

GARR TOOL[®]

High Performance Solid Carbide



2022i

GARR TOOL sets the standard when it comes to high performance tooling. From its beginning in a garage in 1944, GARR TOOL grew quickly due to its quality products and friendly, reliable service. For over seventy-seven years in the cutting tool industry, Garr Tool Company has maintained its commitment to manufacturing the highest quality carbide cutting tools, offering competitive prices and providing unequalled customer service.

Located in Alma, Michigan USA, our current facility of over 200,000 square feet contains clean, efficient production space. An ISO 9001:2015-certified company, GARR TOOL produces thousands of tools per day on our state-of-the-art CNC grinding equipment, run by experienced, conscientious operators. Our select distributors can be found in 35 countries, and end-users worldwide trust and take pride in products that come from GARR TOOL. Our quality tools ensure that individuals in industries such as aerospace, oil and gas, automotive, medical, mold-making, and mining can work efficiently, quickly, and as safely as possible. Garr Tool Company will continue to invest in new technology to meet the future needs of our customers. Adding to our efficiency and service, Oerlikon Balzers Coating USA manages our in-house coating facility.

With a continued focus on maintaining fast, reliable service, we operate an inventory and shipping center in England to better service our customers in the UK and throughout Europe. Quality carbide tooling backed by our ingenuity, integrity, sincerity, work ethic, and personal values is paramount at Garr Tool Company. It's why you can trust GARR TOOL each and every time. We are well-known for having a large inventory in stock, allowing standard catalog items to be shipped within 24 hours at a 99+% fill rate. GARR TOOL continues to introduce new series of standard tools to meet the demands of material specific machining. We also take pride in shipping custom tools within two weeks. To see our selection of tooling, or to learn more about GARR TOOL, we encourage you to visit our website, www.garrtool.com.

All of us at Garr Tool Company, as well as our trusted worldwide network of distributors, look forward to helping you with your solid carbide round tooling needs.





A3 Series

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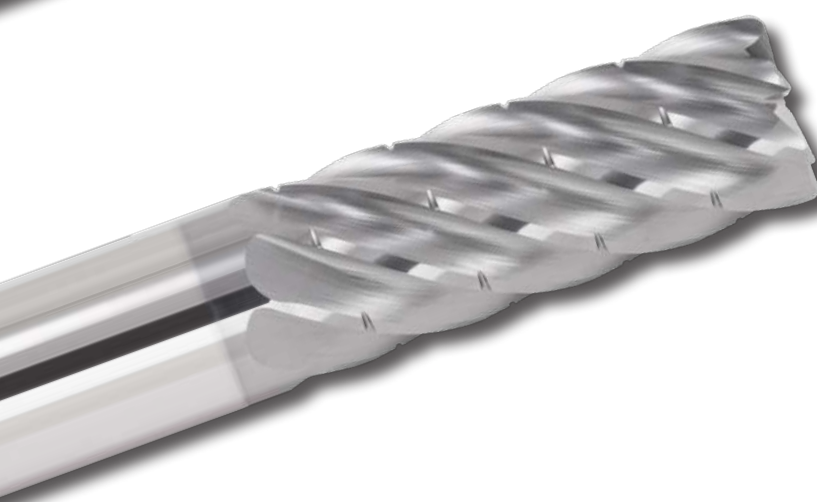
Built for High Efficiency Milling on high RPM machines



V4 Series

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Expanded line of our popular V4 Series



VX-7C Series

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An expansion of the multi-flute HEM VX-7 Series, chip splitters come standard

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1580KH	2 Flute	3xD	30° Helix	Coolant Fed, AlTiN-Based Coated	47
1250H	2 Flute	5xD	30° Helix	AlTiN-Based Coated	23
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1280KH	2 Flute	5xD	30° Helix	Coolant Fed, AlTiN-Based Coated	47
NEW SIZES 1880KD	2 Flute	7xD	30° Helix	Coolant Fed, AlTiN-Based Coated	37
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1500	2 Flute	3xD	Straight	Hard Metal, Bright Finish	57
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1510	2 Flute	3xD	15° Helix	Slow Spiral, Bright Finish	61
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NEW SIZES 1520	2 Flute	3xD	25° Helix	Bright Finish	67
NEW SIZES 1520H	2 Flute	3xD	25° Helix	Hardlube Coated	73
1205	2 Flute	5xD	25° Helix	Bright Finish	67
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1200	2 Flute	5xD	25° Helix	Bright Finish	83
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NEW SIZES V4-S	4 Flute	Square	AlCrN Coated	139
NEW SIZES V4-R	4 Flute	Radius	AlCrN Coated	139
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NEW SIZES VX-7	7 Flute	S, R	AlCrN-Based Coated	160
NEW SIZES VX-7C (Chip Splitter)	7 Flute	S, R	AlCrN-Based Coated	163
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310D	4 Flute	Ball	DIAMOND Coated	199
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710D	4 Flute	Ball	DIAMOND Coated	201
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Recommended tools for:

ALUMINUM

Aluminium / Aluminio / Aluminium / Alluminio / 铝

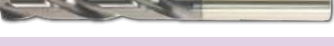
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1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1800H		90	HARDLUBE	2 flute, Parabolic

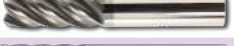
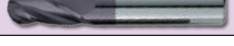
END MILLS

	SERIES	PAGE	COATING	DESCRIPTION
A3		116	BRIGHT	High velocity, 3 flute, High metal removal rate
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
ARC		112	BRIGHT	High performance, 3 flute, Staggered helix rougher
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		216	BRIGHT	2 flute, General purpose, Square end
220MC		219	TiCN	2 flute, General purpose, Square end
320M, 920M		228	BRIGHT	2 flute, General purpose, Ball end
320MC		231	TiCN	2 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1160, 1180		17	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
TMS, TMR		132, 134	AlCrN	High performance, Multiple flute finisher
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
246MA, 846MA		191	AlTiN	High performance, 6 flute, Finisher
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
223MA, 823MA		220	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		232	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

STAINLESS STEEL

Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金

DRILLS

SERIES	PAGE	COATING	DESCRIPTION
1510H	64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H	23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD	29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H	32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD	37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH	47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H	73	HARDLUBE	2 flute, General purpose

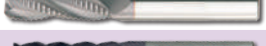
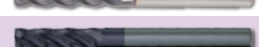
END MILLS

SERIES	PAGE	COATING	DESCRIPTION
V4	139	AlCrN	High performance, 4 flute, Variable helix
V5	152	AlCrN	High performance, 5 flute, Variable helix
VX-7	160	AlCrN-Based	High performance, 7flute, Staggered flute
VRX	164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6	174	AlTiN	High performance, 6 flute, Staggered flute
253MA, 853MA	178	AlTiN	High performance, 3 flute, Profiling and finishing
255MA, 855MA	184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA	189	AlTiN	High performance, 5 flute, Corner radius
VHM	114	AlTiN	High performance, 4 flute, Staggered flute rougher
ARC	112	BRIGHT	High performance, 3 flute, Staggered helix rougher
TMS, TMR	132, 134	AlCrN	High performance, Multiple flute finisher
253MC	182	TiCN	High performance, 3 flute, Profiling and finishing
246MA, 846MA	191	AlTiN	High performance, 6 flute, Finisher, Square end
223MA, 823MA	220	TiAlN	3 flute, General purpose, Square end
230MA, 830MA	220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA	225	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA	232	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA	232	TiAlN	4 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V5		152	AlCrN	High performance, 5 flute, Variable helix
V4		139	AlCrN	High performance, 4 flute, Variable helix
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
246MA, 846MA		191	AlTiN	High performance, 6 flute, Finisher, Square end
TMS, TMR		132, 134	AlCrN	High performance, Multiple flute finisher
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for: **BRASS, BRONZE, COPPER, MAGNESIUM**

Messing, Bronze / Latón, Bronce / Laiton, Bronze / Ottone, Bronzo / 黄铜, 青铜
Kupfer / Cobre / Cuivre / Rame / 铜, Magnesium / Magnesio / Magnésium / Magnesio / 镁

DRILLS

	SERIES	PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1520, 1205		67	BRIGHT	2 flute, General purpose
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1500H		59	HARDLUBE	2 flute, Straight flute
1800H		90	HARDLUBE	2 flute, Parabolic

END MILLS

	SERIES	PAGE	COATING	DESCRIPTION
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
ARC		112	BRIGHT	High performance, 3 flute, Staggered helix rougher
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		216	BRIGHT	2 flute, General purpose, Square end
220MC		219	TiCN	2 flute, General purpose, Square end
320M, 920M		228	BRIGHT	2 flute, General purpose, Ball end
320MC		231	TiCN	2 flute, General purpose, Ball end

DRILLS

	SERIES	PAGE	COATING	DESCRIPTION
1500H		59	HARDLUBE	2 flute, Straight flute
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

	SERIES	PAGE	COATING	DESCRIPTION
H-45		195	AlTiN	High performance, High feed, Corner radius
350MX, 950MX		196	AlTiN	High performance, High Rc finisher, Die mold
545MA		192	AlTiN	High performance, High Rc finisher, Square end
545RA		193	AlTiN	High performance, High Rc finisher, Corner radius
545BA		194	AlTiN	High performance, High Rc finisher, Ball end
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

COMPOSITE MATERIALS*(Graphite, Plastics, Carbon Fiber)*

Verbundwerkstoffe / Material compuesto / Matériaux composites / Materiale composito / 复合材料

DRILLS

	SERIES	PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
154MA		109	TiAIN	4 flute, Center cutting angle
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1800H		90	HARDLUBE	2 flute, Parabolic
1500H		59	HARDLUBE	2 flute, Straight flute

END MILLS

	SERIES	PAGE	COATING	DESCRIPTION
210D		197	DIAMOND	4 flute, Square end
310D		199	DIAMOND	4 flute, Ball end
210RD		198	DIAMOND	4 flute, Corner radius
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
255MC		188	TiCN	High performance, 5 flute, Profiling and finishing
220MC		219	TiCN	2 flute, General purpose, Square end
320MC		231	TiCN	2 flute, General purpose, Ball end
154M, 154MA		108, 109	BRIGHT/TiAIN	4 flute, Drill/Mill, Center cutting to a point
152M, 152MA		106, 107	BRIGHT/TiAIN	2 flute, Drill/Mill, Center cutting to a point

Recommended tools for: **CARBON STEELS, MEDIUM ALLOY STEELS** (generally under 45 Rc)

Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢
Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliages / Acciaio da utensili di media durezza / 中碳合金钢

RECOMMENDED
TOOLS

DRILLS

SERIES	PAGE	COATING	DESCRIPTION
1580HD	29	AlTiN-Based	2 flute, High performance, Common shank
1550H, 1250H, 1850H	23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580H, 1280H	32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD	37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH	47	AlTiN-Based	2 flute, High performance, Coolant fed
1510H	64	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H	73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES	PAGE	COATING	DESCRIPTION
V4	139	AlCrN	High performance, 4 flute, Variable helix
V5	152	AlCrN	High performance, 5 flute, Variable helix
VX-7	160	AlCrN-Based	High performance, 7 flute, Staggered flute
VRX	164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6	174	AlTiN	High performance, 6 flute, Staggered flute
VHM	114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA	184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA	189	AlTiN	High performance, 5 flute, Corner radius
253MA, 853MA	178	AlTiN	High performance, 3 flute, Profiling and finishing
230MA, 830MA	220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA	225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA	232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

CAST IRON

Gusseisen / Reparto de Hierro / Cast Fer / Ghisa / 铸铁

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1120H, 1100H		79	HARDLUBE	3 flute, General purpose
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
230MC		219	TiCN	4 flute, General purpose, Square end
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius

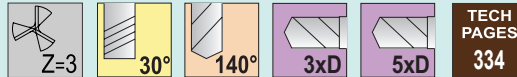
TOLERANCES

d	$+.0000"-.0005" (+.0000-.0127\text{mm})$
l_1	$+.125"-.125" (+3.175-3.175\text{mm})$
l_2	$+.125"-.125" (+3.175-3.175\text{mm})$

**NEW
ITEMS**

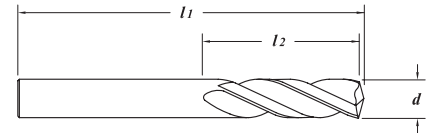
Series 1160, 1180

.1562" - .1910"
(3.967mm - 4.851mm)



**HIGH PERFORMANCE
DRILLS**

ALUMASTAR Coated
ALUMASTAR-Beschichtet
Recubrimiento de ALUMASTAR
Revêtement ALUMASTAR
Rivestimento in ALUMASTAR
ALUMASTAR 涂层



High performance solid submicron grain carbide drill
Designed for drilling aluminum and other soft materials <40Hrc
No spot drilling required
Unique point geometry and coating for higher speeds and feeds
High performance drill point
Live tooling recommended on lathe processes
Shank tolerance: h6



Hochleistungs-Vollhartmetallbohrer aus Feinkornhartmetall
Entwickelt für das Bohren von Aluminium und anderen weichen Werkstoffen <40HRC
Anzentrieren nicht empfohlen
Einzigartige Spitzengeometrie und Beschichtung für höhere Schnittgeschwindigkeiten und Vorschübe
Hochleistungsspitzengeometrie
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6



Broca de submicrograno sólido carburo de alto rendimiento
Diseñada para taladrado de aluminio y otros materiales blandos <40HRC
No requiere pretaladrado
Geometría de punto único y recubrimiento para altas velocidades y alimentaciones
Ángulo de punta de la broca de alto rendimiento
Recomendación para la aplicación en torno
Tolerancia del vástago: h6



Forets carbure submicrograin a haute performances
Developpes pour le perçage des aluminium et autres matieres tendres <40Hrc
Pas de point de centre recommande
Geometrie et revetement unique pour de plus grandes vitesses et avances
Foret a haute performance
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6



Punta in metallo duro ad alte prestazioni
Progettata per foratura di alluminio e altri materiali non ferrosi <40Hrc
Non richiede centrino
Geometria e rivestimento per alta velocità
Punta ad alte prestazioni
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6



高效整体硬质合金钻头
适合钻削铝合金和其它软性材质 <40HRC
不需要定位钻
独一无二的刀尖几何形状和涂层适合更高转速和更大进给量
140° 高效钻尖
不建议在车床，或工具必须纺纱
柄部公差：h6

3xD (1160) EDP#	5xD (1180) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
70631		.1562	5/32"	3.967	2-1/16"
	70161	.1562	5/32"	3.967	2-1/2"
70633		.1570	#22	3.988	2-1/8"
	70163	.1570	#22	3.988	2-1/2"
70635		.1575		4.000	54
	70166	.1575		4.000	65
70637		.1590	#21	4.039	2-1/8"
	70177	.1590	#21	4.039	2-1/2"
70639		.1610	#20	4.089	2-1/8"
	70179	.1610	#20	4.089	2-1/2"
70641		.1660	#19	4.216	2-1/8"
	70181	.1660	#19	4.216	2-3/4"
70643		.1695	#18	4.305	2-1/8"
	70183	.1695	#18	4.305	2-3/4"
70645		.1719	11/64"	4.366	2-1/8"
	70185	.1719	11/64"	4.366	2-3/4"
70647		.1730	#17	4.394	2-3/16"
	70187	.1730	#17	4.394	2-3/4"
70649		.1770	#16	4.496	2-3/16"
	70189	.1770	#16	4.496	2-3/4"
70651		.1772		4.500	55
	70191	.1772		4.500	65
70653		.1800	#15	4.572	2-3/16"
	70196	.1800	#15	4.572	2-3/4"
70655		.1820	#14	4.623	2-3/16"
	70201	.1820	#14	4.623	2-3/4"
70657		.1850	#13	4.700	2-3/16"
	70206	.1850	#13	4.700	2-3/4"
70659		.1875	3/16"	4.763	2-3/16"
	70211	.1875	3/16"	4.763	2-3/4"
70661		.1890	#12	4.801	2-1/4"
	70216	.1890	#12	4.801	2-3/4"
70663		.1910	#11	4.851	2-1/4"
	70221	.1910	#11	4.851	2-3/4"

continued →

Series 1160, 1180 (continued)

.1935" - .2570"
(4.914mm - 6.528mm)

3xD (1160) EDP#	5xD (1180) EDP#	d † Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
70665		.1935	#10	4.914	2-1/4"	3/4"
NEW	70226	.1935	#10	4.914	2-3/4"	1-1/4"
	70667	.1960	#9	4.978	2-1/4"	3/4"
	70229	.1960	#9	4.978	3"	1-5/16"
	70669	.1969		5.000	57	19
NEW	70231	.1969		5.000	75	32
	70671	.1990	#8	5.055	2-1/4"	3/4"
	70236	.1990	#8	5.055	3"	1-5/16"
	70673	.2010	#7	5.105	2-1/4"	3/4"
	70241	.2010	#7	5.105	3"	1-5/16"
	70675	.2031	13/64"	5.159	2-1/4"	3/4"
	70246	.2031	13/64"	5.159	3"	1-5/16"
	70677	.2040	#6	5.182	2-3/8"	7/8"
	70251	.2040	#6	5.182	3"	1-3/8"
	70679	.2055	#5	5.220	2-3/8"	7/8"
	70256	.2055	#5	5.220	3"	1-3/8"
	70681	.2090	#4	5.309	2-3/8"	7/8"
	70261	.2090	#4	5.309	3"	1-3/8"
	70683	.2130	#3	5.410	2-3/8"	7/8"
	70266	.2130	#3	5.410	3"	1-3/8"
	70685	.2165		5.500	60	22
	70271	.2165		5.500	75	35
	70687	.2188	7/32"	5.558	2-3/8"	7/8"
	70276	.2188	7/32"	5.558	3"	1-3/8"
	70689	.2210	#2	5.613	2-7/16"	15/16"
	70281	.2210	#2	5.613	3"	1-3/8"
	70691	.2280	#1	5.791	2-7/16"	15/16"
	70286	.2280	#1	5.791	3"	1-3/8"
	70693	.2340	A	5.944	2-7/16"	15/16"
	70294	.2340	A	5.944	3-1/4"	1-1/2"
	70695	.2344	15/64"	5.954	2-7/16"	15/16"
	70296	.2344	15/64"	5.954	3-1/4"	1-1/2"
	70697	.2362		6.000	64	26
	70301	.2362		6.000	82	38
	70699	.2380	B	6.045	2-1/2"	1"
	70306	.2380	B	6.045	3-1/4"	1-5/8"
	70701	.2420	C	6.147	2-1/2"	1"
	70311	.2420	C	6.147	3-1/4"	1-5/8"
	70703	.2460	D	6.248	2-1/2"	1"
	70316	.2460	D	6.248	3-1/4"	1-5/8"
	70705	.2500	1/4" / E	6.350	2-1/2"	1"
	70321	.2500	1/4" / E	6.350	3-1/4"	1-5/8"
	70707	.2510		6.375	2-1/2"	1"
	70911	.2510		6.375	3-1/4"	1-5/8"
	70709	.2559		6.500	66	28
	70326	.2559		6.500	82	41
	70711	.2570	F	6.528	2-5/8"	1-1/8"
	70331	.2570	F	6.528	3-1/4"	1-11/16"

3xD (1160) EDP#	5xD (1180) EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
70713		.2610	G	6.629	2-5/8"	1-1/8"
	70336	.2610	G	6.629	3-1/2"	1-11/16"
70715		.2656	17/64"	6.746	2-5/8"	1-1/8"
	70341	.2656	17/64"	6.746	3-1/2"	1-11/16"
70717		.2660	H	6.756	2-11/16"	1-3/16"
	70346	.2660	H	6.756	3-1/2"	1-11/16"
70719		.2720	I	6.909	2-11/16"	1-3/16"
	70351	.2720	I	6.909	3-1/2"	1-11/16"
70721		.2756		7.000	68	30
	70356	.2756		7.000	88	43
70723		.2770	J	7.036	2-11/16"	1-3/16"
	70361	.2770	J	7.036	3-1/2"	1-11/16"
70725		.2812	9/32"	7.142	2-11/16"	1-3/16"
	70371	.2812	9/32"	7.142	3-1/2"	1-3/4"
70727		.2900	L	7.366	2-3/4"	1-1/4"
	70376	.2900	L	7.366	3-1/2"	1-3/4"
70728		.2950	M	7.493	2-3/4"	1-1/4"
	70378	.2950	M	7.493	3-3/4"	1-7/8"
NEW 70729		.2953		7.500	70	32
	70381	.2953		7.500	95	44
70731		.2969	19/64"	7.541	2-3/4"	1-1/4"
	70386	.2969	19/64"	7.541	3-3/4"	1-7/8"
70733		.3020	N	7.671	2-15/16"	1-7/16"
	70391	.3020	N	7.671	3-3/4"	1-7/8"
70735		.3125	5/16"	7.938	2-15/16"	1-7/16"
	70396	.3125	5/16"	7.938	3-3/4"	1-7/8"
70737		.3150		8.000	76	36
	70401	.3150		8.000	95	48
70739		.3160	O	8.026	2-15/16"	1-7/16"
	70406	.3160	O	8.026	3-3/4"	1-7/8"
70741		.3230	P	8.204	2-15/16"	1-7/16"
	70411	.3230	P	8.204	3-3/4"	2-3/32"
70743		.3281	21/64"	8.334	2-15/16"	1-7/16"
	70416	.3281	21/64"	8.334	4"	2-3/32"
70745		.3320	Q	8.433	3"	1-7/16"
	70421	.3320	Q	8.433	4"	2-3/32"
70747		.3346		8.500	76	36
	70426	.3346		8.500	100	53
70749		.3390	R	8.611	3"	1-7/16"
	70431	.3390	R	8.611	4"	2-3/32"
70751		.3438	11/32"	8.733	3"	1-7/16"
	70436	.3438	11/32"	8.733	4"	2-3/16"
70753		.3480	S	8.839	3-1/16"	1-1/2"
	70441	.3480	S	8.839	4"	2-3/16"
70755		.3543		9.000	78	38
	70446	.3543		9.000	100	55
NEW 70757		.3580	T	9.093	3-1/16"	1-1/2"
	70451	.3580	T	9.093	4-1/4"	2-9/32"
70759		.3594	23/64"	9.129	3-1/16"	1-1/2"
	70456	.3594	23/64"	9.129	4-1/4"	2-9/32"

continued →

Series 1160, 1180 (continued)

.3680" - .5118"
(9.347mm - 13.000mm)

3xD (1160) EDP#	5xD (1180) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
70761		.3680	U	9.347	3-1/8"
	70461	.3680	U	9.347	4-1/4"
70763		.3740		9.500	79
	70466	.3740		9.500	108
70765		.3750	3/8"	9.525	3-1/8"
	70471	.3750	3/8"	9.525	4-1/4"
70767		.3760		9.550	3-1/8"
	70913	.3760		9.550	4-1/4"
70769		.3770	V	9.576	3-1/4"
	70476	.3770	V	9.576	4-1/4"
70771		.3860	W	9.804	3-1/4"
	70481	.3860	W	9.804	4-1/2"
70773		.3906	25/64"	9.921	3-1/4"
	70486	.3906	25/64"	9.921	4-1/2"
NEW 70775		.3937		10.000	84
	70491	.3937		10.000	114
70777		.3970	X	10.084	3-5/16"
	70496	.3970	X	10.084	4-1/2"
70779		.4040	Y	10.262	3-5/16"
	70501	.4040	Y	10.262	4-1/2"
70781		.4062	13/32"	10.317	3-5/16"
	70506	.4062	13/32"	10.317	4-1/2"
70783		.4134		10.500	85
	70511	.4134		10.500	114
70785		.4219	27/64"	10.716	3-3/8"
	70516	.4219	27/64"	10.716	4-1/2"
NEW 70787		.4331		11.000	87
	70521	.4331		11.000	114
70789		.4375	7/16"	11.113	3-7/16"
	70526	.4375	7/16"	11.113	4-3/4"
NEW 70791		.4528		11.500	90
	70531	.4528		11.500	120
70793		.4531	29/64"	11.509	3-9/16"
	70536	.4531	29/64"	11.509	4-3/4"
70795		.4688	15/32"	11.909	3-11/16"
	70541	.4688	15/32"	11.909	4-3/4"
70797		.4724		12.000	93
	70546	.4724		12.000	120
70799		.4844	31/64"	12.304	3-11/16"
	70551	.4844	31/64"	12.304	5-5/16"
70801		.4921		12.500	95
	70556	.4921		12.500	135
70803		.5000	1/2"	12.700	3-3/4"
	70561	.5000	1/2"	12.700	5-3/8"
70805		.5010		12.725	3-3/4"
	70915	.5010		12.725	5-3/8"
NEW 70807		.5118		13.000	107
	70566	.5118		13.000	136

	3xD (1160) EDP#	5xD (1180) EDP#	$d \pm$ Diameter		l_1 Overall Length	l_2 Flute Length	
			Decimal	Metric			
NEW	70809		.5156	33/64"	13.096	4-1/4"	2-3/16"
		70571	.5156	33/64"	13.096	5-3/8"	3-1/8"
	70811		.5312	17/32"	13.492	4-1/4"	2-1/4"
		70576	.5312	17/32"	13.492	5-11/16"	3-5/16"
	70813		.5469	35/64"	13.891	4-1/4"	2-1/4"
NEW		70581	.5469	35/64"	13.891	5-13/16"	3-3/8"
	70815		.5512		14.000	107	59
		70586	.5512		14.000	148	86
	70817		.5625	9/16"	14.287	4-1/2"	2-3/8"
		70591	.5625	9/16"	14.287	5-15/16"	3-1/2"
NEW	70819		.5781	37/64"	14.683	4-1/2"	2-1/2"
		70596	.5781	37/64"	14.683	6"	3-1/2"
	70821		.5906		15.000	115	64
		70601	.5906		15.000	152	90
	70823		.5938	19/32"	15.082	4-1/2"	2-1/2"
NEW		70606	.5938	19/32"	15.082	6"	3-9/16"
	70825		.6094	39/64"	15.478	4-1/2"	2-9/16"
		70611	.6094	39/64"	15.478	6-3/16"	3-11/16"
	70827		.6250	5/8"	15.875	4-1/2"	2-5/8"
		70616	.6250	5/8"	15.875	6-5/16"	3-3/4"
NEW	70829		.6299		16.000	115	66
		70621	.6299		16.000	160	95



*1180 Series
High Performance Drill in aluminum*



TOLERANCES

d_1	$+0.0000'' - .0004'' (+.000 - .010\text{mm})$
d_2	$h6$
l_1	$+ .125'' - .125'' (+3.175 - 3.175\text{mm})$
l_2	$+ .125'' - .125'' (+3.175 - 3.175\text{mm})$

Series 1550H,1250H,1850H

.0312" - .0354"
(0.792mm - 0.900mm)



HIGH PERFORMANCE

AlTiN-based Coating

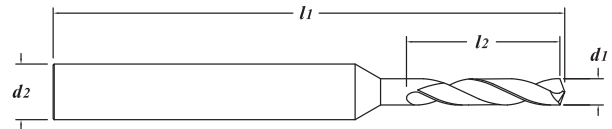
AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank

30° helix for better chip evacuation

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels >40Rc

Live tooling recommended on lathe processes



HochleistungsBohrer aus Feinkornhartmetall mit Schaftdurchmesser 3 mm oder 1/8 Zoll

30° Spirale für bessere Spanabfuhr

Empfohlen für Hoch Nickelhaltige und Hochwärmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl >40HRC

Empfehlung fuer den Einsatz auf der Drehmaschine



De alto rendimiento Broca de metal duro con un diámetro de mango 3mm ó 1/8"

Helice de 30° para una mejor evacuación de viruta

Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta >40HRC

Recomendación para la aplicación en torno



Haute prestation solide submicron foret carbure avec un de queue diameter de 3 mm ou 1/8"

Helice a 30° pour une meilleure évacuation de copeaux

Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils >40HRC

Outil de filature nécessaires pour une utilisation sur un processus de tournage



Sub-micro grana Punta in Metallo duro con gambo diametro 3 mm o 1/8"

Elica a 30° per una migliore evacuazione del truciolo

Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili >40HRC

Utensili rotanti sono consigliate se usato su un tornio



带加强的超细高效硬质合金钻头, 柄径3mm或1/8"

30° 螺旋角更便于排屑

高镍耐高温合金、钴基合金、不锈钢和工具钢 >40HRC

不建议在车床, 或工具必须纺纱

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal		Metric			
00100			.0312	1/32"	0.792	1/8"	2"	5/32"
	00304		.0312	1/32"	0.792	1/8"	2"	15/64"
		00510	.0312	1/32"	0.792	1/8"	2"	7/16"
		00306	.0315		0.800	3.0	50	6.0
		00512	.0315		0.800	3.0	50	12.0
		00308	.0319		0.810	3.0	50	6.0
00106			.0320	#67	0.812	1/8"	2"	11/64"
	00310		.0320	#67	0.812	1/8"	2"	15/64"
		00516	.0320	#67	0.812	1/8"	2"	7/16"
		00518	.0323		0.820	3.0	50	12.0
00112			.0330	#66	0.838	1/8"	2"	11/64"
	00316		.0330	#66	0.838	1/8"	2"	15/64"
		00522	.0330	#66	0.838	1/8"	2"	7/16"
		00318	.0331		0.840	3.0	50	6.0
		00524	.0331		0.840	3.0	50	12.0
00116			.0335		0.850	3.0	50	4.5
		00526	.0335		0.850	3.0	50	12.0
		00322	.0339		0.860	3.0	50	6.5
		00528	.0339		0.860	3.0	50	13.0
00120			.0343		0.870	3.0	50	4.5
		00530	.0343		0.870	3.0	50	13.0
00122			.0346		0.880	3.0	50	4.5
00124			.0350	#65	0.890	3.0	50	4.5
		00328	.0350	#65	0.890	3.0	50	6.5
		00534	.0350	#65	0.890	3.0	50	13.0
		00330	.0354		0.900	3.0	50	6.5
		00536	.0354		0.900	3.0	50	13.0

continued →

Series 1550H,1250H,1850H (continued)

.0358" - .0465"
(0.910mm - 1.181mm)

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal	Metric			
	00332		.0358	0.910	3.0	50	6.5
00130			.0360 #64	0.914	1/8"	2"	3/16"
	00334		.0360 #64	0.914	1/8"	2"	1/4"
		00540	.0360 #64	0.914	1/8"	2"	1/2"
00134			.0366	0.930	3.0	50	5.0
00136			.0370 #63	0.940	3.0	50	5.0
	00340		.0370 #63	0.940	3.0	50	7.0
		00546	.0370 #63	0.940	3.0	50	14.0
00138			.0374	0.950	3.0	50	5.0
00142			.0380 #62	0.965	1/8"	2"	3/16"
	00346		.0380 #62	0.965	1/8"	2"	17/64"
		00552	.0380 #62	0.965	1/8"	2"	9/16"
		00556	.0386	0.980	3.0	50	14.0
00148			.0390 #61	0.990	3.0	50	5.0
	00352		.0390 #61	0.990	3.0	50	7.0
		00558	.0390 #61	0.990	3.0	50	14.0
00150			.0394	1.000	3.0	50	5.0
	00354		.0394	1.000	3.0	50	7.0
		00560	.0394	1.000	3.0	50	14.0
00152			.0400 #60	1.016	1/8"	2"	13/64"
	00356		.0400 #60	1.016	1/8"	2"	9/32"
		00562	.0400 #60	1.016	1/8"	2"	9/16"
00154			.0410 #59	1.041	1/8"	2"	13/64"
	00358		.0410 #59	1.041	1/8"	2"	9/32"
		00564	.0410 #59	1.041	1/8"	2"	9/16"
00156			.0413	1.050	3.0	50	5.5
	00360		.0413	1.050	3.0	50	7.5
		00566	.0413	1.050	3.0	50	15.0
00158			.0420 #58	1.066	1/8"	2"	7/32"
	00362		.0420 #58	1.066	1/8"	2"	5/16"
00160			.0430 #57	1.092	1/8"	2"	7/32"
	00364		.0430 #57	1.092	1/8"	2"	5/16"
		00570	.0430 #57	1.092	1/8"	2"	9/16"
00162			.0433	1.100	3.0	50	5.5
	00366		.0433	1.100	3.0	50	8.0
		00572	.0433	1.100	3.0	50	16.0
00164			.0453	1.150	3.0	50	6.0
	00368		.0453	1.150	3.0	50	8.0
		00574	.0453	1.150	3.0	50	16.0
00166			.0465 #56	1.181	1/8"	2"	15/64"
	00370		.0465 #56	1.181	1/8"	2"	11/32"
		00576	.0465 #56	1.181	1/8"	2"	5/8"

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	$d1$ †			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal	Diameter	Metric			
00168			.0469	3/64"	1.191	1/8"	2"	15/64"
	00372		.0469	3/64"	1.191	1/8"	2"	11/32"
		00578	.0469	3/64"	1.191	1/8"	2"	5/8"
00170			.0472		1.200	3.0	50	6.0
	00374		.0472		1.200	3.0	50	9.0
		00580	.0472		1.200	3.0	50	18.0
00172			.0492		1.250	3.0	50	6.5
	00376		.0492		1.250	3.0	50	9.0
		00582	.0492		1.250	3.0	50	18.0
00174			.0512		1.300	3.0	50	6.5
	00378		.0512		1.300	3.0	50	9.0
		00584	.0512		1.300	3.0	50	18.0
00176			.0520	#55	1.320	1/8"	2"	17/64"
	00380		.0520	#55	1.320	1/8"	2"	3/8"
		00586	.0520	#55	1.320	1/8"	2"	3/4"
00178			.0531		1.350	3.0	50	6.5
	00382		.0531		1.350	3.0	50	9.5
		00588	.0531		1.350	3.0	50	19.0
00180			.0550	#54	1.397	1/8"	2"	9/32"
	00384		.0550	#54	1.397	1/8"	2"	3/8"
		00590	.0550	#54	1.397	1/8"	2"	3/4"
00182			.0551		1.400	3.0	50	7.0
	00386		.0551		1.400	3.0	50	10.0
		00592	.0551		1.400	3.0	65	20.0
00184			.0571		1.450	3.0	50	7.0
	00388		.0571		1.450	3.0	50	10.5
		00594	.0571		1.450	3.0	65	21.0
00186			.0591		1.500	3.0	50	7.5
	00390		.0591		1.500	3.0	50	10.5
		00596	.0591		1.500	3.0	65	21.0
00188			.0595	#53	1.511	1/8"	2"	19/64"
	00392		.0595	#53	1.511	1/8"	2"	7/16"
		00598	.0595	#53	1.511	1/8"	2-1/2"	13/16"
00190			.0610		1.550	3.0	50	7.5
	00394		.0610		1.550	3.0	50	11.0
		00600	.0610		1.550	3.0	65	22.0
00192			.0625	1/16"	1.587	1/8"	2"	5/16"
	00396		.0625	1/16"	1.587	1/8"	2"	7/16"
		00602	.0625	1/16"	1.587	1/8"	2-1/2"	13/16"
00194			.0630		1.600	3.0	50	7.5
	00398		.0630		1.600	3.0	50	11.0
		00604	.0630		1.600	3.0	65	22.0
00196			.0635	#52	1.613	1/8"	2"	5/16"
	00400		.0635	#52	1.613	1/8"	2"	15/32"
		00606	.0635	#52	1.613	1/8"	2-1/2"	7/8"
00198			.0650		1.650	3.0	50	8.5
	00402		.0650		1.650	3.0	50	11.5
		00608	.0650		1.650	3.0	65	23.0
00200			.0669		1.700	3.0	50	8.5
	00404		.0669		1.700	3.0	50	11.5
		00610	.0669		1.700	3.0	65	23.0
00202			.0670	#51	1.702	1/8"	2"	11/32"
	00406		.0670	#51	1.702	1/8"	2"	15/32"
		00612	.0670	#51	1.702	1/8"	2-1/2"	7/8"
00204			.0689		1.750	3.0	50	9.0
	00408		.0689		1.750	3.0	50	12.0
		00614	.0689		1.750	3.0	65	24.0

continued →

Series 1550H, 1250H, 1850H (continued)

.0700" - .0846"
(1.778mm - 2.150mm)

TOLERANCES

d_1	+0.000" -0.004" (+0.00 -0.10mm)
d_2	h6
l_1	+0.125" -0.125" (+3.175 -3.175mm)
l_2	+0.125" -0.125" (+3.175 -3.175mm)

AlTiN-based Coating

AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal		Metric			
00206			.0700	#50	1.778	1/8"	2"	23/64"
	00410		.0700	#50	1.778	1/8"	2"	1/2"
		00616	.0700	#50	1.778	1/8"	2-1/2"	1"
00208			.0709		1.800	3.0	50	9.0
	00412		.0709		1.800	3.0	50	13.0
		00618	.0709		1.800	3.0	65	26.0
00210			.0728		1.850	3.0	50	9.5
		00620	.0728		1.850	3.0	65	26.0
00212			.0730	#49	1.854	1/8"	2"	3/8"
	00416		.0730	#49	1.854	1/8"	2"	1/2"
		00622	.0730	#49	1.854	1/8"	2-1/2"	1"
00214			.0748		1.900	3.0	50	9.5
	00418		.0748		1.900	3.0	50	13.5
		00624	.0748		1.900	3.0	65	27.0
00216			.0760	#48	1.930	1/8"	2"	3/8"
	00420		.0760	#48	1.930	1/8"	2"	17/32"
		00626	.0760	#48	1.930	1/8"	2-1/2"	1-1/8"
00218			.0768		1.950	3.0	50	10.0
	00422		.0768		1.950	3.0	50	14.0
		00628	.0768		1.950	3.0	65	28.0
00220			.0781	5/64"	1.983	1/8"	2"	13/32"
	00424		.0781	5/64"	1.983	1/8"	2"	9/16"
		00630	.0781	5/64"	1.983	1/8"	2-1/2"	1-1/8"
00222			.0785	#47	1.994	1/8"	2"	13/32"
	00426		.0785	#47	1.994	1/8"	2"	9/16"
		00632	.0785	#47	1.994	1/8"	2-1/2"	1-1/8"
00224			.0787		2.000	3.0	50	10.0
	00428		.0787		2.000	3.0	50	14.0
		00634	.0787		2.000	3.0	65	28.0
00226			.0807		2.050	3.0	50	10.5
	00430		.0807		2.050	3.0	50	14.0
		00636	.0807		2.050	3.0	65	28.0
00228			.0810	#46	2.057	1/8"	2"	27/64"
	00432		.0810	#46	2.057	1/8"	2"	9/16"
		00638	.0810	#46	2.057	1/8"	2-1/2"	1-1/8"
00230			.0820	#45	2.083	1/8"	2"	27/64"
	00434		.0820	#45	2.083	1/8"	2"	9/16"
		00640	.0820	#45	2.083	1/8"	2-1/2"	1-1/8"
00232			.0827		2.100	3.0	50	10.5
	00436		.0827		2.100	3.0	50	14.5
		00642	.0827		2.100	3.0	65	29.0
00234			.0846		2.150	3.0	50	11.0
	00438		.0846		2.150	3.0	50	14.5
		00644	.0846		2.150	3.0	65	29.0

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal	Diameter Metric			
00236			.0860	#44	2.184	1/8"	7/16"
	00440		.0860	#44	2.184	1/8"	19/32"
		00646	.0860	#44	2.184	1/8"	1-3/16"
00238			.0866		2.200	3.0	11.0
	00442		.0866		2.200	3.0	15.5
		00648	.0866		2.200	3.0	31.0
00240			.0886		2.250	3.0	11.5
00242			.0890	#43	2.260	1/8"	29/64"
	00446		.0890	#43	2.260	1/8"	5/8"
		00652	.0890	#43	2.260	1/8"	1-1/4"
00244			.0906		2.300	3.0	11.5
	00448		.0906		2.300	3.0	16.0
		00654	.0906		2.300	3.0	32.0
00246			.0925		2.350	3.0	12.0
	00450		.0925		2.350	3.0	16.0
		00656	.0925		2.350	3.0	32.0
00248			.0935	#42	2.375	1/8"	31/64"
	00452		.0935	#42	2.375	1/8"	21/32"
		00658	.0935	#42	2.375	1/8"	1-5/16"
00250			.0938	3/32"	2.382	1/8"	31/64"
	00454		.0938	3/32"	2.382	1/8"	21/32"
		00660	.0938	3/32"	2.382	1/8"	1-5/16"
00252			.0945		2.400	3.0	12.0
	00456		.0945		2.400	3.0	17.0
		00662	.0945		2.400	3.0	34.0
00254			.0960	#41	2.438	1/8"	31/64"
	00458		.0960	#41	2.438	1/8"	43/64"
		00664	.0960	#41	2.438	1/8"	1-11/32"
00256			.0965		2.450	3.0	12.5
		00666	.0965		2.450	3.0	34.0
00258			.0980	#40	2.489	1/8"	1/2"
	00462		.0980	#40	2.489	1/8"	11/16"
		00668	.0980	#40	2.489	1/8"	1-3/8"
00260			.0984		2.500	3.0	12.5
	00464		.0984		2.500	3.0	17.5
		00670	.0984		2.500	3.0	35.0
00262			.0995	#39	2.527	1/8"	1/2"
	00466		.0995	#39	2.527	1/8"	11/16"
		00672	.0995	#39	2.527	1/8"	1-3/8"
00264			.1004		2.550	3.0	13.0
	00468		.1004		2.550	3.0	17.5
		00674	.1004		2.550	3.0	35.0
00266			.1015	#38	2.578	1/8"	17/32"
	00470		.1015	#38	2.578	1/8"	45/64"
		00676	.1015	#38	2.578	1/8"	1-13/32"
00268			.1024		2.600	3.0	13.0
	00472		.1024		2.600	3.0	18.0
		00678	.1024		2.600	3.0	36.0
00270			.1040	#37	2.641	1/8"	17/32"
	00474		.1040	#37	2.641	1/8"	23/32"
		00680	.1040	#37	2.641	1/8"	1-7/16"
00272			.1043		2.650	3.0	13.5
	00476		.1043		2.650	3.0	18.5
		00682	.1043		2.650	3.0	37.0

continued →

Series 1550H,1250H,1850H (continued)

.1063" - .1250"
(2.700mm - 3.175mm)

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal	Metric			
00274			.1063	2.700	3.0	50	13.5
	00478		.1063	2.700	3.0	50	19.0
		00684	.1063	2.700	3.0	75	38.0
00276			.1065 #36	2.705	1/8"	2"	17/32"
	00480		.1065 #36	2.705	1/8"	2"	3/4"
		00686	.1065 #36	2.705	1/8"	3"	1-1/2"
00278			.1083	2.750	3.0	50	14.0
	00482		.1083	2.750	3.0	50	19.5
		00688	.1083	2.750	3.0	75	39.0
00280			.1094 7/64"	2.778	1/8"	2"	9/16"
	00484		.1094 7/64"	2.778	1/8"	2"	49/64"
		00690	.1094 7/64"	2.778	1/8"	3"	1-9/16"
00282			.1100 #35	2.794	1/8"	2"	9/16"
	00486		.1100 #35	2.794	1/8"	2"	49/64"
		00692	.1100 #35	2.794	1/8"	3"	1-9/16"
00284			.1102	2.800	3.0	50	14.0
	00488		.1102	2.800	3.0	50	19.5
		00694	.1102	2.800	3.0	75	39.0
00286			.1110 #34	2.819	1/8"	2"	9/16"
	00490		.1110 #34	2.819	1/8"	2"	25/32"
		00696	.1110 #34	2.819	1/8"	3"	1-5/8"
00288			.1122	2.850	3.0	50	14.5
		00698	.1122	2.850	3.0	75	40.0
00290			.1130 #33	2.870	1/8"	2"	19/32"
	00494		.1130 #33	2.870	1/8"	2"	51/64"
		00700	.1130 #33	2.870	1/8"	3"	1-5/8"
00292			.1142	2.900	3.0	50	14.5
	00496		.1142	2.900	3.0	50	20.0
		00702	.1142	2.900	3.0	75	40.0
00294			.1160 #32	2.946	1/8"	2"	19/32"
	00498		.1160 #32	2.946	1/8"	2"	13/16"
		00704	.1160 #32	2.946	1/8"	3"	1-5/8"
00296			.1161	2.950	3.0	50	15.0
		00706	.1161	2.950	3.0	75	42.0
00298			.1181	3.000	3.0	50	15.0
	00502		.1181	3.000	3.0	50	21.0
		00708	.1181	3.000	3.0	75	42.0
00300			.1200 #31	3.048	1/8"	2"	5/8"
	00504		.1200 #31	3.048	1/8"	2"	7/8"
		00710	.1200 #31	3.048	1/8"	3"	1-3/4"
00302			.1250 1/8"	3.175	1/8"	2"	5/8"
	00506		.1250 1/8"	3.175	1/8"	2"	7/8"
		00712	.1250 1/8"	3.175	1/8"	3"	1-3/4"

TOLERANCES

$d1^*$	3mm - 6mm	+0.016mm +0.004mm (+.00063" +.00015")
	> 6mm - 10mm	+0.021mm +0.006mm (+.00082" +.00023")
	> 10mm - 18mm	+0.025mm +0.007mm (+.00098" +.00027")
	> 18mm - 20mm	+0.029mm +0.008mm (+.00114" +.00031")
$d2$	h6	
$l1$	+3.175mm -3.175mm (+.125" -.125")	
$l2$	+3.175mm -3.175mm (+.125" -.125")	
$l4$	+1.980mm -0.000mm (+.078" -.000")	



Series 1580HD

.1181" - .2342"
(3.000mm - 5.950mm)

HIGH PERFORMANCE
DRILLS

AlTiN-based Coating

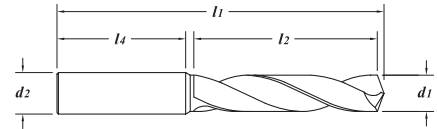
AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



High performance solid submicron grain carbide drill with reinforced shank
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40Rc
Live tooling recommended on lathe processes



Hochleistungs Bohrer aus Feinkornhartmetall mit verstärktem Schaft
Bis zu 50% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehobte Schneidkante
Kann als Pilotbohrer verwendet werden

Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl > 40HRC
Empfehlung fuer den Einsatz auf der Drehmaschine



Taladro de alto rendimiento de metal submicrónico duro con vástago
Hasta un 50% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Puede ser utilizada como broca piloto

Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40Rc
Recomendación para la aplicación en torno



Haute prestation avec drille à grain solide submicron carbure avec tige renforcée
50% plus rapide que les forets carbure standards
Helice à 30° pour une meilleure évacuation de copeaux
Préparation de l'arête de coupe
Peut être utilisé comme foret pilote

Recommander pour base nickel, alliages à hautes températures, alliages de cobalt, aciers inoxydables et aciers à outils > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage



Punte in sub-micro grana con gambo rinforzato per alte prestazioni
Fino al 50% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Può essere usata come punta pilota

Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40HRC
Utensili rotanti sono consigliate se usato su un tornio



带加强柄的超细高效整体硬质合金钻头
跟普通的硬质合金钻头相比可提高速度高达50%
30°螺旋角更便于排屑
切削刃口经过研磨
可做定心钻使用

高镍耐高温合金、钴基合金、不锈钢和工具钢 > 40HRC
不建议在车床，或工具必须纺纱

* Note - These drills are made to a plus/plus tolerance on the drill diameter.
If you are in need of a minus tolerance drill, please refer to our other high performance drills.

EDP#	$d1^+$ Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l4$ Shank Length
	Decimal	Metric				
20085	.1181	3.000	6.0	62	20	36
20095	.1220	3.100	6.0	62	20	36
20105	.1248	3.170	6.0	62	20	36
20115	.1260	3.200	6.0	62	20	36
20125	.1280	3.250	6.0	62	20	36
20135	.1299	3.300	6.0	62	20	36
20145	.1339	3.400	6.0	62	20	36
20155	.1378	3.500	6.0	62	20	36
20165	.1417	3.600	6.0	62	20	36
20175	.1457	3.700	6.0	62	20	36
20185	.1476	3.750	6.0	62	20	36
20195	.1496	3.800	6.0	66	24	36
20205	.1535	3.900	6.0	66	24	36
20215	.1575	4.000	6.0	66	24	36
20225	.1614	4.100	6.0	66	24	36
20235	.1654	4.200	6.0	66	24	36
20245	.1673	4.250	6.0	66	24	36
20255	.1693	4.300	6.0	66	24	36
20265	.1732	4.400	6.0	66	24	36
20275	.1772	4.500	6.0	66	24	36
20285	.1811	4.600	6.0	66	24	36
20295	.1831	4.650	6.0	66	24	36
20305	.1850	4.700	6.0	66	24	36
20315	.1870	4.750	6.0	66	24	36
20325	.1890	4.800	6.0	66	28	36
20335	.1929	4.900	6.0	66	28	36
20345	.1969	5.000	6.0	66	28	36
20355	.2008	5.100	6.0	66	28	36
20365	.2027	5.150	6.0	66	28	36
20375	.2047	5.200	6.0	66	28	36
20385	.2087	5.300	6.0	66	28	36
20395	.2165	5.500	6.0	66	28	36
20405	.2185	5.550	6.0	66	28	36
20408	.2205	5.600	6.0	66	28	36
20412	.2244	5.700	6.0	66	28	36
20415	.2283	5.800	6.0	66	28	36
20425	.2323	5.900	6.0	66	28	36
20435	.2342	5.950	6.0	66	28	36

continued →

Series 1580HD (continued)

.2362" - .4252"
(6.000mm - 10.800mm)

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length
	Decimal	Metric				
20445	.2362	6.000	6.0	66	28	36
20448	.2402	6.100	8.0	79	34	36
20452	.2441	6.200	8.0	79	34	36
20454	.2480	6.300	8.0	79	34	36
20455	.2500	6.350	8.0	79	34	36
20462	.2520	6.400	8.0	79	34	36
20465	.2559	6.500	8.0	79	34	36
20468	.2571	6.530	8.0	79	34	36
20472	.2598	6.600	8.0	79	34	36
20473	.2638	6.700	8.0	79	34	36
20475	.2657	6.750	8.0	79	34	36
20485	.2677	6.800	8.0	79	34	36
20495	.2717	6.900	8.0	79	34	36
20505	.2756	7.000	8.0	79	34	36
20515	.2795	7.100	8.0	79	41	36
20525	.2815	7.150	8.0	79	41	36
20535	.2835	7.200	8.0	79	41	36
20542	.2874	7.300	8.0	79	41	36
20545	.2913	7.400	8.0	79	41	36
20555	.2953	7.500	8.0	79	41	36
20565	.2972	7.550	8.0	79	41	36
20575	.2992	7.600	8.0	79	41	36
20585	.3031	7.700	8.0	79	41	36
20595	.3071	7.800	8.0	79	41	36
20605	.3130	7.950	8.0	79	41	36
20615	.3150	8.000	8.0	79	41	36
20622	.3189	8.100	10.0	89	47	40
20625	.3228	8.200	10.0	89	47	40
20635	.3268	8.300	10.0	89	47	40
20645	.3287	8.350	10.0	89	47	40
20652	.3307	8.400	10.0	89	47	40
20655	.3346	8.500	10.0	89	47	40
20665	.3386	8.600	10.0	89	47	40
20675	.3425	8.700	10.0	89	47	40
20685	.3445	8.750	10.0	89	47	40
20695	.3465	8.800	10.0	89	47	40
20705	.3504	8.900	10.0	89	47	40
20715	.3543	9.000	10.0	89	47	40
20725	.3583	9.100	10.0	89	47	40
20735	.3602	9.150	10.0	89	47	40
20745	.3622	9.200	10.0	89	47	40
20755	.3661	9.300	10.0	89	47	40
20762	.3701	9.400	10.0	89	47	40
20765	.3740	9.500	10.0	89	47	40
20775	.3760	9.550	10.0	89	47	40
20778	.3780	9.600	10.0	89	47	40
20782	.3819	9.700	10.0	89	47	40
20785	.3858	9.800	10.0	89	47	40
20795	.3898	9.900	10.0	89	47	40
20805	.3937	10.000	10.0	89	47	40
20812	.3976	10.100	12.0	102	55	45
20815	.4016	10.200	12.0	102	55	45
20825	.4055	10.300	12.0	102	55	45
20835	.4134	10.500	12.0	102	55	45
20842	.4173	10.600	12.0	102	55	45
20845	.4213	10.700	12.0	102	55	45
20855	.4252	10.800	12.0	102	55	45

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length
	Decimal	Metric				
20865	.4331	11.000	12.0	102	55	45
20875	.4370	11.100	12.0	102	55	45
20885	.4409	11.200	12.0	102	55	45
20892	.4488	11.400	12.0	102	55	45
20895	.4528	11.500	12.0	102	55	45
20905	.4606	11.700	12.0	102	55	45
20915	.4685	11.900	12.0	102	55	45
20925	.4724	12.000	12.0	102	55	45
20935	.4764	12.100	14.0	107	60	45
20941	.4803	12.200	14.0	107	60	45
20945	.4842	12.300	14.0	107	60	45
20955	.4921	12.500	14.0	107	60	45
20961	.4961	12.600	14.0	107	60	45
20965	.5000	12.700	14.0	107	60	45
20975	.5039	12.800	14.0	107	60	45
20978	.5051	12.830	14.0	107	60	45
20981	.5079	12.900	14.0	107	60	45
20982	.5098	12.950	14.0	107	60	45
20985	.5118	13.000	14.0	107	60	45
20998	.5236	13.300	14.0	107	60	45
21005	.5315	13.500	14.0	107	60	45
21015	.5394	13.700	14.0	107	60	45
21025	.5433	13.800	14.0	107	60	45
21035	.5512	14.000	14.0	107	60	45
21045	.5551	14.100	16.0	115	65	48
21053	.5591	14.200	16.0	115	65	48
21055	.5610	14.250	16.0	115	65	48
21065	.5630	14.300	16.0	115	65	48
21075	.5709	14.500	16.0	115	65	48
21085	.5787	14.700	16.0	115	65	48
21105	.5906	15.000	16.0	115	65	48
21115	.5945	15.100	16.0	115	65	48
21125	.6102	15.500	16.0	115	65	48
21135	.6181	15.700	16.0	115	65	48
21145	.6220	15.800	16.0	115	65	48
21155	.6299	16.000	16.0	115	65	48
21159	.6331	16.080	18.0	123	73	48
21175	.6496	16.500	18.0	123	73	48
21185	.6555	16.650	18.0	123	73	48
21195	.6693	17.000	18.0	123	73	48
21215	.6870	17.450	18.0	123	73	48
21225	.6890	17.500	18.0	123	73	48
21235	.7027	17.850	18.0	123	73	48
21245	.7087	18.000	18.0	123	73	48
21255	.7185	18.250	20.0	131	79	50
21265	.7283	18.500	20.0	131	79	50
21275	.7342	18.650	20.0	131	79	50
21295	.7500	19.050	20.0	131	79	50
21304	.7598	19.300	20.0	131	79	50
21315	.7677	19.500	20.0	131	79	50
21325	.7815	19.850	20.0	131	79	50
21335	.7874	20.000	20.0	131	79	50

Series 1580H, 1280H

.1181" - .1719"
(3.000mm - 4.366mm)

TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)
l ₁	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

AlTiN-based Coating

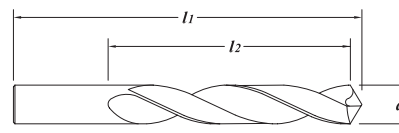
AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



High performance - high penetration solid submicron grain carbide drill
Extended tool life and greater surface finish through faster SFM rates
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys,
stainless steels and tool steels >40Rc

Live tooling recommended on lathe processes
Shank tolerance: h6



Hochleistungs- Vollhartmetallbohrer aus Feinkornhartmetall
Hohe Leistung - Hohe Vorschubgeschwindigkeiten
Bis zu 50% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehonte Schneidkante

Empfohlen für Hoch Nickelhaltige und Hochwärmefeste Stähle, Kobaltbasislegierungen,
Rostfreier- und Werkzeugstahl >40HRC

Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6



Broca de submicrograno sólido carburo de alto rendimiento
Mayor duración de la herramienta y mejores acabados superficiales
gracias al mayor índice SFM
Hasta un 50% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado

Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura,
aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta >40Rc

Recomendación para la aplicación en torno
Tolerancia del vástago: h6



Forets carbure submicrograin à haute performance - haut pouvoir de coupe
Amélioration de la durée de vie et de l'état de surface en finition aussi avec
des avances plus élevées
50% plus rapide que les forets carbure standards
Helice à 30° pour une meilleure évacuation de copeaux
Préparation de l'arête de coupe

Recommander pour base nickel, alliages à hautes températures, alliages de cobalt,
aciers inoxydables et aciers à outils >40HRC

Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6



Alte prestazioni - Alta penetrazione Super sub-micrograno metallo duro
Vita utensile più lunga e ottima finitura della superficie con maggiori avanzamenti
Fino al 50% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato

Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto,
inox e acciai per utensili >40HRC

Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6



高效率 - 高进给 高效整体硬质合金钻头
通过加快切削速度延长刀具使用寿命、提高表面光洁度
跟普通的硬质合金钻头相比可提高速度高达50%
30° 螺旋角更便于排屑
切削刃口经过珩磨

高镍耐高温合金、钴基合金、不锈钢和工具钢 >40HRC
不建议在车床，或工具必须纺纱

柄部公差: h6

3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length
		Decimal	Metric		
20301		.1181	3.000	46	16
	21301	.1181	3.000	50	19
20306		.1200	#31 3.048	1-13/16"	5/8"
	21306	.1200	#31 3.048	2"	3/4"
20311		.1250	1/8" 3.175	1-15/16"	11/16"
	21311	.1250	1/8" 3.175	2"	3/4"
20316		.1285	#30 3.264	1-15/16"	11/16"
	21316	.1285	#30 3.264	2-1/4"	3/4"
20321		.1360	#29 3.454	2-1/16"	3/4"
	21321	.1360	#29 3.454	2-1/4"	7/8"
20326		.1378	3.500	52	19
	21326	.1378	3.500	57	22
20331		.1405	#28 3.569	2-1/16"	3/4"
	21331	.1405	#28 3.569	2-1/4"	7/8"
20336		.1406	9/64" 3.571	2-1/16"	3/4"
	21336	.1406	9/64" 3.571	2-1/4"	7/8"
20341		.1440	#27 3.658	2-1/16"	3/4"
	21341	.1440	#27 3.658	2-1/4"	7/8"
20346		.1470	#26 3.734	2-3/16"	13/16"
	21346	.1470	#26 3.734	2-1/4"	7/8"
20351		.1495	#25 3.797	2-3/16"	13/16"
	21351	.1495	#25 3.797	2-1/4"	15/16"
20356		.1520	#24 3.861	2-3/16"	13/16"
	21356	.1520	#24 3.861	2-1/4"	15/16"
20361		.1540	#23 3.912	2-3/16"	13/16"
	21361	.1540	#23 3.912	2-1/4"	15/16"
20366		.1562	5/32" 3.967	2-3/16"	13/16"
	21366	.1562	5/32" 3.967	2-1/2"	15/16"
20371		.1570	#22 3.988	2-3/16"	13/16"
	21371	.1570	#22 3.988	2-1/2"	15/16"
20376		.1575	4.000	56	21
	21376	.1575	4.000	65	24
20381		.1590	#21 4.039	2-3/16"	13/16"
	21381	.1590	#21 4.039	2-1/2"	15/16"
20386		.1610	#20 4.089	2-3/16"	13/16"
	21386	.1610	#20 4.089	2-1/2"	15/16"
20391		.1660	#19 4.216	2-9/32"	15/16"
	21391	.1660	#19 4.216	2-1/2"	1"
20396		.1695	#18 4.305	2-9/32"	15/16"
	21396	.1695	#18 4.305	2-1/2"	1"
20401		.1719	11/64" 4.366	2-9/32"	15/16"
	21401	.1719	11/64" 4.366	2-1/2"	1"

3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
20406		.1730	#17	4.394	2-9/32"	15/16"
	21406	.1730	#17	4.394	2-1/2"	1"
20411		.1770	#16	4.496	2-9/32"	15/16"
	21411	.1770	#16	4.496	2-1/2"	1"
20416		.1772		4.500	58	24
	21416	.1772		4.500	65	25
20421		.1800	#15	4.572	2-9/32"	15/16"
	21421	.1800	#15	4.572	2-3/4"	1"
20426		.1820	#14	4.623	2-9/32"	15/16"
	21426	.1820	#14	4.623	2-3/4"	1"
20431		.1850	#13	4.700	2-9/32"	15/16"
	21431	.1850	#13	4.700	2-3/4"	1-1/4"
20436		.1875	3/16"	4.763	2-13/32"	1"
	21436	.1875	3/16"	4.763	2-3/4"	1-1/4"
20441		.1890	#12	4.801	2-13/32"	1"
	21441	.1890	#12	4.801	2-3/4"	1-1/4"
20446		.1910	#11	4.851	2-13/32"	1"
	21446	.1910	#11	4.851	2-3/4"	1-1/4"
20451		.1935	#10	4.915	2-13/32"	1"
	21451	.1935	#10	4.915	2-3/4"	1-1/4"
20456		.1960	#9	4.978	2-13/32"	1"
	21456	.1960	#9	4.978	3"	1-5/16"
20461		.1969		5.000	61	25
	21461	.1969		5.000	75	33
20466		.1990	#8	5.055	2-13/32"	1"
	21466	.1990	#8	5.055	3"	1-5/16"
20471		.2010	#7	5.105	2-13/32"	1"
	21471	.2010	#7	5.105	3"	1-5/16"
20476		.2031	13/64"	5.159	2-13/32"	1"
	21476	.2031	13/64"	5.159	3"	1-5/16"
20481		.2040	#6	5.182	2-13/32"	1"
	21481	.2040	#6	5.182	3"	1-3/8"
20486		.2055	#5	5.220	2-13/32"	1"
	21486	.2055	#5	5.220	3"	1-3/8"
20491		.2090	#4	5.309	2-13/32"	1"
	21491	.2090	#4	5.309	3"	1-3/8"
20496		.2130	#3	5.410	2-5/8"	1-3/32"
	21496	.2130	#3	5.410	3"	1-3/8"
20501		.2165		5.500	67	28
	21501	.2165		5.500	75	35
20506		.2188	7/32"	5.558	2-5/8"	1-3/32"
	21506	.2188	7/32"	5.558	3"	1-3/8"
20511		.2210	#2	5.613	2-5/8"	1-3/32"
	21511	.2210	#2	5.613	3"	1-3/8"
20516		.2280	#1	5.791	2-5/8"	1-3/32"
	21516	.2280	#1	5.791	3"	1-3/8"
20521		.2340	A	5.944	2-5/8"	1-3/32"
	21521	.2340	A	5.944	3-1/4"	1-1/2"
20526		.2344	15/64"	5.954	2-5/8"	1-3/32"
	21526	.2344	15/64"	5.954	3-1/4"	1-1/2"
20531		.2362		6.000	67	28
	21531	.2362		6.000	80	38
20536		.2380	B	6.045	2-3/4"	1-7/32"
	21536	.2380	B	6.045	3-1/4"	1-5/8"

continued →

Series 1580H, 1280H (continued)

.2420" - .3438"
(6.147mm - 8.733mm)

3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
20541		.2420	C	6.147	2-3/4"	1-7/32"
	21541	.2420	C	6.147	3-1/4"	1-5/8"
20546		.2460	D	6.248	2-3/4"	1-7/32"
	21546	.2460	D	6.248	3-1/4"	1-5/8"
20551		.2500	1/4" / E	6.350	2-3/4"	1-7/32"
	21551	.2500	1/4" / E	6.350	3-1/4"	1-5/8"
20556		.2559		6.500	70	31
	21556	.2559		6.500	80	41
20561		.2570	F	6.528	2-3/4"	1-7/32"
	21561	.2570	F	6.528	3-1/4"	1-11/16"
20566		.2610	G	6.629	2-3/4"	1-7/32"
	21566	.2610	G	6.629	3-1/2"	1-11/16"
20571		.2656	17/64"	6.746	2-15/16"	1-11/32"
	21571	.2656	17/64"	6.746	3-1/2"	1-11/16"
20576		.2660	H	6.756	2-15/16"	1-11/32"
	21576	.2660	H	6.756	3-1/2"	1-11/16"
20581		.2720	I	6.909	2-15/16"	1-11/32"
	21581	.2720	I	6.909	3-1/2"	1-11/16"
20586		.2756		7.000	75	34
	21586	.2756		7.000	88	43
20591		.2770	J	7.036	2-15/16"	1-11/32"
	21591	.2770	J	7.036	3-1/2"	1-11/16"
20596		.2810	K	7.137	2-15/16"	1-11/32"
	21596	.2810	K	7.137	3-1/2"	1-3/4"
20601		.2812	9/32"	7.142	2-15/16"	1-11/32"
	21601	.2812	9/32"	7.142	3-1/2"	1-3/4"
20606		.2900	L	7.366	2-15/16"	1-11/32"
	21606	.2900	L	7.366	3-1/2"	1-3/4"
20611		.2950	M	7.493	2-15/16"	1-11/32"
	21611	.2950	M	7.493	3-3/4"	1-3/4"
20616		.2953		7.500	75	34
	21616	.2953		7.500	95	44
20621		.2969	19/64"	7.541	3-3/32"	1-15/32"
	21621	.2969	19/64"	7.541	3-3/4"	1-7/8"
20626		.3020	N	7.671	3-3/32"	1-15/32"
	21626	.3020	N	7.671	3-3/4"	1-7/8"
20631		.3125	5/16"	7.938	3-3/32"	1-15/32"
	21631	.3125	5/16"	7.938	3-3/4"	1-7/8"
20636		.3150		8.000	79	37
	21636	.3150		8.000	95	48
20641		.3160	O	8.026	3-3/32"	1-15/32"
	21641	.3160	O	8.026	3-3/4"	1-7/8"
20646		.3230	P	8.204	3-3/32"	1-15/32"
	21646	.3230	P	8.204	3-3/4"	2-3/32"
20651		.3281	21/64"	8.334	3-3/32"	1-15/32"
	21651	.3281	21/64"	8.334	4"	2-3/32"
20656		.3320	Q	8.433	3-3/32"	1-15/32"
	21656	.3320	Q	8.433	4"	2-3/32"
20661		.3346		8.500	79	37
	21661	.3346		8.500	100	53
20666		.3390	R	8.611	3-5/16"	1-9/16"
	21666	.3390	R	8.611	4"	2-3/32"
20671		.3438	11/32"	8.733	3-5/16"	1-9/16"
	21671	.3438	11/32"	8.733	4"	2-3/16"

TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l_1	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)
l_2	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)

Series 1580H, 1280H (continued)

.3480" - .4531"
(8.839mm - 11.509mm)HIGH PERFORMANCE
DRILLS

AlTiN-based Coating

AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层

3xD (1580H) EDP#	5xD (1280H) EDP#	d + Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
20676		.3480	S	8.839	3-5/16"	1-9/16"
	21676	.3480	S	8.839	4"	2-3/16"
20681		.3543		9.000	84	40
	21681	.3543		9.000	100	56
20686		.3580	T	9.093	3-5/16"	1-9/16"
	21686	.3580	T	9.093	4-1/4"	2-9/32"
20691		.3594	23/64"	9.129	3-5/16"	1-9/16"
	21691	.3594	23/64"	9.129	4-1/4"	2-9/32"
20696		.3680	U	9.347	3-5/16"	1-9/16"
	21696	.3680	U	9.347	4-1/4"	2-9/32"
20701		.3740		9.500	84	40
	21701	.3740		9.500	105	58
20706		.3750	3/8"	9.525	3-1/2"	1-11/16"
	21706	.3750	3/8"	9.525	4-1/4"	2-3/8"
20711		.3770	V	9.576	3-1/2"	1-11/16"
	21711	.3770	V	9.576	4-1/4"	2-3/8"
20716		.3860	W	9.804	3-1/2"	1-11/16"
	21716	.3860	W	9.804	4-1/2"	2-3/8"
20721		.3906	25/64"	9.921	3-1/2"	1-11/16"
	21721	.3906	25/64"	9.921	4-1/2"	2-3/8"
20726		.3937		10.000	89	43
	21726	.3937		10.000	115	60
20731		.3970	X	10.084	3-1/2"	1-11/16"
	21731	.3970	X	10.084	4-1/2"	2-1/2"
20736		.4040	Y	10.262	3-1/2"	1-11/16"
	21736	.4040	Y	10.262	4-1/2"	2-9/16"
20741		.4062	13/32"	10.317	3-1/2"	1-11/16"
	21741	.4062	13/32"	10.317	4-1/2"	2-9/16"
20746		.4130	Z	10.490	3-1/2"	1-11/16"
	21746	.4130	Z	10.490	4-1/2"	2-5/8"
20751		.4134		10.500	89	43
	21751	.4134		10.500	115	67
20756		.4219	27/64"	10.716	3-3/4"	1-13/16"
	21756	.4219	27/64"	10.716	4-1/2"	2-11/16"
20761		.4331		11.000	95	46
	21761	.4331		11.000	115	68
20766		.4375	7/16"	11.113	3-3/4"	1-13/16"
	21766	.4375	7/16"	11.113	4-3/4"	2-13/16"
20771		.4528		11.500	95	46
	21771	.4528		11.500	120	71
20776		.4531	29/64"	11.509	3-3/4"	1-13/16"
	21776	.4531	29/64"	11.509	4-3/4"	2-7/8"

continued →

Series 1580H, 1280H (continued)

.4688" - .6299"
(11.908mm - 16.000mm)

3xD (1580H) EDP#	5xD (1280H) EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
20781		.4688	15/32"	11.908	4"	1-15/16"
	21781	.4688	15/32"	11.908	4-3/4"	2-7/8"
20786		.4724		12.000	102	49
	21786	.4724		12.000	120	73
20791		.4844	31/64"	12.304	4"	1-15/16"
	21791	.4844	31/64"	12.304	5-5/16"	3"
20796		.4921		12.500	102	49
	21796	.4921		12.500	135	76
20801		.5000	1/2"	12.700	4"	1-15/16"
	21801	.5000	1/2"	12.700	5-3/8"	3-1/16"
20806		.5118		13.000	107	53
	21806	.5118		13.000	135	78
20811		.5156	33/64"	13.096	4-7/32"	2-3/32"
	21811	.5156	33/64"	13.096	5-3/8"	3-1/8"
20816		.5312	17/32"	13.492	4-7/32"	2-3/32"
	21816	.5312	17/32"	13.492	5-11/16"	3-5/16"
20821		.5315		13.500	110	56
	21821	.5315		13.500	145	84
20826		.5469	35/64"	13.891	4-5/16"	2-7/32"
	21826	.5469	35/64"	13.891	5-13/16"	3-3/8"
20831		.5512		14.000	110	56
	21831	.5512		14.000	145	86
20836		.5625	9/16"	14.288	4-9/16"	2-15/32"
	21836	.5625	9/16"	14.288	5-15/16"	3-1/2"
20841		.5709		14.500	116	63
	21841	.5709		14.500	150	89
20846		.5781	37/64"	14.684	4-15/16"	2-9/16"
	21846	.5781	37/64"	14.684	6"	3-1/2"
20851		.5906		15.000	125	65
	21851	.5906		15.000	150	90
20856		.5938	19/32"	15.083	4-15/16"	2-9/16"
	21856	.5938	19/32"	15.083	6"	3-9/16"
20861		.6094	39/64"	15.479	5-1/16"	2-13/16"
	21861	.6094	39/64"	15.479	6-3/16"	3-11/16"
20866		.6102		15.500	129	71
	21866	.6102		15.500	160	94
20871		.6250	5/8"	15.875	5-1/4"	3-1/8"
	21871	.6250	5/8"	15.875	6-5/16"	3-3/4"
20876		.6299		16.000	133	79
	21876	.6299		16.000	160	95

TOLERANCES

$d1^*$	3mm - 6mm	+0.016mm +0.004mm (+0.00063" +0.00015")
	> 6mm - 10mm	+0.021mm +0.006mm (+0.00082" +0.00023")
	> 10mm - 18mm	+0.025mm +0.007mm (+0.00098" +0.00027")
	> 18mm - 20mm	+0.029mm +0.008mm (+0.00114" +0.00031")
$d2$	h6	
$l1$	+3.175mm -3.175mm (+.125" -.125")	
$l2$	+3.175mm -3.175mm (+.125" -.125")	
$l4$	+1.980mm -.000mm (+.078" -.000")	



NEW ITEMS

Series 1580KD, 1280KD, 1880KD

.1181" - .1470"
(3.000mm - 3.734mm)

HIGH PERFORMANCE DRILLS

AlTiN-based Coating

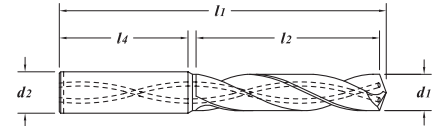
AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



High performance solid submicron grain carbide drill with reinforced shank
Coolant through for high pressure coolant systems
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40Rc
Live tooling recommended on lathe processes

* Note - These drills are made to a plus/plus tolerance on the drill diameter.
If you are in need of a minus tolerance drill, please refer to our other high performance drills.



Hochleistungs Bohrer aus Feinkornhartmetall mit verstärktem Schaft
Mit Innenkühlung für Systeme mit hohem Kühlmitteldruck
Bis zu 70% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehönte Schneidkante
Kann als Pilotbohrer verwendet werden
Empfohlen für Hoch Nickelhaltige und Hochwärmefeste Stähle,
Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl > 40HRC
Empfehlung fuer den Einsatz auf der Drehmaschine



Taladro de alto rendimiento de metal submicrónico duro con vástago
Refrigeración interior para sistemas de refrigeración de alta presión
Hasta un 70% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Puede ser utilizada como broca piloto
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40Rc
Recomendación para la aplicación en torno



Haute prestation avec drille à grain solide submicron carbure avec tige renforcé
Lubrification central pour système de lubrification haute pression
70% plus rapide que les forets carbure standards
Helice a 30° pour une meilleure évacuation de copeaux
Preparation de l'arete de coupe
Peut être utilisé comme foret pilote
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage



Punte in sub-micro grana con gambo rinforzato per alte prestazioni
Lubrificazione interna per sistemi ad alta pressione
Fino al 70% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Può essere usata come punta pilota
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40Hrc
Utensili rotanti sono consigliate se usato su un tornio



带加强柄的超细高效整体硬质合金钻头
内冷孔用于高压内冷系统
跟普通的硬质合金钻头相比可提高速度高达70%
30°螺旋角更便于排屑
切削刃口经过珩磨
可做定心钻使用
高镍耐高温合金、钴基合金、不锈钢和工具钢 > 40HRC
不建议在车床，或工具必须纺纱

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	$d1$ Diameter	$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l4$ Shank Length
				Decimal	Metric			
	27995			.1181	3.000	6.0	62	36
		25065		.1181	3.000	6.0	66	36
NEW			26942	.1181	3.000	6.0	70	36
	28005			.1220	3.100	6.0	62	36
		25075		.1220	3.100	6.0	66	36
	28015			.1248	3.170	6.0	62	36
		25085		.1248	3.170	6.0	66	36
NEW			26946	.1248	3.170	6.0	70	36
NEW	28018			.1250 (1/8")	3.175	6.0	62	36
NEW		25088		.1250 (1/8")	3.175	6.0	66	36
NEW			26948	.1250 (1/8")	3.175	6.0	70	36
	28025			.1260	3.200	6.0	62	36
		25095		.1260	3.200	6.0	66	36
NEW			26950	.1260	3.200	6.0	70	36
	28035			.1280	3.250	6.0	62	36
		25105		.1280	3.250	6.0	66	36
NEW			26952	.1280	3.250	6.0	70	36
NEW	28038			.1285 (#30)	3.264	6.0	62	36
NEW		25108		.1285 (#30)	3.264	6.0	66	36
NEW			26954	.1285 (#30)	3.264	6.0	70	36
	28045			.1299	3.300	6.0	62	36
		25115		.1299	3.300	6.0	66	36
NEW			26956	.1299	3.300	6.0	70	36
	28055			.1339	3.400	6.0	62	36
		25125		.1339	3.400	6.0	66	36
NEW	28058			.1360 (#29)	3.454	6.0	62	36
NEW		25128		.1360 (#29)	3.454	6.0	66	36
NEW			26960	.1360 (#29)	3.454	6.0	70	36
	28065			.1378	3.500	6.0	62	36
		25135		.1378	3.500	6.0	66	36
NEW			26962	.1378	3.500	6.0	75	37
	28075			.1417	3.600	6.0	62	36
		25145		.1417	3.600	6.0	66	36
	28085			.1457	3.700	6.0	62	36
		25155		.1457	3.700	6.0	66	36
NEW	28088			.1470 (#26)	3.734	6.0	62	36
NEW		25158		.1470 (#26)	3.734	6.0	66	36
NEW			26968	.1470 (#26)	3.734	6.0	75	37

continued →

Series 1580KD, 1280KD, 1880KD (continued)

.1476" - .1820"
(3.750mm - 4.622mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
	28095			.1476	3.750	6.0	62	20	36
		25165		.1476	3.750	6.0	66	28	36
NEW			26972	.1476	3.750	6.0	75	37	36
NEW	28098			.1495 (#25)	3.797	6.0	62	20	36
NEW		25172		.1495 (#25)	3.797	6.0	66	28	36
NEW			26978	.1495 (#25)	3.797	6.0	75	37	36
	28105			.1496	3.800	6.0	66	24	36
		25175		.1496	3.800	6.0	74	36	36
	28115			.1535	3.900	6.0	66	24	36
		25185		.1535	3.900	6.0	74	36	36
NEW			26982	.1535	3.900	6.0	75	37	36
NEW	28118			.1562 (5/32")	3.967	6.0	66	24	36
NEW		25192		.1562 (5/32")	3.967	6.0	74	36	36
NEW			26984	.1562 (5/32")	3.967	6.0	75	37	36
	28125			.1563	3.970	6.0	66	24	36
		25195		.1563	3.970	6.0	74	36	36
	28135			.1575	4.000	6.0	66	24	36
		25205		.1575	4.000	6.0	74	36	36
NEW			26986	.1575	4.000	6.0	75	37	36
NEW	28138			.1590 (#21)	4.038	6.0	66	24	36
NEW		25208		.1590 (#21)	4.038	6.0	74	36	36
NEW			26988	.1590 (#21)	4.038	6.0	75	37	36
NEW	28140			.1610 (#20)	4.089	6.0	66	24	36
NEW		25212		.1610 (#20)	4.089	6.0	74	36	36
NEW			26990	.1610 (#20)	4.089	6.0	75	37	36
	28145			.1614	4.100	6.0	66	24	36
		25215		.1614	4.100	6.0	74	36	36
NEW			26992	.1614	4.100	6.0	75	37	36
	28155			.1654	4.200	6.0	66	24	36
		25225		.1654	4.200	6.0	74	36	36
NEW			26994	.1654	4.200	6.0	75	37	36
NEW	28158			.1660 (#19)	4.216	6.0	66	24	36
NEW		25228		.1660 (#19)	4.216	6.0	74	36	36
NEW			26996	.1660 (#19)	4.216	6.0	85	45	36
	28165			.1673	4.250	6.0	66	24	36
		25235		.1673	4.250	6.0	74	36	36
NEW			26998	.1673	4.250	6.0	85	45	36
	28175			.1693	4.300	6.0	66	24	36
		25245		.1693	4.300	6.0	74	36	36
NEW	28178			.1719 (11/64")	4.366	6.0	66	24	36
NEW		25248		.1719 (11/64")	4.366	6.0	74	36	36
NEW			27002	.1719 (11/64")	4.366	6.0	85	45	36
	28185			.1732	4.400	6.0	66	24	36
		25255		.1732	4.400	6.0	74	36	36
NEW			27004	.1732	4.400	6.0	85	45	36
NEW	28188			.1770 (#16)	4.496	6.0	66	24	36
NEW		25262		.1770 (#16)	4.496	6.0	74	36	36
NEW			27006	.1770 (#16)	4.496	6.0	85	45	36
	28195			.1772	4.500	6.0	66	24	36
		25265		.1772	4.500	6.0	74	36	36
NEW			27008	.1772	4.500	6.0	85	45	36
	28205			.1811	4.600	6.0	66	24	36
		25275		.1811	4.600	6.0	74	36	36
NEW			27011	.1811	4.600	6.0	85	45	36
NEW	28208			.1820 (#14)	4.622	6.0	66	24	36
NEW		25280		.1820 (#14)	4.622	6.0	74	36	36
NEW			27012	.1820 (#14)	4.622	6.0	90	50	36

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	$d1$ Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l4$ Shank Length
				Decimal	Metric				
		25285		.1831	4.650	6.0	74	36	36
NEW			27014	.1831	4.650	6.0	90	50	36
	28225			.1850	4.700	6.0	66	24	36
		25295		.1850	4.700	6.0	74	36	36
	28235			.1870	4.750	6.0	66	24	36
		25305		.1870	4.750	6.0	74	36	36
NEW			27016	.1870	4.750	6.0	90	50	36
NEW	28238			.1875 (3/16")	4.762	6.0	66	28	36
NEW		25310		.1875 (3/16")	4.762	6.0	74	36	36
NEW			27018	.1875 (3/16")	4.762	6.0	90	50	36
	28245			.1890 (#12)	4.800	6.0	66	28	36
		25315		.1890 (#12)	4.800	6.0	82	44	36
NEW			27021	.1890 (#12)	4.800	6.0	90	50	36
	28255			.1929	4.900	6.0	66	28	36
		25325		.1929	4.900	6.0	82	44	36
NEW			27022	.1929	4.900	6.0	90	50	36
NEW	28258			.1960 (#9)	4.978	6.0	66	28	36
NEW		25330		.1960 (#9)	4.978	6.0	82	44	36
NEW			27024	.1960 (#9)	4.978	6.0	90	50	36
	28265			.1969	5.000	6.0	66	28	36
		25335		.1969	5.000	6.0	82	44	36
NEW			27026	.1969	5.000	6.0	90	50	36
	28275			.2008	5.100	6.0	66	28	36
		25345		.2008	5.100	6.0	82	44	36
NEW	28278			.2010 (#7)	5.105	6.0	66	28	36
NEW		25348		.2010 (#7)	5.105	6.0	82	44	36
NEW			27031	.2010 (#7)	5.105	6.0	97	57	36
	28285			.2027	5.150	6.0	66	28	36
		25355		.2027	5.150	6.0	82	44	36
	28295			.2047	5.200	6.0	66	28	36
		25365		.2047	5.200	6.0	82	44	36
	28305			.2087	5.300	6.0	66	28	36
		25375		.2087	5.300	6.0	82	44	36
NEW	28308			.2130 (#3)	5.410	6.0	66	28	36
NEW		25380		.2130 (#3)	5.410	6.0	82	44	36
NEW			27036	.2130 (#3)	5.410	6.0	97	57	36
	28315			.2165	5.500	6.0	66	28	36
		25385		.2165	5.500	6.0	82	44	36
NEW			27038	.2165	5.500	6.0	97	57	36
	28325			.2185	5.550	6.0	66	28	36
		25395		.2185	5.550	6.0	82	44	36
NEW	28328			.2188 (7/32")	5.557	6.0	66	28	36
NEW		25398		.2188 (7/32")	5.557	6.0	82	44	36
NEW			27041	.2188 (7/32")	5.557	6.0	97	57	36
	28335			.2205	5.600	6.0	66	28	36
		25397		.2205	5.600	6.0	82	44	36
NEW			27042	.2205	5.600	6.0	97	57	36
	28345			.2244	5.700	6.0	66	28	36
		25400		.2244	5.700	6.0	82	44	36
NEW			27044	.2244	5.700	6.0	97	57	36
NEW	28348			.2280 (#1)	5.791	6.0	66	28	36
NEW		25403		.2280 (#1)	5.791	6.0	82	44	36
NEW			27046	.2280 (#1)	5.791	6.0	97	57	36
	28355			.2283	5.800	6.0	66	28	36
		25405		.2283	5.800	6.0	82	44	36
			27048	.2283	5.800	6.0	97	57	36

continued →

Series 1580KD, 1280KD, 1880KD (continued)

.2323" - .2812"
(5.900mm - 7.142mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
	28365			.2323	5.900	6.0	66	28	36
		25415		.2323	5.900	6.0	82	44	36
NEW			27051	.2323	5.900	6.0	97	57	36
	28375			.2342	5.950	6.0	66	28	36
		25425		.2342	5.950	6.0	82	44	36
NEW			27052	.2342	5.950	6.0	97	57	36
	28385			.2362	6.000	6.0	66	28	36
		25435		.2362	6.000	6.0	82	44	36
NEW			27054	.2362	6.000	6.0	97	57	36
	28395			.2402	6.100	8.0	79	34	36
		25437		.2402	6.100	8.0	91	53	36
	28405			.2441	6.200	8.0	79	34	36
		25440		.2441	6.200	8.0	91	53	36
	28415			.2480	6.300	8.0	79	34	36
		25443		.2480	6.300	8.0	91	53	36
	28425			.2500 (1/4")	6.350	8.0	79	34	36
		25445		.2500 (1/4")	6.350	8.0	91	53	36
NEW			27056	.2500 (1/4")	6.350	8.0	106	66	36
	28435			.2520	6.400	8.0	79	34	36
		25450		.2520	6.400	8.0	91	53	36
NEW			27058	.2520	6.400	8.0	106	66	36
	28445			.2559	6.500	8.0	79	34	36
		25455		.2559	6.500	8.0	91	53	36
NEW			27061	.2559	6.500	8.0	106	66	36
	28446			.2571	6.530	8.0	79	34	36
		25457		.2571	6.530	8.0	91	53	36
NEW			27062	.2571	6.530	8.0	106	66	36
	28455			.2598	6.600	8.0	79	34	36
		25460		.2598	6.600	8.0	91	53	36
NEW			27064	.2598	6.600	8.0	106	66	36
		25463		.2638	6.700	8.0	91	53	36
NEW			27066	.2638	6.700	8.0	106	66	36
NEW	28463			.2656 (17/64")	6.746	8.0	79	34	36
NEW		25464		.2656 (17/64")	6.746	8.0	91	53	36
NEW			27068	.2656 (17/64")	6.746	8.0	106	66	36
	28465			.2657	6.750	8.0	79	34	36
		25465		.2657	6.750	8.0	91	53	36
	28475			.2677	6.800	8.0	79	34	36
		25475		.2677	6.800	8.0	91	53	36
NEW			27071	.2677	6.800	8.0	106	66	36
	28485			.2717	6.900	8.0	79	34	36
		25485		.2717	6.900	8.0	91	53	36
NEW			27072	.2717	6.900	8.0	116	76	36
	28495			.2756	7.000	8.0	79	34	36
		25495		.2756	7.000	8.0	91	53	36
NEW			27074	.2756	7.000	8.0	116	76	36
NEW	28498			.2770 (J)	7.035	8.0	79	41	36
NEW		25498		.2770 (J)	7.035	8.0	91	53	36
NEW			27076	.2770 (J)	7.035	8.0	116	76	36
	28505			.2795	7.100	8.0	79	41	36
		25505		.2795	7.100	8.0	91	53	36
NEW	28508			.2812 (9/32")	7.142	8.0	79	41	36
NEW		25512		.2812 (9/32")	7.142	8.0	91	53	36
NEW			27079	.2812 (9/32")	7.142	8.0	116	76	36

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
	28515			.2815	7.150	8.0	79	41	36
		25515		.2815	7.150	8.0	91	53	36
NEW			27082	.2815	7.150	8.0	116	76	36
	28525			.2835	7.200	8.0	79	41	36
		25525		.2835	7.200	8.0	91	53	36
	28535			.2874	7.300	8.0	79	41	36
		25530		.2874	7.300	8.0	91	53	36
	28545			.2913	7.400	8.0	79	41	36
		25535		.2913	7.400	8.0	91	53	36
	28555			.2953	7.500	8.0	79	41	36
		25545		.2953	7.500	8.0	91	53	36
NEW			27086	.2953	7.500	8.0	116	76	36
	28565			.2972	7.550	8.0	79	41	36
		25555		.2972	7.550	8.0	91	53	36
NEW			27088	.2972	7.550	8.0	116	76	36
	28575			.2992	7.600	8.0	79	41	36
		25565		.2992	7.600	8.0	91	53	36
NEW	28578			.3020 (N)	7.670	8.0	79	41	36
NEW		25570		.3020 (N)	7.670	8.0	91	53	36
NEW			27092	.3020 (N)	7.670	8.0	116	76	36
	28585			.3031	7.700	8.0	79	41	36
		25575		.3031	7.700	8.0	91	53	36
	28595			.3071	7.800	8.0	79	41	36
		25585		.3071	7.800	8.0	91	53	36
NEW			27096	.3071	7.800	8.0	116	76	36
NEW	28602			.3125 (5/16")	7.937	8.0	79	41	36
NEW		25593		.3125 (5/16")	7.937	8.0	91	53	36
NEW			27101	.3125 (5/16")	7.937	8.0	116	76	36
	28605			.3130	7.950	8.0	79	41	36
		25595		.3130	7.950	8.0	91	53	36
NEW			27102	.3130	7.950	8.0	116	76	36
	28615			.3150	8.000	8.0	79	41	36
		25605		.3150	8.000	8.0	91	53	36
NEW			27104	.3150	8.000	8.0	116	76	36
	28625			.3189	8.100	10.0	89	47	40
		25610		.3189	8.100	10.0	103	61	40
	28635			.3228	8.200	10.0	89	47	40
		25615		.3228	8.200	10.0	103	61	40
NEW	28638			.3230 (P)	8.204	10.0	89	47	40
NEW		25618		.3230 (P)	8.204	10.0	103	61	40
NEW			27108	.3230 (P)	8.204	10.0	131	87	40
	28645			.3268	8.300	10.0	89	47	40
		25625		.3268	8.300	10.0	103	61	40
NEW	28648			.3281 (21/64")	8.333	10.0	89	47	40
NEW		25628		.3281 (21/64")	8.333	10.0	103	61	40
NEW			27112	.3281 (21/64")	8.333	10.0	131	87	40
	28655			.3287	8.350	10.0	89	47	40
		25635		.3287	8.350	10.0	103	61	40
NEW			27114	.3287	8.350	10.0	131	87	40
	28665			.3307	8.400	10.0	89	47	40
		25640		.3307	8.400	10.0	103	61	40
	28675			.3346	8.500	10.0	89	47	40
		25645		.3346	8.500	10.0	103	61	40
NEW			27118	.3346	8.500	10.0	131	87	40
	28685			.3386	8.600	10.0	89	47	40
		25655		.3386	8.600	10.0	103	61	40
NEW			27121	.3386	8.600	10.0	131	87	40

continued →

Series 1580KD, 1280KD, 1880KD (continued)

.3390" - .3906"
(8.610mm - 9.920mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
NEW	28688			.3390	(R)	8.610	10.0	89	47
NEW		25658		.3390	(R)	8.610	10.0	103	61
NEW			27122	.3390	(R)	8.610	10.0	131	87
	28695			.3425		8.700	10.0	89	47
		25665		.3425		8.700	10.0	103	61
NEW			27124	.3425		8.700	10.0	131	87
NEW	28698			.3438	(11/32")	8.732	10.0	89	47
NEW		25670		.3438	(11/32")	8.732	10.0	103	61
NEW			27126	.3438	(11/32")	8.732	10.0	131	87
	28725			.3445		8.750	10.0	89	47
		25675		.3445		8.750	10.0	103	61
NEW			27128	.3445		8.750	10.0	131	87
	28735			.3465		8.800	10.0	89	47
		25685		.3465		8.800	10.0	103	61
NEW			27130	.3465		8.800	10.0	131	87
	28745			.3504		8.900	10.0	89	47
		25695		.3504		8.900	10.0	103	61
	28755			.3543		9.000	10.0	89	47
		25705		.3543		9.000	10.0	103	61
NEW			27134	.3543		9.000	10.0	131	87
	28765			.3583		9.100	10.0	89	47
		25715		.3583		9.100	10.0	103	61
NEW	28768			.3594	(23/64")	9.128	10.0	89	47
NEW		25720		.3594	(23/64")	9.128	10.0	103	61
NEW			27138	.3594	(23/64")	9.128	10.0	139	95
		25725		.3602		9.150	10.0	103	61
NEW			27140	.3602		9.150	10.0	139	95
	28815			.3622		9.200	10.0	89	47
		25735		.3622		9.200	10.0	103	61
	28825			.3661		9.300	10.0	89	47
		25745		.3661		9.300	10.0	103	61
	28845			.3701		9.400	10.0	89	47
		25750		.3701		9.400	10.0	103	61
	28855			.3740		9.500	10.0	89	47
		25755		.3740		9.500	10.0	103	61
NEW			27146	.3740		9.500	10.0	139	95
NEW	28858			.3750	(3/8")	9.525	10.0	89	47
NEW		25760		.3750	(3/8")	9.525	10.0	103	61
NEW			27148	.3750	(3/8")	9.525	10.0	139	95
	28875			.3760		9.550	10.0	89	47
		25765		.3760		9.550	10.0	103	61
NEW			27150	.3760		9.550	10.0	139	95
	28878			.3780		9.600	10.0	89	47
		25767		.3780		9.600	10.0	103	61
NEW			27152	.3780		9.600	10.0	139	95
	28882			.3819		9.700	10.0	89	47
		25770		.3819		9.700	10.0	103	61
	28885			.3858		9.800	10.0	89	47
		25775		.3858		9.800	10.0	103	61
	28895			.3898		9.900	10.0	89	47
		25785		.3898		9.900	10.0	103	61
NEW			27160	.3898		9.900	10.0	139	95
NEW	28898			.3906	(25/64")	9.920	10.0	89	47
NEW		25787		.3906	(25/64")	9.920	10.0	103	61
NEW			27162	.3906	(25/64")	9.920	10.0	139	95

Series 1580KD, 1280KD, 1880KD (continued)

.3937" - .4688"
(10.000mm - 11.907mm)

HIGH PERFORMANCE
DRILLS

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
	28905			.3937	10.000	10.0	89	47	40
		25795		.3937	10.000	10.0	103	61	40
NEW			27164	.3937	10.000	10.0	139	95	40
	28925			.3976	10.100	12.0	102	55	45
		25800		.3976	10.100	12.0	118	71	45
	28935			.4016	10.200	12.0	102	55	45
		25805		.4016	10.200	12.0	118	71	45
	28945			.4055	10.300	12.0	102	55	45
		25815		.4055	10.300	12.0	118	71	45
NEW			27170	.4055	10.300	12.0	155	106	45
NEW	28948			.4062 (13/32")	10.317	12.0	102	55	45
NEW		25817		.4062 (13/32")	10.317	12.0	118	71	45
NEW			27172	.4062 (13/32")	10.317	12.0	155	106	45
NEW	28953			.4130 (Z)	10.490	12.0	102	55	45
NEW		25823		.4130 (Z)	10.490	12.0	118	71	45
NEW			27178	.4130 (Z)	10.490	12.0	155	106	45
	28955			.4134	10.500	12.0	102	55	45
		25825		.4134	10.500	12.0	118	71	45
NEW			27180	.4134	10.500	12.0	155	106	45
	28965			.4173	10.600	12.0	102	55	45
		25830		.4173	10.600	12.0	118	71	45
NEW			27182	.4173	10.600	12.0	155	106	45
	28975			.4213	10.700	12.0	102	55	45
		25835		.4213	10.700	12.0	118	71	45
NEW			27184	.4213	10.700	12.0	155	106	45
NEW	28978			.4219 (27/64")	10.716	12.0	102	55	45
NEW		25838		.4219 (27/64")	10.716	12.0	118	71	45
NEW			27186	.4219 (27/64")	10.716	12.0	155	106	45
	28985			.4252	10.800	12.0	102	55	45
		25845		.4252	10.800	12.0	118	71	45
	28995			.4331	11.000	12.0	102	55	45
		25855		.4331	11.000	12.0	118	71	45
NEW			27190	.4331	11.000	12.0	163	114	45
	29005			.4370	11.100	12.0	102	55	45
		25865		.4370	11.100	12.0	118	71	45
NEW	29008			.4375 (7/16")	11.112	12.0	102	55	45
NEW		25868		.4375 (7/16")	11.112	12.0	118	71	45
NEW			27194	.4375 (7/16")	11.112	12.0	163	114	45
	29015			.4409	11.200	12.0	102	55	45
		25875		.4409	11.200	12.0	118	71	45
	29025			.4488	11.400	12.0	102	55	45
		25880		.4488	11.400	12.0	118	71	45
	29035			.4528	11.500	12.0	102	55	45
		25885		.4528	11.500	12.0	118	71	45
NEW	29038			.4531 (29/64")	11.508	12.0	102	55	45
NEW		25888		.4531 (29/64")	11.508	12.0	118	71	45
NEW			27200	.4531 (29/64")	11.508	12.0	163	114	45
	29045			.4606	11.700	12.0	102	55	45
		25895		.4606	11.700	12.0	118	71	45
	29055			.4685	11.900	12.0	102	55	45
NEW	29058			.4688 (15/32")	11.907	12.0	102	55	45
NEW		25910		.4688 (15/32")	11.907	12.0	118	71	45
NEW			27208	.4688 (15/32")	11.907	12.0	163	114	45

continued →

Series 1580KD, 1280KD, 1880KD (continued)

.4724" - .5610"
(12.000mm - 14.250mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
	29065			.4724	12.000	12.0	102	55	45
		25915		.4724	12.000	12.0	118	71	45
NEW			27210	.4724	12.000	12.0	163	114	45
	29075			.4764	12.100	14.0	107	60	45
		25925		.4764	12.100	14.0	124	77	45
	29085			.4803	12.200	14.0	107	60	45
		25930		.4803	12.200	14.0	124	77	45
	29095			.4842	12.300	14.0	107	60	45
		25935		.4842	12.300	14.0	124	77	45
NEW	29098			.4844 (31/64")	12.303	14.0	107	60	45
NEW		25937		.4844 (31/64")	12.303	14.0	124	77	45
NEW			27214	.4844 (31/64")	12.303	14.0	182	133	45
	29115			.4921	12.500	14.0	107	60	45
		25945		.4921	12.500	14.0	124	77	45
NEW			27218	.4921	12.500	14.0	182	133	45
	29125			.4961	12.600	14.0	107	60	45
		25950		.4961	12.600	14.0	124	77	45
	29135			.5000 (1/2")	12.700	14.0	107	60	45
		25955		.5000 (1/2")	12.700	14.0	124	77	45
NEW			27220	.5000 (1/2")	12.700	14.0	182	133	45
	29145			.5039	12.800	14.0	107	60	45
		25960		.5039	12.800	14.0	124	77	45
	29148			.5051	12.830	14.0	107	60	45
		25961		.5051	12.830	14.0	124	77	45
NEW			27224	.5051	12.830	14.0	182	133	45
	29155			.5079	12.900	14.0	107	60	45
NEW			27226	.5079	12.900	14.0	182	133	45
	29161			.5098	12.950	14.0	107	60	45
NEW			27228	.5098	12.950	14.0	182	133	45
	29165			.5118	13.000	14.0	107	60	45
		25965		.5118	13.000	14.0	124	77	45
NEW			27230	.5118	13.000	14.0	182	133	45
	29175			.5157	13.100	14.0	107	60	45
		25975		.5157	13.100	14.0	124	77	45
	29181			.5236	13.300	14.0	107	60	45
NEW	29184			.5312 (17/32")	13.492	14.0	107	60	45
NEW		25983		.5312 (17/32")	13.492	14.0	124	77	45
NEW			27238	.5312 (17/32")	13.492	14.0	182	133	45
	29185			.5315	13.500	14.0	107	60	45
		25985		.5315	13.500	14.0	124	77	45
NEW			27240	.5315	13.500	14.0	182	133	45
	29195			.5394	13.700	14.0	107	60	45
		25995		.5394	13.700	14.0	124	77	45
	29205			.5433	13.800	14.0	107	60	45
		26005		.5433	13.800	14.0	124	77	45
	29215			.5512	14.000	14.0	107	60	45
		26015		.5512	14.000	14.0	124	77	45
NEW			27250	.5512	14.000	14.0	182	133	45
	29225			.5551	14.100	16.0	115	65	48
		26025		.5551	14.100	16.0	133	83	48
	29235			.5591	14.200	16.0	115	65	48
		26027		.5591	14.200	16.0	133	83	48
	29245			.5610	14.250	16.0	115	65	48

Series 1580KD, 1280KD, 1880KD (continued)

.5625" - .7283"
(14.287mm - 18.500mm)

HIGH PERFORMANCE
DRILLS

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length
				Decimal	Metric				
NEW	29250			.5625 (9/16")	14.287	16.0	115	65	48
NEW		26042		.5625 (9/16")	14.287	16.0	133	83	48
NEW			27254	.5625 (9/16")	14.287	16.0	204	152	48
	29255			.5630	14.300	16.0	115	65	48
		26045		.5630	14.300	16.0	133	83	48
	29265			.5709	14.500	16.0	115	65	48
		26055		.5709	14.500	16.0	133	83	48
NEW			27258	.5709	14.500	16.0	204	152	48
	29275			.5787	14.700	16.0	115	65	48
		26065		.5787	14.700	16.0	133	83	48
	29285			.5827	14.800	16.0	115	65	48
		26067		.5827	14.800	16.0	133	83	48
	29305			.5906	15.000	16.0	115	65	48
		26075		.5906	15.000	16.0	133	83	48
NEW			27264	.5906	15.000	16.0	204	152	48
NEW	29308			.5938 (19/32")	15.082	16.0	115	65	48
NEW		26083		.5938 (19/32")	15.082	16.0	133	83	48
NEW			27266	.5938 (19/32")	15.082	16.0	204	152	48
	29315			.5945	15.100	16.0	115	65	48
		26085		.5945	15.100	16.0	133	83	48
NEW			27268	.5945	15.100	16.0	204	152	48
	29325			.6102	15.500	16.0	115	65	48
		26095		.6102	15.500	16.0	133	83	48
		26105		.6181	15.700	16.0	133	83	48
	29345			.6220	15.800	16.0	115	65	48
		26107		.6220	15.800	16.0	133	83	48
NEW			27276	.6220	15.800	16.0	204	152	48
NEW	29348			.6250 (5/8")	15.875	16.0	115	65	48
NEW		26108		.6250 (5/8")	15.875	16.0	133	83	48
NEW			27278	.6250 (5/8")	15.875	16.0	204	152	48
		26115		.6299	16.000	16.0	133	83	48
NEW			27282	.6299	16.000	16.0	204	152	48
	29363			.6331	16.080	18.0	123	73	48
		26118		.6331	16.080	18.0	143	93	48
	29365			.6339	16.100	18.0	123	73	48
		26119		.6339	16.100	18.0	143	93	48
		26123		.6378	16.200	18.0	143	93	48
	29375			.6398	16.250	18.0	123	73	48
		26125		.6398	16.250	18.0	143	93	48
	29385			.6496	16.500	18.0	123	73	48
		26135		.6496	16.500	18.0	143	93	48
	29395			.6555	16.650	18.0	123	73	48
		26145		.6555	16.650	18.0	143	93	48
	29405			.6693	17.000	18.0	123	73	48
		26155		.6693	17.000	18.0	143	93	48
	29415			.6713	17.050	18.0	123	73	48
		26165		.6713	17.050	18.0	143	93	48
	29425			.6870	17.450	18.0	123	73	48
		26175		.6870	17.450	18.0	143	93	48
	29435			.6890	17.500	18.0	123	73	48
		26185		.6890	17.500	18.0	143	93	48
	29445			.7027	17.850	18.0	123	73	48
		26195		.7027	17.850	18.0	143	93	48
	29455			.7087	18.000	18.0	123	73	48
		26205		.7087	18.000	18.0	143	93	48
		26215		.7185	18.250	20.0	153	101	50
		26225		.7283	18.500	20.0	153	101	50

continued →

Series 1580KD, 1280KD, 1880KD (continued)

.7342" - .7874"
(18.650mm - 20.000mm)

3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	d_1 Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length
			Decimal	Metric				
	26235		.7342	18.650	20.0	153	101	50
	26245		.7480	19.000	20.0	153	101	50
29505			.7500 (3/4")	19.050	20.0	131	79	50
	26255		.7500 (3/4")	19.050	20.0	153	101	50
29545			.7579	19.250	20.0	131	79	50
29546			.7590	19.280	20.0	131	79	50
	26260		.7590	19.280	20.0	153	101	50
29551			.7598	19.300	20.0	131	79	50
	26261		.7598	19.300	20.0	153	101	50
29565			.7677	19.500	20.0	131	79	50
	26281		.7795	19.800	20.0	153	101	50
29595			.7815	19.850	20.0	131	79	50
29605			.7874	20.000	20.0	131	79	50



TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l_1	$\leq 1/8"$	+.125" -.062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 - 3.175mm)
l_2	$\leq 1/8"$	+.125" -.062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 - 3.175mm)



Series 1580KH, 1280KH, 1880KH

.1181" - .1540"
(3.000mm - 3.912mm)HIGH PERFORMANCE
DRILLS

AlTiN-based Coating

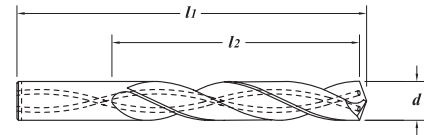
AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



High performance - high penetration solid submicron grain carbide drill
Coolant through capabilities for high pressure coolant systems
Extended tool life and greater surface finish through faster SFM rates
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40HRC
Live tooling recommended on lathe processes
Shank tolerance: h6



Hohe Leistung - Hohe Vorschubgeschwindigkeiten- Vollhartmetallbohrer aus Feinkornhartmetall
Kühlkanäle für Hochdruck Kühlmittelsysteme
Bis zu 70% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehönte Schneidkante
Empfohlen für Hoch Nickelhaltige und Hochwärmefeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl > 40HRC
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6



Broca de submicrograno sólido carburo de alto rendimiento
Orificios de paso refrigerante concebidos para sistemas de refrigeración de alta presión
Hasta un 70% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40HRC
Recomendación para la aplicación en torno
Tolerancia del vástago: h6



Forets carbure submicrograin a haute performance - haut pouvoir de coupe
Canaux de refroidissement pour forte pression de systèmes de liquide de refroidissement
70% plus rapide que les forets carbure standards
Helice a 30° pour une meilleure evacuation de copeaux
Preparation de l'arete de coupe
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6



Alte prestazioni - Alta penetrazioni Super sub-micrograno metallo duro
Lubrificazione interna per sistemi ad alta pressione
Fino al 70% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40HRC
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6



高效率 - 高进给 高效整体硬质合金钻头
通过加快切削速度延长刀具使用寿命、提高表面光洁度
跟普通的硬质合金钻头相比可提高速度高达70%
30°螺旋角更便于排屑
切削刃口经过研磨
高镍耐高温合金、钴基合金、不锈钢和工具钢 > 40HRC
不建议在车床、或工具必须纺纱
柄部公差: h6

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
			Decimal	Metric		
22010			.1181	3.000	46	16
	25366		.1181	3.000	50	19
		26366	.1181	3.000	65	28
22015			.1200	#31	1-13/16"	5/8"
	25371		.1200	#31	2"	3/4"
		26371	.1200	#31	2-1/2"	1-1/8"
22020			.1250	1/8"	1-15/16"	11/16"
	25376		.1250	1/8"	2"	3/4"
		26376	.1250	1/8"	2-1/2"	1-1/8"
22025			.1285	#30	1-15/16"	11/16"
	25381		.1285	#30	2-1/4"	3/4"
		26381	.1285	#30	2-1/2"	1-1/8"
22030			.1360	#29	2-1/16"	3/4"
	25386		.1360	#29	2-1/4"	7/8"
		26386	.1360	#29	3"	1-1/4"
22035			.1378		52	19
	25391		.1378	3.500	57	22
		26391	.1378	3.500	75	32
22040			.1405	#28	2-1/16"	3/4"
	25396		.1405	#28	2-1/4"	7/8"
		26396	.1405	#28	3"	1-1/4"
22045			.1406	9/64"	2-1/16"	3/4"
	25401		.1406	9/64"	2-1/4"	7/8"
		26401	.1406	9/64"	3"	1-1/4"
22050			.1440	#27	2-1/16"	3/4"
	25406		.1440	#27	2-1/4"	7/8"
		26406	.1440	#27	3"	1-3/8"
22055			.1470	#26	2-3/16"	13/16"
	25411		.1470	#26	2-1/4"	7/8"
		26411	.1470	#26	3"	1-3/8"
22060			.1495	#25	2-3/16"	13/16"
	25416		.1495	#25	2-1/4"	15/16"
		26416	.1495	#25	3"	1-3/8"
22065			.1520	#24	2-3/16"	13/16"
	25421		.1520	#24	2-1/4"	15/16"
		26421	.1520	#24	3"	1-1/2"
22070			.1540	#23	2-3/16"	13/16"
	25426		.1540	#23	2-1/4"	15/16"
		26426	.1540	#23	3"	1-1/2"

continued →

Series 1580KH, 1280KH, 1880KH (continued)

.1562" - .1935"
(3.967mm - 4.915mm)

HIGH PERFORMANCE
DRILLS

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	$d^{\dagger}$			l_1	l_2
			Decimal	Diameter	Metric	Overall Length	Flute Length
22075			.1562	5/32"	3.967	2-3/16"	13/16"
	25431		.1562	5/32"	3.967	2-1/2"	15/16"
		26431	.1562	5/32"	3.967	3"	1-1/2"
22080			.1570	#22	3.988	2-3/16"	13/16"
	25436		.1570	#22	3.988	2-1/2"	15/16"
		26436	.1570	#22	3.988	3"	1-1/2"
22085			.1575		4.000	56	21
	25441		.1575		4.000	65	24
		26441	.1575		4.000	75	38
22090			.1590	#21	4.039	2-3/16"	13/16"
	25446		.1590	#21	4.039	2-1/2"	15/16"
		26446	.1590	#21	4.039	3"	1-1/2"
22095			.1610	#20	4.089	2-3/16"	13/16"
	25451		.1610	#20	4.089	2-1/2"	15/16"
		26451	.1610	#20	4.089	3"	1-1/2"
22100			.1660	#19	4.216	2-9/32"	15/16"
	25456		.1660	#19	4.216	2-1/2"	1"
		26456	.1660	#19	4.216	3"	1-1/2"
22105			.1695	#18	4.305	2-9/32"	15/16"
	25461		.1695	#18	4.305	2-1/2"	1"
		26461	.1695	#18	4.305	3-1/2"	1-3/4"
22110			.1719	11/64"	4.366	2-9/32"	15/16"
	25466		.1719	11/64"	4.366	2-1/2"	1"
		26466	.1719	11/64"	4.366	3-1/2"	1-3/4"
22115			.1730	#17	4.394	2-9/32"	15/16"
	25471		.1730	#17	4.394	2-1/2"	1"
		26471	.1730	#17	4.394	3-1/2"	1-3/4"
22120			.1770	#16	4.496	2-9/32"	15/16"
	25476		.1770	#16	4.496	2-1/2"	1"
		26476	.1770	#16	4.496	3-1/2"	1-3/4"
22125			.1772		4.500	58	24
	25481		.1772		4.500	65	25
		26481	.1772		4.500	88	45
22130			.1800	#15	4.572	2-9/32"	15/16"
	25486		.1800	#15	4.572	2-3/4"	1"
		26486	.1800	#15	4.572	3-1/2"	1-3/4"
22135			.1820	#14	4.623	2-9/32"	15/16"
	25491		.1820	#14	4.623	2-3/4"	1"
		26491	.1820	#14	4.623	3-1/2"	1-3/4"
22140			.1850	#13	4.699	2-9/32"	15/16"
	25496		.1850	#13	4.699	2-3/4"	1-1/4"
		26496	.1850	#13	4.699	3-1/2"	1-3/4"
22145			.1875	3/16"	4.763	2-13/32"	1"
	25501		.1875	3/16"	4.763	2-3/4"	1-1/4"
		26501	.1875	3/16"	4.763	4"	2"
22150			.1890	#12	4.801	2-13/32"	1"
	25506		.1890	#12	4.801	2-3/4"	1-1/4"
		26506	.1890	#12	4.801	4"	2"
22155			.1910	#11	4.851	2-13/32"	1"
	25511		.1910	#11	4.851	2-3/4"	1-1/4"
		26511	.1910	#11	4.851	4"	2"
22160			.1935	#10	4.915	2-13/32"	1"
	25516		.1935	#10	4.915	2-3/4"	1-1/4"
		26516	.1935	#10	4.915	4"	2"

Series 1580KH, 1280KH, 1880KH (continued)

.1960" - .2420"
(4.978mm - 6.147mm)

HIGH PERFORMANCE
DRILLS

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	$d^{\dagger}$		l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter		
22165			.1960	#9	4.978	2-13/32"
	25521		.1960	#9	4.978	3"
		26521	.1960	#9	4.978	4"
22170			.1969		5.000	61
	25526		.1969		5.000	75
		26526	.1969		5.000	100
22175			.1990	#8	5.055	2-13/32"
	25531		.1990	#8	5.055	3"
		26531	.1990	#8	5.055	4"
22180			.2010	#7	5.105	2-13/32"
	25536		.2010	#7	5.105	3"
		26536	.2010	#7	5.105	4"
22185			.2031	13/64"	5.159	2-13/32"
	25541		.2031	13/64"	5.159	3"
		26541	.2031	13/64"	5.159	4"
22190			.2040	#6	5.182	2-13/32"
	25546		.2040	#6	5.182	3"
		26546	.2040	#6	5.182	4"
22195			.2055	#5	5.220	2-13/32"
	25551		.2055	#5	5.220	3"
		26551	.2055	#5	5.220	4"
22200			.2090	#4	5.309	2-13/32"
	25556		.2090	#4	5.309	3"
		26556	.2090	#4	5.309	4"
22205			.2130	#3	5.410	2-5/8"
	25561		.2130	#3	5.410	3"
		26561	.2130	#3	5.410	4"
22210			.2165		5.500	67
	25566		.2165		5.500	75
		26566	.2165		5.500	100
22215			.2188	7/32"	5.558	2-5/8"
	25571		.2188	7/32"	5.558	3"
		26571	.2188	7/32"	5.558	4"
22220			.2210	#2	5.613	2-5/8"
	25576		.2210	#2	5.613	3"
		26576	.2210	#2	5.613	4"
22225			.2280	#1	5.791	2-5/8"
	25581		.2280	#1	5.791	3"
		26581	.2280	#1	5.791	4-1/8"
22230			.2340	A	5.944	2-5/8"
	25586		.2340	A	5.944	3-1/4"
		26586	.2340	A	5.944	4-1/8"
22235			.2344	15/64"	5.954	2-5/8"
	25591		.2344	15/64"	5.954	3-1/4"
		26591	.2344	15/64"	5.954	4-1/8"
22240			.2362		6.000	67
	25596		.2362		6.000	80
		26596	.2362		6.000	105
22245			.2380	B	6.045	2-3/4"
	25601		.2380	B	6.045	3-1/4"
		26601	.2380	B	6.045	4-1/8"
22250			.2420	C	6.147	2-3/4"
	25606		.2420	C	6.147	3-1/4"
		26606	.2420	C	6.147	4-1/4"

continued →

Series 1580KH, 1280KH, 1880KH (continued)

.2460" - .3125"
(6.248mm - 7.938mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	$d^{\dagger}$			l_1	l_2
			Decimal	Diameter	Metric	Overall Length	Flute Length
22255			.2460	D	6.248	2-3/4"	1-7/32"
	25611		.2460	D	6.248	3-1/4"	1-5/8"
		26611	.2460	D	6.248	4-1/4"	2-1/4"
22260			.2500	1/4" / E	6.350	2-3/4"	1-7/32"
	25616		.2500	1/4" / E	6.350	3-1/4"	1-5/8"
		26616	.2500	1/4" / E	6.350	4-1/4"	2-1/4"
22265			.2559		6.500	70	31
	25621		.2559		6.500	80	41
		26621	.2559		6.500	105	58
22270			.2570	F	6.528	2-3/4"	1-7/32"
	25626		.2570	F	6.528	3-1/4"	1-11/16"
		26626	.2570	F	6.528	4-3/8"	2-3/8"
22275			.2610	G	6.629	2-3/4"	1-7/32"
	25631		.2610	G	6.629	3-1/2"	1-11/16"
		26631	.2610	G	6.629	4-3/8"	2-3/8"
22280			.2656	17/64"	6.746	2-15/16"	1-11/32"
	25636		.2656	17/64"	6.746	3-1/2"	1-11/16"
		26636	.2656	17/64"	6.746	4-3/8"	2-3/8"
22285			.2660	H	6.756	2-15/16"	1-11/32"
	25641		.2660	H	6.756	3-1/2"	1-11/16"
		26641	.2660	H	6.756	4-3/8"	2-3/8"
22290			.2720	I	6.909	2-15/16"	1-11/32"
	25646		.2720	I	6.909	3-1/2"	1-11/16"
		26646	.2720	I	6.909	4-3/8"	2-3/8"
22295			.2756		7.000	75	34
	25651		.2756		7.000	88	43
		26651	.2756		7.000	110	61
22300			.2770	J	7.036	2-15/16"	1-11/32"
	25656		.2770	J	7.036	3-1/2"	1-11/16"
		26656	.2770	J	7.036	4-3/8"	2-3/8"
22305			.2810	K	7.137	2-15/16"	1-11/32"
	25661		.2810	K	7.137	3-1/2"	1-3/4"
		26661	.2810	K	7.137	4-7/16"	2-7/16"
22310			.2812	9/32"	7.142	2-15/16"	1-11/32"
	25666		.2812	9/32"	7.142	3-1/2"	1-3/4"
		26666	.2812	9/32"	7.142	4-7/16"	2-7/16"
22315			.2900	L	7.366	2-15/16"	1-11/32"
	25671		.2900	L	7.366	3-1/2"	1-3/4"
		26671	.2900	L	7.366	4-7/16"	2-7/16"
22320			.2950	M	7.493	2-15/16"	1-11/32"
	25676		.2950	M	7.493	3-3/4"	1-3/4"
		26676	.2950	M	7.493	4-7/16"	2-7/16"
22325			.2953		7.500	75	34
	25681		.2953		7.500	95	44
		26681	.2953		7.500	115	66
22330			.2969	19/64"	7.541	3-3/32"	1-15/32"
	25686		.2969	19/64"	7.541	3-3/4"	1-7/8"
		26686	.2969	19/64"	7.541	4-9/16"	2-9/16"
22335			.3020	N	7.671	3-3/32"	1-15/32"
	25691		.3020	N	7.671	3-3/4"	1-7/8"
		26691	.3020	N	7.671	4-9/16"	2-9/16"
22340			.3125	5/16"	7.938	3-3/32"	1-15/32"
	25696		.3125	5/16"	7.938	3-3/4"	1-7/8"
		26696	.3125	5/16"	7.938	4-11/16"	2-9/16"

TOLERANCES

<i>d</i>	+.0000" -.0005" (+.0000 -.0127mm)	
<i>l</i> ₁	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)
<i>l</i> ₂	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)

Series 1580KH, 1280KH, 1880KH (continued)

.3150" - .3750"
(8.000mm - 9.525mm)



TECH
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HIGH PERFORMANCE
DRILLS

AlTiN-based Coating

AlTiN-basierte-Beschichtet

Recubrimiento a base de AlTiN

Revêtement à base de AlTiN

Rivestimento in a base AlTiN

AlTiN基涂层



3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	<i>d</i> † Diameter			<i>l</i> ₁ Overall Length	<i>l</i> ₂ Flute Length
			Decimal		Metric		
22345			.3150		8.000	79	37
	25701		.3150		8.000	95	48
		26701	.3150		8.000	120	69
22350			.3160	O	8.026	3-3/32"	1-15/32"
	25706		.3160	O	8.026	3-3/4"	1-7/8"
		26706	.3160	O	8.026	4-11/16"	2-11/16"
22355			.3230	P	8.204	3-3/32"	1-15/32"
	25711		.3230	P	8.204	3-3/4"	2-3/32"
		26711	.3230	P	8.204	4-11/16"	2-11/16"
22360			.3281	21/64"	8.334	3-3/32"	1-15/32"
	25716		.3281	21/64"	8.334	4"	2-3/32"
		26716	.3281	21/64"	8.334	4-11/16"	2-11/16"
22365			.3320	Q	8.433	3-3/32"	1-15/32"
	25721		.3320	Q	8.433	4"	2-3/32"
		26721	.3320	Q	8.433	4-15/16"	2-15/16"
22370			.3346		8.500	79	37
	25726		.3346		8.500	100	53
		26726	.3346		8.500	125	75
22375			.3390	R	8.611	3-5/16"	1-9/16"
	25731		.3390	R	8.611	4"	2-3/32"
		26731	.3390	R	8.611	4-15/16"	2-15/16"
22380			.3438	11/32"	8.733	3-5/16"	1-9/16"
	25736		.3438	11/32"	8.733	4"	2-3/16"
		26736	.3438	11/32"	8.733	4-15/16"	2-15/16"
22385			.3480	S	8.839	3-5/16"	1-9/16"
	25741		.3480	S	8.839	4"	2-3/16"
		26741	.3480	S	8.839	5"	3"
22390			.3543		9.000	84	40
	25746		.3543		9.000	100	56
		26746	.3543		9.000	125	77
22395			.3580	T	9.093	3-5/16"	1-9/16"
	25751		.3580	T	9.093	4-1/4"	2-9/32"
		26751	.3580	T	9.093	5"	3"
22400			.3594	23/64"	9.129	3-5/16"	1-9/16"
	25756		.3594	23/64"	9.129	4-1/4"	2-9/32"
		26756	.3594	23/64"	9.129	5"	3"
22405			.3680	U	9.347	3-5/16"	1-9/16"
	25761		.3680	U	9.347	4-1/4"	2-9/32"
		26761	.3680	U	9.347	5"	3"
22410			.3740		9.500	84	40
	25766		.3740		9.500	105	58
		26766	.3740		9.500	130	80
22415			.3750	3/8"	9.525	3-1/2"	1-11/16"
	25771		.3750	3/8"	9.525	4-1/4"	2-3/8"
		26771	.3750	3/8"	9.525	5-1/8"	3-1/8"

continued →

Series 1580KH, 1280KH, 1880KH (continued)

.3770" - .4921"
(9.576mm - 12.500mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	$d^{\dagger}$		l_1	l_2
			Decimal	Diameter	Overall Length	Flute Length
22420			.3770	V	9.576	3-1/2"
	25776		.3770	V	9.576	4-1/4"
		26776	.3770	V	9.576	5-1/8"
22425			.3860	W	9.804	3-1/2"
	25781		.3860	W	9.804	4-1/2"
		26781	.3860	W	9.804	5-1/8"
22430			.3906	25/64"	9.921	3-1/2"
	25786		.3906	25/64"	9.921	4-1/2"
		26786	.3906	25/64"	9.921	5-1/4"
22435			.3937		10.000	89
	25791		.3937		10.000	115
		26791	.3937		10.000	135
22440			.3970	X	10.084	3-1/2"
	25796		.3970	X	10.084	4-1/2"
		26796	.3970	X	10.084	5-1/4"
22445			.4040	Y	10.262	3-1/2"
	25801		.4040	Y	10.262	4-1/2"
		26801	.4040	Y	10.262	5-3/8"
22450			.4062	13/32"	10.317	3-1/2"
	25806		.4062	13/32"	10.317	4-1/2"
		26806	.4062	13/32"	10.317	5-3/8"
22455			.4130	Z	10.490	3-1/2"
	25811		.4130	Z	10.490	4-1/2"
		26811	.4130	Z	10.490	5-3/8"
22460			.4134		10.500	89
	25816		.4134		10.500	115
		26816	.4134		10.500	135
22465			.4219	27/64"	10.716	3-3/4"
	25821		.4219	27/64"	10.716	4-1/2"
		26821	.4219	27/64"	10.716	5-7/16"
22470			.4331		11.000	95
	25826		.4331		11.000	115
		26826	.4331		11.000	135
22475			.4375	7/16"	11.113	3-3/4"
	25831		.4375	7/16"	11.113	4-3/4"
		26831	.4375	7/16"	11.113	5-7/16"
22480			.4528		11.500	95
	25836		.4528		11.500	120
		26836	.4528		11.500	140
22485			.4531	29/64"	11.509	3-3/4"
	25841		.4531	29/64"	11.509	4-3/4"
		26841	.4531	29/64"	11.509	5-9/16"
22490			.4688	15/32"	11.908	4"
	25846		.4688	15/32"	11.908	4-3/4"
		26846	.4688	15/32"	11.908	5-9/16"
22495			.4724		12.000	102
	25851		.4724		12.000	120
		26851	.4724		12.000	140
22500			.4844	31/64"	12.304	4"
	25856		.4844	31/64"	12.304	5-5/16"
		26856	.4844	31/64"	12.304	5-9/16"
22505			.4921		12.500	102
	25861		.4921		12.500	135
		26861	.4921		12.500	150

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	$d^{\dagger}$			l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter	Metric		
22510			.5000	1/2"	12.700	4"	1-15/16"
	25866		.5000	1/2"	12.700	5-3/8"	3-1/16"
		26866	.5000	1/2"	12.700	6"	4"
22515			.5118		13.000	107	53
	25871		.5118		13.000	135	78
		26871	.5118		13.000	150	102
22520			.5156	33/64"	13.096	4-7/32"	2-3/32"
	25876		.5156	33/64"	13.096	5-3/8"	3-1/8"
		26876	.5156	33/64"	13.096	6"	4"
22525			.5312	17/32"	13.492	4-7/32"	2-3/32"
	25881		.5312	17/32"	13.492	5-11/16"	3-5/16"
		26881	.5312	17/32"	13.492	6-1/8"	4-1/8"
22530			.5315		13.500	110	56
	25886		.5315		13.500	145	84
		26886	.5315		13.500	155	105
22535			.5469	35/64"	13.891	4-5/16"	2-7/32"
	25891		.5469	35/64"	13.891	5-13/16"	3-3/8"
		26891	.5469	35/64"	13.891	6-1/8"	4-1/8"
22540			.5512		14.000	110	56
	25896		.5512		14.000	145	86
		26896	.5512		14.000	155	105
22545			.5625	9/16"	14.288	4-9/16"	2-15/32"
	25901		.5625	9/16"	14.288	5-15/16"	3-1/2"
		26901	.5625	9/16"	14.288	6-1/4"	4-3/8"
22550			.5709		14.500	116	63
	25906		.5709		14.500	150	89
		26906	.5709		14.500	160	109
22555			.5781	37/64"	14.684	4-15/16"	2-9/16"
	25911		.5781	37/64"	14.684	6"	3-1/2"
		26911	.5781	37/64"	14.684	6-1/4"	4-3/8"
22560			.5906		15.000	125	65
	25916		.5906		15.000	150	90
		26916	.5906		15.000	160	112
22565			.5938	19/32"	15.083	4-15/16"	2-9/16"
	25921		.5938	19/32"	15.083	6"	3-9/16"
		26921	.5938	19/32"	15.083	6-3/8"	4-3/8"
22570			.6094	39/64"	15.479	5-1/16"	2-13/16"
	25926		.6094	39/64"	15.479	6-3/16"	3-11/16"
		26926	.6094	39/64"	15.479	6-7/16"	4-7/16"
22575			.6102		15.500	129	71
	25931		.6102		15.500	160	94
		26931	.6102		15.500	165	113
22580			.6250	5/8"	15.875	5-1/4"	3-1/8"
	25936		.6250	5/8"	15.875	6-5/16"	3-3/4"
		26936	.6250	5/8"	15.875	6-9/16"	4-9/16"
22585			.6299		16.000	133	79
	25941		.6299		16.000	160	95
		26941	.6299		16.000	165	117

Series 1600

.0787" - .3750"
(2.000mm - 9.525mm)NEW
ITEMS

TOLERANCES

d	+.0000" -.0005" (+.0000 -.0127mm)	
l1	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)
l2	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)

N/C Spotting

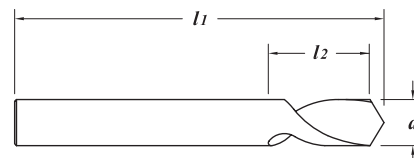
NC-Anbohrer

Marcado N/C

Forets a Pointer, N/C Pointage

Punta da Centro per Controlli Numerici

数控定位



Solid submicron grain carbide drill
For spotting to stabilize long drills
Can be used for chamfering
Rough, angled or spherical surfaces
No O.D. clearance
For locating on true position
Live tooling recommended on lathe processes
Shank tolerance: h6



Vollhartmetallbohrer aus Feinkornhartmetall
Vorzentrieren zum stabilisieren von langen Bohren
Kann zum Erstellen einer Fäse verwendet werden
Grobe, Winklige oder Kugelförmige Oberflächen
Aufbohrer
Für höhere Positioniergenauigkeit
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6



Broca de submicrograno sólido carburo
Pretaladrado para estabilizar brocas largas
Se puede utilizar para crear un chafán
Superficies rugosas, angulosas o esféricas
Sin holgura de D.E.
Para situarla en posición real
Recomendación para la aplicación en torno
Tolerancia del vástago: h6



Forets carbure submicrograin
Pour repérer pour stabiliser forets longs
Peut être utilisé pour créer un chanfrein
Rugueux, surfaces angulaires ou sphériques
Pas de dia dédouanement
Pour localiser la position réelle
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6



Punte in sub-micro grana
Centrino per stabilizzare punti lunghe
Può essere usato per creare uno smusso
Adatto su pareti inclinate o sferiche
Posizionamento preciso
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6

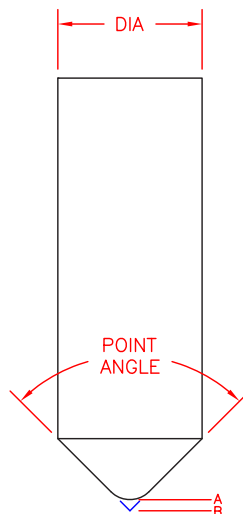


整体硬质合金钻头
定位稳定长钻头
可用于创建倒角
粗加工面、斜面或者球面
没有外径间隙
供准确位置上定位用
不建议在车床，或工具必须纺纱
柄部公差: h6

	82° EDP#	90° EDP#	120° EDP#	140° EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length	
					Decimal	Metric			
NEW	91650	91500	91572	91240	.0787	2.000	50	10	
	91652	91505	91575	91245	.0938	3/32"	2.383	2"	3/8"
	-	91507	-	-	.1181	3.000	38	6	
	-	91510	91580	91250	.1181	3.000	50	10	
NEW	-	91512	-	-	.1181	3.000	75	10	
	-	91514	-	-	.1250	1/8"	3.175	1-1/2"	1/4"
	91656	91000	91100	91260	.1250	1/8"	3.175	2"	3/8"
	-	91002	-	-	.1250	1/8"	3.175	3"	3/8"
	91658	91520	91590	91270	.1575	4.000	50	12	
	-	91522	-	-	.1875	3/16"	4.763	2"	3/8"
	-	91524	-	-	.1875	3/16"	4.763	2-1/2"	1/2"
	91660	91010	91110	91280	.1875	3/16"	4.763	3"	3/4"
	-	91012	-	-	.1875	3/16"	4.763	4"	3/4"
	-	91014	-	-	.1969	5.000	50	10	
	-	91530	91600	91290	.1969	5.000	65	15	
NEW	-	91532	-	-	.1969	5.000	75	15	
	-	91534	-	-	.2362	6.000	50	12	
	91664	91540	91610	91300	.2362	6.000	65	20	
NEW	-	91542	-	-	.2362	6.000	75	20	
NEW	-	91544	-	-	.2362	6.000	100	20	
	-	91546	-	-	.2500	1/4"	6.350	2"	1/2"
	-	91547	-	-	.2500	1/4"	6.350	2-1/2"	5/8"
	91666	91020	91120	91310	.2500	1/4"	6.350	3"	3/4"
	-	91021	-	-	.2500	1/4"	6.350	4"	3/4"
	-	91022	-	-	.2500	1/4"	6.350	6"	3/4"
	-	91023	-	-	.3125	5/16"	7.938	2"	1/2"
NEW	-	91024	-	-	.3125	5/16"	7.938	2-1/2"	5/8"
	91668	91025	91125	91315	.3125	5/16"	7.938	3"	1"
NEW	-	91026	-	-	.3125	5/16"	7.938	4"	1"
NEW	-	91548	-	-	.3150	8.000	50	12	
NEW	-	91549	-	-	.3150	8.000	65	16	
	91670	91550	91620	91320	.3150	8.000	75	25	
	-	91551	-	-	.3150	8.000	100	25	
	-	91028	-	-	.3750	3/8"	9.525	2"	1/2"
	-	91029	-	-	.3750	3/8"	9.525	2-1/2"	5/8"
	91672	91030	91130	91330	.3750	3/8"	9.525	3"	1"
	-	91031	-	-	.3750	3/8"	9.525	4"	1"
	-	91032	-	-	.3750	3/8"	9.525	6"	1"

	82° EDP#	90° EDP#	120° EDP#	140° EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length
					Decimal	Metric		
-	91558	-	-	-	.3937	10.000	65	16
-	91559	-	-	-	.3937	10.000	70	20
-	91560	91630	91340	-	.3937	10.000	88	25
-	91561	-	-	-	.3937	10.000	100	25
NEW	-	91564	-	-	.4375	7/16"	2-3/4"	3/4"
91676	91565	91635	91345	-	.4375	7/16"	4"	1"
-	91568	-	-	-	.4724	12.000	65	16
-	91569	-	-	-	.4724	12.000	75	20
-	91570	91640	91350	-	.4724	12.000	100	30
-	91038	-	-	-	.5000	1/2"	2-1/2"	5/8"
-	91039	-	-	-	.5000	1/2"	3"	3/4"
91680	91040	91140	91360	-	.5000	1/2"	4"	1"
-	91041	-	-	-	.5000	1/2"	6"	1"
-	91050	91170	91370	-	.5512	14.000	100	30
91684	91060	91180	-	-	.5625	9/16"	4"	1"
-	91067	-	-	-	.6250	5/8"	3"	3/4"
-	91068	-	-	-	.6250	5/8"	3-1/2"	1"
-	91069	-	-	-	.6250	5/8"	4"	1"
91686	91070	91190	91390	-	.6250	5/8"	5"	1"
NEW	-	91077	-	-	.6299	16.000	75	20
NEW	-	91078	-	-	.6299	16.000	88	25
NEW	-	91079	-	-	.6299	16.000	100	25
91688	91080	91200	91400	-	.6299	16.000	125	30
91690	91090	91210	-	-	.7087	18.000	125	30
NEW	-	91148	-	-	.7500	3/4"	3"	3/4"
-	91149	-	-	-	.7500	3/4"	4"	1"
91692	91150	91220	91420	-	.7500	3/4"	5"	1"
NEW	-	91159	-	-	.7874	20.000	100	25
-	91160	91230	91430	-	.7874	20.000	125	30
NEW	-	91161	-	-	.7874	20.000	150	30

DIAMETER	DRILL POINT ANGLE			
	82°	90°	120°	140°
2mm .0787	.003	.002	.001	.001
3/32" .0938	.003	.003	.002	.001
3mm .1181	.004	.004	.002	.001
1/8" .1250	.004	.004	.002	.001
4mm .1575	.005	.005	.003	.002
3/16" .1875	.006	.006	.003	.002
5mm .1969	.007	.006	.003	.002
6mm .2362	.008	.007	.004	.003
1/4" .2500	.009	.008	.004	.003
5/16" .3125	.011	.009	.005	.003
8mm .3150	.011	.009	.005	.003
3/8" .3750	.013	.011	.006	.004
10mm .3937	.014	.012	.007	.004
7/16" .4375	.015	.013	.008	.005
12mm .4724	.016	.014	.008	.005
1/2" .5000	.017	.015	.009	.005
14mm .5512	.019	.017	.010	.006
9/16" .5625	.019	.017	.010	.006
5/8" .6250	.022	.019	.011	.007
16mm .6299	.022	.019	.011	.007
18mm .7087	.024	.021	.012	.008
3/4" .7500	.026	.023	.013	.008
20mm .7874	.027	.024	.014	.009



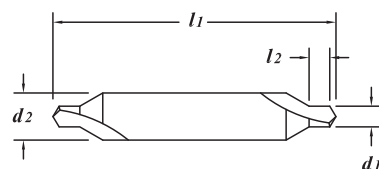
Garr Tool series 1600 spotting drills are not only useful for starting holes, but also for leaving the desired chamfer when programmed to the correct depth. Because spotting drills do not come to a true point, but have a small "flat" as shown in the figure to the left, the length deviation from the chart must be taken into account to leave the correct chamfer length. This chart gives the distance from the theoretical drill point 'B' to the actual drill point 'A'. These values can be used to compensate for the "flat" on our spotting drills in your calculations.


**TECH
PAGES**
322-325

TOLERANCES

d_1	$+0.003" - .0000" (+.0762 - .0000\text{mm})$
d_2	$h6$
l_1	$+0.125" - .125" (+3.175 - 3.175\text{mm})$
l_2	$+0.008" - .008" (+.203 - .203\text{mm})$

Combined Drill and Countersink
Kobiniertes Bohren- und Ansenken
Broca y Avellanadora Combinadas
Percage et Chanfreinage
Centrino a Doppia Punta
组合式钻孔和铰孔钻头



Solid submicron grain carbide drill
 For center drilling applications
 $60^\circ \pm 0^\circ 30'$ included countersink angle
 Live tooling recommended on lathe processes
 Drill length (l_2) is equal to drill diameter (d_1)
 Not able to be altered



Vollhartmetallbohrer aus Feinkornhartmetall
 Zentrierbohrer Anwendungen
 $60^\circ \pm 0^\circ 30'$ inclusive Ansenkwinkel
 Empfehlung fuer den Einsatz auf der Drehmaschine
 Bohrerlänge (l_2) ist gleich wie Bohrdurchmesser (d_1)
 Kann nicht modifiziert werden



Broca de submicrograno sólido carburo
 Aplicaciones de perforación central
 Ángulo de avellanado entre caras de $60^\circ \pm 0^\circ 30'$
 Recomendación para la aplicación en torno
 Drill length (l_2) is equal to drill diameter (d_1)
 No es posible modificar



Forets carbure submicrograin
 Pour applications pour percage au centre
 Inclus angle de chanfreinage a $60^\circ \pm 0^\circ 30'$
 Outil de filature nécessaires pour une utilisation sur un processus de tournage
 La longueur de coupe (l_2) est égale au diamètre (d_1)
 Outil non modifiable



Punte in sub-micro grana
 Centrinatura
 $60^\circ \pm 0^\circ 30'$ di svasatura
 Utensili rotanti sono consigliate se usato su un tornio
 Lunghezza punta (l_2) uguale a diametro punta (d_1)
 Non può essere modificata



整体硬质合金钻头
 钻中心孔用途
 $60^\circ \pm 0^\circ 30'$ 铰孔夹角
 不建议在车床，或工具必须纺纱
 钻头长度 (l_2) 等于钻头直径 (d_1)
 无法改制

EDP #	Number	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Drill Length
		Decimal		Metric			
58030	1	.0469	3/64"	1.191	1/8"	1-1/2"	.0469
58040	2	.0781	5/64"	1.984	3/16"	2"	.0781
58050	3	.1094	7/64"	2.779	1/4"	2"	.1094
58060	4	.1250	1/8"	3.175	5/16"	2-1/8"	.1250
58070	5	.1875	3/16"	4.763	7/16"	2-3/4"	.1875
58080	6	.2188	7/32"	5.558	1/2"	3"	.2188



Tool prep, Coating inspection

TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l_1	$\leq 1/8"$	+.125" -.062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 - 3.175mm)
l_2	$\leq 1/8"$	+.125" -.062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 - 3.175mm)



Series 1500

.0625" - .1660"
(1.588mm - 4.216mm)

GENERAL PURPOSE
DRILLS

Hard Metal

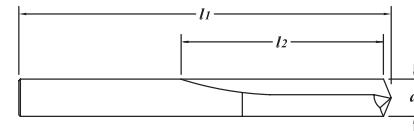
Hartmetall

Metal Duroe

Métal Dur

Metallo Duro

硬金属



Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity

Recommended for high nickel, cobalt based and powdered metals

Live tooling recommended on lathe processes

Shank tolerance: h6

Hardlube Coating - Page 59



Vollhartmetallbohrer aus Feinkornhartmetall
Gerades Spannutendesign für exzellente Stabilität
Werkstoffe mit 40HRC und höher

Exzellente Hitzebeständigkeit und Schmiereigenschaften

Empfohlen für Hoch Nickelhaltige und Kobaltbasislegierungen, Pulvermetall

Empfehlung fuer den Einsatz auf der Drehmaschine

Schaft-Toleranz: h6

Hardlube Beschichtung - Seite 59



Broca de submicrograno sólido carburo
El diseño de ranuras rectas proporciona excelente rigidez
Materiales 40Rc y superiores

Excelente resistencia térmica y lubricación

Recomendado para alto contenido en níquel, aleaciones con base de cobalto y metal pulverizado

Recomendación para la aplicación en torno

Tolerancia del vástago: h6

Recubrimiento de Hardlube - Página 59



Forets carbure submicrograin
Le design de la goujure apporte une excellente rigidité
Materiaux de 40 HRC et plus

Excellente resistance a la haute temperature et glissement

Recommander pour alliages a hautes teneur en nickel, base cobalt et metal fritte

Outil de filature nécessaires pour une utilisation sur un processus de tournage

Tolerance queue: h6

Revêtement Hardlube - Page 59



Punte in sub-micro grana
Tagliente dritto che consente un'ottima rigidità
Materiali a 40 Hrc e superiori

Excellent resistenza al calore e autolubrificante

Raccomandata per lavorazioni su leghe di nickel, cobalto e sinterizzati

Utensili rotanti sono consigliate se usato su un tornio

Tolleranza gambo: h6

Rivestimento in Hardlube - Pagina 59



整体硬质合金钻头
直排屑槽结构保证了极好的刚性
推荐加工洛氏硬度40或40以上的材质

耐热性和润滑性特好

推荐加工高镍合金、钴基合金和粉末冶金

不建议在车床，或工具必须纺纱

柄部公差: h6

涂层 Hardlube - 59页

EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
59165	.0625	1/16"	1.588	5/8"
59180	.0700	#50	1.778	3/4"
59185	.0730	#49	1.854	3/4"
59190	.0760	#48	1.930	3/4"
59195	.0781	5/64"	1.984	3/4"
59200	.0785	#47	1.994	7/8"
39000	.0787		2.000	22
59210	.0810	#46	2.057	7/8"
59215	.0820	#45	2.083	7/8"
59220	.0860	#44	2.184	7/8"
59225	.0890	#43	2.261	7/8"
59230	.0935	#42	2.375	7/8"
59235	.0938	3/32"	2.383	7/8"
59240	.0960	#41	2.438	7/8"
59245	.0980	#40	2.489	7/8"
39050	.0984		2.500	22
59255	.0995	#39	2.527	7/8"
59260	.1015	#38	2.578	7/8"
59265	.1040	#37	2.642	7/8"
59270	.1065	#36	2.705	7/8"
59275	.1094	7/64"	2.779	1"
59280	.1100	#35	2.794	1"
59285	.1110	#34	2.819	1"
59290	.1130	#33	2.870	1"
59295	.1160	#32	2.946	1"
39100	.1181		3.000	25
59305	.1200	#31	3.048	1"
59310	.1250	1/8"	3.175	1"
59315	.1285	#30	3.264	1"
59320	.1360	#29	3.454	1"
39150	.1378		3.500	25
59330	.1405	#28	3.569	1"
59335	.1406	9/64"	3.571	1"
59340	.1440	#27	3.658	1"
59345	.1470	#26	3.734	1"
59350	.1495	#25	3.797	1"
59355	.1520	#24	3.861	1"
59360	.1540	#23	3.912	1"
59365	.1562	5/32"	3.967	1-1/8"
59370	.1570	#22	3.988	1-1/8"
39200	.1575		4.000	28
59380	.1590	#21	4.039	1-1/8"
59385	.1610	#20	4.089	1-1/8"
59390	.1660	#19	4.216	1-1/8"

continued →

Series 1500 (continued)

.1695" - .5000"
(4.305mm - 12.700mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
59395	.1695	#18	4.305	2-1/2"
59400	.1719	11/64"	4.366	2-1/2"
59405	.1730	#17	4.394	2-1/2"
59410	.1770	#16	4.496	2-1/2"
39250	.1772		4.500	63
59420	.1800	#15	4.572	2-1/2"
59425	.1820	#14	4.623	2-1/2"
59430	.1850	#13	4.700	2-1/2"
59435	.1875	3/16"	4.763	2-1/2"
59440	.1890	#12	4.801	2-1/2"
59445	.1910	#11	4.851	2-1/2"
59450	.1935	#10	4.915	2-1/2"
59455	.1960	#9	4.978	2-1/2"
39300	.1969		5.000	63
59465	.1990	#8	5.055	2-1/2"
59470	.2010	#7	5.105	2-1/2"
59475	.2031	13/64"	5.159	2-1/2"
59480	.2040	#6	5.182	2-1/2"
59485	.2055	#5	5.220	2-1/2"
59490	.2090	#4	5.309	2-1/2"
59495	.2130	#3	5.410	2-1/2"
39350	.2165		5.500	63
59505	.2188	7/32"	5.558	2-1/2"
59510	.2210	#2	5.613	2-1/2"
59515	.2280	#1	5.791	2-1/2"
59525	.2344	15/64"	5.954	2-1/2"
39400	.2362		6.000	63
59550	.2500	1/4"	6.350	2-1/2"
59570	.2656	17/64"	6.746	2-1/2"
39500	.2756		7.000	63
59600	.2812	9/32"	7.142	2-1/2"
39520	.2953		7.500	63
59620	.2969	19/64"	7.541	2-1/2"
59630	.3125	5/16"	7.938	2-1/2"
39540	.3150		8.000	63
59650	.3281	21/64"	8.334	3"
39560	.3346		8.500	76
59670	.3438	11/32"	8.733	3"
39580	.3543		9.000	76
59690	.3594	23/64"	9.129	3"
59705	.3750	3/8"	9.525	3"
59720	.3906	25/64"	9.921	3"
39620	.3937		10.000	76
59740	.4062	13/32"	10.317	3"
39640	.4134		10.500	76
59755	.4219	27/64"	10.716	3"
39660	.4331		11.000	76
59765	.4375	7/16"	11.113	3"
59775	.4531	29/64"	11.509	3"
59780	.4688	15/32"	11.908	3"
39700	.4724		12.000	76
59790	.4844	31/64"	12.304	3"
39720	.4921		12.500	76
59800	.5000	1/2"	12.700	3"

TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l ₁	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)
l ₂	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)



Series 1500H

.0625" - .1660"
(1.588mm - 4.216mm)

GENERAL PURPOSE
DRILLS

Hard Metal - Hardlube Coated

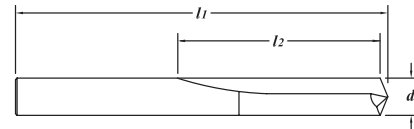
Hartmetall - Hardlube-Beschichtet

Metal Duro - Recubrimiento de Hardlube

Métal Dur - Revêtement Hardlube

Metallo Duro - Rivestimento in Hardlube

硬金属 - Hardlube 涂层



Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity

Recommended for high nickel, cobalt based and powdered metals

Live tooling recommended on lathe processes

Shank tolerance: h6

Uncoated - Page 57



Vollhartmetallbohrer aus Feinkornhartmetall

Gerades Spannutendesign für exzellente Stabilität

Werkstoffe mit 40HRC und höher

Exzellente Hitzebeständigkeit und Schmiereigenschaften

Empfohlen für Hoch Nickelhaltige und Kobaltbasislegierungen, Pulvermetall

Empfehlung fuer den Einsatz auf der Drehmaschine

Schaft-Toleranz: h6

Unbeschichtet - Seite 57



Broca de submicrograno sólido carburo

El diseño de ranuras rectas proporciona excelente rigidez

Materiales 40Rc y superiores

Excelente resistencia térmica y lubricación

Recomendado para alto contenido en níquel, aleaciones con base de cobalto y metal pulverizado

Recomendación para la aplicación en torno

Tolerancia del vástago: h6

Sin recubrimiento - Página 57



Forets carbure submicrograin

Le design de la goujure apporte une excellente rigidité

Matériaux de 40HRC et plus

Excellente résistance a la haute température et glissement

Recommander pour alliages a hautes teneur en nickel, base cobalt et metal fritte

Outil de filature nécessaires pour une utilisation sur un processus de tournage

Tolerance queue: h6

Non revêtu - Page 57



Punte in sub-micro grana

Tagliente dritto che consente un'ottima rigidità

Materiali a 40Hrc e superiori

Eccellente resistenza al calore e autolubrificante

Raccomandata per lavorazioni su leghe di nickel, cobalto e sinterizzati

Utensili rotanti sono consigliate se usato su un tornio

Tolleranza gambo: h6

Non rivestito - Pagina 57



整体硬质合金钻头

直排屑槽结构保证了极好的刚性

推荐加工洛氏硬度40或40以上的材质

耐热性和润滑性特好

推荐加工高镍合金、钴基合金和粉末冶金

不建议在车床，或工具必须纺纱

柄部公差: h6

无涂层 - 57页

EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length
	Decimal	Metric		
59166	.0625	1/16"	1-3/4"	5/8"
59181	.0700	#50	1-3/4"	3/4"
59186	.0730	#49	1-3/4"	3/4"
59191	.0760	#48	1-3/4"	3/4"
59196	.0781	5/64"	1-3/4"	3/4"
59201	.0785	#47	1-3/4"	7/8"
39001	.0787		50	22
59211	.0810	#46	2"	7/8"
59216	.0820	#45	2"	7/8"
59221	.0860	#44	2"	7/8"
59226	.0890	#43	2"	7/8"
59231	.0935	#42	2"	7/8"
59236	.0938	3/32"	2"	7/8"
59241	.0960	#41	2"	7/8"
59246	.0980	#40	2"	7/8"
39051	.0984		50	22
59256	.0995	#39	2"	7/8"
59261	.1015	#38	2"	7/8"
59266	.1040	#37	2"	7/8"
59271	.1065	#36	2"	7/8"
59276	.1094	7/64"	2"	1"
59281	.1100	#35	2"	1"
59286	.1110	#34	2"	1"
59291	.1130	#33	2"	1"
59296	.1160	#32	2"	1"
39101	.1181		50	25
59306	.1200	#31	2"	1"
59311	.1250	1/8"	2"	1"
59316	.1285	#30	2"	1"
59321	.1360	#29	2"	1"
39151	.1378		50	25
59331	.1405	#28	2"	1"
59336	.1406	9/64"	2"	1"
59341	.1440	#27	2"	1"
59346	.1470	#26	2"	1"
59351	.1495	#25	2"	1"
59356	.1520	#24	2"	1"
59361	.1540	#23	2"	1"
59366	.1562	5/32"	2-1/2"	1-1/8"
59371	.1570	#22	2-1/2"	1-1/8"
39201	.1575		63	28
59381	.1590	#21	2-1/2"	1-1/8"
59386	.1610	#20	2-1/2"	1-1/8"
59391	.1660	#19	2-1/2"	1-1/8"

continued →

Series 1500H (continued)

.1695" - .5000"
(4.305mm - 12.700mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
59396	.1695	#18	4.305	2-1/2"
59401	.1719	11/64"	4.366	2-1/2"
59406	.1730	#17	4.394	2-1/2"
59411	.1770	#16	4.496	2-1/2"
39251	.1772		4.500	63
59421	.1800	#15	4.572	2-1/2"
59426	.1820	#14	4.623	2-1/2"
59431	.1850	#13	4.700	2-1/2"
59436	.1875	3/16"	4.763	2-1/2"
59441	.1890	#12	4.801	2-1/2"
59446	.1910	#11	4.851	2-1/2"
59451	.1935	#10	4.915	2-1/2"
59456	.1960	#9	4.978	2-1/2"
39301	.1969		5.000	63
59466	.1990	#8	5.055	2-1/2"
59471	.2010	#7	5.105	2-1/2"
59476	.2031	13/64"	5.159	2-1/2"
59481	.2040	#6	5.182	2-1/2"
59486	.2055	#5	5.220	2-1/2"
59491	.2090	#4	5.309	2-1/2"
59496	.2130	#3	5.410	2-1/2"
39351	.2165		5.500	63
59506	.2188	7/32"	5.558	2-1/2"
59511	.2210	#2	5.613	2-1/2"
59516	.2280	#1	5.791	2-1/2"
59526	.2344	15/64"	5.954	2-1/2"
39401	.2362		6.000	63
59551	.2500	1/4"	6.350	2-1/2"
39451	.2559		6.500	63
59571	.2656	17/64"	6.746	2-1/2"
39501	.2756		7.000	63
59601	.2812	9/32"	7.142	2-1/2"
39521	.2953		7.500	63
59621	.2969	19/64"	7.541	2-1/2"
59631	.3125	5/16"	7.938	2-1/2"
39541	.3150		8.000	63
59651	.3281	21/64"	8.334	3"
39561	.3346		8.500	76
59671	.3438	11/32"	8.733	3"
39581	.3543		9.000	76
59691	.3594	23/64"	9.129	3"
39601	.3740		9.500	76
59706	.3750	3/8"	9.525	3"
59721	.3906	25/64"	9.921	3"
39621	.3937		10.000	76
59741	.4062	13/32"	10.317	3"
59756	.4219	27/64"	10.716	3"
39661	.4331		11.000	76
59766	.4375	7/16"	11.113	3"
39681	.4528		11.500	76
59776	.4531	29/64"	11.509	3"
59781	.4688	15/32"	11.908	3"
39701	.4724		12.000	76
59791	.4844	31/64"	12.304	3"
39721	.4921		12.500	76
59801	.5000	1/2"	12.700	3"

TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l1	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)
l2	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)



Series 1510

.0625" - .1575"
(1.588mm - 4.000mm)

GENERAL PURPOSE
DRILLS

Slow Helix

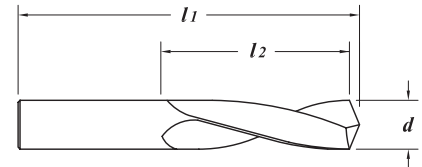
Reduzierte Helix

Hélice Lenta

Hélice Réduite

Lento a Spirale

缓螺旋



Solid submicron grain carbide drill
Heavy web for extra rigidity and added strength
Thinned point

Recommended to run in titanium, inconel, hastelloy, waspaloy, and stainless steel

Live tooling recommended on lathe processes

Shank tolerance: h6

Hardlube Coating - page 64



Vollhartmetallbohrer aus Feinkornhartmetall
Starke Schneidkante für hohe Stabilität
Ausspitzung

Empfohlen für Titan, Inconel, Hastelloy, Waspaloy, und rostfreie Stähle

Empfehlung fuer den Einsatz auf der Drehmaschine

Schaft-Toleranz: h6

Hardlube-Beschichtet - Seite 64



Broca de submicrograno sólido carburo
Cuerpo resistente para mayor rigidez y resistencia
Punta rebajada

Recomendado para titanio, inconel, hastelloy, waspaloy y acero inoxidable

Recomendación para la aplicación en torno

Tolerancia del vástago: h6

Recubrimiento de Hardlube - Página 64



Forets carbure submicrograin
Corps lourd pour plus de rigidité
Ame amincie

Recommander pour titane, inconel, hastelloy, waspaloy et acier inoxydable

Outil de filature nécessaires pour une utilisation sur un processus de tournage

Tolerance queue: h6

Revêtement Hardlube - Page 64



Punte in sub-micro grana
Gambo robusto per una massimia rigidità
Centro scaricato

Raccomandata per lavorazioni su titanio, inconel, hastelloy, waspaloy e acciaio inox

Utensili rotanti sono consigliate se usato su un tornio

Tolleranza gambo: h6

Rivestimento in Hardlube - Pagina 64



整体硬质合金钻头
大的中心刃产生超强刚性和强度
经过修磨的刀尖

推荐加工钛合金、铬钼铁耐热耐腐蚀合金、耐盐酸镍基合金、耐高热镍基合金和不锈钢合金

不建议在车床，或工具必须纺纱

柄部公差: h6

Hardlube 涂层 - 64页

EDP#	d †			l1 Overall Length	l2 Flute Length
	Decimal	Diameter	Metric		
19070	.0625	1/16"	1.588	1-3/4"	5/8"
19075	.0635	#52	1.613	1-3/4"	11/16"
19080	.0670	#51	1.702	1-3/4"	11/16"
19085	.0700	#50	1.778	1-3/4"	11/16"
19090	.0730	#49	1.854	1-3/4"	11/16"
19095	.0760	#48	1.930	1-3/4"	11/16"
19100	.0781	5/64"	1.984	1-3/4"	11/16"
19105	.0785	#47	1.994	1-3/4"	3/4"
19115	.0787		2.000	45	19
19120	.0810	#46	2.057	1-3/4"	3/4"
19125	.0820	#45	2.083	1-3/4"	3/4"
19130	.0860	#44	2.184	1-3/4"	3/4"
19135	.0890	#43	2.261	1-3/4"	3/4"
19140	.0935	#42	2.375	1-3/4"	3/4"
19145	.0938	3/32"	2.383	1-3/4"	3/4"
19150	.0960	#41	2.438	1-13/16"	13/16"
19155	.0980	#40	2.489	1-13/16"	13/16"
19160	.0984		2.500	46	21
19165	.0995	#39	2.527	1-13/16"	13/16"
19170	.1015	#38	2.578	1-13/16"	13/16"
19175	.1040	#37	2.642	1-13/16"	13/16"
19180	.1065	#36	2.705	1-13/16"	13/16"
19185	.1094	7/64"	2.779	1-13/16"	13/16"
19190	.1100	#35	2.794	1-7/8"	7/8"
19195	.1110	#34	2.819	1-7/8"	7/8"
19200	.1130	#33	2.870	1-7/8"	7/8"
19205	.1160	#32	2.946	1-7/8"	7/8"
19210	.1181		3.000	48	22
19215	.1200	#31	3.048	1-7/8"	7/8"
19220	.1250	1/8"	3.175	1-7/8"	7/8"
19225	.1285	#30	3.264	1-15/16"	15/16"
19230	.1360	#29	3.454	1-15/16"	15/16"
19235	.1378		3.500	49	24
19240	.1405	#28	3.569	1-15/16"	15/16"
19245	.1406	9/64"	3.571	1-15/16"	15/16"
19250	.1440	#27	3.658	2-1/16"	1"
19255	.1470	#26	3.734	2-1/16"	1"
19260	.1495	#25	3.797	2-1/16"	1"
19265	.1520	#24	3.861	2-1/16"	1"
19270	.1540	#23	3.912	2-1/16"	1"
19275	.1562	5/32"	3.967	2-1/16"	1"
19280	.1570	#22	3.988	2-1/8"	1-1/16"
19285	.1575		4.000	54	27

continued →

Series 1510 (continued)

.1590" - .3346"
(4.039mm - 8.500mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
19290	.1590	#21	4.039	2-1/8"
19295	.1610	#20	4.089	2-1/8"
19300	.1660	#19	4.216	2-1/8"
19305	.1695	#18	4.305	2-1/8"
19310	.1719	11/64"	4.366	2-1/8"
19315	.1730	#17	4.394	2-3/16"
19320	.1770	#16	4.496	2-3/16"
19325	.1772		4.500	56
19330	.1800	#15	4.572	2-3/16"
19335	.1820	#14	4.623	2-3/16"
19340	.1850	#13	4.700	2-3/16"
19345	.1875	3/16"	4.763	2-3/16"
19350	.1890	#12	4.801	2-1/4"
19355	.1910	#11	4.851	2-1/4"
19360	.1935	#10	4.915	2-1/4"
19365	.1960	#9	4.978	2-1/4"
19370	.1969		5.000	57
19375	.1990	#8	5.055	2-1/4"
19380	.2010	#7	5.105	2-1/4"
19385	.2031	13/64"	5.159	2-1/4"
19390	.2040	#6	5.182	2-3/8"
19395	.2055	#5	5.220	2-3/8"
19400	.2090	#4	5.309	2-3/8"
19405	.2130	#3	5.410	2-3/8"
19410	.2165		5.500	60
19415	.2188	7/32"	5.558	2-3/8"
19420	.2210	#2	5.613	2-7/16"
19425	.2280	#1	5.791	2-7/16"
19430	.2340	A	5.944	2-7/16"
19435	.2344	15/64"	5.954	2-7/16"
19440	.2362		6.000	64
19445	.2380	B	6.045	2-1/2"
19450	.2420	C	6.147	2-1/2"
19455	.2460	D	6.248	2-1/2"
19460	.2500	1/4" / E	6.350	2-1/2"
19465	.2559		6.500	67
19470	.2570	F	6.528	2-5/8"
19475	.2610	G	6.629	2-5/8"
19480	.2656	17/64"	6.746	2-5/8"
19485	.2660	H	6.756	2-11/16"
19490	.2720	I	6.909	2-11/16"
19495	.2756		7.000	68
19500	.2770	J	7.036	2-11/16"
19505	.2810	K	7.137	2-11/16"
19510	.2812	9/32"	7.142	2-11/16"
19515	.2900	L	7.366	2-3/4"
19520	.2950	M	7.493	2-3/4"
19525	.2953		7.500	70
19530	.2969	19/64"	7.541	2-3/4"
19535	.3020	N	7.671	2-15/16"
19540	.3125	5/16"	7.938	2-15/16"
19545	.3150		8.000	75
19550	.3160	O	8.026	2-15/16"
19555	.3230	P	8.204	2-15/16"
19560	.3281	21/64"	8.334	2-15/16"
19565	.3320	Q	8.433	3"
19570	.3346		8.500	76

EDP#	$d^{\dagger}$		l_1	l_2	
	Decimal	Diameter Metric			
19575	.3390	R	8.611	3"	1-11/16"
19580	.3438	11/32"	8.733	3"	1-11/16"
19585	.3480	S	8.839	3-1/16"	1-3/4"
19590	.3543		9.000	78	44
19595	.3580	T	9.093	3-1/16"	1-3/4"
19600	.3594	23/64"	9.129	3-1/16"	1-3/4"
19605	.3680	U	9.347	3-1/8"	1-13/16"
19615	.3750	3/8"	9.525	3-1/8"	1-13/16"
19620	.3770	V	9.576	3-1/4"	1-7/8"
19625	.3860	W	9.804	3-1/4"	1-7/8"
19630	.3906	25/64"	9.921	3-1/4"	1-7/8"
19635	.3937		10.000	84	49
19640	.3970	X	10.084	3-5/16"	1-15/16"
19645	.4040	Y	10.262	3-5/16"	1-15/16"
19650	.4062	13/32"	10.317	3-5/16"	1-15/16"
19655	.4130	Z	10.490	3-3/8"	2"
19660	.4134		10.500	86	51
19665	.4219	27/64"	10.716	3-3/8"	2"
19670	.4331		11.000	87	52
19675	.4375	7/16"	11.113	3-7/16"	2-1/16"
19685	.4531	29/64"	11.509	3-9/16"	2-1/8"
19690	.4688	15/32"	11.908	3-5/8"	2-1/8"
19695	.4724		12.000	94	56
19700	.4844	31/64"	12.304	3-11/16"	2-3/16"
19705	.4921		12.500	95	56
19710	.5000	1/2"	12.700	3-3/4"	2-1/4"
19720	.5156	33/64"	13.096	4-1/4"	2-3/8"
19725	.5312	17/32"	13.492	4-1/4"	2-3/8"
19730	.5315		13.500	107	60
19735	.5469	35/64"	13.891	4-1/4"	2-3/8"
19740	.5512		14.000	107	60
19745	.5625	9/16"	14.287	4-1/2"	2-1/2"
19755	.5781	37/64"	14.683	4-1/2"	2-1/2"
19760	.5906		15.000	115	65
19765	.5938	19/32"	15.082	4-1/2"	2-1/2"
19770	.6094	39/64"	15.478	4-1/2"	2-1/2"
19780	.6250	5/8"	15.875	4-1/2"	2-1/2"
19785	.6299		16.000	115	65

Series 1510H

NEW
ITEMS.0625" - .1575"
(1.588mm - 4.000mm)

TOLERANCES

d	+0.0000" -0.0005" (+0.0000 -0.127mm)
l ₁	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

Slow Helix - HARDLUBE Coated

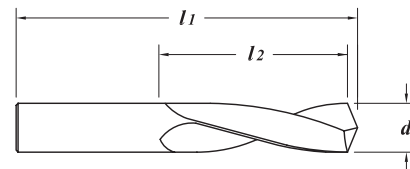
Reduzierte Helix - HARDLUBE-Beschichtet

Hélice Lenta - Recubrimiento de HARDLUBE

Hélice Réduite - Revêtement HARDLUBE

Elica Dolce - Rivestimento in HARDLUBE

缓螺旋 - HARDLUBE 涂层



Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Heavy web for extra rigidity and added strength
Thinned point

Recommended to run in titanium, inconel, hastelloy, waspaloy, and stainless steel

Live tooling recommended on lathe processes

Shank tolerance: h6

Uncoated - page 61



Vollhartmetallbohrer aus Feinkornhartmetall
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Starke Schneidkante für hohe Stabilität
Ausspitzung

Empfohlen für Titan, Inconel, Hastelloy, Waspaloy, und rostfreie Stähle

Empfehlung fuer den Einsatz auf der Drehmaschine

Schaft-Toleranz: h6

Unbeschichtet - Seite 61



Broca de submicrograno sólido carburo
Excelente resistencia térmica y lubricación
Cuerpo resistente para mayor rigidez y resistencia
Punta rebajada

Recomendado para titanio, inconel, hastelloy, waspaloy y acero inoxidable

Recomendación para la aplicación en torno

Tolerancia del vástago: h6

Sin recubrimiento - Página 61



Forets carbure submicrograin
Excellente resistance a la haute temperature et glissement
Corps lourd pour plus de rigidite
Ame amincie

Recommander pour titane, inconel, hastelloy, waspaloy et acier inoxydable

Outil de filature nécessaires pour une utilisation sur un processus de tournage

Tolerance queue: h6

Sans revêtement - Page 61



Punte in sub-micro grana
Eccellente resistenza al calore e autolubrificante
Gambo robusto per una massima rigidità
Centro scaricato

Raccomandata per lavorazioni su titanio, inconel, hastelloy, waspaloy e acciaio inox

Utensili rotanti sono consigliate se usato su un tornio

Tolleranza gambo: h6

Non Rivestito - Pagina 61



整体硬质合金钻头
耐热性和润滑性特好
大的中心刃产生超强刚性和强度
经过修磨的刀尖

推荐加工钛合金、铬镍铁耐热耐蚀合金、耐盐酸镍基合金、耐高温镍基合金和不锈钢合金

不建议在车床，或工具必须纺纱

柄部公差: h6

未涂层 - 61页

EDP#	$d^{\dagger}$			l_1	l_2
	Decimal	Diameter	Metric	Overall Length	Flute Length
19071	.0625	1/16"	1.588	1-3/4"	5/8"
19076	.0635	#52	1.613	1-3/4"	11/16"
19081	.0670	#51	1.702	1-3/4"	11/16"
19086	.0700	#50	1.778	1-3/4"	11/16"
19091	.0730	#49	1.854	1-3/4"	11/16"
19096	.0760	#48	1.930	1-3/4"	11/16"
19101	.0781	5/64"	1.984	1-3/4"	11/16"
19106	.0785	#47	1.994	1-3/4"	3/4"
19116	.0787		2.000	45	19
19121	.0810	#46	2.057	1-3/4"	3/4"
19126	.0820	#45	2.083	1-3/4"	3/4"
NEW 19128	.0827		2.100	45	19
19131	.0860	#44	2.184	1-3/4"	3/4"
19136	.0890	#43	2.261	1-3/4"	3/4"
NEW 19138	.0906		2.300	45	19
19141	.0935	#42	2.375	1-3/4"	3/4"
19146	.0938	3/32"	2.383	1-3/4"	3/4"
NEW 19148	.0945		2.400	46	21
19151	.0960	#41	2.438	1-13/16"	13/16"
19156	.0980	#40	2.489	1-13/16"	13/16"
19161	.0984		2.500	46	21
19166	.0995	#39	2.527	1-13/16"	13/16"
19171	.1015	#38	2.578	1-13/16"	13/16"
19176	.1040	#37	2.642	1-13/16"	13/16"
19181	.1065	#36	2.705	1-13/16"	13/16"
19186	.1094	7/64"	2.779	1-13/16"	13/16"
19191	.1100	#35	2.794	1-7/8"	7/8"
19196	.1110	#34	2.819	1-7/8"	7/8"
19201	.1130	#33	2.870	1-7/8"	7/8"
19206	.1160	#32	2.946	1-7/8"	7/8"
19211	.1181		3.000	48	22
19216	.1200	#31	3.048	1-7/8"	7/8"
NEW 19218	.1220		3.100	48	22
19221	.1250	1/8"	3.175	1-7/8"	7/8"
19226	.1285	#30	3.264	1-15/16"	15/16"
19231	.1360	#29	3.454	1-15/16"	15/16"
19236	.1378		3.500	49	24
19241	.1405	#28	3.569	1-15/16"	15/16"
19246	.1406	9/64"	3.571	1-15/16"	15/16"
19251	.1440	#27	3.658	2-1/16"	1"
19256	.1470	#26	3.734	2-1/16"	1"
19261	.1495	#25	3.797	2-1/16"	1"
19266	.1520	#24	3.861	2-1/16"	1"
19271	.1540	#23	3.912	2-1/16"	1"
19276	.1562	5/32"	3.967	2-1/16"	1"
19281	.1570	#22	3.988	2-1/8"	1-1/16"
19286	.1575		4.000	54	27

† Metric equivalents are for reference only

EDP#	$d^{\dagger}$		l_1	l_2	
	Decimal	Diameter			
19291	.1590	#21	4.039	2-1/8"	1-1/16"
19296	.1610	#20	4.089	2-1/8"	1-1/16"
19301	.1660	#19	4.216	2-1/8"	1-1/16"
19306	.1695	#18	4.305	2-1/8"	1-1/16"
19311	.1719	11/64"	4.366	2-1/8"	1-1/16"
19316	.1730	#17	4.394	2-3/16"	1-1/8"
19321	.1770	#16	4.496	2-3/16"	1-1/8"
19326	.1772		4.500	56	29
19331	.1800	#15	4.572	2-3/16"	1-1/8"
19336	.1820	#14	4.623	2-3/16"	1-1/8"
19341	.1850	#13	4.700	2-3/16"	1-1/8"
19346	.1875	3/16"	4.763	2-3/16"	1-1/8"
19351	.1890	#12	4.801	2-1/4"	1-3/16"
19356	.1910	#11	4.851	2-1/4"	1-3/16"
19361	.1935	#10	4.915	2-1/4"	1-3/16"
19366	.1960	#9	4.978	2-1/4"	1-3/16"
19371	.1969		5.000	57	30
19376	.1990	#8	5.055	2-1/4"	1-3/16"
19381	.2010	#7	5.105	2-1/4"	1-3/16"
19386	.2031	13/64"	5.159	2-1/4"	1-3/16"
19391	.2040	#6	5.182	2-3/8"	1-1/4"
19396	.2055	#5	5.220	2-3/8"	1-1/4"
19401	.2090	#4	5.309	2-3/8"	1-1/4"
19406	.2130	#3	5.410	2-3/8"	1-1/4"
19411	.2165		5.500	60	32
19416	.2188	7/32"	5.558	2-3/8"	1-1/4"
19421	.2210	#2	5.613	2-7/16"	1-5/16"
19426	.2280	#1	5.791	2-7/16"	1-5/16"
19431	.2340	A	5.944	2-7/16"	1-5/16"
19436	.2344	15/64"	5.954	2-7/16"	1-5/16"
19441	.2362		6.000	64	35
19446	.2380	B	6.045	2-1/2"	1-3/8"
19451	.2420	C	6.147	2-1/2"	1-3/8"
19456	.2460	D	6.248	2-1/2"	1-3/8"
19461	.2500	1/4" / E	6.350	2-1/2"	1-3/8"
19466	.2559		6.500	67	37
19471	.2570	F	6.528	2-5/8"	1-7/16"
19476	.2610	G	6.629	2-5/8"	1-7/16"
19481	.2656	17/64"	6.746	2-5/8"	1-7/16"
19486	.2660	H	6.756	2-11/16"	1-1/2"
19491	.2720	I	6.909	2-11/16"	1-1/2"
19496	.2756		7.000	68	38
19501	.2770	J	7.036	2-11/16"	1-1/2"
19506	.2810	K	7.137	2-11/16"	1-1/2"
19511	.2812	9/32"	7.142	2-11/16"	1-1/2"
19516	.2900	L	7.366	2-3/4"	1-9/16"
19521	.2950	M	7.493	2-3/4"	1-9/16"
19526	.2953		7.500	70	40
19531	.2969	19/64"	7.541	2-3/4"	1-9/16"
19536	.3020	N	7.671	2-15/16"	1-5/8"
19541	.3125	5/16"	7.938	2-15/16"	1-5/8"
19546	.3150		8.000	75	43
19551	.3160	O	8.026	2-15/16"	1-11/16"
19556	.3230	P	8.204	2-15/16"	1-11/16"
19561	.3281	21/64"	8.334	2-15/16"	1-11/16"
19566	.3320	Q	8.433	3"	1-11/16"
19571	.3346		8.500	76	43

continued →

Series 1510H (continued)

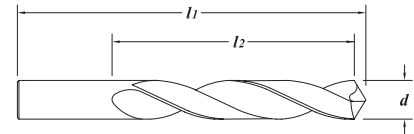
.3390" - .6299"
(8.611mm - 16.000mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
19576	.3390	R	8.611	3"
19581	.3438	11/32"	8.733	3"
19586	.3480	S	8.839	3-1/16"
19591	.3543		9.000	78
19596	.3580	T	9.093	3-1/16"
19601	.3594	23/64"	9.129	3-1/16"
19606	.3680	U	9.347	3-1/8"
19611	.3740		9.500	79
19616	.3750	3/8"	9.525	3-1/8"
19621	.3770	V	9.576	3-1/4"
19626	.3860	W	9.804	3-1/4"
19631	.3906	25/64"	9.921	3-1/4"
19636	.3937		10.000	84
19641	.3970	X	10.084	3-5/16"
19646	.4040	Y	10.262	3-5/16"
19651	.4062	13/32"	10.317	3-5/16"
19656	.4130	Z	10.490	3-3/8"
19661	.4134		10.500	86
19666	.4219	27/64"	10.716	3-3/8"
19671	.4331		11.000	87
19676	.4375	7/16"	11.113	3-7/16"
19681	.4528		11.500	91
19686	.4531	29/64"	11.509	3-9/16"
19691	.4688	15/32"	11.908	3-5/8"
19696	.4724		12.000	94
19701	.4844	31/64"	12.304	3-11/16"
19706	.4921		12.500	95
19711	.5000	1/2"	12.700	3-3/4"
19716	.5118		13.000	107
19721	.5156	33/64"	13.096	4-1/4"
19726	.5312	17/32"	13.492	4-1/4"
19731	.5315		13.500	107
19736	.5469	35/64"	13.891	4-1/4"
19741	.5512		14.000	107
19746	.5625	9/16"	14.287	4-1/2"
19751	.5709		14.500	115
19756	.5781	37/64"	14.683	4-1/2"
19761	.5906		15.000	115
19766	.5938	19/32"	15.082	4-1/2"
19771	.6094	39/64"	15.478	4-1/2"
19776	.6102		15.500	115
19781	.6250	5/8"	15.875	4-1/2"
19786	.6299		16.000	115

TOLERANCES

d	+.0000" -.0005" (+.0000 -.0127mm)	
l_1	$\leq 1/8"$	+.125" -.062" (+3.175 -1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 -3.175mm)
l_2	$\leq 1/8"$	+.125" -.062" (+3.175 -1.588mm)
	$> 1/8"$	+.125" -.125" (+3.175 -3.175mm)

**NEW
ITEMS**
Series 1520, 1205

 .0625" - .1015"
(1.588mm - 2.578mm)

**GENERAL PURPOSE
DRILLS**


Solid submicron grain carbide drill
No spotting required in most applications
4-facet self-centering point
General purpose for all material groups
Live tooling recommended on lathe processes
Shank tolerance: h6
Hardlube Coating - page 73



Vollhartmetallbohrer aus Feinkornhartmetall
Vorzentrieren bei den meisten Anwendungen nicht notwendig
4-Fasen-Anschliff Selbstzentrierend Punkt
Allzweck für alle Materialgruppen
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 73



Broca de submicrograno sólido carburo
No se requiere pretaladrado para la mayoría de las aplicaciones
Punta de 4 caras autocentrada
De uso general para todos los grupos de materiales
Recomendación para la aplicación en torno
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 73



Forets carbure submicrograin
Pas de point de centre requis pour la plupart des applications
Pointe auto centranse avec 4 faces de depouille
Usage général pour tous les groupes de matériaux
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6
Revêtement Hardlube - Page 73



Punte in sub-micro grana
Pre-centraggio non richiesto nella maggior parte delle applicazioni
Punto 4 facce autocentrante
Scopo generale per tutte le materie
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 73



整体硬质合金钻头
自定心刀尖
在多数用途中不需要定心
4-小平面刀尖
通用使用的所有材料组
不建议在车床，或工具必须纺纱
柄部公差: h6
Hardlube 涂层 - 73页

3xD (1520) EDP#	5xD (1205) EDP#	d †		l_1 Overall Length	l_2 Flute Length
		Decimal	Diameter		
77165		.0625	1/16"	1.588	1-3/4"
	89165	.0625	1/16"	1.588	3/4"
77170		.0635	#52	1.613	1-3/4"
	89170	.0635	#52	1.613	3/4"
77175		.0670	#51	1.702	1-3/4"
	89175	.0670	#51	1.702	3/4"
77180		.0700	#50	1.778	1-3/4"
	89180	.0700	#50	1.778	7/8"
77185		.0730	#49	1.854	1-3/4"
	89185	.0730	#49	1.854	7/8"
77190		.0760	#48	1.930	1-3/4"
	89190	.0760	#48	1.930	7/8"
77195		.0781	5/64"	1.984	1-3/4"
	89195	.0781	5/64"	1.984	7/8"
77200		.0785	#47	1.994	1-3/4"
	89200	.0785	#47	1.994	7/8"
77205		.0787		2.000	44
	89205	.0787		2.000	22
77210		.0810	#46	2.057	1-3/4"
	89210	.0810	#46	2.057	7/8"
77215		.0820	#45	2.083	1-3/4"
	89215	.0820	#45	2.083	7/8"
77220		.0860	#44	2.184	1-3/4"
	89220	.0860	#44	2.184	2"
77225		.0890	#43	2.261	1-3/4"
	89225	.0890	#43	2.261	1"
77230		.0935	#42	2.375	1-3/4"
	89230	.0935	#42	2.375	1"
77235		.0938	3/32"	2.383	1-3/4"
	89235	.0938	3/32"	2.383	1"
77240		.0960	#41	2.438	1-13/16"
	89240	.0960	#41	2.438	1"
77245		.0980	#40	2.489	1-13/16"
	89245	.0980	#40	2.489	1"
77250		.0984		2.500	46
	89250	.0984		2.500	21
77255		.0995	#39	2.527	1-13/16"
	89255	.0995	#39	2.527	13/16"
77260		.1015	#38	2.578	1-1/4"
	89260	.1015	#38	2.578	1-1/4"

continued →

Series 1520, 1205 (continued)

.1040" - .1719"
(2.642mm - 4.366mm)

3xD (1520) EDP#	5xD (1205) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
77265		.1040	#37	2.642	1-13/16"
	89265	.1040	#37	2.642	1-1/4"
77270		.1065	#36	2.705	1-13/16"
	89270	.1065	#36	2.705	1-1/4"
77275		.1094	7/64"	2.779	1-13/16"
	89275	.1094	7/64"	2.779	1-1/4"
77280		.1100	#35	2.794	7/8"
	89280	.1100	#35	2.794	1-1/4"
77285		.1110	#34	2.819	7/8"
	89285	.1110	#34	2.819	1-1/4"
77290		.1130	#33	2.870	7/8"
	89290	.1130	#33	2.870	1-1/4"
77295		.1160	#32	2.946	7/8"
	89295	.1160	#32	2.946	1-1/4"
77300		.1181		3.000	48
	89300	.1181		3.000	57
77305		.1200	#31	3.048	7/8"
	89305	.1200	#31	3.048	1-1/4"
77310		.1250	1/8"	3.175	7/8"
	89310	.1250	1/8"	3.175	1-1/4"
77315		.1285	#30	3.264	1-15/16"
	89315	.1285	#30	3.264	1-1/4"
77320		.1360	#29	3.454	1-15/16"
	89320	.1360	#29	3.454	1-3/8"
77325		.1378		3.500	49
	89325	.1378		3.500	63
77330		.1405	#28	3.569	1-15/16"
	89330	.1405	#28	3.569	1-3/8"
77335		.1406	9/64"	3.571	1-15/16"
	89335	.1406	9/64"	3.571	1-3/8"
77340		.1440	#27	3.658	2-1/16"
	89340	.1440	#27	3.658	1-3/8"
77345		.1470	#26	3.734	2-1/16"
	89345	.1470	#26	3.734	1-3/8"
77350		.1495	#25	3.797	2-1/16"
	89350	.1495	#25	3.797	1-3/8"
77355		.1520	#24	3.861	2-1/16"
	89355	.1520	#24	3.861	1-3/8"
77360		.1540	#23	3.912	2-1/16"
	89360	.1540	#23	3.912	1-3/8"
77365		.1562	5/32"	3.967	2-1/16"
	89365	.1562	5/32"	3.967	1-3/8"
77370		.1570	#22	3.988	2-1/8"
	89370	.1570	#22	3.988	1-1/16"
77375		.1575		4.000	54
	89375	.1575		4.000	63
77380		.1590	#21	4.039	2-1/8"
	89380	.1590	#21	4.039	1-1/16"
77385		.1610	#20	4.089	2-1/8"
	89385	.1610	#20	4.089	1-3/8"
77390		.1660	#19	4.216	2-1/8"
	89390	.1660	#19	4.216	1-1/16"
77395		.1695	#18	4.305	2-3/4"
	89395	.1695	#18	4.305	1-5/8"
77400		.1719	11/64"	4.366	2-1/8"
	89400	.1719	11/64"	4.366	1-1/16"

3xD (1520) EDP#	5xD (1205) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length	
		Decimal		Metric		
77405		.1730	#17	4.394	2-3/16"	1-1/8"
	89405	.1730	#17	4.394	2-3/4"	1-5/8"
77410		.1770	#16	4.496	2-3/16"	1-1/8"
	89410	.1770	#16	4.496	2-3/4"	1-5/8"
77415		.1772		4.500	56	29
	89415	.1772		4.500	70	41
77420		.1800	#15	4.572	2-3/16"	1-1/8"
	89420	.1800	#15	4.572	2-3/4"	1-5/8"
77425		.1820	#14	4.623	2-3/16"	1-1/8"
	89425	.1820	#14	4.623	2-3/4"	1-5/8"
77430		.1850	#13	4.700	2-3/16"	1-1/8"
	89430	.1850	#13	4.700	2-3/4"	1-5/8"
77435		.1875	3/16"	4.763	2-3/16"	1-1/8"
	89435	.1875	3/16"	4.763	2-3/4"	1-5/8"
77440		.1890	#12	4.801	2-1/4"	1-3/16"
	89440	.1890	#12	4.801	2-3/4"	1-5/8"
77445		.1910	#11	4.851	2-1/4"	1-3/16"
	89445	.1910	#11	4.851	2-3/4"	1-5/8"
77450		.1935	#10	4.915	2-1/4"	1-3/16"
	89450	.1935	#10	4.915	2-3/4"	1-5/8"
77455		.1960	#9	4.978	2-1/4"	1-3/16"
	89455	.1960	#9	4.978	3"	1-3/4"
77460		.1969		5.000	57	30
	89460	.1969		5.000	76	44
77465		.1990	#8	5.055	2-1/4"	1-3/16"
	89465	.1990	#8	5.055	3"	1-3/4"
77470		.2010	#7	5.105	2-1/4"	1-3/16"
	89470	.2010	#7	5.105	3"	1-3/4"
77475		.2031	13/64"	5.159	2-1/4"	1-3/16"
	89475	.2031	13/64"	5.159	3"	1-3/4"
77480		.2040	#6	5.182	2-3/8"	1-1/4"
	89480	.2040	#6	5.182	3"	1-3/4"
77485		.2055	#5	5.220	2-3/8"	1-1/4"
	89485	.2055	#5	5.220	3"	1-3/4"
77490		.2090	#4	5.309	2-3/8"	1-1/4"
	89490	.2090	#4	5.309	3"	1-3/4"
77495		.2130	#3	5.410	2-3/8"	1-1/4"
	89495	.2130	#3	5.410	3"	1-3/4"
77500		.2165		5.500	60	32
	89500	.2165		5.500	76	44
77505		.2188	7/32"	5.558	2-3/8"	1-1/4"
	89505	.2188	7/32"	5.558	3"	1-3/4"
77510		.2210	#2	5.613	2-7/16"	1-5/16"
	89510	.2210	#2	5.613	3"	1-3/4"
77515		.2280	#1	5.791	2-7/16"	1-5/16"
	89515	.2280	#1	5.791	3"	1-3/4"
77520		.2340	A	5.944	2-7/16"	1-5/16"
	89520	.2340	A	5.944	3-1/4"	2"
77525		.2344	15/64"	5.954	2-7/16"	1-5/16"
	89525	.2344	15/64"	5.954	3-1/4"	2"
77530		.2362		6.000	64	35
	89530	.2362		6.000	82	50
77535		.2380	B	6.045	2-1/2"	1-3/8"
	89535	.2380	B	6.045	3-1/4"	2"
77540		.2420	C	6.147	2-1/2"	1-3/8"
	89540	.2420	C	6.147	3-1/4"	2"

continued →

Series 1520, 1205 (continued)

.2460" - .3543"
(6.248mm - 9.000mm)

3xD (1520) EDP#	5xD (1205) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal			
77545		.2460	D	6.248	2-1/2"
	89545	.2460	D	6.248	1-3/8"
77550		.2500	1/4" / E	6.350	2"
	89550	.2500	1/4" / E	6.350	2-1/2"
77555		.2559		6.500	1-3/8"
	89555	.2559		6.500	2"
77560		.2570	F	6.528	67
	89560	.2570	F	6.528	37
77565		.2610	G	6.629	82
	89565	.2610	G	6.629	50
77570		.2656	17/64"	6.746	2-5/8"
	89570	.2656	17/64"	6.746	1-7/16"
77575		.2660	H	6.756	2-1/2"
	89575	.2660	H	6.756	1-1/2"
77580		.2720	I	6.909	3-1/2"
	89580	.2720	I	6.909	2-1/8"
77585		.2756		7.000	2-11/16"
	89585	.2756		7.000	1-1/2"
77590		.2770	J	7.036	88
	89590	.2770	J	7.036	54
77595		.2810	K	7.137	2-11/16"
	89595	.2810	K	7.137	1-1/2"
77600		.2812	9/32"	7.142	3-1/2"
	89600	.2812	9/32"	7.142	2-1/8"
77605		.2900	L	7.366	2-3/4"
	89605	.2900	L	7.366	1-9/16"
77610		.2950	M	7.493	3-1/2"
	89610	.2950	M	7.493	2-1/8"
77615		.2953		7.500	2-3/4"
	89615	.2953		7.500	2-3/8"
77620		.2969	19/64"	7.541	70
	89620	.2969	19/64"	7.541	60
77625		.3020	N	7.671	2-3/4"
	89625	.3020	N	7.671	1-9/16"
77630		.3125	5/16"	7.938	3-3/4"
	89630	.3125	5/16"	7.938	2-3/8"
77635		.3150		8.000	2-15/16"
	89635	.3150		8.000	1-5/8"
77640		.3160	O	8.026	75
	89640	.3160	O	8.026	43
77645		.3230	P	8.204	95
	89645	.3230	P	8.204	60
77650		.3281	21/64"	8.334	2-15/16"
	89650	.3281	21/64"	8.334	1-11/16"
77655		.3320	Q	8.433	4"
	89655	.3320	Q	8.433	2-1/2"
77660		.3346		8.500	3"
	89660	.3346		8.500	1-11/16"
77665		.3390	R	8.611	76
	89665	.3390	R	8.611	43
77670		.3438	11/32"	8.733	101
	89670	.3438	11/32"	8.733	63
77675		.3480	S	8.839	3"
	89675	.3480	S	8.839	1-11/16"
77680		.3543		9.000	4"
	89680	.3543		9.000	2-1/2"

3xD (1520) EDP#	5xD (1205) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal		Metric	
77685		.3580	T	9.093	3-1/16"
	89685	.3580	T	9.093	4-1/4"
77690		.3594	23/64"	9.129	3-1/16"
	89690	.3594	23/64"	9.129	4-1/4"
77695		.3680	U	9.347	3-1/8"
	89695	.3680	U	9.347	4-1/4"
77700		.3740		9.500	79
	89700	.3740		9.500	107
77705		.3750	3/8"	9.525	3-1/8"
	89705	.3750	3/8"	9.525	4-1/4"
77710		.3770	V	9.576	3-1/4"
	89710	.3770	V	9.576	4-1/4"
77715		.3860	W	9.804	3-1/4"
	89715	.3860	W	9.804	4-1/2"
77720		.3906	25/64"	9.921	3-1/4"
	89720	.3906	25/64"	9.921	4-1/2"
77725		.3937		10.000	84
	89725	.3937		10.000	114
77730		.3970	X	10.084	3-5/16"
	89730	.3970	X	10.084	4-1/2"
	89735	.4040	Y	10.262	4-1/2"
77740		.4062	13/32"	10.317	3-5/16"
	89740	.4062	13/32"	10.317	4-1/2"
77745		.4130	Z	10.490	3-3/8"
	89745	.4130	Z	10.490	4-1/2"
77750		.4134		10.500	86
	89750	.4134		10.500	114
77755		.4219	27/64"	10.716	3-3/8"
	89755	.4219	27/64"	10.716	4-1/2"
77760		.4331		11.000	87
	89760	.4331		11.000	114
77765		.4375	7/16"	11.113	3-7/16"
	89765	.4375	7/16"	11.113	4-1/2"
77770		.4528		11.500	91
	89770	.4528		11.500	120
77775		.4531	29/64"	11.509	3-9/16"
	89775	.4531	29/64"	11.509	4-3/4"
77780		.4688	15/32"	11.908	3-5/8"
	89780	.4688	15/32"	11.908	4-3/4"
77785		.4724		12.000	94
	89785	.4724		12.000	120
77790		.4844	31/64"	12.304	3-11/16"
	89790	.4844	31/64"	12.304	4-3/4"
77795		.4921		12.500	95
	89795	.4921		12.500	120
77800		.5000	1/2"	12.700	3-3/4"
	89800	.5000	1/2"	12.700	4-3/4"
77805		.5118		13.000	107
	89805	.5118		13.000	127
77810		.5156	33/64"	13.096	4-1/4"
	89810	.5156	33/64"	13.096	5"
77815		.5312	17/32"	13.492	4-1/4"
	89815	.5312	17/32"	13.492	5"
77820		.5315		13.500	107
	89820	.5315		13.500	127

continued →

Series 1520, 1205 (continued)

.5469" - .6299"
(13.891mm - 16.000mm)

	3xD (1520) EDP#	5xD (1205) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
			Decimal	Metric		
NEW	77825		.5469	35/64"	13.891	4-1/4"
		89825	.5469	35/64"	13.891	5"
NEW	77830		.5512		14.000	107
		89830	.5512		14.000	127
NEW	77835		.5625	9/16"	14.287	4-1/2"
		89835	.5625	9/16"	14.287	5"
NEW	77840		.5709		14.500	115
		89840	.5709		14.500	127
NEW	77845		.5781	37/64"	14.683	4-1/2"
		89845	.5781	37/64"	14.683	5-1/4"
NEW	77850		.5906		15.000	115
		89850	.5906		15.000	133
NEW	77855		.5938	19/32"	15.082	4-1/2"
		89855	.5938	19/32"	15.082	5-1/4"
NEW	77860		.6094	39/64"	15.478	4-1/2"
		89860	.6094	39/64"	15.478	5-1/4"
NEW	77865		.6102		15.500	115
		89865	.6102		15.500	133
NEW	77870		.6250	5/8"	15.875	4-1/2"
		89870	.6250	5/8"	15.875	5-1/4"
NEW	77875		.6299		16.000	115
		89875	.6299		16.000	133

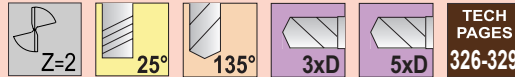


Drill and Reamer Manufacturing

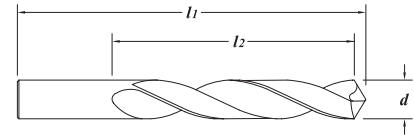
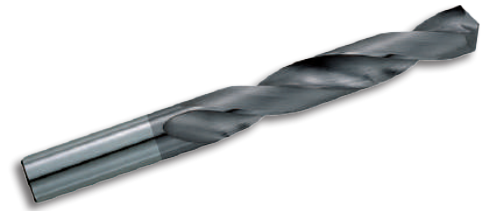
TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l ₁	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)
l ₂	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)

**NEW
ITEMS**
Series 1520H, 1205H

 .0625" - .1015"
(1.588mm - 2.578mm)


HARDLUBE Coated
HARDLUBE-Beschichtet
Recubrimiento de HARDLUBE
Revêtement HARDLUBE
Rivestimento in HARDLUBE
HARDLUBE 涂层


**GENERAL PURPOSE
DRILLS**


Solid submicron grain carbide drill
 Excellent heat resistance and lubricity
 No spotting required in most applications
 4-facet self-centering point
General purpose for all material groups
 Live tooling recommended on lathe processes
 Shank tolerance: h6
 Uncoated - page 67



Vollhartmetallbohrer aus Feinkornhartmetall
 Exzellente Hitzebeständigkeit und Schmiereigenschaften
 Vorzentrieren bei den meisten Anwendungen nicht notwendig
 4-Fasen-Anschliff Selbstzentrierend Punkt
Allzweck für alle Materialgruppen
 Empfehlung fuer den Einsatz auf der Drehmaschine
 Schaft-Toleranz: h6
 Unbeschichtet - Seite 67



Broca de submicrograno sólido carburo
 Excelente resistencia térmica y lubricación
 No se requiere pretaladrado para la mayoría de las aplicaciones
 Punta de 4 caras autocentrada
De uso general para todos los grupos de materiales
 Recomendación para la aplicación en torno
 Tolerancia del vástago: h6
 Sin recubrimiento - Página 67



Forets carbure submicrograin
 Excellente resistance a la haute temperature et glissement
 Pas de point de centre requis pour la plupart des applications
 Pointe auto centrante avec 4 faces de depouille
Usage général pour tous les groupes de matériaux
 Outil de filature nécessaires pour une utilisation sur un processus de tournage
 Tolerance queue: h6
 Sans revêtement - Page 67



Punta in sub-micro grana
 Eccellente resistenza al calore e autolubrificante
 Pre-centraggio non richiesto nella maggior parte delle applicazioni
 Punto 4 facce autocentrante
Scopo generale per tutte le materie
 Utensili rotanti sono consigliate se usato su un tornio
 Tolleranza gambo: h6
 Non Rivestito - Pagina 67



整体硬质合金钻头
 耐热性和润滑性特好
 自定心刀尖
 在多数用途中不需要定心
通用使用的所有材料组
 不建议在车床，或工具必须纺纱
 柄部公差: h6
 未涂层 - 677页

3xD (1520H) EDP#	5xD (1205H) EDP#	d †		l ₁ Overall Length	l ₂ Flute Length
		Decimal	Diameter		
77166		.0625	1/16"	1-3/4"	5/8"
	89166	.0625	1/16"	1-3/4"	3/4"
77171		.0635	#52	1-3/4"	11/16"
	89171	.0635	#52	1-3/4"	3/4"
77176		.0670	#51	1-3/4"	11/16"
	89176	.0670	#51	1-3/4"	3/4"
77181		.0700	#50	1-3/4"	11/16"
	89181	.0700	#50	1-3/4"	7/8"
77186		.0730	#49	1-3/4"	11/16"
	89186	.0730	#49	1-3/4"	7/8"
77191		.0760	#48	1-3/4"	11/16"
	89191	.0760	#48	1-3/4"	7/8"
77196		.0781	5/64"	1-3/4"	11/16"
	89196	.0781	5/64"	1-3/4"	7/8"
77201		.0785	#47	1-3/4"	3/4"
	89201	.0785	#47	1-3/4"	7/8"
77206		.0787		44	19
	89206	.0787		44	22
77211		.0810	#46	1-3/4"	3/4"
	89211	.0810	#46	1-3/4"	7/8"
77216		.0820	#45	1-3/4"	3/4"
	89216	.0820	#45	1-3/4"	7/8"
77221		.0860	#44	1-3/4"	3/4"
	89221	.0860	#44	2"	1"
77226		.0890	#43	1-3/4"	3/4"
	89226	.0890	#43	2"	1"
77231		.0935	#42	1-3/4"	3/4"
	89231	.0935	#42	2"	1"
77236		.0938	3/32"	1-3/4"	3/4"
	89236	.0938	3/32"	2"	1"
77241		.0960	#41	1-13/16"	13/16"
	89241	.0960	#41	2"	1"
77246		.0980	#40	1-13/16"	13/16"
	89246	.0980	#40	2"	1"
77251		.0984		46	21
	89251	.0984		57	32
77256		.0995	#39	1-13/16"	13/16"
	89256	.0995	#39	2-1/4"	1-1/4"
77261		.1015	#38	1-13/16"	13/16"
	89261	.1015	#38	2-1/4"	1-1/4"

Series 1520H, 1205H (continued)

.1040" - .1719"
(2.642mm - 4.366mm)

GENERAL PURPOSE
DRILLS

3xD (1520H) EDP#	5xD (1205H) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
77266	89266	.1040	#37	2.642	1-13/16"
		.1040	#37	2.642	2-1/4"
77271	89271	.1065	#36	2.705	1-13/16"
		.1065	#36	2.705	2-1/4"
77276	89276	.1094	7/64"	2.779	1-13/16"
		.1094	7/64"	2.779	2-1/4"
77281	89281	.1100	#35	2.794	1-7/8"
		.1100	#35	2.794	2-1/4"
77286	89286	.1110	#34	2.819	1-7/8"
		.1110	#34	2.819	2-1/4"
77291	89291	.1130	#33	2.870	1-7/8"
		.1130	#33	2.870	2-1/4"
77296	89296	.1160	#32	2.946	1-7/8"
		.1160	#32	2.946	2-1/4"
77301	89301	.1181		3.000	48
		.1181		3.000	57
77306	89306	.1200	#31	3.048	1-7/8"
		.1200	#31	3.048	2-1/4"
77311	89311	.1250	1/8"	3.175	1-7/8"
		.1250	1/8"	3.175	2-1/4"
77316	89316	.1285	#30	3.264	1-15/16"
		.1285	#30	3.264	2-1/4"
77321	89321	.1360	#29	3.454	1-15/16"
		.1360	#29	3.454	2-1/2"
77326	89326	.1378		3.500	49
		.1378		3.500	63
77331	89331	.1405	#28	3.569	1-15/16"
		.1405	#28	3.569	2-1/2"
77336	89336	.1406	9/64"	3.571	1-15/16"
		.1406	9/64"	3.571	2-1/2"
77341	89341	.1440	#27	3.658	2-1/16"
		.1440	#27	3.658	2-1/2"
77346	89346	.1470	#26	3.734	2-1/16"
		.1470	#26	3.734	2-1/2"
77351	89351	.1495	#25	3.797	2-1/16"
		.1495	#25	3.797	2-1/2"
77356	89356	.1520	#24	3.861	2-1/16"
		.1520	#24	3.861	2-1/2"
77361	89361	.1540	#23	3.912	2-1/16"
		.1540	#23	3.912	2-1/2"
77366	89366	.1562	5/32"	3.967	2-1/16"
		.1562	5/32"	3.967	2-1/2"
77371	89371	.1570	#22	3.988	2-1/8"
		.1570	#22	3.988	2-1/2"
77376	89376	.1575		4.000	54
		.1575		4.000	63
77381	89381	.1590	#21	4.039	2-1/8"
		.1590	#21	4.039	2-1/2"
77386	89386	.1610	#20	4.089	2-1/8"
		.1610	#20	4.089	2-1/2"
77391	89391	.1660	#19	4.216	2-1/8"
		.1660	#19	4.216	2-3/4"
77396	89396	.1695	#18	4.305	2-1/8"
		.1695	#18	4.305	2-3/4"
77401	89401	.1719	11/64"	4.366	2-1/8"
		.1719	11/64"	4.366	2-3/4"

3xD (1520H) EDP#	5xD (1205H) EDP#	d † Diameter			l_1 Overall Length	l_2 Flute Length
		Decimal		Metric		
77406		.1730	#17	4.394	2-3/16"	1-1/8"
	89406	.1730	#17	4.394	2-3/4"	1-5/8"
77411		.1770	#16	4.496	2-3/16"	1-1/8"
	89411	.1770	#16	4.496	2-3/4"	1-5/8"
77416		.1772		4.500	56	29
	89416	.1772		4.500	70	41
77421		.1800	#15	4.572	2-3/16"	1-1/8"
	89421	.1800	#15	4.572	2-3/4"	1-5/8"
77426		.1820	#14	4.623	2-3/16"	1-1/8"
	89426	.1820	#14	4.623	2-3/4"	1-5/8"
77431		.1850	#13	4.700	2-3/16"	1-1/8"
	89431	.1850	#13	4.700	2-3/4"	1-5/8"
77436		.1875	3/16"	4.763	2-3/16"	1-1/8"
	89436	.1875	3/16"	4.763	2-3/4"	1-5/8"
77441		.1890	#12	4.801	2-1/4"	1-3/16"
	89441	.1890	#12	4.801	2-3/4"	1-5/8"
77446		.1910	#11	4.851	2-1/4"	1-3/16"
	89446	.1910	#11	4.851	2-3/4"	1-5/8"
77451		.1935	#10	4.915	2-1/4"	1-3/16"
	89451	.1935	#10	4.915	2-3/4"	1-5/8"
77456		.1960	#9	4.978	2-1/4"	1-3/16"
	89456	.1960	#9	4.978	3"	1-3/4"
77461		.1969		5.000	57	30
	89461	.1969		5.000	76	44
77466		.1990	#8	5.055	2-1/4"	1-3/16"
	89466	.1990	#8	5.055	3"	1-3/4"
77471		.2010	#7	5.105	2-1/4"	1-3/16"
	89471	.2010	#7	5.105	3"	1-3/4"
77476		.2031	13/64"	5.159	2-1/4"	1-3/16"
	89476	.2031	13/64"	5.159	3"	1-3/4"
77481		.2040	#6	5.182	2-3/8"	1-1/4"
	89481	.2040	#6	5.182	3"	1-3/4"
77486		.2055	#5	5.220	2-3/8"	1-1/4"
	89486	.2055	#5	5.220	3"	1-3/4"
77491		.2090	#4	5.309	2-3/8"	1-1/4"
	89491	.2090	#4	5.309	3"	1-3/4"
77496		.2130	#3	5.410	2-3/8"	1-1/4"
	89496	.2130	#3	5.410	3"	1-3/4"
77501		.2165		5.500	60	32
	89501	.2165		5.500	76	44
77506		.2188	7/32"	5.558	2-3/8"	1-1/4"
	89506	.2188	7/32"	5.558	3"	1-3/4"
77511		.2210	#2	5.613	2-7/16"	1-5/16"
	89511	.2210	#2	5.613	3"	1-3/4"
77516		.2280	#1	5.791	2-7/16"	1-5/16"
	89516	.2280	#1	5.791	3"	1-3/4"
77521		.2340	A	5.944	2-7/16"	1-5/16"
	89521	.2340	A	5.944	3-1/4"	2"
77526		.2344	15/64"	5.954	2-7/16"	1-5/16"
	89526	.2344	15/64"	5.954	3-1/4"	2"
77531		.2362		6.000	64	35
	89531	.2362		6.000	82	50
77536		.2380	B	6.045	2-1/2"	1-3/8"
	89536	.2380	B	6.045	3-1/4"	2"
77541		.2420	C	6.147	2-1/2"	1-3/8"
	89541	.2420	C	6.147	3-1/4"	2"

continued →

Series 1520H, 1205H (continued)

.2460" - .3543"
(6.248mm - 9.000mm)

GENERAL PURPOSE
DRILLS

3xD (1520H) EDP#	5xD (1205H) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal			
77546		.2460	D	6.248	2-1/2"
	89546	.2460	D	6.248	1-3/8"
77551		.2500	1/4" / E	6.350	2"
	89551	.2500	1/4" / E	6.350	1-3/8"
77556		.2559		6.500	3-1/4"
	89556	.2559		6.500	2"
77561		.2570	F	6.528	67
	89561	.2570	F	6.528	37
77566		.2610	G	6.629	82
	89566	.2610	G	6.629	50
77571		.2656	17/64"	6.746	2-5/8"
	89571	.2656	17/64"	6.746	1-7/16"
77576		.2660	H	6.756	3-1/4"
	89576	.2660	H	6.756	2"
77581		.2720	I	6.909	3-1/2"
	89581	.2720	I	6.909	2-1/8"
77586		.2756		7.000	2-11/16"
	89586	.2756		7.000	1-1/2"
77591		.2770	J	7.036	88
	89591	.2770	J	7.036	54
77596		.2810	K	7.137	2-11/16"
	89596	.2810	K	7.137	1-1/2"
77601		.2812	9/32"	7.142	3-1/2"
	89601	.2812	9/32"	7.142	2-1/8"
77606		.2900	L	7.366	2-3/4"
	89606	.2900	L	7.366	1-9/16"
77611		.2950	M	7.493	3-1/2"
	89611	.2950	M	7.493	2-1/8"
77616		.2953		7.500	3-3/4"
	89616	.2953		7.500	2-3/8"
77621		.2969	19/64"	7.541	70
	89621	.2969	19/64"	7.541	40
77626		.3020	N	7.671	95
	89626	.3020	N	7.671	60
77631		.3125	5/16"	7.938	2-15/16"
	89631	.3125	5/16"	7.938	1-5/8"
77636		.3150		8.000	3-3/4"
	89636	.3150		8.000	2-3/8"
77641		.3160	O	8.026	75
	89641	.3160	O	8.026	43
77646		.3230	P	8.204	95
	89646	.3230	P	8.204	60
77651		.3281	21/64"	8.334	2-15/16"
	89651	.3281	21/64"	8.334	1-11/16"
77656		.3320	Q	8.433	4"
	89656	.3320	Q	8.433	2-1/2"
77661		.3346		8.500	3"
	89661	.3346		8.500	1-11/16"
77666		.3390	R	8.611	4"
	89666	.3390	R	8.611	2-1/2"
77671		.3438	11/32"	8.733	3"
	89671	.3438	11/32"	8.733	1-11/16"
77676		.3480	S	8.839	4"
	89676	.3480	S	8.839	2-1/2"
77681		.3543		9.000	3-1/16"
	89681	.3543		9.000	1-3/4"

3xD (1520H) EDP#	5xD (1205H) EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	
		Decimal	Metric			
77686		.3580	T	9.093	3-1/16"	1-3/4"
	89686	.3580	T	9.093	4-1/4"	2-3/4"
77691		.3594	23/64"	9.129	3-1/16"	1-3/4"
	89691	.3594	23/64"	9.129	4-1/4"	2-3/4"
77696		.3680	U	9.347	3-1/8"	1-13/16"
	89696	.3680	U	9.347	4-1/4"	2-3/4"
77701		.3740		9.500	79	46
	89701	.3740		9.500	107	70
77706		.3750	3/8"	9.525	3-1/8"	1-13/16"
	89706	.3750	3/8"	9.525	4-1/4"	2-3/4"
77711		.3770	V	9.576	3-1/4"	1-7/8"
	89711	.3770	V	9.576	4-1/4"	2-3/4"
77716		.3860	W	9.804	3-1/4"	1-7/8"
	89716	.3860	W	9.804	4-1/2"	2-7/8"
77721		.3906	25/64"	9.921	3-1/4"	1-7/8"
	89721	.3906	25/64"	9.921	4-1/2"	2-7/8"
77726		.3937		10.000	84	49
	89726	.3937		10.000	114	73
77731		.3970	X	10.084	3-5/16"	1-15/16"
	89731	.3970	X	10.084	4-1/2"	2-7/8"
77736		.4040	Y	10.262	3-5/16"	1-15/16"
	89736	.4040	Y	10.262	4-1/2"	2-7/8"
77741		.4062	13/32"	10.317	3-5/16"	1-15/16"
	89741	.4062	13/32"	10.317	4-1/2"	2-7/8"
77746		.4130	Z	10.490	3-3/8"	2"
	89746	.4130	Z	10.490	4-1/2"	2-7/8"
77751		.4134		10.500	86	51
	89751	.4134		10.500	114	73
77756		.4219	27/64"	10.716	3-3/8"	2"
	89756	.4219	27/64"	10.716	4-1/2"	2-7/8"
77761		.4331		11.000	87	52
	89761	.4331		11.000	114	73
77766		.4375	7/16"	11.113	3-7/16"	2-1/16"
	89766	.4375	7/16"	11.113	4-1/2"	2-7/8"
77771		.4528		11.500	91	54
	89771	.4528		11.500	120	76
77776		.4531	29/64"	11.509	3-9/16"	2-1/8"
	89776	.4531	29/64"	11.509	4-3/4"	3"
77781		.4688	15/32"	11.908	3-5/8"	2-1/8"
	89781	.4688	15/32"	11.908	4-3/4"	3"
77786		.4724		12.000	94	56
	89786	.4724		12.000	120	76
77791		.4844	31/64"	12.304	3-11/16"	2-3/16"
	89791	.4844	31/64"	12.304	4-3/4"	3"
77796		.4921		12.500	95	56
	89796	.4921		12.500	120	76
77801		.5000	1/2"	12.700	3-3/4"	2-1/4"
	89801	.5000	1/2"	12.700	4-3/4"	3"
77806		.5118		13.000	107	60
	89806	.5118		13.000	127	83
77811		.5156	33/64"	13.096	4-1/4"	2-3/8"
	89811	.5156	33/64"	13.096	5"	3-1/4"
77816		.5312	17/32"	13.492	4-1/4"	2-3/8"
	89816	.5312	17/32"	13.492	5"	3-1/4"
77821		.5315		13.500	107	60
	89821	.5315		13.500	127	83

continued →

Series 1520H, 1205H (continued)

.5469" - .6299"
(13.891mm - 16.000mm)

	3xD (1520H) EDP#	5xD (1205H) EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
			Decimal	Metric		
NEW	77826		.5469	35/64"	13.891	4-1/4"
		89826	.5469	35/64"	13.891	2-3/8"
NEW	77831		.5512		14.000	5"
		89831	.5512		14.000	107
NEW	77836		.5625	9/16"	14.287	127
		89836	.5625	9/16"	14.287	83
NEW	77841		.5709		14.500	4-1/2"
		89841	.5709		14.500	2-1/2"
NEW	77846		.5781	37/64"	14.683	5"
		89846	.5781	37/64"	14.683	3-1/4"
NEW	77851		.5906		15.000	5-1/4"
		89851	.5906		15.000	3-1/2"
NEW	77856		.5938	19/32"	15.082	115
		89856	.5938	19/32"	15.082	89
NEW	77861		.6094	39/64"	15.478	4-1/2"
		89861	.6094	39/64"	15.478	2-1/2"
NEW	77866		.6102		15.500	5-1/4"
		89866	.6102		15.500	3-1/2"
NEW	77871		.6250	5/8"	15.875	115
		89871	.6250	5/8"	15.875	89
NEW	77876		.6299		16.000	4-1/2"
		89876	.6299		16.000	2-1/2"



TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l_1	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)
l_2	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)



Series 1120H, 1100H

.1094" - .1575"
(2.779mm - 4.000mm)

GENERAL PURPOSE
DRILLS

HARDLUBE Coated

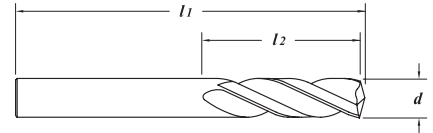
HARDLUBE-Beschichtet

Recubrimiento de HARDLUBE

Revêtement HARDLUBE

Rivestimento in HARDLUBE

HARDLUBE 涂层



Solid submicron grain carbide drill
Self-centering point
Near reamer finishes
Can be used as a core drill
Excellent heat resistance and lubricity
Stub length reduces deflection and vibration
Tighter tolerance holes
Improved roundness and straightness
Recommended for cast aluminum, cast iron and materials with high silicon content
Live tooling recommended on lathe processes
Shank tolerance: h6
Uncoated - page 88



Vollhartmetallbohrer aus Feinkornhartmetall
Anschliff Selbstzentrierend Punkt
Nahe an geriebenen Oberflächen
Kann als Aufbohrer verwendet werden
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Kurze Ausführung Reduziert Abdrängung und Vibrationen
Bessere Bohrungstoleranzen
Verbesserter Rundlauf und Genauigkeit
Empfohlen für Aluminiumguss, Grauguss und Werkstoffe mit hohem Silizium Gehalt
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6
Unbeschichtet - Seite 88



Broca de submicrograno sólido carburo
Punta autocentrada caras
Acabado similar al escañado
Puede ser utilizada para taladrado directo
Excelente resistencia térmica y lubricación
Longitud corta reduce desviaciones y vibraciones
Orificios de alta tolerancia y precisión
Mejor acabado redondeado y recto
Recomendado para aluminio fundido, hierro fundido y materiales con alto contenido de silicio
Recomendación para la aplicación en torno
Tolerancia del vástago: h6
Sin recubrimiento - Página 88



Forets carbure submicrograin
Pointe auto centrante
Près de finitions alésoir
Peut être utilisé comme foret-alésure
Excellente résistance à la haute température et glissement
Longueur Stub réduit flexion et de vibration
Le resserrement des trous de tolérance
Amélioration rondour et de rectitude
Recommander pour fonte d'aluminium, fonte grise et matières à haute teneur en silicium
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6
Sans revêtement - Page 88



Punte in sub-micro grana
Punto autocentrante
Ottimo grado di finitura
Può essere usata come punta da centro
Eccellente resistenza al calore e autolubrificante
Serie corta riduce la flessione e la vibrazione
Alta tolleranza dei fori
Migliore rotondità e linearità
Raccomandata per lavorazioni su alluminio, ghisa e materiali ad alto contenuto di silicio
Utensili rotanti sono consigliati se usato su un tornio
Tolleranza gambo: h6
Non Rivestito - Pagina 88



整体硬质合金钻头
自定心刀头
接近铰孔光洁度
可做套料钻使用
耐热性和润滑性特好
短型长度减少挠曲、减少振动
紧公差孔
提高正圆度和直线度
推荐加工铸铝、铸铁和硅含量高的材料
不建议在车床，或工具必须纺纱
柄部公差: h6
未涂层 - 88页

3xD (1120H) EDP#	5xD (1100H) EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	
		Decimal	Metric			
78276		.1094	7/64"	2.779	1-13/16"	13/16"
	90276	.1094	7/64"	2.779	2-1/4"	1-1/4"
78281		.1100	#35	2.794	1-7/8"	7/8"
	90281	.1100	#35	2.794	2-1/4"	1-1/4"
78286		.1110	#34	2.819	1-7/8"	7/8"
78291		.1130	#33	2.870	1-7/8"	7/8"
	90291	.1130	#33	2.870	2-1/4"	1-1/4"
78296		.1160	#32	2.946	1-7/8"	7/8"
	90296	.1160	#32	2.946	2-1/4"	1-1/4"
78301		.1181		3.000	48	22
	90301	.1181		3.000	57	32
78306		.1200	#31	3.048	1-7/8"	7/8"
	90306	.1200	#31	3.048	2-1/4"	1-1/4"
78311		.1250	1/8"	3.175	1-7/8"	7/8"
	90311	.1250	1/8"	3.175	2-1/4"	1-1/4"
78316		.1285	#30	3.264	1-15/16"	15/16"
	90316	.1285	#30	3.264	2-1/4"	1-1/4"
78321		.1360	#29	3.454	1-15/16"	15/16"
	90321	.1360	#29	3.454	2-1/2"	1-3/8"
78326		.1378		3.500	49	24
	90326	.1378		3.500	63	35
78331		.1405	#28	3.569	1-15/16"	15/16"
	90331	.1405	#28	3.569	2-1/2"	1-3/8"
78336		.1406	9/64"	3.571	1-15/16"	15/16"
	90336	.1406	9/64"	3.571	2-1/2"	1-3/8"
78341		.1440	#27	3.658	2-1/16"	1"
	90341	.1440	#27	3.658	2-1/2"	1-3/8"
78346		.1470	#26	3.734	2-1/16"	1"
	90346	.1470	#26	3.734	2-1/2"	1-3/8"
78351		.1495	#25	3.797	2-1/16"	1"
	90351	.1495	#25	3.797	2-1/2"	1-3/8"
78356		.1520	#24	3.861	2-1/16"	1"
	90356	.1520	#24	3.861	2-1/2"	1-3/8"
78361		.1540	#23	3.912	2-1/16"	1"
	90361	.1540	#23	3.912	2-1/2"	1-3/8"
78366		.1562	5/32"	3.967	2-1/16"	1"
	90366	.1562	5/32"	3.967	2-1/2"	1-3/8"
78371		.1570	#22	3.988	2-1/8"	1-1/16"
	90371	.1570	#22	3.988	2-1/2"	1-3/8"
78376		.1575		4.000	54	27
	90376	.1575		4.000	63	35

continued →

Series 1120H, 1100H (continued)

.1590" - .2362"
(4.039mm - 6.000mm)

GENERAL PURPOSE
DRILLS

3xD (1120H) EDP#	5xD (1100H) EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
78381		.1590	#21	4.039	2-1/8"
	90381	.1590	#21	4.039	2-1/2"
78386		.1610	#20	4.089	2-1/8"
	90386	.1610	#20	4.089	2-1/2"
78391		.1660	#19	4.216	2-1/8"
	90391	.1660	#19	4.216	2-3/4"
78396		.1695	#18	4.305	2-1/8"
	90396	.1695	#18	4.305	2-3/4"
78401		.1719	11/64"	4.366	2-1/8"
	90401	.1719	11/64"	4.366	2-3/4"
78406		.1730	#17	4.394	2-3/16"
	90406	.1730	#17	4.394	2-3/4"
78411		.1770	#16	4.496	2-3/16"
	90411	.1770	#16	4.496	2-3/4"
78416		.1772		4.500	56
	90416	.1772		4.500	70
78421		.1800	#15	4.572	2-3/16"
	90421	.1800	#15	4.572	2-3/4"
78426		.1820	#14	4.623	2-3/16"
	90426	.1820	#14	4.623	2-3/4"
78431		.1850	#13	4.700	2-3/16"
	90431	.1850	#13	4.700	2-3/4"
78436		.1875	3/16"	4.763	2-3/16"
	90436	.1875	3/16"	4.763	2-3/4"
78441		.1890	#12	4.801	2-1/4"
	90441	.1890	#12	4.801	2-3/4"
78446		.1910	#11	4.851	2-1/4"
	90446	.1910	#11	4.851	2-3/4"
78451		.1935	#10	4.915	2-1/4"
	90451	.1935	#10	4.915	2-3/4"
78456		.1960	#9	4.978	2-1/4"
	90456	.1960	#9	4.978	3"
78461		.1969		5.000	57
	90461	.1969		5.000	76
78466		.1990	#8	5.055	2-1/4"
	90466	.1990	#8	5.055	3"
78471		.2010	#7	5.105	2-1/4"
	90471	.2010	#7	5.105	3"
78476		.2031	13/64"	5.159	2-1/4"
	90476	.2031	13/64"	5.159	3"
	90481	.2040	#6	5.182	3"
78486		.2055	#5	5.220	2-3/8"
	90486	.2055	#5	5.220	3"
78491		.2090	#4	5.309	2-3/8"
	90491	.2090	#4	5.309	3"
78496		.2130	#3	5.410	2-3/8"
	90496	.2130	#3	5.410	3"
78501		.2165		5.500	60
	90501	.2165		5.500	76
78506		.2188	7/32"	5.558	2-3/8"
	90506	.2188	7/32"	5.558	3"
78511		.2210	#2	5.613	2-7/16"
	90511	.2210	#2	5.613	3"
78516		.2280	#1	5.791	2-7/16"
	90516	.2280	#1	5.791	3"
78521		.2340	A	5.944	2-7/16"
	90521	.2340	A	5.944	3-1/4"
78526		.2344	15/64"	5.954	2-7/16"
	90526	.2344	15/64"	5.954	3-1/4"
78531		.2362		6.000	64
	90531	.2362		6.000	82

3xD (1120H) EDP#	5xD (1100H) EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
78536		.2380	B	6.045	2-1/2"
	90536	.2380	B	6.045	3-1/4"
78541		.2420	C	6.147	2-1/2"
	90541	.2420	C	6.147	3-1/4"
78546		.2460	D	6.248	2-1/2"
	90546	.2460	D	6.248	3-1/4"
78551		.2500	1/4" / E	6.350	2-1/2"
	90551	.2500	1/4" / E	6.350	3-1/4"
78556		.2559		6.500	67
	90556	.2559		6.500	82
78561		.2570	F	6.528	2-5/8"
	90561	.2570	F	6.528	3-1/4"
78566		.2610	G	6.629	2-5/8"
	90566	.2610	G	6.629	3-1/2"
78571		.2656	17/64"	6.746	2-5/8"
	90571	.2656	17/64"	6.746	3-1/2"
78576		.2660	H	6.756	2-11/16"
	90576	.2660	H	6.756	3-1/2"
78581		.2720	I	6.909	2-11/16"
	90581	.2720	I	6.909	3-1/2"
78586		.2756		7.000	68
	90586	.2756		7.000	88
78591		.2770	J	7.036	2-11/16"
	90591	.2770	J	7.036	3-1/2"
78596		.2810	K	7.137	2-11/16"
	90596	.2810	K	7.137	3-1/2"
78601		.2812	9/32"	7.142	2-11/16"
	90601	.2812	9/32"	7.142	3-1/2"
78606		.2900	L	7.366	2-3/4"
	90606	.2900	L	7.366	3-1/2"
78611		.2950	M	7.493	2-3/4"
	90611	.2950	M	7.493	3-3/4"
78616		.2953		7.500	70
	90616	.2953		7.500	95
78621		.2969	19/64"	7.541	2-3/4"
	90621	.2969	19/64"	7.541	3-3/4"
78626		.3020	N	7.671	2-15/16"
	90626	.3020	N	7.671	3-3/4"
78631		.3125	5/16"	7.938	2-15/16"
	90631	.3125	5/16"	7.938	3-3/4"
78636		.3150		8.000	75
	90636	.3150		8.000	95
78641		.3160	O	8.026	2-15/16"
	90641	.3160	O	8.026	3-3/4"
78646		.3230	P	8.204	2-15/16"
	90646	.3230	P	8.204	3-3/4"
78651		.3281	21/64"	8.334	2-15/16"
	90651	.3281	21/64"	8.334	4"
78656		.3320	Q	8.433	3"
	90656	.3320	Q	8.433	4"
78661		.3346		8.500	76
	90661	.3346		8.500	101
78666		.3390	R	8.611	3"
	90666	.3390	R	8.611	4"
78671		.3438	11/32"	8.733	3"
	90671	.3438	11/32"	8.733	4"
78676		.3480	S	8.839	3-1/16"
	90676	.3480	S	8.839	4"
78681		.3543		9.000	78
	90681	.3543		9.000	101

continued →

Series 1120H, 1100H (continued)

.3580" - .5000"
(9.093mm - 12.700mm)

3xD (1120H) EDP#	5xD (1100H) EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
		Decimal	Metric		
78686		.3580	T	9.093	3-1/16"
78691		.3594	23/64"	9.129	3-1/16"
	90691	.3594	23/64"	9.129	4-1/4"
78696		.3680	U	9.347	3-1/8"
	90696	.3680	U	9.347	4-1/4"
78701		.3740		9.500	79
	90701	.3740		9.500	107
78706		.3750	3/8"	9.525	3-1/8"
	90706	.3750	3/8"	9.525	4-1/4"
78711		.3770	V	9.576	3-1/4"
	90711	.3770	V	9.576	4-1/4"
78716		.3860	W	9.804	3-1/4"
	90716	.3860	W	9.804	4-1/2"
78721		.3906	25/64"	9.921	3-1/4"
	90721	.3906	25/64"	9.921	4-1/2"
78726		.3937		10.000	84
	90726	.3937		10.000	114
78736		.4040	Y	10.262	3-5/16"
	90736	.4040	Y	10.262	4-1/2"
78741		.4062	13/32"	10.317	3-5/16"
	90741	.4062	13/32"	10.317	4-1/2"
78746		.4130	Z	10.490	3-3/8"
	90746	.4130	Z	10.490	4-1/2"
78751		.4134		10.500	86
	90751	.4134		10.500	114
78756		.4219	27/64"	10.716	3-3/8"
	90756	.4219	27/64"	10.716	4-1/2"
78761		.4331		11.000	87
	90761	.4331		11.000	114
78766		.4375	7/16"	11.113	3-7/16"
	90766	.4375	7/16"	11.113	4-1/2"
	90771	.4528		11.500	120
78776		.4531	29/64"	11.509	3-9/16"
	90776	.4531	29/64"	11.509	4-3/4"
78781		.4688	15/32"	11.908	3-5/8"
	90781	.4688	15/32"	11.908	4-3/4"
78786		.4724		12.000	94
	90786	.4724		12.000	120
78791		.4844	31/64"	12.304	3-11/16"
	90791	.4844	31/64"	12.304	4-3/4"
78796		.4921		12.500	95
	90796	.4921		12.500	120
78801		.5000	1/2"	12.700	3-3/4"
	90801	.5000	1/2"	12.700	4-3/4"

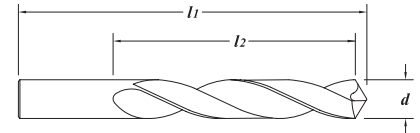
TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l_1	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)
l_2	$\leq 1/8"$	+.125" - .062" (+3.175 - 1.588mm)
	$> 1/8"$	+.125" - .125" (+3.175 - 3.175mm)


Series 1200

.0625" - .1575"
(1.588mm - 4.000mm)

GENERAL PURPOSE
DRILLS



Solid submicron grain carbide drill
General purpose jobber style
Cam point ($\leq 1/8"$ diameter - 4-facet point)
Live tooling recommended on lathe processes
Shank tolerance: h6
Hardlube Coated - page 86



Vollhartmetallbohrer aus Feinkornhartmetall
Universeller Bohrer
Durchmesser 3 mm (1/8") und kleiner - 118° Spitzenwinkel und 4-Fasen-Anschliff
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 86



Broca de submicrograno sólido carburo
Broca para uso general
Para diámetros de 1/8" e inferiores - punta de 4 caras de 118°
Recomendación para la aplicación en torno
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 86



Forets carbure submicrograin
Forets pour application generale
D1/8 et plus petit - 118° avec 4 faces de depouille
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6
Revêtement Hardlube - Page 86



Punte in sub-micro grana
Punta per impieghi generali
Affilatura a 118° punto
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 86



整体硬质合金钻头
通用型机用钻头
(1/8英寸直径和 1/8英寸以下直径 - 118° 4-小平面刀尖)
不建议在车床, 或工具必须纺纱
柄部公差: h6
Hardlube 涂层 - 86页

EDP#	$d^{\dagger}$		l_1	l_2	
	Decimal	Diameter Metric			
56165	.0625	1/16"	1.588	1-3/4"	3/4"
56170	.0635	#52	1.613	1-3/4"	3/4"
56175	.0670	#51	1.702	1-3/4"	3/4"
56180	.0700	#50	1.778	1-3/4"	7/8"
56185	.0730	#49	1.854	1-3/4"	7/8"
56190	.0760	#48	1.930	1-3/4"	7/8"
56195	.0781	5/64"	1.984	1-3/4"	7/8"
56200	.0785	#47	1.994	1-3/4"	7/8"
56205	.0787		2.000	44	22
56210	.0810	#46	2.057	1-3/4"	7/8"
56215	.0820	#45	2.083	1-3/4"	7/8"
56220	.0860	#44	2.184	2"	1"
56225	.0890	#43	2.261	2"	1"
56230	.0935	#42	2.375	2"	1"
56235	.0938	3/32"	2.383	2"	1"
56240	.0960	#41	2.438	2"	1"
56245	.0980	#40	2.489	2"	1"
56250	.0984		2.500	57	32
56255	.0995	#39	2.527	2-1/4"	1-1/4"
56260	.1015	#38	2.578	2-1/4"	1-1/4"
56265	.1040	#37	2.642	2-1/4"	1-1/4"
56270	.1065	#36	2.705	2-1/4"	1-1/4"
56275	.1094	7/64"	2.779	2-1/4"	1-1/4"
56280	.1100	#35	2.794	2-1/4"	1-1/4"
56285	.1110	#34	2.819	2-1/4"	1-1/4"
56290	.1130	#33	2.870	2-1/4"	1-1/4"
56295	.1160	#32	2.946	2-1/4"	1-1/4"
56300	.1181		3.000	57	32
56305	.1200	#31	3.048	2-1/4"	1-1/4"
56310	.1250	1/8"	3.175	2-1/4"	1-1/4"
56315	.1285	#30	3.264	2-1/4"	1-1/4"
56320	.1360	#29	3.454	2-1/2"	1-3/8"
56325	.1378		3.500	63	35
56330	.1405	#28	3.569	2-1/2"	1-3/8"
56335	.1406	9/64"	3.571	2-1/2"	1-3/8"
56340	.1440	#27	3.658	2-1/2"	1-3/8"
56345	.1470	#26	3.734	2-1/2"	1-3/8"
56350	.1495	#25	3.797	2-1/2"	1-3/8"
56355	.1520	#24	3.861	2-1/2"	1-3/8"
56360	.1540	#23	3.912	2-1/2"	1-3/8"
56365	.1562	5/32"	3.967	2-1/2"	1-3/8"
56370	.1570	#22	3.988	2-1/2"	1-3/8"
56375	.1575		4.000	63	35

continued →

Series 1200 (continued)

.1590" - .3346"
(4.039mm - 8.500mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
56380	.1590	#21	4.039	2-1/2"
56385	.1610	#20	4.089	2-1/2"
56390	.1660	#19	4.216	2-3/4"
56395	.1695	#18	4.305	2-3/4"
56400	.1719	11/64"	4.366	2-3/4"
56405	.1730	#17	4.394	2-3/4"
56410	.1770	#16	4.496	2-3/4"
56415	.1772		4.500	70
56420	.1800	#15	4.572	2-3/4"
56425	.1820	#14	4.623	2-3/4"
56430	.1850	#13	4.700	2-3/4"
56435	.1875	3/16"	4.763	2-3/4"
56440	.1890	#12	4.801	2-3/4"
56445	.1910	#11	4.851	2-3/4"
56450	.1935	#10	4.915	2-3/4"
56455	.1960	#9	4.978	3"
56460	.1969		5.000	76
56465	.1990	#8	5.055	3"
56470	.2010	#7	5.105	3"
56475	.2031	13/64"	5.159	3"
56480	.2040	#6	5.182	3"
56485	.2055	#5	5.220	3"
56490	.2090	#4	5.309	3"
56495	.2130	#3	5.410	3"
56500	.2165		5.500	76
56505	.2188	7/32"	5.558	3"
56510	.2210	#2	5.613	3"
56515	.2280	#1	5.791	3"
56520	.2340	A	5.944	3-1/4"
56525	.2344	15/64"	5.954	3-1/4"
56530	.2362		6.000	82
56535	.2380	B	6.045	3-1/4"
56540	.2420	C	6.147	3-1/4"
56545	.2460	D	6.248	3-1/4"
56550	.2500	1/4" / E	6.350	3-1/4"
56555	.2559		6.500	82
56560	.2570	F	6.528	3-1/4"
56565	.2610	G	6.629	3-1/2"
56570	.2656	17/64"	6.746	3-1/2"
56575	.2660	H	6.756	3-1/2"
56580	.2720	I	6.909	3-1/2"
56585	.2756		7.000	88
56590	.2770	J	7.036	3-1/2"
56595	.2810	K	7.137	3-1/2"
56600	.2812	9/32"	7.142	3-1/2"
56605	.2900	L	7.366	3-1/2"
56610	.2950	M	7.493	3-3/4"
56615	.2953		7.500	95
56620	.2969	19/64"	7.541	3-3/4"
56625	.3020	N	7.671	3-3/4"
56630	.3125	5/16"	7.938	3-3/4"
56635	.3150		8.000	95
56640	.3160	O	8.026	3-3/4"
56645	.3230	P	8.204	3-3/4"
56650	.3281	21/64"	8.334	4"
56655	.3320	Q	8.433	4"
56660	.3346		8.500	101

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
56665	.3390	R	8.611	4"
56670	.3438	11/32"	8.733	4"
56675	.3480	S	8.839	4"
56680	.3543		9.000	101
56685	.3580	T	9.093	4-1/4"
56690	.3594	23/64"	9.129	4-1/4"
56695	.3680	U	9.347	4-1/4"
56700	.3740		9.500	107
56705	.3750	3/8"	9.525	4-1/4"
56710	.3770	V	9.576	4-1/4"
56715	.3860	W	9.804	4-1/2"
56720	.3906	25/64"	9.921	4-1/2"
56725	.3937		10.000	114
56730	.3970	X	10.084	4-1/2"
56735	.4040	Y	10.262	4-1/2"
56740	.4062	13/32"	10.317	4-1/2"
56745	.4130	Z	10.490	4-1/2"
56750	.4134		10.500	114
56755	.4219	27/64"	10.716	4-1/2"
56760	.4331		11.000	114
56765	.4375	7/16"	11.113	4-1/2"
56770	.4528		11.500	120
56775	.4531	29/64"	11.509	4-3/4"
56780	.4688	15/32"	11.908	4-3/4"
56785	.4724		12.000	120
56790	.4844	31/64"	12.304	4-3/4"
56795	.4921		12.500	120
56800	.5000	1/2"	12.700	4-3/4"

*Drill Manufacturing*

Series 1200H

.0625" - .1575"
(1.588mm - 4.000mm)



TOLERANCES

d	+.0000" -.0005" (+.0000 -.0127mm)	
l ₁	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+.125" -.062" (+3.175 -1.588mm)
	> 1/8"	+.125" -.125" (+3.175 -3.175mm)

HARDLUBE Coated

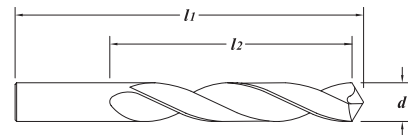
HARDLUBE-Beschichtet

Recubrimiento de HARDLUBE

Revêtement HARDLUBE

Rivestimento in HARDLUBE

HARDLUBE 涂层



Solid submicron grain carbide drill
General purpose jobber style
Excellent heat resistance and lubricity
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Shank tolerance: h6
Uncoated - page 83



Vollhartmetallbohrer aus Feinkornhartmetall
Universeller Bohrer
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Durchmesser 3 mm (1/8") und kleiner - 118° Spitzwinkel und 4-Fasen-Anschliff
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6
Unbeschichtet - Seite 83



Broca de submicrograno sólido carburo
Broca para uso general
Excelente resistencia térmica y lubricación
Para diámetros de 1/8" e inferiores - punta de 4 caras de 118°
Recomendación para la aplicación en torno
Tolerancia del vástago: h6
Sin recubrimiento - Página 83



Forets carbure submicrograin
Forets pour application generale
Excellente resistance a la haute temperature et glissement
D1/8 et plus petit - 118° avec 4 faces de depouille
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6
Sans revêtement - Page 83



Punte in sub-micro grana
Punta per impieghi generali
Eccellente resistenza al calore e autolubrificante
Affilatura a 118° punto
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6
Non Rivestito - Pagina 83



整体硬质合金钻头
通用型机用钻头
耐热性和润滑性特好
(1/8英寸直径和 1/8英寸以下直径 - 118° 4-小平面刀尖)
不建议在车床, 或工具必须纺纱
柄部公差: h6
未涂层 - 83页

EDP#	$d^{\dagger}$		l_1	l_2	
	Decimal	Diameter Metric			
56166	.0625	1/16"	1.588	1-3/4"	3/4"
56171	.0635	#52	1.613	1-3/4"	3/4"
56181	.0700	#50	1.778	1-3/4"	7/8"
56186	.0730	#49	1.854	1-3/4"	7/8"
56191	.0760	#48	1.930	1-3/4"	7/8"
56196	.0781	5/64"	1.984	1-3/4"	7/8"
56206	.0787		2.000	44	22
56216	.0820	#45	2.083	1-3/4"	7/8"
56221	.0860	#44	2.184	2"	1"
56226	.0890	#43	2.261	2"	1"
56231	.0935	#42	2.375	2"	1"
56236	.0938	3/32"	2.383	2"	1"
56241	.0960	#41	2.438	2"	1"
56246	.0980	#40	2.489	2"	1"
56251	.0984		2.500	57	32
56256	.0995	#39	2.527	2-1/4"	1-1/4"
56261	.1015	#38	2.578	2-1/4"	1-1/4"
56266	.1040	#37	2.642	2-1/4"	1-1/4"
56271	.1065	#36	2.705	2-1/4"	1-1/4"
56276	.1094	7/64"	2.779	2-1/4"	1-1/4"
56281	.1100	#35	2.794	2-1/4"	1-1/4"
56286	.1110	#34	2.819	2-1/4"	1-1/4"
56291	.1130	#33	2.870	2-1/4"	1-1/4"
56296	.1160	#32	2.946	2-1/4"	1-1/4"
56301	.1181		3.000	57	32
56306	.1200	#31	3.048	2-1/4"	1-1/4"
56311	.1250	1/8"	3.175	2-1/4"	1-1/4"
56316	.1285	#30	3.264	2-1/4"	1-1/4"
56321	.1360	#29	3.454	2-1/2"	1-3/8"
56331	.1405	#28	3.569	2-1/2"	1-3/8"
56336	.1406	9/64"	3.571	2-1/2"	1-3/8"
56341	.1440	#27	3.658	2-1/2"	1-3/8"
56346	.1470	#26	3.734	2-1/2"	1-3/8"
56351	.1495	#25	3.797	2-1/2"	1-3/8"
56356	.1520	#24	3.861	2-1/2"	1-3/8"
56361	.1540	#23	3.912	2-1/2"	1-3/8"
56366	.1562	5/32"	3.967	2-1/2"	1-3/8"
56371	.1570	#22	3.988	2-1/2"	1-3/8"

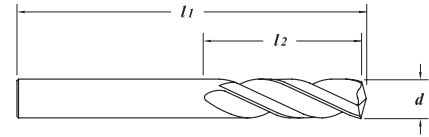
EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
56381	.1590	#21	4.039	2-1/2"
56386	.1610	#20	4.089	2-1/2"
56391	.1660	#19	4.216	2-3/4"
56396	.1695	#18	4.305	2-3/4"
56401	.1719	11/64"	4.366	2-3/4"
56411	.1770	#16	4.496	2-3/4"
56421	.1800	#15	4.572	2-3/4"
56426	.1820	#14	4.623	2-3/4"
56436	.1875	3/16"	4.763	2-3/4"
56441	.1890	#12	4.801	2-3/4"
56446	.1910	#11	4.851	2-3/4"
56451	.1935	#10	4.915	2-3/4"
56471	.2010	#7	5.105	3"
56481	.2040	#6	5.182	3"
56486	.2055	#5	5.220	3"
56491	.2090	#4	5.309	3"
56496	.2130	#3	5.410	3"
56506	.2188	7/32"	5.558	3"
56516	.2280	#1	5.791	3"
56526	.2344	15/64"	5.954	3-1/4"
56541	.2420	C	6.147	3-1/4"
56551	.2500	1/4" / E	6.350	3-1/4"
56561	.2570	F	6.528	3-1/4"
56566	.2610	G	6.629	3-1/2"
56571	.2656	17/64"	6.746	3-1/2"
56601	.2812	9/32"	7.142	3-1/2"
56606	.2900	L	7.366	3-1/2"
56626	.3020	N	7.671	3-3/4"
56631	.3125	5/16"	7.938	3-3/4"
56646	.3230	P	8.204	3-3/4"
56651	.3281	21/64"	8.334	4"
56671	.3438	11/32"	8.733	4"
56696	.3680	U	9.347	4-1/4"
56706	.3750	3/8"	9.525	4-1/4"
56731	.3970	X	10.084	4-1/2"
56741	.4062	13/32"	10.317	4-1/2"
56756	.4219	27/64"	10.716	4-1/2"
56766	.4375	7/16"	11.113	4-1/2"
56801	.5000	1/2"	12.700	4-3/4"

Series 1100

.1094" - .2040"
(2.779mm - 5.182mm)TECH
PAGES
322-325

TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
l ₁	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)
l ₂	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)



Solid submicron grain carbide drill
Self-centering drill point
Near reamer finishes
Can be used as a core drill
Tighter tolerance holes
Improved roundness and straightness
Recommended for cast aluminium, cast iron and materials with high silicon content
Live tooling recommended on lathe processes
Shank tolerance: h6
Hardlube Coated - page 79



Vollhartmetallbohrer aus Feinkornhartmetall
Selbstzentrierend Punkt
Nahe an geriebenen Oberflächen
Kann als Aufbohrer verwendet werden
Bessere Bohrungstoleranzen
Verbesserter Rundlauf und Genauigkeit
Empfohlen für Aluminiumguss, Grauguss und Werkstoffe mit hohem Silizium Gehalt
Empfehlung fuer den Einsatz auf der Drehmaschine
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 79



Broca de submicrograno sólido carburo
Uno mismo punto de centrado
Acabado similar al escariado
Puede ser utilizada para taladrado directo
Orificios de alta tolerancia y precisión
Mejor acabado redondeado y recto
Recomendado para aluminio fundido, hierro fundido y materiales con alto contenido de silicio
Recomendación para la aplicación en torno
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 79



Forets carbure submicrograin
Pointe auto centrante
Près de finitions alésoir
Peut être utilisé comme foret-alésieur
Le resserrement des trous de tolérance
Amélioration rondeur et de rectitude
Recommander pour fonte d'aluminium, fonte grise et matières a haute teneur en silicium
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Tolerance queue: h6
Revêtement Hardlube - Page 79



Punte in sub-micro grana
Punto auto centrante
Ottimo grado di finitura
Può essere usata come punta da centro
Alta tolleranza dei fori
Migliore rotondità e linearità
Raccomandata per lavorazioni su alluminio, ghisa e materiali ad alto contenuto di silicio
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 79



整体硬质合金钻头
自定心刀尖
接近铰孔光洁度
可做套料钻使用
紧公差孔
提高正圆度和直线度
推荐加工铸铝、铸铁和硅含量高的材质
不建议在车床，或工具必须纺纱
柄部公差: h6
Hardlube 涂层 - 79页

EDP#	d †		l ₁	l ₂
	Decimal	Diameter	Overall Length	Flute Length
90275	.1094	7/64"	2-1/4"	1-1/4"
90280	.1100	#35	2-1/4"	1-1/4"
90285	.1110	#34	2-1/4"	1-1/4"
90290	.1130	#33	2-1/4"	1-1/4"
90295	.1160	#32	2-1/4"	1-1/4"
90300	.1181		57	32
90305	.1200	#31	2-1/4"	1-1/4"
90310	.1250	1/8"	2-1/4"	1-1/4"
90315	.1285	#30	2-1/4"	1-1/4"
90320	.1360	#29	2-1/2"	1-3/8"
90325	.1378		63	35
90330	.1405	#28	2-1/2"	1-3/8"
90335	.1406	9/64"	2-1/2"	1-3/8"
90340	.1440	#27	2-1/2"	1-3/8"
90345	.1470	#26	2-1/2"	1-3/8"
90350	.1495	#25	2-1/2"	1-3/8"
90355	.1520	#24	2-1/2"	1-3/8"
90365	.1562	5/32"	2-1/2"	1-3/8"
90375	.1575		63	35
90380	.1590	#21	2-1/2"	1-3/8"
90385	.1610	#20	2-1/2"	1-3/8"
90390	.1660	#19	2-3/4"	1-5/8"
90395	.1695	#18	2-3/4"	1-5/8"
90400	.1719	11/64"	2-3/4"	1-5/8"
90420	.1800	#15	2-3/4"	1-5/8"
90425	.1820	#14	2-3/4"	1-5/8"
90435	.1875	3/16"	2-3/4"	1-5/8"
90440	.1890	#12	2-3/4"	1-5/8"
90455	.1960	#9	3"	1-3/4"
90460	.1969		76	44
90470	.2010	#7	3"	1-3/4"
90475	.2031	13/64"	3"	1-3/4"
90480	.2040	#6	3"	1-3/4"

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
90485	.2055	#5	5.220	3"
90500	.2165		5.500	76
90505	.2188	7/32"	5.558	3"
90510	.2210	#2	5.613	3"
90515	.2280	#1	5.791	3"
90525	.2344	15/64"	5.954	3-1/4"
90530	.2362		6.000	82
90550	.2500	1/4" / E	6.350	3-1/4"
90555	.2559		6.500	82
90560	.2570	F	6.528	3-1/4"
90565	.2610	G	6.629	3-1/2"
90570	.2656	17/64"	6.746	3-1/2"
90575	.2660	H	6.756	3-1/2"
90580	.2720	I	6.909	3-1/2"
90585	.2756		7.000	88
90600	.2812	9/32"	7.142	3-1/2"
90605	.2900	L	7.366	3-1/2"
90620	.2969	19/64"	7.541	3-3/4"
90625	.3020	N	7.671	3-3/4"
90630	.3125	5/16"	7.938	3-3/4"
90635	.3150		8.000	95
90640	.3160	O	8.026	3-3/4"
90650	.3281	21/64"	8.334	4"
90655	.3320	Q	8.433	4"
90660	.3346		8.500	101
90665	.3390	R	8.611	4"
90670	.3438	11/32"	8.733	4"
90680	.3543		9.000	101
90690	.3594	23/64"	9.129	4-1/4"
90705	.3750	3/8"	9.525	4-1/4"
90725	.3937		10.000	114
90745	.4130	Z	10.490	4-1/2"
90755	.4219	27/64"	10.716	4-1/2"
90760	.4331		11.000	114
90765	.4375	7/16"	11.113	4-1/2"
90775	.4531	29/64"	11.509	4-3/4"
90780	.4688	15/32"	11.908	4-3/4"
90790	.4844	31/64"	12.304	4-3/4"
90800	.5000	1/2"	12.700	4-3/4"

Series 1800H

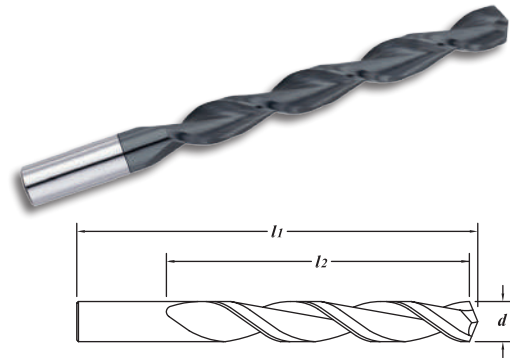
.1875" - .3125"
(4.763mm - 7.938mm)



TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)
l_1	+0.125" -0.125" (+3.175 -3.175mm)
l_2	+0.125" -0.125" (+3.175 -3.175mm)

Parabolic - HARDLUBE Coated
Parabolische - HARDLUBE-Beschichtet
Parabólica - Recubrimiento de HARDLUBE
Parabolique - Revêtement HARDLUBE
Elicoidale - Rivestimento in HARDLUBE
抛物线排屑槽 - HARDLUBE 涂层



Solid submicron grain carbide drill
 Wide open flutes and high helix remove chips quickly
 4-facet point

Recommended for deep holes in soft, non-ferrous materials (aluminum, brass and bronze)

Live tooling recommended on lathe processes
 Shank tolerance: h6



Vollhartmetallbohrer aus Feinkornhartmetall
 Grosse Spannten und grösserer Spiralwinkel für schnelle Spanentfernung
 4-Fasen-Anschliff Punkt

Empfohlen für Tiefe Bohrungen in Weiche Nichteisenmetalle (Aluminium, Messing und Bronze)

Empfehlung fuer den Einsatz auf der Drehmaschine
 Schaft-Toleranz: h6



Broca de submicrograno sólido carburo
 Ranuras anchas y abiertas y la hélice más alta evacúan las virutas con la máxima rapidez
 Punta de 4 caras

Recomendado para orificios profundos en material no ferroso blando (aluminio, latón, bronce)

Recomendación para la aplicación en torno
 Tolerancia del vástago: h6



Forets carbure submicrograin
 Goujures tres larges egale d'hélice eleve pour une évacuation plus rapide des copeaux
 Pointe avec 4 faces de depouille

Recommander pour trous profonds dans matieres tenders non ferreuses

Outil de filature nécessaires pour une utilisation sur un processus de tournage
 Tolerance queue: h6



Punte in sub-micro grana
 Elica accentuata per una più veloce evacuazione del truciolo
 Punto 4 facce

Fori profondi su materiali non ferrosi (alluminio, ottone, bronzo)

Utensili rotanti sono consigliate se usato su un tornio
 Tolleranza gambo: h6



整体硬质合金钻头
 开放式宽容屑槽和大螺旋角能快速清除切屑
 4-小平面刀尖

推荐加工在软质有色金属（铝、黄铜和青铜）内钻深孔

不建议在车床，或工具必须纺纱
 柄部公差: h6

EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
22436	.1875	3/16"	4.763	3-13/16"
22441	.1890	#12	4.801	3-13/16"
22456	.1960	#9	4.978	3-15/16"
22461	.1969		5.000	100
22466	.1990	#8	5.055	3-15/16"
22471	.2010	#7	5.105	3-15/16"
22476	.2031	13/64"	5.159	3-15/16"
22486	.2055	#5	5.220	4"
22496	.2130	#3	5.410	4"
22501	.2165		5.500	102
22506	.2188	7/32"	5.558	4"
22511	.2210	#2	5.613	4"
22516	.2280	#1	5.791	4-1/8"
22531	.2362		6.000	105
22541	.2420	C	6.147	4-1/4"
22546	.2460	D	6.248	4-1/4"
22551	.2500	1/4" / E	6.350	4-1/4"
22556	.2559		6.500	108
22561	.2570	F	6.528	4-3/8"
22566	.2610	G	6.629	4-3/8"
22571	.2656	17/64"	6.746	4-3/8"
22576	.2660	H	6.756	4-3/8"
22581	.2720	I	6.909	4-3/8"
22586	.2756		7.000	111
22596	.2810	K	7.137	4-7/16"
22606	.2900	L	7.366	4-7/16"
22631	.3125	5/16"	7.938	4-11/16"

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length
	Decimal	Metric		
22636	.3150	8.000	119	81
22646	.3230	P	8.204	4-11/16"
22656	.3320	Q	8.433	4-15/16"
22661	.3346		8.500	125
22666	.3390	R	8.611	4-15/16"
22696	.3680	U	9.347	5"
22706	.3750	3/8"	9.525	5-1/8"
22721	.3906	25/64"	9.921	5-1/4"
22726	.3937		10.000	133
22751	.4134		10.500	137
22761	.4331		11.000	138
22766	.4375	7/16"	11.113	5-7/16"
22776	.4531	29/64"	11.509	5-9/16"
22801	.5000	1/2"	12.700	6"
22811	.5156	33/64"	13.096	6"
22831	.5512		14.000	156
				117



Series 4100

.0590" - .0820"
(1.499mm - 2.083mm)



TOLERANCES

d_1	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)
d_2	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)

REAMERS

Standard Reamers

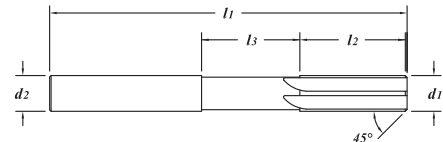
Standard Reibahlen

Escariadores Estándar

Alesoirs Standards

Alesatori Standard

标准铰刀



Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0,250 ±0,050mm (.010" ±.002") less than fluted diameter (d_1)



Vollhartmetall aus Feinkornhartmetall
Gerade RHC-Spannnuten
Standard 45° Führungsfase
Hals-Durchmesser ist 0,250 ±0,050 mm (0,010 Zoll ±0,002 Zoll) kleiner als der Nenn-Durchmesser (d_1)



Carburo sólido de grano submicrónico
Rectos - ranuras RHC
Chafilán de guía estándar de 45°
Diámetro de cuello de 0,250 ±0,050mm (.010" ±.002") menor que diámetro de corte (d_1)



Carbure plein submicrograin
droites goujures - RHC
Une norme chanfrein à 45°
Diamètre de la nuque est 0,250 ± 0,050 mm (.010" ±.002") plus petit que le diamètre de coupe (d_1)



Super sub-micrograno metallo duro
Taglienti dritti
Inclinazione standard a 45°
Diametro del collo di 0,250 ± 0,050 mm (.010" ±.002") inferiore rispetto al diametro di taglio (d_1)



超细晶粒整体硬质合金
直线型—洛氏硬度C级出屑槽
标准45° 导程倒角
颈部长径为 0,250 ± 0,050 mm (.010" ±.002"), 小于刃部直径 (d_1)

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95066	.0590	1.499	.0590"	1-1/2"	3/8"	.250"	4
95069	.0591	1.500	.0591"	1-1/2"	3/8"	.250"	4
95072	.0595	#53 1.511	.0595"	1-1/2"	3/8"	.250"	4
95075	.0600	1.524	.0600"	1-1/2"	3/8"	.250"	4
95078	.0605	1.537	.0605"	1-1/2"	3/8"	.250"	4
95081	.0610	1.549	.0610"	1-1/2"	3/8"	.250"	4
95084	.0615	1.562	.0615"	1-1/2"	3/8"	.250"	4
95087	.0620	1.575	.0620"	1-1/2"	3/8"	.250"	4
95090	.0625	1/16" 1.588	.0625"	1-1/2"	3/8"	.250"	4
95093	.0630	1.600	.0630"	1-1/2"	3/8"	.250"	4
95096	.0635	#52 1.613	.0635"	1-1/2"	3/8"	.250"	4
95099	.0640	1.626	.0640"	1-1/2"	3/8"	.250"	4
95102	.0645	1.638	.0645"	1-1/2"	3/8"	.250"	4
95105	.0650	1.651	.0650"	1-1/2"	3/8"	.250"	4
95108	.0660	1.676	.0660"	1-3/4"	1/2"	.250"	4
95111	.0670	#51 1.702	.0670"	1-3/4"	1/2"	.250"	4
95114	.0680	1.727	.0680"	1-3/4"	1/2"	.375"	4
95117	.0690	1.753	.0690"	1-3/4"	1/2"	.375"	4
95120	.0700	#50 1.778	.0700"	1-3/4"	1/2"	.375"	4
95123	.0710	1.803	.0710"	1-3/4"	1/2"	.375"	4
95126	.0720	1.829	.0720"	1-3/4"	1/2"	.375"	4
95129	.0730	#49 1.854	.0730"	1-3/4"	1/2"	.375"	4
95132	.0740	1.880	.0740"	1-3/4"	1/2"	.375"	4
95135	.0750	1.905	.0750"	1-3/4"	1/2"	.375"	4
95138	.0760	#48 1.930	.0760"	1-3/4"	1/2"	.375"	4
95141	.0770	1.956	.0770"	1-3/4"	1/2"	.375"	4
95144	.0780	1.981	.0780"	1-3/4"	1/2"	.375"	4
95147	.0781	5/64" 1.984	.0781"	1-3/4"	1/2"	.375"	4
95150	.0785	#47 1.994	.0785"	1-3/4"	1/2"	.375"	4
95153	.0787	2.000	.0787"	1-3/4"	1/2"	.375"	4
95156	.0790	2.007	.0790"	1-3/4"	1/2"	.375"	4
95159	.0800	2.032	.0800"	1-3/4"	1/2"	.375"	4
95162	.0810	#46 2.057	.0810"	2"	1/2"	.375"	4
95165	.0820	#45 2.083	.0820"	2"	1/2"	.375"	4

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95168	.0830	2.108	.0830"	2"	1/2"	.375"	4
95171	.0840	2.134	.0840"	2"	1/2"	.375"	4
95174	.0850	2.159	.0850"	2"	1/2"	.375"	4
95177	.0860	#44 2.184	.0860"	2"	1/2"	.375"	4
95180	.0870	2.210	.0870"	2"	1/2"	.375"	4
95183	.0880	2.235	.0880"	2"	1/2"	.375"	4
95186	.0890	#43 2.261	.0890"	2"	1/2"	.375"	4
95189	.0900	2.286	.0900"	2"	1/2"	.375"	4
95192	.0910	2.311	.0910"	2"	1/2"	.375"	4
95195	.0915	2.324	.0915"	2"	1/2"	.375"	4
95198	.0920	2.337	.0920"	2"	1/2"	.375"	4
95201	.0925	2.350	.0925"	2"	1/2"	.375"	4
95204	.0930	2.362	.0930"	2"	1/2"	.375"	4
95207	.0935	#42 2.375	.0935"	2"	1/2"	.375"	4
95210	.0938	3/32" 2.383	.0938"	2"	1/2"	.375"	4
95213	.0940	2.388	.0940"	2"	1/2"	.375"	4
95216	.0945	2.400	.0945"	2"	1/2"	.375"	4
95219	.0950	2.413	.0950"	2"	1/2"	.375"	4
95222	.0960	#41 2.438	.0960"	2-1/4"	5/8"	.375"	4
95225	.0970	2.464	.0970"	2-1/4"	5/8"	.375"	4
95228	.0980	#40 2.489	.0980"	2-1/4"	5/8"	.375"	4
95231	.0984	2.500	.0984"	2-1/4"	5/8"	.375"	4
95234	.0990	2.515	.0990"	2-1/4"	5/8"	.500"	4
95237	.0995	#39 2.527	.0995"	2-1/4"	5/8"	.500"	4
95240	.1000	2.540	.1000"	2-1/4"	5/8"	.500"	4
95243	.1010	2.565	.1010"	2-1/4"	5/8"	.500"	4
95246	.1015	#38 2.578	.1015"	2-1/4"	5/8"	.500"	4
95249	.1020	2.591	.1020"	2-1/4"	5/8"	.500"	4
95252	.1030	2.616	.1030"	2-1/4"	5/8"	.500"	4
95255	.1040	#37 2.642	.1040"	2-1/4"	5/8"	.500"	4
95258	.1050	2.667	.1050"	2-1/4"	5/8"	.500"	4
95261	.1060	2.692	.1060"	2-1/4"	5/8"	.500"	4
95264	.1065	#36 2.705	.1065"	2-1/4"	5/8"	.500"	4
95267	.1070	2.718	.1070"	2-1/4"	5/8"	.500"	4
95270	.1080	2.743	.1080"	2-1/4"	5/8"	.500"	4
95273	.1090	2.769	.1090"	2-1/4"	5/8"	.500"	4
95276	.1094	7/64" 2.779	.1094"	2-1/4"	5/8"	.500"	4
95279	.1100	#35 2.794	.1100"	2-1/4"	5/8"	.500"	4
95282	.1110	#34 2.819	.1110"	2-1/4"	5/8"	.500"	4
95285	.1120	2.845	.1120"	2-1/4"	5/8"	.500"	4
95288	.1130	#33 2.870	.1130"	2-1/4"	5/8"	.500"	4
95291	.1140	2.896	.1140"	2-1/4"	5/8"	.500"	4
95294	.1150	2.921	.1150"	2-1/4"	5/8"	.500"	4
95297	.1160	#32 2.946	.1160"	2-1/4"	5/8"	.500"	4
95300	.1170	2.972	.1170"	2-1/4"	5/8"	.500"	4
95303	.1180	2.997	.1180"	2-1/4"	5/8"	.500"	4
95306	.1181	3.000	.1181"	2-1/4"	5/8"	.500"	4
95309	.1190	3.023	.1190"	2-1/4"	5/8"	.500"	4

continued →

Series 4100 (continued)

.1200" - .1550"
(3.048mm - 3.937mm)

REAMERS

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Neck Length	Number Flutes
	Decimal		Metric					
95312	.1200	#31	3.048	.1200"	2-1/4"	5/8"	.500"	4
95315	.1210		3.073	.1210"	2-1/4"	5/8"	.500"	4
95318	.1220		3.099	.1220"	2-1/4"	5/8"	.500"	4
95321	.1230		3.124	.1230"	2-1/4"	5/8"	.500"	4
95324	.1235		3.137	.1235"	2-1/4"	5/8"	.500"	4
95327	.1240		3.150	.1240"	2-1/4"	5/8"	.500"	4
95330	.1245		3.162	.1245"	2-1/4"	5/8"	.500"	4
95333	.1248		3.170	.1248"	2-1/4"	5/8"	.500"	4
95336	.1250	1/8"	3.175	.1250"	2-1/4"	5/8"	.500"	4
95339	.1255		3.188	.1255"	2-1/4"	5/8"	.500"	4
95342	.1260		3.200	.1260"	2-1/4"	5/8"	.500"	4
95345	.1265		3.213	.1265"	2-1/4"	5/8"	.500"	4
95348	.1270		3.226	.1270"	2-1/4"	5/8"	.500"	4
95351	.1275		3.239	.1275"	2-1/4"	5/8"	.500"	4
95354	.1280		3.251	.1280"	2-1/4"	5/8"	.500"	4
95357	.1285	#30	3.264	.1285"	2-1/4"	5/8"	.500"	4
95360	.1290		3.277	.1290"	2-1/4"	5/8"	.500"	4
95363	.1300		3.302	.1300"	2-1/4"	5/8"	.500"	4
95366	.1310		3.327	.1310"	2-1/2"	3/4"	.500"	4
95369	.1320		3.353	.1320"	2-1/2"	3/4"	.500"	4
95372	.1330		3.378	.1330"	2-1/2"	3/4"	.500"	4
95375	.1340		3.404	.1340"	2-1/2"	3/4"	.500"	4
95378	.1350		3.429	.1350"	2-1/2"	3/4"	.500"	4
95381	.1360	#29	3.454	.1360"	2-1/2"	3/4"	.500"	4
95384	.1370		3.480	.1370"	2-1/2"	3/4"	.500"	4
95387	.1378		3.500	.1378"	2-1/2"	3/4"	.500"	4
95390	.1380		3.505	.1380"	2-1/2"	3/4"	.500"	4
95393	.1390		3.531	.1390"	2-1/2"	3/4"	.500"	4
95396	.1400		3.556	.1400"	2-1/2"	3/4"	.500"	4
95399	.1405	#28	3.569	.1405"	2-1/2"	3/4"	.500"	4
95402	.1406	9/64"	3.571	.1406"	2-1/2"	3/4"	.500"	4
95405	.1410		3.581	.1410"	2-1/2"	3/4"	.500"	4
95408	.1420		3.607	.1420"	2-1/2"	3/4"	.500"	4
95411	.1430		3.632	.1430"	2-1/2"	3/4"	.500"	4
95414	.1440	#27	3.658	.1440"	2-1/2"	3/4"	.500"	4
95417	.1450		3.683	.1450"	2-1/2"	3/4"	.500"	4
95420	.1460		3.708	.1460"	2-1/2"	3/4"	.500"	4
95423	.1470	#26	3.734	.1470"	2-1/2"	3/4"	.500"	4
95426	.1480		3.759	.1480"	2-1/2"	3/4"	.500"	4
95429	.1490		3.785	.1490"	2-1/2"	3/4"	.500"	4
95432	.1495	#25	3.797	.1495"	2-1/2"	3/4"	.500"	4
95435	.1500		3.810	.1500"	2-1/2"	3/4"	.500"	4
95438	.1510		3.835	.1510"	2-1/2"	3/4"	.500"	4
95441	.1520	#24	3.861	.1520"	2-1/2"	3/4"	.500"	4
95444	.1530		3.886	.1530"	2-1/2"	3/4"	.500"	4
95447	.1540	#23	3.912	.1540"	2-1/2"	3/4"	.500"	4
95450	.1545		3.924	.1545"	2-1/2"	3/4"	.500"	4
95453	.1550		3.937	.1550"	2-1/2"	3/4"	.500"	4

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95456	.1555	3.950	.1555"	2-1/2"	3/4"	.500"	4
95459	.1560	3.962	.1560"	2-1/2"	3/4"	.500"	4
95462	.1562 5/32"	3.967	.1562"	2-1/2"	3/4"	.500"	4
95465	.1565	3.975	.1565"	2-1/2"	3/4"	.500"	4
95468	.1570 #22	3.988	.1570"	2-1/2"	3/4"	.500"	4
95471	.1575	4.000	.1575"	2-1/2"	3/4"	.500"	4
95474	.1580	4.013	.1580"	2-1/2"	3/4"	.500"	4
95477	.1590 #21	4.039	.1590"	2-1/2"	3/4"	.500"	4
95480	.1600	4.064	.1600"	2-3/4"	7/8"	.625"	4
95483	.1610 #20	4.089	.1610"	2-3/4"	7/8"	.625"	4
95486	.1620	4.115	.1620"	2-3/4"	7/8"	.625"	4
95489	.1630	4.140	.1630"	2-3/4"	7/8"	.625"	4
95492	.1640	4.166	.1640"	2-3/4"	7/8"	.625"	4
95495	.1650	4.191	.1650"	2-3/4"	7/8"	.625"	4
95498	.1660 #19	4.216	.1660"	2-3/4"	7/8"	.625"	4
95501	.1670	4.242	.1670"	2-3/4"	7/8"	.625"	4
95504	.1680	4.267	.1680"	2-3/4"	7/8"	.625"	4
95507	.1690	4.293	.1690"	2-3/4"	7/8"	.625"	4
95510	.1695 #18	4.305	.1695"	2-3/4"	7/8"	.625"	4
95513	.1700	4.318	.1700"	2-3/4"	7/8"	.625"	4
95516	.1710	4.343	.1710"	2-3/4"	7/8"	.625"	4
95519	.1719 11/64"	4.366	.1719"	2-3/4"	7/8"	.625"	4
95522	.1720	4.369	.1720"	2-3/4"	7/8"	.625"	4
95525	.1730 #17	4.394	.1730"	2-3/4"	7/8"	.625"	4
95528	.1740	4.420	.1740"	2-3/4"	7/8"	.625"	4
95531	.1750	4.445	.1750"	2-3/4"	7/8"	.625"	4
95534	.1760	4.470	.1760"	2-3/4"	7/8"	.625"	4
95537	.1770 #16	4.496	.1770"	2-3/4"	7/8"	.625"	4
95540	.1772	4.500	.1772"	2-3/4"	7/8"	.625"	4
95543	.1780	4.521	.1780"	2-3/4"	7/8"	.625"	4
95546	.1790	4.547	.1790"	2-3/4"	7/8"	.625"	4
95549	.1800 #15	4.572	.1800"	2-3/4"	7/8"	.625"	4
95552	.1810	4.597	.1810"	2-3/4"	7/8"	.625"	4
95555	.1820 #14	4.623	.1820"	2-3/4"	7/8"	.625"	4
95558	.1830	4.648	.1830"	2-3/4"	7/8"	.625"	4
95561	.1840	4.674	.1840"	2-3/4"	7/8"	.625"	4
95564	.1850 #13	4.699	.1850"	2-3/4"	7/8"	.625"	4
95567	.1855	4.712	.1855"	2-3/4"	7/8"	.625"	4
95570	.1860	4.724	.1860"	2-3/4"	7/8"	.625"	4
95573	.1865	4.737	.1865"	2-3/4"	7/8"	.625"	4
95576	.1870	4.750	.1870"	2-3/4"	7/8"	.625"	4
95577	.1873	4.757	.1873"	2-3/4"	7/8"	.625"	4
95579	.1875 3/16"	4.763	.1875"	2-3/4"	7/8"	.625"	4
95582	.1880	4.775	.1880"	2-3/4"	7/8"	.625"	4
95585	.1885	4.788	.1885"	2-3/4"	7/8"	.625"	4
95588	.1890 #12	4.801	.1890"	2-3/4"	7/8"	.625"	4
95591	.1900	4.826	.1900"	2-3/4"	7/8"	.625"	4
95594	.1910 #11	4.851	.1910"	2-3/4"	7/8"	.625"	4

continued →

Series 4100 (continued)

.1920" - .2250"
(4.877mm - 5.715mm)



TOLERANCES

d_1	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)
d_2	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)

Standard Reamers

Standard Reibahlen

Escariadores Estándar

Alesoirs Standarts

Alesatori Standard

标准铰刀



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95597	.1920	4.877	.1920"	2-3/4"	7/8"	.625"	4
95600	.1930	4.902	.1930"	2-3/4"	7/8"	.625"	4
95603	.1935	#10 4.915	.1935"	2-3/4"	7/8"	.625"	4
95606	.1940	4.928	.1940"	2-3/4"	7/8"	.625"	4
95609	.1950	4.953	.1950"	2-3/4"	7/8"	.625"	4
95612	.1960	#9 4.978	.1960"	3"	1"	.625"	4
95615	.1969	5.000	.1969"	3"	1"	.625"	4
95618	.1970	5.004	.1970"	3"	1"	.625"	4
95621	.1980	5.029	.1980"	3"	1"	.625"	4
95624	.1990	#8 5.055	.1990"	3"	1"	.625"	4
95627	.2000	5.080	.2000"	3"	1"	.625"	4
95630	.2010	#7 5.105	.2010"	3"	1"	.625"	4
95633	.2020	5.131	.2020"	3"	1"	.625"	4
95636	.2030	5.156	.2030"	3"	1"	.625"	4
95639	.2031	13/64" 5.159	.2031"	3"	1"	.625"	4
95642	.2040	#6 5.182	.2040"	3"	1"	.625"	4
95645	.2050	5.207	.2050"	3"	1"	.625"	4
95648	.2055	#5 5.220	.2055"	3"	1"	.625"	4
95651	.2060	5.232	.2060"	3"	1"	.625"	4
95654	.2070	5.258	.2070"	3"	1"	.625"	4
95657	.2080	5.283	.2080"	3"	1"	.625"	4
95660	.2090	#4 5.309	.2090"	3"	1"	.625"	4
95663	.2100	5.334	.2100"	3"	1"	.625"	4
95666	.2110	5.359	.2110"	3"	1"	.625"	4
95669	.2120	5.385	.2120"	3"	1"	.625"	4
95672	.2130	#3 5.410	.2130"	3"	1"	.625"	4
95675	.2140	5.436	.2140"	3"	1"	.625"	4
95678	.2150	5.461	.2150"	3"	1"	.625"	4
95681	.2160	5.486	.2160"	3"	1"	.625"	4
95684	.2165	5.500	.2165"	3"	1"	.625"	4
95687	.2170	5.512	.2170"	3"	1"	.625"	4
95690	.2180	5.537	.2180"	3"	1"	.625"	4
95693	.2188	7/32" 5.558	.2188"	3"	1"	.625"	4
95696	.2190	5.563	.2190"	3"	1"	.625"	4
95699	.2200	5.588	.2200"	3"	1"	.625"	4
95702	.2210	#2 5.613	.2210"	3"	1"	.625"	4
95705	.2220	5.639	.2220"	3"	1"	.625"	4
95708	.2230	5.664	.2230"	3"	1"	.625"	4
95711	.2240	5.690	.2240"	3"	1"	.625"	4
95714	.2250	5.715	.2250"	3"	1"	.625"	4

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95717	.2260	5.740	.2260"	3"	1"	.625"	4
95720	.2270	5.766	.2270"	3"	1"	.625"	4
95723	.2280	#1 5.791	.2280"	3"	1"	.625"	4
95726	.2290	5.817	.2290"	3"	1"	.625"	4
95729	.2300	5.842	.2300"	3"	1"	.625"	4
95732	.2310	5.867	.2310"	3"	1"	.625"	4
95735	.2320	5.893	.2320"	3"	1"	.625"	4
95738	.2330	5.918	.2330"	3"	1"	.625"	4
95741	.2340	A 5.944	.2340"	3"	1"	.625"	4
95744	.2344	15/64" 5.954	.2344"	3"	1"	.625"	4
95747	.2350	5.969	.2350"	3"	1"	.625"	4
95750	.2360	5.994	.2360"	3"	1"	.625"	4
95753	.2362	6.000	.2362"	3"	1"	.625"	4
95756	.2370	6.020	.2370"	3"	1"	.625"	4
95759	.2380	B 6.045	.2380"	3"	1"	.625"	4
95762	.2390	6.071	.2390"	3"	1"	.625"	4
95765	.2400	6.096	.2400"	3"	1"	.625"	4
95768	.2410	6.121	.2410"	3"	1"	.625"	4
95771	.2420	C 6.147	.2420"	3"	1"	.625"	4
95774	.2430	6.172	.2430"	3"	1"	.625"	4
95777	.2440	6.198	.2440"	3"	1"	.625"	4
95780	.2450	6.223	.2450"	3"	1"	.625"	4
95783	.2460	D 6.248	.2460"	3"	1"	.625"	4
95786	.2470	6.274	.2470"	3"	1"	.625"	4
95789	.2480	6.299	.2480"	3"	1"	.625"	4
95792	.2485	6.312	.2485"	3"	1"	.625"	4
95795	.2490	6.325	.2490"	3"	1"	.625"	4
95798	.2495	6.337	.2495"	3"	1"	.625"	4
95799	.2498	6.345	.2498"	3"	1"	.625"	4
95801	.2500	1/4" / E 6.350	.2500"	3"	1"	.625"	4
95802	.2502	6.355	.2502"	3"	1"	.625"	4
95804	.2505	6.363	.2505"	3"	1"	.625"	4
95807	.2510	6.375	.2510"	3"	1"	.625"	4
95810	.2515	6.388	.2515"	3"	1"	.625"	4
95813	.2520	6.401	.2520"	3"	1"	.625"	4
95816	.2530	6.426	.2530"	3"	1"	.625"	4
95819	.2540	6.452	.2540"	3"	1"	.625"	4
95822	.2550	6.477	.2550"	3-1/4"	1-1/8"	.625"	6
95825	.2559	6.500	.2559"	3-1/4"	1-1/8"	.625"	6
95828	.2560	6.502	.2560"	3-1/4"	1-1/8"	.625"	6
95831	.2570	F 6.528	.2570"	3-1/4"	1-1/8"	.625"	6
95834	.2580	6.553	.2580"	3-1/4"	1-1/8"	.625"	6
95837	.2590	6.579	.2590"	3-1/4"	1-1/8"	.625"	6
95840	.2600	6.604	.2600"	3-1/4"	1-1/8"	.625"	6
95843	.2610	G 6.629	.2610"	3-1/4"	1-1/8"	.625"	6
95846	.2620	6.655	.2620"	3-1/4"	1-1/8"	.625"	6
95849	.2630	6.680	.2630"	3-1/4"	1-1/8"	.625"	6
95852	.2640	6.706	.2640"	3-1/4"	1-1/8"	.625"	6

continued →

Series 4100 (continued)

.2650" - .3070"
(6.731mm - 7.798mm)

REAMERS

EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Neck Length	Number Flutes	
	Decimal	Metric						
95855	.2650		6.731	.2650"	3-1/4"	1-1/8"	.625"	6
95858	.2656	17/64"	6.746	.2656"	3-1/4"	1-1/8"	.625"	6
95861	.2660	H	6.756	.2660"	3-1/4"	1-1/8"	.625"	6
95864	.2670		6.782	.2670"	3-1/4"	1-1/8"	.625"	6
95867	.2680		6.807	.2680"	3-1/4"	1-1/8"	.625"	6
95870	.2690		6.833	.2690"	3-1/4"	1-1/8"	.625"	6
95873	.2700		6.858	.2700"	3-1/4"	1-1/8"	.625"	6
95876	.2710		6.883	.2710"	3-1/4"	1-1/8"	.625"	6
95879	.2720	I	6.909	.2720"	3-1/4"	1-1/8"	.750"	6
95882	.2730		6.934	.2730"	3-1/4"	1-1/8"	.750"	6
95885	.2740		6.960	.2740"	3-1/4"	1-1/8"	.750"	6
95888	.2750		6.985	.2750"	3-1/4"	1-1/8"	.750"	6
95891	.2756		7.000	.2756"	3-1/4"	1-1/8"	.750"	6
95894	.2760		7.010	.2760"	3-1/4"	1-1/8"	.750"	6
95897	.2770	J	7.036	.2770"	3-1/4"	1-1/8"	.750"	6
95900	.2780		7.061	.2780"	3-1/4"	1-1/8"	.750"	6
95903	.2790		7.087	.2790"	3-1/4"	1-1/8"	.750"	6
95906	.2800		7.112	.2800"	3-1/4"	1-1/8"	.750"	6
95909	.2810	K	7.137	.2810"	3-1/4"	1-1/8"	.750"	6
95912	.2812	9/32"	7.142	.2812"	3-1/4"	1-1/8"	.750"	6
95915	.2820		7.163	.2820"	3-1/4"	1-1/8"	.750"	6
95918	.2830		7.188	.2830"	3-1/4"	1-1/8"	.750"	6
95921	.2840		7.214	.2840"	3-1/4"	1-1/8"	.750"	6
95924	.2850		7.239	.2850"	3-1/4"	1-1/8"	.750"	6
95927	.2860		7.264	.2860"	3-1/4"	1-1/8"	.750"	6
95930	.2870		7.290	.2870"	3-1/4"	1-1/8"	.750"	6
95933	.2880		7.315	.2880"	3-1/4"	1-1/8"	.750"	6
95936	.2890		7.341	.2890"	3-1/4"	1-1/8"	.750"	6
95939	.2900	L	7.366	.2900"	3-1/4"	1-1/8"	.750"	6
95942	.2910		7.391	.2910"	3-1/4"	1-1/8"	.750"	6
95945	.2920		7.417	.2920"	3-1/4"	1-1/8"	.750"	6
95948	.2930		7.442	.2930"	3-1/4"	1-1/8"	.750"	6
95951	.2940		7.468	.2940"	3-1/4"	1-1/8"	.750"	6
95954	.2950	M	7.493	.2950"	3-1/4"	1-1/8"	.750"	6
95957	.2953		7.500	.2953"	3-1/4"	1-1/8"	.750"	6
95960	.2960		7.518	.2960"	3-1/4"	1-1/8"	.750"	6
95963	.2969	19/64"	7.541	.2969"	3-1/4"	1-1/8"	.750"	6
95966	.2970		7.544	.2970"	3-1/4"	1-1/8"	.750"	6
95969	.2980		7.569	.2980"	3-1/4"	1-1/8"	.750"	6
95972	.2990		7.595	.2990"	3-1/4"	1-1/8"	.750"	6
95975	.3000		7.620	.3000"	3-1/4"	1-1/8"	.750"	6
95978	.3010		7.645	.3010"	3-1/4"	1-1/8"	.750"	6
95981	.3020	N	7.671	.3020"	3-1/4"	1-1/8"	.750"	6
95984	.3030		7.696	.3030"	3-1/4"	1-1/8"	.750"	6
95987	.3040		7.722	.3040"	3-1/4"	1-1/8"	.750"	6
95990	.3050		7.747	.3050"	3-1/4"	1-1/8"	.750"	6
95993	.3060		7.772	.3060"	3-1/4"	1-1/8"	.750"	6
95996	.3070		7.798	.3070"	3-1/4"	1-1/8"	.750"	6

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
95999	.3080	7.823	.3080"	3-1/4"	1-1/8"	.750"	6
96002	.3090	7.849	.3090"	3-1/4"	1-1/8"	.750"	6
96005	.3100	7.874	.3100"	3-1/4"	1-1/8"	.750"	6
96006	.3105	7.887	.3105"	3-1/4"	1-1/8"	.750"	6
96008	.3110	7.899	.3110"	3-1/4"	1-1/8"	.750"	6
96011	.3115	7.912	.3115"	3-1/4"	1-1/8"	.750"	6
96014	.3120	7.925	.3120"	3-1/4"	1-1/8"	.750"	6
96015	.3123	7.932	.3123"	3-1/4"	1-1/8"	.750"	6
96017	.3125 5/16"	7.938	.3125"	3-1/4"	1-1/8"	.750"	6
96021	.3130	7.950	.3130"	3-1/4"	1-1/8"	.750"	6
96023	.3135	7.963	.3135"	3-1/4"	1-1/8"	.750"	6
96026	.3140	7.976	.3140"	3-1/4"	1-1/8"	.750"	6
96029	.3150	8.000	.3150"	3-1/4"	1-1/8"	.750"	6
96032	.3160 O	8.026	.3160"	3-1/4"	1-1/8"	.750"	6
96035	.3170	8.052	.3170"	3-1/4"	1-1/8"	.750"	6
96038	.3180	8.077	.3180"	3-1/4"	1-1/8"	.750"	6
96041	.3190	8.103	.3190"	3-1/2"	1-1/4"	.750"	6
96044	.3200	8.128	.3200"	3-1/2"	1-1/4"	.750"	6
96047	.3210	8.153	.3210"	3-1/2"	1-1/4"	.750"	6
96050	.3220	8.179	.3220"	3-1/2"	1-1/4"	.750"	6
96053	.3230 P	8.204	.3230"	3-1/2"	1-1/4"	.750"	6
96056	.3240	8.230	.3240"	3-1/2"	1-1/4"	.750"	6
96059	.3250	8.255	.3250"	3-1/2"	1-1/4"	.750"	6
96062	.3260	8.280	.3260"	3-1/2"	1-1/4"	.750"	6
96065	.3270	8.306	.3270"	3-1/2"	1-1/4"	.750"	6
96068	.3280	8.331	.3280"	3-1/2"	1-1/4"	.750"	6
96071	.3281 21/64"	8.334	.3281"	3-1/2"	1-1/4"	.750"	6
96074	.3290	8.357	.3290"	3-1/2"	1-1/4"	.750"	6
96077	.3300	8.382	.3300"	3-1/2"	1-1/4"	.750"	6
96079	.3310	8.407	.3310"	3-1/2"	1-1/4"	.750"	6
96083	.3320 Q	8.433	.3320"	3-1/2"	1-1/4"	.750"	6
96086	.3330	8.458	.3330"	3-1/2"	1-1/4"	.750"	6
96089	.3340	8.484	.3340"	3-1/2"	1-1/4"	.750"	6
96092	.3346	8.500	.3346"	3-1/2"	1-1/4"	.750"	6
96095	.3350	8.509	.3350"	3-1/2"	1-1/4"	.750"	6
96098	.3360	8.534	.3360"	3-1/2"	1-1/4"	.750"	6
96101	.3370	8.560	.3370"	3-1/2"	1-1/4"	.750"	6
96104	.3380	8.585	.3380"	3-1/2"	1-1/4"	.750"	6
96107	.3390 R	8.611	.3390"	3-1/2"	1-1/4"	.750"	6
96110	.3400	8.636	.3400"	3-1/2"	1-1/4"	.750"	6
96113	.3410	8.661	.3410"	3-1/2"	1-1/4"	.750"	6
96116	.3420	8.687	.3420"	3-1/2"	1-1/4"	.750"	6
96119	.3430	8.712	.3430"	3-1/2"	1-1/4"	.750"	6
96122	.3438 11/32"	8.733	.3438"	3-1/2"	1-1/4"	.750"	6
96125	.3440	8.738	.3440"	3-1/2"	1-1/4"	.750"	6
96128	.3450	8.763	.3450"	3-1/2"	1-1/4"	.750"	6
96131	.3460	8.788	.3460"	3-1/2"	1-1/4"	.750"	6
96134	.3470	8.814	.3470"	3-1/2"	1-1/4"	.750"	6

continued →

Series 4100 (continued)

.3480" - .3810"
(8.839mm - 9.677mm)



TOLERANCES

d_1	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)
d_2	.0590" - .2509" (1.498 - 6.372mm)	+.0002" - .0000" (+.0050 - .0000mm)
	.2510" - .5020" (6.375 - 12.750mm)	+.0003" - .0000" (+.0075 - .0000mm)

REAMERS

Standard Reamers

Standard Reibahlen

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标准铰刀



EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	
	Decimal	Diameter Metric						
96137	.3480	S	8.839	.3480"	3-1/2"	1-1/4"	.750"	6
96141	.3490		8.865	.3490"	3-1/2"	1-1/4"	.750"	6
96143	.3500		8.890	.3500"	3-1/2"	1-1/4"	.750"	6
96146	.3510		8.915	.3510"	3-1/2"	1-1/4"	.750"	6
96149	.3520		8.941	.3520"	3-1/2"	1-1/4"	.750"	6
96152	.3530		8.966	.3530"	3-1/2"	1-1/4"	.750"	6
96155	.3540		8.992	.3540"	3-1/2"	1-1/4"	.750"	6
96158	.3543		9.000	.3543"	3-1/2"	1-1/4"	.750"	6
96161	.3550		9.017	.3550"	3-1/2"	1-1/4"	.750"	6
96164	.3560		9.042	.3560"	3-1/2"	1-1/4"	.750"	6
96167	.3570		9.068	.3570"	3-1/2"	1-1/4"	.750"	6
96170	.3580	T	9.093	.3580"	3-1/2"	1-1/4"	.750"	6
96173	.3590		9.119	.3590"	3-1/2"	1-1/4"	.750"	6
96176	.3594	23/64"	9.129	.3594"	3-1/2"	1-1/4"	.750"	6
96179	.3600		9.144	.3600"	3-1/2"	1-1/4"	.750"	6
96182	.3610		9.169	.3610"	3-1/2"	1-1/4"	.750"	6
96185	.3620		9.195	.3620"	3-1/2"	1-1/4"	.750"	6
96191	.3640		9.246	.3640"	3-1/2"	1-1/4"	.750"	6
96194	.3650		9.271	.3650"	3-1/2"	1-1/4"	.750"	6
96197	.3660		9.296	.3660"	3-1/2"	1-1/4"	.750"	6
96199	.3670		9.322	.3670"	3-1/2"	1-1/4"	.750"	6
96203	.3680	U	9.347	.3680"	3-1/2"	1-1/4"	.750"	6
96206	.3690		9.373	.3690"	3-1/2"	1-1/4"	.750"	6
96209	.3700		9.398	.3700"	3-1/2"	1-1/4"	.750"	6
96212	.3710		9.423	.3710"	3-1/2"	1-1/4"	.750"	6
96215	.3720		9.449	.3720"	3-1/2"	1-1/4"	.750"	6
96218	.3730		9.474	.3730"	3-1/2"	1-1/4"	.750"	6
96221	.3740		9.500	.3740"	3-1/2"	1-1/4"	.750"	6
96224	.3745		9.512	.3745"	3-1/2"	1-1/4"	.750"	6
96225	.3748		9.520	.3748"	3-1/2"	1-1/4"	.750"	6
96227	.3750	3/8"	9.525	.3750"	3-1/2"	1-1/4"	.750"	6
96230	.3755		9.538	.3755"	3-1/2"	1-1/4"	.750"	6
96233	.3760		9.550	.3760"	3-1/2"	1-1/4"	.750"	6
96236	.3765		9.563	.3765"	3-1/2"	1-1/4"	.750"	6
96239	.3770	V	9.576	.3770"	3-1/2"	1-1/4"	.750"	6
96242	.3780		9.601	.3780"	3-1/2"	1-1/4"	.750"	6
96245	.3790		9.627	.3790"	3-1/2"	1-1/4"	.750"	6
96248	.3800		9.652	.3800"	3-1/2"	1-1/4"	.750"	6
96251	.3810		9.677	.3810"	3-1/2"	1-1/4"	.750"	6

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
	Decimal	Metric					
96254	.3820	9.703	.3820"	3-1/2"	1-1/4"	.750"	6
96257	.3830	9.728	.3830"	3-1/2"	1-1/4"	.750"	6
96260	.3840	9.754	.3840"	3-1/2"	1-1/4"	.750"	6
96263	.3850	9.779	.3850"	3-1/2"	1-1/4"	.750"	6
96266	.3860	W 9.804	.3860"	3-1/2"	1-1/4"	.750"	6
96269	.3870	9.830	.3870"	3-1/2"	1-1/4"	.750"	6
96272	.3880	9.855	.3880"	3-1/2"	1-1/4"	.750"	6
96275	.3890	9.881	.3890"	3-1/2"	1-1/4"	.750"	6
96278	.3900	9.906	.3900"	3-1/2"	1-1/4"	.750"	6
96281	.3906	25/64" 9.921	.3906"	3-1/2"	1-1/4"	.750"	6
96284	.3910	9.931	.3910"	3-1/2"	1-1/4"	.750"	6
96287	.3920	9.957	.3920"	3-1/2"	1-1/4"	.750"	6
96290	.3930	9.982	.3930"	3-1/2"	1-1/4"	.750"	6
96293	.3937	10.000	.3937"	3-1/2"	1-1/4"	.750"	6
96296	.3940	10.008	.3940"	3-1/2"	1-1/4"	.750"	6
96299	.3950	10.033	.3950"	3-1/2"	1-1/4"	.750"	6
96302	.3960	10.058	.3960"	3-1/2"	1-1/4"	.750"	6
96305	.3970	X 10.084	.3970"	3-1/2"	1-1/4"	.750"	6
96308	.3980	10.109	.3980"	3-1/2"	1-1/4"	.750"	6
96311	.3990	10.135	.3990"	3-1/2"	1-1/4"	.750"	6
96314	.4000	10.160	.4000"	3-1/2"	1-1/4"	.750"	6
96317	.4010	10.185	.4010"	3-1/2"	1-1/4"	.750"	6
96319	.4020	10.211	.4020"	3-1/2"	1-1/4"	.750"	6
96323	.4030	10.236	.4030"	3-1/2"	1-1/4"	.750"	6
96326	.4040	Y 10.262	.4040"	3-1/2"	1-1/4"	.750"	6
96329	.4050	10.287	.4050"	3-1/2"	1-1/4"	.750"	6
96332	.4060	10.312	.4060"	3-1/2"	1-1/4"	.750"	6
96335	.4062	13/32" 10.317	.4062"	3-1/2"	1-1/4"	.750"	6
96338	.4070	10.338	.4070"	3-1/2"	1-1/4"	.750"	6
96341	.4080	10.363	.4080"	3-1/2"	1-1/4"	.750"	6
96344	.4090	10.389	.4090"	3-1/2"	1-1/4"	.750"	6
96347	.4100	10.414	.4100"	3-1/2"	1-1/4"	.750"	6
96350	.4110	10.439	.4110"	3-1/2"	1-1/4"	.750"	6
96353	.4120	10.465	.4120"	3-1/2"	1-1/4"	.750"	6
96356	.4130	Z 10.490	.4130"	3-1/2"	1-1/4"	.750"	6
96359	.4134	10.500	.4134"	3-1/2"	1-1/4"	.750"	6
96362	.4140	10.516	.4140"	3-1/2"	1-1/4"	.750"	6
96365	.4150	10.541	.4150"	3-1/2"	1-1/4"	.750"	6
96366	.4160	10.566	.4160"	4"	1-3/8"	.750"	6
96367	.4170	10.592	.4170"	4"	1-3/8"	.750"	6
96369	.4190	10.643	.4190"	4"	1-3/8"	.750"	6
96374	.4210	10.693	.4210"	4"	1-3/8"	.750"	6
96377	.4219	27/64" 10.716	.4219"	4"	1-3/8"	.750"	6
96380	.4220	10.719	.4220"	4"	1-3/8"	.750"	6
96383	.4230	10.744	.4230"	4"	1-3/8"	.750"	6
96386	.4240	10.770	.4240"	4"	1-3/8"	.750"	6

continued →

Series 4100 (continued)

.4250" - .4724"
(10.795mm - 12.000mm)

REAMERS

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Neck Length	Number Flutes	
	Decimal	Metric						
96389	.4250	10.795	.4250"	4"	1-3/8"	.750"	6	
96392	.4260	10.820	.4260"	4"	1-3/8"	.750"	6	
96395	.4270	10.846	.4270"	4"	1-3/8"	.750"	6	
96398	.4280	10.871	.4280"	4"	1-3/8"	.750"	6	
96404	.4300	10.922	.4300"	4"	1-3/8"	.750"	6	
96407	.4310	10.947	.4310"	4"	1-3/8"	.750"	6	
96410	.4320	10.973	.4320"	4"	1-3/8"	.750"	6	
96413	.4330	10.998	.4330"	4"	1-3/8"	.750"	6	
96416	.4331	11.000	.4331"	4"	1-3/8"	.750"	6	
96419	.4340	11.024	.4340"	4"	1-3/8"	.750"	6	
96422	.4350	11.049	.4350"	4"	1-3/8"	.750"	6	
96425	.4360	11.074	.4360"	4"	1-3/8"	.750"	6	
96428	.4365	11.087	.4365"	4"	1-3/8"	.750"	6	
96431	.4370	11.100	.4370"	4"	1-3/8"	.750"	6	
96432	.4373	11.107	.4373"	4"	1-3/8"	.750"	6	
96434	.4375	7/16"	11.113	.4375"	4"	1-3/8"	.750"	6
96437	.4380	11.125	.4380"	4"	1-3/8"	.750"	6	
96440	.4385	11.138	.4385"	4"	1-3/8"	.750"	6	
96443	.4390	11.151	.4390"	4"	1-3/8"	.750"	6	
96446	.4400	11.176	.4400"	4"	1-3/8"	.750"	6	
96449	.4410	11.201	.4410"	4"	1-3/8"	.750"	6	
96455	.4430	11.252	.4430"	4"	1-3/8"	.750"	6	
96458	.4440	11.278	.4440"	4"	1-3/8"	.750"	6	
96461	.4450	11.303	.4450"	4"	1-3/8"	.750"	6	
96467	.4470	11.354	.4470"	4"	1-3/8"	.750"	6	
96470	.4480	11.379	.4480"	4"	1-3/8"	.750"	6	
96473	.4490	11.405	.4490"	4"	1-3/8"	.750"	6	
96476	.4500	11.430	.4500"	4"	1-3/8"	.750"	6	
96479	.4510	11.455	.4510"	4"	1-3/8"	.750"	6	
96485	.4528	11.500	.4528"	4"	1-3/8"	.750"	6	
96488	.4530	11.506	.4530"	4"	1-3/8"	.750"	6	
96491	.4531	29/64"	11.509	.4531"	4"	1-3/8"	.750"	6
96494	.4540	11.532	.4540"	4"	1-3/8"	.750"	6	
96497	.4550	11.557	.4550"	4"	1-3/8"	.750"	6	
96500	.4560	11.582	.4560"	4"	1-3/8"	.750"	6	
96503	.4570	11.608	.4570"	4"	1-3/8"	.750"	6	
96506	.4580	11.633	.4580"	4"	1-3/8"	.750"	6	
96512	.4600	11.684	.4600"	4"	1-3/8"	.750"	6	
96515	.4610	11.709	.4610"	4"	1-3/8"	.750"	6	
96527	.4650	11.811	.4650"	4"	1-3/8"	.750"	6	
96530	.4660	11.836	.4660"	4"	1-3/8"	.750"	6	
96533	.4670	11.862	.4670"	4"	1-3/8"	.750"	6	
96539	.4688	15/32"	11.908	.4688"	4"	1-3/8"	.750"	6
96542	.4690	11.913	.4690"	4"	1-3/8"	.750"	6	
96545	.4700	11.938	.4700"	4"	1-1/2"	.750"	6	
96548	.4710	11.963	.4710"	4"	1-1/2"	.750"	6	
96551	.4720	11.989	.4720"	4"	1-1/2"	.750"	6	
96554	.4724	12.000	.4724"	4"	1-1/2"	.750"	6	

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Neck Length	Number Flutes	
	Decimal	Metric						
96557	.4730	12.014	.4730"	4"	1-1/2"	.750"	6	
96561	.4740	12.040	.4740"	4"	1-1/2"	.750"	6	
96563	.4750	12.065	.4750"	4"	1-1/2"	.750"	6	
96566	.4760	12.090	.4760"	4"	1-1/2"	.750"	6	
96569	.4770	12.116	.4770"	4"	1-1/2"	.750"	6	
96572	.4780	12.141	.4780"	4"	1-1/2"	.750"	6	
96578	.4800	12.192	.4800"	4"	1-1/2"	.750"	6	
96581	.4810	12.217	.4810"	4"	1-1/2"	.750"	6	
96584	.4820	12.243	.4820"	4"	1-1/2"	.750"	6	
96590	.4840	12.294	.4840"	4"	1-1/2"	.750"	6	
96593	.4844	31/64"	12.304	.4844"	4"	1-1/2"	.750"	6
96596	.4850	12.319	.4850"	4"	1-1/2"	.750"	6	
96602	.4870	12.370	.4870"	4"	1-1/2"	.750"	6	
96608	.4890	12.421	.4890"	4"	1-1/2"	.750"	6	
96617	.4920	12.497	.4920"	4"	1-1/2"	.750"	6	
96620	.4921	12.500	.4921"	4"	1-1/2"	.750"	6	
96623	.4930	12.522	.4930"	4"	1-1/2"	.750"	6	
96629	.4950	12.573	.4950"	4"	1-1/2"	.750"	6	
96632	.4960	12.598	.4960"	4"	1-1/2"	.750"	6	
96635	.4970	12.624	.4970"	4"	1-1/2"	.750"	6	
96638	.4980	12.649	.4980"	4"	1-1/2"	.750"	6	
96641	.4990	12.675	.4990"	4"	1-1/2"	.750"	6	
96644	.4995	12.687	.4995"	4"	1-1/2"	.750"	6	
96645	.4998	12.695	.4998"	4"	1-1/2"	.750"	6	
96647	.5000	1/2"	12.700	.5000"	4"	1-1/2"	.750"	6
96650	.5005	12.713	.5005"	4"	1-1/2"	.750"	6	
96653	.5010	12.725	.5010"	4"	1-1/2"	.750"	6	
96656	.5020	12.751	.5020"	4"	1-1/2"	.750"	6	

Series 4100 (Metric)

1.990mm - 10.040mm
(.07835" - .39528")



TOLERANCES

d_1	1.500 - 6.372mm	+0.005mm -0.000
	6.375 - 12.750mm	+0.0075mm -0.0000
d_2	1.500 - 6.372mm	+0.005mm -0.000
	6.375 - 12.750mm	+0.0075mm -0.0000

Metric Reamers

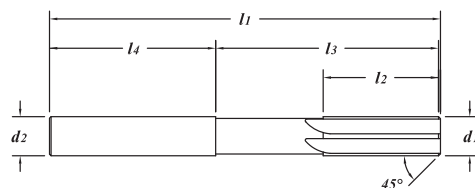
metrisch Reibahlen

Escariadores métrico

Alesoirs métrique

Alesatori metrico

公制铰刀



Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0,250 ±0,050mm (.010" ±0.002") less than fluted diameter (d_1)



Vollhartmetall aus Feinkornhartmetall
Gerade RHC-Spannnuten
Standard 45° Führungsfase
Hals-Durchmesser ist 0,250 ±0,050 mm (0,010 Zoll ±0,002 Zoll) kleiner als der Nenn-Durchmesser (d_1)



Carburo sólido de grano submicrónico
Rectos - ranuras RHC
Chafilán de guía estándar de 45°
Diámetro de cuello de 0,250 ±0,050mm (.010" ±0.002") menor que diámetro de corte (d_1)



Carbure plein submicrograin
droites goujures - RHC
Une norme chanfrein à 45°
Diamètre de la nuque est 0,250 ± 0,050 mm (.010 "±0.002") plus petit que le diamètre de coupe (d_1)



Super sub-micrograno metallo duro
Taglienti dritti
Inclinazione standard a 45°
Diametro del collo di 0,250 ± 0,050 mm (.010 "±0.002") inferiore rispetto al diametro di taglio (d_1)



超细晶粒整体硬质合金
直线型—洛氏硬度C级出屑槽
标准45° 导程倒角
颈部直径为 0,250 ± 0,050 mm (.010 "±0.002"), 小于刃部直径 (d_1)

EDP#	d_1		d_2	l_1	l_2	l_3	l_4	Number Flutes
	Decimal	Metric	Shank Diameter	Overall Length	Flute Length	Reach Length	Shank Length	
96659	.07835	1.990	1.990	50	12	32	18	4
96662	.07874	2.000	2.000	50	12	32	18	4
96665	.07913	2.010	2.010	50	12	32	18	4
96668	.07953	2.020	2.020	50	12	32	18	4
96671	.11772	2.990	2.990	65	16	36	29	4
96674	.11811	3.000	3.000	65	16	36	29	4
96677	.11850	3.010	3.010	65	16	36	29	4
96680	.11890	3.020	3.020	65	16	36	29	4
96683	.15709	3.990	3.990	75	20	45	30	4
96686	.15748	4.000	4.000	75	20	45	30	4
96689	.15787	4.010	4.010	75	20	45	30	4
96692	.15827	4.020	4.020	75	20	45	30	4
96695	.15866	4.030	4.030	75	20	45	30	4
96698	.19646	4.990	4.990	100	25	60	40	4
96701	.19685	5.000	5.000	100	25	60	40	4
96704	.19724	5.010	5.010	100	25	60	40	4
96707	.19764	5.020	5.020	100	25	60	40	4
96710	.19803	5.030	5.030	100	25	60	40	4
96713	.23583	5.990	5.990	100	25	60	40	4
96716	.23622	6.000	6.000	100	25	60	40	4
96719	.23661	6.010	6.010	100	25	60	40	4
96722	.23701	6.020	6.020	100	25	60	40	4
96725	.27559	7.000	7.000	100	25	60	40	6
96728	.31457	7.990	7.990	120	32	75	45	6
96731	.31496	8.000	8.000	120	32	75	45	6
96734	.31535	8.010	8.010	120	32	75	45	6
96737	.31575	8.020	8.020	120	32	75	45	6
96740	.31614	8.030	8.030	120	32	75	45	6
96743	.35433	9.000	9.000	120	32	75	45	6
96746	.39291	9.980	9.980	130	32	75	55	6
96749	.39331	9.990	9.990	130	32	75	55	6
96752	.39370	10.000	10.000	130	32	75	55	6
96755	.39409	10.010	10.010	130	32	75	55	6
96758	.39449	10.020	10.020	130	32	75	55	6
96761	.39488	10.030	10.030	130	32	75	55	6
96764	.39528	10.040	10.040	130	32	75	55	6

EDP#	<i>d1</i>		<i>d2</i>	<i>l1</i>	<i>l2</i>	<i>l3</i>	<i>l4</i>	Number Flutes
	Decimal	Metric	Shank Diameter	Overall Length	Flute Length	Reach Length	Shank Length	
96767	.47165	11.980	11.980	150	40	100	50	6
96770	.47205	11.990	11.990	150	40	100	50	6
96773	.47244	12.000	12.000	150	40	100	50	6
96776	.47283	12.010	12.010	150	40	100	50	6
96779	.47323	12.020	12.020	150	40	100	50	6
96782	.47362	12.030	12.030	150	40	100	50	6



Reamer Manufacturing



LHS / RHC

STR / RHC

RHS / RHC

Special Reamers - Solid Carbide - 2 Week Delivery

Solid Carbide Submicron Grain

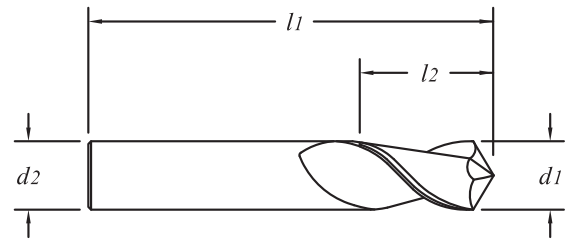
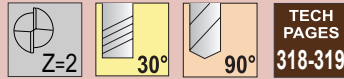
All reamers furnished with a standard 45° Lead Chamfer

All reamers furnished with a standard neck for reach

Neck diameter is .010" ±.002" less than fluted diameter

Diameter		Overall Length	Flute Length	No. of Flutes
Decimal	Metric			
.0590" - .0650"	1.499 - 1.651	1-1/2"	3/8"	4
.0660" - .0800"	1.676 - 2.032	1-3/4"	1/2"	4
.0810" - .0950"	2.057 - 2.413	2"	1/2"	4
.0960" - .1300"	2.438 - 3.302	2-1/4"	5/8"	4
.1310" - .1590"	3.327 - 4.039	2-1/2"	3/4"	4
.1600" - .1950"	4.064 - 4.953	2-3/4"	7/8"	4
.1960" - .2540"	4.978 - 6.452	3"	1"	4
.2550" - .3180"	6.477 - 8.077	3-1/4"	1-1/8"	6
.3190" - .4150"	8.103 - 10.541	3-1/2"	1-1/4"	6
.4160" - .4690"	10.566 - 11.913	4"	1-3/8"	6
.4700" - .5020"	11.938 - 12.751	4"	1-1/2"	6
.5030" - .5700"	12.776 - 14.478	4"	1-5/8"	6
.5710" - .7500"	14.503 - 19.050	4"	1-3/4"	6

d_1	$+0.000^{\circ} -0.002^{\circ}$ (+.000 /-.050mm)
d_2	h6



Solid submicron grain carbide drill/end mill
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance: $\pm 0^{\circ}30'$



Hochleistungs- Vollhartmetallbohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: $\pm 0^{\circ}30'$



Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: $\pm 0^{\circ}30'$



Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: $\pm 0^{\circ}30'$



Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente versatile
Tolleranza punto: $\pm 0^{\circ}30'$



整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 - 中心切削
刀具没有钻尖部份
功能极多
钻点允差: $\pm 0^{\circ}30'$

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
57200	.1250	1/8"	3.175	1/8"	1-1/2"
57210	.1875	3/16"	4.763	3/16"	2"
57220	.2500	1/4"	6.350	1/4"	2-1/2"
57230	.3125	5/16"	7.938	5/16"	2-1/2"
57240	.3750	3/8"	9.525	3/8"	2-1/2"
57250	.4375	7/16"	11.113	7/16"	2-3/4"
57260	.5000	1/2"	12.700	1/2"	3"
57270	.6250	5/8"	15.875	5/8"	3-1/2"
57280	.7500	3/4"	19.050	3/4"	4"

TOLERANCES

d_1	$+0.000" -0.002" (+.000 / -.050\text{mm})$
d_2	$h6$

Series 152MA



TECH
PAGES
318-319

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层



Solid submicron grain carbide drill/end mill
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance: $\pm 0^\circ 30'$



Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumsschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: $\pm 0^\circ 30'$



Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: $\pm 0^\circ 30'$



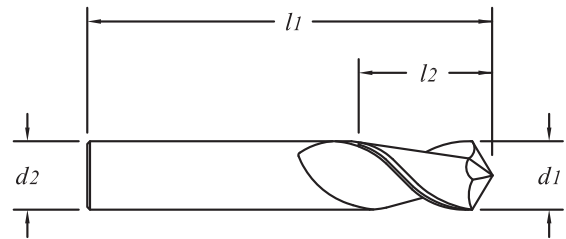
Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: $\pm 0^\circ 30'$



Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente versatile
Tolleranza punto: $\pm 0^\circ 30'$



整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 - 中心切削
刀具没有钻尖部份
功能极多
钻点允差: $\pm 0^\circ 30'$



EDP#	d_1 †		d_2	l_1	l_2
	Decimal	Diameter Metric	Shank Diameter	Overall Length	Flute Length
57207	.1250	1/8"	3.175	1/8"	1-1/2"
57217	.1875	3/16"	4.763	3/16"	2"
57227	.2500	1/4"	6.350	1/4"	2-1/2"
57237	.3125	5/16"	7.938	5/16"	2-1/2"
57247	.3750	3/8"	9.525	3/8"	2-1/2"
57257	.4375	7/16"	11.113	7/16"	2-3/4"
57267	.5000	1/2"	12.700	1/2"	3"
57277	.6250	5/8"	15.875	5/8"	3-1/2"
57287	.7500	3/4"	19.050	3/4"	4"

DRILL MILLS

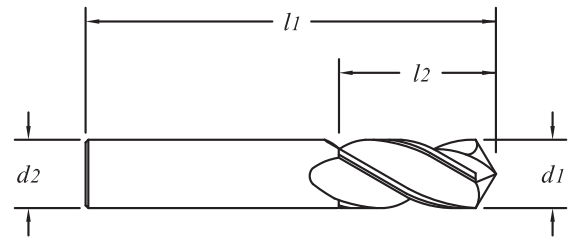
MATERIAL HARDNESS (Rc)

70

35

0

d_1	+0.000° -0.002° (+0.000 / -0.050mm)
d_2	h6



Solid submicron grain carbide drill/end mill
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance: $\pm 0^\circ 30'$



Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: $\pm 0^\circ 30'$



Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: $\pm 0^\circ 30'$



Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: $\pm 0^\circ 30'$



Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente versatile
Tolleranza punto: $\pm 0^\circ 30'$



整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 - 中心切削
刀具没有钻尖部份
功能极多
钻点公差: $\pm 0^\circ 30'$

60° EDP#	82° EDP#	90° EDP#	100° EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
				Decimal	Metric			
-	-	58198	-	.1181	3.000	3.0	38	12
-	57346	58200	-	.1250	1/8"	3.175	1-1/2"	1/2"
-	-	58202	-	.1575		4.000	50	14
-	57350	58210	57390	.1875	3/16"	4.763	2"	5/8"
-	57352	58212	57392	.1969		5.000	65	16
57314	57354	58214	-	.2362		6.000	65	19
57316	57356	58220	57396	.2500	1/4"	6.350	2-1/2"	3/4"
57318	57358	58230	57398	.3125	5/16"	7.938	2-1/2"	7/8"
57320	-	58232	57400	.3150		8.000	65	22
57322	57362	58240	57402	.3750	3/8"	9.525	2-1/2"	7/8"
57324	-	58242	57404	.3937		10.000	70	25
-	-	58252	57408	.4724		12.000	75	25
57330	57370	58260	57410	.5000	1/2"	12.700	3"	1"
57332	57372	58270	57412	.6250	5/8"	15.875	3-1/2"	1-1/4"
-	-	58272	57414	.6299		16.000	88	32
57336	57376	58280	-	.7500	3/4"	19.050	4"	1-1/2"

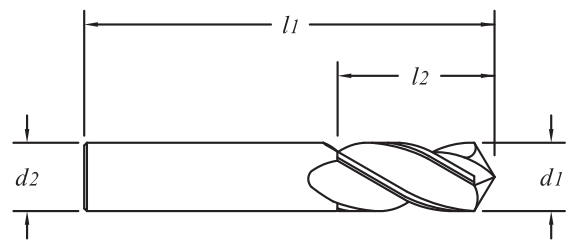
TOLERANCES

d_1	$+0.000" -0.002" (+.000 / -.050\text{mm})$
d_2	$h6$

Series 154MA

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层


Solid submicron grain carbide drill/end mill
Included angle to a point - center cutting
 Tools do not have drill point geometry
 Extremely versatile
 Point tolerance: $\pm 0^\circ 30'$



Hochleistungs- Vollhartmetall Bohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumschnitt
 Werkzeuge haben keine Ausspitzung
 Extrem Vielseitig
 Punkt-Toleranz: $\pm 0^\circ 30'$



Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
 Herramientas sin punta para taladrado
 Extremadamente versátil
 Tolerancia del punta: $\pm 0^\circ 30'$



Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
 Outils n'ont pas la géométrie pointe du foret
 Utilisations variables
 Point tolerance: $\pm 0^\circ 30'$



Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
 Gli utensili non hanno la geometria drill point
 Estremamente versatile
 Tolleranza punto: $\pm 0^\circ 30'$



整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 - 中心切削
 刀具没有钻尖部份
 功能极多
 钻点允差: $\pm 0^\circ 30'$

60° EDP#	82° EDP#	90° EDP#	100° EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
				Decimal	Metric			
-	-	58205	-	.1181	3.000	3.0	38	12
-	58346	58207	-	.1250	1/8"	3.175	1-1/2"	1/2"
-	58348	58209	58388	.1575	4.000	4.0	50	14
-	58350	58217	58390	.1875	3/16"	4.763	2"	5/8"
-	-	58219	-	.1969	5.000	5.0	65	16
58314	58354	58221	58394	.2362	6.000	6.0	65	19
58316	58356	58227	58396	.2500	1/4"	6.350	2-1/2"	3/4"
58318	58358	58237	58398	.3125	5/16"	7.938	2-1/2"	7/8"
58320	-	58239	58400	.3150	8.000	8.0	65	22
58322	58362	58247	58402	.3750	3/8"	9.525	2-1/2"	7/8"
58324	58364	58249	58404	.3937	10.000	10.0	70	25
58326	58366	58257	-	.4375	7/16"	11.113	2-3/4"	1"
58328	-	58259	58408	.4724	12.000	12.0	75	25
58330	58370	58267	58410	.5000	1/2"	12.700	3"	1"
58332	58372	58277	58412	.6250	5/8"	15.875	3-1/2"	1-1/4"
-	58374	58279	-	.6299	16.000	16.0	88	32
58336	58376	58287	58416	.7500	3/4"	19.050	4"	1-1/2"
-	58378	58289	-	.7874	20.000	20.0	100	38

DRILL MILLS
MATERIAL HARDNESS (RC)

70

35

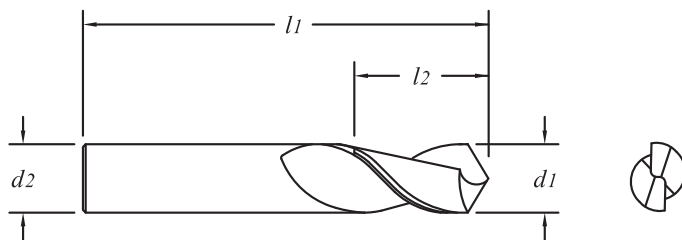
0

d_1	$+0.000^{\circ} - .002^{\circ}$ (+.000 / -.050mm)
d_2	h6



TECH
PAGES
320-321

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层



Solid submicron grain carbide drill/end mill
 Recommended for drilling and milling of mild steels and non-ferrous materials
 4-facet drill point geometry
 Extremely versatile
 Drill point tolerance: $\pm 1^{\circ}$



Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
 Empfohlen für das Bohren und Fräsen von weichen Stählen und Nicht-Eisen-Werkstoffen
 4-Fasen-Anschliff Punkt
 Extrem Vielseitig
 Punkt-Toleranz: $\pm 1^{\circ}$



Fresa/Broca de submicrograno sólido carburo
 Recomendado para el taladrado y fresado de aceros dulces y materiales no férricos
 Punta de 4 caras
 Extremadamente versátil
 Tolerancia del punta: $\pm 1^{\circ}$



Forets/Fraises carbure submicrograin
 Recommandé pour perçage et le fraisage des aciers doux et des matériaux de non-ferreux
 Géométrie de pointe du foret à 4 facettes
 Utilisations variables
 Point tolerance: $\pm 1^{\circ}$



Punte / Fresa de sub-micro grano metallo duro
 Raccomandata per foratura e fresatura di acciai morbidi e materiali non ferrosi
 Punto 4 facce
 Estremamente versatile
 Tolleranza punto: $\pm 1^{\circ}$



整体硬质合金立铣刀/钻头
 推荐用于钻和铣削软钢和非铁材料
 4-小平面刀尖
 功能极多
 钻点允差: $\pm 1^{\circ}$

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
57421	.1181	3.000	3.0	38	12
57423	.1250	1/8"	3.175	1/8"	1-1/2"
57425	.1575	4.000	4.0	50	14
57427	.1875	3/16"	4.762	3/16"	2"
57429	.1969	5.000	5.0	65	16
57431	.2362	6.000	6.0	65	19
57433	.2500	1/4"	6.350	1/4"	2-1/2"
57435	.3125	5/16"	7.937	5/16"	2-1/2"
57437	.3150	8.000	8.0	65	22
57439	.3750	3/8"	9.525	3/8"	2-1/2"
57441	.3937	10.000	10.0	70	25
57443	.4375	7/16"	11.112	7/16"	2-3/4"
57445	.4724	12.000	12.0	75	25
57447	.5000	1/2"	12.700	1/2"	3"
57449	.6250	5/8"	15.875	5/8"	3-1/2"
57451	.6299	16.000	16.0	88	32
57453	.7500	3/4"	19.050	3/4"	4"
57455	.7874	20.000	20.0	100	38



Series ARC

.1575" - .3750"
(4.000mm - 9.525mm)

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6
d_3	+0.000" - .005" (+.000 - .127mm)

Aluminum Rough Cut Mill - Bright Finish (Uncoated)

Aluminium Schrappfräser - Bright Fertig (Ohne Beschichtung)

Fresa de Desbaste Para Aluminio - Acabado Brillante (Sin Recubrimiento)

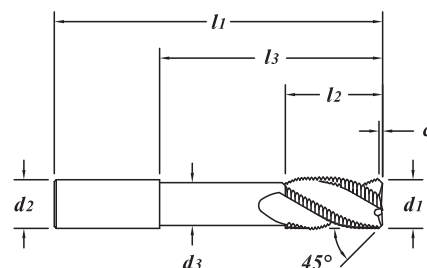
Fraise Ravageuse Pour l'Usinage de l'Aluminium - Finition Brillante (Sans Revêtement)

Fresa per Sgrossatura su Alluminio - Eccellente Finitura (Non Rivestito)

粗加工铝合金铣刀 - 高亮光洁度(未涂层)



Solid submicron grain carbide end mill - center cutting
Standard 45° Lead Chamfer
Wave knuckle design to break up chips
Each flute has individual helix angle to break up harmonics
Reduces tool pressure requiring less machine power
Designed for roughing aluminum alloys and non-ferrous materials



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Standard 45° Führungsfase
Schrappprofil entwickelt, um die Späne zu brechen
Jede Spannute hat einen Spiralwinkel, um die Vibrationen zu vermeiden
Reduziert den Druck auf das Werkzeug und erfordert weniger Maschinenleistung
Entwickelt für das Schrappen von Aluminium Legierungen und Nicht-Eisen Materialien



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Chañán de guía estándar de 45°
Diseño ondulado para rotura de viruta
Cada labio tiene ángulo de hélice individual para rotura de armónicos
Reduce la presión de la herramienta necesitando menos potencia de máquina
Diseñada para desbaste de aleaciones de aluminio y materiales no férricos



Fraises carbure submicrograin - coupe au centre
Une norme chanfrein à 45°
Profil en vagues pour casser le copeau
Chaque dent a un angle d'hélice particulier pour éviter les vibrations
Réduit le stress sur l'outil et nécessite moins de puissance de la machine
Adapté pour l'ébauche des alliages d'aluminium et des matières non-ferreuses



Fresa sub-micrograno metallo duro - taglio al centro
Inclinazione standard a 45°
Geometria ondulata per rompere il truciolo
Ogni elica ha uno specifico angolo per rompere le vibrazioni armoniche
Riduce la pressione e richiede meno potenza alla macchina
Geometria per sgrossatura su leghe di alluminio e materiali non ferrosi



高效超细晶粒整体硬质合金铣刀 - 中心切削
标准45° 导程倒角
波刃设计利于断屑
每刃有独立螺旋角破坏共振利于排屑
降低刀具切削阻力, 减小机床功耗
专为铝合金及有色金属粗加工设计

EDP#	d_1 †		d_2	l_1	l_2	c	l_3	d_3
	Decimal	Diameter Metric						
46219	.1575	4.000	6.0	50	8	0.30	-	-
46222	.1575	4.000	6.0	50	12	0.30	-	-
46225	.1575	4.000	6.0	65	10	0.30	30	3.2
46228	.1575	4.000	6.0	75	15	0.30	40	3.2
46231	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-
46234	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-
46237	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-
46240	.1875	3/16"	4.763	3/16"	3"	1/2"	1-1/2"	.160"
46243	.2362	6.000	6.0	50	12	0.50	-	-
46246	.2362	6.000	6.0	65	19	0.50	-	-
46249	.2362	6.000	6.0	100	20	0.50	60	5.2
46252	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-
46255	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-
46258	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-
46261	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"
46264	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-
46267	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-
46270	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-
46273	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"
46276	.3150	8.000	8.0	50	12	0.50	-	-
46279	.3150	8.000	8.0	65	22	0.50	-	-
46282	.3150	8.000	8.0	100	40	0.50	-	-
46285	.3150	8.000	8.0	100	20	0.50	60	7.2
46288	.3150	8.000	8.0	150	40	0.50	100	7.2
46291	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-
46294	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-
46297	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-
46300	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-
46303	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"
46306	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.025"	4"

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
46309	.3937	10.000	10.0	50	16	0.50	-	-
46312	.3937	10.000	10.0	70	22	0.50	-	-
46315	.3937	10.000	10.0	100	40	0.50	-	-
46318	.3937	10.000	10.0	100	20	0.50	60	9.2
46321	.3937	10.000	10.0	150	40	0.50	100	9.2
46324	.4724	12.000	12.0	65	19	0.80	-	-
46327	.4724	12.000	12.0	75	32	0.80	-	-
46330	.4724	12.000	12.0	100	50	0.80	-	-
46333	.4724	12.000	12.0	100	25	0.80	60	11.2
46336	.4724	12.000	12.0	150	40	0.80	100	11.2
46339	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-
46342	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-
46345	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-
46348	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"
46351	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"
46354	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-
46357	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-
46360	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-
46363	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"
46366	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"
46369	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"
46372	.6299	16.000	16.0	75	19	1.00	-	-
46375	.6299	16.000	16.0	88	32	1.00	-	-
46378	.6299	16.000	16.0	100	50	1.00	-	-
46381	.6299	16.000	16.0	100	20	1.00	50	15.2
46384	.6299	16.000	16.0	150	40	1.00	100	15.2
46387	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-
46390	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-
46393	.7500	3/4"	19.050	3/4"	4"	7/8"	.040"	2"
46396	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"
46399	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"
46402	.7874	20.000	20.0	100	22	1.00	-	-
46405	.7874	20.000	20.0	100	40	1.00	-	-
46408	.7874	20.000	20.0	100	30	1.00	50	19.2
46411	.7874	20.000	20.0	150	40	1.00	100	19.2
46414	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-
46417	1.000	1"	25.400	1"	5"	2"	.040"	-
46420	1.000	1"	25.400	1"	6"	2"	.040"	3-1/2"
46423	1.000	1"	25.400	1"	7"	2"	.040"	4-1/2"

70

MATERIAL HARDNESS (Rc)

35

0

.1575" - .3543"
(4.000mm - 9.000mm)



TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6
d_3	+0.000" - .005" (+.000 - .127mm)

HIGH PERFORMANCE
END MILLS

Staggered Flute Hog Mill - AlTiN Coated

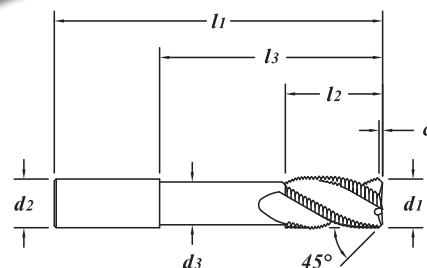
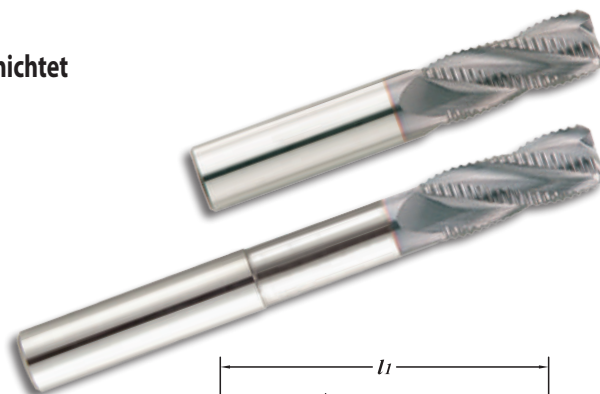
Schruppfräser mit Speziellen Spannutt-Design - AlTiN-Beschichtet

Fresa de Labio Escalonado - Recubrimiento de AlTiN

Fraise Ébauche à Denture Variable - Revêtement AlTiN

Fresa Rompitrucciolo - Rivestimento in AlTiN

锯齿波纹铣刀 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
State-of-the-art rougher using VRX technology
Reduces tool pressure for more aggressive machining
Recommended for stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels <40Rc
Variable flute geometry



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Herkömmliche Vollhartmetallschrupper
Reduziert Schnittdruck für eine aggressivere Bearbeitung
Empfohlen für Rostfreien Stahl, Inconel, Pulvermetalle, Kaltformstähle, Titan, Grauguss und Werkzeugstähle <40HRC
Variable Spannutt-Geometrie



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Desbaste de la mejor calidad con la tecnología VRX
Reduce la presión en la herramienta para los mecanizados más agresivos
Recomendado para acero inoxidable, inconel, materiales pH, acero laminado en frío, hierro de fundición y aceros herramienta <40Rc
Geometría variable de ranura de viruta



Fraises carbure submicrograin - coupe au centre
La maîtrise de l'art pour le fraisage d'ébauche avec technologie des VRX
Reduction de la pression outil pour un fraisage plus agressif
Recommandée pour les aciers inoxydables, inconel, inoxs pH, aciers a outils, aciers forges, titane, fontes et aciers a outils <40HRC
Géométrie variable de la helix



Fresa sub-micrograno metallo duro - taglio al centro
Metallo duro per sgrossatura con tecnologia VRX
Riduce lo sforzo di taglio per lavorazioni aggressive
Raccomandata per lavorazioni su inox, inconel, acciai pressati a freddo, titanio, ghisa e acciai per utensili <40Hrc
Geometria ad elica variabile



超细晶粒整体硬质合金立铣刀 - 中心切削
最先进的整体硬质合金粗切刀具/用途 VRX 技术
减少刀具压力，用于更高速度，更大进给的加工
推荐加工不锈钢、铬镍铁耐热耐腐蚀合金、含磷材质、冷轧钢、钛钢、铸铁和工具钢
不等分刃设计

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter
49450	.1575	4.000	6.0	50	8	0.30	-	-
49455	.1575	4.000	6.0	50	12	0.30	-	-
49460	.1575	4.000	6.0	65	10	0.30	30	3.4
49465	.1575	4.000	6.0	75	15	0.30	40	3.4
49470	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-
49475	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-
49480	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-
49485	.1875	3/16"	4.763	3/16"	3"	1/2"	1-1/2"	.165"
49490	.2362	6.000	6.0	50	12	0.50	-	-
49500	.2362	6.000	6.0	65	19	0.50	-	-
49505	.2362	6.000	6.0	100	15	0.50	40	5.4
49510	.2362	6.000	6.0	100	20	0.50	60	5.4
49520	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-
49543	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-
49547	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"
49550	.2756	7.000	8.0	50	12	0.50	-	-
49555	.2756	7.000	8.0	65	22	0.50	-	-
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	-
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-
49603	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-
49605	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"
49610	.3150	8.000	8.0	50	12	0.50	-	-
49620	.3150	8.000	8.0	65	22	0.50	-	-
49622	.3150	8.000	8.0	100	40	0.50	-	-
49623	.3150	8.000	8.0	100	20	0.50	60	7.4
49624	.3150	8.000	8.0	150	40	0.50	100	7.4
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	-
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	-
49635	.3543	9.000	10.0	50	14	0.50	-	-
49637	.3543	9.000	10.0	65	22	0.50	-	-

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-
49662	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-
49664	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-
49667	.3750	3/8"	9.525	3/8"	4"	1"	.025"	.355"
49670	.3937		10.000	10.0	50	16	0.50	-
49680	.3937		10.000	10.0	70	22	0.50	-
49682	.3937		10.000	10.0	100	40	0.50	-
49684	.3937		10.000	10.0	100	20	0.50	40
49686	.3937		10.000	10.0	100	30	0.50	60
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	-
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	-
49710	.4724		12.000	12.0	65	19	0.80	-
49720	.4724		12.000	12.0	75	32	0.80	-
49725	.4724		12.000	12.0	100	50	0.80	-
49730	.4724		12.000	12.0	100	25	0.80	60
* 49735	.4724		12.000	12.0	150	40	0.80	100
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-
* 49761	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-
* 49762	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"
* 49764	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"
* 49765	.5512		14.000	14.0	75	19	0.80	-
* 49770	.5512		14.000	14.0	88	32	0.80	-
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-
* 49824	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"
* 49826	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"
* 49828	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"
* 49830	.6299		16.000	16.0	75	19	1.00	-
* 49840	.6299		16.000	16.0	88	32	1.00	-
* 49842	.6299		16.000	16.0	100	50	1.00	-
* 49843	.6299		16.000	16.0	100	20	1.00	50
* 49844	.6299		16.000	16.0	150	40	1.00	100
* 49850	.7087		18.000	18.0	100	38	1.00	-
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	-
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-
* 49882	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-
* 49886	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"
* 49887	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"
* 49890	.7874		20.000	20.0	75	22	1.00	-
* 49900	.7874		20.000	20.0	100	38	1.00	-
* 49902	.7874		20.000	20.0	100	30	1.00	50
* 49904	.7874		20.000	20.0	150	40	1.00	100
* 49915	.9843		25.000	25.0	100	25	1.00	-
* 49920	.9843		25.000	25.0	100	38	1.00	-
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	-
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	-

* - Tools with weldon flats

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MATERIAL HARDNESS (Rc)

0

Series A3

NEW
ITEMS

HIGH EFFICIENCY MILLING

TOLERANCES

d_1	+0.000" -0.001" (+0.000mm -0.025mm)
d_2	h6
r	+0.001" -0.001" (+0.025 -0.025mm)

.1575" - .2500"
(4.000mm - 6.350mm)

Variable Helix End Mill

Fräser mit Einer Variablen Spiralgeometrie

Fresa de Hélice Variable

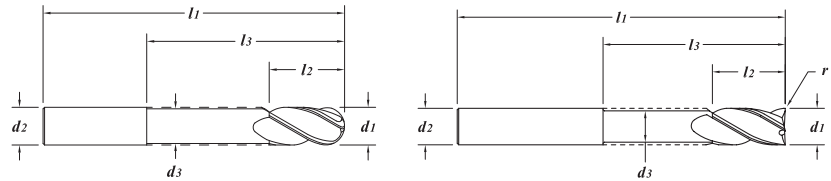
Fraise Avec un Angle Hélice Variable

Fresa ad Elica Variabile

不等螺旋铣刀



Solid submicron grain carbide end mill - center cutting
Engineered for High Velocity Machining of Aluminium
Proprietary geometry with polished flutes breaks up harmonics
Improved end geometry provides superior floor finishes and increased plunge rates
Capable of running up to 40,000 RPM - reduces vibration and balance issues
Chip splitters and neck on shank can be added within 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Entwickelt für die Hochgeschwindigkeitsbearbeitung von Aluminium
Proprietäre Geometrie mit polierten Fluten bricht Harmonische auf
Die verbesserte End geometrie bietet hervorragende Bodenbeläge und erhöhte Eintauchraten
Kann bis zu 40.000 U / min laufen - reduziert Vibrations- und Gleichgewichtsprobleme
Chip spalter und Hals am Schaft können innerhalb von 48 Stunden hinzugefügt werden



Fresa de submicron grano sólido carburo de alto rendimiento - corte centrado
Diseñado para el mecanizado de aluminio de alta velocidad
La geometría patentada con flautas pulidas rompe los armónicos
La geometría del extremo mejorada proporciona acabados de piso superiores y mayores tasas de inmersión
Capaz de funcionar hasta 40.000 RPM, reduce los problemas de vibración y equilibrio
Los divisores de viruta y el cuello en el vástago se pueden agregar en 48 horas



Fraises carbure submicron - coupe au centre
Conçu pour l'usinage à haute vitesse de l'aluminium
La géométrie propriétaire avec des flûtes polies brise les harmoniques
La géométrie améliorée des extrémités offre des finitions de plancher supérieures et des taux de plongée accrus
Capable de fonctionner jusqu'à 40.000 tr / min - réduit les problèmes de vibration et d'équilibre
Les séparateurs de copeaux et le col sur la tige peuvent être ajoutés dans les 48 heures



Fresa sub-microno metallo duro - taglio al centro
Progettato per la lavorazione ad alta velocità dell'alluminio
La geometria proprietaria con flauti levigati rompe le armoniche
La geometria delle estremità migliorata offre finiture del pavimento superiori e maggiori velocità di immersione
In grado di funzionare fino a 40.000 giri / min - riduce i problemi di vibrazione e bilanciamento
I separatori di trucioli e il collo sul gambo possono essere aggiunti entro 48 ore



超细晶粒整体硬质合金立铣刀 - 中心切削
专为铝的高速加工而设计
专有的几何形状和抛光的凹槽可以消除谐波
改进的端部几何形状可提供出色的地板光洁度和增加的切入率
能够运行高达40,000RPM-减少振动和平衡问题
切削分离器和刀柄上的颈部可在48小时内添加

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
07000	.1575	4.000	6.0	50	12	-	16	3.80
07001	.1575	4.000	6.0	50	12	0.20	16	3.80
07002	.1575	4.000	6.0	50	12	0.50	16	3.80
07003	.1575	4.000	6.0	50	12	1.00	16	3.80
07004	.1875 3/16"	4.763	3/16"	2"	1/2"	-	5/8"	.179"
07005	.1875 3/16"	4.763	3/16"	2"	1/2"	.015"	5/8"	.179"
07006	.1875 3/16"	4.763	3/16"	2"	1/2"	.030"	5/8"	.179"
07007	.1875 3/16"	4.763	3/16"	2"	1/2"	.060"	5/8"	.179"
07008	.1875 3/16"	4.763	3/16"	2"	1/2"	BALL	5/8"	.179"
07009	.1969	5.000	6.0	65	16	-	26	4.70
07010	.1969	5.000	6.0	65	16	0.20	26	4.70
07011	.1969	5.000	6.0	65	16	0.50	26	4.70
07012	.1969	5.000	6.0	65	16	1.00	26	4.70
07013	.2362	6.000	6.0	65	19	-	26	5.70
07014	.2362	6.000	6.0	65	19	0.20	26	5.70
07015	.2362	6.000	6.0	65	19	0.50	26	5.70
07016	.2362	6.000	6.0	65	19	1.00	26	5.70
07017	.2362	6.000	6.0	65	19	1.50	26	5.70
07018	.2362	6.000	6.0	65	19	2.00	26	5.70
07019	.2362	6.000	6.0	65	19	BALL	26	5.70
07020	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
07021	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
07022	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
07023	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-
07024	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	.090"	-	-
07025	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-
07026	.2500 1/4"	6.350	1/4"	3"	1"	-	-	-
07027	.2500 1/4"	6.350	1/4"	3"	1"	.030"	-	-
07028	.2500 1/4"	6.350	1/4"	3"	1"	.060"	-	-
07029	.2500 1/4"	6.350	1/4"	3"	3/8"	-	1-1/8"	.235"
07030	.2500 1/4"	6.350	1/4"	3"	3/8"	.015"	1-1/8"	.235"
07031	.2500 1/4"	6.350	1/4"	3"	3/8"	.030"	1-1/8"	.235"
07032	.2500 1/4"	6.350	1/4"	3"	3/8"	.060"	1-1/8"	.235"

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	Metric						
07033	.3150	8.000	8.0	65	19	-	26	7.40
07034	.3150	8.000	8.0	65	19	0.20	26	7.40
07035	.3150	8.000	8.0	65	19	0.50	26	7.40
07036	.3150	8.000	8.0	65	19	1.00	26	7.40
07037	.3150	8.000	8.0	65	19	1.50	26	7.40
07038	.3150	8.000	8.0	65	19	2.00	26	7.40
07039	.3150	8.000	8.0	65	19	3.00	26	7.40
07040	.3150	8.000	8.0	65	19	BALL	26	7.40
07041	.3750 3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
07042	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.010"	-	-
07043	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-
07044	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
07045	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
07046	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-
07047	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.090"	-	-
07048	.3750 3/8"	9.525	3/8"	2-1/2"	1"	.120"	-	-
07049	.3750 3/8"	9.525	3/8"	2-1/2"	1"	BALL	-	-
07050	.3750 3/8"	9.525	3/8"	3"	1-1/4"	-	-	-
07051	.3750 3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
07052	.3750 3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
07053	.3750 3/8"	9.525	3/8"	3"	1-1/4"	.060"	-	-
07054	.3750 3/8"	9.525	3/8"	3"	1-1/4"	.120"	-	-
07055	.3750 3/8"	9.525	3/8"	3"	1/2"	-	1-1/8"	.355"
07056	.3750 3/8"	9.525	3/8"	3"	1/2"	.015"	1-1/8"	.355"
NEW 07057	.3750 3/8"	9.525	3/8"	3"	1/2"	.030"	1-1/8"	.355"
07058	.3750 3/8"	9.525	3/8"	3"	1/2"	.060"	1-1/8"	.355"
07059	.3750 3/8"	9.525	3/8"	3"	1/2"	.090"	1-1/8"	.355"
07060	.3750 3/8"	9.525	3/8"	3"	1/2"	.120"	1-1/8"	.355"
07061	.3750 3/8"	9.525	3/8"	4"	1/2"	-	2-1/8"	.355"
07062	.3750 3/8"	9.525	3/8"	4"	1/2"	.015"	2-1/8"	.355"
NEW 07063	.3750 3/8"	9.525	3/8"	4"	1/2"	.020"	2-1/8"	.355"
07064	.3750 3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"
07065	.3750 3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"
07066	.3750 3/8"	9.525	3/8"	4"	1/2"	.090"	2-1/8"	.355"
07067	.3750 3/8"	9.525	3/8"	4"	1/2"	.120"	2-1/8"	.355"
07068	.3937	10.000	10.0	70	22	-	30	9.40
07069	.3937	10.000	10.0	70	22	0.20	30	9.40
07070	.3937	10.000	10.0	70	22	0.50	30	9.40
07071	.3937	10.000	10.0	70	22	1.00	30	9.40
07072	.3937	10.000	10.0	70	22	1.50	30	9.40
07073	.3937	10.000	10.0	70	22	2.00	30	9.40
07074	.3937	10.000	10.0	70	22	3.00	30	9.40
07075	.3937	10.000	10.0	70	22	BALL	30	9.40
07076	.3937	10.000	10.0	100	40	-	-	-
07077	.3937	10.000	10.0	100	22	-	55	9.40
07078	.4724	12.000	12.0	88	26	-	38	11.40
07079	.4724	12.000	12.0	88	26	0.20	38	11.40
07212	.4724	12.000	12.0	88	26	0.50	38	11.40
07081	.4724	12.000	12.0	88	26	1.00	38	11.40
07082	.4724	12.000	12.0	88	26	1.50	38	11.40
07083	.4724	12.000	12.0	88	26	2.00	38	11.40
07084	.4724	12.000	12.0	88	26	3.00	38	11.40
07085	.4724	12.000	12.0	88	26	4.00	38	11.40
07086	.4724	12.000	12.0	88	26	BALL	38	11.40

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MATERIAL HARDNESS (Rc)

35

0

continued →

Series A3 (continued)

.4724" - .6250"
(12.000mm - 15.875mm)

HIGH PERFORMANCE
END MILLS

MATERIAL HARDNESS (Rc)

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EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	Metric						
07213	.4724	12.000	12.0	88	36	-	-	-
07088	.4724	12.000	12.0	88	36	0.20	-	-
07089	.4724	12.000	12.0	88	36	0.50	-	-
07090	.4724	12.000	12.0	88	36	1.00	-	-
07091	.4724	12.000	12.0	88	36	1.50	-	-
07092	.4724	12.000	12.0	88	36	2.00	-	-
07093	.4724	12.000	12.0	88	36	3.00	-	-
07094	.4724	12.000	12.0	88	36	4.00	-	-
07095	.4724	12.000	12.0	88	36	BALL	-	-
NEW 07215	.5000	12.700	1/2"	3"	1"	-	-	-
NEW 07216	.5000	12.700	1/2"	3"	1"	.030"	-	-
NEW 07217	.5000	12.700	1/2"	3"	1"	BALL	-	-
07096	.5000	12.700	1/2"	3"	1-1/4"	-	-	-
07097	.5000	12.700	1/2"	3"	1-1/4"	.010"	-	-
07098	.5000	12.700	1/2"	3"	1-1/4"	.015"	-	-
07099	.5000	12.700	1/2"	3"	1-1/4"	.020"	-	-
07100	.5000	12.700	1/2"	3"	1-1/4"	.030"	-	-
07101	.5000	12.700	1/2"	3"	1-1/4"	.060"	-	-
07102	.5000	12.700	1/2"	3"	1-1/4"	.090"	-	-
07103	.5000	12.700	1/2"	3"	1-1/4"	.120"	-	-
NEW 07218	.5000	12.700	1/2"	3"	1-1/4"	.125"	-	-
07104	.5000	12.700	1/2"	3"	1-1/4"	.190"	-	-
07105	.5000	12.700	1/2"	3"	1-1/4"	BALL	-	-
NEW 07219	.5000	12.700	1/2"	3"	1/2"	.030"	1-1/2"	.470"
NEW 07220	.5000	12.700	1/2"	3"	1/2"	.090"	1-1/2"	.470"
NEW 07221	.5000	12.700	1/2"	4"	1-5/8"	-	-	-
NEW 07222	.5000	12.700	1/2"	4"	1-5/8"	.030"	-	-
NEW 07223	.5000	12.700	1/2"	4"	1-5/8"	BALL	-	-
07106	.5000	12.700	1/2"	4"	2-1/16"	-	-	-
07107	.5000	12.700	1/2"	4"	2-1/16"	.015"	-	-
07108	.5000	12.700	1/2"	4"	2-1/16"	.030"	-	-
07109	.5000	12.700	1/2"	4"	2-1/16"	.060"	-	-
07110	.5000	12.700	1/2"	4"	2-1/16"	.120"	-	-
NEW 07224	.5000	12.700	1/2"	4"	1/2"	.090"	2"	.470"
NEW 07225	.5000	12.700	1/2"	4"	1/2"	.190"	2"	.470"
07111	.5000	12.700	1/2"	4"	5/8"	-	2-1/4"	.475"
07112	.5000	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.475"
07113	.5000	12.700	1/2"	4"	5/8"	.030"	2-1/4"	.475"
07114	.5000	12.700	1/2"	4"	5/8"	.060"	2-1/4"	.475"
07115	.5000	12.700	1/2"	4"	5/8"	BALL	2-1/4"	.475"
07116	.6250	15.875	5/8"	4"	1-5/8"	-	-	-
07214	.6250	15.875	5/8"	4"	1-5/8"	.030"	-	-
07118	.6250	15.875	5/8"	4"	1-5/8"	.060"	-	-
NEW 07119	.6250	15.875	5/8"	4"	1-5/8"	.090"	-	-
07120	.6250	15.875	5/8"	4"	1-5/8"	.120"	-	-
07121	.6250	15.875	5/8"	4"	3/4"	-	2-3/8"	.590"
07122	.6250	15.875	5/8"	4"	3/4"	.030"	2-3/8"	.590"
NEW 07123	.6250	15.875	5/8"	4"	3/4"	.060"	2-3/8"	.590"
07124	.6250	15.875	5/8"	4"	3/4"	.120"	2-3/8"	.590"
07125	.6250	15.875	5/8"	4"	3/4"	.190"	2-3/8"	.590"

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
07126	.6299	16.000	16.0	100	24	-	50	15.40
07127	.6299	16.000	16.0	100	24	0.50	50	15.40
07128	.6299	16.000	16.0	100	24	1.00	50	15.40
NEW 07129	.6299	16.000	16.0	100	24	1.50	50	15.40
07130	.6299	16.000	16.0	100	24	3.00	50	15.40
NEW 07131	.6299	16.000	16.0	100	24	6.00	50	15.40
07132	.6299	16.000	16.0	100	32	-	50	15.40
07133	.6299	16.000	16.0	100	32	0.50	50	15.40
07134	.6299	16.000	16.0	100	32	1.00	50	15.40
07135	.6299	16.000	16.0	100	32	1.50	50	15.40
07136	.6299	16.000	16.0	100	32	3.00	50	15.40
NEW 07137	.6299	16.000	16.0	100	32	6.00	50	15.40
07138	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-
07139	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-
NEW 07140	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-
07141	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-
07142	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.078"	-
NEW 07143	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.094"	-
07144	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-
07145	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.156"	-
07146	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-
07147	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.250"	-
07148	.7500	3/4"	19.050	3/4"	4"	1-3/4"	BALL	-
07149	.7500	3/4"	19.050	3/4"	4"	1"	-	2"
07150	.7500	3/4"	19.050	3/4"	4"	1"	.030"	2"
07151	.7500	3/4"	19.050	3/4"	4"	1"	.060"	2"
07152	.7500	3/4"	19.050	3/4"	4"	1"	.090"	2"
07153	.7500	3/4"	19.050	3/4"	4"	1"	.120"	2"
07154	.7500	3/4"	19.050	3/4"	4"	1"	.125"	2"
NEW 07155	.7500	3/4"	19.050	3/4"	4"	1"	.160"	2"
NEW 07156	.7500	3/4"	19.050	3/4"	4"	1"	.190"	2"
NEW 07157	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-
07158	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-
07159	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-
07160	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.120"	-
07161	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.125"	-
07162	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.190"	-
07163	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.250"	-
NEW 07226	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-
07164	.7500	3/4"	19.050	3/4"	6"	1"	-	3-3/8"
07165	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-3/8"
07166	.7500	3/4"	19.050	3/4"	6"	1"	.060"	3-3/8"
07167	.7500	3/4"	19.050	3/4"	6"	1"	.090"	3-3/8"
07168	.7500	3/4"	19.050	3/4"	6"	1"	.125"	3-3/8"
07169	.7500	3/4"	19.050	3/4"	6"	1"	.250"	3-3/8"
07170	.7500	3/4"	19.050	3/4"	6"	1"	BALL	3-3/8"

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MATERIAL HARDNESS (Rc)

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continued →

Series A3 (continued)

.7874" - 1.000"
(20.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

MATERIAL HARDNESS (Rc)

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EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
07171	.7874	20.000	20.0	100	30	-	50	19.4
07172	.7874	20.000	20.0	100	30	0.50	50	19.4
07173	.7874	20.000	20.0	100	30	1.00	50	19.4
07174	.7874	20.000	20.0	100	30	1.50	50	19.4
07175	.7874	20.000	20.0	100	30	3.00	50	19.4
07176	.7874	20.000	20.0	100	30	4.00	50	19.4
07177	.7874	20.000	20.0	100	30	5.00	50	19.4
07178	.7874	20.000	20.0	100	30	6.00	50	19.4
07179	.7874	20.000	20.0	100	30	8.00	50	19.4
07180	.7874	20.000	20.0	150	30	-	100	19.40
07181	.7874	20.000	20.0	150	30	0.50	100	19.40
07182	.7874	20.000	20.0	150	30	1.00	100	19.40
NEW 07183	.7874	20.000	20.0	150	30	1.50	100	19.40
NEW 07184	.7874	20.000	20.0	150	30	3.00	100	19.40
NEW 07185	.7874	20.000	20.0	150	30	4.00	100	19.40
07186	.7874	20.000	20.0	150	30	5.00	100	19.40
NEW 07187	.7874	20.000	20.0	150	30	6.00	100	19.40
NEW 07188	.7874	20.000	20.0	150	30	8.00	100	19.40
07189	1.000	1"	25.400	1"	4"	-	2"	.950"
NEW 07190	1.000	1"	25.400	1"	4"	1-1/4"	2"	.950"
07191	1.000	1"	25.400	1"	4-1/2"	1-1/4"	2-1/2"	.950"
07192	1.000	1"	25.400	1"	4-1/2"	1-1/4"	2-1/2"	.950"
07193	1.000	1"	25.400	1"	4-1/2"	1-1/4"	2-1/2"	.950"
07194	1.000	1"	25.400	1"	4-1/2"	1-1/4"	2-1/2"	.950"
07195	1.000	1"	25.400	1"	4-1/2"	1-1/4"	2-1/2"	.950"
NEW 07196	1.000	1"	25.400	1"	5"	1"	2-5/8"	.950"
NEW 07197	1.000	1"	25.400	1"	5"	1"	2-5/8"	.950"
NEW 07198	1.000	1"	25.400	1"	5"	1"	2-5/8"	.950"
NEW 07199	1.000	1"	25.400	1"	5"	1"	2-5/8"	.950"
NEW 07200	1.000	1"	25.400	1"	5"	1"	2-5/8"	.950"
NEW 07201	1.000	1"	25.400	1"	5"	1"	BALL	2-5/8"
07202	1.000	1"	25.400	1"	5"	2-1/4"	-	-
07203	1.000	1"	25.400	1"	5"	2-1/4"	.030"	-
07204	1.000	1"	25.400	1"	5"	2-1/4"	.060"	-
NEW 07205	1.000	1"	25.400	1"	5"	2-1/4"	.120"	-
NEW 07206	1.000	1"	25.400	1"	5"	2-1/4"	.250"	-
NEW 07207	1.000	1"	25.400	1"	6"	3-1/4"	-	-
NEW 07208	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-
NEW 07209	1.000	1"	25.400	1"	6"	3-1/4"	.060"	-
NEW 07210	1.000	1"	25.400	1"	6"	3-1/4"	.120"	-
07211	1.000	1"	25.400	1"	6"	3-1/4"	.250"	-

TOLERANCES

d_1	$+0.000" -0.001"$ ($+0.000 -0.025\text{mm}$)
d_2	h6

Series 142M

HIGH EFFICIENCY MILLING

HIGH PERFORMANCE
END MILLS

HSAL - Square End - ALUMASTAR Coated

HSAL - Ohne Eckenradius - ALUMASTAR-Beschichtet

HSAL - Extremo Sin Radio - Recubrimiento de ALUMASTAR

HSAL - Extrémité Carré - Revêtement ALUMASTAR

HSAL - Piatte - Rivestimento in ALUMASTAR

HSAL - 平头 - ALUMASTAR 涂层



Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)

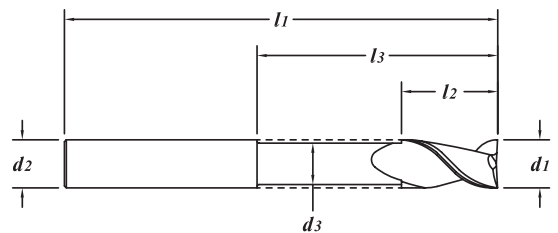
For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 10,000 RPM and above)

Need to use properly balanced holders

Holds perpendicularity

Flats can be added within 48 hours



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Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 - 2500 SFM)

Für die Hochgeschwindigkeitsbearbeitung von AluminiumHohe Geschwindigkeit - Hohe Abtragungsraten (Für Spindeldrehzahlen über 10.000 min⁻¹)

Benutzen Sie korrekt gewuchtete Spannmittel

Hilft die Perpendicularität zu halten

Kann mit einer Fläche innerhalb von 48 Stunden werden



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)

Para el mecanizado a alta velocidad de aluminio

Alta velocidad - alto índice de desalajo de viruta (Para husillos de 10.000 r.p.m. o mas)

Use portaherramientas adecuadaente equilibrados

Ayuda a mantener la perpendicularidad

Puede ser modificado con un plano en 48 horas



Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)

Pour haute vitesse usinage pour l'aluminium

Haute vitesse et haut volume copeaux (Pour les mandrins 10,000 RPM et plus)

Utilisation avec porte outils équilibrés

Aide a tenir la perpendicularite

Peut etre modifier avec un surface plat sous un delai de 48 heures



Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)

Per lavorazioni ad alta velocità su alluminio

Alta velocità - Alto volume di materiale asportato (Per 10.000 Giri al minuto e superiori)

Usare mandrini bilanciati

Rispettare la perpendicolarità

Può essere modificata in 48 ore



高速加工铝合金整体硬质合金立铣刀 - 中心切削

特殊涂层专为加工铝合金

适用于按750-2500英尺/分 (225-750 米/分) 线速度运转的专用涂层

适合高速加工铝合金

高速—高切屑率 用于主轴转速在10,000 RPM及更高

使用动平衡的刀夹

保持垂直

可在48小时内磨成削平柄

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric					
41222	.1575	4.000	6.0	50	12	-	-
41232	.1575	4.000	6.0	65	6	20	3.7
41282	.1875	4.763	3/16"	2"	9/16"	-	-
41342	.1969	5.000	6.0	65	16	-	-
41352	.1969	5.000	6.0	75	8	20	4.7
41402	.2362	6.000	6.0	65	19	-	-
41412	.2362	6.000	6.0	75	10	25	5.7
41462	.2500	6.350	1/4"	2-1/2"	3/4"	-	-
41542	.2756	7.000	8.0	65	19	-	-
41602	.3125	7.938	5/16"	2-1/2"	3/4"	-	-
41662	.3150	8.000	8.0	65	19	-	-
41672	.3150	8.000	8.0	75	12	25	7.4
41722	.3750	9.525	3/8"	2-1/2"	7/8"	-	-
41802	.3937	10.000	10.0	70	24	-	-
41812	.3937	10.000	10.0	75	12	30	9.4
41822	.3937	10.000	10.0	100	12	35	9.4
41882	.4724	12.000	12.0	75	32	-	-
41892	.4724	12.000	12.0	75	16	30	11.4
41902	.4724	12.000	12.0	100	16	35	11.4
41912	.4724	12.000	12.0	100	16	40	11.4
41942	.5000	12.700	1/2"	3"	1-1/4"	-	-
42022	.6250	15.875	5/8"	4"	1-5/8"	-	-
42072	.6299	16.000	16.0	75	16	30	15.4
42082	.6299	16.000	16.0	100	40	-	-
42092	.6299	16.000	16.0	100	20	40	15.4
42102	.6299	16.000	16.0	125	20	60	15.4
42142	.7500	19.050	3/4"	4"	1-5/8"	-	-
42212	.7874	20.000	20.0	100	32	-	-
42222	.7874	20.000	20.0	100	20	40	19
42232	.7874	20.000	20.0	125	20	60	19
42302	1.000	25.400	1"	4"	1-5/8"	-	-

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MATERIAL HARDNESS (Rc)

d_1	$+0.000^{\circ} - .001^{\circ}$ (+.000 - .025mm)
d_2	h6
r	$+0.0005^{\circ} - .0005^{\circ}$ (+.0127 - .0127mm)

.1575" - .4724"
(4.000mm - 12.000mm)



TECH
PAGES
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HSAL - Corner Radius - ALUMASTAR Coated

HSAL - Eckenradius - ALUMASTAR-Beschichtet

HSAL - Ángulo Redondeado - Recubrimiento de ALUMASTAR

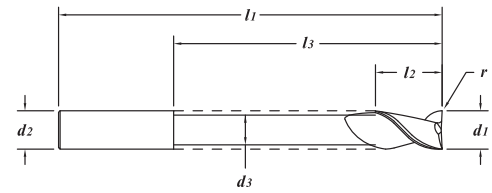
HSAL - Rayon de Coin - Revêtement ALUMASTAR

HSAL - Torica - Rivestimento in ALUMASTAR

HSAL - 圆角半径 - ALUMASTAR 涂层



Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 - 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit - Hohe Abtragungsraten
(Für Spindeldrehzahlen über 10.000 min⁻¹)
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden werden



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad - alto índice de desalajo de viruta
(Para husillos de 10.000 r.p.m. o mas)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas



Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute vitesse et haut volume copeaux
(Pour les mandrins 10,000 RPM et plus)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Peut etre modifier avec un surface plat sous un delai de 48 heures



Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato
(Per 10.000 Giri al minuto e superiori)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore



高速加工铝合金整体硬质合金立铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分 (225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速—高切削率 用于主轴转速在10,000 RPM及更高
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

EDP#	$d_1^{\dagger}$ Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
39222	.1575	4.000	6.0	50	12	0.30	-	-
39232	.1575	4.000	6.0	65	6	0.50	20	3.7
39242	.1575	4.000	6.0	65	6	1.00	20	3.7
39282	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-
39342	.1969	5.000	6.0	65	16	0.30	-	-
39352	.1969	5.000	6.0	75	8	0.50	20	4.7
39362	.1969	5.000	6.0	75	8	1.00	20	4.7
39402	.2362	6.000	6.0	65	19	0.30	-	-
39412	.2362	6.000	6.0	75	10	0.50	25	5.7
39422	.2362	6.000	6.0	75	10	1.00	25	5.7
39432	.2362	6.000	6.0	75	10	1.50	25	5.7
39442	.2362	6.000	6.0	75	10	2.00	25	5.7
39462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-
39602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-
39662	.3150	8.000	8.0	65	19	0.50	-	-
39672	.3150	8.000	8.0	75	12	0.50	25	7.4
39682	.3150	8.000	8.0	75	12	1.00	25	7.4
39692	.3150	8.000	8.0	75	12	2.00	25	7.4
39702	.3150	8.000	8.0	75	12	3.00	25	7.4
39722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-
39802	.3937	10.000	10.0	70	24	0.50	-	-
39812	.3937	10.000	10.0	100	12	1.00	35	9.4
39822	.3937	10.000	10.0	100	12	1.50	35	9.4
39832	.3937	10.000	10.0	100	12	2.00	35	9.4
39842	.3937	10.000	10.0	100	12	3.00	35	9.4
39882	.4724	12.000	12.0	75	32	0.50	-	-
39892	.4724	12.000	12.0	100	16	0.50	40	11.4
39902	.4724	12.000	12.0	100	16	1.00	40	11.4
39912	.4724	12.000	12.0	100	16	1.50	40	11.4
39922	.4724	12.000	12.0	100	16	2.00	40	11.4
39932	.4724	12.000	12.0	100	16	3.00	40	11.4

EDP#	$d1^{\dagger}$		$d2$	$l1$	$l2$	r	$l3$	$d3$
	Decimal	Diameter Metric						
39942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-
40022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-
40082	.6299		16.000	16.0	100	40	1.00	-
40092	.6299		16.000	16.0	125	20	1.00	60
40102	.6299		16.000	16.0	125	20	2.00	60
40142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-
40182	.7874		20.000	20.0	100	40	1.00	-
40192	.7874		20.000	20.0	150	20	1.00	65
40202	.7874		20.000	20.0	150	20	2.00	65
40212	.7874		20.000	20.0	150	20	3.00	65



70

MATERIAL HARDNESS (Rc)

35

0

d_1	+0.000" -0.001" (+0.000 -0.025mm)
d_2	h6
ball radius	+0.0000" -0.0005" (+0.0000 -0.0127mm)

TECH
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HSAL - Ball End - ALUMASTAR Coated

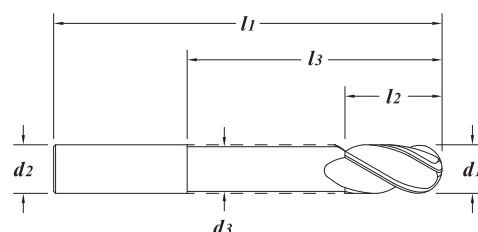
HSAL - Vollradius - ALUMASTAR-Beschichtet

HSAL - Cabeza Esférica - Recubrimiento de ALUMASTAR

HSAL - Hemispherique - Revêtement ALUMASTAR

HSAL - Sferica - Rivestimento in ALUMASTAR

HSAL - 球头 - ALUMASTAR 涂层



Solid submicron grain carbide end mill - center cutting

Specific coating engineered to repel aluminum

Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 10,000 RPM and above)

Need to use properly balanced holders

Holds perpendicularity

Honed edge on radius for improved finish

Flats can be added within 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt

Spezielle Beschichtung entwickelt zu abstoßen Aluminium

Entwickelt für Vorschübe von 225 - 750 M/Min. (750 - 2500 SFM)

Für die Hochgeschwindigkeitsbearbeitung von AluminiumHohe Geschwindigkeit - Hohe Abtragungsrate (Für Spindeldrehzahlen über 10.000 min⁻¹)

Benutzen Sie korrekt gewuchtete Spannmittel

Hilft die Perpendicularität zu halten

Gehobte Schneidkante für einen besseren Oberflächenzustand

Kann mit einer Fläche innerhalb von 48 Stunden werden

Vollradius Toleranz: +0,0000 -0,0127mm (+.0000" -0.0005")



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado

Recubrimiento concebido específicamente para repeler el aluminio

Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)

Para el mecanizado a alta velocidad de aluminio

Alta velocidad - alto índice de desalojo de viruta (Para husillos de 10.000 r.p.m. o mas)

Use portaherramientas adecuadaente equilibrados

Ayuda a mantener la perpendicularidad

Radio perfilado para un mejor acabado

Puede ser modificado con un plano en 48 horas

Tolerancia de la cabeza esférica +0,0000 -0,0127mm (+.0000" -0.0005")



Fraises carbure submicrograin - coupe au centre

Revetement special conçu pour l'aluminium

Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)

Pour haute vitesse usinage pour l'aluminium

Haute velocite et haut volume copeaux (Pour les mandrins 10,000 RPM et plus)

Utilisation avec porte outils équilibrés

Aide a tenir la perpendicularite

Arête de coupe polie sur le rayon pour obtenir un meilleur état de surface

Peut etre modifier avec un surface plat sous un delai de 48 heures

Tolerance du rayon de hemispherique +0,0000 -0,0127mm (+.0000" -0.0005")



Fresa sub-micrograno metallo duro - taglio al centro

Rivestimento specifico costruito per respingere alluminio

Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)

Per lavorazioni ad alta velocità su alluminio

Alta velocità - Alto volume di materiale asportato (Per 10.000 Giri al minuto e superiori)

Usare mandrini bilanciati

Rispettare la perpendicolarità

Tagliente onato per una migliore finitura

Può essere modificata in 48 ore

Tolleranza del raggio +0,0000 -0,0127mm (+.0000" -0.0005")



高速加工铝合金整体硬质合金立铣刀 - 中心切削

特殊涂层专为加工铝合金

适用于按750-2500英尺/分 (225-750 米/分) 线速度运转的专用涂层

适合高速加工铝合金

高速—高切削率 用于主轴转速在10,000 RPM及更高

使用动平衡的刀夹

保持垂直

研磨圆角改善光洁度

可在48小时内磨成削平柄

半径公差 +0,0000 -0,0127mm (+.0000" -0.0005")

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric					
42522	.1575	4.000	6.0	50	12	-	-
42582	.1875	3/16"	4.763	3/16"	2"	9/16"	-
42642	.1969	5.000	6.0	65	16	-	-
42702	.2362	6.000	6.0	65	19	-	-
42762	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-
42764	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"
42842	.2756	7.000	8.0	65	19	-	-
42902	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-
42962	.3150	8.000	8.0	65	19	-	-
43022	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-
43023	.3750	3/8"	9.525	3/8"	4"	1-1/8"	.355"
43102	.3937	10.000	10.0	70	24	-	-
43182	.4724	12.000	12.0	75	32	-	-
43242	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-
43243	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/4"
43322	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-
43382	.6299	16.000	16.0	100	40	-	-
43442	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-
43444	.7500	3/4"	19.050	3/4"	5"	1"	3-1/16"
43482	.7874	20.000	20.0	100	32	-	-
43542	.9843	25.000	25.0	100	38	-	-
43602	1.000	1"	25.400	1"	4"	1-5/8"	-

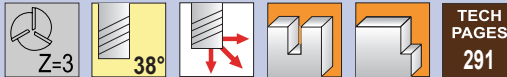
† Metric equivalents are for reference only

TOLERANCES

$d1$	$+0.000" - .001" (+.000 - .025\text{mm})$
$d2$	$h6$

HIGH EFFICIENCY MILLING

Series 143M

.1181" - .3150"
(3.000mm - 8.000mm)HIGH PERFORMANCE
END MILLS

HSAL - Square End - ALUMASTAR Coated

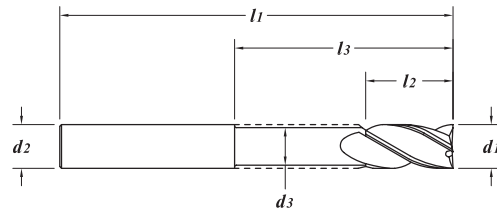
HSAL - Ohne Eckenradius - ALUMASTAR-Beschichtet

HSAL - Extremo Sin Radio - Recubrimiento de ALUMASTAR

HSAL - Extrémité Carré - Revêtement ALUMASTAR

HSAL - Piatte - Rivestimento in ALUMASTAR

HSAL - 平头 - ALUMASTAR 涂层



Solid submicron grain carbide end mill - center cutting

Specific coating engineered to repel aluminum

Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 5,000-20,000 RPM)

Need to use properly balanced holders

Holds perpendicularity

Flats can be added within 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt

Spezielle Beschichtung entwickelt zu abstoßen Aluminium

Entwickelt für Vorschübe von 225 - 750 M/Min. (750 - 2500 SFM)

Für die Hochgeschwindigkeitsbearbeitung von Aluminium

Hohe Geschwindigkeit - Hohe Abtragungsraten (Für Spindeldrehzahlen 5.000-20.000 min⁻¹)

Benutzen Sie korrekt gewuchtete Spannmittel

Hilft die Perpendicularität zu halten

Kann mit einer Fläche innerhalb von 48 Stunden werden



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado

Recubrimiento concebido específicamente para repeler el aluminio

Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)

Para el mecanizado a alta velocidad de aluminio

Alta velocidad - alto índice de desalojo de viruta (Para husillos de 5.000-20.000 r.p.m.)

Use portaherramientas adecuadamente equilibrados

Ayuda a mantener la perpendicularidad

Puede ser modificado con un plano en 48 horas



Fraises carbure submicrograin - coupe au centre

Revetement special conçu pour l'aluminium

Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)

Pour haute vitesse usinage pour l'aluminium

Haute vitesse et haut volume copeaux (Pour les mandrins 5,000-20,000 RPM)

Utilisation avec porte outils équilibrés

Aide a tenir la perpendicularité

Peut etre modifier avec un surface plat sous un delai de 48 heures



Fresa sub-micrograno metallo duro - taglio al centro

Rivestimento specifico costruito per respingere alluminio

Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)

Per lavorazioni ad alta velocità su alluminio

Alta velocità - Alto volume di materiale asportato (Per 5.000-20.000 Giri al minuto)

Usare mandrini bilanciati

Rispettare la perpendicolarità

Può essere modificata in 48 ore



高速加工铝合金整体硬质合金立铣刀 - 中心切削

特殊涂层专为加工铝合金

适用于按750-2500英尺/分 (225-750 米/分) 线速度运转的专用涂层

适合高速加工铝合金

高速—高切削率 用于主轴转速在5,000-20,000 RPM

使用动平衡的刀夹

保持垂直

可在48小时内磨成削平柄

NEW

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter
41173	.1181	3.000	3.0	38	6	-	-
41183	.1181	3.000	3.0	38	12	-	-
41193	.1250 1/8"	3.175	1/8"	1-1/2"	1/4"	-	-
41203	.1250 1/8"	3.175	1/8"	1-1/2"	1/2"	-	-
41213	.1575	4.000	6.0	50	8	-	-
41223	.1575	4.000	6.0	50	12	-	-
41243	.1575	4.000	6.0	65	6	20	3.7
41273	.1875 3/16"	4.763	3/16"	2"	5/16"	-	-
41283	.1875 3/16"	4.763	3/16"	2"	9/16"	-	-
41303	.1875 3/16"	4.763	3/16"	3"	7/32"	3/4"	.170"
41313	.1875 3/16"	4.763	3/16"	3"	1"	-	-
41343	.1969	5.000	6.0	65	16	-	-
41363	.1969	5.000	6.0	75	8	20	4.7
41403	.2362	6.000	6.0	65	19	-	-
41423	.2362	6.000	6.0	75	10	25	5.7
39735	.2500 1/4"	6.350	1/4"	2"	3/8"	-	-
39737	.2500 1/4"	6.350	1/4"	2"	1/2"	-	-
41453	.2500 1/4"	6.350	1/4"	2-1/2"	3/8"	-	-
41463	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
41473	.2500 1/4"	6.350	1/4"	3"	1"	-	-
41475	.2500 1/4"	6.350	1/4"	3"	1-1/4"	-	-
41493	.2500 1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"
41503	.2500 1/4"	6.350	1/4"	4"	3/8"	2-1/8"	.235"
41511	.2500 1/4"	6.350	1/4"	4"	1-1/2"	-	-
41513	.2500 1/4"	6.350	1/4"	4"	1-5/8"	-	-
41543	.2756	7.000	8.0	65	19	-	-
41563	.2756	7.000	8.0	75	12	25	6.4
41593	.3125 5/16"	7.938	5/16"	2-1/2"	7/16"	-	-
41603	.3125 5/16"	7.938	5/16"	2-1/2"	3/4"	-	-
41623	.3125 5/16"	7.938	5/16"	4"	7/16"	1-1/8"	.297"
39739	.3150	8.000	8.0	50	12	-	-
41663	.3150	8.000	8.0	65	19	-	-
41683	.3150	8.000	8.0	75	12	25	7.4
41685	.3150	8.000	8.0	75	26	-	-
41687	.3150	8.000	8.0	75	30	-	-
41693	.3150	8.000	8.0	100	12	55	7.4

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MATERIAL HARDNESS (Rc)

continued →

Series 143M (continued)

.3750" - .6299"
(9.525mm - 16.000mm)

HIGH PERFORMANCE
END MILLS

MATERIAL HARDNESS (Rc)

70

35

0

EDP#	$d1$ †			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	Diameter	Metric					
39741	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-
41713	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	-	-
39743	.3750	3/8"	9.525	3/8"	2-1/2"	3/4"	-	-
41723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
41733	.3750	3/8"	9.525	3/8"	3"	1"	-	-
41735	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-
41737	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	-	-
41763	.3750	3/8"	9.525	3/8"	4"	1/2"	2-1/8"	.355"
41773	.3750	3/8"	9.525	3/8"	4"	1-5/8"	-	-
42363	.3750	3/8"	9.525	3/8"	4"	2"	-	-
41783	.3750	3/8"	9.525	3/8"	6"	1/2"	4"	.355"
39745	.3937		10.000	10.0	50	14	-	-
41803	.3937		10.000	10.0	70	24	-	-
41805	.3937		10.000	10.0	75	30	-	-
41843	.3937		10.000	10.0	100	12	35	9.4
41853	.3937		10.000	10.0	100	12	55	9.4
41863	.3937		10.000	10.0	150	12	110	9.4
39747	.4724		12.000	12.0	65	16	-	-
39749	.4724		12.000	12.0	75	26	-	-
41883	.4724		12.000	12.0	75	32	-	-
41893	.4724		12.000	12.0	100	50	-	-
41903	.4724		12.000	12.0	100	16	40	11.4
41913	.4724		12.000	12.0	100	16	55	11.4
41923	.4724		12.000	12.0	150	16	110	11.4
39751	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-
39753	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"	-	-
41933	.5000	1/2"	12.700	1/2"	3"	5/8"	-	-
39755	.5000	1/2"	12.700	1/2"	3"	1"	-	-
41943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-
41945	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-
41963	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-
41965	.5000	1/2"	12.700	1/2"	4"	1-3/4"	-	-
41973	.5000	1/2"	12.700	1/2"	4"	2"	-	-
41983	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.475"
41993	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.475"
42003	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-
39757	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-
42013	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	-	-
39759	.6250	5/8"	15.875	5/8"	3-1/2"	1"	-	-
42016	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-
42021	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-
42023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-
42025	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-
42373	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-
42033	.6250	5/8"	15.875	5/8"	6"	3/4"	2-3/8"	.590"
42043	.6250	5/8"	15.875	5/8"	6"	3/4"	4-3/8"	.590"
42053	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-
42083	.6299		16.000	16.0	100	40	-	-
42103	.6299		16.000	16.0	100	20	40	15.4
42113	.6299		16.000	16.0	125	20	60	15.4
42123	.6299		16.000	16.0	150	20	110	15.4

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Diameter	Metric					
42133	.7500	3/4"	19.050	3/4"	4"	1"	-	-
42136	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-
42141	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-
42143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-
NEW 42145	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-
42153	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-
42155	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-
42163	.7500	3/4"	19.050	3/4"	6"	1"	2-1/2"	.715"
42173	.7500	3/4"	19.050	3/4"	6"	1"	4-3/8"	.715"
42193	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-
42203	.7874		20.000	20.0	100	25	-	-
42213	.7874		20.000	20.0	100	32	-	-
42223	.7874		20.000	20.0	100	20	40	19.0
42226	.7874		20.000	20.0	125	20	60	19.0
42233	.7874		20.000	20.0	150	20	85	19.0
42236	.7874		20.000	20.0	150	20	110	19.0
42243	.9843		25.000	25.0	100	38	-	-
42283	.9843		25.000	25.0	100	25	50	24.0
42286	.9843		25.000	25.0	125	25	65	24.0
42291	.9843		25.000	25.0	150	25	90	24.0
42293	1.000	1"	25.400	1"	4"	1"	-	-
42303	1.000	1"	25.400	1"	4"	1-5/8"	-	-
42313	1.000	1"	25.400	1"	5"	2"	-	-
42343	1.000	1"	25.400	1"	6"	1-1/4"	3-3/8"	.960"
42353	1.000	1"	25.400	1"	6"	3-1/4"	-	-

70

MATERIAL HARDNESS (Rc)

35

0



$d1$	+0.00" - .001" (+.000 - .025mm)
$d2$	h6
r	+0.005" - .0005" (+.0127 - .0127mm)

.1181" - .2362"
(3.000mm - 6.000mm)



HSAL - Corner Radius - ALUMASTAR Coated

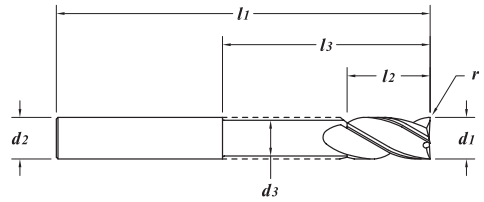
HSAL - Eckenradius - ALUMASTAR-Beschichtet

HSAL - Ángulo Redondeado - Recubrimiento de ALUMASTAR

HSAL - Rayon de Coin - Revêtement ALUMASTAR

HSAL - Torica - Rivestimento in ALUMASTAR

HSAL - 圆角半径 - ALUMASTAR 涂层



Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 5,000-20,000 RPM)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 - 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit - Hohe Abtragungsraten (Für Spindeldrehzahlen 5.000-20.000 min⁻¹)
Benutzen Sie korrekt gewichtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden werden



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad - alto índice de desalojo de viruta (Para husillos de 5.000-20.000 r.p.m.)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas



Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute vitesse et haut volume copeaux (Pour les mandrins 5,000-20,000 RPM)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularité
Peut etre modifier avec un surface plat sous un delai de 48 heures



Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 5.000-20.000 Giri al minuto)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore



高速加工铝合金整体硬质合金铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分(225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速 - 高切屑率 用于主轴转速在5,000-20,000 RPM
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	Metric						
39113	.1181	3.000	3.0	38	6	0.20	-	-
39123	.1181	3.000	3.0	38	6	0.50	-	-
39133	.1181	3.000	3.0	38	12	0.20	-	-
39143	.1181	3.000	3.0	38	12	0.50	-	-
39153	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-
39163	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"	-
39173	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-
39183	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-
39193	.1575	4.000	6.0	50	8	0.20	-	-
39203	.1575	4.000	6.0	50	8	0.50	-	-
39213	.1575	4.000	6.0	50	12	0.20	-	-
39223	.1575	4.000	6.0	50	12	0.30	-	-
39225	.1575	4.000	6.0	50	12	0.50	-	-
39243	.1575	4.000	6.0	65	6	0.30	20	3.7
39253	.1575	4.000	6.0	65	6	0.50	20	3.7
39263	.1575	4.000	6.0	65	6	1.00	20	3.7
39265	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-
39275	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-
39280	.1875	3/16"	4.763	3/16"	2"	5/16"	.030"	-
39283	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-
39285	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-
39293	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-
39303	.1875	3/16"	4.763	3/16"	3"	7/32"	.010"	3/4"
39313	.1875	3/16"	4.763	3/16"	3"	7/32"	.030"	3/4"
39343	.1969	5.000	6.0	65	16	0.30	-	-
39363	.1969	5.000	6.0	75	8	0.30	20	4.7
39373	.1969	5.000	6.0	75	8	0.50	20	4.7
39383	.1969	5.000	6.0	75	8	1.00	20	4.7
39403	.2362	6.000	6.0	65	19	0.30	-	-
39423	.2362	6.000	6.0	75	10	0.30	25	5.7
39433	.2362	6.000	6.0	75	10	0.50	25	5.7
39436	.2362	6.000	6.0	75	10	1.00	25	5.7
39439	.2362	6.000	6.0	75	10	1.50	25	5.7
39443	.2362	6.000	6.0	75	10	2.00	25	5.7

EDP#	$d1^{\dagger}$ Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal		Metric						
39314	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-
39316	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
39318	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-
39453	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
39463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
39320	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
39473	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
39483	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
39493	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/8"	.235"
40403	.2500	1/4"	6.350	1/4"	4"	3/8"	.030"	1-1/8"	.235"
39503	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.235"
39543	.2756		7.000	8.0	65	19	0.30	-	-
39563	.2756		7.000	8.0	75	12	0.30	25	6.4
NEW 39322	.3125	5/16"	7.938	5/16"	2"	1/2"	.010"	-	-
39324	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"	-	-
39593	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.010"	-	-
39603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	-
NEW 39326	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.020"	-	-
39613	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.030"	-	-
39623	.3125	5/16"	7.938	5/16"	4"	7/16"	.015"	1-1/8"	.297"
39633	.3125	5/16"	7.938	5/16"	4"	7/16"	.030"	1-1/8"	.297"
39328	.3150		8.000	8.0	50	12	0.50	-	-
39663	.3150		8.000	8.0	65	19	0.50	-	-
39683	.3150		8.000	8.0	75	12	0.50	25	7.4
39688	.3150		8.000	8.0	75	12	1.00	25	7.4
39693	.3150		8.000	8.0	75	12	2.00	25	7.4
39698	.3150		8.000	8.0	75	12	3.00	25	7.4
39330	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-
39332	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
39703	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-
39713	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-
39334	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-
39723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-
39733	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-
39734	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.120"	-	-
39738	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
39763	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"
39773	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"
39783	.3750	3/8"	9.525	3/8"	6"	1/2"	.030"	4"	.355"
39336	.3937		10.000	10.0	50	14	0.50	-	-
39803	.3937		10.000	10.0	70	24	0.50	-	-
39843	.3937		10.000	10.0	100	12	0.50	35	9.4
39848	.3937		10.000	10.0	100	12	1.00	35	9.4
39853	.3937		10.000	10.0	100	12	1.50	35	9.4
39863	.3937		10.000	10.0	100	12	2.00	35	9.4
39873	.3937		10.000	10.0	100	12	3.00	35	9.4
39344	.4724		12.000	12.0	65	16	0.50	-	-
39883	.4724		12.000	12.0	75	32	0.50	-	-
39346	.4724		12.000	12.0	75	32	0.75	-	-
39348	.4724		12.000	12.0	75	32	1.00	-	-
39903	.4724		12.000	12.0	100	16	0.50	40	11.4
39907	.4724		12.000	12.0	100	16	1.00	40	11.4
39911	.4724		12.000	12.0	100	16	1.50	40	11.4
39915	.4724		12.000	12.0	100	16	2.00	40	11.4
39919	.4724		12.000	12.0	100	16	3.00	40	11.4

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MATERIAL HARDNESS (Rc)

35

0

continued →

Series 143R (continued)

.5000" - 1.000"
(12.700mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

MATERIAL HARDNESS (Rc)

70

35

0

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	1/2"	Metric						
39353	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
39355	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
39923	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
39933	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
39356	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
39943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
39953	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
39963	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
39965	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
39967	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.190"	-	-
39972	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
39973	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-
40413	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
40423	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-
40433	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.475"
39983	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.475"
40443	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.475"
40453	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.475"
39993	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.475"
NEW 39366	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
NEW 39368	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
NEW 39369	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
NEW 39370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
40463	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-
39372	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-
40023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
40473	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-
40483	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-
NEW 40485	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.190"	-	-
40033	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"
40043	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-3/8"	.590"
40083	.6299		16.000	16.0	100	40	1.00	-	-
40103	.6299		16.000	16.0	100	20	1.00	40	15.4
40113	.6299		16.000	16.0	125	20	2.00	60	15.4
40118	.6299		16.000	16.0	125	20	3.00	60	15.4
40123	.6299		16.000	16.0	125	20	4.00	60	15.4
39374	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.020"	-	-
40133	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
39376	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.020"	-	-
40143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
40153	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
40493	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.120"	-	-
40495	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.190"	-	-
40497	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.250"	-	-
40503	.7500	3/4"	19.050	3/4"	6"	1"	.015"	2-1/2"	.715"
40163	.7500	3/4"	19.050	3/4"	6"	1"	.030"	2-1/2"	.715"
40513	.7500	3/4"	19.050	3/4"	6"	1"	.060"	2-1/2"	.715"
40523	.7500	3/4"	19.050	3/4"	6"	1"	.120"	2-1/2"	.715"
40171	.7500	3/4"	19.050	3/4"	6"	1"	.015"	4"	.715"
40173	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-3/8"	.715"
40183	.7874		20.000	20.0	100	32	1.00	-	-
40223	.7874		20.000	20.0	100	20	1.00	40	19.0
40225	.7874		20.000	20.0	150	20	1.00	65	19.0
40226	.7874		20.000	20.0	150	20	2.00	65	19.0
40229	.7874		20.000	20.0	150	20	3.00	65	19.0
40231	.7874		20.000	20.0	150	20	4.00	65	19.0
40243	.9843		25.000	25.0	100	38	1.00	-	-
40293	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-
40303	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-
40313	1.000	1"	25.400	1"	4"	1-5/8"	.120"	-	-
40343	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.960"
40353	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-3/8"	.960"
40363	1.000	1"	25.400	1"	6"	1-1/4"	.120"	3-3/8"	.960"
NEW 40366	1.000	1"	25.400	1"	6"	1-1/4"	.030"	4"	.960"

CAM Tool Libraries

Download Tool Libraries Now



Access **Simulation Files** in DXF format for each GARR TOOL end mill, drill, or reamer from the Mastercam tech exchange, or download individual STP files from MachiningCloud.com.

$d1$	+0.000" - .002" (+.000mm - .050mm)
$d2$	h6

.2362" - .5000"
(6.000mm - 12.700mm)



Multi-Flute End Mill - Square End - AlCrN-based Coated

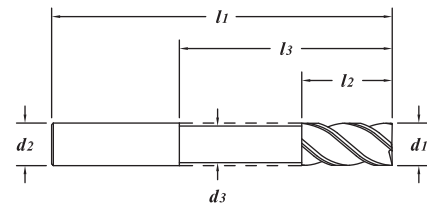
Mehrzähne fräser - Ohne Eckenradius - AlCrN-Basierende Beschichtet

Fresa de Multi Labio - Extremo Sin Radio - Recubrimiento Basado en AlCrN

Fraise de Multi-lèvre - Extrémité Carré - Revêtement à base de AlCrN

Fresa di Multitagliente - Piatte - Rivestimento in Base AlCrN

多刃加工铣刀 - 平头 - 涂层铝氮化铬



Solid submicron grain carbide end mill - non-center cutting

Engineered for Titanium

Multiple flutes for increased feed rates

Odd number of flutes to naturally break up harmonics

Engineered for High Efficiency Milling

Up to 8% Radial (ap) engagement

Can be used to finish most steels <40Hrc, as well as aluminium

Conventional grind for better finish cutting and less push off when finishing

Regrindable



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt

Entwickelt für die Bearbeitung von Titan

Mehr Zähne für höhere Vorschube

Ungleiche Spannutenzahl, um Vibrationen zu vermeiden

Entwickelt für hocheffizientes Fräsen

Bis zu 8% radialen (ap) eintauchen

Geeignet für das Schlichten in den meisten Stählen < 40 HRC, und Aluminium

Konventionelle Konstruktion für einen besseren Oberflächenzustand und weniger

Schneiddruck auf der Seite

Nachschleifbar



Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado

Diseñada para Titanio

Múltiples labios para aumentar las gamas de avance

Número de labios impar para rotura natural de armónicos

Diseñado para el fresado de alta eficiencia

Hasta 8% radial (ap)

Puede ser utilizada para acabado en la mayoría de aceros < 40Hrc, y Aluminio

Afilado convencional para un mejor acabado y menor empuje

Posibilidad de afilado



Fraises carbure submicrograin - pas de coupe au centre

Développé pour l'usinage du titane

Fraise multi-lèvres pour de plus grandes avances

Nombre impair de lèvres pour empêcher naturellement les vibrations

Conçu pour un fraisage à haute efficacité

Jusqu'à 8% amorce radiale (ap)

Adapté pour un usinage de finition dans la plupart des aciers < 40 HRC, et Aluminium

Construction conventionnelle pour une meilleure finition et moins d'effort de coupe

Affilable



Fresa sub-micrograno metallo duro - no taglio al centro

Progettata per titanio

Taglienti multipli per alti avanzamenti

Numero taglienti alternato per rompere le vibrazioni armoniche

Progettato per la fresatura ad alta efficienza

Fino a 8% radiale (ap)

Può essere usata per la finitura su acciai < 40Hrc, e Alluminio

Affilatura per una migliore finitura

Riaffilabile



高效超细晶粒整体硬质合金立铣刀 - 不切割在中心

专用于钛合金加工

多刃提高进给率

奇数刃自然破坏刀具共振

有效的握线旋削

设计并已通过0.08倍径切削宽度

可用于精加工硬度< 40Hrc的钢件, 和铝

常规刃磨提高加工质量、降低切削阻力

可以重磨

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter	Number Flutes
	Decimal	Metric						
98390	.2362	6.000	6.0	50	12	-	-	7
98392	.2362	6.000	6.0	65	19	-	-	7
98394	.2362	6.000	6.0	100	38	-	-	7
98396	.2362	6.000	6.0	100	10	60	5.4	7
98398	.2500	1/4"	6.350	1/4"	3/8"	-	-	7
98400	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	7
98402	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	7
98404	.3125	5/16"	7.938	5/16"	2"	7/16"	-	7
98406	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	7
98408	.3125	5/16"	7.938	5/16"	4"	1-1/2"	-	7
98410	.3150	8.000	8.0	50	12	-	-	7
98412	.3150	8.000	8.0	65	22	-	-	7
98414	.3150	8.000	8.0	100	38	-	-	7
98416	.3150	8.000	8.0	100	12	60	7.4	7
98418	.3750	3/8"	9.525	3/8"	2"	1/2"	-	7
98420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	7
98422	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	7
98424	.3750	3/8"	9.525	3/8"	4"	2"	-	7
98426	.3937	10.000	10.0	50	16	-	-	7
98428	.3937	10.000	10.0	70	22	-	-	7
98430	.3937	10.000	10.0	100	38	-	-	7
98432	.3937	10.000	10.0	100	50	-	-	7
98434	.3937	10.000	10.0	100	16	60	9.4	7
98436	.4724	12.000	12.0	75	26	-	-	9
98438	.4724	12.000	12.0	75	32	-	-	9
98440	.4724	12.000	12.0	100	42	-	-	9
98442	.4724	12.000	12.0	100	52	-	-	9
98444	.4724	12.000	12.0	150	19	105	11.4	9
98446	.5000	1/2"	12.700	1/2"	3"	1"	-	9
98448	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	9
98450	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	9
98452	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	9
98454	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	9

† Metric equivalents are for reference only

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	Number Flutes
	Decimal	Diameter	Metric						
98456	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	9
98458	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	9
98460	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-	9
98462	.6250	5/8"	15.875	5/8"	6"	3/4"	4-1/8"	.590"	9
98464	.6299		16.000	16.0	88	32	-	-	9
98466	.6299		16.000	16.0	100	42	-	-	9
98468	.6299		16.000	16.0	150	60	-	-	9
98470	.6299		16.000	16.0	150	80	-	-	9
98472	.6299		16.000	16.0	150	22	102	15.4	9
98474	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	11
98476	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	11
98478	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	11
98480	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	11
98484	.7874		20.000	20.0	100	26	-	-	11
98486	.7874		20.000	20.0	100	38	-	-	11
98488	.7874		20.000	20.0	150	60	-	-	11
98490	.7874		20.000	20.0	150	80	-	-	11
98494	1.000	1"	25.400	1"	4"	1-1/2"	-	-	13
98496	1.000	1"	25.400	1"	5"	2-1/4"	-	-	13
98498	1.000	1"	25.400	1"	6"	3-1/4"	-	-	13
98500	1.000	1"	25.400	1"	7"	4-1/4"	-	-	13



70

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MATERIAL HARDNESS (Rc)

0

d_1	+0.00" - .002" (+.000mm - .050mm)
d_2	h6
r	+0.01" - .001" (+.025mm - .025mm)

.4724"
(12.000mm)



TECH
PAGES
306-307

Multi-Flute End Mill - Corner Radius - AlCrN-based Coated

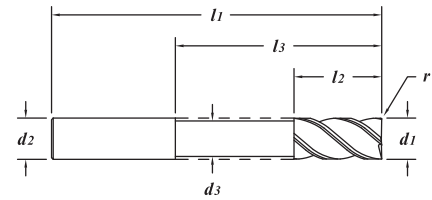
Mehrzähne fräser - Eckenradius - AlCrN-Basierende Beschichtet

Fresa de Multi Labio - Ángulo Redondeado - Recubrimiento Basado en AlCrN

Fraise de Multi-lèvre - Rayon de Coin - Revêtement à base de AlCrN

Fresa di Multitagliente - Torico - Rivestimento in Base AlCrN

多刃加工铣刀 - 圆角半径 - 涂层铝氮化铬



Solid submicron grain carbide end mill - non-center cutting

Engineered for Titanium

Multiple flutes for increased feed rates

Odd number of flutes to naturally break up harmonics

Engineered for High Efficiency Milling

Up to 8% Radial (ap) engagement

Can be used to finish most steels <40Rc, as well as aluminium

Conventional grind for better finish cutting and less push off when finishing

Regrindable



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt

Entwickelt für die Bearbeitung von Titan

Mehr Zähne für höhere Vorschube

Ungleiche Spannutenzahl, um Vibrationen zu vermeiden

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Affûtable



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高效超微晶粒整体硬质合金立铣刀 - 不切割在中心

专用于钛合金加工

多刃提高进给率

奇数刃自然破坏刀具共振

有效的螺旋铣削

设计并加工0.08倍径切削宽度

可用于精加工硬度<40Rc的钢材, 和铝

常规刃磨提高加工质量、降低切削阻力

可以重磨

EDP #	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes
98502	.4724	12.000	12.0	75	26	0.30	-	-	7
98504	.4724	12.000	12.0	75	26	0.50	-	-	7
98508	.4724	12.000	12.0	75	26	1.00	-	-	7
98516	.4724	12.000	12.0	75	26	4.00	-	-	7
98518	.4724	12.000	12.0	75	32	0.50	-	-	7
98522	.4724	12.000	12.0	75	32	1.00	-	-	7
98524	.4724	12.000	12.0	75	32	1.50	-	-	7
98528	.4724	12.000	12.0	75	32	3.00	-	-	7
98532	.4724	12.000	12.0	100	42	0.50	-	-	7
98538	.4724	12.000	12.0	100	42	1.50	-	-	7
98544	.4724	12.000	12.0	100	42	4.00	-	-	7
98546	.4724	12.000	12.0	100	52	0.50	-	-	7
98550	.4724	12.000	12.0	100	52	1.00	-	-	7
98552	.4724	12.000	12.0	100	52	1.50	-	-	7
98556	.4724	12.000	12.0	100	52	3.00	-	-	7
98560	.4724	12.000	12.0	150	19	0.50	105	11.4	7
98564	.4724	12.000	12.0	150	19	1.00	105	11.4	7
98570	.4724	12.000	12.0	150	19	3.00	105	11.4	7

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	Number Flutes
	Decimal		Metric							
98574	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-	7
98576	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-	7
98578	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	7
98580	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-	7
98582	.5000	1/2"	12.700	1/2"	3"	1"	.090"	-	-	7
98584	.5000	1/2"	12.700	1/2"	3"	1"	.120"	-	-	7
98586	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-	7
98588	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	7
98590	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	7
98592	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	7
98594	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	7
98598	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	7
98600	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-	7
98602	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.470"	7
98604	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/8"	.470"	7
98606	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.470"	7
98608	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.470"	7
98610	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.470"	7
98612	.5000	1/2"	12.700	1/2"	4"	5/8"	.125"	2-1/8"	.470"	7
98614	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	7
98616	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.020"	-	-	7
98618	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	7
98620	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-	7
98622	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-	7
98626	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	7
98628	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-	7
98630	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.120"	-	-	7
98632	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.125"	-	-	7
98634	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-	7
98636	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	7
98638	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	7
98640	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	7
98642	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	7
98644	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-	7
98646	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.010"	-	-	7
98648	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-	7
98652	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	7
98654	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	7
98658	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.010"	-	-	7
98660	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.020"	-	-	7
98662	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-	7
98666	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.120"	-	-	7
98670	.6250	5/8"	15.875	5/8"	6"	3/4"	.010"	4-1/8"	.590"	7
98672	.6250	5/8"	15.875	5/8"	6"	3/4"	.020"	4-1/8"	.590"	7
98674	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"	7
98678	.6250	5/8"	15.875	5/8"	6"	3/4"	.120"	4-1/8"	.590"	7

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MATERIAL HARDNESS (Rc)

0

continued →

Series TMR (continued)

.6299" - .7874"
(16.000mm - 20.000mm)

HIGH PERFORMANCE
END MILLS

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	Number Flutes
	Decimal		Metric							
98680	.6299		16.000	16.0	88	32	0.50	-	-	7
98690	.6299		16.000	16.0	88	32	3.00	-	-	7
98696	.6299		16.000	16.0	100	42	0.50	-	-	7
98700	.6299		16.000	16.0	100	42	1.00	-	-	7
98704	.6299		16.000	16.0	100	42	2.00	-	-	7
98706	.6299		16.000	16.0	100	42	3.00	-	-	7
98708	.6299		16.000	16.0	100	42	4.00	-	-	7
98710	.6299		16.000	16.0	100	42	5.00	-	-	7
98712	.6299		16.000	16.0	150	60	0.50	-	-	7
98716	.6299		16.000	16.0	150	60	1.00	-	-	7
98720	.6299		16.000	16.0	150	60	2.00	-	-	7
98722	.6299		16.000	16.0	150	60	3.00	-	-	7
98724	.6299		16.000	16.0	150	60	4.00	-	-	7
98726	.6299		16.000	16.0	150	60	5.00	-	-	7
98732	.6299		16.000	16.0	150	80	1.00	-	-	7
98738	.6299		16.000	16.0	150	80	3.00	-	-	7
98744	.6299		16.000	16.0	150	22	0.50	102	15.4	7
98752	.6299		16.000	16.0	150	22	2.00	102	15.4	7
98754	.6299		16.000	16.0	150	22	3.00	102	15.4	7
98760	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.010"	-	-	9
98764	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	9
98766	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	9
98770	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-	9
98772	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	-	-	9
98774	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.010"	-	-	9
98778	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	9
98784	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.190"	-	-	9
98788	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.010"	-	-	9
98790	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-	9
98794	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-	9
98796	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-	9
98800	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.250"	-	-	9
98802	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.010"	-	-	9
98804	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.020"	-	-	9
98806	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	9
98808	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-	9
98814	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.250"	-	-	9
98816	.7500	3/4"	19.050	3/4"	6"	1"	.010"	4-1/8"	.720"	9
98820	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.720"	9
98822	.7500	3/4"	19.050	3/4"	6"	1"	.060"	4-1/8"	.720"	9
98830	.7874		20.000	20.0	100	26	0.50	-	-	9
98834	.7874		20.000	20.0	100	26	1.00	-	-	9
98864	.7874		20.000	20.0	100	38	6.00	-	-	9
98866	.7874		20.000	20.0	150	60	0.50	-	-	9
98876	.7874		20.000	20.0	150	60	3.00	-	-	9
98882	.7874		20.000	20.0	150	60	6.00	-	-	9
98884	.7874		20.000	20.0	150	80	0.50	-	-	9

MATERIAL HARDNESS (Rc)

EDP#	d_1 †		d_2	l_1	l_2	r	l_3	d_3	Number Flutes
	Decimal	Diameter Metric							
98920	1.000	1"	25.400	1"	4"	1-1/2"	.015"	-	11
98924	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	11
98928	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-	11
98934	1.000	1"	25.400	1"	5"	2-1/4"	.015"	-	11
98936	1.000	1"	25.400	1"	5"	2-1/4"	.030"	-	11
98942	1.000	1"	25.400	1"	5"	2-1/4"	.120"	-	11
98944	1.000	1"	25.400	1"	5"	2-1/4"	.190"	-	11
98946	1.000	1"	25.400	1"	5"	2-1/4"	.250"	-	11
98948	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	11
98950	1.000	1"	25.400	1"	6"	3-1/4"	.060"	-	11
98954	1.000	1"	25.400	1"	6"	3-1/4"	.190"	-	11
98958	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	11
98966	1.000	1"	25.400	1"	7"	4-1/4"	.250"	-	11

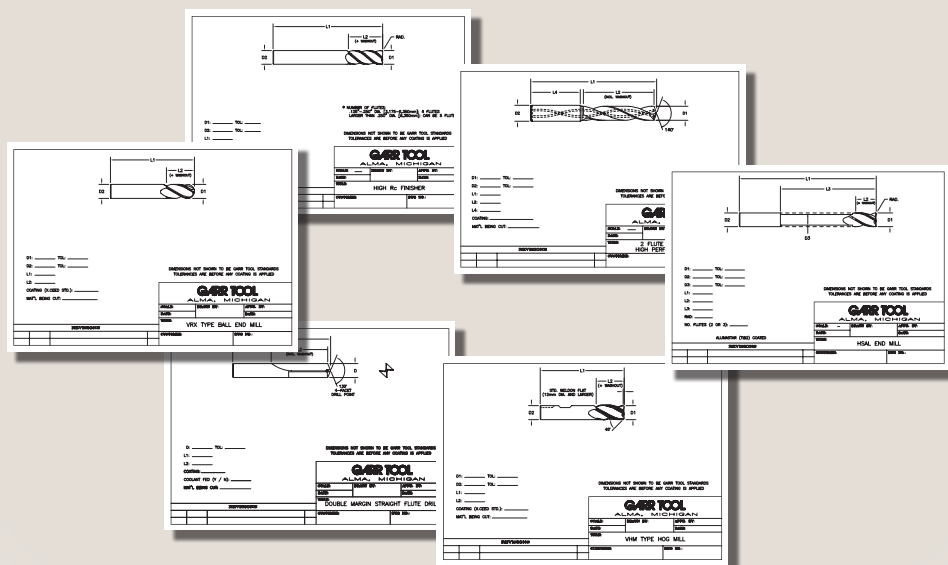


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MATERIAL HARDNESS (Rc)

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Access an assortment of 'fill-in-the-blank' prints
from our website to aid in the quoting of custom tooling.

www.garrtool.com

TOLERANCES

d_1	+0.002" - .002" (+.000mm - .050mm)
d_2	h6
r	+0.001" - .001" (+.025 - .025mm)
ball radius	+0.000" - .001" (+.000 - .025mm)

HIGH EFFICIENCY MILLING

TECH
PAGES
298-299

Series V4S, V4R, V4B

NEW
ITEMS.1562" - .2188"
(3.967mm - 5.558mm)

Variable Helix End Mill - AlCrN-based Coated

Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Basierende Beschichtet

Fresa de Hélice Variable - Recubrimiento Basado en AlCrN

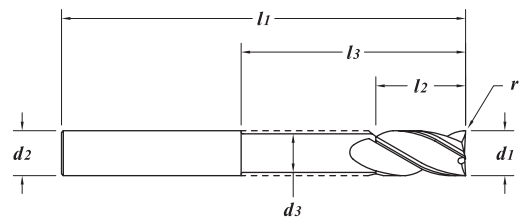
Fraise Avec un Angle Hélice Variable - Revêtement à base de AlCrN

Fresa ad Elica Variabile - Rivestimento in Base AlCrN

不等螺旋铣刀 - 涂层铝氮化铬

HIGH PERFORMANCE
END MILLS

Solid submicron grain carbide end mill - center cutting
Helix geometry varies of length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
Recommended for titanium, inconel, and stainless steel (<40 Hrc)
PCT (Polish Carbide Treatment) enhances tool life
Minimizes burr on part
12mm and larger tools offered with weldon flat
Smaller diameters can be modified with a flat within 48 hours
The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



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Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Empfohlen für Titan, Inconel, und Rostfreien Stahl (<40 Hrc)
PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Stanzzeit bis zu
Reduziert die Gratbildung am Werkstück
Spiralgeometrie variiert auf der gesamten Spanabfuhr beim Schlitz- und Taschenfräsen
Variable Spannutgeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen
Variabler Winkel für bessere Spangeometrie
Ab Durchmesser 12 mm und grösser können die Werkzeuge mit Weldon-Spannfläche angeboten werden
Kleinere Durchmesser können innerhalb 48 Stunden mit einer Spannfläche geliefert werden
Die Kombination einer verlängerten Spannfläche mit einer Weldon-Spannfläche kann die Ursache bei Spannut-Auswaschungen bei einigen Fräsespannfuttern sein



Fresa de submicrono sólido carburo de alto rendimiento - corte centrado
Recomendado para Titanio, Inconel, y Acero inoxidable (<40 Hrc)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta. hasta
Minimiza las rebabas en la pieza
La geometría de la hélice varía a lo largo de la longitud del labio
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeros
El labio con filo variable que contribuye a la buena formación de la viruta
Htas de Ø12 mm. y mayores disponibles con mango Weldon
Es posible añadir un plano Weldon en diámetros menores en 48 horas
La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que el labio alcance el interior de algunos portaherramientas



Fraises carbure submicron - coupe au centre
Recommandé pour les titane, inconel, et aciers inoxydables (<40 Hrc)
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Minimise les bavures sur la pièce
La géométrie de l'hélice varie sur la longueur de l'hélice
Variable des dents de coupe est d'aider à l'évacuation des copeaux de fentes et des poches
Un pas variable améliore la formation des copeaux
Des outils d'un dia. 12 mm ou supérieur sont disponibles avec une queue weldon
Les petits diamètres peuvent être modifiés avec une queue Weldon endéans 48 heures
La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin



Fresa sub-micrograno metallo duro - taglio al centro
Raccomandata per lavorazioni su titanio, inconel, e inox (<40 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Non crea bava sul pezzo
La geometria dell'elica varia sulla lunghezza del tagliente
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave
L'angolo di spoglia variabile aiuta la formazione del truciolo
Dal diametro 12 mm in su disponibili con attacco weldon
Diametri più piccoli possono essere modificati in 48 ore
Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni



超细晶粒整体硬质合金立铣刀 - 中心切削
推荐的加工材料：钛合金、不锈钢、(≤40HRC)
PCT(硬质合金抛光处理)使刀具寿命提高
使工件的毛刺最少
整个切削刃的螺旋角可变
切削刃螺旋角可变的设计有利于碎屑在加工槽和型腔中排出
可变的前角有利于碎屑的形成
12mm及以上刀具提供侧固槽位设计
可在48小时内生产小直径的平底刀具
过长的刀具结合侧固槽位的刀具可能会导致刀具夹头受到冲击而损坏

EDP#			d_1 †			d_2	l_1	l_2	r	l_3	d_3
(plain)	(weldon)		Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
NEW	50171	-	.1562	5/32"	3.967	1/4"	2"	1/2"	-	-	-
NEW	50172	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.010"	-	-
NEW	50173	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.015"	-	-
NEW	50174	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.020"	-	-
NEW	50175	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.030"	-	-
NEW	50176	-	.1562	5/32"	3.967	1/4"	2"	1/2"	BALL	-	-
NEW	50177	-	.1575		4.000	6.0	50	12	-	-	-
NEW	50178	-	.1575		4.000	6.0	50	12	0.20	-	-
NEW	50179	-	.1575		4.000	6.0	50	12	0.30	-	-
NEW	50180	-	.1575		4.000	6.0	50	12	0.50	-	-
NEW	50181	-	.1575		4.000	6.0	50	12	BALL	-	-
NEW	50182	-	.1875	3/16"	4.763	1/4"	2"	1/2"	-	-	-
NEW	50183	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.010"	-	-
NEW	50184	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.015"	-	-
NEW	50185	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.020"	-	-
NEW	50186	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.030"	-	-
NEW	50187	-	.1875	3/16"	4.763	1/4"	2"	1/2"	BALL	-	-
NEW	50188	-	.1969		5.000	6.0	65	20	-	-	-
NEW	50189	-	.1969		5.000	6.0	65	20	0.20	-	-
NEW	50190	-	.1969		5.000	6.0	65	20	0.30	-	-
NEW	50191	-	.1969		5.000	6.0	65	20	0.50	-	-
NEW	50192	-	.1969		5.000	6.0	65	20	BALL	-	-
NEW	50193	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	-	-	-
NEW	50194	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.010"	-	-
NEW	50195	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	-	-
NEW	50196	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.020"	-	-
NEW	50197	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.030"	-	-
NEW	50198	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	BALL	-	-

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MATERIAL HARDNESS (Rc)

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continued →

Series V4S, V4R, V4B (continued)

.2362" - .2500"
(6.000mm - 6.350mm)

EDP#		$d1$ †		$d2$	$l1$	$l2$	r	$l3$	$d3$		
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter	
50236	-	.2362		6.000	6.0	65	12	-	-	-	
50199	-	.2362		6.000	6.0	65	12	0.30	-	-	
50200	-	.2362		6.000	6.0	65	12	0.50	-	-	
50201	-	.2362		6.000	6.0	65	12	0.75	-	-	
50202	-	.2362		6.000	6.0	65	12	1.00	-	-	
50203	-	.2362		6.000	6.0	65	12	1.50	-	-	
50252	-	.2362		6.000	6.0	65	12	BALL	-	-	
50237	-	.2362		6.000	6.0	65	19	-	-	-	
50204	-	.2362		6.000	6.0	65	19	0.30	-	-	
50205	-	.2362		6.000	6.0	65	19	0.50	-	-	
50206	-	.2362		6.000	6.0	65	19	1.00	-	-	
50253	-	.2362		6.000	6.0	65	19	BALL	-	-	
50540	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-	
50489	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-	
50490	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	
50491	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-	
NEW	50708	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-	-
NEW	50709	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.040"	-	-
NEW	50710	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.060"	-	-
NEW	50711	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.090"	-	-
	50560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	BALL	-	-
	50645	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-
	50614	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-
	50616	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
	50618	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-
NEW	50712	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"	-	-
NEW	50713	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.040"	-	-
NEW	50714	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"	-	-
NEW	50715	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.090"	-	-
	50238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
	50207	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
	50208	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
	50620	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
	50209	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
NEW	50716	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.040"	-	-
	50210	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-
NEW	50717	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.090"	-	-
	50254	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-
NEW	50653	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	-	-	-
	50493	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
NEW	50677	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	BALL	-	-

Series V4S, V4R, V4B (continued)

.2500" - .3150"
(6.350mm - 8.000mm)

HIGH PERFORMANCE
END MILLS

	EDP#		d_1 †			d_2	l_1	l_2	r	l_3	d_3
	(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
NEW	50654	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-	-
NEW	50681	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	BALL	-	-
NEW	50655	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	-	-	-
NEW	50718	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	.020"	-	-
NEW	50682	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	BALL	-	-
NEW	50656	-	.2500	1/4"	6.350	1/4"	4"	2"	-	-	-
NEW	50683	-	.2500	1/4"	6.350	1/4"	4"	2"	BALL	-	-
NEW	50651	-	.2500	1/4"	6.350	1/4"	3"	3/8"	-	1-1/8"	.237"
NEW	50678	-	.2500	1/4"	6.350	1/4"	3"	3/8"	BALL	1-1/8"	.237"
	50600	-	.2500	1/4"	6.350	1/4"	4"	3/8"	-	1-1/8"	.237"
	50211	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.230"
	50474	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	1-1/8"	.237"
NEW	50679	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	1-1/2"	.237"
NEW	50652	-	.2500	1/4"	6.350	1/4"	4"	3/8"	-	2"	.237"
NEW	50680	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	2"	.237"
NEW	50719	-	.2500	1/4"	6.350	1/4"	6"	3/8"	.010"	4"	.230"
NEW	50680	-	.2500	1/4"	6.350	1/4"	6"	3/8"	BALL	4"	.230"
NEW	50720	-	.3125	5/16"	7.937	5/16"	2"	3/8"	.030"	-	-
	50541	-	.3125	5/16"	7.937	5/16"	2"	7/16"	-	-	-
	50622	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.010"	-	-
	50624	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.015"	-	-
	50492	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.020"	-	-
NEW	50721	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.125"	-	-
	50561	-	.3125	5/16"	7.937	5/16"	2"	7/16"	BALL	-	-
	50239	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	-	-	-
	50626	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.010"	-	-
	50628	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.015"	-	-
	50212	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.020"	-	-
	50213	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.030"	-	-
NEW	50722	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.060"	-	-
NEW	50723	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.125"	-	-
	50255	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	BALL	-	-
NEW	50657	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	-	-	-
NEW	50724	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.015"	-	-
NEW	50725	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.030"	-	-
NEW	50726	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.060"	-	-
NEW	50685	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	BALL	-	-
NEW	50658	-	.3125	5/16"	7.937	5/16"	3"	7/16"	-	1-1/2"	.295"
NEW	50686	-	.3125	5/16"	7.937	5/16"	3"	7/16"	BALL	1-1/2"	.295"
	50602	-	.3150		8.000	8.0	50	12	-	-	-
	50630	-	.3150		8.000	8.0	50	12	0.50	-	-
	50240	-	.3150		8.000	8.0	65	22	-	-	-
	50214	-	.3150		8.000	8.0	65	22	0.50	-	-
	50356	-	.3150		8.000	8.0	65	22	0.75	-	-
	50215	-	.3150		8.000	8.0	65	22	1.00	-	-
NEW	50727	-	.3150		8.000	8.0	65	22	1.20	-	-
	50357	-	.3150		8.000	8.0	65	22	1.50	-	-
	50358	-	.3150		8.000	8.0	65	22	2.00	-	-
NEW	50728	-	.3150		8.000	8.0	65	22	3.00	-	-
	50256	-	.3150		8.000	8.0	65	22	BALL	-	-

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MATERIAL HARDNESS (Rc)

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continued →

Series V4S, V4R, V4B (continued)

.3150" - .3937"
(8.000mm - 10.000mm)

	EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3
	(plain)	(weldon)	Decimal	Diameter	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
NEW	50659	-	.3150	8.000	8.0	75	32	-	-	-
NEW	50687	-	.3150	8.000	8.0	75	32	BALL	-	-
NEW	50660	-	.3150	8.000	8.0	100	12	-	50	7.50
NEW	50688	-	.3150	8.000	8.0	100	12	BALL	50	7.50
	50542	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-
	50632	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-
NEW	50729	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-
	50494	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-
	50634	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-
NEW	50730	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-
NEW	50732	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.090"	-
NEW	50733	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.120"	-
NEW	50734	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.125"	-
	50562	-	.3750	3/8"	9.525	3/8"	2"	1/2"	BALL	-
	50241	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-
	50216	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.010"	-
NEW	50735	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-
	50217	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-
	50218	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-
NEW	50736	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.040"	-
	50219	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-
	50636	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.090"	-
NEW	50737	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.120"	-
NEW	50738	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.125"	-
	50257	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	BALL	-
NEW	50661	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-
NEW	50739	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-
	50637	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-
NEW	50740	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.060"	-
NEW	50689	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	BALL	-
NEW	50662	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	-	-
NEW	50741	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-
NEW	50742	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.030"	-
NEW	50743	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.060"	-
NEW	50744	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.120"	-
NEW	50690	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-
NEW	50745	-	.3750	3/8"	9.525	3/8"	6"	2-1/2"	.060	-
	50604	-	.3750	3/8"	9.525	3/8"	4"	1/2"	-	1-1/8"
	50220	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"
	50476	-	.3750	3/8"	9.525	3/8"	4"	1/2"	BALL	1-1/8"
	50606	-	.3937	10.000	10.0	50	14	-	-	.355"
	50638	-	.3937	10.000	10.0	50	14	0.50	-	-
	50242	-	.3937	10.000	10.0	70	22	-	-	-
NEW	50746	-	.3937	10.000	10.0	70	22	0.25	-	-
	50221	-	.3937	10.000	10.0	70	22	0.50	-	-
	50359	-	.3937	10.000	10.0	70	22	0.75	-	-
	50360	-	.3937	10.000	10.0	70	22	1.00	-	-
	50361	-	.3937	10.000	10.0	70	22	1.50	-	-
	50362	-	.3937	10.000	10.0	70	22	2.00	-	-
NEW	50747	-	.3937	10.000	10.0	70	22	3.00	-	-
	50258	-	.3937	10.000	10.0	70	22	BALL	-	-
	50608	-	.3937	10.000	10.0	70	26	-	-	-
NEW	50748	-	.3937	10.000	10.0	70	26	1.50	-	-
NEW	50663	-	.3937	10.000	10.0	70	30	-	-	-
NEW	50691	-	.3937	10.000	10.0	70	30	BALL	-	-

Series V4S, V4R, V4B (continued)

.3937" - .5000"
(10.000mm - 12.700mm)

HIGH PERFORMANCE
END MILLS

	EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3	
	(plain)	(weldon)	Decimal	Diameter							Metric
NEW	50749	-	.3937		10.000	10.0	70	22	0.50	30	9.40
NEW	50750	-	.3937		10.000	10.0	100	12	0.30	50	9.40
NEW	50692	-	.3937		10.000	10.0	100	14	BALL	50	9.40
	50450	50449	.4724		12.000	12.0	75	26	-	-	-
	50363	50369	.4724		12.000	12.0	75	26	0.30	-	-
	50364	50370	.4724		12.000	12.0	75	26	0.50	-	-
	50365	50366	.4724		12.000	12.0	75	26	0.75	-	-
	50367	50371	.4724		12.000	12.0	75	26	1.00	-	-
	50372	50373	.4724		12.000	12.0	75	26	1.50	-	-
	50374	50375	.4724		12.000	12.0	75	26	2.00	-	-
	50470	-	.4724		12.000	12.0	75	26	BALL	-	-
	50243	50283	.4724		12.000	12.0	75	32	-	-	-
	50222	50270	.4724		12.000	12.0	75	32	0.50	-	-
	50223	50271	.4724		12.000	12.0	75	32	1.00	-	-
	50259	50291	.4724		12.000	12.0	75	32	BALL	-	-
NEW	50664	-	.4724		12.000	12.0	88	36	-	-	-
NEW	50751	-	.4724		12.000	12.0	88	36	0.30	-	-
NEW	50752	-	.4724		12.000	12.0	88	36	0.50	-	-
NEW	50753	-	.4724		12.000	12.0	88	36	1.00	-	-
NEW	50754	-	.4724		12.000	12.0	88	36	1.50	-	-
NEW	50755	-	.4724		12.000	12.0	88	36	3.00	-	-
NEW	50693	-	.4724		12.000	12.0	88	36	BALL	-	-
	50564	-	.4724		12.000	12.0	100	42	-	-	-
	50566	-	.4724		12.000	12.0	100	42	0.30	-	-
	50568	-	.4724		12.000	12.0	100	42	0.50	-	-
	50570	-	.4724		12.000	12.0	100	42	1.00	-	-
	50572	-	.4724		12.000	12.0	100	42	2.00	-	-
	50574	-	.4724		12.000	12.0	100	42	3.00	-	-
	50576	-	.4724		12.000	12.0	100	42	BALL	-	-
NEW	50665	-	.4724		12.000	12.0	100	48	-	-	-
NEW	50756	-	.4724		12.000	12.0	100	48	0.30	-	-
NEW	50757	-	.4724		12.000	12.0	100	48	0.50	-	-
NEW	50758	-	.4724		12.000	12.0	100	48	1.00	-	-
NEW	50759	-	.4724		12.000	12.0	100	48	1.50	-	-
NEW	50760	-	.4724		12.000	12.0	100	48	3.00	-	-
NEW	50761	-	.4724		12.000	12.0	100	48	4.00	-	-
NEW	50694	-	.4724		12.000	12.0	100	48	BALL	-	-
NEW	50695	-	.4724		12.000	12.0	100	14	BALL	50	11.40
	50543	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
	50640	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
NEW	50762	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
	50496	50497	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
	50642	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
NEW	50763	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
NEW	50764	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"	-	-
NEW	50765	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.120"	-	-
	50644	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-
NEW	50766	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.156"	-	-
NEW	50767	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.190"	-	-
	50563	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	BALL	-	-

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MATERIAL HARDNESS (Rc)

0

continued →

Series V4S, V4R, V4B (continued)

.5000"
(12.700mm)

EDP#		$d1^{\dagger}$			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
50452	50453	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
50379	50380	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-
NEW	50768	-	.5000	1/2"	1/2"	3"	1"	.015"	-	-
50381	50382	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-
50383	50384	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
50385	50386	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-
NEW	50769	-	.5000	1/2"	1/2"	3"	1"	.090"	-	-
NEW	50770	-	.5000	1/2"	1/2"	3"	1"	.120"	-	-
NEW	50771	-	.5000	1/2"	1/2"	3"	1"	.125"	-	-
NEW	50772	-	.5000	1/2"	1/2"	3"	1"	.190"	-	-
50472	50473	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-
50244	50284	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
50224	50272	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
NEW	50773	-	.5000	1/2"	1/2"	3"	1-1/4"	.015"	-	-
50225	50273	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
50226	50274	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
50227	50275	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
NEW	50774	-	.5000	1/2"	1/2"	3"	1-1/4"	.090"	-	-
NEW	50775	-	.5000	1/2"	1/2"	3"	1-1/4"	.120"	-	-
NEW	50776	-	.5000	1/2"	1/2"	3"	1-1/4"	.125"	-	-
NEW	50777	-	.5000	1/2"	1/2"	3"	1-1/4"	.156"	-	-
NEW	50778	-	.5000	1/2"	1/2"	3"	1-1/4"	.190"	-	-
50260	50292	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-
NEW	50666	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	-	-	-
NEW	50779	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.010"	-	-
NEW	50780	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.015"	-	-
NEW	50781	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.020"	-	-
NEW	50782	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.030"	-	-
NEW	50783	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.060"	-	-
NEW	50784	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.090"	-	-
NEW	50785	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	.120"	-	-
NEW	50696	-	.5000	1/2"	1/2"	3-1/2"	1-1/2"	BALL	-	-
50578	50579	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
50580	50581	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-
50582	50583	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-
50584	50585	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
50586	50587	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-
50588	50589	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
50590	50591	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.120"	-	-
50592	50593	.5000	1/2"	12.700	1/2"	4"	1-5/8"	BALL	-	-
50646	-	.5000	1/2"	12.700	1/2"	4"	1-3/4"	-	-	-
50647	-	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
50245	50285	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
NEW	50786	-	.5000	1/2"	1/2"	4"	2-1/8"	.010"	-	-
NEW	50787	-	.5000	1/2"	1/2"	4"	2-1/8"	.015"	-	-
NEW	50788	-	.5000	1/2"	1/2"	4"	2-1/8"	.020"	-	-
NEW	50789	-	.5000	1/2"	1/2"	4"	2-1/8"	.030"	-	-
NEW	50790	-	.5000	1/2"	1/2"	4"	2-1/8"	.060"	-	-
NEW	50791	-	.5000	1/2"	1/2"	4"	2-1/8"	.090"	-	-
NEW	50792	-	.5000	1/2"	1/2"	4"	2-1/8"	.120"	-	-
NEW	50793	-	.5000	1/2"	1/2"	4"	2-1/8"	.125"	-	-
NEW	50794	-	.5000	1/2"	1/2"	4"	2-1/8"	.190"	-	-
50261	50293	.5000	1/2"	12.700	1/2"	4"	2-1/8"	BALL	-	-

Series V4S, V4R, V4B (continued)

.5000" - .6250"
(12.700mm - 15.875mm)

HIGH PERFORMANCE
END MILLS

	EDP#		d_1 †			d_2	l_1	l_2	r	l_3	d_3
	(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
NEW	50668	-	.5000	1/2"	12.700	1/2"	6"	3"	-	-	-
NEW	50795	-	.5000	1/2"	12.700	1/2"	6"	3"	.020"	-	-
NEW	50796	-	.5000	1/2"	12.700	1/2"	6"	3"	.030"	-	-
NEW	50797	-	.5000	1/2"	12.700	1/2"	6"	3"	.060"	-	-
NEW	50798	-	.5000	1/2"	12.700	1/2"	6"	3"	.120"	-	-
NEW	50799	-	.5000	1/2"	12.700	1/2"	6"	3"	.190"	-	-
NEW	50699	-	.5000	1/2"	12.700	1/2"	6"	3"	BALL	-	-
	50610	-	.5000	1/2"	12.700	1/2"	4"	5/8"	-	2-1/4"	.475"
	50228	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.470"
NEW	50900	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/4"	.470"
NEW	50901	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/4"	.470"
NEW	50902	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/4"	.470"
	50478	-	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	2-1/4"	.475"
NEW	50667	-	.5000	1/2"	12.700	1/2"	6"	5/8"	-	3-1/8"	.475"
	50235	-	.5000	1/2"	12.700	1/2"	6"	5/8"	-	4-1/8"	.475"
	50594	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.020"	4-1/8"	.470"
	50596	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.470"
NEW	50697	-	.5000	1/2"	12.700	1/2"	6"	5/8"	BALL	3-1/8"	.475"
	50598	-	.5000	1/2"	12.700	1/2"	6"	5/8"	BALL	4-1/8"	.475"
NEW	50698	-	.5000	1/2"	12.700	1/2"	6"	1"	BALL	4-1/2"	.475"
	50545	50546	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
NEW	50903	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
NEW	50904	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"	-	-
	50498	50499	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
	50500	50501	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"	-	-
	50502	50503	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-
NEW	50905	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"	-	-
NEW	50906	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.120"	-	-
NEW	50907	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.125"	-	-
NEW	50908	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.156"	-	-
NEW	50909	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.190"	-	-
NEW	50910	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.250"	-	-
	50246	50286	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
NEW	50911	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-
NEW	50912	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
	50229	50277	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
	50534	50535	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
	50536	50537	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-
	50538	50539	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
NEW	50913	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	-	-
	50230	50278	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
NEW	50914	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
NEW	50915	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.156"	-	-
NEW	50916	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.190"	-	-
NEW	50917	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.250"	-	-
	50262	50294	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	BALL	-	-

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MATERIAL HARDNESS (Rc)

0

continued →

Series V4S, V4R, V4B (continued)

.6250" - .6299"
(15.875mm - 16.000mm)

	EDP#		d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	(plain)	(weldon)	Decimal		Metric						
NEW	50669	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-
NEW	50918	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-
NEW	50919	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.015"	-	-
NEW	50920	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.020"	-	-
NEW	50921	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-
NEW	50922	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-
NEW	50923	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.090"	-	-
NEW	50924	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.120"	-	-
NEW	50925	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.125"	-	-
NEW	50926	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.156"	-	-
NEW	50927	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.190"	-	-
NEW	50928	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.250"	-	-
NEW	50700	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	BALL	-	-
	50612	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
NEW	50670	-	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
NEW	50701	-	.6250	5/8"	15.875	5/8"	4"	1-3/4"	BALL	-	-
	50547	-	.6299		16.000	16.0	75	19	-	-	-
	50504	-	.6299		16.000	16.0	75	19	0.50	-	-
	50506	-	.6299		16.000	16.0	75	19	1.00	-	-
	50508	-	.6299		16.000	16.0	75	19	3.00	-	-
NEW	50929	-	.6299		16.000	16.0	75	19	4.00	-	-
NEW	50930	-	.6299		16.000	16.0	75	19	5.00	-	-
NEW	50931	-	.6299		16.000	16.0	75	19	6.00	-	-
	50247	50287	.6299		16.000	16.0	88	32	-	-	-
	50231	50279	.6299		16.000	16.0	88	32	0.50	-	-
	50409	50410	.6299		16.000	16.0	88	32	0.75	-	-
	50411	50412	.6299		16.000	16.0	88	32	1.00	-	-
	50413	50414	.6299		16.000	16.0	88	32	1.50	-	-
	50415	50416	.6299		16.000	16.0	88	32	2.00	-	-
NEW	50932	-	.6299		16.000	16.0	88	32	2.50	-	-
	50417	50418	.6299		16.000	16.0	88	32	3.00	-	-
NEW	50933	-	.6299		16.000	16.0	88	32	4.00	-	-
NEW	50934	-	.6299		16.000	16.0	88	32	5.00	-	-
NEW	50935	-	.6299		16.000	16.0	88	32	6.00	-	-
	50263	50295	.6299		16.000	16.0	88	32	BALL	-	-
NEW	50671	-	.6299		16.000	16.0	100	48	-	-	-
NEW	50936	-	.6299		16.000	16.0	100	48	0.50	-	-
NEW	50937	-	.6299		16.000	16.0	100	48	1.00	-	-
NEW	50938	-	.6299		16.000	16.0	100	48	1.50	-	-
NEW	50939	-	.6299		16.000	16.0	100	48	2.00	-	-
NEW	50940	-	.6299		16.000	16.0	100	48	3.00	-	-
NEW	50941	-	.6299		16.000	16.0	100	48	4.00	-	-
NEW	50942	-	.6299		16.000	16.0	100	48	5.00	-	-
NEW	50943	-	.6299		16.000	16.0	100	48	6.00	-	-
NEW	50702	-	.6299		16.000	16.0	100	48	BALL	-	-

Series V4S, V4R, V4B (continued)

.7500"
(19.050mm)

HIGH PERFORMANCE
END MILLS

EDP#		d_1 †			d_2	l_1	l_2	r	l_3	d_3
(plain) (weldon)		Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
	50548	-	.7500 3/4"	19.050	3/4"	3"	7/8"	-	-	-
NEW	50944	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.010"	-	-
NEW	50945	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.015"	-	-
NEW	50946	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.020"	-	-
	50556	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
NEW	50947	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
NEW	50948	-	.7500 3/4"	19.050	3/4"	3"	7/8"	.120"	-	-
	50549	50550	.7500 3/4"	19.050	3/4"	4"	1"	-	-	-
NEW	50949	-	.7500 3/4"	19.050	3/4"	4"	1"	.010"	-	-
NEW	50950	-	.7500 3/4"	19.050	3/4"	4"	1"	.015"	-	-
	50510	50511	.7500 3/4"	19.050	3/4"	4"	1"	.020"	-	-
	50512	50513	.7500 3/4"	19.050	3/4"	4"	1"	.030"	-	-
	50514	50515	.7500 3/4"	19.050	3/4"	4"	1"	.060"	-	-
NEW	50951	-	.7500 3/4"	19.050	3/4"	4"	1"	.090"	-	-
NEW	50952	-	.7500 3/4"	19.050	3/4"	4"	1"	.120"	-	-
NEW	50953	-	.7500 3/4"	19.050	3/4"	4"	1"	.190"	-	-
NEW	50954	-	.7500 3/4"	19.050	3/4"	4"	1"	.250"	-	-
NEW	50955	-	.7500 3/4"	19.050	3/4"	4"	1"	.3125"	-	-
	50248	50288	.7500 3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
NEW	50956	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.010"	-	-
NEW	50957	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
	50516	50517	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-
	50232	50280	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
	50518	50519	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
NEW	50958	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.090"	-	-
	50520	50521	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
NEW	50959	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-
NEW	50960	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.156"	-	-
NEW	50961	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-
NEW	50962	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.250"	-	-
NEW	50963	-	.7500 3/4"	19.050	3/4"	4"	1-1/2"	.3125"	-	-
	50264	50296	.7500 3/4"	19.050	3/4"	4"	1-1/2"	BALL	-	-
	50551	50552	.7500 3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
NEW	50964	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.010"	-	-
NEW	50965	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
	50522	50523	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.020"	-	-
	50524	50525	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
	50526	50527	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
NEW	50966	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.090"	-	-
NEW	50967	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-
NEW	50968	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.125"	-	-
NEW	50969	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.156"	-	-
NEW	50970	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
NEW	50971	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.250"	-	-
NEW	50972	-	.7500 3/4"	19.050	3/4"	4"	1-3/4"	.3125"	-	-

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MATERIAL HARDNESS (Rc)

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continued →

Series V4S, V4R, V4B (continued)

.7500" - .7874"
(19.050 - 20.000mm)

EDP#		$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
	50553	50554	.7500 3/4"	19.050	3/4"	5"	2-1/8"	-	-	-
NEW	50973	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.010"	-	-
NEW	50974	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.015"	-	-
NEW	50975	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-
NEW	50976	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
NEW	50977	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-
NEW	50978	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.090"	-	-
NEW	50979	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-
NEW	50980	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.125"	-	-
NEW	50981	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.156"	-	-
NEW	50982	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.190"	-	-
NEW	50983	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.250"	-	-
NEW	50984	-	.7500 3/4"	19.050	3/4"	5"	2-1/8"	.3125"	-	-
NEW	50672	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	-	-	-
NEW	50985	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.010"	-	-
NEW	50986	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-
NEW	50987	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.020"	-	-
NEW	50988	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
NEW	50989	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
NEW	50990	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.090"	-	-
NEW	50991	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.120"	-	-
NEW	50992	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.125"	-	-
NEW	50993	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.156"	-	-
NEW	50994	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.190"	-	-
NEW	50995	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.250"	-	-
NEW	50996	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	.3125"	-	-
NEW	50703	-	.7500 3/4"	19.050	3/4"	5"	2-1/2"	BALL	-	-
	50555	-	.7874	20.000	20.0	100	25	-	-	-
	50249	50289	.7874	20.000	20.0	100	38	-	-	-
NEW	50997	-	.7874	20.000	20.0	100	38	0.50	-	-
	50528	-	.7874	20.000	20.0	100	38	1.00	-	-
	50530	-	.7874	20.000	20.0	100	38	2.00	-	-
NEW	50998	-	.7874	20.000	20.0	100	38	2.50	-	-
	50532	-	.7874	20.000	20.0	100	38	3.00	-	-
NEW	50999	-	.7874	20.000	20.0	100	38	4.00	-	-
NEW	50121	-	.7874	20.000	20.0	100	38	5.00	-	-
NEW	50122	-	.7874	20.000	20.0	100	38	6.00	-	-
NEW	50123	-	.7874	20.000	20.0	100	38	8.00	-	-
	50265	50297	.7874	20.000	20.0	100	38	BALL	-	-
NEW	50673	-	.7874	20.000	20.0	100	48	-	-	-
NEW	50124	-	.7874	20.000	20.0	100	48	0.50	-	-
NEW	50125	-	.7874	20.000	20.0	100	48	1.00	-	-
NEW	50126	-	.7874	20.000	20.0	100	48	1.50	-	-
NEW	50127	-	.7874	20.000	20.0	100	48	2.00	-	-
NEW	50128	-	.7874	20.000	20.0	100	48	2.50	-	-
NEW	50129	-	.7874	20.000	20.0	100	48	3.00	-	-
NEW	50131	-	.7874	20.000	20.0	100	48	4.00	-	-
NEW	50132	-	.7874	20.000	20.0	100	48	5.00	-	-
NEW	50133	-	.7874	20.000	20.0	100	48	6.00	-	-
NEW	50134	-	.7874	20.000	20.0	100	48	8.00	-	-
NEW	50704	-	.7874	20.000	20.0	100	48	BALL	-	-

Series V4S, V4R, V4B (continued)

.7874" - 1.000"
(20.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

	EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3
	(plain)	(weldon)	Decimal	Diameter	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
NEW	50674	-	.7874	20.000	20.0	150	60	-	-	-
NEW	50135	-	.7874	20.000	20.0	150	60	0.50	-	-
NEW	50136	-	.7874	20.000	20.0	150	60	1.00	-	-
NEW	50137	-	.7874	20.000	20.0	150	60	3.00	-	-
NEW	50138	-	.7874	20.000	20.0	150	60	6.00	-	-
NEW	50705	-	.7874	20.000	20.0	150	60	BALL	-	-
	50250	50290	1.000	1"	25.400	1"	4"	1-1/2"	-	-
NEW	50139	-	1.000	1"	25.400	1"	4"	1-1/2"	.020"	-
	50233	50281	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-
NEW	50141	-	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-
NEW	50142	-	1.000	1"	25.400	1"	4"	1-1/2"	.090"	-
NEW	50143	-	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-
	50557	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-
NEW	50144	-	1.000	1"	25.400	1"	4"	1-1/2"	.156"	-
NEW	50145	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-
NEW	50146	-	1.000	1"	25.400	1"	4"	1-1/2"	.250"	-
NEW	50147	-	1.000	1"	25.400	1"	4"	1-1/2"	.3125"	-
NEW	50148	-	1.000	1"	25.400	1"	4"	1-1/2"	.375"	-
	50266	50298	1.000	1"	25.400	1"	4"	1-1/2"	BALL	-
NEW	50675	-	1.000	1"	25.400	1"	4-1/2"	2"	-	-
NEW	50149	-	1.000	1"	25.400	1"	4-1/2"	2"	.020"	-
NEW	50151	-	1.000	1"	25.400	1"	4-1/2"	2"	.030"	-
NEW	50152	-	1.000	1"	25.400	1"	4-1/2"	2"	.060"	-
NEW	50153	-	1.000	1"	25.400	1"	4-1/2"	2"	.090"	-
NEW	50154	-	1.000	1"	25.400	1"	4-1/2"	2"	.120"	-
NEW	50155	-	1.000	1"	25.400	1"	4-1/2"	2"	.156"	-
NEW	50156	-	1.000	1"	25.400	1"	4-1/2"	2"	.190"	-
NEW	50157	-	1.000	1"	25.400	1"	4-1/2"	2"	.250"	-
NEW	50158	-	1.000	1"	25.400	1"	4-1/2"	2"	.3125"	-
NEW	50706	-	1.000	1"	25.400	1"	4-1/2"	2"	BALL	-
	50234	50282	1.000	1"	25.400	1"	5"	2-1/8"	.030"	-
NEW	50676	-	1.000	1"	25.400	1"	5"	2-1/2"	-	-
NEW	50159	-	1.000	1"	25.400	1"	5"	2-1/2"	.020"	-
NEW	50161	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-
NEW	50162	-	1.000	1"	25.400	1"	5"	2-1/2"	.060"	-
NEW	50163	-	1.000	1"	25.400	1"	5"	2-1/2"	.090"	-
NEW	50164	-	1.000	1"	25.400	1"	5"	2-1/2"	.120"	-
NEW	50165	-	1.000	1"	25.400	1"	5"	2-1/2"	.156"	-
NEW	50166	-	1.000	1"	25.400	1"	5"	2-1/2"	.190"	-
NEW	50167	-	1.000	1"	25.400	1"	5"	2-1/2"	.250"	-
NEW	50168	-	1.000	1"	25.400	1"	5"	2-1/2"	.3125"	-
NEW	50707	-	1.000	1"	25.400	1"	5"	2-1/2"	BALL	-

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MATERIAL HARDNESS (Rc)

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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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d_1	+0.000" - .002" (+.000mm -.050mm)
d_2	h6
r	+.001" -.001" (+.025 -.025mm)

.2362" - .3125"
(6.000mm - 7.938mm)



Variable Helix End Mill - AlCrN Coated

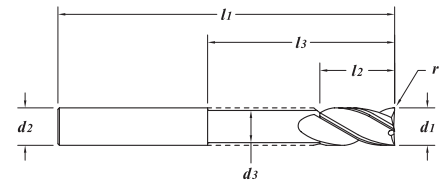
Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

Fresa de Hélice Variable - Recubrimiento de AlCrN

Fraise Avec un Angle Hélice Variable - Revêtement AlCrN

Fresa ad Elica Variabile - Rivestimento in AlCrN

不等螺旋铣刀 - 涂层铝氮化铬



Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Recommended for titanium, Inconel, and stainless steel (< 40Hrc)
Minimizes burr on part
Helix geometry varies over length of flutes
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life
12mm and larger tools offered with weldon flat
Smaller diameters can be modified with a flat within 48 hours
The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan, Inconel, und Rostfreie Stahl (<40HRC)
PCT (Polish Carbide Treatment) steigert die Werkzeugstandzeit
Reduziert die Gratbildung am Werkstück
Spiralgeometrie variiert auf der gesamten Schneidendenlänge
Spezielles Spannut-Design um Vibrationen zu reduzieren
Variable Spannutgeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen
Variabler Winkel für bessere Spangeometrie
12 mm oder größere Durchmesser auch mit Weldon Schaft erhältlich
Kleinere Durchmesser können innerhalb 48 Stunden mit einer Spannfläche geliefert werden
Die Kombination einer verlängerten Spannutlänge mit einer Weldon-Spannfläche kann die Ursache bei Spannut-Auswaschungen bei einigen Fräsespannluttern sein



Fresa de submicrono sólido carburo de alto rendimiento - corte centrado
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio, Inconel, y Acero Inoxidable (<40 HRC)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta. hasta
Minimiza las rebabas en la pieza
La geometría de la hélice varía a lo largo de la longitud del labio
Labios escalonados para control de vibraciones
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeras
El labio con filo variable que contribuye a la buena formación de la viruta
Htas de Ø12 mm. y mayores disponibles con mango Weldon
Es posible añadir un plano Weldon en diámetros menores en 48 horas
La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que el labio alcance el interior de algunos portaherramientas



Fraises carbure submicron grain - coupe au centre
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane, inconel, et aciers (<40 HRC)
PCT (le traitement pour poli le carbure) améliore la durée de vie de l'outil
Minimise les bavures sur la pièce
La géométrie de l'hélice varie sur la longueur de l'hélice
Une denture variable réduit les vibrations
Un design à denture variable améliore l'évacuation des copeaux lors des opérations de rainurage et d'usinage de poches
Un pas variable améliore la formation des copeaux
Des outils d'un dia. 12 mm ou supérieurs sont disponibles avec une queue weldon
Les petits diamètres peuvent être modifiés avec une queue Weldon en 48 heures
La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin



Fresa sub-micrograno metallo duro - taglio al centro
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio, Inconel, e Acciai (<40 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Non crea bava su pezzo
La geometria dell'elica varia sulla lunghezza del tagliente
Taglienti sfalsati per controllare le forze
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave
L'angolo di spoglia variabile aiuta la formazione del truciolo
Dal diametro 12 mm in su disponibili con attacco weldon
Diametri più piccoli possono essere modificati in 48 ore
Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni



超细晶粒整体硬质合金立铣刀 - 中心切削
有效的螺旋铣削
推荐的加工材料：钛合金，不锈钢(<40HRC)
PCT (硬质合金抛光处理) 使刀具寿命提高
使工件的毛刺最少
整个切削刃的螺旋角可变
交错式的刀刃能抑制噪音
切削刃螺旋角可变的设计有利于碎屑在加工槽和型腔中排出
可变的前角有利于碎屑的形成
12mm及以上刀具提供侧刃槽位设计
可在48小时内生产小直径的平底刀具
过长的刀刃结合侧刃槽的刀具可能会导致刀具夹头受到冲击而损坏

EDP#		d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
		(plain)	(weldon)	Decimal	Metric				
50000	-	.2362		6.000	6.0	50	13	-	-
50001	-	.2362		6.000	6.0	50	13	0.5	-
50002	-	.2362		6.000	6.0	65	19	-	-
50003	-	.2362		6.000	6.0	65	19	0.5	-
50004	-	.2362		6.000	6.0	65	13	-	20
50005	-	.2362		6.000	6.0	65	13	0.5	20
50006	-	.2362		6.000	6.0	65	13	1.0	20
50007	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-
51000	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-
50008	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-
51001	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-
50009	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-
51002	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-
51003	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-
51004	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-
50011	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
51005	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-
50012	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-
50013	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-
50014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-
50015	-	.2500	1/4"	6.350	1/4"	3"	1"	-	-
51006	-	.2500	1/4"	6.350	1/4"	3"	1"	.010"	-
51007	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-
50016	-	.2500	1/4"	6.350	1/4"	3"	1"	.030"	-
50113	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-
50017	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	1-1/4"
51008	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	2-1/8"
50023	-	.2756		7.000	8.0	65	22	0.2	-
50018	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-
50019	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-
50021	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-
50022	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-

EDP#		$d1^{\dagger}$		$d2$	$l1$	$l2$	r	$l3$	$d3$	
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
50024	-	.3150		8.000	8.0	65	22	0.2	-	-
50025	-	.3150		8.000	8.0	65	22	0.5	-	-
50026	-	.3150		8.000	8.0	75	19	-	26	7.2
50027	-	.3150		8.000	8.0	75	19	0.5	26	7.2
50028	-	.3150		8.000	8.0	75	19	1.0	26	7.2
50029	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-
50031	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-
50032	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
50033	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-
50034	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
50035	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-
50036	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
50037	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
50038	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-
51009	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
50114	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
51010	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-
50039	-	.3750	3/8"	9.525	3/8"	4"	2"	-	-	-
50041	-	.3750	3/8"	9.525	3/8"	4"	2"	.030"	-	-
51011	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"	.355"
50042	-	.3750	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"
51012	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	2-1/8"	.355"
51013	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"	.355"
51014	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	4-1/8"	.355"
50043	-	.3937		10.000	10.0	70	22	-	-	-
51015	-	.3937		10.000	10.0	70	22	0.30	-	-
50044	-	.3937		10.000	10.0	70	22	0.50	-	-
51016	-	.3937		10.000	10.0	70	22	0.75	-	-
51017	-	.3937		10.000	10.0	70	22	1.00	-	-
50045	-	.3937		10.000	10.0	75	22	-	32	9.0
50046	-	.3937		10.000	10.0	75	22	0.50	32	9.0
NEW	51018	-	.3937	10.000	10.0	75	22	0.75	32	9.0
	50047	-	.3937	10.000	10.0	75	22	1.00	32	9.0
	51019	-	.4724	12.000	12.0	65	19	-	-	-
	51020	-	.4724	12.000	12.0	65	19	0.50	-	-
	50484	50485	.4724	12.000	12.0	75	26	-	-	-
	51021	-	.4724	12.000	12.0	75	26	0.30	-	-
	50486	50487	.4724	12.000	12.0	75	26	0.50	-	-
	51022	-	.4724	12.000	12.0	75	26	0.75	-	-
	51023	-	.4724	12.000	12.0	75	26	1.00	-	-
	50112	-	.4724	12.000	12.0	75	26	2.00	-	-
50115	-	.4724	12.000	12.0	75	26	2.50	-	-	
50048	50299	.4724	12.000	12.0	75	32	-	-	-	
51024	-	.4724	12.000	12.0	75	32	0.30	-	-	
50049	50300	.4724	12.000	12.0	75	32	0.50	-	-	
51025	-	.4724	12.000	12.0	75	32	0.75	-	-	
51026	-	.4724	12.000	12.0	75	32	1.00	-	-	
51027	-	.4724	12.000	12.0	100	38	-	-	-	
51028	-	.4724	12.000	12.0	100	38	0.50	-	-	
50423	-	.4724	12.000	12.0	100	42	-	-	-	
50425	-	.4724	12.000	12.0	100	42	0.30	-	-	
50427	-	.4724	12.000	12.0	100	42	0.50	-	-	
50429	-	.4724	12.000	12.0	100	42	1.00	-	-	
50431	-	.4724	12.000	12.0	100	42	2.00	-	-	
51029	-	.4724	12.000	12.0	100	52	-	-	-	
51030	-	.4724	12.000	12.0	100	52	0.50	-	-	
50051	50301	.4724	12.000	12.0	100	26	-	38	10.8	
50052	50302	.4724	12.000	12.0	100	26	0.50	38	10.8	
50053	50303	.4724	12.000	12.0	100	26	1.00	38	10.8	

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MATERIAL HARDNESS (Rc)

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continued →

Series V5 (continued)

.5000"
(12.700mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
50054	50304	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
50106	50305	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
50055	50306	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
50107	50307	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
50056	50308	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
50108	50309	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-
50057	50310	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-
50109	50311	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
50058	50312	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
50111	50313	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
50059	50314	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
50061	50315	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
50062	50316	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
50063	50317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.045"	-	-
50064	50318	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
50065	50319	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
50433	50435	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-
51031	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-
51032	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
50436	50437	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
50438	50439	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-
50440	50441	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-
50442	50443	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
50444	50445	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-
50446	50447	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
50067	50321	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
51033	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
50068	50322	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
51034	-	.5000	1/2"	12.700	1/2"	6"	1"	.030"	-	-
51035	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-	-
51036	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	.030"	-	-
51037	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"
51038	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.475"
50066	50320	.5000	1/2"	12.700	1/2"	4"	1-1/4"	.030"	2-1/4"	.475"
51039	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.475"
51040	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.475"

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MATERIAL HARDNESS (Rc)

EDP#		$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
50069	50323	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
51041	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
50071	50324	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
50072	50325	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
50401	50402	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
51042	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
51043	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
51044	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-	-
51045	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	.030"	-	-
51046	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-
50403	50404	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.030"	-	-
51047	-	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.060"	-	-
51048	-	.6250	5/8"	15.875	5/8"	6"	3-1/2"	.030"	-	-
51049	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.590"
50073	50326	.6250	5/8"	15.875	5/8"	4"	1-1/4"	.030"	2-1/4"	.590"
51050	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"
51051	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	3-3/8"	.590"
51052	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"
51053	-	.6299		16.000	16.0	75	19	-	-	-
51054	-	.6299		16.000	16.0	75	19	0.50	-	-
50074	50327	.6299		16.000	16.0	88	32	-	-	-
50075	50328	.6299		16.000	16.0	88	32	0.50	-	-
50420	-	.6299		16.000	16.0	88	32	1.00	-	-
51055	-	.6299		16.000	16.0	88	32	2.00	-	-
50422	-	.6299		16.000	16.0	88	32	3.00	-	-
50424	-	.6299		16.000	16.0	88	32	4.00	-	-
50430	-	.6299		16.000	16.0	100	40	0.50	-	-
50432	-	.6299		16.000	16.0	100	40	1.00	-	-
50434	-	.6299		16.000	16.0	100	40	3.00	-	-
50076	50329	.6299		16.000	16.0	100	32	-	50	14.4
50077	-	.6299		16.000	16.0	100	32	0.50	50	14.4
50426	-	.6299		16.000	16.0	100	32	1.00	50	14.4
51056	-	.6299		16.000	16.0	100	32	2.00	50	14.4
50428	-	.6299		16.000	16.0	100	32	3.00	50	14.4
50078	-	.7087		18.000	18.0	100	32	0.75	-	-

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MATERIAL HARDNESS (Rc)

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continued →

Series V5 (continued)

.7500"
(19.050mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1^{\dagger}$			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
50079	50332	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
51103	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.015"	-	-
50081	50333	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
51057	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
51105	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.120"	-	-
51107	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.015"	-	-
51058	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-
51109	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.060"	-	-
50082	50334	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
51111	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
50083	50335	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
50084	50336	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
51059	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.078"	-	-
50085	50337	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
51113	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-
51060	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-
51115	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
51061	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
51119	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
51062	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
51121	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
51063	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
51123	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
50086	50338	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	-
51125	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.015"	-	-
50087	50339	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
51064	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-
51065	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-
51127	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.015"	-	-
51066	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
51129	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-
51131	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-
51067	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
51133	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
51135	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-
51068	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-
51137	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.060"	-	-
50089	50341	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
51139	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.015"	-	-
50091	50342	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
51141	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-
51143	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-
51145	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-
51147	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.060"	-	-
51069	-	.7500	3/4"	19.050	3/4"	4"	1"	.030"	2"	.705"
51070	-	.7500	3/4"	19.050	3/4"	5"	1"	.030"	2-1/2"	.705"
50088	50340	.7500	3/4"	19.050	3/4"	5-1/2"	1-1/2"	.030"	3-1/4"	.705"
51071	-	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.705"

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MATERIAL HARDNESS (Rc)

EDP#		$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
(plain)	(weldon)	Decimal	Metric						
50092	50343	.7874	20.000	20.0	100	38	-	-	-
51072	-	.7874	20.000	20.0	100	38	0.50	-	-
50093	50344	.7874	20.000	20.0	100	38	0.75	-	-
51073	-	.7874	20.000	20.0	100	38	1.00	-	-
51074	-	.7874	20.000	20.0	100	38	1.50	-	-
51075	-	.7874	20.000	20.0	100	38	2.00	-	-
51076	-	.7874	20.000	20.0	100	38	3.00	-	-
51077	-	.9843	25.000	25.0	100	38	-	-	-
51078	-	.9843	25.000	25.0	100	38	0.50	-	-
NEW 51079	-	.9843	25.000	25.0	100	38	0.75	-	-
51080	-	.9843	25.000	25.0	100	38	1.50	-	-
51081	-	.9843	25.000	25.0	100	38	3.00	-	-
50094	-	1.000	1"	25.400	1"	4"	1-1/4"	-	-
50095	-	1.000	1"	25.400	1"	4"	1-1/4"	.030"	-
NEW 51082	-	1.000	1"	25.400	1"	4"	1-1/4"	.120"	-
-	50348	1.000	1"	25.400	1"	4"	1-1/2"	-	-
-	50349	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-
-	50350	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-
51083	-	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-
NEW 50116	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-
50097	-	1.000	1"	25.400	1"	4"	1-3/4"	-	-
50098	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-
50099	-	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-
51084	-	1.000	1"	25.400	1"	4"	1-3/4"	.120"	-
51085	-	1.000	1"	25.400	1"	4-1/2"	2"	.030"	-
51086	-	1.000	1"	25.400	1"	4-1/2"	2"	.060"	-
51087	-	1.000	1"	25.400	1"	4-1/2"	2"	.120"	-
51088	-	1.000	1"	25.400	1"	4-1/2"	2"	.250"	-
51089	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-
51090	-	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-
50104	50354	1.000	1"	25.400	1"	6"	3-1/4"	-	-
50105	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-
51091	-	1.000	1"	25.400	1"	6"	3-3/8"	.060"	-
51092	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-
51093	-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-
51094	-	1.000	1"	25.400	1"	5"	1-1/4"	.030"	2-5/8"
50101	-	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.030"	3-1/4"
50102	50352	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.060"	3-1/4"
51095	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"
51096	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"

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MATERIAL HARDNESS (Rc)

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d_1	+0.00" - .002" (+.000mm -.050mm)
d_2	h6
r	+0.01" - .001" (+.025 -.025mm)

.4724" - .6299"
(12.000mm - 16.000mm)



TECH
PAGES
300-301

Variable Helix End Mill - AlCrN Coated

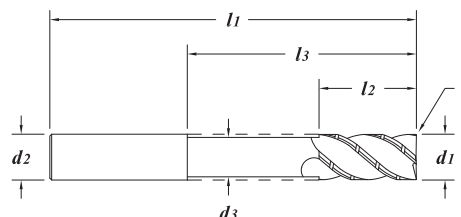
Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

Fresa de Hélice Variable - Recubrimiento de AlCrN

Fraise Avec un Angle Hélice Variable - Revêtement AlCrN

Fresa ad Elica Variabile - Rivestimento in AlCrN

不等螺旋铣刀 - 涂层铝氮化铬



Solid submicron grain carbide end mill - center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Recommended for titanium, inconel, and stainless steel (<40Rc)
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
PCT (Polish Carbide Treatment) enhances tool life



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Zu helfen, lange chips zu brechen
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan, Inconel, und Rostfreie Stahl (<40HRC)
PCT (Polish Carbide Treatment) steigert die Werkzeugstandzeit
Spezielles Spannut-Design um Vibrationen zu reduzieren
Variable Spannutegeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Chip splitter para ayudar a romper chips largas
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio, Inconel, y Acero Inoxidable (<40 Rc)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta.
Labios escalonados para control de vibraciones
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeras



Fraises carbure submicrograin - coupe au centre
Pour aider à briser de longues puce
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane, inconel, et aciers (<40 HRC)
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Une denture variable réduit les vibrations
Un design à denture variable améliore l'évacuation des copeaux lors des opérations de rainurage et d'usinage de poches



Fresa sub-micrograno metallo duro - taglio al centro
Per aiutare a rompere le lunghe chips
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio, Inconel, e Acciai (<40 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Taglienti sfalsati per controllare le forze
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave



超细晶粒整体硬质合金立铣刀 - 中心切削
芯片分路器有助于打破长芯片
有效的螺旋铣削
推荐的加工钛、镍基合金、不锈钢 (<40HRC)
PCT (硬质合金抛光处理) 使刀具寿命提高
交错式的刀刃能抑制噪音
切削刃螺旋角可变的设计有利于碎屑在加工槽和型腔中排出

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
50801	.4724	12.000	12.0	100	42	0.30	-	-
50800	.4724	12.000	12.0	100	42	1.00	-	-
50803	.5000	12.700	1/2"	3"	1"	-	-	-
50807	.5000	12.700	1/2"	3"	1"	.015"	-	-
50805	.5000	12.700	1/2"	3"	1"	.020"	-	-
50809	.5000	12.700	1/2"	3"	1"	.030"	-	-
50811	.5000	12.700	1/2"	3"	1-1/4"	.015"	-	-
50810	.5000	12.700	1/2"	3"	1-1/4"	.020"	-	-
50815	.5000	12.700	1/2"	3"	1-1/4"	.030"	-	-
50813	.5000	12.700	1/2"	3"	1-1/4"	.060"	-	-
50820	.5000	12.700	1/2"	3"	1-1/4"	.090"	-	-
50825	.5000	12.700	1/2"	4"	1-1/2"	.010"	-	-
50817	.5000	12.700	1/2"	4"	1-1/2"	.030"	-	-
50830	.5000	12.700	1/2"	4"	1-5/8"	-	-	-
50819	.5000	12.700	1/2"	4"	1-5/8"	.030"	-	-
50835	.5000	12.700	1/2"	4"	2-1/8"	-	-	-
50836	.5000	12.700	1/2"	4"	2-1/8"	.030"	-	-
50821	.5000	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"
50823	.6250	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
50840	.6250	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
50827	.6250	15.875	5/8"	4"	1-5/8"	-	-	-
50829	.6250	15.875	5/8"	4"	1-5/8"	.030"	-	-
50845	.6250	15.875	5/8"	4"	2-1/8"	.030"	-	-
50831	.6250	15.875	5/8"	6"	2-1/2"	.030"	-	-
50833	.6299	16.000	16.0	100	40	0.50	-	-
50837	.6299	16.000	16.0	100	40	1.00	-	-

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Diameter	Metric						
50839	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
50841	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
50843	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
50847	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
50850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
50849	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
50851	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
50855	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
50853	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
50857	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
50859	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-
50861	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-
50863	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
50860	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
50867	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-
NEW 50869	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
NEW 50871	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-	-
50873	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-



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MATERIAL HARDNESS (Rc)

0

.3150" - .5000"
(8.000mm - 12.700mm)

TOLERANCES

d_1	+0.000" - .002" (+.000mm - .050mm)
d_2	h6
r	+0.001" - .001" (+.025 - .025mm)

Square End, Corner Radius - AlCrN-based Coated

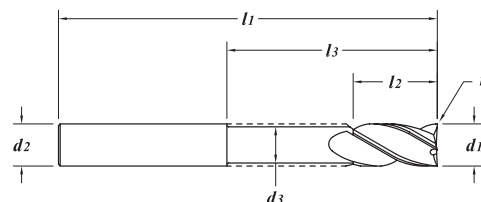
Ohne Eckenradius, Eckenradius - AlCrN-Basierende Beschichtet

Extremo Sin Radio, Ángulo Redondeado - Recubrimiento Basado en AlCrN

Extrémité Carré, Rayon de Coin - Revêtement à base de AlCrN

Piatte, Torico - Rivestimento in Base AlCrN

平头, 圆角半径 - 涂层铝氮化铬



Solid submicron grain carbide end mill - non-center cutting
Engineered for High Efficiency Milling
 Multiple flutes for increased feed rates
 Staggered flute geometry
 PCT (Polish Carbide Treatment) enhances tool life
 Up to 15% (ae) Radial engagement



Hochleistungs-Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt
Entwickelt für hocheffizientes Fräsen
 Mehr Zähne für höhere Vorschube
 Spezielles Spannut-Design
 PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Standzeit
 Bis zu 15% radialen (ae) eintauchen



Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado
Diseñado para el fresado de alta eficiencia
 Múltiples labios para aumentar las gamas de avance
 Labios escalonados
 PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida
 Hasta 15% radial (ae)



Fraises carbure submicrograin - pas de coupe au centre
Conçu pour un fraisage à haute efficacité
 Fraise multi-lèvres pour de plus grandes avances
 Une denture variable réduit les vibrations
 PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
 Jusqu'à 15% amorçage radial (ae)



Fresa sub-micrograno metallo duro - no taglio al centro
Progettato per la fresatura ad alta efficienza
 Taglienti multipli per alti avanzamenti
 Taglienti sfalsati per controllare le forze
 PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
 Fino a 15% radiale (ae)



高效超细晶粒整体硬质合金立铣刀 - 不切削在中心
有效的螺旋 铣削
 多刃提高进给率
 整个切削刃的螺旋角可变
 PCT (硬质合金抛光处理) 使刀具寿命提高
 设计并已加工0.15倍径切削宽度

EDP#	$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$	
	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter	
NEW	64100	.3150	8.000	8.0	65	22	-	-	-	
	64102	.3150	8.000	8.0	65	22	0.50	-	-	
	64104	.3150	8.000	8.0	65	22	1.00	-	-	
	64105	.3150	8.000	8.0	75	27	1.60	-	-	
	64106	.3150	8.000	8.0	75	32	-	-	-	
	64108	.3150	8.000	8.0	75	32	0.50	-	-	
	64110	.3150	8.000	8.0	75	32	1.00	-	-	
NEW	64112	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	
	64114	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	
	64116	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	
	64117	.3750	3/8"	9.525	3/8"	3"	1"	.025"	-	
	64118	.3750	3/8"	9.525	3/8"	3"	1-1/2"	-	-	
	64120	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.020"	-	
	64122	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.030"	-	
NEW	64123	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.060"	-	
NEW	64246	.3750	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"
NEW	64124	.3937	10.000	10.0	70	25	-	-	-	
	64126	.3937	10.000	10.0	70	25	0.50	-	-	
	64128	.3937	10.000	10.0	70	25	1.00	-	-	
	64130	.4724	12.000	12.0	75	26	-	-	-	
	64132	.4724	12.000	12.0	75	26	0.50	-	-	
	64134	.4724	12.000	12.0	75	26	1.00	-	-	
	64136	.4724	12.000	12.0	75	32	-	-	-	
	64138	.4724	12.000	12.0	75	32	0.50	-	-	
	64140	.4724	12.000	12.0	75	32	1.00	-	-	
	64141	.4724	12.000	12.0	100	42	1.00	-	-	
NEW	64142	.4724	12.000	12.0	100	50	-	-	-	
	64144	.4724	12.000	12.0	100	50	0.50	-	-	
	64146	.4724	12.000	12.0	100	50	1.00	-	-	
	64218	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	
	64220	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	
	64222	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	
	64223	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	
	64224	.5000	1/2"	12.700	1/2"	3"	1"	-	-	
NEW	64226	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	
	64228	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal		Metric						
64148	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
64150	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
64152	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
64154	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
64156	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
NEW 64157	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
64158	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-	-
64160	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"	-	-
NEW 64161	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/8"	.475"
NEW 64242	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
NEW 64244	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
64162	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
NEW 64163	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-
64164	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
NEW 64165	.5000	1/2"	12.700	1/2"	4"	2"	.125"	-	-
NEW 64248	.5512		14.000	14.0	88	32	0.50	-	-
64166	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
64168	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
64170	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
NEW 64171	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
64172	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
64174	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-
64176	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-
NEW 64177	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.120"	-	-
NEW 64250	.6250	5/8"	15.875	5/8"	4"	2"	.120"	-	-
64178	.6299		16.000	16.0	88	32	-	-	-
64180	.6299		16.000	16.0	88	32	0.50	-	-
64182	.6299		16.000	16.0	88	32	1.00	-	-
64230	.6299		16.000	16.0	88	32	2.00	-	-
NEW 64231	.6299		16.000	16.0	100	40	1.00	-	-
64232	.6299		16.000	16.0	100	40	1.50	-	-
64234	.6299		16.000	16.0	125	65	0.50	-	-
64236	.6299		16.000	16.0	125	65	3.00	-	-
NEW 64252	.7500	3/4"	19.050	3/4"	3"	1"	-	-	-
NEW 64254	.7500	3/4"	19.050	3/4"	3"	1"	.030"	-	-
64184	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
64186	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
64188	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
64190	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
NEW 64256	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
NEW 64258	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
NEW 64260	.7500	3/4"	19.050	3/4"	5"	1"	.030"	3"	.730"
64192	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-	-
64194	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
64238	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-
NEW 64262	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.120"	-	-
NEW 64264	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
NEW 64266	.7500	3/4"	19.050	3/4"	6"	1-1/8"	.120"	3-5/8"	.730"
64196	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
64198	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-

70

35

MATERIAL HARDNESS (Rc)

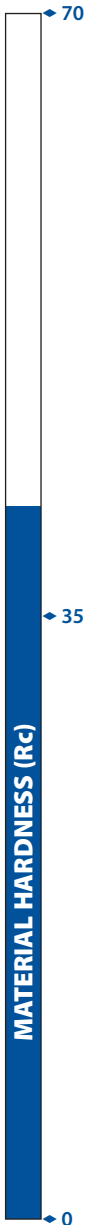
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continued →

Series VX-7 (continued)

.7874" - 1.0000"
(20.000mm - 25.400mm)

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
	Decimal	Metric						
64200	.7874	20.000	20.0	100	38	-	-	-
64202	.7874	20.000	20.0	100	38	0.50	-	-
64204	.7874	20.000	20.0	100	38	1.00	-	-
64206	1.000	1"	25.400	1"	4"	1-1/2"	-	-
64208	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-
64240	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-
64210	1.000	1"	25.400	1"	5"	2"	-	-
64212	1.000	1"	25.400	1"	5"	2-1/2"	-	-
NEW 64213	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-
64214	1.000	1"	25.400	1"	6"	3-1/4"	-	-
64216	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-



TOLERANCES

d_1	$+0.000" - .002" (+.000mm - .050mm)$
d_2	$h6$
r	$+0.001" - .001" (+.025 - .025mm)$

HIGH EFFICIENCY MILLING

Series VX-7C - Chip Splitter

TECH
PAGES
304-305

Square End, Corner Radius - AlCrN-based Coated

Ohne Eckenradius, Eckenradius - AlCrN-Basierende Beschichtet

Extremo Sin Radio, Ángulo Redondeado - Recubrimiento Basado en AlCrN

Extrémité Carré, Rayon de Coin - Revêtement à base de AlCrN

Piatte, Torico - Rivestimento in Base AlCrN

平头, 圆角半径 - 涂层铝氮化铬



Solid submicron grain carbide end mill - non-center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Multiple flutes for increased feed rates
Staggered flute geometry
PCT (Polish Carbide Treatment) enhances tool life
Up to 15% (ae) Radial engagement



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumschnitt
Spänespalter zum Brechen langer Späne
Entwickelt für hocheffizientes Fräsen
Mehr Zähne für höhere Vorschube
Spezielles Spannut-Design
PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Standzeit
Bis zu 15% radialen (ae) eintauchen



Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado
Divisor de virutas para ayudar a romper virutas largas
Diseñado para el fresado de alta eficiencia
Múltiples labios para aumentar las gamas de avance
Labios escalonados
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida
Hasta 15% radial (ae)



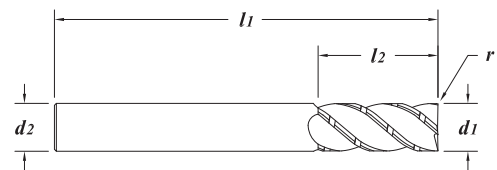
Fraises carbure submicrograin - pas de coupe au centre
Séparateur de copeaux pour aider à briser les copeaux longs
Conçu pour un fraisage à haute efficacité
Fraise multi-lèbres pour de plus grandes avances
Une denture variable réduit les vibrations
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Jusqu'à 15% amorce radiale (ae)



Fresa sub-micrograno metallo duro - no taglio al centro
Spaccatrucioli per aiutare a rompere i trucioli lunghi
Progettato per la fresatura ad alta efficienza
Taglienti multipli per alti avanzamenti
Taglienti sfalsati per controllare le forze
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Fino a 15% radiale (ae)



高效超细晶粒整体硬质合金立铣刀 - 不切削在中心
切屑分离器有助于分解长切屑
专为高效铣削而设计
多刃提高进给率
整个切削刃的螺旋角可变
PCT (硬质合金抛光处理) 使刀具寿命提高
设计并已试加工0.15倍径切削宽度



EDP#	d_1 †			d_2	l_1	l_2	r
	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius
64300	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-
64302	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"
64304	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"
64310	.4724		12.000	12.0	100	50	0.50
64316	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
64318	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
64322	.5000	1/2"	12.700	1/2"	3"	1"	.030"
64330	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"
64332	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"
64338	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-
64342	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"
64346	.5000	1/2"	12.700	1/2"	4"	2"	-
64348	.5000	1/2"	12.700	1/2"	4"	2"	.030"
64352	.5000	1/2"	12.700	1/2"	4"	2"	.125"
64360	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-
64364	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"
64368	.6299		16.000	16.0	100	40	0.75
64369	.6299		16.000	16.0	100	40	1.00
64372	.6299		16.000	16.0	100	50	1.00
64380	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
64386	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"
NEW 64389	.7874		20.000	20.0	100	38	0.50
64400	1.000	1"	25.400	1"	5"	2-1/2"	.030"

HIGH PERFORMANCE
END MILLS

MATERIAL HARDNESS (Rc)

.0591" - .1181"
(1.500mm - 3.000mm)TECH
PAGES
296-297

TOLERANCES

d_1	+0.000" - .002" (+.000mm - .050mm)
d_2	h6
r	+0.001" - .001" (+.025 - .025mm)

Square End, Corner Radius, Ball End - AlTiN Coated

Ohne Eckenradius, Eckenradius, Vollradius - AlTiN-Beschichtet

Extremo Sin Radio, Ángulo Redondeado, Cabeza Esférica - Recubrimiento de AlTiN

Extrémité Carré, Rayon de Coin, Hemispherique - Revêtement AlTiN

Piatte, Torico, Sferica - Rivestimento in AlTiN

平头, 圆角半径, 球头 - AlTiN 涂层

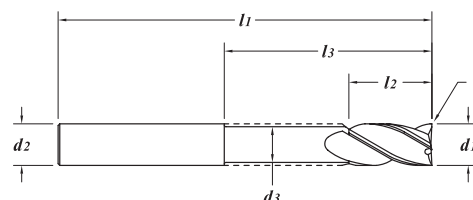


Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Entwickelt für hocheffizientes Fräsen
Reduziert Vibrationen für eine aggressivere Bearbeitung, um Bearbeitungszeit zu reduzieren und eine grössere Produktivität zu erzielen

Empfohlen für Rostfreien Stahl, Inconel, Pulvermetalle, Titan, und Werkzeugstähle

Variable Spannuten-Geometrie

Die Kombination einer verlängerten Spannutenlänge mit einer Weldon-Spannfläche kann die Ursache bei Spannuten-Auswaschungen bei einigen Frässpantennuttern sein



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Diseñado para el fresado de alta eficiencia
Reduce las vibraciones hasta en los más agresivos mecanizados, obteniéndose bajos tiempos de ciclo y mayor productividad

Recomendado para acero inoxidable, inconel, materiales pH, acero laminado en frío, hierro de fundición y aceros herramienta

Geometría variable de ranura de viruta

La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que el labio alcance el interior de algunos portaherramientas



Fraises carbure submicrograin - coupe au centre
Conçu pour un fraisage à haute efficacité
Reduction des vibrations pour un fraisage plus agressif résultant des temps de cycles plus court et une meilleure productivité

Recommandée pour les aciers inoxydables, Inconel, inox pH, aciers a outils, aciers forges, titane, fontes et aciers a outils

Géométrie variable de la hélice

La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin



Fresa sub-micrograno metallo duro - taglio al centro
Progettato per la fresatura ad alta efficienza
Riduzioni delle vibrazioni per lavorazioni aggressive per ridurre il tempo ciclo ed aumentare la produttività

Raccomandata per lavorazioni su inox, inconel, titanio e acciai per utensili

Geometria ad elica variabile

Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni



超细晶粒整体硬质合金立铣刀 - 中心切削
高性能铣削的标准
适合更高速, 更大进给的加工, 可以减少振动, 减少加工时间, 提高生产效率

推荐加工不锈钢、铬镍铁耐热耐腐蚀合金、含磷材质、钛钢 和 工具钢

不等分刃设计

过长的刃刃结合侧固槽的刀具可能会导致刀具夹头受到冲击而损坏

EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3	
(plain)	(weldon)	Decimal		Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
61084	-	.0591		1.500	3.0	38	3.0	-	-	-
61086	-	.0591		1.500	3.0	38	3.0	0.20	-	-
61088	-	.0591		1.500	3.0	38	3.0	BALL	-	-
61090	-	.0591		1.500	3.0	38	6.0	-	-	-
61092	-	.0591		1.500	3.0	38	6.0	0.20	-	-
61094	-	.0591		1.500	3.0	38	6.0	BALL	-	-
61096	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	-	-	-
61098	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"	-	-
61100	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	BALL	-	-
61102	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	-	-	-
61104	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	-	-
61106	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	BALL	-	-
61108	-	.0787		2.000	3.0	38	4.0	-	-	-
61110	-	.0787		2.000	3.0	38	4.0	0.20	-	-
61112	-	.0787		2.000	3.0	38	4.0	BALL	-	-
61114	-	.0787		2.000	3.0	38	8.0	-	-	-
61116	-	.0787		2.000	3.0	38	8.0	0.20	-	-
61118	-	.0787		2.000	3.0	38	8.0	BALL	-	-
61120	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	-	-	-
61122	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"	-	-
61124	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	BALL	-	-
61126	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	-	-	-
61128	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	-	-
61130	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	BALL	-	-
61877	-	.1181		3.000	3.0	38	8	-	-	-
27420	-	.1181		3.000	3.0	50	8	0.20	-	-
61132	-	.1181		3.000	3.0	50	8	0.30	-	-
27425	-	.1181		3.000	3.0	50	8	0.50	-	-
61134	-	.1181		3.000	3.0	50	8	BALL	-	-
61887	-	.1181		3.000	3.0	38	12	-	-	-
27430	-	.1181		3.000	3.0	50	12	0.20	-	-
61136	-	.1181		3.000	3.0	50	12	0.30	-	-
27435	-	.1181		3.000	3.0	50	12	0.50	-	-
61138	-	.1181		3.000	3.0	50	12	BALL	-	-

EDP#		$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
(plain)	(weldon)	Decimal		Metric						
61917	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-	-
27440	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-
61140	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"	-	-
61073	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"	-	-
61142	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	BALL	-	-
61144	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	-	-	-
61146	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.010"	-	-
61148	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.015"	-	-
61074	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.030"	-	-
61149	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	BALL	-	-
61927	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-	-
27450	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-
61150	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	-	-
27455	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-
61075	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	-	-
61152	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	BALL	-	-
61154	-	.1562	5/32"	3.967	3/16"	2"	5/16"	-	-	-
27460	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.010"	-	-
61156	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"	-	-
61076	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.030"	-	-
61077	-	.1562	5/32"	3.967	3/16"	2"	5/16"	BALL	-	-
61158	-	.1562	5/32"	3.967	3/16"	2"	1/2"	-	-	-
27470	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.010"	-	-
61160	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.015"	-	-
61078	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.030"	-	-
61079	-	.1562	5/32"	3.967	3/16"	2"	1/2"	BALL	-	-
61162	-	.1575		4.000	6.0	50	8	-	-	-
27480	-	.1575		4.000	6.0	50	8	0.30	-	-
61164	-	.1575		4.000	6.0	50	8	0.50	-	-
28470	-	.1575		4.000	6.0	50	8	BALL	-	-
61977	-	.1575		4.000	6.0	50	12	-	-	-
27490	-	.1575		4.000	6.0	50	12	0.30	-	-
27495	-	.1575		4.000	6.0	50	12	0.50	-	-
28480	-	.1575		4.000	6.0	50	12	BALL	-	-
61166	-	.1575		4.000	6.0	65	19	-	-	-
61168	-	.1575		4.000	6.0	65	19	0.30	-	-
62007	-	.1875	3/16"	4.763	3/16"	2"	5/16"	-	-	-
27500	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-
61170	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-
61172	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-	-
28490	-	.1875	3/16"	4.763	3/16"	2"	5/16"	BALL	-	-
61174	-	.1875	3/16"	4.763	3/16"	2"	7/16"	-	-	-
61176	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.010"	-	-
61178	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.015"	-	-
62017	-	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	-
27520	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-
61180	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-
27521	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-
61182	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	-
28500	-	.1875	3/16"	4.763	3/16"	2"	9/16"	BALL	-	-
61184	-	.1875	3/16"	4.763	3/16"	3"	1"	.010"	-	-
61186	-	.1875	3/16"	4.763	3/16"	3"	1-1/4"	.010"	-	-
63100	-	.1875	3/16"	4.763	3/16"	4"	5/16"	.010"	-	-
61188	-	.1969		5.000	6.0	50	10	-	-	-
27522	-	.1969		5.000	6.0	50	10	0.30	-	-
61190	-	.1969		5.000	6.0	50	10	0.50	-	-
28510	-	.1969		5.000	6.0	50	10	BALL	-	-

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MATERIAL HARDNESS (Rc)

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continued →

Series VRX (continued)

.1969" - .2500"
(5.000mm - 6.350mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter
(plain)	(weldon)	Decimal	Metric						
62057	-	.1969	5.000	6.0	65	15	-	-	-
27524	-	.1969	5.000	6.0	65	15	0.30	-	-
27526	-	.1969	5.000	6.0	65	15	0.50	-	-
27528	-	.1969	5.000	6.0	65	15	1.00	-	-
28520	-	.1969	5.000	6.0	65	15	BALL	-	-
63110	-	.1969	5.000	6.0	100	10	0.30	-	-
61192	-	.1969	5.000	6.0	100	10	0.30	55	4.70
61194	-	.2188	7/32"	1/4"	2"	3/8"	-	-	-
61196	-	.2188	7/32"	1/4"	2"	3/8"	.010"	-	-
27525	-	.2188	7/32"	1/4"	2"	3/8"	.015"	-	-
61198	-	.2188	7/32"	1/4"	2"	3/8"	BALL	-	-
61200	-	.2188	7/32"	1/4"	2-1/2"	3/4"	-	-	-
61202	-	.2188	7/32"	1/4"	2-1/2"	3/4"	.010"	-	-
27530	-	.2188	7/32"	1/4"	2-1/2"	3/4"	.015"	-	-
61204	-	.2188	7/32"	1/4"	2-1/2"	3/4"	.020"	-	-
61206	-	.2188	7/32"	1/4"	2-1/2"	3/4"	BALL	-	-
61208	-	.2188	7/32"	1/4"	3"	1-1/4"	.015"	-	-
63120	-	.2188	7/32"	1/4"	4"	3/8"	.015"	-	-
61210	-	.2188	7/32"	1/4"	4"	3/8"	.015"	2-1/4"	.205"
62077	-	.2362	6.000	6.0	50	12	-	-	-
27535	-	.2362	6.000	6.0	50	12	0.30	-	-
61212	-	.2362	6.000	6.0	50	12	0.50	-	-
61214	-	.2362	6.000	6.0	50	12	0.75	-	-
28530	-	.2362	6.000	6.0	50	12	BALL	-	-
62087	-	.2362	6.000	6.0	65	19	-	-	-
61216	-	.2362	6.000	6.0	65	19	0.20	-	-
27540	-	.2362	6.000	6.0	65	19	0.30	-	-
27545	-	.2362	6.000	6.0	65	19	0.50	-	-
61218	-	.2362	6.000	6.0	65	19	0.75	-	-
27547	-	.2362	6.000	6.0	65	19	1.00	-	-
27548	-	.2362	6.000	6.0	65	19	1.50	-	-
28540	-	.2362	6.000	6.0	65	19	BALL	-	-
61220	-	.2362	6.000	6.0	75	26	0.30	-	-
61222	-	.2362	6.000	6.0	75	26	0.50	-	-
61224	-	.2362	6.000	6.0	75	38	0.30	-	-
61226	-	.2362	6.000	6.0	75	38	0.50	-	-
63130	-	.2362	6.000	6.0	100	12	0.30	32	5.70
62137	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-
61228	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-
27560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-
61230	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-
28570	-	.2500	1/4"	6.350	1/4"	2"	3/8"	BALL	-
61232	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-
61234	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-
62147	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
27570	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-
27580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-
61236	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-
27581	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-
61238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.040"	-
27583	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-
28580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-

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MATERIAL HARDNESS (Rc)

EDP#		$d1^{\dagger}$			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
61240	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-
61241	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
61242	-	.2500	1/4"	6.350	1/4"	3"	1-1/2"	.015"	-	-
61244	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	3/4"	.240"
63140	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.240"
61246	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.240"
27585	-	.2756		7.000	8.0	50	12	0.30	-	-
27590	-	.2756		7.000	8.0	65	22	0.30	-	-
61248	-	.2812	9/32"	7.142	5/16"	2"	7/16"	-	-	-
27595	-	.2812	9/32"	7.142	5/16"	2"	7/16"	.015"	-	-
61250	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	-	-	-
61252	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.010"	-	-
27597	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.015"	-	-
61254	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	-
63150	-	.2812	9/32"	7.142	5/16"	4"	7/16"	.015"	-	-
62207	-	.3125	5/16"	7.938	5/16"	2"	7/16"	-	-	-
61256	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.010"	-	-
61258	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.015"	-	-
27600	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-
61260	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"	-	-
28610	-	.3125	5/16"	7.938	5/16"	2"	7/16"	BALL	-	-
62217	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-
27610	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	-	-
61262	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-
27620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-
27622	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-
61264	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.040"	-	-
27624	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	-	-
28620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	BALL	-	-
61266	-	.3125	5/16"	7.938	5/16"	3"	1-1/4"	.015"	-	-
63160	-	.3125	5/16"	7.938	5/16"	4"	7/16"	.020"	1-7/8"	.300"
62257	-	.3150		8.000	8.0	50	12	-	-	-
61268	-	.3150		8.000	8.0	50	12	0.30	-	-
27630	-	.3150		8.000	8.0	50	12	0.50	-	-
61270	-	.3150		8.000	8.0	50	12	0.75	-	-
28630	-	.3150		8.000	8.0	50	12	BALL	-	-
62267	-	.3150		8.000	8.0	65	22	-	-	-
27635	-	.3150		8.000	8.0	65	22	0.30	-	-
27640	-	.3150		8.000	8.0	65	22	0.50	-	-
61272	-	.3150		8.000	8.0	65	22	0.75	-	-
27642	-	.3150		8.000	8.0	65	22	1.00	-	-
27643	-	.3150		8.000	8.0	65	22	1.50	-	-
61274	-	.3150		8.000	8.0	65	22	2.00	-	-
28640	-	.3150		8.000	8.0	65	22	BALL	-	-
61276	-	.3150		8.000	8.0	75	38	0.50	-	-
61278	-	.3150		8.000	8.0	100	50	0.50	-	-
63170	-	.3150		8.000	8.0	100	12	0.50	47	7.60
61280	-	.3438	11/32"	8.733	3/8"	2"	1/2"	-	-	-
27645	-	.3438	11/32"	8.733	3/8"	2"	1/2"	.020"	-	-
61282	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	-	-	-
27650	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.020"	-	-
61284	-	.3438	11/32"	8.733	3/8"	3"	1-1/4"	.015"	-	-

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MATERIAL HARDNESS (Rc)

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continued →

HIGH EFFICIENCY MILLING

TOLERANCES

d_1	$+0.000^{\circ} - .002^{\circ} (+.000\text{mm} - .050\text{mm})$
d_2	$h6$
r	$+0.001^{\circ} - .001^{\circ} (+.025 - .025\text{mm})$

.3438" - .3937"
(8.733mm - 10.000mm)



TECH
PAGES
296-297

Square End, Corner Radius, Ball End - AlTiN Coated

Ohne Eckenradius, Eckenradius, Vollradius - AlTiN-Beschichtet

Extremo Sin Radio, Ángulo Redondeado, Cabeza Esférica - Recubrimiento de AlTiN

Extrémité Carré, Rayon de Coin, Hemispherique - Revêtement AlTiN

Piatte, Torico, Sferica - Rivestimento in AlTiN

平头, 圆角半径, 球头 - AlTiN 涂层



EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3
		Decimal	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
63180	(plain)	.3438	11/32"	8.733	3/8"	4"	1/2"	.020"	-
27655	(weldon)	.3543	9.000	10.0	50	14	0.50	-	-
62287	-	.3543	9.000	10.0	65	22	-	-	-
27657	-	.3543	9.000	10.0	65	22	0.50	-	-
62317	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-
27658	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-
61286	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-
27660	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-
27662	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-
61288	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-
28670	-	.3750	3/8"	9.525	3/8"	2"	1/2"	BALL	-
62327	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
27670	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-
61290	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-
27680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-
27682	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-
61292	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.040"	-
61294	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.050"	-
27684	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-
61296	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.094"	-
28680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	BALL	-
61298	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-
61299	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-
61300	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-
61302	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-
61304	-	.3750	3/8"	9.525	3/8"	4"	2"	.015"	-
61306	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"
63190	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"
61308	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	2-1/8"
61310	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"
61312	-	.3937	10.000	10.0	50	16	-	-	-
27690	-	.3937	10.000	10.0	50	16	0.50	-	-
61314	-	.3937	10.000	10.0	50	16	1.00	-	-
28690	-	.3937	10.000	10.0	50	16	BALL	-	-
62397	-	.3937	10.000	10.0	70	22	-	-	-
27698	-	.3937	10.000	10.0	70	22	0.30	-	-
27700	-	.3937	10.000	10.0	70	22	0.50	-	-
61316	-	.3937	10.000	10.0	70	22	0.75	-	-
27702	-	.3937	10.000	10.0	70	22	1.00	-	-
28700	-	.3937	10.000	10.0	70	22	BALL	-	-
61318	-	.3937	10.000	10.0	70	32	0.50	-	-
61320	-	.3937	10.000	10.0	100	38	0.50	-	-
61322	-	.3937	10.000	10.0	100	50	0.50	-	-
63200	-	.3937	10.000	10.0	100	14	0.50	47	9.50

EDP#		$d1^{\dagger}$			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
27705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"	-	-
28705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	BALL	-	-
62437	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	-	-	-
27708	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.010"	-	-
27710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.020"	-	-
28710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	BALL	-	-
63210	-	.4375	7/16"	11.113	7/16"	6"	1"	.020"	-	-
62475	-	.4724		12.000	12.0	65	19	-	-	-
27712	-	.4724		12.000	12.0	65	19	0.30	-	-
27715	-	.4724		12.000	12.0	65	19	0.50	-	-
28715	-	.4724		12.000	12.0	65	19	BALL	-	-
61324	-	.4724		12.000	12.0	75	26	-	-	-
61326	-	.4724		12.000	12.0	75	26	0.50	-	-
62485	-	.4724		12.000	12.0	75	32	-	-	-
27718	-	.4724		12.000	12.0	75	32	0.30	-	-
27720	-	.4724		12.000	12.0	75	32	0.50	-	-
61328	-	.4724		12.000	12.0	75	32	0.75	-	-
27722	-	.4724		12.000	12.0	75	32	1.00	-	-
27730	-	.4724		12.000	12.0	75	32	1.50	-	-
27735	-	.4724		12.000	12.0	75	32	2.00	-	-
61330	-	.4724		12.000	12.0	75	32	3.00	-	-
28720	-	.4724		12.000	12.0	75	32	BALL	-	-
61332	-	.4724		12.000	12.0	100	38	-	-	-
61334	-	.4724		12.000	12.0	100	38	0.50	-	-
61336	-	.4724		12.000	12.0	100	42	-	-	-
61338	-	.4724		12.000	12.0	100	42	0.50	-	-
61340	-	.4724		12.000	12.0	100	52	-	-	-
61342	-	.4724		12.000	12.0	100	52	0.50	-	-
63220	-	.4724		12.000	12.0	150	19	0.50	57	11.50
62525	62527	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
27739	27738	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
61344	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
27741	27740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
27743	27742	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
61346	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
28751	28750	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	BALL	-	-
61348	-	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
61350	-	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-
61352	-	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
61354	-	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-
61356	-	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-
61358	-	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-
62535	62537	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
27751	27750	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
61360	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
27761	27760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
27763	27762	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
61362	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.040"	-	-
61364	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.050"	-	-
27767	27764	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
61366	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.078"	-	-
63398	63399	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-

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MATERIAL HARDNESS (Rc)

0

continued →

Series VRX (continued)

.5000" - .6250"
(12.700mm - 15.875mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
61368	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.094"	-	-
61370	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.100"	-	-
27769	27768	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
61372	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
28761	28760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-
28771	28770	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	-	-
61374	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-
63401	63400	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-
61376	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-
63411	63410	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
63421	63420	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-
63424	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.125"	-	-
61378	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	BALL	-	-
61380	-	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
61382	-	.5000	1/2"	12.700	1/2"	4"	1-3/4"	.015"	-	-
62565	62567	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
63431	63430	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-
61384	-	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-
63441	63440	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
63451	63450	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-
61386	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
63241	63240	.5000	1/2"	12.700	1/2"	6"	2"	.020"	-	-
61388	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.015"	-	-
61390	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.030"	-	-
61392	-	.5000	1/2"	12.700	1/2"	6"	3-1/4"	.030"	-	-
61394	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.480"
61396	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.480"
63231	63230	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.480"
61398	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.480"
61400	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.480"
27766	27765	.5512		14.000	14.0	75	19	0.50	-	-
28781	28780	.5512		14.000	14.0	75	19	BALL	-	-
27771	27770	.5512		14.000	14.0	88	32	0.50	-	-
28786	28785	.5512		14.000	14.0	88	32	BALL	-	-
63261	63260	.5512		14.000	14.0	150	50	0.50	-	-
63251	-	.5512		14.000	14.0	150	19	0.50	57	13.50
62625	62627	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	-	-	-
61402	-	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
63461	63460	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
61404	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"	-	-
27781	27780	.6250	5/8"	15.875	5/8"	3"	3/4"	.025"	-	-
61406	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-
28796	28795	.6250	5/8"	15.875	5/8"	3"	3/4"	BALL	-	-
62655	62657	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
27791	27790	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-
61408	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
61410	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
27801	27800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.025"	-	-
61412	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
61414	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-
27803	27802	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
61416	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.078"	-	-
61418	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.094"	-	-
27805	27804	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
61420	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
28801	28800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	BALL	-	-

MATERIAL HARDNESS (Rc)

EDP#		$d1$ †			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
61422	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-
63501	63500	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-
61424	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.015"	-	-
63511	63510	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-
63521	63520	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-
61426	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
61428	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-
61430	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
61432	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-
62675	62677	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
63531	63530	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.010"	-	-
63541	63540	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-
63551	63550	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-
63281	63280	.6250	5/8"	15.875	5/8"	6"	2"	.025"	-	-
63283	-	.6250	5/8"	15.875	5/8"	6"	2"	.090"	-	-
63285	-	.6250	5/8"	15.875	5/8"	6"	2"	.125"	-	-
28806	28805	.6250	5/8"	15.875	5/8"	6"	2"	BALL	-	-
61434	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-
61436	-	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-
61438	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.600"
61440	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.600"
63271	63270	.6250	5/8"	15.875	5/8"	6"	3/4"	.025"	3-1/4"	.600"
61442	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.600"
61444	-	.6299		16.000	16.0	75	19	-	-	-
27809	-	.6299		16.000	16.0	75	19	0.30	-	-
27811	27810	.6299		16.000	16.0	75	19	0.50	-	-
61446	-	.6299		16.000	16.0	75	19	1.00	-	-
28811	28810	.6299		16.000	16.0	75	19	BALL	-	-
62715	62717	.6299		16.000	16.0	88	32	-	-	-
27819	27818	.6299		16.000	16.0	88	32	0.30	-	-
27821	27820	.6299		16.000	16.0	88	32	0.50	-	-
61448	-	.6299		16.000	16.0	88	32	0.75	-	-
27823	27822	.6299		16.000	16.0	88	32	1.00	-	-
61450	-	.6299		16.000	16.0	88	32	1.50	-	-
27825	27824	.6299		16.000	16.0	88	32	2.00	-	-
61452	-	.6299		16.000	16.0	88	32	3.00	-	-
28821	28820	.6299		16.000	16.0	88	32	BALL	-	-
63581	63580	.6299		16.000	16.0	100	38	0.30	-	-
61454	-	.6299		16.000	16.0	100	38	0.50	-	-
61456	-	.6299		16.000	16.0	100	42	0.50	-	-
63291	63290	.6299		16.000	16.0	150	19	0.50	82	15.25
27831	-	.7087		18.000	18.0	75	22	0.80	-	-
28831	-	.7087		18.000	18.0	75	22	BALL	-	-
27836	27835	.7087		18.000	18.0	100	38	0.80	-	-
28836	28835	.7087		18.000	18.0	100	38	BALL	-	-
63301	-	.7087		18.000	18.0	150	25	0.80	82	17.25
61458	-	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
27841	27840	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
61460	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
28841	28840	.7500	3/4"	19.050	3/4"	3"	7/8"	BALL	-	-
61462	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-	-
61464	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-
62775	62777	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
27851	27850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
27861	27860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
27865	27864	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
27867	27866	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
28861	28860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	BALL	-	-

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MATERIAL HARDNESS (Rc)

0

continued →

Series VRX (continued)

.7500" - .8661"
(19.050mm - 22.000mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1^{\dagger}$			$d2$	$l1$	$l2$	r	$l3$	$d3$
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter
61466	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-
61468	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
61470	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
61472	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
61474	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	BALL	-	-
62785	62787	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
63601	63600	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
27869	27868	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
63611	63610	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
61476	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.094"	-	-
63621	63620	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-
61478	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
61480	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	BALL	-	-
62795	62797	.7500	3/4"	19.050	3/4"	5"	2"	-	-	-
63631	63630	.7500	3/4"	19.050	3/4"	5"	2"	.015"	-	-
63311	63310	.7500	3/4"	19.050	3/4"	5"	2"	.030"	-	-
63641	63640	.7500	3/4"	19.050	3/4"	5"	2"	.060"	-	-
61482	-	.7500	3/4"	19.050	3/4"	5"	2"	.094"	-	-
61484	-	.7500	3/4"	19.050	3/4"	5"	2"	.125"	-	-
28866	28865	.7500	3/4"	19.050	3/4"	5"	2"	BALL	-	-
61486	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-	-
61488	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
62805	62807	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-
63651	63650	.7500	3/4"	19.050	3/4"	6"	3"	.015"	-	-
63661	63660	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-
63671	63670	.7500	3/4"	19.050	3/4"	6"	3"	.060"	-	-
61490	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
61492	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
61494	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	-	-	-
61496	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-
63321	63320	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-1/4"	.730"
63323	-	.7500	3/4"	19.050	3/4"	6"	1"	.060"	3-1/4"	.730"
63325	-	.7500	3/4"	19.050	3/4"	6"	1"	.090"	3-1/4"	.730"
63327	-	.7500	3/4"	19.050	3/4"	6"	1"	.125"	3-1/4"	.730"
NEW 63329	-	.7500	3/4"	19.050	3/4"	6"	1"	.190"	3-1/4"	.730"
61498	-	.7874		20.000	20.0	75	22	-	-	-
61500	-	.7874		20.000	20.0	75	22	0.50	-	-
27871	27870	.7874		20.000	20.0	75	22	1.00	-	-
28871	28870	.7874		20.000	20.0	75	22	BALL	-	-
62825	62827	.7874		20.000	20.0	100	38	-	-	-
27879	27878	.7874		20.000	20.0	100	38	0.50	-	-
61502	-	.7874		20.000	20.0	100	38	0.75	-	-
27881	27880	.7874		20.000	20.0	100	38	1.00	-	-
27891	27890	.7874		20.000	20.0	100	38	1.50	-	-
61504	-	.7874		20.000	20.0	100	38	3.00	-	-
28881	28880	.7874		20.000	20.0	100	38	BALL	-	-
61506	-	.7874		20.000	20.0	100	42	0.50	-	-
61508	-	.7874		20.000	20.0	125	52	0.50	-	-
63331	63330	.7874		20.000	20.0	150	25	1.00	82	19.30
27911	-	.8661		22.000	22.0	100	38	1.00	-	-

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MATERIAL HARDNESS (Rc)

0

	EDP#		d_1 †		d_2	l_1	l_2	r	l_3	d_3		
	(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter	
NEW	61510	-	.9843		25.000	25.0	100	26	-	-	-	
	61512	-	.9843		25.000	25.0	100	26	0.50	-	-	
	62855	62857	.9843		25.000	25.0	100	38	-	-	-	
	61514	-	.9843		25.000	25.0	100	38	0.50	-	-	
	27941	27940	.9843		25.000	25.0	100	38	1.00	-	-	
NEW	27951	-	.9843		25.000	25.0	100	38	1.50	-	-	
	61516	-	.9843		25.000	25.0	100	38	3.00	-	-	
	28901	28900	.9843		25.000	25.0	100	38	BALL	-	-	
NEW	61518	-	.9843		25.000	25.0	100	42	-	-	-	
	61520	-	.9843		25.000	25.0	100	42	0.50	-	-	
	61522	-	.9843		25.000	25.0	125	50	0.50	-	-	
	63351	63350	.9843		25.000	25.0	125	50	1.00	-	-	
	63361	63360	.9843		25.000	25.0	150	32	1.00	82	24.40	
	61524	-	1.000	1"	25.400	1"	4"	1"	-	-	-	
	27959	27958	1.000	1"	25.400	1"	4"	1"	.015"	-	-	
	27961	27960	1.000	1"	25.400	1"	4"	1"	.035"	-	-	
	-	27962	1.000	1"	25.400	1"	4"	1"	.060"	-	-	
	28911	28910	1.000	1"	25.400	1"	4"	1"	BALL	-	-	
	62885	62887	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-	
	27967	27966	1.000	1"	25.400	1"	4"	1-1/2"	.015"	-	-	
	61526	-	1.000	1"	25.400	1"	4"	1-1/2"	.025"	-	-	
	27971	27970	1.000	1"	25.400	1"	4"	1-1/2"	.035"	-	-	
	27981	27980	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-	
	27991	-	1.000	1"	25.400	1"	4"	1-1/2"	.090"	-	-	
	61528	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-	
	61530	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-	-	
	61532	-	1.000	1"	25.400	1"	4"	1-1/2"	.250"	-	-	
	28916	28915	1.000	1"	25.400	1"	4"	1-1/2"	BALL	-	-	
	61534	-	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-	
	62895	62897	1.000	1"	25.400	1"	4"	1-3/4"	-	-	-	
	28001	28000	1.000	1"	25.400	1"	4"	1-3/4"	.015"	-	-	
	61536	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-	-	
	28011	28012	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-	-	
	28021	-	1.000	1"	25.400	1"	4"	1-3/4"	.090"	-	-	
	61538	-	1.000	1"	25.400	1"	4"	1-3/4"	.125"	-	-	
	NEW	61540	-	1.000	1"	25.400	1"	4"	1-3/4"	.190"	-	-
	NEW	61542	-	1.000	1"	25.400	1"	4"	1-3/4"	.250"	-	-
		62905	62907	1.000	1"	25.400	1"	5"	2"	-	-	-
		63369	63368	1.000	1"	25.400	1"	5"	2"	.015"	-	-
		63371	63370	1.000	1"	25.400	1"	5"	2"	.035"	-	-
		63373	63372	1.000	1"	25.400	1"	5"	2"	.060"	-	-
		63375	63374	1.000	1"	25.400	1"	5"	2"	.090"	-	-
		61544	-	1.000	1"	25.400	1"	5"	2"	.125"	-	-
		61546	-	1.000	1"	25.400	1"	5"	2"	.250"	-	-
		28931	28930	1.000	1"	25.400	1"	5"	2"	BALL	-	-
		61548	-	1.000	1"	25.400	1"	5"	2-1/2"	-	-	-
		61550	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
		62915	62917	1.000	1"	25.400	1"	6"	3"	-	-	-
		61552	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-
		61554	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-
61556		-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-	-	
NEW		61558	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	2-5/8"	.980"
		63381	63380	1.000	1"	25.400	1"	6"	1-1/4"	.035"	3-1/4"	.980"
NEW	61560	-	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-1/4"	.980"	
NEW	61562	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"	.980"	

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MATERIAL HARDNESS (Rc)

0

d_1	+0.000" - .002" (+.000mm - .050mm)
d_2	h6
r	+0.01" - .001" (+.025 - .025mm)

.2362" - .4724"
(6.000mm - 12.000mm)



TECH
PAGES
302-303

Square End, Corner Radius - AlTiN Coated

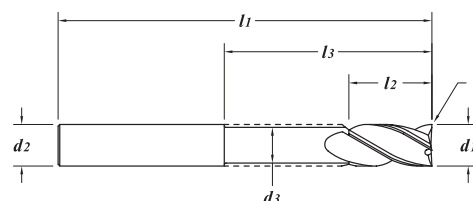
Ohne Eckenradius, Eckenradius - AlTiN-Beschichtet

Extremo Sin Radio, Ángulo Redondeado - Recubrimiento de AlTiN

Extrémité Carré, Rayon de Coin - Revêtement AlTiN

Piatte, Torico - Rivestimento in AlTiN

平头, 圆角半径 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity
Recommended for stainless steel, inconel, titanium and tool steels
Staggered flute geometry
Engineered for High Efficiency Milling



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Reduziert Vibrationen für eine aggressive Bearbeitung, um Bearbeitungszeit zu reduzieren und eine grössere Produktivität zu erzielen
Empfohlen für Rostfreien Stahl, Inconel, Titan, und Werkzeugstähle
Entwickelt für hocheffizientes Fräsen



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Reduce las vibraciones hasta en los más agresivos mecanizados, obteniéndose bajos tiempos de ciclo y mayor productividad
Recomendado para acero inoxidable, inconel, acero laminado en frío, hierro de fundición y aceros herramienta
Diseñado para el fresado de alta eficiencia



Fraises carbure submicrograin - coupe au centre
Reduction des vibrations pour un fraisage plus agressif resultant des temps de cycles plus court et une meilleure productivité
Recommandée pour les aciers inoxydables, Inconel, aciers a outils, aciers forges, titane, fontes et aciers a outils
Conçu pour un fraisage à haute efficacité



Fresa sub-micrograno metallo duro - taglio al centro
Riduzioni delle vibrazioni per lavorazioni aggressive per ridurre il tempo ciclo ed aumentare la produttività
Raccomandata per lavorazioni su inox, inconel, titanio e acciai per utensili
Progettato per la fresatura ad alta efficienza



超细晶粒整体硬质合金立铣刀 - 中心切削
适合更高速度, 更大进给的加工, 可以减少振动, 减少加工时间, 提高生产效率
推荐加工不锈钢, 铬镍铁耐热合金、含磷材质、钛钢 和工具钢
有效的断屑就削

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal	Metric						
60101	.2362	6.000	6.0	65	20	-	-	-
60103	.2362	6.000	6.0	65	20	0.50	-	-
60100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
60102	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-
60104	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-
60105	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-
60106	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-
60162	.3150	8.000	8.0	65	22	-	-	-
60107	.3150	8.000	8.0	65	22	0.50	-	-
60109	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-
60111	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-
60108	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
60110	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-
60113	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-
60112	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-
60114	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-
60184	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-
60164	.3937	10.000	10.0	70	22	-	-	-
60115	.3937	10.000	10.0	70	22	0.50	-	-
60117	.3937	10.000	10.0	70	22	1.00	-	-
60119	.4724	12.000	12.0	65	20	-	-	-
60121	.4724	12.000	12.0	65	20	0.50	-	-
60123	.4724	12.000	12.0	75	26	-	-	-
60125	.4724	12.000	12.0	75	26	0.75	-	-
60166	.4724	12.000	12.0	75	32	-	-	-
60127	.4724	12.000	12.0	75	32	0.50	-	-
60129	.4724	12.000	12.0	75	32	1.00	-	-

**NEW
ITEMS**

Series VRX-6 (continued)

.5000" - 1.000"
(12.700mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	Decimal		Metric						
60131	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
NEW 60185	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
60157	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
60133	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
60159	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
NEW 60189	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
60186	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-
60135	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
60201	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
60116	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
60118	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
60120	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
60122	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
60124	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
60126	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
60128	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
60137	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-
60139	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
60190	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
60194	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
60196	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
60130	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
60132	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-
60134	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.020"	-	-
60136	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
60200	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-
60141	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
NEW 60143	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
60138	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
60140	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
60145	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
60142	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
60144	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
60146	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
60148	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
60150	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
60168	.6299		16.000	16.0	88	32	-	-	-
60170	.6299		16.000	16.0	88	32	0.50	-	-
60174	.6299		16.000	16.0	100	40	-	-	-
60176	.6299		16.000	16.0	100	40	0.50	-	-
60180	.6299		16.000	16.0	100	32	-	50	14.50
NEW 60182	.6299		16.000	16.0	100	32	0.50	50	14.50
60152	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
60154	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
60147	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-
60156	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
60158	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
60160	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-
60149	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-
60151	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-
NEW 60188	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
60153	1.000	1"	25.400	1"	6"	3"	.030"	-	-
60155	1.000	1"	25.400	1"	7"	1-1/4"	-	4-1/8"	.980"

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MATERIAL HARDNESS (Rc)

0

European facility based in High Wycombe, England

Garr Tool Company has made a significant investment in the future by establishing a sales and stock centre in the UK. This facility is our commitment to providing the best service to our European distributors. Security of supply is important to our customers and we want to build confidence that we will supply your round tooling needs.



- Over 8,000 products in stock
- 99.7% fill rate
- Next day shipping throughout Europe
- Order up to 17:30 CET
- Inside sales support
- Same day quotes



TOLERANCES

d_1	$+0.000" - .001" (+.000 - .025\text{mm})$
d_2	$h6$

Series 242M, 842M

TECH
PAGES
290HIGH
PERFORMANCE
END MILLS

Square End

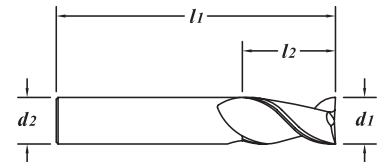
Ohne Eckenradius

Extremo Sin Radio

Extrémité Carré

Piatte

平头



Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Excellent choice for slotting
Polished cylindrical O.D. margin reduces chatter
Recommended for aluminum and titanium
Sharp corners (Can be modified with a corner radius)
Designed for spindle speeds between 3,000 - 8,000 RPM, 1% diameter for chip load



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Exzellente Wahl zum Nutfräsen
Polierter Durchmesser O.D. Führungsfase reduziert Vibrationen
Empfohlen für Aluminium und Titan
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
Entwickelt für Drehzahlen von 3.000 bis 8.000 min⁻¹, 1% Durchmesser für Spanformung



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Excelente elección para ranurado
El margen de D.E. cilíndrico pulido reduce las vibraciones
Recomendado para aluminio y titanio
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Diseñado para velocidades de cabezal entre 3000-8000 RPM, 1% del diámetro para evacuación de viruta



Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Choix excellent pour le rainurage
La marge sur le diamètre contribue à réduire les bavardages
Recommandée pour l'aluminium et titane
Angles pointus (Peut être modifier avec un rayon de coin)
Conçu pour des vitesses de broches de 3000 à 8000 Tours / minute, 1% du diamètre pour la charge de copeaux



Fresa sub-micrograno metallo duro - taglio al centro
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Scelta eccellente per cave
Il margine cilindrico lucidato di O.D. riduce la vibrazione
Raccomandata per alte prestazioni per lavorazioni di alluminio e titanio
Tagliente vivo (Può essere modificata con un raggio)
Progettato per impiego su mandrini tra 3.000-8.000 giri al minuto



高效超细晶粒整体硬质合金立铣刀 - 中心切削
推荐加工高效加工铝材质和钛材质
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
外圆余量经过抛光可减少振纹
是铣槽的极好选择
尖角（可以改为圆角）
适合转速3,000 - 8,000转/分，1%直径用于切削负载

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	
	Decimal	Diameter Metric				
08910	.1181		3.000	3.0	38	8
08920	.1181		3.000	3.0	50	12
85160	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
85170	.1250	1/8"	3.175	1/8"	2"	1/2"
08950	.1575		4.000	6.0	50	8
08960	.1575		4.000	6.0	50	12
85180	.1875	3/16"	4.763	3/16"	2"	5/16"
85190	.1875	3/16"	4.763	3/16"	2"	9/16"
08990	.1969		5.000	6.0	50	10
09000	.1969		5.000	6.0	65	15
09010	.2362		6.000	6.0	50	12
09020	.2362		6.000	6.0	65	25
09030	.2362		6.000	6.0	100	50
85200	.2500	1/4"	6.350	1/4"	2"	1/2"
85220	.2500	1/4"	6.350	1/4"	2-1/2"	1"
85240	.2500	1/4"	6.350	1/4"	4"	2"
85300	.3125	5/16"	7.938	5/16"	3"	1-1/8"
09240	.3150		8.000	8.0	65	20
09040	.3150		8.000	8.0	75	30
09050	.3150		8.000	8.0	100	50
85400	.3750	3/8"	9.525	3/8"	2"	5/8"
85420	.3750	3/8"	9.525	3/8"	2-1/2"	1"
85440	.3750	3/8"	9.525	3/8"	4"	2"
09060	.3937		10.000	10.0	50	16
09070	.3937		10.000	10.0	70	25
09080	.3937		10.000	10.0	100	50
09090	.4724		12.000	12.0	65	20
09100	.4724		12.000	12.0	75	32
09110	.4724		12.000	12.0	100	50
85500	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"
85520	.5000	1/2"	12.700	1/2"	3"	1-1/4"
85540	.5000	1/2"	12.700	1/2"	4"	2"
85600	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
85620	.6250	5/8"	15.875	5/8"	6"	3"
09120	.6299		16.000	16.0	88	40
09130	.6299		16.000	16.0	150	75
09140	.7087		18.000	18.0	100	45
85700	.7500	3/4"	19.050	3/4"	4"	1-3/4"
85720	.7500	3/4"	19.050	3/4"	6"	3"
09350	.7874		20.000	20.0	100	38
09150	.7874		20.000	20.0	150	75
09160	.9843		25.000	25.0	100	45
09170	.9843		25.000	25.0	150	75
85800	1.000	1"	25.400	1"	4"	1-3/4"
85820	1.000	1"	25.400	1"	6"	3"

70

MATERIAL HARDNESS (Rc)

35

0

Series 253MA, 853MA

.1181" - .5512"
(3.000mm - 14.000mm)

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

Square End - AlTiN Coated

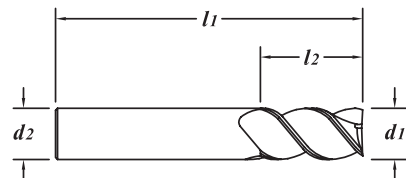
Ohne Eckenradius - AlTiN-Beschichtet

Extremo Sin Radio - Recubrimiento de AlTiN

Extrémité Carré - Revêtement AlTiN

Piatte - Rivestimento in AlTiN

平头 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Slots stainless steel at an axial depth of 25% of diameter
Recommended for stainless steel
Sharp corners (Can be modified with a corner radius)
Uncoated - page 180
TiCN Coated - page 182



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Trocken oder Halbtrockene Bearbeitung
Nutfäsen von Rostfreiem Stahl mit einer Axialzustellung von 25% des Durchmessers
Empfohlen für Rostfreiem Stahl
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
Unbeschichtet - Seite 180
TiCN-Beschichtet - Seite 182



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semisecco
Ranurado de acero inoxidable a una profundidad axial del 25% del diámetro
Recomendado para acero inoxidable
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Sin recubrimiento - Página 180
Recubrimiento de TiCN - Página 182



Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Usinage à sec ou avec l'air
Rainurage de l'acier inoxydable avec profondeur de coupe axiale équivalente à 25% du diamètre
Recommandée pour aciers inoxydables
Angles pointus (Peut être modifié avec un rayon de coin)
Sans revêtement - Page 180
Revêtement TiCN - Page 182



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di inox
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Lavorazione dal pieno su inox con profondità di taglio consigliata pari al 25% del diametro
Raccomandata per lavorazioni su inox
Tagliente vivo (Può essere modificata con un raggio)
Non Rivestito - Pagina 180
Rivestimento in TiCN - Pagina 182



高效超细晶粒整体硬质合金立铣刀 - 中心切削
高效加工铝合金
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
干式或半干式机加工
以25%直径的轴向深度在铝材上铣槽
推荐加工不锈钢
尖角（可以改为圆角）
未涂层 - 180页
TiCN 涂层 - 182页

EDP#	d_1 †		d_2	l_1	l_2
	Decimal	Diameter			
10347	.1181	3.000	3.0	38	8
10357	.1181	3.000	3.0	50	12
86137	.1250	1/8"	3.175	1/8"	1-1/2"
86147	.1250	1/8"	3.175	1/8"	2"
10387	.1575	4.000	6.0	50	8
10397	.1575	4.000	6.0	50	12
86157	.1875	3/16"	4.763	3/16"	2"
86167	.1875	3/16"	4.763	3/16"	2"
86187	.1875	3/16"	4.763	3/16"	3"
10407	.1969	5.000	5.0	50	8
10417	.1969	5.000	5.0	50	14
10507	.1969	5.000	6.0	50	8
10517	.1969	5.000	6.0	65	16
10017	.2362	6.000	6.0	50	12
10027	.2362	6.000	6.0	65	19
10037	.2362	6.000	6.0	75	32
86207	.2500	1/4"	6.350	1/4"	2"
86227	.2500	1/4"	6.350	1/4"	2-1/2"
86247	.2500	1/4"	6.350	1/4"	3"
86267	.3125	5/16"	7.938	5/16"	2"
86277	.3125	5/16"	7.938	5/16"	2-1/2"
86287	.3125	5/16"	7.938	5/16"	4"
10427	.3150	8.000	8.0	50	11
10047	.3150	8.000	8.0	65	20
10057	.3150	8.000	8.0	75	32
86307	.3750	3/8"	9.525	3/8"	2"
86327	.3750	3/8"	9.525	3/8"	2-1/2"
86347	.3750	3/8"	9.525	3/8"	3-1/2"
10067	.3937	10.000	10.0	50	12
10077	.3937	10.000	10.0	75	25
10087	.3937	10.000	10.0	88	38
86367	.4375	7/16"	11.113	7/16"	2-1/2"
86377	.4375	7/16"	11.113	7/16"	2-3/4"
86387	.4375	7/16"	11.113	7/16"	4"
10097	.4724	12.000	12.0	65	16
10107	.4724	12.000	12.0	75	26
10117	.4724	12.000	12.0	100	50
86407	.5000	1/2"	12.700	1/2"	2-1/2"
86427	.5000	1/2"	12.700	1/2"	3"
86447	.5000	1/2"	12.700	1/2"	4"
10437	.5512	14.000	14.0	65	16
10447	.5512	14.000	14.0	75	25
10457	.5512	14.000	14.0	100	50

† Metric equivalents are for reference only

EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal	Diameter Metric			
86467	.5625	9/16"	14.288	9/16"	3"
86477	.5625	9/16"	14.288	9/16"	3-1/2"
86507	.6250	5/8"	15.875	5/8"	3"
86527	.6250	5/8"	15.875	5/8"	3-1/2"
86547	.6250	5/8"	15.875	5/8"	6"
10137	.6299		16.000	16.0	88
10147	.6299		16.000	16.0	150
10167	.7087		18.000	18.0	100
86607	.7500	3/4"	19.050	3/4"	3-1/2"
86627	.7500	3/4"	19.050	3/4"	4"
86647	.7500	3/4"	19.050	3/4"	6"
10187	.7874		20.000	20.0	100
10197	.7874		20.000	20.0	150
86697	1.000	1"	25.400	1"	4"
86727	1.000	1"	25.400	1"	4"
86747	1.000	1"	25.400	1"	6"

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MATERIAL HARDNESS (Rc)

Series 253M, 853M

.1181" - .5512"
(3.000mm - 14.000mm)



TECH
PAGES
288-289

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

HIGH PERFORMANCE
END MILLS

Square End

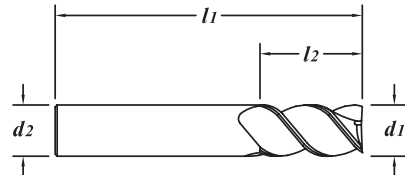
Ohne Eckenradius

Extremo Sin Radio

Extrémité Carré

Piatte

平头



Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Slots aluminum at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 178
TiCN Coated - page 182



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, rostfreies Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 178
TiCN-Beschichtet - Seite 182



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 178
Recubrimiento de TiCN - Página 182



Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Amélioration des finitions dans le Titane
Angles pointus
Recommandée pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 178
Revêtement TiCN - Page 182



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di acciai, inox e materiali esotici
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Consigliata per una migliore finitura sul titanio
Nocciolo rinforzato
Tagliente vivo
Rivestimento in AlTiN - Pagina 178
Rivestimento in TiCN - Pagina 182



高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
改善钛合金的光洁度
强力芯部
尖角
AlTiN 涂层 - 178页
TiCN 涂层 - 182页

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
10340	.1181	3.000	3.0	38	8
10350	.1181	3.000	3.0	50	12
86130	.1250	3.175	1/8"	1-1/2"	1/4"
86140	.1250	3.175	1/8"	2"	1/2"
10380	.1575	4.000	6.0	50	8
10390	.1575	4.000	6.0	50	12
86150	.1875	4.763	3/16"	2"	5/16"
86160	.1875	4.763	3/16"	2"	9/16"
86180	.1875	4.763	3/16"	3"	1"
10400	.1969	5.000	5.0	50	8
10410	.1969	5.000	5.0	50	14
10010	.2362	6.000	6.0	50	12
10020	.2362	6.000	6.0	65	19
10030	.2362	6.000	6.0	75	32
86200	.2500	6.350	1/4"	2"	1/2"
86220	.2500	6.350	1/4"	2-1/2"	3/4"
86240	.2500	6.350	1/4"	3"	1-1/4"
86260	.3125	7.938	5/16"	2"	7/16"
86270	.3125	7.938	5/16"	2-1/2"	13/16"
86280	.3125	7.938	5/16"	4"	1-1/4"
10420	.3150	8.000	8.0	50	11
10040	.3150	8.000	8.0	65	20
10050	.3150	8.000	8.0	75	32
86300	.3750	9.525	3/8"	2"	1/2"
86320	.3750	9.525	3/8"	2-1/2"	1"
86340	.3750	9.525	3/8"	3-1/2"	1-1/2"
10060	.3937	10.000	10.0	50	12
10070	.3937	10.000	10.0	75	25
10080	.3937	10.000	10.0	88	38
86360	.4375	11.113	7/16"	2-1/2"	9/16"
86370	.4375	11.113	7/16"	2-3/4"	1"
86380	.4375	11.113	7/16"	4"	2"
10090	.4724	12.000	12.0	65	16
10100	.4724	12.000	12.0	75	26
10110	.4724	12.000	12.0	100	50
86400	.5000	12.700	1/2"	2-1/2"	5/8"
86420	.5000	12.700	1/2"	3"	1"
86440	.5000	12.700	1/2"	4"	2"
10430	.5512	14.000	14.0	65	16
10440	.5512	14.000	14.0	75	25
10450	.5512	14.000	14.0	100	50

MATERIAL HARDNESS (Rc)

70

35

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EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal	Diameter Metric			
86460	.5625	9/16"	14.288	9/16"	3"
86470	.5625	9/16"	14.288	9/16"	3-1/2"
86480	.5625	9/16"	14.288	9/16"	6"
86500	.6250	5/8"	15.875	5/8"	3"
86520	.6250	5/8"	15.875	5/8"	3-1/2"
86540	.6250	5/8"	15.875	5/8"	6"
10120	.6299		16.000	16.0	75
10130	.6299		16.000	16.0	88
10140	.6299		16.000	16.0	150
10160	.7087		18.000	18.0	100
10170	.7087		18.000	18.0	150
86600	.7500	3/4"	19.050	3/4"	3-1/2"
86620	.7500	3/4"	19.050	3/4"	4"
86640	.7500	3/4"	19.050	3/4"	6"
10460	.7874		20.000	20.0	75
10180	.7874		20.000	20.0	100
10190	.7874		20.000	20.0	150
10480	.9843		25.000	25.0	100
10490	.9843		25.000	25.0	150
86690	1.000	1"	25.400	1"	4"
86720	1.000	1"	25.400	1"	4"
86740	1.000	1"	25.400	1"	6"



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35

MATERIAL HARDNESS (Rc)

0

TOLERANCES

d_1	+0.00" - .002" (+.000 - .050mm)
d_2	h6



Square End - TiCN Coated

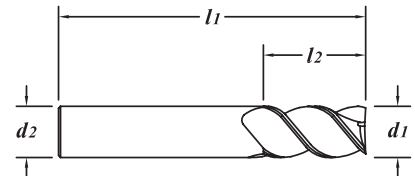
Ohne Eckenradius - TiCN-Beschichtet

Extremo Sin Radio - Recubrimiento de TiCN

Extrémité Carré - Revêtement TiCN

Piatte - Rivestimento in TiCN

平头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Slots aluminum and stainless steel at an axial depth of 25% of diameter
Recommended for aluminum and stainless steel
Sharp corners (Can be modified with a corner radius)
AlTiN Coated - page 178
Uncoated - page 180



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinestabilität und Teileintegration sind entscheidend!
Verbesserte Verschleißbeständigkeit und Schmiereigenschaften
Nutfäsen von rostfreiem Stahl und Aluminium mit einer Axialzustellung von 25% des Durchmessers
Empfohlen für rostfreiem Stahl und Aluminium
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
AlTiN-Beschichtet - Seite 178
Unbeschichtet - Seite 180



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mejoradas la resistencia a la abrasión y la lubricación
Ranurado de acero inoxidable y aluminio a una profundidad axial del 25% del diámetro
Recomendado para acero inoxidable y aluminio
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Recubrimiento de AlTiN - Página 178
Sin recubrimiento - Página 180



Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont tres importantes
Amélioration de la résistance à l'abrasion et au glissement
Rainurage de l'acier inoxydable et aluminium avec profondeur de coupe axiale équivalente à 25% du diamètre
Recommandée pour aciers inoxydables et aluminium
Angles pointus (Peut être modifier avec un rayon de coin)
Revêtement AlTiN - Page 178
Sans revêtement - Page 180



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di inox e alluminio
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Maggiore resistenza all'abrasione
Lavorazione dal pieno su alluminio con profondità di taglio consigliata pari al 25% del diametro
Raccomandata per lavorazioni su inox e alluminio
Tagliente vivo (Può essere modificata con un raggio)
Rivestimento in AlTiN - Pagina 178
Non Rivestito - Pagina 180



高效超细晶粒整体硬质合金立铣刀 - 中心切削
高效加工铝合金
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
改善耐磨性和润滑性
以25%直径的轴向深度在铝材上铣槽
推荐加工不锈钢、铝
尖角（可以改为圆角）
AlTiN 涂层 - 178页
未涂层 - 180页

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Diameter	Metric			
86154	.1875	3/16"	4.763	3/16"	2"	5/16"
86164	.1875	3/16"	4.763	3/16"	2"	9/16"
86184	.1875	3/16"	4.763	3/16"	3"	1"
86204	.2500	1/4"	6.350	1/4"	2"	1/2"
86224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
86244	.2500	1/4"	6.350	1/4"	3"	1-1/4"
86264	.3125	5/16"	7.938	5/16"	2"	7/16"
86274	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
86284	.3125	5/16"	7.938	5/16"	4"	1-1/4"
86304	.3750	3/8"	9.525	3/8"	2"	1/2"
86324	.3750	3/8"	9.525	3/8"	2-1/2"	1"
86344	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
86364	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
86374	.4375	7/16"	11.113	7/16"	2-3/4"	1"
86384	.4375	7/16"	11.113	7/16"	4"	2"
86404	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
86424	.5000	1/2"	12.700	1/2"	3"	1"
86444	.5000	1/2"	12.700	1/2"	4"	2"
86464	.5625	9/16	14.288	9/16"	3"	7/8"
86474	.5625	9/16	14.288	9/16"	3-1/2"	1-1/4"
86484	.5625	9/16	14.288	9/16"	6"	2-1/2"
86504	.6250	5/8"	15.875	5/8"	3"	7/8"
86524	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
86544	.6250	5/8"	15.875	5/8"	6"	2-1/2"
86604	.7500	3/4"	19.050	3/4"	3-1/2"	1"
86624	.7500	3/4"	19.050	3/4"	4"	1-1/2"
86644	.7500	3/4"	19.050	3/4"	6"	3"
86694	1.000	1"	25.400	1"	4"	1-1/8"
86724	1.000	1"	25.400	1"	4"	2"
86744	1.000	1"	25.400	1"	6"	3-1/4"

TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	h6

Series 263M, 263MC, 263MA, 863MA

TECH
PAGES
288-289

Square End

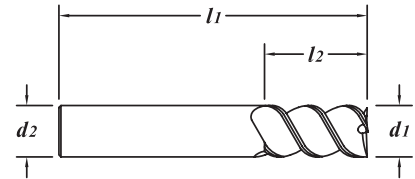
Ohne Eckenradius

Extremo Sin Radio

Extrémité Carré

Piatte

平头



Solid submicron grain carbide end mill - center cutting
High performance profiling
Rigid work holding, machine stability and part integrity are critical!
Modified end gash - will not cut square corner
Recommended for steels, stainless steel and high-temperature alloys
Can be modified with a corner radius
TiCN Coated
AlTiN Coated



Vollhartmetallbohrer aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinestabilität und Teileintegration sind entscheidend!
Modifizierte Endgeometrie - Schneidet keine quadratischen Ecken
Empfohlen für Stahl, rostfreies Stahl und Hochwarmfesten Legierungen
Kann mit einem Eckenradius modifiziert werden
TiCN-Beschichtet
AlTiN-Beschichtet



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acanaladura final modificada - No adecuada para cortar en esquinas cuadradas
Recomendado para aceros, acero inoxidable y aleaciones de alta temperatura
Se puede modificar con un ángulo redondeado
Recubrimiento de TiCN
Recubrimiento de AlTiN



Fraises carbure submicrograin - coupe au centre
Haute performance pour l'usinage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Coupe au centre spécifique
Recommandée pour aciers, aciers inoxydables et alliages hautes températures
Peut être modifiée avec un rayon de coin
Revêtement TiCN
Revêtement AlTiN



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni in contornitura su acciaio, inox, superleghe
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Non consigliata per lavorazioni assiali
Può essere modificata con un raggio
Rivestimento in TiCN
Rivestimento in AlTiN



高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和耐高温合金钢上作仿形切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
修整底端面—不能切削直角
可以改为圆角
TiCN 涂层
AlTiN 涂层

(263M) UNCOATED EDP#	(263MC) TiCN EDP#	(263MA/863MA) AlTiN EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
23010	-	-	.2500	1/4"	6.350	1/4"	2-1/2"
23020	-	-	.3125	5/16"	7.938	5/16"	2-1/2"
23030	-	-	.3750	3/8"	9.525	3/8"	2-1/2"
23040	-	-	.4375	7/16"	11.113	7/16"	2-3/4"
23050	-	-	.5000	1/2"	12.700	1/2"	3"
23060	-	-	.6250	5/8"	15.875	5/8"	3-1/2"
23070	-	-	.7500	3/4"	19.050	3/4"	4"
23080	-	-	1.000	1"	25.400	1"	4"
-	23014	-	.2500	1/4"	6.350	1/4"	2-1/2"
-	23024	-	.3125	5/16"	7.938	5/16"	2-1/2"
-	23034	-	.3750	3/8"	9.525	3/8"	2-1/2"
-	23044	-	.4375	7/16"	11.113	7/16"	2-3/4"
-	23054	-	.5000	1/2"	12.700	1/2"	3"
-	23064	-	.6250	5/8"	15.875	5/8"	3-1/2"
-	23074	-	.7500	3/4"	19.050	3/4"	4"
-	23084	-	1.000	1"	25.400	1"	4"
-	-	23517	.2362		6.000	6.0	65
-	-	23017	.2500	1/4"	6.350	1/4"	2-1/2"
-	-	23027	.3125	5/16"	7.938	5/16"	2-1/2"
-	-	23527	.3150		8.000	8.0	65
-	-	23037	.3750	3/8"	9.525	3/8"	2-1/2"
-	-	23537	.3937		10.000	10.0	70
-	-	23047	.4375	7/16"	11.113	7/16"	2-3/4"
-	-	23547	.4724		12.000	12.0	75
-	-	23057	.5000	1/2"	12.700	1/2"	3"
-	-	23067	.6250	5/8"	15.875	5/8"	3-1/2"
-	-	23557	.6299		16.000	16.0	88
-	-	23077	.7500	3/4"	19.050	3/4"	4"
-	-	23087	1.000	1"	25.400	1"	4"

HIGH
END MILLS

70

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MATERIAL HARDNESS (Rc)

0

Series 255MA, 855MA

.1181" - .4724"
(3.000mm - 12.000mm)



TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

HIGH PERFORMANCE
END MILLS

Square End - AlTiN Coated

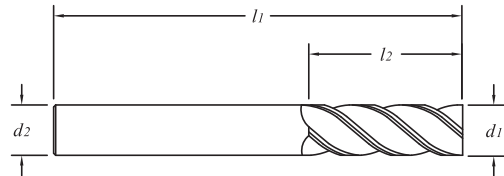
Ohne Eckenradius - AlTiN-Beschichtet

Extremo Sin Radio - Recubrimiento de AlTiN

Extrémité Carré - Revêtement AlTiN

Piatte - Rivestimento in AlTiN

平头 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core, Sharp corners
Recommended for steels, stainless steel and exotics
Uncoated - page 186
TiCN Coated - page 188



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Trocken oder Halbtrockene Bearbeitung
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, rostfreier Stahl und exotischen Werkstoffen
Unbeschichtet - Seite 186
TiCN-Beschichtet - Seite 188



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semisecco
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Sin recubrimiento - Página 186
Recubrimiento de TiCN - Página 188



Fraises carbure submicrograin - coupe au centre
Pour haute performance fraissage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Usinage à sec ou avec l'air
Amélioration des finitions dans le Titane
Angles pointus
Recommandée pour aciers, aciers inoxydables et alliages exotiques
Sans revêtement - Page 186
Revêtement TiCN - Page 188



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Non Rivestito - Pagina 186
Rivestimento in TiCN - Pagina 188



高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
干式或半干式机加工
改善钛合金的光洁度
强力芯部
尖角
未涂层 - 186页
TiCN 涂层 - 188页

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
40047	.1181	3.000	3.0	38	8
40057	.1181	3.000	3.0	50	12
52087	.1250	1/8"	1/8"	1-1/2"	1/4"
52097	.1250	1/8"	1/8"	2"	1/2"
40087	.1575	4.000	6.0	50	8
40097	.1575	4.000	6.0	50	12
52107	.1875	3/16"	3/16"	2"	5/16"
52127	.1875	3/16"	3/16"	2"	9/16"
40107	.1969	5.000	5.0	50	8
40127	.1969	5.000	5.0	50	14
40117	.1969	5.000	6.0	50	8
40137	.1969	5.000	6.0	65	16
40207	.2362	6.000	6.0	50	10
40227	.2362	6.000	6.0	65	20
40247	.2362	6.000	6.0	100	32
52207	.2500	1/4"	1/4"	2"	3/8"
52227	.2500	1/4"	1/4"	2-1/2"	3/4"
52237	.2500	1/4"	1/4"	3"	1-1/8"
52247	.2500	1/4"	1/4"	4"	1-1/4"
52307	.3125	5/16"	5/16"	2"	7/16"
52327	.3125	5/16"	5/16"	2-1/2"	13/16"
52347	.3125	5/16"	5/16"	4"	1-1/4"
40307	.3150	8.000	8.0	50	11
40327	.3150	8.000	8.0	65	21
40347	.3150	8.000	8.0	100	32
40367	.3543	9.000	10.0	65	22
52407	.3750	3/8"	3/8"	2"	1/2"
52427	.3750	3/8"	3/8"	2-1/2"	7/8"
52437	.3750	3/8"	3/8"	3"	1-1/4"
52447	.3750	3/8"	3/8"	3-1/2"	1-1/2"
40407	.3937	10.000	10.0	50	12
40427	.3937	10.000	10.0	70	22
40447	.3937	10.000	10.0	88	38
52507	.4375	7/16"	7/16"	2-1/2"	9/16"
52527	.4375	7/16"	7/16"	2-3/4"	1"
52547	.4375	7/16"	7/16"	4"	2"
40507	.4724	12.000	12.0	65	16
40527	.4724	12.000	12.0	75	32
40547	.4724	12.000	12.0	100	50

† Metric equivalents are for reference only

EDP#	$d1^{\dagger}$		Metric	$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal	Diameter				
52607	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
52627	.5000	1/2"	12.700	1/2"	3"	1-1/4"
52647	.5000	1/2"	12.700	1/2"	4"	2"
52707	.6250	5/8"	15.875	5/8"	3"	3/4"
52727	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52747	.6250	5/8"	15.875	5/8"	6"	2-1/2"
40607	.6299		16.000	16.0	75	20
40627	.6299		16.000	16.0	88	41
40647	.6299		16.000	16.0	150	63
52807	.7500	3/4"	19.050	3/4"	3"	7/8"
52827	.7500	3/4"	19.050	3/4"	4"	1-5/8"
52837	.7500	3/4"	19.050	3/4"	5"	2"
52847	.7500	3/4"	19.050	3/4"	6"	3-1/4"
40727	.7874		20.000	20.0	100	41
40747	.7874		20.000	20.0	150	82
40787	.9843		25.000	25.0	100	28
40827	.9843		25.000	25.0	100	50
40847	.9843		25.000	25.0	150	82
52897	1.000	1"	25.400	1"	4"	1-1/8"
52927	1.000	1"	25.400	1"	4"	2"
52947	1.000	1"	25.400	1"	6"	3-1/4"



End Mill Manufacturing

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35

MATERIAL HARDNESS (Rc)

0

Series 255M, 855M

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$

.1181" - .5000"
(3.000mm - 12.700mm)



HIGH PERFORMANCE
END MILLS

Square End

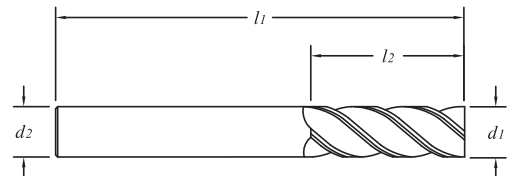
Ohne Eckenradius

Extremo Sin Radio

Extrémité Carré

Piatte

平头



Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved finishes in titanium
Heavy core, Sharp corners
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 184
TiCN Coated - page 188



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinestabilität und Teileintegration sind entscheidend!
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, rostfreiem Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 184
TiCN-Beschichtet - Seite 188



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 184
Recubrimiento de TiCN - Página 188



Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Amélioration des finitions dans le Titane
Angles pointus
Recommandée pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 184
Revêtement TiCN - Page 188



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Rivestimento in AlTiN - Pagina 184
Rivestimento in TiCN - Pagina 188



高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
改善钛合金的光洁度
强力芯部
尖角
AlTiN 涂层 - 184页
TiCN 涂层 - 188页

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
40040	.1181	3.000	3.0	38	8
40050	.1181	3.000	3.0	50	12
52080	.1250 1/8"	3.175	1/8"	1-1/2"	1/4"
52090	.1250 1/8"	3.175	1/8"	2"	1/2"
40080	.1575	4.000	6.0	50	8
40090	.1575	4.000	6.0	50	12
52100	.1875 3/16"	4.763	3/16"	2"	5/16"
52120	.1875 3/16"	4.763	3/16"	2"	9/16"
40100	.1969	5.000	5.0	50	8
40120	.1969	5.000	5.0	50	14
40200	.2362	6.000	6.0	50	10
40220	.2362	6.000	6.0	65	20
40240	.2362	6.000	6.0	100	32
52200	.2500 1/4"	6.350	1/4"	2"	3/8"
52220	.2500 1/4"	6.350	1/4"	2-1/2"	3/4"
52240	.2500 1/4"	6.350	1/4"	4"	1-1/4"
52300	.3125 5/16"	7.938	5/16"	2"	7/16"
52320	.3125 5/16"	7.938	5/16"	2-1/2"	13/16"
52340	.3125 5/16"	7.938	5/16"	4"	1-1/4"
40320	.3150	8.000	8.0	65	21
40340	.3150	8.000	8.0	100	32
52400	.3750 3/8"	9.525	3/8"	2"	1/2"
52420	.3750 3/8"	9.525	3/8"	2-1/2"	7/8"
52440	.3750 3/8"	9.525	3/8"	3-1/2"	1-1/2"
40420	.3937	10.000	10.0	70	22
40440	.3937	10.000	10.0	88	38
52500	.4375 7/16"	11.113	7/16"	2-1/2"	9/16"
52520	.4375 7/16"	11.113	7/16"	2-3/4"	1"
52540	.4375 7/16"	11.113	7/16"	4"	2"
40520	.4724	12.000	12.0	75	32
40540	.4724	12.000	12.0	100	50
52600	.5000 1/2"	12.700	1/2"	2-1/2"	5/8"
52620	.5000 1/2"	12.700	1/2"	3"	1-1/4"
52640	.5000 1/2"	12.700	1/2"	4"	2"

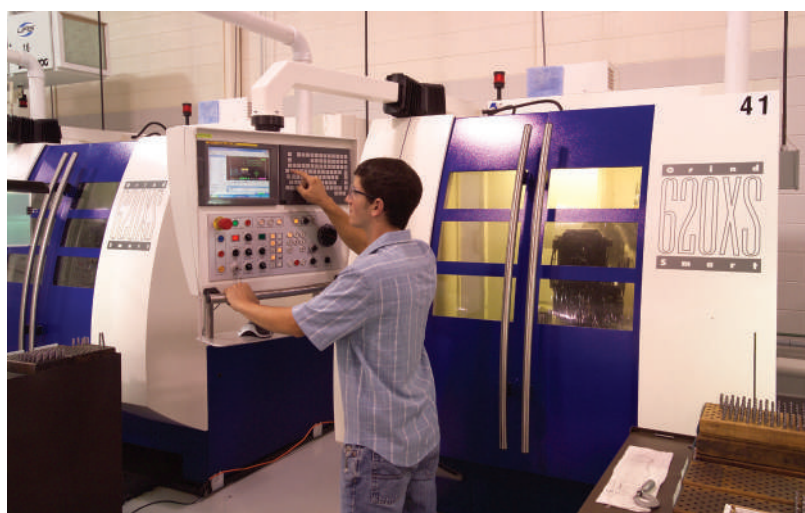
MATERIAL HARDNESS (Rc)

70

35

0

EDP#	$d1^+$ Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal		Metric			
52700	.6250	5/8"	15.875	5/8"	3"	3/4"
52720	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52740	.6250	5/8"	15.875	5/8"	6"	2-1/2"
40600	.6299		16.000	16.0	75	20
40620	.6299		16.000	16.0	88	41
40640	.6299		16.000	16.0	150	63
52800	.7500	3/4"	19.050	3/4"	3"	7/8"
52820	.7500	3/4"	19.050	3/4"	4"	1-5/8"
52830	.7500	3/4"	19.050	3/4"	5"	2"
52840	.7500	3/4"	19.050	3/4"	6"	3-1/4"
40700	.7874		20.000	20.0	75	22
40720	.7874		20.000	20.0	100	41
40740	.7874		20.000	20.0	150	82
40780	.9843		25.000	25.0	100	28
40820	.9843		25.000	25.0	100	50
40840	.9843		25.000	25.0	150	82
52890	1.000	1"	25.400	1"	4"	1-1/8"
52920	1.000	1"	25.400	1"	4"	2"
52940	1.000	1"	25.400	1"	6"	3-1/4"



70

35

MATERIAL HARDNESS (Rc)

0

Series 255MC

.1875" - 1.000"
(4.763mm - 25.400mm)

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

Square End - TiCN Coated

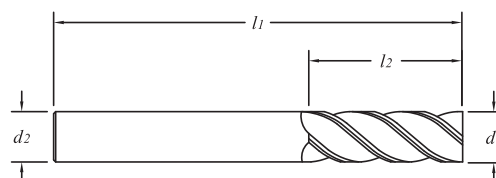
Ohne Eckenradius - TiCN-Beschichtet

Extremo Sin Radio - Recubrimiento de TiCN

Extrémité Carré - Revêtement TiCN

Piatte - Rivestimento in TiCN

平头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Improved finishes in titanium
Heavy core, Sharp corners
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 184
Uncoated - page 186



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Verbesserte Verschleißbeständigkeit und Schmiereigenschaften
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, rostfreiem Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 184
Unbeschichtet - Seite 186



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mejoradas la resistencia a la abrasión y la lubricación
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 184
Sin recubrimiento - Página 186



Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Amélioration de la résistance à l'abrasion et au glissement
Amélioration des finitions dans le Titane
Angles pointus
Recommandée pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 184
Sans revêtement - Page 186



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Rivestimento in AlTiN - Pagina 184
Non Rivestito - Pagina 186



高效超细晶粒整体硬质合金立铣刀 - 中心切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
改善耐磨性和润滑性
改善钛合金的光洁度
强力芯部
尖角
在钢件、不锈钢和稀有材质上作高效铣削
AlTiN 涂层 - 184页
未涂层 - 186页

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
52104	.1875	3/16"	4.763	3/16"	2"
52124	.1875	3/16"	4.763	3/16"	2"
52204	.2500	1/4"	6.350	1/4"	2"
52224	.2500	1/4"	6.350	1/4"	2-1/2"
52244	.2500	1/4"	6.350	1/4"	4"
52304	.3125	5/16"	7.938	5/16"	2"
52324	.3125	5/16"	7.938	5/16"	2-1/2"
52344	.3125	5/16"	7.938	5/16"	4"
52404	.3750	3/8"	9.525	3/8"	2"
52424	.3750	3/8"	9.525	3/8"	2-1/2"
52444	.3750	3/8"	9.525	3/8"	3-1/2"
52504	.4375	7/16"	11.113	7/16"	2-1/2"
52524	.4375	7/16"	11.113	7/16"	2-3/4"
52544	.4375	7/16"	11.113	7/16"	4"
52604	.5000	1/2"	12.700	1/2"	2-1/2"
52624	.5000	1/2"	12.700	1/2"	3"
52644	.5000	1/2"	12.700	1/2"	4"
52704	.6250	5/8"	15.875	5/8"	3"
52724	.6250	5/8"	15.875	5/8"	3-1/2"
52744	.6250	5/8"	15.875	5/8"	6"
52804	.7500	3/4"	19.050	3/4"	3"
52824	.7500	3/4"	19.050	3/4"	4"
52844	.7500	3/4"	19.050	3/4"	6"
52894	1.000	1"	25.400	1"	4"
52924	1.000	1"	25.400	1"	4"
52944	1.000	1"	25.400	1"	6"

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$
r	$+0.001" - .001" (+.025 - .025\text{mm})$

Series 255RA, 855RA

.1181" - .3125"
(3.000mm - 7.938mm)

HIGH PERFORMANCE
END MILLS

Corner Radius - AlTiN Coated

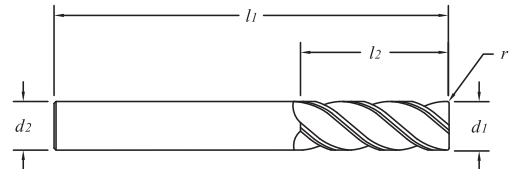
Eckenradius - AlTiN-Beschichtet

Ángulo Redondeado - Recubrimiento de AlTiN

Rayon de Coin - Revêtement AlTiN

Torica - Rivestimento in AlTiN

圓角半径 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core
An ideal tool for finishing applications after using the VRX end mill
Recommended for steels, stainless steel and exotics



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Maschinenstabilität und Teileintegration sind entscheidend!
Trocken oder Halbtrockene Bearbeitung
Verbessertes Schlichten von Titan
Starker Kern
Ein ideales Werkzeug zum Schlichten nach der Benutzung des VRX Fräasers
Empfohlen für Stahl, Rostfreistahl und exotischen Werkstoffen



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semisecco
Acabados mejorados en titanio
Núcleo pesado
Herramienta ideal para aplicaciones de acabado después de la utilización de fresas VRX
Recomendado para aceros, acero inoxidable y materiales exóticos



Fraises carbure submicrograin - coupe au centre
Pour haute performance fraiseage
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Usinage à sec ou avec l'air
Amélioration des finitions dans le Titane
Un outil idéal pour la finition après l'utilisation des fraises VRX
Recommandée pour aciers, aciers inoxydables et alliages exotiques



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovero nucleo pesante
Utensile ideale per operazioni di finitura dopo l'utilizzo della fresa VRX
Consigliata per una di acciai, inox e materiali esotici



高效超细晶粒整体硬质合金立铣刀 - 中心切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
干式或半干式机加工
改善钛合金的光洁度
强力芯部
VRX立铣刀是一种理想刀具，适合精加工
在钢件、不锈钢和稀有材质上作高效铣削

EDP#	$d1$ †		$d2$	$l1$	$l2$	r	
	Decimal	Metric					
83527	.1181	3.000	3.0	38	8	0.20	
83537	.1181	3.000	3.0	38	8	0.50	
83547	.1181	3.000	3.0	50	12	0.20	
83550	.1181	3.000	3.0	50	12	0.30	
83557	.1181	3.000	3.0	50	12	0.50	
83567	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"
83577	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"
83587	.1250	1/8"	3.175	1/8"	2"	1/2"	.010"
83597	.1250	1/8"	3.175	1/8"	2"	1/2"	.020"
83600	.1250	1/8"	3.175	1/8"	2"	1/2"	.030"
83607	.1575	4.000	6.0	50	8	0.30	
83617	.1575	4.000	6.0	50	8	0.50	
83627	.1575	4.000	6.0	50	12	0.30	
83637	.1575	4.000	6.0	50	12	0.50	
83647	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"
83657	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"
83667	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"
83677	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"
83680	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"
83707	.1969	5.000	6.0	65	15	0.30	
83717	.1969	5.000	6.0	65	15	0.50	
83767	.2362	6.000	6.0	50	12	0.30	
83777	.2362	6.000	6.0	50	12	0.50	
83780	.2362	6.000	6.0	65	19	0.20	
83787	.2362	6.000	6.0	65	19	0.30	
83797	.2362	6.000	6.0	65	19	0.50	
83807	.2362	6.000	6.0	65	19	1.00	
83827	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"
83837	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"
83845	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
83847	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
83857	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
83877	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
83907	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"
83927	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"
83937	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"
83940	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"
83947	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"
83957	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"
83977	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"

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MATERIAL HARDNESS (Rc)

continued →

Series 255RA, 855RA (continued)

.3150" - 1.000"
(8.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	$d1^{\dagger}$			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius
	Decimal	Diameter					
83987	.3150		8.000	8.0	50	12	0.50
83997	.3150		8.000	8.0	50	12	1.00
84000	.3150		8.000	8.0	65	22	0.30
84007	.3150		8.000	8.0	65	22	0.50
84017	.3150		8.000	8.0	65	22	1.00
84027	.3150		8.000	8.0	65	22	1.50
84087	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"
84097	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"
84100	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
84107	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
84117	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
84137	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
84147	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"
84167	.3937		10.000	10.0	70	22	0.50
84177	.3937		10.000	10.0	70	22	1.00
84257	.4724		12.000	12.0	75	32	0.30
84267	.4724		12.000	12.0	75	32	0.50
84277	.4724		12.000	12.0	75	32	1.00
84287	.4724		12.000	12.0	75	32	1.50
84307	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"
84317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"
84327	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"
84337	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"
84357	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"
84367	.5000	1/2"	12.700	1/2"	4"	2"	.030"
84377	.5000	1/2"	12.700	1/2"	4"	2"	.060"
84397	.5000	1/2"	12.700	1/2"	4"	2"	.120"
84467	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
84487	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
84497	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
84507	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"
84567	.6299		16.000	16.0	88	32	1.00
84577	.6299		16.000	16.0	88	32	2.00
84587	.6299		16.000	16.0	150	65	1.00
84597	.6299		16.000	16.0	150	65	2.00
84667	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
84687	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
84697	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
84700	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"
84707	.7500	3/4"	19.050	3/4"	5"	2"	.030"
84717	.7500	3/4"	19.050	3/4"	5"	2"	.060"
84747	.7500	3/4"	19.050	3/4"	5"	2"	.120"
84757	.7500	3/4"	19.050	3/4"	5"	2"	.190"
84767	.7874		20.000	20.0	100	38	1.00
84777	.7874		20.000	20.0	100	38	3.00
84887	.9843		25.000	25.0	100	38	1.00
84897	.9843		25.000	25.0	100	38	3.00
84957	1.000	1"	25.400	1"	4"	1-1/2"	.015"
84967	1.000	1"	25.400	1"	4"	1-1/2"	.030"
84970	1.000	1"	25.400	1"	4"	1-1/2"	.060"
84977	1.000	1"	25.400	1"	4"	1-1/2"	.120"
84987	1.000	1"	25.400	1"	5"	2"	.030"
84990	1.000	1"	25.400	1"	5"	2"	.060"
84997	1.000	1"	25.400	1"	5"	2"	.120"
85007	1.000	1"	25.400	1"	5"	2"	.190"

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MATERIAL HARDNESS (Rc)

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	h6

NEW
ITEM

Series 246M, 246MC, 246MA, 846M, 846MA

TECH
PAGES
288-289

Square End

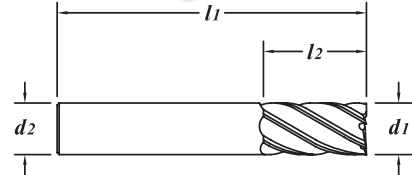
Ohne Eckenradius

Extremo Sin Radio

Extrémité Carré

Piatte

平头

HIGH
END MILLS

Solid submicron grain carbide end mill - center cutting
High performance finishing in a variety of steels
 Rigid work holding, machine stability and part integrity are critical!
 Excellent durability
 TiCN Coated
 AlTiN Coated



Vollhartmetallbohrer aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung für Stahl
 Gute Werkstückspannung, Maschinestabilität und Teileintegration
 sind entscheidend!
 Ausgezeichnete Haltbarkeit
 TiCN-Beschichtet
 AlTiN-Beschichtet



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento para aceros
 La sujeción firme del útil, la estabilidad de la máquina y la integridad
 de las piezas son cruciales
 Excelente durabilidad
 Recubrimiento de TiCN
 Recubrimiento de AlTiN



Fraises carbure submicrograin - coupe au centre
Haute performance pour la finition pour aciers
 Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement
 de l'outil sont très importantes
 Excellente durée de vie
 Revêtement TiCN
 Revêtement AlTiN



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di utensile di finitura su acciaio
 Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
 Eccellente durata di vita utensile
 Rivestimento in TiCN
 Rivestimento in AlTiN



高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、高效精加工刀具
 高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
 耐用性极好
 TiCN 涂层
 AlTiN 涂层

(246M/846M) UNCOATED EDP#	(246MC) TiCN EDP#	(246MA/846MA) AlTiN EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
Decimal	Metric						
51110	-	-	.1875	3/16"	4.763	3/16"	2"
51510	-	-	.1969		5.000	5.0	50
51520	-	-	.2362		6.000	6.0	65
51150	-	-	.2500	1/4"	6.350	1/4"	2-1/2"
51190	-	-	.3125	5/16"	7.938	5/16"	2-1/2"
51530	-	-	.3150		8.000	8.0	65
51230	-	-	.3750	3/8"	9.525	3/8"	2-1/2"
51540	-	-	.3937		10.000	10.0	70
51270	-	-	.4375	7/16"	11.113	7/16"	2-3/4"
51310	-	-	.5000	1/2"	12.700	1/2"	3"
51330	-	-	.6250	5/8"	15.875	5/8"	3-1/2"
51560	-	-	.6299		16.000	16.0	88
51350	-	-	.7500	3/4"	19.050	3/4"	4"
51370	-	-	1.000	1"	25.400	1"	4"
51400	-	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"
51430	-	-	1.250	1-1/4"	31.750	1-1/4"	6"
-	51114	-	.1875	3/16"	4.763	3/16"	2"
-	51154	-	.2500	1/4"	6.350	1/4"	2-1/2"
-	51194	-	.3125	5/16"	7.938	5/16"	2-1/2"
-	51234	-	.3750	3/8"	9.525	3/8"	2-1/2"
-	51274	-	.4375	7/16"	11.113	7/16"	2-3/4"
-	51314	-	.5000	1/2"	12.700	1/2"	3"
-	51334	-	.6250	5/8"	15.875	5/8"	3-1/2"
-	51354	-	.7500	3/4"	19.050	3/4"	4"
-	51374	-	1.000	1"	25.400	1"	4"
-	51404	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"
-	51434	-	1.250	1-1/4"	31.750	1-1/4"	6"
-	-	51117	.1875	3/16"	4.763	3/16"	2"
-	-	51517	.1969		5.000	5.0	50
-	-	51597	.1969		5.000	6.0	65
-	-	51527	.2362		6.000	6.0	65
-	-	51157	.2500	1/4"	6.350	1/4"	2-1/2"
-	-	51197	.3125	5/16"	7.938	5/16"	2-1/2"
-	-	51537	.3150		8.000	8.0	65
-	-	51237	.3750	3/8"	9.525	3/8"	2-1/2"
-	-	51547	.3937		10.000	10.0	70
-	-	51277	.4375	7/16"	11.113	7/16"	2-3/4"
-	-	51557	.4724		12.000	12.0	75
-	-	51317	.5000	1/2"	12.700	1/2"	3"
-	-	51337	.6250	5/8"	15.875	5/8"	3-1/2"
-	-	51567	.6299		16.000	16.0	88
-	-	51357	.7500	3/4"	19.050	3/4"	4"
-	-	51577	.7874		20.000	20.0	100
-	-	51587	.9843		25.000	25.0	100
-	-	51377	1.000	1"	25.400	1"	4"
-	-	51407	1.250	1-1/4"	31.750	1-1/4"	4-1/2"
-	-	51437	1.250	1-1/4"	31.750	1-1/4"	6"

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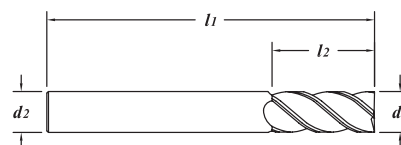
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MATERIAL HARDNESS (Rc)

TOLERANCES

TECH
PAGES
310-311

平头 - AlTiN 涂层



Ball End - page 194



Vollradiusfräser - Seite 194



Fresadora de radios - Página 194



Hemispherique - Page 194



Sferiche - Pagina 194



球头 - 194页

EDP#	$d1^{\dagger}$ Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	Number of Flutes
	Decimal		Metric				
21200	.1181		3.000	3.0	38	12	4
21230	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	4
21260	.1575		4.000	6.0	50	12	4
21290	.1875	3/16"	4.763	3/16"	2"	9/16"	4
21320	.1969		5.000	6.0	65	15	4
21350	.2362		6.000	6.0	65	19	4
21380	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	4
21410	.2756		7.000	8.0	65	22	5
21440	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5
21470	.3150		8.000	8.0	65	22	5
21500	.3543		9.000	10.0	65	22	5
21530	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5
21560	.3937		10.000	10.0	70	22	5
21620	.4724		12.000	12.0	75	32	5
21660	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5
21710	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5
21740	.6299		16.000	16.0	88	32	5
21800	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5
21830	.7874		20.000	20.0	100	38	5
21890	.9843		25.000	25.0	100	38	5
21920	1.000	1"	25.400	1"	4"	1-1/2"	5

TOLERANCES

d_1	+0.000" -0.002" (+.000mm -.050mm)
d_2	h6
r	+0.001" -0.001" (+.025 -.025mm)

Series 545RA

HIGH ROCKWELL END MILLS

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Corner Radius - AlTiN Coated

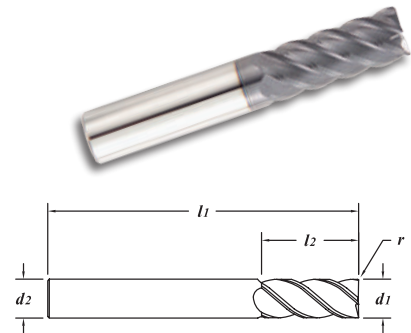
Eckenradius - AlTiN-Beschichtet

Ángulo Redondeado - Recubrimiento de AlTiN

Rayon de Coin - Revêtement AlTiN

Torico - Rivestimento in AlTiN

圓角半径 - AlTiN 涂层

HIGH PERFORMANCE
END MILLS

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

Recommended for Inconel, tool steels, and hardened die mold above 45 Rc

Square End - page 192

Ball End - page 194



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für die Bearbeitung von gehärteten Werkstoffen

Empfohlen für Empfohlen für die Bearbeitung von gehärteten
Formenbaustählen, Inconel und Werkzeugstählen über 45 HRC

Schaftfräser ohne Eckenradius - Seite 192

Vollradiusfräser - Seite 194



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell

Recomendadas para trabajar troqueles endurecidos, inconel y aceros
de herramientas alrededor de 45Rc

Fresa de vástago sin radio de cantos - Página 192

Fresadora de radios - Página 194



Fraises carbure submicrograin - coupe au centre
Haute performance outil pour durs material

Recommandee pour utilisation dans aciers a moules a haute durete,
inconel, et aciers a outillage au dessus de 45HRC

Extrémité carré - Page 192

Hemispherique - Page 194



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni da impiegare su materiali temprati

Raccomandata per lavorazioni su acciai temprati, inconel e acciai per
utensili superiori a 45 Hrc

Piatte - Pagina 192

Sferiche - Pagina 194



高效超细晶粒整体硬质合金立铣刀 - 中心切削
适合加工洛氏硬度高的材质

推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢

平头 - 192页

球头 - 194页

EDP#	d_1 †		d_2	l_1	l_2	r		
	Decimal	Metric						Shank Diameter
21202	.1181		3.000	3.0	38	12	0.20	4
21212	.1181		3.000	3.0	38	12	0.50	4
21232	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	4
21242	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	4
21262	.1575		4.000	6.0	50	12	0.30	4
21292	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	4
21302	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	4
21322	.1969		5.000	6.0	65	15	0.30	4
21342	.2362		6.000	6.0	65	19	0.20	4
21352	.2362		6.000	6.0	65	19	0.50	4
21372	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	4
21382	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	4
21392	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	4
21412	.2756		7.000	8.0	65	22	0.50	5
21432	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	5
21442	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	5
21452	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	5
21462	.3150		8.000	8.0	65	22	0.20	5
21472	.3150		8.000	8.0	65	22	0.50	5
21502	.3543		9.000	10.0	65	22	0.50	5
21522	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	5
21532	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	5
21542	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	5
21552	.3937		10.000	10.0	70	22	0.20	5
21562	.3937		10.000	10.0	70	22	0.50	5
21612	.4724		12.000	12.0	75	32	0.50	5
21622	.4724		12.000	12.0	75	32	1.00	5
21642	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	5
21652	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	5
21662	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	5
21672	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	5
21692	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	5
21702	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	5
21712	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	5
21722	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	5
21732	.6299		16.000	16.0	88	32	0.50	5
21742	.6299		16.000	16.0	88	32	1.00	5
21772	.7087		18.000	18.0	100	38	0.50	5
21802	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	5
21812	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	5
21822	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	5
21832	.7874		20.000	20.0	100	38	0.50	5
21922	1.000	1"	25.400	1"	4"	1-1/2"	.015"	5
21932	1.000	1"	25.400	1"	4"	1-1/2"	.030"	5
21942	1.000	1"	25.400	1"	4"	1-1/2"	.060"	5

70

35

MATERIAL HARDNESS (Rc)

0

HIGH ROCKWELL END MILLS

TOLERANCES

d_1	$+0.000'' - .002'' (+.000 - .050\text{mm})$
d_2	$h6$
ball radius	$+0.000'' - .001'' (+.000 - .025\text{mm})$



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Ball End - AlTiN Coated

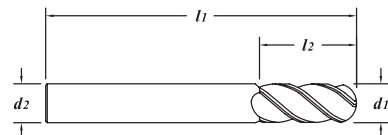
Vollradius - AlTiN-Beschichtet

Cabeza Esférica - Recubrimiento de AlTiN

Hemispherique - Revêtement AlTiN

Sferica - Rivestimento in AlTiN

球头 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

Recommended for Inconel, tool steels, and hardened die mold above 45 Rc

Square End - page 192

Corner Radius - page 193



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für die Bearbeitung von gehärteten Werkstoffen

Empfohlen für Empfohlen für die Bearbeitung von gehärteten
Formenbaustählen, Inconel und Werkzeugstählen über 45 HRc

Vollradius Toleranz: $+0,000 / -0,025 (+.000'' - .001'')$

Schaftfräser ohne Eckenradius - Seite 192

Schaftfräser mit Eckenradius - Seite 193



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell

Recomendadas para trabajar troqueles endurecidos, Inconel y aceros
de herramientas alrededor de 45Rc

Tolerancia de la cabeza esférica $+0,000 / -0,025 (+.000'' - .001'')$

Fresa de vástago sin radio de cantos - Página 192

Fresa de vástago con radio de cantos - Página 193



Fraises carbure submicrograin - coupe au centre
Haute performance outil pour durs material

Recommandee pour utilisation dans aciers a moules a haute durete,
inconel, et aciers a outillage au dessus de 45HRC

Tolerance du rayon de hemispherique $+0,000 / -0,025 (+.000'' - .001'')$

Extrémité carré - Page 192

Rayon de Coin - Page 193



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni da impiegare su materiali temprati

Raccomandata per lavorazioni su acciai temprati, Inconel e acciai per
utensili superiori a 45 Hrc

Tolleranza del raggio $+0,000 / -0,025 (+.000'' - .001'')$

Piatte - Pagina 192

Toriche - Pagina 193



高效超细晶粒整体硬质合金立铣刀 - 中心切削
适合加工洛氏硬度高的材质

推荐加工淬硬模具、铬镍铁耐热合金和洛氏硬度45以上的工具钢

半径公差 $+0,000 / -0,025 (+.000'' - .001'')$

平头 - 192页

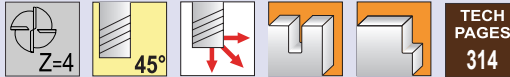
圆弧角 - 193页

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes
	Decimal	Metric				
21204	.1181	3.000	3.0	38	12	4
21234	.1250	1/8"	3.175	1/8"	1-1/2"	4
21264	.1575	4.000	6.0	50	12	4
21294	.1875	3/16"	4.763	3/16"	2"	4
21324	.1969	5.000	6.0	65	15	4
21354	.2362	6.000	6.0	65	19	4
21384	.2500	1/4"	6.353	1/4"	2-1/2"	4
21414	.2756	7.000	8.0	65	22	5
21444	.3125	5/16"	7.938	5/16"	2-1/2"	5
21474	.3150	8.000	8.0	65	22	5
21504	.3543	9.000	10.0	65	22	5
21534	.3750	3/8"	9.525	3/8"	2-1/2"	5
21564	.3937	10.000	10.0	70	22	5
21624	.4724	12.000	12.0	75	32	5
21664	.5000	1/2"	12.700	1/2"	3"	5
21714	.6250	5/8"	15.875	5/8"	3-1/2"	5
21744	.6299	16.000	16.0	88	32	5
21774	.7087	18.000	18.0	100	38	5
21804	.7500	3/4"	19.050	3/4"	4"	5
21924	1.000	1"	25.400	1"	4"	5

TOLERANCES

d_1	+0.000" -0.002" (+.000mm -.050mm)
d_2	h6
r	+0.001" -0.001" (+.025 -.025mm)

HIGH FEED END MILLS

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Series H-45

HIGH
PERFORMANCE
END MILLS

Corner Radius - AlTiN Coated

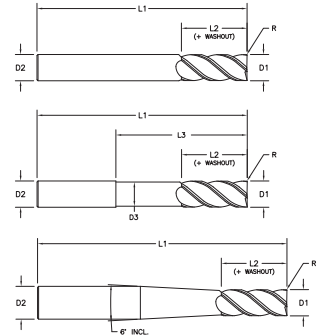
Eckenradius - AlTiN-Beschichtet

Ángulo Redondeado - Recubrimiento de AlTiN

Rayon de Coin - Revêtement AlTiN

Torico - Rivestimento in AlTiN

圓角半径 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
For light axial / radial depths of cut

Recommended for die mold applications

Rigid work holding, machine stability and part integrity are critical!

* - tool has 3° blend angle to shank

* - tool has reduced diameter shank



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungswerkzeug für die Bearbeitung von Teilen mit kleinen axialen Schnitttiefen

Empfohlen für Werkzeuganwendungen

Gute Werkstücksanpassung, Maschinestabilität und Teileintegration sind entscheidend!

* - Das Werkzeug hat einen konischen Hals von 3°

* - Das Werkzeug hat einen reduzierten Schaftdurchmesser



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Herramienta de alto rendimiento para uso en profundidades axiales ligeras de corte

Recomendado para aplicaciones de Moldes

La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales

* - la herramienta tiene un ángulo de mezcla de 3° con el vástago

* - la herramienta tiene un vástago de diámetro reducido



Fraises carbure submicrograin - coupe au centre
Outil haute performance pour un usinage avec des petites profondeurs de coupe axiales

Recommandé pour les applications de matrices

Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes

* - L'outil a un angle de dégagement de 3° sur la queue

* - L'outil a un diamètre de queue réduit



Fresa sub-micrograno metallo duro - taglio al centro
Utensile ad alte prestazioni per piccole profondità di taglio

Consigliato per le applicazioni Die Mold

Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!

* - utensile con 3° di inclinazione rispetto al gambo

* - utensile con diametro ridotto del gambo



超细晶粒整体硬质合金立铣刀 - 中心切削
适用于轴用小切深加工的高性能铣刀

推薦用於模具應用

高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！

* - 部分型号柄部有3°过渡角

* - 部分型号柄径小于刃径

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
48300	.1181	3.000	6.0	65	3	0.75	15.0	2.80
48305	.1250	1/8"	3.175	1/8"	3"	1/8"	.015"	-
48310	.1250	1/8"	3.175	1/8"	3"	1/8"	.030"	-
48315	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.010"	3/4"
48320	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.015"	3/4"
48325	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.020"	3/4"
* 48330	.1250	1/8"	3.175	3/16"	3"	1/8"	.030"	*
48335	.1575	4.000	6.0	65	4	1.00	20.0	3.70
48340	.1875	3/16"	4.763	3/16"	3"	3/16"	.015"	-
48345	.1875	3/16"	4.763	3/16"	3"	3/16"	.030"	-
48350	.1875	3/16"	4.763	3/16"	3"	3/16"	.060"	-
48355	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.020"	7/8"
48360	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.030"	7/8"
48365	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.060"	7/8"
48370	.1875	3/16"	4.763	1/4"	4"	3/16"	.020"	1-1/2"
48375	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	1-1/2"
* 48380	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	*
* 48385	.1969	5.000	6.0	100	5	1.20	* 10.0	5.00
48390	.2362	6.000	6.0	100	6	1.50	30.0	5.70
48395	.2500	1/4"	6.350	1/4"	3"	1/4"	.015"	-
48400	.2500	1/4"	6.350	1/4"	3"	1/4"	.030"	-
48405	.2500	1/4"	6.350	1/4"	3"	1/4"	.060"	-
* 48410	.2756	7.000	6.0	100	7	1.50	*	-
48415	.3125	5/16"	7.938	5/16"	2-1/2"	5/16"	.020"	-
48420	.3125	5/16"	7.938	5/16"	3"	5/16"	.078"	1-5/8"
48425	.3125	5/16"	7.938	5/16"	3"	5/16"	.094"	1-5/8"
48430	.3150	8.000	8.0	75	8	2.00	-	-
48435	.3150	8.000	8.0	100	8	2.00	40.0	7.70
48440	.3750	3/8"	9.525	3/8"	3"	3/8"	.015"	-
48445	.3750	3/8"	9.525	3/8"	3"	3/8"	.030"	-
48450	.3750	3/8"	9.525	3/8"	3"	3/8"	.060"	-
48455	.3750	3/8"	9.525	3/8"	3"	3/8"	.094"	2.00"
48460	.3750	3/8"	9.525	3/8"	4"	3/8"	.030"	2-1/2"
48465	.3750	3/8"	9.525	3/8"	4"	3/8"	.094"	2-1/2"
48470	.3937	10.000	10.0	100	10	2.00	50.0	9.70
48475	.4724	12.000	12.0	100	12	3.00	60.0	11.70
48480	.5000	1/2"	12.700	1/2"	3"	1/2"	.015"	-
48485	.5000	1/2"	12.700	1/2"	3"	1/2"	.030"	-
48490	.5000	1/2"	12.700	1/2"	3"	1/2"	.060"	-
48495	.5000	1/2"	12.700	1/2"	3"	1/2"	.125"	-
48500	.5000	1/2"	12.700	1/2"	4"	1/2"	.125"	-

70

35

0

MATERIAL HARDNESS (Rc)

DIE MOLD CUTTERS

TOLERANCES

d_1	$+0.000^{\circ} - .001^{\circ} (+.000 - .025\text{mm})$
d_2	$h6$
ball radius	$+0.0000^{\circ} - .0005^{\circ} (+.0000 - .0127\text{mm})$

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Die Mold Cutter - Ball End - AlTiN Coated

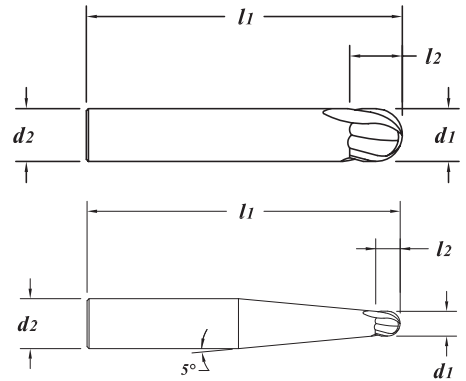
Formenbau Werkzeuge - Vollradius - AlTiN-Beschichtet

Fresas Para Moldes Troquelados - Cabeza Esférica - Recubrimiento de AlTiN

Fraises pour Moules et Outillages - Hemispherique - Revêtement AlTiN

Utensile per Stampi - Sferica - Rivestimento in AlTiN

模具刀具 - 球头 - AlTiN 涂层



Solid submicron grain carbide end mill - center cutting
High performance machining in the die mold industry
Rigid work holding, machine stability and part integrity are critical!
≤5.0mm (.1969") diameter have 5° taper to shank
Recommended for high Rockwell materials
Can be modified with a neck in 48 hours



Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Hochleistungsbearbeitung in der Formenbau Industrie
Gute Werkstückspannung, Maschinestabilität und Teileintegration sind entscheidend!
≤5,0mm (.1969") Durchmesser und kleiner haben 5° Kegel zum Schaft
Empfohlen für Gehärtete Werkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Vollradius Toleranz: $+0,0000 / -0,0127 (+.0000^{\circ} - .0005^{\circ})$



Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento para la industria troqueladora
La sujeción firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Diámetro de 5,0mm (.1969") e inferiores cuentan con un ahusamiento de 5° hasta el mango
Recomendado para materiales de alta Rc
Puede ser modificado con un cuello en 48 horas
Tolerancia de la cabeza esférica $+0,0000 / -0,0127 (+.0000^{\circ} - .0005^{\circ})$



Fraises carbure submicrograin - coupe au centre
Haute performance pour le fraisage dans l'industrie du moule
Le serrage et la stabilité de la pièce, la rigidité de la machine et l'attachement de l'outil sont très importantes
Diamètre 5,0mm (.1969") et plus petit ont un angle de dépouille conique de 5° sur le queue
Recommandée pour matières à haute dureté
Peut être modifié avec un col de dégage sous un délai de 48 heures
Tolérance du rayon de hémisphérique $+0,0000 / -0,0127 (+.0000^{\circ} - .0005^{\circ})$



Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di stampi
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
I diametri inferiori a 6mm sono rastremati a 5°
Materiali temprati
Può essere modificata in 48 ore
Tolleranza del raggio $+0,0000 / -0,0127 (+.0000^{\circ} - .0005^{\circ})$



高效超细晶粒整体硬质合金立铣刀 - 中心切削
用于模具行业高效机加工
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
为特定用途测试并选择硬质合金
5,0mm (.1969")直径和大于5,0mm (.1969")直径都有一个5°锥度直到柄部
洛氏硬度高的材质
可用轴颈进行修正
半径公差 $+0,0000 / -0,0127 (+.0000^{\circ} - .0005^{\circ})$

EDP#	$d_1^{\dagger}$		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	
	Decimal	Diameter Metric				
14210	.0312	1/32"	0.792	1/4"	3"	1/32"
15210	.0394		1.000	6.0	75	1
15220	.0591		1.500	6.0	75	1.5
14220	.0625	1/16"	1.588	1/4"	3"	1/16"
15230	.0787		2.000	6.0	75	2
14230	.0938	3/32"	2.383	1/4"	3"	3/32"
15240	.1181		3.000	6.0	75	3
14240	.1250	1/8"	3.175	1/4"	3"	1/8"
15250	.1575		4.000	6.0	75	4
14250	.1875	3/16"	4.763	1/4"	3"	3/16"
15260	.1969		5.000	6.0	75	5
15270	.2362		6.000	6.0	75	6
14260	.2500	1/4"	6.350	1/4"	3"	1/4"
14270	.3125	5/16"	7.938	5/16"	4"	5/16"
15280	.3150		8.000	8.0	100	8
14280	.3750	3/8"	9.525	3/8"	4"	3/8"
15290	.3937		10.000	10.0	100	10
15300	.4724		12.000	12.0	100	12
14290	.5000	1/2"	12.700	1/2"	4"	1/2"

 $\dagger$ Metric equivalents are for reference only

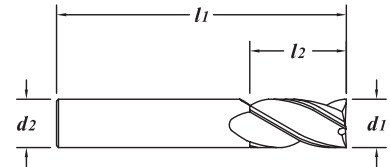
TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	h6

Series 210D

**TECH
PAGES
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Square End - Diamond Coated
Ohne Eckenradius - Diamant-Beschichtet
Extremo Sin Radio - Recubrimiento de Diamante
Extrémité Carré - Revêtement Diamant
Piatte - Rivestimento in Diamante
平头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
 Crystalline diamond coating
 Recommended for graphite, fiber-reinforced plastics, carbon fiber



Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumschnitt
 Krystalline Beschichtung
 Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe



Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
 Recubrimiento cristalino
 Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono



Carbure de classe C-2 - coupe au centre
 Revêtement Crystalline
 Recommandée pour graphite, plastiques renforcés par des fibres et fibre de carbone



Fresa metallo duro di classificazione C-2 - taglio al centro
 Rivestimento al diamante
 Alte prestazioni per lavorazioni di Grafito, resine, fibre di carbonio



高效C-2级硬质合金立铣刀 - 中心切削
 晶体涂层
 推荐加工石墨、纤维补强塑料、碳素纤维

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Diameter Metric			
10018	.0312	1/32"	0.792	1/8"	1-1/2"
46018	.0394		1.000	3/8"	3/32"
10028	.0469	3/64"	1.191	1/8"	1-1/2"
46028	.0591		1.500	3/8"	1/8"
10038	.0625	1/16"	1.588	1/8"	1-1/2"
46038	.0787		2.000	3/8"	1/4"
10058	.0938	3/32"	2.383	1/8"	1-1/2"
46058	.1181		3.000	3/8"	3/8"
10078	.1250	1/8"	3.175	1/8"	1-1/2"
46078	.1575		4.000	4.0"	1/2"
10118	.1875	3/16"	4.763	3/16"	2"
46098	.1969		5.000	5.0"	5/8"
46108	.2362		6.000	6.0"	1"
10158	.2500	1/4"	6.350	1/4"	2-1/2"
10198	.3125	5/16"	7.938	5/16"	3/4"
46128	.3150		8.000	8.0"	7/8"
10238	.3750	3/8"	9.525	3/8"	2-1/2"
46148	.3937		10.000	10.0"	7/8"
46168	.4724		12.000	12.0"	25"
10318	.5000	1/2"	12.700	1/2"	25"
13338	.6250	5/8"	15.875	5/8"	3"
46188	.6299		16.000	16.0"	3-1/2"
13358	.7500	3/4"	19.050	3/4"	88"
13378	1.000	1"	25.400	1"	1-1/2"

70

35

0

MATERIAL HARDNESS (Rc)

 HIGH PERFORMANCE
END MILLS

TOLERANCES

d_1	$+0.000^{\circ} -0.002^{\circ} (+.000 -0.050\text{mm})$
d_2	$h6$
r	$+0.001^{\circ} -0.001^{\circ} (+.025 -0.25\text{mm})$



Corner Radius - Diamond Coated

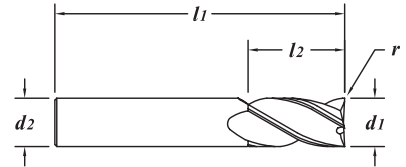
Eckenradius - Diamant-Beschichtet

Ángulo Redondeado - Recubrimiento de Diamante

Rayon de Coin - Revêtement Diamant

Torica - Rivestimento in Diamante

圓角半径 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
For stronger corners and part radius
Recommended for graphite, fiber-reinforced plastics, carbon fiber



Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumschnitt
Krystalline Beschichtung
Für stärkere Schneidecken und Radiusteile
Empfohlen für Graphit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe



Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Para un mejor refuerzo de esquinas y zonas curvas
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono



Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Pour rayons de pièce et angles renforcés
Recommandée pour graphite, plastiques renforcés par des fibres et fibre de carbone



Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Raggi rinforzati
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio



高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
用于强化圆角和零件半径
推荐加工石墨、纤维补强塑料、碳纤维

EDP#	$d_1^{\dagger}$ Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	
	Decimal	Metric					
24118	.1181		3.000	3.0	38	12	0.50
80018	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
80028	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
24148	.1575		4.000	4.0	50	14	0.30
24158	.1575		4.000	4.0	50	14	0.50
80058	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
80068	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
24178	.2362		6.000	6.0	65	20	0.50
24208	.2362		6.000	6.0	65	20	1.50
80108	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
80118	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
80128	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
24248	.3150		8.000	8.0	65	20	1.00
80248	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
80258	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
24318	.3937		10.000	10.0	70	25	1.00
24378	.4724		12.000	12.0	75	25	0.50
24398	.4724		12.000	12.0	75	25	1.00
80328	.5000	1/2"	12.700	1/2"	3"	1"	.030"
80348	.5000	1/2"	12.700	1/2"	3"	1"	.060"

$\dagger$ Metric equivalents are for reference only

TOLERANCES

d_1	$+0.000" -0.002" (+.000 -0.050\text{mm})$
d_2	$h6$
ball radius	$+0.000" -0.001" (+.000 -0.025\text{mm})$



Series 310D

HIGH PERFORMANCE
END MILLS

Ball End - Diamond Coated

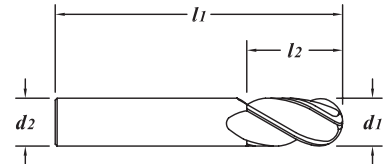
Vollradius - Diamant-Beschichtet

Cabeza Esférica - Recubrimiento de Diamante

Hemispherique - Revêtement Diamant

Sferica - Rivestimento in Diamante

球头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating

Recommended for graphite, fiber-reinforced plastics, carbon fiber



Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung

Empfohlen für Graphit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Vollradius Toleranz: $+0,000 / -0,025 (+.000" -0.001")$



Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino

Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+.000" -0.001")$



Carbure de classe C-2 - coupe au centre
Revêtement Crystalline

Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone
Tolerance du rayon de hemispherique $+0,000 / -0,025 (+.000" -0.001")$



Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante

Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Tolleranza del raggio $+0,000 / -0,025 (+.000" -0.001")$



高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层

推荐加工石墨、纤维补强塑料、碳素纤维
半径公差 $+0,000 / -0,025 (+.000" -0.001")$

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Diameter Metric			
15018	.0312	1/32"	0.792	1/8"	3/32"
48018	.0394		1.000	3.0	4
15028	.0469	3/64"	1.191	1/8"	1-1/2"
48028	.0591		1.500	3.0	6
15038	.0625	1/16"	1.588	1/8"	1-1/2"
48038	.0787		2.000	3.0	8
15058	.0938	3/32"	2.383	1/8"	1-1/2"
48058	.1181		3.000	3.0	12
15078	.1250	1/8"	3.175	1/8"	1-1/2"
48078	.1575		4.000	4.0	14
15118	.1875	3/16"	4.763	3/16"	2"
48098	.1969		5.000	5.0	16
48108	.2362		6.000	6.0	20
15158	.2500	1/4"	6.350	1/4"	2-1/2"
15198	.3125	5/16"	7.938	5/16"	2-1/2"
48128	.3150		8.000	8.0	20
15238	.3750	3/8"	9.525	3/8"	2-1/2"
48168	.4724		12.000	12.0	25
15318	.5000	1/2"	12.700	1/2"	3"

70

MATERIAL HARDNESS (Rc)

35

0

$d1$	$+0.000^{\circ} -0.002^{\circ} (+.000 -0.050\text{mm})$
$d2$	$h6$



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Extra Length - Square End - Diamond Coated

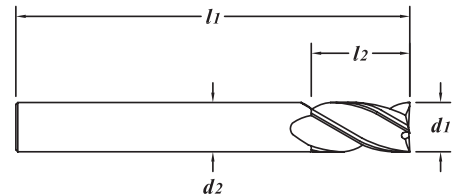
Extra Länge - Ohne Eckenradius - Diamant-Beschichtet

Longitud Extra - Extremo Sin Radio - Recubrimiento de Diamante

Extra Longue - Extrémité Carré - Revêtement Diamant

Lunghezza Extra - Piatte - Rivestimento in Diamante

超长 - 平头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating

Recommended for graphite, fiber-reinforced plastics, carbon fiber
Can be modified with a neck in 48 hours



Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung

Empfohlen für Graphit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden



Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino

Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Puede ser modificado con un cuello en 48 horas



Carbure de classe C-2 - coupe au centre
Revêtement Crystalline

Recommandée pour graphite, plastiques renforcés par des fibres et fibre de carbone
Modification possible : gorge de dégagement (sous 48 Heures)



Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante

Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Può essere modificata in 48 ore



高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层

推荐加工石墨、纤维补强塑料、碳纤维
可用轴颈进行修正

EDP#	$d1^{\dagger}$ Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal	Metric			
94028	.1181	3.000	3.0	75	20
38038	.1250	1/8"	3.175	1/8"	3"
94068	.1575	4.000	4.0	75	25
38048	.1875	3/16"	4.763	3/16"	4"
38058	.2500	1/4"	6.350	1/4"	3"
38068	.2500	1/4"	6.350	1/4"	4"
38078	.2500	1/4"	6.350	1/4"	6"
38098	.3125	5/16"	7.938	5/16"	4"
94168	.3150	8.000	8.0	100	25
38128	.3750	3/8"	9.525	3/8"	4"
38138	.3750	3/8"	9.525	3/8"	6"
94208	.3937	10.000	10.0	100	25
94248	.4724	12.000	12.0	100	25
38168	.5000	1/2"	12.700	1/2"	4"
38178	.5000	1/2"	12.700	1/2"	4"

TOLERANCES

d_1	$+0.000 \text{ } -0.002 \text{ } (+.000 \text{ } -.050\text{mm})$
d_2	$h6$
ball radius	$+0.000 \text{ } -.001 \text{ } (+.000 \text{ } -.025\text{mm})$



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Series 710D

HIGH PERFORMANCE
END MILLS

Extra Length - Ball End - Diamond Coated

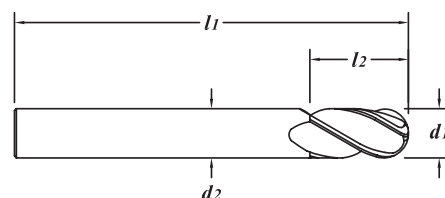
Extra Länge - Vollradius - Diamant-Beschichtet

Longitud Extra - Cabeza Esférica - Recubrimiento de Diamante

Extra Longue - Hemispherique - Revêtement Diamant

Lunghezza Extra - Sferica - Rivestimento in Diamante

超长 - 球头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating

Recommended for graphite, fiber-reinforced plastics, carbon fiber
Can be modified with a neck in 48 hours



Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumschnitt
Krystalline Beschichtung

Empfohlen für Graphit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Vollradius Toleranz: $+0,000 / -0,025 (+.000 \text{ } -.001 \text{ })$



Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino

Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Puede ser modificado con un cuello en 48 horas
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+.000 \text{ } -.001 \text{ })$



Carbure de classe C-2 - coupe au centre
Revêtement Crystalline

Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone
Modification possible : gorge de dégagement (sous 48 Heures)
Tolerance du rayon de hemispherique $+0,000 / -0,025 (+.000 \text{ } -.001 \text{ })$



Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante

Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Può essere modificata in 48 ore
Tolleranza del raggio $+0,000 / -0,025 (+.000 \text{ } -.001 \text{ })$



高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层

推荐加工石墨、纤维补强塑料、碳素纤维
可用轴颈进行修正
半径公差 $+0,000 / -0,025 (+.000 \text{ } -.001 \text{ })$

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Diameter Metric			
99028	.1181	3.000	3.0	75	20
40038	.1250	1/8"	3.175	1/8"	1"
99068	.1575	4.000	4.0	75	25
40048	.1875	3/16"	4.763	3/16"	1"
99108	.2362	6.000	6.0	100	25
99128	.2362	6.000	6.0	150	38
40058	.2500	1/4"	6.350	1/4"	1"
40068	.2500	1/4"	6.350	1/4"	1"
40078	.2500	1/4"	6.350	1/4"	1-1/2"
40098	.3125	5/16"	7.938	5/16"	1"
99168	.3150	8.000	8.0	100	25
40128	.3750	3/8"	9.525	3/8"	1"
40138	.3750	3/8"	9.525	3/8"	1-1/2"
99208	.3937	10.000	10.0	100	25
40168	.5000	1/2"	12.700	1/2"	1"
40178	.5000	1/2"	12.700	1/2"	2"

70

MATERIAL HARDNESS (Rc)

35

0

HARD CARBON COATING

An addition to the Garr Tool lineup of quality coating options

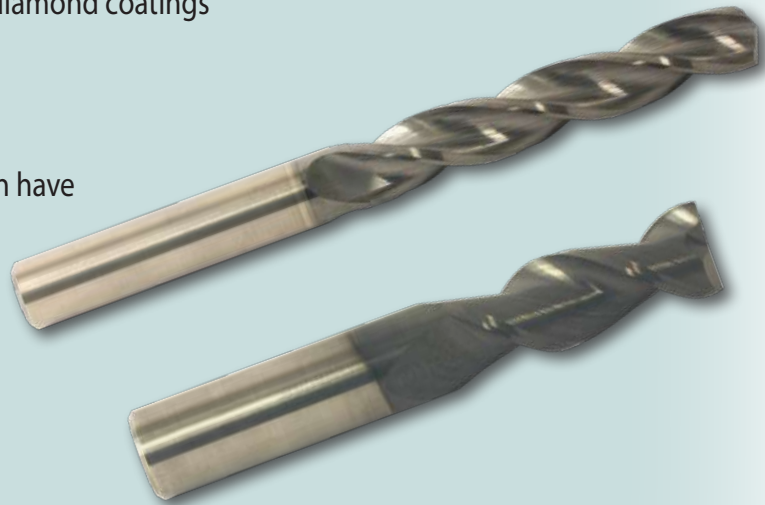


Recommended applications:

Aluminum and aluminum alloys with up to 12% silicon
Non-ferrous metals such as copper, bronze, and platinum
Composites such as GRP, CFK, CFRP, and PEEK
Applications involving combined abrasion and adhesion

Advantages of using Hard Carbon:

Excellent wear resistance due to high hardness
Sharp cutting edges in comparison with diamond coatings
Very good adhesion
Thin, smooth, high density
Can be used on end mills and drills
Most standard products in our catalog can have
Hard Carbon added in 2 weeks



** Sample Pricing:*

50-100 pc. pricing column

<13157> 230MA 1/4" TiAlN Coated - \$18.16 each
<13150> 230M 1/4" add Hard Carbon Coating - \$24.74 each
<10158> 210D 1/4" Diamond Coated - \$107.53 each

* Pricing listed as of 5/16/2022, and is meant for comparison only.
For specific and current pricing, please contact our sales office to request a quote.

Solid micrograin carbide tested for drilling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material



SERIES 780 - 8-FACET POINT

Double angle drill point geometry reduces cutting forces to eliminate exit burrs

Works well in carbon fiber especially when the honeycomb core is either titanium or aluminum

Works in glass-filled epoxy, harder plastics, softer steels, CFRP (Carbon Fiber Reinforced Plastic), and aluminum

Can be coated with a variety of coatings depending on your application



SERIES 805 - CARBON FIBER

Designed for drilling CFRP and plastics

Good in both multidirectional fibers and unidirectional fibers

90° center cutting point for better entry and exit hole with little to no delamination

Parabolic flute shape for less tool pressure on the material, and also for better chip flow in soft plastics

Add Hard Carbon coating for longer tool life than uncoated tools, and shorter lead times than Diamond coating

ROUTERS

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (i.e. - *no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

- Polycrystalline Diamond
- Amorphous Diamond / Hard Carbon
- AlCrN Coated



SERIES 700 - FIBERGLASS ROUTER

For cutting glass-filled epoxies

End cut examples



Burr
Type



Drill
Point

SERIES 701 - KEVLAR ROUTER

Gives a clean edge when trimming
Aramid Fibers (Kevlar)

End cut examples



Burr
Type



Drill
Point

SERIES 702 - CARBON FIBER ROUTER

For trim milling of single-layer panels

SERIES 703 - CARBON FIBER ROUTER

For rough cutting of stacked panels
with or without honeycomb cores

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (*i.e.* - *no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

- Polycrystalline Diamond
- Amorphous Diamond / Hard Carbon
- AlCrN Coated



SERIES 704 - COMPRESSION ROUTER - 4 FLUTE

For profile milling of carbon fiber



SERIES 705 - COMPRESSION ROUTER - 2 FLUTE

For slotting of carbon fiber



SERIES 706 - SINGLE FLUTE ROUTER

For aluminum and soft plastics





Blank Prep

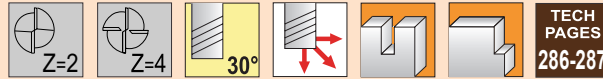


TOLERANCES

d_1	$\leq .030"$	$+0.000" - .001"$ (+.000 - .025mm)
	$\geq 1/32"$	$+0.000" - .002"$ (+.000 - .050mm)
d_2		h6

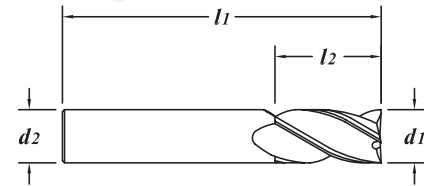
Series 160M, 170M, 860M, 870M

.0200" - .2362"
(0.508mm - 6.000mm)



TECH
PAGES
286-287

GENERAL PURPOSE
END MILLS

Stub Length - Square End
Kurze Länge - Ohne Eckenradius
Longitud Corta - Extremo Sin Radio
Longueur Courte - Extrémité Carré
Serie Corta - Piatte
短柱长度 - 平头


Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiAlN Coated - page 209
Standard Length - page 216
Extended Length - page 238



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Extrem Vielseitig
TiAlN-Beschichtet - Seite 209
Standard Länge - Seite 216
Extra Länge - Seite 238



Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Extremadamente versátil
Recubrimiento de TiAlN - Página 209
Longitud Estándar - Página 216
Longitud Extra - Página 238



Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidité
Utilisations variables
Revêtement TiAlN - Page 209
Longueur Standard - Page 216
Longueur Extra - Page 238



Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Estremamente versatile
Rivestimento in TiAlN - Pagina 209
Lunghezza Standard - Pagina 216
Lunghezza Extra - Pagina 238



超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
功能极多
TiAlN 涂层 - 209页
标准长度 - 216页
超长 - 238页

(160M/860M) 2 Flute EDP#	(170M/870M) 4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal		Metric			
01350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"
01360	-	.0210	.0210"	0.533	1/8"	1-1/2"	.032"
01370	-	.0220	.0220"	0.559	1/8"	1-1/2"	.033"
01380	-	.0230	.0230"	0.584	1/8"	1-1/2"	.035"
01390	-	.0240	.0240"	0.610	1/8"	1-1/2"	.036"
01400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"
01410	-	.0260	.0260"	0.660	1/8"	1-1/2"	.039"
01420	-	.0270	.0270"	0.686	1/8"	1-1/2"	.041"
01430	-	.0280	.0280"	0.711	1/8"	1-1/2"	.042"
01440	-	.0290	.0290"	0.737	1/8"	1-1/2"	.044"
01450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"
01010	02010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
01510	02510	.0394		1.000	3.0	38	2
01020	02020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
01520	02520	.0591		1.500	3.0	38	3
01030	02030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"
01530	02530	.0787		2.000	3.0	38	4
01040	02040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"
01540	02540	.0984		2.500	3.0	38	5
01550	02550	.1181		3.000	3.0	38	6
01050	02050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
01560	02560	.1378		3.500	4.0	50	7
01060	02060	.1562	5/32"	3.967	3/16"	2"	5/16"
01570	02570	.1575		4.000	4.0	50	8
01580	02580	.1772		4.500	5.0	50	9.5
01070	02070	.1875	3/16"	4.763	3/16"	2"	3/8"
01590	02590	.1969		5.000	5.0	50	10
01080	02080	.2188	7/32"	5.558	1/4"	2"	7/16"
01600	02600	.2362		6.000	6.0	50	12

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MATERIAL HARDNESS (Rc)

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continued →

Series 160M, 170M, 860M, 870M (continued)

.2500" - 1.000"
(6.350mm - 25.400mm)

GENERAL PURPOSE
END MILLS

(160M/860M) 2 Flute EDP#	(170M/870M) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
01090	02090	.2500	1/4"	6.350	1/4"	2"
01610	02610	.2756		7.000	7.0	50
01100	02100	.3125	5/16"	7.938	5/16"	2"
01620	02620	.3150		8.000	8.0	50
01630	02630	.3543		9.000	9.0	50
01110	02110	.3750	3/8"	9.525	3/8"	2"
01640	02640	.3937		10.000	10.0	50
01650	02650	.4331		11.000	11.0	65
01120	02120	.4375	7/16"	11.113	7/16"	2-1/2"
01660	02660	.4724		12.000	12.0	65
01130	02130	.5000	1/2"	12.700	1/2"	2-1/2"
01140	02140	.6250	5/8"	15.875	5/8"	3"
-	02670	.6299		16.000	16.0	75
01150	02150	.7500	3/4"	19.050	3/4"	3"
-	02680	.7874		20.000	20.0	75
-	02160	1.000	1"	25.400	1"	3"



End Mill Manufacturing

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	h6

Series 160MA, 170MA, 860MA, 870MA


GENERAL PURPOSE
END MILLS

Stub Length - Square End - TiALN Coated

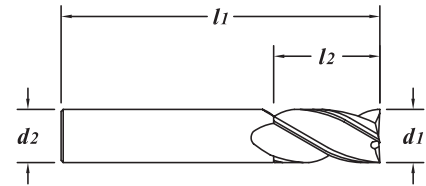
Kurze Länge - Ohne Eckenradius - TiALN-Beschichtet

Longitud Corta - Extremo Sin Radio - Recubrimiento de TiALN

Longueur Courte - Extrémité Carré - Revêtement TiALN

Serie Corta - Piatte - Rivestimento in TiALN

短柱长度 - 平头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Uncoated - page 207
Standard Length - page 220
Extended Length - page 241



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 207
Standard Länge - Seite 220
Extra Länge - Seite 241



Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Mecanizado seco o semisecco
Extremadamente versátil
Sin recubrimiento - Página 207
Longitud Estándar - Página 220
Longitud Extra - Página 241



Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidité
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 207
Longueur Standart - Page 220
Longueur Extra - Page 241



Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 207
Lunghezza Standard - Pagina 220
Lunghezza Extra - Pagina 241



超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
干式或半干式机加工
功能极多
未涂层 - 207页
标准长度 - 220页
超长 - 241页

(160MA/860MA) 2 Flute EDP#	(170MA/870MA) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
01017	02017	.0312	1/32"	0.792	1/8"	1-1/2"
01517	02517	.0394		1.000	3.0	38
01027	02027	.0469	3/64"	1.191	1/8"	1-1/2"
01527	02527	.0591		1.500	3.0	38
01037	02037	.0625	1/16"	1.588	1/8"	1-1/2"
01537	02537	.0787		2.000	3.0	38
01047	02047	.0938	3/32"	2.383	1/8"	1-1/2"
01547	02547	.0984		2.500	3.0	38
01557	02557	.1181		3.000	3.0	38
01057	02057	.1250	1/8"	3.175	1/8"	1-1/2"
01567	02567	.1378		3.500	4.0	50
01067	02067	.1562	5/32"	3.967	3/16"	2"
01577	02577	.1575		4.000	4.0	50
01587	02587	.1772		4.500	5.0	50
01077	02077	.1875	3/16"	4.763	3/16"	2"
01597	02597	.1969		5.000	5.0	50
01087	02087	.2188	7/32"	5.558	1/4"	2"
01607	02607	.2362		6.000	6.0	50
01097	02097	.2500	1/4"	6.350	1/4"	2"
01617	02617	.2756		7.000	7.0	50
01107	02107	.3125	5/16"	7.938	5/16"	2"
01627	02627	.3150		8.000	8.0	50
01637	02637	.3543		9.000	9.0	50
01117	02117	.3750	3/8"	9.525	3/8"	2"
01647	02647	.3937		10.000	10.0	50
01657	02657	.4331		11.000	11.0	65
01127	02127	.4375	7/16"	11.113	7/16"	2-1/2"
01667	02667	.4724		12.000	12.0	65
01137	02137	.5000	1/2"	12.700	1/2"	2-1/2"
01147	02147	.6250	5/8"	15.875	5/8"	3"
-	02677	.6299		16.000	16.0	75
01157	02157	.7500	3/4"	19.050	3/4"	3"
-	02687	.7874		20.000	20.0	75
-	02167	1.000	1"	25.400	1"	3"

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MATERIAL HARDNESS (Rc)

Series 170R, 870R

.0625" - .3150"
(1.588mm - 8.000mm)

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$
r	$+0.001" - .001" (+.025 - .025\text{mm})$

Stub Length - Corner Radius

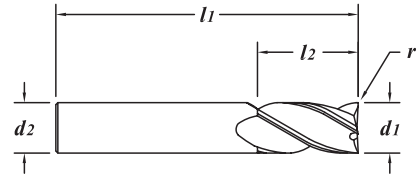
Kurze Länge - Eckenradius

Longitud Corta - Ángulo Redondeado

Longueur Courte - Rayon de Coin

Serie Corta - Torico

短柱长度 - 圆角半径



Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 212
Standard Length - page 222
Extended Length - page 243



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für stärkere Schneidecken und Radiusteile
Extrem Vielseitig
TiAlN-Beschichtet - Seite 212
Standard Länge - Seite 222
Extra Länge - Seite 243



Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Extremadamente versátil
Recubrimiento de TiAlN - Página 212
Longitud Estándar - Página 222
Longitud Extra - Página 243



Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Utilisations variables
Revêtement TiAlN - Page 212
Longueur Standart - Page 222
Extra Longueur - Page 243



Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente versatile
Rivestimento in TiAlN - Pagina 212
Lunghezza Standard - Pagina 222
Lunghezza Extra - Pagina 243



超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
功能极多
TiAlN 涂层 - 212页
标准长度 - 222页
超长 - 243页

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
	Decimal	Metric				
30701	.0625	1/16"	1.588	1/8"	1-1/2"	.010"
30703	.0625	1/16"	1.588	1/8"	1-1/2"	.015"
30705	.0938	3/32"	2.383	1/8"	1-1/2"	.010"
30707	.0938	3/32"	2.383	1/8"	1-1/2"	.015"
30709	.0938	3/32"	2.383	1/8"	1-1/2"	.020"
30711	.1181	1/8"	3.000	3/8"	6"	0.20
30713	.1181	1/8"	3.000	3/8"	6"	0.50
30715	.1250	1/8"	3.175	1/8"	1-1/2"	.010"
30717	.1250	1/8"	3.175	1/8"	1-1/2"	.015"
30719	.1250	1/8"	3.175	1/8"	1-1/2"	.020"
30721	.1250	1/8"	3.175	1/8"	1-1/2"	.030"
30904	.1250	1/8"	3.175	1/8"	1-1/2"	.040"
30909	.1562	5/32"	3.967	3/16"	2"	.015"
30911	.1562	5/32"	3.967	3/16"	2"	.030"
30913	.1562	5/32"	3.967	3/16"	2"	.060"
30723	.1575	1/8"	4.000	4.0	50	0.30
30725	.1575	1/8"	4.000	4.0	50	0.50
30727	.1875	3/16"	4.763	3/16"	2"	.010"
30729	.1875	3/16"	4.763	3/16"	2"	.015"
30731	.1875	3/16"	4.763	3/16"	2"	.020"
30733	.1875	3/16"	4.763	3/16"	2"	.030"
30735	.1969	5/16"	5.000	5.0	50	0.30
30737	.1969	5/16"	5.000	5.0	50	0.50
30739	.2362	3/8"	6.000	6.0	50	0.50
30741	.2362	3/8"	6.000	6.0	50	0.80
30743	.2362	3/8"	6.000	6.0	50	1.00
30745	.2362	3/8"	6.000	6.0	50	1.50
30747	.2362	3/8"	6.000	6.0	50	2.00
30749	.2500	1/4"	6.350	1/4"	2"	.010"
30751	.2500	1/4"	6.350	1/4"	2"	.015"
30753	.2500	1/4"	6.350	1/4"	2"	.020"
30755	.2500	1/4"	6.350	1/4"	2"	.030"
30757	.2500	1/4"	6.350	1/4"	2"	.045"
30759	.2500	1/4"	6.350	1/4"	2"	.060"
30761	.3125	5/16"	7.938	5/16"	2"	.015"
30763	.3125	5/16"	7.938	5/16"	2"	.020"
30765	.3125	5/16"	7.938	5/16"	2"	.030"
30767	.3125	5/16"	7.938	5/16"	2"	.045"
30769	.3125	5/16"	7.938	5/16"	2"	.060"
30771	.3150	5/16"	8.000	8.0	50	0.50
30773	.3150	5/16"	8.000	8.0	50	0.80
30775	.3150	5/16"	8.000	8.0	50	1.00
30777	.3150	5/16"	8.000	8.0	50	1.50
30779	.3150	5/16"	8.000	8.0	50	2.00
30781	.3150	5/16"	8.000	8.0	50	2.50
30783	.3150	5/16"	8.000	8.0	50	3.00

EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
	Decimal		Metric				
30785	.3750	3/8"	9.525	3/8"	2"	5/8"	.010"
30787	.3750	3/8"	9.525	3/8"	2"	5/8"	.015"
30789	.3750	3/8"	9.525	3/8"	2"	5/8"	.020"
30791	.3750	3/8"	9.525	3/8"	2"	5/8"	.030"
30793	.3750	3/8"	9.525	3/8"	2"	5/8"	.045"
30795	.3750	3/8"	9.525	3/8"	2"	5/8"	.060"
30797	.3937		10.000	10.0	50	16	0.50
30799	.3937		10.000	10.0	50	16	0.80
30801	.3937		10.000	10.0	50	16	1.00
30803	.3937		10.000	10.0	50	16	1.50
30805	.3937		10.000	10.0	50	16	2.00
30807	.3937		10.000	10.0	50	16	2.50
30809	.3937		10.000	10.0	50	16	3.00
30811	.3937		10.000	10.0	50	16	3.20
30813	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.010"
30815	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.015"
30817	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"
30819	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.030"
30821	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.045"
30823	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.060"
30825	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.090"
30827	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.125"
30829	.4724		12.000	12.0	65	19	0.50
30831	.4724		12.000	12.0	65	19	0.80
30833	.4724		12.000	12.0	65	19	1.00
30835	.4724		12.000	12.0	65	19	1.50
30837	.4724		12.000	12.0	65	19	2.00
30839	.4724		12.000	12.0	65	19	2.50
30841	.4724		12.000	12.0	65	19	3.00
30843	.4724		12.000	12.0	65	19	3.20
30845	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"
30847	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"
30849	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"
30851	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
30853	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.045"
30855	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
30857	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"
30859	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"
30861	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"
30863	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"
30865	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"
30867	.6250	5/8"	15.875	5/8"	3"	3/4"	.045"
30869	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"
30871	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"
30873	.6299		16.000	16.0	75	19	0.50
30875	.6299		16.000	16.0	75	19	1.00
30877	.6299		16.000	16.0	75	19	2.00
30879	.6299		16.000	16.0	75	19	2.50
30881	.6299		16.000	16.0	75	19	3.00
30883	.6299		16.000	16.0	75	19	4.00
30885	.6299		16.000	16.0	75	19	5.00
30887	.7500	3/4"	19.050	3/4"	3"	1"	.015"
30889	.7500	3/4"	19.050	3/4"	3"	1"	.020"
30891	.7500	3/4"	19.050	3/4"	3"	1"	.030"
30893	.7500	3/4"	19.050	3/4"	3"	1"	.045"
30895	.7500	3/4"	19.050	3/4"	3"	1"	.060"
30897	.7500	3/4"	19.050	3/4"	3"	1"	.090"
30899	.7500	3/4"	19.050	3/4"	3"	1"	.125"
30901	.7500	3/4"	19.050	3/4"	3"	1"	.250"

70

35

MATERIAL HARDNESS (Rc)

0

Series 170RA, 870RA

.0625" - .3150"
(1.588mm - 8.000mm)



TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6
r	+0.001" - .001" (+.025 - .025mm)

GENERAL PURPOSE
END MILLS

Stub Length - Corner Radius - TiAlN Coated

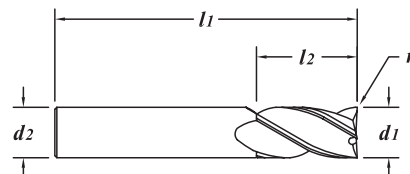
Kurze Länge - Eckenradius - TiAlN-Beschichtet

Longitud Corta - Ángulo Redondeado - Recubrimiento de TiAlN

Longueur Courte - Rayon de Coin - Revêtement TiAlN

Serie Corta - Torico - Rivestimento in TiAlN

短柱长度 - 圆角半径 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Dry or semi-dry machining
Extremely versatile
Uncoated - page 210
Standard Length - page 225
Extended Length - page 246



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 210
Standard Länge - Seite 225
Extra Länge - Seite 246



Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semiseco
Extremadamente versátil
Sin recubrimiento - Página 210
Longitud Estándar - Página 225
Longitud Extra - Página 246



Fraises carbure submicrograin - coupe au centre
Rayon de coin renforcés
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 210
Longueur Standart - Page 225
Extra Longueur - Page 246



Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 210
Lunghezza Standard - Pagina 225
Lunghezza Extra - Pagina 246



超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
干式或半干式机加工
功能极多
未涂层 - 210页
标准长度 - 225页
超长 - 246页

EDP#	d_1 †			d_2	l_1	l_2	r
	Decimal	Diameter	Metric				
30702	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"
30704	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.015"
30706	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"
30708	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.015"
30710	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.020"
30712	.1181		3.000	3.0	38	6	0.20
30714	.1181		3.000	3.0	38	6	0.50
30716	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"
30718	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"
30720	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"
30722	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"
30906	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.040"
30910	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"
30912	.1562	5/32"	3.967	3/16"	2"	5/16"	.030"
30914	.1562	5/32"	3.967	3/16"	2"	5/16"	.060"
30724	.1575		4.000	4.0	50	8	0.30
30726	.1575		4.000	4.0	50	8	0.50
30728	.1875	3/16"	4.763	3/16"	2"	3/8"	.010"
30730	.1875	3/16"	4.763	3/16"	2"	3/8"	.015"
30732	.1875	3/16"	4.763	3/16"	2"	3/8"	.020"
30734	.1875	3/16"	4.763	3/16"	2"	3/8"	.030"
30736	.1969		5.000	5.0	50	10	0.30
30738	.1969		5.000	5.0	50	10	0.50
24117	.1969		5.000	5.0	50	16	0.30
30740	.2362		6.000	6.0	50	12	0.50
30742	.2362		6.000	6.0	50	12	0.80
30744	.2362		6.000	6.0	50	12	1.00
30746	.2362		6.000	6.0	50	12	1.50
30748	.2362		6.000	6.0	50	12	2.00
30750	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"
30752	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"
30754	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"
30756	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"
30758	.2500	1/4"	6.350	1/4"	2"	1/2"	.045"
30760	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"
30762	.3125	5/16"	7.938	5/16"	2"	1/2"	.015"
30764	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"
30766	.3125	5/16"	7.938	5/16"	2"	1/2"	.030"
30768	.3125	5/16"	7.938	5/16"	2"	1/2"	.045"
30770	.3125	5/16"	7.938	5/16"	2"	1/2"	.060"
30772	.3150		8.000	8.0	50	12	0.50
30774	.3150		8.000	8.0	50	12	0.80
30776	.3150		8.000	8.0	50	12	1.00
30778	.3150		8.000	8.0	50	12	1.50
30780	.3150		8.000	8.0	50	12	2.00
30782	.3150		8.000	8.0	50	12	2.50
30784	.3150		8.000	8.0	50	12	3.00

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
	Decimal	Diameter	Metric				
30786	.3750	3/8"	9.525	3/8"	2"	5/8"	.010"
30788	.3750	3/8"	9.525	3/8"	2"	5/8"	.015"
30790	.3750	3/8"	9.525	3/8"	2"	5/8"	.020"
30792	.3750	3/8"	9.525	3/8"	2"	5/8"	.030"
30794	.3750	3/8"	9.525	3/8"	2"	5/8"	.045"
30796	.3750	3/8"	9.525	3/8"	2"	5/8"	.060"
30798	.3937		10.000	10.0	50	16	0.50
30800	.3937		10.000	10.0	50	16	0.80
30802	.3937		10.000	10.0	50	16	1.00
30804	.3937		10.000	10.0	50	16	1.50
30806	.3937		10.000	10.0	50	16	2.00
30808	.3937		10.000	10.0	50	16	2.50
30810	.3937		10.000	10.0	50	16	3.00
30812	.3937		10.000	10.0	50	16	3.20
30814	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.010"
30816	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.015"
30818	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"
30820	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.030"
30822	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.045"
30824	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.060"
30826	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.090"
30828	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.125"
30830	.4724		12.000	12.0	65	19	0.50
30832	.4724		12.000	12.0	65	19	0.80
30834	.4724		12.000	12.0	65	19	1.00
30836	.4724		12.000	12.0	65	19	1.50
30838	.4724		12.000	12.0	65	19	2.00
30840	.4724		12.000	12.0	65	19	2.50
30842	.4724		12.000	12.0	65	19	3.00
30844	.4724		12.000	12.0	65	19	3.20
30846	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"
30848	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"
30850	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"
30852	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
30854	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.045"
30856	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
30858	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"
30860	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"
30862	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"
30864	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"
30866	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"
30868	.6250	5/8"	15.875	5/8"	3"	3/4"	.045"
30870	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"
30872	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"
30874	.6299		16.000	16.0	75	19	0.50
30876	.6299		16.000	16.0	75	19	1.00
30878	.6299		16.000	16.0	75	19	2.00
30880	.6299		16.000	16.0	75	19	2.50
30882	.6299		16.000	16.0	75	19	3.00
30884	.6299		16.000	16.0	75	19	4.00
30886	.6299		16.000	16.0	75	19	5.00
30888	.7500	3/4"	19.050	3/4"	3"	1"	.015"
30890	.7500	3/4"	19.050	3/4"	3"	1"	.020"
30892	.7500	3/4"	19.050	3/4"	3"	1"	.030"
30894	.7500	3/4"	19.050	3/4"	3"	1"	.045"
30896	.7500	3/4"	19.050	3/4"	3"	1"	.060"
30898	.7500	3/4"	19.050	3/4"	3"	1"	.090"
30900	.7500	3/4"	19.050	3/4"	3"	1"	.125"
30902	.7500	3/4"	19.050	3/4"	3"	1"	.250"

70

35

MATERIAL HARDNESS (Rc)

0



TOLERANCES

d_1	$\leq .030"$	$+0.000" -0.001" (+0.000 -0.025mm)$
	$\geq 1/32"$	$+0.000" -0.002" (+0.000 -0.050mm)$
d_2	h6	
ball radius	$+0.000" -0.001" (+0.000 -0.025mm)$	

Stub Length - Ball End

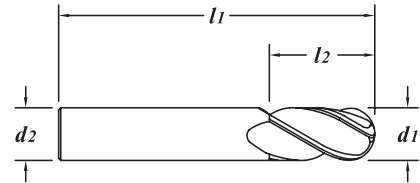
Kurze Länge - Vollradius

Longitud Corta - Cabeza Esférica

Longueur Courte - Hemispherique

Serie Corta - Sferica

短柱长度 - 双头



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
Radius Tolerance: $+0.000 / -0.025mm (+0.000" -0.001")$
TiAlN Coated - page 215
Standard Length - page 228
Extended Length - Page 249



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Extrem Vielseitig
Vollradius Toleranz: $+0.000 / -0.025mm (+0.000" -0.001")$
TiAlN-Beschichtet - Seite 215
Standard Länge - Seite 228
Extra Länge - Seite 249



Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Extremadamente versátil
Tolerancia de la cabeza esférica $+0.000 / -0.025mm (+0.000" -0.001")$
Recubrimiento de TiAlN - Página 215
Longitud Estándar - Página 228
Longitud Extra - Página 249



Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidité
Utilisations variables
Tolerance du rayon de hemispherique $+0.000 / -0.025mm (+0.000" -0.001")$
Revêtement TiAlN - Page 215
Longueur Standard - Page 228
Longueur Extra - Page 249



Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Estremamente versatile
Tolleranza del raggio $+0.000 / -0.025mm (+0.000" -0.001")$
Rivestimento in TiAlN - Pagina 215
Lunghezza Standard - Pagina 228
Lunghezza Extra - Pagina 249



超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
功能极多
半径公差 $+0.000 / -0.025mm (+0.000" -0.001")$
TiAlN 涂层 - 215页
标准长度 - 228页
超长 - 249页

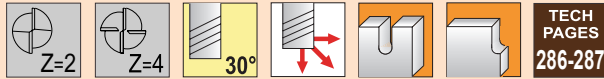
(180M/980M) 2 Flute EDP#	(190M/990M) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
03350	-	.0200	.0200"	0.508	1/8"	1-1/2"
03400	-	.0250	.0250"	0.635	1/8"	.038"
03450	-	.0300	.0300"	0.762	1/8"	.045"
03010	04010	.0312	1/32"	0.792	1/8"	1/16"
03510	04510	.0394		1.000	3.0	2
03020	04020	.0469	3/64"	1.191	1/8"	3/32"
03520	-	.0591		1.500	3.0	3
03030	04030	.0625	1/16"	1.588	1/8"	1/8"
03530	04530	.0787		2.000	3.0	4
03040	04040	.0938	3/32"	2.383	1/8"	3/16"
03540	04540	.0984		2.500	3.0	5
03550	04550	.1181		3.000	3.0	6
03050	04050	.1250	1/8"	3.175	1/8"	1/4"
03560	04560	.1378		3.500	4.0	7
03060	04060	.1562	5/32"	3.967	3/16"	2"
03570	04570	.1575		4.000	4.0	8
03580	04580	.1772		4.500	5.0	9.5
03070	04070	.1875	3/16"	4.763	3/16"	2"
03590	04590	.1969		5.000	5.0	10
03080	04080	.2188	7/32"	5.558	1/4"	2"
03600	04600	.2362		6.000	6.0	12
03090	04090	.2500	1/4"	6.350	1/4"	2"
03610	04610	.2756		7.000	7.0	12
03100	04100	.3125	5/16"	7.938	5/16"	2"
03620	04620	.3150		8.000	8.0	12
03630	04630	.3543		9.000	9.0	14
03110	04110	.3750	3/8"	9.525	3/8"	2"
03640	04640	.3937		10.000	10.0	16
03120	04120	.4375	7/16"	11.113	7/16"	2-1/2"
03660	04660	.4724		12.000	12.0	65
03130	04130	.5000	1/2"	12.700	1/2"	2-1/2"
03150	04150	.7500	3/4"	19.050	3/4"	3"

† Metric equivalents are for reference only

TOLERANCES

d_1	$+0.000^{\circ} -0.002^{\circ} (+.000 -.050\text{mm})$
d_2	$h6$
ball radius	$+0.000^{\circ} -0.001^{\circ} (+.000 -.025\text{mm})$

Series 180MA, 190MA, 980MA, 990MA

GENERAL PURPOSE
END MILLS

Stub Length - Ball End - TiAlN Coated

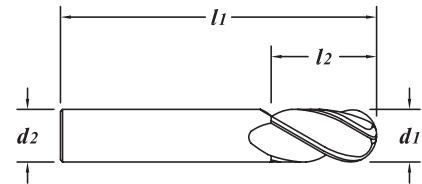
Kurze Länge - Vollradius - TiAlN-Beschichtet

Longitud Corta - Cabeza Esférica - Recubrimiento de TiAlN

Longueur Courte - Hemispherique - Revêtement TiAlN

Serie Corta - Sferica - Rivestimento in TiAlN

短柱长度 - 双头 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Radius Tolerance: $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
Uncoated - page 214
Standard Length - page 232
Extended Length - page 252



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Kürzere Spannuten für höhere Stabilität
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
Unbeschichtet - Seite 214
Standard Länge - Seite 232
Extra Länge - Seite 252



Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Mecanizado seco o semisecco
Extremadamente versátil
Tolerancia de la cabeza esférica $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
Sin recubrimiento - Página 214
Longitud Estándar - Página 232
Longitud Extra - Página 252



Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidité
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
Sans revêtement - Page 214
Longueur Standard - Page 232
Longueur Extra - Page 252



Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Lavorazione a secco o a umido
Estremamente versatile
Tolleranza del raggio $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
Non Rivestito - Pagina 214
Lunghezza Standard - Pagina 232
Lunghezza Extra - Pagina 252



超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
干式或半干式机加工
功能极多
半径公差 $+0.000 / -0.025\text{mm} (+.000^{\circ} -.001^{\circ})$
未涂层 - 214页
标准长度 - 232页
超长 - 252页

(180MA/980MA) 2 Flute EDP#	(190MA/990MA) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
03017	04017	.0312	1/32"	0.792	1/8"	1-1/2"
03517	04517	.0394		1.000	3.0	38
03027	04027	.0469	3/64"	1.191	1/8"	1-1/2"
03527	04527	.0591		1.500	3.0	38
03037	04037	.0625	1/16"	1.588	1/8"	1-1/2"
03537	04537	.0787		2.000	3.0	38
03047	04047	.0938	3/32"	2.383	1/8"	1-1/2"
03547	04547	.0984		2.500	3.0	38
03557	04557	.1181		3.000	3.0	38
03057	04057	.1250	1/8"	3.175	1/8"	1-1/2"
03567	04567	.1378		3.500	4.0	50
03067	04067	.1562	5/32"	3.967	3/16"	2"
03577	04577	.1575		4.000	4.0	50
03587	04587	.1772		4.500	5.0	50
03077	04077	.1875	3/16"	4.763	3/16"	2"
03597	04597	.1969		5.000	5.0	50
03087	04087	.2188	7/32"	5.558	1/4"	2"
03607	04607	.2362		6.000	6.0	50
03097	04097	.2500	1/4"	6.350	1/4"	2"
03617	04617	.2756		7.000	7.0	50
03107	04107	.3125	5/16"	7.938	5/16"	2"
03627	04627	.3150		8.000	8.0	50
03637	04637	.3543		9.000	9.0	50
03117	04117	.3750	3/8"	9.525	3/8"	2"
03647	04647	.3937		10.000	10.0	50
03657	04657	.4331		11.000	11.0	65
03127	04127	.4375	7/16"	11.113	7/16"	2-1/2"
03667	04667	.4724		12.000	12.0	65
03137	04137	.5000	1/2"	12.700	1/2"	2-1/2"
-	04147	.6250	5/8"	15.875	5/8"	3"
-	04157	.7500	3/4"	19.050	3/4"	3"
-	04687	.7874		20.000	20.0	75

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MATERIAL HARDNESS (Rc)

0

Series 220M, 223M, 230M, 820M, 823M, 830M

.0200" - .2362"
(0.508mm - 6.000mm)



TOLERANCES

$d1$	$\leq .030"$	$+0.000" - .001"$ (+.000 - .025mm)
	$\geq 1/32"$	$+0.000" - .002"$ (+.000 - .050mm)
$d2$	h6	

GENERAL PURPOSE
END MILLS

Standard Length - Square End

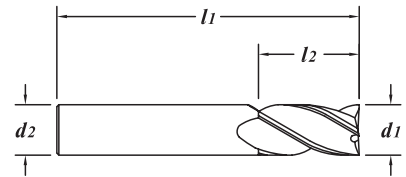
Standard Länge - Ohne Eckenradius

Longitud Estándar - Extremo Sin Radio

Longueur Standart - Extrémité Carré

Lunghezza Standard - Piatte

标准长度 - 平头



Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coated - page 218
TiCN Coated - page 219
TiAlN Coated - page 220
Stub Length - page 207
Extended Length - page 238



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Extrem Vielseitig
TiN-Beschichtet - Seite 218
TiCN-Beschichtet - Seite 219
TiAlN-Beschichtet - Seite 220
Kurze Länge - Seite 207
Extra Länge - Seite 238



Fresa de submicrono sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiN - Página 218
Recubrimiento de TiCN - Página 219
Recubrimiento de TiAlN - Página 220
Longitud Corta - Página 207
Longitud Extra - Página 238



Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiN - Page 218
Revêtement TiCN - Page 219
Revêtement TiAlN - Page 220
Longueur Courte - Page 207
Longueur Extra - Page 238



Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Rivestimento in TiN - Pagina 218
Rivestimento in TiCN - Pagina 219
Rivestimento in TiAlN - Pagina 220
Serie Corta - Pagina 207
Lunghezza Extra - Pagina 238



超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
TiN 涂层 - 218页
TiCN 涂层 - 219页
TiAlN 涂层 - 220页
短柱长度 - 207页
超长 - 238页

(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal		Metric			
11650	-	13650	.0200	.0200"	0.508	1/8"	1-1/2"	.060"
11660	-	-	.0210	.0210"	0.533	1/8"	1-1/2"	.063"
11670	-	-	.0220	.0220"	0.559	1/8"	1-1/2"	.066"
11680	-	-	.0230	.0230"	0.584	1/8"	1-1/2"	.069"
11690	-	-	.0240	.0240"	0.610	1/8"	1-1/2"	.072"
11700	-	13700	.0250	.0250"	0.635	1/8"	1-1/2"	.075"
11710	-	-	.0260	.0260"	0.660	1/8"	1-1/2"	.078"
11720	-	-	.0270	.0270"	0.686	1/8"	1-1/2"	.081"
11730	-	-	.0280	.0280"	0.711	1/8"	1-1/2"	.084"
11740	-	-	.0290	.0290"	0.737	1/8"	1-1/2"	.087"
11750	-	13750	.0300	.0300"	0.762	1/8"	1-1/2"	.090"
11010	12010	13010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
45010	37010	46010	.0394		1.000	3.0	38	4
11020	12020	13020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
45020	37020	46020	.0591		1.500	3.0	38	6
11030	12030	13030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
11040	12040	13040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
45030	37030	46030	.0787		2.000	3.0	38	8
11050	12050	13050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
45040	37040	46040	.0984		2.500	3.0	38	12
11060	12060	13060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
45050	37050	46050	.1181		3.000	3.0	38	12
11070	12070	13070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
45060	37060	46060	.1378		3.500	4.0	50	12
11080	12080	13080	.1406	9/64"	3.571	3/16"	2"	9/16"
11090	12090	13090	.1562	5/32"	3.967	3/16"	2"	9/16"
45070	37070	46070	.1575		4.000	4.0	50	14
11100	12100	13100	.1719	11/64"	4.366	3/16"	2"	9/16"
45080	37080	46080	.1772		4.500	5.0	50	14
11110	12110	13110	.1875	3/16"	4.763	3/16"	2"	5/8"
NEW 92070	93070	94070	.1969		5.000	5.0	50	16
45090	37090	46090	.1969		5.000	5.0	65	16
11120	12120	13120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
11130	12130	13130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
11140	12140	13140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
45100	37100	46100	.2362		6.000	6.0	65	19

Series 220M, 223M, 230M, 820M, 823M, 830M (continued)

.2500" - 1.250"
(6.350mm - 31.750mm)

GENERAL PURPOSE
END MILLS

(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter	Metric			
11150	12150	13150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11160	12160	13160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
45110	37110	46110	.2756		7.000	7.0	65	22
11170	12170	13170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
11180	12180	13180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
11190	12190	13190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
45120	37120	46120	.3150		8.000	8.0	65	22
11200	12200	13200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
11210	12210	13210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
45130	37130	46130	.3543		9.000	9.0	65	22
11220	12220	13220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
11230	12230	13230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11240	12240	13240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
45140	37140	46140	.3937		10.000	10.0	70	25
11250	12250	13250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
11260	12260	13260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
45150	37150	46150	.4331		11.000	11.0	75	25
11270	12270	13270	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11280	12280	13280	.4531	29/64"	11.509	1/2"	3"	1"
11290	-	13290	.4688	15/32"	11.908	1/2"	3"	1"
45160	37160	46160	.4724		12.000	12.0	75	25
11300	12300	13300	.4844	31/64"	12.304	1/2"	3"	1"
11310	12310	13310	.5000	1/2"	12.700	1/2"	3"	1"
45170	37170	46170	.5512		14.000	14.0	88	32
11320	12320	13320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
11330	12330	13330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
45180	37180	46180	.6299		16.000	16.0	88	38
11340	12340	13340	.6875	11/16"	17.463	3/4"	4"	1-1/2"
45190	37190	46190	.7087		18.000	18.0	100	38
11350	12350	13350	.7500	3/4"	19.050	3/4"	4"	1-1/2"
45200	37200	46200	.7874		20.000	20.0	100	38
45210	37210	46210	.8661		22.000	22.0	100	38
11360	12360	13360	.8750	7/8"	22.225	7/8"	4"	1-1/2"
45220	37220	46220	.9843		25.000	25.0	100	38
11370	12370	13370	1.000	1"	25.400	1"	4"	1-1/2"
-	-	13390	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"

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MATERIAL HARDNESS (Rc)

0

d_1	$+0.000^{\circ} - 0.002^{\circ}$ (+.000 -.050mm)
d_2	h6



TECH
PAGES
286-287

Standard Length - Square End - TiN Coated

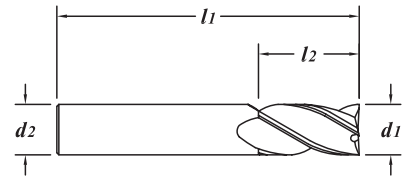
Standard Länge - Ohne Eckenradius - TiN-Beschichtet

Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiN

Longueur Standart - Extrémité Carré - Revêtement TiN

Lunghezza Standard - Piatte - Rivestimento in TiN

标准长度 - 平头 - TiN 涂层



Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Uncoated - page 216
TiCN Coated - page 219
TiAlN Coated - page 220



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Verbesserte Schmiereigenschaft
Extrem Vielseitig
Unbeschichtet - Seite 216
TiCN-Beschichtet - Seite 219
TiAlN-Beschichtet - Seite 220



Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiCN - Página 219
Recubrimiento de TiAlN - Página 220



Fraises carbure submicrograin - coupe au centre
Amélioration du glissement
Utilisations variables
Sans revêtement - Page 216
Revêtement TiCN - Page 219
Revêtement TiAlN - Page 220



Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Non Rivestito - Pagina 216
Rivestimento in TiCN - Pagina 219
Rivestimento in TiAlN - Pagina 220



超细晶粒整体硬质合金立铣刀 - 中心切削
改善润滑性能
功能极多
未涂层 - 216页
TiCN 涂层 - 219页
TiAlN 涂层 - 220页

(220MT) 2 Flute EDP#	(230MT) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
11073	13073	.1250	1/8"	3.175	1/8"	1-1/2"
11113	13113	.1875	3/16"	4.763	3/16"	2"
11153	13153	.2500	1/4"	6.350	1/4"	2-1/2"
11193	13193	.3125	5/16"	7.938	5/16"	2-1/2"
11233	13233	.3750	3/8"	9.525	3/8"	2-1/2"
11273	13273	.4375	7/16"	11.113	7/16"	2-3/4"
11313	13313	.5000	1/2"	12.700	1/2"	3"
11333	13333	.6250	5/8"	15.875	5/8"	3-1/2"
11353	13353	.7500	3/4"	19.050	3/4"	4"
-	13373	1.000	1"	25.400	1"	4"

TOLERANCES

d_1	$+0.000" -0.002" (+.000 -0.050\text{mm})$
d_2	$h6$

Series 220MC, 223MC, 230MC



Standard Length - Square End - TiCN Coated

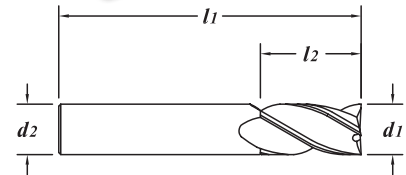
Standard Länge - Ohne Eckenradius - TiCN-Beschichtet

Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiCN

Longueur Standart - Extrémité Carré - Revêtement TiCN

Lunghezza Standard - Piatte - Rivestimento in TiCN

标准长度 - 平头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Uncoated - page 216
TiN Coated - page 218
TiAlN Coated - page 220
Extended Length - Page 240



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Verbesserte Verschleißbeständigkeit und Schmiereisenschaft
Extrem Vielseitig
Unbeschichtet - Seite 216
TiN-Beschichtet - Seite 218
TiAlN-Beschichtet - Seite 220
Extra Länge - Seite 240



Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiN - Página 218
Recubrimiento de TiAlN - Página 220
Longitud Extra - Página 240



Fraises carbure submicrograin - coupe au centre
Amélioration de la résistance à l'abrasion et au glissement
Utilisations variables
Sans revêtement - Page 216
Revêtement TiN - Page 218
Revêtement TiAlN - Page 220
Extra Longue - Page 240



Fresa sub-micrograno metallo duro - taglio al centro
Maggiore resistenza all'abrasione
Estremamente versatile
Non Rivestito - Pagina 216
Rivestimento in TiN - Pagina 218
Rivestimento in TiAlN - Pagina 220
Lunghezza Extra - Pagina 240



超细晶粒整体硬质合金立铣刀 - 中心切削
改善耐磨性和润滑性
功能极多
未涂层 - 216页
TiN 涂层 - 218页
TiAlN 涂层 - 220页
超长 - 240页

(220MC) 2 Flute EDP#	(223MC) 3 Flute EDP#	(230MC) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
11014	12014	13014	.0312	1/32"	0.792	1/8"	3/32"
11024	12024	13024	.0469	3/64"	1.191	1/8"	1/8"
11034	12034	13034	.0625	1/16"	1.588	1/8"	1/4"
11044	12044	13044	.0781	5/64"	1.984	1/8"	1/4"
11054	12054	13054	.0938	3/32"	2.383	1/8"	3/8"
11064	12064	13064	.1094	7/64"	2.779	1/8"	3/8"
11074	12074	13074	.1250	1/8"	3.175	1/8"	1/2"
11084	12084	13084	.1406	9/64"	3.571	3/16"	9/16"
11094	12094	13094	.1562	5/32"	3.967	3/16"	9/16"
11104	12104	13104	.1719	11/64"	4.366	3/16"	9/16"
11114	12114	13114	.1875	3/16"	4.763	3/16"	5/8"
11124	12124	13124	.2031	13/64"	5.159	1/4"	5/8"
11134	12134	13134	.2188	7/32"	5.558	1/4"	5/8"
11144	12144	13144	.2344	15/64"	5.954	1/4"	3/4"
11154	12154	13154	.2500	1/4"	6.350	1/4"	3/4"
11164	12164	13164	.2656	17/64"	6.746	5/16"	7/8"
11174	12174	13174	.2812	9/32"	7.142	5/16"	7/8"
11184	12184	13184	.2969	19/64"	7.541	5/16"	7/8"
11194	12194	13194	.3125	5/16"	7.938	5/16"	7/8"
11204	12204	13204	.3281	21/64"	8.334	3/8"	7/8"
11214	12214	13214	.3438	11/32"	8.733	3/8"	7/8"
11224	12224	13224	.3594	23/64"	9.129	3/8"	7/8"
11234	12234	13234	.3750	3/8"	9.525	3/8"	7/8"
11244	12244	13244	.3906	25/64"	9.921	7/16"	7/8"
11254	12254	13254	.4062	13/32"	10.317	7/16"	7/8"
11264	-	13264	.4219	27/64"	10.716	7/16"	7/8"
11274	12274	13274	.4375	7/16"	11.113	7/16"	1"
11284	-	13284	.4531	29/64"	11.509	1/2"	1"
11294	12294	13294	.4688	15/32"	11.908	1/2"	1"
-	12304	13304	.4844	31/64"	12.304	1/2"	1"
11314	12314	13314	.5000	1/2"	12.700	1/2"	1"
11324	12324	13324	.5625	9/16"	14.288	9/16"	1-1/4"
11334	12334	13334	.6250	5/8"	15.875	5/8"	1-1/4"
11344	-	13344	.6875	11/16"	17.463	3/4"	1-1/2"
11354	12354	13354	.7500	3/4"	19.050	3/4"	1-1/2"
11364	-	13364	.8750	7/8"	22.225	7/8"	1-1/2"
11374	12374	13374	1.000	1"	25.400	1"	1-1/2"
-	-	13394	1.250	1-1/4"	31.750	1-1/4"	2"

GENERAL PURPOSE
END MILLS

35

MATERIAL HARDNESS (Rc)

0

Series 220MA, 223MA, 230MA, 820MA, 823MA, 830MA

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

.0312" - .3594"
(0.792mm - 9.129mm)



GENERAL PURPOSE
END MILLS

Standard Length - Square End - TiALN Coated

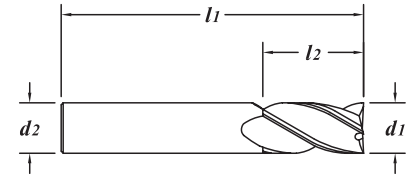
Standard Länge - Ohne Eckenradius - TiALN-Beschichtet

Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiALN

Longueur Standart - Extrémité Carré - Revêtement TiALN

Lunghezza Standard - Piatte - Rivestimento in TiALN

标准长度 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 216
TiN Coated - page 218
TiCN Coated - page 219
Stub Length - page 209
Extended Length - page 241



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 216
TiN-Beschichtet - Seite 218
TiCN-Beschichtet - Seite 219
Kurze Länge - Seite 209
Extra Länge - Seite 241



Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semisecco
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiN - Página 218
Recubrimiento de TiCN - Página 219
Longitud Corta - Página 209
Longitud Extra - Página 241



Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 216
Revêtement TiN - Page 218
Revêtement TiCN - Page 219
Longueur Courte - Page 209
Longueur Extra - Page 241



Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 216
Rivestimento in TiN - Pagina 218
Rivestimento in TiCN - Pagina 219
Serie Corta - Pagina 209
Lunghezza Extra - Pagina 241



超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
未涂层 - 216页
TiN 涂层 - 218页
TiCN 涂层 - 219页
短柱长度 - 209页
超长 - 241页

(220MA/820MA)	(223MA/823MA)	(230MA/830MA)	d_1 †			d_2	l_1	l_2
2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length
11017	12017	13017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
45017	37017	46017	.0394		1.000	3.0	38	4
11027	12027	13027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
45027	37027	46027	.0591		1.500	3.0	38	6
11037	12037	13037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
11047	12047	13047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
45037	37037	46037	.0787		2.000	3.0	38	8
11057	12057	13057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
45047	37047	46047	.0984		2.500	3.0	38	12
11067	12067	13067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
45057	37057	46057	.1181		3.000	3.0	38	12
11077	12077	13077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
45067	37067	46067	.1378		3.500	4.0	50	12
11087	12087	13087	.1406	9/64"	3.571	3/16"	2"	9/16"
11097	12097	13097	.1562	5/32"	3.967	3/16"	2"	9/16"
45077	37077	46077	.1575		4.000	4.0	50	14
11107	12107	13107	.1719	11/64"	4.366	3/16"	2"	9/16"
45087	37087	46087	.1772		4.500	5.0	50	14
11117	12117	13117	.1875	3/16"	4.763	3/16"	2"	5/8"
92077	93077	94077	.1969		5.000	5.0	50	16
45097	37097	46097	.1969		5.000	5.0	65	16
11127	12127	13127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
11137	12137	13137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
11147	12147	13147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
45107	37107	46107	.2362		6.000	6.0	65	19
11157	12157	13157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11167	12167	13167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
45117	37117	46117	.2756		7.000	7.0	65	22
11177	12177	13177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
11187	12187	13187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
11197	12197	13197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
45127	37127	46127	.3150		8.000	8.0	65	22
11207	12207	13207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
11217	12217	13217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
45137	37137	46137	.3543		9.000	9.0	65	22
11227	12227	13227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"

(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
Decimal					Metric			
11237	12237	13237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11247	12247	13247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
45147	37147	46147	.3937		10.000	10.0	70	25
11257	12257	13257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
11267	12267	13267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
45157	37157	46157	.4331		11.000	11.0	75	25
11277	12277	13277	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11287	12287	13287	.4531	29/64"	11.509	1/2"	3"	1"
11297	12297	13297	.4688	15/32"	11.908	1/2"	3"	1"
45167	37167	46167	.4724		12.000	12.0	75	25
11307	12307	13307	.4844	31/64"	12.304	1/2"	3"	1"
11317	12317	13317	.5000	1/2"	12.700	1/2"	3"	1"
45177	37177	46177	.5512		14.000	14.0	88	32
11327	12327	13327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
11337	12337	13337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
45187	37187	46187	.6299		16.000	16.0	88	38
11347	12347	13347	.6875	11/16"	17.463	3/4"	4"	1-1/2"
45197	37197	46197	.7087		18.000	18.0	100	38
11357	12357	13357	.7500	3/4"	19.050	3/4"	4"	1-1/2"
45207	37207	46207	.7874		20.000	20.0	100	38
45217	37217	46217	.8661		22.000	22.0	100	38
11367	12367	13367	.8750	7/8"	22.225	7/8"	4"	1-1/2"
45227	37227	46227	.9843		25.000	25.0	100	38
11377	12377	13377	1.000	1"	25.400	1"	4"	1-1/2"
-	-	13397	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"

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MATERIAL HARDNESS (Rc)

0



End Mill Manufacturing

Series 220R, 223R, 230R, 820R, 823R, 830R

.0625" - .3125"
(1.588mm - 7.938mm)



TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6
r	+0.001" - .001" (+.025 - .025mm)

GENERAL PURPOSE
END MILLS

Standard Length - Corner Radius

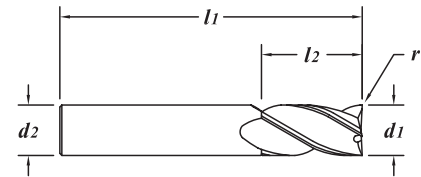
Standard Länge - Eckenradius

Longitud Estándar - Ángulo Redondeado

Longueur Standart - Rayon de Coin

Lunghezza Standard - Torico

标准长度 - 圆角半径



Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 225
Stub Length - page 210
Extended Length - page 243



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für stärkere Schneidecken und Radiusteile
Extrem vielseitig
TiAlN-Beschichtet - Seite 225
Kurze Länge - Seite 210
Extra Länge - Seite 243



Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Extremadamente versátil
Recubrimiento de TiAlN - Página 225
Longitud Corta - Página 210
Longitud Extra - Página 243



Fraises carbure submicrograin - coupe au centre
Rayon de coin renforcés
Utilisations variables
Revêtement TiAlN - Page 225
Longueur Courte - Page 210
Extra Longueur - Page 243



Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente versatile
Rivestimento in TiAlN - Pagina 225
Serie Corta - Pagina 210
Lunghezza Extra - Pagina 243



超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
功能极多
TiAlN 涂层 - 225页
短柱长度 - 210页
超长 - 243页

(220R/820R)	(223R/823R)	(230R/830R)	d_1 †			d_2	l_1	l_2	r
2 Flute	3 Flute	4 Flute	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius
EDP#	EDP#	EDP#							
79580	36100	80580	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"
79590	36102	80590	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"
79600	36104	80600	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"
79610	36106	80610	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"
79620	36108	80620	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"
36500	36110	24070	.1181		3.000	3.0	38	12	0.20
36502	36112	24080	.1181		3.000	3.0	38	12	0.50
79000	36114	80000	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"
79010	36116	80010	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
79020	36118	80020	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
79030	36120	80030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"
-	-	80035	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.040"
36504	36122	24090	.1575		4.000	4.0	50	14	0.30
36506	36124	24100	.1575		4.000	4.0	50	14	0.50
79040	36126	80040	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"
79050	36128	80050	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
79060	36130	80060	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
79070	36132	80070	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"
36508	36134	24110	.1969		5.000	5.0	65	16	0.30
36510	36136	24120	.1969		5.000	5.0	65	16	0.50
36512	36138	24170	.2362		6.000	6.0	65	19	0.50
36514	36140	24180	.2362		6.000	6.0	65	19	0.80
36516	36142	24190	.2362		6.000	6.0	65	19	1.00
36518	36144	24200	.2362		6.000	6.0	65	19	1.50
36520	36146	24210	.2362		6.000	6.0	65	19	2.00
36522	36148	80090	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
79100	36150	80100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
79110	36152	80110	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
79120	36154	80120	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
79130	36156	80130	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"
79140	36158	80140	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
79160	36160	80160	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"
79170	36162	80170	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"
79180	36164	80180	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"
79190	36166	80190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"
79200	36168	80200	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"

Series 220R, 223R, 230R, 820R, 823R, 830R (continued)

.3150" - .6250"
(8.000mm - 15.875mm)

GENERAL PURPOSE
END MILLS

(220R/820R) 2 Flute EDP#	(223R/823R) 3 Flute EDP#	(230R/830R) 4 Flute EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	
			Decimal		Metric				
36524	36170	24220	.3150		8.000	8.0	65	22	0.50
36526	36172	24230	.3150		8.000	8.0	65	22	0.80
36528	36174	24240	.3150		8.000	8.0	65	22	1.00
36530	36176	24250	.3150		8.000	8.0	65	22	1.50
36532	36178	24260	.3150		8.000	8.0	65	22	2.00
36534	36180	24270	.3150		8.000	8.0	65	22	2.50
36536	36182	24280	.3150		8.000	8.0	65	22	3.00
36538	36184	80220	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
79230	36186	80230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"
79240	36188	80240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
79250	36190	80250	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
79260	36192	80260	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"
79270	36194	80270	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
36540	36196	24290	.3937		10.000	10.0	70	25	0.50
36542	36198	24300	.3937		10.000	10.0	70	25	0.80
36544	36200	24310	.3937		10.000	10.0	70	25	1.00
36546	36202	24320	.3937		10.000	10.0	70	25	1.50
36548	36204	24330	.3937		10.000	10.0	70	25	2.00
36550	36206	24340	.3937		10.000	10.0	70	25	2.50
36552	36208	24350	.3937		10.000	10.0	70	25	3.00
36554	36210	24360	.3937		10.000	10.0	70	25	3.20
36556	36212	80700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"
36558	36214	80705	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"
36560	36216	80710	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"
36562	36218	80715	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"
36564	36220	80720	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"
36566	36222	80725	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"
36568	36224	80730	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"
36570	36226	80735	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"
36572	36228	24370	.4724		12.000	12.0	75	25	0.50
36574	36230	24380	.4724		12.000	12.0	75	25	0.80
36576	36232	24390	.4724		12.000	12.0	75	25	1.00
36578	36234	24400	.4724		12.000	12.0	75	25	1.50
36580	36236	24410	.4724		12.000	12.0	75	25	2.00
36582	36238	24420	.4724		12.000	12.0	75	25	2.50
36584	36240	24430	.4724		12.000	12.0	75	25	3.00
36586	36242	24440	.4724		12.000	12.0	75	25	3.20
36588	36244	80290	.5000	1/2"	12.700	1/2"	3"	1"	.010"
79300	36246	80300	.5000	1/2"	12.700	1/2"	3"	1"	.015"
79310	36248	80310	.5000	1/2"	12.700	1/2"	3"	1"	.020"
79320	36250	80320	.5000	1/2"	12.700	1/2"	3"	1"	.030"
79330	36252	80330	.5000	1/2"	12.700	1/2"	3"	1"	.045"
79340	36254	80340	.5000	1/2"	12.700	1/2"	3"	1"	.060"
79350	36256	80350	.5000	1/2"	12.700	1/2"	3"	1"	.090"
79360	36258	80360	.5000	1/2"	12.700	1/2"	3"	1"	.125"
79370	36260	80370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
79380	36262	80380	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"
79390	36264	80390	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
79400	36266	80400	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"
79410	36268	80410	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
79420	36270	80420	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"

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MATERIAL HARDNESS (Rc)

0

continued →

Series 220R, 223R, 230R, 820R, 823R, 830R (continued)

.6299" - 1.000"
(16.000mm - 25.400mm)

GENERAL PURPOSE
END MILLS

(220R/820R) 2 Flute EDP#	(223R/823R) 3 Flute EDP#	(230R/830R) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	
			Decimal	Metric					
36590	36272	24450	.6299		16.000	16.0	88	38	0.50
36592	36274	24460	.6299		16.000	16.0	88	38	1.00
36594	36276	24470	.6299		16.000	16.0	88	38	2.00
36596	36278	24480	.6299		16.000	16.0	88	38	2.50
36598	36280	24490	.6299		16.000	16.0	88	38	3.00
36600	36282	24500	.6299		16.000	16.0	88	38	4.00
36602	36284	24510	.6299		16.000	16.0	88	38	5.00
79440	36286	80440	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
79450	36288	80450	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"
79460	36290	80460	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
79470	36292	80470	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"
79480	36294	80480	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
79490	36296	80490	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"
79500	36298	80500	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"
79630	36300	80630	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"
36604	36302	24520	.7874		20.000	20.0	100	38	0.50
36606	36304	24530	.7874		20.000	20.0	100	38	1.00
36608	36306	24540	.7874		20.000	20.0	100	38	2.00
36610	36308	24550	.7874		20.000	20.0	100	38	3.00
36612	36310	24560	.7874		20.000	20.0	100	38	5.00
79510	36312	80510	1.000	1"	25.400	1"	4"	1-1/2"	.015"
79520	36314	80520	1.000	1"	25.400	1"	4"	1-1/2"	.020"
79530	36316	80530	1.000	1"	25.400	1"	4"	1-1/2"	.030"
79540	36318	80540	1.000	1"	25.400	1"	4"	1-1/2"	.045"
79550	36320	80550	1.000	1"	25.400	1"	4"	1-1/2"	.060"
79560	36322	80560	1.000	1"	25.400	1"	4"	1-1/2"	.090"
79570	36324	80570	1.000	1"	25.400	1"	4"	1-1/2"	.125"
79640	36326	80640	1.000	1"	25.400	1"	4"	1-1/2"	.250"

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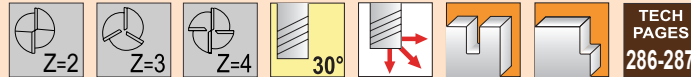
MATERIAL HARDNESS (Rc)

TOLERANCES

d_1	$+0.000" -0.002" (+.000 -0.050\text{mm})$
d_2	$h6$
r	$+0.001" -0.001" (+.025 -0.025\text{mm})$

Series 220RA, 223RA, 230RA, 823RA, 830RA

.0625" - .3125"
(1.588mm - 7.938mm)



TECH
PAGES
286-287

GENERAL PURPOSE
END MILLS

Standard Length - Corner Radius - TiALN Coated

Standard Länge - Eckenradius - TiALN-Beschichtet

Longitud Estándar - Ángulo Redondeado - Recubrimiento de TiALN

Longueur Standart - Rayon de Coin - Revêtement TiALN

Lunghezza Standard - Torico - Rivestimento in TiALN

标准长度 - 圆角半径 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Dry or semi-dry machining
Extremely versatile
Uncoated - page 222
Stub Length - page 212
Extended Length - page 246



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 222
Kurze Länge - Seite 212
Extra Länge - Seite 246



Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semisecco
Extremadamente versátil
Sin recubrimiento - Página 222
Longitud Corta - Página 212
Longitud Extra - Página 246



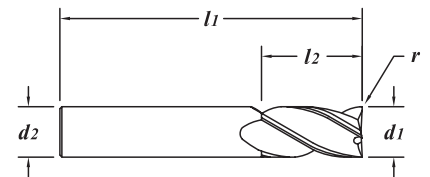
Fraises carbure submicrograin - coupe au centre
Rayon de coin renforcés
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 222
Longueur Courte - Page 212
Extra Longueur - Page 246



Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 222
Serie Corta - Pagina 212
Lunghezza Extra - Pagina 246



超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
干式或半干式机加工
功能极多
未涂层 - 222页
短柱长度 - 212页
超长 - 246页



(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
			Decimal		Metric				
79587	36101	80587	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"
79597	36103	80597	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"
79607	36105	80607	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"
79617	36107	80617	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"
79627	36109	80627	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"
-	36111	24077	.1181		3.000	3.0	38	12	0.20
-	36113	24087	.1181		3.000	3.0	38	12	0.50
79007	36115	80007	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"
79017	36117	80017	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
79027	36119	80027	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
79037	36121	80037	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"
-	-	80038	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.040"
-	36123	24097	.1575		4.000	4.0	50	14	0.30
-	36125	24107	.1575		4.000	4.0	50	14	0.50
79047	36127	80047	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"
79057	36129	80057	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
79067	36131	80067	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
79077	36133	80077	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"
-	-	24117	.1969		5.000	5.0	50	16	0.30
-	36135	24119	.1969		5.000	5.0	65	16	0.30
-	36137	24127	.1969		5.000	5.0	65	16	0.50
-	36139	24177	.2362		6.000	6.0	65	19	0.50
-	36141	24187	.2362		6.000	6.0	65	19	0.80
-	36143	24197	.2362		6.000	6.0	65	19	1.00
-	36145	24207	.2362		6.000	6.0	65	19	1.50
-	36147	24217	.2362		6.000	6.0	65	19	2.00
-	36149	80097	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
79107	36151	80107	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
79117	36153	80117	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
79127	36155	80127	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
79137	36157	80137	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"
79147	36159	80147	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
79167	36161	80167	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"
79177	36163	80177	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"
79187	36165	80187	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"
79197	36167	80197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"
79207	36169	80207	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"

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MATERIAL HARDNESS (Rc)

continued →

Series 220RA, 223RA, 230RA, 823RA, 830RA (continued)

.3150" - .6299"
(8.000mm - 16.000mm)

GENERAL PURPOSE
END MILLS

(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 4 Flute EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	
			Decimal	Metric					
-	36171	24227	.3150		8.000	8.0	65	22	0.50
-	36173	24237	.3150		8.000	8.0	65	22	0.80
-	36175	24247	.3150		8.000	8.0	65	22	1.00
-	36177	24257	.3150		8.000	8.0	65	22	1.50
-	36179	24267	.3150		8.000	8.0	65	22	2.00
-	36181	24277	.3150		8.000	8.0	65	22	2.50
-	36183	24287	.3150		8.000	8.0	65	22	3.00
-	36185	80227	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
79237	36187	80237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"
79247	36189	80247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
79257	36191	80257	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
79267	36193	80267	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"
79277	36195	80277	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
-	36197	24297	.3937		10.000	10.0	70	25	0.50
-	36199	24307	.3937		10.000	10.0	70	25	0.80
-	36201	24317	.3937		10.000	10.0	70	25	1.00
-	36203	24327	.3937		10.000	10.0	70	25	1.50
-	36205	24337	.3937		10.000	10.0	70	25	2.00
-	36207	24347	.3937		10.000	10.0	70	25	2.50
-	36209	24357	.3937		10.000	10.0	70	25	3.00
-	36211	24367	.3937		10.000	10.0	70	25	3.20
-	36213	80279	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"
-	36215	80281	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"
-	36217	80283	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"
-	36219	80285	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"
-	36221	80287	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"
-	36223	80289	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"
-	36225	80291	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"
-	36227	80293	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"
-	36229	24377	.4724		12.000	12.0	75	25	0.50
-	36231	24387	.4724		12.000	12.0	75	25	0.80
-	36233	24397	.4724		12.000	12.0	75	25	1.00
-	36235	24407	.4724		12.000	12.0	75	25	1.50
-	36237	24417	.4724		12.000	12.0	75	25	2.00
-	36239	24427	.4724		12.000	12.0	75	25	2.50
-	36241	24437	.4724		12.000	12.0	75	25	3.00
-	36243	24447	.4724		12.000	12.0	75	25	3.20
-	36245	80297	.5000	1/2"	12.700	1/2"	3"	1"	.010"
79307	36247	80307	.5000	1/2"	12.700	1/2"	3"	1"	.015"
79317	36249	80317	.5000	1/2"	12.700	1/2"	3"	1"	.020"
79327	36251	80327	.5000	1/2"	12.700	1/2"	3"	1"	.030"
79337	36253	80337	.5000	1/2"	12.700	1/2"	3"	1"	.045"
79347	36255	80347	.5000	1/2"	12.700	1/2"	3"	1"	.060"
79357	36257	80357	.5000	1/2"	12.700	1/2"	3"	1"	.090"
79367	36259	80367	.5000	1/2"	12.700	1/2"	3"	1"	.125"
79377	36261	80377	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
-	36263	80387	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"
79397	36265	80397	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
79407	36267	80407	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"
79417	36269	80417	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
79427	36271	80427	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"
-	36273	24457	.6299		16.000	16.0	88	38	0.50
-	36275	24467	.6299		16.000	16.0	88	38	1.00
-	36277	24477	.6299		16.000	16.0	88	38	2.00
-	36279	24487	.6299		16.000	16.0	88	38	2.50
-	36281	24497	.6299		16.000	16.0	88	38	3.00
-	36283	24507	.6299		16.000	16.0	88	38	4.00
-	36285	24517	.6299		16.000	16.0	88	38	5.00

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MATERIAL HARDNESS (Rc)

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(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 4 Flute EDP#	$d1$ †			$d2$	$l1$	$l2$	r
			Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius
79447	36287	80447	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
79457	36289	80457	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"
79467	36291	80467	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
79477	36293	80477	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"
79487	36295	80487	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
79497	36297	80497	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"
79507	36299	80507	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"
79637	36301	80637	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"
-	36303	24527	.7874		20.000	20.0	100	38	0.50
-	36305	24537	.7874		20.000	20.0	100	38	1.00
-	36307	24547	.7874		20.000	20.0	100	38	2.00
-	36309	24557	.7874		20.000	20.0	100	38	3.00
-	36311	24567	.7874		20.000	20.0	100	38	5.00
-	36313	80517	1.000	1"	25.400	1"	4"	1-1/2"	.015"
-	36315	80527	1.000	1"	25.400	1"	4"	1-1/2"	.020"
79537	36317	80537	1.000	1"	25.400	1"	4"	1-1/2"	.030"
-	36319	80547	1.000	1"	25.400	1"	4"	1-1/2"	.045"
79557	36321	80557	1.000	1"	25.400	1"	4"	1-1/2"	.060"
-	36323	80567	1.000	1"	25.400	1"	4"	1-1/2"	.090"
79577	36325	80577	1.000	1"	25.400	1"	4"	1-1/2"	.125"
79647	36327	80647	1.000	1"	25.400	1"	4"	1-1/2"	.250"



End Mill Manufacturing

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MATERIAL HARDNESS (Rc)

0

Series 320M, 323M, 330M, 920M, 923M, 930M

.0200" - .2656"
(0.508mm - 6.746mm)TECH
PAGES
286-287

TOLERANCES

d_1	$\leq .030"$	$+0.000" - .001" (+0.000 - .025mm)$
	$\geq 1/32"$	$+0.000" - .002" (+0.000 - .050mm)$
d_2	h6	
ball radius	$+0.000" - .001" (+0.000 - .025mm)$	

Standard Length - Ball End

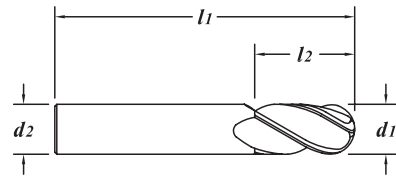
Standard Länge - Vollradius

Longitud Estándar - Cabeza Esférica

Longueur Standart - Hemispherique

Lunghezza Standard - Sferica

标准长度 - 球头



Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coated - page 230
TiCN Coated - page 231
TiAlN Coated - page 232
Stub Length - page 214
Extended Length - page 249



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Extrem Vielseitig
Vollradius Toleranz: $+0.000 / -0.025 (+0.000 - .001")$
TiN-Beschichtet - Seite 230
TiCN-Beschichtet - Seite 231
TiAlN-Beschichtet - Seite 232
Kurze Länge - Seite 214
Extra Länge - Seite 249



Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Tolerancia de la cabeza esférica $+0.000 / -0.025 (+0.000 - .001")$
Recubrimiento de TiN - Página 230
Recubrimiento de TiCN - Página 231
Recubrimiento de TiAlN - Página 232
Longitud Corta - Página 214
Longitud Extra - Página 249



Fraises carbure submicrograin - coupe au centre
Utilisations variables
Tolerance du rayon de hemispherique $+0.000 / -0.025 (+0.000 - .001")$
Revêtement TiN - Page 230
Revêtement TiCN - Page 231
Revêtement TiAlN - Page 232
Longueur Courte - Page 214
Longueur Extra - Page 249



Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Tolleranza del raggio $+0.000 / -0.025 (+0.000 - .001")$
Rivestimento in TiN - Pagina 230
Rivestimento in TiCN - Pagina 231
Rivestimento in TiAlN - Pagina 232
Serie Corta - Pagina 214
Lunghezza Extra - Pagina 249



超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
半径公差 $+0.000 / -0.025 (+0.000 - .001")$
TiN 涂层 - 230页
TiCN 涂层 - 231页
TiAlN 涂层 - 232页
短柱长度 - 214页
超长 - 249页

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
16650	-	-	.0200	.0200"	0.508	1/8"	1-1/2"
16700	-	-	.0250	.0250"	0.635	1/8"	1-1/2"
16750	-	-	.0300	.0300"	0.762	1/8"	1-1/2"
16010	17010	18010	.0312	1/32"	0.792	1/8"	3/32"
47010	38010	48010	.0394		1.000	3.0	4
16020	17020	18020	.0469	3/64"	1.191	1/8"	1-1/2"
47020	38020	48020	.0591		1.500	3.0	6
16030	17030	18030	.0625	1/16"	1.588	1/8"	1-1/2"
16040	17040	18040	.0781	5/64"	1.984	1/8"	1-1/2"
47030	38030	48030	.0787		2.000	3.0	8
16050	17050	18050	.0938	3/32"	2.383	1/8"	1-1/2"
47040	38040	48040	.0984		2.500	3.0	12
16060	17060	18060	.1094	7/64"	2.779	1/8"	1-1/2"
47050	38050	48050	.1181		3.000	3.0	12
16070	17070	18070	.1250	1/8"	3.175	1/8"	1-1/2"
47060	38060	48060	.1378		3.500	4.0	50
16080	17080	18080	.1406	9/64"	3.571	3/16"	2"
16090	17090	18090	.1562	5/32"	3.967	3/16"	2"
47070	38070	48070	.1575		4.000	4.0	50
16100	17100	18100	.1719	11/64"	4.366	3/16"	2"
47080	38080	48080	.1772		4.500	5.0	50
16110	17110	18110	.1875	3/16"	4.763	3/16"	2"
97070	98070	99070	.1969		5.000	5.0	50
47090	38090	48090	.1969		5.000	5.0	65
16120	17120	18120	.2031	13/64"	5.159	1/4"	2-1/2"
16130	17130	18130	.2188	7/32"	5.558	1/4"	2-1/2"
16140	17140	18140	.2344	15/64"	5.954	1/4"	2-1/2"
47100	38100	48100	.2362		6.000	6.0	65
16150	17150	18150	.2500	1/4"	6.350	1/4"	2-1/2"
16160	17160	18160	.2656	17/64"	6.746	5/16"	2-1/2"

Series 320M, 323M, 330M, 920M, 923M, 930M (continued)

.2756" - 1.000"
(7.00mm - 25.40mm)

GENERAL PURPOSE
END MILLS

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter Metric			
47110	38110	48110	.2756		7.0	65	22
16170	17170	18170	.2812	9/32"	7.142	5/16"	7/8"
16180	-	18180	.2969	19/64"	7.541	5/16"	7/8"
16190	17190	18190	.3125	5/16"	7.938	5/16"	7/8"
47120	38120	48120	.3150		8.000	8.0	65
16200	17200	18200	.3281	21/64"	8.334	3/8"	2-1/2"
16210	17210	18210	.3438	11/32"	8.733	3/8"	2-1/2"
47130	38130	48130	.3543		9.000	9.0	65
16220	-	18220	.3594	23/64"	9.129	3/8"	2-1/2"
16230	17230	18230	.3750	3/8"	9.525	3/8"	2-1/2"
16240	17240	18240	.3906	25/64"	9.921	7/16"	2-3/4"
47140	38140	48140	.3937		10.000	10.0	70
16250	17250	18250	.4062	13/32"	10.317	7/16"	2-3/4"
16260	17260	18260	.4219	27/64"	10.716	7/16"	2-3/4"
47150	38150	48150	.4331		11.000	11.0	75
16270	17270	18270	.4375	7/16"	11.113	7/16"	2-3/4"
16280	-	18280	.4531	29/64"	11.509	1/2"	3"
16290	17290	18290	.4688	15/32"	11.908	1/2"	3"
47160	38160	48160	.4724		12.000	12.0	75
16300	-	18300	.4844	31/64"	12.304	1/2"	3"
16310	17310	18310	.5000	1/2"	12.700	1/2"	3"
47170	38170	48170	.5512		14.000	14.0	88
16320	17320	18320	.5625	9/16"	14.288	9/16"	3-1/2"
16330	17330	18330	.6250	5/8"	15.875	5/8"	3-1/2"
47180	38180	48180	.6299		16.000	16.0	88
16340	17340	18340	.6875	11/16"	17.463	3/4"	4"
47190	-	48190	.7087		18.000	18.0	100
16350	17350	18350	.7500	3/4"	19.050	3/4"	4"
47200	38200	48200	.7874		20.000	20.0	100
47210	-	48210	.8661		22.000	22.0	100
16360	17360	18360	.8750	7/8"	22.225	7/8"	4"
47220	-	-	.9843		25.000	25.0	100
16370	17370	18370	1.000	1"	25.400	1"	4"

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MATERIAL HARDNESS (Rc)

TECH
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TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	h6
ball radius	+0.000" -0.001" (+0.000 -0.025mm)

Standard Length - Ball End - TiN Coated

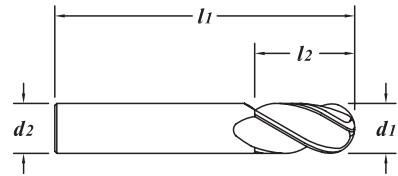
Standard Länge - Vollradius - TiN-Beschichtet

Longitud Estándar - Cabeza Esférica - Recubrimiento de TiN

Longueur Standart - Hemispherique - Revêtement TiN

Lunghezza Standard - Sferica - Rivestimento in TiN

标准长度 - 球头 - TiN 涂层



Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Uncoated - page 228
TiCN Coated - page 231
TiAlN Coated - page 232



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Verbesserte Schmiereigenschaft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / -0,025 (+0.000" -0.001")
Unbeschichtet - Seite 228
TiCN-Beschichtet - Seite 231
TiAlN-Beschichtet - Seite 232



Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / -0,025 (+0.000" -0.001")
Sin recubrimiento - Página 228
Recubrimiento de TiCN - Página 231
Recubrimiento de TiAlN - Página 232



Fraises carbure submicrograin - coupe au centre
Amélioration du glissement
Utilisations variables
Tolérance du rayon de hemispherique +0,000 / -0,025 (+0.000" -0.001")
Sans revêtement - Page 228
Revêtement TiCN - Page 231
Revêtement TiAlN - Page 232



Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Tolleranza del raggio +0,000 / -0,025 (+0.000" -0.001")
Non Rivestito - Pagina 228
Rivestimento in TiCN - Pagina 231
Rivestimento in TiAlN - Pagina 232



超细晶粒整体硬质合金立铣刀 - 中心切削
改善润滑性能
功能极多
半径公差 +0,000 / -0,025 (+0.000" -0.001")
未涂层 - 228页
TiCN 涂层 - 231页
TiAlN 涂层 - 232页

(320MT) 2 Flute EDP#	(330MT) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal	Metric			
16073	18073	.1250	1/8"	3.175	1/8"	1-1/2"
16113	18113	.1875	3/16"	4.763	3/16"	2"
16153	18153	.2500	1/4"	6.350	1/4"	2-1/2"
16193	18193	.3125	5/16"	7.938	5/16"	2-1/2"
16233	18233	.3750	3/8"	9.525	3/8"	2-1/2"
16273	18273	.4375	7/16"	11.113	7/16"	2-3/4"
16313	18313	.5000	1/2"	12.700	1/2"	3"
16333	18333	.6250	5/8"	15.875	5/8"	3-1/2"
16353	18353	.7500	3/4"	19.050	3/4"	4"
16373	18373	1.000	1"	25.400	1"	4"

TOLERANCES

d_1	+0.000" -0.002" (+.000 -0.050mm)
d_2	h6
ball radius	+0.000" -0.001" (+.000 -0.025mm)

Series 320MC, 323MC, 330MC


GENERAL PURPOSE
END MILLS

Standard Length - Ball End - TiCN Coated

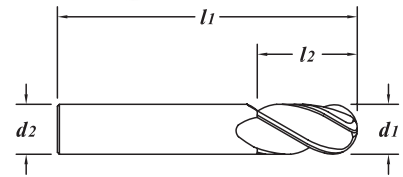
Standard Länge - Vollradius - TiCN-Beschichtet

Longitud Estándar - Cabeza Esférica - Recubrimiento de TiCN

Longueur Standart - Hemispherique - Revêtement TiCN

Lunghezza Standard - Sferica - Rivestimento in TiCN

标准长度 - 球头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Uncoated - page 228
TiN Coated - page 230
TiALN Coated - page 232
Extended Length - Page 251



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Verbesserte Verschleißbeständigkeit und Schmiereinschäft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / -0,025 (+.000" -0.001")
Unbeschichtet - Seite 228
TiN-Beschichtet - Seite 230
TiALN-Beschichtet - Seite 232
Extra Länge - Seite 251



Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / -0,025 (+.000" -0.001")
Sin recubrimiento - Página 228
Recubrimiento de TiN - Página 230
Recubrimiento de TiALN - Página 232
Longitud Extra - Página 251



Fraises carbure submicrograin - coupe au centre
Amélioration de la resistance a l'abrasion et au glissement
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / -0,025 (+.000" -0.001")
Sans revêtement - Page 228
Revêtement TiN - Page 230
Revêtement TiALN - Page 232
Extra Longue - Page 251



Fresa sub-micrograno metallo duro - taglio al centro
Maggiore resistenza all'abrasione
Estremamente versatile
Tolleranza del raggio +0,000 / -0,025 (+.000" -0.001")
Non Rivestito - Pagina 228
Rivestimento in TiN - Pagina 230
Rivestimento in TiALN - Pagina 232
Lunghezza Extra - Pagina 251



超细晶粒整体硬质合金立铣刀 - 中心切削
改善耐磨性和润滑性
功能极多
半径公差 +0,000 / -0,025 (+.000" -0.001")
未涂层 - 228页
TiN 涂层 - 230页
TiALN 涂层 - 232页
超长 - 251页

(320MC) 2 Flute EDP#	(323MC) 3 Flute EDP#	(330MC) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
16014	17014	18014	.0312	1/32"	0.792	1/8"	3/32"
16024	17024	18024	.0469	3/64"	1.191	1/8"	1-1/2"
16034	17034	18034	.0625	1/16"	1.588	1/8"	1-1/2"
16044	17044	18044	.0781	5/64"	1.984	1/8"	1-1/2"
16054	17054	18054	.0938	3/32"	2.383	1/8"	3/8"
16064	17064	18064	.1094	7/64"	2.779	1/8"	3/8"
16074	17074	18074	.1250	1/8"	3.175	1/8"	1/2"
16084	17084	18084	.1406	9/64"	3.571	3/16"	2"
16094	17094	18094	.1562	5/32"	3.967	3/16"	2"
16104	-	18104	.1719	11/64"	4.366	3/16"	2"
16114	17114	18114	.1875	3/16"	4.763	3/16"	2"
16124	17124	18124	.2031	13/64"	5.159	1/4"	2-1/2"
16134	17134	18134	.2188	7/32"	5.558	1/4"	2-1/2"
16144	17144	18144	.2344	15/64"	5.954	1/4"	2-1/2"
16154	17154	18154	.2500	1/4"	6.350	1/4"	2-1/2"
-	17164	18164	.2656	17/64"	6.746	5/16"	2-1/2"
16174	17174	18174	.2812	9/32"	7.142	5/16"	2-1/2"
-	-	18184	.2969	19/64"	7.541	5/16"	2-1/2"
16194	17194	18194	.3125	5/16"	7.938	5/16"	2-1/2"
16204	-	-	.3281	21/64"	8.334	3/8"	2-1/2"
-	17214	18214	.3438	11/32"	8.733	3/8"	2-1/2"
16224	-	18224	.3594	23/64"	9.129	3/8"	2-1/2"
16234	17234	18234	.3750	3/8"	9.525	3/8"	2-1/2"
16244	-	18244	.3906	25/64"	9.921	7/16"	2-3/4"
16254	17254	18254	.4062	13/32"	10.317	7/16"	2-3/4"
-	-	18264	.4219	27/64"	10.716	7/16"	2-3/4"
16274	17274	18274	.4375	7/16"	11.113	7/16"	2-3/4"
-	-	18284	.4531	29/64"	11.509	1/2"	3"
-	17294	18294	.4688	15/32"	11.908	1/2"	3"
16304	17304	18304	.4844	31/64"	12.304	1/2"	3"
16314	17314	18314	.5000	1/2"	12.700	1/2"	3"
16324	17324	18324	.5625	9/16"	14.288	9/16"	3-1/2"
16334	17334	18334	.6250	5/8"	15.875	5/8"	3-1/2"
-	17344	-	.6875	11/16"	17.463	3/4"	4"
16354	17354	18354	.7500	3/4"	19.050	3/4"	4"
16364	17364	18364	.8750	7/8"	22.225	7/8"	4"
16374	17374	18374	1.000	1"	25.400	1"	4"

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0

MATERIAL HARDNESS (Rc)

Series 320MA, 323MA, 330MA, 920MA, 923MA, 930MA

.0312" - .3150"
(0.792mm - 8.000mm)



TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	h6
ball radius	+0.000" -0.001" (+0.000 -0.025mm)

GENERAL PURPOSE
END MILLS

Standard Length - Ball End - TiALN Coated

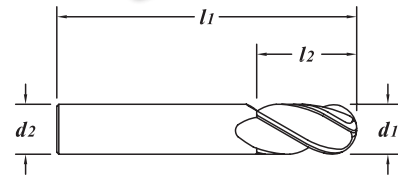
Standard Länge - Vollradius - TiALN-Beschichtet

Longitud Estándar - Cabeza Esférica - Recubrimiento de TiALN

Longueur Standart - Hemispherique - Revêtement TiALN

Lunghezza Standard - Sferica - Rivestimento in TiALN

标准长度 - 球头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 228
TiN Coated - page 230
TiCN Coated - page 231
Stub Length - page 215
Extended Length - page 252



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / -0,025 (+0.000" -0.001")
Unbeschichtet - Seite 228
TiN-Beschichtet - Seite 230
TiCN-Beschichtet - Seite 231
Kurze Länge - Seite 215
Extra Länge - Seite 252



Fresa de submicron grano sólido carburo - corte centrado
Mecanizado seco o semisecho
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / -0,025 (+0.000" -0.001")
Sin recubrimiento - Página 228
Recubrimiento de TiN - Página 230
Recubrimiento de TiCN - Página 231
Longitud Corta - Página 215
Longitud Extra - Página 252



Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / -0,025 (+0.000" -0.001")
Sans revêtement - Page 228
Revêtement TiN - Page 230
Revêtement TiCN - Page 231
Longueur Courte - Page 215
Longueur Extra - Page 252



Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente versatile
Tolleranza del raggio +0,000 / -0,025 (+0.000" -0.001")
Non Rivestito - Pagina 228
Rivestimento in TiN - Pagina 230
Rivestimento in TiCN - Pagina 231
Serie Corta - Pagina 215
Lunghezza Extra - Pagina 252



超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径公差 +0,000 / -0,025 (+0.000" -0.001")
未涂层 - 228页
TiN 涂层 - 230页
TiCN 涂层 - 231页
短柱长度 - 215页
超长 - 252页

(320MA/920MA) 2 Flute EDP#	(323MA/923MA) 3 Flute EDP#	(330MA/930MA) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
16017	17017	18017	.0312	1/32"	0.792	1/8"	1-1/2"
47017	38017	48017	.0394		1.000	3.0	38
16027	17027	18027	.0469	3/64"	1.191	1/8"	1-1/2"
47027	38027	48027	.0591		1.500	3.0	38
16037	17037	18037	.0625	1/16"	1.588	1/8"	1-1/2"
16047	17047	18047	.0781	5/64"	1.984	1/8"	1-1/2"
47037	38037	48037	.0787		2.000	3.0	38
16057	17057	18057	.0938	3/32"	2.383	1/8"	1-1/2"
47047	38047	48047	.0984		2.500	3.0	38
16067	17067	18067	.1094	7/64"	2.779	1/8"	1-1/2"
47057	38057	48057	.1181		3.000	3.0	38
16077	17077	18077	.1250	1/8"	3.175	1/8"	1-1/2"
47067	38067	48067	.1378		3.500	4.0	50
16087	17087	18087	.1406	9/64"	3.571	3/16"	2"
16097	17097	18097	.1562	5/32"	3.967	3/16"	2"
47077	38077	48077	.1575		4.000	4.0	50
16107	17107	18107	.1719	11/64"	4.366	3/16"	2"
47087	38087	48087	.1772		4.500	5.0	50
16117	17117	18117	.1875	3/16"	4.763	3/16"	2"
97077	98077	99077	.1969		5.000	5.0	50
47097	38097	48097	.1969		5.000	5.0	65
16127	17127	18127	.2031	13/64"	5.159	1/4"	2-1/2"
16137	17137	18137	.2188	7/32"	5.558	1/4"	2-1/2"
16147	17147	18147	.2344	15/64"	5.954	1/4"	2-1/2"
47107	38107	48107	.2362		6.000	6.0	65
16157	17157	18157	.2500	1/4"	6.350	1/4"	2-1/2"
16167	17167	18167	.2656	17/64"	6.746	5/16"	2-1/2"
47117	38117	48117	.2756		7.000	7.0	65
16177	17177	18177	.2812	9/32"	7.142	5/16"	2-1/2"
16187	17187	18187	.2969	19/64"	7.541	5/16"	2-1/2"
16197	17197	18197	.3125	5/16"	7.938	5/16"	2-1/2"
47127	38127	48127	.3150		8.000	8.0	65

Series 320MA, 323MA, 330MA, 920MA, 923MA, 930MA (continued)

.3281" - 1.000"
(8.334mm - 25.400mm)

GENERAL PURPOSE
END MILLS

(320MA/920MA) 2 Flute EDP#	(323MA/923MA) 3 Flute EDP#	(330MA/930MA) 4 Flute EDP#	$d1$ †			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
			Decimal	Diameter	Metric			
16207	17207	18207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
16217	17217	18217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
47137	38137	48137	.3543		9.000	9.0	65	22
16227	17227	18227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
16237	17237	18237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
16247	17247	18247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
47147	38147	48147	.3937		10.000	10.0	70	25
16257	17257	18257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
16267	-	18267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
47157	38157	48157	.4331		11.000	11.0	75	25
16277	17277	18277	.4375	7/16"	11.113	7/16"	2-3/4"	1"
16287	17287	18287	.4531	29/64"	11.509	1/2"	3"	1"
16297	17297	18297	.4688	15/32"	11.908	1/2"	3"	1"
47167	38167	48167	.4724		12.000	12.0	75	25
16307	17307	18307	.4844	31/64"	12.304	1/2"	3"	1"
16317	17317	18317	.5000	1/2"	12.700	1/2"	3"	1"
47177	38177	48177	.5512		14.000	14.0	88	32
16327	17327	18327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
16337	17337	18337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
47187	38187	48187	.6299		16.000	16.0	88	38
16347	17347	18347	.6875	11/16"	17.463	3/4"	4"	1-1/2"
47197	38197	48197	.7087		18.000	18.0	100	38
16357	17357	18357	.7500	3/4"	19.050	3/4"	4"	1-1/2"
47207	38207	48207	.7874		20.000	20.0	100	38
47217	38217	48217	.8661		22.000	22.0	100	38
-	17367	18367	.8750	7/8"	22.225	7/8"	4"	1-1/2"
47227	38227	48227	.9843		25.000	25.0	100	38
16377	17377	18377	1.000	1"	25.400	1"	4"	1-1/2"

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MATERIAL HARDNESS (Rc)

0

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$



Standard Length - Straight Flute - Square End

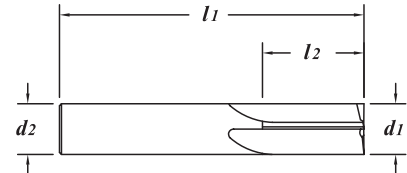
Standard Länge - Gerade Spannutt - Ohne Eckenradius

Longitud Estándar - Ranura Recta - Extremo Sin Radio

Longueur Standart - Goujures Droite - Extrémité Carré

Lunghezza Standard - Tagliente Dritto - Piatte

标准长度 - 直排屑槽 - 平头



Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Für die Bearbeitung von gehärteten Stählen
Hilft die Perpendicularität zu halten



Fresa de submicrograno sólido carburo - corte centrado
Para corte de materiales de alta dureza Rc
Ayuda a mantener la perpendicularidad



Fraises carbure submicrograin - coupe au centre
Pour la coupe de matériaux à haute dureté
Aide à tenir la perpendicularité



Fresa sub-micrograno metallo duro - taglio al centro
Per lavorazioni su materiali temprati
Taglio perpendicolare

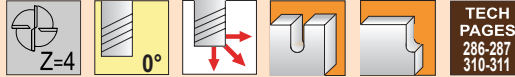


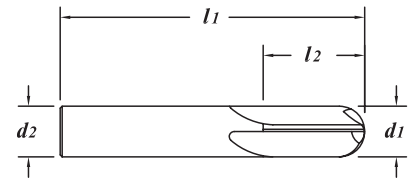
超细晶粒整体硬质合金立铣刀 - 中心切削
用于切削洛氏硬度高的材料
协助保持垂直度

(222M) 2 Flute EDP#	(234M) 4 Flute EDP#		d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
		Decimal		Metric			
81070	82070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
81110	82110	.1875	3/16"	4.763	3/16"	2"	5/8"
81150	82150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
81190	82190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
81230	82230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
81270	82270	.4375	7/16"	11.113	7/16"	2-3/4"	1"
81310	82310	.5000	1/2"	12.700	1/2"	3"	1"
81330	82330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
81350	82350	.7500	3/4"	19.050	3/4"	4"	1-1/2"
81370	82370	1.000	1"	25.400	1"	4"	1-1/2"

TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$h6$
ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$

Series 334MA

**TECH
PAGES**
286-287
310-311

**GENERAL PURPOSE
END MILLS**
Standard Length - Straight Flute - Ball End - TiALN Coated
Standard Länge - Gerade Spannutt - Vollradius - TiALN-Beschichtet
Longitud Estándar - Ranura Recta - Cabeza Esférica - Recubrimiento de TiALN
Longueur Standart - Goujures Droite - Hemispherique - Revêtement TiALN
Lunghezza Standard - Tagliente Dritto - Sferica - Rivestimento in TiALN
标准长度 - 直排屑槽 - 球头 - TiALN 涂层


Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärteten Stählen
Hilft die Perpendicularität zu halten
Vollradius Toleranz: $+0,000 / -0,025 (+0.000" -0.001")$



Fresa de submicrograno sólido carburo - corte centrado
Para corte de materiales de alta dureza Rc
Ayuda a mantener la perpendicularidad
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+0.000" -0.001")$



Fraises carbure submicrograin - coupe au centre
Pour la coupe de matériaux à haute dureté
Aide à tenir la perpendicularité
Tolerance du rayon de hemispherique $+0,000 / -0,025 (+0.000" -0.001")$



Fresa sub-micrograno metallo duro - taglio al centro
Per lavorazioni su materiali temprati
Taglio perpendicolare
Tolleranza del raggio $+0,000 / -0,025 (+0.000" -0.001")$



超细晶粒整体硬质合金立铣刀 - 中心切削
用于切削洛氏硬度高的材料
协助保持垂直度
半径公差 $+0,000 / -0,025 (+0.000" -0.001")$

(334MA) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
84077	.1250	1/8"	3.175	1/8"	1/2"
84115	.1875	3/16"	4.763	3/16"	5/8"
84157	.2500	1/4"	6.350	1/4"	3/4"
84237	.3750	3/8"	9.525	3/8"	7/8"

70

35

MATERIAL HARDNESS (Rc)

0

d_1	$+0.003" - .000" (+.075 - .000mm)$
d_2	$h6$



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Standard Length - Tapered - Square End

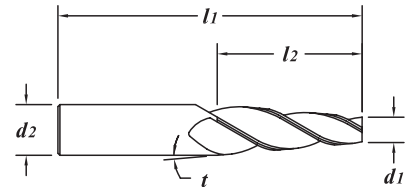
Standard Länge - Kegelig - Ohne Eckenradius

Longitud Estándar - Cónica - Extremo Sin Radio

Longueur Standart - Conique - Extrémité Carré

Lunghezza Standard - Frese per Nervature - Piatte

标准长度 - 锥度 - 平头



273M EDP#	d_2 Shank Diameter	t Taper Per Side	d_1 † Tip Diameter		l_1 Overall Length	l_2 Flute Length	
			Decimal	Metric			
49010	1/4"	1°	.1250	1/8"	3.175	3"	1-1/2"
49020	1/4"	1° 30'	.1250	1/8"	3.175	3"	1-1/2"
49030	1/4"	2°	.1250	1/8"	3.175	3"	1"
49040	1/4"	3°	.1250	1/8"	3.175	3"	1-1/4"
49050	1/4"	5°	.1250	1/8"	3.175	3"	3/4"
49060	1/4"	7°	.1250	1/8"	3.175	3"	1/2"
49070	3/8"	1°	.1875	3/16"	4.763	3-1/2"	1-3/4"
49080	3/8"	1° 30'	.1875	3/16"	4.763	3-1/2"	1-3/4"
49090	3/8"	2°	.1875	3/16"	4.763	3-1/2"	1-3/4"
49100	3/8"	3°	.1562	5/32"	3.967	3-1/2"	1-3/4"
49110	3/8"	5°	.1250	1/8"	3.175	3-1/2"	1-1/2"
49120	3/8"	7°	.1562	5/32"	3.967	3-1/2"	1"
49130	1/2"	3°	.2500	1/4"	6.350	4"	2"
49140	1/2"	5°	.2500	1/4"	6.350	4"	1-1/2"
49150	1/2"	7°	.1875	3/16"	4.763	4"	1-5/16"



Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet zum halten von Entwurfswinkel bei Formenbau Anwendungen



Fresa de submicrograno sólido carburo - corte centrado
Excelente para mantener ángulos de desmoldeo en aplicaciones de troquelado



Fraises carbure submicrograin - coupe au centre
Excellent pour la tenue des arêtes en applications moules et outillages



Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per lavorazioni di pareti inclinate sugli stampi



超细晶粒整体硬质合金立铣刀 - 中心切削
在模具用途中对于保持拔模角度非常好

TOLERANCES

$d1$	$+.003" \text{ } -.000" \text{ } (+.075 \text{ } -.000\text{mm})$
$d2$	$h6$

Series 373M



Standard Length - Tapered - Ball End

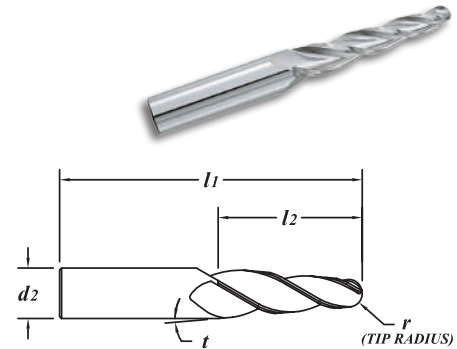
Standard Länge - Kegelig - Vollradius

Longitud Estándar - Cónica - Cabeza Esférica

Longueur Standart - Conique - Hemispherique

Lunghezza Standard - Frese per Nervature - Sferica

标准长度 - 锥度 - 球头



Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Ausgezeichnet zum halten von Entwurfswinkel bei Formenbau Anwendungen



Fresa de submicrograno sólido carburo - corte centrado
Excelente para mantener ángulos de desmoldeo en aplicaciones de troquelado



Fraises carbure submicrograin - coupe au centre
Excellent pour la tenue des arêtes en applications moules et outillages



Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per lavorazioni di pareti inclinate sugli stampi



超细晶粒整体硬质合金立铣刀 - 中心切削
在模具用途中对于保持拔模角度非常好

373M EDP#	$d2$ Shank Diameter	t Taper Per Side	r † Tip Radius		$l1$ Overall Length	$l2$ Flute Length
			Decimal	Metric		
50010	1/4"	1°	.0620	.062"	1.575	3"
50020	1/4"	1° 30'	.0620	.062"	1.575	3"
50030	1/4"	2°	.0620	.062"	1.575	3"
50040	1/4"	3°	.0620	.062"	1.575	3"
50050	1/4"	5°	.0620	.062"	1.575	3"
50060	1/4"	7°	.0620	.062"	1.575	3"
50070	3/8"	1°	.0930	.093"	2.362	3-1/2"
50080	3/8"	1° 30'	.0930	.093"	2.362	3-1/2"
50090	3/8"	2°	.0930	.093"	2.362	3-1/2"
50100	3/8"	3°	.0780	.078"	1.981	3-1/2"
50110	3/8"	5°	.0620	.062"	1.575	3-1/2"
50120	3/8"	7°	.0780	.078"	1.981	3-1/2"
50130	1/2"	3°	.1250	.125"	3.175	4"
50140	1/2"	5°	.1250	.125"	3.175	4"
50150	1/2"	7°	.0930	.093"	2.362	4"

70

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MATERIAL HARDNESS (Rc)

0

GENERAL PURPOSE
END MILLS

Series 620M, 623M, 630M, 640M, 643M, 650M

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$

.1181" - .3150"
(3.000mm - 8.000mm)



TECH
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GENERAL PURPOSE
END MILLS

Extra Length - Square End

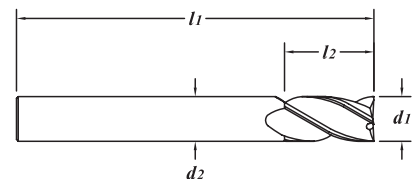
Extra Länge - Ohne Eckenradius

Longitud Extra - Extremo Sin Radio

Extra Longue - Extrémité Carré

Lunghezza Extra - Piatte

超长 - 平头



Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coated - page 240
TiAlN Coated - page 241
Stub Length - page 207
Standard Length - page 216



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
TiCN-Beschichtet - Seite 240
TiAlN-Beschichtet - Seite 241
Kurze Länge - Seite 207
Standard Länge - Seite 216



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Recubrimiento de TiCN - Página 240
Recubrimiento de TiAlN - Página 241
Longitud Corta - Página 207
Longitud Estándar - Página 216



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Peut être modifié avec un col de dégage sous un délai de 48 heures
Utilisations variables
Revêtement TiCN - Page 240
Revêtement TiAlN - Page 241
Longueur Courte - Page 207
Longueur Standard - Page 216



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Può essere modificata in 48 ore
Estremamente versatile
Rivestimento in TiCN - Pagina 240
Rivestimento in TiAlN - Pagina 241
Serie Corta - Pagina 207
Lunghezza Standard - Pagina 216



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
可以在48小时内用轴颈进行修正
功能极多
TiCN 涂层 - 240页
TiAlN 涂层 - 241页
短柱长度 - 207页
标准长度 - 216页

(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
92010	93010	94010	.1181	3.000	3.0	50	16
92020	93020	94020	.1181	3.000	3.0	75	20
92030	93030	94030	.1181	3.000	3.0	75	25
41010	54510	42010	.1250	1/8"	3.175	1/8"	2"
41020	54520	42020	.1250	1/8"	3.175	1/8"	3"
41030	54530	42030	.1250	1/8"	3.175	1/8"	1"
92040	93040	94040	.1575	4.000	4.0	50	16
92050	93050	94050	.1575	4.000	4.0	75	20
92060	93060	94060	.1575	4.000	4.0	75	25
41040	54540	42040	.1875	3/16"	4.763	3/16"	3"
41050	54550	42050	.1875	3/16"	4.763	3/16"	1-1/8"
41060	54560	42060	.1875	3/16"	4.763	3/16"	4"
92080	93080	94080	.1969	5.000	5.0	75	20
92090	93090	94090	.1969	5.000	5.0	75	25
92100	93100	94100	.2362	6.000	6.0	75	25
92110	93110	94110	.2362	6.000	6.0	100	25
92120	93120	94120	.2362	6.000	6.0	100	32
92130	93130	94130	.2362	6.000	6.0	150	38
41070	54570	42070	.2500	1/4"	6.350	1/4"	3"
41080	54580	42080	.2500	1/4"	6.350	1/4"	4"
41090	54590	42090	.2500	1/4"	6.350	1/4"	1-1/2"
41100	54600	42100	.2500	1/4"	6.350	1/4"	6"
41110	54610	42110	.3125	5/16"	7.938	5/16"	3"
41120	54620	42120	.3125	5/16"	7.938	5/16"	4"
41130	54630	42130	.3125	5/16"	7.938	5/16"	1-5/8"
41140	54640	42140	.3125	5/16"	7.938	5/16"	1-1/2"
92140	93140	94140	.3150	8.000	8.0	75	25
92150	93150	94150	.3150	8.000	8.0	100	25
92160	93160	94160	.3150	8.000	8.0	100	41
92170	93170	94170	.3150	8.000	8.0	150	50

Series 620M, 623M, 630M, 640M, 643M, 650M (continued)

.3750" - 1.250"
(9.525mm - 31.750mm)

GENERAL PURPOSE
END MILLS

(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter	Metric			
41150	54650	42150	.3750	3/8"	9.525	3/8"	3"	1"
41160	54660	42160	.3750	3/8"	9.525	3/8"	4"	1"
41170	54670	42170	.3750	3/8"	9.525	3/8"	4"	2"
41180	54680	42180	.3750	3/8"	9.525	3/8"	6"	1-1/2"
41190	54690	42190	.3750	3/8"	9.525	3/8"	6"	3"
92180	93180	94180	.3937		10.000	10.0	75	25
92190	93190	94190	.3937		10.000	10.0	100	25
92200	93200	94200	.3937		10.000	10.0	100	50
92210	93210	94210	.3937		10.000	10.0	150	38
92220	93220	94220	.3937		10.000	10.0	150	75
41200	54700	42200	.4375	7/16"	11.113	7/16"	4"	1"
41210	54710	42210	.4375	7/16"	11.113	7/16"	4"	2"
41220	54720	42220	.4375	7/16"	11.113	7/16"	6"	1-1/2"
41230	54730	42230	.4375	7/16"	11.113	7/16"	6"	3"
92230	93230	94230	.4724		12.000	12.0	100	25
92240	93240	94240	.4724		12.000	12.0	100	50
92250	93250	94250	.4724		12.000	12.0	150	50
92260	93260	94260	.4724		12.000	12.0	150	75
41240	54740	42240	.5000	1/2"	12.700	1/2"	4"	1"
41250	54750	42250	.5000	1/2"	12.700	1/2"	4"	2"
41260	54760	42260	.5000	1/2"	12.700	1/2"	6"	1-1/2"
41270	54770	42270	.5000	1/2"	12.700	1/2"	6"	3"
92270	93270	94270	.5512		14.000	14.0	100	25
92280	93280	94280	.5512		14.000	14.0	100	50
92290	93290	94290	.5512		14.000	14.0	150	50
92300	93300	94300	.5512		14.000	14.0	150	75
41280	54780	42280	.5625	9/16"	14.288	9/16"	6"	2"
41290	54790	42290	.5625	9/16"	14.288	9/16"	6"	3"
41300	54800	42300	.6250	5/8"	15.875	5/8"	6"	2"
41310	54810	42310	.6250	5/8"	15.875	5/8"	6"	3"
92310	93310	94310	.6299		16.000	16.0	150	50
92320	93320	94320	.6299		16.000	16.0	150	75
92330	93330	94330	.7087		18.000	18.0	150	50
92340	93340	94340	.7087		18.000	18.0	150	75
41320	54820	42320	.7500	3/4"	19.050	3/4"	6"	2"
41330	54830	42330	.7500	3/4"	19.050	3/4"	6"	3"
92350	93350	94350	.7874		20.000	20.0	150	50
92360	93360	94360	.7874		20.000	20.0	150	75
92370	93370	94370	.9843		25.000	25.0	150	50
-	93380	94380	.9843		25.000	25.0	150	75
41340	54840	42340	1.000	1"	25.400	1"	6"	2"
41350	54850	42350	1.000	1"	25.400	1"	6"	3"
-	-	42360	1.000	1"	25.400	1"	6"	4"
-	-	42390	1.250	1-1/4"	31.750	1-1/4"	6"	3"

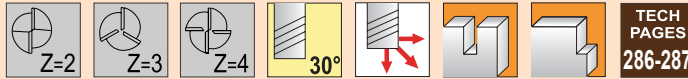
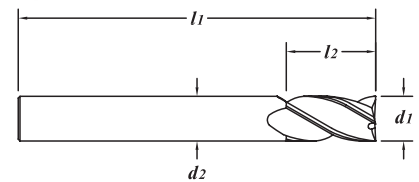
70

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MATERIAL HARDNESS (Rc)

0

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6

**Extra Length - Square End - TiCN Coated****Extra Länge - Ohne Eckenradius - TiCN-Beschichtet****Longitud Extra - Extremo Sin Radio - Recubrimiento de TiCN****Extra Longue - Extrémité Carré - Revêtement TiCN****Lunghezza Extra - Piatte - Rivestimento in TiCN****超长 - 平头 - TiCN 涂层**

Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 238
TiAlN Coated - page 241
Standard Length - page 219



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Verbesserte Verschleißbeständigkeit und Schmiereigenschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Unbeschichtet - Seite 238
TiAlN-Beschichtet - Seite 241
Standard Länge - Seite 219



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mejoradas la resistencia a la abrasión y la lubricación
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Sin recubrimiento - Página 238
Recubrimiento de TiAlN - Página 241
Longitud Estándar - Página 219



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Amélioration de la résistance à l'abrasion et au glissement
Peut être modifié avec un col de dégage sous un délai de 48 heures
Utilisations variables
Sans revêtement - Page 238
Revêtement TiAlN - Page 241
Longueur Standard - Page 219



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente versatile
Non Rivestito - Pagina 238
Rivestimento in TiAlN - Pagina 241
Lunghezza Standard - Pagina 219



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
改善耐磨性和润滑性
可以在48小时内用轴颈进行修正
功能极多
未涂层 - 238页
TiAlN 涂层 - 241页
标准长度 - 219页

(620MC) 2 Flute EDP#	(623MC) 3 Flute EDP#	(630MC) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
41014	54514	42014	.1250	1/8"	3.175	1/8"	2"
41024	54524	42024	.1250	1/8"	3.175	1/8"	3"
41034	54534	42034	.1250	1/8"	3.175	1/8"	3"
41044	54544	42044	.1875	3/16"	4.763	3/16"	3"
41054	54554	42054	.1875	3/16"	4.763	3/16"	3"
41064	54564	42064	.1875	3/16"	4.763	3/16"	4"
41074	54574	42074	.2500	1/4"	6.350	1/4"	3"
41084	54584	42084	.2500	1/4"	6.350	1/4"	4"
41094	54594	42094	.2500	1/4"	6.350	1/4"	4"
41104	54604	42104	.2500	1/4"	6.350	1/4"	6"
41114	54614	42114	.3125	5/16"	7.938	5/16"	3"
41124	54624	42124	.3125	5/16"	7.938	5/16"	4"
41134	54634	42134	.3125	5/16"	7.938	5/16"	4"
41144	54644	42144	.3125	5/16"	7.938	5/16"	6"
41154	54654	42154	.3750	3/8"	9.525	3/8"	3"
41164	54664	42164	.3750	3/8"	9.525	3/8"	4"
41174	54674	42174	.3750	3/8"	9.525	3/8"	4"
41184	54684	42184	.3750	3/8"	9.525	3/8"	6"
41194	54694	42194	.3750	3/8"	9.523	3/8"	6"
41204	54704	42204	.4375	7/16"	11.113	7/16"	4"
41214	54714	42214	.4375	7/16"	11.113	7/16"	4"
41224	54724	42224	.4375	7/16"	11.113	7/16"	6"
-	54734	42234	.4375	7/16"	11.113	7/16"	6"
41244	54744	42244	.5000	1/2"	12.700	1/2"	4"
41254	54754	42254	.5000	1/2"	12.700	1/2"	4"
41264	54764	42264	.5000	1/2"	12.700	1/2"	6"
41274	54774	42274	.5000	1/2"	12.700	1/2"	6"
41284	54784	42284	.5625	9/16"	14.288	9/16"	6"
41294	-	42294	.5625	9/16"	14.288	9/16"	6"
41304	54804	42304	.6250	5/8"	15.875	5/8"	6"
41314	54814	42314	.6250	5/8"	15.875	5/8"	6"
41324	54824	42324	.7500	3/4"	19.050	3/4"	6"
41334	54834	42334	.7500	3/4"	19.050	3/4"	6"
41344	54844	42344	1.000	1"	25.400	1"	6"
41354	54854	42354	1.000	1"	25.400	1"	6"
-	-	42364	1.000	1"	25.400	1"	6"
-	-	42394	1.250	1-1/4"	31.750	1-1/4"	6"

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$

Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA

TECH
PAGES
286-287.1181" - .3150"
(3.000mm - 8.000mm)GENERAL PURPOSE
END MILLS

Extra Length - Square End - TiAlN Coated

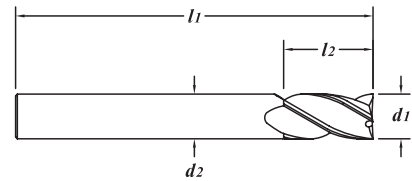
Extra Länge - Ohne Eckenradius - TiAlN-Beschichtet

Longitud Extra - Extremo Sin Radio - Recubrimiento de TiAlN

Extra Longue - Extrémité Carré - Revêtement TiAlN

Lunghezza Extra - Piatte - Rivestimento in TiAlN

超长 - 平头 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 238
TiCN Coated - page 240
Stub Length - Page 209
Standard Length - Page 220



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Unbeschichtet - Seite 238
TiCN-Beschichtet - Seite 240
Kurze Länge - Seite 209
Standard Länge - Seite 220



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mecanizado seco o semiseco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Sin recubrimiento - Página 238
Recubrimiento de TiCN - Página 240
Longitud Corta - Página 209
Longitud Estándar - Página 220



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Usinage a sec ou avec l'air
Peut être modifier avec un col degage sous un délai de 48 heures
Utilisations variables
Sans revêtement - Page 238
Revêtement TiCN - Page 240
Longueur Courte - Page 209
Longueur Standard - Page 220



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente versatile
Non Rivestito - Pagina 238
Rivestimento in TiCN - Pagina 240
Serie Corta - Pagina 209
Lunghezza Standard - Pagina 220



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
未涂层 - 238页
TiCN 涂层 - 240页
短柱长度 - 209页
标准长度 - 220页

(620MA/640MA)	(623MA/643MA)	(630MA/650MA)	d_1 †		d_2	l_1	l_2
2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	Decimal	Diameter	Shank Diameter	Overall Length	Flute Length
92017	93017	94017	.1181		3.0	50	16
92027	93027	94027	.1181		3.0	75	20
92037	93037	94037	.1181		3.0	75	25
41017	54517	42017	.1250	1/8"	3.175	2"	5/8"
41027	54527	42027	.1250	1/8"	3.175	3"	3/4"
41037	54537	42037	.1250	1/8"	3.175	3"	1"
92047	93047	94047	.1575		4.0	50	16
92057	93057	94057	.1575		4.0	75	20
92067	93067	94067	.1575		4.0	75	25
41047	54547	42047	.1875	3/16"	4.763	3"	1"
41057	54557	42057	.1875	3/16"	4.763	3"	1-1/8"
41067	54567	42067	.1875	3/16"	4.763	4"	1"
92087	93087	94087	.1969		5.0	75	20
92097	93097	94097	.1969		5.0	75	25
92107	93107	94107	.2362		6.0	75	25
92117	93117	94117	.2362		6.0	100	25
92127	93127	94127	.2362		6.0	100	32
92137	93137	94137	.2362		6.0	150	38
41077	54577	42077	.2500	1/4"	6.350	3"	1"
41087	54587	42087	.2500	1/4"	6.350	4"	1"
41097	54597	42097	.2500	1/4"	6.350	4"	1-1/2"
41107	54607	42107	.2500	1/4"	6.350	6"	1-1/2"
41117	54617	42117	.3125	5/16"	7.938	3"	1"
41127	54627	42127	.3125	5/16"	7.938	4"	1"
41137	54637	42137	.3125	5/16"	7.938	4"	1-5/8"
41147	54647	42147	.3125	5/16"	7.938	6"	1-1/2"
92147	93147	94147	.3150		8.000	75	25
92157	93157	94157	.3150		8.000	100	25
92167	93167	94167	.3150		8.000	100	41
92177	93177	94177	.3150		8.000	150	50

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MATERIAL HARDNESS (Rc)

0

continued →

Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA (continued)

.3750" - 1.250"
(9.525mm - 31.750mm)

GENERAL PURPOSE
END MILLS

(620MA/640MA) 2 Flute EDP#	(623MA/643MA) 3 Flute EDP#	(630MA/650MA) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal				
41157	54657	42157	.3750	3/8"	9.525	3/8"	3"
41167	54667	42167	.3750	3/8"	9.525	3/8"	4"
41177	54677	42177	.3750	3/8"	9.525	3/8"	4"
41187	54687	42187	.3750	3/8"	9.525	3/8"	6"
41197	54697	42197	.3750	3/8"	9.525	3/8"	6"
92187	93187	94187	.3937		10.000	10.0	75
92197	93197	94197	.3937		10.000	10.0	100
92207	93207	94207	.3937		10.000	10.0	100
92217	93217	94217	.3937		10.000	10.0	150
92227	93227	94227	.3937		10.000	10.0	150
41207	54707	42207	.4375	7/16"	11.113	7/16"	4"
41217	54717	42217	.4375	7/16"	11.113	7/16"	4"
41227	54727	42227	.4375	7/16"	11.113	7/16"	6"
41237	54737	42237	.4375	7/16"	11.113	7/16"	6"
92237	93237	94237	.4724		12.000	12.0	100
92247	93247	94247	.4724		12.000	12.0	100
92257	93257	94257	.4724		12.000	12.0	150
92267	93267	94267	.4724		12.000	12.0	150
41247	54747	42247	.5000	1/2"	12.700	1/2"	4"
41257	54757	42257	.5000	1/2"	12.700	1/2"	4"
41267	54767	42267	.5000	1/2"	12.700	1/2"	6"
41277	54777	42277	.5000	1/2"	12.700	1/2"	6"
92277	93277	94277	.5512		14.000	14.0	100
92287	93287	94287	.5512		14.000	14.0	100
-	93297	94297	.5512		14.000	14.0	150
92307	93307	94307	.5512		14.000	14.0	150
41287	54787	42287	.5625	9/16"	14.288	9/16"	6"
-	54797	42297	.5625	9/16"	14.288	9/16"	6"
41307	54807	42307	.6250	5/8"	15.875	5/8"	6"
41317	54817	42317	.6250	5/8"	15.875	5/8"	6"
92317	93317	94317	.6299		16.000	16.0	150
92327	93327	94327	.6299		16.000	16.0	150
-	-	94337	.7087		18.000	18.0	150
-	93347	94347	.7087		18.000	18.0	150
41327	54827	42327	.7500	3/4"	19.050	3/4"	6"
41337	54837	42337	.7500	3/4"	19.050	3/4"	6"
92357	93357	94357	.7874		20.000	20.0	150
92367	93367	94367	.7874		20.000	20.0	150
-	93377	94377	.9843		25.000	25.0	150
92387	93387	94387	.9843		25.000	25.0	150
41347	54847	42347	1.000	1"	25.400	1"	6"
41357	54857	42357	1.000	1"	25.400	1"	6"
-	-	42367	1.000	1"	25.400	1"	6"
-	-	42397	1.250	1-1/4"	31.750	1-1/4"	6"

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MATERIAL HARDNESS (Rc)

0

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$
r	$+0.001" - .001" (+.025 - .025\text{mm})$

Series 630R

.1250" - .3125"
(3.175mm - 7.938mm)



Extra Length - Corner Radius

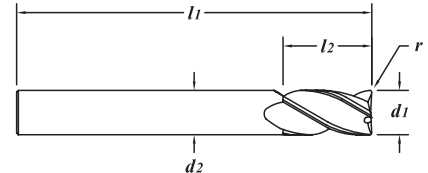
Extra Länge - Eckenradius

Longitud Extra - Ángulo Redondeado

Extra Longue - Rayon de Coin

Lunghezza Extra - Torico

超长 - 圆角半径



Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Can be modified with a neck within 48 hours
Extremely versatile
TiAlN Coated - page 246
Stub Length - page 210
Standard Length - page 222



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Für stärkere Schneidecken und Radiusteile
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
TiAlN-Beschichtet - Seite 246
Kurze Länge - Seite 210
Standard Länge - Seite 222



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Para un mejor refuerzo de esquinas y zonas curvas
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Recubrimiento de TiAlN - Página 246
Longitud Corta - Página 210
Longitud Estándar - Página 222



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Rayon de coin renforcés
Peut être modifié avec un col de dégauche sous un délai de 48 heures
Utilisations variables
Revêtement TiAlN - Page 246
Longueur Courte - Page 210
Longueur Standard - Page 222



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Raggi rinforzati
Può essere modificata in 48 ore
Estremamente versatile
Rivestimento in TiAlN - Pagina 246
Serie Corta - Pagina 210
Lunghezza Standard - Pagina 222



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
用于强化圆角和零件半径
可以在48小时内用轴颈进行修正
功能极多
TiAlN 涂层 - 246页
短柱长度 - 210页
标准长度 - 222页

EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
	Decimal	Diameter	Metric				
20100	.1250	1/8"	3.175	1/8"	3"	1"	.010"
20110	.1250	1/8"	3.175	1/8"	3"	1"	.015"
20120	.1250	1/8"	3.175	1/8"	3"	1"	.020"
20130	.1250	1/8"	3.175	1/8"	3"	1"	.030"
20140	.1250	1/8"	3.175	1/8"	3"	1"	.045"
20150	.1875	3/16"	4.763	3/16"	3"	1"	.010"
20160	.1875	3/16"	4.763	3/16"	3"	1"	.015"
20170	.1875	3/16"	4.763	3/16"	3"	1"	.020"
20180	.1875	3/16"	4.763	3/16"	3"	1"	.030"
20190	.1875	3/16"	4.763	3/16"	3"	1"	.045"
20200	.1875	3/16"	4.763	3/16"	3"	1"	.060"
20210	.1875	3/16"	4.763	3/16"	4"	1"	.010"
20220	.1875	3/16"	4.763	3/16"	4"	1"	.015"
20230	.1875	3/16"	4.763	3/16"	4"	1"	.020"
20240	.1875	3/16"	4.763	3/16"	4"	1"	.030"
20250	.1875	3/16"	4.763	3/16"	4"	1"	.045"
20260	.1875	3/16"	4.763	3/16"	4"	1"	.060"
20270	.2500	1/4"	6.350	1/4"	3"	1"	.010"
20280	.2500	1/4"	6.350	1/4"	3"	1"	.020"
20290	.2500	1/4"	6.350	1/4"	3"	1"	.030"
20300	.2500	1/4"	6.350	1/4"	3"	1"	.045"
20310	.2500	1/4"	6.350	1/4"	3"	1"	.060"
20320	.2500	1/4"	6.350	1/4"	4"	1"	.010"
20330	.2500	1/4"	6.350	1/4"	4"	1"	.020"
20340	.2500	1/4"	6.350	1/4"	4"	1"	.030"
20350	.2500	1/4"	6.350	1/4"	4"	1"	.045"
20360	.2500	1/4"	6.350	1/4"	4"	1"	.060"
20370	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.010"
20380	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.020"
20390	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.030"
20400	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.045"
20410	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.060"
20420	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.010"
20430	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.020"
20440	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.030"
20450	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.045"
20460	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.060"
20470	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.090"
20480	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.125"

continued →

Series 630R (continued)

.3750" - .6250"
(9.525mm - 15.875mm)

GENERAL PURPOSE
END MILLS

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius
	Decimal		Metric				
20490	.3750	3/8"	9.525	3/8"	4"	1"	.010"
20500	.3750	3/8"	9.525	3/8"	4"	1"	.020"
20510	.3750	3/8"	9.525	3/8"	4"	1"	.030"
20520	.3750	3/8"	9.525	3/8"	4"	1"	.045"
20530	.3750	3/8"	9.525	3/8"	4"	1"	.060"
20540	.3750	3/8"	9.525	3/8"	4"	1"	.090"
20550	.3750	3/8"	9.525	3/8"	4"	1"	.125"
20560	.3750	3/8"	9.525	3/8"	4"	2"	.010"
20570	.3750	3/8"	9.525	3/8"	4"	2"	.020"
20580	.3750	3/8"	9.525	3/8"	4"	2"	.030"
20590	.3750	3/8"	9.525	3/8"	4"	2"	.045"
20600	.3750	3/8"	9.525	3/8"	4"	2"	.060"
20610	.3750	3/8"	9.525	3/8"	4"	2"	.090"
20620	.3750	3/8"	9.525	3/8"	4"	2"	.125"
20630	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"
20640	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"
20650	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"
20660	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"
20670	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"
20680	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"
20690	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"
20700	.5000	1/2"	12.700	1/2"	4"	1"	.015"
20710	.5000	1/2"	12.700	1/2"	4"	1"	.020"
20720	.5000	1/2"	12.700	1/2"	4"	1"	.030"
20730	.5000	1/2"	12.700	1/2"	4"	1"	.045"
20740	.5000	1/2"	12.700	1/2"	4"	1"	.060"
20750	.5000	1/2"	12.700	1/2"	4"	1"	.090"
20760	.5000	1/2"	12.700	1/2"	4"	1"	.125"
20770	.5000	1/2"	12.700	1/2"	4"	2"	.015"
20780	.5000	1/2"	12.700	1/2"	4"	2"	.020"
20790	.5000	1/2"	12.700	1/2"	4"	2"	.030"
20800	.5000	1/2"	12.700	1/2"	4"	2"	.045"
20810	.5000	1/2"	12.700	1/2"	4"	2"	.060"
20820	.5000	1/2"	12.700	1/2"	4"	2"	.090"
20830	.5000	1/2"	12.700	1/2"	4"	2"	.125"
20840	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"
20850	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"
20860	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"
20870	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"
20880	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"
20890	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"
20900	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"
20910	.6250	5/8"	15.875	5/8"	6"	2"	.010"
20920	.6250	5/8"	15.875	5/8"	6"	2"	.015"
20930	.6250	5/8"	15.875	5/8"	6"	2"	.020"
20940	.6250	5/8"	15.875	5/8"	6"	2"	.030"
20950	.6250	5/8"	15.875	5/8"	6"	2"	.045"
20960	.6250	5/8"	15.875	5/8"	6"	2"	.060"
20970	.6250	5/8"	15.875	5/8"	6"	2"	.090"
20980	.6250	5/8"	15.875	5/8"	6"	2"	.125"

MATERIAL HARDNESS (Rc)

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius
	Decimal	Metric				
20990	.7500	3/4"	19.050	6"	3"	.015"
21000	.7500	3/4"	19.050	6"	3"	.020"
21010	.7500	3/4"	19.050	6"	3"	.030"
21020	.7500	3/4"	19.050	6"	3"	.045"
21030	.7500	3/4"	19.050	6"	3"	.060"
21040	.7500	3/4"	19.050	6"	3"	.090"
21050	.7500	3/4"	19.050	6"	3"	.125"
21140	.7500	3/4"	19.050	6"	3"	.250"
21060	1.000	1"	25.400	6"	3"	.015"
21070	1.000	1"	25.400	6"	3"	.020"
21080	1.000	1"	25.400	6"	3"	.030"
21090	1.000	1"	25.400	6"	3"	.045"
21100	1.000	1"	25.400	6"	3"	.060"
21110	1.000	1"	25.400	6"	3"	.090"
21120	1.000	1"	25.400	6"	3"	.125"
21130	1.000	1"	25.400	6"	3"	.250"



End Mill Reconditioning

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MATERIAL HARDNESS (Rc)

0

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$
r	$+0.001" - .001" (+.025 - .025\text{mm})$

.1250" - .3125"
(3.175mm - 7.938mm)



Extra Length - Corner Radius - TiAlN Coated

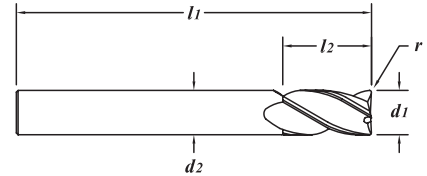
Extra Länge - Eckenradius - TiAlN-Beschichtet

Longitud Extra - Ángulo Redondeado - Recubrimiento de TiAlN

Extra Longue - Rayon de Coin - Revêtement TiAlN

Lunghezza Extra - Torico - Rivestimento in TiAlN

超长 - 圆角半径 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 243
Stub Length - page 212
Standard Length - page 225



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Unbeschichtet - Seite 243
Kurze Länge - Seite 212
Standard Länge - Seite 225



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semisecco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Sin recubrimiento - Página 243
Longitud Corta - Página 212
Longitud Estándar - Página 225



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Rayon de coin renforcés
Usinage à sec ou avec l'air
Peut être modifier avec un col degage sous un délai de 48 heures
Utilisations variables
Sans revêtement - Page 243
Longueur Courte - Page 212
Longueur Standard - Page 225



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Raggi rinforzati
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente versatile
Non Rivestito - Pagina 243
Serie Corta - Pagina 212
Lunghezza Standard - Pagina 225



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
用于强化圆角和零件半径
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
未涂层 - 243页
短柱长度 - 212页
标准长度 - 225页

EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	
	Decimal	Metric					
20107	.1250	1/8"	3.175	1/8"	3"	1"	.010"
20117	.1250	1/8"	3.175	1/8"	3"	1"	.015"
20127	.1250	1/8"	3.175	1/8"	3"	1"	.020"
20137	.1250	1/8"	3.175	1/8"	3"	1"	.030"
20147	.1250	1/8"	3.175	1/8"	3"	1"	.045"
20157	.1875	3/16"	4.763	3/16"	3"	1"	.010"
20167	.1875	3/16"	4.763	3/16"	3"	1"	.015"
20177	.1875	3/16"	4.763	3/16"	3"	1"	.020"
20187	.1875	3/16"	4.763	3/16"	3"	1"	.030"
20197	.1875	3/16"	4.763	3/16"	3"	1"	.045"
20207	.1875	3/16"	4.763	3/16"	3"	1"	.060"
20217	.1875	3/16"	4.763	3/16"	4"	1"	.010"
20227	.1875	3/16"	4.763	3/16"	4"	1"	.015"
20237	.1875	3/16"	4.763	3/16"	4"	1"	.020"
20247	.1875	3/16"	4.763	3/16"	4"	1"	.030"
20257	.1875	3/16"	4.763	3/16"	4"	1"	.045"
20267	.1875	3/16"	4.763	3/16"	4"	1"	.060"
20277	.2500	1/4"	6.350	1/4"	3"	1"	.010"
20287	.2500	1/4"	6.350	1/4"	3"	1"	.020"
20297	.2500	1/4"	6.350	1/4"	3"	1"	.030"
20307	.2500	1/4"	6.350	1/4"	3"	1"	.045"
20317	.2500	1/4"	6.350	1/4"	3"	1"	.060"
20327	.2500	1/4"	6.350	1/4"	4"	1"	.010"
20337	.2500	1/4"	6.350	1/4"	4"	1"	.020"
20347	.2500	1/4"	6.350	1/4"	4"	1"	.030"
20357	.2500	1/4"	6.350	1/4"	4"	1"	.045"
20367	.2500	1/4"	6.350	1/4"	4"	1"	.060"
20377	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.010"
20387	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.020"
20397	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.030"
20407	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.045"
20417	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.060"
20427	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.010"
20437	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.020"
20447	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.030"
20457	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.045"
20467	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.060"
20477	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.090"
20487	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.125"

EDP#	d_1 † Diameter		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
	Decimal						
20497	.3750	3/8"	9.525	3/8"	4"	1"	.010"
20507	.3750	3/8"	9.525	3/8"	4"	1"	.020"
20517	.3750	3/8"	9.525	3/8"	4"	1"	.030"
20527	.3750	3/8"	9.525	3/8"	4"	1"	.045"
20537	.3750	3/8"	9.525	3/8"	4"	1"	.060"
20547	.3750	3/8"	9.525	3/8"	4"	1"	.090"
20557	.3750	3/8"	9.525	3/8"	4"	1"	.125"
20567	.3750	3/8"	9.525	3/8"	4"	2"	.010"
20577	.3750	3/8"	9.525	3/8"	4"	2"	.020"
20587	.3750	3/8"	9.525	3/8"	4"	2"	.030"
20597	.3750	3/8"	9.525	3/8"	4"	2"	.045"
20607	.3750	3/8"	9.525	3/8"	4"	2"	.060"
20617	.3750	3/8"	9.525	3/8"	4"	2"	.090"
20627	.3750	3/8"	9.525	3/8"	4"	2"	.125"
20637	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"
20647	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"
20657	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"
20667	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"
20677	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"
20687	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"
20697	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"
21157	.4375	7/16"	11.113	7/16"	4"	1"	.010"
21167	.4375	7/16"	11.113	7/16"	4"	1"	.015"
21177	.4375	7/16"	11.113	7/16"	4"	1"	.020"
21187	.4375	7/16"	11.113	7/16"	4"	1"	.030"
21227	.4375	7/16"	11.113	7/16"	4"	1"	.125"
20707	.5000	1/2"	12.700	1/2"	4"	1"	.015"
20717	.5000	1/2"	12.700	1/2"	4"	1"	.020"
20727	.5000	1/2"	12.700	1/2"	4"	1"	.030"
20737	.5000	1/2"	12.700	1/2"	4"	1"	.045"
20747	.5000	1/2"	12.700	1/2"	4"	1"	.060"
20757	.5000	1/2"	12.700	1/2"	4"	1"	.090"
20767	.5000	1/2"	12.700	1/2"	4"	1"	.125"
20777	.5000	1/2"	12.700	1/2"	4"	2"	.015"
20787	.5000	1/2"	12.700	1/2"	4"	2"	.020"
20797	.5000	1/2"	12.700	1/2"	4"	2"	.030"
20807	.5000	1/2"	12.700	1/2"	4"	2"	.045"
20817	.5000	1/2"	12.700	1/2"	4"	2"	.060"
20827	.5000	1/2"	12.700	1/2"	4"	2"	.090"
20837	.5000	1/2"	12.700	1/2"	4"	2"	.125"
20847	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"
20857	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"
20867	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"
20877	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"
20887	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"
20897	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"
20907	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"
20917	.6250	5/8"	15.875	5/8"	6"	2"	.010"
20927	.6250	5/8"	15.875	5/8"	6"	2"	.015"
20937	.6250	5/8"	15.875	5/8"	6"	2"	.020"
20947	.6250	5/8"	15.875	5/8"	6"	2"	.030"
20957	.6250	5/8"	15.875	5/8"	6"	2"	.045"
20967	.6250	5/8"	15.875	5/8"	6"	2"	.060"
20977	.6250	5/8"	15.875	5/8"	6"	2"	.090"
20987	.6250	5/8"	15.875	5/8"	6"	2"	.125"

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MATERIAL HARDNESS (Rc)

0

continued →

Series 630RA (continued)

.7500" - 1.000"
(19.050mm - 25.400mm)

EDP#	$d1$ †			$d2$	$l1$	$l2$	r
	Decimal	Diameter	Metric				
20997	.7500	3/4"	19.050	3/4"	6"	3"	.015"
21007	.7500	3/4"	19.050	3/4"	6"	3"	.020"
21017	.7500	3/4"	19.050	3/4"	6"	3"	.030"
21027	.7500	3/4"	19.050	3/4"	6"	3"	.045"
21037	.7500	3/4"	19.050	3/4"	6"	3"	.060"
21047	.7500	3/4"	19.050	3/4"	6"	3"	.090"
21057	.7500	3/4"	19.050	3/4"	6"	3"	.125"
21147	.7500	3/4"	19.050	3/4"	6"	3"	.250"
21067	1.000	1"	25.400	1"	6"	3"	.015"
21077	1.000	1"	25.400	1"	6"	3"	.020"
21087	1.000	1"	25.400	1"	6"	3"	.030"
21097	1.000	1"	25.400	1"	6"	3"	.045"
21107	1.000	1"	25.400	1"	6"	3"	.060"
21117	1.000	1"	25.400	1"	6"	3"	.090"
21127	1.000	1"	25.400	1"	6"	3"	.125"
21137	1.000	1"	25.400	1"	6"	3"	.250"



TOLERANCES

d_1	$+0.000 \text{ } -0.002 \text{ } (+.000 \text{ } -.050\text{mm})$
d_2	$h6$
ball radius	$+0.000 \text{ } -0.001 \text{ } (+.000 \text{ } -.025\text{mm})$

Series 720M, 723M, 730M, 740M, 743M, 750M

.1181" - .3150"
(3.000mm - 8.000mm)



GENERAL PURPOSE
END MILLS

Extra Length - Ball End

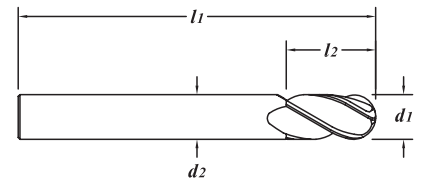
Extra Länge - Vollradius

Longitud Extra - Cabeza Esférica

Extra Longue - Hemispherique

Lunghezza Extra - Sferica

超长 - 球头



Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coated - page 251
TiAlN Coated - page 252
Stub Length - page 214
Standard Length - page 228



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: $+0.000 \text{ } -0.025 \text{ } (+.000 \text{ } -.001 \text{ })$
TiCN-Beschichtet - Seite 251
TiAlN-Beschichtet - Seite 252
Kurze Länge - Seite 214
Standard Länge - Seite 228



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica $+0.000 \text{ } -0.025 \text{ } (+.000 \text{ } -.001 \text{ })$
Recubrimiento de TiCN - Página 251
Recubrimiento de TiAlN - Página 252
Longitud Corta - Página 214
Longitud Estándar - Página 228



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Peut être modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique $+0.000 \text{ } -0.025 \text{ } (+.000 \text{ } -.001 \text{ })$
Revêtement TiCN - Page 251
Revêtement TiAlN - Page 252
Longueur Courte - Page 214
Longueur Standart - Page 228



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio $+0.000 \text{ } -0.025 \text{ } (+.000 \text{ } -.001 \text{ })$
Rivestimento in TiCN - Pagina 251
Rivestimento in TiAlN - Pagina 252
Serie Corta - Pagina 214
Lunghezza Standard - Pagina 228



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
可以在48小时内用轴颈进行修正
功能极多
半径公差 $+0.000 \text{ } -0.025 \text{ } (+.000 \text{ } -.001 \text{ })$
TiCN 涂层 - 251页
TiAlN 涂层 - 252页
短柱长度 - 214页
标准长度 - 228页

(720M/740M) 2 Flute EDP#	(723M/743M) 3 Flute EDP#	(730M/750M) 4 Flute EDP#	d_1 + Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
97010	98010	99010	.1181	3.000	3.0	50	16
97020	98020	99020	.1181	3.000	3.0	75	20
97030	98030	99030	.1181	3.000	3.0	75	25
43010	55510	44010	.1250	1/8"	3.175	1/8"	2"
43020	55520	44020	.1250	1/8"	3.175	1/8"	3"
43030	55530	44030	.1250	1/8"	3.175	1/8"	3"
97040	98040	99040	.1575	4.000	4.0	50	16
97050	98050	99050	.1575	4.000	4.0	75	20
97060	98060	99060	.1575	4.000	4.0	75	25
43040	55540	44040	.1875	3/16"	4.763	3/16"	3"
43050	55550	44050	.1875	3/16"	4.763	3/16"	3"
43060	55560	44060	.1875	3/16"	4.763	3/16"	4"
97080	98080	99080	.1969	5.000	5.0	75	20
97090	98090	99090	.1969	5.000	5.0	75	25
97100	98100	99100	.2362	6.000	6.0	75	25
97110	98110	99110	.2362	6.000	6.0	100	25
97120	98120	99120	.2362	6.000	6.0	100	32
97130	98130	99130	.2362	6.000	6.0	150	38
43070	55570	44070	.2500	1/4"	6.350	1/4"	3"
43080	55580	44080	.2500	1/4"	6.350	1/4"	4"
43090	55590	44090	.2500	1/4"	6.350	1/4"	4"
43100	55600	44100	.2500	1/4"	6.350	1/4"	6"
43110	55610	44110	.3125	5/16"	7.938	5/16"	3"
43120	55620	44120	.3125	5/16"	7.938	5/16"	4"
43130	55630	44130	.3125	5/16"	7.938	5/16"	4"
43140	55640	44140	.3125	5/16"	7.938	5/16"	6"
97140	98140	99140	.3150	8.000	8.0	75	25
97150	98150	99150	.3150	8.000	8.0	100	25
97160	98160	99160	.3150	8.000	8.0	100	41
97170	98170	99170	.3150	8.000	8.0	150	50

continued →

MATERIAL HARDNESS (Rc)

Series 720M, 723M, 730M, 740M, 743M, 750M (continued)

.3750" - 1.000"
(9.525mm - 25.400mm)

GENERAL PURPOSE
END MILLS

(720M/740M) 2 Flute EDP#	(723M/743M) 3 Flute EDP#	(730M/750M) 4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Diameter	Metric			
43150	55650	44150	.3750	3/8"	9.525	3/8"	3"	1"
43160	55660	44160	.3750	3/8"	9.525	3/8"	4"	1"
43170	55670	44170	.3750	3/8"	9.525	3/8"	4"	2"
43180	55680	44180	.3750	3/8"	9.525	3/8"	6"	1-1/2"
43190	55690	44190	.3750	3/8"	9.525	3/8"	6"	3"
97180	98180	99180	.3937		10.000	10.0	75	25
97190	98190	99190	.3937		10.000	10.0	100	25
97200	98200	99200	.3937		10.000	10.0	100	50
97210	98210	99210	.3937		10.000	10.0	150	38
97220	98220	99220	.3937		10.000	10.0	150	75
43200	55700	44200	.4375	7/16"	11.113	7/16"	4"	1"
43210	55710	44210	.4375	7/16"	11.113	7/16"	4"	2"
43220	-	44220	.4375	7/16"	11.113	7/16"	6"	1-1/2"
43230	-	44230	.4375	7/16"	11.113	7/16"	6"	3"
97230	98230	99230	.4724		12.000	12.0	100	25
97240	98240	99240	.4724		12.000	12.0	100	50
97250	98250	99250	.4724		12.000	12.0	150	50
97260	98260	99260	.4724		12.000	12.0	150	75
43240	55740	44240	.5000	1/2"	12.700	1/2"	4"	1"
43250	55750	44250	.5000	1/2"	12.700	1/2"	4"	2"
43260	55760	44260	.5000	1/2"	12.700	1/2"	6"	1-1/2"
43270	55770	44270	.5000	1/2"	12.700	1/2"	6"	3"
97270	98270	-	.5512		14.000	14.0	100	25
97280	-	-	.5512		14.000	14.0	100	50
97290	-	99290	.5512		14.000	14.0	150	50
97300	98300	-	.5512		14.000	14.0	150	75
43280	55780	44280	.5625	9/16"	14.288	9/16"	6"	2"
-	55790	44290	.5625	9/16"	14.288	9/16"	6"	3"
43300	55800	44300	.6250	5/8"	15.875	5/8"	6"	2"
43310	55810	44310	.6250	5/8"	15.875	5/8"	6"	3"
97310	98310	99310	.6299		16.000	16.0	150	50
97320	98320	99320	.6299		16.000	16.0	150	75
97340	98340	99340	.7087		18.000	18.0	150	75
43320	55820	44320	.7500	3/4"	19.050	3/4"	6"	2"
43330	55830	44330	.7500	3/4"	19.050	3/4"	6"	3"
97350	98350	99350	.7874		20.000	20.0	150	50
97360	98360	99360	.7874		20.000	20.0	150	75
-	98370	-	.9843		25.000	25.0	150	50
97380	98380	-	.9843		25.000	25.0	150	75
43340	55840	44340	1.000	1"	25.400	1"	6"	2"
43350	55850	44350	1.000	1"	25.400	1"	6"	3"

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MATERIAL HARDNESS (Rc)

0

TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$h6$
ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$

Series 720MC, 723MC, 730MC

TECH
PAGES
286-287

Extra Length - Ball End - TiCN Coated

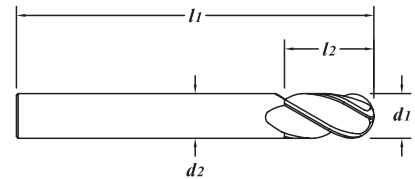
Extra Länge - Vollradius - TiCN-Beschichtet

Longitud Extra - Cabeza Esférica - Recubrimiento de TiCN

Extra Longue - Hemispherique - Revêtement TiCN

Lunghezza Extra - Sferica - Rivestimento in TiCN

超长 - 球头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 249
TiAlN Coated - page 252
Standard Length - page 231



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Verbesserte Verschleißbeständigkeit und Schmiereisenschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: $+0.000 / -0.025 (+0.000" -0.001")$
Unbeschichtet - Seite 249
TiAlN-Beschichtet - Seite 252
Standard Länge - Seite 231



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mejoradas la resistencia a la abrasión y la lubricación
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica $+0.000 / -0.025 (+0.000" -0.001")$
Sin recubrimiento - Página 249
Recubrimiento de TiAlN - Página 252
Longitud Estándar - Página 231



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Amélioration de la résistance à l'abrasion et au glissement
Peut être modifié avec un col de dégage sous un délai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique $+0.000 / -0.025 (+0.000" -0.001")$
Sans revêtement - Page 249
Revêtement TiAlN - Page 252
Longueur Standard - Page 231



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio $+0.000 / -0.025 (+0.000" -0.001")$
Non Rivestito - Pagina 249
Rivestimento in TiAlN - Pagina 252
Lunghezza Standard - Pagina 231



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
改善耐磨性和润滑性
可以在48小时内用轴颈进行修正
功能极多
半径公差 $+0.000 / -0.025 (+0.000" -0.001")$
未涂层 - 249页
TiAlN 涂层 - 252页
标准长度 - 231页

(720MC) 2 Flute EDP#	(723MC) 3 Flute EDP#	(730MC) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal	Metric			
43014	55514	44014	.1250	1/8"	3.175	1/8"	2"
43024	55524	44024	.1250	1/8"	3.175	1/8"	3"
43034	55534	44034	.1250	1/8"	3.175	1/8"	3"
43044	55544	44044	.1875	3/16"	4.763	3/16"	3"
43054	55554	44054	.1875	3/16"	4.763	3/16"	3"
43064	55564	44064	.1875	3/16"	4.763	3/16"	4"
43074	55574	44074	.2500	1/4"	6.350	1/4"	3"
43084	55584	44084	.2500	1/4"	6.350	1/4"	4"
43094	55594	44094	.2500	1/4"	6.350	1/4"	4"
43104	55604	44104	.2500	1/4"	6.350	1/4"	6"
43114	55614	44114	.3125	5/16"	7.938	5/16"	3"
43124	55624	44124	.3125	5/16"	7.938	5/16"	4"
43134	-	44134	.3125	5/16"	7.938	5/16"	4"
43144	55644	44144	.3125	5/16"	7.938	5/16"	6"
43154	55654	44154	.3750	3/8"	9.525	3/8"	3"
43164	55664	44164	.3750	3/8"	9.525	3/8"	4"
43174	55674	44174	.3750	3/8"	9.525	3/8"	4"
43184	55684	44184	.3750	3/8"	9.525	3/8"	6"
-	55694	44194	.3750	3/8"	9.525	3/8"	6"
-	-	44204	.4375	7/16"	11.113	7/16"	4"
-	-	44214	.4375	7/16"	11.113	7/16"	4"
43224	55724	44224	.4375	7/16"	11.113	7/16"	6"
-	-	44234	.4375	7/16"	11.113	7/16"	6"
43244	55744	44244	.5000	1/2"	12.700	1/2"	4"
43254	55754	44254	.5000	1/2"	12.700	1/2"	4"
43264	55764	44264	.5000	1/2"	12.700	1/2"	6"
43274	55774	44274	.5000	1/2"	12.700	1/2"	6"
-	-	44284	.5625	9/16"	14.288	9/16"	6"
-	-	44294	.5625	9/16"	14.288	9/16"	6"
43304	55804	44304	.6250	5/8"	15.875	5/8"	6"
-	-	44314	.6250	5/8"	15.875	5/8"	6"
43324	55824	44324	.7500	3/4"	19.050	3/4"	6"
43334	55834	44334	.7500	3/4"	19.050	3/4"	6"
-	55844	44344	1.000	1"	25.400	1"	6"
43354	55854	44354	1.000	1"	25.400	1"	6"

GENERAL PURPOSE
END MILLS

70

35

MATERIAL HARDNESS (Rc)

0

Series 720MA, 723MA, 730MA, 740MA, 743MA, 750MA

.1181" - .3150"
(3.000mm - 8.000mm)TECH
PAGES
286-287

TOLERANCES

d_1	+0.000" - .002" (+.000 - .050mm)
d_2	h6
ball radius	+0.000" - .001" (+.000 - .025mm)

Extra Length - Ball End - TiALN Coated

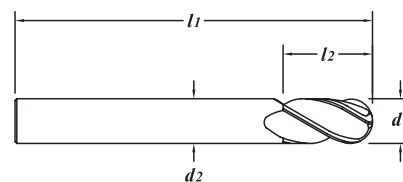
Extra Länge - Vollradius - TiALN-Beschichtet

Longitud Extra - Cabeza Esférica - Recubrimiento de TiALN

Extra Longue - Hemispherique - Revêtement TiALN

Lunghezza Extra - Sferica - Rivestimento in TiALN

超长 - 球头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 249
TiCN Coated - page 251
Stub Length - page 215
Standard Length - page 232



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Erweiterte Reichweite
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: +0,000 / -0,025 (+.000" - .001")
Unbeschichtet - Seite 249
TiCN-Beschichtet - Seite 251
Kurze Länge - Seite 215
Standard Länge - Seite 232



Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mecanizado seco o semisecco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / -0,025 (+.000" - .001")
Sin recubrimiento - Página 249
Recubrimiento de TiCN - Página 251
Longitud Corta - Página 215
Longitud Estándar - Página 232



Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Usinage a sec ou avec l'air
Peut être modifié avec un col degage sous un délai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / -0,025 (+.000" - .001")
Sans revêtement - Page 249
Revêtement TiCN - Page 251
Longueur Courte - Page 215
Longueur Standard - Page 232



Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio +0,000 / -0,025 (+.000" - .001")
Non Rivestito - Pagina 249
Rivestimento in TiCN - Pagina 251
Serie Corta - Pagina 215
Lunghezza Standard - Pagina 232



超细晶粒整体硬质合金立铣刀 - 中心切削
加长
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
半径公差 +0,000 / -0,025 (+.000" - .001")
未涂层 - 249页
TiCN 涂层 - 251页
短柱长度 - 215页
标准长度 - 232页

(720MA/740MA)	(723MA/743MA)	(730MA/750MA)	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	Decimal	Metric			
97017	98017	99017	.1181	3.000	3.0	50	16
97027	98027	99027	.1181	3.000	3.0	75	20
97037	98037	99037	.1181	3.000	3.0	75	25
43017	55517	44017	.1250	1/8"	3.175	1/8"	2"
43027	55527	44027	.1250	1/8"	3.175	1/8"	3"
43037	55537	44037	.1250	1/8"	3.175	1/8"	3"
97047	98047	99047	.1575	4.000	4.0	50	16
97057	98057	99057	.1575	4.000	4.0	75	20
97067	98067	99067	.1575	4.000	4.0	75	25
43047	55547	44047	.1875	3/16"	4.763	3/16"	3"
43057	55557	44057	.1875	3/16"	4.763	3/16"	3"
43067	55567	44067	.1875	3/16"	4.763	3/16"	4"
97087	98087	99087	.1969	5.000	5.0	75	20
97097	98097	99097	.1969	5.000	5.0	75	25
97107	98107	99107	.2362	6.000	6.0	75	25
97117	98117	99117	.2362	6.000	6.0	100	25
97127	98127	99127	.2362	6.000	6.0	100	32
97137	98137	99137	.2362	6.000	6.0	150	38
43077	55577	44077	.2500	1/4"	6.350	1/4"	3"
43087	55587	44087	.2500	1/4"	6.350	1/4"	4"
43097	55597	44097	.2500	1/4"	6.350	1/4"	4"
43107	55607	44107	.2500	1/4"	6.350	1/4"	6"
43117	-	44117	.3125	5/16"	7.938	5/16"	3"
43127	55627	44127	.3125	5/16"	7.938	5/16"	4"
43137	55637	44137	.3125	5/16"	7.938	5/16"	4"
43147	55647	44147	.3125	5/16"	7.938	5/16"	6"
97147	98147	99147	.3150	8.000	8.0	75	25
97157	98157	99157	.3150	8.000	8.0	100	25
97167	98167	99167	.3150	8.000	8.0	100	41
97177	98177	99177	.3150	8.000	8.0	150	50

Series 720MA, 723MA, 730MA, 740MA, 743MA, 750MA (continued)

.3750" - 1.000"
(9.525mm - 25.400mm)

GENERAL PURPOSE
END MILLS

(720MA/740MA) 2 Flute EDP#	(723MA/743MA) 3 Flute EDP#	(730MA/750MA) 4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
			Decimal		Metric			
43157	55657	44157	.3750	3/8"	9.525	3/8"	3"	1"
43167	55667	44167	.3750	3/8"	9.525	3/8"	4"	1"
43177	55677	44177	.3750	3/8"	9.525	3/8"	4"	2"
43187	55687	44187	.3750	3/8"	9.525	3/8"	6"	1-1/2"
43197	55697	44197	.3750	3/8"	9.525	3/8"	6"	3"
97187	98187	99187	.3937		10.000	10.0	75	25
97197	98197	99197	.3937		10.000	10.0	100	25
97207	98207	99207	.3937		10.000	10.0	100	50
97217	98217	99217	.3937		10.000	10.0	150	38
97227	98227	99227	.3937		10.000	10.0	150	75
43207	-	44207	.4375	7/16"	11.113	7/16"	4"	1"
-	55717	44217	.4375	7/16"	11.113	7/16"	4"	2"
43227	-	44227	.4375	7/16"	11.113	7/16"	6"	1-1/2"
43237	55737	44237	.4375	7/16"	11.113	7/16"	6"	3"
97237	-	99237	.4724		12.000	12.0	100	25
97247	98247	99247	.4724		12.000	12.0	100	50
97257	98257	99257	.4724		12.000	12.0	150	50
97267	98267	99267	.4724		12.000	12.0	150	75
43247	55747	44247	.5000	1/2"	12.700	1/2"	4"	1"
43257	55757	44257	.5000	1/2"	12.700	1/2"	4"	2"
43267	55767	44267	.5000	1/2"	12.700	1/2"	6"	1-1/2"
43277	55777	44277	.5000	1/2"	12.700	1/2"	6"	3"
97277	-	99277	.5512		14.000	14.0	100	25
-	-	99287	.5512		14.000	14.0	100	50
97297	-	99297	.5512		14.000	14.0	150	50
-	-	99307	.5512		14.000	14.0	150	75
43287	-	44287	.5625	9/16"	14.288	9/16"	6"	2"
43297	-	44297	.5625	9/16"	14.288	9/16"	6"	3"
43307	55807	44307	.6250	5/8"	15.875	5/8"	6"	2"
43317	55817	44317	.6250	5/8"	15.875	5/8"	6"	3"
97317	98317	99317	.6299		16.000	16.0	150	50
97327	98327	99327	.6299		16.000	16.0	150	75
-	98337	99337	.7087		18.000	18.0	150	50
-	-	99347	.7087		18.000	18.0	150	75
43327	55827	44327	.7500	3/4"	19.050	3/4"	6"	2"
43337	55837	44337	.7500	3/4"	19.050	3/4"	6"	3"
97357	98357	99357	.7874		20.000	20.0	150	50
97367	98367	99367	.7874		20.000	20.0	150	75
-	-	99377	.9843		25.000	25.0	150	50
-	-	99387	.9843		25.000	25.0	150	75
-	55847	44347	1.000	1"	25.400	1"	6"	2"
43357	55857	44357	1.000	1"	25.400	1"	6"	3"

70

35

MATERIAL HARDNESS (Rc)

0

d_1	+0.000" -0.002" (+.000 - .050mm)
d_2	-.0001" -.0005" (-.0025 - .0127mm)



TECH
PAGES
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Standard Length - Double End - 3/8" Shank

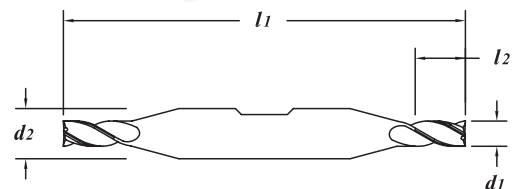
Standard Länge - Doppelle Ende - 3/8" Schaft

Longitud Estándar - Doble Punta - Espiga de 3/8"

Longueur Standard - Double Extrémité - 3/8" Diametre de la Tige

Lunghezza Standard - Doppia Fresa - Stelo 3/8"

标准长度 - 双头 - 3/8" 刀杆



Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)



Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad



Fraises carbure submicrograin - coupe au centre
Queue de diamètre 3/8 avec meplat weldon
Alternative au fraises HSS



Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS



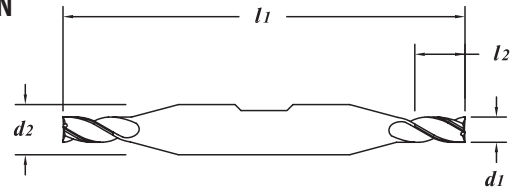
超微晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面—译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性

(425M) 2 Flute EDP#	(435M) 4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
Decimal	Metric					
33010	34010	.1250	1/8"	3.175	3/8"	3"
33020	34020	.1562	5/32"	3.967	3"	7/16"
33030	34030	.1875	3/16"	4.763	3"	1/2"
33050	34050	.2500	1/4"	6.350	3"	5/8"
-	34060	.2812	9/32"	7.142	4"	11/16"
-	34070	.3125	5/16"	7.938	4"	3/4"
-	34090	.3750	3/8"	9.525	4"	3/4"

TOLERANCES

$d1$	$+0.000" -0.002" (+.000 -0.050\text{mm})$
$d2$	$-0.0001" -0.0005" (-0.0025 -0.0127\text{mm})$

Series 435MA

Standard Length - Double End - 3/8" Shank - TiAlN Coated
Standard Länge - Doppelseite - 3/8" Schaft - TiAlN-Beschichtet
Longitud Estándar - Doble Punta - Espiga de 3/8" - Recubrimiento de TiAlN
Longueur Standard - Double Extrémité - 3/8" Diamètre de la Tige - Revêtement TiAlN
Lunghezza Standard - Doppia Fresa - Stelo 3/8" - Rivestimento in TiAlN
标准长度 - 双头 - 3/8" 刀杆 - TiAlN 涂层


Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
Trocken oder Halbtrockene Bearbeitung



Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad
Mecanizado seco o semiseco



Fraises carbure submicrograin - coupe au centre
Queue de diamètre 3/8 avec meplat weldon
Alternative aux fraises HSS
Usinage à sec ou avec l'air



Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Lavorazione a secco o a umido



超细晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面—译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性
干式或半干式机加工

(435MA) 4 Flute EDP#	Decimal	$d1$ † Diameter	Metric	$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
34017	.1250	1/8"	3.175	3/8"	3"	3/8"
34027	.1562	5/32"	3.967	3/8"	3"	7/16"
34037	.1875	3/16"	4.763	3/8"	3"	1/2"
34047	.2188	7/32"	5.558	3/8"	3"	9/16"
34057	.2500	1/4"	6.350	3/8"	3"	5/8"
34067	.2812	9/32"	7.142	3/8"	4"	11/16"
34077	.3125	5/16"	7.938	3/8"	4"	3/4"
34097	.3750	3/8"	9.525	3/8"	4"	3/4"

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MATERIAL HARDNESS (Rc)

0

TOLERANCES

d_1	+0.000" -0.002" (+.000 -0.050mm)
d_2	-0.0001" -0.0005" (-.0025 -0.0127mm)
ball radius	+0.000" -0.001" (+.000 -0.025mm)



Standard Length - Double End - 3/8" Shank - Ball End

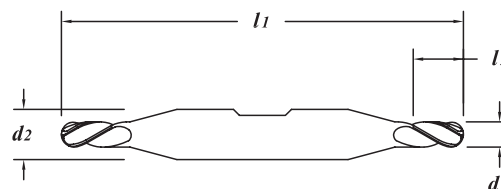
Standard Länge - Doppelseite - 3/8" Schaft - Vollradius

Longitud Estándar - Doble Punta - Espiga de 3/8" - Cabeza Esférica

Longueur Standard - Double Extrémité - 3/8" Diamètre de la Tige - Hemisphérique

Lunghezza Standard - Doppia Fresa - Stelo 3/8" - Sferica

标准长度 - 双头 - 3/8" 刀杆 - 球头



Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel

EDP#	d_1 †		d_2	l_1	l_2
	Decimal	Diameter Metric			
36010	.1250	1/8"	3.175	3"	3/8"
36030	.1875	3/16"	4.763	3"	1/2"



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
Vollradius Toleranz: +0,000 / -0,025 (+.000" -0.001")



Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad
Tolerancia de la cabeza esférica +0,000 / -0,025 (+.000" -0.001")



Fraises carbure submicrograin - coupe au centre
Queue de diamètre 3/8 avec meplat weldon
Alternative aux fraises HSS
Tolerance du rayon de hemispherique +0,000 / -0,025 (+.000" -0.001")



Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Tolleranza del raggio +0,000 / -0,025 (+.000" -0.001")



超细晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面—译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性
半径公差 +0,000 / -0,025 (+.000" -0.001")

TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$-0.0001" -0.0005" (-0.0025 -0.0127\text{mm})$
ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$

Series 535MA



Standard Length - Double End - 3/8" Shank - Ball End - TiAlN Coated

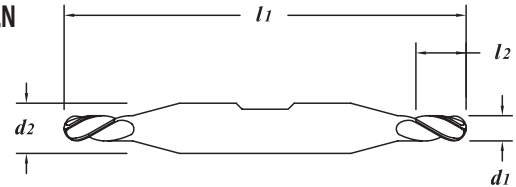
Standard Länge - Doppelseite - 3/8" Schaft - Vollradius - TiAlN-Beschichtet

Longitud Estándar - Doble Punta - Espiga de 3/8" - Cabeza Esférica - Recubrimiento de TiAlN

Longueur Standard - Double Extrémité - 3/8" Diamètre de la Tige - Hemisphérique - Revêtement TiAlN

Lunghezza Standard - Doppia Fresa - Stelo 3/8" - Sferica - Rivestimento in TiAlN

标准长度 - 双头 - 3/8" 刀杆 - 球头 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
Trocken oder Halbtrockene Bearbeitung
Vollradius Toleranz: $+0,000 / -0,025 (+0.000" -0.001")$



Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad
Mecanizado seco o semiseco
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+0.000" -0.001")$



Fraises carbure submicrograin - coupe au centre
Queue de diamètre 3/8 avec meplat weldon
Alternative aux fraises HSS
Usinage à sec ou avec l'air
Tolérance du rayon de hémisphérique $+0,000 / -0,025 (+0.000" -0.001")$



Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Lavorazione a secco o a umido
Tolleranza del raggio $+0,000 / -0,025 (+0.000" -0.001")$



超细晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面—译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性
干式或半干式机加工
半径公差 $+0,000 / -0,025 (+0.000" -0.001")$

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
36017	.1250	1/8"	3.175	3/8"	3"
36027	.1562	5/32"	3.967	3/8"	7/16"
36037	.1875	3/16"	4.763	3/8"	1/2"
36057	.2500	1/4"	6.350	3/8"	5/8"
36077	.3125	5/16"	7.938	3/8"	3/4"

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MATERIAL HARDNESS (Rc)

GENERAL PURPOSE
END MILLS

$d1$	$+0.000" - .002" (+.000 - .050\text{mm})$
$d2$	$h6$



Standard Length - Square End - Double End

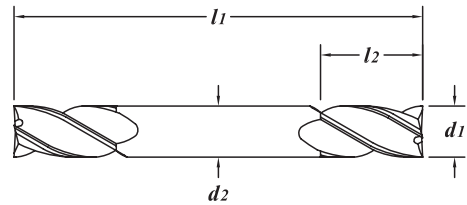
Standard Länge - Ohne Eckenradius - Dopple Ende

Longitud Estándar - Extremo Sin Radio - Doble Punta

Longueur Standart - Extrémité Carré - Double Extrémité

Lunghezza Standard - Piatte - Doppia Fresa

标准长度 - 平头 - 球头



Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 259



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
TiAlN-Beschichtet - Seite 237
Kurze Länge - Seite 202



Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiAlN - Página 237
Longitud Corta - Página 202



Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiAlN - Page 237
Longueur Courte - Page 202



Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Rivestimento in TiAlN - Pagina 237
Serie Corta - Pagina 202



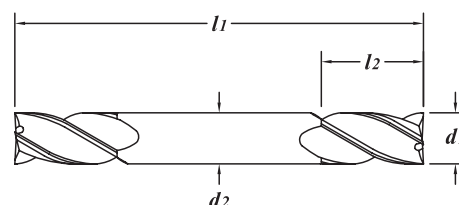
超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
TiAlN 涂层 - 237页
短柱长度 - 202页

EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length
	Decimal	Diameter Metric			
30030	.0625	1/16"	1.588	1/8"	3/16"
30040	.0938	3/32"	2.383	1/8"	1/4"
30050	.1250	1/8"	3.175	1/8"	3/8"
30060	.1562	5/32"	3.967	3/16"	7/16"
30070	.1875	3/16"	4.763	3/16"	1/2"
30090	.2500	1/4"	6.350	1/4"	5/8"
30100	.3125	5/16"	7.938	5/16"	3/4"
30110	.3750	3/8"	9.525	3/8"	3/4"
30130	.5000	1/2"	12.700	1/2"	1"

TOLERANCES

d_1	$+0.000" -0.002" (+.000 -0.050\text{mm})$
d_2	h6

Series 430MA, 450MA

Standard Length - Square End - Double End - TiAlN Coated
Standard Länge - Ohne Eckenradius - Doppelseite - TiAlN-Beschichtet
Longitud Estándar - Extremo Sin Radio - Doble Punta - Recubrimiento de TiAlN
Longueur Standart - Extrémité Carré - Double Extrémité - Revêtement TiAlN
Lunghezza Standard - Piatte - Doppia Fresa - Rivestimento in TiAlN
标准长度 - 平头 - 球头 - TiAlN 涂层


Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 258



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 236
Kurze Länge - Seite 203



Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Sin recubrimiento - Página 236
Longitud Corta - Página 203



Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 236
Longueur Courte - Page 203



Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 236
Serie Corta - Pagina 203



超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
未涂层 - 236页
短柱长度 - 203页

(430MA/450MA) EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Diameter Metric			
30017	.0312	1/32"	0.792	1/8"	3/32"
30027	.0469	3/64"	1.191	1/8"	1/8"
30037	.0625	1/16"	1.588	1/8"	3/16"
30047	.0938	3/32"	2.383	1/8"	1/4"
30057	.1250	1/8"	3.175	1/8"	3/8"
30067	.1562	5/32"	3.967	3/16"	2-1/2"
30077	.1875	3/16"	4.763	3/16"	1/2"
30087	.2188	7/32"	5.558	1/4"	2-1/2"
30607	.2362		6.000	6.0	65
30097	.2500	1/4"	6.350	1/4"	2-1/2"
30107	.3125	5/16"	7.938	5/16"	3-1/2"
30117	.3750	3/8"	9.525	3/8"	3-1/2"
30127	.4375	7/16"	11.113	7/16"	4"
30137	.5000	1/2"	12.700	1/2"	4"

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MATERIAL HARDNESS (Rc)

0



TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$h6$
ball radius	$+0.000" - .001" (+.000 - .025\text{mm})$

Standard Length - Double End - Ball End

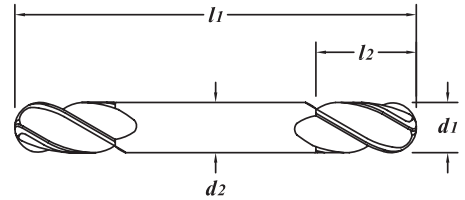
Standard Länge - Doppelseite - Vollradius

Longitud Estándar - Doble Punta - Cabeza Esférica

Longueur Standard - Double Extrémité - Hemispherique

Lunghezza Standard - Doppia Fresa - Sferica

标准长度 - 球头 - 双头



Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 261



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Extrem Vielseitig
Vollradius Toleranz: $+0,000 / -0,025 (+.000" - .001")$
TiAlN-Beschichtet - Seite 261



Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+.000" - .001")$
Recubrimiento de TiAlN - Página 261



Fraises carbure submicrograin - coupe au centre
Utilisations variables
Tolerance du rayon de hemispherique $+0,000 / -0,025 (+.000" - .001")$
Revêtement TiAlN - Page 261



Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Tolleranza del raggio $+0,000 / -0,025 (+.000" - .001")$
Rivestimento in TiAlN - Pagina 261



超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
半径允差 $+0,000 / -0,025 (+.000" - .001")$
TiAlN 涂层 - 261页

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	Decimal	Metric			
32050	.1250	1/8"	3.175	1/8"	3/8"
32070	.1875	3/16"	4.763	3/16"	1/2"
32090	.2500	1/4"	6.350	1/4"	5/8"
32110	.3750	3/8"	9.525	3/8"	3/4"
32130	.5000	1/2"	12.700	1/2"	1"

TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$h6$
ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$



TECH
PAGES
286-287

Series 530MA

GENERAL PURPOSE
END MILLS

Standard Length - Double End - Ball End - TiAlN Coated

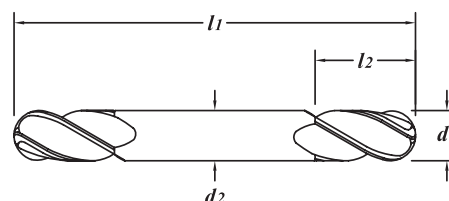
Standard Länge - Doppelsende - Vollradius - TiAlN-Beschichtet

Longitud Estándar - Doble Punta - Cabeza Esférica - Recubrimiento de TiAlN

Longueur Standard - Double Extrémité - Hemispherique - Revêtement TiAlN

Lunghezza Standard - Doppia Fresa - Sferica - Rivestimento in TiAlN

标准长度 - 球头 - 双头 - TiAlN 涂层



Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 260



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: $+0,000 / -0,025 (+0.000" -0.001")$
Unbeschichtet - Seite 260



Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semisecco
Extremadamente versátil
Tolerancia de la cabeza esférica $+0,000 / -0,025 (+0.000" -0.001")$
Sin recubrimiento - Página 260



Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique $+0,000 / -0,025 (+0.000" -0.001")$
Sans revêtement - Page 260



Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente versatile
Tolleranza del raggio $+0,000 / -0,025 (+0.000" -0.001")$
Non Rivestito - Pagina 260



超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径公差 $+0,000 / -0,025 (+0.000" -0.001")$
未涂层 - 260页

EDP#	d_1 †			d_2	l_1	l_2
	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length
32017	.0312	1/32"	0.792	1/8"	2"	3/32"
32027	.0469	3/64"	1.191	1/8"	2"	1/8"
32037	.0625	1/16"	1.588	1/8"	2"	3/16"
32047	.0938	3/32"	2.383	1/8"	2"	1/4"
32057	.1250	1/8"	3.175	1/8"	2"	3/8"
32067	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"
32077	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"
32097	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"
32117	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"
32137	.5000	1/2"	12.700	1/2"	4"	1"

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MATERIAL HARDNESS (Rc)

d_1	$+0.011" - 0.000" (+0.25 - 0.00mm)$
d_2	$h6$



Standard Length - N/C Tolerance - Square End

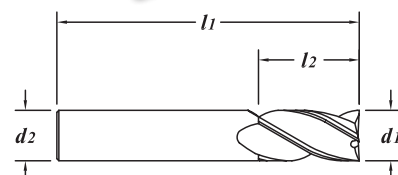
Standard Länge - N/C Toleranz - Ohne Eckenradius

Longitud Estándar - Tolerancia N/C - Extremo Sin Radio

Longueur Standart - Tolerance NC - Extrémité Carré

Lunghezza Standard - Precisa - Piatte

标准长度 - 数控公差 - 平头



Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumschnitt
Ausgezeichnet für Keilnuten
Enge Toleranzen für präzise Bearbeitung
Wenn nötig zum zusammenlegen von Werkzeugen



Fresa de submicrograno sólido carburo - corte centrado
Excelente para chaveteras
Tolerancia ajustada para mecanizado de precisión
Para uso en aplicaciones de machihembrado



Fraises carbure submicrograin - coupe au centre
Excellent pour rainures de clavettes
Haute tolérance pour usinage de précision
Pour l'usage quand les outils assortis sont nécessaires



Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per piccole cave
Alta tolleranza per lavorazioni di precisione
Consigliabile per esecuzione di chiavette



超细晶粒整体硬质合金立铣刀 - 中心切削
铣键槽极好
在精加工时保持紧公差
在需要匹配刀具时可供使用

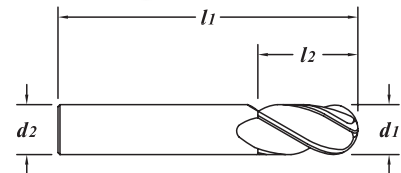
(280M) 2 Flute EDP#	(290M) 4 Flute EDP#	Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
25010	26010	.0625	1/16"	1.588	1/8"	1-1/2"
25020	26020	.0938	3/32"	2.383	1/8"	1-1/2"
25030	26030	.1250	1/8"	3.175	1/8"	1-1/2"
25040	26040	.1875	3/16"	4.763	3/16"	2"
25050	26050	.2500	1/4"	6.350	1/4"	2-1/2"
* 25070	* 26070	.3750	3/8"	9.525	3/8"	2-1/2"
* 25090	* 26090	.5000	1/2"	12.700	1/2"	3"
-	* 26100	.6250	5/8"	15.875	5/8"	3-1/2"

* - Tools with weldon flats

TOLERANCES

d_1	$+0.001" -0.000" (+0.025 -0.000\text{mm})$
d_2	$h6$

Series 380M, 390M

Standard Length - N/C Tolerance - Ball End
Standard Länge - N/C Toleranz - Vollradius
Longitud Estándar - Tolerancia N/C - Cabeza Esférica
Longueur Standart - Tolerance NC - Hemispherique
Lunghezza Standard - Precisa - Sferica
标准长度 - 数控公差 - 球头


Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary
Ball radius tolerance $+0.0127\text{mm} -0.0000\text{mm} (+.0005" -.0000")$



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet für Keilnuten
Enge Toleranzen für präzise Bearbeitung
Wenn nötig zum zusammenlegen von Werkzeugen
Vollradius Toleranz: $+0,0127 / -0,0000 (+.0005" -.0000")$



Fresa de submicrograno sólido carburo - corte centrado
Excelente para chaveteras
Tolerancia ajustada para mecanizado de precisión
Para uso en aplicaciones de machihembrado
Tolerancia de la cabeza esférica $+0,0127 / -0,0000 (+.0005" -.0000")$



Fraises carbure submicrograin - coupe au centre
Excellent pour rainures de clavettes
Haute tolerance pour usinage de precision
Pour l'usage quand les outils assortis sont nécessaires
Tolerance du rayon de hemispherique $+0,0127 / -0,0000 (+.0005" -.0000")$



Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per piccole cave
Alta tolleranza per lavorazioni di precisione
Consigliabile per esecuzione di chiavette
Tolleranza del raggio $+0,0127 / -0,0000 (+.0005" -.0000")$



超细晶粒整体硬质合金立铣刀 - 中心切削
铣键槽极好
在精加工时保持紧公差
在需要匹配刀具时可供使用
半径公差 $+0,0127 / -0,0000 (+.0005" -.0000")$

(380M) 2 Flute EDP#	(390M) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
27010	28010	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
27030	28030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
-	28040	.1875	3/16"	4.763	3/16"	2"	9/16"
27050	28050	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
-	28060	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
* 27070	* 28070	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
-	* 28090	.5000	1/2"	12.700	1/2"	3"	1"
-	* 28100	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"

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MATERIAL HARDNESS (Hc)

0

* - Tools with weldon flats

SA (1/4" Steel Shank)

Carbide Rotary Files - Cylindrical Shape

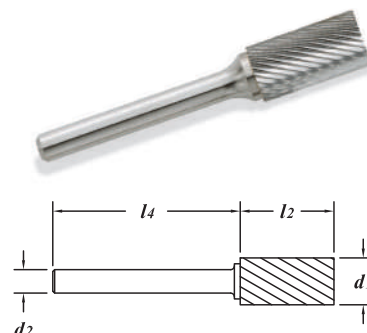
Rotierende Hartmetallwerkzeuge - Zylindrische Form

Limas Rotativas de Carburo - Forma Cilíndrica

Fraises Limes Rotatives Carbure - Forme Cylindrique

Lime Rotative in Metallo Duro - Geometria Cilindrica

硬质合金回转锉刀 - 圆柱形



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

EDP#	TOOL #	d1 †		d2	l2	l4
		Decimal	Diameter		Shank Diameter	Flute Length
60010	* SA-14	.1875	3/16"	4.763	1/4"	5/8"
60012	* SA-14D	.1875	3/16"	4.763	1/4"	5/8"
60020	* SA-1	.2500	1/4"	6.350	1/4"	5/8"
60021	* SA-1A	.2500	1/4"	6.350	1/4"	5/8"
60022	* SA-1D	.2500	1/4"	6.350	1/4"	5/8"
60030	SA-2	.3125	5/16"	7.938	1/4"	3/4"
60032	SA-2D	.3125	5/16"	7.938	1/4"	3/4"
60040	SA-3	.3750	3/8"	9.525	1/4"	3/4"
60041	SA-3A	.3750	3/8"	9.525	1/4"	3/4"
60042	SA-3D	.3750	3/8"	9.525	1/4"	3/4"
60050	SA-4	.4375	7/16"	11.113	1/4"	1"
60052	SA-4D	.4375	7/16"	11.113	1/4"	1"
60060	SA-5	.5000	1/2"	12.700	1/4"	1"
60061	SA-5A	.5000	1/2"	12.700	1/4"	1"
60062	SA-5D	.5000	1/2"	12.700	1/4"	1"
60070	SA-6	.6250	5/8"	15.875	1/4"	1"
60071	SA-6A	.6250	5/8"	15.875	1/4"	1"
60072	SA-6D	.6250	5/8"	15.875	1/4"	1"
60080	SA-7	.7500	3/4"	19.050	1/4"	1"
60081	SA-7A	.7500	3/4"	19.050	1/4"	1"
60082	SA-7D	.7500	3/4"	19.050	1/4"	1"
60090	SA-9	1.000	1"	25.400	1/4"	1"
60091	SA-9A	1.000	1"	25.400	1/4"	1"
60092	SA-9D	1.000	1"	25.400	1/4"	1"

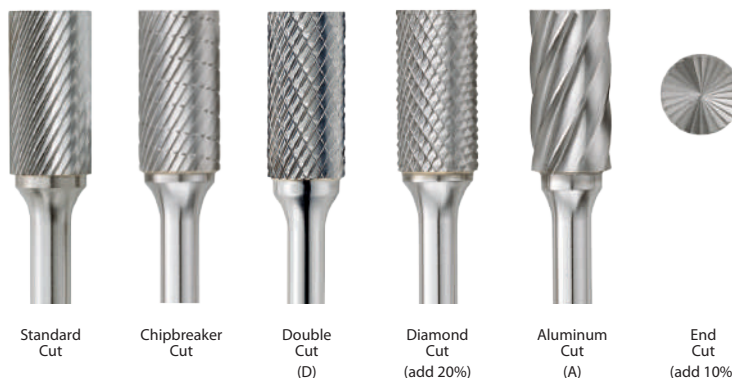
Basic Rotary File Cut Styles Available



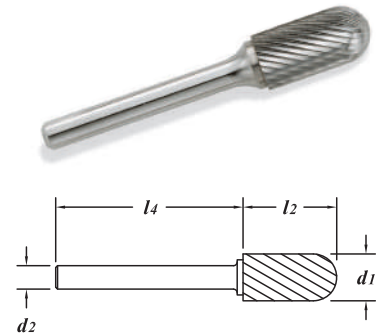
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金



Double Cut and Aluminum Cut rotary files are in stock where indicated by (D) and (A) in the catalog tables.

Carbide Rotary Files - Cylindrical-Radius Shape**Rotierende Hartmetallwerkzeuge - Zylindrische Radius Form****Limas Rotativas de Carburo - Forma Cilíndrica-Redondeada****Fraises Limes Rotatives Carbure - Forme Cylindrique - Hemispherique****Lime Rotative in Metallo Duro - Geometria Cilindrica-Torica****硬质合金回转锉刀 - 圆柱一半径形状**

Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ † Diameter			$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length
		Decimal		Metric			
61010	* SC-14	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
61012	* SC-14D	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
61020	* SC-1	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61021	* SC-1A	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61022	* SC-1D	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61030	SC-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
61032	SC-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
61040	SC-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61041	SC-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61042	SC-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61050	SC-4	.4375	7/16"	11.113	1/4"	1"	1-3/4"
61052	SC-4D	.4375	7/16"	11.113	1/4"	1"	1-3/4"
61060	SC-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61061	SC-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61062	SC-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61070	SC-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61071	SC-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61072	SC-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61080	SC-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
61081	SC-7A	.7500	3/4"	19.050	1/4"	1"	1-3/4"
61082	SC-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"

Carbide Rotary Files - Ball Shape

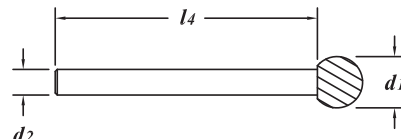
Rotierende Hartmetallwerkzeuge - Vollradiusform

Limas Rotativas de Carburo - Forma Esférica

Fraises Limes Rotatives Carbure - Forme Cylindrique a Bout Hemispherique

Lime Rotative in Metallo Duro - Geometria Sferica

硬质合金回转锉刀 - 球型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

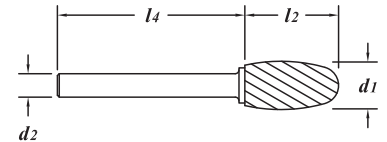


Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length
		Decimal	Diameter			
62010	* SD-14	.1875	3/16"	4.763	1/4"	2"
62012	* SD-14D	.1875	3/16"	4.763	1/4"	2"
62020	* SD-1	.2500	1/4"	6.350	1/4"	2"
62021	* SD-1A	.2500	1/4"	6.350	1/4"	2"
62022	* SD-1D	.2500	1/4"	6.350	1/4"	2"
62030	SD-2	.3125	5/16"	7.938	1/4"	1-3/4"
62032	SD-2D	.3125	5/16"	7.938	1/4"	1-3/4"
62040	SD-3	.3750	3/8"	9.525	1/4"	1-3/4"
62041	SD-3A	.3750	3/8"	9.525	1/4"	1-3/4"
62042	SD-3D	.3750	3/8"	9.525	1/4"	1-3/4"
62050	SD-4	.4375	7/16"	11.113	1/4"	1-3/4"
62052	SD-4D	.4375	7/16"	11.113	1/4"	1-3/4"
62060	SD-5	.5000	1/2"	12.700	1/4"	1-3/4"
62061	SD-5A	.5000	1/2"	12.700	1/4"	1-3/4"
62062	SD-5D	.5000	1/2"	12.700	1/4"	1-3/4"
62070	SD-6	.6250	5/8"	15.875	1/4"	1-3/4"
62071	SD-6A	.6250	5/8"	15.875	1/4"	1-3/4"
62072	SD-6D	.6250	5/8"	15.875	1/4"	1-3/4"
62080	SD-7	.7500	3/4"	19.050	1/4"	1-3/4"
62082	SD-7D	.7500	3/4"	19.050	1/4"	1-3/4"
62090	SD-9	1.000	1"	25.400	1/4"	1-3/4"
62092	SD-9D	1.000	1"	25.400	1/4"	1-3/4"

Carbide Rotary Files - Egg Shape**Rotierende Hartmetallwerkzeuge - Eiform****Limas Rotativas de Carburo - Forma Ovalada****Fraises Limes Rotatives Carbure - Forme Ovale****Lime Rotative in Metallo Duro - Geometria Ovale****硬质合金回转锉刀 - 蛋型**

Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ † Diameter			$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length
		Decimal		Metric			
63010	* SE-1	.2500	1/4"	6.350	1/4"	3/8"	2"
63012	* SE-1D	.2500	1/4"	6.350	1/4"	3/8"	2"
63020	SE-3	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63021	SE-3A	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63022	SE-3D	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63030	SE-5	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63031	SE-5A	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63032	SE-5D	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63040	SE-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63041	SE-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63042	SE-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63050	SE-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
63052	SE-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"

SF (1/4" Steel Shank)

Carbide Rotary Files - Tree-Radius Shape

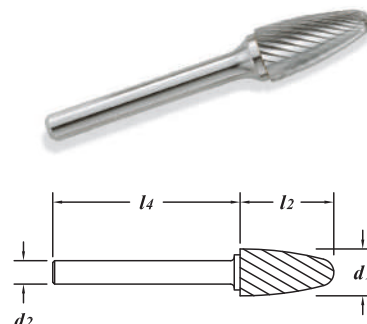
Rotierende Hartmetallwerkzeuge - Baumradiusform

Limas Rotativas de Carburo - Forma de Árbol-Redondeada

Fraises Limes Rotatives Carbure - Forme Ogive a Bout Hemispherique

Lime Rotative in Metallo Duro - Geometria a Tre Raggi

硬质合金回转锉刀 - 树一半径型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

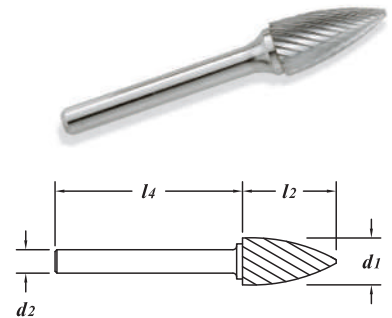


Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ † Diameter			$d2$	$l2$	$l4$
		Decimal		Metric	Shank Diameter	Flute Length	Shank Length
64010	* SF-1	.2500	1/4"	6.350	1/4"	5/8"	2"
64011	* SF-1A	.2500	1/4"	6.350	1/4"	5/8"	2"
64012	* SF-1D	.2500	1/4"	6.350	1/4"	5/8"	2"
64020	SF-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
64021	SF-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
64022	SF-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
64030	SF-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
64031	SF-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"
64032	SF-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
64040	SF-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
64041	SF-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
64042	SF-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
64050	SF-14	.7500	3/4"	19.050	1/4"	1-1/4"	1-3/4"
64052	SF-14D	.7500	3/4"	19.050	1/4"	1-1/4"	1-3/4"

Carbide Rotary Files - Tree-Pointed Shape**Rotierende Hartmetallwerkzeuge - Baumpunktform****Limas Rotativas de Carburo - Forma de Árbol con Punta****Fraises Limes Rotatives Carbure - Forme Ogive a Bout Pointu****Lime Rotative in Metallo Duro - Geometria a Punta****硬质合金回转锉刀 - 树一尖端型**

Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length	
		Decimal	Diameter Metric				
65010	* SG-1	.2500	1/4"	6.350	1/4"	5/8"	2"
65012	* SG-1D	.2500	1/4"	6.350	1/4"	5/8"	2"
65020	SG-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
65022	SG-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
65030	SG-13	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"
65032	SG-13D	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"
65040	SG-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
65042	SG-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
65050	SG-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
65052	SG-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
65060	SG-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
65062	SG-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"

SH (1/4" Steel Shank)

Carbide Rotary Files - Flame Shape

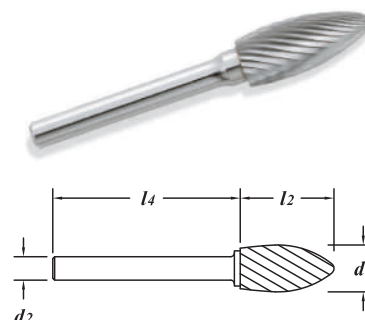
Rotierende Hartmetallwerkzeuge - Flammenform

Limas Rotativas de Carburo - Forma de Flama

Fraises Limes Rotatives Carbure - Forme Flamme

Lime Rotative in Metallo Duro - Geometria a Fiamma

硬质合金回转锉刀 - 火焰型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削

EDP#	TOOL #	$d1$ † Diameter			$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length
		Decimal		Metric			
66010	SH-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
66012	SH-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
66020	SH-5	.5000	1/2"	12.700	1/4"	1-1/4"	1-3/4"
66022	SH-5D	.5000	1/2"	12.700	1/4"	1-1/4"	1-3/4"
66030	SH-6	.6250	5/8"	15.875	1/4"	1-7/16"	1-3/4"
66032	SH-6D	.6250	5/8"	15.875	1/4"	1-7/16"	1-3/4"
66040	SH-7	.7500	3/4"	19.050	1/4"	1-5/8"	1-3/4"
66042	SH-7D	.7500	3/4"	19.050	1/4"	1-5/8"	1-3/4"

Carbide Rotary Files - Taper Shape (60° Included Angle)

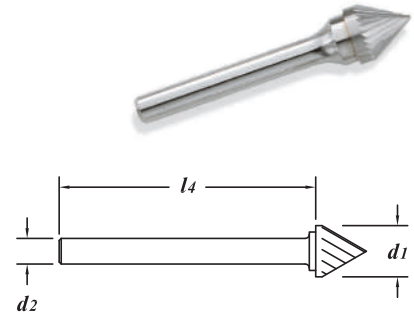
Rotierende Hartmetallwerkzeuge - Kegelsapfenform (60° inclusive Winkel)

Limas Rotativas de Carburo - Forma Cónica (Ángulo de cara de 60°)

Fraises Limes Rotatives Carbure - Forme Conique (Forme conique a 60°)

Lime Rotative in Metallo Duro - Geometria Conica (Angolo a 60°)

硬质合金回转锉刀 - 退拔型 (60° 夹角)



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
** - Solid Carbide/Double End



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
** - Vollhartmetall / Doppel ende



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
** - Carburo sólido / Doble punta



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
** - Carbure Plein / Double Extrémité



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
** - Metallo duro / Doppia fresa



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
** - 整体硬质合金 / 双头

EDP#	TOOL #	$d1$ † Diameter		$d2$ Shank Diameter	$l4$ Shank Length
		Decimal	Metric		
67010	** SJ-1	.2500	1/4"	6.350	1/4"
67012	** SJ-1D	.2500	1/4"	6.350	1/4"
67020	SJ-3	.3750	3/8"	9.525	1/4"
67022	SJ-3D	.3750	3/8"	9.525	1/4"
67030	SJ-5	.5000	1/2"	12.700	1/4"
67032	SJ-5D	.5000	1/2"	12.700	1/4"
67040	SJ-6	.6250	5/8"	15.875	1/4"
67042	SJ-6D	.6250	5/8"	15.875	1/4"
67050	SJ-7	.7500	3/4"	19.050	1/4"
67052	SJ-7D	.7500	3/4"	19.050	1/4"

SK (1/4" Steel Shank)

Carbide Rotary Files - Taper Shape (90° Included Angle)

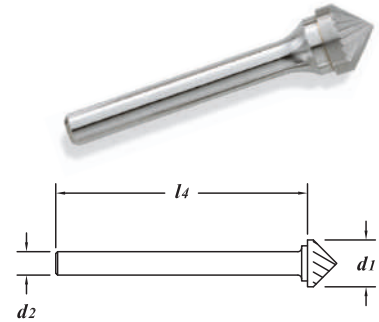
Rotierende Hartmetallwerkzeuge - Kegelsapfenform (90° inclusive Winkel)

Limas Rotativas de Carburo - Forma Cónica (Ángulo de cara de 90°)

Fraises Limes Rotatives Carbure - Forme Conique (Forme conique a 90°)

Lime Rotative in Metallo Duro - Geometria Conica (Angolo a 90°)

硬质合金回转锉刀 - 退拔型 (90° 夹角)



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
** - Solid Carbide/Double End



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
** - Vollhartmetall / Doppel ende



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
** - Carburo sólido / Doble punta



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
** - Carbure Plein / Double Extrémité



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
** - Metallo duro / Doppia fresa



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
** - 整体硬质合金 / 双头

EDP#	TOOL #	$d1$ † Diameter		$d2$ Shank Diameter	$l4$ Shank Length
		Decimal	Metric		
68010	** SK-1	.2500	1/4"	6.350	1-11/16"
68012	** SK-1D	.2500	1/4"	6.350	1-11/16"
68020	SK-3	.3750	3/8"	9.525	1-3/4"
68022	SK-3D	.3750	3/8"	9.525	1-3/4"
68030	SK-5	.5000	1/2"	12.700	1-3/4"
68032	SK-5D	.5000	1/2"	12.700	1-3/4"
68040	SK-6	.6250	5/8"	15.875	1-3/4"
68042	SK-6D	.6250	5/8"	15.875	1-3/4"
68050	SK-7	.7500	3/4"	19.050	1-3/4"
68052	SK-7D	.7500	3/4"	19.050	1-3/4"
68070	SK-9	1.000	1"	25.400	1-3/4"
68072	SK-9D	1.000	1"	25.400	1-3/4"

Carbide Rotary Files - Cone-Radius Shape (14° included angle)

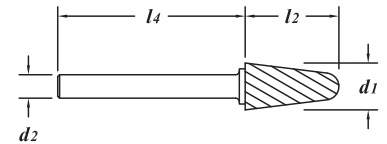
Rotierende Hartmetallwerkzeuge - Kegel-Radiusform (14° inclusive Winkel)

Limas Rotativas de Carburo - Forma Cónica-Redondeada (Ángulo de cara de 14°)

Fraises Limes Rotatives Carbure - Forme Conique a Bout Hemispherique (forme conique a 14°)

Lime Rotative in Metallo Duro - Geometria torica conica (Angolo a 14°)

硬质合金回转锉刀 - 圆锥一半径型 (14° 夹角)



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	$l2$ Flute Length	$l4$ Shank Length
		Decimal	Diameter Metric			
69010	* SL-1	.2500	1/4"	6.350	1/4"	5/8"
69012	* SL-1D	.2500	1/4"	6.350	1/4"	5/8"
69020	SL-2	.3125	5/16"	7.938	1/4"	7/8"
69022	SL-2D	.3125	5/16"	7.938	1/4"	7/8"
69030	SL-3	.3750	3/8"	9.525	1/4"	1-1/16"
69031	SL-3A	.3750	3/8"	9.525	1/4"	1-1/16"
69032	SL-3D	.3750	3/8"	9.525	1/4"	1-1/16"
69040	SL-4	.5000	1/2"	12.700	1/4"	1-1/8"
69041	SL-4A	.5000	1/2"	12.700	1/4"	1-1/8"
69042	SL-4D	.5000	1/2"	12.700	1/4"	1-1/8"
69050	SL-5	.6250	5/8"	15.875	1/4"	1-3/16"
69051	SL-5A	.6250	5/8"	15.875	1/4"	1-3/16"
69052	SL-5D	.6250	5/8"	15.875	1/4"	1-3/16"
69060	SL-7	.7500	3/4"	19.050	1/4"	1-1/2"
69062	SL-7D	.7500	3/4"	19.050	1/4"	1-1/2"

SM (1/4" Steel Shank)

Carbide Rotary Files - Cone Flat Shape (*no radius*)

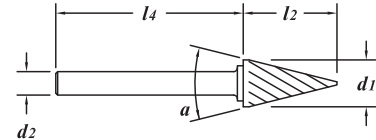
Rotierende Hartmetallwerkzeuge - Kegel-Flache Form (*Ohne Radius*)

Limas Rotativas de Carburo - Forma Cónica-Plana (*no redondeada*)

Fraises Limes Rotatives Carbure - Forme Conique a Bout Plat (*Pas de rayon*)

Lime Rotative in Metallo Duro - Geometria piatta conica (*piatta*)

硬质合金回转锉刀 - 圆锥—平面型 (*无圆角半径*)



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein

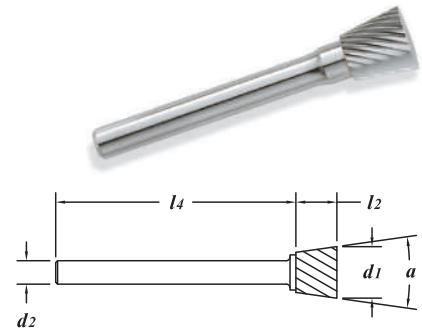


Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	a Included Angle	$l2$ Flute Length	$l4$ Shank Length	
		Decimal	Metric					
70010	* SM-1	.2500	1/4"	6.350	1/4"	22°	1/2"	2"
70012	* SM-1D	.2500	1/4"	6.350	1/4"	22°	1/2"	2"
70020	SM-4	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"
70022	SM-4D	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"
70030	SM-5	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"
70032	SM-5D	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"
70040	SM-6	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"
70042	SM-6D	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"

Carbide Rotary Files - Inverted Cone Shape**Rotierende Hartmetallwerkzeuge - Umgekehrte Kegelform****Limas Rotativas de Carburo - Forma Cónica Invertida****Fraises Limes Rotatives Carbure - Forme Conique Inversee****Lime Rotative in Metallo Duro - Geometria conica invertita****硬质合金回转锉刀 - 倒圆锥型**

Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide



Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall



Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido



Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein



Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro



超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	a Included Angle	$l2$ Flute Length	$l4$ Shank Length
		Decimal	Diameter Metric				
71010	* SN-1	.2500	1/4"	6.350	10°	5/16"	2"
71012	* SN-1D	.2500	1/4"	6.350	10°	5/16"	2"
71020	SN-2	.3750	3/8"	9.525	13°	3/8"	1-3/4"
71022	SN-2D	.3750	3/8"	9.525	13°	3/8"	1-3/4"
71030	SN-3	.5000	1/2"	12.700	16°	1/2"	1-3/4"
71032	SN-3D	.5000	1/2"	12.700	16°	1/2"	1-3/4"

3/16" Diameter (3/16" Shank)

Solid Carbide Rotary Files

Rotierende Vollhartmetallwerkzeuge

Limas Rotativas de Carburo Sólido

Fraises Limes Rotatives Plein Carbure

Lime Rotative in Metallo Duro Solido

整体硬质合金回转锉刀



Solid Submicron Grain Carbide
3/16" (4,762mm) shank
D - Double Cut



Vollhartmetall aus Feinkornhartmetall
3/16" (4,762mm) Schaft
D - Doppelte Bearbeitung



Carburo sólido de grano submicrónico
Espigas de 3/16" (4,762mm)
D - Corte doble



Carbure plein submicrograin
Queue 3/16" (4,762mm)
D - Double Coupe



Super sub-micrograno metallo duro
Stelo da 3/16" (4,762mm)
D - Doppio tagliente



优质超细晶粒
3/16" (4,762mm) 刀柄
D - 双切削



SA-81



SC-81



SD-81



SE-81



SF-81



SG-81



SJ-81



SK-81



SL-81



SM-81



SN-81

EDP#	TOOL #	d_1 †			l_1 Overall Length	a Included Angle	l_2 Flute Length
		Decimal	Diameter	Metric			
72010	SA-81	.1875	3/16"	4.763	2"	-	5/8"
72012	SA-81D	.1875	3/16"	4.763	2"	-	5/8"
72020	SC-81	.1875	3/16"	4.763	2"	-	5/8"
72030	SD-81	.1875	3/16"	4.763	2"	-	-
72032	SD-81D	.1875	3/16"	4.763	2"	-	-
72040	SE-81	.1875	3/16"	4.763	2"	-	9/32"
72042	SE-81D	.1875	3/16"	4.763	2"	-	9/32"
72050	SF-81	.1875	3/16"	4.763	2"	-	1/2"
72052	SF-81D	.1875	3/16"	4.763	2"	-	1/2"
72060	SG-81	.1875	3/16"	4.763	2"	-	1/2"
72062	SG-81D	.1875	3/16"	4.763	2"	-	1/2"
72070	SJ-81	.1875	3/16"	4.763	2"	60°	-
72072	SJ-81D	.1875	3/16"	4.763	2"	60°	-
72080	SK-81	.1875	3/16"	4.763	2"	90°	-
72082	SK-81D	.1875	3/16"	4.763	2"	90°	-
72090	SL-81	.1875	3/16"	4.763	2"	14°	1/2"
72092	SL-81D	.1875	3/16"	4.763	2"	14°	1/2"
72100	SM-81	.1875	3/16"	4.763	2"	12°	5/8"
72110	SN-81	.1875	3/16"	4.763	2"	10°	1/4"
72112	SN-81D	.1875	3/16"	4.763	2"	10°	1/4"

Carbide Rotary Files

Rotierende Hartmetallwerkzeuge

Limas Rotativas de Carburo

Fraises Limes Rotatives Carbure

Lime Rotative in Metallo Duro

硬质合金回转锉刀



Submicron Grain Carbide
1/8" (3,175mm) steel shank
D - Double Cut



Feinkornhartmetall
1/8" (3,175mm) Stahlschaft
D - Doppelte Bearbeitung



Submicrograno carburo
Espigas de acero de 1/8" (3,175mm)
D - Corte doble



Carbure submicrograin
Queue acier 1/8" (3,175mm)
D - Double Coupe



Sub-micrograno metallo duro
Stelo in acciaio da 1/8" (3,175mm)
D - Doppio tagliente



超细晶粒硬质合金
1/8" (3,175mm) 钢质刀柄
D - 双切削



SA-51



SB-51



SC-51



SD-51



SE-51



SF-51



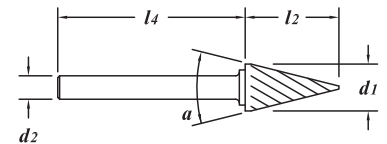
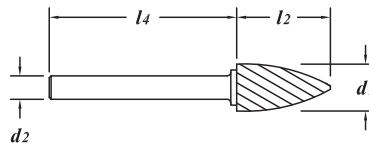
SG-51



SM-51



SN-51



EDP#	TOOL #	$d1$ † Diameter			$d2$ Shank Diameter	a Included Angle	$l2$ Flute Length	$l4$ Shank Length
		Decimal		Metric				
73010	SA-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73012	SA-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73020	SB-51	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"
73022	SB-51D	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"
73030	SC-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73032	SC-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73040	SD-51	.2500	1/4"	6.350	1/8"	-	-	1-1/2"
73042	SD-51D	.2500	1/4"	6.350	1/8"	-	-	1-1/2"
73050	SE-51	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"
73052	SE-51D	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"
73060	SF-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73062	SF-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73070	SG-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73072	SG-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73080	SM-51	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"
73082	SM-51D	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"
73090	SN-51	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"
73092	SN-51D	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"

CAD drawings representative for dimension placement

1/8" Diameter (1/8" Shank)

ROTARY FILES

Solid Carbide Rotary Files

Rotierende Vollhartmetallwerkzeuge

Limas Rotativas de Carburo Sólido

Fraises Limes Rotatives Plein Carbure

Lime Rotative in Metallo Duro Solido

整体硬质合金回转铣刀



Solid Submicron Grain Carbide
1/8" (3,175mm) shank
D - Double Cut



SA-41

SA-42

SA-43

SC-41

SC-42

SD-41

SD-42

SE-41

SF-42



SG-43

SH-41

SJ-42

SK-42

SL-41

SL-42

SM-41

SM-43

SN-42



Vollhartmetall aus Feinkornhartmetall
1/8" (3,175mm) Schaft
D - Doppelte Bearbeitung



Carburo sólido de grano submicrónico
Espigas de 1/8" (3,175mm)
D - Corte doble



Carbure plein submicrograin
Queue 1/8" (3,175mm)
D - Double Coupe

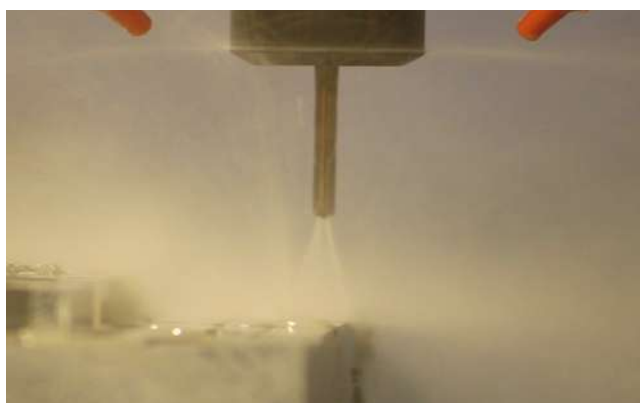
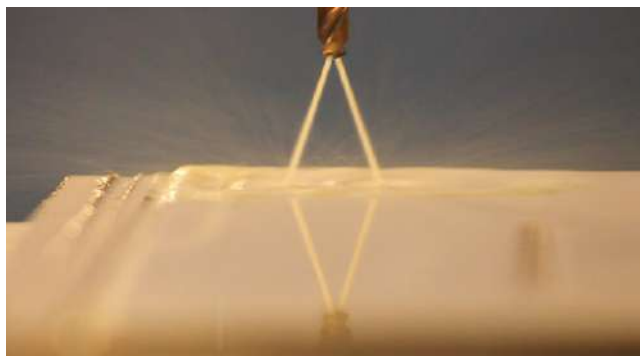


Super sub-micrograno metallo duro
Stelo da 1/8" (3,175mm)
D - Doppio tagliente



优质超细晶粒
1/8" (3,175mm) 刀柄
D - 双切削

EDP#	TOOL #	$d1$ † Diameter			$l1$ Overall Length	a Included Angle	$l2$ Flute Length
		Decimal		Metric			
74010	SA-41	.0625	1/16"	1.588	1-1/2"	-	1/4"
74012	SA-41D	.0625	1/16"	1.588	1-1/2"	-	1/4"
74020	SA-42	.0938	3/32"	2.383	1-1/2"	-	7/16"
74022	SA-42D	.0938	3/32"	2.383	1-1/2"	-	7/16"
74030	SA-43	.1250	1/8"	3.175	1-1/2"	-	9/16"
74032	SA-43D	.1250	1/8"	3.175	1-1/2"	-	9/16"
74040	SC-41	.0938	3/32"	2.383	1-1/2"	-	7/16"
74042	SC-41D	.0938	3/32"	2.383	1-1/2"	-	7/16"
74050	SC-42	.1250	1/8"	3.175	1-1/2"	-	9/16"
74052	SC-42D	.1250	1/8"	3.175	1-1/2"	-	9/16"
74060	SD-41	.0938	3/32"	2.383	1-1/2"	-	-
74062	SD-41D	.0938	3/32"	2.383	1-1/2"	-	-
74070	SD-42	.1250	1/8"	3.175	1-1/2"	-	-
74072	SD-42D	.1250	1/8"	3.175	1-1/2"	-	-
74080	SE-41	.1250	1/8"	3.175	1-1/2"	-	7/32"
74082	SE-41D	.1250	1/8"	3.175	1-1/2"	-	7/32"
74090	SF-42	.1250	1/8"	3.175	1-1/2"	-	1/2"
74092	SF-42D	.1250	1/8"	3.175	1-1/2"	-	1/2"
74100	SG-43	.1250	1/8"	3.175	1-1/2"	-	3/8"
74102	SG-43D	.1250	1/8"	3.175	1-1/2"	-	3/8"
74110	SH-41	.1250	1/8"	3.175	1-1/2"	-	1/4"
74112	SH-41D	.1250	1/8"	3.175	1-1/2"	-	1/4"
74120	SJ-42	.1250	1/8"	3.175	1-1/2"	60°	-
74122	SJ-42D	.1250	1/8"	3.175	1-1/2"	60°	-
74130	SK-42	.1250	1/8"	3.175	1-1/2"	90°	-
74132	SK-42D	.1250	1/8"	3.175	1-1/2"	90°	-
74140	SL-41	.1250	1/8"	3.175	1-1/2"	8°	3/8"
74142	SL-41D	.1250	1/8"	3.175	1-1/2"	8°	3/8"
74150	SL-42	.1250	1/8"	3.175	1-1/2"	8°	1/2"
74152	SL-42D	.1250	1/8"	3.175	1-1/2"	8°	1/2"
74160	SM-41	.1250	1/8"	3.175	1-1/2"	12°	3/8"
74162	SM-41D	.1250	1/8"	3.175	1-1/2"	12°	3/8"
74170	SM-43	.1250	1/8"	3.175	1-1/2"	7°	5/8"
74172	SM-43D	.1250	1/8"	3.175	1-1/2"	7°	5/8"
74180	SN-42	.1250	1/8"	3.175	1-1/2"	10°	3/16"
74182	SN-42D	.1250	1/8"	3.175	1-1/2"	10°	3/16"



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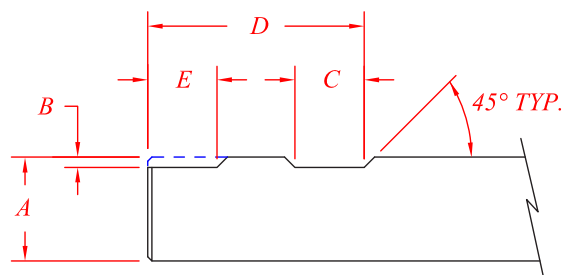
PROBLEM	SUGGESTIONS
Chipping on point	Reduce feed rate
	Check part rigidity
	Constant feed rate
	Verify speeds and feeds
	Minimum drill overhang
	Reduce number of peck cycles
Chipping on O.D.	Reduce feed rate
	Confirm concentricity of drill in holder
	Check coolant flow and location
	Check part rigidity
Breakage	Reduce feed rate
	Check your program - is 'R' clearing the part
	Check coolant flow and location
	Check part rigidity
Heavy wear on corners	Increase feed rate
	Check coolant flow and location
	Confirm concentricity of drill in holder
	Check part rigidity
Long, stringy chips	Increase feed rate
	Increase hone relief
	Constant feed rate
	Increase number of peck cycles
Excessive noise	Check drill
	Check part rigidity
	Check for proper speeds and feeds
Tool life	Lower speeds and feeds
	Check coolant flow and location
	Confirm concentricity of drill in holder
	Confirm coolant concentration
Hole too small	Increase feed rate
	Confirm coolant concentration
	Confirm drill diameter
Hole too large	Reduce feed rate
	Slow feed rate to start hole
	Increase RPMs
	Spot hole
Chip welding	Increase RPMs by 20%
	Confirm coolant concentration
	Check coolant flow and location
Chip packing	Add a peck cycle to clear chips
	Increase RPMs
	Reduce feed rate
	Check coolant flow and location

PROBLEM	SUGGESTIONS
Chipping	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of end mill in holder
	Decrease ramp angle or slow down approach
	Check coolant flow and location
Breakage	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Resharpen earlier
Chattering	Too light of a cut
	Leave more stock for finish pass
	Decrease axial depth
	Adjust speeds and feeds
Part finish	Confirm concentricity of end mill in holder
	Decrease feed rate
	Use different style of end mill
	Check coolant flow and location
	Check part rigidity
Burr	Change end mill sooner / too much wear
	Verify speeds and feeds
	Increase spindle speed
	Decrease feed rate
	Use different style of end mill
Excessive noise	Check part rigidity
	Verify speeds and feeds
	Too light of a cut
	Confirm concentricity of end mill in holder
Tool life	Work material harder than expected
	Verify speeds and feeds
	Recutting chips
	Too light of a cut
	Use different style of end mill
Wear	Speed too fast
	Too light of a feed
	Confirm concentricity of end mill in holder
	Verify speeds and feeds
Chip welding	Verify speeds and feeds
	Check coolant flow and location
	Use different style of end mill
Chip packing	Check coolant flow and location
	Decrease axial depth
	Adjust speeds and feeds
	Use different style of end mill
Wall not straight	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Use different style of end mill

PROBLEM	SUGGESTIONS
Hole diameter too large	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of reamer in holder
	Confirm diameter of reamer
	Check coolant flow and location
Hole diameter too small	Leave more stock before reaming
	Reamer worn
	Check coolant flow and concentration
	Resharpen earlier
Hole not straight	Hole was not drilled properly
	Leave more stock before reaming
	Confirm concentricity of reamer in holder
	Check part rigidity
Part finish	Reamer worn
	Verify speeds and feeds
	Confirm concentricity of reamer in holder
	Check coolant flow and location
	Check part rigidity
Tool life	Work material harder than expected
	Verify speeds and feeds
	Not evacuating chips properly
	Too light of a cut
Wear	Speed too fast
	Too light of a feed
	Confirm concentricity of reamer in holder
	Check coolant flow, location, and concentration
Not evacuating	Verify speeds and feeds
	Check coolant flow, location, and concentration
	Reamer worn

Weldon Flat Specs

STANDARD WELDON SHANK DIMENSIONS					
Diameter (A)	B	C	D	E	
3/8"	.3750"	.050" - .065"	.280" - .282"	.921"	-
7/16"	.4375"	.050" - .065"	.312" - .314"	.991"	-
1/2"	.5000"	.060" - .075"	.330" - .332"	1.055"	-
9/16"	.5625"	.065" - .080"	.400" - .402"	1.154"	-
5/8"	.6250"	.065" - .080"	.400" - .402"	1.154"	-
3/4"	.7500"	.075" - .090"	.455" - .457"	1.242"	-
7/8"	.8750"	.065" - .080"	.455" - .457"	1.242"	.500"
1"	1.0000"	.075" - .090"	.515" - .517"	1.398"	.500"
1-1/4"	1.2500"	.094" - .109"	.515" - .517"	1.398"	.500"



$$\text{SFM} = \frac{\pi \times \text{Diameter} \times \text{RPM}}{12}$$

$$\text{CPT} = \frac{\text{IPM}}{\text{RPM} \times \text{Number of Teeth}}$$

$$\text{RPM} = \frac{\text{SFM} \times 3.82}{\text{Diameter}}$$

$$\text{IPM} = \text{RPM} \times \text{Number of Teeth} \times \text{CPT}$$

Chip Thinning Calculation:

$$\frac{.50 \left(\frac{\text{Diameter}}{\text{Radial Stepover}} \right)}{\sqrt{\left(\frac{\text{Diameter}}{\text{Radial Stepover}} \right) - 1}} \times \text{CPT}_{(\text{Actual})} = \text{CPT}_{(\text{Programmed})}$$

Example below:

$$\frac{.50 \left(\frac{0.50}{.015} \right)}{\sqrt{\left(\frac{0.50}{.015} \right) - 1}} = \frac{16.667}{5.6} = 2.93 \times .0015 = .0045$$

(Chip Thinning reference charts on pages 308-309)

For additional help:

Check out our web site, the MC-20 machinist calculator or, if you have a smartphone, search for the feedrate calculator from the App Store.

h6 TOLERANCE FOR SHRINK FIT HOLDERS (as taken from the Machinery's Handbook)		
SHANK DIAMETER		TOLERANCE
Decimal	Nominal	
≤ .1181"	≤ 3mm	-.00000" / -.00024"
> .1181" - .2362"	> 3mm - 6mm	-.00000" / -.00032"
> .2362" - .3937"	> 6mm - 10mm	-.00000" / -.00035"
> .3937" - .7087"	> 10mm - 18mm	-.00000" / -.00043"
> .7087" - 1.1811"	> 18mm - 30mm	-.00000" / -.00050"
> 1.1811"	> 30mm	-.00000" / -.00050"

Tool Coatings for Standard Products



TiN
(Titanium Nitride)

General purpose coating - low heat resistance. Good lubricity.



TiCN
(Titanium Carbonitride)

Good abrasion resistance. Recommended for aluminum, brass and bronze applications. Low heat resistance - good lubricity.



TiAlN
(Titanium Aluminum Nitride)

Multi-layer coating with good thermal stability for increased speeds and feeds. For semi-dry to dry cutting of most steels, high-nickel alloys, stainless steel and cast iron. Excellent heat resistance, good lubricity. For materials that are 40Rc and under.



AlTiN
(Aluminum Titanium Nitride)

A single-layer coating whose hardness, oxidation resistance and thermal stability were optimized for material hardness above 38Rc and high-speed machining of materials that are difficult to work (titanium alloys, Inconel).



ALUMASTAR®
(Titanium Diboride - TiB₂)

A thin film coating with a low affinity for aluminum, ideal for machining aluminum alloys. The resistance to adhesion of aluminum allows higher speeds or feeds. Coating thickness is intentionally kept lower in order to maintain a sharp edge.



CRYSTALLINE DIAMOND
(CVD)

Improved productivity in composites. Excellent choice for cutting graphite and fiberglass. Can be added to a special for milling or drilling applications.



AlCrN
(Aluminum Chromium Nitride)

Aluminum Chromium-based coatings have excellent wear resistance, thermal shock stability, and hot hardness. Well suited for Titanium, Inconel, and carbon fiber.



HARDLUBE

Multi-layer coating with thermal stability and lubricating properties needed for the drilling of steels, high-nickel alloys, stainless steel, cast iron, aluminum, brass, and bronze. Excellent heat resistance, great lubricity.



AlTiN-based

Greater abrasion resistance, extra shear strength, lower adhesion tendency, maximum toughness and a very smooth surface achieve a quantum leap in drilling performance. This coating is particularly advantageous for carbide drills. With its unique nanostructure, AlTiN plus AlCrN, it boosts productivity in various materials.



AlCrN-based

High wear resistance even under severe thermal stress. Revolutionary smooth coating with outstanding adhesion. Prevents sticking and build-up on edges. Precise high-performance coating. Maintains sharp edges. Primarily for high-temp alloys, stainless, and tool steels.

SFM (M/Min.) / RPM Conversion Charts

SFM	DIAMETER														
	.0625"	.0938"	.1250"	.1562"	.1875"	.2188"	.2500"	.3125"	.3750"	.4375"	.5000"	.6250"	.7500"	.8750"	1.000"
	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"
RPM															
50	3050	2040	1530	1220	1020	875	765	610	510	440	380	310	250	220	190
75	4580	3060	2290	1830	1530	1310	1150	920	760	570	570	460	380	330	285
100	6100	4080	3050	2450	2040	1750	1530	1220	1020	760	760	610	510	440	385
125	7630	5100	3820	3050	2550	2180	1920	1530	1270	950	950	770	630	550	475
150	9150	6120	4570	3670	3060	2620	2290	1830	1530	1140	1140	920	760	660	575
175	10,680	7140	5350	4270	3570	3060	2680	2140	1780	1330	1330	1080	880	770	665
200	12,200	8150	6100	4900	4070	3500	3100	2450	2000	1500	1500	1200	1000	875	750
300	18,500	12,200	9200	7300	6100	5250	4600	3700	3100	2300	2300	1800	1500	1300	1100
400	24,500	16,300	12,200	9800	8150	7000	6100	4900	4100	3050	3050	2450	2050	1750	1525
500	30,500	20,400	15,300	12,200	10,200	8700	7600	6100	5100	3800	3800	3100	2500	2200	1900
750	45,800	36,700	22,900	18,300	15,300	13,100	11,500	9200	7600	5700	5700	4600	3800	3770	2850
1000	-	40,800	30,600	24,500	20,400	17,500	15,300	12,200	10,200	7650	7650	6100	5100	4400	3800
1500	-	-	40,800	36,700	30,600	26,200	22,900	18,300	15,300	11,300	11,300	9200	7600	6500	5700
2000	-	-	-	49,000	40,800	35,000	30,600	24,400	20,400	15,300	15,300	12,200	10,200	8700	7600
3000	-	-	-	-	-	52,500	45,900	36,600	30,600	22,900	22,900	18,300	15,300	13,100	11,400
4000	-	-	-	-	-	-	-	48,800	40,800	30,600	30,600	24,400	20,400	17,500	15,200
5000	-	-	-	-	-	-	-	-	51,000	38,200	38,200	30,600	25,500	21,800	19,000

M/Min.	DIAMETER														
	.0394"	.0787"	.1181"	.1575"	.1969"	.2362"	.3150"	.3937"	.4724"	.5512"	.6299"	.7087"	.7874"	.8661"	.9843"
	1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm	8.0mm	10.0mm	12.0mm	14.0mm	16.0mm	18.0mm	20.0mm	22.0mm	25.0mm
RPM															
15	4800	2400	1600	1200	960	800	600	480	400	340	300	265	240	220	190
22	7000	3500	2300	1750	1400	1170	875	700	585	500	440	390	350	320	280
30	10,000	4800	3200	2400	1900	1590	1200	955	800	685	600	530	480	440	380
38	12,100	6000	4000	3025	2420	2020	1515	1210	1000	870	760	670	600	550	485
45	14,300	7200	4800	3600	2870	2390	1790	1430	1200	1020	900	800	710	650	575
53	16,880	8440	5630	4220	3375	2815	2110	1690	1400	1200	1055	940	845	770	675
60	19,110	9550	6370	4780	3825	3185	2390	1910	1590	1365	1200	1060	955	870	765
90	28,770	14,350	9550	7165	5735	4780	3585	2870	2390	2050	1790	1590	1430	1300	1150
120	38,220	19,100	12,750	9550	7645	6370	4780	3820	3185	2730	2490	2120	1910	1740	1530
150	47,770	23,885	15,925	11,950	9550	7965	5970	4780	3980	3410	2990	2650	2390	2170	1900
230	-	36,625	24,400	18,315	14,650	12,210	9150	7325	6100	5230	4580	4070	3660	3330	2930
300	-	47,770	31,850	23,885	19,110	15,925	11,950	9550	7960	6825	5970	5300	4780	4340	3820
450	-	-	47,770	35,830	28,660	23,885	17,915	14,330	11,950	10,240	8960	7960	7170	6510	5730
600	-	-	-	47,770	38,220	31,850	23,885	19,100	15,920	13,650	12,000	10,600	9550	8685	7600
900	-	-	-	-	-	47,770	35,830	28,660	23,885	20,475	17,900	15,900	14,330	13,030	11,500
1200	-	-	-	-	-	-	47,770	38,210	31,850	27,300	23,885	21,230	19,100	17,370	15,300
1500	-	-	-	-	-	-	-	47,770	39,810	34,210	29,860	26,540	23,885	21,710	19,100

GARR TOOL General Purpose Milling Guide

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	60 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	.0025" - .0035" .0015" - .0020"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	55 - 90 45 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	.0025" - .0035" .0015" - .0020"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascocolloy	< 40 > 40	55 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	.0025" - .0035" .0015" - .0020"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0020" - .0030"	.0025" - .0035"	
5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"	.0015" - .0025"	
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金												
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 - 150 80 - 100	.0002" - .0005" .0002" - .0004"	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0006"	.0006" - .0009" .0003" - .0007"	.0008" - .0012" .0004" - .0008"	.0013" - .0018" .0007" - .0012"	.0010" - .0020" .0008" - .0015"	.0012" - .0025" .0010" - .0016"	.0012" - .0020" .0013" - .0017"	.0020" - .0028" .0015" - .0020"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	100 - 150 80 - 100	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0005"	.0005" - .0010" .0004" - .0007"	.0008" - .0015" .0005" - .0010"	.0009" - .0013" .0005" - .0010"	.0010" - .0018" .0007" - .0010"	.0015" - .0020" .0009" - .0015"	.0018" - .0022" .0012" - .0018"	.0018" - .0035" .0015" - .0025"	.0023" - .0036" .0020" - .0030"
	400 Series - 403, 405, 420, 455	< 40 > 40	150 - 200 100 - 150	.0005" - .0008" .0003" - .0007"	.0007" - .0010" .0004" - .0008"	.0009" - .0015" .0006" - .0010"	.0009" - .0014" .0007" - .0011"	.0011" - .0015" .0008" - .0012"	.0013" - .0018" .0009" - .0015"	.0015" - .0025" .0012" - .0020"	.0020" - .0035" .0018" - .0030"	.0022" - .0040" .0020" - .0035"	.0030" - .0046" .0024" - .0042"
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢												
A2, D2, P20, H13, S7, O1	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0014" - .0020"	.0022" - .0030" .0015" - .0022"	
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢												
	4140, 4340, 52100, 6150, 8620	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0014" - .0020"	.0022" - .0030" .0015" - .0022"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	.0022" - .0030"	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件												
	Ductile Iron		175 - 225	.0005" - .0008"	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"
	Gray Iron		175 - 225	.0005" - .0008"	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属												
	Aluminum		300 - 500	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Magnesium		300 - 500	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Copper		250 - 450	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Brass, Bronze		200 - 400	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料												
	Fiberglass, Plastics, G10		200 - 400	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Graphite			(See Graphite Chart - page 315)									

When plunging into a solid, drop feed by approximately 50%. 20% of diameter for basic engagement parameters.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Milling Guide

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1,5mm	3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	24 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 高镍基合金												
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	22 - 35 18 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	22 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		39 - 59	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076	0,064 - 0,089
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 - 0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064	0,038 - 0,064
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
13/8, 15/5, 17-4, pH Types		< 40 > 40	39 - 59 31 - 39	0,005 - 0,013 0,005 - 0,010	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,015	0,015 - 0,023 0,008 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043	0,051 - 0,071 0,038 - 0,051
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	39 - 59 31 - 39	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,013	0,013 - 0,025 0,010 - 0,018	0,020 - 0,038 0,013 - 0,025	0,023 - 0,033 0,018 - 0,025	0,025 - 0,046 0,018 - 0,025	0,038 - 0,051 0,023 - 0,038	0,046 - 0,056 0,030 - 0,046	0,046 - 0,089 0,038 - 0,064	0,058 - 0,091 0,051 - 0,076
400 Series - 403, 405, 420, 455		< 40 > 40	59 - 79 39 - 59	0,013 - 0,020 0,008 - 0,018	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089	0,076 - 0,117 0,061 - 0,107
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢													
A2, D2, P20, H13, S7, O1	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051	0,056 - 0,076 0,038 - 0,056	
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢												
	4140, 4340, 52100, 6150, 8620	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051	0,056 - 0,076 0,038 - 0,056
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071	0,056 - 0,076
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件												
	Ductile Iron		69 - 89	0,013 - 0,020	0,020 - 0,031	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114	0,114 - 0,140
	Gray Iron		69 - 89	0,013 - 0,020	0,020 - 0,031	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114	0,114 - 0,140
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属												
	Aluminum		118 - 197	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Magnesium		118 - 197	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Copper		98 - 177	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Brass, Bronze		79 - 157	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料												
	Fiberglass, Plastics, G10		79 - 157	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Graphite			(See Graphite Chart - page 315)									

When plunging into a solid, drop feed by approximately 50%. 20% of diameter for basic engagement parameters.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide

for 246MA, 253MA, 255MA, 263MA

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	70 - 110 50 - 90	.0008"-.0020" .0005"-.0015"	.0004"-.0010" .0004"-.0007"	.0007"-.0012" .0005"-.0011"	.0010"-.0018" .0008"-.0014"	.0010"-.0020" .0010"-.0017"	.0018"-.0028" .0015"-.0025"	.0023"-.0031" .0021"-.0028"	.0027"-.0034" .0024"-.0030"	.0029"-.0036" .0025"-.0031"	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliages de nickel / Leghe di nickel / 镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	65 - 110 55 - 90	.0005"-.0009" .0003"-.0008"	.0005"-.0009" .0004"-.0007"	.0007"-.0013" .0007"-.0012"	.0010"-.0017" .0009"-.0015"	.0010"-.0020" .0010"-.0018"	.0020"-.0028" .0015"-.0025"	.0025"-.0032" .0022"-.0030"	.0029"-.0036" .0026"-.0033"	.0030"-.0038" .0029"-.0035"	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Dicalloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	65 - 110 55 - 90	.0005"-.0010" .0003"-.0008"	.0008"-.0010" .0004"-.0008"	.0006"-.0012" .0005"-.0010"	.0007"-.0015" .0006"-.0013"	.0011"-.0016" .0008"-.0014"	.0018"-.0026" .0013"-.0023"	.0025"-.0030" .0022"-.0028"	.0026"-.0034" .0025"-.0031"	.0032"-.0038" .0030"-.0035"	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliages de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		125 - 175	.0005"-.0010"	.0005"-.0012"	.0008"-.0015"	.0010"-.0022"	.0018"-.0027"	.0023"-.0032"	.0025"-.0033"	.0027"-.0035"	.0028"-.0037"	
	5553 / Beta Titanium		100 - 150	.0004"-.0010"	.0004"-.0010"	.0006"-.0014"	.0008"-.0017"	.0015"-.0025"	.0022"-.0028"	.0024"-.0030"	.0026"-.0032"	.0028"-.0035"	
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金												
	13/8, 15/5, 17-4, PH Types	< 40 > 40	175 - 225 135 - 175	.0005"-.0007" .0002"-.0004"	.0004"-.0008" .0002"-.0006"	.0007"-.0010" .0003"-.0007"	.0008"-.0012" .0004"-.0008"	.0013"-.0018" .0007"-.0012"	.0010"-.0020" .0008"-.0015"	.0012"-.0025" .0010"-.0016"	.0012"-.0020" .0013"-.0017"	.0020"-.0028" .0015"-.0020"	
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	200 - 225 155 - 200	.0003"-.0007" .0002"-.0005"	.0005"-.0010" .0004"-.0007"	.0008"-.0015" .0005"-.0010"	.0009"-.0013" .0005"-.0010"	.0010"-.0018" .0007"-.0010"	.0015"-.0020" .0009"-.0015"	.0018"-.0022" .0012"-.0018"	.0018"-.0035" .0015"-.0025"	.0023"-.0036" .0020"-.0030"	
	400 Series - 403, 405, 420, 455	< 40 > 40	200 - 225 150 - 200	.0007"-.0010" .0004"-.0008"	.0009"-.0015" .0006"-.0010"	.0009"-.0014" .0007"-.0011"	.0011"-.0015" .0008"-.0012"	.0013"-.0018" .0009"-.0015"	.0015"-.0025" .0012"-.0020"	.0020"-.0035" .0018"-.0030"	.0022"-.0040" .0020"-.0035"	.0030"-.0046" .0024"-.0042"	
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢												
P	A2, D2, P20, H13, S2, O1	< 40 > 40	225 - 325 150 - 225	.0005"-.0008" .0003"-.0005"	.0008"-.0015" .0005"-.0010"	.0015"-.0020" .0008"-.0012"	.0015"-.0023" .0010"-.0015"	.0015"-.0025" .0010"-.0018"	.0020"-.0030" .0015"-.0020"	.0020"-.0030" .0015"-.0020"	.0025"-.0035" .0018"-.0025"	.0030"-.0040" .0020"-.0030"	
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢												
	4140, 4340, 52100, 6150, 8620	< 40 > 40	225 - 325 150 - 225	.0005"-.0008" .0003"-.0005"	.0008"-.0015" .0005"-.0010"	.0015"-.0020" .0008"-.0012"	.0015"-.0023" .0010"-.0015"	.0015"-.0025" .0010"-.0018"	.0020"-.0030" .0015"-.0020"	.0020"-.0030" .0015"-.0020"	.0025"-.0035" .0018"-.0025"	.0030"-.0040" .0020"-.0030"	
K	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	225 - 325	.0005"-.0008"	.0008"-.0015"	.0015"-.0020"	.0015"-.0023"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件												
	Ductile Iron		225 - 325	.0010"-.0015"	.0015"-.0020"	.0020"-.0030"	.0025"-.0035"	.0025"-.0035"	.0030"-.0045"	.0040"-.0050"	.0040"-.0050"	.0050"-.0060"	
	Gray Iron		300 - 400	.0015"-.0025"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	.0030"-.0040"	.0040"-.0050"	.0050"-.0060"	.0060"-.0070"	.0060"-.0070"	
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属												
	Aluminum		300 - 500	.0006"-.0010"	.0008"-.0014"	.0012"-.0020"	.0014"-.0028"	.0020"-.0030"	.0035"-.0048"	.0050"-.0060"	.0058"-.0070"	.0068"-.0090"	
	Magnesium		300 - 500	.0006"-.0010"	.0008"-.0014"	.0012"-.0020"	.0014"-.0028"	.0020"-.0030"	.0035"-.0048"	.0050"-.0060"	.0058"-.0070"	.0068"-.0090"	
	Copper		250 - 450	.0006"-.0010"	.0008"-.0014"	.0012"-.0020"	.0014"-.0028"	.0020"-.0030"	.0035"-.0048"	.0050"-.0060"	.0058"-.0070"	.0068"-.0090"	
	Brass, Bronze		200 - 400	.0006"-.0010"	.0008"-.0014"	.0012"-.0020"	.0014"-.0028"	.0020"-.0030"	.0035"-.0048"	.0050"-.0060"	.0058"-.0070"	.0068"-.0090"	
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料												
	Fiberglass, Plastics, G10		200 - 400	.0006"-.0010"	.0008"-.0014"	.0012"-.0020"	.0014"-.0028"	.0020"-.0030"	.0035"-.0048"	.0050"-.0060"	.0058"-.0070"	.0068"-.0090"	
	Graphite	(See Graphite Chart - page 315)											

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (IPM) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for 846MA, 853MA, 855MA, 863MA

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)								
				3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金											
	Haynes 25/188, Stellite 21, Cobalt Chrome	<40 >40	28 - 43 20 - 35	0,020 - 0,051 0,013 - 0,038	0,010 - 0,025 0,010 - 0,018	0,018 - 0,030 0,013 - 0,028	0,025 - 0,046 0,020 - 0,036	0,025 - 0,051 0,025 - 0,043	0,046 - 0,071 0,038 - 0,064	0,058 - 0,079 0,053 - 0,071	0,069 - 0,086 0,061 - 0,076	0,074 - 0,091 0,064 - 0,079
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 高镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	<40 >40	26 - 43 22 - 35	0,013 - 0,023 0,008 - 0,020	0,013 - 0,023 0,010 - 0,018	0,018 - 0,033 0,018 - 0,030	0,025 - 0,041 0,023 - 0,038	0,025 - 0,051 0,025 - 0,046	0,051 - 0,071 0,038 - 0,064	0,064 - 0,081 0,056 - 0,076	0,074 - 0,091 0,066 - 0,084	0,076 - 0,097 0,074 - 0,089
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	<40 >40	26 - 43 22 - 35	0,013 - 0,025 0,008 - 0,020	0,020 - 0,025 0,010 - 0,020	0,015 - 0,030 0,013 - 0,025	0,018 - 0,038 0,015 - 0,033	0,028 - 0,041 0,020 - 0,036	0,046 - 0,066 0,033 - 0,058	0,064 - 0,076 0,056 - 0,071	0,066 - 0,086 0,064 - 0,079	0,081 - 0,097 0,076 - 0,089
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		49 - 69	0,013 - 0,025	0,013 - 0,030	0,020 - 0,038	0,025 - 0,056	0,046 - 0,069	0,058 - 0,081	0,064 - 0,084	0,069 - 0,089	0,071 - 0,094	
5553 / Beta Titanium		39 - 59	0,010 - 0,025	0,010 - 0,025	0,015 - 0,036	0,020 - 0,041	0,038 - 0,064	0,056 - 0,071	0,061 - 0,076	0,066 - 0,081	0,071 - 0,089	
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
	13/8, 15/5, 17-4, PH Types	<40 >40	69 - 89 53 - 69	0,013 - 0,018 0,005 - 0,010	0,010 - 0,020 0,005 - 0,015	0,018 - 0,025 0,007 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043	0,051 - 0,071 0,038 - 0,051
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	<40 >40	79 - 89 61 - 79	0,008 - 0,018 0,005 - 0,013	0,013 - 0,025 0,010 - 0,018	0,020 - 0,038 0,013 - 0,025	0,023 - 0,033 0,013 - 0,025	0,025 - 0,046 0,018 - 0,025	0,038 - 0,051 0,023 - 0,038	0,046 - 0,056 0,030 - 0,046	0,046 - 0,089 0,038 - 0,064	0,058 - 0,091 0,051 - 0,076
	400 Series - 403, 405, 420, 455	<40 >40	79 - 89 59 - 79	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089	0,076 - 0,117 0,061 - 0,107
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢											
	A2, D2, P20, H13, S2, O1	<40 >40	89 - 128 59 - 89	0,013 - 0,020 0,008 - 0,013	0,020 - 0,038 0,013 - 0,025	0,038 - 0,051 0,020 - 0,030	0,038 - 0,058 0,025 - 0,038	0,038 - 0,064 0,025 - 0,046	0,051 - 0,076 0,038 - 0,051	0,051 - 0,076 0,038 - 0,051	0,064 - 0,089 0,046 - 0,064	0,076 - 0,102 0,051 - 0,076
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	<40 >40	89 - 128 59 - 89	0,013 - 0,020 0,008 - 0,013	0,020 - 0,038 0,013 - 0,025	0,038 - 0,051 0,020 - 0,030	0,038 - 0,058 0,025 - 0,038	0,038 - 0,064 0,025 - 0,046	0,051 - 0,076 0,038 - 0,051	0,051 - 0,076 0,038 - 0,051	0,064 - 0,089 0,046 - 0,064	0,076 - 0,102 0,051 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
	1000's - 1018, 1020, 12L14	<40	89 - 128	0,013 - 0,020	0,020 - 0,038	0,038 - 0,051	0,038 - 0,058	0,038 - 0,064	0,051 - 0,076	0,051 - 0,076	0,064 - 0,089	0,076 - 0,102
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件											
	Ductile Iron		89 - 128	0,025 - 0,038	0,038 - 0,051	0,051 - 0,076	0,064 - 0,089	0,064 - 0,089	0,076 - 0,114	0,102 - 0,127	0,102 - 0,127	0,127 - 0,152
	Gray Iron		118 - 157	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,076 - 0,102	0,076 - 0,102	0,102 - 0,127	0,127 - 0,152	0,152 - 0,178	0,152 - 0,178
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属											
	Aluminum		118 - 197	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Magnesium		118 - 197	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Copper		98 - 177	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Brass, Bronze		79 - 157	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料											
	Fiberglass, Plastics, G10		79 - 157	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Graphite			(See Graphite Chart - page 315)								

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (IPM) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Aluminum (Machining Centers with Low-Range HP/Torque)

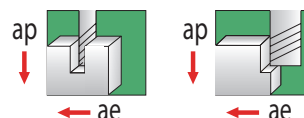
Series 242M/842M/A3 End Mills

- NOTES:** Climb milling recommended for best finish
 Contact your OEM for your machine's optimal running parameters
 Figures shown are based on 6061 / 7075
 CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
 For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

Diameter	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 400 - 600	SFM = 300 - 450	SFM = 500 - 650
	CPT (Fz) = .5% - 1.5% of diameter	CPT (Fz) = .5% - 1% of diameter	CPT (Fz) = 1% - 2% of diameter
1/8"	.0006" - .0018"	.0006" - .0012"	.0012" - .0024"
3/16"	.0009" - .0028"	.0009" - .0018"	.0018" - .0036"
1/4"	.0013" - .0038"	.0013" - .0025"	.0025" - .0050"
5/16"	.0016" - .0047"	.0016" - .0031"	.0031" - .0062"
3/8"	.0019" - .0056"	.0019" - .0037"	.0037" - .0074"
1/2"	.0025" - .0075"	.0025" - .0050"	.0050" - .0100"
5/8"	.0031" - .0094"	.0031" - .0062"	.0062" - .0120"
3/4"	.0038" - .0110"	.0038" - .0075"	.0075" - .0150"
1"	.0050" - .0150"	.0050" - .0100"	.0100" - .0200"

Diameter	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 125 - 180	M/Min. = 90 - 140	M/Min. = 150 - 200
	CPT (Fz) = .5% - 1.5% of diameter	CPT (Fz) = .5% - 1% of diameter	CPT (Fz) = 1% - 2% of diameter
3,0mm	0,015 - 0,045	0,015 - 0,030	0,030 - 0,060
4,0mm	0,020 - 0,060	0,020 - 0,040	0,040 - 0,080
6,0mm	0,030 - 0,090	0,030 - 0,060	0,060 - 0,120
8,0mm	0,040 - 0,120	0,040 - 0,080	0,080 - 0,160
10,0mm	0,050 - 0,150	0,050 - 0,100	0,100 - 0,200
12,0mm	0,060 - 0,180	0,060 - 0,120	0,120 - 0,240
16,0mm	0,080 - 0,240	0,080 - 0,160	0,160 - 0,320
20,0mm	0,100 - 0,300	0,100 - 0,200	0,200 - 0,400
25,0mm	0,125 - 0,375	0,125 - 0,250	0,250 - 0,500

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1xD	up to 1xD
Radial (ae)	1xD	up to 50% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Aluminum (Machining Centers with Mid-Range HP/Torque)

Series 142M/143M/A3 End Mills

TECHNICAL

NOTES: Climb milling recommended for best finish

Contact your OEM for your machine's optimal running parameters

Figures shown are based on 6061 / 7075

CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills

In controlled slotting tests, 4000 SFM, 1% diameter Chipload Per Tooth and 50% of Dia. axial depth were obtained

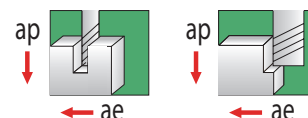
In cases for tools with slower SFM (M/Min.), reference Series 242M/842M

For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

Diameter	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 1500 - 2000	SFM = 750 - 1500	SFM = 1500 - 2000
	CPT (Fz) = 1.5% - 2.5% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 1.5% - 2.5% of diameter
1/8"	.0019" - .0031"	.0013" - .0025"	.0019" - .0031"
3/16"	.0028" - .0047"	.0018" - .0037"	.0028" - .0047"
1/4"	.0037" - .0062"	.0025" - .0050"	.0037" - .0062"
5/16"	.0052" - .0078"	.0031" - .0062"	.0052" - .0078"
3/8"	.0055" - .0094"	.0037" - .0074"	.0055" - .0094"
1/2"	.0075" - .0125"	.0050" - .0100"	.0075" - .0125"
5/8"	.0093" - .0156"	.0062" - .0125"	.0093" - .0156"
3/4"	.0112" - .0188"	.0075" - .0150"	.0112" - .0188"
1"	.0150" - .0250"	.0100" - .0200"	.0150" - .0250"

Diameter	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 450 - 760	M/Min. = 225 - 450	M/Min. = 450 - 760
	CPT (Fz) = 1.5% - 2.5% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 1.5% - 2.5% of diameter
3,0mm	0,045 - 0,075	0,030 - 0,060	0,045 - 0,075
4,0mm	0,060 - 0,100	0,040 - 0,080	0,060 - 0,100
6,0mm	0,090 - 0,150	0,060 - 0,120	0,090 - 0,150
8,0mm	0,120 - 0,200	0,080 - 0,160	0,120 - 0,200
10,0mm	0,150 - 0,250	0,100 - 0,200	0,150 - 0,250
12,0mm	0,180 - 0,300	0,120 - 0,240	0,180 - 0,300
16,0mm	0,240 - 0,400	0,160 - 0,320	0,240 - 0,400
20,0mm	0,300 - 0,500	0,200 - 0,400	0,300 - 0,500
25,0mm	0,375 - 0,625	0,250 - 0,500	0,375 - 0,625

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1xD	up to 1xD
Radial (ae)	1xD	up to 50% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Aluminum (Machining Centers with High-Range HP/Torque)

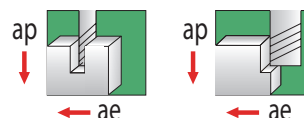
Series A3 End Mills

NOTES: Climb milling recommended for best finish
 Contact your OEM for your machine's optimal running parameters
 CPT parameters shown are for 2xD LOC tooling and 2.5xD Reach Lengths
 CPT may need to be reduced based on machine/tool holding connection
 Preferred tool holders: Rego Fix powRgrip or Shrink Fit

Diameter	SLOTTING		PROFILING	FINISHING
	Axial = .5xD	Axial = 1xD	Axial = 2xD Radial = 30%-40%xD	Axial = Max LOC Radial = 2.5%xD
	SFM = Maximum RPM	SFM = Maximum RPM	SFM = Maximum RPM	SFM = up to 80% Max RPM
	CPT (Fz) = 1.5% - 3% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 2% - 3% of diameter	CPT (Fz) = 1% of diameter
3/16"	.0028" - .0056"	.0018" - .0037"	.0037" - .0056"	.0018"
1/4"	.0037" - .0074"	.0025" - .0050"	.0050" - .0075"	.0025"
5/16"	.0052" - .0104"	.0031" - .0062"	.0062" - .0094"	.0031"
3/8"	.0055" - .0110"	.0037" - .0074"	.0075" - .0112"	.0037"
1/2"	.0075" - .0150"	.0050" - .0100"	.0100" - .0150"	.0050"
5/8"	.0093" - .0186"	.0062" - .0125"	.0125" - .0187"	.0062"
3/4"	.0112" - .0224"	.0075" - .0150"	.0150" - .0225"	.0075"
1"	.0150" - .0300"	.0100" - .0200"	.0200" - .0300"	.0100"

Diameter	SLOTTING		PROFILING	FINISHING
	Axial = .5xD	Axial = 1xD	Axial = 2xD Radial = 30%-40%xD	Axial = Max LOC Radial = 2.5%xD
	M/Min. = Maximum RPM	M/Min. = Maximum RPM	M/Min. = Maximum RPM	M/Min. = up to 80% Max RPM
	CPT (Fz) = 1.5% - 3% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 2% - 3% of diameter	CPT (Fz) = 1% of diameter
4,0mm	0,060 - 0,120	0,040 - 0,080	0,080 - 0,120	0,040
6,0mm	0,090 - 0,180	0,060 - 0,120	0,120 - 0,180	0,060
8,0mm	0,120 - 0,240	0,080 - 0,160	0,160 - 0,240	0,080
10,0mm	0,150 - 0,300	0,100 - 0,200	0,200 - 0,300	0,100
12,0mm	0,180 - 0,360	0,120 - 0,240	0,240 - 0,360	0,120
16,0mm	0,240 - 0,480	0,160 - 0,320	0,320 - 0,480	0,160
20,0mm	0,300 - 0,600	0,200 - 0,400	0,400 - 0,600	0,200
25,0mm	0,375 - 0,750	0,250 - 0,500	0,500 - 0,750	0,250

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1xD	up to 2xD
Radial (ae)	1xD	up to 50% of Dia.



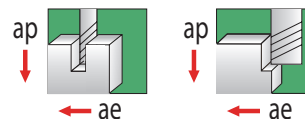
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for ARC Series 3-Flute Rougher

ISO Material		SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	150 - 250	.0005" - .0008"	.0007" - .0010"	.0008" - .0013"	.0012" - .0018"	.0015" - .0023"	.0018" - .0028"	.0020" - .0035"	.0025" - .0045"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属									
	Aluminum	700 - 1000	.0010" - .0020"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0040" - .0050"	.0050" - .0060"	.0060" - .0070"
	Copper, Brass, Bronze	300 - 500	.0008" - .0013"	.0012" - .0018"	.0015" - .0023"	.0018" - .0028"	.0020" - .0035"	.0025" - .0045"	.0030" - .0050"	.0040" - .0060"

ISO Material		M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
			4,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	40 - 80	0,010 - 0,020	0,015 - 0,025	0,020 - 0,035	0,025 - 0,050	0,035 - 0,055	0,045 - 0,075	0,050 - 0,090	0,060 - 0,115
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属									
	Aluminum	200 - 350	0,025 - 0,050	0,040 - 0,065	0,050 - 0,075	0,060 - 0,090	0,075 - 0,100	0,100 - 0,125	0,125 - 0,150	0,150 - 0,180
	Copper, Brass, Bronze	80 - 150	0,020 - 0,035	0,025 - 0,050	0,035 - 0,055	0,045 - 0,075	0,050 - 0,090	0,060 - 0,115	0,075 - 0,125	0,100 - 0,150

	Slotting	Profiling
Axial (ap)	1xD	2xD
Radial (ae)	1xD	0.5xD



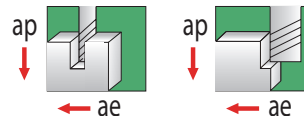
ARC SERIES TOOLS ARE NOT DESIGNED FOR OVER 28Rc MATERIALS

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

ISO Material		SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金									
	High Temperature Alloys: Inconel 625/718, A286	100 - 175	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0015"	.0010"-.0015"	.0012"-.0020"	.0015"-.0025"	.0015"-.0025"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	150 - 200	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0030"	.0030"-.0035"	.0030"-.0040"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
	Stainless Steel: 303	290 - 375	.0008"-.0010"	.0010"-.0015"	.0013"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	.0035"-.0045"
	Stainless Steel: 304, 316, 400 Series, Kovar, Invar	250 - 300	.0006"-.0010"	.0008"-.0015"	.0010"-.0020"	.0012"-.0020"	.0015"-.0020"	.0020"-.0025"	.0025"-.0030"	.0025"-.0035"
	Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l	200 - 250	.0006"-.0008"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"
P	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢									
	High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	250 - 400	.0006"-.0008"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	Carbon Steels: 1000 Series	275 - 425	.0006"-.0008"	.0008"-.0012"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0025"	.0020"-.0030"	.0025"-.0035"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件									
	Cast Iron	400 - 500	.0010"-.0020"	.0010"-.0020"	.0015"-.0020"	.0015"-.0025"	.0020"-.0035"	.0025"-.0035"	.0030"-.0040"	.0040"-.0050"

	Slotting	Profiling
Axial (ap)	0.5xD	2xD
Radial (ae)	1xD	0.2xD

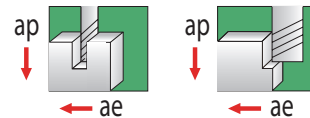


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

ISO Material		M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)								
			4,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金										
	High Temperature Alloys: Inconel 625/718, A286	30 - 55	0,008 - 0,015	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,038	0,025 - 0,038	0,030 - 0,050	0,038 - 0,063	0,038 - 0,063
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Titanium: 6AL4V, CP	45 - 60	0,010 - 0,020	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,050	0,050 - 0,076	0,063 - 0,076	0,076 - 0,089	0,076 - 0,102
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金										
	Stainless Steel: 303	90 - 115	0,010 - 0,020	0,020 - 0,025	0,025 - 0,038	0,033 - 0,050	0,038 - 0,050	0,050 - 0,076	0,063 - 0,089	0,076 - 0,102	0,089 - 0,114
	Stainless Steel: 304, 316, 400 Series, Kovar, Invar	75 - 90	0,008 - 0,015	0,015 - 0,025	0,020 - 0,038	0,025 - 0,050	0,030 - 0,050	0,038 - 0,050	0,050 - 0,063	0,063 - 0,076	0,063 - 0,089
	Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l	60 - 75	0,008 - 0,015	0,015 - 0,020	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,076	0,050 - 0,076
P	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢										
	High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	75 - 125	0,006 - 0,015	0,015 - 0,020	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,076	0,050 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	Carbon Steels: 1000 Series	85 - 130	0,008 - 0,015	0,015 - 0,020	0,020 - 0,030	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,063	0,050 - 0,076	0,063 - 0,089
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件										
	Cast Iron	125 - 150	0,013 - 0,025	0,025 - 0,050	0,025 - 0,050	0,038 - 0,050	0,038 - 0,063	0,050 - 0,089	0,063 - 0,089	0,076 - 0,102	0,102 - 0,127

	Slotting	Profiling
Axial (ap)	0.5xD	2xD
Radial (ae)	1xD	0.2xD



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VRX

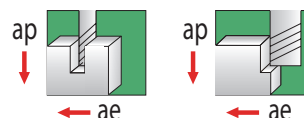
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	75 - 150 60 - 125	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0010"	.0008" - .0015" .0007" - .0013"	.0010" - .0019" .0009" - .0017"	.0014" - .0024" .0012" - .0020"	.0016" - .0030" .0014" - .0026"	.0020" - .0038" .0018" - .0034"	.0028" - .0048" .0024" - .0040"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金												
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	75 - 150 60 - 125	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0010"	.0008" - .0015" .0007" - .0013"	.0010" - .0019" .0009" - .0017"	.0014" - .0024" .0012" - .0020"	.0016" - .0030" .0014" - .0026"	.0020" - .0038" .0018" - .0034"	.0028" - .0048" .0024" - .0040"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	75 - 150 60 - 125	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0010"	.0008" - .0015" .0007" - .0013"	.0010" - .0019" .0009" - .0017"	.0014" - .0024" .0012" - .0020"	.0016" - .0030" .0014" - .0026"	.0020" - .0038" .0018" - .0034"	.0028" - .0048" .0024" - .0040"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		175 - 300	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0014" .0006" - .0010"	.0008" - .0017" .0007" - .0013"	.0010" - .0021" .0009" - .0017"	.0014" - .0028" .0012" - .0020"	.0016" - .0034" .0014" - .0026"	.0020" - .0042" .0018" - .0034"	.0028" - .0056" .0024" - .0040"
	5553 / Beta Titanium		125 - 225	.0003" - .0006" .0003" - .0005"	.0003" - .0007" .0003" - .0006"	.0004" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0010"	.0008" - .0015" .0007" - .0013"	.0010" - .0019" .0009" - .0017"	.0014" - .0024" .0012" - .0020"	.0016" - .0030" .0014" - .0026"	.0020" - .0038" .0018" - .0034"	.0028" - .0048" .0024" - .0040"
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
13/8, 15/5, 17-4, pH Types		< 40 > 40	175 - 300 150 - 225	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0010"	.0008" - .0015" .0007" - .0013"	.0010" - .0019" .0009" - .0017"	.0014" - .0024" .0012" - .0020"	.0016" - .0030" .0014" - .0026"	.0020" - .0038" .0018" - .0034"	.0028" - .0048" .0022" - .0040"
300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic		< 40 > 40	200 - 325 175 - 250	.0003" - .0006" .0003" - .0005"	.0004" - .0007" .0003" - .0006"	.0005" - .0008" .0004" - .0007"	.0007" - .0012" .0006" - .0011"	.0008" - .0015" .0007" - .0014"	.0010" - .0019" .0009" - .0018"	.0014" - .0024" .0012" - .0022"	.0016" - .0030" .0014" - .0028"	.0020" - .0038" .0018" - .0036"	.0028" - .0048" .0024" - .0044"
400 Series - 403, 405, 420, 455		< 40	225 - 350	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0013"	.0008" - .0016"	.0010" - .0020"	.0014" - .0026"	.0016" - .0032"	.0024" - .0043"	.0028" - .0052"
		> 40	175 - 250	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0011"	.0007" - .0014"	.0009" - .0018"	.0012" - .0022"	.0014" - .0028"	.0018" - .0036"	.0024" - .0044"
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢													
A2, D2, P20, H13, S7, O1		< 40 > 40	175 - 300 125 - 275	.0004" - .0007" .0003" - .0005"	.0005" - .0008" .0003" - .0005"	.0006" - .0010" .0005" - .0008"	.0008" - .0013" .0007" - .0010"	.0009" - .0016" .0008" - .0013"	.0011" - .0020" .0010" - .0017"	.0016" - .0026" .0014" - .0020"	.0018" - .0032" .0016" - .0026"	.0022" - .0040" .0020" - .0034"	.0032" - .0052" .0028" - .0040"
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢												
	4140, 4340, 52100, 6150, 8620	< 40 > 40	250 - 400 225 - 300	.0004" - .0007" .0003" - .0005"	.0005" - .0008" .0003" - .0005"	.0006" - .0010" .0005" - .0008"	.0008" - .0014" .0007" - .0011"	.0009" - .0017" .0008" - .0014"	.0011" - .0021" .0010" - .0018"	.0016" - .0026" .0014" - .0022"	.0018" - .0034" .0016" - .0028"	.0022" - .0042" .0020" - .0036"	.0032" - .0056" .0028" - .0044"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	300 - 425	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件												
	Ductile Iron		300 - 425	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0009" - .0016"	.0010" - .0019"	.0012" - .0023"	.0018" - .0032"	.0020" - .0038"	.0024" - .0046"	.0036" - .0064"
	Gray Iron		325 - 475	.0005" - .0008"	.0007" - .0010"	.0007" - .0012"	.0010" - .0017"	.0011" - .0020"	.0013" - .0024"	.0020" - .0034"	.0022" - .0040"	.0026" - .0048"	.0040" - .0068"

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VRX

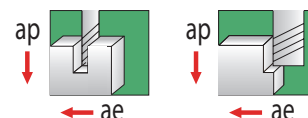
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material			HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)									
					1,5mm	3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金													
	Haynes 25/188, Stellite 21, Cobalt Chrome		< 40 > 40	25 - 45 20 - 40	0,008 - 0,015 0,008 - 0,012	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,030 0,015 - 0,025	0,020 - 0,038 0,018 - 0,033	0,025 - 0,048 0,023 - 0,043	0,036 - 0,061 0,030 - 0,051	0,041 - 0,076 0,036 - 0,066	0,051 - 0,097 0,046 - 0,086	0,071 - 0,122 0,061 - 0,102
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金													
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel		< 40 > 40	25 - 45 20 - 40	0,008 - 0,015 0,008 - 0,012	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,030 0,015 - 0,025	0,020 - 0,038 0,018 - 0,033	0,025 - 0,048 0,023 - 0,043	0,036 - 0,061 0,030 - 0,051	0,041 - 0,076 0,036 - 0,066	0,051 - 0,097 0,046 - 0,086	0,071 - 0,122 0,061 - 0,102
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金													
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology		< 40 > 40	25 - 45 20 - 40	0,008 - 0,015 0,008 - 0,012	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,030 0,015 - 0,025	0,020 - 0,038 0,018 - 0,033	0,025 - 0,048 0,023 - 0,043	0,036 - 0,061 0,030 - 0,051	0,041 - 0,076 0,036 - 0,066	0,051 - 0,097 0,046 - 0,086	0,071 - 0,122 0,061 - 0,102
M	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金													
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si			55 - 90	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,036	0,020 - 0,043	0,025 - 0,053	0,036 - 0,071	0,041 - 0,086	0,051 - 0,107	0,071 - 0,142
	5553 / Beta Titanium			40 - 70	0,008 - 0,015	0,008 - 0,018	0,010 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金													
	13/8, 15/5, 17-4, pH Types		< 40 > 40	55 - 90 45 - 70	0,008 - 0,015 0,008 - 0,013	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,030 0,015 - 0,025	0,020 - 0,038 0,018 - 0,033	0,025 - 0,048 0,023 - 0,043	0,036 - 0,061 0,030 - 0,051	0,041 - 0,076 0,036 - 0,066	0,051 - 0,097 0,046 - 0,086	0,071 - 0,122 0,056 - 0,102
	300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic		< 40 > 40	60 - 100 55 - 75	0,008 - 0,015 0,008 - 0,013	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,030 0,015 - 0,028	0,020 - 0,038 0,018 - 0,036	0,025 - 0,048 0,023 - 0,046	0,036 - 0,061 0,030 - 0,056	0,041 - 0,076 0,036 - 0,071	0,051 - 0,097 0,046 - 0,091	0,071 - 0,122 0,061 - 0,112
P	400 Series - 403, 405, 420, 455		< 40 > 40	70 - 110 55 - 75	0,008 - 0,015 0,008 - 0,013	0,010 - 0,018 0,008 - 0,015	0,013 - 0,020 0,010 - 0,018	0,018 - 0,033 0,015 - 0,028	0,020 - 0,041 0,018 - 0,036	0,025 - 0,051 0,023 - 0,046	0,036 - 0,066 0,030 - 0,056	0,041 - 0,081 0,036 - 0,071	0,061 - 0,109 0,046 - 0,091	0,071 - 0,132 0,061 - 0,112
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢													
	A2, D2, P20, H13, S7, O1		< 40 > 40	55 - 90 40 - 85	0,010 - 0,018 0,008 - 0,013	0,013 - 0,020 0,008 - 0,013	0,015 - 0,025 0,013 - 0,020	0,020 - 0,033 0,018 - 0,025	0,023 - 0,041 0,020 - 0,033	0,028 - 0,051 0,025 - 0,043	0,041 - 0,066 0,036 - 0,051	0,046 - 0,081 0,041 - 0,066	0,056 - 0,102 0,051 - 0,086	0,081 - 0,132 0,071 - 0,102
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢													
	4140, 4340, 52100, 6150, 8620		< 40 > 40	75 - 120 70 - 90	0,010 - 0,018 0,008 - 0,013	0,013 - 0,020 0,008 - 0,013	0,015 - 0,025 0,013 - 0,020	0,020 - 0,036 0,018 - 0,028	0,023 - 0,043 0,020 - 0,036	0,028 - 0,053 0,025 - 0,046	0,041 - 0,071 0,036 - 0,056	0,046 - 0,086 0,041 - 0,071	0,056 - 0,107 0,051 - 0,091	0,081 - 0,142 0,071 - 0,112
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢													
1000's - 1018, 1020, 12L14		< 40	90 - 130	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,020 - 0,038	0,023 - 0,046	0,028 - 0,056	0,041 - 0,076	0,046 - 0,091	0,056 - 0,112	0,081 - 0,152	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件													
	Ductile Iron			90 - 130	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,023 - 0,041	0,025 - 0,048	0,030 - 0,058	0,046 - 0,081	0,051 - 0,097	0,061 - 0,117	0,091 - 0,163
	Gray Iron			100 - 145	0,013 - 0,020	0,018 - 0,025	0,018 - 0,030	0,025 - 0,043	0,028 - 0,051	0,033 - 0,061	0,051 - 0,086	0,056 - 0,102	0,066 - 0,122	0,102 - 0,173

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for V4

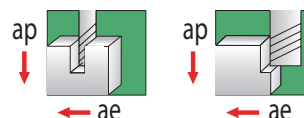
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
				1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	90 - 185 75 - 150	.0008" - .0015" .0006" - .0013"	.0009" - .0018" .0007" - .0016"	.0011" - .0022" .0009" - .0020"	.0016" - .0030" .0012" - .0026"	.0018" - .0036" .0014" - .0032"	.0022" - .0044" .0018" - .0040"	.0032" - .0060" .0024" - .0052"	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	90 - 185 75 - 150	.0008" - .0015" .0006" - .0013"	.0009" - .0018" .0007" - .0016"	.0011" - .0022" .0009" - .0020"	.0016" - .0030" .0012" - .0026"	.0018" - .0036" .0014" - .0032"	.0022" - .0044" .0018" - .0040"	.0032" - .0060" .0024" - .0052"	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	90 - 185 75 - 150	.0008" - .0015" .0006" - .0013"	.0009" - .0018" .0007" - .0016"	.0011" - .0022" .0009" - .0020"	.0016" - .0030" .0012" - .0026"	.0018" - .0036" .0014" - .0032"	.0022" - .0044" .0018" - .0040"	.0032" - .0060" .0024" - .0052"	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		200 - 375	.0009" - .0017"	.0010" - .0020"	.0012" - .0024"	.0018" - .0034"	.0020" - .0040"	.0024" - .0048"	.0036" - .0068"	
	5553 / Beta Titanium		150 - 280	.0009" - .0015"	.0010" - .0018"	.0012" - .0022"	.0018" - .0030"	.0020" - .0036"	.0024" - .0044"	.0032" - .0060"	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
13/8, 15/5, 17-4, pH Types		< 40 > 40	225 - 375 175 - 275	.0008" - .0015" .0006" - .0013"	.0009" - .0018" .0007" - .0016"	.0011" - .0022" .0009" - .0020"	.0016" - .0030" .0012" - .0026"	.0018" - .0036" .0014" - .0032"	.0022" - .0044" .0018" - .0040"	.0032" - .0060" .0024" - .0052"	
300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic		< 40 > 40	250 - 400 175 - 275	.0008" - .0016" .0006" - .0013"	.0009" - .0018" .0007" - .0016"	.0011" - .0022" .0009" - .0020"	.0016" - .0030" .0012" - .0026"	.0018" - .0036" .0014" - .0032"	.0022" - .0044" .0018" - .0040"	.0032" - .0060" .0024" - .0052"	
400 Series - 403, 405, 420, 455		< 40 > 40	225 - 425 175 - 325	.0008" - .0016" .0006" - .0014"	.0009" - .0019" .0007" - .0017"	.0011" - .0023" .0009" - .0021"	.0016" - .0032" .0012" - .0028"	.0018" - .0038" .0014" - .0034"	.0022" - .0046" .0018" - .0042"	.0032" - .0064" .0024" - .0056"	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
A2, D2, P20, H13, S7, O1		< 40 > 40	225 - 400 150 - 325	.0008" - .0016" .0006" - .0013"	.0011" - .0019" .0010" - .0016"	.0013" - .0023" .0012" - .0020"	.0016" - .0032" .0012" - .0026"	.0022" - .0038" .0020" - .0032"	.0026" - .0056" .0024" - .0040"	.0040" - .0064" .0036" - .0052"	
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢										
	4140, 4340, 52100, 6150, 8620	< 40 > 40	350 - 500 250 - 375	.0008" - .0017" .0006" - .0014"	.0011" - .0020" .0010" - .0017"	.0013" - .0024" .0012" - .0020"	.0016" - .0034" .0012" - .0028"	.0022" - .0040" .0020" - .0034"	.0026" - .0048" .0024" - .0040"	.0040" - .0068" .0036" - .0056"	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	375 - 600	.0010" - .0018"	.0011" - .0021"	.0013" - .0025"	.0020" - .0036"	.0022" - .0042"	.0026" - .0050"	.0040" - .0072"	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件										
	Ductile Iron		350 - 525	.0010" - .0018"	.0013" - .0022"	.0015" - .0026"	.0020" - .0036"	.0026" - .0044"	.0030" - .0052"	.0040" - .0072"	
	Gray Iron		450 - 590	.0011" - .0020"	.0014" - .0023"	.0016" - .0027"	.0022" - .0040"	.0028" - .0046"	.0032" - .0054"	.0044" - .0080"	

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for V4

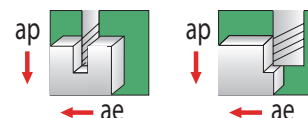
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)						
				6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金									
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		60 - 115	0,023 - 0,043	0,025 - 0,051	0,030 - 0,061	0,046 - 0,086	0,051 - 0,102	0,061 - 0,122	0,091 - 0,173
	5553 / Beta Titanium		45 - 85	0,023 - 0,038	0,025 - 0,046	0,030 - 0,056	0,046 - 0,076	0,051 - 0,091	0,061 - 0,112	0,081 - 0,152
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
13/8, 15/5, 17-4, pH Types		< 40 > 40	70 - 115 55 - 85	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	75 - 120 55 - 85	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
400 Series - 403, 405, 420, 455		< 40 > 40	70 - 130 55 - 100	0,020 - 0,041 0,015 - 0,036	0,023 - 0,048 0,018 - 0,043	0,028 - 0,058 0,023 - 0,053	0,041 - 0,081 0,030 - 0,071	0,046 - 0,097 0,036 - 0,086	0,056 - 0,117 0,046 - 0,107	0,081 - 0,163 0,061 - 0,142
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢										
A2, D2, P20, H13, S7, O1		< 40 > 40	70 - 120 45 - 100	0,020 - 0,041 0,015 - 0,033	0,028 - 0,048 0,025 - 0,041	0,033 - 0,058 0,030 - 0,051	0,041 - 0,081 0,030 - 0,066	0,056 - 0,097 0,051 - 0,081	0,066 - 0,142 0,061 - 0,102	0,102 - 0,163 0,091 - 0,132
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	110 - 150 75 - 115	0,020 - 0,043 0,015 - 0,036	0,028 - 0,051 0,025 - 0,043	0,033 - 0,061 0,030 - 0,051	0,041 - 0,086 0,030 - 0,071	0,056 - 0,102 0,051 - 0,086	0,066 - 0,122 0,061 - 0,102	0,102 - 0,173 0,091 - 0,142
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	115 - 180	0,025 - 0,046	0,028 - 0,053	0,033 - 0,064	0,051 - 0,091	0,056 - 0,107	0,066 - 0,127	0,102 - 0,183
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件									
	Ductile Iron		110 - 160	0,025 - 0,046	0,033 - 0,056	0,038 - 0,066	0,051 - 0,091	0,066 - 0,112	0,076 - 0,132	0,102 - 0,183
	Gray Iron		135 - 180	0,028 - 0,051	0,036 - 0,058	0,041 - 0,069	0,056 - 0,102	0,071 - 0,117	0,081 - 0,137	0,112 - 0,203

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for V5, V5C

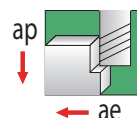
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
				1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		240 - 450	.0010" - .0018"	.0011" - .0021"	.0013" - .0025"	.0020" - .0036"	.0022" - .0042"	.0026" - .0050"	.0040" - .0072"	
	5553 / Beta Titanium		180 - 340	.0010" - .0016"	.0011" - .0019"	.0013" - .0023"	.0020" - .0032"	.0022" - .0038"	.0026" - .0046"	.0040" - .0064"	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
13/8, 15/5, 17-4, pH Types		< 40 > 40	300 - 450 210 - 330	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	300 - 480 210 - 330	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"	
400 Series - 403, 405, 420, 455		< 40 > 40	270 - 510 210 - 390	.0009" - .0017" .0007" - .0015"	.0010" - .0020" .0008" - .0018"	.0012" - .0024" .0010" - .0022"	.0018" - .0034" .0014" - .0030"	.0020" - .0040" .0016" - .0036"	.0024" - .0048" .0020" - .0044"	.0036" - .0068" .0028" - .0060"	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
A2, D2, P20, H13, S7, O1		< 40 > 40	270 - 480 180 - 390	.0009" - .0017" .0007" - .0014"	.0010" - .0020" .0008" - .0017"	.0012" - .0024" .0010" - .0021"	.0018" - .0034" .0014" - .0028"	.0020" - .0040" .0016" - .0034"	.0024" - .0048" .0020" - .0042"	.0036" - .0068" .0028" - .0056"	
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢										
	4140, 4340, 52100, 6150, 8620	< 40 > 40	420 - 600 300 - 450	.0009" - .0018" .0007" - .0015"	.0010" - .0021" .0008" - .0018"	.0012" - .0025" .0010" - .0022"	.0018" - .0036" .0014" - .0030"	.0020" - .0042" .0016" - .0036"	.0024" - .0050" .0020" - .0044"	.0036" - .0072" .0028" - .0060"	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	450 - 720	.0011" - .0019"	.0012" - .0022"	.0014" - .0026"	.0022" - .0038"	.0024" - .0044"	.0028" - .0052"	.0044" - .0076"	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件										
	Ductile Iron		420 - 630	.0011" - .0019"	.0012" - .0022"	.0014" - .0026"	.0022" - .0038"	.0024" - .0044"	.0028" - .0052"	.0044" - .0076"	
	Gray Iron		540 - 710	.0012" - .0021"	.0013" - .0024"	.0015" - .0028"	.0024" - .0042"	.0026" - .0048"	.0030" - .0056"	.0048" - .0084"	

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for V5, V5C

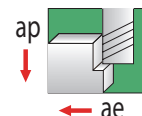
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
				6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		75 - 135	0,025 - 0,046	0,028 - 0,053	0,033 - 0,064	0,051 - 0,091	0,056 - 0,107	0,066 - 0,127	0,102 - 0,183	
	5553 / Beta Titanium		55 - 105	0,025 - 0,041	0,028 - 0,048	0,033 - 0,058	0,051 - 0,081	0,056 - 0,097	0,066 - 0,117	0,102 - 0,163	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
13/8, 15/5, 17-4, pH Types		< 40 > 40	90 - 135 65 - 100	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	90 - 145 65 - 100	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142	
400 Series - 403, 405, 420, 455		< 40 > 40	85 - 155 65 - 120	0,023 - 0,043 0,018 - 0,038	0,025 - 0,051 0,020 - 0,046	0,030 - 0,061 0,025 - 0,056	0,046 - 0,086 0,036 - 0,076	0,051 - 0,102 0,041 - 0,091	0,061 - 0,122 0,051 - 0,112	0,091 - 0,173 0,071 - 0,152	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
P	A2, D2, P20, H13, S7, O1	< 40 > 40	85 - 145 55 - 120	0,023 - 0,043 0,018 - 0,036	0,025 - 0,051 0,020 - 0,043	0,030 - 0,061 0,025 - 0,053	0,046 - 0,086 0,036 - 0,071	0,051 - 0,102 0,041 - 0,086	0,061 - 0,122 0,051 - 0,107	0,091 - 0,173 0,071 - 0,142	
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢										
	4140, 4340, 52100, 6150, 8620	< 40 > 40	130 - 180 90 - 135	0,023 - 0,046 0,018 - 0,038	0,025 - 0,053 0,020 - 0,046	0,030 - 0,064 0,025 - 0,056	0,046 - 0,091 0,036 - 0,076	0,051 - 0,107 0,041 - 0,091	0,061 - 0,127 0,051 - 0,112	0,091 - 0,183 0,071 - 0,152	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	135 - 220	0,028 - 0,048	0,030 - 0,056	0,036 - 0,066	0,056 - 0,097	0,061 - 0,112	0,071 - 0,132	0,112 - 0,193	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件										
	Ductile Iron		130 - 190	0,028 - 0,048	0,030 - 0,056	0,036 - 0,066	0,056 - 0,097	0,061 - 0,112	0,071 - 0,132	0,112 - 0,193	
	Gray Iron		170 - 215	0,030 - 0,053	0,033 - 0,061	0,038 - 0,071	0,061 - 0,107	0,066 - 0,122	0,076 - 0,142	0,122 - 0,213	

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VRX-6

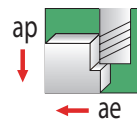
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)						
				1/4"	3/8"	1/2"	5/8"	3/4"	1"	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	115 - 230 95 - 190	.0006" - .0012" .0004" - .0010"	.0006" - .0014" .0005" - .0013"	.0011" - .0023" .0008" - .0020"	.0011" - .0023" .0009" - .0021"	.0012" - .0028" .0010" - .0026"	.0022" - .0046" .0016" - .0040"	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	115 - 230 95 - 190	.0006" - .0013" .0003" - .0007"	.0008" - .0016" .0007" - .0015"	.0012" - .0024" .0008" - .0020"	.0012" - .0025" .0011" - .0022"	.0016" - .0032" .0014" - .0030"	.0024" - .0048" .0016" - .0040"	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	115 - 230 95 - 190	.0006" - .0012" .0003" - .0007"	.0008" - .0014" .0005" - .0013"	.0011" - .0023" .0007" - .0019"	.0012" - .0024" .0010" - .0022"	.0016" - .0028" .0010" - .0026"	.0022" - .0046" .0014" - .0038"	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		250 - 470	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0050"	.0040" - .0060"	
	5553 / Beta Titanium		185 - 350	.0008" - .0014"	.0012" - .0022"	.0016" - .0028"	.0023" - .0034"	.0024" - .0044"	.0032" - .0056"	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
13/8, 15/5, 17-4, pH Types		< 40 > 40	280 - 470 215 - 345	.0008" - .0015" .0006" - .0013"	.0010" - .0017" .0009" - .0016"	.0016" - .0030" .0012" - .0026"	.0018" - .0031" .0013" - .0028"	.0020" - .0034" .0018" - .0032"	.0032" - .0060" .0024" - .0052"	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	310 - 500 215 - 345	.0008" - .0015" .0006" - .0013"	.0010" - .0017" .0008" - .0015"	.0016" - .0030" .0012" - .0026"	.0017" - .0028" .0014" - .0024"	.0020" - .0034" .0016" - .0030"	.0032" - .0060" .0022" - .0038"	
400 Series - 403, 405, 420, 455		< 40 > 40	280 - 530 215 - 405	.0008" - .0016" .0006" - .0014"	.0010" - .0018" .0009" - .0017"	.0016" - .0032" .0012" - .0028"	.0020" - .0035" .0013" - .0030"	.0020" - .0036" .0018" - .0034"	.0032" - .0064" .0024" - .0056"	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢										
A2, D2, P20, H13, S7, O1		< 40 > 40	280 - 500 185 - 410	.0008" - .0015" .0006" - .0013"	.0013" - .0023" .0012" - .0020"	.0018" - .0024" .0016" - .0022"	.0024" - .0034" .0020" - .0028"	.0034" - .0044" .0024" - .0032"	.0036" - .0048" .0030" - .0040"	
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils allés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	435 - 625 310 - 470	.0010" - .0016" .0007" - .0012"	.0013" - .0024" .0012" - .0020"	.0018" - .0024" .0016" - .0022"	.0024" - .0034" .0020" - .0028"	.0034" - .0044" .0024" - .0032"	.0036" - .0048" .0030" - .0040"	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	465 - 750	.0010" - .0017"	.0013" - .0025"	.0018" - .0024"	.0024" - .0034"	.0034" - .0044"	.0036" - .0048"	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件									
	Ductile Iron		435 - 660	.0012" - .0019"	.0015" - .0026"	.0024" - .0038"	.0026" - .0050"	.0030" - .0052"	.0048" - .0076"	
	Gray Iron		560 - 740	.0013" - .0021"	.0016" - .0027"	.0026" - .0042"	.0028" - .0052"	.0032" - .0064"	.0052" - .0084"	

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VRX-6

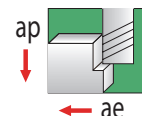
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
				6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	35 - 70 30 - 57	0,015 - 0,030 0,010 - 0,025	0,015 - 0,033 0,010 - 0,030	0,015 - 0,036 0,013 - 0,033	0,028 - 0,058 0,020 - 0,051	0,028 - 0,058 0,023 - 0,053	0,030 - 0,071 0,025 - 0,066	0,056 - 0,117 0,041 - 0,102	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	35 - 70 30 - 57	0,015 - 0,033 0,008 - 0,018	0,020 - 0,035 0,013 - 0,028	0,020 - 0,041 0,018 - 0,038	0,030 - 0,061 0,020 - 0,051	0,030 - 0,064 0,028 - 0,056	0,041 - 0,081 0,036 - 0,076	0,061 - 0,122 0,041 - 0,102	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	35 - 70 30 - 57	0,015 - 0,030 0,008 - 0,018	0,020 - 0,033 0,010 - 0,025	0,020 - 0,036 0,013 - 0,033	0,028 - 0,058 0,018 - 0,048	0,030 - 0,061 0,025 - 0,056	0,041 - 0,071 0,025 - 0,066	0,056 - 0,117 0,036 - 0,097	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		75 - 140	0,025 - 0,038	0,030 - 0,050	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,076 - 0,127	0,102 - 0,152	
	5553 / Beta Titanium		57 - 110	0,020 - 0,036	0,025 - 0,046	0,030 - 0,056	0,041 - 0,071	0,058 - 0,086	0,061 - 0,112	0,081 - 0,142	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
13/8, 15/5, 17-4, pH Types		< 40 > 40	85 - 140 65 - 105	0,020 - 0,038 0,015 - 0,033	0,023 - 0,040 0,020 - 0,038	0,025 - 0,043 0,023 - 0,041	0,041 - 0,076 0,030 - 0,066	0,046 - 0,079 0,033 - 0,071	0,051 - 0,086 0,046 - 0,081	0,081 - 0,152 0,061 - 0,132	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	95 - 150 65 - 105	0,020 - 0,038 0,015 - 0,033	0,023 - 0,040 0,018 - 0,035	0,025 - 0,043 0,020 - 0,038	0,041 - 0,076 0,030 - 0,066	0,043 - 0,071 0,036 - 0,061	0,051 - 0,086 0,041 - 0,076	0,081 - 0,152 0,056 - 0,097	
400 Series - 403, 405, 420, 455		< 40 > 40	85 - 160 65 - 125	0,020 - 0,041 0,015 - 0,036	0,023 - 0,043 0,020 - 0,040	0,025 - 0,046 0,023 - 0,043	0,041 - 0,081 0,030 - 0,071	0,051 - 0,089 0,033 - 0,076	0,051 - 0,091 0,046 - 0,086	0,081 - 0,163 0,061 - 0,142	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
P	A2, D2, P20, H13, S7, O1	< 40 > 40	85 - 150 57 - 125	0,020 - 0,038 0,015 - 0,033	0,025 - 0,048 0,022 - 0,042	0,033 - 0,058 0,030 - 0,051	0,046 - 0,061 0,041 - 0,056	0,061 - 0,086 0,051 - 0,071	0,086 - 0,112 0,061 - 0,081	0,091 - 0,122 0,076 - 0,102	
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢										
	4140, 4340, 52100, 6150, 8620	< 40 > 40	130 - 190 95 - 140	0,025 - 0,041 0,018 - 0,030	0,029 - 0,051 0,025 - 0,041	0,033 - 0,061 0,030 - 0,051	0,046 - 0,061 0,041 - 0,056	0,061 - 0,086 0,051 - 0,071	0,086 - 0,112 0,061 - 0,081	0,091 - 0,122 0,076 - 0,102	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	140 - 230	0,025 - 0,043	0,029 - 0,053	0,033 - 0,064	0,046 - 0,061	0,061 - 0,086	0,086 - 0,112	0,091 - 0,122	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件										
	Ductile Iron		130 - 200	0,030 - 0,048	0,034 - 0,056	0,038 - 0,066	0,061 - 0,097	0,066 - 0,127	0,076 - 0,132	0,122 - 0,193	
	Gray Iron		170 - 225	0,033 - 0,053	0,037 - 0,061	0,041 - 0,069	0,066 - 0,107	0,071 - 0,132	0,081 - 0,163	0,132 - 0,213	

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VX-7, VX-7C

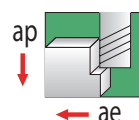
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)				
				3/8"	1/2"	5/8"	3/4"	1"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金							
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金							
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金							
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金							
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		260 - 490	.0014" - .0028"	.0021" - .0040"	.0026" - .0048"	.0028" - .0056"	.0042" - .0080"
	5553 / Beta Titanium		195 - 365	.0014" - .0026"	.0021" - .0036"	.0026" - .0043"	.0028" - .0052"	.0042" - .0072"
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
13/8, 15/5, 17-4, pH Types		< 40 > 40	290 - 490 225 - 360	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	325 - 520 225 - 360	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
400 Series - 403, 405, 420, 455		< 40 > 40	290 - 555 225 - 425	.0013" - .0028" .0010" - .0025"	.0019" - .0038" .0014" - .0034"	.0022" - .0046" .0017" - .0041"	.0026" - .0056" .0020" - .0050"	.0038" - .0076" .0028" - .0068"
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢								
A2, D2, P20, H13, S7, O1		< 40 > 40	290 - 520 195 - 425	.0016" - .0028" .0014" - .0024"	.0024" - .0038" .0022" - .0031"	.0026" - .0046" .0024" - .0038"	.0032" - .0056" .0028" - .0048"	.0048" - .0076" .0044" - .0062"
MEDIUM ALLOY TOOL STEELS / Mittelt Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils allés / Acciaio da utensili di media durezza / 中合金钢								
4140, 4340, 52100, 6150, 8620		< 40 > 40	455 - 650 325 - 490	.0016" - .0029" .0014" - .0024"	.0024" - .0040" .0022" - .0033"	.0026" - .0048" .0024" - .0040"	.0032" - .0058" .0028" - .0048"	.0048" - .0080" .0044" - .0066"
CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
1000's - 1018, 1020, 12L14		< 40	490 - 780	.0016" - .0030"	.0024" - .0043"	.0026" - .0050"	.0032" - .0060"	.0048" - .0086"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件							
	Ductile Iron		455 - 685	.0018" - .0031"	.0029" - .0046"	.0031" - .0053"	.0036" - .0062"	.0058" - .0092"
	Gray Iron		585 - 770	.0019" - .0032"	.0031" - .0048"	.0034" - .0055"	.0038" - .0064"	.0062" - .0096"

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Milling Guide for VX-7, VX-7C

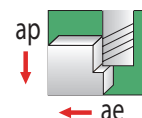
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)					
				8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金								
	Inconel-625/718, Waspaloy, Invar Rene, Hastelloy, Monel	< 40 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium		80 - 150 60 - 110	0,026 - 0,051 0,026 - 0,046	0,036 - 0,071 0,036 - 0,066	0,053 - 0,102 0,053 - 0,091	0,066 - 0,122 0,066 - 0,109	0,071 - 0,142 0,071 - 0,132	0,107 - 0,203 0,107 - 0,183
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	13/8, 15/5, 17-4, pH Types	< 40 > 40	90 - 150 70 - 110	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,056 - 0,109 0,043 - 0,099	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	100 - 160 70 - 110	0,024 - 0,052 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,056 - 0,109 0,043 - 0,099	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	400 Series - 403, 405, 420, 455	< 40 > 40	90 - 170 70 - 130	0,024 - 0,051 0,018 - 0,043	0,033 - 0,071 0,025 - 0,064	0,048 - 0,097 0,036 - 0,086	0,056 - 0,117 0,043 - 0,104	0,066 - 0,142 0,051 - 0,127	0,097 - 0,193 0,071 - 0,173
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute resistance / Acciaio da utensili molto duro / 高硬度工具钢								
	A2, D2, P20, H13, S7, O1	< 40 > 40	90 - 160 60 - 130	0,032 - 0,051 0,026 - 0,040	0,041 - 0,071 0,036 - 0,061	0,061 - 0,097 0,056 - 0,079	0,066 - 0,117 0,061 - 0,097	0,081 - 0,142 0,071 - 0,122	0,122 - 0,193 0,112 - 0,157
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢								
	4140, 4340, 52100, 6150, 8620	< 40 > 40	140 - 200 100 - 150	0,032 - 0,053 0,026 - 0,040	0,041 - 0,074 0,036 - 0,061	0,061 - 0,102 0,056 - 0,084	0,066 - 0,122 0,061 - 0,102	0,081 - 0,147 0,071 - 0,122	0,122 - 0,203 0,112 - 0,168
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	150 - 240	0,032 - 0,053	0,041 - 0,076	0,061 - 0,109	0,066 - 0,127	0,081 - 0,152	0,122 - 0,218
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件								
	Ductile Iron		140 - 210	0,035 - 0,057	0,046 - 0,079	0,074 - 0,117	0,079 - 0,135	0,091 - 0,157	0,147 - 0,234
	Gray Iron		180 - 235	0,036 - 0,060	0,048 - 0,081	0,079 - 0,122	0,086 - 0,140	0,097 - 0,163	0,157 - 0,244

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for TMS / TMR

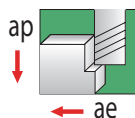
(High Efficiency Milling)

NOTE - CHIP THINNING CALCULATION ALREADY APPLIED

CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 308)

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		SFM (Vc)	CHIPLOAD PER TOOTH (Fz)						
			1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	6Al-4V	250 - 400	.0020" - .0042"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	5553	150 - 250	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	Free Machining (303)	300 - 400	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	Austenitic (304 / 304L)	225 - 350	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"
	Martensitic (17-4 / 416)	200 - 250	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢								
	8620	250 - 400	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"
	4140, D2, S7	250 - 350	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000 Series, A36, 12L14	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	CAST STEELS / Gegossenes Stahl / Acero bastidor vertidos / Acier fontes / Acciaio fuso / 铸钢								
	Steel	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件								
	Ductile Iron	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	Gray Iron	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum (6061-T6)	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	Copper, Brass	175 - 350	.0017" - .0042"	.0025" - .0052"	.0030" - .0065"	.0035" - .0078"	.0043" - .0095"	.0052" - .0115"	.0065" - .0143"



ap = full flute length
ae = 2%

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for TMS / TMR

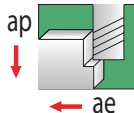
(High Efficiency Milling)

NOTE - CHIP THINNING CALCULATION ALREADY APPLIED

CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 309)

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)						
			6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	6Al-4V	98 - 157	0,051 - 0,107	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,132 - 0,363
	5553	59 - 98	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	Free Machining (303)	118 - 157	0,051 - 0,107	0,069 - 132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,132 - 0,363
	Austenitic (304 / 304L)	89 - 138	0,043 - 0,089	0,064 - 0,109	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292
	Martensitic (17-4 / 416)	79 - 98	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils allés / Acciaio da utensili di media durezza / 中碳合金钢								
	8620	98 - 157	0,043 - 0,089	0,064 - 0,109	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292
	4140, D2, S7	98 - 138	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000 Series, A36, 12L14	118 - 197	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
	CAST STEELS / Gegossenes Stahl / Acero bastidor vertidos / Acier fontes / Acciaio fuso / 铸钢								
	Steel	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件								
	Ductile Iron	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
	Gray Iron	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum (6061-T6)	90 - 150	0,050 - 0,105	0,075 - 0,130	0,090 - 0,165	0,105 - 0,200	0,130 - 0,240	0,165 - 0,292	0,203 - 0,363
	Copper, Brass	60 - 110	0,043 - 0,105	0,064 - 0,130	0,076 - 0,165	0,089 - 0,200	0,109 - 0,240	0,132 - 0,292	0,165 - 0,363



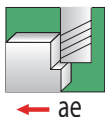
ap = full flute length

ae = 2%

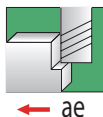
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Chip Thinning Calculations for TMS / TMR End Mills

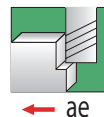
ae = 3%



ae = 2%



ae = 1%



3% Radial Engagement (.03 x d)

Actual (CPT)	Programmed (CPT)
.0002"	.0005"
.0003"	.0010"
.0005"	.0015"
.0007"	.0020"
.0009"	.0025"
.0010"	.0030"
.0012"	.0035"
.0014"	.0040"
.0015"	.0045"
.0017"	.0050"
.0019"	.0055"
.0020"	.0060"
.0022"	.0065"
.0024"	.0070"
.0026"	.0075"
.0027"	.0080"
.0029"	.0085"
.0031"	.0090"
.0032"	.0095"
.0034"	.0100"
.0036"	.0105"
.0037"	.0110"
.0039"	.0115"
.0041"	.0120"
.0043"	.0125"
.0044"	.0130"
.0046"	.0135"
.0048"	.0140"
.0049"	.0145"
.0051"	.0150"
.0053"	.0155"
.0054"	.0160"
.0056"	.0165"
.0058"	.0170"
.0060"	.0175"
.0061"	.0180"
.0063"	.0185"
.0065"	.0190"
.0066"	.0195"
.0068"	.0200"

2% Radial Engagement (.02 x d)

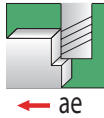
Actual (CPT)	Programmed (CPT)
.0001"	.0005"
.0003"	.0010"
.0004"	.0015"
.0006"	.0020"
.0007"	.0025"
.0008"	.0030"
.0010"	.0035"
.0011"	.0040"
.0013"	.0045"
.0014"	.0050"
.0015"	.0055"
.0017"	.0060"
.0018"	.0065"
.0020"	.0070"
.0021"	.0075"
.0022"	.0080"
.0024"	.0085"
.0025"	.0090"
.0027"	.0095"
.0028"	.0100"
.0029"	.0105"
.0031"	.0110"
.0032"	.0115"
.0034"	.0120"
.0035"	.0125"
.0036"	.0130"
.0038"	.0135"
.0039"	.0140"
.0041"	.0145"
.0042"	.0150"
.0043"	.0155"
.0045"	.0160"
.0046"	.0165"
.0048"	.0170"
.0049"	.0175"
.0050"	.0180"
.0052"	.0185"
.0053"	.0190"
.0055"	.0195"
.0056"	.0200"

1% Radial Engagement (.01 x d)

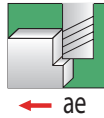
Actual (CPT)	Programmed (CPT)
.0001"	.0005"
.0002"	.0010"
.0003"	.0015"
.0004"	.0020"
.0005"	.0025"
.0006"	.0030"
.0007"	.0035"
.0008"	.0040"
.0009"	.0045"
.0010"	.0050"
.0011"	.0055"
.0012"	.0060"
.0013"	.0065"
.0014"	.0070"
.0015"	.0075"
.0016"	.0080"
.0017"	.0085"
.0018"	.0090"
.0019"	.0095"
.0020"	.0100"
.0021"	.0105"
.0022"	.0110"
.0023"	.0115"
.0024"	.0120"
.0025"	.0125"
.0026"	.0130"
.0027"	.0135"
.0028"	.0140"
.0029"	.0145"
.0030"	.0150"
.0031"	.0155"
.0032"	.0160"
.0033"	.0165"
.0034"	.0170"
.0035"	.0175"
.0036"	.0180"
.0037"	.0185"
.0038"	.0190"
.0039"	.0195"
.0040"	.0200"

Chip Thinning Calculations for TMS / TMR End Mills

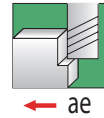
ae = 3%



ae = 2%



ae = 1%



3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
0,0043mm	0,0127mm
0,0086mm	0,0254mm
0,0130mm	0,0381mm
0,0173mm	0,0508mm
0,0216mm	0,0635mm
0,0259mm	0,0762mm
0,0302mm	0,0889mm
0,0345mm	0,1016mm
0,0389mm	0,1143mm
0,0432mm	0,1270mm
0,0475mm	0,1397mm
0,0518mm	0,1524mm
0,0561mm	0,1651mm
0,0605mm	0,1778mm
0,0648mm	0,1905mm
0,0691mm	0,2032mm
0,0734mm	0,2159mm
0,0777mm	0,2286mm
0,0820mm	0,2413mm
0,0864mm	0,2540mm
0,0907mm	0,2667mm
0,0950mm	0,2794mm
0,0993mm	0,2921mm
0,1036mm	0,3048mm
0,1080mm	0,3175mm
0,1123mm	0,3302mm
0,1166mm	0,3429mm
0,1209mm	0,3556mm
0,1252mm	0,3683mm
0,1295mm	0,3810mm
0,1339mm	0,3937mm
0,1382mm	0,4064mm
0,1425mm	0,4191mm
0,1468mm	0,4318mm
0,1511mm	0,4445mm
0,1554mm	0,4572mm
0,1598mm	0,4699mm
0,1641mm	0,4826mm
0,1684mm	0,4953mm
0,1727mm	0,5080mm

2% Radial Engagement (.02 x d)	
Actual (CPT)	Programmed (CPT)
0,0036mm	0,0127mm
0,0071mm	0,0254mm
0,0107mm	0,0381mm
0,0142mm	0,0508mm
0,0178mm	0,0635mm
0,0213mm	0,0762mm
0,0249mm	0,0889mm
0,0284mm	0,1016mm
0,0320mm	0,1143mm
0,0356mm	0,1270mm
0,0391mm	0,1397mm
0,0427mm	0,1524mm
0,0462mm	0,1651mm
0,0498mm	0,1778mm
0,0533mm	0,1905mm
0,0569mm	0,2032mm
0,0605mm	0,2159mm
0,0640mm	0,2286mm
0,0676mm	0,2413mm
0,0711mm	0,2540mm
0,0747mm	0,2667mm
0,0782mm	0,2794mm
0,0818mm	0,2921mm
0,0853mm	0,3048mm
0,0889mm	0,3175mm
0,0925mm	0,3302mm
0,0960mm	0,3429mm
0,0996mm	0,3556mm
0,1031mm	0,3683mm
0,1067mm	0,3810mm
0,1102mm	0,3937mm
0,1138mm	0,4064mm
0,1173mm	0,4191mm
0,1209mm	0,4318mm
0,1245mm	0,4445mm
0,1280mm	0,4572mm
0,1316mm	0,4699mm
0,1351mm	0,4826mm
0,1387mm	0,4953mm
0,1422mm	0,5080mm

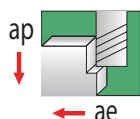
1% Radial Engagement (.01 x d)	
Actual (CPT)	Programmed (CPT)
0,0025mm	0,0127mm
0,0051mm	0,0254mm
0,0076mm	0,0381mm
0,0102mm	0,0508mm
0,0127mm	0,0635mm
0,0152mm	0,0762mm
0,0178mm	0,0889mm
0,0203mm	0,1016mm
0,0229mm	0,1143mm
0,0254mm	0,1270mm
0,0279mm	0,1397mm
0,0305mm	0,1524mm
0,0330mm	0,1651mm
0,0356mm	0,1778mm
0,0381mm	0,1905mm
0,0406mm	0,2032mm
0,0432mm	0,2159mm
0,0457mm	0,2286mm
0,0483mm	0,2413mm
0,0508mm	0,2540mm
0,0533mm	0,2667mm
0,0559mm	0,2794mm
0,0584mm	0,2921mm
0,0610mm	0,3048mm
0,0635mm	0,3175mm
0,0660mm	0,3302mm
0,0686mm	0,3429mm
0,0711mm	0,3556mm
0,0737mm	0,3683mm
0,0762mm	0,3810mm
0,0787mm	0,3937mm
0,0813mm	0,4064mm
0,0838mm	0,4191mm
0,0864mm	0,4318mm
0,0889mm	0,4445mm
0,0914mm	0,4572mm
0,0940mm	0,4699mm
0,0965mm	0,4826mm
0,0991mm	0,4953mm
0,1016mm	0,5080mm

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

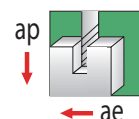
(Reference Series: 545MA, 545BA, 545RA, VRX)

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	SFM = 450		SFM = 250		SFM = 175		SFM = 125		SFM = 75		SFM = 60	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	13750	.0009"	7650	.0008"	5350	.0006"	3820	.0005"	2300	.0004"	1850	.0003"
3/16"	9200	.0012"	5100	.0010"	3570	.0008"	2550	.0007"	1530	.0006"	1225	.0004"
1/4"	6900	.0015"	3850	.0012"	2675	.0010"	1910	.0008"	1150	.0007"	925	.0006"
3/8"	4600	.0018"	2550	.0015"	1800	.0012"	1275	.0010"	765	.0009"	615	.0008"
1/2"	3450	.0022"	1950	.0018"	1350	.0014"	955	.0012"	575	.0012"	460	.0010"
5/8"	2750	.0027"	1550	.0022"	1100	.0020"	765	.0018"	460	.0015"	370	.0013"
3/4"	2300	.0030"	1275	.0027"	900	.0025"	640	.0022"	390	.0017"	310	.0017"
1"	1720	.0033"	960	.0030"	675	.0027"	480	.0025"	290	.0023"	230	.0019"

Profiling / Side Milling	
Axial (ap)	1xD
Radial (ae)	5% of Dia.



Slotting / Pocket Milling	
Axial (ap)	5% of Dia.
Radial (ae)	1xD



High Speed Machining

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	SFM = 1200		SFM = 1000		SFM = 800		SFM = 600		SFM = 450		SFM = 375	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	36670	.0006"	30600	.0005"	24500	.0004"	18340	.0004"	13750	.0003"	11460	.0002"
3/16"	24450	.0009"	20400	.0008"	16300	.0006"	12230	.0005"	9200	.0004"	7650	.0003"
1/4"	18340	.0012"	15300	.0010"	12230	.0008"	9200	.0007"	6900	.0005"	5750	.0004"
3/8"	12225	.0015"	10200	.0012"	8150	.0010"	6100	.0008"	4600	.0007"	3850	.0006"
1/2"	9170	.0018"	7650	.0015"	6100	.0012"	4600	.0010"	3450	.0009"	2870	.0008"
5/8"	7335	.0022"	6100	.0018"	4900	.0014"	3700	.0012"	2750	.0011"	2300	.0010"
3/4"	6115	.0027"	5100	.0022"	4100	.0020"	3100	.0018"	2300	.0014"	1900	.0013"
1"	4585	.0030"	3820	.0027"	3100	.0025"	2300	.0022"	1720	.0019"	1450	.0017"

Profiling / Side Milling	
Axial (ap)	1xD
Radial (ae)	2% of Dia.

Slotting / Pocket Milling	
Axial (ap)	2% of Dia.
Radial (ae)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 1/2" (.02 x .500") = .010" per pass

Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.

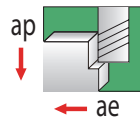
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

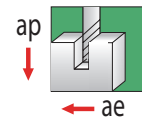
(Reference Series: 545MA, 545BA, 545RA, VRX)

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	M/Min. = 135		M/Min. = 75		M/Min. = 50		M/Min. = 40		M/Min. = 25		M/Min. = 20	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3,0mm	14500	0,025	8100	0,020	5650	0,015	4050	0,010	2400	0,008	1950	0,007
4,0mm	10900	0,030	6100	0,025	4200	0,020	3000	0,015	1800	0,010	1450	0,008
6,0mm	7300	0,035	4050	0,030	2800	0,025	2000	0,020	1200	0,015	970	0,010
8,0mm	5450	0,040	3000	0,035	2100	0,030	1500	0,025	900	0,020	725	0,015
12,0mm	3650	0,055	2000	0,045	1400	0,035	1000	0,030	600	0,025	480	0,020
16,0mm	2700	0,065	1500	0,055	1050	0,050	750	0,045	450	0,030	360	0,025
18,0mm	2400	0,075	1350	0,065	950	0,060	675	0,055	400	0,045	320	0,030
20,0mm	2150	0,078	1200	0,070	850	0,065	600	0,058	360	0,050	290	0,040
25,0mm	1750	0,080	1000	0,075	700	0,070	500	0,060	300	0,055	250	0,045

	Profiling / Side Milling
Axial (ap)	1xD
Radial (ae)	5% of Dia.



	Slotting / Pocket Milling
Axial (ap)	5% of Dia.
Radial (ae)	1xD



High Speed Machining

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	M/Min. = 365		M/Min. = 305		M/Min. = 240		M/Min. = 180		M/Min. = 135		M/Min. = 115	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3,0mm	38800	0,020	32300	0,015	25800	0,008	19400	0,008	14500	0,007	12100	0,005
4,0mm	29100	0,025	24200	0,020	19400	0,015	14500	0,010	10900	0,008	9100	0,007
6,0mm	19400	0,030	16100	0,025	12900	0,020	9700	0,015	7300	0,010	6050	0,008
8,0mm	14500	0,035	12100	0,030	9700	0,025	7250	0,020	5450	0,015	4500	0,010
12,0mm	9700	0,045	8075	0,035	6450	0,030	4850	0,025	3650	0,020	3000	0,015
16,0mm	7250	0,055	6050	0,045	4850	0,035	3600	0,030	2700	0,025	2300	0,020
18,0mm	6450	0,065	5400	0,055	4300	0,050	3200	0,045	2400	0,030	2000	0,025
20,0mm	5800	0,070	4850	0,060	3850	0,055	2900	0,050	2150	0,040	1800	0,028
25,0mm	4650	0,075	3870	0,065	3100	0,060	2300	0,055	1750	0,045	1450	0,030

	Profiling / Side Milling
Axial (ap)	1xD
Radial (ae)	2% of Dia.

	Slotting / Pocket Milling
Axial (ap)	2% of Dia.
Radial (ae)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 12mm (.02 x 12mm) = .24mm per pass

**Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.**

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Die Mold Cutters

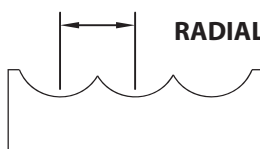
Roughing

(Reference series: 350MX)

DIAMETER	RPM		CHIPLOAD PER TOOTH (Fz)	
	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1/32"	20,000 - 40,000	20,000 - 40,000	.0005" - .0007"	.0004" - .0005"
1/16"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0010"
3/32"	20,000 - 32,000	20,000 - 30,000	.0015" - .0020"	.0010" - .0015"
1/8"	18,000 - 24,000	15,000 - 20,000	.0020" - .0025"	.0015" - .0020"
3/16"	12,000 - 16,000	10,000 - 14,000	.0030" - .0040"	.0020" - .0030"
1/4"	9,000 - 12,000	7,500 - 10,000	.0040" - .0050"	.0025" - .0040"
5/16"	7,000 - 10,000	6,000 - 8,500	.0050" - .0065"	.0035" - .0050"
3/8"	6,000 - 8,000	5,000 - 7,000	.0060" - .0075"	.0045" - .0060"
1/2"	4,500 - 6,000	4,000 - 5,500	.0080" - .0100"	.0055" - .0080"
5/8"	3,500 - 5,000	3,000 - 4,500	.0090" - .0110"	.0065" - .0090"
3/4"	3,000 - 4,000	2,500 - 3,500	.0100" - .0120"	.0075" - .0100"
1"	2,300 - 3,000	2,000 - 2,500	.0110" - .0130"	.0085" - .0110"

Semi-Finishing and Finishing

DIAMETER	RPM		CHIPLOAD PER TOOTH (Fz)	
	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1/32"	20,000 - 40,000	20,000 - 40,000	.0004" - .0005"	.0003" - .0004"
1/16"	20,000 - 40,000	20,000 - 40,000	.0008" - .0010"	.0005" - .0008"
3/32"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0012"
1/8"	20,000 - 40,000	20,000 - 36,000	.0015" - .0020"	.0010" - .0015"
3/16"	20,000 - 32,000	20,000 - 25,000	.0020" - .0030"	.0015" - .0020"
1/4"	18,000 - 25,000	15,000 - 18,000	.0025" - .0040"	.0020" - .0030"
5/16"	14,000 - 19,000	12,000 - 14,000	.0035" - .0050"	.0025" - .0040"
3/8"	12,000 - 16,000	10,000 - 12,000	.0045" - .0060"	.0030" - .0045"
1/2"	9,000 - 12,000	7,500 - 9,000	.0055" - .0080"	.0040" - .0060"
5/8"	6,500 - 9,000	5,000 - 7,000	.0065" - .0090"	.0050" - .0070"
3/4"	5,500 - 7,500	4,000 - 6,000	.0075" - .0100"	.0060" - .0080"
1"	4,000 - 6,000	3,500 - 5,500	.0085" - .0110"	.0070" - .0090"



RADIAL STEP OVER (ae)

AXIAL DEPTH OF CUT (ap)



Roughing	
Axial (ap)	15% - 25% of Dia.
Radial (ae)	20% - 30% of Dia.

Semi-Finishing	
Axial (ap)	5% - 8% of Dia.
Radial (ae)	2% - 5% of Dia.

Finishing	
Axial (ap)	1% - 3% of Dia.
Radial (ae)	.5% - 1% of Dia.

High pressure air is recommended for clearing chips away from the cut.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

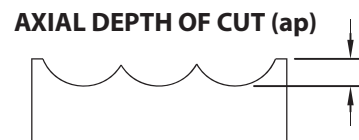
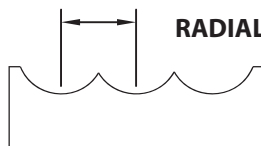
Roughing

(Reference series: 950MX)

DIAMETER	RPM		CHIPLOAD PER TOOTH (Fz)	
	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1,0mm	20,000 - 40,000	20,000 - 40,000	0,013 - 0,018	0,010 - 0,013
1,5mm	20,000 - 40,000	20,000 - 40,000	0,025 - 0,038	0,020 - 0,025
2,0mm	20,000 - 32,000	20,000 - 30,000	0,038 - 0,050	0,025 - 0,038
3,0mm	18,000 - 24,000	15,000 - 20,000	0,050 - 0,065	0,038 - 0,050
4,0mm	12,000 - 16,000	10,000 - 14,000	0,075 - 0,100	0,050 - 0,075
6,0mm	9,000 - 12,000	7,500 - 10,000	0,100 - 0,125	0,065 - 0,100
8,0mm	7,000 - 10,000	6,000 - 8,500	0,125 - 0,165	0,088 - 0,125
10,0mm	6,000 - 8,000	5,000 - 7,000	0,150 - 0,190	0,110 - 0,150
12,0mm	4,500 - 6,000	4,000 - 5,500	0,200 - 0,250	0,140 - 0,200
16,0mm	3,500 - 5,000	3,000 - 4,500	0,225 - 0,275	0,165 - 0,225
20,0mm	3,000 - 4,000	2,500 - 3,500	0,250 - 0,300	0,190 - 0,250
25,0mm	2,300 - 3,000	2,000 - 2,500	0,275 - 0,325	0,215 - 0,275

Semi-Finishing and Finishing

DIAMETER	RPM		CHIPLOAD PER TOOTH (Fz)	
	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1,0mm	20,000 - 40,000	20,000 - 40,000	0,010 - 0,013	0,008 - 0,010
1,5mm	20,000 - 40,000	20,000 - 40,000	0,020 - 0,025	0,013 - 0,020
2,0mm	20,000 - 40,000	20,000 - 40,000	0,025 - 0,038	0,020 - 0,030
3,0mm	20,000 - 40,000	20,000 - 36,000	0,038 - 0,050	0,025 - 0,038
4,0mm	20,000 - 32,000	20,000 - 25,000	0,050 - 0,075	0,038 - 0,050
6,0mm	18,000 - 25,000	15,000 - 18,000	0,065 - 0,100	0,050 - 0,075
8,0mm	14,000 - 19,000	12,000 - 14,000	0,088 - 0,125	0,065 - 0,100
10,0mm	12,000 - 16,000	10,000 - 12,000	0,110 - 0,150	0,075 - 0,110
12,0mm	9,000 - 12,000	7,500 - 9,000	0,140 - 0,200	0,100 - 0,150
16,0mm	6,500 - 9,000	5,000 - 7,000	0,165 - 0,225	0,125 - 0,175
20,0mm	5,500 - 7,500	4,000 - 6,000	0,190 - 0,250	0,150 - 0,200
25,0mm	4,000 - 6,000	3,500 - 5,500	0,215 - 0,275	0,175 - 0,225



Roughing	
Axial (ap)	15% - 25% of Dia.
Radial (ae)	20% - 30% of Dia.

Semi-Finishing	
Axial (ap)	5% - 8% of Dia.
Radial (ae)	2% - 5% of Dia.

Finishing	
Axial (ap)	1% - 3% of Dia.
Radial (ae)	.5% - 1% of Dia.

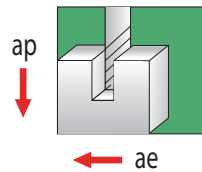
High pressure air is recommended for clearing chips away from the cut.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

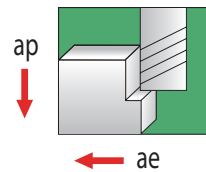
GARR TOOL Milling Guide for H-45 High Feed End Mills

	UP TO 40 HRC			40 - 45 HRC			45 - 55 HRC			55 - 60 HRC		
DIAMETER	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN
3,0mm	16000	-	3100	13000	-	2032	11300	-	1778	9700	-	889
1/8"	15200	120	-	12000	80	-	10700	70	-	9200	35	-
4,0mm	12100	-	3700	9700	-	2540	8500	-	2159	7300	-	1016
3/16"	10200	160	-	8200	110	-	7100	90	-	6100	45	-
5,0mm	9700	-	4000	7700	-	2667	6800	-	2286	5800	-	1143
6,0mm	8100	-	4600	6500	-	3048	5700	-	2540	4900	-	1270
1/4"	7650	180	-	6100	120	-	5400	100	-	4600	50	-
5/16"	6100	195	-	4900	130	-	4300	110	-	3700	55	-
8,0mm	6050	-	4950	4850	-	3302	4300	-	2794	3650	-	1397
3/8"	5100	200	-	4100	135	-	3600	115	-	3100	60	-
10,0mm	4850	-	5100	3900	-	3429	3400	-	2921	2900	-	1524
12,0mm	4050	-	6400	3200	-	4064	2800	-	3429	2400	-	1651
1/2"	3800	240	-	3100	160	-	2700	135	-	2300	65	-

	Slotting Pocket Milling
Axial (ap)	0.3 x Radius
Radial (ae)	1 x D



	Profiling Side Milling
Axial (ap)	1 x D
Radial (ae)	0.3 x Radius



D = Tool Diameter

Example: Axial = 0.3 x radius, when D = 1/2" with .060" corner radius (.3 x .060") = .018" per pass

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

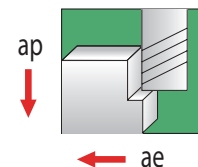
GARR TOOL Milling Guide for Diamond Coated End Mills in Graphite

DIAMETER	RPM	CHIPLOAD PER TOOTH (Fz)
1/32" - 1/16"	15,000 - 35,000	.0005" - .0010"
1/16" - 1/8"	8,000 - 31,000	.0008" - .0015"
1/8" - 3/16"	8,000 - 31,000	.0010" - .0020"
3/16" - 1/4"	8,000 - 25,000	.0010" - .0020"
1/4" - 5/16"	6,000 - 23,000	.0020" - .0040"
5/16" - 3/8"	6,000 - 20,000	.0020" - .0040"
3/8" - 1/2"	6,000 - 20,000	.0030" - .0050"
1/2" - 5/8"	4,500 - 15,000	.0050" - .0060"
5/8" - 3/4"	4,500 - 12,000	.0060" - .0070"
3/4" - 1"	4,500 - 12,000	.0070" - .0080"

DIAMETER	RPM	CHIPLOAD PER TOOTH (Fz)
1,0 - 3,0mm	15,000 - 35,000	0,015 - 0,030
3,0 - 6,0mm	8,000 - 31,000	0,030 - 0,050
6,0 - 10,0mm	6,000 - 31,000	0,050 - 0,100
10,0 - 12,0mm	6,000 - 25,000	0,080 - 0,130
16,0 - 20,0mm	4,500 - 15,000	0,130 - 0,150
20,0 - 25,0mm	4,500 - 12,000	0,150 - 0,200

Generally, tools will run at maximum RPM in relation to the corresponding parameters below:

	Slotting	Profiling
Axial (ap)	5% of Dia.	1xD
Radial (ae)	1xD	10% of Dia.



These recommendations are suggested for use primarily in graphite cutting applications. Rigid work holding, machine stability and part integrity are critical!

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Reaming Guide

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)			
				.0590" - .1250"	.1251" - .2500"	.2501" - .3750"	.3751" - .5020"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	80 - 120 60 - 80	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	100 - 125 80 - 110	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	150 - 175 120 - 150	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		120 - 150	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
5553 / Beta Titanium		90 - 110	.0004" - .0007"	.0006" - .0010"	.0009" - .0011"	.0010" - .0015"	
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	400 Series - 403, 405, 420, 455	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
P	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢						
	A2, D2, P20, H13, S7, O1	< 40 > 40	100 - 125 80 - 110	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
1000's - 1018, 1020, 12L14	< 40	100 - 125	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"	
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件						
	Ductile Iron		150 - 225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Gray Iron		125 - 200	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Magnesium		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Copper		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Brass, Bronze		125 - 200	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		150	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)			
				1,50 - 3,00mm	3,01 - 6,00mm	6,01 - 9,00mm	9,01 - 13,00mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	25 - 40 15 - 25	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	30 - 40 25 - 35	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	45 - 50 35 - 45	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		40 - 45	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
M	5553 / Beta Titanium		30 - 35	0,010 - 0,020	0,015 - 0,025	0,023 - 0,030	0,025 - 0,040
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	400 Series - 403, 405, 420, 455	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢						
	A2, D2, P20, H13, S7, O1	< 40 > 40	30 - 40 25 - 35	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢						
P	4140, 4340, 52100, 6150, 8620	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	30 - 40	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件						
K	Ductile Iron		45 - 70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Gray Iron		35 - 70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Magnesium		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Copper		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Brass, Bronze		40 - 60	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		40 - 45	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Drill Mills

* Chamfering *

TECHNICAL

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)								
			154M, 154MA 152M, 152MA	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	60 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	55 - 90 45 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascotloy	< 40 > 40	55 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"	
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"	
	5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"	
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金										
13/8, 15/5, 17-4, pH Types		< 40 > 40	100 - 150 80 - 100	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0006"	.0006" - .0009" .0003" - .0007"	.0008" - .0012" .0004" - .0008"	.0013" - .0018" .0007" - .0012"	.0010" - .0020" .0008" - .0015"	.0012" - .0025" .0010" - .0016"	.0012" - .0020" .0013" - .0017"	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	150 - 225 125 - 220	.0002" - .0006" .0003" - .0005"	.0005" - .0008" .0003" - .0007"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0012"	.0010" - .0018" .0009" - .0015"	.0015" - .0025" .0013" - .0018"	.0018" - .0028" .0013" - .0018"	.0022" - .0032" .0017" - .0025"	
400 Series - 403, 405, 420, 455		< 40 > 40	150 - 200 100 - 150	.0007" - .0010" .0004" - .0008"	.0009" - .0015" .0006" - .0010"	.0009" - .0014" .0007" - .0011"	.0011" - .0015" .0008" - .0012"	.0013" - .0018" .0009" - .0015"	.0015" - .0025" .0012" - .0020"	.0020" - .0035" .0018" - .0030"	.0030" - .0046" .0024" - .0042"	
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢												
A2, D2, P20, H13, S7, O1	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"		
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢											
	200, 250, 300, 8620	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"	
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"		
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件											
	Ductile Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	
	Gray Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属											
	Aluminum (6061, 7075)		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	Magnesium		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	Copper		250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	Brass, Bronze		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料											
	Glass Epoxy, Fiberglass, Plastics		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for Drill Mills

* Chamfering *

TECHNICAL

ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)									
		154M, 154MA 152M, 152MA	3,0mm	4,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,00mm	20,0mm	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	24 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,020 - 0,038	0,025 - 0,046 0,025 - 0,038	0,038 - 0,076 0,038 - 0,064	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 高镍基合金											
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	22 - 35 18 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,020 - 0,038	0,025 - 0,046 0,025 - 0,038	0,038 - 0,076 0,038 - 0,064	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	22 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,020 - 0,038	0,025 - 0,046 0,025 - 0,038	0,038 - 0,076 0,038 - 0,064	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
M	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		20 - 31	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 - 0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
	13/8, 15/5, 17-4, pH Types	< 40 > 40	39 - 59 31 - 39	0,008 - 0,015 0,005 - 0,010	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,015	0,015 - 0,023 0,008 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	59 - 89 49 - 87	0,005 - 0,015 0,008 - 0,013	0,005 - 0,015 0,008 - 0,013	0,013 - 0,020 0,008 - 0,018	0,020 - 0,038 0,013 - 0,025	0,038 - 0,046 0,020 - 0,030	0,025 - 0,046 0,018 - 0,030	0,038 - 0,064 0,033 - 0,046	0,046 - 0,071 0,038 - 0,058	0,056 - 0,081 0,043 - 0,064
	400 Series - 403, 405, 420, 455	< 40 > 40	59 - 79 39 - 59	0,018 - 0,025 0,010 - 0,020	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
P	A2, D2, P20, H13, S7, O1	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,025 - 0,038	0,036 - 0,061 0,030 - 0,046	0,046 - 0,066 0,036 - 0,051	0,051 - 0,071 0,036 - 0,051
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,025 - 0,038	0,036 - 0,061 0,030 - 0,046	0,046 - 0,066 0,036 - 0,051	0,051 - 0,071 0,036 - 0,051
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
K	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件											
	Ductile Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
N	Gray Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属											
	Aluminum (6061, 7075)		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Magnesium		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Copper		98 - 177	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
O	Brass, Bronze		98 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料											
	Glass Epoxy, Fiberglass, Plastics		79 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Drilling Guide for Drill Mills

* Through Hole *

TECHNICAL

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			152DA	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	60 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	55 - 90 45 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascocolloy	< 40 > 40	55 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"
	5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"
	M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金									
13/8, 15/5, 17-4, pH Types		< 40 > 40	100 - 150 80 - 100	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0006"	.0006" - .0009" .0003" - .0007"	.0008" - .0012" .0004" - .0008"	.0013" - .0018" .0007" - .0012"	.0010" - .0020" .0008" - .0015"	.0012" - .0025" .0010" - .0016"	.0012" - .0020" .0013" - .0017"
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic		< 40 > 40	150 - 225 125 - 220	.0002" - .0006" .0003" - .0005"	.0005" - .0008" .0003" - .0007"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0012"	.0010" - .0018" .0009" - .0015"	.0015" - .0025" .0013" - .0018"	.0018" - .0028" .0013" - .0018"	.0022" - .0032" .0017" - .0025"
400 Series - 403, 405, 420, 455		< 40 > 40	150 - 200 100 - 150	.0007" - .0010" .0004" - .0008"	.0009" - .0015" .0006" - .0010"	.0009" - .0014" .0007" - .0011"	.0011" - .0015" .0008" - .0012"	.0013" - .0018" .0009" - .0015"	.0015" - .0025" .0012" - .0020"	.0020" - .0035" .0018" - .0030"	.0030" - .0046" .0024" - .0042"
HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto durezza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
A2, D2, P20, H13, S7, O1		< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0010" - .0015"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
4140, 4340, 52100, 6150, 8620		< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0010" - .0015"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
1000's - 1018, 1020, 12L14		< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件										
	Ductile Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
	Gray Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
N	NON-FERROUS / Nichteisenmetalle / Metal non ferroso / métal non ferreux / metallo non ferroso / 有色金属										
	Aluminum (6061, 7075)		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Magnesium		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Copper		250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Brass, Bronze		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料										
	Glass Epoxy, Fiberglass, Plastics		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Drilling Guide for Drill Mills

* Through Hole *

TECHNICAL

ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)									
		152DA	3,0mm	4,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,00mm	20,0mm	
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	24 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 高镍基合金											
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	22 - 35 18 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	22 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
M	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		20 - 31	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 - 0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
	13/8, 15/5, 17-4, pH Types	< 40 > 40	39 - 59 31 - 39	0,008 - 0,015 0,005 - 0,010	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,015	0,015 - 0,023 0,008 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	59 - 89 49 - 87	0,005 - 0,015 0,008 - 0,013	0,005 - 0,015 0,008 - 0,013	0,013 - 0,020 0,008 - 0,018	0,020 - 0,038 0,013 - 0,025	0,038 - 0,046 0,020 - 0,030	0,025 - 0,046 0,018 - 0,030	0,038 - 0,064 0,033 - 0,046	0,046 - 0,071 0,038 - 0,058	0,056 - 0,081 0,043 - 0,064
	400 Series - 403, 405, 420, 455	< 40 > 40	59 - 79 39 - 59	0,018 - 0,025 0,010 - 0,020	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
P	A2, D2, P20, H13, S7, O1	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
K	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件											
	Ductile Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
N	Gray Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属											
	Aluminum (6061, 7075)		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Magnesium		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Copper		98 - 177	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
O	Brass, Bronze		98 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料											
O	Glass Epoxy, Fiberglass, Plastics		79 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Drilling Guide (Uncoated)

ISO Material		HRC	SFM (by Series)			
			1100	1200, 1205, 1520	1500, 1510	1600
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium	 < 40 > 40	- -	60 - 90 45 - 65	60 - 90 45 - 65	45 - 75 30 - 50
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	50 - 80 35 - 60	50 - 80 35 - 60	35 - 65 20 - 45
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	45 - 75 35 - 55	45 - 75 35 - 55	30 - 60 20 - 40
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	60 - 90 40 - 65	60 - 90 40 - 65	45 - 75 25 - 50
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢					
	A2, D2, P20, H13, S7, O1 Thompson Shaft, Armor Plate (Class 1)	< 40 > 40 > 50	- - -	80 - 130 60 - 110 -	80 - 130 60 - 110 45 - 80	65 - 110 45 - 90 30 - 60
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	100 - 140 70 - 120	100 - 140 70 - 120	65 - 120 55 - 100
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	120 - 170	120 - 170	105 - 150
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		70 - 140	120 - 170	120 - 170	105 - 150
	Gray Iron		70 - 165	120 - 190	120 - 190	105 - 170
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	200 - 300	-	160 - 250
	Magnesium		-	120 - 215	-	80 - 165
	Copper		-	100 - 165	-	60 - 125
	Brass, Bronze		-	120 - 215	-	80 - 165
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		140	100 - 230	105 - 230	-

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GARR TOOL General Purpose Drilling Guide

ISO Material		HRC	CHIPLOAD PER TOOTH (Fz)				
			1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium	 	.0004" - .0009" .0003" - .0007"	.0008" - .0014" .0006" - .0011"	.0012" - .0020" .0010" - .0017"	.0016" - .0027" .0014" - .0024"	.0021" - .0033" .0019" - .0030"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	400 Series - 403, 405, 420, 455	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
P	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢						
	A2, D2, P20, H13, S7, O1	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	Thompson Shaft, Armor Plate (Class 1)	> 50	.0002" - .0006"	.0005" - .0009"	.0009" - .0015"	.0013" - .0022"	.0018" - .0028"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件						
	Ductile Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	Gray Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		.0006" - .0011"	.0009" - .0015"	.0013" - .0021"	.0017" - .0028"	.0022" - .0034"
	Magnesium		.0005" - .0010"	.0009" - .0014"	.0013" - .0020"	.0017" - .0027"	.0022" - .0033"
	Copper		.0004" - .0008"	.0008" - .0012"	.0012" - .0018"	.0016" - .0025"	.0021" - .0031"
	Brass, Bronze		.0005" - .0009"	.0009" - .0013"	.0013" - .0019"	.0017" - .0026"	.0022" - .0032"
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0003" - .0008"	.0007" - .0012"	.0011" - .0018"	.0015" - .0025"	.0020" - .0031"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Drilling Guide (Uncoated)

ISO Material		HRC	M/Min. (by Series)			
			1100	1200, 1205, 1520	1500, 1510	1600
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium	 	- -	18 - 27 14 - 20	18 - 27 14 - 20	14 - 23 10 - 15
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	15 - 25 10 - 18	15 - 25 10 - 18	10 - 20 6 - 14
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	14 - 23 10 - 17	14 - 23 10 - 17	10 - 18 6 - 12
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	18 - 27 12 - 20	18 - 27 12 - 20	14 - 23 8 - 15
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
	A2, D2, P20, H13, S7, O1 Thompson Shaft, Armor Plate (Class 1)	< 40 > 40 > 50	- - -	25 - 40 18 - 34 -	25 - 40 18 - 34 14 - 25	20 - 34 14 - 27 10 - 20
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	30 - 43 21 - 37	30 - 43 21 - 37	20 - 37 17 - 30
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	37 - 52	37 - 52	32 - 45
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron Gray Iron	 	21 - 43 21 - 50	37 - 52 37 - 58	37 - 52 37 - 58	32 - 45 32 - 52
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	60 - 90	-	50 - 75
	Magnesium		-	37 - 65	-	25 - 50
	Copper		-	30 - 50	-	18 - 38
	Brass, Bronze		-	37 - 65	-	25 - 50
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		43	30 - 70	32 - 70	-

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GARR TOOL General Purpose Drilling Guide

ISO Material	HRC	CHIPLOAD PER TOOTH (Fz)				
		2,0 - 3,0mm	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金					
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
M	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		0,010 - 0,023	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	5553 / Beta Titanium		0,008 - 0,018	0,015 - 0,028	0,025 - 0,043	0,036 - 0,061
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	400 Series - 403, 405, 420, 455	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
P	A2, D2, P20, H13, S7, O1	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	Thompson Shaft, Armor Plate (Class 1)	> 50	0,005 - 0,015	0,013 - 0,023	0,023 - 0,038	0,033 - 0,056
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
K	Ductile Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	Gray Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		0,015 - 0,028	0,023 - 0,038	0,033 - 0,053	0,043 - 0,071
	Magnesium		0,013 - 0,025	0,023 - 0,036	0,033 - 0,051	0,043 - 0,069
	Copper		0,010 - 0,020	0,020 - 0,030	0,030 - 0,046	0,041 - 0,064
	Brass, Bronze		0,013 - 0,023	0,023 - 0,033	0,033 - 0,048	0,043 - 0,066
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		0,008 - 0,020	0,018 - 0,030	0,028 - 0,046	0,038 - 0,064

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Drilling Guide (Hardlube Coated)

ISO Material		HRC	SFM (by Series)			
			1100H, 1120H	1200H, 1205H, 1520H	1500H, 1510H	1800H
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	55 - 75 45 - 65	55 - 75 45 - 65	- -
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	55 - 80 45 - 70	55 - 80 45 - 70	- -
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	- -	55 - 80 45 - 70	55 - 80 45 - 70	- -
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	70 - 100	70 - 100	-
	5553 / Beta Titanium		-	55 - 75	55 - 75	-
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	60 - 90 45 - 70	60 - 90 45 - 70	- -
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	55 - 85 45 - 65	55 - 85 45 - 65	- -
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	70 - 100 50 - 75	70 - 100 50 - 75	- -
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢					
	A2, D2, P20, H13, S7, O1	< 40 > 40	- -	90 - 140 70 - 120	90 - 140 70 - 120	- -
P	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	55 - 90	-
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	110 - 150 80 - 130	110 - 150 80 - 130	- -
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
1000's - 1018, 1020, 12L14		< 40	-	130 - 180	130 - 180	-
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		80 - 150	130 - 180	130 - 180	-
	Gray Iron		80 - 150	130 - 200	130 - 200	-
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	200 - 300	-	200 - 300
	Magnesium		-	130 - 225	-	130 - 225
	Copper		-	110 - 175	-	110 - 175
	Brass, Bronze		-	130 - 225	-	130 - 325
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		160	125 - 250	125 - 250	-

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Drilling Guide

ISO Material		HRC	CHIPLOAD PER TOOTH (Fz)				
			1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium	 	.0004" - .0009" .0003" - .0007"	.0008" - .0014" .0006" - .0011"	.0012" - .0020" .0010" - .0017"	.0016" - .0027" .0014" - .0024"	.0021" - .0033" .0019" - .0030"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	400 Series - 403, 405, 420, 455	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢						
P	A2, D2, P20, H13, S7, O1 Thompson Shaft, Armor Plate (Class 1)	< 40 > 40 > 50	.0004" - .0009" .0003" - .0007" .0002" - .0006"	.0007" - .0013" .0006" - .0011" .0005" - .0009"	.0011" - .0019" .0010" - .0017" .0009" - .0015"	.0015" - .0026" .0014" - .0024" .0013" - .0022"	.0020" - .0032" .0019" - .0030" .0018" - .0028"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件						
	Ductile Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	Gray Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		.0006" - .0011"	.0009" - .0015"	.0013" - .0021"	.0017" - .0028"	.0022" - .0034"
	Magnesium		.0005" - .0010"	.0009" - .0014"	.0013" - .0020"	.0017" - .0027"	.0022" - .0033"
	Copper		.0004" - .0008"	.0008" - .0012"	.0012" - .0018"	.0016" - .0025"	.0021" - .0031"
	Brass, Bronze		.0005" - .0009"	.0009" - .0013"	.0013" - .0019"	.0017" - .0026"	.0022" - .0032"
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0003" - .0008"	.0007" - .0012"	.0011" - .0018"	.0015" - .0025"	.0020" - .0031"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL General Purpose Drilling Guide (Hardlube Coated)

ISO Material		HRC	M/Min. (by Series)			
			1100H, 1120H	1200H, 1205H, 1520H	1500H, 1510H	1800H
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	17 - 23 13 - 20	17 - 23 13 - 20	- -
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	17 - 25 13 - 21	17 - 25 13 - 21	- -
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	- -	17 - 25 13 - 21	17 - 25 13 - 21	- -
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si 5553 / Beta Titanium	 < 40 > 40	- -	21 - 30 17 - 23	21 - 30 17 - 23	- -
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	18 - 27 13 - 21	18 - 27 13 - 21	- -
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	17 - 26 13 - 20	17 - 26 13 - 20	- -
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	21 - 30 15 - 23	21 - 30 15 - 23	- -
P	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
	A2, D2, P20, H13, S7, O1 Thompson Shaft, Armor Plate (Class 1)	< 40 > 40 > 50	- - -	27 - 43 21 - 37 -	27 - 43 21 - 37 17 - 27	- - -
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	34 - 45 25 - 40	34 - 45 25 - 40	- -
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	40 - 55	40 - 55	-
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		25 - 45	40 - 55	40 - 55	-
	Gray Iron		25 - 53	40 - 60	40 - 60	-
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	60 - 90	-	60 - 90
	Magnesium		-	40 - 68	-	40 - 68
	Copper		-	34 - 53	-	34 - 53
	Brass, Bronze		-	40 - 68	-	40 - 68
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		50	38 - 75	-	-

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GARR TOOL General Purpose Drilling Guide

ISO Material	HRC	CHIPLOAD PER TOOTH (Fz)				
		2,0 - 3,0mm	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 镍基合金					
	Inconel-625/718, Waspalloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
M	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		0,010 - 0,023	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	5553 / Beta Titanium		0,008 - 0,018	0,015 - 0,028	0,025 - 0,043	0,036 - 0,061
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	400 Series - 403, 405, 420, 455	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
P	A2, D2, P20, H13, S7, O1	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	Thompson Shaft, Armor Plate (Class 1)	> 50	0,005 - 0,015	0,013 - 0,023	0,023 - 0,038	0,033 - 0,056
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
K	Ductile Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
	Gray Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		0,015 - 0,028	0,023 - 0,038	0,033 - 0,053	0,043 - 0,071
	Magnesium		0,013 - 0,025	0,023 - 0,036	0,033 - 0,051	0,043 - 0,069
	Copper		0,010 - 0,020	0,020 - 0,030	0,030 - 0,046	0,041 - 0,064
	Brass, Bronze		0,013 - 0,023	0,023 - 0,033	0,033 - 0,048	0,043 - 0,066
O	COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		0,008 - 0,020	0,018 - 0,030	0,028 - 0,046	0,038 - 0,064

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide for Mini Drills

(Series 1550H,1250H,1850H)

TECHNICAL

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)		
				.0312" - .0390"	.0394" - .0787"	.0791" - .1250"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliages de nickel / Leghe di nickel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliages de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		90 - 130	.0003" - .0006"	.0004" - .0008"	.0006" - .0012"
	5553 / Beta Titanium		75 - 115	.0002" - .0004"	.0003" - .0006"	.0005" - .0010"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	95 - 135 80 - 125	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	90 - 125 80 - 115	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	400 Series - 403, 405, 420, 455	< 40 > 40	100 - 150 80 - 125	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
P	A2, D2, P20, H13, S7, O1	< 40 > 40	100 - 175 60 - 80	.0003" - .0006" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	125 - 175 80 - 125	.0004" - .0008" .0003" - .0005"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	125 - 175	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		100 - 200	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Gray Iron		80 - 175	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum 2014, 2024, 6061-(T1-T6), 7075, Extruded		125 - 300	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Magnesium		125 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Copper		125 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Brass		100 - 250	.0003" - .0008"	.0004" - .0012"	.0006" - .0015"
	Bronze		80 - 250	.0003" - .0008"	.0004" - .0012"	.0006" - .0015"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide for Mini Drills

(Series 1550H,1250H,1850H)

TECHNICAL

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)		
				0,79 - 0,99mm	1,00 - 2,00mm	2,01 - 3,17mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	20 - 30 15 - 25	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nickel / 镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	20 - 30 15 - 25	0,008 - 0,013 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	20 - 30 15 - 25	0,005 - 0,013 0,005 - 0,010	0,010 - 0,020 0,008 - 0,018	0,013 - 0,025 0,010 - 0,023
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		25 - 40	0,008 - 0,015	0,010 - 0,020	0,015 - 0,030
	5553 / Beta Titanium		20 - 35	0,005 - 0,010	0,008 - 0,015	0,013 - 0,025
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 - 40 25 - 40	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	25 - 40 25 - 35	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	400 Series - 403, 405, 420, 455	< 40 > 40	30 - 45 25 - 40	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
	A2, D2, P20, H13, S7, O1	< 40 > 40	30 - 50 20 - 25	0,008 - 0,015 0,005 - 0,010	0,010 - 0,020 0,008 - 0,015	0,015 - 0,030 0,013 - 0,025
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	40 - 50 25 - 40	0,010 - 0,020 0,008 - 0,013	0,015 - 0,030 0,010 - 0,020	0,020 - 0,038 0,015 - 0,030
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	40 - 50	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		30 - 60	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Gray Iron		25 - 50	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum 2014, 2024, 6061-(T1-T6), 7075, Extruded		40 - 90	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Magnesium		40 - 75	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Copper		40 - 75	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Brass		30 - 75	0,008 - 0,020	0,010 - 0,030	0,015 - 0,038
	Bronze		25 - 75	0,008 - 0,020	0,010 - 0,030	0,015 - 0,038

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide

ISO Material		HRC	SFM (Vc)		CHIPLOAD PER TOOTH (Fz)				
			NON-COOLANT	COOLANT FED	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"	5/8" - 3/4"
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	80 60	100 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .0024" - .0035"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金								
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	90 70	110 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .0024" - .0035"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40 > 40	90 60	115 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .0024" - .0035"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		110	135	.0010" - .0018"	.0015" - .0023"	.0020" - .0029"	.0025" - .0035"	.0030" - .0041"
	5553 / Beta Titanium		70	100	.0008" - .0015"	.0012" - .0020"	.0017" - .0026"	.0022" - .0032"	.0027" - .0038"
M	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 80	120 90	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .0026" - .0038"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	90 70	110 80	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .0026" - .0038"
	400 Series - 403, 405, 420, 455	< 40 > 40	110 80	130 105	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .0026" - .0038"
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高硬度工具钢								
	A2, D2, P20, H13, S7, O1	< 40 > 40	160 130	200 150	.0011" - .0020" .0007" - .0014"	.0015" - .0025" .0011" - .0019"	.0020" - .0031" .0016" - .0025"	.0025" - .0037" .0021" - .0031"	.0030" - .0043" .0026" - .0037"
P	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢								
	4140, 4340, 52100, 6150, 8620	< 40 > 40	175 145	215 170	.0011" - .0020" .0007" - .0014"	.0015" - .0025" .0011" - .0019"	.0020" - .0031" .0016" - .0025"	.0025" - .0037" .0021" - .0031"	.0030" - .0043" .0026" - .0037"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	225	275	.0014" - .0023"	.0018" - .0027"	.0023" - .0033"	.0028" - .0039"	.0033" - .0045"
K	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件								
	Ductile Iron		250	350	.0015" - .0023"	.0019" - .0028"	.0024" - .0034"	.0029" - .0040"	.0034" - .0046"
	Gray Iron		275	375	.0016" - .0024"	.0020" - .0029"	.0025" - .0035"	.0030" - .0041"	.0035" - .0047"
N	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		350	425	.0023" - .0033"	.0027" - .0038"	.0033" - .0044"	.0038" - .0050"	.0043" - .0056"
	Aluminum Die Cast		300	375	.0018" - .0028"	.0022" - .0033"	.0027" - .0039"	.0032" - .0045"	.0037" - .0051"
	Magnesium		275	350	.0020" - .0030"	.0024" - .0035"	.0029" - .0041"	.0034" - .0047"	.0039" - .0053"
	Copper		200	300	.0017" - .0025"	.0021" - .0030"	.0026" - .0036"	.0031" - .0042"	.0036" - .0048"
	Brass		250	350	.0020" - .0032"	.0024" - .0037"	.0029" - .0043"	.0034" - .0049"	.0039" - .0055"
	Bronze		200	275	.0018" - .0025"	.0022" - .0030"	.0027" - .0036"	.0032" - .0042"	.0037" - .0048"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide

ISO Material	HRC	M/Min. (Vc)		CHIPLOAD PER TOOTH (Fz)				
		NON-COOLANT	COOLANT FED	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm	16,0 - 20,0mm
S	COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金							
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	25 20	30 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金							
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	25 20	35 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金							
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	25 20	35 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金							
M	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		35	40	0,025 - 0,046	0,038 - 0,058	0,051 - 0,074	0,064 - 0,089
	5553 / Beta Titanium		20	30	0,020 - 0,038	0,030 - 0,051	0,043 - 0,066	0,056 - 0,081
	STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier inoxydable / Acciaio Inox / 不锈钢合金							
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 25	35 25	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	25 20	35 25	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081
	400 Series - 403, 405, 420, 455	< 40 > 40	35 25	40 30	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081
	HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils à haute résistance / Acciaio da utensili molto duro / 高强度工具钢							
P	A2, D2, P20, H13, S7, O1	< 40 > 40	50 40	60 45	0,028 - 0,051 0,018 - 0,036	0,038 - 0,064 0,028 - 0,048	0,051 - 0,079 0,041 - 0,064	0,064 - 0,094 0,053 - 0,079
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中合金钢							
	4140, 4340, 52100, 6150, 8620	< 40 > 40	55 45	65 50	0,028 - 0,051 0,018 - 0,036	0,038 - 0,064 0,028 - 0,048	0,051 - 0,079 0,041 - 0,064	0,064 - 0,094 0,053 - 0,079
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢							
K	1000's - 1018, 1020, 12L14	< 40	70	85	0,036 - 0,058	0,048 - 0,069	0,058 - 0,064	0,071 - 0,099
	CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Matériaux fontes / Materiale fuso / 铸造件							
	Ductile Iron		75	105	0,038 - 0,058	0,048 - 0,071	0,061 - 0,086	0,074 - 0,102
N	Gray Iron		85	115	0,041 - 0,061	0,051 - 0,074	0,064 - 0,089	0,076 - 0,104
	NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属							
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		105	130	0,058 - 0,084	0,069 - 0,097	0,084 - 0,112	0,097 - 0,127
	Aluminum Die Cast		90	115	0,046 - 0,071	0,056 - 0,084	0,069 - 0,099	0,081 - 0,114
	Magnesium		85	105	0,051 - 0,076	0,061 - 0,089	0,074 - 0,104	0,086 - 0,119
	Copper		60	90	0,043 - 0,064	0,053 - 0,076	0,066 - 0,091	0,079 - 0,107
	Brass		75	105	0,051 - 0,081	0,061 - 0,094	0,074 - 0,109	0,086 - 0,124
N	Bronze		60	85	0,048 - 0,064	0,056 - 0,076	0,069 - 0,091	0,081 - 0,107
								0,094 - 0,122

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Drilling Guide for Aluminum Series 3-Flute Drills

			CHIPLOAD PER TOOTH (Fz)					
Material	Type	SFM (Vc)	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
Aluminum Alloy	6061	450 - 650	.0020" - .0040"	.0025" - .0050"	.0035" - .0060"	.0045" - .0070"	.0055" - .0080"	.0065" - .0100"
Cast Aluminum	380	300 - 500	.0015" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"	.0035" - .0070"	.0040" - .0080"
Magnesium		250 - 500	.0015" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"	.0035" - .0070"	.0040" - .0080"
Copper & Brass		250 - 400	.0010" - .0025"	.0020" - .0030"	.0020" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"
Titanium	6Al-4V	100 - 300	.0010" - .0020"	.0020" - .0030"	.0020" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"

			CHIPLOAD PER TOOTH (Fz)					
Material	Type	M/Min. (Vc)	4,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm
Aluminum Alloy	6061	140 - 200	0,050 - 0,100	0,065 - 0,125	0,090 - 0,150	0,115 - 0,175	0,150 - 0,200	0,165 - 0,250
Cast Aluminum	380	90 - 150	0,038 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150	0,090 - 0,175	0,100 - 0,200
Magnesium		75 - 150	0,038 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150	0,090 - 0,175	0,100 - 0,200
Copper, Brass		75 - 120	0,025 - 0,060	0,050 - 0,075	0,050 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150
Titanium	6Al-4V	30 - 90	0,025 - 0,050	0,050 - 0,075	0,050 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

OPERATING PARAMETERS		
TOOL DIAMETER	Vc	
	1500 SFM	3000 SFM
	RPM (n)	
1/16"	45,000	90,000
1/8"	45,000	90,000
3/16"	30,000	60,000
1/4"	23,000	45,000
3/8"	15,000	30,000
1/2"	11,000	22,000
3/4"	7,500	15,000
1"	5,500	10,000

Speeds and Feeds

Carbide burrs typically operate between 1500 and 3000 SFM. Solid carbide burrs that are 1/8" diameter or less can typically be run at speeds up to 75,000 RPM (n). Burrs ranging in size from 3/16" to 3/8" diameter can utilize a 30,000 RPM (n) grinder. Burrs ranging in size from 1/4" to 1/2" diameter can utilize a 22,000 RPM (n) grinder. These are general speed recommendations that may need to be adjusted for optimal performance.

Safety Information

Always wear the appropriate personal protective equipment, such as safety glasses and protective clothing, when using solid carbide or HSS cutting tools. Machines should be fully guarded. Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

BURR TROUBLESHOOTING OPTIONS	
PROBLEM	POSSIBLE SOLUTIONS
Broken Braze	Excessive Force Heat from rubbing shank Dull tool
Chatter	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Lack of rigid setup
Plugged Flutes	Use coarser burr Working in soft material Use an anti-stick agent Faster RPM Slower RPM Lighter cuts
Excessive Vibration	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Faster feed Slower feed Lack of rigid setup
Poor Finish	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Switch to finer cut Don't use double cut Faster feed Lack of rigid setup
Poor Tool Life	Heat from rubbing shank Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Don't use double cut Faster feed Slower feed Cutting abrasive material Lack of rigid setup

Hardness Conversion Chart

ROCKWELL HARDNESS (HRb)	ROCKWELL HARDNESS (HRc)	BRINELL HARDNESS (HB)	VICKERS HARDNESS (HV)	TENSILE STRENGTH (N/mm ²)	PSI (1000 lb/in ²)
67	-	116	122	401	58
70	-	121	127	432	63
73	-	126	132	448	65
75	-	131	137	455	66
77	-	137	143	463	67
80	-	143	150	479	69
82	-	149	156	494	72
84	-	156	163	525	76
86	-	163	171	540	78
89	-	170	178	556	81
91	-	179	188	602	88
93	-	187	196	632	92
96	-	197	212	664	97
97	-	207	218	695	101
98	-	212	222	710	103
-	20	217	228	741	107
-	21	223	234	756	110
-	22	229	241	772	112
-	23	235	247	787	114
-	24	241	255	818	118
-	25	248	261	849	123
-	27	255	269	865	125
-	28	262	275	895	130
-	29	269	284	911	132
-	30	277	292	942	136
-	31	285	300	973	141
-	32	293	308	988	143
-	33	302	318	1019	147
-	34	311	327	1050	152
-	35	321	337	1096	159
-	37	331	349	1127	163
-	38	341	359	1158	168
-	39	352	370	1189	172
-	40	363	381	1235	179
-	41	375	395	1266	183
-	42	388	408	1312	190
-	44	401	422	1359	197
-	45	415	437	1420	206
-	46	429	452	1467	212
-	48	444	470	1513	219
-	50	461	497	1559	226
-	51	477	517	1621	235
-	52	495	532	1668	241
-	54	543	572	1729	250
-	56	514	609	1807	262
-	57	555	630	1884	273
-	59	578	670	1961	284
-	60	601	698	2039	295
-	61	-	720	-	-
-	62	-	746	-	-
-	63	-	772	-	-
-	64	-	800	-	-
-	65	-	832	-	-
-	66	-	865	-	-
-	67	-	900	-	-
-	68	-	940	-	-

Conversions from each scale are approximate

Decimal Equivalent Chart

Diameter	Decimal Equiv.
#80	.0135
0.35mm	.0138
#79	.0145
1/64"	.0156
0.40mm	.0158
#78	.0160
0.45mm	.0177
#77	.0180
0.50mm	.0197
#76	.0200
#75	.0210
0.55mm	.0217
#74	.0225
0.60mm	.0236
#73	.0240
#72	.0250
0.65mm	.0256
#71	.0260
0.70mm	.0276
#70	.0280
#69	.0292
0.75mm	.0295
#68	.0310
1/32"	.0312
0.80mm	.0315
#67	.0320
#66	.0330
0.85mm	.0335
#65	.0350
0.90mm	.0354
#64	.0360
#63	.0370
0.95mm	.0374
#62	.0380
#61	.0390
1.00mm	.0394
#60	.0400
#59	.0410
1.05mm	.0413
#58	.0420
#57	.0430
1.10mm	.0433
1.15mm	.0453
#56	.0465
3/64"	.0469
1.20mm	.0472
1.25mm	.0492
1.30mm	.0512
#55	.0520
1.35mm	.0531
#54	.0550
1.40mm	.0551
1.45mm	.0571
1.50mm	.0591
#53	.0595
1.55mm	.0610
1/16"	.0625
1.60mm	.0630
#52	.0635
1.65mm	.0650
1.70mm	.0669
#51	.0670
1.75mm	.0689
#50	.0700
1.80mm	.0709
1.85mm	.0728

Diameter	Decimal Equiv.
#49	.0730
1.90mm	.0748
#48	.0760
1.95mm	.0768
5/64"	.0781
#47	.0785
2.00mm	.0787
2.05mm	.0807
#46	.0810
#45	.0820
2.10mm	.0827
2.15mm	.0846
#44	.0860
2.20mm	.0866
2.25mm	.0886
#43	.0890
2.30mm	.0906
2.35mm	.0925
#42	.0935
3/32"	.0938
2.40mm	.0945
#41	.0960
2.45mm	.0965
#40	.0980
2.50mm	.0984
#39	.0995
#38	.1015
2.60mm	.1024
#37	.1040
2.70mm	.1063
#36	.1065
2.75mm	.1083
7/64"	.1094
#35	.1100
2.80mm	.1102
#34	.1110
#33	.1130
2.90mm	.1142
#32	.1160
3.00mm	.1181
#31	.1200
3.10mm	.1220
1/8"	.1250
3.20mm	.1260
3.25mm	.1280
#30	.1285
3.30mm	.1299
3.40mm	.1339
#29	.1360
3.50mm	.1378
#28	.1405
9/64"	.1406
3.60mm	.1417
#27	.1440
3.70mm	.1457
#26	.1470
3.75mm	.1476
#25	.1495
3.80mm	.1496
#24	.1520
3.90mm	.1535
#23	.1540
5/32"	.1562
#22	.1570
4.00mm	.1575
#21	.1590
#20	.1610

Diameter	Decimal Equiv.
4.10mm	.1614
4.20mm	.1654
#19	.1660
4.25mm	.1673
4.30mm	.1693
#18	.1695
11/64"	.1719
#17	.1730
4.40mm	.1732
#16	.1770
4.50mm	.1772
#15	.1800
4.60mm	.1811
#14	.1820
#13	.1850
4.70mm	.1850
4.75mm	.1870
3/16"	.1875
4.80mm	.1890
#12	.1890
#11	.1910
4.90mm	.1929
#10	.1935
#9	.1960
5.00mm	.1969
#8	.1990
5.10mm	.2008
#7	.2010
13/64"	.2031
#6	.2040
5.20mm	.2047
#5	.2055
5.25mm	.2067
5.30mm	.2087
#4	.2090
5.40mm	.2126
#3	.2130
5.50mm	.2165
7/32"	.2188
5.60mm	.2205
#2	.2210
5.70mm	.2244
5.75mm	.2264
#1	.2280
5.80mm	.2283
5.90mm	.2323
A	.2340
15/64"	.2344
6.00mm	.2362
B	.2380
6.10mm	.2402
C	.2420
6.20mm	.2441
D	.2460
6.25mm	.2461
6.30mm	.2480
1/4"	.2500
E	.2500
6.40mm	.2520
6.50mm	.2559
F	.2570
6.60mm	.2598
G	.2610
6.70mm	.2638
17/64"	.2656
6.75mm	.2657
H	.2660

Diameter	Decimal Equiv.
6.80mm	.2677
6.90mm	.2717
I	.2720
7.00mm	.2756
J	.2770
7.10mm	.2795
K	.2810
9/32"	.2812
7.20mm	.2835
7.25mm	.2854
7.30mm	.2874
L	.2900
7.40mm	.2913
M	.2950
7.50mm	.2953
19/64"	.2969
7.60mm	.2992
N	.3020
7.70mm	.3031
7.75mm	.3051
7.80mm	.3071
7.90mm	.3110
5/16"	.3125
8.00mm	.3150
O	.3160
8.10mm	.3189
8.20mm	.3228
P	.3230
8.25mm	.3248
8.30mm	.3268
21/64"	.3281
8.40mm	.3307
Q	.3320
8.50mm	.3346
8.60mm	.3386
R	.3390
8.70mm	.3425
11/32"	.3438
8.75mm	.3445
8.80mm	.3465
S	.3480
8.90mm	.3504
9.00mm	.3543
T	.3580
9.10mm	.3583
23/64"	.3594
9.20mm	.3622
9.25mm	.3642
9.30mm	.3661
U	.3680
9.40mm	.3701
9.50mm	.3740
3/8"	.3750
V	.3770
9.60mm	.3780
9.70mm	.3819
9.75mm	.3839
9.80mm	.3858
W	.3860
9.90mm	.3898
25/64"	.3906
10.00mm	.3937
X	.3970
Y	.4040
13/32"	.4062
Z	.4130
10.50mm	.4134

Diameter	Decimal Equiv.
27/64"	.4219
11.00mm	.4331
7/16"	.4375
11.50mm	.4528
29/64"	.4531
15/32"	.4688
12.00mm	.4724
31/64"	.4844
12.50mm	.4921
1/2"	.5000
13.00mm	.5118
33/64"	.5156
17/32"	.5312
13.50mm	.5315
35/64"	.5469
14.00mm	.5512
9/16"	.5625
14.50mm	.5709
37/64"	.5781
15.00mm	.5906
19/32"	.5938
39/64"	.6094
15.50mm	.6102
5/8"	.6250
16.00mm	.6299
41/64"	.6406
16.50mm	.6496
21/32"	.6562
17.00mm	.6693
43/64"	.6719
11/16"	.6875
17.50mm	.6890
45/64"	.7031
18.00mm	.7087
23/32"	.7188
18.50mm	.7283
47/64"	.7344
19.00mm	.7480
3/4"	.7500
49/64"	.7656
19.50mm	.7677
25/32"	.7812
20.00mm	.7874
51/64"	.7969
20.50mm	.8071
13/16"	.8125
21.00mm	.8268
53/64"	.8281
27/32"	.8438
21.50mm	.8465
55/64"	.8594
22.00mm	.8661
7/8"	.8750
22.50mm	.8858
57/64"	.8906
23.00mm	.9055
29/32"	.9062
59/64"	.9219
23.50mm	.9252
15/16"	.9375
24.00mm	.9449
61/64"	.9531
24.50mm	.9646
31/32"	.9688
25.00mm	.9843
63/64"	.9844
1"	1.0000



GARR TOOL TRAINING CENTER

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