903	123.10	32903-C3	136.30
.0469 (3/64)	1	.093 (3/32)	.240	I	1/2	3-3/32	942647	135.10	942647-C3	155.30
.0590 (1.5 mm)	3/4	.118 (3 mm)	.177	II	3/8	3.118	965459	132.90	965459-C3	146.10
.0625 (1/16)	3/4	.125 (1/8)	.177	II	3/8	3-1/8	965462	132.90	965462-C3	146.10
.0625 (1/16)	3/4	.125 (1/8)	.115	I	1/2	3-1/8	32904	123.10	32904-C3	136.30
.0625 (1/16)	1	.125 (1/8)	.302	II	3/8	3-1/8	937362	132.90	937362-C3	153.10
.0625 (1/16)	1	.125 (1/8)	.240	I	1/2	3-1/8	942662	135.10	942662-C3	155.30
.0781 (5/64)	3/4	.156 (5/32)	.115	I	1/2	3-5/32	959778	123.10	959778-C3	136.30
.0781 (5/64)	1	.156 (5/32)	.302	II	3/8	3-5/32	937378	135.10	937378-C3	155.30
.0781 (5/64)	1	.156 (5/32)	.240	I	1/2	3-5/32	32905	144.40	32905-C3	164.60
.0787 (2 mm)	3/4	.157 (4 mm)	.177	II	3/8	3.157	96542M	132.90	96542M-C3	146.10
.0787 (2 mm)	1	.157 (4 mm)	.240	I	1/2	3.157	3292M	144.40	3292M-C3	164.60
.0937 (3/32)	3/4	.187 (3/16)	.115	I	1/2	3-3/16	959793	123.10	959793-C3	136.30
.0937 (3/32)	1	.187 (3/16)	.302	II	3/8	3-3/16	937393	132.90	937393-C3	153.10
.0937 (3/32)	1	.187 (3/16)	.240	I	1/2	3-3/16	32906	144.40	32906-C3	164.60
.0937 (3/32)	1-1/2	.187 (3/16)	.365	I	3/4	3-11/16	850493	154.40	850493-C3	179.60
.1181 (3 mm)	1	.236 (6 mm)	.240	I	1/2	3.236	942694	144.40	942694-C3	164.60
.1250 (1/8)	1	.250 (1/4)	.302	II	3/8	3-1/4	937395	132.90	937395-C3	153.10
.1250 (1/8)	1	.250 (1/4)	.240	I	1/2	3-1/4	942695	144.40	942695-C3	164.60
.1250 (1/8)	1-1/4	.250 (1/4)	.365	II	1/2	3-1/4	848695	155.70	848695-C3	180.90
.1250 (1/8)	1-1/4	.250 (1/4)	.240	I	3/4	3-1/2	32908	162.10	32908-C3	187.30
.1250 (1/8)	1-1/2	.250 (1/4)	.365	I	3/4	3-3/4	850495	164.40	850495-C3	189.60
.1562 (5/32)	1-1/2	.312 (5/16)	.365	I	3/4	3-13/16	32910	198.70	32910-C3	223.90
.1875 (3/16)	1-3/8	.375 (3/8)	.302	I	3/4	3-5/8	32912	198.70	32912-C3	223.90
.2500 (1/4)	1-1/2	.500 (1/2)	.365	I	3/4	4	32916	219.90	32916-C3	245.10

SPEEDS & FEEDS ONLINE!

*Radial DOC accounts for max transition radius at neck

Click Tool # for stock, speeds & feeds, & other technical info

CONCAVE RADIUS END MILLS



- Ground form relieved (can be re-ground without losing radius)
- 4 flutes
- Cutting on OD and radius only (non-end cutting)
- Solid carbide
- CNC ground in the USA

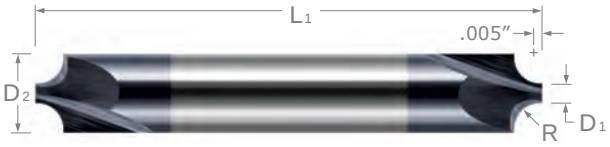
RADIUS	CUTTER DIAMETER	LENGTH OF CUT	RADIUS CENTER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2 +.060″ −.000″	L_4 +.001″ −.001″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
1/64	1/4	.281	.1406	1/4	2-1/2	45915	53.10	45915-C3	59.30
1/64	1/2	.281	.1406	1/2	3	32801	102.10		
.020	1/4	.281	.1450	1/4	2-1/2	45920	52.20	45920-C3	58.40
1/32	1/4	.312	.1562	1/4	2-1/2	45931	53.10	45931-C3	59.30
1/32	1/2	.312	.1562	1/2	3	32802	102.10		
1 mm	1/4	.329	.1644	1/4	2-1/2	4591M	52.20	4591M-C3	58.40
1 mm	1/2	.329	.1644	1/2	3	3281M	103.90		
3/64	1/4	.344	.1719	1/4	2-1/2	45947	53.10	45947-C3	59.30
3/64	1/2	.344	.1719	1/2	3	32803	103.90		
1/16	3/8	.375	.1875	3/8	2-1/2	45962	66.10	45962-C3	74.30
1/16	1/2	.375	.1875	1/2	3	32804	102.10		
5/64	1/2	.407	.2034	1/2	3	32805	102.10	32805-C3	114.30
2 mm	1/2	.407	.2044	1/2	3	3282M	103.90	3282M-C3	116.10
3/32	1/2	.437	.2187	1/2	3	32806	103.90	32806-C3	116.10
7/64	5/8	.469	.2344	5/8	3-1/2	32807	133.10	32807-C3	145.30
1/8	5/8	.500	.2500	5/8	3-1/2	32808	130.70	32808-C3	142.90
5/32	3/4	.562	.2812	3/4	4	32810	220.10	32810-C3	233.30
3/16	1	.624	.3120	3/4	3-1/2	32812*	178.40	32812-C3*	191.90
1/4	1-1/4	.750	.3750	3/4	4	32816*	209.70	32816-C3*	222.90

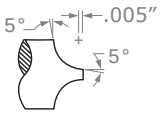
SPEEDS & FEEDS ONLINE!

*Solid carbide head with steel shank

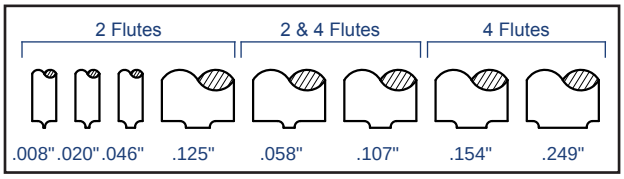
CORNER ROUNDING END MILLS

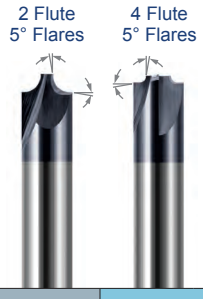
2 & 4 Flute – Flared





- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA





RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE
.003	**.046**	2	1/8	1-1/2		17003	36.70	17003-C3	41.90
.004	**.046**	2	1/8	1-1/2		17004	36.70	17004-C3	41.90
.005	**.008**	2	1/8	1-1/2		67405	46.10	67405-C3	51.30
.005	**.020**	2	1/8	1-1/2		45305	39.70	45305-C3	44.90
.005	**.046**	2	1/8	1-1/2		17005	36.70	17005-C3	41.90
.005	**.046**	2	3/16	4	***LONG!***	31605	62.10	31605-C3	69.30
.005	**.058**	4	1/8	1-1/2		67605	49.90	67605-C3	55.10
.005	**.107**	4	1/8	1-1/2		68005	49.90	68005-C3	55.10
.005	**.249**	4	3/8	2-1/2		21005	58.20	21005-C3	70.40
.006	**.020**	2	1/8	1-1/2		45306	39.70	45306-C3	44.90
.006	**.046**	2	1/8	1-1/2		17006	36.70	17006-C3	41.90
.006	**.058**	4	1/8	1-1/2		67606	49.90	67606-C3	55.10
.006	**.107**	4	1/8	1-1/2		68006	49.90	68006-C3	55.10
.007	**.020**	2	1/8	1-1/2		45307	39.70	45307-C3	44.90
.007	**.046**	2	1/8	1-1/2		17007	36.70	17007-C3	41.90
.007	**.058**	4	1/8	1-1/2		67607	49.90	67607-C3	55.10
.007	**.107**	4	1/8	1-1/2		68007	49.90	68007-C3	55.10
.008	**.008**	2	1/8	1-1/2		67408	46.10	67408-C3	51.30
.008	**.020**	2	1/8	1-1/2		45308	39.70	45308-C3	44.90
.008	**.046**	2	1/8	1-1/2		17008	36.70	17008-C3	41.90
.008	**.046**	2	3/16	4	***LONG!***	31608	62.10	31608-C3	69.30
.008	**.058**	4	1/8	1-1/2		67608	49.90	67608-C3	55.10
.008	**.249**	4	3/8	2-1/2		21008	58.20	21008-C3	70.40
.009	**.020**	2	1/8	1-1/2		45309	39.70	45309-C3	44.90
.009	**.046**	2	1/8	1-1/2		17009	36.70	17009-C3	41.90
.010	**.008**	2	1/8	1-1/2		67410	46.10	67410-C3	51.30
.010	**.020**	2	1/8	1-1/2		45310	39.70	45310-C3	44.90
.010	**.046**	2	1/8	1-1/2		17010	36.70	17010-C3	41.90
.010	**.046**	2	3/16	4	***LONG!***	31610	62.10	31610-C3	69.30

SPEEDS & FEEDS ONLINE!

continued on next page

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.010	**.058**	4	1/8	1-1/2		67610	49.90	67610-C3	55.10
.010	**.107**	4	3/16	2		68010	54.10	68010-C3	60.30
.010	**.125**	2	3/16	2		941510	54.10	941510-C3	60.30
.010	**.249**	4	3/8	2-1/2		21010	58.20	21010-C3	70.40
.011	**.020**	2	1/8	1-1/2		45311	39.70	45311-C3	44.90
.011	**.046**	2	1/8	1-1/2		17011	36.70	17011-C3	41.90
.012	**.020**	2	1/8	1-1/2		45312	39.70	45312-C3	44.90
.012	**.046**	2	1/8	1-1/2		17012	36.70	17012-C3	41.90
.012	**.107**	4	3/16	2		68012	54.10	68012-C3	60.30
.013	**.020**	2	1/8	1-1/2		45313	39.70	45313-C3	44.90
.013	**.046**	2	1/8	1-1/2		17013	36.70	17013-C3	41.90
.014	**.020**	2	1/8	1-1/2		45314	39.70	45314-C3	44.90
.014	**.046**	2	1/8	1-1/2		17014	36.70	17014-C3	41.90
.015 (1/64)	**.008**	2	1/8	1-1/2		67415	46.10	67415-C3	51.30
.015 (1/64)	**.020**	2	1/8	1-1/2		45315	39.70	45315-C3	44.90
.015 (1/64)	**.046**	2	1/8	1-1/2		17015	36.70	17015-C3	41.90
.015 (1/64)	**.046**	2	3/16	4	***LONG!***	31615	62.10	31615-C3	69.30
.015 (1/64)	**.058**	4	1/8	1-1/2		67615	49.90	67615-C3	55.10
.015 (1/64)	**.107**	4	3/16	2		68015	54.10	68015-C3	60.30
.015 (1/64)	**.125**	2	3/16	2		941515	54.10	941515-C3	60.30
.015 (1/64)	**.249**	4	3/8	2-1/2		21015	58.20	21015-C3	70.40
.018	**.020**	2	1/8	1-1/2		45318	39.70	45318-C3	44.90
.018	**.046**	2	1/8	1-1/2		17018	36.70	17018-C3	41.90
.018	**.107**	4	3/16	2		68018	54.10	68018-C3	60.30
.020	**.008**	2	1/8	1-1/2		67420	46.10	67420-C3	51.30
.020	**.020**	2	1/8	1-1/2		45320	39.70	45320-C3	44.90
.020	**.046**	2	1/8	1-1/2		17020	36.70	17020-C3	41.90
.020	**.046**	2	3/16	4	***LONG!***	31620	62.10	31620-C3	69.30
.020	**.058**	4	1/8	1-1/2		67620	49.90	67620-C3	55.10
.020	**.107**	4	3/16	2		68020	54.10	68020-C3	60.30
.020	**.125**	2	3/16	2		941520	54.10	941520-C3	60.30
.020	**.249**	4	3/8	2-1/2		21020	58.20	21020-C3	70.40
.022	**.020**	2	1/8	1-1/2		45322	39.70	45322-C3	44.90
.022	**.046**	2	1/8	1-1/2		17022	36.70	17022-C3	41.90
.022	**.107**	4	3/16	2		68022	54.10	68022-C3	60.30
.025	**.008**	2	1/8	1-1/2		67425	46.10	67425-C3	51.30
.025	**.020**	2	1/8	1-1/2		45325	39.70	45325-C3	44.90
.025	**.046**	2	1/8	1-1/2		17025	36.70	17025-C3	41.90
.025	**.046**	2	3/16	4	***LONG!***	31625	62.10	31625-C3	69.30
.025	**.058**	4	1/8	1-1/2		67625	49.90	67625-C3	55.10

SPEEDS & FEEDS ONLINE!

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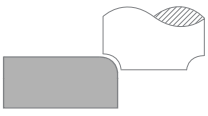
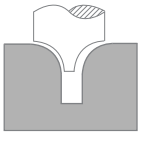
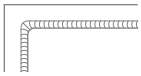
5° Flares at Shoulder and Pilot to Avoid Steps in Workpiece



Large Pilots for Profiling, Increasing Strength and Requiring Less Speed



Small Pilots for Narrow Slots and Holes



Small Pilots Allow Milling of Tight Inside Corners

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE
.025	**.107**	4	3/16	2		68025	54.10	68025-C3	60.30
.025	**.125**	2	3/16	2		941525	54.10	941525-C3	60.30
.025	**.249**	4	3/8	2-1/2		21025	58.20	21025-C3	70.40
.027	**.046**	2	1/8	1-1/2		17027	36.70	17027-C3	41.90
.027	**.107**	4	3/16	2		68027	54.10	68027-C3	60.30
.030	**.008**	2	1/8	1-1/2		67430	46.10	67430-C3	51.30
.030	**.020**	2	1/8	1-1/2		45330	39.70	45330-C3	44.90
.030	**.046**	2	1/8	1-1/2		17030	36.70	17030-C3	41.90
.030	**.046**	2	3/16	4	*LONG!*	31630	62.10	31630-C3	69.30
.030	**.058**	4	1/8	1-1/2		67630	49.90	67630-C3	55.10
.030	**.107**	4	3/16	2		68030	54.10	68030-C3	60.30
.030	**.125**	2	3/16	2		941530	54.10	941530-C3	60.30
.030	**.249**	4	3/8	2-1/2		21030	64.10	21030-C3	76.30
.031 (1/32)	**.008**	2	1/8	1-1/2		67431	46.10	67431-C3	51.30
.031 (1/32)	**.020**	2	1/8	1-1/2		45331	39.70	45331-C3	44.90
.031 (1/32)	**.046**	2	1/8	1-1/2		17031	36.70	17031-C3	41.90
.031 (1/32)	**.046**	2	3/16	4	*LONG!*	31631	62.10	31631-C3	69.30
.031 (1/32)	**.058**	4	1/8	1-1/2		67631	49.90	67631-C3	55.10
.031 (1/32)	**.107**	4	3/16	2		68031	54.10	68031-C3	60.30
.031 (1/32)	**.125**	2	3/16	2		941531	60.40	941531-C3	66.60
.031 (1/32)	**.154**	4	1/4	2		946631	70.90	946631-C3	79.30
.031 (1/32)	**.249**	4	3/8	2-1/2		21031	64.10	21031-C3	76.30
.032	**.046**	2	1/8	1-1/2		17032	36.70	17032-C3	41.90
.032	**.249**	4	3/8	2-1/2		21032	64.10	21032-C3	76.30
.035	**.020**	2	1/8	1-1/2		67835	39.70	67835-C3	44.90
.035	**.046**	2	1/8	1-1/2		17035	36.70	17035-C3	41.90
.035	**.046**	2	3/16	4	*LONG!*	31635	62.10	31635-C3	69.30
.035	**.058**	4	3/16	2		67635	55.90	67635-C3	62.10
.035	**.249**	4	3/8	2-1/2		21035	64.10	21035-C3	76.30
.037	**.107**	4	3/16	2		68037	54.10	68037-C3	60.30
.039 (1 mm)	**.020**	2	1/8	1-1/2		67839	39.70	67839-C3	44.90
.039 (1 mm)	**.046**	2	1/8	1-1/2		17039	36.70	17039-C3	41.90
.039 (1 mm)	**.046**	2	3/16	4	*LONG!*	31639	62.10	31639-C3	69.30
.039 (1 mm)	**.058**	4	3/16	2		67639	55.90	67639-C3	62.10
.039 (1 mm)	**.100**	2	3/16	2		45339	48.20	45339-C3	54.40
.039 (1 mm)	**.107**	4	3/16	2		68039	48.20	68039-C3	54.40
.039 (1 mm)	**.154**	4	1/4	2		946639	70.90	946639-C3	79.30
.039 (1 mm)	**.249**	4	3/8	2-1/2		21039	64.10	21039-C3	76.30
.040	**.020**	2	1/8	1-1/2		45340	39.70	45340-C3	44.90
.040	**.046**	2	3/16	2		17040	46.90	17040-C3	53.10
.040	**.107**	4	1/4	2		68040	70.90	68040-C3	79.30
.040	**.249**	4	3/8	2-1/2		21040	77.50	21040-C3	89.70
.043	**.046**	2	3/16	2		17043	46.90	17043-C3	53.10
.043	**.058**	4	3/16	2		67643	55.90	67643-C3	62.10
.043	**.249**	4	3/8	2-1/2		21043	77.50	21043-C3	89.70
.045	**.046**	2	3/16	2		17045	46.90	17045-C3	53.10
.045	**.058**	4	3/16	2		67645	55.90	67645-C3	62.10

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	**.020**	2	1/8	1-1/2		67847	39.70	67847-C3	44.90
.047 (3/64)	**.046**	2	3/16	2		17047	46.90	17047-C3	53.10
.047 (3/64)	**.046**	2	3/16	4	***LONG!***	31647	62.10	31647-C3	69.30
.047 (3/64)	**.058**	4	3/16	2		67647	55.90	67647-C3	62.10
.047 (3/64)	**.107**	4	1/4	2		68047	70.90	68047-C3	79.30
.047 (3/64)	**.125**	2	1/4	2		45347	55.40	45347-C3	63.80
.047 (3/64)	**.249**	4	3/8	2-1/2		21047	77.50	21047-C3	89.70
.050	**.020**	2	1/8	1-1/2		67850	39.70	67850-C3	44.90
.050	**.046**	2	3/16	2		17050	46.90	17050-C3	53.10
.050	**.046**	2	1/4	4	***LONG!***	31650	73.70	31650-C3	82.10
.050	**.058**	4	3/16	2		67650	55.90	67650-C3	62.10
.050	**.107**	4	1/4	2		68050	70.90	68050-C3	79.30
.050	**.125**	2	1/4	2		45350	55.40	45350-C3	63.80
.050	**.249**	4	3/8	2-1/2		21050	77.50	21050-C3	89.70
.052	**.107**	4	1/4	2		68052	70.90	68052-C3	79.30
.055	**.046**	2	3/16	2		17055	46.90	17055-C3	53.10
.055	**.058**	4	3/16	2		67655	55.90	67655-C3	62.10
.055	**.107**	4	1/4	2		68055	70.90	68055-C3	79.30
.058	**.107**	4	1/4	2		68058	70.90	68058-C3	79.30
.060	**.020**	2	3/16	2		67860	48.70	67860-C3	54.90
.060	**.046**	2	3/16	2		17060	46.90	17060-C3	53.10
.060	**.046**	2	1/4	4	***LONG!***	31660	73.70	31660-C3	82.10
.060	**.058**	4	3/16	2		67660	55.90	67660-C3	62.10
.060	**.107**	4	1/4	2		68060	70.90	68060-C3	79.30
.060	**.125**	2	1/4	2		45360	55.40	45360-C3	63.80
.060	**.154**	4	5/16	2-1/2		946660	81.70	946660-C3	91.90
.060	**.249**	4	1/2	3		21060	86.40	21060-C3	98.40
.062 (1/16)	**.020**	2	3/16	2		67862	48.70	67862-C3	54.90
.062 (1/16)	**.046**	2	3/16	2		17062	46.90	17062-C3	53.10
.062 (1/16)	**.046**	2	1/4	4	***LONG!***	31662	73.70	31662-C3	82.10
.062 (1/16)	**.058**	4	3/16	2		67662	55.90	67662-C3	62.10
.062 (1/16)	**.107**	4	1/4	2		68062	70.90	68062-C3	79.30
.062 (1/16)	**.125**	2	1/4	2		45362	55.40	45362-C3	63.80
.062 (1/16)	**.154**	4	5/16	2-1/2		946662	81.70	946662-C3	91.90
.062 (1/16)	**.249**	4	1/2	3		21062	86.40	21062-C3	103.20
.065	**.046**	2	3/16	2		17065	46.90	17065-C3	53.10
.070	**.046**	2	3/16	2		17070	46.90	17070-C3	53.10
.070	**.058**	4	1/4	2		67670	70.90	67670-C3	79.30
.070	**.107**	4	1/4	2		68070	70.90	68070-C3	79.30
.072	**.046**	2	1/4	2		17072	53.70	17072-C3	62.10
.072	**.249**	4	1/2	3		21072	90.50	21072-C3	107.30
.075	**.046**	2	1/4	2		17075	53.70	17075-C3	62.10
.078 (5/64)	**.020**	2	3/16	2		67878	54.10	67878-C3	60.30
.078 (5/64)	**.046**	2	1/4	2		17078	53.70	17078-C3	62.10
.078 (5/64)	**.046**	2	1/4	4	***LONG!***	31678	73.70	31678-C3	82.10
.078 (5/64)	**.058**	4	1/4	2		67678	70.90	67678-C3	79.30

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.078 (5/64)	**.107**	4	5/16	2-1/2		68078	81.70	68078-C3	91.90
.078 (5/64)	**.125**	2	5/16	2-1/2		941578	81.70	941578-C3	91.90
.078 (5/64)	**.154**	4	5/16	2-1/2		946678	81.70	946678-C3	91.90
.078 (5/64)	**.249**	4	1/2	3		21078	90.50	21078-C3	107.30
.080	**.046**	2	1/4	2		17080	53.70	17080-C3	62.10
.080	**.058**	4	1/4	2		67680	70.90	67680-C3	79.30
.080	**.107**	4	5/16	2-1/2		68080	81.70	68080-C3	91.90
.085	**.046**	2	1/4	2		17085	53.70	17085-C3	62.10
.089	**.045**	2	1/4	2		17089	53.70	17089-C3	62.10
.089	**.107**	4	5/16	2-1/2		68089	81.70	68089-C3	91.90
.089	**.248**	4	1/2	3		21089	90.50	21089-C3	107.30
.090	**.045**	2	1/4	2		17090	53.70	17090-C3	62.10
.090	**.058**	4	1/4	2		67690	70.90	67690-C3	79.30
.090	**.107**	4	5/16	2-1/2		68090	81.70	68090-C3	91.90
.093 (3/32)	**.045**	2	1/4	2		17093	53.70	17093-C3	62.10
.093 (3/32)	**.045**	2	5/16	4	***LONG!***	31693	97.10	31693-C3	108.50
.093 (3/32)	**.058**	4	1/4	2		67693	70.90	67693-C3	79.30
.093 (3/32)	**.107**	4	5/16	2-1/2		68093	81.70	68093-C3	91.90
.093 (3/32)	**.125**	2	5/16	2-1/2		941593	81.70	941593-C3	91.90
.093 (3/32)	**.154**	4	3/8	2-1/2		946693	100.10	946693-C3	112.30
.093 (3/32)	**.248**	4	1/2	3		21093	92.20	21093-C3	109.10
.095	**.045**	2	1/4	2		17095	53.70	17095-C3	62.10
.100	**.045**	2	1/4	2		17100	53.70	17100-C3	62.10
.100	**.045**	2	5/16	4	***LONG!***	31700	97.10	31700-C3	108.50
.100	**.058**	4	5/16	2-1/2		77800	82.10	77800-C3	92.30
.100	**.107**	4	5/16	2-1/2		68100	82.10	68100-C3	92.30
.100	**.248**	4	1/2	3		21100	92.20	21100-C3	109.10
.109 (7/64)	**.058**	2	5/16	2-1/2		17109	82.10	17109-C3	92.30
.109 (7/64)	**.107**	4	3/8	2-1/2		68109	100.10	68109-C3	112.30
.118 (3 mm)	**.058**	2	5/16	2-1/2		17118	82.10	17118-C3	92.30
.118 (3 mm)	**.107**	4	3/8	2-1/2		68118	100.10	68118-C3	112.30
.118 (3 mm)	**.248**	4	1/2	3		21118	116.90	21118-C3	133.70
.125 (1/8)	**.046**	2	5/16	2-1/2		948425	79.70	948425-C3	89.90
.125 (1/8)	**.058**	2	5/16	2-1/2		17125	82.10	17125-C3	92.30
.125 (1/8)	**.058**	2	3/8	4	***LONG!***	31725	115.90	31725-C3	124.10
.125 (1/8)	**.107**	4	3/8	2-1/2		68125	100.10	68125-C3	112.30
.125 (1/8)	**.125**	2	7/16	2-1/2		941608	133.40	941608-C3	148.90
.125 (1/8)	**.154**	4	7/16	2-1/2		946725	133.40	946725-C3	148.90
.125 (1/8)	**.248**	4	5/8	3-1/2		21125	148.40	21125-C3	166.60
.140 (9/64)	**.058**	2	3/8	2-1/2		17140	98.50	17140-C3	110.70
.140 (9/64)	**.107**	4	7/16	2-1/2		68140	133.40	68140-C3	148.90
.156 (5/32)	**.058**	2	3/8	2-1/2		17156	98.50	17156-C3	110.70
.156 (5/32)	**.107**	4	7/16	2-1/2		68156	133.40	68156-C3	148.90
.156 (5/32)	**.248**	4	5/8	3-1/2		21156	163.40	21156-C3	181.60

SPEEDS & FEEDS ONLINE!

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.172 (11/64)	**.058**	2	7/16	2-1/2	17172	148.40	17172-C3	163.90
.187 (3/16)	**.058**	2	7/16	2-1/2	17187	148.40	17187-C3	163.90
.187 (3/16)	**.107**	4	1/2	3	68187	155.70	68187-C3	172.50
.187 (3/16)	**.248**	4	5/8	3-1/2	21187	175.10	21187-C3	193.30
.197 (5 mm)	**.058**	2	1/2	3	17197	155.70	17197-C3	172.50
.197 (5 mm)	**.107**	4	5/8	3-1/2	68197	233.70	68197-C3	251.90
.219 (7/32)	**.058**	2	1/2	3	17219	157.10	17219-C3	173.90
.219 (7/32)	**.107**	4	5/8	3-1/2	68219	233.70	68219-C3	251.90
.236 (6 mm)	**.107**	2	5/8	3-1/2	17236	236.10	17236-C3	254.30
.236 (6 mm)	**.107**	4	5/8	3-1/2	68236	233.70	68236-C3	251.90
.250 (1/4)	**.058**	2	5/8	3-1/2	17199	236.10	17199-C3	254.30
.250 (1/4)	**.107**	2	5/8	3-1/2	17250	233.70	17250-C3	251.90
.250 (1/4)	**.107**	4	5/8	3-1/2	68250	233.70	68250-C3	251.90
.250 (1/4)	**.154**	4	3/4	4	946750	260.10	946750-C3	281.20
.250 (1/4)	**.247**	4	3/4	4	21250	260.10	21250-C3	281.20
.312 (5/16)	**.247**	4	1	4	21312	367.40	21312-C3	397.60
.375 (3/8)	**.246**	4	1	4	21375	401.10	21375-C3	431.30

SPEEDS & FEEDS ONLINE!

★★★★★

"Best Tool ever! [Back Corner Rounding End Mill] No more second ops! (making iPad/tablet display frames for kiosks)."

— @centralmachineinc

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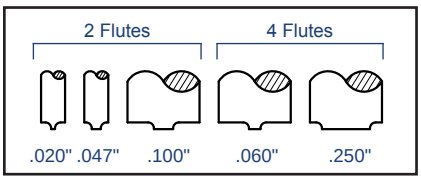
CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared



- Unflared shoulder and pilot for full radius form
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	**.020**	2	1/8	1-1/2		932205	39.10			932205-C3	44.30		
.005	**.047**	2	1/8	1-1/2		46005	30.20	46005-C1	35.40	46005-C3	35.40	46005-C4	45.90
.008	**.047**	2	1/8	1-1/2		46008	30.20	46008-C1	35.40	46008-C3	35.40		
.010	**.020**	2	1/8	1-1/2		932210	39.10			932210-C3	44.30		
.010	**.047**	2	1/8	1-1/2		46010	29.70	46010-C1	34.90	46010-C3	34.90	46010-C4	45.40
.010	**.250**	4	3/8	2-1/2		44010	51.90			44010-C3	64.10		
.012	**.047**	2	1/8	1-1/2		46012	30.20	46012-C1	35.40	46012-C3	35.40		
.015 (1/64)	**.020**	2	1/8	1-1/2		932215	39.10			932215-C3	44.30		
.015 (1/64)	**.047**	2	1/8	1-1/2		46015	29.70	46015-C1	34.90	46015-C3	34.90	46015-C4	45.40
.015 (1/64)	**.047**	2	3/16	4	***LONG!***	928015	60.10			928015-C3	67.30		
.015 (1/64)	**.060**	4	1/8	1-1/2		929915	47.20			929915-C3	52.40		
.015 (1/64)	**.250**	4	3/8	2-1/2		44015	51.90			44015-C3	64.10		
.018	**.047**	2	1/8	1-1/2		46018	30.20	46018-C1	35.40	46018-C3	35.40		
.020	**.020**	2	1/8	1-1/2		932220	39.10			932220-C3	44.30		
.020	**.047**	2	1/8	1-1/2		46020	29.70	46020-C1	34.90	46020-C3	34.90	46020-C4	45.40
.020	**.047**	2	3/16	4	***LONG!***	928020	60.10			928020-C3	67.30		
.020	**.250**	4	3/8	2-1/2		44020	51.90			44020-C3	64.10		
.022	**.047**	2	1/8	1-1/2		46022	30.20	46022-C1	35.40	46022-C3	35.40		
.025	**.020**	2	1/8	1-1/2		932225	39.10			932225-C3	44.30		
.025	**.047**	2	1/8	1-1/2		46025	29.70	46025-C1	34.90	46025-C3	34.90	46025-C4	45.40
.025	**.250**	4	3/8	2-1/2		44025	51.90			44025-C3	64.10		
.027	**.047**	2	1/8	1-1/2		46027	30.20	46027-C1	35.40	46027-C3	35.40		
.030	**.047**	2	1/8	1-1/2		46030	30.20	46030-C1	35.40	46030-C3	35.40	46030-C4	45.90
.030	**.250**	4	3/8	2-1/2		44030	56.90			44030-C3	69.10		
.031 (1/32)	**.020**	2	1/8	1-1/2		932231	39.10			932231-C3	44.30		
.031 (1/32)	**.047**	2	1/8	1-1/2		46031	29.70	46031-C1	34.90	46031-C3	34.90	46031-C4	45.40
.031 (1/32)	**.047**	2	3/16	4	***LONG!***	928031	60.10			928031-C3	67.30		
.031 (1/32)	**.060**	4	1/8	1-1/2		929931	47.20			929931-C3	52.40		
.031 (1/32)	**.250**	4	3/8	2-1/2		44031	56.90			44031-C3	69.10		
.032	**.047**	2	1/8	1-1/2		46032	33.50	46032-C1	38.70	46032-C3	38.70		
.035	**.047**	2	1/8	1-1/2		46035	33.50	46035-C1	38.70	46035-C3	38.70		
.039 (1 mm)	**.047**	2	1/8	1-1/2		46039	33.50	46039-C1	38.70	46039-C3	38.70	46039-C4	49.20
.039 (1 mm)	**.250**	4	3/8	2-1/2		44039	56.90			44039-C3	69.10		

SPEEDS & FEEDS ONLINE!

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Click Tool # for stock, speeds & feeds, & other technical info

CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared (cont.)

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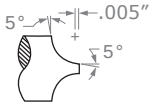
RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.043	**.047**	2	3/16	2		46043	39.70	46043-C1	45.90	46043-C3	45.90		
.047 (3/64)	**.047**	2	3/16	2		46047	39.10	46047-C1	45.30	46047-C3	45.30	46047-C4	60.80
.047 (3/64)	**.250**	4	3/8	2-1/2		44047	56.90			44047-C3	69.10		
.050	**.047**	2	3/16	2		46050	39.10	46050-C1	45.30	46050-C3	45.30	46050-C4	60.80
.050	**.250**	4	3/8	2-1/2		44050	56.90			44050-C3	69.10		
.055	**.047**	2	3/16	2		46055	39.10	46055-C1	45.30	46055-C3	45.30		
.060	**.047**	2	3/16	2		46060	40.40	46060-C1	46.60	46060-C3	46.60	46060-C4	62.10
.060	**.250**	4	1/2	3		44060	80.40			44060-C3	97.20		
.062 (1/16)	**.047**	2	3/16	2		46062	39.70	46062-C1	45.90	46062-C3	45.90	46062-C4	61.40
.062 (1/16)	**.047**	2	1/4	4	***LONG!***	928062	71.70			928062-C3	80.10		
.062 (1/16)	**.060**	4	3/16	2		929962	53.10			929962-C3	59.30		
.062 (1/16)	**.250**	4	1/2	3		44062	80.40			44062-C3	97.20		
.067	**.047**	2	3/16	2		46067	40.40	46067-C1	46.60	46067-C3	46.60		
.072	**.047**	2	1/4	2		46072	46.50	46072-C1	54.70	46072-C3	54.90		
.078 (5/64)	**.047**	2	1/4	2		46078	45.70	46078-C1	53.90	46078-C3	54.10	46078-C4	70.40
.078 (5/64)	**.250**	4	1/2	3		44078	80.40			44078-C3	97.20		
.089	**.047**	2	1/4	2		46089	46.50	46089-C1	54.70	46089-C3	54.90		
.093 (3/32)	**.047**	2	1/4	2		46093	46.50	46093-C1	54.70	46093-C3	54.90	46093-C4	71.20
.093 (3/32)	**.047**	2	5/16	4	***LONG!***	928093	84.10			928093-C3	95.50		
.093 (3/32)	**.060**	4	1/4	2		929993	65.90			929993-C3	74.30		
.093 (3/32)	**.250**	4	1/2	3		44093	90.40			44093-C3	107.20		
.100	**.047**	2	1/4	2		46100	45.70	46100-C1	53.90	46100-C3	54.10	46100-C4	70.40
.104	**.060**	2	5/16	2-1/2		46104	64.50	46104-C1	74.70	46104-C3	74.70		
.109 (7/64)	**.060**	2	5/16	2-1/2		46109	63.50	46109-C1	73.70	46109-C3	73.70		
.118 (3 mm)	**.060**	2	5/16	2-1/2		46118	64.50	46118-C1	74.70	46118-C3	74.70	46118-C4	89.20
.118 (3 mm)	**.250**	4	1/2	3		44118	90.40			44118-C3	107.20		
.125 (1/8)	**.060**	2	5/16	2-1/2		46125	64.50	46125-C1	74.70	46125-C3	74.70	46125-C4	89.20
.125 (1/8)	**.060**	2	3/8	4	***LONG!***	928125	127.70			928125-C3	140.90		
.125 (1/8)	**.250**	4	5/8	3-1/2		44125	132.50			44125-C3	150.70		
.140 (9/64)	**.060**	2	3/8	2-1/2		46140	74.10	46140-C1	86.30	46140-C3	86.30		
.156 (5/32)	**.060**	2	3/8	2-1/2		46156	80.10	46156-C1	92.30	46156-C3	92.30		
.156 (5/32)	**.250**	4	5/8	3-1/2		44156	142.40			44156-C3	160.60		
.172 (11/64)	**.060**	2	7/16	2-1/2		46172	131.50	46172-C1	146.70	46172-C3	147.10		
.187 (3/16)	**.060**	2	7/16	2-1/2		46187	135.50	46187-C1	150.70	46187-C3	151.10		
.187 (3/16)	**.250**	4	5/8	3-1/2		44187	155.70			44187-C3	173.90		
.197 (5 mm)	**.060**	2	1/2	3		46197	188.10	46197-C1	204.30	46197-C3	204.90		
.219 (7/32)	**.060**	2	1/2	3		46219	180.50	46219-C1	196.70	46219-C3	197.30		
.236 (6 mm)	**.110**	2	5/8	3-1/2		46236	241.10	46236-C1	259.30	46236-C3	259.30		
.250 (1/4)	**.110**	2	5/8	3-1/2		46250	241.10	46250-C1	259.30	46250-C3	259.30		
.250 (1/4)	**.250**	4	3/4	4		44250	252.70			44250-C3	273.80		
.312 (5/16)	**.250**	2	1	4		46312	374.40	46312-C1	404.60	46312-C3	404.60		
.375 (3/8)	**.250**	2	1	4		46375	407.90	46375-C1	438.10	46375-C3	438.10		

SPEEDS & FEEDS ONLINE!

CORNER ROUNDING END MILLS

Long Reach – Flared



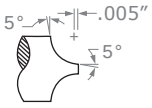
- **Reduced diameter for clearance along walls and in small features**
- Small pilot design for miniature holes, narrow slots and small inside corners
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Axial depth of cut = radius plus .005″
- 2 flutes
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIAMETER	NECK DIAMETER	NECK LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1 +.000″ −.001″	D3	L3 +.010″ −.000″	D2	L1	2 FL	PRICE	2 FL	PRICE
.005	.010	.031	.156	1/8	1-1/2	994605	34.40		
	.010	.031	.250	1/8	1-1/2	56905	34.40		
	.010	.031	.375	1/8	1-1/2	57305	35.40		
	.020	.031	.156	1/8	1-1/2	992205	34.40	992205-C3	38.60
	.020	.031	.250	1/8	1-1/2	55705	34.40	55705-C3	38.60
	.020	.031	.375	1/8	1-1/2	56005	35.40		
	.020	.062	.312	1/8	1-1/2	990905	34.40		
	.020	.062	.500	1/8	1-1/2	57505	34.40		
	.020	.062	.750	1/8	2	55305	35.40		
	.020	.093	.750	1/8	2	57405	39.40		
	.020	.093	1.125	1/8	2	54305	39.40		
.008	.010	.031	.156	1/8	1-1/2	994608	34.40	994608-C3	38.60
	.010	.031	.250	1/8	1-1/2	56908	34.40		
	.010	.031	.375	1/8	1-1/2	57308	35.40		
.010	.010	.031	.156	1/8	1-1/2	994610	34.40	994610-C3	38.60
	.010	.031	.250	1/8	1-1/2	56910	34.40	56910-C3	38.60
	.010	.031	.375	1/8	1-1/2	57310	35.40		
	.020	.062	.312	1/8	1-1/2	990910	34.40	990910-C3	38.60
	.020	.062	.500	1/8	1-1/2	57510	34.40		
	.020	.062	.750	1/8	2	55310	35.40		
	.020	.093	.750	1/8	2	57410	39.40		
	.020	.093	1.125	1/8	2	54310	39.40		
.015	.020	.062	.312	1/8	1-1/2	990915	34.40	990915-C3	38.60
	.020	.062	.500	1/8	1-1/2	57515	34.40	57515-C3	38.60
	.020	.062	.750	1/8	2	55315	35.40		
	.020	.093	.750	1/8	2	57415	39.40		
	.020	.093	1.125	1/8	2	54315	39.40		
.020	.020	.062	.312	1/8	1-1/2	990920	34.40	990920-C3	38.60
	.020	.062	.500	1/8	1-1/2	57520	34.40	57520-C3	38.60
	.020	.062	.750	1/8	2	55320	35.40		
	.020	.093	.750	1/8	2	57420	39.40		
	.020	.093	1.125	1/8	2	54320	39.40		
.025	.020	.093	.750	1/8	2	57425	39.40		
	.020	.093	1.125	1/8	2	54325	39.40		
.030	.020	.093	.750	1/8	2	57430	39.40	57430-C3	43.60
	.020	.093	1.125	1/8	2	54330	39.40		

SPEEDS & FEEDS ONLINE!

CORNER ROUNDING END MILLS

3 Flute – Flared



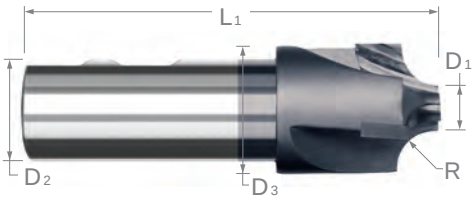
- Single end
- Cutting on radius and end only (not center cutting)
- 5° flares tangent at pilot and shoulder to avoid steps
- Axial depth of cut = radius plus .005″
- 3 flutes
- Solid carbide
- CNC ground in the USA

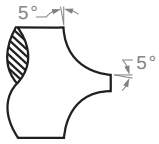
RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1	D2	L1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)	.058	1/8	1-1/2	933415	28.40	933415-C3	32.60
.031 (1/32)	.058	1/8	1-1/2	933431	28.40	933431-C3	32.60
.062 (1/16)	.058	3/16	2	933462	36.20	933462-C3	40.70
.062 (1/16)	.154	5/16	2-1/2	928262	61.90	928262-C3	69.10
.093 (3/32)	.058	1/4	2	933493	53.10	933493-C3	59.30
.093 (3/32)	.154	3/8	2-1/2	928293	70.70	928293-C3	78.90
.125 (1/8)	.058	5/16	2-1/2	933508	61.90	933508-C3	69.10
.125 (1/8)	.248	5/8	3-1/2	973008	103.40	973008-C3	115.60
.187 (3/16)	.058	7/16	2-1/2	933512	101.40	933512-C3	111.60
.187 (3/16)	.248	5/8	3-1/2	973012	117.20	973012-C3	129.40

SPEEDS & FEEDS ONLINE!

CORNER ROUNDING END MILLS

3 Flute – Flared – Carbide Tipped





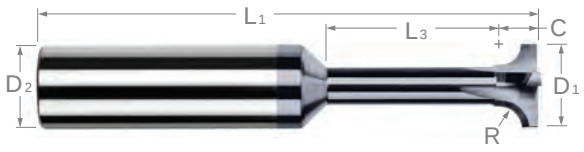
- Carbide tipped - cutting on radius only
- 5° flares tangent to radius at pilot and shoulder to avoid steps
- 3 flutes
- Weldon flat
- CNC ground in the USA

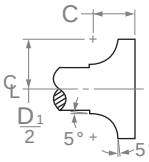
RADIUS	PILOT DIAMETER	HEAD DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R	D1	D3	D2	L1	3 FL	PRICE	3 FL	PRICE
1/4	13/32	1	3/4	3-1/4	45016	182.90	45016-C3	203.10
5/16	13/32	1-1/8	7/8	3-1/2	45020	187.40	45020-C3	206.90
3/8	13/32	1-1/4	7/8	3-3/4	45024	194.10	45024-C3	214.60
7/16	13/32	1-3/8	1	4	45028	217.40	45028-C3	242.60
1/2	13/32	1-1/2	1	4	45032	240.50	45032-C3	260.70
5/8	21/32	2	1-1/4	4-1/4	45040	298.20	45040-C3	323.40

SPEEDS & FEEDS ONLINE!

CORNER ROUNDING END MILLS

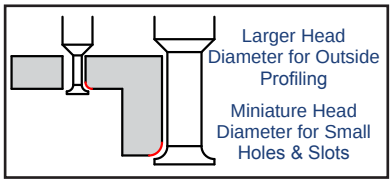
Back Corner Rounding End Mills – Flared





5° Flares at Shoulder & Pilot to Avoid Steps in Workpiece

- Designed to mill radius on backside of workpiece
- 5° flares at neck and shoulder to avoid steps
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Cutting on radius and flares only
- Solid carbide
- CNC ground in the USA



RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1 +.000″ −.002″		L3	C +.003″ −.001″ *		D2	L1	TOOL #	PRICE	TOOL #	PRICE
.005	.030	.017	.062	.025	3	1/8	1-1/2	57705	55.40	57705-C3	59.60
.005	.060	.047	.250	.025	3	1/8	1-1/2	58005	55.40	58005-C3	59.60
.005	.115	.102	.875	.025	3	1/8	2	59805	57.70	59805-C3	61.90
.008	.075	.056	.312	.028	3	1/8	1-1/2	58708	55.40	58708-C3	59.60
.008	.187	.144	.500	.070	3	3/16	2	16008	58.90	16008-C3	63.40
.010	.045	.022	.078	.030	3	1/8	1-1/2	60910	55.40	60910-C3	59.60
.010	.075	.052	.281	.030	3	1/8	1-1/2	58710	55.40	58710-C3	59.60
.010	.187	.140	.500	.072	3	3/16	2	16010	58.90	16010-C3	63.40
.012	.075	.048	.250	.032	3	1/8	1-1/2	58712	55.40	58712-C3	59.60
.015 (1/64)	.060	.027	.093	.035	3	1/8	1-1/2	58515	55.40	58515-C3	59.60
.015 (1/64)	.090	.057	.312	.035	3	1/8	1-1/2	59715	55.40	59715-C3	59.60
.015 (1/64)	.187	.130	.500	.077	3	3/16	2	16015	58.90	16015-C3	63.40
.015 (1/64)	.187	.130	1.000	.077	3	3/16	2-1/2	992815	59.70	992815-C3	64.20
.020	.075	.032	.109	.040	3	1/8	1-1/2	59220	55.40	59220-C3	59.60
.020	.115	.072	.375	.040	3	1/8	1-1/2	60420	55.40	60420-C3	59.60
.020	.187	.120	.500	.082	3	3/16	2	16020	58.90	16020-C3	63.40
.022	.187	.116	.500	.084	3	3/16	2	16022	58.90	16022-C3	63.40
.025	.090	.037	.125	.055	3	1/8	1-1/2	60125	55.40	60125-C3	59.60
.025	.187	.110	.500	.087	3	3/16	2	16025	58.90	16025-C3	63.40
.027	.187	.106	.500	.089	3	3/16	2	16027	58.90	16027-C3	63.40
.030	.115	.052	.187	.060	3	1/8	1-1/2	60630	55.40	60630-C3	59.60
.030	.187	.100	.500	.092	3	3/16	2	16030	58.90	16030-C3	63.40
.030	.187	.100	1.000	.092	3	3/16	2-1/2	992830	59.70	992830-C3	64.20
.031 (1/32)	.115	.050	.156	.061	3	1/8	1-1/2	60631	55.40	60631-C3	59.60
.031 (1/32)	.187	.098	.500	.093	3	3/16	2	16031	58.90	16031-C3	63.40
.031 (1/32)	.187	.098	1.000	.093	3	3/16	2-1/2	992831	59.70	992831-C3	64.20
.035	.250	.153	.500	.097	3	1/4	2-1/2	16035	64.10	16035-C3	70.30
.039 (1 mm)	.250	.145	.500	.101	3	1/4	2-1/2	16039	64.10	16039-C3	70.30
.039 (1 mm)	.250	.145	1.000	.101	3	1/4	2-1/2	992839	64.10	992839-C3	70.30
.040	.250	.143	.500	.102	3	1/4	2-1/2	16040	64.10	16040-C3	70.30
.045	.250	.133	.500	.107	3	1/4	2-1/2	16045	64.10	16045-C3	70.30

SPEEDS & FEEDS ONLINE!

*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

CORNER ROUNDING END MILLS

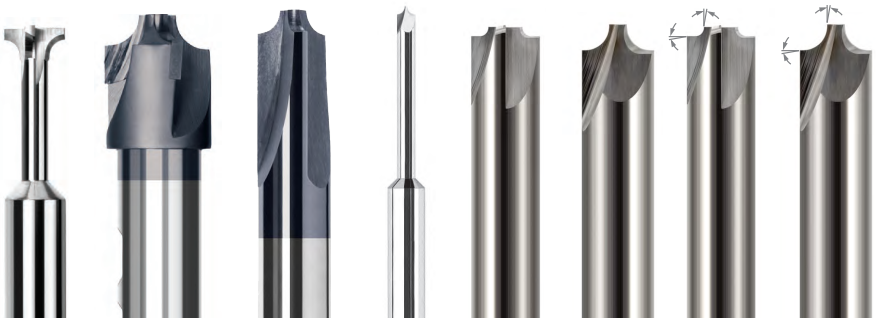
Back Corner Rounding End Mills – Flared (cont.)

continued from previous page

RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1 +.000″ −.002″		L_3	C +.003″ −.001″ *		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	.250	.128	.625	.109	3	1/4	2-1/2	16047	64.10	16047-C3	70.30
.047 (3/64)	.250	.128	1.250	.109	3	1/4	3	992847	69.90	992847-C3	76.10
.050	.250	.122	.375	.112	3	1/4	2-1/2	985050	64.10	985050-C3	70.30
.050	.250	.122	.625	.112	3	1/4	2-1/2	16050	64.10	16050-C3	70.30
.050	.250	.122	1.250	.112	3	1/4	3	992850	69.90	992850-C3	76.10
.055	.250	.113	.625	.117	3	1/4	2-1/2	16055	64.10	16055-C3	70.30
.060	.312	.164	.437	.122	3	5/16	2-1/2	985060	87.70	985060-C3	94.90
.060	.312	.164	.875	.122	3	5/16	2-1/2	16060	87.70	16060-C3	94.90
.062 (1/16)	.312	.160	.437	.124	3	5/16	2-1/2	985062	87.70	985062-C3	94.90
.062 (1/16)	.312	.160	.875	.124	3	5/16	2-1/2	16062	87.70	16062-C3	94.90
.062 (1/16)	.312	.160	1.250	.124	3	5/16	3	992862	92.70	992862-C3	99.90
.070	.375	.207	.875	.132	3	3/8	2-1/2	16070	100.40	16070-C3	108.60
.078 (5/64)	.375	.191	.500	.171	3	3/8	2-1/2	985078	100.40	985078-C3	108.60
.078 (5/64)	.375	.191	1.000	.171	3	3/8	2-1/2	16078	100.40	16078-C3	108.60
.078 (5/64)	.375	.191	1.500	.171	3	3/8	3	992878	107.90	992878-C3	116.10
.080	.375	.187	1.000	.173	3	3/8	2-1/2	16080	100.40	16080-C3	108.60
.090	.375	.167	1.000	.183	3	3/8	2-1/2	16090	100.40	16090-C3	108.60
.093 (3/32)	.375	.161	.500	.186	3	3/8	2-1/2	985093	100.40	985093-C3	108.60
.093 (3/32)	.375	.161	1.000	.186	3	3/8	2-1/2	16093	100.40	16093-C3	108.60
.093 (3/32)	.375	.161	1.500	.186	3	3/8	3	992893	107.90	992893-C3	116.10
.100	.500	.272	.500	.193	4	1/2	3	985100	144.70	985100-C3	156.90
.100	.500	.272	1.000	.193	4	1/2	3	16100	144.70	16100-C3	156.90
.118 (3 mm)	.500	.236	1.000	.211	4	1/2	3	1613M	144.70	1613M-C3	156.90
.125 (1/8)	.500	.222	.500	.218	4	1/2	3	985108	144.70	985108-C3	156.90
.125 (1/8)	.500	.222	1.000	.218	4	1/2	3	16108	144.70	16108-C3	156.90
.125 (1/8)	.500	.222	1.500	.218	4	1/2	3-1/2	992908	150.10	992908-C3	162.30
.156 (5/32)	.625	.284	1.000	.250	4	5/8	3-1/2	16110	195.90	16110-C3	208.10
.187 (3/16)	.625	.222	1.000	.281	4	5/8	3-1/2	16112	195.90	16112-C3	208.10
.250 (1/4)	1.000	.471	1.500	.376	4	1	4	16116	294.10	16116-C3	314.30

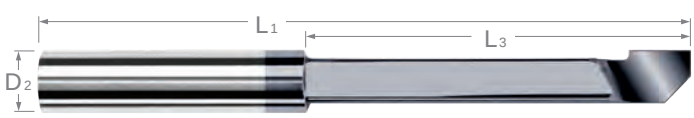
SPEEDS & FEEDS ONLINE!

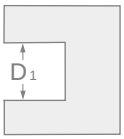
*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).



Check Out All of Our Corner Rounding Solutions!

BORING BARS





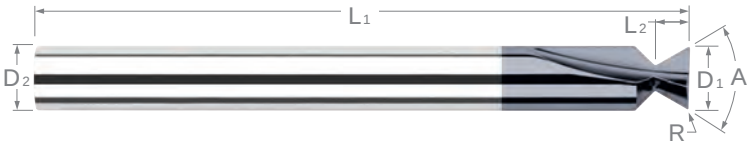
- Helical back rake flute improves accuracy and chip flow
- Square neck improves rigidity and has less deflection
- Tip is ground to sharp corner
- 70% stronger than round neck design
- Solid carbide
- CNC ground in the USA

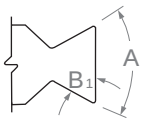
Helical Back Rake Design!

	MIN. BORE DIAMETER	MAX BORE DEPTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1	L_3	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.031	**5/32**	1/8	1-1/2	29030	31.20	29030-C3	35.40
	.036	**5/32**	1/8	1-1/2	29035	31.20		
	.042	**1/4**	1/8	1-1/2	29040	28.40	29040-C3	32.60
	.052	**5/16**	1/8	1-1/2	29050	27.70	29050-C3	31.90
	.057	**5/16**	1/8	1-1/2	29055	27.70		
	.062	**3/8**	1/8	1-1/2	29060	27.70	29060-C3	31.90
	.062	**1/2**	1/8	1-1/2	29060L	29.10	29060L-C3	33.30
	.072	**7/16**	1/8	1-1/2	29070	27.70	29070-C3	31.90
	.082	**1/2**	1/8	1-1/2	29080	27.70		
	.087	**1/2**	1/8	1-1/2	29085	27.70		
	.087	**5/8**	1/8	2	29085L	32.50		
	.092	**1/2**	1/8	1-1/2	29090	27.70	29090-C3	31.90
NEW	.092	**5/8**	1/8	2	29090L	32.50	29090L-C3	38.60
NEW	.102	**9/16**	1/8	1-1/2	29100	27.70	29100-C3	31.90
NEW	.102	**5/8**	1/8	2	29100L	32.50	29100L-C3	38.60
	.112	**9/16**	1/8	1-1/2	29110	27.70	29110-C3	31.90
	.112	**5/8**	1/8	2	29110L	32.50	29110L-C3	36.70
	.120	**5/8**	1/8	1-1/2	29120	27.70	29120-C3	31.90
	.120	**3/4**	1/8	2	29120L	32.50	29120L-C3	36.70
NEW	.135	**3/4**	5/32	2	29135	30.90	29135-C3	34.90
	.150	**3/4**	3/16	2	29150	31.70	29150-C3	36.20
	.150	**1**	3/16	2	29150L	37.90	29150L-C3	42.40
	.150	**1-1/2**	3/16	2-1/2	29150XL	40.40	29150XL-C3	44.90
	.180	**1**	3/16	2	29180	31.70	29180-C3	36.20
	.180	**1-1/2**	3/16	2-1/2	29180L	38.40	29180L-C3	42.90
	.180	**2**	3/16	3	29180XL	50.10	29180XL-C3	54.60
	.210	**1**	1/4	2	29210	33.10	29210-C3	39.30
	.210	**1-1/2**	1/4	2-1/2	29210L	38.90	29210L-C3	45.10
NEW	.210	**2**	1/4	3	29210XL	47.90	29210XL-C3	54.10
	.240	**1**	1/4	2	29240	33.10	29240-C3	39.30
	.240	**1-1/2**	1/4	2-1/2	29240L	38.90	29240L-C3	45.10
	.240	**2**	1/4	3	29240XL	57.50	29240XL-C3	63.70
NEW	.300	**1**	5/16	2-1/2	29300	79.90	29300-C3	88.40
NEW	.360	**2**	3/8	3	29360	104.90	29360-C3	113.10

Click Tool # for stock, speeds & feeds, & other technical info

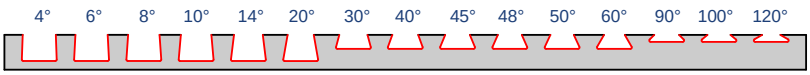
DOVETAIL CUTTERS





B1 = 90 - (A / 2)
A = 180 - 2B1

- Offered with sharp corner, .005", or .010" Corner Radius
- Solid carbide
- CNC ground in the USA



Stocked in *Fifteen* Included Angles!

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.020″ −.000″		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/16	.125	.054	.005	2	1/8	1-1/2	930004	80.50	930004-C3	84.70
	3/32	.187	.081	.010	2	1/8	1-1/2	991406	78.10	991406-C3	82.30
	1/8	.250	.108	***SHARP!***	2	1/8	1-1/2	883608	80.50	883608-C3	84.70
	1/8	.250	.108	.010	2	1/8	1-1/2	991408	81.90	991408-C3	86.10
	3/16	.375	.161	***SHARP!***	2	3/16	2	883612	82.90	883612-C3	87.40
4°	3/16	.375	.162	.010	2	3/16	2	991412	84.20	991412-C3	88.70
	1/4	.500	.215	***SHARP!***	2	1/4	2	883616	103.70	883616-C3	109.90
	1/4	.500	.216	.010	2	1/4	2	991416	105.50	991416-C3	111.70
	3/8	.750	.323	***SHARP!***	3	3/8	2-1/2	883624	120.10	883624-C3	128.30
	3/8	.750	.323	.010	3	3/8	2-1/2	991424	121.90	991424-C3	130.10
	1/2	1.000	.431	.010	3	1/2	3	991432	165.20	991432-C3	177.40
	1/16	.125	.049	.005	2	1/8	1-1/2	932304	80.50	932304-C3	84.70
	3/32	.187	.074	.010	2	1/8	1-1/2	989206	78.10	989206-C3	82.30
	1/8	.250	.099	***SHARP!***	2	1/8	1-1/2	891208	79.20	891208-C3	83.40
	1/8	.250	.100	.010	2	1/8	1-1/2	989208	80.50	989208-C3	84.70
	3/16	.375	.148	***SHARP!***	2	3/16	2	891212	81.40	891212-C3	85.90
6°	3/16	.375	.149	.010	2	3/16	2	989212	82.70	989212-C3	87.20
	1/4	.500	.198	***SHARP!***	2	1/4	2	891216	102.70	891216-C3	108.90
	1/4	.500	.199	.010	2	1/4	2	989216	104.40	989216-C3	110.60
	3/8	.750	.296	***SHARP!***	3	3/8	2-1/2	891224	118.50	891224-C3	126.70
	3/8	.750	.297	.010	3	3/8	2-1/2	989224	120.40	989224-C3	128.60
	1/2	1.000	.396	.010	3	1/2	3	989232	163.10	989232-C3	175.30
	1/8	.218	.096	.010	2	1/8	1-1/2	984808	78.10	984808-C3	82.30
8°	3/16	.281	.150	.010	2	3/16	2	984812	80.40	984812-C3	84.90
	1/4	.375	.199	.010	2	1/4	2	984816	102.10	984816-C3	108.30
	1/32	.047	.023	***SHARP!***	2	1/8	1-1/2	990102	78.50	990102-C3	82.70
	1/16	.093	.046	***SHARP!***	2	1/8	1-1/2	990104	78.50	990104-C3	82.70
	1/16	.093	.047	.005	2	1/8	1-1/2	61504	79.90	61504-C3	84.10
	5/64	.109	.060	.005	2	1/8	1-1/2	61505	79.90	61505-C3	84.10
	3/32	.125	.071	***SHARP!***	2	1/8	1-1/2	990106	75.90	990106-C3	80.10
	3/32	.125	.073	.010	2	1/8	1-1/2	27006	77.20	27006-C3	81.40
10°	1/8	.187	.092	***SHARP!***	2	1/8	1-1/2	990108	75.90	990108-C3	80.10
	1/8	.187	.094	.010	2	1/8	1-1/2	27008	77.20	27008-C3	81.40
	3/16	.250	.144	***SHARP!***	2	3/16	2	990112	78.20	990112-C3	82.70
	3/16	.250	.146	.010	2	3/16	2	27012	79.70	27012-C3	84.20
	1/4	.312	.195	***SHARP!***	2	1/4	2	990116	99.10	990116-C3	105.30
	1/4	.312	.197	.010	2	1/4	2	27016	101.10	27016-C3	107.30

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

DOVETAIL CUTTERS

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continued from previous page

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	5/16	.375	.247	SHARP!	3	5/16	2-1/2	990120	104.90	990120-C3	112.10
	5/16	.375	.249	.010	3	5/16	2-1/2	27020	106.70	27020-C3	113.90
	3/8	.500	.288	SHARP!	3	3/8	2-1/2	990124	112.90	990124-C3	121.10
	3/8	.500	.289	.010	3	3/8	2-1/2	27024	114.90	27024-C3	123.10
	1/2	.625	.391	SHARP!	3	1/2	3	990132	156.50	990132-C3	168.70
	1/2	.625	.392	.010	3	1/2	3	27032	159.10	27032-C3	171.30
14°	1/16	.093	.040	.005	2	1/8	1-1/2	873404	79.90	873404-C3	84.10
	3/32	.125	.065	.010	2	1/8	1-1/2	979406	77.20	979406-C3	81.40
	1/8	.187	.082	.010	2	1/8	1-1/2	979408	77.20	979408-C3	81.40
	3/16	.250	.129	.010	2	3/16	2	979412	79.70	979412-C3	84.20
	1/4	.312	.176	.010	2	1/4	2	979416	101.10	979416-C3	107.30
	5/16	.375	.223	.010	3	5/16	2-1/2	979420	106.70	979420-C3	113.90
	3/8	.500	.255	.010	3	3/8	2-1/2	979424	114.90	979424-C3	123.10
	1/2	.625	.349	.010	3	1/2	3	979432	159.10	979432-C3	171.30
20°	1/32	.031	.020	SHARP!	2	1/8	1-1/2	986002	67.70	986002-C3	71.90
	1/16	.062	.040	SHARP!	2	1/8	1-1/2	986004	67.70	986004-C3	71.90
	1/16	.062	.042	.005	2	1/8	1-1/2	62304	69.10	62304-C3	73.30
	5/64	.078	.052	.005	2	1/8	1-1/2	62305	69.10	62305-C3	73.30
	3/32	.093	.060	SHARP!	2	1/8	1-1/2	986006	64.90	986006-C3	69.10
	3/32	.093	.064	.010	2	1/8	1-1/2	16406	66.40	16406-C3	70.60
	1/8	.125	.081	SHARP!	2	1/8	1-1/2	986008	65.10	986008-C3	69.30
	1/8	.125	.085	.010	2	1/8	1-1/2	16408	66.40	16408-C3	70.60
	3/16	.187	.122	SHARP!	2	3/16	2	986012	67.50	986012-C3	72.10
	3/16	.187	.125	.010	2	3/16	2	16412	68.70	16412-C3	73.20
	1/4	.250	.162	SHARP!	2	1/4	2	986016	85.10	986016-C3	91.30
	1/4	.250	.166	.010	2	1/4	2	16416	86.70	16416-C3	92.90
	5/16	.312	.202	SHARP!	3	5/16	2-1/2	986020	93.10	986020-C3	100.30
	5/16	.312	.206	.010	3	5/16	2-1/2	16420	94.90	16420-C3	102.10
	3/8	.375	.243	SHARP!	3	3/8	2-1/2	986024	98.10	986024-C3	106.30
	3/8	.375	.247	.010	3	3/8	2-1/2	16424	99.70	16424-C3	107.90
	1/2	.500	.324	SHARP!	3	1/2	3	986032	134.90	986032-C3	147.10
	1/2	.500	.328	.010	3	1/2	3	16432	137.40	16432-C3	149.60
	5/8	.625	.409	.010	4	5/8	3	16440	157.40	16440-C3	169.60
	3/4	.750	.489	.010	4	3/4	3	16448	166.10	16448-C3	179.30
30°	1/32	.020	.020	SHARP!	2	1/8	1-1/2	983302	67.70	983302-C3	71.90
	1/16	.045	.041	SHARP!	2	1/8	1-1/2	983304	67.70	983304-C3	71.90
	1/16	.045	.041	.005	2	1/8	1-1/2	63404	69.10	63404-C3	73.30
	5/64	.055	.052	.005	2	1/8	1-1/2	63405	69.10	63405-C3	73.30
	3/32	.062	.060	SHARP!	2	1/8	1-1/2	983306	64.90	983306-C3	69.10
	3/32	.078	.057	.010	2	1/8	1-1/2	16506	66.40	16506-C3	70.60
	1/8	.082	.081	SHARP!	2	1/8	1-1/2	983308	65.10	983308-C3	69.30
	1/8	.093	.081	.010	2	1/8	1-1/2	16508	66.40	16508-C3	70.60
	3/16	.125	.121	SHARP!	2	3/16	2	983312	66.10	983312-C3	70.60
	3/16	.125	.127	.010	2	3/16	2	16512	67.40	16512-C3	71.90
	1/4	.156	.166	SHARP!	2	1/4	2	983316	83.70	983316-C3	89.90
	1/4	.156	.172	.010	2	1/4	2	16516	85.10	16516-C3	91.30

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

DOVETAIL CUTTERS

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continued from previous page

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	5/16	.218	.196	SHARP!	3	5/16	2-1/2	983320	91.50	983320-C3	98.70
	5/16	.187	.218	.010	3	5/16	2-1/2	16520	93.20	16520-C3	100.40
	3/8	.250	.241	SHARP!	3	3/8	2-1/2	983324	96.20	983324-C3	104.40
	3/8	.250	.247	.010	3	3/8	2-1/2	16524	98.10	16524-C3	106.30
	1/2	.312	.333	SHARP!	3	1/2	3	983332	132.50	983332-C3	144.70
	1/2	.312	.339	.010	3	1/2	3	16532	134.90	16532-C3	147.10
	5/8	.375	.430	.010	4	5/8	3	16540	154.90	16540-C3	167.10
	3/4	.500	.488	.010	4	3/4	3	16548	163.70	16548-C3	176.90
40°	1/16	.035	.037	SHARP!	2	1/8	1-1/2	977804	67.70	977804-C3	71.90
	1/16	.040	.037	.005	2	1/8	1-1/2	64604	69.10	64604-C3	73.30
	5/64	.050	.046	.005	2	1/8	1-1/2	64605	69.10	64605-C3	73.30
	3/32	.062	.056	.010	2	1/8	1-1/2	28506	66.40	28506-C3	70.60
	1/8	.078	.068	SHARP!	2	1/8	1-1/2	977808	65.10	977808-C3	69.30
	1/8	.093	.066	.010	2	1/8	1-1/2	28508	66.40	28508-C3	70.60
	3/16	.109	.108	SHARP!	2	3/16	2	977812	67.50	977812-C3	72.10
	3/16	.125	.105	.010	2	3/16	2	28512	68.70	28512-C3	73.20
	1/4	.156	.136	SHARP!	2	1/4	2	977816	85.10	977816-C3	91.30
	1/4	.156	.145	.010	2	1/4	2	28516	86.70	28516-C3	92.90
	5/16	.187	.176	SHARP!	3	5/16	2-1/2	977820	93.10	977820-C3	100.30
	5/16	.187	.185	.010	3	5/16	2-1/2	28520	94.90	28520-C3	102.10
	3/8	.218	.216	SHARP!	3	3/8	2-1/2	977824	98.10	977824-C3	106.30
	3/8	.250	.202	.010	3	3/8	2-1/2	28524	99.70	28524-C3	107.90
	1/2	.312	.273	SHARP!	3	1/2	3	977832	134.90	977832-C3	147.10
	1/2	.312	.281	.010	3	1/2	3	28532	137.40	28532-C3	149.60
	5/8	.375	.361	.010	4	5/8	3	28540	157.40	28540-C3	169.60
	3/4	.500	.395	.010	4	3/4	3	28548	166.10	28548-C3	179.30
45°	1/8	.093	.058	.010	2	1/8	1-1/2	928408	70.50	928408-C3	74.70
	3/16	.125	.094	.010	2	3/16	2	928412	72.90	928412-C3	77.40
	1/4	.156	.121	SHARP!	2	1/4	2	874516	89.50	874516-C3	95.70
	1/4	.156	.131	.010	2	1/4	2	928416	90.90	928416-C3	97.10
	3/8	.250	.168	SHARP!	3	3/8	2-1/2	874524	103.50	874524-C3	111.70
	3/8	.250	.178	.010	3	3/8	2-1/2	928424	104.90	928424-C3	113.10
	1/2	.312	.242	SHARP!	3	1/2	3	874532	141.90	874532-C3	154.10
	1/2	.312	.251	.010	3	1/2	3	928432	144.20	928432-C3	156.40
48°	1/16	.035	.036	.005	2	1/8	1-1/2	896504	67.40	896504-C3	71.60
	5/64	.045	.043	.005	2	1/8	1-1/2	896505	67.40	896505-C3	71.60
	3/32	.050	.059	.010	2	1/8	1-1/2	16606	64.10	16606-C3	68.30
	1/8	.070	.063	SHARP!	2	1/8	1-1/2	973108	62.70	973108-C3	66.90
	1/8	.093	.053	.010	2	1/8	1-1/2	16608	64.10	16608-C3	68.30
	3/16	.109	.090	SHARP!	2	3/16	2	973112	65.90	973112-C3	70.40
	3/16	.125	.087	.010	2	3/16	2	16612	67.20	16612-C3	71.70
	1/4	.156	.111	SHARP!	2	1/4	2	973116	82.90	973116-C3	89.10
	1/4	.156	.122	.010	2	1/4	2	16616	84.50	16616-C3	90.70
	5/16	.187	.157	.010	3	5/16	2-1/2	16620	92.70	16620-C3	99.90

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

DOVETAIL CUTTERS

(cont.)

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
48°	3/8	.250	.152	SHARP!	3	3/8	2-1/2	973124	95.70	973124-C3	103.90
	3/8	.250	.163	.010	3	3/8	2-1/2	16624	97.40	16624-C3	105.60
	1/2	.312	.222	SHARP!	3	1/2	3	973132	131.90	973132-C3	144.10
	1/2	.312	.233	.010	3	1/2	3	16632	134.20	16632-C3	146.40
50°	1/8	.093	.050	.010	2	1/8	1-1/2	926208	64.10	926208-C3	68.30
	3/16	.125	.082	.010	2	3/16	2	926212	67.20	926212-C3	71.70
	1/4	.156	.116	.010	2	1/4	2	926216	87.10	926216-C3	93.30
	3/8	.250	.153	.010	3	3/8	2-1/2	926224	99.70	926224-C3	107.90
	1/2	.312	.220	.010	3	1/2	3	926232	138.40	926232-C3	150.60
60°	1/32	.014	.015	SHARP!	2	1/8	1-1/2	995202	64.70	995202-C3	68.90
	1/16	.028	.030	SHARP!	2	1/8	1-1/2	995204	66.10	995204-C3	70.30
	1/16	.032	.032	.005	2	1/8	1-1/2	65104	67.40	65104-C3	71.60
	5/64	.035	.038	SHARP!	2	1/8	1-1/2	995205	66.10	995205-C3	70.30
	5/64	.040	.039	.005	2	1/8	1-1/2	65105	67.40	65105-C3	71.60
	3/32	.040	.047	SHARP!	2	1/8	1-1/2	995206	62.70	995206-C3	66.90
	3/32	.045	.056	.010	2	1/8	1-1/2	16706	64.10	16706-C3	68.30
	1/8	.056	.060	SHARP!	2	1/8	1-1/2	995208	62.70	995208-C3	66.90
	1/8	.062	.068	.010	2	1/8	1-1/2	16708	64.10	16708-C3	68.30
	5/32	.070	.075	SHARP!	2	3/16	2	995210	65.90	995210-C3	70.40
	5/32	.078	.081	.010	2	3/16	2	16710	67.20	16710-C3	71.70
	3/16	.085	.089	SHARP!	2	3/16	2	995212	65.90	995212-C3	70.40
	3/16	.093	.095	.010	2	3/16	2	16712	67.20	16712-C3	71.70
	1/4	.118	.114	SHARP!	2	1/4	2	995216	81.50	995216-C3	87.70
	1/4	.125	.120	.010	2	1/4	2	16716	82.90	16716-C3	89.10
	5/16	.141	.150	SHARP!	3	5/16	2-1/2	995220	89.20	995220-C3	96.40
	5/16	.156	.147	.010	3	5/16	2-1/2	16720	90.90	16720-C3	98.10
	3/8	.156	.195	SHARP!	3	3/8	2-1/2	995224	93.20	995224-C3	101.40
	3/8	.187	.174	.010	3	3/8	2-1/2	16724	95.10	16724-C3	103.30
	7/16	.187	.222	SHARP!	3	7/16	2-3/4	995228	100.70	995228-C3	110.90
	7/16	.218	.200	.010	3	7/16	2-3/4	16728	103.10	16728-C3	113.30
	1/2	.218	.248	SHARP!	3	1/2	3	995232	129.50	995232-C3	141.70
	1/2	.250	.226	.010	3	1/2	3	16732	131.90	16732-C3	144.10
	5/8	.281	.301	SHARP!	4	5/8	3	995240	193.50	995240-C3	205.70
	5/8	.312	.279	.010	4	5/8	3	16740	195.90	16740-C3	208.10
	3/4	.343	.354	SHARP!	4	3/4	3	995248	232.50	995248-C3	245.70
	3/4	.375	.332	.010	4	3/4	3	16748	234.90	16748-C3	248.10
	1	.500	.437	.010	4	1	4	16764	416.40	16764-C3	436.60
90°	1/32	.008	.015	SHARP!	2	1/8	1-1/2	992002	66.10	992002-C3	70.30
	1/16	.023	.030	.005	2	1/8	1-1/2	66304	67.40	66304-C3	71.60
	5/64	.027	.038	.005	2	1/8	1-1/2	66305	67.40	66305-C3	71.60
	3/32	.025	.043	SHARP!	2	1/8	1-1/2	992006	62.70	992006-C3	66.90
	3/32	.031	.059	.010	2	1/8	1-1/2	16806	64.10	16806-C3	68.30
	1/8	.034	.057	SHARP!	2	1/8	1-1/2	992008	61.70	992008-C3	65.90
	1/8	.040	.073	.010	2	1/8	1-1/2	16808	63.10	16808-C3	67.30
	5/32	.047	.090	.010	2	3/16	2	16810	67.20	16810-C3	71.70

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

DOVETAIL CUTTERS

(cont.)

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
90°	3/16	.052	.084	SHARP!	2	3/16	2	992012	65.90	992012-C3	70.40
	3/16	.047	.122	.010	2	3/16	2	16812	67.20	16812-C3	71.70
	1/4	.068	.114	SHARP!	2	1/4	2	992016	81.50	992016-C3	87.70
	1/4	.063	.154	.010	2	1/4	2	16816	82.90	16816-C3	89.10
	5/16	.085	.143	SHARP!	3	5/16	2-1/2	992020	89.20	992020-C3	96.40
	5/16	.093	.155	.010	3	5/16	2-1/2	16820	90.90	16820-C3	98.10
	3/8	.105	.165	SHARP!	3	3/8	2-1/2	992024	93.20	992024-C3	101.40
	3/8	.125	.153	.010	3	3/8	2-1/2	16824	95.10	16824-C3	103.30
	7/16	.141	.185	.010	3	7/16	2-3/4	16828	103.10	16828-C3	113.30
	1/2	.141	.218	SHARP!	3	1/2	3	992032	129.50	992032-C3	141.70
	1/2	.156	.216	.010	3	1/2	3	16832	131.90	16832-C3	144.10
	5/8	.187	.279	.010	4	5/8	3	16840	195.90	16840-C3	208.10
	3/4	.218	.342	.010	4	3/4	3	16848	234.90	16848-C3	248.10
100°	1/8	.040	.065	.010	2	1/8	1-1/2	964408	65.90	964408-C3	70.10
	3/16	.047	.110	.010	2	3/16	2	964412	69.10	964412-C3	73.60
	1/4	.062	.137	.010	2	1/4	2	964416	87.10	964416-C3	93.30
	3/8	.093	.188	.010	3	3/8	2-1/2	964424	99.50	964424-C3	107.70
	1/2	.125	.237	.010	3	1/2	3	964432	138.20	964432-C3	150.40
120°	1/8	.039	.045	.010	2	1/8	1-1/2	959908	65.90	959908-C3	70.10
	3/16	.047	.079	.010	2	3/16	2	959912	69.10	959912-C3	73.60
	1/4	.062	.090	.010	2	1/4	2	959916	87.10	959916-C3	93.30
	3/8	.093	.107	.010	3	3/8	2-1/2	959924	99.50	959924-C3	107.70
	1/2	.109	.177	.010	3	1/2	3	959932	138.20	959932-C3	150.40

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

★★★★★

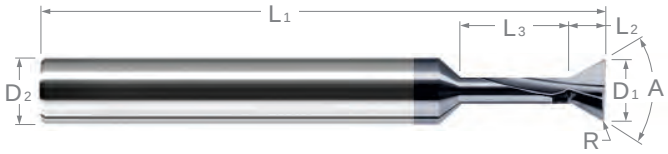
" Harvey Tool Dovetail Cutters are the only thing that works for us."

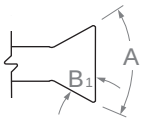
— @MagnusonSuperchargers

Follow us on Instagram @harveytool!

DOVETAIL CUTTERS

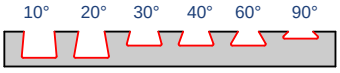
Long Reach





$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$

- Reduced neck for long reach machining
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA



Stocked in *Six* Included Angles!

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	NECK LENGTH	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.187	.094	.125	.010	2	1/8	1-1/2	899108	88.10	899108-C3	92.30
	1/4	.312	.197	.250	.010	2	1/4	2	899116	112.10	899116-C3	118.30
	1/2	.625	.392	.250	.010	3	1/2	3	899132	170.20	899132-C3	182.40
20°	1/8	.125	.085	.125	.010	2	1/8	1-1/2	877408	77.10	877408-C3	81.30
	1/4	.250	.166	.250	.010	2	1/4	2	877416	97.70	877416-C3	103.90
	1/2	.500	.328	.250	.010	3	1/2	3	877432	148.40	877432-C3	160.60
30°	1/16	.045	.041	.062	.005	2	1/8	1-1/2	849904	79.90	849904-C3	84.10
	3/32	.078	.057	.093	.010	2	1/8	1-1/2	914806	77.10	914806-C3	81.30
	1/8	.093	.081	.125	.010	2	1/8	1-1/2	914808	77.10	914808-C3	81.30
	3/16	.125	.127	.187	.010	2	3/16	2	914812	80.10	914812-C3	84.60
	1/4	.156	.172	.250	.010	2	1/4	2	914816	96.10	914816-C3	102.30
	3/8	.250	.247	.250	.010	3	3/8	2-1/2	914824	143.70	914824-C3	151.90
	1/2	.312	.339	.250	.010	3	1/2	3	914832	146.10	914832-C3	158.30
40°	1/8	.093	.066	.125	.010	2	1/8	1-1/2	864008	79.90	864008-C3	84.10
	1/4	.156	.145	.250	.010	2	1/4	2	864016	96.10	864016-C3	102.30
	1/2	.312	.281	.250	.010	3	1/2	3	864032	146.10	864032-C3	158.30
60°	1/16	.032	.032	.062	.005	2	1/8	1-1/2	865504	77.50	865504-C3	81.70
	3/32	.045	.056	.093	.010	2	1/8	1-1/2	925306	74.90	925306-C3	79.10
	1/8	.056	.060	.125	***SHARP!***	2	1/8	1-1/2	865908	73.50	865908-C3	77.70
	1/8	.062	.068	.125	.010	2	1/8	1-1/2	925308	74.90	925308-C3	79.10
	3/16	.093	.095	.187	.010	2	3/16	2	925312	78.10	925312-C3	82.60
	1/4	.118	.114	.250	***SHARP!***	2	1/4	2	865916	92.70	865916-C3	98.90
	1/4	.125	.120	.250	.010	2	1/4	2	925316	94.10	925316-C3	100.30
	3/8	.187	.174	.250	.010	3	3/8	2-1/2	925324	104.90	925324-C3	113.10
	1/2	.218	.248	.250	***SHARP!***	3	1/2	3	865932	140.40	865932-C3	152.60
	1/2	.250	.226	.250	.010	3	1/2	3	925332	142.70	925332-C3	154.90
90°	1/16	.023	.030	.062	.005	2	1/8	1-1/2	885704	77.50	885704-C3	81.70
	3/32	.031	.059	.093	.010	2	1/8	1-1/2	931006	74.90	931006-C3	79.10
	1/8	.034	.057	.125	***SHARP!***	2	1/8	1-1/2	884608	73.50	884608-C3	77.70
	1/8	.040	.073	.125	.010	2	1/8	1-1/2	931008	73.70	931008-C3	77.90
	3/16	.047	.122	.187	.010	2	3/16	2	931012	78.10	931012-C3	82.60
	1/4	.068	.114	.250	***SHARP!***	2	1/4	2	884616	92.70	884616-C3	98.90
	1/4	.062	.154	.250	.010	2	1/4	2	931016	94.10	931016-C3	100.30
	3/8	.125	.153	.250	.010	3	3/8	2-1/2	931024	104.90	931024-C3	113.10
	1/2	.141	.218	.250	***SHARP!***	3	1/2	3	884632	140.40	884632-C3	152.60
	1/2	.156	.216	.250	.010	3	1/2	3	931032	142.70	931032-C3	154.90

SPEEDS & FEEDS ONLINE!

*Diameter measured over radii (not to theoretical sharp corner).

Click Tool # for stock, speeds & feeds, & other technical info

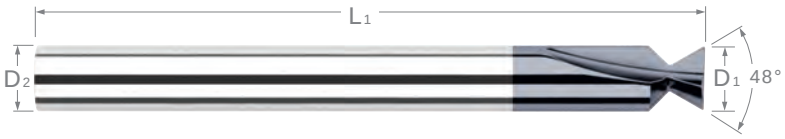
NEW COATING!

DOVETAIL CUTTERS

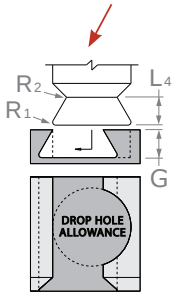
Parker Hannifin O-Ring Dovetail Cutters

Designed to Parker Hannifin O-Ring Standards

With Drop Hole Allowance



WITH DROP HOLE ALLOWANCE



- **Designed for milling full dovetail grooves with drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (ORD 5700/USA, ORD 5700)
- Undersized cutter design allows climb milling on both faces of groove for improved finish
- Mills both top and bottom radii
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

O-RING X-SECTION	CUTTER DIA.*	GLAND DEPTH	CORNER RADIUS	NECK DIA.*	NECK RADIUS	RADIUS CENTER	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED		
	D_1 +.000″ −.002″	G	R_1 +.001″ −.001″		R_2 +.001″ −.001″	L_4 +.001″ −.001″	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.070	.079	.051	.015	.054	.005	.047	1/8	1-1/2	23807 †	65.70	23807-C3 †	69.90	23807-C8 †	71.90	NEW
.070	.084	.054	.015	.056	.005	.050	1/8	1-1/2	56307 Δ	65.70	56307-C3 Δ	69.90	56307-C8 Δ	71.90	NEW
.103	.135	.082	.015	.088	.010	.073	3/16	2	23814	68.40	23814-C3	72.90	23814-C8	74.60	NEW
.139	.172	.112	.031	.116	.010	.103	3/16	2	23821	68.40	23821-C3	72.90	23821-C8	74.60	NEW
.210	.284	.172	.031	.179	.015	.158	5/16	2-1/2	23828	90.50	23828-C3	97.70	23828-C8	104.70	NEW
.275	.362	.232	.062	.237	.015	.219	3/8	2-1/2	23835	104.90	23835-C3	113.10	23835-C8	122.10	NEW
.375	.488	.317	.093	.327	.020	.299	1/2	3	23842	134.20	23842-C3	146.40	23842-C8	154.40	NEW

SPEEDS & FEEDS ONLINE!

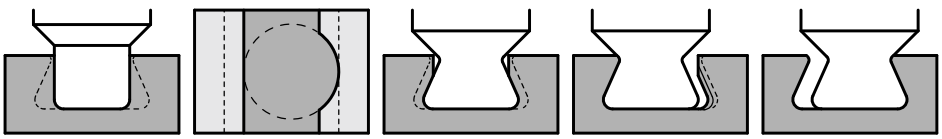
*Diameter measured over radii (not to theoretical sharp corner). †Meets ORD 5700/USA spec.
ΔMeets ORD 5700 spec. All other tools meet BOTH specifications.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

With Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Mill off-center drop hole.
- Insert O-Ring Cutter through drop hole at full axial depth and mill single pass down center of groove. Please note that cutter is contacting both sides of part and it may be necessary to reduce the feed rate (up to 40%).
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.

Click here for radial calculations



O-Ring Slotting End Mills

◀ *See page 312*

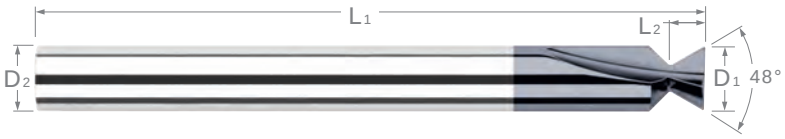
- ***Ideal for slotting o-ring dovetail grooves!***
- ***Achieve the right slot width and shape without radial stepovers!***

Designed to Parker Hannifin O-Ring Standards

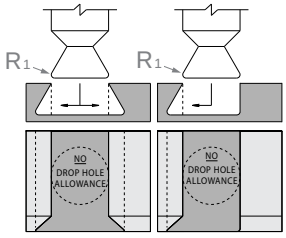
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

Without Drop Hole Allowance



WITHOUT DROP HOLE ALLOWANCE



- **Designed for milling half dovetails or full dovetails with no drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (tools meet both specs: ORD 5700/USA, ORD 5700)
- Mills bottom radius only
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

	O-RING X-SECTION	CUTTER DIA.*	LOC	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
		D_1 +.000″ −.002″	L_2 +.020″ −.000″	R_1 +.001″ −.001″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	.070	.055	.054	.015	.023	1/8	1-1/2	23907	64.20	23907-C3	68.40	23907-C8	70.40
NEW	.103	.083	.085	.015	.024	1/8	1-1/2	23914	64.20	23914-C3	68.40	23914-C8	70.40
NEW	.139	.113	.115	.031	.044	1/8	1-1/2	23921	64.20	23921-C3	68.40	23921-C8	70.40
NEW	.210	.171	.176	.031	.048	3/16	2	23928	66.90	23928-C3	71.40	23928-C8	73.10
NEW	.275	.231	.238	.062	.086	1/4	2	23935	87.70	23935-C3	93.90	23935-C8	94.40
NEW	.375	.315	.323	.093	.128	3/8	2-1/2	23942	102.40	23942-C3	110.60	23942-C8	119.60

SPEEDS & FEEDS ONLINE!

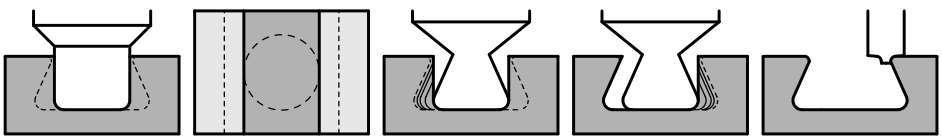
*Diameter measured over radii (not to theoretical sharp corner). **Diameter at length of cut.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- Tools are very fragile. Reduced neck profile and small o-ring groove size result in weakened tool for this difficult application. Always reconsider the potential to use the WITH drop hole allowance.
- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Cutter into slot at full axial depth.
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.
- These tools are able to mill both Full and Half O-Ring grooves. As such, a corner radius at the top of the part must be machined for final groove form (see series 170xx).

Click here for radial calculations



Mill Slot | Insert Cutter to Depth | Multiple Descending Radial Passes | Multiple Descending Radial Passes | Radius Corner

O-Ring Corner Rounding End Mills

◀ See page 312

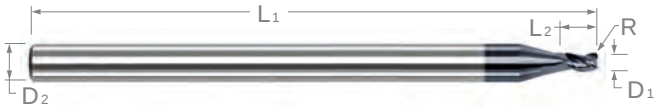
- *Ideal for creating radius on top part of o-ring dovetail groove!*
- *Design ensures smooth, blended form on part!*

Click Tool # for stock, speeds & feeds, & other technical info

NEW COATING!

DOVETAIL CUTTERS

O-Ring Slotting End Mills



Ideal for Slotting O-Ring Dovetail Grooves!

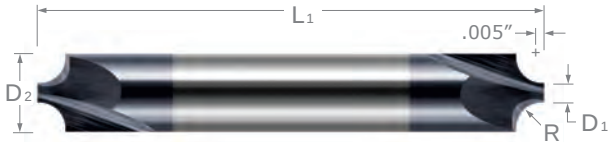
- Optimized for O-Ring grooves
- Diameters designed to gland width opening
- Stub flute length for improved strength
- Corner radius to match Parker Hannifin standards
- High helix and optimized geometry for improved performance
- 3 Flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED		
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	TOOL #	PRICE	
.055	.015	.065	1/8	1-1/2	56510	23.4	56510-C3	27.60	56510-C8	33.80	NEW
.085	.015	.100	1/8	1-1/2	56520	23.4	56520-C3	27.60	56520-C8	33.80	NEW
.115	.031	.140	1/8	1-1/2	56530	23.4	56530-C3	27.60	56530-C8	33.80	NEW
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.176	.031	.210	3/16	2	56540	26.1	56540-C3	30.60	56540-C8	36.80	NEW
.236	.062	.280	1/4	2-1/2	56550	34.4	56550-C3	40.60	56550-C8	50.30	NEW
.323	.093	.380	3/8	2-1/2	56560	48.9	56560-C3	57.10	56560-C8	74.30	NEW

SPEEDS & FEEDS ONLINE!

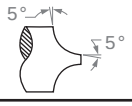
DOVETAIL CUTTERS

O-Ring Corner Rounding End Mills



For Creating Radius on Top Part of O-Ring Dovetail Groove

- Radius matches Parker Hannifin standards
- Double-ended
- Flares are tangent to radius
- Design ensures smooth, blended form on part
- Depth of cut = radius plus .005"
- 2 flutes
- Solid carbide
- CNC ground in the USA

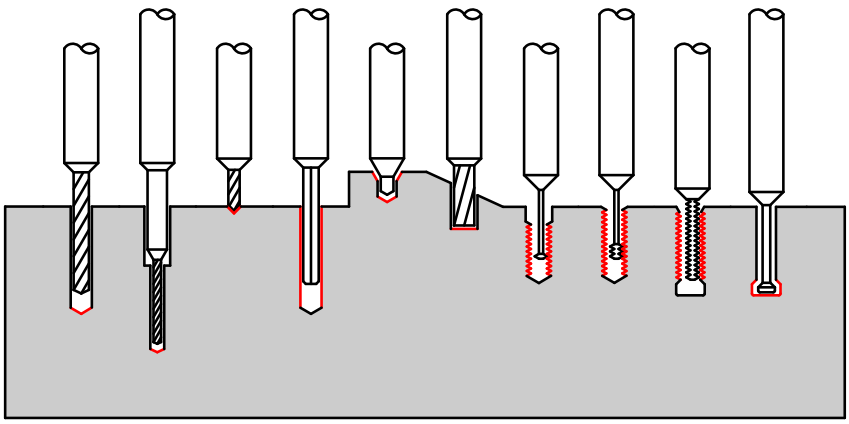


5° Flares At Shoulder and Pilot to Avoid Steps in Workpiece

O-RING X-SECTION	RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	R $^{+.0005''}_{-.0005''}$	D_1	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.070	.005	.046	1/8	1-1/2	17005	36.70	17005-C3	41.90
.103	.010	.046	1/8	1-1/2	17010	36.70	17010-C3	41.90
.139	.010	.046	1/8	1-1/2	17010	36.70	17010-C3	41.90
.210	.015	.046	1/8	1-1/2	17015	36.70	17015-C3	41.90
.275	.015	.046	1/8	1-1/2	17015	36.70	17015-C3	41.90
.375	.020	.046	1/8	1-1/2	17020	36.70	17020-C3	41.90

SPEEDS & FEEDS ONLINE!

HOLEMAKING & THREADING



Dozens of Solutions from Spotting to Threading!

MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels

Available for 3x, 5x, 8x, 10x, & 12x Hole Depths!

- Optimized for drilling hardened tool, die, and mold steels 46Rc to 68Rc with outstanding performance in high temperature alloys and difficult-to-machine steels
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- Double margin design for exceptional hole accuracy and finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Select carbide grade for improved tool life
- CNC ground in the USA

Double Margin Design for Exceptional Hole Accuracy

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0156 (1/64)		.396 mm	.075	**1.90 mm**	(3x)	3 mm	50 mm	CSG0156-C6	37.70
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BGN0156-C6	38.90
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	ARY0156-C6	39.40
.0160	#78	.406 mm	.079	**2.00 mm**	(3x)	3 mm	50 mm	CSG0160-C6	37.70
.0160	#78	.406 mm	.157	**4.00 mm**	(8x)	3 mm	50 mm	ARY0160-C6	39.40
.0180	#77	.457 mm	.087	**2.20 mm**	(3x)	3 mm	50 mm	CSG0180-C6	37.70
.0180	#77	.457 mm	.177	**4.50 mm**	(8x)	3 mm	50 mm	ARY0180-C6	39.40
.0196		.500 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	CSG0196-C6	36.40
.0196		.500 mm	.133	**3.40 mm**	(5x)	3 mm	50 mm	BGN0196-C6	37.20
.0196		.500 mm	.193	**4.90 mm**	(8x)	3 mm	50 mm	ARY0196-C6	38.10
.0200	#76	.508 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	CSG0200-C6	36.40
.0200	#76	.508 mm	.197	**5.00 mm**	(8x)	3 mm	50 mm	ARY0200-C6	38.10
.0210	#75	.533 mm	.098	**2.50 mm**	(3x)	3 mm	50 mm	CSG0210-C6	36.40
.0210	#75	.533 mm	.205	**5.20 mm**	(8x)	3 mm	50 mm	ARY0210-C6	38.10
.0225	#74	.571 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	CSG0225-C6	36.40
.0225	#74	.571 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ARY0225-C6	38.10
.0240	#73	.609 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	CSG0240-C6	36.40
.0240	#73	.609 mm	.236	**6.00 mm**	(8x)	3 mm	50 mm	ARY0240-C6	38.10
.0250	#72	.635 mm	.118	**3.00 mm**	(3x)	3 mm	50 mm	CSG0250-C6	36.40
.0250	#72	.635 mm	.244	**6.20 mm**	(8x)	3 mm	50 mm	ARY0250-C6	38.10
.0260	#71	.660 mm	.122	**3.10 mm**	(3x)	3 mm	50 mm	CSG0260-C6	36.40
.0260	#71	.660 mm	.252	**6.40 mm**	(8x)	3 mm	50 mm	ARY0260-C6	38.10
.0280	#70	.711 mm	.134	**3.40 mm**	(3x)	3 mm	50 mm	CSG0280-C6	36.40
.0280	#70	.711 mm	.276	**7.00 mm**	(8x)	3 mm	50 mm	ARY0280-C6	38.10
.0292	#69	.741 mm	.138	**3.50 mm**	(3x)	3 mm	50 mm	CSG0292-C6	36.40
.0292	#69	.741 mm	.283	**7.20 mm**	(8x)	3 mm	50 mm	ARY0292-C6	38.10
.0310	#68	.787 mm	.146	**3.70 mm**	(3x)	3 mm	50 mm	CSG0310-C6	36.90
.0310	#68	.787 mm	.299	**7.60 mm**	(8x)	3 mm	50 mm	ARY0310-C6	38.10
.0312 (1/32)		.793 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	CSG0312-C6	36.90
.0312 (1/32)		.793 mm	.212	**5.40 mm**	(5x)	3 mm	50 mm	BGN0312-C6	37.90
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	ARY0312-C6	38.90
.0312 (1/32)		.793 mm	.370	**9.40 mm**	(10x)	3 mm	50 mm	DXT0312-C6	40.10
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	EFG0312-C6	41.40
.0320	#67	.812 mm	.154	**3.90 mm**	(3x)	3 mm	50 mm	CSG0320-C6	36.90
.0320	#67	.812 mm	.315	**8.00 mm**	(8x)	3 mm	50 mm	ARY0320-C6	38.90

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0330	#66	.838 mm	.157	**4.00 mm**	(3x)	3 mm	50 mm	CSG0330-C6	36.90
.0330	#66	.838 mm	.323	**8.20 mm**	(8x)	3 mm	50 mm	ARY0330-C6	38.90
.0350	#65	.889 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	CSG0350-C6	36.90
.0350	#65	.889 mm	.339	**8.60 mm**	(8x)	3 mm	50 mm	ARY0350-C6	38.90
.0360	#64	.914 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	CSG0360-C6	36.90
.0360	#64	.914 mm	.354	**9.00 mm**	(8x)	3 mm	50 mm	ARY0360-C6	38.90
.0370	#63	.939 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	CSG0370-C6	36.90
.0370	#63	.939 mm	.362	**9.20 mm**	(8x)	3 mm	50 mm	ARY0370-C6	38.90
.0380	#62	.965 mm	.181	**4.60 mm**	(3x)	3 mm	50 mm	CSG0380-C6	36.90
.0380	#62	.965 mm	.370	**9.40 mm**	(8x)	3 mm	50 mm	ARY0380-C6	38.90
.0390	#61	.990 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0390-C6	36.90
.0390	#61	.990 mm	.378	**9.60 mm**	(8x)	3 mm	50 mm	ARY0390-C6	38.90
.0393		1.000 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0393-C6	40.10
.0393		1.000 mm	.267	**6.80 mm**	(5x)	3 mm	50 mm	BGN0393-C6	41.10
.0393		1.000 mm	.386	**9.80 mm**	(8x)	3 mm	50 mm	ARY0393-C6	41.70
.0400	#60	1.016 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	CSG0400-C6	40.10
.0400	#60	1.016 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ARY0400-C6	41.70
.0410	#59	1.041 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	CSG0410-C6	40.10
.0410	#59	1.041 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ARY0410-C6	41.70
.0420	#58	1.066 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	CSG0420-C6	40.10
.0420	#58	1.066 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ARY0420-C6	41.70
.0430	#57	1.092 mm	.205	**5.20 mm**	(3x)	3 mm	50 mm	CSG0430-C6	40.10
.0430	#57	1.092 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ARY0430-C6	41.70
.0465	#56	1.181 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	CSG0465-C6	40.10
.0465	#56	1.181 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ARY0465-C6	41.70
.0468 (3/64)		1.190 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	CSG0468-C6	40.10
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BGN0468-C6	41.10
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ARY0468-C6	41.70
.0468 (3/64)		1.190 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	DXT0468-C6	43.10
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	EFG0468-C6	44.40
.0500		1.270 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	CSG0500-C6	40.10
.0500		1.270 mm	.492	**12.50 mm**	(8x)	3 mm	50 mm	ARY0500-C6	41.70
.0520	#55	1.320 mm	.244	**6.20 mm**	(3x)	3 mm	50 mm	CSG0520-C6	40.10
.0520	#55	1.320 mm	.512	**13.00 mm**	(8x)	3 mm	50 mm	ARY0520-C6	41.70
.0550	#54	1.397 mm	.260	**6.60 mm**	(3x)	3 mm	50 mm	CSG0550-C6	40.10
.0550	#54	1.397 mm	.531	**13.50 mm**	(8x)	3 mm	50 mm	ARY0550-C6	41.70
.0590		1.500 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	CSG0590-C6	43.20
.0590		1.500 mm	.393	**10.00 mm**	(5x)	3 mm	50 mm	BGN0590-C6	44.10
.0590		1.500 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ARY0590-C6	44.70
.0595	#53	1.511 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	CSG0595-C6	43.20
.0595	#53	1.511 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ARY0595-C6	44.70
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	CSG0625-C6	43.20
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BGN0625-C6	44.10
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ARY0625-C6	44.70
.0625 (1/16)		1.587 mm	.728	**18.50 mm**	(10x)	3 mm	63 mm	DXT0625-C6	45.90
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	EFG0625-C6	47.20

SPEEDS & FEEDS ONLINE!
continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0635	#52	1.612 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	CSG0635-C6	43.20
.0635	#52	1.612 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ARY0635-C6	44.70
.0670	#51	1.701 mm	.307	**8.00 mm**	(3x)	3 mm	50 mm	CSG0670-C6	43.20
.0670	#51	1.701 mm	.650	**16.50 mm**	(8x)	3 mm	63 mm	ARY0670-C6	44.70
.0700	#50	1.778 mm	.335	**8.50 mm**	(3x)	3 mm	50 mm	CSG0700-C6	43.20
.0700	#50	1.778 mm	.689	**17.50 mm**	(8x)	3 mm	63 mm	ARY0700-C6	44.70
.0730	#49	1.854 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	CSG0730-C6	43.20
.0730	#49	1.854 mm	.709	**18.00 mm**	(8x)	3 mm	63 mm	ARY0730-C6	44.70
.0760	#48	1.930 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	CSG0760-C6	43.20
.0760	#48	1.930 mm	.748	**19.00 mm**	(8x)	3 mm	63 mm	ARY0760-C6	44.70
.0781 (5/64)		1.984 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	CSG0781-C6	43.20
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BGN0781-C6	44.10
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ARY0781-C6	44.70
.0781 (5/64)		1.984 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	DXT0781-C6	45.90
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	EFG0781-C6	47.20
.0785	#47	1.993 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	CSG0785-C6	46.10
.0785	#47	1.993 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ARY0785-C6	44.70
.0787		2.000 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	CSG0787-C6	46.10
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BGN0787-C6	47.50
.0787		2.000 mm	.768	**19.50 mm**	(8x)	4 mm	63 mm	ARY0787-C6	48.70
.0810	#46	2.057 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	CSG0810-C6	46.10
.0810	#46	2.057 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ARY0810-C6	48.70
.0820	#45	2.082 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	CSG0820-C6	46.10
.0820	#45	2.082 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ARY0820-C6	48.70
.0860	#44	2.184 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	CSG0860-C6	46.10
.0860	#44	2.184 mm	.827	**21.00 mm**	(8x)	4 mm	63 mm	ARY0860-C6	48.70
.0890	#43	2.260 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	CSG0890-C6	46.10
.0890	#43	2.260 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	ARY0890-C6	48.70
.0935	#42	2.374 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0935-C6	46.10
.0935	#42	2.374 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ARY0935-C6	48.70
.0937 (3/32)		2.381 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0937-C6	46.10
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BGN0937-C6	47.50
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ARY0937-C6	48.70
.0937 (3/32)		2.381 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	DXT0937-C6	49.90
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	EFG0937-C6	51.20
.0960	#41	2.438 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	CSG0960-C6	46.10
.0960	#41	2.438 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0960-C6	48.70
.0980	#40	2.489 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0980-C6	46.10
.0980	#40	2.489 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0980-C6	48.70
.0984		2.500 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0984-C6	48.90
.0984		2.500 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ARY0984-C6	51.70
.0995	#39	2.527 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG0995-C6	48.90
.0995	#39	2.527 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ARY0995-C6	51.70
.1015	#38	2.578 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	CSG1015-C6	48.90
.1015	#38	2.578 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ARY1015-C6	51.70
.1040	#37	2.641 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ARY1040-C6	51.70

SPEEDS & FEEDS ONLINE!
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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1065	#36	2.705 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	CSG1065-C6	48.90
.1065	#36	2.705 mm	1.024	**26.00 mm**	(8x)	4 mm	63 mm	ARY1065-C6	51.70
.1093 (7/64)		2.778 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	CSG1093-C6	48.90
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BGN1093-C6	50.40
.1093 (7/64)		2.778 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1093-C6	51.70
.1100	#35	2.794 mm	.531	**13.50 mm**	(3x)	4 mm	50 mm	CSG1100-C6	48.90
.1100	#35	2.794 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1100-C6	51.70
.1110	#34	2.819 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ARY1110-C6	51.70
.1130	#33	2.870 mm	1.102	**28.00 mm**	(8x)	4 mm	63 mm	ARY1130-C6	51.70
.1160	#32	2.946 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ARY1160-C6	51.70
.1181		3.000 mm	.571	**14.50 mm**	(3x)	4 mm	50 mm	CSG1181-C6	50.10
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BGN1181-C6	51.40
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ARY1181-C6	52.70
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	1.181	**30.00 mm**	(8x)	6 mm	75 mm	ARY1200-C6	59.10
.1250 (1/8)		3.175 mm	.591	**15.00 mm**	(3x)	6 mm	63 mm	CSG1250-C6	56.20
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	ARY1250-C6	59.10
.1360	#29	3.454 mm	.630	**16.00 mm**	(3x)	6 mm	63 mm	CSG1360-C6	56.20
.1360	#29	3.454 mm	1.339	**34.00 mm**	(8x)	6 mm	75 mm	ARY1360-C6	59.10
.1406 (9/64)		3.571 mm	.669	**17.00 mm**	(3x)	6 mm	63 mm	CSG1406-C6	56.20
.1406 (9/64)		3.571 mm	1.378	**35.00 mm**	(8x)	6 mm	75 mm	ARY1406-C6	59.10
.1470	#26	3.733 mm	1.417	**36.00 mm**	(8x)	6 mm	100 mm	ARY1470-C6	59.10
.1562 (5/32)		3.968 mm	.748	**19.00 mm**	(3x)	6 mm	63 mm	CSG1562-C6	56.20
.1562 (5/32)		3.968 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1562-C6	59.10
.1590	#21	4.038 mm	1.535	**39.00 mm**	(8x)	6 mm	100 mm	ARY1590-C6	59.10
.1770	#16	4.495 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ARY1770-C6	59.10
.1800	#15	4.572 mm	1.732	**44.00 mm**	(8x)	6 mm	100 mm	ARY1800-C6	59.10
.1875 (3/16)		4.762 mm	.906	**23.00 mm**	(3x)	6 mm	63 mm	CSG1875-C6	56.20
.1875 (3/16)		4.762 mm	1.811	**46.00 mm**	(8x)	6 mm	100 mm	ARY1875-C6	59.10

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Miniature High Performance Drills – Hardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%. For 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For higher hardness materials, peck depths should be .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Hardness	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
Hardened Steels	38-45 Rc	150	.00029	.00060	.00090	.00119	.00150	.00179	.00240	.00359	.00480
	46-55 Rc	90	.00022	.00045	.00068	.00089	.00112	.00134	.00180	.00269	.00360
	56-68 Rc	40	.00014	.00030	.00045	.00060	.00075	.00089	.00120	.00180	.00240

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels

Available for 3x, 5x, 8x, 10x, & 12x Hole Depths!

- Optimized for drilling prehardened medium alloy steels, stainless steels, and tool steels up to 45Rc
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Specialized Flute Shape for Improved Chip Evacuation

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0078		.200 mm	.053	**1.35 mm**	(5x)	3 mm	50 mm	BVT0078-C3	38.70
.0083	#91	.210 mm	.055	**1.40 mm**	(5x)	3 mm	50 mm	BVT0083-C3	38.70
.0087	#90	.221 mm	.059	**1.50 mm**	(5x)	3 mm	50 mm	BVT0087-C3	38.70
.0091	#89	.231 mm	.061	**1.55 mm**	(5x)	3 mm	50 mm	BVT0091-C3	38.70
.0095	#88	.241 mm	.065	**1.65 mm**	(5x)	3 mm	50 mm	BVT0095-C3	38.70
.0100	#87	.254 mm	.047	**1.20 mm**	(3x)	3 mm	50 mm	DHE0100-C3	36.70
.0100	#87	.254 mm	.067	**1.70 mm**	(5x)	3 mm	50 mm	BVT0100-C3	37.70
.0100	#87	.254 mm	.138	**3.50 mm**	(12x)	3 mm	50 mm	CHT0100-C3	43.10
.0105	#86	.266 mm	.071	**1.80 mm**	(5x)	3 mm	50 mm	BVT0105-C3	37.70
.0110	#85	.279 mm	.053	**1.35 mm**	(3x)	3 mm	50 mm	DHE0110-C3	36.70
.0110	#85	.279 mm	.075	**1.90 mm**	(5x)	3 mm	50 mm	BVT0110-C3	37.70
.0110	#85	.279 mm	.150	**3.80 mm**	(12x)	3 mm	50 mm	CHT0110-C3	43.10
.0115	#84	.292 mm	.079	**2.00 mm**	(5x)	3 mm	50 mm	BVT0115-C3	37.70
.0120	#83	.304 mm	.057	**1.45 mm**	(3x)	3 mm	50 mm	DHE0120-C3	36.70
.0120	#83	.304 mm	.083	**2.10 mm**	(5x)	3 mm	50 mm	BVT0120-C3	37.70
.0120	#83	.304 mm	.118	**3.00 mm**	(8x)	3 mm	50 mm	ADS0120-C3	40.40
.0120	#83	.304 mm	.142	**3.60 mm**	(10x)	3 mm	50 mm	EXP0120-C3	41.70
.0120	#83	.304 mm	.165	**4.20 mm**	(12x)	3 mm	50 mm	CHT0120-C3	43.10
.0125	#82	.317 mm	.083	**2.10 mm**	(5x)	3 mm	50 mm	BVT0125-C3	37.70
.0125	#82	.317 mm	.173	**4.40 mm**	(12x)	3 mm	50 mm	CHT0125-C3	43.10
.0130	#81	.330 mm	.061	**1.55 mm**	(3x)	3 mm	50 mm	DHE0130-C3	36.70
.0130	#81	.330 mm	.087	**2.20 mm**	(5x)	3 mm	50 mm	BVT0130-C3	37.70
.0130	#81	.330 mm	.126	**3.20 mm**	(8x)	3 mm	50 mm	ADS0130-C3	40.40
.0130	#81	.330 mm	.154	**3.90 mm**	(10x)	3 mm	50 mm	EXP0130-C3	41.70
.0130	#81	.330 mm	.177	**4.50 mm**	(12x)	3 mm	50 mm	CHT0130-C3	43.10
.0135	#80	.342 mm	.091	**2.30 mm**	(5x)	3 mm	50 mm	BVT0135-C3	37.70
.0135	#80	.342 mm	.185	**4.70 mm**	(12x)	3 mm	50 mm	CHT0135-C3	43.10
.0140		.355 mm	.094	**2.40 mm**	(5x)	3 mm	50 mm	BVT0140-C3	37.70
.0140		.355 mm	.193	**4.90 mm**	(12x)	3 mm	50 mm	CHT0140-C3	43.10
.0144	#79	.368 mm	.069	**1.75 mm**	(3x)	3 mm	50 mm	DHE0144-C3	36.70
.0144	#79	.368 mm	.098	**2.50 mm**	(5x)	3 mm	50 mm	BVT0144-C3	37.70
.0144	#79	.368 mm	.142	**3.60 mm**	(8x)	3 mm	50 mm	ADS0144-C3	40.40
.0144	#79	.368 mm	.169	**4.30 mm**	(10x)	3 mm	50 mm	EXP0144-C3	41.70
.0144	#79	.368 mm	.197	**5.00 mm**	(12x)	3 mm	50 mm	CHT0144-C3	43.10
.0150		.381 mm	.102	**2.60 mm**	(5x)	3 mm	50 mm	BVT0150-C3	37.70
.0150		.381 mm	.205	**5.20 mm**	(12x)	3 mm	50 mm	CHT0150-C3	43.10
.0156 (1/64)		.396 mm	.075	**1.90 mm**	(3x)	3 mm	50 mm	DHE0156-C3	36.70

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BVT0156-C3	37.70
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	ADS0156-C3	40.40
.0156 (1/64)		.396 mm	.185	**4.70 mm**	(10x)	3 mm	50 mm	EXP0156-C3	41.70
.0156 (1/64)		.396 mm	.213	**5.40 mm**	(12x)	3 mm	50 mm	CHT0156-C3	43.10
.0160	#78	.406 mm	.079	**2.00 mm**	(3x)	3 mm	50 mm	DHE0160-C3	36.70
.0160	#78	.406 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BVT0160-C3	37.70
.0160	#78	.406 mm	.157	**4.00 mm**	(8x)	3 mm	50 mm	ADS0160-C3	40.40
.0160	#78	.406 mm	.189	**4.80 mm**	(10x)	3 mm	50 mm	EXP0160-C3	41.70
.0160	#78	.406 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	CHT0160-C3	43.10
.0170		.431 mm	.114	**2.90 mm**	(5x)	3 mm	50 mm	BVT0170-C3	37.70
.0170		.431 mm	.236	**6.00 mm**	(12x)	3 mm	50 mm	CHT0170-C3	43.10
.0180	#77	.457 mm	.087	**2.20 mm**	(3x)	3 mm	50 mm	DHE0180-C3	36.70
.0180	#77	.457 mm	.122	**3.10 mm**	(5x)	3 mm	50 mm	BVT0180-C3	37.70
.0180	#77	.457 mm	.177	**4.50 mm**	(8x)	3 mm	50 mm	ADS0180-C3	40.70
.0180	#77	.457 mm	.213	**5.40 mm**	(10x)	3 mm	50 mm	EXP0180-C3	41.70
.0180	#77	.457 mm	.244	**6.20 mm**	(12x)	3 mm	50 mm	CHT0180-C3	43.10
.0190		.482 mm	.130	**3.30 mm**	(5x)	3 mm	50 mm	BVT0190-C3	37.70
.0190		.482 mm	.260	**6.60 mm**	(12x)	3 mm	50 mm	CHT0190-C3	43.10
.0196		.500 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	DHE0196-C3	36.20
.0196		.500 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BVT0196-C3	37.10
.0196		.500 mm	.268	**6.80 mm**	(12x)	3 mm	50 mm	CHT0196-C3	42.10
.0200	#76	.508 mm	.094	**2.40 mm**	(3x)	3 mm	50 mm	DHE0200-C3	36.20
.0200	#76	.508 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BVT0200-C3	37.10
.0200	#76	.508 mm	.197	**5.00 mm**	(8x)	3 mm	50 mm	ADS0200-C3	40.70
.0200	#76	.508 mm	.228	**5.80 mm**	(10x)	3 mm	50 mm	EXP0200-C3	41.90
.0200	#76	.508 mm	.276	**7.00 mm**	(12x)	3 mm	50 mm	CHT0200-C3	42.10
.0210	#75	.533 mm	.098	**2.50 mm**	(3x)	3 mm	50 mm	DHE0210-C3	36.20
.0210	#75	.533 mm	.142	**3.60 mm**	(5x)	3 mm	50 mm	BVT0210-C3	37.10
.0210	#75	.533 mm	.205	**5.20 mm**	(8x)	3 mm	50 mm	ADS0210-C3	40.70
.0210	#75	.533 mm	.244	**6.20 mm**	(10x)	3 mm	50 mm	EXP0210-C3	41.90
.0210	#75	.533 mm	.291	**7.40 mm**	(12x)	3 mm	50 mm	CHT0210-C3	42.10
.0220		.558 mm	.150	**3.80 mm**	(5x)	3 mm	50 mm	BVT0220-C3	37.10
.0225	#74	.571 mm	.106	**2.70 mm**	(3x)	3 mm	50 mm	DHE0225-C3	36.20
.0225	#74	.571 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BVT0225-C3	37.10
.0225	#74	.571 mm	.220	**5.60 mm**	(8x)	3 mm	50 mm	ADS0225-C3	40.70
.0225	#74	.571 mm	.268	**6.80 mm**	(10x)	3 mm	50 mm	EXP0225-C3	41.90
.0225	#74	.571 mm	.307	**7.80 mm**	(12x)	3 mm	50 mm	CHT0225-C3	42.10
.0230		.584 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BVT0230-C3	37.10
.0240	#73	.609 mm	.114	**2.90 mm**	(3x)	3 mm	50 mm	DHE0240-C3	36.20
.0240	#73	.609 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BVT0240-C3	37.10
.0240	#73	.609 mm	.236	**6.00 mm**	(8x)	3 mm	50 mm	ADS0240-C3	40.70
.0240	#73	.609 mm	.283	**7.20 mm**	(10x)	3 mm	50 mm	EXP0240-C3	41.90
.0240	#73	.609 mm	.331	**8.40 mm**	(12x)	3 mm	50 mm	CHT0240-C3	42.10
.0250	#72	.635 mm	.118	**3.00 mm**	(3x)	3 mm	50 mm	DHE0250-C3	36.20
.0250	#72	.635 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BVT0250-C3	37.10
.0250	#72	.635 mm	.244	**6.20 mm**	(8x)	3 mm	50 mm	ADS0250-C3	40.70
.0250	#72	.635 mm	.291	**7.40 mm**	(10x)	3 mm	50 mm	EXP0250-C3	41.90

SPEEDS & FEEDS ONLINE!
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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0250	#72	.635 mm	.346	**8.80 mm**	(12x)	3 mm	50 mm	CHT0250-C3	42.10
.0260	#71	.660 mm	.122	**3.10 mm**	(3x)	3 mm	50 mm	DHE0260-C3	36.20
.0260	#71	.660 mm	.173	**4.40 mm**	(5x)	3 mm	50 mm	BVT0260-C3	37.10
.0260	#71	.660 mm	.252	**6.40 mm**	(8x)	3 mm	50 mm	ADS0260-C3	40.70
.0260	#71	.660 mm	.307	**7.80 mm**	(10x)	3 mm	50 mm	EXP0260-C3	41.90
.0260	#71	.660 mm	.354	**9.00 mm**	(12x)	3 mm	50 mm	CHT0260-C3	42.10
.0270		.685 mm	.181	**4.60 mm**	(5x)	3 mm	50 mm	BVT0270-C3	37.10
.0280	#70	.711 mm	.134	**3.40 mm**	(3x)	3 mm	50 mm	DHE0280-C3	36.20
.0280	#70	.711 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BVT0280-C3	37.10
.0280	#70	.711 mm	.276	**7.00 mm**	(8x)	3 mm	50 mm	ADS0280-C3	40.70
.0280	#70	.711 mm	.331	**8.40 mm**	(10x)	3 mm	50 mm	EXP0280-C3	41.90
.0280	#70	.711 mm	.386	**9.80 mm**	(12x)	3 mm	50 mm	CHT0280-C3	42.10
.0292	#69	.741 mm	.138	**3.50 mm**	(3x)	3 mm	50 mm	DHE0292-C3	36.20
.0292	#69	.741 mm	.197	**5.00 mm**	(5x)	3 mm	50 mm	BVT0292-C3	37.10
.0292	#69	.741 mm	.283	**7.20 mm**	(8x)	3 mm	50 mm	ADS0292-C3	40.70
.0292	#69	.741 mm	.347	**8.80 mm**	(10x)	3 mm	50 mm	EXP0292-C3	41.90
.0292	#69	.741 mm	.394	**10.00 mm**	(12x)	3 mm	50 mm	CHT0292-C3	42.10
.0300		.762 mm	.205	**5.20 mm**	(5x)	3 mm	50 mm	BVT0300-C3	37.10
.0300		.762 mm	.413	**10.50 mm**	(12x)	3 mm	50 mm	CHT0300-C3	42.10
.0310	#68	.787 mm	.146	**3.70 mm**	(3x)	3 mm	50 mm	DHE0310-C3	36.70
.0310	#68	.787 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0310-C3	37.50
.0310	#68	.787 mm	.299	**7.60 mm**	(8x)	3 mm	50 mm	ADS0310-C3	40.70
.0310	#68	.787 mm	.362	**9.20 mm**	(10x)	3 mm	50 mm	EXP0310-C3	41.90
.0310	#68	.787 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0310-C3	43.20
.0312 (1/32)		.793 mm	.150	**3.80 mm**	(3x)	3 mm	50 mm	DHE0312-C3	36.70
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0312-C3	37.50
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	ADS0312-C3	40.70
.0312 (1/32)		.793 mm	.370	**9.40 mm**	(10x)	3 mm	50 mm	EXP0312-C3	41.90
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0312-C3	43.20
.0320	#67	.812 mm	.154	**3.90 mm**	(3x)	3 mm	50 mm	DHE0320-C3	36.70
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BVT0320-C3	37.50
.0320	#67	.812 mm	.315	**8.00 mm**	(8x)	3 mm	50 mm	ADS0320-C3	40.70
.0320	#67	.812 mm	.378	**9.60 mm**	(10x)	3 mm	50 mm	EXP0320-C3	41.90
.0320	#67	.812 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	CHT0320-C3	43.20
.0330	#66	.838 mm	.157	**4.00 mm**	(3x)	3 mm	50 mm	DHE0330-C3	36.70
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BVT0330-C3	37.50
.0330	#66	.838 mm	.323	**8.20 mm**	(8x)	3 mm	50 mm	ADS0330-C3	40.70
.0330	#66	.838 mm	.386	**9.80 mm**	(10x)	3 mm	50 mm	EXP0330-C3	41.90
.0330	#66	.838 mm	.453	**11.50 mm**	(12x)	3 mm	50 mm	CHT0330-C3	43.20
.0350	#65	.889 mm	.165	**4.20 mm**	(3x)	3 mm	50 mm	DHE0350-C3	36.70
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BVT0350-C3	37.50
.0350	#65	.889 mm	.339	**8.60 mm**	(8x)	3 mm	50 mm	ADS0350-C3	40.70
.0350	#65	.889 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	EXP0350-C3	41.90
.0350	#65	.889 mm	.472	**12.00 mm**	(12x)	3 mm	50 mm	CHT0350-C3	43.20
.0360	#64	.914 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	DHE0360-C3	36.70
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BVT0360-C3	37.50
.0360	#64	.914 mm	.354	**9.00 mm**	(8x)	3 mm	50 mm	ADS0360-C3	40.70
.0360	#64	.914 mm	.413	**10.50 mm**	(10x)	3 mm	50 mm	EXP0360-C3	41.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0360	#64	.914 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	CHT0360-C3	43.20
.0370	#63	.939 mm	.173	**4.40 mm**	(3x)	3 mm	50 mm	DHE0370-C3	36.70
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BVT0370-C3	37.50
.0370	#63	.939 mm	.362	**9.20 mm**	(8x)	3 mm	50 mm	ADS0370-C3	40.70
.0370	#63	.939 mm	.433	**11.00 mm**	(10x)	3 mm	50 mm	EXP0370-C3	41.90
.0370	#63	.939 mm	.512	**13.00 mm**	(12x)	3 mm	50 mm	CHT0370-C3	43.20
.0380	#62	.965 mm	.181	**4.60 mm**	(3x)	3 mm	50 mm	DHE0380-C3	36.70
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BVT0380-C3	37.50
.0380	#62	.965 mm	.370	**9.40 mm**	(8x)	3 mm	50 mm	ADS0380-C3	40.70
.0380	#62	.965 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	EXP0380-C3	41.90
.0380	#62	.965 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	CHT0380-C3	43.20
.0390	#61	.990 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0390-C3	36.70
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BVT0390-C3	37.50
.0390	#61	.990 mm	.378	**9.60 mm**	(8x)	3 mm	50 mm	ADS0390-C3	40.70
.0390	#61	.990 mm	.453	**11.50 mm**	(10x)	3 mm	50 mm	EXP0390-C3	41.90
.0390	#61	.990 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	CHT0390-C3	43.20
.0393		1.000 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0393-C3	40.10
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BVT0393-C3	41.10
.0393		1.000 mm	.386	**9.80 mm**	(8x)	3 mm	50 mm	ADS0393-C3	43.50
.0393		1.000 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0393-C3	44.90
.0393		1.000 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	CHT0393-C3	46.10
.0400	#60	1.016 mm	.189	**4.80 mm**	(3x)	3 mm	50 mm	DHE0400-C3	40.10
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BVT0400-C3	41.10
.0400	#60	1.016 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ADS0400-C3	43.50
.0400	#60	1.016 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0400-C3	44.90
.0400	#60	1.016 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	CHT0400-C3	46.10
.0410	#59	1.041 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	DHE0410-C3	40.10
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BVT0410-C3	41.10
.0410	#59	1.041 mm	.394	**10.00 mm**	(8x)	3 mm	50 mm	ADS0410-C3	43.50
.0410	#59	1.041 mm	.472	**12.00 mm**	(10x)	3 mm	50 mm	EXP0410-C3	44.90
.0410	#59	1.041 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	CHT0410-C3	46.10
.0420	#58	1.066 mm	.197	**5.00 mm**	(3x)	3 mm	50 mm	DHE0420-C3	40.10
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BVT0420-C3	41.10
.0420	#58	1.066 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ADS0420-C3	43.50
.0420	#58	1.066 mm	.492	**12.50 mm**	(10x)	3 mm	50 mm	EXP0420-C3	44.90
.0420	#58	1.066 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	CHT0420-C3	46.10
.0430	#57	1.092 mm	.205	**5.20 mm**	(3x)	3 mm	50 mm	DHE0430-C3	40.10
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BVT0430-C3	41.10
.0430	#57	1.092 mm	.413	**10.50 mm**	(8x)	3 mm	50 mm	ADS0430-C3	43.50
.0430	#57	1.092 mm	.512	**13.00 mm**	(10x)	3 mm	50 mm	EXP0430-C3	44.90
.0430	#57	1.092 mm	.591	**15.00 mm**	(12x)	3 mm	50 mm	CHT0430-C3	46.10
.0465	#56	1.181 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	DHE0465-C3	40.10
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BVT0465-C3	41.10
.0465	#56	1.181 mm	.630	**16.00 mm**	(12x)	3 mm	63 mm	CHT0465-C3	46.10
.0468 (3/64)		1.190 mm	.220	**5.60 mm**	(3x)	3 mm	50 mm	DHE0468-C3	40.10
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BVT0468-C3	41.10
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	ADS0468-C3	43.50
.0468 (3/64)		1.190 mm	.551	**14.00 mm**	(10x)	3 mm	50 mm	EXP0468-C3	44.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	CHT0468-C3	46.10
.0500		1.270 mm	.236	**6.00 mm**	(3x)	3 mm	50 mm	DHE0500-C3	40.10
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BVT0500-C3	41.10
.0500		1.270 mm	.492	**12.50 mm**	(8x)	3 mm	50 mm	ADS0500-C3	43.50
.0500		1.270 mm	.591	**15.00 mm**	(10x)	3 mm	50 mm	EXP0500-C3	44.90
.0500		1.270 mm	.689	**17.50 mm**	(12x)	3 mm	63 mm	CHT0500-C3	46.10
.0520	#55	1.320 mm	.244	**6.20 mm**	(3x)	3 mm	50 mm	DHE0520-C3	40.10
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BVT0520-C3	41.10
.0520	#55	1.320 mm	.512	**13.00 mm**	(8x)	3 mm	50 mm	ADS0520-C3	43.50
.0520	#55	1.320 mm	.610	**15.50 mm**	(10x)	3 mm	50 mm	EXP0520-C3	44.90
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	CHT0520-C3	46.10
.0550	#54	1.397 mm	.260	**6.60 mm**	(3x)	3 mm	50 mm	DHE0550-C3	40.10
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BVT0550-C3	41.10
.0550	#54	1.397 mm	.531	**13.50 mm**	(8x)	3 mm	50 mm	ADS0550-C3	43.50
.0550	#54	1.397 mm	.650	**16.50 mm**	(10x)	3 mm	63 mm	EXP0550-C3	44.90
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	CHT0550-C3	46.10
.0590		1.500 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	DHE0590-C3	43.40
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BVT0590-C3	44.20
.0590		1.500 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ADS0590-C3	46.70
.0590		1.500 mm	.689	**17.50 mm**	(10x)	3 mm	63 mm	EXP0590-C3	48.20
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	CHT0590-C3	49.50
.0595	#53	1.511 mm	.283	**7.20 mm**	(3x)	3 mm	50 mm	DHE0595-C3	43.40
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BVT0595-C3	44.20
.0595	#53	1.511 mm	.571	**14.50 mm**	(8x)	3 mm	50 mm	ADS0595-C3	46.70
.0595	#53	1.511 mm	.709	**18.00 mm**	(10x)	3 mm	63 mm	EXP0595-C3	48.20
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	CHT0595-C3	49.50
.0625 (1/16)		1.587 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	DHE0625-C3	43.40
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BVT0625-C3	44.20
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ADS0625-C3	46.70
.0625 (1/16)		1.587 mm	.728	**18.50 mm**	(10x)	3 mm	63 mm	EXP0625-C3	48.20
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	CHT0625-C3	49.50
.0635	#52	1.612 mm	.299	**7.60 mm**	(3x)	3 mm	50 mm	DHE0635-C3	43.40
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BVT0635-C3	44.20
.0635	#52	1.612 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	ADS0635-C3	46.70
.0635	#52	1.612 mm	.748	**19.00 mm**	(10x)	3 mm	63 mm	EXP0635-C3	48.20
.0635	#52	1.612 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	CHT0635-C3	49.50
.0670	#51	1.701 mm	.315	**8.00 mm**	(3x)	3 mm	50 mm	DHE0670-C3	43.40
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BVT0670-C3	44.20
.0670	#51	1.701 mm	.650	**16.50 mm**	(8x)	3 mm	63 mm	ADS0670-C3	46.70
.0670	#51	1.701 mm	.787	**20.00 mm**	(10x)	3 mm	63 mm	EXP0670-C3	48.20
.0670	#51	1.701 mm	.906	**23.00 mm**	(12x)	3 mm	63 mm	CHT0670-C3	49.50
.0700	#50	1.778 mm	.335	**8.50 mm**	(3x)	3 mm	50 mm	DHE0700-C3	43.40
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BVT0700-C3	44.20
.0700	#50	1.778 mm	.689	**17.50 mm**	(8x)	3 mm	63 mm	ADS0700-C3	46.70
.0700	#50	1.778 mm	.827	**21.00 mm**	(10x)	3 mm	63 mm	EXP0700-C3	48.20
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	CHT0700-C3	49.50
.0730	#49	1.854 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	DHE0730-C3	43.40

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BVT0730-C3	44.20
.0730	#49	1.854 mm	.709	**18.00 mm**	(8x)	3 mm	63 mm	ADS0730-C3	46.70
.0730	#49	1.854 mm	.866	**22.00 mm**	(10x)	3 mm	63 mm	EXP0730-C3	48.20
.0730	#49	1.854 mm	.984	**25.00 mm**	(12x)	3 mm	63 mm	CHT0730-C3	49.50
.0760	#48	1.930 mm	.354	**9.00 mm**	(3x)	3 mm	50 mm	DHE0760-C3	43.40
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BVT0760-C3	44.20
.0760	#48	1.930 mm	.748	**19.00 mm**	(8x)	3 mm	63 mm	ADS0760-C3	46.70
.0760	#48	1.930 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	EXP0760-C3	48.20
.0760	#48	1.930 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	CHT0760-C3	49.50
.0781 (5/64)		1.984 mm	.374	**9.50 mm**	(3x)	3 mm	50 mm	DHE0781-C3	43.40
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BVT0781-C3	44.20
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	ADS0781-C3	46.70
.0781 (5/64)		1.984 mm	.906	**23.00 mm**	(10x)	3 mm	63 mm	EXP0781-C3	46.90
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	CHT0781-C3	49.50
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BVT0785-C3	44.20
.0787		2.000 mm	.374	**9.50 mm**	(3x)	4 mm	50 mm	DHE0787-C3	43.40
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BVT0787-C3	47.70
.0787		2.000 mm	.768	**19.50 mm**	(8x)	4 mm	63 mm	ADS0787-C3	50.10
.0787		2.000 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	EXP0787-C3	51.70
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	CHT0787-C3	53.10
.0810	#46	2.057 mm	.394	**10.00 mm**	(3x)	4 mm	50 mm	DHE0810-C3	43.40
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BVT0810-C3	47.70
.0810	#46	2.057 mm	.787	**20.00 mm**	(8x)	4 mm	63 mm	ADS0810-C3	50.10
.0810	#46	2.057 mm	.945	**24.00 mm**	(10x)	4 mm	63 mm	EXP0810-C3	51.70
.0810	#46	2.057 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	CHT0810-C3	53.10
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BVT0820-C3	47.70
.0860	#44	2.184 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	DHE0860-C3	43.40
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BVT0860-C3	47.70
.0860	#44	2.184 mm	.827	**21.00 mm**	(8x)	4 mm	63 mm	ADS0860-C3	50.10
.0860	#44	2.184 mm	1.024	**26.00 mm**	(10x)	4 mm	63 mm	EXP0860-C3	51.70
.0860	#44	2.184 mm	1.181	**30.00 mm**	(12x)	4 mm	75 mm	CHT0860-C3	53.10
.0890	#43	2.260 mm	.413	**10.50 mm**	(3x)	4 mm	50 mm	DHE0890-C3	43.40
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BVT0890-C3	47.70
.0890	#43	2.260 mm	.866	**22.00 mm**	(8x)	4 mm	63 mm	ADS0890-C3	50.10
.0890	#43	2.260 mm	1.063	**27.00 mm**	(10x)	4 mm	63 mm	EXP0890-C3	51.70
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	CHT0890-C3	53.10
.0935	#42	2.374 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0935-C3	43.40
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0935-C3	47.70
.0935	#42	2.374 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	CHT0935-C3	53.10
.0937 (3/32)		2.381 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0937-C3	46.40
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0937-C3	47.70
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	ADS0937-C3	50.10
.0937 (3/32)		2.381 mm	1.102	**28.00 mm**	(10x)	4 mm	63 mm	EXP0937-C3	51.70
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	CHT0937-C3	52.90
.0960	#41	2.438 mm	.453	**11.50 mm**	(3x)	4 mm	50 mm	DHE0960-C3	46.40
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BVT0960-C3	47.70
.0960	#41	2.438 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0960-C3	50.10

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0960	#41	2.438 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0960-C3	51.70
.0960	#41	2.438 mm	1.338	**34.00 mm**	(12x)	4 mm	75 mm	CHT0960-C3	52.90
.0980	#40	2.489 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0980-C3	46.40
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0980-C3	47.70
.0980	#40	2.489 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0980-C3	50.10
.0980	#40	2.489 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0980-C3	51.70
.0980	#40	2.489 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	CHT0980-C3	52.90
.0984		2.500 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0984-C3	49.10
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0984-C3	50.70
.0984		2.500 mm	.945	**24.00 mm**	(8x)	4 mm	63 mm	ADS0984-C3	53.20
.0984		2.500 mm	1.142	**29.00 mm**	(10x)	4 mm	75 mm	EXP0984-C3	54.40
.0984		2.500 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	CHT0984-C3	55.70
.0995	#39	2.527 mm	.472	**12.00 mm**	(3x)	4 mm	50 mm	DHE0995-C3	49.10
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT0995-C3	50.70
.0995	#39	2.527 mm	.984	**25.00 mm**	(8x)	4 mm	63 mm	ADS0995-C3	53.20
.0995	#39	2.527 mm	1.181	**30.00 mm**	(10x)	4 mm	75 mm	EXP0995-C3	54.40
.0995	#39	2.527 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	CHT0995-C3	55.70
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT1000-C3	50.70
.1000		2.540 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	CHT1000-C3	55.70
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BVT1015-C3	50.70
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BVT1040-C3	50.70
.1040	#37	2.641 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	CHT1040-C3	55.70
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BVT1065-C3	50.70
.1065	#36	2.705 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	CHT1065-C3	55.70
.1093 (7/64)		2.778 mm	.512	**13.00 mm**	(3x)	4 mm	50 mm	DHE1093-C3	49.10
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1093-C3	50.70
.1093 (7/64)		2.778 mm	1.063	**27.00 mm**	(8x)	4 mm	63 mm	ADS1093-C3	53.20
.1093 (7/64)		2.778 mm	1.299	**33.00 mm**	(10x)	4 mm	75 mm	EXP1093-C3	54.40
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	CHT1093-C3	55.70
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1100-C3	50.70
.1100	#35	2.794 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	CHT1100-C3	55.70
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1110-C3	50.70
.1110	#34	2.819 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	CHT1110-C3	55.70
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BVT1130-C3	50.70
.1181		3.000 mm	.571	**14.50 mm**	(3x)	4 mm	50 mm	DHE1181-C3	49.10
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BVT1181-C3	50.70
.1181		3.000 mm	1.142	**29.00 mm**	(8x)	4 mm	63 mm	ADS1181-C3	53.20
.1181		3.000 mm	1.378	**35.00 mm**	(10x)	4 mm	100 mm	EXP1181-C3	54.40
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	CHT1181-C3	55.70
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BVT1200-C3	56.70
.1200	#31	3.048 mm	1.654	**42.00 mm**	(12x)	6 mm	100 mm	CHT1200-C3	61.70
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BVT1250-C3	56.70
.1250 (1/8)		3.175 mm	1.220	**31.00 mm**	(8x)	6 mm	75 mm	ADS1250-C3	59.20
.1250 (1/8)		3.175 mm	1.457	**37.00 mm**	(10x)	6 mm	100 mm	EXP1250-C3	60.40
.1250 (1/8)		3.175 mm	1.732	**44.00 mm**	(12x)	6 mm	100 mm	CHT1250-C3	61.70
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BVT1360-C3	56.70

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.1360	#29	3.454 mm	1.890	**48.00 mm**	(12x)	6 mm	100 mm	CHT1360-C3	61.70
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BVT1406-C3	56.70
.1406 (9/64)		3.571 mm	1.969	**50.00 mm**	(12x)	6 mm	100 mm	CHT1406-C3	61.70
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1470-C3	56.70
.1470	#26	3.733 mm	2.047	**52.00 mm**	(12x)	6 mm	100 mm	CHT1470-C3	61.70
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BVT1562-C3	56.70
.1562 (5/32)		3.968 mm	2.126	**54.00 mm**	(12x)	6 mm	100 mm	CHT1562-C3	61.70
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1574-C3	56.70
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BVT1590-C3	56.70
.1590	#21	4.038 mm	2.205	**56.00 mm**	(12x)	6 mm	100 mm	CHT1590-C3	61.70
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1718-C3	56.70
.1718 (11/64)		4.365 mm	2.362	**60.00 mm**	(12x)	6 mm	100 mm	CHT1718-C3	61.70
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1770-C3	56.70
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BVT1800-C3	56.70
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BVT1875-C3	56.70
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT1968-C3	56.70
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT2009-C3	56.70
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BVT2031-C3	56.70
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BVT2129-C3	56.70
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BVT2187-C3	56.70
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2343-C3	56.70
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BVT2362-C3	56.70
.2500 (1/4)		6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BVT2500-C3	56.70
.2500 (1/4)		6.350 mm	3.465	**88.00 mm**	(12x)	8 mm	150 mm	CHT2500-C3	61.70

SPEEDS & FEEDS ONLINE!

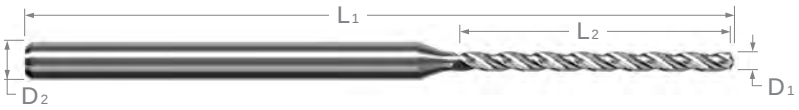
SPEEDS & FEEDS (Miniature High Performance Drills – Prehardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths and a material hardness of 29-37 Rc. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). For ferrous materials at 38-45 Rc, reduce IPR (for 3x and 5x, reduce to 80%; for 8x and 10x, reduce to 60%; for 12x, reduce to 52%). Pecking cycles are recommended to avoid chip packing and breakage. For materials at 29-37 Rc, initial peck depth should be 2-3x Diameter with each subsequent peck at 1-2x Diameter. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
		.015	.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys



Available for 5x, 8x, & 12x Hole Depths!

Special 3 Flute Design to Maximize Chip Flow, Hole Accuracy, and Finish

- Optimized for drilling aluminum and aluminum alloys with excellent performance in unfilled plastics, copper, brass, and bronze alloys
- Special 3 flute design to maximize chip flow, hole accuracy, and finish
- 130° point angle
- Polished flute valleys and TiB_2 coating prevent built-up edge and extend tool life
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.0150		.381 mm	.102	**2.60 mm**	(5x)	3 mm	50 mm	BAF0150-C8	41.90
.0156 (1/64)		.396 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BAF0156-C8	41.90
.0156 (1/64)		.396 mm	.154	**3.90 mm**	(8x)	3 mm	50 mm	CBG0156-C8	44.70
.0156 (1/64)		.396 mm	.213	**5.40 mm**	(12x)	3 mm	50 mm	DQW0156-C8	47.10
.0160	#78	.406 mm	.106	**2.70 mm**	(5x)	3 mm	50 mm	BAF0160-C8	41.90
.0160	#78	.406 mm	.220	**5.60 mm**	(12x)	3 mm	50 mm	DQW0160-C8	47.10
.0180	#77	.457 mm	.122	**3.10 mm**	(5x)	3 mm	50 mm	BAF0180-C8	41.90
.0180	#77	.457 mm	.244	**6.20 mm**	(12x)	3 mm	50 mm	DQW0180-C8	47.10
.0196		.500 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BAF0196-C8	41.40
.0196		.500 mm	.268	**6.80 mm**	(12x)	3 mm	50 mm	DQW0196-C8	46.40
.0200	#76	.508 mm	.134	**3.40 mm**	(5x)	3 mm	50 mm	BAF0200-C8	41.40
.0200	#76	.508 mm	.276	**7.00 mm**	(12x)	3 mm	50 mm	DQW0200-C8	46.40
.0210	#75	.533 mm	.142	**3.60 mm**	(5x)	3 mm	50 mm	BAF0210-C8	41.40
.0210	#75	.533 mm	.291	**7.40 mm**	(12x)	3 mm	50 mm	DQW0210-C8	46.40
.0225	#74	.571 mm	.154	**3.90 mm**	(5x)	3 mm	50 mm	BAF0225-C8	41.40
.0225	#74	.571 mm	.307	**7.80 mm**	(12x)	3 mm	50 mm	DQW0225-C8	46.40
.0236		.600 mm	.157	**4.00 mm**	(5x)	3 mm	50 mm	BAF0236-C8	41.40
.0240	#73	.609 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BAF0240-C8	41.40
.0240	#73	.609 mm	.331	**8.40 mm**	(12x)	3 mm	50 mm	DQW0240-C8	46.40
.0250	#72	.635 mm	.165	**4.20 mm**	(5x)	3 mm	50 mm	BAF0250-C8	41.40
.0250	#72	.635 mm	.346	**8.80 mm**	(12x)	3 mm	50 mm	DQW0250-C8	46.40
.0260	#71	.660 mm	.173	**4.40 mm**	(5x)	3 mm	50 mm	BAF0260-C8	41.40
.0260	#71	.660 mm	.354	**9.00 mm**	(12x)	3 mm	50 mm	DQW0260-C8	46.40
.0275		.700 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BAF0275-C8	41.40
.0280	#70	.711 mm	.189	**4.80 mm**	(5x)	3 mm	50 mm	BAF0280-C8	41.40
.0280	#70	.711 mm	.386	**9.80 mm**	(12x)	3 mm	50 mm	DQW0280-C8	46.40
.0292	#69	.741 mm	.197	**5.00 mm**	(5x)	3 mm	50 mm	BAF0292-C8	41.40
.0292	#69	.741 mm	.394	**10.00 mm**	(12x)	3 mm	50 mm	DQW0292-C8	46.40
.0300		.762 mm	.205	**5.20 mm**	(5x)	3 mm	50 mm	BAF0300-C8	41.40
.0310	#68	.787 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0310-C8	41.40
.0310	#68	.787 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0310-C8	47.10
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0312-C8	41.40
.0312 (1/32)		.793 mm	.307	**7.80 mm**	(8x)	3 mm	50 mm	CBG0312-C8	44.20
.0312 (1/32)		.793 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0312-C8	47.10
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0315-C8	41.40
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BAF0320-C8	41.40
.0320	#67	.812 mm	.433	**11.00 mm**	(12x)	3 mm	50 mm	DQW0320-C8	47.10

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BAF0330-C8	41.40
.0330	#66	.838 mm	.453	**11.50 mm**	(12x)	3 mm	50 mm	DQW0330-C8	47.10
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BAF0350-C8	41.40
.0350	#65	.889 mm	.472	**12.00 mm**	(12x)	3 mm	50 mm	DQW0350-C8	47.10
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BAF0354-C8	41.40
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BAF0360-C8	41.40
.0360	#64	.914 mm	.492	**12.50 mm**	(12x)	3 mm	50 mm	DQW0360-C8	47.10
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BAF0370-C8	41.40
.0370	#63	.939 mm	.512	**13.00 mm**	(12x)	3 mm	50 mm	DQW0370-C8	47.10
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BAF0380-C8	41.40
.0380	#62	.965 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	DQW0380-C8	47.10
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BAF0390-C8	41.40
.0390	#61	.990 mm	.531	**13.50 mm**	(12x)	3 mm	50 mm	DQW0390-C8	47.10
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BAF0393-C8	43.10
.0393		1.000 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	DQW0393-C8	48.10
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BAF0400-C8	43.10
.0400	#60	1.016 mm	.551	**14.00 mm**	(12x)	3 mm	50 mm	DQW0400-C8	48.10
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BAF0410-C8	43.10
.0410	#59	1.041 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	DQW0410-C8	48.10
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BAF0420-C8	43.10
.0420	#58	1.066 mm	.571	**14.50 mm**	(12x)	3 mm	50 mm	DQW0420-C8	48.10
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BAF0430-C8	43.10
.0430	#57	1.092 mm	.591	**15.00 mm**	(12x)	3 mm	50 mm	DQW0430-C8	48.10
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BAF0450-C8	43.10
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BAF0465-C8	43.10
.0465	#56	1.181 mm	.630	**16.00 mm**	(12x)	3 mm	63 mm	DQW0465-C8	48.10
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BAF0468-C8	43.10
.0468 (3/64)		1.190 mm	.453	**11.50 mm**	(8x)	3 mm	50 mm	CBG0468-C8	45.40
.0468 (3/64)		1.190 mm	.650	**16.50 mm**	(12x)	3 mm	63 mm	DQW0468-C8	48.10
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BAF0492-C8	43.10
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BAF0500-C8	43.10
.0500		1.270 mm	.689	**17.50 mm**	(12x)	3 mm	63 mm	DQW0500-C8	48.10
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BAF0520-C8	43.10
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	DQW0520-C8	48.10
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BAF0550-C8	43.10
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	DQW0550-C8	48.10
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BAF0590-C8	43.50
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	DQW0590-C8	48.90
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BAF0595-C8	43.50
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	DQW0595-C8	48.90
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BAF0600-C8	43.50
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BAF0625-C8	43.50
.0625 (1/16)		1.587 mm	.610	**15.50 mm**	(8x)	3 mm	50 mm	CBG0625-C8	46.10
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	DQW0625-C8	48.90
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BAF0635-C8	43.50
.0635	#52	1.612 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	DQW0635-C8	48.90
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BAF0670-C8	43.50
.0670	#51	1.701 mm	.906	**23.00 mm**	(12x)	3 mm	63 mm	DQW0670-C8	48.90

SPEEDS & FEEDS ONLINE!
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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	3 FL	PRICE
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BAF0700-C8	43.50
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	DQW0700-C8	48.90
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BAF0730-C8	43.50
.0730	#49	1.854 mm	.984	**25.00 mm**	(12x)	3 mm	63 mm	DQW0730-C8	48.90
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BAF0760-C8	43.50
.0760	#48	1.930 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0760-C8	48.90
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BAF0781-C8	43.50
.0781 (5/64)		1.984 mm	.768	**19.50 mm**	(8x)	3 mm	63 mm	CBG0781-C8	46.10
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0781-C8	48.90
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BAF0785-C8	43.50
.0785	#47	1.993 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	DQW0785-C8	48.90
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BAF0787-C8	44.70
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	DQW0787-C8	49.90
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BAF0800-C8	44.70
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BAF0810-C8	44.70
.0810	#46	2.057 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	DQW0810-C8	49.90
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BAF0820-C8	44.70
.0820	#45	2.082 mm	1.142	**29.00 mm**	(12x)	4 mm	75 mm	DQW0820-C8	49.90
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BAF0860-C8	44.70
.0860	#44	2.184 mm	1.181	**30.00 mm**	(12x)	4 mm	75 mm	DQW0860-C8	49.90
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BAF0890-C8	44.70
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	DQW0890-C8	49.90
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BAF0900-C8	44.70
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0935-C8	44.70
.0935	#42	2.374 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	DQW0935-C8	49.90
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0937-C8	44.70
.0937 (3/32)		2.381 mm	.906	**23.00 mm**	(8x)	4 mm	63 mm	CBG0937-C8	47.20
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	DQW0937-C8	49.90
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BAF0960-C8	44.70
.0960	#41	2.438 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0960-C8	49.90
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0980-C8	44.70
.0980	#40	2.489 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0980-C8	49.90
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0984-C8	45.10
.0984		2.500 mm	1.339	**34.00 mm**	(12x)	4 mm	75 mm	DQW0984-C8	50.10
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF0995-C8	45.10
.0995	#39	2.527 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	DQW0995-C8	50.10
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF1000-C8	45.10
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BAF1015-C8	45.10
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	DQW1015-C8	50.10
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BAF1040-C8	45.10
.1040	#37	2.641 mm	1.417	**36.00 mm**	(12x)	4 mm	75 mm	DQW1040-C8	50.10
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BAF1065-C8	45.10
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	DQW1065-C8	50.10
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1093-C8	45.10
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	DQW1093-C8	50.10
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1100-C8	45.10
.1100	#35	2.794 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	DQW1100-C8	50.10

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1110-C8	45.10
.1110	#34	2.819 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	DQW1110-C8	50.10
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BAF1130-C8	45.10
.1130	#33	2.870 mm	1.535	**39.00 mm**	(12x)	4 mm	75 mm	DQW1130-C8	50.10
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BAF1160-C8	45.10
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BAF1181-C8	46.10
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	DQW1181-C8	51.20
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BAF1200-C8	56.90
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BAF1250-C8	56.90
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BAF1360-C8	56.90
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BAF1406-C8	56.90
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1470-C8	56.90
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BAF1562-C8	56.90
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1574-C8	56.90
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BAF1590-C8	56.90
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1718-C8	56.90
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1770-C8	56.90
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BAF1800-C8	56.90
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BAF1875-C8	56.90
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF1968-C8	56.90
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF2009-C8	56.90
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BAF2031-C8	56.90
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BAF2129-C8	56.90
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BAF2187-C8	56.90
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2343-C8	56.90
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BAF2362-C8	56.90
.2500 (1/4)		6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BAF2500-C8	56.90

SPEEDS & FEEDS ONLINE!

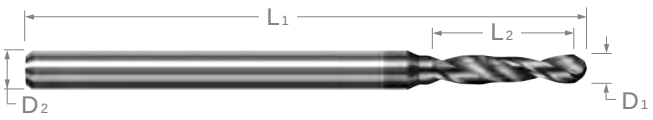
SPEEDS & FEEDS (Miniature High Performance Drills – Aluminum Alloys)

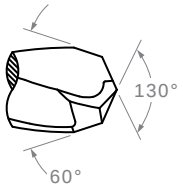
Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x, reduce to 75%; for 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: ≤ 28 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
		.015	.031	.047	.062	.078	.093	.125	.187	.250
Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx)	450	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00071	.00147	.00223	.00295	.00371	.00442	.00594	.00889	.01188
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
Wrought - 5%-8% Si (4xxx)	600									
Wrought - 8%-12% Si (4xxx)	480									
Magnesium Alloys	900	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Zinc Alloys	480									
Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00063	.00131	.00199	.00262	.00329	.00393	.00528	.00790	.01056
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
Plastics: Unfilled Plastics	500	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320
Reinforced Plastics	350	.00063	.00131	.00199	.00329	.00393	.00528	.00790	.01056	.01584

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle





- Optimized for drilling layered composites with excellent performance in virgin plastics and other composite materials
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Double Angle Point Geometry Prevents Delamination

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0312-C4	51.10
.0314		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0315-C4	51.10
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	DDA0320-C4	51.10
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	DDA0330-C4	51.10
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	DDA0350-C4	51.10
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	DDA0354-C4	51.10
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	DDA0360-C4	51.10
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	DDA0370-C4	51.10
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	DDA0380-C4	51.10
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	DDA0390-C4	51.10
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	DDA0393-C4	52.40
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	DDA0400-C4	52.40
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	DDA0410-C4	52.40
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	DDA0420-C4	52.40
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	DDA0430-C4	52.40
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	DDA0450-C4	52.40
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	DDA0465-C4	52.40
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	DDA0468-C4	52.40
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	DDA0492-C4	52.40
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	DDA0500-C4	52.40
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	DDA0520-C4	52.40
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	DDA0550-C4	52.40
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	DDA0590-C4	53.10
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	DDA0595-C4	53.10
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	DDA0600-C4	53.10
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	DDA0625-C4	53.10
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	DDA0635-C4	53.10
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	DDA0670-C4	53.10

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	DDA0700-C4	53.10
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	DDA0730-C4	53.10
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	DDA0760-C4	53.10
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	DDA0781-C4	53.10
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	DDA0785-C4	53.10
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	DDA0787-C4	54.10
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	DDA0800-C4	54.10
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	DDA0810-C4	54.10
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	DDA0820-C4	54.10
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	DDA0860-C4	54.10
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	DDA0890-C4	54.10
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	DDA0900-C4	54.10
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0935-C4	54.10
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0937-C4	54.10
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	DDA0960-C4	54.10
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0980-C4	54.10
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0984-C4	54.50
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA0995-C4	54.50
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA1000-C4	54.50
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	DDA1015-C4	54.50
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	DDA1040-C4	54.50
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	DDA1065-C4	54.50
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1093-C4	54.50
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1100-C4	54.50
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1110-C4	54.50
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	DDA1130-C4	54.50
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	DDA1160-C4	54.50
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	DDA1181-C4	55.70
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	DDA1200-C4	65.90
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	DDA1250-C4	65.90
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	DDA1360-C4	65.90
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	DDA1406-C4	65.90
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	DDA1470-C4	65.90
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	DDA1562-C4	65.90
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	DDA1574-C4	65.90
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	DDA1590-C4	65.90
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1718-C4	65.90
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1770-C4	65.90
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	DDA1800-C4	65.90
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	DDA1875-C4	65.90

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA1968-C4	65.90
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA2009-C4	65.90
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	DDA2031-C4	65.90
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	DDA2129-C4	65.90
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	DDA2187-C4	65.90
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	DDA2343-C4	65.90
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	DDA2362-C4	65.90
.2500 (1/4)		6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	DDA2500-C4	65.90

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Miniature High Performance Drills – Composites)

Important Note: Posted chiploads are for the double angle drills. For brad point drills, reduce chiploads by approx. 10%. Since the melting point varies greatly from plastic to plastic, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. Look at our online speeds and feeds for more information. For complete speeds and feeds charts, please go to www.harveytool.com.

Material Type		Type	Hardness	SFM	Chip Load Per Revolution (IPR) By Cutter Diameter								
					.015	.031	.047	.062	.078	.093	.125	.187	.250
Unfilled Plastics	ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108
	Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
Filled Plastics	Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108
	Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
		Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400-600	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
		Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350-500	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097
Fiber Reinforced	FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350-500	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119
	G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200-300	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097

★★★★★

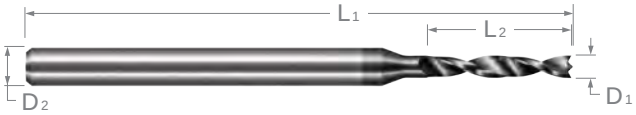
"Nothing like a fresh @harveytool when cutting carbon fiber!!!"

— @KeyBar

Follow us on Instagram @harveytool!

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point



- Optimized for drilling glass or carbon fiber filled and reinforced composites with excellent performance in other filled, layered, and woven composite materials
- Center and OD spur point geometry for accurate scoring action, prevents fraying, uncut fibers, and tear out
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Brad Point Prevents Fraying & Tear Out

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0312-C4	44.10
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0315-C4	44.10
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0320-C4	44.10
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BSW0330-C4	44.10
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0350-C4	44.10
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0354-C4	44.10
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BSW0360-C4	44.10
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BSW0370-C4	44.10
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0380-C4	44.10
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0390-C4	44.10
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0393-C4	46.10
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0400-C4	46.10
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BSW0410-C4	46.10
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BSW0420-C4	46.10
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BSW0430-C4	46.10
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BSW0450-C4	46.10
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0465-C4	46.10
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0468-C4	46.10
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0492-C4	46.10
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0500-C4	46.10
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BSW0520-C4	46.10
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BSW0550-C4	46.10
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0590-C4	46.10
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0595-C4	46.10
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0600-C4	46.10
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0625-C4	46.10
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BSW0635-C4	46.10
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BSW0670-C4	46.10
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BSW0700-C4	46.10
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BSW0730-C4	46.10
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BSW0760-C4	46.10
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0781-C4	46.10
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0785-C4	46.10
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0787-C4	47.90

SPEEDS & FEEDS ONLINE!

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0800-C4	47.90
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0810-C4	47.90
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0820-C4	47.90
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BSW0860-C4	47.90
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0890-C4	47.90
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0900-C4	47.90
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0935-C4	48.50
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0937-C4	48.50
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0960-C4	48.50
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0980-C4	48.50
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0984-C4	48.90
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0995-C4	48.90
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1000-C4	48.90
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1015-C4	48.90
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1040-C4	48.90
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1065-C4	48.90
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1093-C4	48.90
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1100-C4	48.90
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1110-C4	48.90
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1130-C4	48.90
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1160-C4	48.90
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1181-C4	48.90
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1200-C4	56.40
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1250-C4	56.40
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BSW1360-C4	56.40
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BSW1406-C4	56.40
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1470-C4	56.40
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1562-C4	56.40
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1574-C4	56.40
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1590-C4	56.40
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1718-C4	56.40
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1770-C4	56.40
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1800-C4	56.40
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BSW1875-C4	56.40
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW1968-C4	56.40
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2009-C4	56.40
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2031-C4	56.40
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BSW2129-C4	56.40
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BSW2187-C4	56.40
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2343-C4	56.40
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2362-C4	56.40
.2500 (1/4)		6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BSW2500-C4	56.40

SPEEDS & FEEDS ONLINE!

PLEASE SEE SPEEDS & FEEDS ON PAGE 334

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom

Ideal for Inclined & Rounded Surfaces

- Flat bottom design (no point angle and no dish) allows for drilling on irregular surfaces and reduces burrs on break through
- Ideal for drilling on inclined and rounded surfaces, creating flat bottom holes, tilted drilling for angled holes, and drilling intersecting holes, half holes, shoulders, or thin plates
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

No Point Angle & No Dish Allows for Drilling on Irregular Surfaces

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0312-C3	39.40	FBD0312-C8	42.10
.0314		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0315-C3	39.40	FBD0315-C8	42.10
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	FBD0320-C3	39.40	FBD0320-C8	42.10
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	FBD0330-C3	39.40	FBD0330-C8	42.10
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	FBD0350-C3	39.40	FBD0350-C8	42.10
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	FBD0354-C3	39.40	FBD0354-C8	42.10
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	FBD0360-C3	39.40	FBD0360-C8	42.10
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	FBD0370-C3	39.40	FBD0370-C8	42.10
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	FBD0380-C3	39.40	FBD0380-C8	42.10
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	FBD0390-C3	39.40	FBD0390-C8	42.10
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	FBD0393-C3	43.20	FBD0393-C8	45.90
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	FBD0400-C3	43.20	FBD0400-C8	45.90
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	FBD0410-C3	43.20	FBD0410-C8	45.90
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	FBD0420-C3	43.20	FBD0420-C8	45.90
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	FBD0430-C3	43.20	FBD0430-C8	45.90
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	FBD0450-C3	43.20	FBD0450-C8	45.90
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	FBD0465-C3	43.20	FBD0465-C8	45.90
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	FBD0468-C3	43.20	FBD0468-C8	45.90
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	FBD0492-C3	43.20	FBD0492-C8	45.90
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	FBD0500-C3	43.20	FBD0500-C8	45.90
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	FBD0520-C3	43.20	FBD0520-C8	45.90
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	FBD0550-C3	43.20	FBD0550-C8	45.90
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	FBD0590-C3	46.50	FBD0590-C8	49.20
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	FBD0595-C3	46.50	FBD0595-C8	49.20
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	FBD0600-C3	46.50	FBD0600-C8	49.20
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	FBD0625-C3	46.50	FBD0625-C8	49.20
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	FBD0635-C3	46.50	FBD0635-C8	49.20
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	FBD0670-C3	46.50	FBD0670-C8	49.20
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	FBD0700-C3	46.50	FBD0700-C8	49.20

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER inch	wire	metric D_1 +.000mm −.013mm	FLUTE LENGTH inch	metric L_2 +.25mm −.00mm	hole depth	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED 2 FL	PRICE	TiB_2 COATED 2 FL	PRICE
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	FBD0730-C3	46.50	FBD0730-C8	49.20
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	FBD0760-C3	46.50	FBD0760-C8	49.20
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	FBD0781-C3	46.50	FBD0781-C8	49.20
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	FBD0785-C3	46.50	FBD0785-C8	49.20
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	FBD0787-C3	50.10	FBD0787-C8	52.90
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	FBD0800-C3	50.10	FBD0800-C8	52.90
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	FBD0810-C3	50.10	FBD0810-C8	52.90
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	FBD0820-C3	50.10	FBD0820-C8	52.90
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	FBD0860-C3	50.10	FBD0860-C8	52.90
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	FBD0890-C3	50.10	FBD0890-C8	52.90
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	FBD0900-C3	50.10	FBD0900-C8	52.90
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0935-C3	50.10	FBD0935-C8	52.90
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0937-C3	50.10	FBD0937-C8	52.90
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	FBD0960-C3	50.10	FBD0960-C8	52.90
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0980-C3	50.10	FBD0980-C8	52.90
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0984-C3	53.10	FBD0984-C8	55.90
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD0995-C3	53.10	FBD0995-C8	55.90
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD1000-C3	53.10	FBD1000-C8	55.90
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	FBD1015-C3	53.10	FBD1015-C8	55.90
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	FBD1040-C3	53.10	FBD1040-C8	55.90
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	FBD1065-C3	53.10	FBD1065-C8	55.90
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1093-C3	53.10	FBD1093-C8	55.90
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1100-C3	53.10	FBD1100-C8	55.90
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1110-C3	53.10	FBD1110-C8	55.90
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	FBD1130-C3	53.10	FBD1130-C8	55.90
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	FBD1160-C3	53.10	FBD1160-C8	55.90
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	FBD1181-C3	53.10	FBD1181-C8	55.90

		D_1 +.000mm −.013mm	L_2 +.75mm −.00mm			D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	FBD1200-C3	59.50	FBD1200-C8	62.20
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	FBD1250-C3	59.50	FBD1250-C8	62.20
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	FBD1360-C3	59.50	FBD1360-C8	62.20
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	FBD1406-C3	59.50	FBD1406-C8	62.20
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	FBD1470-C3	59.50	FBD1470-C8	62.20
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	FBD1562-C3	59.50	FBD1562-C8	62.20
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	FBD1574-C3	59.50	FBD1574-C8	62.20
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	FBD1590-C3	59.50	FBD1590-C8	62.20
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1718-C3	59.50	FBD1718-C8	62.20
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1770-C3	59.50	FBD1770-C8	62.20
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	FBD1800-C3	59.50	FBD1800-C8	62.20
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	FBD1875-C3	59.50	FBD1875-C8	62.20
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD1968-C3	59.50	FBD1968-C8	62.20
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD2009-C3	59.50	FBD2009-C8	62.20

SPEEDS & FEEDS ONLINE!

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH inch	metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED 2 FL	PRICE	TiB_2 COATED 2 FL	PRICE
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1				
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	FBD2031-C3	59.50	FBD2031-C8	62.20
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	FBD2129-C3	59.50	FBD2129-C8	62.20
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	FBD2187-C3	59.50	FBD2187-C8	62.20
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	FBD2343-C3	59.50	FBD2343-C8	62.20
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	FBD2362-C3	59.50	FBD2362-C8	62.20
.2500 (1/4)		6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	FBD2500-C3	59.50	FBD2500-C8	62.20

SPEEDS & FEEDS ONLINE!

SPEEDS & FEEDS (Miniature High Performance Drills – Flat Bottom)

Important Note: Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For Ferrous materials at 38-45 Rc reduce IPR to 80% of the chart value. Values in table are also to be used for drilling on a flat surface. For drilling on inclined or rounded surfaces please refer to the complete speeds and feeds chart available online at www.harveytool.com. Pecking cycles are recommended to avoid chip packing and breakage. Initial Peck must fully submerge the drill point into the material. Do not use a pecking cycle for half-hole drilling or any situation where the drill is not fully enclosed in the material during the drilling operation. For steels at 29-37 Rc, an initial peck should be 2-3x Diameter, and each subsequent peck should be 1-2x Diameter. For harder steels at 38-45 Rc, 1-2x Diameter is recommended for an initial peck, and each subsequent peck should be .5-1x Diameter.

Coating	Material	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250
AlTiN Hardness: 29-37 Rc (279-344 HBn)	**Carbon Steels** Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
TiB_2 Hardness: ≤ 28 Rc (≤ 271 HBn)	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	450	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
	Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00065	.00134	.00203	.00268	.00337	.00402	.00540	.00808	.01080
	Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
	Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
	Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
	Wrought - 5%-8% Si (4xxx)	600									
	Wrought - 8%-12% Si (4xxx)	480									
	Magnesium Alloys	900	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Zinc Alloys	480									
	Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
	Plastics: Unfilled Plastics	500	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Reinforced Plastics	350	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through

Available in 12x & 20x Flute Lengths!

- Drill up to 20x diameter in depth
- Coolant through design for improved chip removal and heat reduction at the drill tip
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- h6 shank tolerance for high precision tool holders
- AlTiN coated for improved lubricity and heat resistance
- CNC ground in Germany
- Solid carbide

Coolant Through Design for Improved Chip Removal

COOLANT-THROUGH

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	ACD0520-C3	152.50
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	ACD0550-C3	152.50
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0590-C3	152.50
.0590		1.500 mm	1.280	**32.50 mm**	(20x)	3 mm	75 mm	CXZ0590-C3	181.10
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0595-C3	152.50
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	ACD0625-C3	152.50
.0625 (1/16)		1.587 mm	1.358	**34.50 mm**	(20x)	3 mm	75 mm	CXZ0625-C3	181.10
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	ACD0700-C3	152.50
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	ACD0781-C3	152.50
.0781 (5/64)		1.984 mm	1.693	**43.00 mm**	(20x)	3 mm	100 mm	CXZ0781-C3	181.10
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	ACD0787-C3	157.90
.0787		2.000 mm	1.732	**44.00 mm**	(20x)	4 mm	100 mm	CXZ0787-C3	200.70
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	ACD0890-C3	157.90
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	ACD0937-C3	157.90
.0937 (3/32)		2.381 mm	2.047	**52.00 mm**	(20x)	4 mm	100 mm	CXZ0937-C3	200.70
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	ACD1015-C3	157.90
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	ACD1065-C3	157.90
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	ACD1093-C3	157.90
.1093 (7/64)		2.778 mm	2.362	**60.00 mm**	(20x)	4 mm	100 mm	CXZ1093-C3	200.70
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	ACD1181-C3	157.90
.1181		3.000 mm	2.559	**65.00 mm**	(20x)	4 mm	100 mm	CXZ1181-C3	200.70

SPEEDS & FEEDS ONLINE!

see Speeds & Feeds on next page

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through (cont.)

SPEEDS & FEEDS (Miniature High Performance Drills – Deep Hole)

Important Note: Values in table are in inches and are based on 12x length drills and a material hardness of 29-37 Rc. For longer lengths and higher hardness materials, table values of IPR must be reduced (for 20x, reduce to 75%). For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter							
		.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Tool Steels A, L, O, P, W series	125	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
D, H, M, T, S series	90	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Titanium Alloys	100	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507

Deep Hole Drilling Guidelines

For best results, the following steps are recommended:

- For hole depths of 12x Diameter or greater, drill a pilot hole up to 1.5x D in depth using a drill with 3x LOF or shorter.
- Insert primary drill at low speed (~500 rpm) and start coolant flow.
- Increase speed and feed to recommended parameters.
- Under optimal conditions, it is possible to feed to full hole depth without pecking. If necessary, use 2-4 pecks to get to full hole depth.
- After reaching desired hole depth, reduce speed (~500 RPM) before retracting the drill.
- Cutting oil is recommended. As an alternative, it is possible to use emulsions with EP additives. Use a fine mesh prefilter (=5µm) on spindle through coolant to prevent a blockage of the coolant hole. A minimum coolant pressure of 600-800 PSI is recommended.

★★★★★

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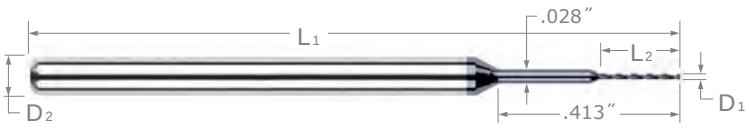
MINIATURE DRILLS



Miniature Drills Down to .002"

- For tools .020″ and smaller, there is an intermediate neck diameter as pictured above
- 130° drill point
- Solid carbide
- CNC ground in Germany

DRILL DIAMETER inch	DRILL DIAMETER wire	DRILL DIAMETER metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0003″ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.0020		.050 mm	.028	1/8	1-1/2	20020**	34.70		
.0039	#102	.100 mm	.039	1/8	1-1/2	20039	24.70		
.0051	#99	.130 mm	.056	1/8	1-1/2	20051	24.10		
.0059	#97	.150 mm	.066	1/8	1-1/2	20059	22.40		
.0063	#96		.066	1/8	1-1/2	20063	22.40		
.0069		.175 mm	.066	1/8	1-1/2	20069	22.40		
.0071	#94		.106	1/8	1-1/2	20071	20.40		
.0075	#93		.106	1/8	1-1/2	20075	20.40		
.0079	#92	.200 mm	.160	1/8	1-1/2	20079	17.10		
.0083	#91		.160	1/8	1-1/2	20083	17.10		
.0087	#90		.126	1/8	1-1/2	20087	17.10		
.0089		.225 mm	.160	1/8	1-1/2	20089	17.10		
.0091	#89		.160	1/8	1-1/2	20091	16.70		
.0095	#88		.160	1/8	1-1/2	20095	16.70		
.0098		.250 mm	.160	1/8	1-1/2	20098	16.70		
.0100	#87		.160	1/8	1-1/2	20100	16.70	20100-C3	20.90
.0108		.275 mm	.160	1/8	1-1/2	20108	16.70	20108-C3	20.90
.0110	#85		.160	1/8	1-1/2	20110	16.70	20110-C3	20.90
.0115	#84		.180	1/8	1-1/2	20115	16.70	20115-C3	20.90
.0118		.300 mm	.180	1/8	1-1/2	20118	16.70	20118-C3	20.90
.0120	#83		.230	1/8	1-1/2	20120	15.10	20120-C3	19.30
.0130	#81		.230	1/8	1-1/2	20130	15.10	20130-C3	19.30
.0135	#80		.270	1/8	1-1/2	20135	14.70	20135-C3	18.90
.0138		.350 mm	.270	1/8	1-1/2	20138	14.70	20138-C3	18.90
.0145	#79		.270	1/8	1-1/2	20145	14.70	20145-C3	18.90
.0157		.400 mm	.270	1/8	1-1/2	20157	14.70	20157-C3	18.90
.0160	#78		.270	1/8	1-1/2	20160	14.70	20160-C3	18.90
.0168			.270	1/8	1-1/2	20168	14.70	20168-C3	18.90
.0177		.450 mm	.270	1/8	1-1/2	20177	14.70	20177-C3	18.90
.0180	#77		.270	1/8	1-1/2	20180	13.70	20180-C3	17.90
.0197		.500 mm	.275	1/8	1-1/2	20197	13.70	20197-C3	17.90
.0200	#76		.275	1/8	1-1/2	20200	13.70	20200-C3	17.90

SPEEDS & FEEDS ONLINE!

* Tolerance for all AlTiN coating is +.0002"/−.0003".
** Intermediate diameter is .040" and the total reach is .310".

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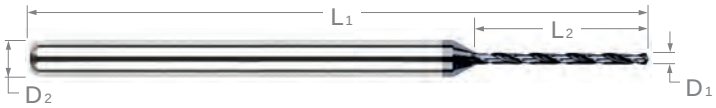
MINIATURE DRILLS

(cont.)



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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0003″ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.0210	#75		.275	1/8	1-1/2	20205	13.70	20205-C3	17.90
.0225	#74		.275	1/8	1-1/2	20210	13.70	20210-C3	17.90
.0236		.600 mm	.275	1/8	1-1/2	20214	13.70	20214-C3	17.90
.0240	#73		.275	1/8	1-1/2	20215	13.70	20215-C3	17.90
.0250	#72		.275	1/8	1-1/2	20220	13.70	20220-C3	17.90
.0260	#71		.275	1/8	1-1/2	20225	13.70	20225-C3	17.90
.0276		.700 mm	.335	1/8	1-1/2	20229	13.70	20229-C3	17.90
.0280	#70		.335	1/8	1-1/2	20230	13.70	20230-C3	17.90
.0292	#69		.335	1/8	1-1/2	20235	13.70	20235-C3	17.90
.0302			.395	1/8	1-1/2	20240	13.70	20240-C3	17.90
.0310	#68		.395	1/8	1-1/2	20245	12.90	20245-C3	17.10
.0312 (1/32)			.395	1/8	1-1/2	20250	12.90	20250-C3	17.10
.0315		.800 mm	.395	1/8	1-1/2	20253	12.90	20253-C3	17.10
.0320	#67		.395	1/8	1-1/2	20255	12.90	20255-C3	17.10
.0330	#66		.395	1/8	1-1/2	20260	12.90	20260-C3	17.10
.0350	#65		.395	1/8	1-1/2	20265	12.90	20265-C3	17.10
.0354		.900 mm	.395	1/8	1-1/2	20267	12.90	20267-C3	17.10
.0360	#64		.395	1/8	1-1/2	20270	12.90	20270-C3	17.10
.0370	#63		.395	1/8	1-1/2	20275	12.90	20275-C3	17.10
.0380	#62		.395	1/8	1-1/2	20280	12.90	20280-C3	17.10
.0390	#61		.395	1/8	1-1/2	20285	12.90	20285-C3	17.10
.0394		1.000 mm	.395	1/8	1-1/2	20290	12.90	20290-C3	17.10
.0400	#60		.395	1/8	1-1/2	20295	12.90	20295-C3	17.10
.0410	#59		.395	1/8	1-1/2	20300	12.90	20300-C3	17.10
.0420	#58		.395	1/8	1-1/2	20305	12.90	20305-C3	17.10
.0430	#57		.395	1/8	1-1/2	20310	12.90	20310-C3	17.10
.0433		1.100 mm	.395	1/8	1-1/2	20311	12.90	20311-C3	17.10
.0440			.395	1/8	1-1/2	20315	12.90	20315-C3	17.10
.0465	#56		.395	1/8	1-1/2	20320	12.90	20320-C3	17.10
.0469 (3/64)			.395	1/8	1-1/2	20325	12.90	20325-C3	17.10
.0472		1.200 mm	.395	1/8	1-1/2	20327	12.90	20327-C3	17.10
.0492		1.250 mm	.395	1/8	1-1/2	20330	12.90	20330-C3	17.10
.0500		1.270 mm	.395	1/8	1-1/2	20332	12.90	20332-C3	17.10
.0512		1.300 mm	.413	1/8	1-1/2	20335	12.90	20335-C3	17.10
.0520	#55		.413	1/8	1-1/2	20340	12.90	20340-C3	17.10

SPEEDS & FEEDS ONLINE!

* Tolerance for all AlTiN coating is +.0002"/−.0003".

continued on next page

MINIATURE DRILLS

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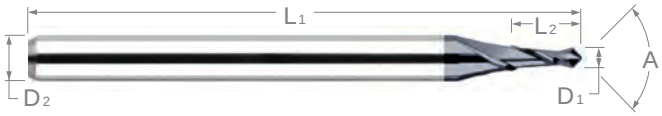
DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED 2 FL	UNCOATED PRICE	AlTiN COATED 2 FL	AlTiN COATED PRICE
D_1 $^{+.0000''}_{-.0003''}$ *			L_2	D_2	L_1				
.0531		1.350 mm	.413	1/8	1-1/2	20345	12.90	20345-C3	17.10
.0550	#54		.413	1/8	1-1/2	20350	12.90	20350-C3	17.10
.0571		1.450 mm	.413	1/8	1-1/2	20355	12.90	20355-C3	17.10
.0591		1.500 mm	.413	1/8	1-1/2	20360	12.90	20360-C3	17.10
.0595	#53		.413	1/8	1-1/2	20365	12.90	20365-C3	17.10
.0610		1.550 mm	.413	1/8	1-1/2	20370	12.90	20370-C3	17.10
.0625 (1/16)			.413	1/8	1-1/2	20375	12.90	20375-C3	17.10
D_1 $^{+.0000''}_{-.0005''}$ *			L_2	D_2	L_1				
.0630		1.600 mm	.413	1/8	1-1/2	20376	12.90	20376-C3	17.10
.0635	#52		.413	1/8	1-1/2	20377	12.90	20377-C3	17.10
.0670	#51		.413	1/8	1-1/2	20384	12.90	20384-C3	17.10
.0700	#50		.413	1/8	1-1/2	20390	12.90	20390-C3	17.10
.0730	#49		.413	1/8	1-1/2	20396	12.90	20396-C3	17.10
.0760	#48		.413	1/8	1-1/2	20402	12.90	20402-C3	17.10
.0781 (5/64)			.413	1/8	1-1/2	20407	12.90	20407-C3	17.10
.0785	#47		.413	1/8	1-1/2	20408	12.90	20408-C3	17.10
.0787		2.000 mm	.413	1/8	1-1/2	20409	12.90	20409-C3	17.10
.0810	#46		.413	1/8	1-1/2	20414	12.90	20414-C3	17.10
.0820	#45		.413	1/8	1-1/2	20416	12.90	20416-C3	17.10
.0860	#44		.413	1/8	1-1/2	20424	12.90	20424-C3	17.10
.0890	#43		.413	1/8	1-1/2	20430	12.90	20430-C3	17.10
.0935	#42		.413	1/8	1-1/2	20439	12.90	20439-C3	17.10
.0938 (3/32)			.413	1/8	1-1/2	20440	12.90	20440-C3	17.10
.0960	#41		.413	1/8	1-1/2	20445	12.90	20445-C3	17.10
.0980	#40		.413	1/8	1-1/2	20449	12.90	20449-C3	17.10
.0984		2.500 mm	.413	1/8	1-1/2	20450	12.90	20450-C3	17.10
.0995	#39		.413	1/8	1-1/2	20453	12.90	20453-C3	17.10
.1015	#38		.413	1/8	1-1/2	20457	12.90	20457-C3	17.10
.1040	#37		.413	1/8	1-1/2	20462	12.90	20462-C3	17.10
.1065	#36		.413	1/8	1-1/2	20467	12.90	20467-C3	17.10
.1094 (7/64)			.413	1/8	1-1/2	20473	12.90	20473-C3	17.10
.1100	#35		.413	1/8	1-1/2	20475	12.90	20475-C3	17.10
.1110	#34		.413	1/8	1-1/2	20477	12.90	20477-C3	17.10
.1130	#33		.413	1/8	1-1/2	20481	12.90	20481-C3	17.10
.1160	#32		.413	1/8	1-1/2	20487	12.90	20487-C3	17.10
.1181		3.000 mm	.413	1/8	1-1/2	20491	12.90	20491-C3	17.10
.1200	#31		.413	1/8	1-1/2	20493	12.90	20493-C3	17.10
.1250 (1/8)			.413	1/8	1-1/2	20498	12.90	20498-C3	17.10

SPEEDS & FEEDS ONLINE!

* Tolerance for all AlTiN coating is +.0002"/−.0003".

MINIATURE DRILLS

Spotting Drills



Stocked in 9 Included Angles

- Thinned web to reduce walking
- Self-centering point geometry
- 2 flutes
- Solid carbide
- CNC ground in the USA

INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
A +1° −1°	D1	L2			D2	L1		2 FL	PRICE	2 FL	PRICE
60°	.020	.060	.0020	I	1/8	1-1/2		932720	27.70	932720-C3	31.90
	.030	.090	.0030	I	1/8	1-1/2		932730	27.10	932730-C3	31.30
	.045	.135	.0030	I	1/8	1-1/2		932745	23.50	932745-C3	27.70
	.060	.180	.0050	I	1/8	1-1/2		932760	27.10	932760-C3	31.30
	.090	.270	.0050	I	1/8	1-1/2		932790	27.10	932790-C3	31.30
	.125 (1/8)	.375	.0100	I	1/8	1-1/2		932808	27.10	932808-C3	31.30
	.125 (1/8)	.375	.0100	II	1/8	1-1/2		932811	27.10	932811-C3	31.30
	.187 (3/16)	.625	.0130	II	3/16	2		932812	24.40	932812-C3	28.90
	.250 (1/4)	.750	.0180	II	1/4	2-1/2		932816	29.40	932816-C3	35.60
82°	.010	.030	.0015	I	1/8	1-1/2		983110	32.50	983110-C3	36.70
	.020	.060	.0020	I	1/8	1-1/2		983120	27.70	983120-C3	31.90
	.030	.090	.0030	I	1/8	1-1/2		983130	26.10	983130-C3	30.30
	.045	.135	.0030	I	1/8	1-1/2		983145	23.50	983145-C3	27.70
	.060	.180	.0050	I	1/8	1-1/2		983160	23.20	983160-C3	27.40
	.090	.270	.0050	I	1/8	1-1/2		983190	22.20	983190-C3	26.40
	.125 (1/8)	.375	.0100	I	1/8	1-1/2		983208	21.10	983208-C3	25.30
	.125 (1/8)	.375	.0100	II	1/8	1-1/2		965208	21.10	965208-C3	25.30
	.187 (3/16)	.625	.0130	II	3/16	2		965212	24.40	965212-C3	28.90
	.250 (1/4)	.750	.0180	II	1/4	2-1/2		965216	30.20	965216-C3	36.40
90°	.008	.024	.0015	I	1/8	1-1/2		11408	39.40	11408-C3	43.60
	.010	.030	.0015	I	1/8	1-1/2		11410	31.40	11410-C3	35.60
	.010	.030	.0015	I	1/8	3	*LONG!*	987910	37.70	987910-C3	41.90
	.012	.036	.0015	I	1/8	1-1/2		11412	39.40	11412-C3	43.60
	.015 (1/64)	.045	.0015	I	1/8	1-1/2		11415	31.40	11415-C3	35.60
	.020	.060	.0020	I	1/8	1-1/2		11420	27.10	11420-C3	31.30
	.020	.060	.0020	I	1/8	3	*LONG!*	987920	33.40	987920-C3	37.60
	.025	.075	.0020	I	1/8	1-1/2		11425	27.10	11425-C3	31.30
	.030	.090	.0030	I	1/8	1-1/2		11430	25.10	11430-C3	29.30
	.030	.090	.0030	I	1/8	3	*LONG!*	987930	31.70	987930-C3	35.90
	.031 (1/32)	.093	.0030	I	1/8	1-1/2		11431	25.10	11431-C3	29.30
	.035	.105	.0030	I	1/8	1-1/2		11435	25.10	11435-C3	29.30
	.039 (1 mm)	.117	.0030	I	1/8	1-1/2		11439	25.10	11439-C3	29.30
	.040	.120	.0030	I	1/8	1-1/2		11440	22.90	11440-C3	27.10
	.045	.135	.0030	I	1/8	1-1/2		11445	22.90	11445-C3	27.10
	.045	.135	.0030	I	1/8	3	*LONG!*	987945	29.40	987945-C3	33.60
	.047 (3/64)	.141	.0040	I	1/8	1-1/2		11447	22.90	11447-C3	27.10
	.050	.150	.0040	I	1/8	1-1/2		11450	22.90	11450-C3	27.10
	.055	.165	.0040	I	1/8	1-1/2		11455	22.90	11455-C3	27.10

SPEEDS & FEEDS ONLINE!

continued on next page

TYPE I

On center design reduces walking and minimizes flat at bottom of spot. Ideally suited for starting smaller diameter drills and shallow spots.

TYPE II

Ahead of center design improves tip strength. Ideally suited for larger diameter drills and tougher materials.

Click Tool # for stock, speeds & feeds, & other technical info

NEW ANGLE!

MINIATURE DRILLS

Spotting Drills (cont.)

continued from previous page

INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1	L_2			D_2	L_1		2 FL	PRICE	2 FL	PRICE
90°	.060	.180	.0050	I	1/8	1-1/2		11460	22.70	11460-C3	26.90
	.060	.180	.0050	I	1/8	3	LONG!	987960	29.10	987960-C3	33.30
	.062 (1/16)	.186	.0050	I	1/8	1-1/2		11462	22.70	11462-C3	26.90
	.070	.210	.0050	I	1/8	1-1/2		11470	22.70	11470-C3	26.90
	.075	.225	.0050	I	1/8	1-1/2		11475	22.70	11475-C3	26.90
	.078 (5/64)	.234	.0050	I	1/8	1-1/2		11478	22.70	11478-C3	26.90
	.080	.240	.0050	I	1/8	1-1/2		11480	22.70	11480-C3	26.90
	.090	.270	.0050	I	1/8	1-1/2		11490	21.40	11490-C3	25.60
	.090	.270	.0050	I	1/8	3	LONG!	987990	27.90	987990-C3	32.10
	.093 (3/32)	.279	.0060	I	1/8	1-1/2		11493	21.40	11493-C3	25.60
	.100	.300	.0060	I	1/8	1-1/2		11500	21.40	11500-C3	25.60
	.109 (7/64)	.327	.0080	I	1/8	1-1/2		11509	21.40	11509-C3	25.60
	.118 (3 mm)	.354	.0080	I	1/8	1-1/2		1153M	21.40	1153M-C3	25.60
	.125 (1/8)	.375	.0100	I	1/8	1-1/2		11525	20.50	11525-C3	24.70
	.125 (1/8)	.375	.0100	I	1/8	3	LONG!	988008	27.10	988008-C3	31.30
	.125 (1/8)	.375	.0100	II	1/8	1-1/2		37508	20.50	37508-C3	24.70
	.125 (1/8)	.375	.0100	II	1/8	4	LONG!	55808	28.90	55808-C3	33.40
	.140 (9/64)	.375	.0100	II	3/16	2		37509	28.50	37509-C3	33.10
	.156 (5/32)	.375	.0110	II	3/16	2		37510	23.70	37510-C3	28.20
	.187 (3/16)	.625	.0130	II	3/16	2		37512	23.70	37512-C3	28.20
	.187 (3/16)	.625	.0130	II	3/16	4	LONG!	55812	35.40	55812-C3	41.60
	.218 (7/32)	.750	.0150	II	1/4	2-1/2		37514	36.40	37514-C3	42.60
	.236 (6 mm)	.750	.0160	II	1/4	2-1/2		37515	36.40	37515-C3	42.60
	.250 (1/4)	.750	.0180	II	1/4	2-1/2		37516	29.40	37516-C3	35.60
	.250 (1/4)	.750	.0180	II	1/4	6	LONG!	55816	47.90	55816-C3	56.10
	.312 (5/16)	.750	.0220	II	5/16	2-1/2		37520	50.40	37520-C3	57.60
	.375 (3/8)	1.000	.0270	II	3/8	2-1/2		37524	53.40	37524-C3	61.60
	.500 (1/2)	1.000	.0350	II	1/2	3		37532	92.20	37532-C3	104.40
100°	.030	.090	.0030	I	1/8	1-1/2		975830	26.10	975830-C3	30.30
	.060	.180	.0050	I	1/8	1-1/2		975860	23.20	975860-C3	27.40
	.090	.270	.0050	I	1/8	1-1/2		975890	23.50	975890-C3	27.70
	.125 (1/8)	.375	.0100	I	1/8	1-1/2		975908	21.10	975908-C3	25.30
	.125 (1/8)	.375	.0100	II	1/8	1-1/2		955908	21.10	955908-C3	25.30
	.187 (3/16)	.625	.0130	II	3/16	2		955912	24.40	955912-C3	28.90
	.250 (1/4)	.750	.0180	II	1/4	2-1/2		955916	30.20	955916-C3	36.40
120°	.010	.030	.0015	I	1/8	1-1/2		11610	31.40	11610-C3	35.60
	.015 (1/64)	.045	.0015	I	1/8	1-1/2		11615	31.40	11615-C3	35.60
	.020	.060	.0020	I	1/8	1-1/2		11620	27.10	11620-C3	31.30
	.025	.075	.0020	I	1/8	1-1/2		11625	27.10	11625-C3	31.30
	.030	.090	.0030	I	1/8	1-1/2		11630	25.10	11630-C3	29.30
	.031 (1/32)	.093	.0030	I	1/8	1-1/2		11631	25.10	11631-C3	29.30
	.040	.120	.0030	I	1/8	1-1/2		11640	22.90	11640-C3	27.10
	.045	.135	.0030	I	1/8	1-1/2		11645	22.90	11645-C3	27.10
	.047 (3/64)	.141	.0040	I	1/8	1-1/2		11647	22.90	11647-C3	27.10
	.050	.150	.0040	I	1/8	1-1/2		11650	22.90	11650-C3	27.10
	.055	.165	.0040	I	1/8	1-1/2		11655	22.90	11655-C3	27.10
	.060	.180	.0050	I	1/8	1-1/2		11660	22.70	11660-C3	26.90
	.062 (1/16)	.186	.0050	I	1/8	1-1/2		11662	22.70	11662-C3	26.90
	.070	.210	.0050	I	1/8	1-1/2		11670	22.70	11670-C3	26.90
	.078 (5/64)	.234	.0050	I	1/8	1-1/2		11678	22.70	11678-C3	26.90
	.090	.270	.0050	I	1/8	1-1/2		11690	21.40	11690-C3	25.60

SPEEDS & FEEDS ONLINE!

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MINIATURE DRILLS

Spotting Drills (cont.)

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	INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A $^{+1°}_{-1°}$	D_1	L_2			D_2	L_1	2 FL	PRICE	2 FL	PRICE
		.093 (3/32)	.279	.0060	I	1/8	1-1/2	11693	21.40	11693-C3	25.60
		.100	.300	.0060	I	1/8	1-1/2	11700	21.40	11700-C3	25.60
		.118 (3 mm)	.354	.0080	I	1/8	1-1/2	1173M	21.40	1173M-C3	25.60
		.125 (1/8)	.375	.0100	I	1/8	1-1/2	11725	20.50	11725-C3	24.70
	120°	.125 (1/8)	.375	.0100	II	1/8	1-1/2	38208	20.50	38208-C3	24.70
		.156 (5/32)	.375	.0110	II	3/16	2	38210	45.70	38210-C3	50.20
		.187 (3/16)	.625	.0130	II	3/16	2	38212	23.70	38212-C3	28.20
		.250 (1/4)	.750	.0180	II	1/4	2-1/2	38216	29.40	38216-C3	35.60
		.375 (3/8)	1.000	.0270	II	3/8	2-1/2	38224	53.40	38224-C3	61.60
NEW		.030	.090	.0030	I	1/8	1-1/2	839530	28.90	839530-C3	33.10
NEW		.060	.180	.0050	I	1/8	1-1/2	839560	28.90	839560-C3	33.10
NEW	130°	.090	.270	.0050	I	1/8	1-1/2	839590	28.90	839590-C3	33.10
NEW		.125 (1/8)	.375	.0100	I	1/8	1-1/2	839608	30.20	839608-C3	34.40
NEW		.250 (1/4)	.750	.0180	II	1/4	2-1/2	847016	31.60	847016-C3	37.80
		.010	.030	.0015	I	1/8	1-1/2	39810	32.50	39810-C3	36.70
		.015 (1/64)	.045	.0015	I	1/8	1-1/2	39815	32.50	39815-C3	36.70
		.020	.060	.0020	I	1/8	1-1/2	39820	27.70	39820-C3	31.90
		.025	.075	.0020	I	1/8	1-1/2	39825	27.70	39825-C3	31.90
		.030	.090	.0030	I	1/8	1-1/2	39830	26.10	39830-C3	30.30
		.031 (1/32)	.093	.0030	I	1/8	1-1/2	39831	26.10	39831-C3	30.30
		.040	.120	.0030	I	1/8	1-1/2	39840	23.50	39840-C3	27.70
		.045	.135	.0030	I	1/8	1-1/2	39845	23.50	39845-C3	27.70
		.047 (3/64)	.141	.0040	I	1/8	1-1/2	39847	23.50	39847-C3	27.70
		.050	.150	.0040	I	1/8	1-1/2	39850	23.50	39850-C3	27.70
		.055	.165	.0040	I	1/8	1-1/2	39855	23.50	39855-C3	27.70
		.060	.180	.0050	I	1/8	1-1/2	39860	23.20	39860-C3	27.40
		.062 (1/16)	.186	.0050	I	1/8	1-1/2	39862	23.20	39862-C3	27.40
	140°	.070	.210	.0050	I	1/8	1-1/2	39870	23.20	39870-C3	27.40
		.075	.225	.0050	I	1/8	1-1/2	39875	23.20	39875-C3	27.40
		.078 (5/64)	.234	.0050	I	1/8	1-1/2	39878	23.20	39878-C3	27.40
		.090	.270	.0050	I	1/8	1-1/2	39890	22.20	39890-C3	26.40
		.093 (3/32)	.279	.0060	I	1/8	1-1/2	39893	22.20	39893-C3	26.40
		.100	.300	.0060	I	1/8	1-1/2	39900	22.20	39900-C3	26.40
		.118 (3 mm)	.354	.0080	I	1/8	1-1/2	3993M	22.20	3993M-C3	26.40
		.125 (1/8)	.375	.0100	I	1/8	1-1/2	39925	21.10	39925-C3	25.30
		.125 (1/8)	.375	.0100	II	1/8	1-1/2	41008	21.10	41008-C3	25.30
		.140 (9/64)	.375	.0100	II	3/16	2	41009	24.40	41009-C3	28.90
		.156 (5/32)	.375	.0110	II	3/16	2	41010	24.40	41010-C3	28.90
		.187 (3/16)	.625	.0130	II	3/16	2	41012	24.40	41012-C3	28.90
		.250 (1/4)	.750	.0180	II	1/4	2-1/2	41016	30.20	41016-C3	36.40
		.375 (3/8)	1.000	.0270	II	3/8	2-1/2	41024	53.40	41024-C3	61.60
		.030	.090	.0030	I	1/8	1-1/2	961130	26.10	961130-C3	30.30
		.045	.135	.0030	I	1/8	1-1/2	961145	23.50	961145-C3	27.70
		.060	.180	.0050	I	1/8	1-1/2	961160	23.20	961160-C3	27.40
		.090	.270	.005	I	1/8	1-1/2	961190	23.50	961190-C3	27.70
	150°	.125 (1/8)	.375	.0100	I	1/8	1-1/2	961208	21.10	961208-C3	25.30
		.125 (1/8)	.375	.0100	II	1/8	1-1/2	949508	21.10	949508-C3	25.30
		.187 (3/16)	.625	.0130	II	3/16	2	949512	24.40	949512-C3	28.90
		.250 (1/4)	.750	.0180	II	1/4	2-1/2	949516	30.20	949516-C3	36.40
		.060	.180	.0050	I	1/8	1-1/2	893660	23.50	893660-C3	27.70
	170°	.125 (1/8)	.375	.0100	I	1/8	1-1/2	893708	23.50	893708-C3	27.70
		.250 (1/4)	.750	.0180	II	1/4	2-1/2	893716	30.20	893716-C3	36.40

SPEEDS & FEEDS ONLINE!

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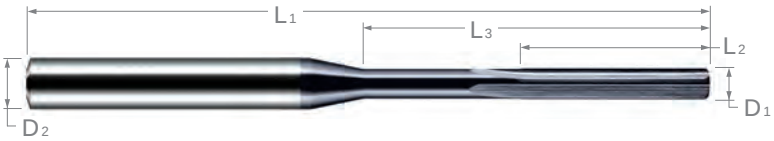

	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D1*		L2 +.020″ −.000″	L3 +.020″ −.000″		D2 (h6)	L1	TOOL #	PRICE	TOOL #	PRICE
.0080		.062	.100	4	1/8	1-1/2	RSB0080	47.70	RSB0080-C3	51.90
.0083	#91	.062	.100	4	1/8	1-1/2	RSB0083	47.70	RSB0083-C3	51.90
.0085		.062	.109	4	1/8	1-1/2	RSB0085	47.70	RSB0085-C3	51.90
.0087	#90	.062	.109	4	1/8	1-1/2	RSB0087	47.70	RSB0087-C3	51.90
.0090		.062	.118	4	1/8	1-1/2	RSB0090	47.70	RSB0090-C3	51.90
.0091	#89	.062	.118	4	1/8	1-1/2	RSB0091	47.70	RSB0091-C3	51.90
.0095	#88	.062	.118	4	1/8	1-1/2	RSB0095	47.70	RSB0095-C3	51.90
.0100	#87	.078	.125	4	1/8	1-1/2	RSB0100	47.70	RSB0100-C3	51.90
.0105	#86	.078	.125	4	1/8	1-1/2	RSB0105	47.70	RSB0105-C3	51.90
.0110	#85	.078	.141	4	1/8	1-1/2	RSB0110	47.70	RSB0110-C3	51.90
.0115	#84	.078	.141	4	1/8	1-1/2	RSB0115	47.70	RSB0115-C3	51.90
.0120	#83	.093	.156	4	1/8	1-1/2	RSB0120	47.70	RSB0120-C3	51.90
.0125	#82	.093	.172	4	1/8	1-1/2	RSB0125	47.70	RSB0125-C3	51.90
.0130	#81	.093	.172	4	1/8	1-1/2	RSB0130	47.70	RSB0130-C3	51.90
.0135	#80	.109	.187	4	1/8	1-1/2	RSB0135	47.70	RSB0135-C3	51.90
.0140		.109	.187	4	1/8	1-1/2	RSB0140	47.70	RSB0140-C3	51.90
.0145	#79	.109	.187	4	1/8	1-1/2	RSB0145	47.70	RSB0145-C3	51.90
.0150		.109	.187	4	1/8	1-1/2	RSB0150	47.70	RSB0150-C3	51.90
.0155		.109	.187	4	1/8	1-1/2	RSB0155	47.70	RSB0155-C3	51.90
.0160	#78	.125	.218	4	1/8	1-1/2	RSB0160	35.90	RSB0160-C3	40.10
.0165		.125	.218	4	1/8	1-1/2	RSB0165	35.90	RSB0165-C3	40.10
.0170		.125	.218	4	1/8	1-1/2	RSB0170	35.90	RSB0170-C3	40.10
.0175		.125	.218	4	1/8	1-1/2	RSB0175	35.90	RSB0175-C3	40.10
.0180	#77	.140	.250	4	1/8	1-1/2	RSB0180	35.90	RSB0180-C3	40.10
.0185		.140	.250	4	1/8	1-1/2	RSB0185	35.90	RSB0185-C3	40.10
.0190		.140	.250	4	1/8	1-1/2	RSB0190	35.90	RSB0190-C3	40.10
.0195		.140	.250	4	1/8	1-1/2	RSB0195	35.90	RSB0195-C3	40.10
.0200	#76	.140	.250	4	1/8	1-1/2	RSB0200	35.90	RSB0200-C3	40.10
.0205		.140	.250	4	1/8	1-1/2	RSB0205	35.90	RSB0205-C3	40.10
.0210	#75	.172	.281	4	1/8	1-1/2	RSB0210	35.90	RSB0210-C3	40.10
.0215		.172	.281	4	1/8	1-1/2	RSB0215	35.90	RSB0215-C3	40.10
.0220		.172	.281	4	1/8	1-1/2	RSB0220	35.90	RSB0220-C3	40.10
.0225	#74	.172	.281	4	1/8	1-1/2	RSB0225	35.90	RSB0225-C3	40.10
.0230		.172	.281	4	1/8	1-1/2	RSB0230	35.90	RSB0230-C3	40.10
.0235		.172	.281	4	1/8	1-1/2	RSB0235	35.90	RSB0235-C3	40.10
.0240	#73	.187	.312	4	1/8	1-1/2	RSB0240	35.90	RSB0240-C3	40.10
.0245		.187	.312	4	1/8	1-1/2	RSB0245	35.90	RSB0245-C3	40.10
.0250	#72	.187	.312	4	1/8	1-1/2	RSB0250	35.90	RSB0250-C3	40.10
.0255		.187	.312	4	1/8	1-1/2	RSB0255	35.90	RSB0255-C3	40.10
.0260	#71	.187	.312	4	1/8	1-1/2	RSB0260	35.90	RSB0260-C3	40.10
.0265		.187	.312	4	1/8	1-1/2	RSB0265	35.90	RSB0265-C3	40.10

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0270		.218	.375	4	1/8	2	RSB0270	35.90	RSB0270-C3	40.10
.0275		.218	.375	4	1/8	2	RSB0275	35.90	RSB0275-C3	40.10
.0280	#70	.218	.375	4	1/8	2	RSB0280	35.90	RSB0280-C3	40.10
.0285		.218	.375	4	1/8	2	RSB0285	35.90	RSB0285-C3	40.10
.0290		.218	.375	4	1/8	2	RSB0290	35.90	RSB0290-C3	40.10
.0292	#69	.218	.375	4	1/8	2	RSB0292	35.90	RSB0292-C3	40.10
.0295 (.75 mm)		.218	.375	4	1/8	2	RSB0295	35.90	RSB0295-C3	40.10
.0300		.218	.375	4	1/8	2	RSB0300	35.90	RSB0300-C3	40.10
.0305		.218	.375	4	1/8	2	RSB0305	35.90	RSB0305-C3	40.10
.0310	#68	.218	.375	4	1/8	2	RSB0310	35.90	RSB0310-C3	40.10
.0315 (.80 mm)		.218	.375	4	1/8	2	RSB0315	35.90	RSB0315-C3	40.10
.0320	#67	.250	.437	4	1/8	2	RSB0320	35.90	RSB0320-C3	40.10
.0325		.250	.437	4	1/8	2	RSB0325	35.90	RSB0325-C3	40.10
.0330	#66	.250	.437	4	1/8	2	RSB0330	35.90	RSB0330-C3	40.10
.0335 (.85 mm)		.250	.437	4	1/8	2	RSB0335	35.90	RSB0335-C3	40.10
.0340		.250	.437	4	1/8	2	RSB0340	35.90	RSB0340-C3	40.10
.0345		.250	.437	4	1/8	2	RSB0345	35.90	RSB0345-C3	40.10
.0350	#65	.250	.437	4	1/8	2	RSB0350	35.90	RSB0350-C3	40.10
.0355		.250	.437	4	1/8	2	RSB0355	35.90	RSB0355-C3	40.10
.0360	#64	.281	.500	4	1/8	2	RSB0360	35.90	RSB0360-C3	40.10
.0365		.281	.500	4	1/8	2	RSB0365	35.90	RSB0365-C3	40.10
.0370	#63	.281	.500	4	1/8	2	RSB0370	35.90	RSB0370-C3	40.10
.0375		.281	.500	4	1/8	2	RSB0375	35.90	RSB0375-C3	40.10
.0380	#62	.281	.500	4	1/8	2	RSB0380	35.90	RSB0380-C3	40.10
.0385		.281	.500	4	1/8	2	RSB0385	35.90	RSB0385-C3	40.10
.0390	#61	.281	.500	4	1/8	2	RSB0390	35.90	RSB0390-C3	40.10
.0395		.281	.500	4	1/8	2	RSB0395	35.90	RSB0395-C3	40.10
.0400	#60	.281	.500	4	1/8	2	RSB0400	35.90	RSB0400-C3	40.10
.0405		.281	.500	4	1/8	2	RSB0405	35.90	RSB0405-C3	40.10
.0410	#59	.281	.500	4	1/8	2	RSB0410	35.90	RSB0410-C3	40.10
.0415		.281	.500	4	1/8	2	RSB0415	35.90	RSB0415-C3	40.10
.0420	#58	.281	.500	4	1/8	2	RSB0420	35.90	RSB0420-C3	40.10
.0425		.312	.562	4	1/8	2	RSB0425	35.90	RSB0425-C3	40.10
.0430	#57	.312	.562	4	1/8	2	RSB0430	35.90	RSB0430-C3	40.10
.0435		.312	.562	4	1/8	2	RSB0435	35.90	RSB0435-C3	40.10
.0440		.312	.562	4	1/8	2	RSB0440	35.90	RSB0440-C3	40.10
.0445		.312	.562	4	1/8	2	RSB0445	35.90	RSB0445-C3	40.10
.0450		.312	.562	4	1/8	2	RSB0450	35.90	RSB0450-C3	40.10
.0455		.312	.562	4	1/8	2	RSB0455	35.90	RSB0455-C3	40.10
.0460		.312	.562	4	1/8	2	RSB0460	35.90	RSB0460-C3	40.10
.0465	#56	.312	.562	4	1/8	2	RSB0465	35.90	RSB0465-C3	40.10
.0469 (3/64)		.312	.562	4	1/8	2	RSB0469	30.10	RSB0469-C3	34.30
.0470		.312	.562	4	1/8	2	RSB0470	30.10	RSB0470-C3	34.30
.0475		.312	.562	4	1/8	2	RSB0475	30.10	RSB0475-C3	34.30
.0480		.375	.625	4	1/8	2	RSB0480	30.10	RSB0480-C3	34.30
.0485		.375	.625	4	1/8	2	RSB0485	30.10	RSB0485-C3	34.30
.0490		.375	.625	4	1/8	2	RSB0490	30.10	RSB0490-C3	34.30
.0495		.375	.625	4	1/8	2	RSB0495	30.10	RSB0495-C3	34.30
.0500		.375	.625	4	1/8	2	RSB0500	30.10	RSB0500-C3	34.30

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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NEW SIZES!

MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0505		.375	.625	4	1/8	2	RSB0505	30.10	RSB0505-C3	34.30
.0510		.375	.625	4	1/8	2	RSB0510	30.10	RSB0510-C3	34.30
.0515		.375	.625	4	1/8	2	RSB0515	30.10	RSB0515-C3	34.30
.0520	#55	.375	.625	4	1/8	2	RSB0520	30.10	RSB0520-C3	34.30
.0525		.375	.625	4	1/8	2	RSB0525	30.10	RSB0525-C3	34.30
.0530		.437	.687	4	1/8	2	RSB0530	30.10	RSB0530-C3	34.30
.0535		.437	.687	4	1/8	2	RSB0535	30.10	RSB0535-C3	34.30
.0540		.437	.687	4	1/8	2	RSB0540	30.10	RSB0540-C3	34.30
.0545		.437	.687	4	1/8	2	RSB0545	30.10	RSB0545-C3	34.30
.0550	#54	.437	.687	4	1/8	2	RSB0550	30.10	RSB0550-C3	34.30
.0555		.437	.750	4	1/8	2	RSB0555	30.10	RSB0555-C3	34.30
.0560		.437	.750	4	1/8	2	RSB0560	30.10	RSB0560-C3	34.30
.0565		.437	.750	4	1/8	2	RSB0565	30.10	RSB0565-C3	34.30
.0570		.437	.750	4	1/8	2	RSB0570	30.10	RSB0570-C3	34.30
.0575		.437	.750	4	1/8	2	RSB0575	30.10	RSB0575-C3	34.30
.0580		.437	.750	4	1/8	2	RSB0580	30.10	RSB0580-C3	34.30
.0585		.437	.750	4	1/8	2	RSB0585	30.10	RSB0585-C3	34.30
.0590		.437	.750	4	1/8	2	RSB0590	30.10	RSB0590-C3	34.30
.0595	#53	.437	.750	4	1/8	2	RSB0595	30.10	RSB0595-C3	34.30
.0600		.437	.812	4	1/8	2	RSB0600	30.10	RSB0600-C3	34.30
.0605		.437	.812	4	1/8	2	RSB0605	30.10	RSB0605-C3	34.30
.0610 (1.55 mm)		.437	.812	4	1/8	2	RSB0610	30.10	RSB0610-C3	34.30
.0615		.437	.812	4	1/8	2	RSB0615	30.10	RSB0615-C3	34.30
.0620		.437	.812	4	1/8	2	RSB0620	30.10	RSB0620-C3	34.30
.0625 (1/16)		.437	.812	4	1/8	2	RSB0625	30.10	RSB0625-C3	34.30
.0630 (1.60 mm)		.437	.812	4	1/8	2	RSB0630	30.10	RSB0630-C3	34.30
.0635	#52	.437	.812	4	1/8	2	RSB0635	30.10	RSB0635-C3	34.30
.0640		.437	.812	4	1/8	2	RSB0640	30.10	RSB0640-C3	34.30
.0650 (1.65 mm)		.437	.812	4	1/8	2	RSB0650	30.10	RSB0650-C3	34.30
.0660		.500	.875	4	1/8	2	RSB0660	30.10	RSB0660-C3	34.30
.0670	#51	.500	.875	4	1/8	2	RSB0670	30.10	RSB0670-C3	34.30
.0680		.500	.875	4	1/8	2	RSB0680	30.10	RSB0680-C3	34.30
.0690		.500	.875	4	1/8	2	RSB0690	30.10	RSB0690-C3	34.30
.0700	#50	.562	.937	4	1/8	2	RSB0700	30.10	RSB0700-C3	34.30
.0710		.562	.937	4	1/8	2	RSB0710	30.10	RSB0710-C3	34.30
.0720		.562	.937	4	1/8	2	RSB0720	30.10	RSB0720-C3	34.30
.0730	#49	.562	.937	4	1/8	2	RSB0730	30.10	RSB0730-C3	34.30
.0740		.562	.937	4	1/8	2	RSB0740	30.10	RSB0740-C3	34.30
.0750		.562	1.000	4	1/8	2	RSB0750	30.10	RSB0750-C3	34.30
.0760	#48	.562	1.000	4	1/8	2	RSB0760	30.10	RSB0760-C3	34.30
.0765		.562	1.000	4	1/8	2	RSB0765	30.10	RSB0765-C3	34.30
.0770		.562	1.000	4	1/8	2	RSB0770	30.10	RSB0770-C3	34.30
.0775		.562	1.000	4	1/8	2	RSB0775	30.10	RSB0775-C3	34.30
.0780		.562	1.000	4	1/8	2	RSB0780	30.10	RSB0780-C3	34.30
.0781 (5/64)		.562	1.000	4	1/8	2	RSB0781	30.10	RSB0781-C3	34.30
.0785	#47	.562	1.000	4	1/8	2	RSB0785	30.10	RSB0785-C3	34.30
.0787 (2.00 mm)		.562	1.000	4	1/8	2	RSB0787	30.10	RSB0787-C3	34.30
.0790		.562	1.000	4	1/8	2	RSB0790	30.10	RSB0790-C3	34.30
.0795		.562	1.000	4	1/8	2	RSB0795	30.10	RSB0795-C3	34.30

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0800		.562	1.000	4	1/8	2	RSB0800	30.10	RSB0800-C3	34.30
.0810	#46	.562	1.000	4	1/8	2	RSB0810	30.10	RSB0810-C3	34.30
.0820	#45	.562	1.000	4	1/8	2	RSB0820	30.10	RSB0820-C3	34.30
.0830		.562	1.000	4	1/8	2	RSB0830	30.10	RSB0830-C3	34.30
.0840		.625	1.125	4	1/8	2-1/2	RSB0840	30.10	RSB0840-C3	34.30
.0850		.625	1.125	4	1/8	2-1/2	RSB0850	30.10	RSB0850-C3	34.30
.0860	#44	.625	1.125	4	1/8	2-1/2	RSB0860	30.10	RSB0860-C3	34.30
.0870		.625	1.125	4	1/8	2-1/2	RSB0870	30.10	RSB0870-C3	34.30
.0880		.625	1.125	4	1/8	2-1/2	RSB0880	30.10	RSB0880-C3	34.30
.0890	#43	.625	1.125	4	1/8	2-1/2	RSB0890	30.10	RSB0890-C3	34.30
.0900		.625	1.125	4	1/8	2-1/2	RSB0900	30.10	RSB0900-C3	34.30
.0910		.625	1.125	4	1/8	2-1/2	RSB0910	30.10	RSB0910-C3	34.30
.0920		.625	1.125	4	1/8	2-1/2	RSB0920	30.10	RSB0920-C3	34.30
.0925 (2.35 mm)		.687	1.250	4	1/8	2-1/2	RSB0925	30.10	RSB0925-C3	34.30
.0930		.687	1.250	4	1/8	2-1/2	RSB0930	30.10	RSB0930-C3	34.30
.0935	#42	.687	1.250	4	1/8	2-1/2	RSB0935	30.10	RSB0935-C3	34.30
.0937 (3/32)		.687	1.250	4	1/8	2-1/2	RSB0937	30.10	RSB0937-C3	34.30
.0940		.687	1.250	4	1/8	2-1/2	RSB0940	30.10	RSB0940-C3	34.30
.0945 (2.40 mm)		.687	1.250	4	1/8	2-1/2	RSB0945	30.10	RSB0945-C3	34.30
.0950		.687	1.250	4	1/8	2-1/2	RSB0950	30.10	RSB0950-C3	34.30
.0960	#41	.687	1.250	4	1/8	2-1/2	RSB0960	30.10	RSB0960-C3	34.30
.0970		.687	1.250	4	1/8	2-1/2	RSB0970	30.10	RSB0970-C3	34.30
.0980	#40	.687	1.250	4	1/8	2-1/2	RSB0980	30.10	RSB0980-C3	34.30
.0990		.687	1.250	4	1/8	2-1/2	RSB0990	30.10	RSB0990-C3	34.30
.0995	#39	.687	1.250	4	1/8	2-1/2	RSB0995	30.10	RSB0995-C3	34.30
.1000		.750	1.375	4	1/8	2-1/2	RSB1000	30.10	RSB1000-C3	34.30
.1010		.750	1.375	4	1/8	2-1/2	RSB1010	30.10	RSB1010-C3	34.30
.1015	#38	.750	1.375	4	1/8	2-1/2	RSB1015	30.10	RSB1015-C3	34.30
.1020		.750	1.375	4	1/8	2-1/2	RSB1020	30.10	RSB1020-C3	34.30
.1030		.750	1.375	4	1/8	2-1/2	RSB1030	30.10	RSB1030-C3	34.30
.1040	#37	.750	1.375	4	1/8	2-1/2	RSB1040	30.10	RSB1040-C3	34.30
.1050		.750	1.375	4	1/8	2-1/2	RSB1050	30.10	RSB1050-C3	34.30
.1060		.750	1.375	4	1/8	2-1/2	RSB1060	30.10	RSB1060-C3	34.30
.1065	#36	.750	1.375	4	1/8	2-1/2	RSB1065	30.10	RSB1065-C3	34.30
.1070		.750	1.375	4	1/8	2-1/2	RSB1070	30.10	RSB1070-C3	34.30
.1080		.750	1.375	4	1/8	2-1/2	RSB1080	30.10	RSB1080-C3	34.30
.1083 (2.75 mm)		.750	1.375	4	1/8	2-1/2	RSB1083	30.10	RSB1083-C3	34.30
.1085		.750	1.375	4	1/8	2-1/2	RSB1085	30.10	RSB1085-C3	34.30
.1090		.750	1.375	4	1/8	2-1/2	RSB1090	30.10	RSB1090-C3	34.30
.1094 (7/64)		.750	1.375	4	1/8	2-1/2	RSB1094	30.10	RSB1094-C3	34.30
.1100	#35	.750	1.375	4	1/8	2-1/2	RSB1100	30.10	RSB1100-C3	34.30
.1105		.750	1.375	4	1/8	2-1/2	RSB1105	30.10	RSB1105-C3	34.30
.1110	#34	.750	1.375	4	1/8	2-1/2	RSB1110	30.10	RSB1110-C3	34.30
.1120		.750	1.375	4	1/8	2-1/2	RSB1120	30.10	RSB1120-C3	34.30
.1130	#33	.750	1.500	4	1/8	2-1/2	RSB1130	30.10	RSB1130-C3	34.30
.1140		.750	1.500	4	1/8	2-1/2	RSB1140	30.10	RSB1140-C3	34.30
.1150		.750	1.500	4	1/8	2-1/2	RSB1150	30.10	RSB1150-C3	34.30
.1160	#32	.750	1.500	4	1/8	2-1/2	RSB1160	30.10	RSB1160-C3	34.30
.1170		.750	1.500	4	1/8	2-1/2	RSB1170	30.10	RSB1170-C3	34.30

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1180		.750	1.500	4	1/8	2-1/2	RSB1180	30.10	RSB1180-C3	34.30
.1190		.750	1.500	4	1/8	2-1/2	RSB1190	30.10	RSB1190-C3	34.30
.1200	#31	.750	1.500	4	1/8	2-1/2	RSB1200	30.10	RSB1200-C3	34.30
.1210		.750	1.500	4	1/8	2-1/2	RSB1210	30.10	RSB1210-C3	34.30
.1220 (3.10 mm)		.750	1.500	4	1/8	2-1/2	RSB1220	30.10	RSB1220-C3	34.30
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1230		.750	1.500	4	3/16	3	RSB1230	35.40	RSB1230-C3	39.90
.1235		.750	1.500	4	3/16	3	RSB1235	35.40	RSB1235-C3	39.90
.1240		.750	1.500	4	3/16	3	RSB1240	35.40	RSB1240-C3	39.90
.1245		.750	1.500	4	3/16	3	RSB1245	35.40	RSB1245-C3	39.90
.1250 (1/8)		.750	1.500	4	3/16	3	RSB1250	35.40	RSB1250-C3	39.90
.1255		.750	1.500	4	3/16	3	RSB1255	35.40	RSB1255-C3	39.90
.1260 (3.20 mm)		.750	1.500	4	3/16	3	RSB1260	35.40	RSB1260-C3	39.90
.1265		.750	1.500	4	3/16	3	RSB1265	35.40	RSB1265-C3	39.90
.1285	#30	.750	1.500	4	3/16	3	RSB1285	35.40	RSB1285-C3	39.90
.1360	#29	.750	1.625	4	3/16	3	RSB1360	35.40	RSB1360-C3	39.90
.1390		.750	1.625	4	3/16	3	RSB1390	35.40	RSB1390-C3	39.90
.1395		.750	1.625	4	3/16	3	RSB1395	35.40	RSB1395-C3	39.90
.1400		.750	1.625	4	3/16	3	RSB1400	35.40	RSB1400-C3	39.90
.1405	#28	.750	1.625	4	3/16	3	RSB1405	35.40	RSB1405-C3	39.90
.1406 (9/64)		.750	1.625	4	3/16	3	RSB1406	35.40	RSB1406-C3	39.90
.1410		.750	1.625	4	3/16	3	RSB1410	35.40	RSB1410-C3	39.90
.1415		.750	1.625	4	3/16	3	RSB1415	35.40	RSB1415-C3	39.90
.1420		.750	1.625	4	3/16	3	RSB1420	35.40	RSB1420-C3	39.90
.1440	#27	.750	1.625	4	3/16	3	RSB1440	35.40	RSB1440-C3	39.90
.1470	#26	.875	1.750	4	3/16	3	RSB1470	35.40	RSB1470-C3	39.90
.1495	#25	.875	1.750	4	3/16	3	RSB1495	35.40	RSB1495-C3	39.90
.1520	#24	.875	1.750	4	3/16	3	RSB1520	35.40	RSB1520-C3	39.90
.1540	#23	.875	1.750	4	3/16	3	RSB1540	35.40	RSB1540-C3	39.90
.1545		.875	1.750	4	3/16	3	RSB1545	35.40	RSB1545-C3	39.90
.1550		.875	1.750	4	3/16	3	RSB1550	35.40	RSB1550-C3	39.90
.1555		.875	1.750	4	3/16	3	RSB1555	35.40	RSB1555-C3	39.90
.1560		.875	1.750	4	3/16	3	RSB1560	35.40	RSB1560-C3	39.90
.1562 (5/32)		.875	1.750	4	3/16	3	RSB1562	35.40	RSB1562-C3	39.90
.1565		.875	1.750	4	3/16	3	RSB1565	35.40	RSB1565-C3	39.90
.1570	#22	.875	1.750	4	3/16	3	RSB1570	35.40	RSB1570-C3	39.90
.1575 (4.00 mm)		.875	1.750	4	3/16	3	RSB1575	35.40	RSB1575-C3	39.90
.1580		.875	1.875	4	3/16	3	RSB1580	35.40	RSB1580-C3	39.90
.1585		.875	1.875	4	3/16	3	RSB1585	35.40	RSB1585-C3	39.90
.1590	#21	.875	1.875	4	3/16	3	RSB1590	35.40	RSB1590-C3	39.90
.1610	#20	.875	1.875	4	3/16	3	RSB1610	35.40	RSB1610-C3	39.90
.1660	#19	.875	1.875	4	3/16	3	RSB1660	35.40	RSB1660-C3	39.90
.1695	#18	1.000	2.000	4	3/16	4	RSB1695	39.20	RSB1695-C3	45.40
.1705		1.000	2.000	4	3/16	4	RSB1705	39.20	RSB1705-C3	45.40
.1710		1.000	2.000	4	3/16	4	RSB1710	39.20	RSB1710-C3	45.40
.1715		1.000	2.000	4	3/16	4	RSB1715	39.20	RSB1715-C3	45.40
.1719 (11/64)		1.000	2.000	4	3/16	4	RSB1719	39.20	RSB1719-C3	45.40

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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	REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
	.1725		1.000	2.000	4	3/16	4	RSB1725	39.20	RSB1725-C3	45.40
	.1730	#17	1.000	2.000	4	3/16	4	RSB1730	39.20	RSB1730-C3	45.40
	.1735		1.000	2.000	4	3/16	4	RSB1735	39.20	RSB1735-C3	45.40
	.1770	#16	1.000	2.000	4	3/16	4	RSB1770	39.20	RSB1770-C3	45.40
	.1800	#15	1.000	2.125	4	3/16	4	RSB1800	39.20	RSB1800-C3	45.40
	.1820	#14	1.000	2.125	4	3/16	4	RSB1820	39.20	RSB1820-C3	45.40
	.1850 (4.70 mm)	#13	1.000	2.125	4	1/4	4	RSB1850	47.40	RSB1850-C3	53.90
	.1860		1.000	2.125	4	1/4	4	RSB1860	47.40	RSB1860-C3	53.90
	.1865		1.000	2.125	4	1/4	4	RSB1865	47.40	RSB1865-C3	53.90
	.1870		1.000	2.125	4	1/4	4	RSB1870	47.40	RSB1870-C3	53.90
	.1875 (3/16)		1.000	2.125	4	1/4	4	RSB1875	47.40	RSB1875-C3	53.90
	.1880		1.000	2.125	4	1/4	4	RSB1880	47.40	RSB1880-C3	53.90
	.1885		1.000	2.125	4	1/4	4	RSB1885	47.40	RSB1885-C3	53.90
	.1890	#12	1.000	2.125	4	1/4	4	RSB1890	47.40	RSB1890-C3	53.90
NEW	.1910	#11	1.000	2.125	4	1/4	4	RSB1910	47.40	RSB1910-C3	54.60
NEW	.1935	#10	1.000	2.125	4	1/4	4	RSB1935	47.40	RSB1935-C3	54.60
NEW	.1960	#9	1.000	2.125	4	1/4	4	RSB1960	47.40	RSB1960-C3	54.60
NEW	.1969 (5.00 mm)		1.000	2.125	4	1/4	4	RSB1969	49.70	RSB1969-C3	56.90
NEW	.1990	#8	1.000	2.125	4	1/4	4	RSB1990	49.70	RSB1990-C3	56.90
NEW	.2010	#7	1.000	2.125	4	1/4	4	RSB2010	49.70	RSB2010-C3	56.90
NEW	.2015		1.000	2.125	4	1/4	4	RSB2015	49.70	RSB2015-C3	56.90
NEW	.2020		1.000	2.125	4	1/4	4	RSB2020	49.70	RSB2020-C3	56.90
NEW	.2025		1.000	2.125	4	1/4	4	RSB2025	49.70	RSB2025-C3	56.90
NEW	.2031 (13/64)		1.000	2.250	4	1/4	4	RSB2031	50.40	RSB2031-C3	57.60
NEW	.2035		1.000	2.250	4	1/4	4	RSB2035	50.40	RSB2035-C3	57.60
NEW	.2040	#6	1.000	2.250	4	1/4	4	RSB2040	50.40	RSB2040-C3	57.60
NEW	.2045		1.000	2.250	4	1/4	4	RSB2045	50.40	RSB2045-C3	57.60
NEW	.2055	#5	1.000	2.250	4	1/4	4	RSB2055	50.40	RSB2055-C3	57.60
NEW	.2090	#4	1.000	2.250	4	1/4	4	RSB2090	50.40	RSB2090-C3	57.60
NEW	.2130	#3	1.000	2.250	4	1/4	4	RSB2130	50.40	RSB2130-C3	57.60
NEW	.2170		1.000	2.375	4	1/4	4	RSB2170	50.40	RSB2170-C3	57.60
NEW	.2175		1.000	2.375	4	1/4	4	RSB2175	50.40	RSB2175-C3	57.60
NEW	.2180		1.000	2.375	4	1/4	4	RSB2180	50.40	RSB2180-C3	57.60
NEW	.2185		1.000	2.375	4	1/4	4	RSB2185	50.40	RSB2185-C3	57.60
NEW	.2187 (7/32)		1.000	2.375	4	1/4	4	RSB2187	50.40	RSB2187-C3	57.60
NEW	.2190		1.000	2.375	4	1/4	4	RSB2190	50.40	RSB2190-C3	57.60
NEW	.2195		1.000	2.375	4	1/4	4	RSB2195	50.40	RSB2195-C3	57.60
NEW	.2200		1.000	2.375	4	1/4	4	RSB2200	50.40	RSB2200-C3	57.60
NEW	.2205 (5.60 mm)		1.000	2.375	4	1/4	4	RSB2205	50.40	RSB2205-C3	57.60
NEW	.2210	#2	1.000	2.375	4	1/4	4	RSB2210	50.40	RSB2210-C3	57.60
NEW	.2280	#1	1.125	2.500	6	1/4	4	RSB2280	54.70	RSB2280-C3	61.90
NEW	.2330		1.125	2.500	6	1/4	4	RSB2330	54.70	RSB2330-C3	61.90
NEW	.2335		1.125	2.500	6	1/4	4	RSB2335	54.70	RSB2335-C3	61.90
NEW	.2340	A	1.125	2.500	6	1/4	4	RSB2340	54.70	RSB2340-C3	61.90
NEW	.2344 (15/64)		1.125	2.500	6	1/4	4	RSB2344	54.70	RSB2344-C3	61.90
NEW	.2350		1.125	2.500	6	1/4	4	RSB2350	54.70	RSB2350-C3	61.90
NEW	.2355		1.125	2.500	6	1/4	4	RSB2355	54.70	RSB2355-C3	61.90
NEW	.2360		1.125	2.500	6	1/4	4	RSB2360	54.70	RSB2360-C3	61.90

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

continued on next page

Click Tool # for stock, speeds & feeds, & other technical info

NEW SIZES!

MINIATURE REAMERS

(cont.)

continued from previous page

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	
.2362 (6.00 mm)		1.125	2.500	6	1/4	4	RSB2362	54.70	RSB2362-C3	61.90	NEW
.2380	B	1.125	2.500	6	1/4	4	RSB2380	54.70	RSB2380-C3	61.90	NEW
.2420	C	1.125	2.500	6	1/4	4	RSB2420	54.70	RSB2420-C3	61.90	NEW
.2460	D	1.125	2.500	6	1/4	4	RSB2460	54.70	RSB2460-C3	61.90	NEW
.2485		1.125	2.750	6	5/16	4	RSB2485	57.40	RSB2485-C3	66.10	NEW
.2490		1.125	2.750	6	5/16	4	RSB2490	57.40	RSB2490-C3	66.10	NEW
.2495		1.125	2.750	6	5/16	4	RSB2495	57.40	RSB2495-C3	66.10	NEW
.2500 (1/4)	E	1.125	2.750	6	5/16	4	RSB2500	57.40	RSB2500-C3	66.10	NEW
.2505		1.125	2.750	6	5/16	4	RSB2505	57.40	RSB2505-C3	66.10	NEW
.2510		1.125	2.750	6	5/16	4	RSB2510	57.40	RSB2510-C3	66.10	NEW
.2515		1.125	2.750	6	5/16	4	RSB2515	57.40	RSB2515-C3	66.10	NEW
.2570	F	1.125	2.750	6	5/16	4	RSB2570	57.40	RSB2570-C3	66.10	NEW

SPEEDS & FEEDS ONLINE!

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

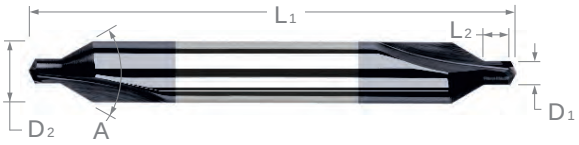
SPEEDS & FEEDS (Miniature Reamers)

Important Note: Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

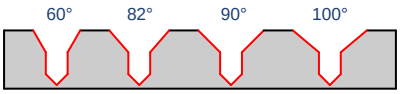
In order to maintain appropriate stock removal amounts based on the reamer size, a hole should be pre-drilled at a diameter that is 90-94% of the finished reamed hole diameter. For example, for a finished reamed hole diameter of .0625", the pre-drilled hole diameter should be in the range of .056"-.058". The pre-drilled hole should not be smaller than 85% of the finished reamed hole diameter.

Material	SFM	Chip Load IPR (Inches Per Revolution) By Reamer Diameter								
		.015	.031	.047	.062	.078	.093	.125	.187	.250
Aluminum Alloys Casting (2xx, 5xx, 7xx, 8xx)	450	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00036	.00075	.00114	.00151	.00190	.00226	.00304	.00454	.00608
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
Wrought - 5%-8% Si (4xxx)	600									
Wrought - 8%-12% Si (4xxx)	480									
Magnesium Alloys	900	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675
Zinc Alloys	480									
Copper Alloys High Coppers - 90%+ (C1xxxx)	170	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Tool Steels A, L, O, P, W series	125	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540
D, H, M, T, S series	90	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Titanium Alloys	100	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338

COMBINED DRILL & COUNTERSINKS



- 60°, 82°, 90°, and 100° included angles - plain type
- 2 flutes
- 118° included tip angle
- Double-ended
- Solid carbide
- CNC ground in the USA

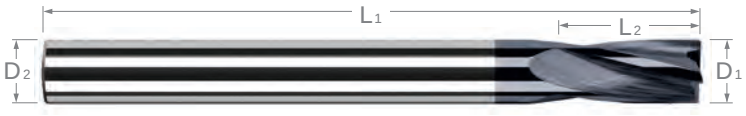


Stocked in *Four* Angles!

INCLUDED ANGLE	SIZE	DRILL DIAMETER	DRILL LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°		D1 +.0015″ +.0005″	L2 +.005″ −.000″	D2	L1	2 FL	PRICE	2 FL	PRICE
60°	0000	1/64	1/64	1/8	1-1/2	11002	30.90	11002-C3	35.30
	000	.020	.020	1/8	1-1/2	11005	23.50	11005-C3	28.40
	00	.025	.025	1/8	1-1/2	11010	18.40	11010-C3	23.30
	0	1/32	1/32	1/8	1-1/2	11020	18.40	11020-C3	23.30
	1	3/64	3/64	1/8	1-1/2	11030	15.50	11030-C3	20.50
	2	5/64	5/64	3/16	2	11040	23.50	11040-C3	28.20
	3	7/64	7/64	1/4	2	11050	26.70	11050-C3	33.40
	4	1/8	1/8	5/16	2-1/2	11060	36.40	11060-C3	46.60
	5	3/16	3/16	7/16	2-3/4	11070	54.40	11070-C3	69.60
82°	00	.025	.025	1/8	1-1/2	25610	18.90	25610-C3	24.10
	0	1/32	1/32	1/8	1-1/2	25620	18.90	25620-C3	24.10
	1	3/64	3/64	1/8	1-1/2	25630	15.90	25630-C3	21.10
	2	5/64	5/64	3/16	2	25640	24.40	25640-C3	30.60
	3	7/64	7/64	1/4	2	25650	27.50	25650-C3	35.90
	4	1/8	1/8	5/16	2-1/2	25660	37.40	25660-C3	47.60
	5	3/16	3/16	7/16	2-3/4	25670	56.10	25670-C3	71.30
90°	0000	1/64	1/64	1/8	1-1/2	17902	30.90	17902-C3	35.30
	000	.020	.020	1/8	1-1/2	17905	23.50	17905-C3	28.40
	00	.025	.025	1/8	1-1/2	17910	18.40	17910-C3	23.30
	0	1/32	1/32	1/8	1-1/2	17920	18.40	17920-C3	23.30
	1	3/64	3/64	1/8	1-1/2	17930	15.50	17930-C3	20.50
	2	5/64	5/64	3/16	2	17940	23.50	17940-C3	28.20
	3	7/64	7/64	1/4	2	17950	26.70	17950-C3	33.40
	4	1/8	1/8	5/16	2-1/2	17960	36.30	17960-C3	43.50
	5	3/16	3/16	7/16	2-3/4	17970	54.40	17970-C3	66.80
NEW	0	1/32	1/32	1/8	1-1/2	849520	21.20	849520-C3	25.40
NEW	1	3/64	3/64	1/8	1-1/2	849530	17.80	849530-C3	22.10
NEW 100°	2	5/64	5/64	3/16	2	849540	26.90	849540-C3	31.40
NEW	3	7/64	7/64	1/4	2	849550	30.50	849550-C3	36.70
NEW	4	1/8	1/8	5/16	2-1/2	849560	41.50	849560-C3	48.70

COUNTERBORES

Flat Bottom



For Spot Facing or Counterboring on Irregular Surfaces

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- Center cutting
- Ground with full cylindrical margin (not side cutting)
- 15° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA

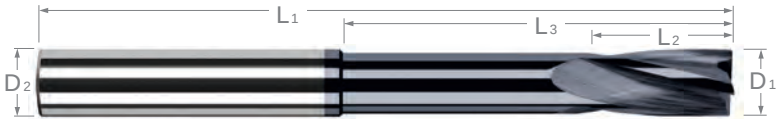
CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0005″*	L_2 +.030″ −.000″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.0312 (1/32)	1/8	1/8	1-1/2	23331	28.10	23331-C3	32.30
.0394 (1 mm)	5/32	1/8	1-1/2	2331M	28.10	2331M-C3	32.30
.0469 (3/64)	3/16	1/8	1-1/2	23347	28.10	23347-C3	32.30
.0625 (1/16)	1/4	1/8	1-1/2	23362	28.10	23362-C3	32.30
.0781 (5/64)	5/16	1/8	1-1/2	23378	28.10	23378-C3	32.30
.0787 (2 mm)	5/16	1/8	1-1/2	2332M	28.10	2332M-C3	32.30
.0937 (3/32)	3/8	1/8	1-1/2	23393	28.10	23393-C3	32.30
.1094 (7/64)	3/8	1/8	1-1/2	23407	28.10	23407-C3	32.30
.1181 (3 mm)	3/8	1/8	1-1/2	2343M	28.10	2343M-C3	32.30
.1250 (1/8)	1/2	1/8	1-1/2	23408	28.10	23408-C3	32.30
.1406 (9/64)	9/16	3/16	2	23409	26.90	23409-C3	31.40
.1562 (5/32)	5/8	3/16	2	23410	26.90	23410-C3	31.40
.1575 (4 mm)	5/8	3/16	2	2344M	26.90	2344M-C3	31.40
.1719 (11/64)	5/8	3/16	2	23411	26.90	23411-C3	31.40
.1875 (3/16)	3/4	3/16	2	23412	26.90	23412-C3	31.40
.1968 (5 mm)	3/4	1/4	2-1/2	2345M	36.70	2345M-C3	42.90
.2031 (13/64)	3/4	1/4	2-1/2	23413	36.70	23413-C3	42.90
.2187 (7/32)	3/4	1/4	2-1/2	23414	36.70	23414-C3	42.90
.2344 (15/64)	7/8	1/4	2-1/2	23415	36.70	23415-C3	42.90
.2362 (6 mm)	7/8	1/4	2-1/2	2346M	36.70	2346M-C3	42.90
.2500 (1/4)	7/8	1/4	2-1/2	23416	36.70	23416-C3	42.90
.2656 (17/64)	7/8	5/16	2-1/2	23417	45.40	23417-C3	52.60
.2812 (9/32)	7/8	5/16	2-1/2	23418	45.40	23418-C3	52.60
.2969 (19/64)	7/8	5/16	2-1/2	23419	45.40	23419-C3	52.60
.3125 (5/16)	1	5/16	2-1/2	23420	45.40	23420-C3	52.60
.3150 (8 mm)	1	3/8	2-1/2	2348M	54.10	2348M-C3	62.30
.3281 (21/64)	1	3/8	2-1/2	23421	54.10	23421-C3	62.30
.3437 (11/32)	1	3/8	2-1/2	23422	54.10	23422-C3	62.30
.3594 (23/64)	1	3/8	2-1/2	23423	54.10	23423-C3	62.30
.3750 (3/8)	1	3/8	2-1/2	23424	54.10	23424-C3	62.30
.3937 (10 mm)	1	7/16	2-3/4	2340M	66.70	2340M-C3	76.90
.4375 (7/16)	1	7/16	2-3/4	23428	66.70	23428-C3	76.90
.5000 (1/2)	1	1/2	3	23432	87.70	23432-C3	99.90
.5625 (9/16)	1-1/2	5/8	3-1/2	23436	124.50	23436-C3	136.70
.6250 (5/8)	1-1/2	5/8	3-1/2	23440	139.40	23440-C3	151.60
.6875 (11/16)	1-1/2	3/4	4	23444	201.90	23444-C3	215.10
.7500 (3/4)	1-1/2	3/4	4	23448	201.90	23448-C3	215.10

SPEEDS & FEEDS ONLINE!

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

COUNTERBORES

Flat Bottom – Long Reach



Undersized Neck to Avoid Heeling

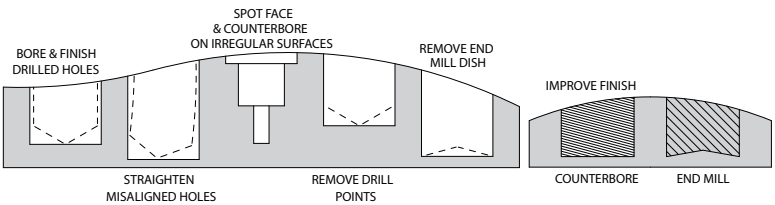
- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- Center cutting
- Ground with full cylindrical margin (not side cutting)
- 15° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	FLUTE LENGTH	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.0000″ −.0005″ *	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
	.0312 (1/32)	1/8	1/4	1/8	2-1/2	25431	32.40	25431-C3	36.60
	.0394 (1 mm)	5/32	5/16	1/8	2-1/2	2541M	32.40	2541M-C3	36.60
	.0469 (3/64)	3/16	3/8	1/8	2-1/2	25447	32.40	25447-C3	36.60
	.0625 (1/16)	1/4	1/2	1/8	2-1/2	25462	32.40	25462-C3	36.60
	.0781 (5/64)	5/16	5/8	1/8	2-1/2	25478	32.40	25478-C3	36.60
	.0787 (2 mm)	5/16	5/8	1/8	2-1/2	2542M	32.40	2542M-C3	36.60
	.0937 (3/32)	3/8	3/4	1/8	2-1/2	25493	32.40	25493-C3	36.60
	.1094 (7/64)	3/8	7/8	1/8	2-1/2	25507	32.40	25507-C3	36.60
	.1181 (3 mm)	3/8	1	1/8	2-1/2	2553M	32.40	2553M-C3	36.60
	.1250 (1/8)	1/2	1	1/8	2-1/2	25508	32.40	25508-C3	36.60
	.1406 (9/64)	9/16	1-1/8	3/16	3	25509	39.40	25509-C3	43.90
	.1562 (5/32)	5/8	1-1/4	3/16	3	25510	39.40	25510-C3	43.90
	.1575 (4 mm)	5/8	1-1/4	3/16	3	2554M	39.40	2554M-C3	43.90
	.1719 (11/64)	5/8	1-3/8	3/16	3	25511	39.40	25511-C3	43.90
	.1875 (3/16)	3/4	1-1/2	3/16	3	25512	39.40	25512-C3	43.90
NEW	.1968 (5 mm)	3/4	1-9/16	1/4	4	2555M	54.70	2555M-C3	61.90
	.2031 (13/64)	3/4	1-5/8	1/4	4	25513	52.40	25513-C3	59.60
	.2187 (7/32)	3/4	1-3/4	1/4	4	25514	52.40	25514-C3	59.60
	.2344 (15/64)	7/8	1-7/8	1/4	4	25515	52.40	25515-C3	59.60
NEW	.2362 (6 mm)	7/8	1-7/8	1/4	4	2556M	54.70	2556M-C3	61.90
	.2500 (1/4)	7/8	2	1/4	4	25516	52.40	25516-C3	59.60
	.2656 (17/64)	7/8	2-1/8	5/16	4	25517	66.40	25517-C3	75.10
	.2812 (9/32)	7/8	2-1/4	5/16	4	25518	66.40	25518-C3	75.10
	.2969 (19/64)	7/8	2-3/8	5/16	4	25519	66.40	25519-C3	75.10
	.3125 (5/16)	1	2-1/2	5/16	4	25520	66.40	25520-C3	75.10
NEW	.3150 (8 mm)	1	2-1/2	3/8	4	2558M	85.60	2558M-C3	96.80
	.3437 (11/32)	1	2-3/4	3/8	4	25522	80.10	25522-C3	91.30
	.3750 (3/8)	1	3	3/8	4	25524	80.10	25524-C3	91.30
NEW	.3937 (10 mm)	1	3	7/16	4	2550M	99.50	2550M-C3	111.70
	.4375 (7/16)	1	3	7/16	4	25528	92.90	25528-C3	105.10
	.5000 (1/2)	1	3	1/2	4	25532	113.90	25532-C3	126.10

SPEEDS & FEEDS ONLINE!

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

APPLICATIONS:



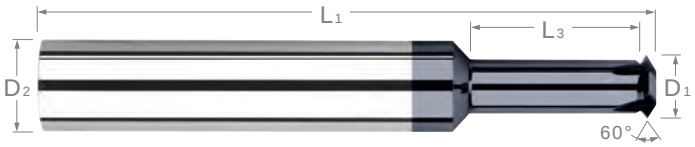
SPOT EFFECTIVELY. The flat bottom removes end mill dish or drill points while effectively spotting on irregular surfaces.

HOLD POSITION. The full cylindrical margin and back taper are not side cutting and won't grab or deflect.

CONTROL FINISH. The slow helix with a low rake avoids part engagement and helps to control finish.

THREAD MILLING CUTTERS

Single Form – UN Threads



- Single thread form – can mill multiple pitches
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide
- CNC ground in the USA

Click here for thread fit chart

Stocked in Multiple Reach Lengths!

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
00	.032	.016	**1/16**	2	1/8	1-1/2	71001	68.20	71001-C3	72.40		
00	.032	.016	**3/32**	2	1/8	1-1/2	41401	72.20	41401-C3	76.40		
0	.044	.024	**3/32**	2	1/8	1-1/2	71002	65.70	71002-C3	69.90	71002-C4	76.40
0	.044	.024	**1/8**	2	1/8	1-1/2	41402	69.90	41402-C3	74.10	41402-C4	80.60
0	.044	.024	**3/16**	2	1/8	1-1/2	54202	75.10	54202-C3	79.30	54202-C4	85.80
0	.044	.024	**1/4**	2	1/8	1-1/2	993902	78.50	993902-C3	82.70		
0	.044	.024	**5/16**	2	1/8	1-1/2	901202	81.90	901202-C3	86.10		
1	.054	.032	**1/8**	2	1/8	1-1/2	71004	65.70	71004-C3	69.90	71004-C4	76.40
1	.054	.032	**3/16**	2	1/8	1-1/2	41404	69.90	41404-C3	74.10	41404-C4	80.60
1	.054	.032	**1/4**	2	1/8	1-1/2	54204	75.10	54204-C3	79.30	54204-C4	85.80
1	.054	.032	**5/16**	2	1/8	1-1/2	993904	78.50	993904-C3	82.70		
1	.054	.032	**3/8**	2	1/8	1-1/2	901204	81.90	901204-C3	86.10		
2	.064	.038	**5/32**	2	1/8	1-1/2	71006	65.70	71006-C3	69.90	71006-C4	76.40
2	.064	.038	**7/32**	2	1/8	1-1/2	41406	69.90	41406-C3	74.10	41406-C4	80.60
2	.064	.038	**5/16**	2	1/8	1-1/2	54206	75.10	54206-C3	79.30	54206-C4	85.80
2	.064	.038	**7/16**	2	1/8	1-1/2	993906	78.50	993906-C3	82.70		
2	.064	.038	**9/16**	2	1/8	1-1/2	901206	81.90	901206-C3	86.10		
3	.072	.040	**5/32**	2	1/8	1-1/2	71008	65.70	71008-C3	69.90	71008-C4	76.40
3	.072	.040	**1/4**	2	1/8	1-1/2	41408	69.90	41408-C3	74.10	41408-C4	80.60
3	.072	.040	**3/8**	2	1/8	1-1/2	54208	75.10	54208-C3	79.30	54208-C4	85.80
3	.072	.040	**1/2**	2	1/8	1-1/2	993908	78.50	993908-C3	82.70		
4	.080	.040	**1/8**	2	3/16	2	71010	65.90	71010-C3	70.40	71010-C4	80.60
4	.080	.040	**1/4**	2	3/16	2	41410	70.10	41410-C3	74.60	41410-C4	84.80
4	.080	.040	**3/8**	2	3/16	2	54210	75.40	54210-C3	79.90	54210-C4	90.10
4	.080	.040	**1/2**	2	3/16	2	993910	79.20	993910-C3	83.70		
4	.080	.040	**5/8**	2	3/16	2	901210	83.10	901210-C3	87.60		
5	.093	.050	**3/16**	4	3/16	2	71015	65.70	71015-C3	70.20		
5	.093	.050	**3/8**	4	3/16	2	41415	69.90	41415-C3	74.40		
5	.093	.050	**1/2**	4	3/16	2	54215	75.10	54215-C3	79.60		
5	.093	.050	**5/8**	4	3/16	2	993915	79.20	993915-C3	83.70		
6	.098	.050	**5/32**	4	3/16	2	932920	65.90	932920-C3	70.40		
6	.098	.050	**1/4**	4	3/16	2	71020	65.90	71020-C3	70.40	71020-C4	80.60
6	.098	.050	**3/8**	4	3/16	2	41420	70.10	41420-C3	74.60	41420-C4	84.80
6	.098	.050	**1/2**	4	3/16	2	54220	75.40	54220-C3	79.90	54220-C4	90.10
6	.098	.050	**5/8**	4	3/16	2	993920	79.20	993920-C3	83.70		
6	.098	.050	**3/4**	4	3/16	2	901220	83.10	901220-C3	87.60		

SPEEDS & FEEDS ONLINE!

continued on next page

THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

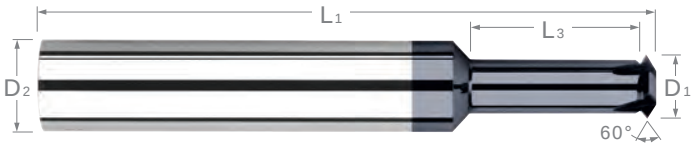
continued from previous page

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
8	.120	.070	**7/32**	4	1/4	2-1/2	932930	66.90	932930-C3	73.10		
8	.120	.070	**5/16**	4	1/4	2-1/2	71030	67.70	71030-C3	73.90	71030-C4	84.40
8	.120	.070	**1/2**	4	1/4	2-1/2	41430	72.20	41430-C3	78.40	41430-C4	88.90
8	.120	.070	**5/8**	4	1/4	2-1/2	54230	77.20	54230-C3	83.40	54230-C4	93.90
8	.120	.070	**3/4**	4	1/4	2-1/2	993930	83.10	993930-C3	89.30		
8	.120	.070	**7/8**	4	1/4	2-1/2	901230	88.10	901230-C3	94.30		
10	.135	.070	**7/32**	4	1/4	2-1/2	932940	66.90	932940-C3	73.10		
10	.135	.070	**5/16**	4	1/4	2-1/2	71040	67.70	71040-C3	73.90	71040-C4	84.40
10	.135	.070	**1/2**	4	1/4	2-1/2	41440	72.20	41440-C3	78.40	41440-C4	88.90
10	.135	.070	**5/8**	4	1/4	2-1/2	54240	77.20	54240-C3	83.40	54240-C4	93.90
10	.135	.070	**7/8**	4	1/4	2-1/2	993940	83.10	993940-C3	89.30		
10	.135	.070	**1-1/8**	4	1/4	2-1/2	901240	88.10	901240-C3	94.30		
12	.160	.095	**3/8**	4	1/4	2-1/2	71045	67.70	71045-C3	73.90		
12	.160	.095	**5/8**	4	1/4	2-1/2	41445	72.20	41445-C3	78.40		
12	.160	.095	**7/8**	4	1/4	2-1/2	54245	77.20	54245-C3	83.40		
1/4	.180	.115	**5/16**	4	1/4	2-1/2	932950	66.90	932950-C3	73.10		
1/4	.180	.115	**1/2**	4	1/4	2-1/2	71050	67.70	71050-C3	73.90	71050-C4	84.40
1/4	.180	.115	**3/4**	4	1/4	2-1/2	41450	72.20	41450-C3	78.40	41450-C4	88.90
1/4	.180	.115	**1**	4	1/4	2-1/2	54250	77.20	54250-C3	83.40	54250-C4	93.90
1/4	.180	.115	**1-1/4**	4	1/4	2-1/2	993950	83.10	993950-C3	89.30		
1/4	.180	.115	**1-1/2**	4	1/4	3	901250	88.10	901250-C3	94.30		
5/16	.240	.160	**1/2**	4	1/4	2-1/2	71055	67.70	71055-C3	73.90	71055-C4	84.40
5/16	.240	.160	**3/4**	4	1/4	2-1/2	41455	72.20	41455-C3	78.40	41455-C4	88.90
5/16	.240	.160	**1**	4	1/4	2-1/2	54255	79.70	54255-C3	85.90	54255-C4	96.40
5/16	.240	.160	**1-1/4**	4	1/4	2-1/2	993955	83.10	993955-C3	89.30		
5/16	.240	.160	**1-1/2**	4	1/4	3	901255	88.10	901255-C3	94.30		
3/8	.300	.218	**3/4**	4	3/8	2-1/2	71060	88.10	71060-C3	96.30	71060-C4	108.30
3/8	.300	.218	**1**	4	3/8	2-1/2	41460	92.40	41460-C3	100.60	41460-C4	112.60
3/8	.300	.218	**1-1/4**	4	3/8	2-1/2	54260	97.40	54260-C3	105.60	54260-C4	117.60
3/8	.300	.218	**1-1/2**	4	3/8	3	993960	101.10	993960-C3	109.30		
3/8	.300	.218	**1-3/4**	4	3/8	3	901260	104.70	901260-C3	112.90		
7/16	.340	.230	**3/4**	4	3/8	2-1/2	71065	99.20	71065-C3	107.40		
7/16	.340	.230	**1**	4	3/8	2-1/2	41465	103.40	41465-C3	111.60		
1/2	.388	.250	**3/4**	4	1/2	3	71070	99.20	71070-C3	111.40		
1/2	.388	.250	**1-1/4**	4	1/2	3	41470	103.90	41470-C3	116.10		
1/2	.388	.250	**1-3/4**	4	1/2	4	54270	110.70	54270-C3	122.90		
1/2	.388	.250	**2-1/4**	4	1/2	4	993970	115.40	993970-C3	127.60		
1/2	.388	.250	**2-3/4**	4	1/2	6	901270	119.90	901270-C3	132.10		
5/8	.450	.300	**1**	6	1/2	3	71075	103.70	71075-C3	115.90		
5/8	.450	.300	**1-3/8**	6	1/2	3	41475	108.50	41475-C3	120.70		
3/4	.495	.325	**1**	6	1/2	3	71080	103.70	71080-C3	115.90		
3/4	.495	.325	**1-3/8**	6	1/2	3	41480	108.50	41480-C3	120.70		
3/4	.495	.325	**1-3/4**	6	1/2	4	54280	114.20	54280-C3	126.40		
3/4	.495	.325	**2-1/4**	6	1/2	4	993980	119.20	993980-C3	131.40		
3/4	.495	.325	**2-3/4**	6	1/2	6	901280	124.10	901280-C3	136.30		
1	.620	.420	**1-5/16**	6	5/8	3-1/2	71090	140.90	71090-C3	153.10		
1	.620	.420	**1-3/4**	6	5/8	3-1/2	41490	148.70	41490-C3	160.90		

SPEEDS & FEEDS ONLINE!

THREAD MILLING CUTTERS

Single Form – Metric

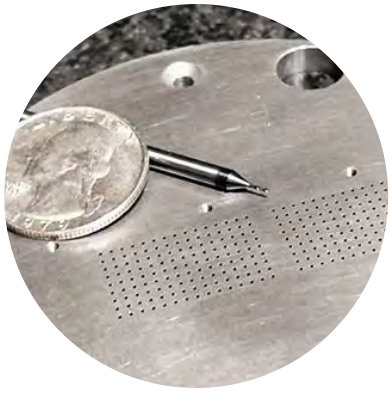


- Single thread form – can mill multiple pitches
- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide
- CNC ground in the USA

Click here for thread fit chart

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.00 mm −.05 mm			L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M1.6	1.16 mm	.696 mm	**2.10 mm**	2	3 mm	38 mm	890316	69.90	890316-C3	74.10
M1.6	1.16 mm	.696 mm	**3.50 mm**	2	3 mm	38 mm	882116	69.90	882116-C3	74.10
M2	1.50 mm	.900 mm	**2.70 mm**	2	3 mm	38 mm	890319	69.90	890319-C3	74.10
M2	1.50 mm	.900 mm	**4.50 mm**	2	3 mm	38 mm	882119	69.90	882119-C3	74.10
M2.5	1.90 mm	1.140 mm	**3.50 mm**	2	3 mm	38 mm	890322	69.90	890322-C3	74.10
M2.5	1.90 mm	1.140 mm	**5.80 mm**	2	3 mm	38 mm	882122	69.90	882122-C3	74.10
M3	2.30 mm	1.380 mm	**4.00 mm**	4	3 mm	38 mm	890324	69.90	890324-C3	74.10
M3	2.30 mm	1.380 mm	**6.80 mm**	4	3 mm	38 mm	882124	69.90	882124-C3	74.10
M4	3.00 mm	1.800 mm	**5.50 mm**	4	3 mm	38 mm	890326	70.90	890326-C3	75.10
M4	3.00 mm	1.800 mm	**9.00 mm**	4	3 mm	38 mm	882126	71.90	882126-C3	76.10
M5	4.00 mm	2.400 mm	**7.00 mm**	4	4 mm	50 mm	890328	71.90	890328-C3	76.40
M5	4.00 mm	2.400 mm	**12.00 mm**	4	4 mm	50 mm	882128	74.10	882128-C3	78.60
M6	4.80 mm	2.880 mm	**8.50 mm**	4	6 mm	50 mm	890330	70.90	890330-C3	77.10
M6	4.80 mm	2.880 mm	**14.00 mm**	4	6 mm	50 mm	882130	71.90	882130-C3	78.10
M8	6.00 mm	3.600 mm	**11.00 mm**	4	6 mm	50 mm	890332	71.90	890332-C3	78.10
M8	6.00 mm	3.600 mm	**18.00 mm**	4	6 mm	50 mm	882132	76.50	882132-C3	82.70
M10	8.00 mm	4.800 mm	**15.00 mm**	4	8 mm	63 mm	890334	93.20	890334-C3	100.40
M10	8.00 mm	4.800 mm	**24.00 mm**	4	8 mm	63 mm	882134	98.10	882134-C3	105.30
M16	13.70 mm	8.220 mm	**25.00 mm**	6	14 mm	75 mm	890339	109.90	890339-C3	122.10
M16	13.70 mm	8.220 mm	**42.00 mm**	6	14 mm	89 mm	882139	121.10	882139-C3	133.30

SPEEDS & FEEDS ONLINE!



★★★★★

"315 little bitty .020 holes in Stainless Steel. #HarveyTool."

— @cnc_werx

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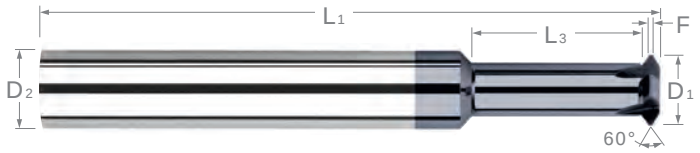
THREAD MILLING CUTTERS

Single Form for Hardened Steels



Tip of Included Angle Ground to a Flat for Increased Wear Resistance

- **Designed for threading hardened steels 46-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° UN threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention
- CNC ground in the USA

WORKS GREAT IN STEELS UP TO 68Rc

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.000″ −.002″	F +.0000″ −.0005″		L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
0	80	.044	.0013	.028	**3/32**	3	1/8	1-1/2	986602-C6	79.90
0	80	.044	.0013	.028	**1/8**	3	1/8	1-1/2	993102-C6	83.20
0	80	.044	.0013	.028	**3/16**	3	1/8	1-1/2	959502-C6	87.10
0	80	.044	.0013	.028	**1/4**	3	1/8	1-1/2	930302-C6	90.90
0	80	.044	.0013	.028	**5/16**	3	1/8	1-1/2	898902-C6	94.40
1	64-72	.054	.0014	.034	**1/8**	3	1/8	1-1/2	986604-C6	79.90
1	64-72	.054	.0014	.034	**3/16**	3	1/8	1-1/2	993104-C6	83.20
1	64-72	.054	.0014	.034	**1/4**	3	1/8	1-1/2	959504-C6	87.10
1	64-72	.054	.0014	.034	**5/16**	3	1/8	1-1/2	930304-C6	90.70
2	56-64	.064	.0016	.041	**5/32**	3	1/8	1-1/2	986606-C6	79.90
2	56-64	.064	.0016	.041	**7/32**	3	1/8	1-1/2	993106-C6	83.20
2	56-64	.064	.0016	.041	**5/16**	3	1/8	1-1/2	959506-C6	87.10
2	56-64	.064	.0016	.041	**7/16**	3	1/8	1-1/2	930306-C6	90.90
3	48-56	.072	.0018	.046	**5/32**	3	1/8	1-1/2	986608-C6	79.90
3	48-56	.072	.0018	.046	**1/4**	3	1/8	1-1/2	993108-C6	83.20
3	48-56	.072	.0018	.046	**3/8**	3	1/8	1-1/2	959508-C6	87.10
4	40-48	.080	.0021	.050	**5/32**	3	3/16	2	986610-C6	80.40
4	40-48	.080	.0021	.050	**1/4**	3	3/16	2	993110-C6	85.10
4	40-48	.080	.0021	.050	**3/8**	3	3/16	2	959510-C6	88.70
4	40-48	.080	.0021	.050	**1/2**	3	3/16	2	930310-C6	92.40
4	40-48	.080	.0021	.050	**5/8**	3	3/16	2	898910-C6	96.10
5	40-44	.093	.0023	.063	**3/16**	4	3/16	2	986615-C6	85.10
5	40-44	.093	.0023	.063	**1/2**	4	3/16	2	959515-C6	88.70
5	40-44	.093	.0023	.063	**5/8**	4	3/16	2	930315-C6	92.40
6	32-40	.098	.0025	.062	**1/4**	4	3/16	2	986620-C6	80.40
6	32-40	.098	.0025	.062	**3/8**	4	3/16	2	993120-C6	85.10
6	32-40	.098	.0025	.062	**1/2**	4	3/16	2	959520-C6	88.70
6	32-40	.098	.0025	.062	**5/8**	4	3/16	2	930320-C6	92.40
8	32-36	.120	.0028	.084	**5/16**	4	1/4	2-1/2	986630-C6	84.50
8	32-36	.120	.0028	.084	**1/2**	4	1/4	2-1/2	993130-C6	89.40
8	32-36	.120	.0028	.084	**5/8**	4	1/4	2-1/2	959530-C6	94.10
8	32-36	.120	.0028	.084	**3/4**	4	1/4	2-1/2	930330-C6	98.70
8	32-36	.120	.0028	.084	**7/8**	4	1/4	2-1/2	898930-C6	103.40

SPEEDS & FEEDS ONLINE!

*Tools are designed to produce an 83% depth of thread maximum.

continued on next page

THREAD MILLING CUTTERS

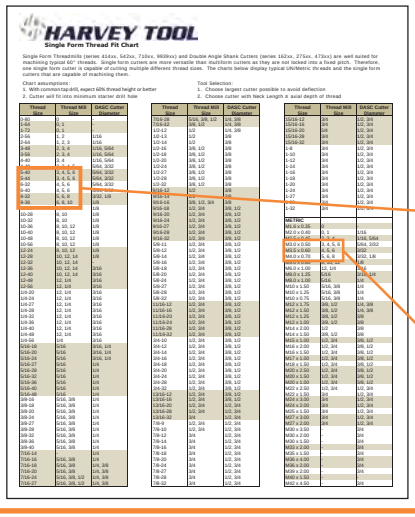
Single Form for Hardened Steels (cont.)

continued from previous page

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.000″ −.002″	F +.0000″ −.0005″		L_3 +.020″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
10	24-36	.135	.0028	.086	**5/16**	5	1/4	2-1/2	986640-C6	84.50
10	24-36	.135	.0028	.086	**1/2**	5	1/4	2-1/2	993140-C6	89.40
10	24-36	.135	.0028	.086	**5/8**	5	1/4	2-1/2	959540-C6	94.10
10	24-36	.135	.0028	.086	**7/8**	5	1/4	2-1/2	930340-C6	98.70
10	24-36	.135	.0028	.086	**1-1/8**	5	1/4	2-1/2	898940-C6	103.40
12	24-32	.160	.0030	.111	**3/8**	5	1/4	2-1/2	986645-C6	84.50
12	24-32	.160	.0030	.111	**5/8**	5	1/4	2-1/2	993145-C6	94.10
1/4	20-32	.180	.0030	.122	**1/2**	5	1/4	2-1/2	986650-C6	89.40
1/4	20-32	.180	.0030	.122	**3/4**	5	1/4	2-1/2	993150-C6	94.10
1/4	20-32	.180	.0030	.122	**1**	5	1/4	2-1/2	959550-C6	98.70
1/4	20-32	.180	.0030	.122	**1-1/4**	5	1/4	2-1/2	930350-C6	103.20
5/16	18-28	.240	.0036	.174	**1/2**	5	1/4	2-1/2	986655-C6	89.40
5/16	18-28	.240	.0036	.174	**3/4**	5	1/4	2-1/2	993155-C6	94.10
5/16	18-28	.240	.0036	.174	**1**	5	1/4	2-1/2	959555-C6	98.70
5/16	18-28	.240	.0036	.174	**1-1/4**	5	1/4	2-1/2	930355-C6	103.20
3/8	16-28	.300	.0036	.227	**3/4**	5	3/8	2-1/2	986660-C6	113.70
3/8	16-28	.300	.0036	.227	**1**	5	3/8	2-1/2	993160-C6	118.40
3/8	16-28	.300	.0036	.227	**1-1/4**	5	3/8	2-1/2	959560-C6	123.20
3/8	16-28	.300	.0036	.227	**1-1/2**	5	3/8	3	930360-C6	127.90
1/2	12-18	.388	.0056	.294	**3/4**	5	1/2	3	986670-C6	125.50
1/2	12-18	.388	.0056	.294	**1-1/4**	5	1/2	3	993170-C6	133.90
1/2	12-18	.388	.0056	.294	**1-3/4**	5	1/2	4	959570-C6	138.70
1/2	12-18	.388	.0056	.294	**2-1/4**	5	1/2	4	930370-C6	143.40
3/4	10-16	.495	.0063	.385	**1**	6	1/2	3	986680-C6	133.10
3/4	10-16	.495	.0063	.385	**1-3/8**	6	1/2	3	993180-C6	144.20
3/4	10-16	.495	.0063	.385	**1-3/4**	6	1/2	3	959580-C6	155.40
3/4	10-16	.495	.0063	.385	**2-1/4**	6	1/2	4	930380-C6	166.70

SPEEDS & FEEDS ONLINE!

*Tools are designed to produce an 83% depth of thread maximum.


HARVEY TOOL
Single Form Thread Fit Chart

SINGLE FORM THREAD FIT CHARTS

Our single form thread milling cutters can produce a range of thread sizes, from common UN threads to metric threads.

For example, our 5 thread size single form cutters (pictured left) can produce a range of thread sizes from 5-40 to 8-32 as well as M3.0 x 0.50 to M4.0 x 0.70.

For help with choosing the right thread mill, please call our Technical Support Team at **800-645-5609**.

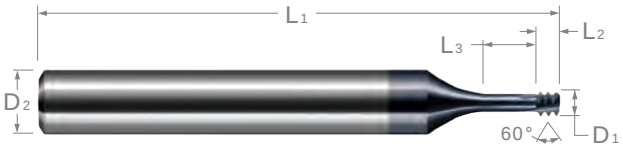
5-40	3, 4, 5, 6
5-44	3, 4, 5, 6
6-32	4, 5, 6
6-40	4, 5, 6
8-32	5, 6, 8

M3.0 x 0.50	3, 4, 5, 6
M3.5 x 0.60	4, 5, 6
M4.0 x 0.70	5, 6, 8

Click here to download the thread fit charts

THREAD MILLING CUTTERS

Tri-Form – UN Threads



Left-Hand Cut, Left Hand Spiral Design

- **Designed for threading in hardened steels and difficult-to-machine materials**
- Left-hand cut, left-hand spiral design for climb milling from top to bottom of right-hand threads
- Three forms and helical design reduces tool pressure and deflection resulting in accurate threads
- Cuts internal 60° UN threads
- Able to cut larger threads of the same pitch
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

Left-Hand Cut, Left-Hand Spiral Design

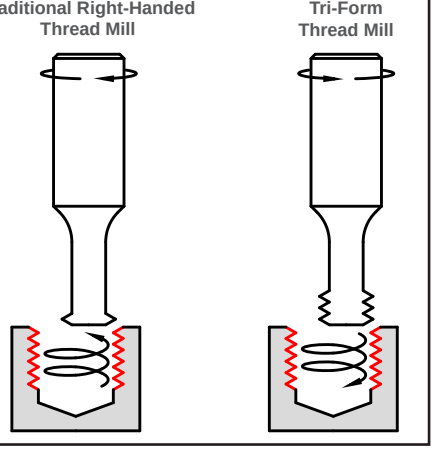
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE
2-56	.065	.053	.042	**3/32**	3	1/4	2-1/2	899910-C6	147.90
2-56	.065	.053	.042	**5/32**	3	1/4	2-1/2	896410-C6	154.10
4-40	.085	.075	.053	**3/32**	3	1/4	2-1/2	899916-C6	147.90
4-40	.085	.075	.053	**5/32**	3	1/4	2-1/2	896416-C6	154.10
6-32	.100	.093	.061	**5/32**	3	1/4	2-1/2	899922-C6	147.90
6-32	.100	.093	.061	**1/4**	3	1/4	2-1/2	896422-C6	154.10
8-32	.126	.093	.087	**7/32**	3	1/4	2-1/2	899928-C6	137.50
8-32	.126	.093	.087	**5/16**	3	1/4	2-1/2	896428-C6	143.70
10-24	.138	.125	.086	**7/32**	3	1/4	2-1/2	899934-C6	137.50
10-24	.138	.125	.086	**5/16**	3	1/4	2-1/2	896434-C6	143.70
10-32	.145	.093	.106	**7/32**	3	1/4	2-1/2	899936-C6	137.50
10-32	.145	.093	.106	**5/16**	3	1/4	2-1/2	896436-C6	143.70
1/4-20	.187	.150	.124	**5/16**	3	1/4	2-1/2	899944-C6	137.50
1/4-20	.187	.150	.124	**1/2**	3	1/4	2-1/2	896444-C6	143.70
1/4-28	.197	.107	.151	**5/16**	3	1/4	2-1/2	899946-C6	137.50
1/4-28	.197	.107	.151	**1/2**	3	1/4	2-1/2	896446-C6	143.70

SPEEDS & FEEDS ONLINE!

Tri-Form Thread Mills

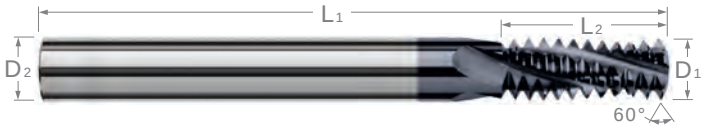
Our Tri-Form Thread Mills are unlike traditional right-handed thread mills, as they have a left-hand cut, left-hand spiral design.

- Improves thread accuracy and surface finish by climb milling from the top to the bottom of a hole.
- Tri-Form Thread Mills eliminate the need to arc-in when engaging the tool, which reduces radial pressure and deflection.



THREAD MILLING CUTTERS

Multi-Form – UN Threads



- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

WORKS GREAT IN STEELS UP TO 60Rc

OUTSTANDING IN ALUMINUM!

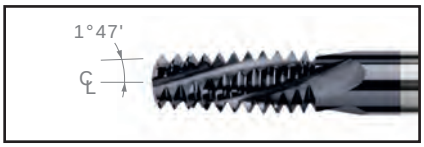
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
2-56	.065	.125	3	1/8	2	70010	80.70	70010-C3	84.90	70010-C8	86.90
3-48	.075	.167	3	1/8	2	70012	85.20	70012-C3	89.40		
4-40	.085	.175	3	1/8	2	70016	85.20	70016-C3	89.40	70016-C8	91.40
5-44	.095	.228	3	1/8	2	70020	85.20	70020-C3	89.40		
6-32	.100	.218	3	1/8	2	70022	88.10	70022-C3	92.30	70022-C8	94.30
8-32	.115	.250	3	1/8	2	70028	94.50	70028-C3	98.70	70028-C8	100.70
8-36	.115	.250	3	1/8	2	70031	94.50	70031-C3	98.70		
10-24	.120	.312	3	1/8	2	70034	99.40	70034-C3	103.60	70034-C8	105.60
10-28	.120	.312	3	1/8	2	70035	101.40	70035-C3	105.60		
10-32	.120	.312	3	1/8	2	70036	99.40	70036-C3	103.60	70036-C8	105.60
1/4-20	.180	.500	3	3/16	2-1/2	70044	118.90	70044-C3	123.40	70044-C8	125.10
1/4-28	.180	.500	3	3/16	2-1/2	70046	118.90	70046-C3	123.40	70046-C8	125.10
5/16-18	.235	.625	3	1/4	2-1/2	70054	128.70	70054-C3	134.90	70054-C8	135.40
5/16-24	.235	.625	3	1/4	2-1/2	70056	145.50	70056-C3	151.70	70056-C8	152.20
3/8-16	.285	.750	4	5/16	3	70064	173.10	70064-C3	180.30	70064-C8	187.30
3/8-24	.285	.750	4	5/16	3	70066	173.10	70066-C3	180.30	70066-C8	187.30
7/16-14	.305	.750	4	5/16	3	70074	173.10	70074-C3	180.30	70074-C8	187.30
7/16-20	.335	.875	4	3/8	3-1/2	70076	186.70	70076-C3	194.90	70076-C8	203.90
1/2-13	.350	.875	4	3/8	3-1/2	70084	192.90	70084-C3	201.10		
9/16-12	.370	.875	4	3/8	3-1/2	70092	192.90	70092-C3	201.10		
9/16-18	.370	.875	4	3/8	3-1/2	70094	192.90	70094-C3	201.10		
5/8-11	.470	1.250	4	1/2	3-1/2	70104	238.40	70104-C3	250.60		
3/4-10	.495	1.250	4	1/2	3-1/2	70124	238.40	70124-C3	250.60		
3/4-12	.495	1.250	4	1/2	3-1/2	70126	238.40	70126-C3	250.60		
3/4-16	.490	1.250	4	1/2	3-1/2	70128	243.40	70128-C3	255.60		
7/8-9	.620	1.375	4	5/8	4	70132	355.40	70132-C3	368.60		
7/8-14	.490	1.250	4	1/2	3-1/2	70134	243.40	70134-C3	255.60		
1-8	.620	1.375	4	5/8	4	70154	355.40	70154-C3	368.60		

SPEEDS & FEEDS ONLINE!

THREAD MILLING CUTTERS

Multi-Form – N.P.T. Threads

- Cuts internal and external 60° National Pipe Taper (N.P.T.) threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA



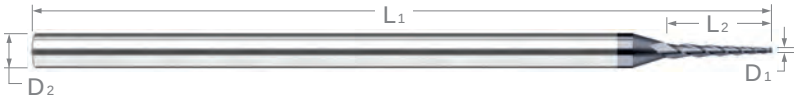
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/16, 1/8-27	.245*	.437	3	1/4	2-1/2	70204	128.10	70204-C3	134.30	70204-C8	134.80
1/4, 3/8-18	.305*	.625	4	5/16	3	70214	175.40	70214-C3	182.60	70214-C8	189.60
1/2, 3/4-14	.495*	.875	4	1/2	3-1/2	70226	204.70	70226-C3	216.90		
1,2-11.5	.620*	1.125	4	5/8	4	70232	289.10	70232-C3	302.30		

SPEEDS & FEEDS ONLINE!

*Major cutter diameter

THREAD MILLING CUTTERS

N.P.T. Tapered End Mills – Square



1°47' Angle for NPT threads

- 1°47' angle for preparation of parts prior to internal or external NPT thread milling
- Length of cut and diameters designed for range of standard NPT dimensions
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

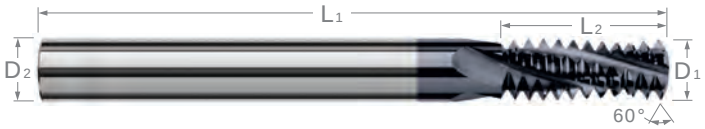
ANGLE PER SIDE	END DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
1°47'	.200	**.625** (3x)	1/4	2	912282	51.40	912282-C6	60.60
	.300	**.900** (3x)	3/8	2-1/2	912286	64.20	912286-C6	74.40
	.400	**1.250** (3x)	1/2	3	912292	86.20	912292-C6	99.40

SPEEDS & FEEDS ONLINE!

N.P.T. Thread Fit Chart		
Thread Mill Tool #	Thread Size	Tapered End Mill Tool #
70204	1/16, 1/8-27	912282
70214	1/4, 3/8-18	912282, 912286
70226	1/2, 3/4-14	912286
70232	1, 2-11.5	912292

THREAD MILLING CUTTERS

Multi-Form – Metric



- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

WORKS GREAT IN STEELS UP TO 60Rc

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.0005″ −.0005″	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.085	.178	3	1/8	2	16903	103.40	16903-C3	107.60
M4-0.70	.115	.276	3	1/8	2	16907	103.40	16907-C3	107.60
M4.5-0.75	.120	.250	3	1/8	2	16909	103.40	16909-C3	107.60
M5-0.80	.120	.312	3	1/8	2	16911	103.40	16911-C3	107.60
M6-1.00	.170	.500	3	3/16	2-1/2	16917	125.40	16917-C3	129.90
M8-1.25	.235	.625	3	1/4	2-1/2	16923	134.90	16923-C3	141.10
M10-1.50	.300	.750	4	5/16	3	16929	181.70	16929-C3	188.90
M12-1.75	.360	.875	4	3/8	3-1/2	16935	202.20	16935-C3	210.40
M14-1.50	.370	.875	4	3/8	3-1/2	16941	202.20	16941-C3	210.40
M16-2.00	.470	1.250	4	1/2	3-1/2	16947	248.90	16947-C3	261.10
M18-1.50	.490	1.250	4	1/2	3-1/2	16953	248.90	16953-C3	261.10
M20-2.50	.495	1.250	4	1/2	3-1/2	16959	248.90	16959-C3	261.10

SPEEDS & FEEDS ONLINE!

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° UN threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

Coolant-Fed for Chip Removal

WORKS GREAT IN STEELS UP TO 60Rc

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.0005″ −.0005″	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10-24	.145	.312	3	3/16	2-3/8	17334	99.20	17334-C3	103.70
10-32	.150	.312	3	3/16	2-3/8	17336	99.20	17336-C3	103.70
1/4-20	.180	.500	3	3/16	2-3/8	17344	120.20	17344-C3	124.70
1/4-28	.180	.500	3	3/16	2-3/8	17346	120.20	17346-C3	124.70
5/16-18	.235	.625	3	1/4	2-3/8	17354	129.40	17354-C3	135.60
5/16-24	.235	.625	3	1/4	2-3/8	17356	151.20	17356-C3	157.40
3/8-16	.285	.750	4	5/16	3	17364	174.40	17364-C3	181.60
3/8-24	.285	.750	4	5/16	3	17366	174.40	17366-C3	181.60
7/16-14	.305	.750	4	5/16	3	17374	174.40	17374-C3	181.60
7/16-20	.335	.875	4	3/8	3	17376	187.90	17376-C3	196.10
1/2-13	.350	.875	4	3/8	3	17384	193.90	17384-C3	202.10

SPEEDS & FEEDS ONLINE!

THREAD MILLING CUTTERS

Multi-Form – Long Flute – UN Threads

Designed for Deep Threaded Applications!

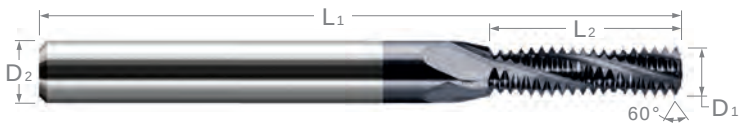
- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° UN threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

	THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
		D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE		
NEW	2-56	.069	.215	3	1/8	2	987110	97.10	987110-C3	101.30	987110-C8	103.30
	3-48	.079	.250	3	1/8	2	987112	101.90	987112-C3	106.10		
NEW	4-40	.089	.275	3	1/8	2	987116	101.90	987116-C3	106.10	987116-C8	107.90
NEW	6-32	.110	.375	3	1/8	2	987122	101.90	987122-C3	106.10	987122-C8	107.90
NEW	8-32	.131	.407	3	3/16	2-1/2	987128	108.50	987128-C3	113.10	987128-C8	116.60
	8-36	.131	.417	3	3/16	2-1/2	987131	114.10	987131-C3	118.60		
NEW	10-24	.145	.500	3	3/16	2-1/2	987134	133.90	987134-C3	138.40	987134-C8	142.60
NEW	10-32	.150	.500	3	3/16	2-1/2	987136	133.90	987136-C3	138.40	987136-C8	140.10
NEW	1/4-20	.195	.750	3	1/4	2-1/2	987144	136.10	987144-C3	142.30	987144-C8	142.80
NEW	1/4-28	.195	.750	3	1/4	2-1/2	987146	136.10	987146-C3	142.30	987146-C8	145.40
	5/16-18	.245	.944	3	5/16	3	987154	176.70	987154-C3	183.90		
	5/16-24	.245	.958	3	5/16	3	987156	181.40	987156-C3	188.60		
	3/8-16	.300	1.125	4	3/8	3-1/2	987164	210.70	987164-C3	218.90		
	3/8-24	.300	1.125	4	3/8	3-1/2	987166	216.70	987166-C3	224.90		
	7/16-20	.350	1.300	4	3/8	3-1/2	987176	216.70	987176-C3	224.90		
	1/2-13	.400	1.308	4	1/2	3-1/2	987184	219.90	987184-C3	232.10		

SPEEDS & FEEDS ONLINE!

THREAD MILLING CUTTERS

Multi-Form – Long Flute – Metric



Designed for Deep Threaded Applications!

- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° metric threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.090	.276	3	1/8	2	842903	120.10	842903-C3	124.30
M4-0.70	.124	.441	3	3/16	2-1/2	842907	123.10	842907-C3	127.60
M5-0.80	.155	.504	3	3/16	2-1/2	842911	120.50	842911-C3	125.10
M6-1.00	.186	.748	3	1/4	2-1/2	842917	142.40	842917-C3	148.60
M8-1.25	.245	.984	3	5/16	2-1/2	842923	183.10	842923-C3	190.30
M10-1.50	.311	1.122	4	3/8	3-1/2	842929	229.70	842929-C3	237.90
M16-2.00	.490	1.890	4	1/2	3-1/2	842947	296.90	842947-C3	309.10

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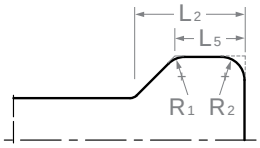
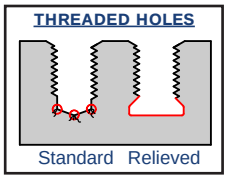
THREAD MILLING CUTTERS

Thread Relief Cutter



- Tool designed to relieve stress concentrations at corners of undercut and bottom of last thread to prevent fracture and failure
- Relief is typically done before threading operation to avoid damaging the thread forms
- Chamfer eliminates burrs and partial threads at last thread
- Flattens bottom of hole to achieve maximum thread depth
- Center cutting
- Solid carbide
- CNC ground in the USA



CUTTER DIA. D_1 +.000″ −.001″	LOC L_2 +.002″ −.000″	WIDTH (TSC) L_5	RADIUS 1 R_1 +.001″ −.001″	RADIUS 2 R_2 +.001″ −.001″	NECK DIA. D_3	NECK LENGTH L_3 +.010″ −.000″	RADIAL DOC	SHANK DIA. D_2	OAL L_1	UNCOATED 4 FL	UNCOATED PRICE	AlTiN COATED 4 FL	AlTiN COATED PRICE
.066	.029	.015	.000	.005	.036	.172	.014	1/8	1-1/2	896602	47.70	896602-C3	51.90
.075	.030	.015	.000	.005	.042	.187	.015	1/8	1-1/2	877502	45.70	877502-C3	49.90
.084	.038	.020	.000	.005	.045	.218	.018	3/16	2	988804	44.40	988804-C3	48.90
.102	.049	.025	.000	.010	.051	.281	.024	3/16	2	985707	45.10	985707-C3	49.60

D_1 +.000″ −.002″	L_2 +.005″ −.000″	L_5	R_1 +.001″ −.001″	R_2 +.001″ −.001″	D_3	L_3 +.030″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125	.054	.030	.000	.010	.074	.343	.024	1/4	2-1/2	979609	54.90	979609-C3	61.10
.142	.050	.020	.000	.010	.078	.359	.030	1/4	2-1/2	975405	56.10	975405-C3	62.30
.168	.050	.020	.000	.010	.103	.422	.030	1/4	2-1/2	955305	54.90	955305-C3	61.10
.193	.055	.020	.000	.010	.118	.547	.035	1/4	2-1/2	952505	56.40	952505-C3	62.60
.193	.075	.040	.015	.015	.118	.547	.035	1/4	2-1/2	952516	56.40	952516-C3	62.60
.245	.072	.030	.000	.010	.155	.797	.042	1/4	2-1/2	946009	58.50	946009-C3	64.70
.245	.102	.060	.020	.020	.155	.797	.042	1/4	2-1/2	946027	58.50	946027-C3	64.70
.355	.086	.030	.000	.010	.236	1.078	.056	3/8	2-1/2	942909	91.10	942909-C3	99.30
.355	.116	.060	.020	.020	.236	1.078	.056	3/8	2-1/2	942927	91.10	942927-C3	99.30
.355	.136	.080	.030	.030	.236	1.078	.056	3/8	2-1/2	942931	91.10	942931-C3	99.30

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COATINGS & SUBSTRATES CHART

Coating / Substrate:	**TiN** Titanium Nitride -C1	**AlTiN** Aluminum Titanium Nitride -C3	**AlTiN Nano** Aluminum Titanium Nitride Nano -C6
Application / Benefits:	• General purpose coating for machining ferrous materials.	• High performance coating in ferrous materials. • Excellent high temperature resistance and hardness. • Maintains high surface hardness at elevated temperatures improving tool life and allowing faster feed rates. • Produces aluminum oxide layer at high temperature which reduces thermal conductivity, transferring heat into the chip. • Excellent in dry machining, machining titanium alloys, inconel, stainless alloys and cast iron. • Not recommended for use in aluminum and aluminum alloys.	• Premium coating in ferrous materials. • Latest generation AlTiN coating mixed with silicon to produce a unique nanocomposite coating. This structure improves hardness, heat resistance, and toughness over traditional AlTiN coatings. • Superior results, extended tool life and reduced cycle times over traditional AlTiN coatings in demanding applications where setup minimizes runout and vibration. • Not recommended for use in aluminum and aluminum alloys.
Materials:	**Ferrous Materials & Exotic Metals**		
	General Purpose Ferrous Materials	Alloy steels, stainless steels, tool steels, titanium, inconel, nickel and other aerospace materials	Hardened steels, hardened stainless, nickel based alloys, tool steels, titanium alloys, inconel and other aerospace materials
Color:	Gold	Dark Gray / Black	Blue / Black
Structure:	Mono-layer	Multi-layer	Nano Composite Multi-layer
Hardness (HV 0.05):	2447 (24 GPa)	3569 (35 GPa)	4181 (41 GPa)
Coefficient of Friction:	.40	.70	.40
Coating Thickness (microns):	2 - 5	2 - 5	1 - 4
Max. Working Temp:	1000° F	1400° F	2100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

COATINGS & SUBSTRATES CHART

ZrN Zirconium Nitride -C7	**TiB_2** Titanium Diboride -C8	**Amorphous Diamond** Diamond-Like Coating -C4	**CVD Diamond** Crystalline CVD Diamond	**PCD Diamond** Polycrystalline Diamond
• High hardness, lubricity and abrasion resistance. • Improves performance over uncoated carbide in a wide variety of non-ferrous materials. • Less expensive alternative to diamond.	• Primary benefit over other non-ferrous coatings is extremely low affinity to aluminum. • Prevents build-up on cutting edge, chip packing and extends tool life. • Recommended in Aluminum Alloys and Magnesium Alloys. • Not ideally suited for abrasive varieties of these alloys.	• A PVD amorphous diamond coating which improves lubricity and wear resistance in non-ferrous materials. • Coating is thin relative to CVD diamond, preventing edge rounding. • Sharp edges improve results (performance and finish) over CVD in certain abrasive, non-ferrous materials (copper, brass, high silicon aluminum). • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thin coating maintains sharper edge.	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and extends tool life up to 50x and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Diamond layer approx 5 times thicker than Amorphous Diamond, improving wear resistance. • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thicker diamond layer for increased wear resistance.	• PCD diamond is manufactured as a carbide backed flat wafer. The wafer is brazed to a carbide body to form an end mill. • PCD has excellent hardness and abrasion resistance, and is the thickest diamond layer we offer. • Sharply ground cutting edges and thick diamond layer combine the sharp edge benefits of Amorphous Diamond with the abrasion resistance of CVD Diamond. • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thickest diamond layer ground to sharp edge.
Non-Ferrous & Non-Metallic Materials				
Abrasive non-ferrous alloys such as Brass, Bronze, Copper and Abrasive Aluminum Alloys	Aluminum Alloys, Magnesium Alloys	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc	Graphite, Composites, Green Carbide, Green Ceramics	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc, Green Carbide, Green Ceramics
Light Gold / Champagne	Light Gray / Silver	Charcoal / Gray	Gray	Gray / Black
Mono-layer	Mono-layer	Mono-layer	True Crystalline CVD Multi-Layer	Polycrystalline Diamond (Carbide Backed)
2243 (22 GPa)	2804 (27.5 GPa)	7954 - 8973 (78 - 88 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)
.40	.35	.10	.05 - .30	.05 - .20
2 - 5	1 - 3	.5 - 2.5	8 - 10	.010" - .030" Solid PCD Layer
1100° F	900° F	750° F	1100° F	1100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

INDEX BY SERIES ID

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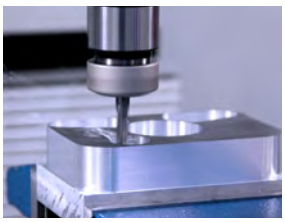
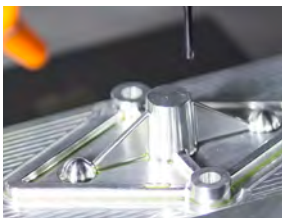


How to Avoid 4 Major Types of Tool Wear

Ball Nose Milling Strategy



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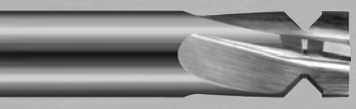
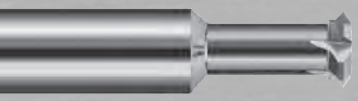
New Picatinny Form Cutters **(pg. 236)**



Picatinny Rail Form Cutters

Used to create the entire Picatinny Rail in a single pass without the need for tool change.



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