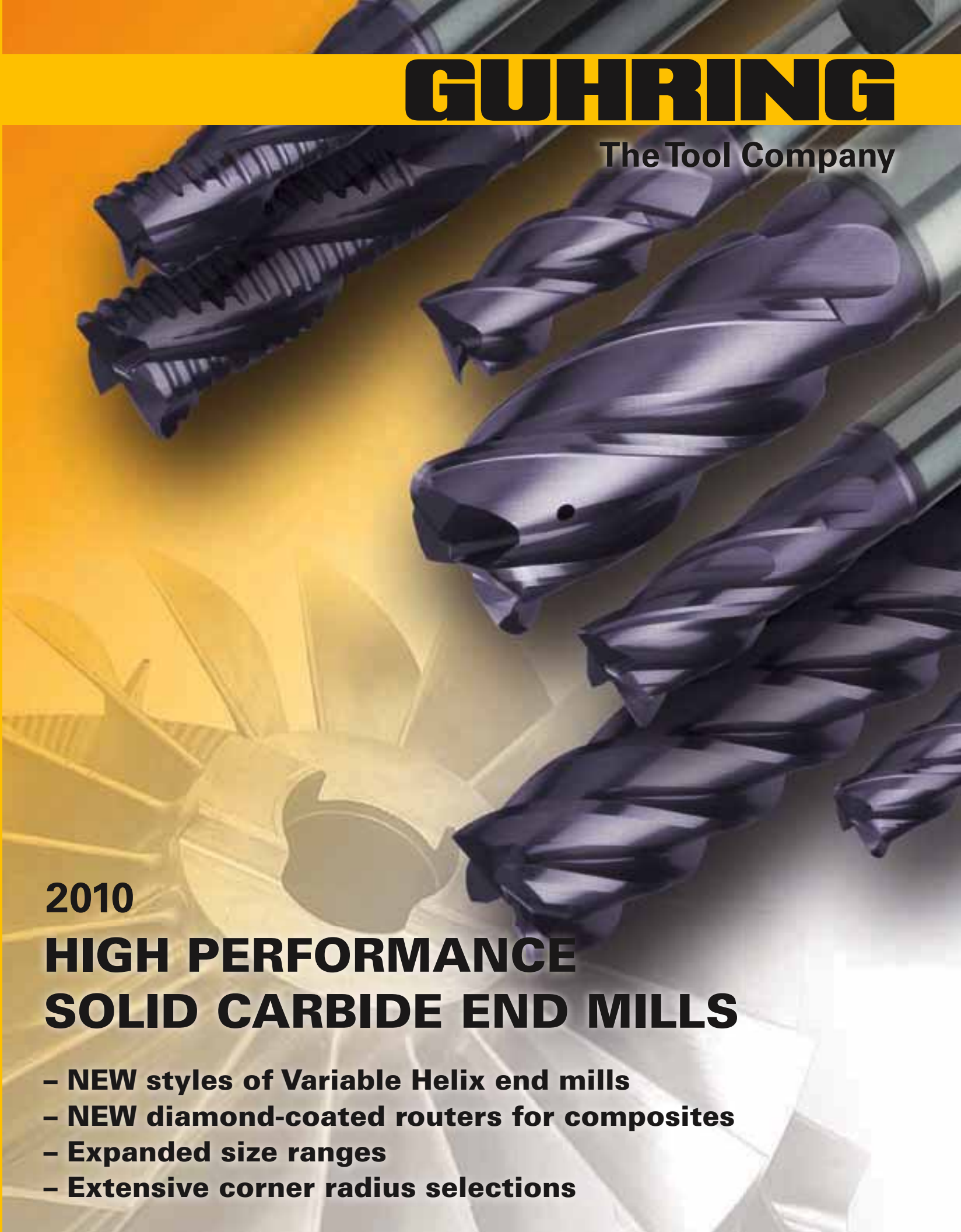
GUHRING

The Tool Company



GUHRING 2010 High Performance End Mills

2010
HIGH PERFORMANCE SOLID CARBIDE END MILLS

- NEW styles of Variable Helix end mills
- NEW diamond-coated routers for composites
- Expanded size ranges
- Extensive corner radius selections

The Guhring Group

Dietmar Pfränger
Production and Technical Director

Dr. Jörg Gühring
President, Research and Development

Oliver Gühring
Sales and Marketing Director

Bernd Schatz
Financial and Commercial Director

Dear customer,
Guhring is today one of the world's leading suppliers of rotary cutting tools. The current product range includes more than 1,620 different tool types and more than 44,000 different products. The reason for our success is our 4,500 employees world-wide – 350 in the USA. The leading principle of our company strategy is customer satisfaction. Herein lay our strengths.

Manufacturing expertise
With our own carbide production, coating technology, machine and equipment division as well as development departments for the core competences we have direct influence over the essential parameters for the efficiency of the tool: tool material, geometry and coating.

Product know-how
Our employees have all the knowledge and experience accumulated in the company's more than one hundred years existence. Simultaneously, our R&D center continuously provides innovations and optimizes tool performance in our testing facility with the assistance of state-of-the-art technologies.

Innovation proficiency
In 1980, Guhring was the first tool manufacturer to coat drilling tools with TiN, achieving a considerable increase in tool performance. In addition, the development of HSK shows the performance capabilities of our R&D center. Currently, Guhring is the forerunner in MQL machining and the machining of new materials such as CGI and ADI.

Global service
Guhring is represented in 56 countries, in 32 of these with Guhring subsidiaries. Here we produce tools for our world-wide customer base and ensure a constant supply of tools to our customers via refurbishment or within the scope of Tool Management Projects. All production plants apply the same materials and have identical machines and facilities at their disposal. Customers can rely on identical high quality Guhring standards anywhere in the world.

Tool Division
Rotary cutting tools are our core business. There is no other competitor who produces an equally large range of cutting tools, especially in carbide. We also produce tools in high speed steel and in the high-tech tool materials cermet, PCD/CBN and ceramic for our customers.

Machine and equipment division
To ensure the geometries, tool materials and coatings are converted into precision tools of the highest quality with an optimal cost-efficiency, Guhring's machine and equipment division designs and produces the most important manufacturing equipment for our tool production.

Service Division
To enable customers to fully utilize the potential of their Guhring tools, we provide comprehensive services such as re-grinding and re-coating with original Guhring geometries and coatings, returning the original efficiency to the refurbished tools.

Carbide Division
Guhring's carbide development and production makes it possible to provide tools in application optimized tool materials, and to react immediately to new machining trends as well as materials. Customers benefit directly from the associated technology and cost advantages. Our carbide division and its annual carbide production of approximately 1,500 tons make Guhring one of the largest carbide producers world-wide.

We are privileged to continue to convince our customers through our efficiency!

Dr. Jörg Gühring

Factory Sigmaringen-Laiz

Carbide Plant Berlin

Precision Tools Production, Berlin

Brookfield, WI

Huntington Beach, CA

Detroit, MI

Guhring Series No. Index

	Series	Description	Type	Surface Finish	Page
NEW	3011	UNI PRO extra long length end mills (2-fluted), metric	N	Bright	122
NEW	3012	UNI PRO XL end mills (4-fluted), metric	N	Bright	137
NEW	3014	UNI PRO extra long length ball nose end mills (2-fluted), metric	N	Bright	143
NEW	3015	UNI PRO XL ball nose end mills (4-fluted), metric	N	Bright	148
NEW	3019	FINISH-TECH / GH 100 U standard length multi-flute end mills, metric	NH	Bright	92
NEW	3021	UNI PRO extra long length end mills (2-fluted), metric	N	FIREX®	122
	3023	UNI PRO XL end mills (4-fluted), metric	N	FIREX®	137
NEW	3024	UNI PRO standard length ball nose end mills (2-fluted), metric	N	Bright	141
	3030	UNI PRO XL ball nose end mills (2-fluted), metric	N	FIREX®	143
	3043	UNI PRO XL ball nose end mills (4-fluted), metric	N	FIREX®	148
NEW	3047	FINISH-TECH / GH 100 U standard length multi-flute end mills, metric	NH	FIREX®	92
NEW	3049	UNI PRO standard length ball nose end mills (2-fluted), metric	N	FIREX®	141
NEW	3059	ALUMI-TECH standard length end mills (2-fluted), metric	W	Bright	73
	3077	RF 100 A standard length variable helix end mills for aluminum	W	Bright	49
	3078	RF 100 F standard length variable helix end mills for materials < 30 HRC	NH	FIREX®	37
	3079	RF 100 U standard length variable helix end mills, corner radius, for materials < 54 HRC	N	FIREX®	29
	3080	RF 100 VA standard length variable helix end mills for stainless steels	N	nano-A™	39
	3081	RF 100 VA/NF standard length variable helix roughing-finishing end mills for stainless steels	NF	nano-A™	43
	3082	RF 100 U/HF standard length variable helix roughing-finishing end mills, for materials < 54 HRC	HF	FIREX®	33
NEW	3083	CR 100 carbide diamond coated routers for composite materials	n/a	Diamond	65
NEW	3084	CR 100 center cutting carbide diamond coated routers for composite materials	n/a	Diamond	64
	3086	AERO-TECH / GH 100 U stub length end mills (3-fluted)	NH	FIREX®	69
	3087	UNI PRO "R" standard length end mills (2-fluted), corner radius	N	FIREX®	124
	3088	UNI PRO "R" long length end mills (2-fluted), corner radius	N	FIREX®	126
	3089	UNI PRO "R" standard length end mills (4-fluted), corner radius	N	FIREX®	139
	3090	UNI PRO "R" XL end mills (4-fluted), corner radius	N	FIREX®	139
	3091	FINISH-TECH 50 / GH 100 U standard length multi-flute end mills, corner radius	NH	FIREX®	96
	3092	UNI PRO stub length end mills (2-fluted)	N	FIREX®	120
	3093	UNI PRO stub length end mills (4-fluted)	N	FIREX®	132
	3095	RF 50 stub length variable flute end mills (4-fluted)	N	FIREX®	57
	3096	RF 50 standard length variable flute end mills (4-fluted)	N	FIREX®	57
	3097	AERO-ROUGH 48 / RS 100 U standard length end mills	NF	FIREX®	79
	3098	AERO-ROUGH 56 / RS 100 F standard length end mills	NF	FIREX®	80
	3099	RF 100 U stub length variable helix end mills for materials < 54 HRC	N	FIREX®	25
	3100	RF 100 U standard length variable helix end mills for materials < 54 HRC	N	FIREX®	26
	3101	TRACE-TECH / GF 300 B standard length ball nose	H-HSC	FIREX®	114
NEW	3106	UNI PRO "R" standard length end mills (2-fluted), corner radius	N	Bright	125
NEW	3111	UNI PRO "R" standard length end mills (4-fluted), corner radius	N	Bright	138
NEW	3112	GH 100 U standard length multi-flute end mills, corner radius, metric	NH	Bright	97
	3113	RF 100 U stub length variable helix end mills for materials < 54 HRC	N	FIREX®	25
	3114	RF 100 U standard length variable helix end mills for materials < 54 HRC	N	FIREX®	26
	3115	RF 100 SF standard length 6-flute variable helix end mills for materials < 54 HRC	NH	FIREX®	53
NEW	3126	ALUMI-TECH standard length end mills (2-fluted), metric	W	Bright	72
	3127	ROUGH-TECH ALU / GS 100 A standard length end mills, coarse tooth, metric	WR	Bright	77
	3146	UNI PRO standard length end mills (2-fluted)	N	Bright	121
	3147	UNI PRO long length end mills (2-fluted)	N	Bright	123
	3148	UNI PRO standard length end mills (2-fluted)	N	FIREX®	121
	3149	UNI PRO long length end mills (2-fluted)	N	FIREX®	123
	3150	UNI PRO standard length end mills (4-fluted)	N	Bright	133
	3151	UNI PRO XL end mills (4-fluted)	N	Bright	136
	3152	UNI PRO long length end mills (4-fluted),	N	Bright	135
	3153	UNI PRO standard length end mills (4-fluted)	N	FIREX®	133
	3155	UNI PRO XL end mills (4-fluted)	N	FIREX®	136
	3156	UNI PRO long length end mills (4-fluted)	N	FIREX®	135
	3157	UNI PRO standard length ball nose end mills (2-fluted)	N	Bright	140
	3158	UNI PRO long length ball nose end mills (2-fluted)	N	Bright	142
	3159	UNI PRO standard length ball nose end mills (2-fluted)	N	FIREX®	140
	3160	UNI PRO long length ball nose end mills (2-fluted)	N	FIREX®	142
	3161	UNI PRO standard length ball nose end mills (4-fluted)	N	Bright	144
	3162	UNI PRO XL ball nose end mills (4-fluted)	N	Bright	147
	3164	UNI PRO long length ball nose end mills (4-fluted)	N	Bright	146

Guhring Series No. Index

	Series	Description	Type	Surface Finish	Page
	3165	UNI PRO standard length ball nose end mills (4-fluted)	N	FIREX®	144
	3166	UNI PRO XL ball nose end mills (4-fluted)	N	FIREX®	147
	3167	UNI PRO long length ball nose end mills (4-fluted)	N	FIREX®	146
	3168	UNI PRO standard length end mills (3-fluted)	N	Bright	128
	3169	UNI PRO XL end mills (3-fluted)	N	Bright	130
	3170	UNI PRO standard length end mills (3-fluted)	N	FIREX®	128
	3171	UNI PRO XL end mills (3-fluted)	N	FIREX®	130
	3172	AERO-TECH / GH 100 A standard length end mills (3-fluted)	NH	Bright	70
	3173	AERO-TECH / GH 100 U standard length end mills (3-fluted)	NH	FIREX®	70
	3174	ALUMI-TECH standard length end mills (2-fluted)	W	Bright	73
	3175	ALUMI-TECH long length end mills (2-fluted)	W	Bright	74
	3177	ALUMI-TECH / GA 200 A long length end mills (3-fluted)	W	Bright	75
	3178	FINISH-TECH / GH 100 U standard length multi-flute end mills	NH	Bright	91
	3179	FINISH-TECH / GH 100 U standard length multi-flute end mills	NH	FIREX®	91
	3180	FINISH-TECH / GH 100 U long length multi-flute end mills	NH	Bright	93
	3181	FINISH-TECH / GH 100 U long length multi-flute end mills	NH	FIREX®	93
	3182	FINISH-TECH / GH 100 H standard length multi-flute end mills	H	FIREX®	89
	3183	FINISH-TECH / GH 100 H long length multi-flute end mills	H	FIREX®	90
	3184	ROUGH-TECH ALU / GS 100 A standard length end mills, coarse tooth	WR	Bright	77
	3186	ROUGH-TECH 48 / GS 100 U standard length end mills, fine tooth	NRF	Bright	83
	3188	ROUGH-TECH 48 / GS 100 U standard length end mills, fine tooth	NRF	FIREX®	83
	3189	ROUGH-TECH 54 / GS 100 H standard length end mills, fine tooth	HR	FIREX®	86
	3190	ROUGH-TECH 54 / GS 100 H long length end mills, fine tooth	HR	FIREX®	87
	3191	TRACE-TECH / GF 300 B long length ball nose	H-HSC	FIREX®	116
	3192	TRACE-TECH / GF 300 T long length cutters, Torus	H-HSC	FIREX®	112
	3202	RF 100 A standard length variable helix end mills for aluminum, metric	W	Bright	49
	3203	AERO-TECH / GH 100 U standard length end mills (3-fluted), metric	NH	Bright	70
	3204	ROUGH-TECH 48 / GS 100 U standard length end mills, fine tooth, metric	NRF	Bright	84
	3303	UNI PRO standard length end mills (2-fluted)	N	Bright	122
	3304	UNI PRO standard length end mills (4-fluted)	N	Bright	134
NEW	3306	UNI PRO standard length ball nose end mills (4-fluted), metric	N	Bright	145
NEW	3307	UNI PRO standard length end mills (3-fluted), metric	N	Bright	129
NEW	3308	UNI PRO standard length ball nose end mills (2-fluted), metric	N	Bright	141
	3309	ALUMI-TECH standard length end mills (2-fluted), metric	W	Bright	73
NEW	3310	ALUMI-TECH standard length end mills (2-fluted), metric	W	Bright	72
	3311	FINISH-TECH / GH 100 U standard length multi-flute end mills, metric	NH	Bright	92
	3312	FINISH-TECH / GH 100 U XL multi-flute end mills, metric	NH	Bright	94
	3313	FINISH-TECH / GH 100 U XL multi-flute end mills, metric	NH	Bright	94
NEW	3314	UNI PRO XL end mills (3-fluted), metric	N	Bright	131
NEW	3319	RF 100 A standard length variable helix end mills for aluminum, metric	W	Bright	49
NEW	3358	ALUMI-TECH long length end mills (2-fluted), metric	W	Bright	74
	3359	TRACE-TECH / GF 300 B standard length ball nose, metric	H-HSC	FIREX®	115
	3360	TRACE-TECH / GF 300 B XL ball nose, metric	H-HSC	FIREX®	117
	3362	TRACE-TECH / GF 300 T XL hard profile cutters, Torus, metric	H-HSC	FIREX®	113
	3364	ROUGH-TECH ALU / GS 100 A standard length, coolant fed end mills, coarse tooth, metric	WR	Bright	77
	3365	ROUGH-TECH 48 / GS 100 U standard length, coolant fed end mills, fine tooth, metric	NRF	FIREX®	84
	3366	RF 100 F standard length variable helix end mills, coolant through, for materials < 30 HRC, metric	NH	FIREX®	37
	3367	ALUMI-TECH / GA 200 A standard length, coolant fed end mills (3-fluted), metric	W	Bright	75
NEW	3468	RF 100 A/WF standard length variable helix rougher for aluminum, metric	WF	Bright	51
NEW	3469	RF 100 A/WF standard length variable helix rougher for aluminum, metric	WF	Bright	51
NEW	3470	RF 100 A/WF long length variable helix rougher for aluminum, metric	WF	Bright	51
NEW	3471	RF 100 A/WF long length variable helix rougher for aluminum, metric	WF	Bright	51
NEW	3498	RF 100 Ti standard length variable helix end mills, corner radius, for titanium alloys, metric	N	Super-A™	47
NEW	3499	RF 100 Ti standard length variable helix end mills, corner radius, for titanium alloys, metric	N	Super-A™	47
NEW	3507	RF 100 U/HF standard lgth variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	33
NEW	3508	RF 100 U/HF standard lgth variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	33
NEW	3509	RF 100 U/HF long length variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	34
NEW	3522	RF 100 U/HF long length variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	34
NEW	3540	AERO-TECH / GH 100 U stub length end mills (3-fluted), metric	NH	FIREX®	69
NEW	3558	UNI PRO stub length end mills (3-fluted), metric	N	FIREX®	127

Guhring Series No. Index

	Series	Description	Type	Surface Finish	Page
	3561	UNI PRO "R" standard length end mills (2-fluted), corner radius, metric	N	FIREX®	125
	3562	UNI PRO "R" standard length end mills (4-fluted), corner radius, metric	N	FIREX®	138
	3563	GH 100 U standard length multi-flute end mills, corner radius, metric	NH	FIREX®	97
NEW	3598	RF 100 U/HF extra long variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	34
NEW	3600	RF 100 U/HF extra long variable helix roughing-finishing end mills, for materials < 54 HRC, metric	HF	FIREX®	34
	3627	RF 100 U long length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	28
	3629	RF 100 F standard length variable helix end mills for materials < 30 HRC, metric	NH	FIREX®	37
	3630	RF 100 F standard length variable helix end mills for materials < 30 HRC, metric	NH	FIREX®	37
NEW	3631	RF 100 SF standard length 6-flute variable helix end mills for materials < 54 HRC, metric	NH	FIREX®	53
NEW	3632	RF 100 SF standard length 6-flute variable helix end mills for materials < 54 HRC, metric	NH	FIREX®	53
NEW	3633	UNI PRO stub length end mills (2-fluted), metric	N	FIREX®	120
NEW	3634	UNI PRO stub length end mills (2-fluted), metric	N	FIREX®	120
NEW	3637	UNI PRO stub length end mills (4-fluted), metric	N	FIREX®	132
	3676	UNI PRO standard length end mills (2-fluted), metric	N	FIREX®	122
	3677	UNI PRO standard length end mills (3-fluted), metric	N	FIREX®	129
	3678	UNI PRO standard length end mills (4-fluted), metric	N	FIREX®	134
	3679	UNI PRO standard length ball nose end mills (2-fluted), metric	N	FIREX®	141
	3680	UNI PRO XL end mills (3-fluted), metric	N	FIREX®	131
	3682	ROUGH-TECH 54 / GS 100 H standard length end mills, fine tooth, metric	HR	FIREX®	87
	3689	FINISH-TECH / GH 100 U standard length multi-flute end mills, metric	NH	FIREX®	92
	3691	FINISH-TECH / GH 100 U XL multi-flute end mills, metric	NH	FIREX®	94
	3693	FINISH-TECH / GH 100 U XL multi-flute end mills, metric	NH	FIREX®	94
NEW	3696	RF 100 VA/NF standard lgth variable helix roughing/finishing end mills for stainless steels, metric	NF	nano-A™	43
	3715	FINISH-TECH / GH 100 H standard length multi-flute end mills, metric	H	FIREX®	89
NEW	3716	FINISH-TECH / GH 100 H long length multi-flute end mills, metric	H	FIREX®	90
NEW	3718	RF 100 VA/NF standard lgth variable helix roughing/finishing end mills for stainless steels, metric	NF	nano-A™	43
NEW	3719	UNI PRO stub length end mills (3-fluted), metric	N	FIREX®	127
NEW	3721	UNI PRO stub length end mills (4-fluted), metric	N	FIREX®	132
	3723	ROUGH-TECH 48 / GS 100 U standard length end mills, fine tooth, metric	NRF	FIREX®	84
	3727	UNI PRO standard length ball nose end mills (4-fluted), metric	N	FIREX®	145
NEW	3729	AERO-TECH / GH 100 U stub length end mills (3-fluted), metric	NH	FIREX®	69
	3731	RF 100 U stub length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	25
	3732	RF 100 U standard length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	26
NEW	3733	RF 100 VA/NF long length variable helix roughing/finishing end mills for stainless steels, metric	NF	nano-A™	44
	3736	RF 100 U standard length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	26
	3741	AERO-TECH / GH 100 U standard length end mills (3-fluted), metric	NH	FIREX®	70
NEW	3800	RF 100 VA standard length variable helix end mills for stainless steels, metric	N	nano-A™	40
NEW	3803	RF 100 VA standard length variable helix end mills for stainless steels, metric	N	nano-A™	40
NEW	3804	RF 100 VA stub length variable helix end mills for stainless steels, metric	N	nano-A™	39
NEW	3805	RF 100 VA stub length variable helix end mills for stainless steels, metric	N	nano-A™	39
NEW	3806	RF 100 VA long length variable helix end mills for stainless steels, metric	N	nano-A™	40
NEW	3807	RF 100 VA long length variable helix end mills for stainless steels, metric	N	nano-A™	40
NEW	3837	RF 100 U long length variable helix end mills w/reduced neck for materials < 54 HRC, metric	N	FIREX®	27
NEW	3838	RF 100 U long length variable helix end mills w/reduced neck for materials < 54 HRC, metric	N	FIREX®	27
NEW	3839	RF 100 U long length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	27
	3846	UNI PRO standard length end mills (2-fluted)	N	Super-A™	121
	3847	UNI PRO long length end mills (2-fluted)	N	Super-A™	123
	3848	GF 500 B HSC standard length ball nose profile cutters, metric	N-HSC	TiAlN	105
	3849	GF 500 B HSC XL ball nose profile cutters, metric	N-HSC	TiAlN	106
	3850	UNI PRO standard length end mills (4-fluted)	N	Super-A™	133
	3851	UNI PRO XL end mills (4-fluted)	N	Super-A™	136
	3852	UNI PRO end mills (4-fluted), long length	N	Super-A™	135
	3853	GF 500 B HSC XL ball nose profile cutters, metric	N-HSC	TiAlN	107
	3854	GF 500 B HSC standard length ball nose profile cutters, metric	N-HSC	TiAlN	109
	3855	GF 500 B HSC long length ball nose profile cutters, metric	N-HSC	TiAlN	108
	3856	GF 500 T HSC standard length profile cutters with Torus form, metric	N-HSC	TiAlN	100
	3857	UNI PRO standard length ball nose end mills (2-fluted)	N	Super-A™	140
	3858	UNI PRO long length ball nose end mills (2-fluted)	N	Super-A™	142
	3859	GF 500 T HSC XL profile cutters with Torus form, metric	N-HSC	TiAlN	101
	3860	GF 500 T HSC XL profile cutters with Torus form, metric	N-HSC	TiAlN	102

Guhring Series No. Index

	Series	Description	Type	Surface Finish	Page
	3861	UNI PRO standard length ball nose end mills (4-fluted)	N	Super-A™	144
	3862	UNI PRO XL ball nose end mills (4-fluted)	N	Super-A™	147
	3863	GF 500 T HSC long length profile cutters with Torus form, metric	N-HSC	TiAlN	104
	3864	UNI PRO long length ball nose end mills (4-fluted)	N	Super-A™	146
	3865	GF 500 T HSC long length profile cutters with Torus form, metric	N-HSC	TiAlN	103
	3866	GF 500 B HSC long length ball nose profile cutters, metric	N-HSC	TiAlN	110
	3867	DL 100 X2 standard length PCD high performance end mill	n/a	Bright	61
	3868	UNI PRO standard length end mills (3-fluted)	N	Super-A™	128
	3869	UNI PRO XL end mills (3-fluted)	N	Super-A™	130
	3870	DL 100 X2 standard length PCD high performance end mill	n/a	Bright	61
NEW	3871	RF 100 U long length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	27
NEW	3872	RF 100 U standard length variable helix end mills w/corner radius for materials < 54 HRC, metric	N	FIREX®	29
NEW	3873	RF 100 U standard length variable helix end mills w/corner radius for materials < 54 HRC, metric	N	FIREX®	29
	3874	ALUMI-TECH standard length end mills (2-fluted)	W	Super-A™	73
	3875	ALUMI-TECH long length end mills (2-fluted)	W	Super-A™	74
	3876	RF 100 Ti standard length variable helix end mills, corner radius, for titanium alloys	N	Super-A™	46
NEW	3877	ALUMI-TECH / GA 200 A standard length end mills (3-fluted)	W	Super-A™	75
	3884	ROUGH-TECH ALU / GS 100 A standard length end mills, coarse tooth	WR	Super-A™	77
NEW	3885	RF 100 VA/NF long length variable helix roughing/finishing end mills for stainless steels, metric	NF	nano-A™	44
	3886	ROUGH-TECH 48 / GS 100 U standard length end mills, fine tooth	NRF	Super-A™	83
NEW	3887	AERO-ROUGH 48 / RS 100 U standard length end mills, metric	NF	FIREX®	79
NEW	3888	AERO-ROUGH 56 / RS 100 F standard length end mills, metric	NF	FIREX®	79
NEW	3889	AERO-ROUGH 56 / RS 100 F standard length end mills, metric	NF	FIREX®	80
NEW	3890	AERO-ROUGH 56 / RS 100 F standard length end mills, metric	NF	FIREX®	80
NEW	3891	RF 100 U 3-flute standard length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	31
NEW	3892	RF 100 U 3-flute standard length variable helix end mills for materials < 54 HRC, metric	N	FIREX®	31
NEW	3893	RF 100 U 3-flute standard OAL/stub flute lgth variable helix end mills for materials < 54 HRC, metric	N	FIREX®	31
NEW	3894	RF 100 U 3-flute standard OAL/stub flute lgth variable helix end mills for materials < 54 HRC, metric	N	FIREX®	31
NEW	3895	RF 100 H standard length variable helix end mills for hardened steels up to 60 HRC, metric	H	TiAlN	55
NEW	3896	RF 100 H standard length variable helix end mills for hardened steels up to 60 HRC, metric	H	TiAlN	55
NEW	3897	RF 100 SF long length 5-flute variable helix end mills for materials < 54 HRC, metric	NH	FIREX®	54
NEW	3898	RF 100 SF long length 5-flute variable helix end mills for materials < 54 HRC, metric	NH	FIREX®	54
NEW	5492	Coolant fed high performance PCD end mill for aluminum and composites	N/A	Bright	62
NEW	5493	Coolant fed high performance PCD end mill for aluminum and composites	N/A	Bright	63

GUHRING Select

For well over 100 years, the name Guhring has been associated with cutting tool innovation and quality. High-production facilities on every continent rely on Guhring technology to elevate their productivity, and manufacturers of high-precision parts know that Guhring provides consistent quality and performance.

Now smaller machine shops can also enjoy the benefits of Guhring's well-known cutting tool expertise with **GUHRING Select**, a new category of stocked standard carbide drills, taps and variable helix carbide end mills. This category is comprised of existing cutting tool series; current products which are already favorites in many machine shops across the United States.

Each **GUHRING Select** series has been chosen because of its versatility in a wide range of materials and machining operations, to provide you with a full compliment of quality drill, tap and end mill options at an economical price. These top-quality carbide tools will increase your productivity, and because they're **GUHRING Select**, you can ***save 22% - 40%*** over similar style tools by purchasing them. For the 3-man shop or the high-production facility, Guhring has a **GUHRING Select** tool which can help increase profitability.

Look for the **Guhring Select** logo to quickly identify these economical cutting tool choices.

QUICK FINDER		page 8
RF-LINE	• High Performance End Mills with Variable Helix designs	page 24
DIAMOND-TECH	• PCD-tipped End Mills • Diamond Coated Routers	page 60 page 64
TECH-LINE	• High Performance End Mills • HSC Trace Mills and Profile Cutters	page 68 page 98
PRO-LINE	• General Purpose End Mills • General Purpose Corner Radius & Ball Nose End Mills	page 120 page 138
TECHNICAL SECTION		page 152
FEEDS AND SPEEDS		page 160

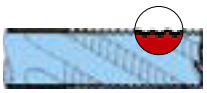
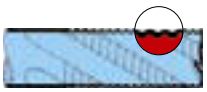
QUICK-FINDER - RF 100 Variable Helix end mill selection guide

		Application	Slot drilling 1 x d	Roughing 0.3-0.8 x d	Finishing > 0.1 x d	Super finishing 0.1 x d
Material/ Application group	Hardness tensile strength	Example material	Rigid conditions: - good cooling - sufficient performance - short-chipping		Unstable conditions: - standard cooling - average performance - medium- to long-chipping	Finishing:
Steel	up to 28 HRc	1045 / 5115	RF 100 F Series #3078		RF 100 VA/NF Series #3081	RF 100 S/F Series #3115
	above 28 HRc	4140	RF 100 U Series #3114		RF 100 U/HF Series #3082	
Stainless steel	up to 28 HRc	304 / 303	RF 100 VA Series #3080		RF 100 VA/NF Series #3081	
	above 28 HRc	316 Ti	RF 100 F Series #3078		RF 100 VA/NF Series #3081	
Cast iron	up to 180 HB 30	Gray Cast	RF 100 F Series #3078		RF 100 U/HF Series #3082	
	above 180 HB 30	GGG / GGT / GGv ductile	RF 100 U Series #3114		RF 100 U/HF Series #3082	
Aluminium	up to 3% Si	Wrought Alloys	RF 100 A Series #3077		RF 100 A/WF Series #3469	RF 100 A Series #3077
	above 3% Si	Cast Alloys	RF 100 F Seies #3078		RF 100 A/WF Series #3469	RF 100 F Series #3078
Ti-special alloys	Ti-basis	TiAl6V4 Inconel 625	RF 100 Ti Series #3876		RF 100 U/HF Series #3082	RF 100 S/F Series #3115
	Ni-basis	Inconel 728	RF 100 F Series #3078		RF 100 VA/NF Series #3081	
Hardened steel **H**	up to 52 HRC	H11	RF 100 U Series #3114		RF 100 U/HF Series #3082	
	above 52 HRC	D2	RF 100 H Series #3896		-	RF 100 H Series #3895

QUICK-FINDER - TECH-LINE and PRO-LINE end mill selection guide

		Application	Slot drilling 1 x d	Roughing 0.3-0.8 x d	Finishing > 0.1 x d	Super finishing 0.1 x d
Material/ Application group	Hardness tensile strength	Example material	Rigid conditions: - good cooling - short-chipping	Unstable conditions: - standard cooling - medium- to long-chipping		Finishing:
Steel	up to 28 HRc	1045 / 5115	Uni-Pro Series #3153	Rough-Tech 48 Series #3188		Finish-Tech 50 Series #3179
	above 28 HRc	4140	Aero-Tech Series #3173	Aero-Rough 48 Series #3097		
Stainless steel	up to 28 HRc	304 / 303	Uni-Pro Series #3153	Aero-Rough 48 Series #3097		
	above 28 HRc	316 Ti	Aero-Tech Series #3173	Aero-Rough 48 Series #3097		
Cast iron	up to 180 HB 30	Gray Cast	Uni-Pro Series #3153	Aero-Rough 48 Series #3097		
	above 180 HB 30	GGG / GGT / GGv ductile	Aero-Tech Series #3173	Aero-Rough 56 Series #3098		
Aluminium	up to 3% Si	Wrought Alloys	Alumi-Tech Series #3174	Rough-Tech ALU Series #3184		Alumi-Tech Series #3177
	above 3% Si	Cast Alloys	Aero-Tech Series #3173	Rough-Tech ALU Series #3184		Uni-Pro Series #3153
Ti-special alloys	Ti-basis	TiAl6V4 Inconel 625	Aero-Tech Series #3173	Aero-Rough 56 Series #3098		Finish-Tech 50 Series #3179
	Ni-basis	Inconel 728	Uni-Pro Series #3153	Aero-Rough 48 Series #3097		
Hardened steel **H**	up to 52 HRC	H11	Aero-Tech Series #3713	Aero-Rough 56 Series #3098		
	above 52 HRC	D2	—	Rough-Tech 56 Series #3189		FInish-Tech 62 Series #3182

Types of milling cutters and their basic application range to DIN 1836

	Type N	Standard teeth with 30° spiral, suitable for finishing operations of structural, case hardened and heat-treatable steels as well as short-chipping non-ferrous metals or materials up to a hardness of 48 HRC.
	Type W	Quick spiral (45°), suitable for finishing operations of soft materials such as aluminum, aluminum alloys and non-ferrous metals up to a hardness of approximately 180 HB 30.
	Type NH	Extremely quick spiral (45°), suitable for finishing operations of high-alloyed materials and cast iron up to a hardness of approximately 52 HRC.
	Type H	Extremely quick spiral (55°), suitable for finishing operations as well as HSC of all hardened materials and chilled cast iron up to a hardness of approximately 62 HRC.
	Type NR (round coarse tooth)	Round knuckle-type teeth, short-chipping with excellent chip evacuation. Suitable for roughing of materials up to a hardness of approximately 38 HRC.
	Type WR (round extra coarse tooth)	Coarse knuckle-type teeth, short-chipping with excellent chip evacuation. Suitable for roughing of aluminum, non-ferrous metals as well as soft steels up to a hardness of approximately 180 HB 30.
	**Type NRf (round fine tooth)**	Fine knuckle-type teeth, short-chipping with excellent chip evacuation. Higher feed rates in comparison to type NR. Suitable for roughing of materials with high hardness up to approx. 48 HRC.
	**Type HR (round extra fine tooth)**	Fine knuckle-type teeth, short-chipping with excellent chip evacuation. Suitable for roughing of hardened materials such as grey and chilled cast iron up to a hardness with of approx. 52 up to 56 HRC.
	Type NF (flat/truncated profile)	Flat knuckle-type teeth, short-chipping with improved, smoother Surface finish quality in comparison to type NR or NRf. Suitable for roughing of materials up to a hardness of approximately 56 HRC.
	Type HF	Flat fine knuckle-type teeth, short-chipping with improved, smoother surface finish quality compared to type HR. Suitable for roughing of materials up to a hardness of approximately 56 HRC.
	Type WF	Flat extra course knuckle-type teeth, short-chipping with improved, smoother surface finish quality when compared to type WR. Suitable for roughing of aluminum and non-ferrous materials up to 182 HB 30.

Pictograms

Tool material	Solid carbide			PCD								
	Ultra-fine grain carbide			Polycrystalline Diamond								
Standard	fract.	metric										
	fractional (inch)	metric (mm)										
Type (see below)	W	N	NH	H	HF	NF	WF					
	Application range to DIN 1835											
Shank form	HA	HB										
	to DIN 6535											
Helix angle	20°	29° 30° 31°	30°	30° 32°	35° 38°	36° 38°	45°	40° 42°	41° 43° 45°	44° 45° 46°	55°	
	Size of helix angle / number of different helix angles											
No. of flutes	2	3	4	4/5	4/6	5	5/6	6	6/8	6-10		
	Number of flutes											
Length												
	stub	standard		long		extra long						
Corner chamfer/ radius	90°	0.03 -0.1 x 45°	0.05 -0.15 x 45°	.001 -.004 x 45°	0.025 -0.150 x 45°	.002 -.006 x 45°	.002 -.008 x 45°	.008 -.024 x 45°	.012 -.024 x 45°	R	Ball	
	Size of corner chamfer or radius, dependent on diameter											

RF-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
RF 100 U variable helix end mills (4 flute)						**Carbide**			
fract.	N	35° 38°	4		GUHRING Select	FIREX®	3113	3099	25
metric	N	35° 38°	4		GUHRING Select	FIREX®		3731	25
fract.	N	35° 38°	4		GUHRING Select	FIREX®	3114	3100	26
metric	N	35° 38°	4		GUHRING Select	FIREX®	3736	3732	26
metric	N	35° 38°	4		GUHRING Select	FIREX®	3839	3871	27
metric	N	35° 38°	4		GUHRING Select	FIREX®	3837	3838	27
metric	N	35° 38°	4		GUHRING Select	FIREX®	3627		28
fract.	N	35° 38°	4		r GUHRING Select	FIREX®	3079		29
metric	N	35° 38°	4		r GUHRING Select	FIREX®	3872	3873	29
RF 100 U variable helix end mills (3 flute)						**Carbide**			
metric	N	41° 43° 45°	3			FIREX®	3891	3892	31
metric	N	41° 43° 45°	3			FIREX®	3893	3894	31
RF 100 U/HF variable helix end mills with roughing/finishing profile						**Carbide**			
fract.	HF	30° 32°	4			FIREX®	3082 / 3082		33
metric	HF	30° 32°	4			FIREX®	3507	3508	33
metric	HF	30° 32°	4			FIREX®	3509	3522	34
metric	HF	30° 32°	4			FIREX®	3598	3600	34

RF-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
RF 100 F variable helix end mills for free-cutting materials						**Carbide**			
fract.	NH	40° 42°	4			FIREX®	**3078 / 3078**		37
metric	NH	40° 42°	4			FIREX®	**3629**	**3630**	37
metric	NH	40° 42°	4			FIREX®		**3366**	37
RF 100 VA variable helix end mills for stainless steels						**Carbide**			
fract.	N	36° 38°	4			nano-A™	**3080 / 3080**		39
metric	N	36° 38°	4			nano-A™	**3804**	**3805**	39
metric	N	36° 38°	4			nano-A™	**3800**	**3803**	40
metric	N	36° 38°	4			nano-A™	**3806**	**3807**	40
RF 100 VA/NF variable helix rough/finishing end mills for stainless steels						**Carbide**			
fract.	NF	36° 38°	4			nano-A™	**3081 / 3081**		43
metric	NF	36° 38°	4			nano-A™	**3696**	**3718**	43
metric	NF	36° 38°	4			nano-A™	**3733**	**3885**	44
RF 100 Ti variable helix end mills for titanium and nickel alloys						**Carbide**			
fract.	N	35° 38°	4			Super-A™	**3876 / 3876**		46
metric	N	35° 38°	4			Super-A™	**3498**	**3499**	47
RF 100 A variable helix end mills for aluminum and cast aluminum						**Carbide**			
fract.	W	40° 42°	4			Bright	**3077 / 3077**		49
metric	W	40° 42°	4			Bright	**3202**	**3319**	49

RF-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
RF 100 A/WF variable helix roughing end mills for aluminum & Al-alloys						**Carbide**			
metric	WF	29° 30° 31°	3			Bright	**3468**	**3469**	51
metric	WF	29° 30° 31°	3			Bright	**3470**	**3471**	51
RF 100 SF 6-flute "Super Finish" variable helix end mills						**Carbide**			
fract.	NH	45°	6			FIREX®	**3115**		53
metric	NH	45°	6			FIREX®	**3631**	**3632**	53
RF 100 SF 5-flute "Super Finish" variable helix end mills						**Carbide**			
metric	NH	45°	5			FIREX®	**3897**	**3898**	54
RF 100 H variable helix end mills for hardened steels up to 60 HRC						**Carbide**			
metric	H	40° 42°	4			TiAlN	**3895**	**3896**	55
RF 50 variable flute end mills						**Carbide**			
fract.	N	40°	4			FIREX®	**3095 / 3095**		57
fract.	N	40°	4			FIREX®	**3096 / 3096**		57

DIAMOND-TECH

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
DL 100 X2 - High performance PCD end mill for aluminum and composites						**PCD**			
fract.	--	0°	2			Bright	**3867**		61
fract.	--	0°	3			Bright	**3870**		61
Coolant fed high performance PCD end mill for aluminum and composites						**PCD**			
metric	--	0°	2			Bright	**5492**		62
metric	--	0°	3			Bright	**5493**		63
CR 100 Carbide Routers - diamond coated, for composite materials						**Carbide**			
fract.	--	0°	10-15			Diamond	**3083**		65
fract.	--	0°	10-15			Diamond	**3084**		64
fract.	--	0°	10-15			Diamond	**3085**		65

TECH-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
GH 100 U / AERO-TECH end mills (3-fluted)						**Carbide**			
fract.	NH	45°	3			FIREX®	**3086**		69
metric	NH	45°	3			FIREX®	**3540**	**3729**	69
fract.	NH	45°	3			Bright	**3172**		70
fract.	NH	45°	3			FIREX®	**3173**		70
metric	NH	45°	3			Bright	**3203**		70
metric	NH	45°	3			FIREX®	**3741**		70
ALUMI-TECH end mills (2-fluted) for aluminum						**Carbide**			
metric	W	45°	2			Bright	**3310**	**3126**	72
fract.	W	45°	2			Bright	**3174**		73
metric	W	45°	2			Bright	**3309**	**3059**	73
fract.	W	45°	2			Super-A™	**3874**		73
fract.	W	45°	2			Bright	**3175**		74
metric	W	45°	2			Bright	**3358**		74
fract.	W	45°	2			Super-A™	**3875**		74
GA 200 A / ALUMI-TECH LR end mills (3-fluted) with corner radius						**Carbide**			
fract.	W	45°	3		r	Bright	**3177**		75
fract.	W	45°	3		r	Super-A™	**3877**		75
metric	W	45°	3		r	Bright	**3367**		75
GS 100 A / ROUGH-TECH ALU end mills, coarse tooth						**Carbide**			
fract.	WR	30°	3			Bright	**3184**		77
fract.	WR	30°	3			Super-A™	**3884**		77
metric	WR	30°	3			Bright		**3127**	77
metric	WR	30°	3			Bright		**3364**	77

Index

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
RS 100 U / AERO-ROUGH 48 end mills						**Carbide**			
fract.	NF	30°	4/5			FIREX®	**3097**		79
metric	NF	30°	4/5			FIREX®	**3887**	**3888**	79
RS 100 F / AERO-ROUGH 56 end mills						**Carbide**			
fract.	NF	45°	5/6			FIREX®	**3098**		80
metric	NF	45°	5/6			FIREX®	**3889**	**3890**	80
GS 100 U / ROUGH-TECH 48 end mills, fine tooth						**Carbide**			
fract.	NRf	30°	4			Bright	**3186**		83
fract.	NRf	30°	4			FIREX®	**3188**		83
fract.	NRf	30°	4			Super-A™	**3886**		83
metric	NRf	30°	4			Bright		**3204**	84
metric	NRf	30°	4			FIREX®		**3723**	84
metric	NRf	30°	4			FIREX®		**3365**	84
GS 100 H / ROUGH-TECH 56 end mills, fine tooth						**Carbide**			
fract.	HR	20°	4			FIREX®	**3189**		86
metric	HR	20°	4			FIREX®		**3682**	87
fract.	HR	20°	4			FIREX®	**3190**		87

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
GH 100 H / FINISH-TECH 62 multi-flute end mills						**Carbide**			
fract.	H	55°	6/8			FIREX®	**3182**		89
metric	H	55°	6/8			FIREX®	**3715**		89
fract.	H	55°	6/8			FIREX®	**3183**		90
metric	H	55°	6/8			FIREX®	**3716**		90
GH 100 U / FINISH-TECH 50 multi-flute end mills						**Carbide**			
fract.	NH	45°	6-10			Bright	**3178**		91
metric	NH	45°	6-10			Bright	**3311**	**3019**	92
fract.	NH	45°	6-10			FIREX®	**3179**		91
metric	NH	45°	6-10			FIREX®	**3689**	**3047**	92
fract.	NH	45°	6/8		r	FIREX®	**3091**		96
metric	NH	45°	6/8		r	Bright	**3112**		97
metric	NH	45°	6/8		r	FIREX®	**3563**		97
fract.	NH	45°	6/8			Bright	**3180**		93
fract.	NH	45°	6/8			FIREX®	**3181**		93
metric	NH	45°	6/8			Bright	**3312**	**3313**	94
metric	NH	45°	6/8			FIREX®	**3691**	**3693**	94

TECH-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
GF 500 T HSC-profile cutters with Torus form						**Carbide**			
metric	N	30°	2			TiAlN	**3856**		100
metric	N	30°	2			TiAlN	**3859**		101
metric	N	30°	2			TiAlN	**3860**		102
metric	N	30°	2			TiAlN	**3865**		103
metric	N	30°	2			TiAlN	**3863**		104
GF 500 B HSC-Ball nose profile cutters						**Carbide**			
metric	N	30°	2			TiAlN	**3848**		105
metric	N	30°	2			TiAlN	**3854**		109
metric	N	30°	2			TiAlN	**3849**		106
metric	N	30°	2			TiAlN	**3853**		107
metric	N	30°	2			TiAlN	**3855**		108
metric	N	30°	2			TiAlN	**3866**		110
GF 300 T / TRACE-TECH hard profile cutters with Torus grind						**Carbide**			
fract.	H	30°	2			FIREX®	**3192**		112
metric	H	30°	2			FIREX®	**3362**		113
GF 300 B / TRACE-TECH ball nose hard profile cutters						**Carbide**			
fract.	H	30°	2			FIREX®	**3101**		114
metric	H	30°	2			FIREX®	**3359**		115
fract.	H	30°	2			FIREX®	**3191**		116
metric	H	30°	2			FIREX®	**3360**		117

PRO-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
UNI PRO end mills (2-fluted)						**Carbide**			
fract.	N	30°	2			FIREX®	**3092**		120
metric	N	30°	2			FIREX®	**3633**	**3634**	120
fract.	N	30°	2			Bright	**3146**		121
metric	N	30°	2			Bright	**3303**		122
fract.	N	30°	2			FIREX®	**3148**		121
metric	N	30°	2			FIREX®	**3676**		122
fract.	N	30°	2			Super-A™	**3846**		121
fract.	N	30°	2			Bright	**3147**		123
fract.	N	30°	2			FIREX®	**3149**		123
fract.	N	30°	2			Super-A™	**3847**		123
metric	N	30°	2			Bright	**3011**		122
metric	N	30°	2			FIREX®	**3021**		122
UNI PRO end mills (2-fluted) with corner radius						**Carbide**			
fract.	N	30°	2		r	FIREX®	**3087**		124
metric	N	30°	2		r	Bright	**3106**		125
metric	N	30°	2		r	FIREX®	**3561**		125
fract.	N	30°	2		r	FIREX®	**3088**		126

Index

PRO-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
UNI PRO end mills (3-fluted)						**Carbide**			
metric	N	30°	3			FIREX®	**3558**	**3719**	127
fract.	N	30°	3			Bright	**3168**		128
metric	N	30°	3			Bright	**3307**		129
fract.	N	30°	3			FIREX®	**3170**		128
fract.	N	30°	3			Super-A™	**3868**		128
metric	N	30°	3			FIREX®	**3677**		129
UNI PRO end mills (3-fluted)						**Carbide**			
fract.	N	30°	3			Bright	**3169**		130
fract.	N	30°	3			FIREX®	**3171**		130
fract.	N	30°	3			Super-A™	**3869**		130
metric	N	30°	3			Bright	**3314**		131
metric	N	30°	3			FIREX®	**3680**		131
UNI PRO end mills (4-fluted)						**Carbide**			
fract.	N	30°	4			FIREX®	**3093**		132
metric	N	30°	4			FIREX®	**3637**	**3721**	132
fract.	N	30°	4			Bright	**3150**		133
fract.	N	30°	4			FIREX®	**3153**		133
fract.	N	30°	4			Super-A™	**3850**		133
metric	N	30°	4			Bright	**3304**		134
metric	N	30°	4			FIREX®	**3678**		134

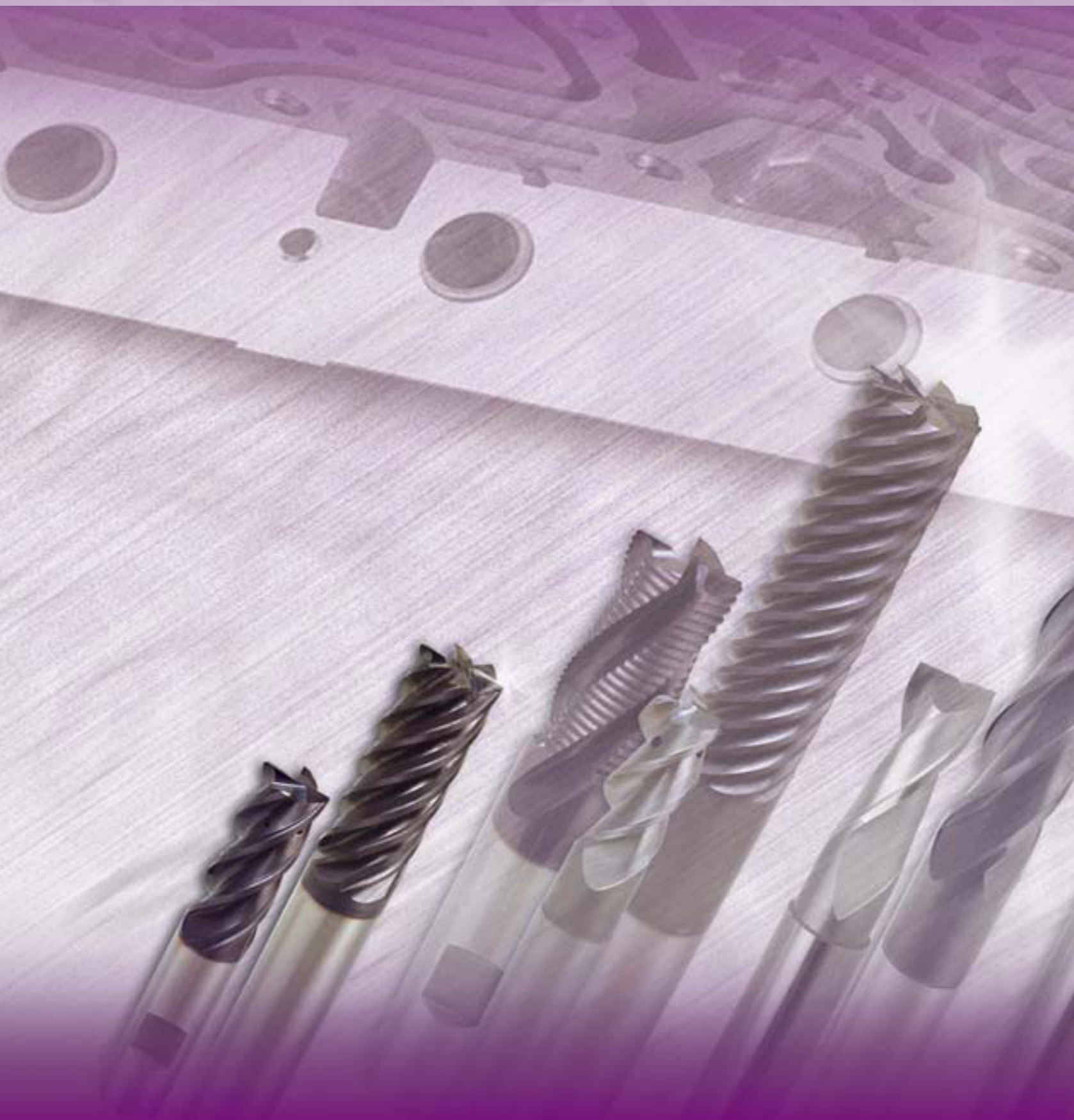
PRO-LINE

Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
UNI PRO end mills (4-fluted)						**Carbide**			
fract.	N	30°	4			Bright	**3152**		135
fract.	N	30°	4			FIREX®	**3156**		135
fract.	N	30°	4			Super-A™	**3852**		135
fract.	N	30°	4			Bright	**3151**		136
fract.	N	30°	4			FIREX®	**3155**		136
fract.	N	30°	4			Super-A™	**3851**		136
metric	N	30°	4			Bright	**3012**		137
metric	N	30°	4			FIREX®	**3023**		137
UNI PRO "R" end mills (4-fluted) with corner radius						**Carbide**			
fract.	N	30°	4		r	FIREX®	**3089**		139
metric	N	30°	4		r	Bright	**3111**		138
metric	N	30°	4		r	FIREX®	**3562**		138
fract.	N	30°	4		r	FIREX®	**3090**		139
UNI PRO ball nose end mills (2-fluted)						**Carbide**			
fract.	N	30°	2			Bright	**3157**		140
fract.	N	30°	2			FIREX®	**3159**		140
fract.	N	30°	2			Super-A™	**3857**		140
metric	N	30°	2			Bright	**3308**	**3024**	141
metric	N	30°	2			FIREX®	**3679**	**3049**	141

PRO-LINE

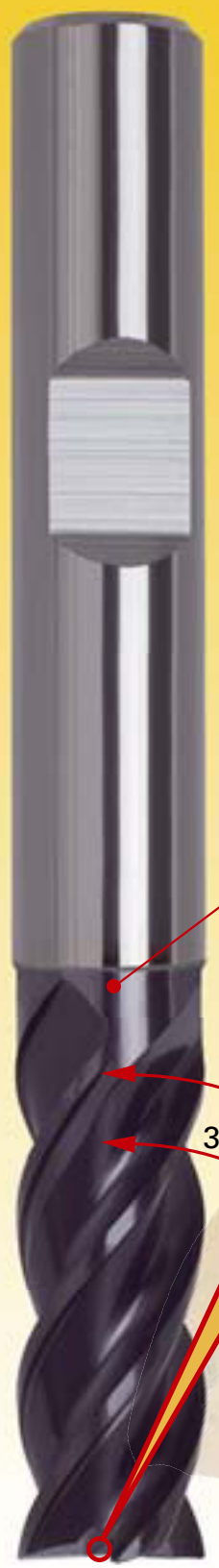
Standard	Tooth profile	Helix angle	No. of Flutes	Length	Tool illustration	Tool material / Surface finish	Series HA	Series HB	Page
UNI PRO ball nose end mills (2-fluted)						**Carbide**			
fract.	N	30°	2			Bright	**3158**		142
fract.	N	30°	2			FIREX®	**3160**		142
fract.	N	30°	2			Super-A™	**3858**		142
metric	N	30°	2			Bright	**3014**		143
metric	N	30°	2			FIREX®	**3030**		143
UNI PRO ball nose end mills (4-fluted)						**Carbide**			
fract.	N	30°	4			Bright	**3161**		144
fract.	N	30°	4			FIREX®	**3165**		144
fract.	N	30°	4			Super-A™	**3861**		144
metric	N	30°	4			Bright	**3306**		145
metric	N	30°	4			FIREX®	**3727**		145
UNI PRO ball nose end mills (4-fluted)						**Carbide**			
fract.	N	30°	4			Bright	**3164**		146
fract.	N	30°	4			FIREX®	**3167**		146
fract.	N	30°	4			Super-A™	**3864**		146
fract.	N	30°	4			Bright	**3162**		147
fract.	N	30°	4			FIREX®	**3166**		147
fract.	N	30°	4			Super-A™	**3862**		147
metric	N	30°	4			Bright	**3015**		148
metric	N	30°	4			FIREX®	**3043**		148
End Mill Value Packs						**Carbide**			
fract.					**Pro-Line Universal End Mill Kit**	FIREX®			149
fract.					**RF 100 Variable Helix End Mill Kit**	FIREX®			41

RF-LINE



GUHRING

RF 100 U - high-performance end mills for materials up to 48 HRc

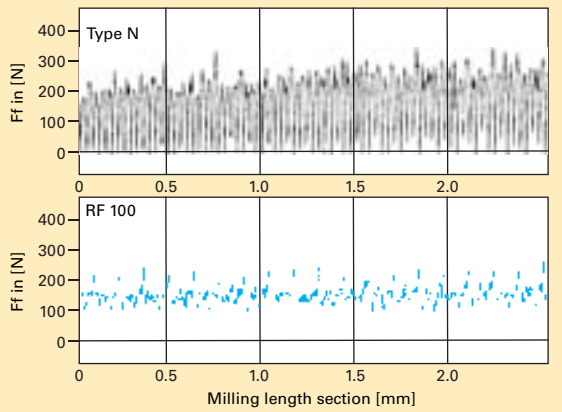


RF 100 U high-performance end mills excel thanks to unequal helix angles which considerably reduce vibration. The uneven helix angle vastly improves surface quality with finishing operations and considerably higher feed rates with slot milling and roughing operations are also achieved.

With many applications, the complete milling process can be covered with one RF 100, which as well as increasing tool life and dimensional accuracy of the workpiece generates a considerable cost advantage.

Summary of advantages

- suitable for roughing and finishing
- up to 60% higher feed rates
- up to 4 times longer tool life
- vibration-free operation
- improved workpiece surface quality



The cutting force comparison between a conventional milling cutter type N and a RF100 clearly shows the quieter, more rigid operation of the RF100.

with micro-corner protection for longer tool life

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

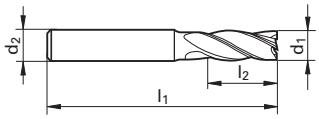
● = optimal suitability ○ = limited suitability

RF 100 U (universal) 4-flute variable helix end mills for materials < 48 HRC

Stub length

N | 35° 38° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3113	3099
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100

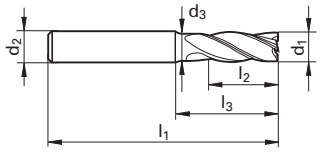


d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
3/16	3/16	2	3/8	4.760	●	
1/4	1/4	2	1/2	6.350	●	
5/16	5/16	2	1/2	7.940	●	
3/8	3/8	2	5/8	9.520	●	●
1/2	1/2	2 1/2	5/8	12.700	●	●
5/8	5/8	3	3/4	15.870	●	●
3/4	3/4	3	1	19.050	●	●
1	1	3	1	25.400	●	●

Stub length (metric)

N | 35° 38° | 4 | 0.1-0.6 x 45°

	HB
Series	3731
Tool material	Solid carbide
Surface finish	FIREX®
Application	H
d_2 shank tolerance	h6
d_1 tolerance	h10
Techn. data page	160
	RF100



d1	d2	d3	l1	l2	l3	Order	Availability HB
mm	mm	mm	mm	mm	mm	no.	
6.000	6.000	5.500	54.00	10.00	18.00	6.000	❍
8.000	8.000	7.500	58.00	12.00	22.00	8.000	❍
10.000	10.000	9.200	66.00	14.00	26.00	10.000	❍
12.000	12.000	11.200	73.00	16.00	28.00	12.000	❍
14.000	14.000	13.200	75.00	18.00	30.00	14.000	❍
16.000	16.000	15.000	82.00	22.00	34.00	16.000	❍
18.000	18.000	17.000	84.00	24.00	36.00	18.000	❍
20.000	20.000	19.000	92.00	26.00	42.00	20.000	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

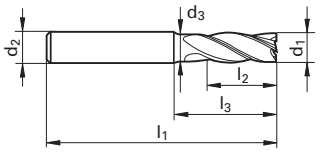
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 U (universal) 4-flute variable helix end mills for materials < 48 HRC

Standard length

35° 38° | N | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3114	3100
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100

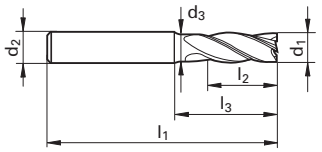


d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
3/16	3/16	2	5/8	4.760	●	
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	●
7/16	7/16	2 3/4	1	11.110	●	
1/2	1/2	3	1	12.700	●	●
5/8	5/8	3 1/2	1 1/4	15.870	●	●
3/4	3/4	4	1 1/2	19.050	●	●
1	1	4	1 1/2	25.400	●	●

Standard length (metric)

35° 38° | N | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3736	3732
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
4.000	6.000	3.700	57.00	11.00	18.00	4.000	●	❍
5.000	6.000	4.700	57.00	13.00	18.00	5.000	●	❍
6.000	6.000	5.500	57.00	13.00	21.00	6.000	●	❍
8.000	8.000	7.500	63.00	19.00	27.00	8.000	●	❍
10.000	10.000	9.200	72.00	22.00	32.00	10.000	●	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	●	❍
14.000	14.000	13.200	83.00	26.00	38.00	14.000	●	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	●	❍
18.000	18.000	17.000	92.00	32.00	44.00	18.000	●	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	●	❍
25.000	25.000	23.500	121.00	45.00	65.00	25.000	●	❍

● USA Stock ❍ International Stock (0-2 wks)

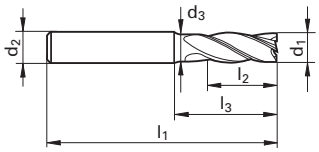
RF 100 U (universal) 4-flute variable helix end mills for materials < 48 HRC

Long length w/ neck clearance (metric)

35° 38° | N | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3837	3838
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100

NEW NEW



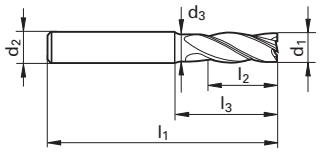
d1	d2	d3	l1	l2	l3	Order	HA	HB
mm	mm	mm	mm	mm	mm	no.	Availability	
6.000	6.000	5.500	65.00	13.00	29.00	6.000	●	❍
8.000	8.000	7.500	75.00	19.00	39.00	8.000	●	❍
10.000	10.000	9.200	80.00	22.00	40.00	10.000	●	❍
12.000	12.000	11.200	93.00	26.00	48.00	12.000	●	❍
16.000	16.000	15.000	108.00	32.00	60.00	16.000	●	❍
20.000	20.000	19.000	126.00	38.00	76.00	20.000	●	❍

Long length (metric)

35° 38° | N | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3839	3871
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100

NEW NEW



d1	d2	d3	l1	l2	l3	Order	HA	HB
mm	mm	mm	mm	mm	mm	no.	Availability	
6.000	6.000	5.500	65.00	18.00	29.00	6.000	●	❍
8.000	8.000	7.500	75.00	24.00	39.00	8.000	●	❍
10.000	10.000	9.200	80.00	30.00	40.00	10.000	●	❍
12.000	12.000	11.200	93.00	36.00	48.00	12.000	●	❍
16.000	16.000	15.000	108.00	48.00	60.00	16.000	●	❍
20.000	20.000	19.000	126.00	60.00	76.00	20.000	●	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 U (universal) 4-flute variable helix end mills for materials < 48 HRC

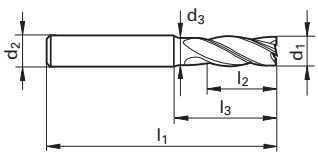
Extra long length

N | 35° 38° | 4 | 0.1-0.6 x 45°

HA

Series	3627
Tool material	Solid carbide
Surface finish	FIREX®
Application	H
d_2 shank tolerance	h6
d_1 tolerance	h10
Techn. data page	160

GUHRING Select



d1	d2	d3	l1	l2	l3	Order	Availability
mm	mm	mm	mm	mm	mm	no.	
10.000	10.000	9.200	100.00	40.00	50.00	10.000	●
12.000	12.000	11.200	150.00	45.00	60.00	12.000	●
14.000	14.000	13.200	150.00	45.00	60.00	14.000	●
16.000	16.000	15.000	150.00	65.00	80.00	16.000	●
18.000	18.000	19.000	150.00	65.00	80.00	18.000	●
20.000	20.000	19.000	150.00	65.00	80.00	20.000	●
25.000	25.000	23.500	150.00	75.00	94.00	25.000	●

● USA Stock ◯ International Stock (0-2 wks)

RF 100 U (universal) 4-flute variable helix end mills for materials < 48 HRC

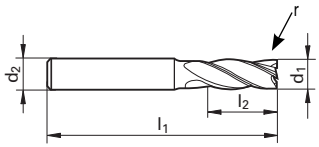
Standard length with corner radius

N | 35° 38° | 4 | R

	HA	HB
Series	3079	
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF100	RF100

GUHRING Select

All tools come with
NAS-Style corner radius



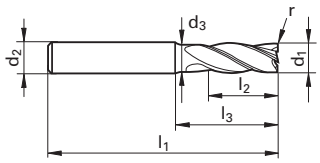
d1=d2	l1	l2	r	Order	Availability	
fract.	fract.	fract.	inch	no.		
1/4	2 1/2	3/4	0.015	6.352	●	
1/4	2 1/2	3/4	0.031	6.354	●	
5/16	2 1/2	13/16	0.031	7.944	●	
3/8	2 1/2	1	0.031	9.524	●	
7/16	2 3/4	1 1/4	0.031	11.114	●	
1/2	3 1/2	1 1/4	0.031	12.704		●
1/2	3 1/2	1 1/4	0.040	12.705		●
1/2	3 1/2	1 1/4	0.062	12.706		●
1/2	3 1/2	1 1/4	0.090	12.707		●
5/8	3 1/2	1 1/4	0.031	15.874		●
5/8	3 1/2	1 1/4	0.062	15.876		●
3/4	4	1 1/2	0.062	19.056		●
3/4	4	1 1/2	0.090	19.057		●
3/4	4	1 1/2	0.125	19.059		●
1	4	1 1/2	0.062	25.406		●
1	4	1 1/2	0.090	25.407		●
1	4	1 1/2	0.125	25.409		●

Standard length with corner radius (metric)

N | 35° 38° | 4 | R

	HA	HB
Series	3872	3873
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF100	RF100
	NEW	NEW

GUHRING Select



d1=d2	d3	l1	l2	l3	r	Order	Availability	
mm	mm	mm	mm	mm	mm	no.		
6.000	5.500	57.00	13.00	21.00	0.5	6.005	❍	❍
6.000	5.500	57.00	13.00	21.00	1.0	6.010	❍	❍
6.000	5.500	57.00	13.00	21.00	2.0	6.020	❍	❍
8.000	7.500	63.00	19.00	27.00	0.5	8.005	❍	❍
8.000	7.500	63.00	19.00	27.00	1.0	8.010	❍	❍
8.000	7.500	63.00	19.00	27.00	2.0	8.020	❍	❍
10.000	9.200	72.00	22.00	32.00	0.5	10.005	❍	❍
10.000	9.200	72.00	22.00	32.00	1.0	10.010	❍	❍
10.000	9.200	72.00	22.00	32.00	2.0	10.020	❍	❍
12.000	11.200	83.00	26.00	38.00	0.5	12.005	❍	❍
12.000	11.200	83.00	26.00	38.00	1.0	12.010	❍	❍
12.000	11.200	83.00	26.00	38.00	2.0	12.020	❍	❍
16.000	15.000	92.00	32.00	44.00	0.5	16.005	❍	❍
16.000	15.000	92.00	32.00	44.00	1.0	16.010	❍	❍
16.000	15.000	92.00	32.00	44.00	2.0	16.020	❍	❍
16.000	15.000	92.00	32.00	44.00	3.0	16.030	❍	❍
20.000	19.000	104.00	38.00	54.00	0.5	20.005	❍	❍
20.000	19.000	104.00	38.00	54.00	1.0	20.010	❍	❍
20.000	19.000	104.00	38.00	54.00	2.0	20.020	❍	❍
20.000	19.000	104.00	38.00	54.00	3.0	20.030	❍	❍
25.000	23.500	121.00	45.00	65.00	2.0	25.020	❍	❍
25.000	23.500	121.00	45.00	65.00	3.0	25.030	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

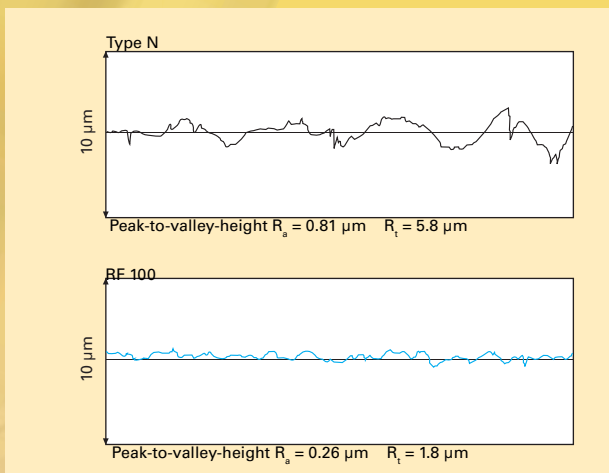
RF 100 U - high-performance end mills for materials up to 44 HRC

RF 100 U end mills excel thanks to unequal helix angles which considerably reduce vibration. The uneven helix angle vastly improves surface quality for finishing operations and a considerably higher feed rate for slot milling operations are also achieved. The three flute design provides additional flute space for improved chip evacuation in slot milling operations or in materials which may clog a standard four flute design.

With many applications, the complete milling process can be covered with one RF 100 U, which as well as increasing tool life and dimensional accuracy of the workpiece generates a considerable cost advantage.

Summary of advantages

- suitable for roughing and finishing
- up to 60% higher feed rates
- up to 4-times longer tool life
- vibration-free operation
- improved workpiece surface quality



The peak-to-valley height comparison between a conventional milling cutter type N and a RF 100 shows a considerable quieter, more rigid operation of the RF 100.

Material	Alloyed Steel		Tool Steel		Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

RF 100 U (universal) 3-flute variable helix end mills for materials < 44 HRC

Standard length, stub flute length (metric)

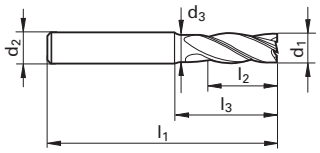
N | 41° 43° 45° | 3 | 0,025-0,3 x 45°

	HA	HB
Series	3893	3894
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160

RF100 | RF100

NEW | NEW

GUHRING Select



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
3.000	6.000	2.700	57.00	4.00	15.00	3.000	●	❍
4.000	6.000	3.700	57.00	5.00	18.00	4.000	●	❍
5.000	6.000	4.500	57.00	6.00	18.00	5.000	●	❍
6.000	6.000	5.500	57.00	7.00	21.00	6.000	●	❍
8.000	8.000	7.500	63.00	9.00	27.00	8.000	●	❍
10.000	10.000	9.200	72.00	11.00	32.00	10.000	●	❍
12.000	12.000	11.200	83.00	12.00	38.00	12.000	●	❍
16.000	16.000	15.000	92.00	16.00	44.00	16.000	●	❍

Standard length (metric)

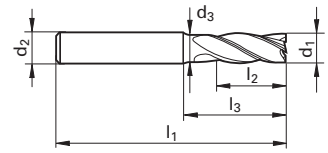
N | 41° 43° 45° | 3 | 0,025-0,3 x 45°

	HA	HB
Series	3891	3892
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160

RF100 | RF100

NEW | NEW

GUHRING Select



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
3.000	6.000	2.700	57.00	8.00	15.00	3.000	●	❍
4.000	6.000	3.700	57.00	11.00	18.00	4.000	●	❍
5.000	6.000	4.700	57.00	13.00	18.00	5.000	●	❍
6.000	6.000	5.500	57.00	13.00	21.00	6.000	●	❍
8.000	8.000	7.500	63.00	19.00	27.00	8.000	●	❍
10.000	10.000	9.200	72.00	22.00	32.00	10.000	●	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	●	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	●	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	●	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

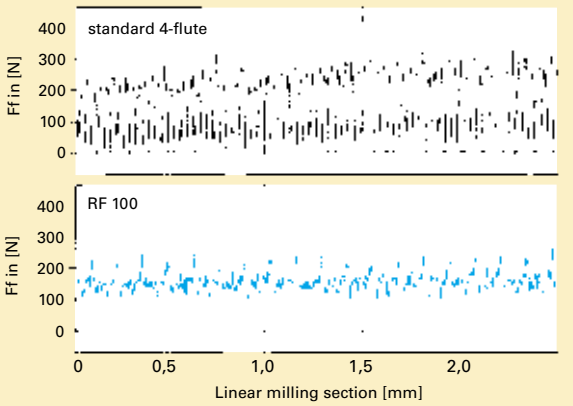
RF 100 U/HF variable helix roughing / finishing end mills for materials < 48 HRC

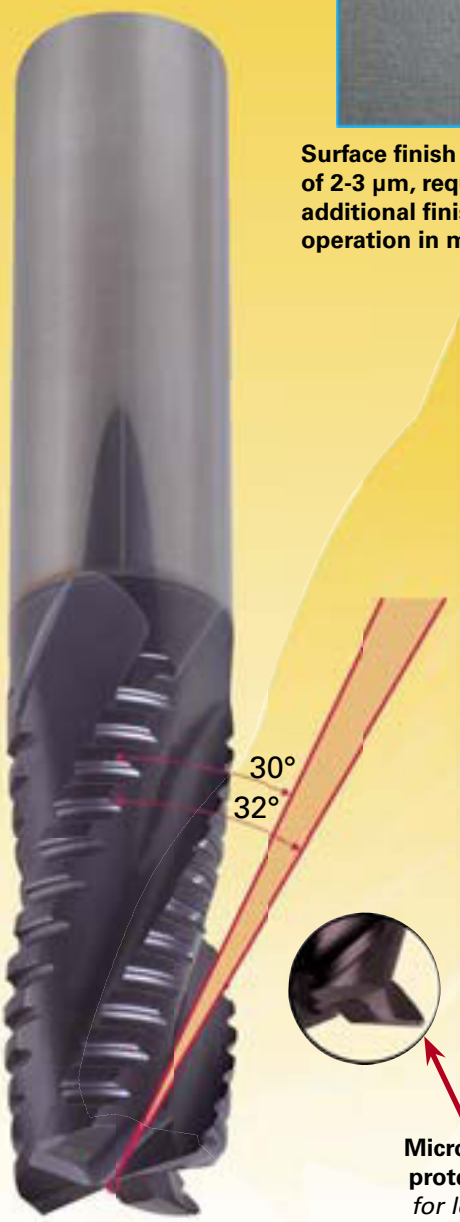
Based on our standard RF 100 end mills, we have developed a new series of variable-helix end mills with a completely new designed roughing profile.

The result is a drastic increase in tool life compared to conventional knuckle-type geometries and an improvement in surface finish-quality of the workpiece, so that in many applications finishing operations are unnecessary.

Surface finish quailty of 2-3 µm, requires no additional finishing operation in many cases

- up to 70% higher in feed rates
- vibration-free machining
- increased surface finish quality (Ra = 2-3 µm)
- small easy removable chips
- less cutting pressure
- vastly reduced horsepower consumption





Micro edge protection *for longer tool life*

Material	Alloyed Steel		Tool Steel		Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

● USA Stock ○ International Stock (0-2 wks)

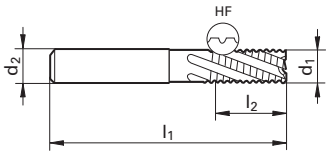
RF 100 U/HF (universal) 4-flute variable helix end mills with roughing-finishing profile

Standard length

HF | 30° 32° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3082	
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	161	

RF100 RF100



d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	
1/2	1/2	3 1/2	1 1/4	12.700		●
5/8	5/8	3 1/2	1 1/4	15.870		●
3/4	3/4	4	1 1/2	19.050		●
1	1	4	1 1/2	25.400		●

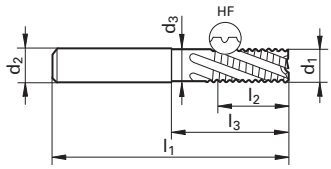
Standard length (metric)

HF | 30° 32° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3507	3508
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	161	

RF100 RF100

NEW NEW



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	57.00	13.00	21.00	6.000	❍	❍
8.000	8.000	7.500	63.00	19.00	27.00	8.000	❍	❍
10.000	10.000	9.200	72.00	22.00	32.00	10.000	❍	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	❍	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	❍	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	❍	❍
25.000	25.000	24.000	121.00	45.00	65.00	25.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

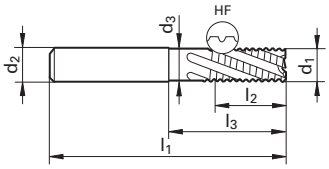
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 U/HF (universal) 4-flute variable helix end mills with roughing-finishing profile

Long length (metric)

HF | 30° 32° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3509	3522
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	161	

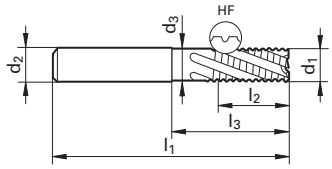


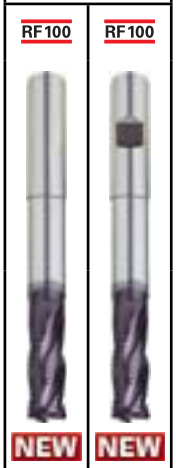
d1	d2	d3	l1	l2	l3.	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	65.00	18.00	29.00	6.000	❍	❍
8.000	8.000	7.500	75.00	24.00	39.00	8.000	❍	❍
10.000	10.000	9.200	80.00	30.00	40.00	10.000	❍	❍
12.000	12.000	11.200	93.00	36.00	48.00	12.000	❍	❍
16.000	16.000	15.000	108.00	48.00	60.00	16.000	❍	❍
20.000	20.000	19.000	126.00	60.00	76.00	20.000	❍	❍

Extra long length (metric)

HF | 30° 32° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3598	3600
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	161	





d1	d2	d3	l1	l2	l3.	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	80.00	13.00	40.00	6.000	❍	❍
8.000	8.000	7.500	100.00	19.00	50.00	8.000	❍	❍
10.000	10.000	9.200	100.00	22.00	50.00	10.000	❍	❍
12.000	12.000	11.200	150.00	26.00	80.00	12.000	❍	❍
16.000	16.000	15.000	150.00	32.00	80.00	16.000	❍	❍
20.000	20.000	19.000	150.00	38.00	80.00	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

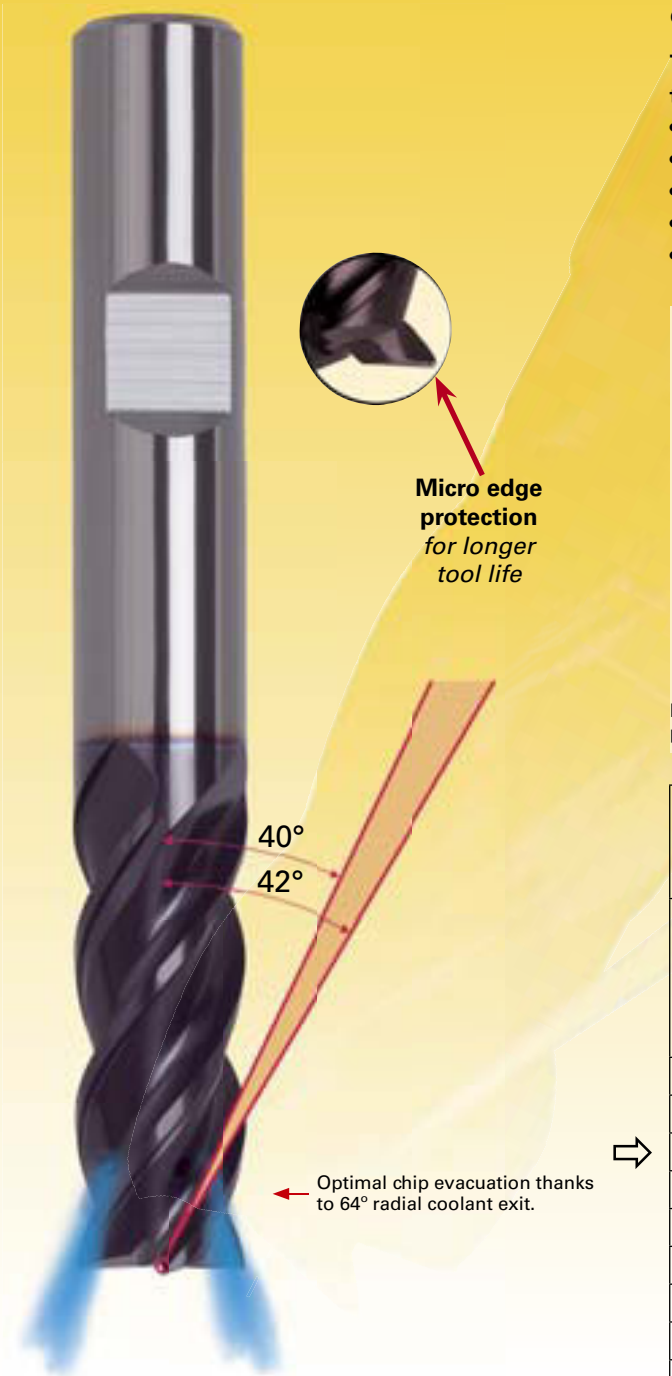
GUHRING

Shrink-Fit Technology

Shrink-fit systems, chucks and extensions for maximum clamping force and rigidity

RF 100 F variable helix end mills for free-cutting materials < 30 HRC

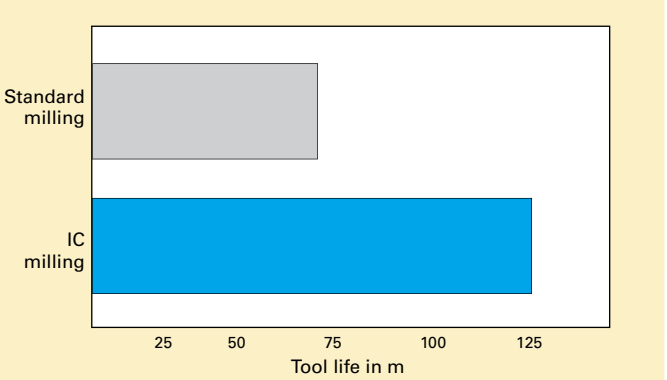
We have developed the RF 100 end mill with variable spiral angle primarily to prevent chattering and the so-called corkscrew effect (as found when withdrawing tools having a large spiral angle)



Milling cutters with coolant through offer a considerably longer tool life and higher feed rates compared to conventional tools. Guhring has designed the milling cutter's radial coolant exit at an angle of 64°, offering considerable protection to the sensitive cutting edge corner. This coolant exit design also helps to prevent any built-up edge.

Therefore, Guhring's RF 100 F variable helix end mills offer the following advantages:

- up to 60% higher in feed rates
- longer tool life
- vibration-free machining
- suitable for roughing and finishing
- increased surface finish quality



Milling cutters with internal cooling achieve a 2/3 longer tool life in comparison with conventional milling cutters.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

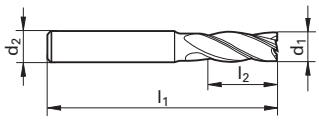
● USA Stock ○ International Stock (0-2 wks)

RF 100 F 4-flute variable helix end mills for free-cutting materials < 30 HRC

Standard length

NH | 40° 42° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3078	
Tool material	Solid carbide	
Surface finish	FIREX®	
Application		
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF 100	RF 100

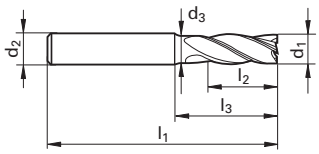


d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
3/16	3/16	2	5/8	4.760	●	
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	
1/2	1/2	3 1/2	1 1/4	12.700		●
5/8	5/8	3 1/2	1 1/4	15.870		●
3/4	3/4	4	1 1/2	19.050		●

Standard length (metric)

NH | 40° 42° | 4 | 0.1-0.6 x 45°

	HA	HB	HB
Series	3629	3630	3366
Tool material	Solid carbide		
Surface finish	FIREX®		
Application			
d_2 shank tolerance	h6		
d_1 tolerance	h10		
Techn. data page	160		
	RF 100	RF 100	RF 100



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB	Availability HB
mm	mm	mm	mm	mm	mm	no.			
4.000	6.000	3.700	57.00	11.00	18.00	4.000	❍	❍	
5.000	6.000	4.700	57.00	13.00	18.00	5.000	❍	❍	
6.000	6.000	5.500	57.00	13.00	21.00	6.000	❍	❍	●
8.000	8.000	7.500	63.00	19.00	27.00	8.000	❍	❍	●
10.000	10.000	9.200	72.00	22.00	32.00	10.000	●	❍	●
12.000	12.000	11.200	83.00	26.00	38.00	12.000	●	❍	●
16.000	16.000	15.000	92.00	32.00	44.00	16.000	❍	❍	●
20.000	20.000	19.000	104.00	38.00	54.00	20.000	❍	❍	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

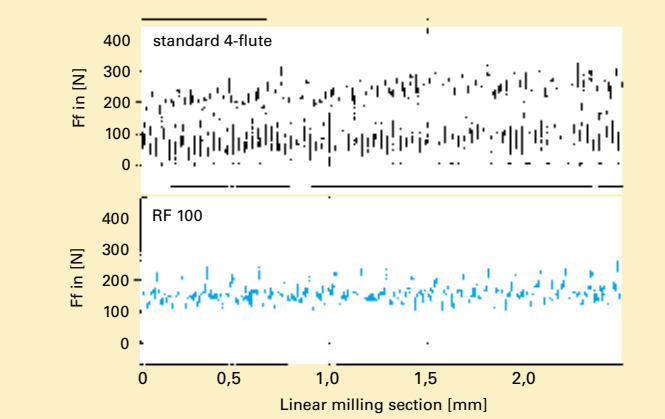
RF 100 VA variable helix end mills for stainless steels

Milling stainless steel presents some unique challenges. Guhring developed the RF 100 VA style variable helix end mill to have greater tool life and performance in stainless steels.

RF 100 VA style end mills feature Guhring's newest high-performance coating, nano-A™. This micro-layer coating has the superior heat and wear resistance that is needed when milling stainless steels.

This end mill design also allows these benefits:

- up to 60% higher feed rates
- longer tool life
- increased drilling depths
- vibration-free machining
- suitable for roughing and finishing
- increased surface finish quality
- reduced cutter wandering



A cutting force comparion between a conventiona type N and a RF 100 variable helix end mill clearly shows the RF 100 end mill's quieter and more stable machining characteristics

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

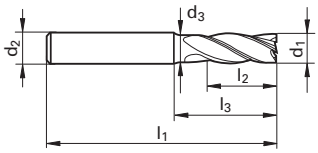
● USA Stock ○ International Stock (0-2 wks)

RF 100 VA 4-flute variable helix end mills for stainless steels

Stub length (metric)

N | 36° 38° | 4 | 0,15-0,70 x 45°

	HA	HB
Series	3804	3805
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF100	RF100
	NEW	NEW

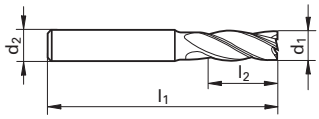


d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
4.000	6.000	3.700	54.00	8.00	15.00	4.000	❍	❍
5.000	6.000	4.700	54.00	9.00	15.00	5.000	❍	❍
6.000	6.000	5.500	54.00	10.00	18.00	6.000	❍	❍
8.000	8.000	7.500	58.00	12.00	22.00	8.000	❍	❍
10.000	10.000	9.200	66.00	14.00	26.00	10.000	❍	❍
12.000	12.000	11.200	73.00	16.00	28.00	12.000	❍	❍
16.000	16.000	15.000	82.00	22.00	34.00	16.000	❍	❍
20.000	20.000	19.000	92.00	26.00	42.00	20.000	❍	❍

Standard length

N | 36° 38° | 4 | 0,15-0,70 x 45°

	HA	HB
Series	3080	
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF100	RF100



d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
3/16	3/16	2	5/8	4.760	●	
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	
1/2	1/2	3 1/2	1 1/4	12.700		●
5/8	5/8	3 1/2	1 1/4	15.870		●
3/4	3/4	4	1 1/2	19.050		●
1	1	4	1 1/2	25.400		●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

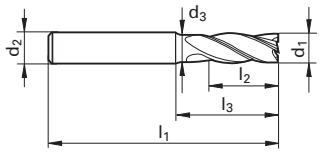
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 VA 4-flute variable helix end mills for stainless steels

Standard length (metric)

N | 36° 38° | 4 | 0,15-0,70 x 45°

	HA	HB
Series	3800	3803
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100
	NEW	NEW

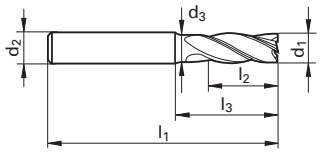


d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	57.00	13.00	21.00	6.000	❍	❍
8.000	8.000	7.500	63.00	19.00	27.00	8.000	❍	❍
10.000	10.000	9.200	72.00	22.00	32.00	10.000	❍	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	❍	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	❍	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	❍	❍
25.000	25.000	23.500	121.00	45.00	65.00	25.000	❍	❍

Long length (metric)

N | 36° 38° | 4 | 0,15-0,70 x 45°

	HA	HB
Series	3806	3807
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100
	NEW	NEW



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	65.00	10.00	29.00	6.000	❍	❍
8.000	8.000	7.500	75.00	12.00	39.00	8.000	❍	❍
10.000	10.000	9.200	80.00	14.00	40.00	10.000	❍	❍
12.000	12.000	11.200	93.00	16.00	48.00	12.000	❍	❍
16.000	16.000	15.000	108.00	22.00	60.00	16.000	❍	❍
20.000	20.000	19.000	126.00	26.00	76.00	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

GUHRING

RF 100 Variable Helix Carbide End Mill Kit

Each kit contains four carbide
RF 100 U
"Universal" end mills

One #3114 1/4" dia.
One #3114 5/16" dia.
One #3114 3/8" dia.
One #3114 1/2" dia.

Kit EDP # 333046675

Series 3114 features:

- 35˚/38˚ variable helix angle
- Vibration-free milling
- Designed for a range of materials
- Improved surface finish
- 4 flutes, standard length
- FIREX® heat-resistant coating
- Extended tool life

RF 100 VA/NF variable helix roughing / finishing end mills for stainless steels

Based on our standard RF 100 end mills, we have developed a new series of variable-helix end mills with a completely new designed roughing profile for stainless steel.

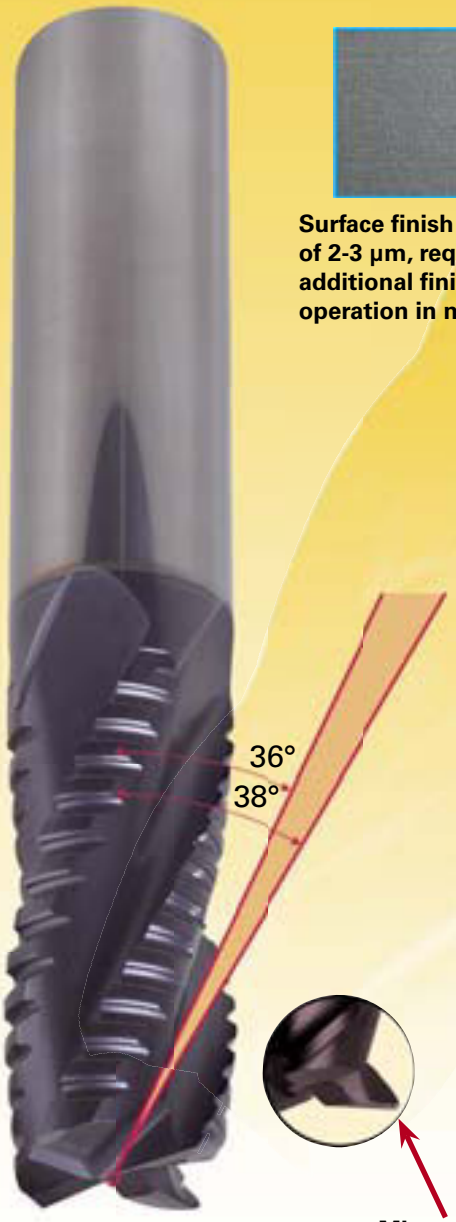
The result is a drastic increase in tool life compared to conventional knuckle-type geometries and an improvement in surface finish-quality of the workpiece, so that in many applications finishing operations are unnecessary.

RF 100 VA style end mills feature Guhring's newest high-performance coating, nano-A™. This micro-layer coating has the superior heat and wear resistance that is needed when milling stainless steels.

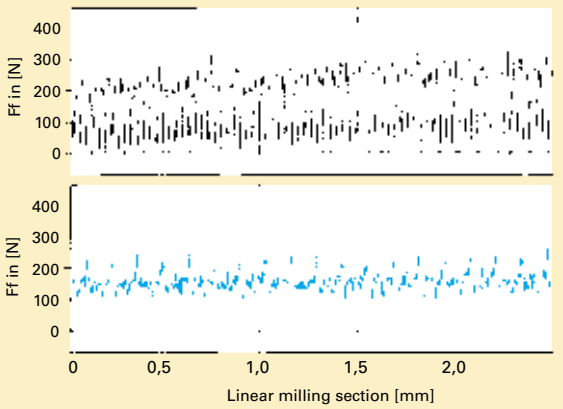
This end mill design also allows these benefits:

- up to 60% higher in feed rates
- vibration-free machining
- increased surface finish quality
- small easy removable chips
- less cutting preasure
- vastly reduced horsepower consumption

Surface finish quailty of 2-3 µm, requires no additional finishing operation in many cases



Micro edge protection *for longer tool life*



Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

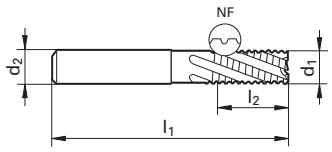
● USA Stock ○ International Stock (0-2 wks)

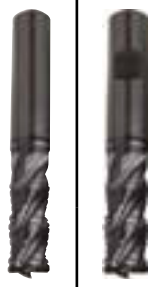
RF 100 VA/NF 4-flute variable helix end mills with roughing profile for stainless steel

Standard length

NF | 36° 38° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3081	
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	161	
	RF100	RF100



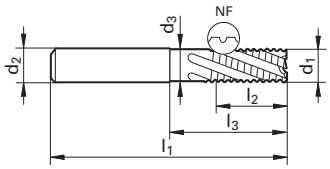


d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	
1/2	1/2	3 1/2	1 1/4	12.700		●
5/8	5/8	3 1/2	1 1/4	15.870		●
3/4	3/4	4	1 1/2	19.050		●
1	1	4	1 1/2	25.400		●

Standard length (metric)

NF | 36° 38° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3696	3718
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	161	161
	RF100	RF100
	NEW	NEW



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	57.00	13.00	21.00	6.000	❍	❍
8.000	8.000	7.500	63.00	19.00	27.00	8.000	❍	❍
10.000	10.000	9.200	72.00	22.00	32.00	10.000	❍	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	❍	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	❍	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	❍	❍
25.000	25.000	24.000	121.00	45.00	65.00	25.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

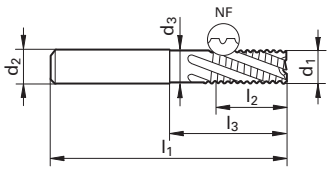
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 VA/NF variable helix end mills with roughing / finishing profile for stainless steel

Long length

NF | 36° 38° | 4 | 0,3-0,6 x 45°

	HA	HB
Series	3733	3885
Tool material	Solid carbide	
Surface finish	nano-A™	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	161	161



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	65.00	10.00	29.00	6.000	❍	❍
8.000	8.000	7.500	75.00	12.00	39.00	8.000	❍	❍
10.000	10.000	9.200	80.00	14.00	40.00	10.000	❍	❍
12.000	12.000	11.200	93.00	16.00	48.00	12.000	❍	❍
16.000	16.000	15.000	108.00	22.00	60.00	16.000	❍	❍
20.000	20.000	19.000	126.00	26.00	76.00	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

GUHRING

TM VENDING MACHINE

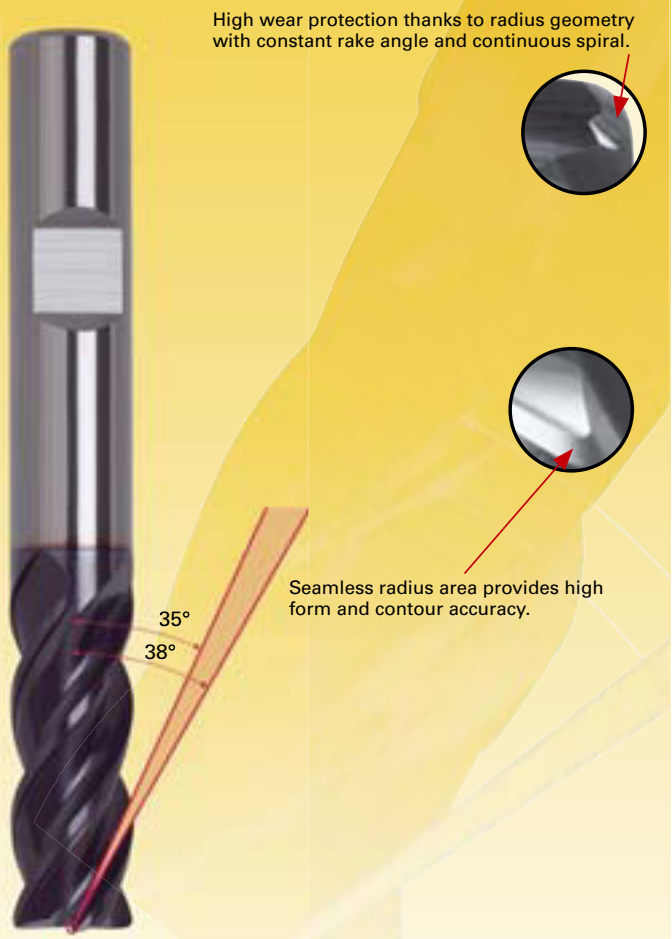
Guhring's modular TM Vending Machine relieves the customer of all tasks regarding tool storage and administration. Drawer and spiral modules enable the individual adaptation to specific customer storage requirements. The intelligent software ensures tool availability around the clock and detailed evaluation of all consumption and movement data.

RF 100 Ti 4-flute variable helix end mills for titanium & nickel alloys

The RF 100 Ti is especially designed for titanium and other aerospace alloys, and has a totally new corner radius design for increased tool life and highest metal removal rates.

The special features of Guhring's milling cutters with corner radius are:

- outside diameter and the radius is ground in one pass
- radius point geometry with constant helix-radius correction



Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 Ti		○							●	○		

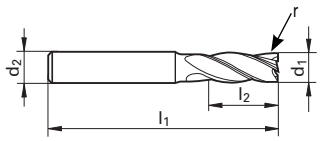
● = optimal suitability ○ = limited suitability

Standard length with corner radius

N | 35° 38° | 4 | $R^{+0,02}_{-0,00}$

		HA
Series	3876	
Tool material	Solid carbide	
Surface finish	Super-A™	
Application		
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
		RF 100 / RF 100

All tools come with NAS-style corner radius



d1=d2	l1	l2	r	Order	Availability	
fract.	fract.	fract.	dec.	no.		
1/4	2 1/2	3/4	0.015	6.352	●	
1/4	2 1/2	3/4	0.031	6.354	●	
5/16	2 1/2	13/16	0.031	7.944	●	
3/8	2 1/2	1	0.031	9,524	●	
7/16	2 3/4	1 1/4	0.031	11.114	●	
1/2	3 1/2	1 1/4	0.031	12.704		●
1/2	3 1/2	1 1/4	0.040	12.705		●
1/2	3 1/2	1 1/4	0.062	12.706		●
1/2	3 1/2	1 1/4	0.090	12.707		●
5/8	3 1/2	1 1/4	0.031	15.874		●
5/8	3 1/2	1 1/4	0.062	15.876		●
3/4	4	1 1/2	0.062	19.056		●
3/4	4	1 1/2	0.090	19.057		●
3/4	4	1 1/2	0.125	19.059		●
1	4	1 1/2	0.062	25.406		●
1	4	1 1/2	0.090	25.407		●
1	4	1 1/2	0.125	25.409		●

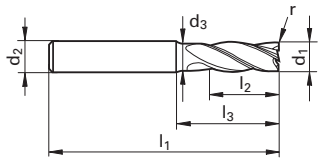
● USA Stock ○ International Stock (0-2 wks)

RF 100 Ti 4-flute variable helix end mills for titanium and nickel alloys

Standard length with corner radius

N | 35° 38° | 4 | R +0,02 -0,00

	HA	HB
Series	3498	3499
Tool material	Solid carbide	
Surface finish	Super-A™	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160



d1=d2	d3	l1	l2	l3	r	Order	Availability	
mm	mm	mm	mm	mm	mm	no.		
6.000	5.500	57.00	13.00	21.00	0.50	6.005	○	○
6.000	5.500	57.00	13.00	21.00	0.80	6.008	○	○
6.000	5.500	57.00	13.00	21.00	1.00	6.010	○	○
6.000	5.500	57.00	13.00	21.00	1.50	6.015	○	○
6.000	5.500	57.00	13.00	21.00	2.00	6.020	○	○
8.000	7.500	63.00	19.00	27.00	0.50	8.005	○	○
8.000	7.500	63.00	19.00	27.00	0.80	8.008	○	○
8.000	7.500	63.00	19.00	27.00	1.00	8.010	○	○
8.000	7.500	63.00	19.00	27.00	1.50	8.015	○	○
8.000	7.500	63.00	19.00	27.00	2.00	8.020	○	○
10.000	9.200	72.00	22.00	32.00	0.50	10.005	○	○
10.000	9.200	72.00	22.00	32.00	0.80	10.008	○	○
10.000	9.200	72.00	22.00	32.00	1.00	10.010	○	○
10.000	9.200	72.00	22.00	32.00	1.50	10.015	○	○
10.000	9.200	72.00	22.00	32.00	2.00	10.020	○	○
12.000	11.200	83.00	26.00	38.00	0.50	12.005	○	○
12.000	11.200	83.00	26.00	38.00	0.80	12.008	○	○
12.000	11.200	83.00	26.00	38.00	1.00	12.010	○	○
12.000	11.200	83.00	26.00	38.00	1.50	12.015	○	○
12.000	11.200	83.00	26.00	38.00	2.00	12.020	○	○
12.000	11.200	83.00	26.00	38.00	2.50	12.025	○	○
12.000	11.200	83.00	26.00	38.00	3.00	12.030	○	○
12.000	11.200	83.00	26.00	38.00	3.17	12.031	○	○
12.000	11.200	83.00	26.00	38.00	4.00	12.040	○	○
16.000	15.000	92.00	32.00	44.00	0.50	16.005	○	○
16.000	15.000	92.00	32.00	44.00	0.80	16.008	○	○
16.000	15.000	92.00	32.00	44.00	1.00	16.010	○	○
16.000	15.000	92.00	32.00	44.00	1.50	16.015	○	○
16.000	15.000	92.00	32.00	44.00	2.00	16.020	○	○
16.000	15.000	92.00	32.00	44.00	2.50	16.025	○	○
16.000	15.000	92.00	32.00	44.00	3.00	16.030	○	○
16.000	15.000	92.00	32.00	44.00	3.17	16.031	○	○
16.000	15.000	92.00	32.00	44.00	4.00	16.040	○	○
20.000	19.000	104.00	38.00	54.00	0.50	20.005	○	○
20.000	19.000	104.00	38.00	54.00	1.00	20.010	○	○
20.000	19.000	104.00	38.00	54.00	1.50	20.015	○	○

d1=d2	d3	l1	l2	l3	r	Order	Availability	
mm	mm	mm	mm	mm	mm	no.		
20.000	19.000	104.00	38.00	54.00	2.00	20.020	●	●
20.000	19.000	104.00	38.00	54.00	2.50	20.025	○	○
20.000	19.000	104.00	38.00	54.00	3.00	20.030	○	○
20.000	19.000	104.00	38.00	54.00	3.17	20.031	○	○
20.000	19.000	104.00	38.00	54.00	4.00	20.040	○	○
25.000	23.500	121.00	45.00	65.00	1.50	25.015	○	○
25.000	23.500	121.00	45.00	65.00	2.00	25.020	○	○
25.000	23.500	121.00	45.00	65.00	2.50	25.025	○	○
25.000	23.500	121.00	45.00	65.00	3.00	25.030	●	●
25.000	23.500	121.00	45.00	65.00	3.17	25.031	○	○
25.000	23.500	121.00	45.00	65.00	4.00	25.040	○	○
25.000	23.500	121.00	45.00	65.00	5.00	25.050	○	○

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

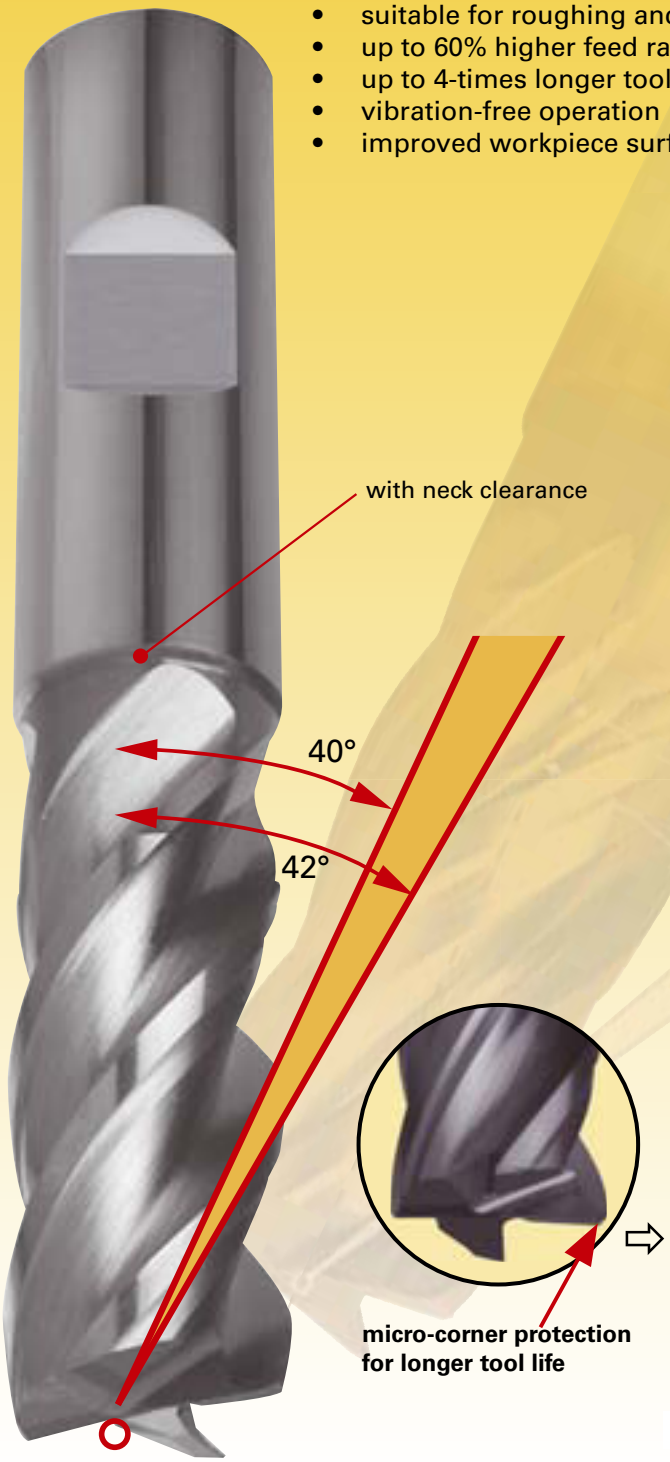
RF 100 A - high-performance roughing end mills for aluminium and Al-alloys

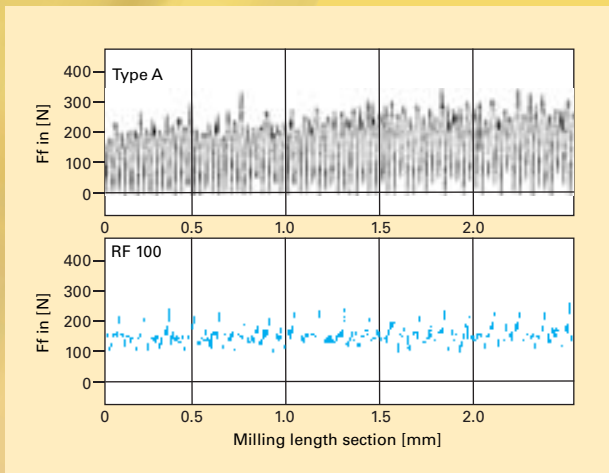
RF 100 high-perfomance end mills excel thanks to unequal helix angles which considerably reduce vibration. The uneven helix angle vastly improves surface quality for finishing operations and a considerably higher feed rate for slot drilling and roughing operations are also achieved.

With many applications, the complete milling process can be covered with one RF 100, which as well as increasing tool life and dimensional accuracy of the workpiece generates a considerable cost advantage.

Summary of advantages

- suitable for roughing and finishing
- up to 60% higher feed rates
- up to 4-times longer tool life
- vibration-free operation
- improved workpiece surface quality





The cutting force comparison between a conventional milling cutter type N and the RF 100 shows a clearly quieter, more rigid operation of the RF 100.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

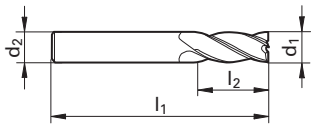
● = optimal suitability ○ = limited suitability

RF 100 A 4-flute variable helix end mills for aluminum and cast aluminum < 22 HRC

Standard length

W | 40° 42° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3077	
Tool material	Solid carbide	
Surface finish	Bright	
Application	●	
d_2 shank tolerance	h6	
d_1 tolerance	h10	
Techn. data page	160	
	RF100	RF100

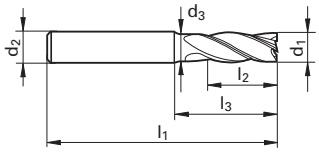


d1	d2	l1	l2	Order	Availability HA	Availability HB
fract.	fract.	fract.	fract.	no.		
3/16	3/16	2	5/8	4.760	●	
1/4	1/4	2 1/2	3/4	6.350	●	
5/16	5/16	2 1/2	13/16	7.940	●	
3/8	3/8	2 1/2	1	9.520	●	
1/2	1/2	3 1/2	1 1/4	12.700		●
5/8	5/8	3 1/2	1 1/4	15.870		●
3/4	3/4	4	1 1/2	19.050		●

Standard length (metric)

W | 40° 42° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3202	3319
Tool material	Solid carbide	
Surface finish	Bright	
Application	●	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160
	RF100	RF100



NEW

d1	d2	l1	l2	Order	Availability HA	Availability HB
mm	mm	mm	mm	no.		
4.000	6.000	57.00	11.00	4.000	❍	❍
5.000	6.000	57.00	13.00	5.000	❍	❍
6.000	6.000	57.00	13.00	6.000	●	❍
8.000	8.000	63.00	19.00	8.000	●	❍
10.000	10.000	72.00	22.00	10.000	❍	❍
12.000	12.000	83.00	26.00	12.000	❍	❍
16.000	16.000	92.00	32.00	16.000	❍	❍
20.000	20.000	104.00	38.00	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 A/WF - high-performance roughing end mills for aluminium and Al-alloys

Based on our RF 100 end mill with unqual helix angles in combination with a newly developed roughing geometry. The result is a dramatic increase in tool life in comparison to conventional rough milling cutters with round or flat knuckle-type teeth. At the same time, the surface quality of the workpiece is improved to a peak-to-valley height of appr. Ra = 2-3 µm, making in many cases finishing operations unnecessary.

Simultaneously, the innovative design reduces power consumption in comparison to conventional RF 100 end mills allowing the application in unstable conditions and on less powerful machines

Summary of advantages

- low cutting pressure and power consumption
- vibration-free operation
- increased feed rates possible
- increased surface qualities (R_a = 2-3 µm)
- longer tool life

Workpiece surface
Ra = 2-3 µm

Type	Roughing end mill	RF 100 A/WF
Performance index	100%	140%
Workpiece surface	R_a = 9-10 µm	R_a = 2-3 µm
Tool life index	100%	180%
Power consumption	100%	130%
Cutting pressure	100%	125%

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

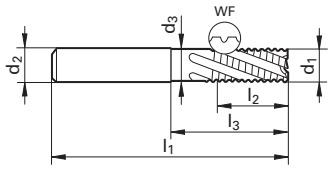
● = optimal suitability ○ = limited suitability

RF 100 A/WF variable helix roughing end mills for aluminum and aluminum alloys

Standard length (metric)

WF | 29° 30° 31° | 3 | 0,3-0,6 x 45°

	HA	HB
Series	3468	3469
Tool material	Solid carbide	
Surface finish	Bright	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	161	161

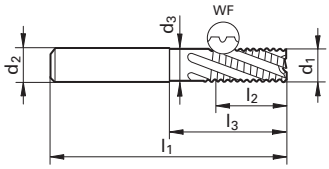


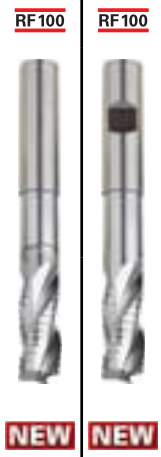
d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	65.00	13.00	29.00	6.000	●	❍
8.000	8.000	7.500	75.00	19.00	39.00	8.000	●	❍
10.000	10.000	9.200	80.00	22.00	40.00	10.000	●	❍
12.000	12.000	11.200	93.00	26.00	48.00	12.000	●	❍
16.000	16.000	15.000	108.00	32.00	60.00	16.000	●	❍
20.000	20.000	19.000	126.00	38.00	76.00	20.000	●	❍

Long length (metric)

WF | 29° 30° 31° | 3 | 0,3-0,6 x 45°

	HA	HB
Series	3470	3471
Tool material	Solid carbide	
Surface finish	Bright	
Application		
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	161	161





d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	65.00	13.00	29.00	6.000	❍	❍
8.000	8.000	7.500	75.00	19.00	39.00	8.000	❍	❍
10.000	10.000	9.200	80.00	22.00	40.00	10.000	❍	❍
12.000	12.000	11.200	93.00	26.00	48.00	12.000	❍	❍
16.000	16.000	15.000	108.00	32.00	60.00	16.000	❍	❍
20.000	20.000	19.000	126.00	38.00	76.00	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

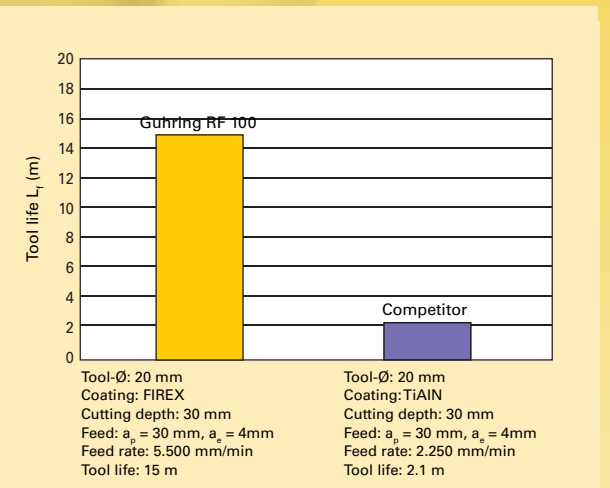
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 S/F - “Super Finish“ variable helix end mills for materials up to 48 HRC

Based on our 4-flute RF 100 U the RF 100 S/F has a higher, more rigid web paired with 5 or 6 cutting edges. In addition, its innovative flute geometry ensures optimal chip evacuation. The range of application includes super finishing and HSC finishing as well as semi-roughing operations, i.e. feed widths (a_e) up to 0.3xD with close to complete cutting length.

Summary of advantages

- suitable for semi-roughing and HSC-finishing
- extremely high form accuracy
- vibration-free operation
- optimised flute geometry
- high feed rates possible
- optimal surface quality
- increased tool life



Tool life comparison:
Semi-roughing in 48 HRC the RF 100 S/F achieves more than 7 times the too life in comparison to conventional end mills.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	
RF 100 U/HF		●	●	●					○		○	
RF 100 F	●		○			●				●		
RF 100 VA	○				●	●				○		
RF 100 VA/NF	●				●	●				○		
RF 100 A							●	●				
RF 100 A/WF							●	●				
RF 100 Ti		○							●	○		
RF 100 H		○		○							●	●
RF 100 SF	●	●	●	●	●	●	○	○	●	●	○	

● = optimal suitability ○ = limited suitability

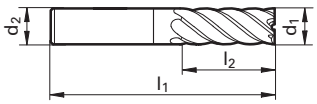
RF 100 SF 6-flute variable helix end mills for materials < 54 HRC

Standard length

NH | 44° 45° 46° | 6 | 0,025-0,3 x 45°

	HA
Series	3115
Tool material	Solid carbide
Surface finish	FIREX®
Application	H
d_2 shank tolerance	h6
d_1 tolerance	h10
Techn. data page	160

RF100



d1	d2	l1	l2	Order	Availability
fract.	fract.	fract.	fract.	no.	
5/16	5/16	2 1/2	13/16	7.940	●
3/8	3/8	2 1/2	1	9.520	●
1/2	1/2	3	1	12.700	●
5/8	5/8	3 1/2	1 1/4	15.870	●
3/4	3/4	4	1 1/2	19.050	●
1	1	4	1 1/2	25.400	●

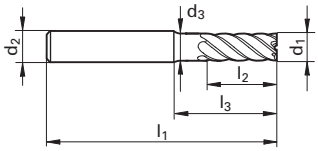
Standard length (metric)

NH | 44° 45° 46° | 6 | 0,025-0,3 x 45°

	HA	HB
Series	3631	3632
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160

RF100 RF100

NEW NEW



d1	d2	d3	l1	l2	l3	Order	Availability	
mm	mm	mm	mm	mm	mm	no.		
8.000	8.000	7.500	63.00	19.00	27.00	8.000	❍	❍
10.000	10.000	9.500	72.00	22.00	32.00	10.000	❍	❍
12.000	12.000	11.200	83.00	26.00	38.00	12.000	❍	❍
16.000	16.000	15.000	92.00	32.00	44.00	16.000	●	❍
20.000	20.000	19.000	104.00	38.00	54.00	20.000	❍	❍
25.000	25.000	23.500	121.00	45.00	65.00	25.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

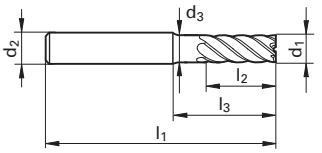
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RF 100 SF 5-flute variable flute spaced end mills for materials < 54 HRC

Long length (metric)

NH | 45° | 5 | 0,025-0,3 x 45°

	HA	HB
Series	3897	3898
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
4.000	6.000	3.700	65.00	12.00	23.00	4.000	❍	❍
5.000	6.000	5.700	65.00	15.00	26.00	5.000	❍	❍
6.000	6.000	5.500	65.00	18.00	29.00	6.000	❍	❍
8.000	8.000	7.500	75.00	24.00	39.00	8.000	❍	❍
10.000	10.000	9.200	80.00	30.00	40.00	10.000	❍	❍
12.000	12.000	11.200	93.00	36.00	48.00	12.000	❍	❍
16.000	16.000	15.000	108.00	48.00	60.00	16.000	❍	❍
20.000	20.000	19.000	126.00	60.00	76.00	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

RF 100 H - high-performance roughing end mills for hardened steels up to 60 HRC

Innovative design with core stability enables roughing operations up to 1xD in materials up 60 HRC as well as finishing operations over the entire cutting edge length (up to 2.5xD) in materials up to 60 HRC. Also applicable with HPC strategy for roughing materials over 60 HRC.

Summary of advantages

- for roughing & finishing
- up to 60% higher feed rates
- up to 4-times longer tool life
- vibration-free operation
- improved surface finish

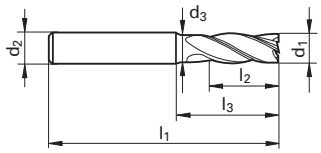
Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 H		○		○							●	●

● = optimal suitability ○ = limited suitability

Standard length (metric)

H | 40° 42° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3895	3896
Tool material	Solid carbide	
Surface finish	TiAlN	
Application	H	
d_2 shank tolerance	h6	h6
d_1 tolerance	h10	h10
Techn. data page	160	160



d1	d2	d3	l1	l2	l3	Order	Availability HA	Availability HB
mm	mm	mm	mm	mm	mm	no.		
6.000	6.000	5.500	57.00	13.00	21.00	6.000	●	○
8.000	8.000	7.500	63.00	19.00	27.00	8.000	●	○
10.000	10.000	9.200	72.00	22.00	32.00	10.000	●	○
12.000	12.000	11.200	83.00	26.00	38.00	12.000	●	○
16.000	16.000	15.000	92.00	32.00	44.00	16.000	●	○
20.000	20.000	19.000	104.00	38.00	54.00	20.000	●	○

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

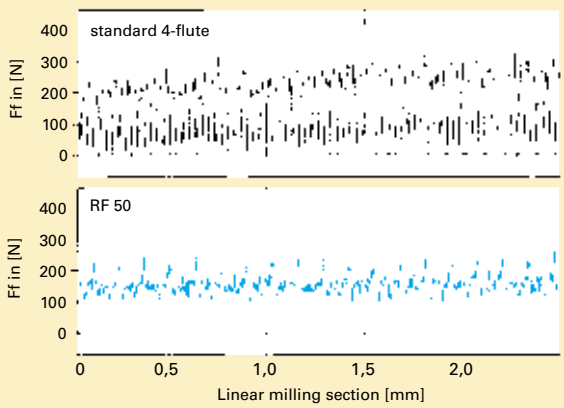
When ordering: EDP no. = Series + Order no., example: 3867 12.700

Guhring RF 50 variable flute end mills for materials < 54 HRC

We have developed the RF 50 end mill with variable flute spacing primarily to prevent chatter and the so-called cork-screw effect (as found when withdrawing tools having a large spiral angle)

However, the variable flute spacing does not only combat these two unwanted effects but offers the following additional advantages:

- **Higher feed rates**
- **longer tool life**
- **increased milling depths**
- **vibration-free machining**
- **suitable for roughing and finishing**
- **increased surface finish quality**
- **straighter cutting**



A cutting force comparison between a conventional type N and a RF 50 variable helix end mill clearly shows the RF 50 end mill's quieter and more stable machining characteristics.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
RF 100 U	○	●	●	●					●		○	

● = optimal suitability ○ = limited suitability

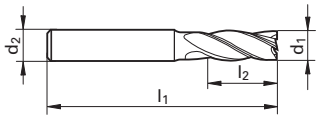
● USA Stock ○ International Stock (0-2 wks)

RF 50 variable flute end mills for materials < 54 HRC

Stub length

N | 40° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3095	
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 Shank tolerance	h6	
d_1 Tolerance	h10	
Tech. data page	160	

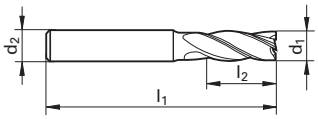


d1	d2	l1	l2	No.	Order	Availability HA	Availability HB
fract.	dec.	dec.	dec.	flutes	no.		
3/16	0.188	2.000	0.375	4	4.760	●	
1/4	0.250	2.000	0.500	4	6.350	●	
5/16	0.313	2.000	0.500	4	7.940	●	
3/8	0.375	2.000	0.625	4	9.520	●	
1/2	0.500	2.500	0.625	4	12.700		●
5/8	0.625	3.000	0.750	4	15.870		●
3/4	0.750	3.000	1.000	4	19.050		●
1	1.000	3.000	1.000	4	25.400		●

Standard length

N | 40° | 4 | 0.1-0.6 x 45°

	HA	HB
Series	3096	
Tool material	Solid carbide	
Surface finish	FIREX®	
Application	H	
d_2 Shank tolerance	h6	
d_1 Tolerance	h10	
Tech. data page	160	

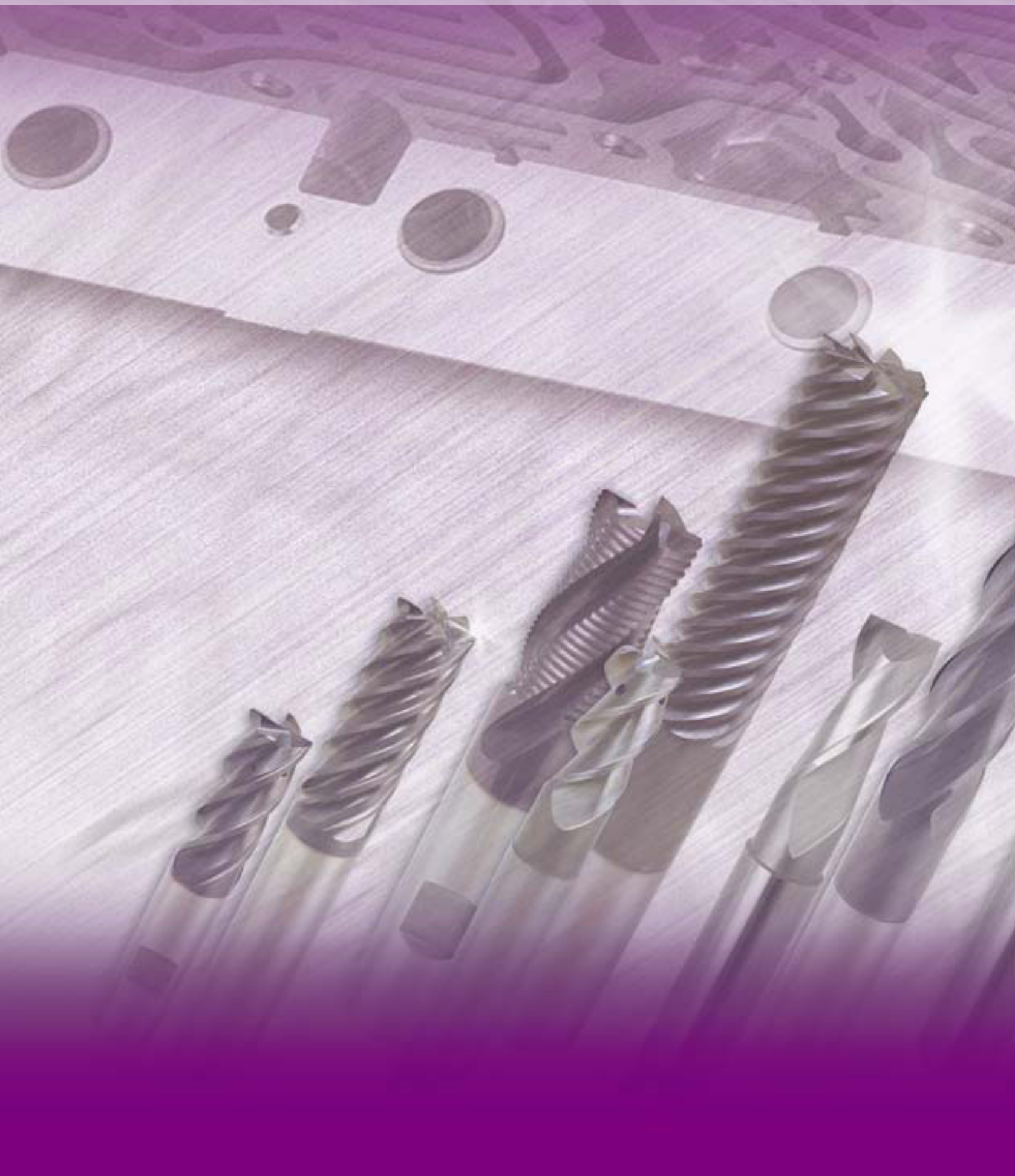


d1	d2	l1	l2	No.	Order	Availability HA	Availability HB
fract.	dec.	dec.	dec.	flutes	no.		
3/16	0.188	2.000	0.625	4	4.760	●	
1/4	0.250	2.500	0.750	4	6.350	●	
5/16	0.313	2.500	0.813	4	7.940	●	
3/8	0.375	2.500	1.000	4	9.520	●	
7/16	0.438	2.750	1.000	4	11.110	●	
1/2	0.500	3.000	1.000	4	12.700		●
5/8	0.625	3.500	1.250	4	15.870		●
3/4	0.750	4.000	1.500	4	19.050		●
1	1.000	4.000	1.500	4	25.400		●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

DIAMOND-TECH



The PCD and CBN tool range

Standard and highly complex PCD special tools
Guhring's PCD tool range includes drills, milling cutters and reamers, as well as tools with interchangeable inserts. Additionally, Guhring develops, designs and produces customer specific special tools for highly complex machining tasks. Some examples are PCD-tipped finishing reamers for the machining of valve seats in the automotive industry, or combination tools enabling different machining operations with one single tool.

Standard and highly complex CBN special tools
Guhring's CBN tool range includes, dependent on the range of application, drills, milling cutters, reamers and interchangeable inserts. These tools are applied in the automotive and medical industry as well as other specific applications. For example, CBN tools from Guhring are successfully and economically applied in the production of wheels, pumps and shafts.

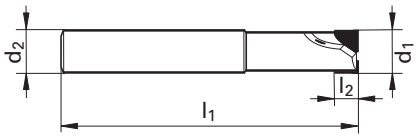
Small but extremely accurate
CBN reaming tools with small diameters offer highest precision.

DL 100 X2 High performance end mills, for aluminum and composites

2-flute, center cutting

2

Series	3867
Tool material	PCD
Surface finish	○
Application	●
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	*call tech support*

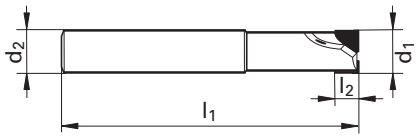


d1	d2	l1	l2	No.	Order	Availability
fract.	dec.	dec.	dec.	flutes	no.	
1/4	0.250	2.500	0.750	2	6.350	●
3/8	0.375	3.000	0.750	2	9.520	●
1/2	0.500	3.000	1.000	2	12.700	●
3/4	0.750	4.000	1.000	2	19.050	●

3-flute, non-center cutting

3

Series	3870
Tool material	PCD
Surface finish	○
Application	●
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	*call tech support*



d1	d2	l1	l2	No.	Order	Availability
fract.	dec.	dec.	dec.	flutes	no.	
3/8	0.375	3.000	0.500	3	9.520	●
1/2	0.500	3.000	0.500	3	12.700	●
3/4	0.750	3.000	0.500	3	19.050	●
1	1.000	4.000	1.000	3	25.400	●

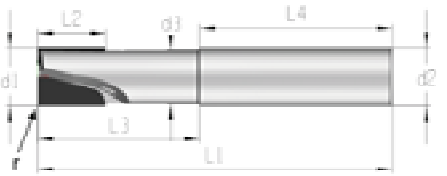
Alloyed Steels · Tool Steels · Cast materials · Stainless Steels · Al and Al-alloys · Ti / Ni alloys · H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

2-flute, center cutting, coolant fed

Series	5492
Tool material	PCD
Surface finish	○
Application	●
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	*call tech support*

Coolant Fed!



NEW

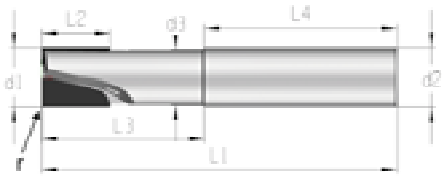
d1	d2	d3	l1	l2	l3	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	flutes	no.	
6.000	6.000	5.700	57.0	8.00	21.00	36.00	0.1	2	6.000	❍
8.000	8.000	7.400	63.0	8.00	27.00	36.00	0.1	2	8.000	❍
8.000	8.000	7.400	63.0	12.00	27.00	36.00	0.1	2	8.001	❍
10.000	10.000	9.400	72.0	8.00	32.00	40.00	0.1	2	10.000	❍
10.000	10.000	9.400	72.0	16.00	32.00	40.00	0.1	2	10.001	❍
12.000	12.000	11.200	83.0	8.00	38.00	45.00	0.1	2	12.000	❍
12.000	12.000	11.200	83.0	16.00	38.00	45.00	0.1	2	12.001	❍
14.000	14.000	13.000	83.0	8.00	38.00	45.00	0.1	2	14.000	❍
14.000	14.000	13.000	83.0	16.00	38.00	45.00	0.1	2	14.001	❍
16.000	16.000	15.000	100.0	12.00	52.00	48.00	0.1	2	16.000	❍
16.000	16.000	15.000	100.0	20.00	52.00	48.00	0.1	2	16.001	❍
18.000	18.000	17.000	100.0	12.00	52.00	48.00	0.1	2	18.000	❍
18.000	18.000	17.000	100.0	20.00	52.00	48.00	0.1	2	18.001	❍
20.000	20.000	19.000	100.0	12.00	50.00	50.00	0.1	2	20.000	❍
20.000	20.000	19.000	100.0	20.00	50.00	50.00	0.1	2	20.001	❍

2-flute, long length, center cutting, coolant fed

2

Series	5493
Tool material	PCD
Surface finish	○
Application	●
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	*call tech support*

Coolant Fed!



NEW

d1	d2	d3	l1	l2	l3	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	flutes	no.	
6.000	6.000	5.700	75.00	8.00	21.00	54.00	0.1	2	6.000	❍
8.000	8.000	7.400	100.00	8.00	27.00	73.00	0.1	2	8.000	❍
8.000	8.000	7.400	100.00	12.00	27.00	73.00	0.1	2	8.001	❍
10.000	10.000	9.400	100.00	8.00	32.00	68.00	0.1	2	10.000	❍
10.000	10.000	9.400	100.00	16.00	32.00	68.00	0.1	2	10.001	❍
12.000	12.000	11.200	100.00	8.00	38.00	62.00	0.1	2	12.000	❍
12.000	12.000	11.200	100.00	16.00	38.00	62.00	0.1	2	12.001	❍
14.000	14.000	13.000	100.00	8.00	38.00	62.00	0.1	2	14.000	❍
14.000	14.000	13.000	100.00	16.00	38.00	62.00	0.1	2	14.001	❍
16.000	16.000	15.000	150.00	12.00	52.00	98.00	0.1	2	16.000	❍
16.000	16.000	15.000	150.00	20.00	52.00	98.00	0.1	2	16.001	❍
18.000	18.000	17.000	125.00	12.00	52.00	73.00	0.1	2	18.000	❍
18.000	18.000	17.000	125.00	20.00	52.00	73.00	0.1	2	18.001	❍
20.000	20.000	19.000	150.00	12.00	50.00	100.00	0.1	2	20.000	❍
20.000	20.000	19.000	150.00	20.00	50.00	100.00	0.1	2	20.001	❍

Alloyed Steels · Tool Steels · Cast materials · Stainless Steels · Al and Al-alloys · Ti / Ni alloys · H Hardened Materials

GUHRING

High-Performance Cutting Tools for Composite and Aerospace Materials

Standard tooling:

Carbide Routers
PCD End Mills
90° Diamond Coated Drills

PCD Special Tooling Capabilities:

Please see www.guhring.com/PS/PCD.htm

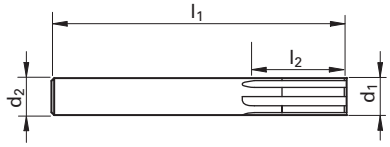
CR 100 carbide routers for composite materials

Multi-flute plunging router

Series	3084
Tool material	PCD
Surface finish	Diamond
Application	Composites
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	*call tech support*

Plunging

NEW

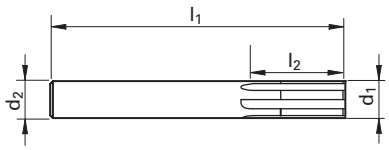


d1	d2	l1	l2	No.	Order	Availability
mm	mm	mm	mm	flutes	no.	
1/4	1/4	2.500	0.750	10	6.350	●
3/8	3/8	3.000	1.000	14	9.520	●
1/2	1/2	3.500	1.250	15	12.700	●
5/8	5/8	4.000	1.625	15	15.870	●

CR 100 carbide routers for composite materials

Multi-flute slotting router

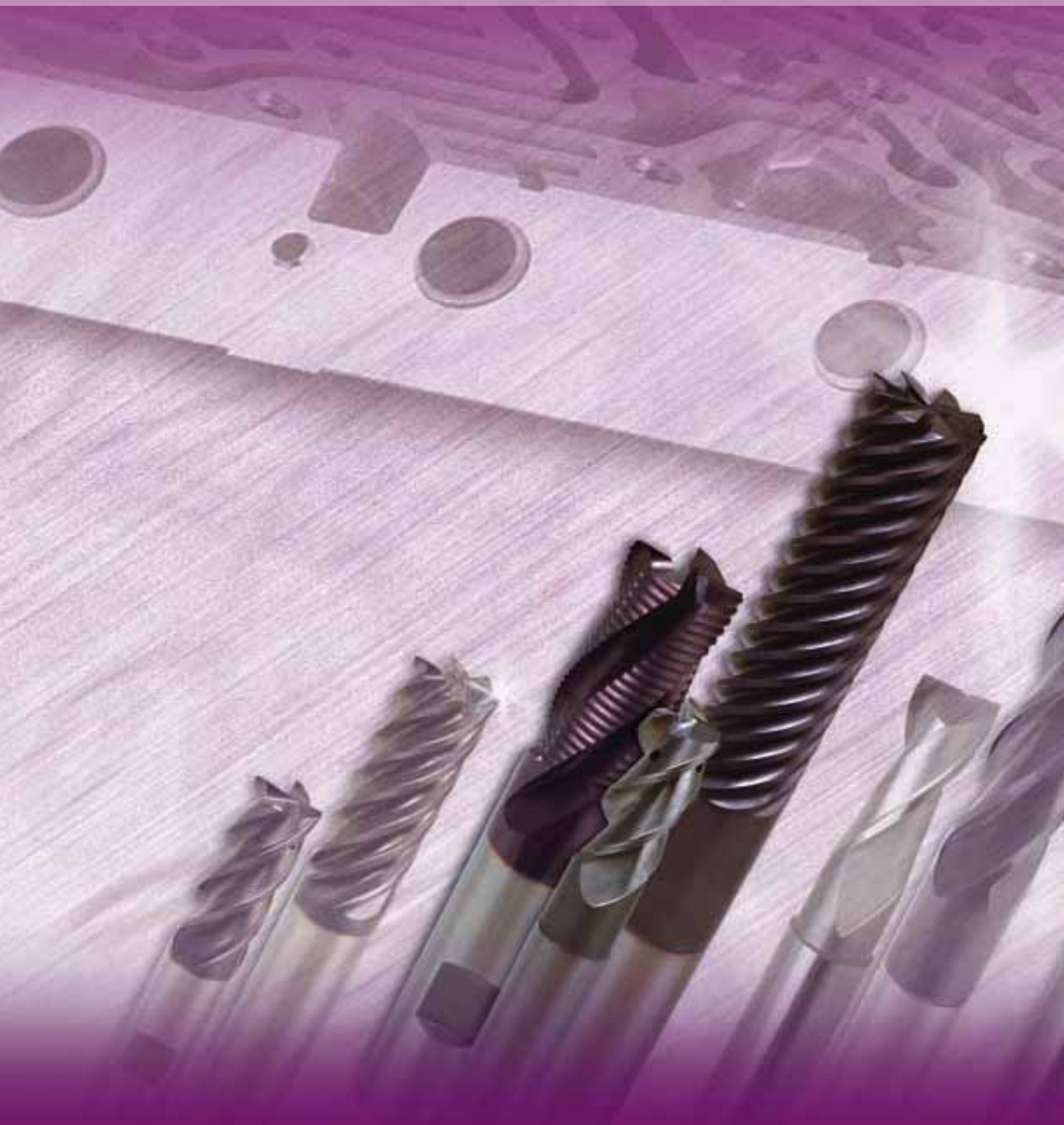
Series	3083	3085
Tool material	PCD	PCD
Surface finish	Diamond	Diamond
Application	Composites	Composites
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	*call tech support*	*call tech support*
		End Cutting



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
1/4	1/4	2.500	0.750	10	6.350	●	❍
3/8	3/8	3.000	1.000	14	9.520	●	❍
1/2	1/2	3.500	1.250	15	12.700	●	❍
5/8	5/8	4.000	1.625	15	15.870	●	❍

Alloyed Steels · Tool Steels · Cast materials · Stainless Steels · Al and Al-alloys · Ti / Ni alloys · H Hardened Materials

TECH-LINE

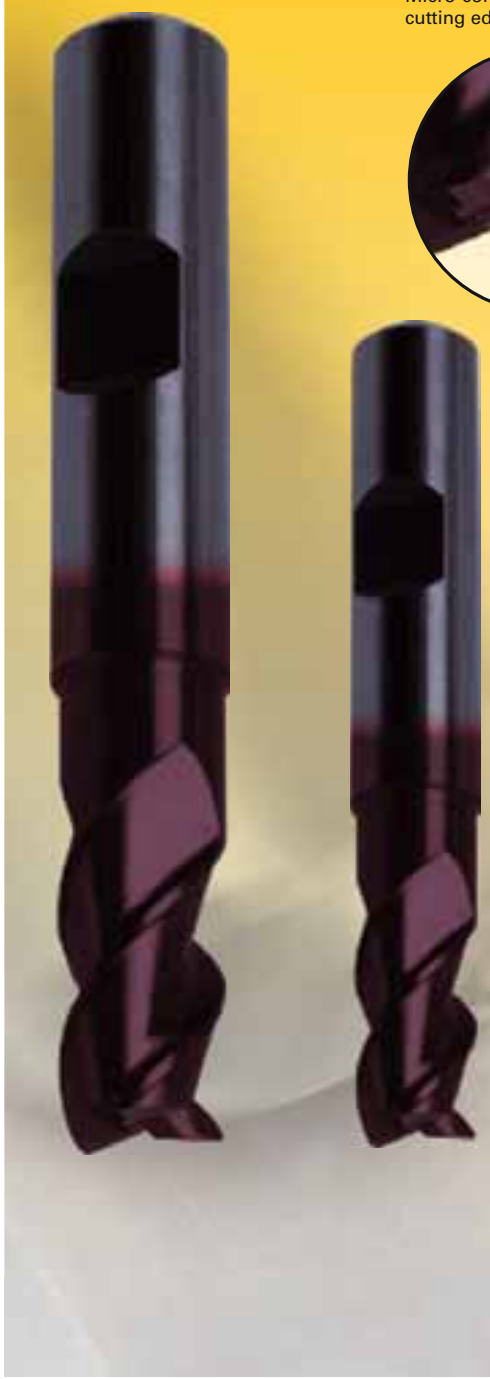


GUHRING

AERO-TECH / GH 100 U high performance 3-flute end mills

The new design Guhring GH 100 U end mills offer the ultimate pre-requisite for a cost-efficient, optimal machining of general steels, high-alloyed steels, CrNi steels as well as stainless steels and titanium-alloys up to 50 HRC.

All GH 100 U end mills excel thanks to their micro-corner protection combined with a reinforced and corrected minor cutting edge. This design considerably reduces the wear at the cutting edges allowing a higher feed rate as well as improved tool life.



Micro-corner protection and corrected reinforced cutting edge = optimal stability

GH 100 U end mills (3-fluted) excel further thanks to their optimized flute geometry, achieving ultimate machining efficiency especially for slot milling and roughing operations. Paired with a very high spiral, optimal chip evacuation is achieved while reducing vibration. The advantages:

- **reduced wear**
- **high feed rates possible**
- **optimal chip evacuation**
- **can be applied for roughing and finishing**

Material	Alloyed Steel		Tool Steel		Cast iron		Cast iron		Stainless steel		Stainless steel		Aluminium		Aluminium		Ti-special alloys		Ti-special alloys		H		H	
Hardness tensile strength	up to 28HRc		over 28 HRc		up to 180 HB 30		over 180 HB 30		up to 28 HRc		over 28 HRc		up to 3% Si		over 3% Si		Ti-based		Ni-based		up to 52 HRC		over 52 HRC	
Aero-Tech	○		●		○		●		○		●		○		●		●		●		○			
Alumi-Tech	○												●		●									
Rough-Tech ALU	○												●		●									
Aero-Rough 48	●		●		●				●		○		○		○		●		●					
Aero-Rough 56	○		●		●		●		○		○		○		○		●		○		●		○	
Rough-Tech 48	●		●		●				●		○		○		○		●		●					
Rough-Tech 56	○		●		●		●		○		○						○		●		●		○	
Finish-Tech 50	○		●		●		●		●		●		○		●		●		●		●		○	
Finish-Tech 62					○		●														●		●	
GF 500	○		●		●		●		○		○				●		●		●		●			
GF 300					○		●										○				●		●	
Uni-Pro (all)	●		○		●		○		○		●		●		○		○		●					

● = optimal suitability ○ = limited suitability

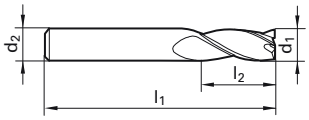
● USA Stock ◯ International Stock (0-2 wks)

GH 100 U / AERO-TECH end mills (3-fluted) for material < 50 HRC

Stub length

NH | 45° | 3 | .001 -.006 x 45°

	HA
Series	3086
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	162

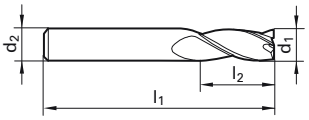


d1	d2	l1	l2	No.	Order	Availability
fract.	fract.	fract.	fract.	flutes	no.	
1/16	1/16	1 1/2	3/8	3	1.590	●
1/8	1/8	1 1/2	1/4	3	3.170	●
3/16	3/16	2	3/8	3	4.760	●
1/4	1/4	2	1/2	3	6.350	●
5/16	5/16	2	1/2	3	7.940	●
3/8	3/8	2	5/8	3	9.520	●
7/16	7/16	2 1/2	5/8	3	11.110	●
1/2	1/2	2 1/2	5/8	3	12.700	●

NH | 45° | 3 | 0.05 -0.15 x 45°

	HA	HB
Series	3540	3729
Tool material	Solid carbide	
Surface finish	FIREX®	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162

NEW NEW



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
3.000	6.000	50.00	4.00	3	3.000	❍	❍
4.000	6.000	54.00	5.00	3	4.000	❍	❍
5.000	6.000	54.00	6.00	3	5.000	❍	❍
6.000	6.000	54.00	7.00	3	6.000	❍	❍
7.000	8.000	58.00	8.00	3	7.000	❍	❍
8.000	8.000	58.00	9.00	3	8.000	❍	❍
9.000	10.000	66.00	10.00	3	9.000	❍	❍
10.000	10.000	66.00	11.00	3	10.000	❍	❍
12.000	12.000	73.00	12.00	3	12.000	❍	❍
14.000	14.000	75.00	14.00	3	14.000	❍	❍
16.000	16.000	82.00	16.00	3	16.000	❍	❍
18.000	18.000	84.00	18.00	3	18.000	❍	❍
20.000	20.000	92.00	20.00	3	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

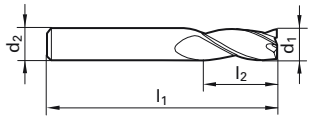
When ordering: EDP no. = Series + Order no., example: 3867 12.700

GH 100 U / AERO-TECH end mills (3-fluted) for material < 50 HRC

Standard length

NH | 45° | 3 | .002 -.008 x 45°

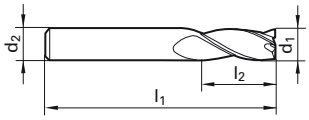
	HA	HA
Series	3172	3173
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162



d1	d2	l1	l2	No.	Order	Availability	
fract.	fract.	fract.	fract.	flutes	no.		
1/8	1/8	1 1/2	3/8	3	3.170	●	●
3/16	3/16	2	5/8	3	4.760	●	●
1/4	1/4	2 1/2	3/4	3	6.350	●	●
5/16	5/16	2 1/2	13/16	3	7.940	●	●
3/8	3/8	3	1	3	9.520	●	●
1/2	1/2	3	1	3	12.700	●	●
5/8	5/8	3 1/2	1 1/4	3	15.870	●	●
3/4	3/4	4	1 1/2	3	19.050	●	●
1	1	4	1 1/2	3	25.400	●	●

NH | 45° | 3 | .002 -.006 x 45°

	HA	HA
Series	3203	3741
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
2.00	2.00	32.00	6.00	3	2.000	●	●
2.50	2.50	32.00	7.00	3	2.500	●	●
3.00	3.00	38.00	7.00	3	3.000	●	●
3.50	3.50	50.00	7.00	3	3.500	●	●
4.00	4.00	50.00	8.00	3	4.000	●	●
4.50	4.50	50.00	8.00	3	4.500	●	●
5.00	5.00	50.00	10.00	3	5.000	●	●
5.50	5.50	57.00	10.00	3	5.500	●	❍
6.00	6.00	57.00	10.00	3	6.000	●	●
6.50	6.50	60.00	13.00	3	6.500	●	❍
7.00	7.00	60.00	13.00	3	7.000	●	❍
7.50	7.50	63.00	16.00	3	7.500	❍	❍
8.00	8.00	63.00	16.00	3	8.000	●	●
8.50	8.50	67.00	16.00	3	8.500	●	●
9.00	9.00	67.00	16.00	3	9.000	●	●
9.50	9.50	72.00	19.00	3	9.500	●	❍
10.00	10.00	72.00	19.00	3	10.000	●	●
11.00	11.00	83.00	22.00	3	11.000	●	❍
12.00	12.00	83.00	22.00	3	12.000	●	●
13.00	13.00	83.00	22.00	3	13.000	❍	❍
14.00	14.00	83.00	22.00	3	14.000	●	●
15.00	15.00	92.00	26.00	3	15.000	●	❍
16.00	16.00	92.00	26.00	3	16.000	●	●
18.00	18.00	92.00	26.00	3	18.000	●	●
20.00	20.00	104.00	32.00	3	20.000	●	●

● USA Stock ❍ International Stock (0-2 wks)

GUHRING Reconditioning Services

Restore your standard and special carbide or PCD tooling to its original factory quality, condition and performance. High precision remanufacturing delivers longer reground tool life and often more regrinds per tool, resulting in significant cost savings in terms of both tooling and machining expenses.

Guhring is able to provide factory reconditioning for our own drills, step drills, carbide end mills and reamers, and we can provide the same high-quality service for most competitors' tooling as well.

Two convenient locations offer in-house regrinds plus recoat service: Brookfield, WI and New Hudson, MI. Daily UPS shipments can return reconditioned tools to your facility within a few days; expedited services are also available.

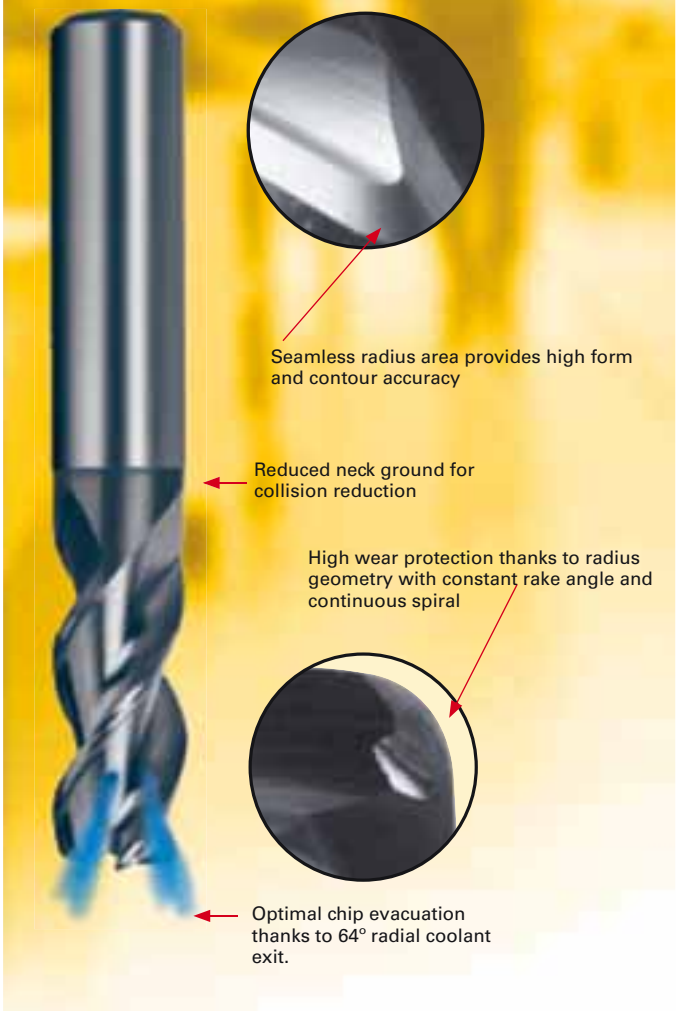
Extend the life of your carbide and PCD tooling - trust Guhring Reconditioning Services to restore your tools to like-new condition.

High metal removal end mills ALUMI-TECH / GA 200 A: The aluminum specialist

This innovative tool was developed specifically for the machining of integrated aluminum components and is suitable for roughing and slot milling as well as finishing operations.

Special features:

- radial coolant exit (64° angle) for optimal chip evacuation
- radius geometry with continuous helix-radius-correction
- reduced neck ground for collision reduction



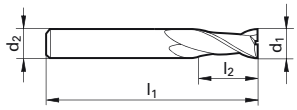
Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Alumi-Tech	○						●	●				

● = optimal suitability ○ = limited suitability

Stub length (metric)

W | 45° | 2 | 0.03 -0.1 x 45°

	HA	HB
Series	3310	3126
Tool material	Solid carbide	
Surface finish	Bright	Bright
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	168	168



NEW NEW

d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
3.000	6.000	50.00	4.00	2	3.000	❍	❍
4.000	6.000	54.00	5.00	2	4.000	❍	❍
5.000	6.000	54.00	6.00	2	5.000	❍	❍
6.000	6.000	54.00	7.00	2	6.000	❍	❍
8.000	8.000	58.00	9.00	2	8.000	❍	❍
10.000	10.000	66.00	11.00	2	10.000	❍	❍
12.000	12.000	73.00	12.00	2	12.000	❍	❍
14.000	14.000	75.00	14.00	2	14.000	❍	❍
16.000	16.000	82.00	16.00	2	16.000	❍	❍
18.000	18.000	84.00	18.00	2	18.000	❍	❍
20.000	20.000	92.00	20.00	2	20.000	❍	❍

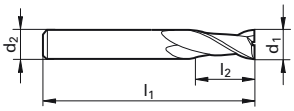
● USA Stock ❍ International Stock (0-2 wks)

GA 200 A / ALUMI-TECH end mills (2-fluted) for aluminum

Standard length

W | 45° | 2 | .001 -.004 x 45°

	HA	HA
Series	3174	3874
Tool material	Solid carbide	
Surface finish	Bright	Super-A
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	168	168

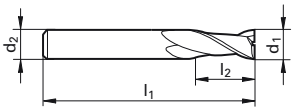


d1	d2	l1	l2	No.	Order	Availability	
fract.	fract.	fract.	fract.	flutes	no.		
1/8	1/8	1 1/2	7/16	2	3.170	●	●
3/16	3/16	2	9/16	2	4.760	●	●
1/4	1/4	2 1/2	3/4	2	6.350	●	●
5/16	5/16	2 1/2	13/16	2	7.940	●	●
3/8	3/8	2 1/2	7/8	2	9.520	●	●
7/16	7/16	2 3/4	1	2	11.110	●	●
1/2	1/2	3	1	2	12.700	●	●
9/16	9/16	3 1/2	1 1/8	2	14.290	●	●
5/8	5/8	3 1/2	1 1/4	2	15.870	●	●
3/4	3/4	4	1 1/2	2	19.050	●	●
1	1	4	1 1/2	2	25.400	●	●

Standard length (metric)

W | 45° | 2 | 0.03 -0.1 x 45°

	HA	HB
Series	3309	3059
Tool material	Solid carbide	
Surface finish	Bright	Bright
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	168	168



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
3.000	6.000	57.00	7.00	2	3.000	❍	❍
4.000	6.000	57.00	8.00	2	4.000	❍	❍
5.000	6.000	57.00	10.00	2	5.000	❍	❍
6.000	6.000	57.00	10.00	2	6.000	❍	❍
8.000	8.000	63.00	16.00	2	8.000	❍	❍
10.000	10.000	72.00	19.00	2	10.000	●	❍
12.000	12.000	83.00	22.00	2	12.000	❍	❍
14.000	14.000	83.00	22.00	2	14.000	❍	❍
16.000	16.000	92.00	26.00	2	16.000	❍	❍
18.000	18.000	92.00	26.00	2	18.000	❍	❍
20.000	20.000	104.00	32.00	2	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

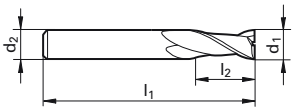
When ordering: EDP no. = Series + Order no., example: 3867 12.700

GA 200 A / ALUMI-TECH end mills (2-flute) for aluminum

Long length

W | 45° | 2 | .001 -.004 x 45°

	HA	HA
Series	3175	3875
Tool material	Solid carbide	
Surface finish	Bright	Super-A
Application	●	●
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	168	168

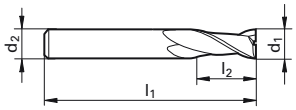


d1	d2	l1	l2	No.	Order	Availability	
fract.	fract.	fract.	fract.	flutes	no.		
1/4	1/4	3	1 1/8	2	6.350	●	●
3/8	3/8	3	1 1/8	2	9.520	●	●
1/2	1/2	4 1/2	2	2	12.700	●	●
5/8	5/8	5	2 1/4	2	15.870	●	●

Extra long length (metric)

W | 45° | 2 | 0.03 -0.1 x 45°

	HA
Series	3358
Tool material	Solid carbide
Surface finish	Bright
Application	●
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	168



NEW

d1	d2	l1	l2	No.	Order	Availability
mm	mm	mm	mm	flutes	no.	
5.000	5.000	75.00	30.00	2	5.000	❍
6.000	6.000	75.00	30.00	2	6.000	❍
8.000	8.000	100.00	40.00	2	8.000	❍
10.000	10.000	100.00	40.00	2	10.000	❍
12.000	12.000	150.00	45.00	2	12.000	❍
16.000	16.000	150.00	65.00	2	16.000	❍

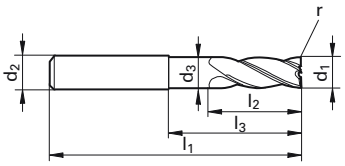
● USA Stock ❍ International Stock (0-2 wks)

GA 200 A / ALUMI-TECH end mills (3-fluted) with corner radius for aluminum

Long length

W 45° 3 R

Series	3177	3877
Tool material	Solid carbide	
Surface finish	Bright	Super-A
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	168	168



NEW

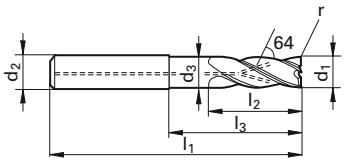
d1=d2	d3	l1	l2	l3	r	Order	3177	3877
fract.	fract.	fract.	fract.	dec.	dec.	no.	Availability	
1/4	1/4	3	3/8	1.500	0.0100	6.350	●	●
5/16	5/16	3	7/16	1.500	0.0125	7.940	●	●
3/8	3/8	3	9/16	1.500	0.0150	9.520	●	●
1/2	1/2	4 1/2	3/4	2.750	0.0200	12.700	●	●
5/8	5/8	5	7/8	3.000	0.0250	15.870	●	●
3/4	3/4	5	1	3.000	0.0300	19.050	●	●

Standard length (metric)

W 45° 3 R

Series	3367
Tool material	Solid carbide
Surface finish	Bright
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	168

* coolant fed

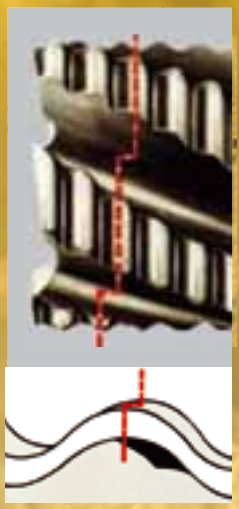


d1=d2	d3	l1	l2	l3	r	Order	3367
mm	mm	mm	mm	mm	mm	no.	Availability
6.000	5.700	57.00	10.00	21.00	1.0	6.000	●
8.000	7.700	63.00	16.00	27.00	1.0	8.000	●
10.000	9.500	72.00	19.00	32.00	1.5	10.000	●
12.000	11.500	83.00	22.00	38.00	1.5	12.000	●
16.000	15.500	92.00	26.00	44.00	2.0	16.000	●
20.000	19.500	104.00	32.00	54.00	2.5	20.000	●

Alloyed Steels · Tool Steels · Cast materials · Stainless Steels · Al and Al-alloys · Ti / Ni alloys · H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

ROUGH-TECH ALU / GS 100 A roughing cutters for aluminum, alloys and soft steel



GS 100 roughing cutters excel primarily thanks to their general purpose application possibilities enabling almost any combination of cutting depth (DOC) and cutting width (WOC). In comparison to roughing/finishing cutters with a flat knuckle-type geometry, the considerably lower power requirement ensures a reliable and economical machining process especially with less powerful machines.
Thanks to its round knuckle-type geometry with a staggered pitch angle (see illustration) the feed engagement is spread across the full length of the cutting edge even with less rigid workpiece clamping conditions or long tool neck lengths. In spite of a lower tooth feed rate compared to flat knuckle-types a high rate of metal removal is achieved.

GS 100 A: special geometry for aluminum:
- The 3-flute, 30° RH helix GS 100 A is suitable for the machining of aluminum, aluminum-alloys and other soft materials up to 700 N/mm².

Advantages at a glance:
- reduced power requirement and cutting pressure
- suitable for less powerful and less stable machines
- suitable for less favorable workpiece and tool clamping conditions
- high metal removal rate thanks to the utilization of the complete cutting edge length

In comparison with conventional tools, GS 100 A roughing cutters with internal cooling excel with considerably longer tool life and higher feed rates as well as increased feed engagement widths and depths. Guhring milling cutters with radial coolant exits at 64° provide particular protection to the sensitive corners. The specifically aimed coolant exits completely prevent built-up edges and ensure complete chip evacuation, especially with deep pockets and channels.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Rough-Tech ALU	○						●	●				

● = optimal suitability ○ = limited suitability

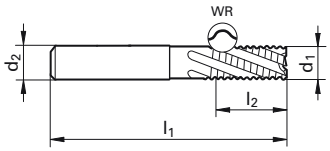
● USA Stock ◐ International Stock (0-2 wks)

GS 100 A / ROUGH-TEC ALU end mills, coarse tooth for aluminum

Standard length

WR | 30° | 3 | .008 - .024 x 45°

	HA	HA
Series	3184	3884
Tool material	Solid carbide	
Surface finish	Bright	Super-A
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	164	164

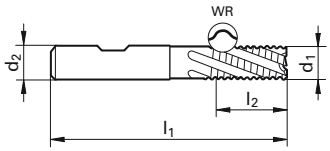


d1	d2	l1	l2	No.	Order	Availability	
fract.	fract.	fract.	fract.	flutes	no.		
1/4	1/4	2 1/2	3/4	3	6.350	●	●
5/16	5/16	2 1/2	3/4	3	7.940	●	●
3/8	3/8	2 1/2	7/8	3	9.520	●	●
1/2	1/2	3	1	3	12.700	●	●
5/8	5/8	3 1/2	1 1/4	3	15.870	●	●
3/4	3/4	4	1 5/8	3	19.050	●	●
1	1	4	1 3/4	3	25.400	●	●

Standard length (metric)

WR | 30° | 3 | 0,3-0,6 x 45°

	HB	HB
Series	3127	3364
Tool material	Solid carbide	
Surface finish	Bright	Bright
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	164	164



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
6.000	6.000	57.00	10.00	3	6.000	❍	❍
8.000	8.000	63.00	16.00	3	8.000	●	●
10.000	10.000	72.00	19.00	3	10.000	❍	●
12.000	12.000	83.00	22.00	3	12.000	❍	●
14.000	14.000	83.00	22.00	3	14.000	❍	
16.000	16.000	92.00	26.00	3	16.000	❍	●
18.000	18.000	92.00	26.00	3	18.000	❍	
20.000	20.000	104.00	32.00	3	20.000	❍	❍
25.000	25.000	121.00	45.00	3	25.000	❍	

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

AERO-ROUGH / RS 100 U/F - Roughing geometry for optimal efficiency

RS 100 high-performance roughing cutters benefit from a completely new roughing geometry, considerably reducing surface finish wear thanks to its unequal spacing. The result is a drastic increase in tool life compared to conventional round knuckle-type geometries and an improvement in the surface finish quality of the workpiece, so that in many applications finishing operations are unnecessary and the machining cost per workpiece is vastly reduced. In addition, the tool excels with a much reduced power requirement in comparison to tools without chip breaking geometry.

Two types of RS 100 high-performance roughing cutters are available: The 4-flute, 30° RH spiral RS 100 U is suitable for the machining of all standard steels. With a new 5 to 6 flute geometry and a spiral angle increased to 45°, RS 100 F possesses a considerably increased core diameter and is suitable for roughing/finishing operations with a width of cut up to 0.25 x D in all general purpose steels and tough materials.

Advantages at a glance:

- increased tool life in comparison to milling cutters with round knuckle-type teeth
- increased feed rate thanks to new edge wear protection
- improved workpiece surface finish
- reduced power requirement compared to smooth cutting milling cutters

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Aero-Rough 48	●	●	●		●	○	○	○	●	●		
Aero-Rough 56	○	●	●	●	○	○	○	○	●	○	●	○

● = optimal suitability ○ = limited suitability

Comparison overview:

Type	NR round knuckle-type	NF flat knuckle-type (old)	RS 100 U&F (new)
Perform. index	100%	65%	120%
Workpiece Surface finish	Ra = 9-10 µm	Ra = 6-7 µm	Ra = 2-3 µm
Tool life index	100%	100%	140%

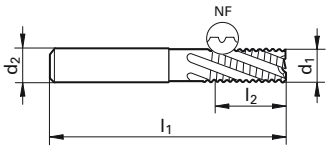
● USA Stock ◐ International Stock (0-2 wks)

RS 100 U / AERO-ROUGH 48 end mills

for materials < 48 HRC, standard length

NF | 30° | 4/5 | .012 -.024 x 45°

	HA
Series	3097
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	163

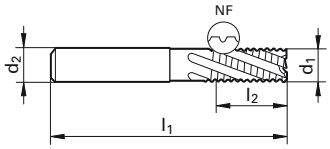


d1	d2	l1	l2	No.	Order	Availability
fract.	fract.	fract.	fract.	flutes	no.	
1/4	1/4	2 1/2	3/4	4	6.350	●
5/16	5/16	2 1/2	13/16	4	7.940	●
3/8	3/8	2 1/2	7/8	4	9.520	●
1/2	1/2	3	1	4	12.700	●
5/8	5/8	3 1/2	1 1/4	4	15.870	●
3/4	3/4	4	1 5/8	4	19.050	●
1	1	4	1 3/4	5	25.400	●

Standard length (metric)

NF | 30° | 4/5 | 0,3-0,6 x 45°

	HA	HB
Series	3887	3888
Tool material	Solid carbide	
Surface finish	FIREX®	
Application		
d_2 Shank Tolerance	h6	
d_1 Tolerance	h10	
Tech. data page	163	



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
6.000	6.000	57.00	13.00	4	6.000	❍	❍
8.000	8.000	63.00	19.00	4	8.000	❍	❍
10.000	10.000	72.00	22.00	4	10.000	❍	❍
12.000	12.000	83.00	26.00	4	12.000	❍	❍
14.000	14.000	83.00	26.00	4	14.000	❍	❍
16.000	16.000	92.00	32.00	4	16.000	❍	❍
18.000	18.000	92.00	32.00	4	18.000	❍	❍
20.000	20.000	104.00	38.00	4	20.000	❍	❍
25.000	25.000	121.00	45.00	5	25.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

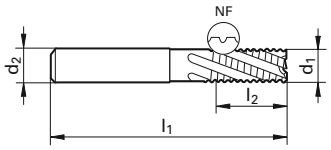
When ordering: EDP no. = Series + Order no., example: 3867 12.700

RS 100 F / AERO-ROUGH 56 end mills for materials < 56 HRC

Standard length

NF | 45° | 5/6 | .012 - .024 x 45°

	HA
Series	3098
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	163



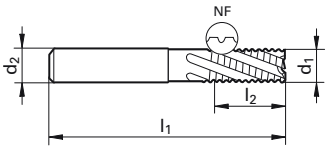
d1	d2	l1	l2	No.	Order	Availability
fract.	fract.	fract.	fract.	flutes	no.	
1/4	1/4	2 1/2	3/4	5	6.350	●
5/16	5/16	2 1/2	13/16	5	7.940	●
3/8	3/8	2 1/2	7/8	5	9.520	●
1/2	1/2	3	1	5	12.700	●
5/8	5/8	3 1/2	1 1/4	6	15.870	●
3/4	3/4	4	1 5/8	6	19.050	●
1	1	4	1 3/4	6	25.400	●

Standard length (metric)

NF | 45° | 5/6 | 0,3-0,6 x 45°

	HA	HB
Series	3889	3890
Tool material	Solid carbide	
Surface finish	FIREX®	
Application		
d_2 Shank Tolerance	h6	
d_1 Tolerance	h10	
Tech. data page	163	

NEW NEW



d1	d2	l1	l2	No.	Order	Availability	
mm	mm	mm	mm	flutes	no.		
6.000	6.000	57.00	13.00	5	6.000	❍	❍
8.000	8.000	63.00	19.00	5	8.000	❍	❍
10.000	10.000	72.00	22.00	5	10.000	❍	❍
12.000	12.000	83.00	26.00	5	12.000	❍	❍
14.000	14.000	83.00	26.00	5	14.000	❍	❍
16.000	16.000	92.00	32.00	6	16.000	❍	❍
18.000	18.000	92.00	32.00	6	18.000	❍	❍
20.000	20.000	104.00	38.00	6	20.000	❍	❍
25.000	25.000	121.00	45.00	6	25.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

GUHRING Coating Services

Cutting tools and wear parts substrates have benefitted from enormous engineering advances over recent decades. Thin film coatings, when properly applied, improve tool and part characteristics and functionality. They increase surface hardness, lower the friction coefficient and thermal conductivity, and provide a chemically inert surface. As a cutting tool manufacturer, Guhring offers a level of coating expertise without equal in the industry. Our coating services features include:

- **High-performance PVD (physical vapor deposition) coatings from the first manufacturer to apply TiN coating to cutting tools**
- **Coatings developed for specific applications and workpiece materials**
- **In-house coating chambers at two U.S. locations; for cut and wear parts**
- **Proprietary Guhring coatings such as FIREX® and Super-A™ for exceptional heat and wear resistance**

ROUGH-TECH 48 GS 100 U
roughing cutters for materials < 48 HRC

GS 100 roughing cutters offer extensive general purpose application possibilities. Thes roughers have a unique round knuckle-type tooth profile which requires less HP than traditional flat knuckle-type end mills.
The unique geometry also has a staggered pitch angle (see illustration), spreading the feed engagement across the full length of the cutting edge and allowing for a high rate of metal removal.

GS 100 U: special geometry for materials < 48 HRC

- The 4-flute GS 100 U with its 30° RH spiral and fine knuckle-type teeth is suitable for the machining of all general steels up to 48 HRC, high-alloyed steels as well as titanium or chrome nickel alloys.

GS 100 H: special geometry for materials < 56 HRC

- The GS 100 F 5- and 6-flute end mill has a 45° right hand spiral with the NF style knuckle design suitable for machining high tensile steels up to 56 HRC hardness.

Advantages at a glance:

- reduced power requirement and cutting pressure
- suitable for less powerful and less stable machines
- suitable for less favorable workpiece and tool clamping conditions
- high metal removal rate thanks to the utilization of the complete cutting edge length

Guhring milling cutters with radial coolant exits at 64° (series #3365) provide particular protection to the sensitive corners. The specifically aimed coolant exits completely prevent built-up edges and ensure complete chip evacuation, especially with deep pockets and channels.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Aero-Tech	○	●	○	●	○	●	○	●	●	●	○	
Alumi-Tech	○						●	●				
Rough-Tech ALU	○						●	●				
Aero-Rough 48	●	●	●		●	○	○	○	●	●		
Aero-Rough 56	○	●	●	●	○	○	○	○	●	○	●	○
Rough-Tech 48	●	●	●		●	○	○	○	●	●		
Rough-Tech 56	○	●	●	●	○	○			○	●	●	○
Finish-Tech 50	○	●	●	●	●	●	○	●	●	●	●	○
Finish-Tech 62			○	●							●	●
GF 500	○	●	●	●	○	○		●	●	●	●	
GF 300			○	●					○		●	●
Uni-Pro (all)	●	○	●	○	○	●	●	○	○	●		

● = optimal suitability ○ = limited suitability

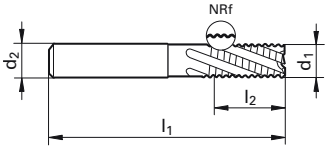
● USA Stock ◯ International Stock (0-2 wks)

GS 100 U / ROUGH-TECH 48 roughing cutters for materials <48 HRC

Standard length

NRf | 30° | 4 | .012 -.024 x 45°

Series	3186	3188	3886
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A
Application			
d_2 Shank Tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	164	164	164



d1	d2	l1	l2	No.	Order	Availability		
fract.	fract.	fract.	fract.	flutes	no.			
1/4	1/4	2 1/2	3/4	4	6.350	●	●	●
5/16	5/16	2 1/2	3/4	4	7.940	●	●	●
3/8	3/8	2 1/2	7/8	4	9.520	●	●	●
1/2	1/2	3	1	4	12.700	●	●	●
5/8	5/8	3 1/2	1 1/4	4	15.870	●	●	●
3/4	3/4	4	1 5/8	4	19.050	●	●	●
1	1	4	1 3/4	4	25.400	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

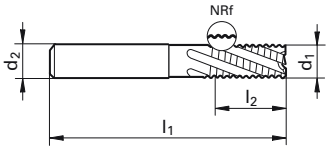
When ordering: EDP no. = Series + Order no., example: 3867 12.700

GS 100 U / ROUGH-TECH 48 end mills, fine tooth for materials < 48 HRC

Standard length (metric)

NRf | 30° | 4 | 0,3-0,6 x 45°

Series	3204	3723	3365
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	FIREX®
Application			
d_2 Shank Tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	164	164	164



d1	d2	l1	l2	No.	Order	Availability		
mm	mm	mm	mm	flutes	no.			
6.000	6.000	57.00	13.00	4	6.000	❍	❍	●
8.000	8.000	63.00	19.00	4	8.000	❍	●	●
10.000	10.000	72.00	22.00	4	10.000	❍	●	●
12.000	12.000	83.00	26.00	4	12.000	●	●	●
14.000	14.000	83.00	26.00	4	14.000	❍	●	
16.000	16.000	92.00	32.00	4	16.000	●	●	●
18.000	18.000	92.00	32.00	4	18.000	❍	❍	
20.000	20.000	104.00	38.00	4	20.000	❍	●	❍
25.000	25.000	121.00	45.00	4	25.000	❍	❍	

● USA Stock ❍ International Stock (0-2 wks)

Need information in a hurry? Or at 11 pm on a Saturday?

Check out www.guhring.com and quickly and easily find detailed information about all of our standard drills, taps and end mills.

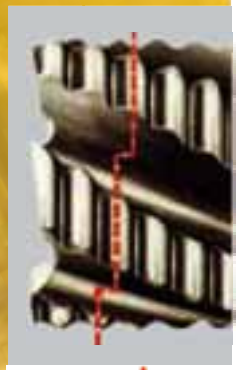
Our newly updated technical library provides common milling formulas, a competitor's cross-reference utility, DIN standard information, tool application tips, and much more.

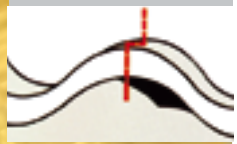
Authorized Guhring distributors can also log into our system and check inventory, track open and closed orders, and download valuable information.

Click on the Guhring Navigator button and utilize our free software to guide you toward the optimal drill, tap or end mill for your application, plus determine various machining parameters such as torque requirements and speed/feed rates.

GS 100 H roughing cutters for materials < 54 HRC

GS 100 roughing cutters excel primarily thanks to their general purpose application possibilities enabling almost any combination of cutting depth (DOC) and cutting width (WOC). In comparison to roughing/finishing cutters with a flat knuckle-type geometry, the considerably lower power requirement ensures a reliable and economical machining process especially with less powerful machines.





GS 100 H: special geometry for materials < 54 HRC:

- GS 100 H excels in the machining of difficult-to-machine materials over 1000 N/mm², cast iron and grey cast iron as well as hardened materials up to approximately 52 to 54 HRC thanks to its 20° helix and its small rake angle.

Advantages at a glance:

- reduced power requirement and cutting pressure
- suitable for less powerful and less stable machines
- suitable for less favourable workpiece and tool clamping conditions
- high metal removal rate thanks to the utilisation of the complete cutting edge length

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Rough-Tech 48	●	●	●		●	○	○	○	●	●		
Rough-Tech 56	○	●	●	●	○	○			○	●	●	○

● = optimal suitability ○ = limited suitability

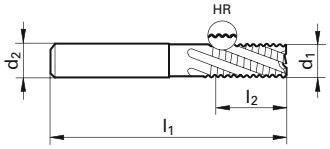
Standard length

HR | 20° | 4 | .012 - .024 x 45°

Series	3189
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	164

HA

54 HRC



d1	d2	l1	l2	No.	Order	Availability
fract.	fract.	fract.	fract.	flutes	no.	
1/4	1/4	2 1/2	3/4	4	6.350	●
5/16	5/16	2 1/2	3/4	4	7.940	●
3/8	3/8	2 1/2	7/8	4	9.520	●
1/2	1/2	3	1	4	12.700	●
5/8	5/8	3 1/2	1 1/4	4	15.870	●
3/4	3/4	4	1 5/8	4	19.050	●

● USA Stock ◐ International Stock (0-2 wks)

GS 100 H / ROUGH-TECH 56 end mills, fine tooth for materials < 54 HRC

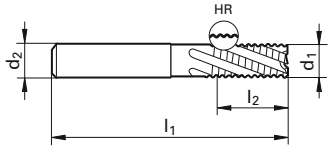
Standard length (metric)

HR | 20° | 4 | 0,3-0,6 x 45°

HB

Series	3682
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	164

54 HRC



d1	d2	l1	l2	No.	Order	Availability
mm	mm	mm	mm	flutes	no.	
6.000	6.000	57.00	13.00	4	6.000	●
8.000	8.000	63.00	19.00	4	8.000	●
10.000	10.000	72.00	22.00	4	10.000	●
12.000	12.000	83.00	26.00	4	12.000	●
16.000	16.000	92.00	32.00	4	16.000	●
20.000	20.000	104.00	38.00	4	20.000	●

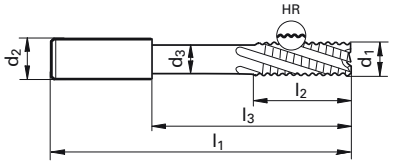
Long length

HR | 20° | 4 | .012 -.024 x 45°

HA

Series	3190
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	164

54 HRC



d1=d2	d3	l1	l2	l3	No.	Order	Availability
fract.	fract.	fract.	fract.	dec.	flutes	no.	
1/4	1/4	3	3/4	1.500	4	6.350	●
5/16	5/16	3	7/8	1.500	4	7.940	●
3/8	3/8	3	7/8	1.500	4	9.520	●
1/2	1/2	4 1/2	1	2.750	4	12.700	●
5/8	5/8	5	1 1/4	3.000	4	15.870	●
3/4	3/4	5	1 1/2	3.000	4	19.050	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GH 100 H high performance end mills for hard milling and superfine finishing

Guhring's hard milling cutters optimally satisfy the requirements for time- and cost-saving machining of hardened workpieces. Different geometries as well as the carbide grade with its high hardness and toughness are optimally adapted for the various milling operations.

Subsequently, Guhring's hard milling cutters achieve highest contour accuracy for cutting depths up to 4xD. Furthermore, milling cutters with full or corner radii are especially suitable for roughing or finishing operations in 3D HSC machining of forms and forging dies.

Advantages:

- application up to 62 HRC
- superior tool rigidity
- high contour accuracy of radii
- excellent surface fiinish

Micro-corner protection and corrected reinforced cutting edge = optimal stability

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Finish-Tech 62			○	●							●	●

● = optimal suitability ○ = limited suitability

● USA Stock ◯ International Stock (0-2 wks)

GH 100 H / FINISH-TECH 62 multi-flute end mills for superfine finishing of materials < 62 HRC

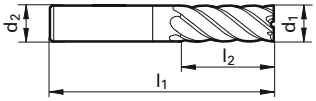
Standard length

H | 55° | 6/8 | .002 -.008 x 45°

HA

Series	3182
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	162

62HRC



d1	d2	l1	l2	No.	Order	Availability
fract.	fract.	fract.	fract.	flutes	no.	
1/4	1/4	2 1/2	3/4	6	6.350	●
5/16	5/16	2 1/2	7/8	6	7.940	●
3/8	3/8	2 1/2	7/8	6	9.520	●
1/2	1/2	3	1	6	12.700	●
5/8	5/8	3 1/2	1 1/4	6	15.870	●
3/4	3/4	4	1 1/2	8	19.050	●

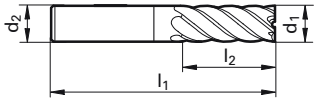
Standard length (metric)

H | 55° | 6/8 | 0.05 -0.2 x 45°

HA

Series	3715
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	162

62HRC



d1	d2	l1	l2	No.	Order	Availability
mm	mm	mm	mm	flutes	no.	
3.000	6.000	57.00	8.00	6	3.000	❍
4.000	6.000	57.00	11.00	6	4.000	❍
5.000	6.000	57.00	13.00	6	5.000	❍
6.000	6.000	57.00	13.00	6	6.000	●
8.000	8.000	63.00	19.00	6	8.000	❍
10.000	10.000	72.00	22.00	6	10.000	❍
12.000	12.000	83.00	26.00	6	12.000	❍
14.000	14.000	83.00	26.00	6	14.000	❍
16.000	16.000	92.00	32.00	6	16.000	❍
18.000	18.000	92.00	32.00	8	18.000	❍
20.000	20.000	104.00	38.00	8	20.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GH 100 H / FINISH-TECH 62 multi-flute end mills for superfine finishing of materials < 62 HRC

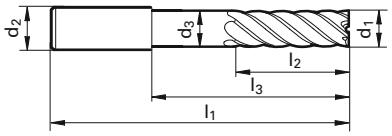
Long length

H | 55° | 6/8 | .002 -.008 x 45°

HA

Series	3183
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	162

62HRC



d1=d2	d3	l1	l2	l3	No.	Order	Availability
fract.	fract.	fract.	fract.	dec.	flutes	no.	
1/4	1/4	3	3/4	1.500	6	6.350	●
5/16	5/16	3	7/8	1.500	6	7.940	●
3/8	3/8	3	7/8	1.500	6	9.520	●
1/2	1/2	4 1/2	1	2.750	6	12.700	●
5/8	5/8	5	1 1/4	3.000	6	15.870	●
3/4	3/4	5	1 1/2	3.000	8	19.050	●

Long length (metric)

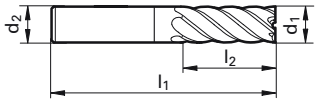
H | 55° | 6/8 | 0.05 -0.2 x 45°

HA

Series	3716
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h10
Tech. data page	162

62HRC

NEW



d1	d2	l1	l2	No.	Order	Availability
mm	mm	mm	mm	flutes	no.	
6.000	6.000	75.00	30.00	6	6.000	❍
8.000	8.000	100.00	40.00	6	8.000	❍
10.000	10.000	150.00	40.00	6	10.000	❍
12.000	12.000	150.00	45.00	6	12.000	❍
16.000	16.000	150.00	65.00	6	16.000	❍
20.000	20.000	150.00	65.00	8	20.000	❍

● USA Stock ❍ International Stock (0-2 wks)

Finish-Tech 50 / GH 100 U high performance end mills

The new design Guhring GH 100 U end mills offer the ultimate pre-requisite for a cost-efficient, optimal machining of general steels, high-alloyed steels, CrNi steels as well as stainless steels and titanium-alloys up to 50 HRC.

All GH 100 U end mills excel thanks to their micro-corner protection combined with a reinforced and corrected minor cutting edge. This design considerably reduces the wear at the cutting edges allowing a higher feed rate as well as improving tool life.

Micro-corner protection and corrected reinforced cutting edge = optimal stability

GH 100 U multi-tooth end mills excel thanks to a reinforced core, providing high stability and enabling the production of optimal workpiece surfaces. Together with the reduced machining time wear is drastically reduced. The advantages:

- **reduced wear**
- **high feed rates possible**
- **high contour accuracy**
- **reduced machining time**
- **suitable for HSC (High Speed Cutting)**

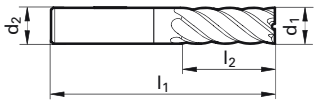
Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Finish-Tech 50	○	●	●	●	●	●	○	●	●	●	●	○

● = optimal suitability ○ = limited suitability

Standard length

NH | 45° | 6-10 | .002 -.008 x 45°

Series	3178	3179
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162



d1 fract.	d2 fract.	l1 fract.	l2 fract.	No. flutes	Order no.	Availability 3178	Availability 3179
1/4	1/4	2 1/2	3/4	6	6.350	●	●
5/16	5/16	2 1/2	7/8	6	7.940	●	●
3/8	3/8	2 1/2	7/8	6	9.520	●	●
1/2	1/2	3	1	6	12.700	●	●
5/8	5/8	3 1/2	1 1/4	6	15.870	●	●
3/4	3/4	4	1 1/2	8	19.050	●	●
1	1	4	1 1/2	10	25.400	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

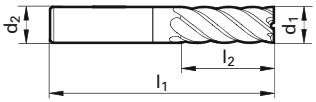
When ordering: EDP no. = Series + Order no., example: 3867 12.700

GH 100 H / FINISH-TECH 50 multi-tooth end mills for superfine finishing of materials < 50 HRC

Standard length (metric)

NH | 45° | 6-10 | 0.05 -0.2 x 45°

Series	3311	3689	3019	3047
Tool material	Solid carbide			
Surface finish	Bright	FIREX®	Bright	FIREX®
Application				
d_2 Shank Tolerance	h6	h6	h6	h6
d_1 Tolerance	h10	h10	h10	h10
Tech. data page	162	162	162	162



d1	d2	l1	l2	No.	Order	HA	HA	HB	HB
mm	mm	mm	mm	flutes	no.	Availability			
3.000	6.000	57.00	8.00	6	3.000	❍	●	❍	❍
4.000	6.000	57.00	11.00	6	4.000	❍	●	❍	❍
5.000	6.000	57.00	13.00	6	5.000	❍	●	❍	❍
6.000	6.000	57.00	13.00	6	6.000	❍	●	❍	❍
8.000	8.000	63.00	19.00	6	8.000	❍	●	❍	❍
10.000	10.000	72.00	22.00	6	10.000	❍	●	❍	❍
12.000	12.000	83.00	26.00	6	12.000	❍	●	❍	❍
14.000	14.000	83.00	26.00	6	14.000	❍	●	❍	❍
16.000	16.000	92.00	32.00	6	16.000	❍	●	❍	❍
18.000	18.000	92.00	32.00	8	18.000	❍	●	❍	❍
20.000	20.000	104.00	38.00	8	20.000	❍	●	❍	❍
25.000	25.000	121.00	45.00	10	25.000	❍	❍	❍	❍

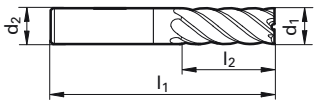
● USA Stock ❍ International Stock (0-2 wks)

GH 100 H / FINISH-TECH 50 multi-tooth end mills for superfine finishing of materials < 50 HRC

Long length

NH | 45° | 6/8 | .002 -.008 x 45°

	HA	HA
Series	3180	3181
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162



d1	d2	l1	l2	No.	Order	Availability	
fract.	fract.	fract.	fract.	flutes	no.		
1/4	1/4	3	1 1/8	6	6.350	●	●
5/16	5/16	3	1 1/8	6	7.940	●	●
3/8	3/8	3	1 1/8	6	9.520	●	●
1/2	1/2	4 1/2	2	6	12.700	●	●
5/8	5/8	5	2 1/4	6	15.870	●	●
3/4	3/4	5	2 1/4	8	19.050	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

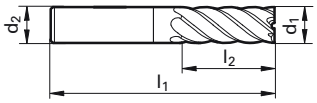
When ordering: EDP no. = Series + Order no., example: 3867 12.700

GH 100 H / FINISH-TECH 50 multi-tooth end mills for superfine finishing of materials < 50 HRC

Extra Long length (metric)

NH | 45° | 6/8 | 0.05 -0.2 x 45°

Series	3312	3313	3691	3693
Tool material	Solid carbide			
Surface finish	Bright		FIREX®	
Application				
d_2 Shank Tolerance	h6	h6	h6	h6
d_1 Tolerance	h10	h10	h10	h10
Tech. data page	162	162	162	162
	HA	HB	HA	HB



d1	d2	l1	l2	No.	Order	Availability			
mm	mm	mm	mm	flutes	no.				
6.00	6.00	75.00	30.00	6	6.000	❍	❍	●	❍
8.00	8.00	100.00	40.00	6	8.000	❍	❍	❍	❍
10.00	10.00	100.00	40.00	6	10.000	❍	❍	●	❍
12.00	12.00	150.00	45.00	6	12.000	❍	❍	●	❍
16.00	16.00	150.00	65.00	6	16.000	❍	❍	●	❍
20.00	20.00	150.00	65.00	8	20.000	❍	❍	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

Looking for the next level in finish milling?

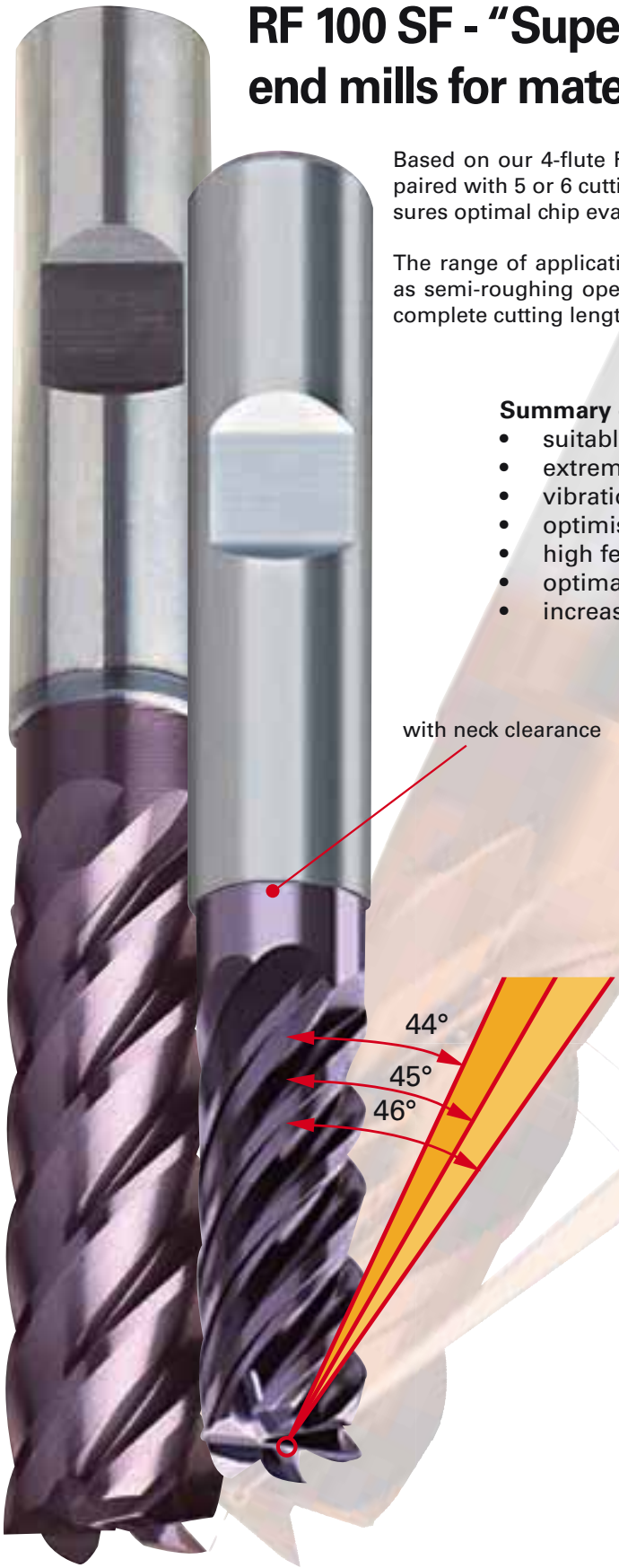
RF 100 SF - “Super Finish“ variable helix end mills for materials up to 48 HRC

Based on our 4-flute RF 100 U the RF 100 S/F has a higher, more rigid web paired with 5 or 6 cutting edges. In addition, its innovative flute geometry ensures optimal chip evacuation.

The range of application includes super finishing and HSC finishing as well as semi-roughing operations, i.e. feed widths (a_e) up to 0.3xD with close to complete cutting length.

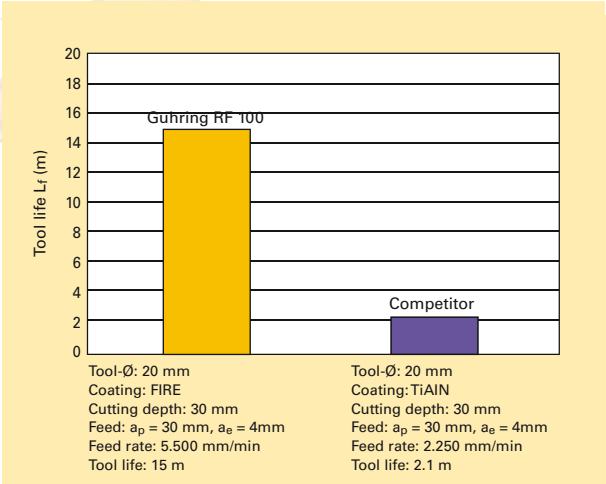
Summary of advantages

- suitable for semi-roughing and HSC-finishing
- extremely high form accuracy
- vibration-free operation
- optimised flute geometry
- high feed rates possible
- optimal surface quality
- increased tool life



micro-corner protection for longer tool life

**** See page 53 for more information***



Tool life comparison:
Semi-roughing in 48 HRC the RF 100 S/F achieves more than 7 times the too life in comparison to conventional end mills.

Finish-Tech 50 / GH 100 U high performance end mills with radius

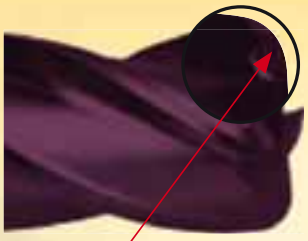
The new design Guhring GH 100 U end mills offer the ultimate pre-requisite for a cost-efficient, optimal machining of general steels, high-alloyed steels, CrNi steels as well as stainless steels and titanium-alloys up to 50 HRC.

All GH 100 U end mills excel thanks to their micro-corner protection combined with a reinforced and corrected minor cutting edge. This design considerably reduces the wear at the cutting edges allowing a higher feed rate as well as improving tool life.

GH 100 U multi-tooth end mills excel thanks to a reinforced core, providing high stability and optimal workpiece surfaces. Along with reduced machining time, wear is drastically reduced. The advantages:

- **reduced wear**
- **high feed rates possible**
- **high contour accuracy**
- **reduced machining time**
- **suitable for HSC (High Speed Cutting)**

Seamless radius area provides high form and contour accuracy.



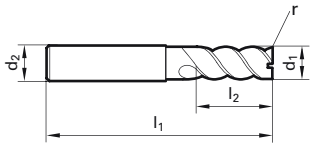
High wear protection thanks to radius geometry with constant rake angle and continuous spiral.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
Finish-Tech 50	○	●	●	●	●	●	○	●	●	●	●	○

● = optimal suitability ○ = limited suitability

Standard length

Series		3091
Tool material		Solid carbide
Surface finish		FIREX®
Application		
d_2 Shank Tolerance		h6
d_1 Tolerance		h10
Tech. data page		162



d1=d2	l1	l2	r	No.	Code	Availability
fract.	fract.	fract.	dec.	flutes	No.	
1/4	2 1/2	3/4	0.015	6	6.352	●
1/4	2 1/2	3/4	0.031	6	6.354	●
1/4	2 1/2	3/4	0.062	6	6.356	●
5/16	2 1/2	13/16	0.015	6	7.942	●
5/16	2 1/2	13/16	0.031	6	7.944	●
5/16	2 1/2	13/16	0.062	6	7.946	●
3/8	2 1/2	1	0.015	6	9.522	●
3/8	2 1/2	1	0.031	6	9.524	●
3/8	2 1/2	1	0.062	6	9.526	●
1/2	3	1	0.015	6	12.702	●
1/2	3	1	0.031	6	12.704	●
1/2	3	1	0.062	6	12.706	●
1/2	3	1	0.090	6	12.707	●
5/8	3 1/2	1 /14	0.031	6	15.874	●
5/8	3 1/2	1 /14	0.062	6	15.876	●
5/8	3 1/2	1 /14	0.090	6	15.877	●
3/4	4	1 1/2	0.031	8	19.054	●
3/4	4	1 1/2	0.062	8	19.056	●
3/4	4	1 1/2	0.09	8	19.057	●
3/4	4	1 1/2	0.0125	8	19.059	●

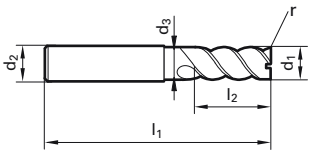
● USA Stock ◐ International Stock (0-2 wks)

GH 100 U / FINISH-TECH 50 multi-flute end mills with corner radius

Standard length (metric)

NH | 45° | 6/8 | R

	HA	HA
Series	3112	3563
Tool material	Solid carbide	Solid carbide
Surface finish	Bright	FIREX®
Application		
d_2 Shank Tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	162	162



d1=d2	d3	l1	l2	r	No.	Code		Availability
mm	mm	mm	mm	mm	fl.	No.		
6.000	5.700	57.00	13.00	0.50	6	6.005	❍	●
6.000	5.700	57.00	13.00	1.00	6	6.010	❍	❍
8.000	7.700	63.00	19.00	0.50	6	8.005	❍	❍
8.000	7.700	63.00	19.00	1.00	6	8.010	❍	❍
8.000	7.700	63.00	19.00	1.50	6	8.015	❍	❍
8.000	7.700	63.00	19.00	2.00	6	8.020	❍	❍
10.000	9.500	72.00	22.00	0.50	6	10.005	❍	●
10.000	9.500	72.00	22.00	1.00	6	10.010	❍	●
10.000	9.500	72.00	22.00	1.50	6	10.015	❍	❍
10.000	9.500	72.00	22.00	2.00	6	10.020	❍	❍
12.000	11.500	83.00	26.00	0.50	6	12.005	❍	❍
12.000	11.500	83.00	26.00	1.00	6	12.010	❍	❍
12.000	11.500	83.00	26.00	1.50	6	12.015	❍	❍
12.000	11.500	83.00	26.00	2.00	6	12.020	❍	❍
16.000	15.500	92.00	32.00	1.00	6	16.010	❍	❍
16.000	15.500	92.00	32.00	1.50	6	16.015	❍	❍
16.000	15.500	92.00	32.00	2.00	6	16.020	❍	❍
20.000	19.500	104.00	38.00	1.00	8	20.010	❍	❍
20.000	19.500	104.00	38.00	1.50	8	20.015	❍	❍
20.000	19.500	104.00	38.00	2.00	8	20.020	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 HSC Trace Milling Cutters with ball nose or Torus form -

GF 500 HSC (High Speed Cutting) trace milling cutters are suitable for all roughing, finishing as well as fine finishing operations under HSC conditions in the mould and die industry. The range of application includes all general steels as well as high-alloyed steels but also hardened materials from 40 to 54 HRC.

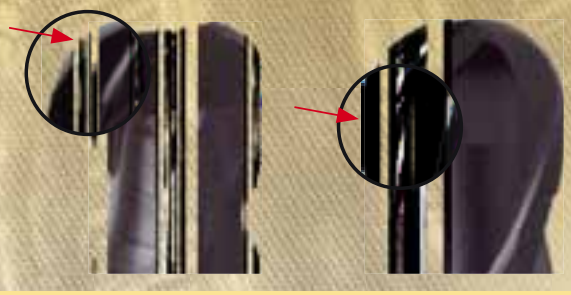
The new web thinning form provides optimal chip evacuation as well as stability. In addition, the extremely close tolerances on radius and diameter ensure a very high contour accuracy on the workpiece, improving tool life considerably. A completely new grinding process produces considerably smoother cutting edges and flutes and also results in a clear increase in tool life. GF 500 B HSC ball nose trace milling cutters and GF 500 T HSC-trace milling cutters with Torus form are both available with different lengths. The combination of the new geometries with reinforced shanks as well as reduced neck diameters allows extremely high feed rates and also provides high rigidity and optimal collision protection even for increased cutting depths.

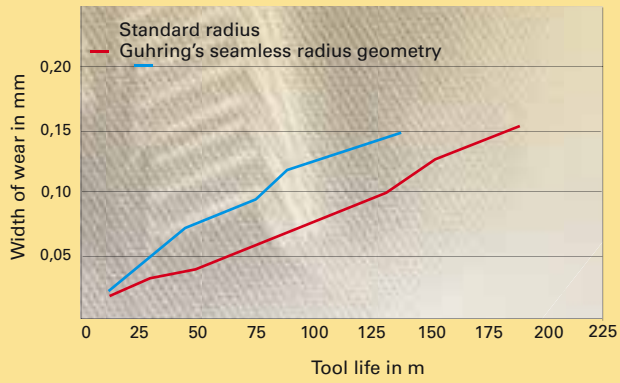
Advantages at a glance:

- accurate tolerances on diameter
- close radius tolerances
- radius grind with constant helix correction
- straight and radius areas ground in one pass
- grinding process for highest Surface finish finishes

Optimal wear protection thanks to radius grind with constant rake angle and continuous helix.

Seamless radius area provides high form and contour accuracy.

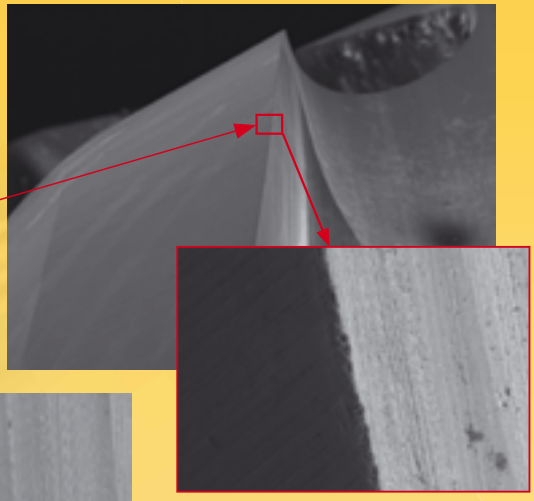




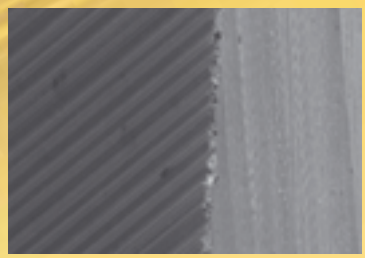
Pic. 1: Wear comparison
Guhring's seamless radius geometry reduces wear and provides a considerably longer tool life in comparison with tools ground with conventional full radius.

for highest accuracy in the mold and die industry

GF 500 milling cutters benefit from considerably smoother cutting edges and flutes produced by a completely new grinding process. It results in a reduction in crumbling of the cutting edges and therefore increases tool life. In addition, wear is extremely even, allowing more economical and frequent regrinding of the tools and providing further cost advantages.

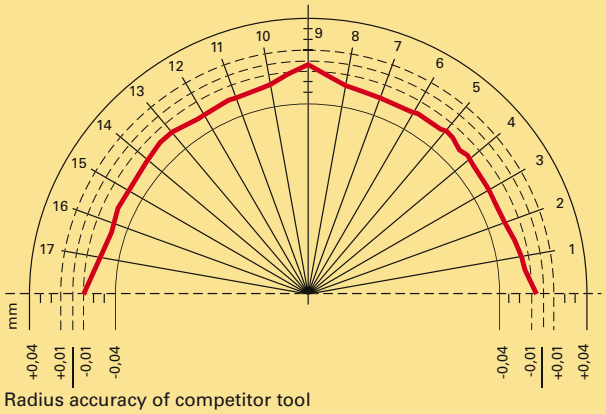


GF 500 cutting edge, produced with the new Guhring grinding process

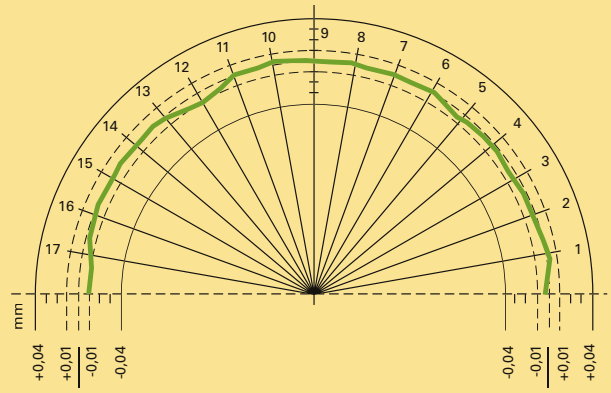


Cutting edge of the competitor tool, produced by conventional grinding process

As well as high Surface finish qualities, close radius tolerances are achieved. Subsequently, GF 500 milling cutters offer very high form accuracy as well as considerable tool life increases up to 60 % in comparison to conventional tools.



Radius accuracy of competitor tool
(+/- 0.05 mm, +/-0.002“)



GF 500 radius tolerance
(+/- 0.01 mm, +/-0.0004“)

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
GF 500	○	●	●	●	○	○		●	●	●	●	

● = optimal suitability ○ = limited suitability

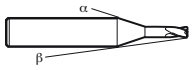
GF 500 T HSC-profile cutters with Torus form for materials < 54 HRC

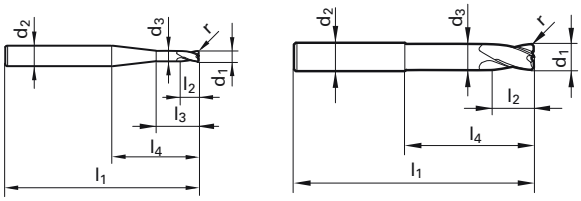
Standard length (metric)

Series	3856
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54 HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)





d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	57.00	3.00	6.20	20.00	0.50	5.70	2	2.000	❍
3.000	6.000	2.800	57.00	3.50	8.40	20.00	0.50	4.30	2	3.000	❍
4.000	6.000	3.800	57.00	4.00	9.40	20.00	1.00	2.90	2	4.000	❍
6.000	6.000	5.600	57.00	6.00	-	20.00	2.00	-	2	6.000	●
8.000	8.000	7.600	63.00	7.00	-	26.00	2.00	-	2	8.000	❍
10.000	10.000	9.600	72.00	8.00	-	30.00	3.00	-	2	10.000	❍
12.000	12.000	11.500	83.00	10.00	-	35.00	4.00	-	2	12.000	❍

● USA Stock ❍ International Stock (0-2 wks)

Long length (metric)

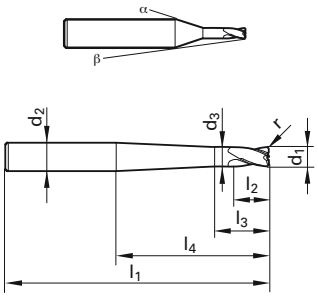
N | 30° | 2 | R

HA

Series	3859
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54 HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	80.00	3.00	8.00	40.00	0.50	2.90	2	2.000	❍
3.000	6.000	2.800	80.00	3.50	12.00	40.00	0.50	2.20	2	3.000	❍
4.000	6.000	3.800	80.00	4.00	20.00	40.00	1.00	1.40	2	4.000	❍
6.000	8.000	5.600	100.00	6.00	25.00	60.00	2.00	1.00	2	6.000	❍
8.000	10.000	7.600	120.00	7.00	30.00	75.00	2.00	0.80	2	8.000	❍
10.000	12.000	9.600	120.00	8.00	30.00	70.00	3.00	0.80	2	10.000	❍
12.000	16.000	11.500	150.00	10.00	35.00	100.00	4.00	1.20	2	12.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 T HSC-profile cutters with Torus form / tapered for materials < 54 HRC

Long length (metric)

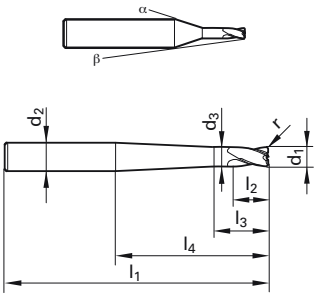
N | 30° | 2 | R

HA

Series	3860
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54 HRC

Radius Precision ± 0.0004" (+/- 0.01mm)



d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	80.00	3.00	8.00	40.00	0.50	1.00	2	2.000	❍
3.000	6.000	2.800	80.00	3.50	12.00	40.00	0.50	1.00	2	3.000	❍
4.000	6.000	3.800	100.00	4.00	20.00	60.00	0.50	1.00	2	4.000	❍
6.000	8.000	5.600	120.00	6.00	25.00	80.00	1.00	1.00	2	6.000	❍
8.000	10.000	7.600	150.00	7.00	20.00	105.00	1.00	0.60	2	8.000	❍

● USA Stock ❍ International Stock (0-2 wks)

GF 500 T HSC-profile cutters with Torus form / reduced neck for materials < 54 HRC

Long length (metric)

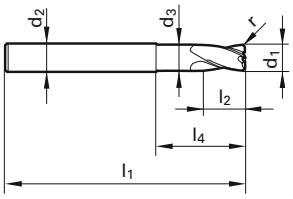
N | 30° | 2 | R

HA

Series	3865
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	d3	l1	l2	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	no.	
6.000	6.000	5.600	80.00	6.00	45.00	2.00	2	6.000	❍
8.000	8.000	7.600	100.00	7.00	65.00	2.00	2	8.000	❍
10.000	12.000	9.600	120.00	8.00	70.00	3.00	2	10.000	❍
12.000	12.000	11.500	120.00	10.00	75.00	4.00	2	12.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 T HSC-profile cutters with Torus form for materials < 54 HRC

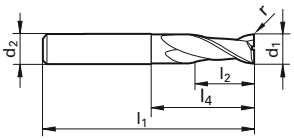
Long length (metric)

Series	3863
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

HA

54HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	l1	l2	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	flutes	no.	
4.000	4.000	80.00	8.00	17.50	0.50	2	4.000	●
6.000	6.000	100.00	12.00	23.00	1.00	2	6.000	❍
8.000	8.000	100.00	16.00	29.00	1.00	2	8.000	❍
10.000	10.000	100.00	20.00	35.00	1.00	2	10.000	❍
12.000	12.000	120.00	24.00	41.00	1.50	2	12.000	❍

● USA Stock ❍ International Stock (0-2 wks)

GF 500 B HSC-ball nose profile cutters for materials < 54 HRC

Standard length (metric)

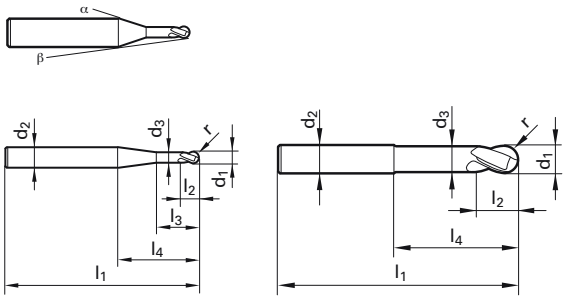
N | 30° | 2 | Ball

HA

Series	3848
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	57.00	3.00	6.200	20.00	1.00	5.70	2	2.000	❍
3.000	6.000	2.800	57.00	3.50	8.400	20.00	1.50	4.30	2	3.000	❍
4.000	6.000	3.800	57.00	4.00	9.400	20.00	2.00	2.90	2	4.000	❍
6.000	6.000	5.600	57.00	6.00	20.000	20.00	3.00	-	2	6.000	❍
8.000	8.000	7.600	63.00	7.00	26.000	26.00	4.00	-	2	8.000	❍
10.000	10.000	9.600	72.00	8.00	30.000	30.00	5.00	-	2	10.000	❍
12.000	12.000	11.500	83.00	10.00	35.000	35.00	6.00	-	2	12.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 B HSC-ball nose profile cutters / tapered for materials < 54 HRC

Long length (metric)

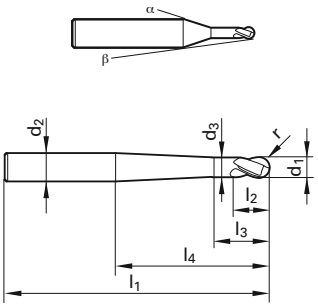
N | 30° | 2 | Ball

HA

Series	3849
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

Radius Precision ± 0.0004" (+/- 0.01mm)



d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	80.00	3.00	8.00	40.00	1.00	2.90	2	2.000	❍
3.000	6.000	2.800	80.00	3.50	12.00	40.00	1.50	2.20	2	3.000	❍
4.000	6.000	3.800	80.00	4.00	20.00	40.00	2.00	1.40	2	4.000	❍
5.000	6.000	4.700	80.00	5.00	25.00	40.00	2.50	0.70	2	5.000	❍
6.000	8.000	5.600	100.00	6.00	25.00	60.00	3.00	1.00	2	6.000	❍
8.000	10.000	7.600	120.00	7.00	30.00	75.00	4.00	0.80	2	8.000	❍
10.000	12.000	9.600	120.00	8.00	30.00	70.00	5.00	0.80	2	10.000	❍
12.000	16.000	11.500	150.00	10.00	35.00	100.00	6.00	1.20	2	12.000	❍

● USA Stock ❍ International Stock (0-2 wks)

GF 500 B HSC-ball nose profile cutters / tapered for materials < 54 HRC

Long length (metric)

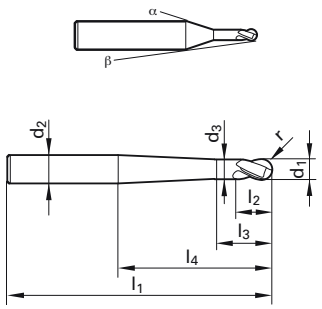
N | 30° | 2 | Ball

HA

Series	3853
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	d3	l1	l2	l3	l4	r	β	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	mm	°	flutes	no.	
2.000	6.000	1.800	80.00	3.00	8.00	40.00	1.00	1.00	2	2.000	❍
3.000	6.000	2.800	80.00	3.50	12.00	40.00	1.50	1.00	2	3.000	❍
4.000	6.000	3.800	100.00	4.00	20.00	60.00	2.00	1.00	2	4.000	❍
6.000	8.000	5.600	120.00	6.00	25.00	80.00	3.00	1.00	2	6.000	❍
8.000	10.000	7.600	150.00	7.00	20.00	105.00	4.00	0.60	2	8.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 B HSC-ball nose profile cutters / reduced neck for materials < 54 HRC

Long length (metric)

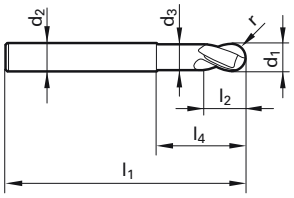
N | 30° | 2 | Ball

HA

Series	3855
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

Radius Precision ± 0.0004" (+/- 0.01mm)



d1	d2	d3	l1	l2	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	no.	
6.000	6.000	5.600	80.00	6.00	45.00	3.00	2	6.000	❍
8.000	8.000	7.600	100.00	7.00	65.00	4.00	2	8.000	❍
10.000	10.000	9.600	120.00	8.00	80.00	5.00	2	10.000	❍
12.000	12.000	11.500	120.00	10.00	75.00	6.00	2	12.000	❍

● USA Stock ❍ International Stock (0-2 wks)

GF 500 B HSC-ball nose profile cutters for materials < 54 HRC

Standard length (metric)

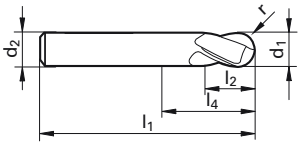
N | 30° | 2 | Ball

HA

Series	3854
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

Radius Precision ± 0.0004“ (+/- 0.01mm)



d1	d2	l1	l2	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	flutes	no.	
6.000	6.000	57.00	12.00	23.00	3.00	2	6.000	❍
8.000	8.000	63.00	16.00	29.00	4.00	2	8.000	❍
10.000	10.000	72.00	20.00	35.00	5.00	2	10.000	❍
12.000	12.000	83.00	24.00	41.00	6.00	2	12.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 500 B HSC-ball nose profile cutters for materials < 54 HRC

Long length (metric)

N | 30° | 2 | Ball

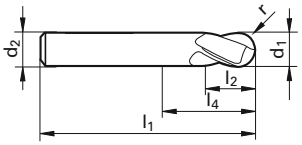
HA

Series	3866
Tool material	Solid carbide
Surface finish	TiAlN
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC

l4 = Recommended projection from chuck

Radius Precision ± 0.0004" (+/- 0.01mm)

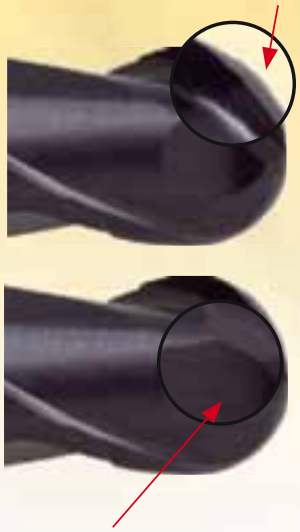


d1	d2	l1	l2	l4	r	No.	Order	Availability
mm	mm	mm	mm	mm	mm	flutes	no.	
4.000	4.000	80.00	8.00	17.50	2.00	2	4.000	❍
6.000	6.000	100.00	12.00	23.00	3.00	2	6.000	❍
8.000	8.000	100.00	16.00	29.00	4.00	2	8.000	❍
10.000	10.000	100.00	20.00	35.00	5.00	2	10.000	❍
12.000	12.000	120.00	24.00	41.00	6.00	2	12.000	❍

● USA Stock ❍ International Stock (0-2 wks)

GF 300 B and GF 300 T: Ball nose and Torus end mills for high performance milling in materials < 62 HRC

High wear protection thanks to radius geometry with constant rake angle and continuous spiral.



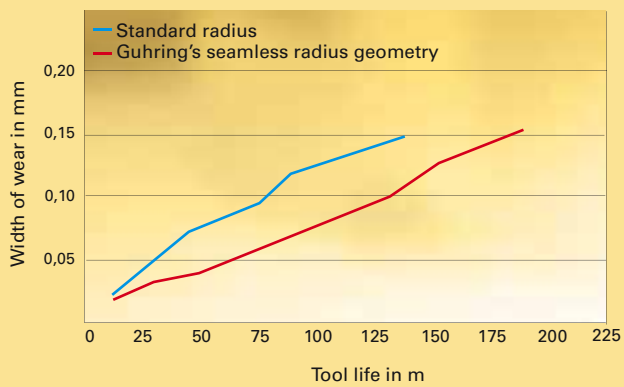
Seamless radius area provides high form and contour accuracy.

The die and mold industry places ever higher demands on milling cutters – primarily with regard to accuracy and tool life. Therefore, Guhring's cutting tool program now includes radius milling cutters that are perfectly adapted to satisfy these demands and provide optimal machining results thanks to application orientated geometries, carbide grades and coatings. The advantages are especially high form and contour accuracy of the workpiece, minimal wear and therefore excellent tool life.

The special features of Guhring's ball nose milling cutters are:

- outside diameter and the radius is ground in one-pass
- radius point geometry with constant helix-radius-correction
- reduced neck ground for collision reduction with protruding edges

(see next page)



Wear comparison:
Guhring's seamless radius geometry reduces wear and provides a considerably longer tool life in comparison with tools ground with conventional full radius.

Material	Alloyed Steel	Tool Steel	Cast iron		Stainless steel		Aluminium		Ti-special alloys		H	
Hardness tensile strength	up to 28HRc	over 28 HRc	up to 180 HB 30	over 180 HB 30	up to 28 HRc	over 28 HRc	up to 3% Si	over 3% Si	Ti-based	Ni-based	up to 52 HRC	over 52 HRC
GF 500	○	●	●	●	○	○		●	●	●	●	
GF 300			○	●					○		●	●

● = optimal suitability ○ = limited suitability

GF 300 T / TRACE-TECH 62 cutters with Torus grind / reduced neck for materials < 62 HRC

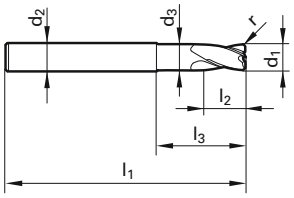
Extra long length

H | 30° | 4 | R

HA

Series	3192
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54HRC



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
fract.	fract.	dec.	fract.	fract.	dec.	dec.	flutes	No.	
3/16	1/4	0.167	2 1/2	3/16	1.000	0.008	4	4.760	●
1/4	1/4	0.230	3	1/4	1.500	0.010	4	6.350	●
5/16	5/16	0.292	3	5/16	1.500	0.013	4	7.940	●
3/8	3/8	0.355	3	3/8	1.500	0.013	4	9.520	●
1/2	1/2	0.480	4 1/2	1/2	2.750	0.020	4	12.700	●
5/8	5/8	0.605	5	5/8	3.000	0.025	4	15.870	●

● USA Stock ◯ International Stock (0-2 wks)

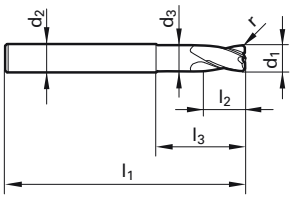
Extra long length (metric)

H | 30° | 4 | R

HA

Series	3362
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	167

54 HRC



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	No.	
6.000	6.000	5.700	75.00	9.00	39.00	1.00	4	6.000	❍
8.000	8.000	7.700	100.00	12.00	64.00	1.00	4	8.000	❍
10.000	10.000	9.500	100.00	15.00	60.00	1.50	4	10.000	❍
12.000	12.000	11.500	150.00	18.00	105.00	1.50	4	12.000	❍
16.000	16.000	15.500	150.00	24.00	102.00	2.00	4	16.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

GF 300 B / TRACE-TECH ball nose cutters / reduced neck for materials < 62 HRC

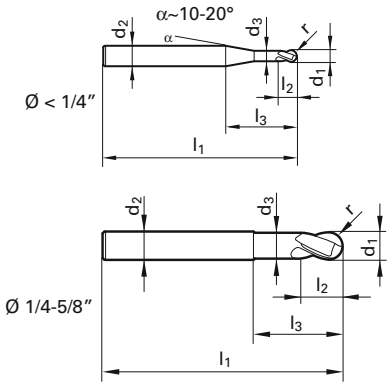
Standard length

H | 30° | 2 | Ball

HA

Series	3101
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
fract.	fract.	dec.	fract.	fract.	dec.	dec.	flutes	No.	
1/8	1/8	0.113	2	3/8	0.500	0.063	2	3.170	●
3/16	3/16	0.176	2	3/16	0.500	0.094	2	4.760	●
1/4	1/4	0.238	2	1/4	0.688	0.125	2	6.350	●
5/16	5/16	0.300	2	5/16	1.197	0.156	2	7.940	●
3/8	3/8	0.363	2 1/2	3/8	1.197	0.188	2	9.520	●
1/2	1/2	0.480	3	1/2	1.447	0.250	2	12.700	●

● USA Stock ◯ International Stock (0-2 wks)

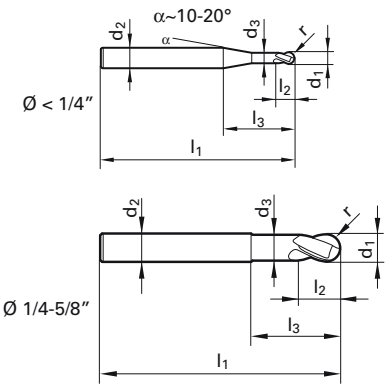
Standard length (metric)

H | 30° | 2 | Ball

HA

Series	3359
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

54 HRC



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	No.	
0.500	3.000	0.400	38.00	0.75	10.00	0.25	2	0.500	❍
0.800	3.000	0.700	38.00	1.20	10.00	0.40	2	0.800	❍
1.000	3.000	0.900	38.00	1.50	10.00	0.50	2	1.000	❍
1.500	3.000	1.400	38.00	2.25	10.00	0.75	2	1.500	❍
2.000	6.000	1.900	57.00	3.00	21.00	1.00	2	2.000	●
3.000	6.000	2.700	57.00	5.00	21.00	1.50	2	3.000	●
4.000	6.000	3.700	57.00	6.00	21.00	2.00	2	4.000	●
5.000	6.000	4.700	57.00	8.00	21.00	2.50	2	5.000	●
6.000	6.000	5.700	57.00	9.00	21.00	3.00	2	6.000	●
8.000	8.000	7.700	63.00	12.00	27.00	4.00	2	8.000	●
10.000	10.000	9.500	72.00	15.00	32.00	5.00	2	10.000	●
12.000	12.000	11.500	83.00	18.00	38.00	6.00	2	12.000	❍
16.000	16.000	15.500	92.00	24.00	44.00	8.00	2	16.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

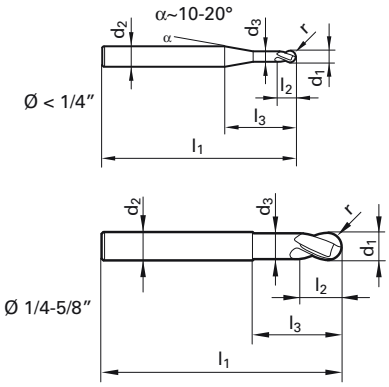
GF 300 B / TRACE-TECH ball nose cutters / reduced neck for materials < 62 HRC

Long length

H | 30° | 2 | Ball

HA

Series	3191
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
fract.	fract.	dec.	fract.	fract.	dec.	dec.	flutes	No.	
1/8	1/4	0.230	2 1/2	1/8	1.000	0.063	2	3.170	●
3/16	1/4	0.167	2 1/2	3/16	1.000	0.094	2	4.760	●
1/4	1/4	0.230	3	1/4	1.500	0.125	2	6.350	●
5/16	5/16	0.292	3	5/16	1.500	0.156	2	7.940	●
3/8	3/8	0.355	3	3/8	1.500	0.188	2	9.520	●
1/2	1/2	0.480	4 1/2	1/2	2.750	0.250	2	12.700	●
5/8	5/8	0.605	5	5/8	3.000	0.313	2	15.870	●

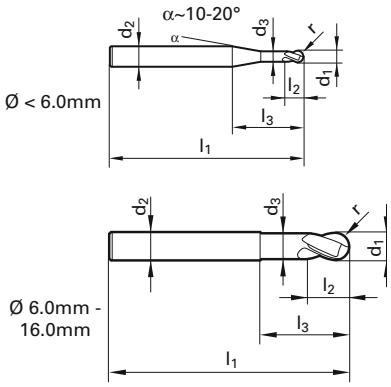
● USA Stock ◯ International Stock (0-2 wks)

Extra long length (metric)

H | 30° | 2 | Ball

HA

Series	3360
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank Tolerance	h6
d_1 Tolerance	h8
Tech. data page	166

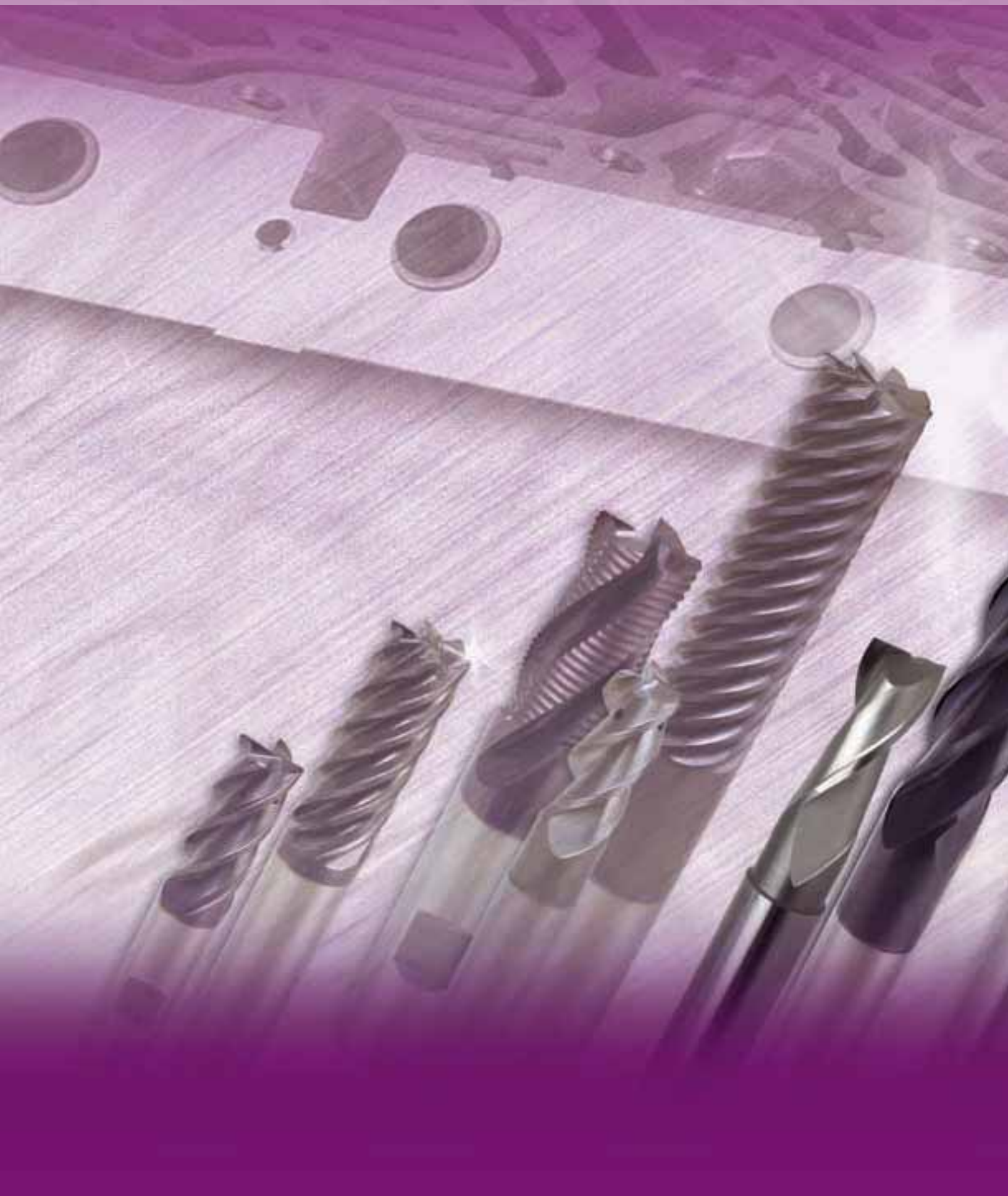


d1	d2	d3	l1	l2	l3	r	No.	Code	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	No.	
3.000	6.000	2.700	75.00	5.00	39.00	1.50	2	3.000	❍
4.000	6.000	3.700	75.00	6.00	39.00	2.00	2	4.000	❍
5.000	6.000	4.700	75.00	8.00	39.00	2.50	2	5.000	❍
6.000	6.000	5.700	75.00	9.00	39.00	3.00	2	6.000	❍
8.000	8.000	7.700	100.00	12.00	64.00	4.00	2	8.000	❍
10.000	10.000	9.500	100.00	15.00	60.00	5.00	2	10.000	❍
12.000	12.000	11.500	150.00	18.00	105.00	6.00	2	12.000	❍
16.000	16.000	15.500	150.00	24.00	102.00	8.00	2	16.000	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

PRO-LINE



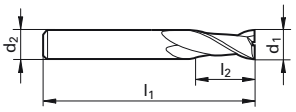
GUHRING

UNI PRO end mills (2-fluted)

Stub length

N | 30° | 2 | .001 -.006 x 45°

	HA
Series	3092
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	165



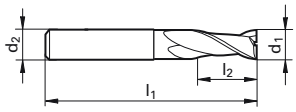
d1	d2	l1	l2	No.	Code	Availability
fract.	fract.	fract.	fract.	flutes	No.	
1/16	1/16	1 1/2	1/8	2	1.590	●
1/8	1/8	1 1/2	1/4	2	3.170	●
3/16	3/16	2	3/8	2	4.760	●
1/4	1/4	2	1/2	2	6.350	●
5/16	5/16	2	1/2	2	7.940	●
3/8	3/8	2	5/8	2	9.520	●
7/16	7/16	2 1/2	5/8	2	11.110	●
1/2	1/2	2 1/2	5/8	2	12.700	●
5/8	5/8	3	3/4	2	15.870	●
3/4	3/4	3	1	2	19.050	●

Stub length (metric)

N | 30° | 2 | 0.025 -0.150 x 45°

	HA	HB
Series	3633	3634
Tool material	Solid carbide	
Surface finish	FIREX®	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
2.000	6.000	50.00	3.00	2	2.000	❍	❍
2.500	6.000	50.00	3.00	2	2.500	❍	❍
3.000	6.000	50.00	4.00	2	3.000	●	❍
4.000	6.000	54.00	5.00	2	4.000	❍	❍
5.000	6.000	54.00	6.00	2	5.000	❍	❍
6.000	6.000	54.00	7.00	2	6.000	❍	❍
6.500	8.000	58.00	8.00	2	6.500	❍	❍
8.000	8.000	58.00	9.00	2	8.000	❍	❍
10.000	10.000	66.00	11.00	2	10.000	❍	❍
12.000	12.000	73.00	12.00	2	12.000	❍	❍
14.000	14.000	75.00	14.00	2	14.000	❍	❍
16.000	16.000	82.00	16.00	2	16.000	❍	❍
18.000	18.000	84.00	18.00	2	18.000	❍	❍
20.000	20.000	92.00	20.00	2	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

UNI PRO end mills (2-fluted)

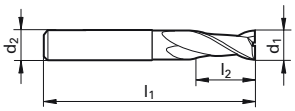
Standard length

N | 30° | 2 | 0.025 -0.150 x 45°

Series	3146	3148	3846
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

HA | HA | HA

NEW Expanded offering!



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/16	1/8	1 1/2	3/16	2	1.590	●	●	●
5/64	1/8	1 1/2	1/4	2	1.980	●	●	○
3/32	1/8	1 1/2	9/32	2	2.380	●	●	●
7/64	1/8	1 1/2	3/8	2	2.780	●	●	○
1/8	1/8	1 1/2	3/8	2	3.170	●	●	●
9/64	3/16	2	9/16	2	3.570	●	●	○
5/32	3/16	2	1/2	2	3.970	●	●	●
11/64	3/16	2	9/16	2	4.370	●	●	○
3/16	3/16	2	5/8	2	4.760	●	●	●
13/64	31/4	2 1/2	5/8	2	5.160	●	●	○
7/32	1/4	2 1/2	5/8	2	5.560	●	●	●
15/64	1/4	2 1/2	3/4	2	5.950	●	●	○
1/4	1/4	2 1/2	3/4	2	6.350	●	●	●
17/64	5/16	2 1/2	7/8	2	6.750	●	●	○
9/32	5/16	2 1/2	3/4	2	7.140	●	●	●
19/64	5/16	2 1/2	7/8	2	7.540	●	●	○
5/16	5/16	2 1/2	13/16	2	7.940	●	●	●
21/64	3/8	2 1/2	7/8	2	8.330	●	●	○
11/32	3/8	2 1/2	1	2	8.730	●	●	●
23/64	3/8	2 1/2	7/8	2	9.130	●	●	○
3/8	3/8	2 1/2	1	2	9.520	●	●	●
25/64	7/16	2 1/2	7/8	2	9.920	●	●	○
13/32	7/16	2 3/4	1	2	10.320	●	●	●
27/64	7/16	2 1/2	7/8	2	10.720	●	●	○
7/16	7/16	2 3/4	1	2	11.110	●	●	●
29/64	1/2	3	1	2	11.510	●	●	○
15/32	1/2	3	1	2	11.910	●	●	●
31/64	1/2	3	1	2	12.300	●	●	○
1/2	1/2	3	1	2	12.700	●	●	●
9/16	9/16	3 1/2	1 1/8	2	14.290	●	●	●
5/8	5/8	3 1/2	1 1/4	2	15.870	●	●	●
11/16	3/4	4	1 3/8	2	17.460	●	●	●
3/4	3/4	4	1 1/2	2	19.050	●	●	●
1	1	4	1 1/2	2	25.400	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

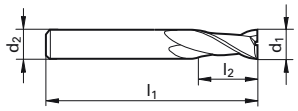
Red indicates NEW size - available Fall 2010

UNI PRO end mills (2-fluted)

Standard length (metric)

N | 30° | 2 | 0.05 -0.15 x 45°

	HA	HA
Series	3303	3676
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

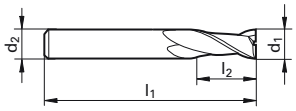


d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
2.000	2.000	32.00	6.00	2	2.000	○	●
2.500	2.500	32.00	7.00	2	2.500	○	○
3.000	3.000	38.00	7.00	2	3.000	○	●
3.500	3.500	50.00	7.00	2	3.500	○	●
4.000	4.000	50.00	8.00	2	4.000	●	○
4.500	4.500	50.00	8.00	2	4.500	○	●
5.000	5.000	50.00	10.00	2	5.000	●	●
5.500	5.500	57.00	10.00	2	5.500	○	●
6.000	6.000	57.00	10.00	2	6.000	○	●
6.500	6.500	60.00	13.00	2	6.500	○	●
7.000	7.000	60.00	13.00	2	7.000	○	○
7.500	7.500	63.00	16.00	2	7.500	○	●
8.000	8.000	63.00	16.00	2	8.000	●	●
8.500	8.500	67.00	16.00	2	8.500	○	●
9.000	9.000	67.00	16.00	2	9.000	○	●
9.500	9.500	72.00	19.00	2	9.500	○	●
10.000	10.000	72.00	19.00	2	10.000	○	●
11.000	11.000	83.00	22.00	2	11.000	○	○
12.000	12.000	83.00	22.00	2	12.000	○	●
13.000	13.000	83.00	22.00	2	13.000	○	●
14.000	14.000	83.00	22.00	2	14.000	○	○
15.000	15.000	92.00	26.00	2	15.000	●	○
16.000	16.000	92.00	26.00	2	16.000	○	●
18.000	18.000	92.00	26.00	2	18.000	○	●
20.000	20.000	104.00	32.00	2	20.000	○	●

Extra Long length (metric)

N | 30° | 2 | 0.05 -0.15 x 45°

	HA	HA
Series	3011	3021
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165
	NEW	NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
3.000	3.000	75.00	20.00	2	3.000	○	○
4.000	4.000	75.00	25.00	2	4.000	○	○
5.000	5.000	75.00	30.00	2	5.000	○	○
6.000	6.000	75.00	30.00	2	6.000	○	○
8.000	8.000	100.00	40.00	2	8.000	●	○
10.000	10.000	100.00	40.00	2	10.000	○	○
12.000	12.000	150.00	45.00	2	12.000	○	○
14.000	14.000	150.00	45.00	2	14.000	○	○
14.000	16.000	150.00	65.00	2	14.001	○	○
16.000	16.000	150.00	65.00	2	16.000	○	○
18.000	18.000	150.00	65.00	2	18.000	○	○
18.000	20.000	150.00	65.00	2	18.001	○	○
20.000	20.000	150.00	65.00	2	20.000	○	○

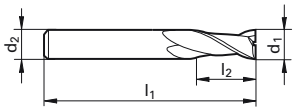
● USA Stock ○ International Stock (0-2 wks)

UNI PRO end mills (2-fluted)

Long length

N | 30° | 2 | .002 -.008 x 45°

	HA	HA	HA
Series	3147	3149	3847
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/8	1/8	2	1/2	2	3.170	●	●	●
3/16	3/16	2 1/2	3/4	2	4.760	●	●	●
1/4	1/4	3	1 1/8	2	6.350	●	●	●
5/16	5/16	3	1 1/8	2	7.940	●	●	●
3/8	3/8	3	1 1/8	2	9.520	●	●	●
7/16	7/16	4 1/2	2	2	11.110	●	●	●
1/2	1/2	4 1/2	2	2	12.700	●	●	●
5/8	5/8	5	2 1/4	2	15.870	●	●	●
3/4	3/4	5	2 1/4	2	19.050	●	●	●
1	1	5	2 1/4	2	25.400	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

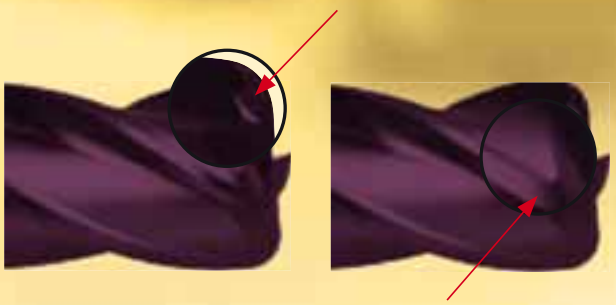
Corner radius milling cutters: Satisfying the highest demands on accuracy and tool life

Especially the die and mould industry places ever higher demands on milling cutters – primarily with regard to accuracy and tool life. Therefore, Guhring's cutting tool program now includes radius milling cutters that are perfectly adapted to satisfy these demands and provide optimal machining results thanks to application orientated geometries, carbide grades and coatings. The advantages are especially high form and contour accuracy of the workpiece, minimal wear and therefore excellent tool life.

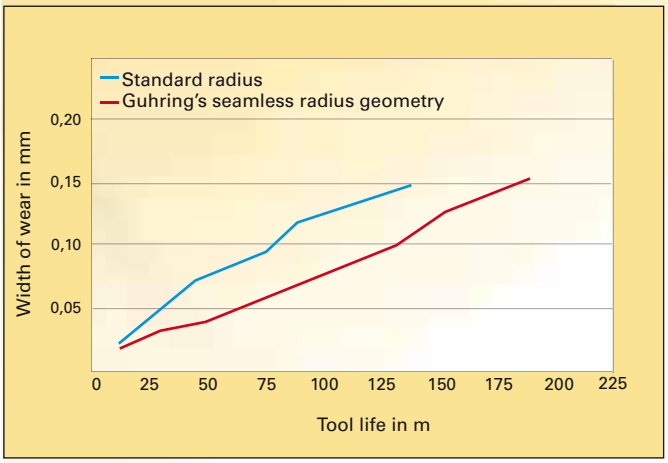
The special features of Guhring's Ball nose milling cutters are:

- outside diameter and the radius is ground in one-pass
- radius point geometry with constant helix-radius-correction
- reduced neck ground for collision reduction with protruding edges

High wear protection thanks to radius geometry with constant rake angle and continuous spiral.



Seamless radius area provides high form and contour accuracy.

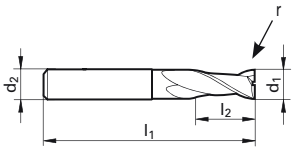


Wear comparison:
Guhring's seamless radius geometry reduces wear and provides a considerably longer tool life in comparison with tools ground with conventional full radius.

Standard length

N | 30° | 2 | R | HA

Series	3087
Tool material	Carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	HA
d_1 Tolerance	h10
Tech. data page	165



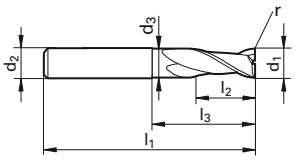
d1	d2	l1	l2	r	No.	Code	Availability
fract.	fract.	fract.	fract.	in.	flutes	No.	
1/8	1/8	1 1/2	3/8	0.015	2	3.172	●
1/8	1/8	1 1/2	3/8	0.031	2	3.174	●
3/16	3/16	2	5/8	0.015	2	4.762	●
3/16	3/16	2	5/8	0.031	2	4.764	●
3/16	3/16	2	5/8	0.062	2	4.766	●
1/4	1/4	2 1/2	3/4	0.015	2	6.352	●
1/4	1/4	2 1/2	3/4	0.031	2	6.354	●
1/4	1/4	2 1/2	3/4	0.062	2	6.356	●
5/16	5/16	2 1/2	13/16	0.015	2	7.942	●
5/16	5/16	2 1/2	13/16	0.031	2	7.944	●
5/16	5/16	2 1/2	13/16	0.062	2	7.946	●
3/8	3/8	2 1/2	1	0.015	2	9.522	●
3/8	3/8	2 1/2	1	0.031	2	9.524	●
3/8	3/8	2 1/2	1	0.062	2	9.526	●
1/2	1/2	3	1	0.015	2	12.702	●
1/2	1/2	3	1	0.031	2	12.704	●
1/2	1/2	3	1	0.062	2	12.706	●

● USA Stock ◯ International Stock (0-2 wks)

UNI PRO “R” end mills (2-fluted) with corner radius

Standard length (metric)

N | 30° | 2 | R



	HA	HA
Series	3106	3561
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

NEW

NEW

d1	d2	d3	l1	l2	l3	r	No.	Code	Availability	
mm	mm	mm	mm	mm	mm	mm	flutes	No.		
6.000	6.000	5.700	57.00	10.00	21.00	0.50	2	6.005	❍	❍
6.000	6.000	5.700	57.00	10.00	21.00	1.00	2	6.010	❍	❍
8.000	8.000	7.700	63.00	16.00	27.00	0.50	2	8.005	❍	❍
8.000	8.000	7.700	63.00	16.00	27.00	1.00	2	8.010	❍	❍
8.000	8.000	7.700	63.00	16.00	27.00	1.50	2	8.015	❍	❍
8.000	8.000	7.700	63.00	16.00	27.00	2.00	2	8.020	❍	❍
10.000	10.000	9.500	72.00	19.00	32.00	0.50	2	10.005	❍	❍
10.000	10.000	9.500	72.00	19.00	32.00	1.00	2	10.010	❍	❍
10.000	10.000	9.500	72.00	19.00	32.00	1.50	2	10.015	❍	❍
10.000	10.000	9.500	72.00	19.00	32.00	2.00	2	10.020	❍	❍
12.000	12.000	11.500	83.00	22.00	38.00	0.50	2	12.005	❍	❍
12.000	12.000	11.500	83.00	22.00	38.00	1.00	2	12.010	❍	❍
12.000	12.000	11.500	83.00	22.00	38.00	1.50	2	12.015	❍	❍
12.000	12.000	11.500	83.00	22.00	38.00	2.00	2	12.020	❍	❍
16.000	16.000	15.500	92.00	26.00	44.00	1.00	2	16.010	❍	❍
16.000	16.000	15.500	92.00	26.00	44.00	1.50	2	16.015	❍	❍
16.000	16.000	15.500	92.00	26.00	44.00	2.00	2	16.020	❍	❍
20.000	20.000	19.500	104.00	32.00	54.00	1.00	2	20.010	❍	❍
20.000	20.000	19.500	104.00	32.00	54.00	1.50	2	20.015	❍	❍
20.000	20.000	19.500	104.00	32.00	54.00	2.00	2	20.020	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO “R” end mills (2-fluted) with corner radius

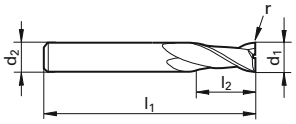
Long length

N | 30° | 2 | R

HA

Series	3088
Tool material	Solid carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	165

NEW



d1	d2	l1	l2	r	No.	Code	Availability
fract.	fract.	fract.	fract.	in.	flutes	No.	
1/8	1/8	2	1/2	0.015	2	3.172	●
1/8	1/8	2	1/2	0.031	2	3.174	●
1/4	1/4	3	1 1/8	0.015	2	6.352	●
1/4	1/4	3	1 1/8	0.031	2	6.354	●
1/4	1/4	3	1 1/8	0.062	2	6.356	●
3/8	3/8	3	1 1/8	0.015	2	9.522	●
3/8	3/8	3	1 1/8	0.031	2	9.524	●
3/8	3/8	3	1 1/8	0.062	2	9.526	●
1/2	1/2	4 1/2	2	0.015	2	12.702	●
1/2	1/2	4 1/2	2	0.031	2	12.704	●
1/2	1/2	4 1/2	2	0.062	2	12.706	●

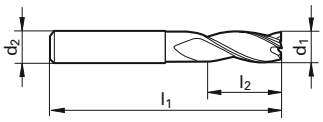
● USA Stock ◯ International Stock (0-2 wks)

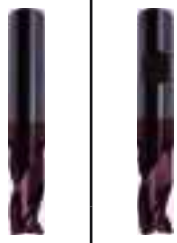
UNI PRO end mills (3-fluted)

Stub length (metric)

N | 30° | 3 | 0.05 -0.15 x 45°

	HA	HB
Series	3558	3719
Tool material	Carbide	Carbide
Surface finish	FIREX®	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165





NEW NEW

d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
2.000	6.000	50.00	3.00	3	2.000	❍	❍
2.500	6.000	50.00	3.00	3	2.500	❍	❍
3.000	6.000	50.00	4.00	3	3.000	●	●
3.500	6.000	50.00	4.00	3	3.500	❍	❍
4.000	6.000	54.00	5.00	3	4.000	❍	❍
5.000	6.000	54.00	6.00	3	5.000	❍	❍
6.000	6.000	54.00	7.00	3	6.000	❍	❍
7.000	8.000	58.00	8.00	3	7.000	❍	❍
8.000	8.000	58.00	9.00	3	8.000	❍	❍
10.000	10.000	66.00	11.00	3	10.000	●	●
12.000	12.000	73.00	12.00	3	12.000	❍	❍
16.000	16.000	82.00	16.00	3	16.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

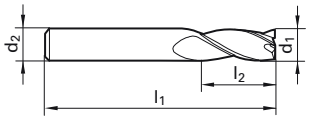
When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO end mills (3-fluted)

Standard length

N | 30° | 3 | .002 -.008 x 45°

Series	3168	3170	3868
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/8	1/8	1 1/2	3/8	3	3.170	●	●	●
3/16	3/16	2	5/8	3	4.760	●	●	●
1/4	1/4	2 1/2	3/4	3	6.350	●	●	●
5/16	5/16	2 1/2	13/16	3	7.940	●	●	●
3/8	3/8	3	1	3	9.520	●	●	●
7/16	7/16	2 3/4	1	3	11.110	●	●	●
1/2	1/2	3	1	3	12.700	●	●	●
9/16	9/16	3 1/2	1 1/8	3	14.290	●	●	●
5/8	5/8	3 1/2	1 1/4	3	15.870	●	●	●
3/4	3/4	4	1 1/2	3	19.050	●	●	●
1	1	4	1 1/2	3	25.400	●	●	●

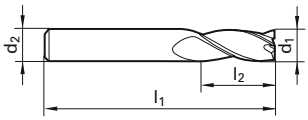
● USA Stock ◯ International Stock (0-2 wks)

UNI PRO end mills (3-fluted)

Standard length (metric)

N | 30° | 3 | 0.05 -0.15 x 45°

	HA	HA
Series	3307	3677
Tool material	Solid Carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165



NEW

d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
2.000	2.000	32.00	6.00	3	2.000	❍	❍
2.500	2.500	32.00	7.00	3	2.500	❍	❍
3.000	3.000	38.00	7.00	3	3.000	❍	❍
3.500	3.500	50.00	7.00	3	3.500	❍	❍
4.000	4.000	50.00	8.00	3	4.000	❍	❍
4.500	4.500	50.00	8.00	3	4.500	❍	❍
5.000	5.000	50.00	10.00	3	5.000	❍	❍
5.500	5.500	57.00	10.00	3	5.500	❍	❍
6.000	6.000	57.00	10.00	3	6.000	❍	❍
6.500	6.500	60.00	13.00	3	6.500	❍	❍
7.000	7.000	60.00	13.00	3	7.000	❍	❍
7.500	7.500	63.00	16.00	3	7.500	❍	❍
8.000	8.000	63.00	16.00	3	8.000	❍	❍
8.500	8.500	67.00	16.00	3	8.500	❍	❍
9.000	9.000	67.00	16.00	3	9.000	❍	❍
9.500	9.500	72.00	19.00	3	9.500	❍	❍
10.000	10.000	72.00	19.00	3	10.000	❍	❍
11.000	11.000	83.00	22.00	3	11.000	❍	❍
12.000	12.000	83.00	22.00	3	12.000	❍	❍
13.000	13.000	83.00	22.00	3	13.000	❍	❍
14.000	14.000	83.00	22.00	3	14.000	❍	❍
15.000	15.000	92.00	26.00	3	15.000	❍	❍
16.000	16.000	92.00	26.00	3	16.000	❍	❍
18.000	18.000	92.00	26.00	3	18.000	❍	❍
20.000	20.000	104.00	32.00	3	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

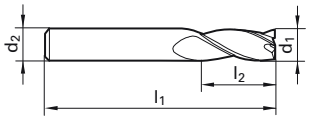
When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO XL end mills (3-fluted)

Extra long length

N | 30° | 3 | 0.05 -0.2 x 45°

	HA	HA	HA
Series	3169	3171	3869
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



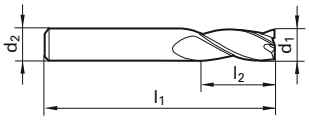
d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
3/16	3/16	3	1 1/4	3	4.760	●	●	●
1/4	1/4	4	1 5/8	3	6.350	●	●	●
5/16	5/16	4	1 5/8	3	7.940	●	●	●
3/8	3/8	4	1 5/8	3	9.520	●	●	●
7/16	7/16	5	2	3	11.110	●	●	●
1/2	1/2	6	3	3	12.700	●	●	●
5/8	5/8	6	3	3	15.870	●	●	●
3/4	3/4	6	3	3	19.050	●	●	●
1	1	6	3	3	25.400	●	●	●

● USA Stock ◯ International Stock (0-2 wks)

Extra long length (metric)

N | 30° | 3 | 0.05 -0.15 x 45°

	HA	HA
Series	3314	3680
Tool material		Carbide
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165
	NEW	NEW



d1	d2	l1	l2	No.	Code		Availability
mm	mm	mm	mm	flutes	No.		
3.000	3.000	75.00	20.00	3	3.000	❍	❍
4.000	4.000	75.00	25.00	3	4.000	❍	❍
5.000	5.000	75.00	30.00	3	5.000	❍	❍
6.000	6.000	75.00	30.00	3	6.000	❍	❍
8.000	8.000	100.00	40.00	3	8.000	❍	❍
10.000	10.000	100.00	40.00	3	10.000	❍	❍
12.000	12.000	150.00	45.00	3	12.000	❍	❍
16.000	16.000	150.00	65.00	3	16.000	❍	❍
20.000	20.000	150.00	65.00	3	20.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

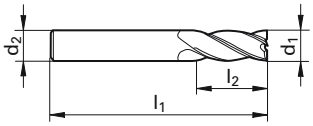
When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO end mills (4-fluted)

Stub length

N | 30° | 4 | .001 -.006 x 45°

	HA
Series	3093
Tool material	Solid Carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	165



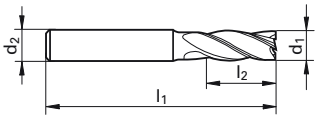
d1	d2	l1	l2	No.	Code	Availability
fract.	fract.	fract.	fract.	flutes	No.	
1/16	1/16	1 1/2	1/8	4	1.590	●
1/8	1/8	1 1/2	1/4	4	3.170	●
3/16	3/16	2	3/8	4	4.760	●
1/4	1/4	2	1/2	4	6.350	●
5/16	5/16	2	1/2	4	7.940	●
3/8	3/8	2	5/8	4	9.520	●
7/16	7/16	2 1/2	5/8	4	11.110	●
1/2	1/2	2 1/2	5/8	4	12.700	●
5/8	5/8	3	3/4	4	15.870	●
3/4	3/4	3	1	4	19.050	●

Stub length (metric)

N | 30° | 4 | 0.05 -0.15 x 45°

	HA	HB
Series	3637	3721
Tool material	Solid Carbide	
Surface finish	FIREX®	
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

NEW NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
2.000	6.000	50.00	4.00	4	2.000	❍	❍
3.000	6.000	50.00	5.00	4	3.000	❍	❍
4.000	6.000	54.00	8.00	4	4.000	❍	❍
5.000	6.000	54.00	9.00	4	5.000	❍	❍
6.000	6.000	54.00	10.00	4	6.000	❍	❍
8.000	8.000	58.00	12.00	4	8.000	❍	❍
10.000	10.000	66.00	14.00	4	10.000	❍	❍
12.000	12.000	73.00	16.00	4	12.000	❍	❍
14.000	14.000	75.00	18.00	4	14.000	❍	❍
16.000	16.000	82.00	22.00	4	16.000	❍	❍
18.000	18.000	84.00	24.00	4	18.000	❍	❍
20.000	20.000	92.00	26.00	4	20.000	❍	❍

● USA Stock ❍ International Stock (0-2 wks)

UNI PRO end mills (4-fluted)*

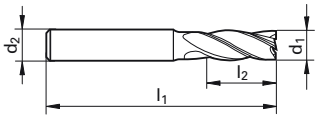
Standard length

N | 30° | 4/6 | .001 -.008 x 45°

Series	3150	3153	3850
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

NEW Expanded size range!

**1" dia = 6 flute*



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/16	1/8	1 1/2	3/16	4	1.590	●	●	●
5/64	1/8	1 1/2	1/4	4	1.980	●	●	○
3/32	1/8	1 1/2	9/32	4	2.380	●	●	●
7/64	1/8	1 1/2	3/8	4	2.780	●	●	○
1/8	1/8	1 1/2	3/8	4	3.170	●	●	●
9/64	3/16	2	9/16	4	3.570	●	●	○
5/32	3/16	2	1/2	4	3.970	●	●	●
11/64	3/16	2	9/16	4	4.370	●	●	○
3/16	3/16	2	5/8	4	4.760	●	●	●
13/64	31/4	2 1/2	5/8	4	5.160	●	●	○
7/32	1/4	2 1/2	5/8	4	5.560	●	●	●
15/64	1/4	2 1/2	3/4	4	5.950	●	●	○
1/4	1/4	2 1/2	3/4	4	6.350	●	●	●
17/64	5/16	2 1/2	7/8	4	6.750	●	●	○
9/32	5/16	2 1/2	3/4	4	7.140	●	●	●
19/64	5/16	2 1/2	7/8	4	7.540	●	●	○
5/16	5/16	2 1/2	13/16	4	7.940	●	●	●
21/64	3/8	2 1/2	7/8	4	8.330	●	●	○
11/32	3/8	2 1/2	1	4	8.730	●	●	●
23/64	3/8	2 1/2	7/8	4	9.130	●	●	○
3/8	3/8	2 1/2	1	4	9.520	●	●	●
25/64	7/16	2 1/2	7/8	4	9.920	●	●	○
13/32	7/16	2 3/4	1	4	10.320	●	●	●
27/64	7/16	2 1/2	7/8	4	10.720	●	●	○
7/16	7/16	2 3/4	1	4	11.110	●	●	●
29/64	1/2	3	1	4	11.510	●	●	○
15/32	1/2	3	1	4	11.910	●	●	●
31/64	1/2	3	1	4	12.300	●	●	○
1/2	1/2	3	1	4	12.700	●	●	●
9/16	9/16	3 1/2	1 1/8	4	14.290	●	●	●
5/8	5/8	3 1/2	1 1/4	4	15.870	●	●	●
11/16	3/4	4	1 3/8	4	17.460	●	●	●
3/4	3/4	4	1 1/2	4	19.050	●	●	●
1	1	4	1 1/2	6	25.400	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

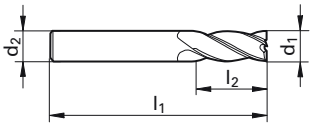
Red indicates NEW size - available Fall 2010

UNI PRO end mills (4-fluted)

Standard length (metric)

N | 30° | 4 | 0.05 -0.15 x 45°

	HA	HA
Series	3304	3678
Tool material	Solid carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
4.000	4.000	50.00	11.00	4	4.000	●	●
4.500	4.500	50.00	11.00	4	4.500	○	●
5.000	5.000	50.00	13.00	4	5.000	●	●
6.000	6.000	57.00	13.00	4	6.000	○	●
7.000	7.000	60.00	16.00	4	7.000	○	○
7.500	7.500	63.00	16.00	4	7.500	○	○
8.000	8.000	63.00	19.00	4	8.000	●	●
9.000	9.000	67.00	19.00	4	9.000	○	○
10.000	10.000	72.00	22.00	4	10.000	○	●
11.000	11.000	83.00	26.00	4	11.000	○	●
12.000	12.000	83.00	26.00	4	12.000	○	●
13.000	13.000	83.00	26.00	4	13.000	○	●
14.000	14.000	83.00	26.00	4	14.000	○	●
16.000	16.000	92.00	32.00	4	16.000	○	●
18.000	18.000	92.00	32.00	4	18.000	○	●
20.000	20.000	104.00	38.00	4	20.000	●	●

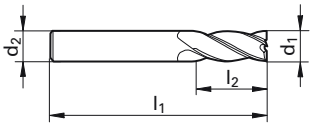
● USA Stock ○ International Stock (0-2 wks)

UNI PRO end mills (4-fluted)*

Long length

N | 30° | 4 | .002 -.008 x 45°

Series	3152	3156	3852
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



*1" dia = 6 flute

d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/8	1/8	2	1/2	4	3.170	●	●	●
3/16	3/16	2 1/2	3/4	4	4.760	●	●	●
1/4	1/4	3	1 1/8	4	6.350	●	●	●
5/16	5/16	3	1 1/8	4	7.940	●	●	●
3/8	3/8	3	1 1/8	4	9.520	●	●	●
7/16	7/16	4 1/2	2	4	11.110	●	●	●
1/2	1/2	4 1/2	2	4	12.700	●	●	●
5/8	5/8	5	2 1/4	4	15.870	●	●	●
3/4	3/4	5	2 1/4	4	19.050	●	●	●
1	1	5	2 1/4	6	25.400	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

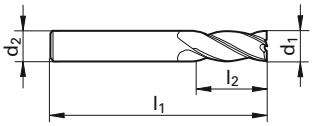
UNI PRO XL end mills (4-fluted)*

Extra long length

N | 30° | 4 | .002 -.008 x 45°

Series	3151	3155	3851
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

*1" dia = 6 flute



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
3/16	3/16	3	1 1/4	4	4.760	●	●	●
1/4	1/4	4	1 5/8	4	6.350	●	●	●
5/16	5/16	4	1 5/8	4	7.940	●	●	●
3/8	3/8	4	1 5/8	4	9.520	●	●	●
7/16	7/16	5	2	4	11.110	●	●	●
1/2	1/2	6	3	4	12.700	●	●	●
5/8	5/8	6	3	4	15.870	●	●	●
3/4	3/4	6	3	4	19.050	●	●	●
1	1	6	3	6	25.400	●	●	●

● USA Stock ◯ International Stock (0-2 wks)

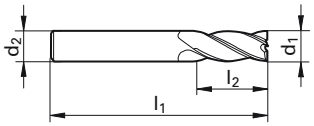
Extra long length (metric)

N | 30° | 4 | 0.05 -0.15 x 45°

Series	3012	3023
Tool material	Solid Carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

HA | HA

NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
3.000	3.000	75.00	20.00	4	3.000	❍	❍
4.000	4.000	75.00	25.00	4	4.000	●	●
5.000	5.000	75.00	30.00	4	5.000	❍	❍
6.000	6.000	75.00	30.00	4	6.000	❍	❍
8.000	8.000	100.00	40.00	4	8.000	❍	❍
10.000	10.000	100.00	40.00	4	10.000	❍	❍
12.000	12.000	150.00	45.00	4	12.000	❍	❍
14.000	14.000	150.00	45.00	4	14.000	❍	❍
16.000	16.000	150.00	65.00	4	16.000	❍	❍
18.000	18.000	150.00	65.00	4	18.000	❍	❍
20.000	20.000	150.00	65.00	4	20.000	❍	❍

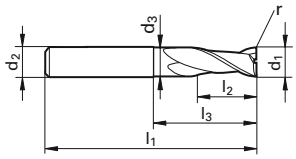
Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

UNI PRO “R” end mills (4-fluted) with corner radius

Standard length (metric)

N | 30° | 4 | R

Series	3111	3562
Tool material		Solid carbide
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165



d1	d2	d3	l1	l2	l3	r	No.	Code	Availability	Availability
mm	mm	mm	mm	mm	mm	mm	flutes	No.		
6.000	6.000	5.700	57.00	13.00	21.00	0.50	4	6.005	❍	●
6.000	6.000	5.700	57.00	13.00	21.00	1.00	4	6.010	❍	❍
8.000	8.000	7.700	63.00	19.00	27.00	0.50	4	8.005	❍	●
8.000	8.000	7.700	63.00	19.00	27.00	1.00	4	8.010	❍	●
8.000	8.000	7.700	63.00	19.00	27.00	1.50	4	8.015	❍	❍
8.000	8.000	7.700	63.00	19.00	27.00	2.00	4	8.020	❍	❍
10.000	10.000	9.500	72.00	22.00	32.00	0.50	4	10.005	❍	●
10.000	10.000	9.500	72.00	22.00	32.00	0.80	4	10.008	❍	❍
10.000	10.000	9.500	72.00	22.00	32.00	1.00	4	10.010	❍	❍
10.000	10.000	9.500	72.00	22.00	32.00	1.50	4	10.015	❍	❍
10.000	10.000	9.500	72.00	22.00	32.00	2.00	4	10.020	❍	❍
12.000	12.000	11.500	83.00	26.00	38.00	0.50	4	12.005	❍	❍
12.000	12.000	11.500	83.00	26.00	38.00	0.80	4	12.008	❍	❍
12.000	12.000	11.500	83.00	26.00	38.00	1.00	4	12.010	❍	❍
12.000	12.000	11.500	83.00	26.00	38.00	1.50	4	12.015	❍	❍
12.000	12.000	11.500	83.00	26.00	38.00	2.00	4	12.020	❍	❍
16.000	16.000	15.500	92.00	32.00	44.00	1.00	4	16.010	❍	❍
16.000	16.000	15.500	92.00	32.00	44.00	1.50	4	16.015	❍	❍
16.000	16.000	15.500	92.00	32.00	44.00	2.00	4	16.020	❍	❍
20.000	20.000	19.500	104.00	38.00	54.00	1.00	4	20.010	❍	❍
20.000	20.000	19.500	104.00	38.00	54.00	1.50	4	20.015	❍	❍
20.000	20.000	19.500	104.00	38.00	54.00	2.00	4	20.020	❍	❍

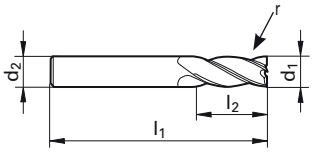
● USA Stock ❍ International Stock (0-2 wks)

UNI PRO “R” end mills (4-fluted) with corner radius

Standard length

N 30° 4 R HA

Series	3089
Tool material	Carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	165

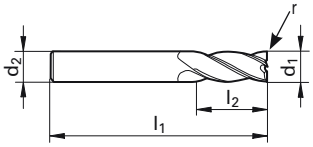


d1	d2	l1	l2	r	No.	Code	Availa-bility
fract.	fract.	fract.	fract.	in.	flutes	No.	
1/8	1/8	1 1/2	3/8	0.015	4	3.172	●
1/8	1/8	1 1/2	3/8	0.031	4	3.174	●
3/16	3/16	2	5/8	0.015	4	4.762	●
3/16	3/16	2	5/8	0.031	4	4.764	●
3/16	3/16	2	5/8	0.062	4	4.766	●
1/4	1/4	2 1/2	3/4	0.015	4	6.352	●
1/4	1/4	2 1/2	3/4	0.031	4	6.354	●
1/4	1/4	2 1/2	3/4	0.062	4	6.356	●
5/16	5/16	2 1/2	13/16	0.015	4	7.942	●
5/16	5/16	2 1/2	13/16	0.031	4	7.944	●
5/16	5/16	2 1/2	13/16	0.062	4	7.946	●
3/8	3/8	2 1/2	1	0.015	4	9.522	●
3/8	3/8	2 1/2	1	0.031	4	9.524	●
3/8	3/8	2 1/2	1	0.062	4	9.526	●
1/2	1/2	3	1	0.015	4	12.702	●
1/2	1/2	3	1	0.031	4	12.704	●
1/2	1/2	3	1	0.062	4	12.706	●

Extra long length

N 30° 4 R HA

Series	3090
Tool material	Carbide
Surface finish	FIREX®
Application	
d_2 Shank tolerance	h6
d_1 Tolerance	h10
Tech. data page	165



d1	d2	l1	l2	r	No.	Code	Availa-bility
fract.	fract.	fract.	fract.	in.	flutes	No.	
1/4	1/4	4	1 5/8	0.015	4	6.352	●
1/4	1/4	4	1 5/8	0.031	4	6.354	●
1/4	1/4	4	1 5/8	0.062	4	6.356	●
3/8	3/8	4	1 5/8	0.015	4	9.522	●
3/8	3/8	4	1 5/8	0.031	4	9.524	●
3/8	3/8	4	1 5/8	0.062	4	9.526	●
1/2	1/2	6	3	0.015	4	12.702	●
1/2	1/2	6	3	0.031	4	12.704	●
1/2	1/2	6	3	0.062	4	12.706	●

Alloyed Steels · Tool Steels · Cast materials · Stainless Steels · Al and Al-alloys · Ti / Ni alloys · H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

Ball nose milling cutters:

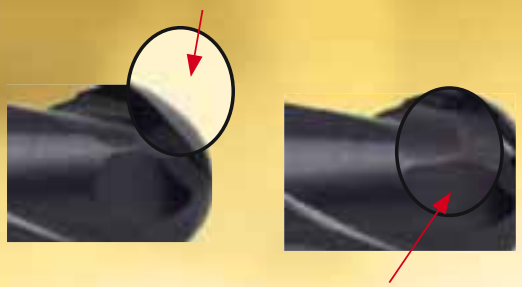
Satisfying the highest demands on accuracy and tool life

Especially the die and mould industry places ever higher demands on milling cutters – primarily with regard to accuracy and tool life. Therefore, Guhring's cutting tool program now includes radius milling cutters that are perfectly adapted to satisfy these demands and provide optimal machining results thanks to application orientated geometries, carbide grades and coatings. The advantages are especially high form and contour accuracy of the workpiece, minimal wear and therefore excellent tool life.

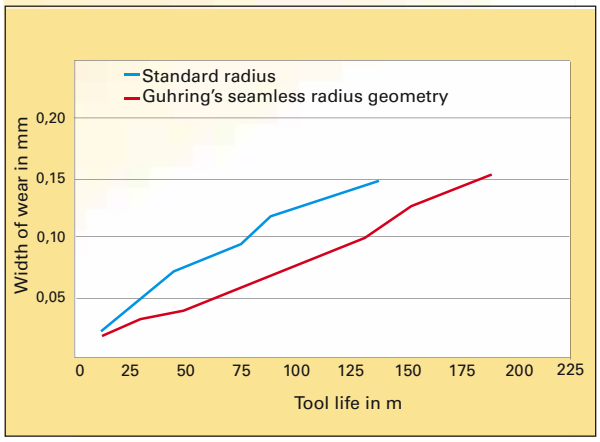
Features of Guhring's Ball nose milling cutters:

- outside diameter and radius are ground in one pass
- radius point geometry with constant helix-radius-correction
- reduced neck ground for collision reduction with protruding edges

High wear protection thanks to radius geometry with constant rake angle and continuous spiral.



Seamless radius area provides high form and contour accuracy.



Wear comparison:
Guhring's seamless radius geometry reduces wear and provides a considerably longer tool life in comparison with tools ground with conventional full radius.

UNI PRO ball nose end mills (2-fluted)

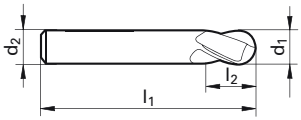
Standard length

N | 30° | 2 | Ball

Series	3157	3159	3857
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

HA | HA | HA

NEW Expanded size range!



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/16	1/8	1 1/2	3/16	2	1.590	●	●	●
5/64	1/8	1 1/2	1/8	2	1.980	●	●	○
3/32	1/8	1 1/2	3/8	2	2.380	●	●	○
7/64	1/8	1 1/2	3/8	2	2.780	●	●	○
1/8	1/8	1 1/2	3/8	2	3.170	●	●	●
9/64	3/16	2	9/16	2	3.570	●	●	○
5/32	3/16	2	9/16	2	3.970	●	●	○
11/64	3/16	2	9/16	2	4.370	●	●	○
3/16	3/16	2	5/8	2	4.760	●	●	●
13/64	31/4	2 1/2	5/8	2	5.160	●	●	○
7/32	1/4	2 1/2	5/8	2	5.560	●	●	○
15/64	1/4	2 1/2	3/4	2	5.950	●	●	○
1/4	1/4	2 1/2	3/4	2	6.350	●	●	●
17/64	5/16	2 1/2	7/8	2	6.750	●	●	○
9/32	5/16	2 1/2	7/8	2	7.140	●	●	○
19/64	5/16	2 1/2	7/8	2	7.540	●	●	○
5/16	5/16	2 1/2	13/16	2	7.940	●	●	●
21/64	3/8	2 1/2	7/8	2	8.330	●	●	○
11/32	3/8	2 1/2	7/8	2	8.730	●	●	○
23/64	3/8	2 1/2	7/8	2	9.130	●	●	○
3/8	3/8	2 1/2	1	2	9.520	●	●	●
25/64	7/16	2 3/4	7/8	2	9.920	●	●	○
13/32	7/16	2 3/4	7/8	2	10.320	●	●	○
27/64	7/16	2 3/4	7/8	2	10.720	●	●	○
7/16	7/16	2 3/4	1	2	11.110	●	●	●
29/64	1/2	3	1	2	11.510	●	●	○
15/32	1/2	3	1	2	11.910	●	●	○
31/64	1/2	3	1	2	12.300	●	●	○
1/2	1/2	3	1	2	12.700	●	●	●
9/16	9/16	3 1/2	1 1/8	2	14.290	●	●	●
5/8	5/8	3 1/2	1 1/4	2	15.870	●	●	●
3/4	3/4	4	1 1/2	2	19.050	●	●	●
1	1	4	1 1/2	2	25.400	●	●	○

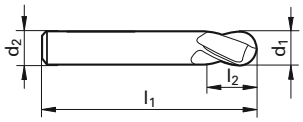
● USA Stock ○ International Stock (0-2 wks)

Red indicates NEW size - available Fall 2010

UNI PRO ball nose end mills (2-fluted)

Standard length (metric)

N | 30° | 2 | Ball



Series	HA	HA	HB	HB
	3308	3679	3024	3049
Tool material	Solid Carbide		Solid Carbide	
Surface finish	Bright	FIREX®	Bright	FIREX®
Application				
d_2 Shank tolerance	h6	h6	h6	h6
d_1 Tolerance	h10	h10	h10	h10
Tech. data page	165	165	165	165

d1	d2	l1	l2	No.	Code	Availability		Availability	
mm	mm	mm	mm	flutes	No.				
0.500	3.000	38.00	1.00	2	0.500	❍	❍	❍	❍
0.800	3.000	38.00	1.00	2	0.800	❍	❍	❍	❍
1.000	3.000	38.00	2.00	2	1.000	❍	●	❍	❍
1.500	3.000	38.00	3.00	2	1.500	❍	●	❍	❍
2.000	6.000	57.00	6.00	2	2.000	❍	●	❍	❍
3.000	6.000	57.00	7.00	2	3.000	❍	●	❍	❍
4.000	6.000	57.00	8.00	2	4.000	❍	●	❍	❍
5.000	6.000	57.00	10.00	2	5.000	●	●	❍	❍
6.000	6.000	57.00	10.00	2	6.000	❍	●	❍	❍
8.000	8.000	63.00	16.00	2	8.000	❍	●	❍	❍
10.000	10.000	72.00	19.00	2	10.000	❍	●	❍	❍
12.000	12.000	83.00	22.00	2	12.000	❍	●	❍	❍
14.000	14.000	83.00	22.00	2	14.000	❍	●	❍	❍
16.000	16.000	92.00	26.00	2	16.000	❍	●	❍	❍
18.000	18.000	92.00	26.00	2	18.000	❍	●	❍	❍
20.000	20.000	104.00	32.00	2	20.000	❍	●	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

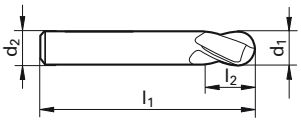
When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO ball nose end mills (2-fluted)

Extra long length

N | 30° | 2 | Ball

	HA	HA	HA
Series	3158	3160	3858
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/8	1/8	2	1/2	2	3.170	●	●	●
3/16	3/16	2 1/2	3/4	2	4.760	●	●	●
1/4	1/4	3	1 1/8	2	6.350	●	●	●
5/16	5/16	3	1 1/8	2	7.940	●	●	●
3/8	3/8	3	1 1/8	2	9.520	●	●	●
7/16	7/16	4 1/2	2	2	11.110	●	●	●
1/2	1/2	4 1/2	2	2	12.700	●	●	●
5/8	5/8	5	2 1/4	2	15.870	●	●	●
3/4	3/4	5	2 1/4	2	19.050	●	●	●

● USA Stock ◯ International Stock (0-2 wks)

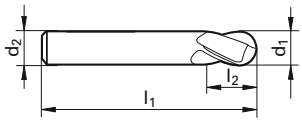
Extra long length (metric)

N | 30° | 2 | Ball

Series	3014	3030
Tool material	Solid Carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

HA | HA

NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
3.000	3.000	75.00	20.00	2	3.000	❍	❍
4.000	4.000	75.00	25.00	2	4.000	❍	❍
5.000	5.000	75.00	30.00	2	5.000	❍	❍
6.000	6.000	75.00	30.00	2	6.000	❍	●
8.000	8.000	100.00	40.00	2	8.000	❍	❍
10.000	10.000	100.00	40.00	2	10.000	❍	●
12.000	12.000	150.00	45.00	2	12.000	❍	❍

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

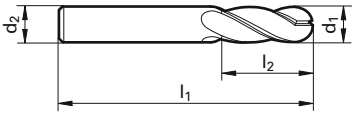
When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO ball nose end mills (4-fluted)

Standard length

N | 30° | 4 | Ball

NEW Expanded size range!



	HA	HA	HA
Series	3161	3165	3861
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/16	1/8	1 1/2	3/16	4	1.590	●	●	●
5/64	1/8	1 1/2	1/8	4	1.980	●	●	○
3/32	1/8	1 1/2	3/8	4	2.380	●	●	○
7/64	1/8	1 1/2	3/8	4	2.780	●	●	○
1/8	1/8	1 1/2	3/8	4	3.170	●	●	●
9/64	3/16	2	9/16	4	3.570	●	●	○
5/32	3/16	2	9/16	4	3.970	●	●	○
11/64	3/16	2	9/16	4	4.370	●	●	○
3/16	3/16	2	5/8	4	4.760	●	●	●
13/64	31/4	2 1/2	5/8	4	5.160	●	●	○
7/32	1/4	2 1/2	5/8	4	5.560	●	●	○
15/64	1/4	2 1/2	3/4	4	5.950	●	●	○
1/4	1/4	2 1/2	3/4	4	6.350	●	●	●
17/64	5/16	2 1/2	7/8	4	6.750	●	●	○
9/32	5/16	2 1/2	7/8	4	7.140	●	●	○
19/64	5/16	2 1/2	7/8	4	7.540	●	●	○
5/16	5/16	2 1/2	13/16	4	7.940	●	●	●
21/64	3/8	2 1/2	7/8	4	8.330	●	●	○
11/32	3/8	2 1/2	7/8	4	8.730	●	●	○
23/64	3/8	2 1/2	7/8	4	9.130	●	●	○
3/8	3/8	2 1/2	1	4	9.520	●	●	●
25/64	7/16	2 3/4	7/8	4	9.920	●	●	○
13/32	7/16	2 3/4	7/8	4	10.320	●	●	○
27/64	7/16	2 3/4	7/8	4	10.720	●	●	○
7/16	7/16	2 3/4	1	4	11.110	●	●	●
29/64	1/2	3	1	4	11.510	●	●	○
15/32	1/2	3	1	4	11.910	●	●	○
31/64	1/2	3	1	4	12.300	●	●	○
1/2	1/2	3	1	4	12.700	●	●	●
9/16	9/16	3 1/2	1 1/8	4	14.290	●	●	●
5/8	5/8	3 1/2	1 1/4	4	15.870	●	●	●
3/4	3/4	4	1 1/2	4	19.050	●	●	●
1	1	4	1 1/2	4	25.400	●	●	●

● USA Stock ○ International Stock (0-2 wks)

Red indicates NEW size - available Fall 2010

UNI PRO ball nose end mills (4-fluted)

Standard length (metric)

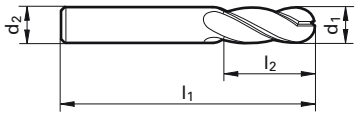
N | 30° | 4 | Ball

Series	3306	3727
Tool material		Carbide
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

HA | HA

NEW

NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
4.000	4.000	50.00	11.00	4	4.000	❍	❍
5.000	5.000	50.00	13.00	4	5.000	❍	❍
6.000	6.000	57.00	13.00	4	6.000	❍	●
8.000	8.000	63.00	19.00	4	8.000	❍	❍
10.000	10.000	72.00	22.00	4	10.000	❍	❍
12.000	12.000	83.00	26.00	4	12.000	❍	❍
14.000	14.000	83.00	26.00	4	14.000	❍	❍
16.000	16.000	92.00	32.00	4	16.000	❍	❍
18.000	18.000	92.00	32.00	4	18.000	❍	❍
20.000	20.000	104.00	38.00	4	20.000	●	●

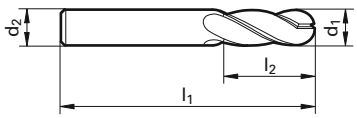
Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

UNI PRO XL ball nose end mills (4-fluted)

Long length

N | 30° | 4 | Ball



	HA	HA	HA
Series	3164	3167	3864
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	HA	HA	HA
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165

d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
1/8	1/8	2	1/2	4	3.170	●	●	●
3/16	3/16	2 1/2	3/4	4	4.760	●	●	●
1/4	1/4	3	1 1/8	4	6.350	●	●	●
5/16	5/16	3	1 1/8	4	7.940	●	●	●
3/8	3/8	3	1 1/8	4	9.520	●	●	●
7/16	7/16	4 1/2	2	4	11.110	●	●	●
1/2	1/2	4 1/2	2	4	12.700	●	●	●
5/8	5/8	5	2 1/4	4	15.870	●	●	●
3/4	3/4	5	2 1/4	4	19.050	●	●	●

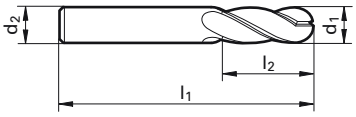
● USA Stock ◯ International Stock (0-2 wks)

UNI PRO XL ball nose end mills (4-fluted)

Extra long length

N | 30° | 4 | Ball

Series	3162	3166	3862
Tool material	Solid carbide		
Surface finish	Bright	FIREX®	Super-A™
Application			
d_2 Shank tolerance	h6	h6	h6
d_1 Tolerance	h10	h10	h10
Tech. data page	165	165	165



d1	d2	l1	l2	No.	Code	Availability		
fract.	fract.	fract.	fract.	flutes	No.			
3/16	3/16	3	1 1/4	4	4.760	●	●	●
1/4	1/4	4	1 5/8	4	6.350	●	●	●
5/16	5/16	4	1 5/8	4	7.940	●	●	●
3/8	3/8	4	1 5/8	4	9.520	●	●	●
7/16	7/16	5	2	4	11.110	●	●	●
1/2	1/2	6	3	4	12.700	●	●	●
5/8	5/8	6	3	4	15.870	●	●	●
3/4	3/4	6	3	4	19.050	●	●	●

Alloyed Steels | Tool Steels | Cast materials | Stainless Steels | Al and Al-alloys | Ti / Ni alloys | H Hardened Materials

When ordering: EDP no. = Series + Order no., example: 3867 12.700

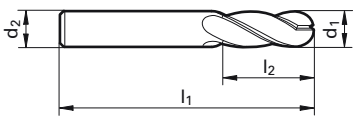
UNI PRO XL ball nose end mills (4-fluted)

Extra long length (metric)

N | 30° | 4 | Ball

	HA	HA
Series	3015	3043
Tool material	Carbide	
Surface finish	Bright	FIREX®
Application		
d_2 Shank tolerance	h6	h6
d_1 Tolerance	h10	h10
Tech. data page	165	165

NEW



d1	d2	l1	l2	No.	Code	Availability	
mm	mm	mm	mm	flutes	No.		
3.000	3.000	75.00	20.00	4	3.000	❍	❍
4.000	4.000	75.00	25.00	4	4.000	❍	●
5.000	5.000	75.00	30.00	4	5.000	❍	❍
6.000	6.000	75.00	30.00	4	6.000	❍	●
8.000	8.000	100.00	40.00	4	8.000	❍	●
10.000	10.000	100.00	40.00	4	10.000	❍	●
12.000	12.000	150.00	45.00	4	12.000	❍	●

● USA Stock ❍ International Stock (0-2 wks)

GUHRING

Solid Carbide
High Performance End Mills

Pro-Line Universal End Mill Kits

Here is a great way to try Guhring quailty precision ground carbide end mills with heat-resistant FIREX® coating in your shop - at a great price! Our unique carbide grade and proprietary coating deliver strong performance and extended tool life.

Kit EDP #333038728

Each Guhring Uni-Pro End Mill Kit contains:

One each
Series 3153 Uni-Pro 1/4" dia. 5/16" dia. 3/8" dia. 1/2" dia.

PLUS - a bonus: One **Series 3179** Finish-Tech 50 1/4" dia.

Series 3153 Uni-Pro Features:

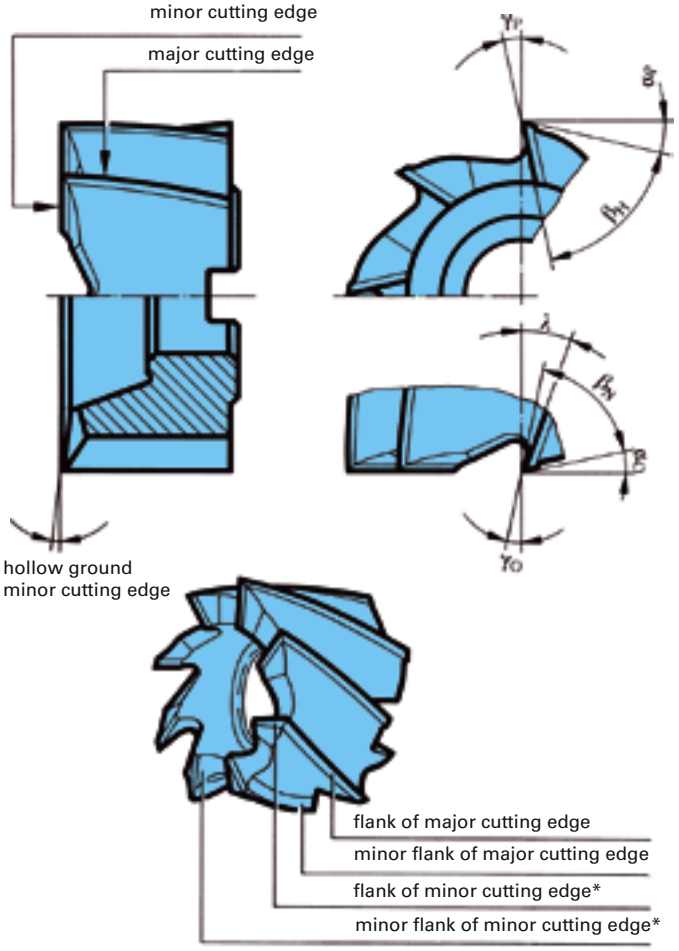
- Cutting geometry allows for use in a wide array of materials
- FIREX® coating provides outstanding heat and wear resistance
- Guhring's own ultra fine grain carbide for increased tool life
- 4-flute design with 30° helix produces a good surface finish
- Standard length, straight shank

Series 3179 Finish-Tech 50 Features:

- 6-flute geometry (at 1/4" dia) with free-cutting 45° helix angle produces an excellent surface finish, allows elevated feed rates
- Large core diameter for added rigidity, improving surface finish
- FIREX® coating provides outstanding heat and wear resistance
- Micro-corner protection chamfer reduces wear at corner, adds tool life
- Guhring's own ultra fine grain carbide for increased tool life

TECHNICAL SECTION

GUHRING



α_P = clearance angle, major cutting edge
β_H = lip angle, major cutting edge
γ_P = rake angle, major cutting edge

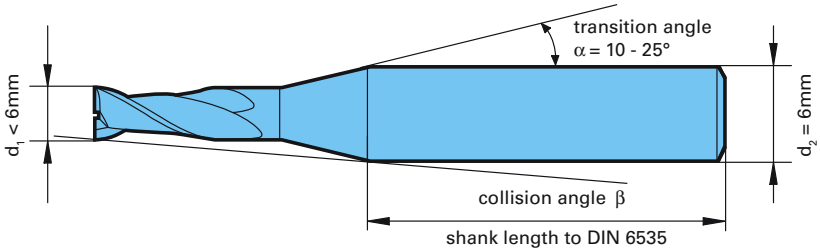
α_O = clearance angle, minor cutting edge
β_N = lip angle, minor cutting edge
γ_O = rake angle, minor cutting edge

λ = spiral angle

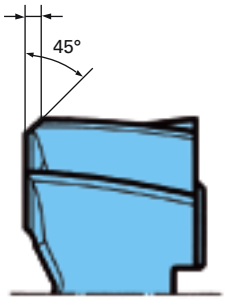
*) minor cutting edges do not cut in the direction of feed

TECHNICAL SECTION

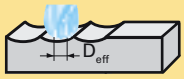
Transition angle α and collision angle β with tools $d_1 < d_2$, tapered, dependent on flute and total length.



chamfer is measured axially

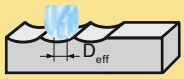


Milling Formulas - INCH Values

Symbol	Description		Formula
SFM	Surface Feet / Minute		$SFM = \frac{RPM \times D}{3.82}$
RPM	Revolutions / Minute		$RPM = \frac{SFM \times 3.82}{D}$
IPT	Feed /Tooth		$IPT = \frac{IPM}{z \times RPM}$
IPM	Inches / Minute		$IPM = IPT \times RPM \times z$
$D_{(eff)}$	Effective Diameter		$D(eff) = 2 \times \sqrt{R^2 - (R - D_1)^2}$

Symbol key: D = tool diameter (in.) z = no. of flutes R = radius D_1 = DOC (ap)

Milling Formulas - METRIC Values

Symbol	Description		Formula
Vc	Surface Meters / Minute		$Vc = \frac{\pi \times D \times n}{1000}$
n	Revolutions / Minute		$n = \frac{Vc \times 1000}{\pi \times D}$
fz	Feed /Tooth		$fz = \frac{vf}{n \times z}$
Vf	Millimeters / Minute		$vf = (n) \times (z) \times (fz)$
D(eff)	Effective Diameter		$D(eff) = 2 \times \sqrt{D \times ap - ap^2}$

Symbol key: $\pi = 3.1416$ D = tool diameter (mm) z = no. of flutes ap = depth of cut

Comparsion of Hardness

Tens. strength (N/mm²)	HRC	HB30	HV10
240		71	75
255		76	80
270		81	85
285		86	90
305		90	95
320		95	100
335		100	105
350		105	110
370		109	115
385		114	120
400		119	125
415		124	130
430		128	135
450		133	140
465		138	145
480		143	150
495		147	155
510		152	160
530		157	165
545		162	170
560		166	175
575		171	180
595		176	185
610		181	190
625		185	195
640		190	200
660		195	205
675		199	210
690		204	215
705		209	220
720		214	225
740		219	230
755		223	235
770		228	240
785		233	245
800	22	238	250
820	23	242	255
835	24	247	260
860	25	255	268
870	26	258	272
900	27	266	280
920	28	273	287

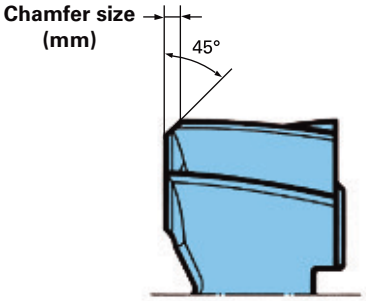
Tens. strength (N/mm²)	HRC	HB30	HV10
940	29	278	293
970	30	287	302
995	31	295	310
1020	32	301	317
1050	33	311	327
1080	34	319	336
1110	35	328	345
1140	36	337	355
1170	37	346	364
1200	38	354	373
1230	39	363	382
1260	40	372	392
1300	41	383	403
1330	42	393	413
1360	43	402	423
1400	44	413	434
1440	45	424	446
1480	46	435	458
1530	47	449	473
1570	48	460	484
1620	49	472	497
1680	50	488	514
1730	51	501	527
1790	52	517	544
1845	53	532	560
1910	54	549	578
1980	55	567	596
2050	56	584	615
2140	57	607	639
2180	58	622	655
	59		675
	60		698
	61		720
	62		745
	63		773
	64		800
	65		829
	66		864
	67		900
	68		940

Tolerances to DIN ISO 286

			Nominal diameter range in µm/tolerances in µm									
			from 1 up to 3	over 3 up to 6	over 6 up to 10	over 10 up to 18	over 18 up to 30	over 30 up to 50	over 50 up to 80	over 80 up to 120	over 120 up to 180	over 180 up to 250
Tolerances: Position and Grade	Shafts	h 6	0	0	0	0	0	0	0	0	0	0
			-6	-8	-9	-11	-13	-16	-19	-22	-25	-29
		h 7	0	0	0	0	0	0	0	0	0	0
			-10	-12	-15	-18	-21	-25	-30	-35	-40	-46
		h 8	0	0	0	0	0	0	0	0	0	0
			-14	-18	-22	-27	-33	-39	-46	-54	-63	-72
		h 9	0	0	0	0	0	0	0	0	0	0
			-25	-30	-36	-43	-52	-62	-74	-87	-100	-115
		h 10	0	0	0	0	0	0	0	0	0	0
			-40	-48	-58	-70	-84	-100	-120	-140	-160	-185
		e 8*	-14	-20	-25	-32	-40	-50	-60	-72	-85	-100
			-28	-38	-47	-59	-73	-89	-106	-126	-148	-172

*Milling cutters to tolerance e8 produce key slots to tolerance P9 with one cut.

Size of micro-corner protection



Nominal diameter (mm)	Chamfer size (mm)	Product description / Product name	
< 2.00	0.025 x 45°	RF 100 U (3-fluted cutter)	Uni-Pro End Mill (2-flute)
2.00 - 6.00	0.05 x 45°	RF 100 S/F (5-fluted cutter)	Uni-Pro End Mill (3-flute)
6.10 - 10.00	0.10 x 45°	RF 100 S/F (6-fluted cutter)	Uni-Pro End Mill (4-flute)
10.01 - 20.00	0.15 x 45°	GH 100 U / Aero-Tech (3-fluted cutter)	Uni-Pro Mini End Mill (3-flute)
20.01 - 25.00	0.20 x 45°	GH 100 U / Finish-Tech 50 (6-/8-fluted cutter)	
25.01 - 32.00	0.30 x 45°	GH 100 H / Finish-Tech 62 (6-/8-fluted cutter)	

Nominal diameter (mm)	Chamfer size (mm)	Product description / Product name	
< 2.00	0.00 x 45°	Alumi-Tech (2-fluted cutter)	
2.00 - 6.00	0.03 x 45°		
6.10 - 10.00	0.05 x 45°		
10.01 - 20.00	0.10 x 45°		

Nominal diameter (mm)	Chamfer size (mm)	Product description / Product name	
4.00 - 5.00	0.10 x 45°	RF 100 U (4-fluted cutter)	
5.01 - 8.00	0.15 x 45°	RF 100 F	
8.01 -12.00	0.20 x 45°	RF 100 A	
12.01 - 14.00	0.25 x 45°		
14.01 - 16.00	0.35 x 45°		
16.01 - 18.00	0.40 x 45°		
18.01 - 20.00	0.45 x 45°		
20.01 - 25.00	0.60 x 45°		
25.01 - 32.00	0.75 x 45°		

Nominal diameter (mm)	Chamfer size (mm)	Product description / Product name	
6.00 - 10 .00	0.30 x 45°	RF 100 U/HF	RS 100 F / Aero-Rough 56
10.01 - 20.00	0.50 x 45°	RF 100 VA/NF	GS 100 U / Rough-Tech 48
20.01 - 25.00	0.60 x 45°	RF 100 A/WF	GS 100 A / Rough-Tech ALU
25.01 - 32.00	0.80 x 45°	RS 100 U / Aero-Rough 48	GS 100 H / Rough-Tech 56

Nominal diameter (mm)	Chamfer size (mm)	Product description / Product name	
4.00 -5.00	0.15 x 45°	RF 100 VA	
5.01 - 6.00	0.20 x 45°	RF 100 H	
6.01 - 8.00	0.25 x 45°		
8.01 - 10.00	0.30 x 45°		
10.01 - 12.00	0.35 x 45°		
12.01 - 14.00	0.40 x 45°		
14.01 - 16.00	0.50 x 45°		
16.01 - 18.00	0.60 x 45°		
18.01 - 20.00	0.60 x 45°		
20.01 - 25.00	0.75 x 45°		
25.01 - 32.00	0.90 x 45°		

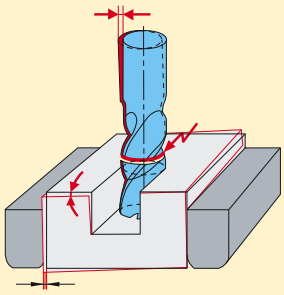
General notes

All the cutting rate recommendations specified in this catalog are standard values valid exclusively for new tools or tools re-ground to Guhring specifications. Pre-requisites are stable machines, optimal cooling, optimal tool clamping and maximum concentricity of the tool and the machine spindle. Our recommended cutting rates must be reduced if the conditions deviate. The values may also be adjusted to influence Surface finish quality, machining rate or tool life.

1. Workpiece clamping
Loss of tool life or tool breakage through unstable clamping

➤ improve workpiece clamping

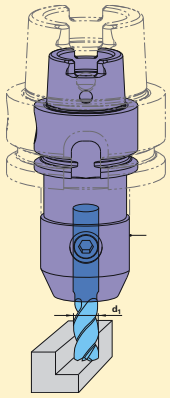
Alternative:
➤ reduce feed
➤ reduce cutting width or depth



2. Tool clamping
Loss of tool life or tool breakage through unstable, worn or too small/long/thin tool holder

➤ apply new or larger tool holder or holder with increased clamping force and increased concentricity

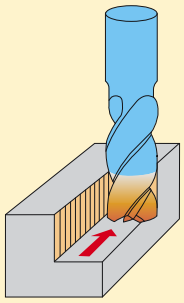
Alternative:
➤ reduce cutting rates
➤ reduce clamping length
➤ apply tool with smaller diameter
➤ check clamping screws for wear



3. Surface finish quality
Excessive peak-to-valley height Ra/Rz at the tool Surface finish through excessive feed rates or vibrations

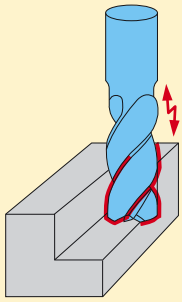
➤ improve workpiece clamping and tool clamping (see points 1 and 2)

Alternative:
➤ reduce feed and feed rate
➤ increase cutting speed



4. Vibrations
High tool wear, insufficient workpiece Surface finish quality and insufficient dimensional accuracy through vibration

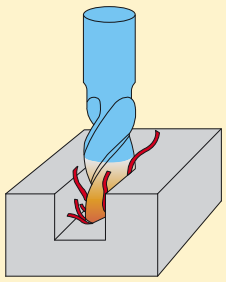
➤ improve workpiece and tool clamping (see points 1 and 2)
➤ increase tooth feed, because the chip centre thickness is too small
➤ modify speed
➤ modify milling strategy, i.e. select alternative cutting distribution
➤ change tool selection, i.e. reduce no. of teeth or spiral



5. Chip congestion/cooling
Significant reduction in tool life, chipping on cutting edges, edge build-up of flutes through insufficient chip evacuation

➤ select milling cutters with internal cooling

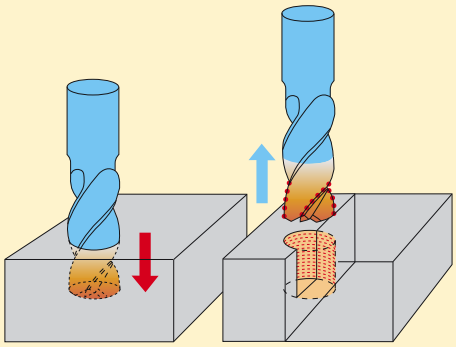
Alternative:
➤ peripheral cooling via GM 300 chuck
➤ increase volume flow
➤ adjust coolant flow
➤ apply compressed air cooling (according to tool and material)
➤ reduce feed rate
➤ modify cutting distribution
➤ select end mill with fewer flutes



6. Pecking when drilling
Significant reduction in tool life as well as chipping of cutting edges through insufficient chip evacuation and thermal stresses

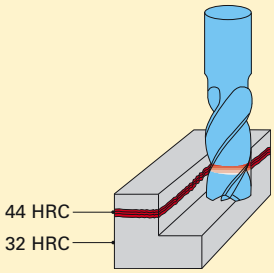
➤ select milling cutter with internal cooling
with drilling depths > 0.5 x D pecking in stages

Alternative:
➤ peripheral cooling via GM 300 chuck
➤ increase volume flow
➤ adjust coolant flow
➤ reduce feed rate

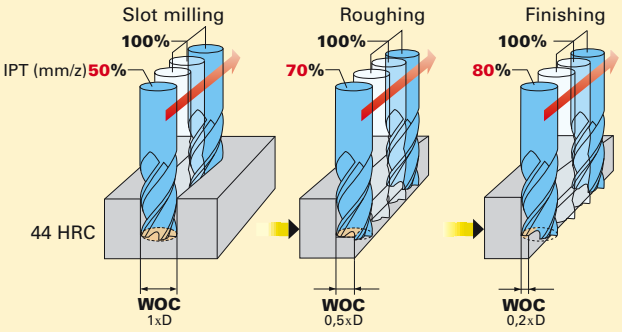


7. Thermal influence on materials
Through welding or torch cutting, the material characteristics at the parting line do not correspond with the specified material class

➤ reduce cutting rates
➤ select tool for materials with a higher tensile strength

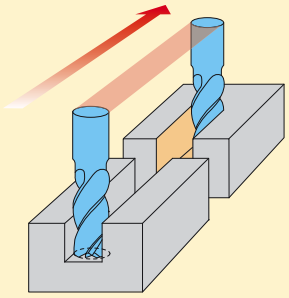


8. Entry in hardened materials
For entering materials over 44 HRC, reduce the feed rate IPT in accordance with the illustration on the right

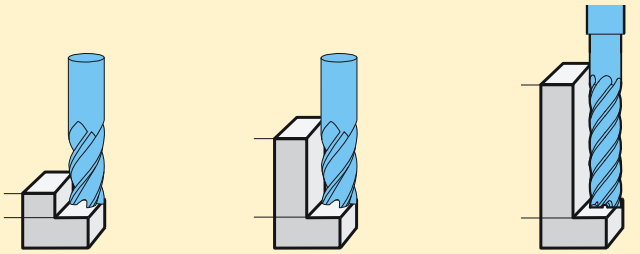


9. Loss in tool life with interrupted cutting
Significant loss in tool life through interrupted cutting (especially with milling angles of 90°)

➤ modify cutting distribution
➤ reduce feed rate for entry and exit
➤ reduce approach angle



10. Feed rate adjustment: Modifying the cutting depth
➤ when modifying the cutting depth DOC, the feed rate must be reduced in accordance with the illustration on the right
➤ cutting speed or revolutions remain unchanged up to cutting depths of 3 x D, must only be adapted over 3 x D



DOC = 1 x D
IPT = 100 %

DOC = 2 x D
IPT = 50 %

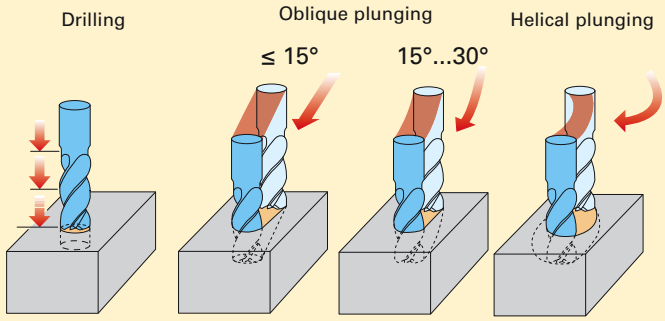
DOC = 3 x D
IPT = 25 %

11. Plunging strategies
for drilling:
➤ reduce feed rate IPT
➤ additional pecking for drilling depths > 0.5 x D or transition to radial machining
Attention: Danger of breakage through abrupt load increase!

Ramping up to 15° (preferred):
➤ reduction in feed rate IPT not required

Ramping between 15° and 30°:
➤ reduce feed rate IPT in accordance with the illustration on the right

Helical plunging:
➤ for helical plunging on a milling cycle, we recommend a feed of 0.1 to 0.2 per cycle (0.100“ - 0.200“)
➤ reduce feed rate IPT in accordance with the illustration on the right
➤ select preferred hole diameter 1.8 x D



90°
IPT -70 %

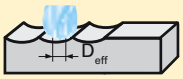
≤ 15°
IPT = 100 %

15°...30°
IPT -30 %

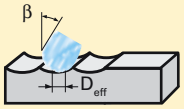
IPT -15 %

12. Copy milling

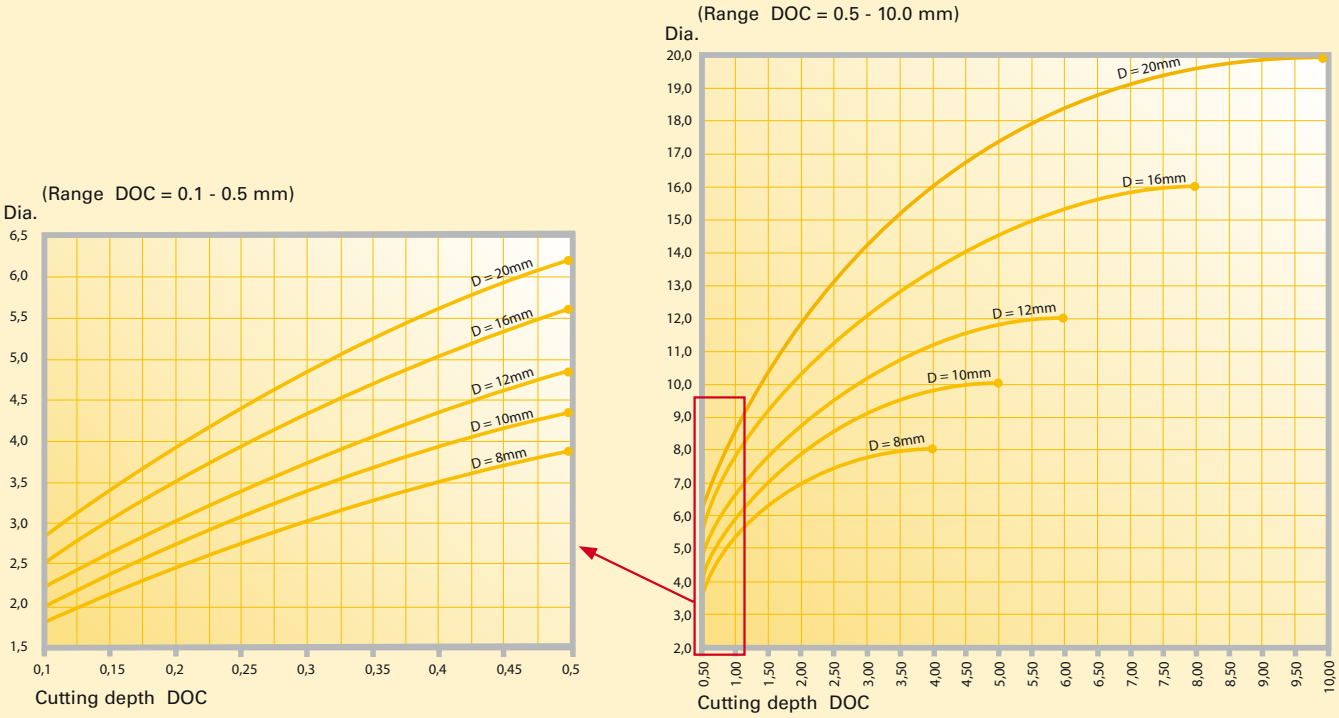
For cutting depths DOC<0.5xD, the engaged effective diameter D_{eff} must be applied to calculate the speed. With the spindle not engaged, the effective diameter is calculated according to the illustration below. To increase tool life, we recommend machining with tilted spindle. The tilt angle must be taken into account when calculating the effective diameter D_{eff}.



$$D_{(eff)} = 2 \cdot \sqrt{D \cdot DOC - DOC^2}$$

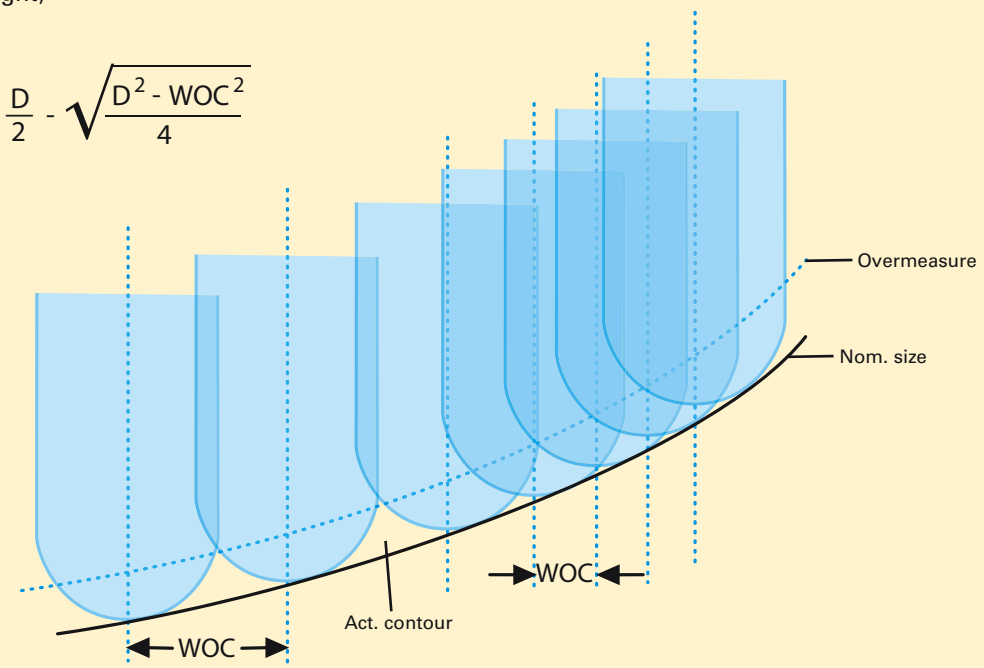


$$D_{(eff)} = D \cdot \sin\left[\beta + \arccos\left(\frac{D - 2DOC}{D}\right)\right]$$



Modifying the cutting width WOC results in improved Surface finish quality of the workpiece (reduced peak-to-valley height)

$$R_{th} = \frac{D}{2} - \sqrt{\frac{D^2 - WOC^2}{4}}$$



Feed and Speed Table - RF 100 U, F, SF, VA, A, Ti, H for stable conditions

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use RF 100 Type	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	F	Slotting	540	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
			F	Roughing	600	0.0008	0.0016	0.0022	0.0028	0.0033	0.0039	0.0047	0.0067
			SF	Finishing	840	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	F	Slotting	480	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
			F	Roughing	540	0.0008	0.0016	0.0022	0.0028	0.0033	0.0039	0.0047	0.0067
			SF	Finishing	660	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	U	Slotting	405	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			U	Roughing	480	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			SF	Finishing	600	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	H	up to 54 HRC	U	Slotting	210	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			U	Roughing	330	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			SF	Finishing	450	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
	H	54-60 HRC		Slotting									
			H	Roughing									
			H	Finishing	330	0.0004	0.0006	0.0010	0.0014	0.0017	0.0020	0.0031	0.0035
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	VA	Slotting	360	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
			VA	Roughing	420	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
			SF	Finishing	540	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	VA	Slotting	240	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			VA	Roughing	360	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			SF	Finishing	420	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	VA/F	Slotting	210	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			VA/F	Roughing	300	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			SF	Finishing	360	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
High-Temperature Alloys Nimonic, Inconel, Monel, Hastelloy		up to 42 HRc	Ti/U	Slotting	90	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
			Ti/U	Roughing	105	0.0004	0.0008	0.0012	0.0014	0.0016	0.0022	0.0026	0.0031
			SF	Finishing	135	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	Ti/U	Slotting	180	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			Ti/U	Roughing	270	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			SF	Finishing	390	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	F	Slotting	480	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			F	Roughing	540	0.0008	0.0016	0.0022	0.0028	0.0033	0.0039	0.0047	0.0067
			SF	Finishing	660	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	U	Slotting	420	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			U	Roughing	480	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			SF	Finishing	600	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	A	Slotting	1500	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			A	Roughing	1800	0.0008	0.0016	0.0022	0.0028	0.0033	0.0039	0.0047	0.0067
			A	Finishing	3000	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	A	Slotting	690	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			A	Roughing	840	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			A	Finishing	1050	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Magnesium Alloys		-	A	Slotting	540	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			A	Roughing	660	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			A	Finishing	840	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Non-ferrous Copper Alloys, Brass, Bronze		up to 28 HRc	A	Slotting	750	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			A	Roughing	900	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			SF	Finishing	1200	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055

RF 100 U/HF, VA/NF, A/WF for unstable conditions

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use RF 100 Type	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	VA-NF	Slotting	540	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			VA-NF	Roughing	600	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
				Finishing									
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	VA-NF	Slotting	480	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			VA-NF	Roughing	540	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
				Finishing									
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	U-HF	Slotting	405	0.0004	0.0006	0.0010	0.0012	0.0014	0.0018	0.0024	0.0028
			U-HF	Roughing	480	0.0004	0.0008	0.0012	0.0014	0.0016	0.0022	0.0026	0.0031
				Finishing									
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	H	up to 54 HRC	U-HF	Slotting	210	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
			U-HF	Roughing	330	0.0005	0.0006	0.0010	0.0012	0.0014	0.0018	0.0024	0.0028
				Finishing									
	H	54-60 HRC		Slotting									
				Roughing									
				Finishing									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	VA-NF	Slotting	360	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			VA-NF	Roughing	420	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
				Finishing									
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	VA-NF	Slotting	240	0.0004	0.0006	0.0010	0.0012	0.0014	0.0018	0.0024	0.0028
			VA-NF	Roughing	360	0.0005	0.0008	0.0012	0.0014	0.0016	0.0022	0.0026	0.0031
				Finishing									
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	VA-NF	Slotting	210	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
			VA-NF	Roughing	300	0.0005	0.0006	0.0010	0.0012	0.0014	0.0018	0.0024	0.0028
				Finishing									
High-Temperature Alloys Nimonic, Inconel, Monel, Hastelloy		up to 42 HRc	U-HF	Slotting	90	0.0003	0.0004	0.0006	0.0008	0.0010	0.0014	0.0016	0.0020
			U-HF	Roughing	105	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
				Finishing									
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	U-HF	Slotting	180	0.0004	0.0006	0.0010	0.0012	0.0014	0.0018	0.0024	0.0028
			U-HF	Roughing	270	0.0005	0.0008	0.0012	0.0014	0.0016	0.0022	0.0026	0.0031
				Finishing									
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	VA-NF	Slotting	480	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			VA-NF	Roughing	540	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
				Finishing									
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	U-HF	Slotting	420	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			U-HF	Roughing	480	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
				Finishing									
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	A/WF	Slotting	1500	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			A/WF	Roughing	1800	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
				Finishing									
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	A/WF	Slotting	690	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			A/WF	Roughing	840	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
				Finishing									
Magnesium Alloys		-	A/WF	Slotting	540	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			A/WF	Roughing	660	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
				Finishing									
Non-ferrous Copper Alloys, Brass, Bronze		up to 28 HRc	VA-NF	Slotting	750	0.0005	0.0010	0.0012	0.0016	0.0018	0.0024	0.0028	0.0039
			VA-NF	Roughing	900	0.0006	0.0012	0.0016	0.0020	0.0024	0.0028	0.0035	0.0051
				Finishing									

Feed and Speed Table - Finish-Tech (GH 100 U & H) & Aero-Tech (GH 100 U)

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use Type	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	Aero-Tech	Slotting	540	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
			Aero-Tech	Roughing	600	0.0007	0.0014	0.0019	0.0025	0.0030	0.0035	0.0043	0.0060
			Finish-Tech	Finishing	840	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	Aero-Tech	Slotting	480	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
			Aero-Tech	Roughing	540	0.0007	0.0014	0.0019	0.0025	0.0030	0.0035	0.0043	0.0060
			Finish-Tech	Finishing	660	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	Aero-Tech	Slotting	365	0.0005	0.0009	0.0013	0.0017	0.0020	0.0025	0.0030	0.0044
			Aero-Tech	Roughing	432	0.0006	0.0013	0.0016	0.0020	0.0025	0.0030	0.0035	0.0050
			Finish-Tech	Finishing	540	0.0005	0.0009	0.0013	0.0016	0.0019	0.0022	0.0028	0.0041
Hardened Steels **Carbon and Alloy Steels, Tool & Die Steels**	H	up to 54 HRC	Aero-Tech	Slotting	168	0.0003	0.0007	0.0008	0.0011	0.0012	0.0017	0.0019	0.0028
			Finish-Tech***	Roughing	264	0.0004	0.0007	0.0010	0.0012	0.0014	0.0018	0.0022	0.0033
			Finish-Tech	Finishing	360	0.0004	0.0008	0.0011	0.0014	0.0017	0.0019	0.0025	0.0036
	H	54-60 HRC		Slotting									
				Roughing									
			Finish-Tech	Finishing	270	0.0004	0.0006	0.0010	0.0014	0.0017	0.0020	0.0031	0.0035
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	Aero-Tech	Slotting	288	0.0005	0.0011	0.0014	0.0018	0.0021	0.0025	0.0032	0.0046
			Aero-Tech	Roughing	336	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
			Finish-Tech	Finishing	432	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	Aero-Tech	Slotting	192	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
			Aero-Tech	Roughing	288	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Finish-Tech	Finishing	336	0.0005	0.0011	0.0014	0.0018	0.0021	0.0025	0.0032	0.0046
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	Aero-Tech	Slotting	168	0.0004	0.0009	0.0011	0.0014	0.0016	0.0021	0.0025	0.0035
			Aero-Tech	Roughing	240	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
			Finish-Tech	Finishing	288	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
High-Temperature Alloys **Nimonic, Inconel, Monel, Hastelloy**		up to 42 HRc	Aero-Tech	Slotting	72	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021
			Aero-Tech	Roughing	84	0.0004	0.0007	0.0011	0.0012	0.0014	0.0019	0.0023	0.0028
			Finish-Tech	Finishing	108	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	Aero-Tech	Slotting	162	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
			Aero-Tech	Roughing	243	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Finish-Tech	Finishing	351	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	Aero-Tech	Slotting	384	0.0007	0.0014	0.0018	0.0023	0.0028	0.0034	0.0039	0.0057
			Aero-Tech	Roughing	432	0.0007	0.0014	0.0019	0.0025	0.0030	0.0035	0.0043	0.0060
			Finish-Tech	Finishing	528	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	Aero-Tech	Slotting	336	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Aero-Tech	Roughing	384	0.0007	0.0014	0.0018	0.0023	0.0028	0.0034	0.0039	0.0057
			Finish-Tech	Finishing	480	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	Aero-Tech	Slotting	1200	0.0007	0.0014	0.0018	0.0023	0.0028	0.0034	0.0039	0.0057
			Aero-Tech	Roughing	1440	0.0007	0.0014	0.0019	0.0025	0.0030	0.0035	0.0043	0.0060
			Finish-Tech	Finishing	2400	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	Aero-Tech	Slotting	552	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Aero-Tech	Roughing	672	0.0007	0.0014	0.0018	0.0023	0.0028	0.0034	0.0039	0.0057
			Finish-Tech	Finishing	840	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
Magnesium Alloys		-	Aero-Tech	Slotting	432	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Aero-Tech	Roughing	528	0.0007	0.0014	0.0018	0.0023	0.0028	0.0034	0.0039	0.0057
			Finish-Tech	Finishing	672	0.0006	0.0012	0.0016	0.0021	0.0025	0.0032	0.0035	0.0053
Non-ferrous **Copper Alloys, Brass, Bronze**		up to 28 HRc	Aero-Tech	Slotting	600	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0028	0.0043
			Aero-Tech	Roughing	720	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050
			Finish-Tech	Finishing	960	0.0006	0.0011	0.0014	0.0019	0.0023	0.0028	0.0034	0.0050

Feed and Speed Table - Aero-Rough 48 (RS 100 U) & Aero-Rough 56 (RS 100 F)

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use Type	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	Aero-Rough 48	Slotting	432	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 56	Roughing	480	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
				Finishing									
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	Aero-Rough 48	Slotting	384	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 56	Roughing	432	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
				Finishing									
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	Aero-Rough 48	Slotting	324	0.0004	0.0005	0.0009	0.0011	0.0013	0.0016	0.0022	0.0025
			Aero-Rough 56	Roughing	384	0.0004	0.0007	0.0011	0.0013	0.0014	0.0020	0.0023	0.0028
				Finishing									
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	H	up to 54 HRC	Aero-Rough 56	Slotting	168	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0022
			Aero-Rough 56	Roughing	264	0.0005	0.0005	0.0009	0.0011	0.0013	0.0016	0.0022	0.0025
				Finishing									
	H	54-60 HRC		Slotting									
				Roughing									
				Finishing									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	Aero-Rough 48	Slotting	288	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 48	Roughing	336	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
				Finishing									
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	Aero-Rough 48	Slotting	192	0.0004	0.0005	0.0009	0.0011	0.0013	0.0016	0.0022	0.0025
			Aero-Rough 48	Roughing	288	0.0005	0.0007	0.0011	0.0013	0.0014	0.0020	0.0023	0.0028
				Finishing									
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	Aero-Rough 48	Slotting	168	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0022
			Aero-Rough 48	Roughing	240	0.0005	0.0005	0.0009	0.0011	0.0013	0.0016	0.0022	0.0025
				Finishing									
High-Temperature Alloys Nimonic, Inconel, Monel, Hastelloy		up to 42 HRc	Aero-Rough 48	Slotting	81	0.0003	0.0004	0.0005	0.0007	0.0009	0.0013	0.0014	0.0018
			Aero-Rough 56	Roughing	94.5	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0022
				Finishing									
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	Aero-Rough 48	Slotting	162	0.0004	0.0005	0.0009	0.0011	0.0013	0.0016	0.0022	0.0025
			Aero-Rough 56	Roughing	243	0.0005	0.0007	0.0011	0.0013	0.0014	0.0020	0.0023	0.0028
				Finishing									
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	Aero-Rough 48	Slotting	432	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
			Aero-Rough 56	Roughing	486	0.0005	0.0011	0.0014	0.0018	0.0022	0.0025	0.0032	0.0046
				Finishing									
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	Aero-Rough 48	Slotting	378	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 56	Roughing	432	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
				Finishing									
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	Aero-Rough 48	Slotting	1350	0.0005	0.0011	0.0014	0.0020	0.0023	0.0028	0.0033	0.0050
			Aero-Rough 48	Roughing	1620	0.0006	0.0013	0.0016	0.0022	0.0025	0.0032	0.0035	0.0053
				Finishing									
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	Aero-Rough 48	Slotting	621	0.0005	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0042
			Aero-Rough 48	Roughing	756	0.0005	0.0011	0.0014	0.0018	0.0022	0.0025	0.0032	0.0046
				Finishing									
Magnesium Alloys		-	Aero-Rough 48	Slotting	486	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 48	Roughing	594	0.0005	0.0011	0.0014	0.0018	0.0022	0.0025	0.0032	0.0046
				Finishing									
Non-ferrous Copper Alloys, Brass, Bronze		up to 28 HRc	Aero-Rough 48	Slotting	675	0.0005	0.0009	0.0011	0.0014	0.0016	0.0022	0.0025	0.0035
			Aero-Rough 48	Roughing	810	0.0005	0.0011	0.0014	0.0018	0.0022	0.0025	0.0032	0.0046
			Finish-Tech	Finishing	960								

Feed and Speed Table - Rough-Tech 48 (GS 100 U), Rough-tech 56 (GS 100 H), Rough-Tech ALU (GS 100 A)

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use Type	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	Rough-Tech 48	Slotting	432	0.0004	0.0008	0.0010	0.0013	0.0014	0.0019	0.0022	0.0031
			Rough-Tech 48	Roughing	480	0.0005	0.0008	0.0011	0.0014	0.0016	0.0021	0.0025	0.0038
				Finishing									
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	Rough-Tech 48	Slotting	384	0.0004	0.0008	0.0010	0.0013	0.0014	0.0019	0.0022	0.0031
			Rough-Tech 48	Roughing	432	0.0005	0.0008	0.0011	0.0014	0.0016	0.0021	0.0025	0.0038
				Finishing									
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	Rough-Tech 48	Slotting	324	0.0003	0.0005	0.0008	0.0010	0.0011	0.0014	0.0019	0.0022
			Rough-Tech 48 & 56	Roughing	384	0.0003	0.0006	0.0010	0.0011	0.0013	0.0018	0.0021	0.0025
				Finishing									
Hardened Steels **Carbon and Alloy Steels, Tool & Die Steels**	H	up to 54 HRC	Rough-Tech 56	Slotting	168	0.0003	0.0005	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019
			Rough-Tech 56	Roughing	264	0.0004	0.0005	0.0008	0.0010	0.0011	0.0014	0.0019	0.0022
				Finishing									
	H	54-60 HRC		Slotting									
				Roughing									
				Finishing									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	Rough-Tech 48	Slotting	288	0.0004	0.0008	0.0010	0.0013	0.0014	0.0019	0.0022	0.0031
			Rough-Tech 48	Roughing	336	0.0005	0.0008	0.0011	0.0014	0.0016	0.0021	0.0025	0.0038
				Finishing									
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	Rough-Tech 48	Slotting	192	0.0003	0.0004	0.0007	0.0008	0.0010	0.0013	0.0017	0.0020
			Rough-Tech 48	Roughing	288	0.0004	0.0006	0.0008	0.0010	0.0011	0.0015	0.0018	0.0022
				Finishing									
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	Rough-Tech 48	Slotting	168	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0014	0.0017
			Rough-Tech 48	Roughing	240	0.0004	0.0004	0.0007	0.0008	0.0010	0.0013	0.0017	0.0020
				Finishing									
High-Temperature Alloys **Nimonic, Inconel, Monel, Hastelloy**		up to 42 HRc	Rough-Tech 48	Slotting	72	0.0002	0.0003	0.0004	0.0006	0.0007	0.0010	0.0011	0.0014
			Rough-Tech 48	Roughing	84	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0014	0.0017
				Finishing									
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	Rough-Tech 48	Slotting	144	0.0003	0.0004	0.0007	0.0008	0.0010	0.0013	0.0017	0.0020
			Rough-Tech 48	Roughing	216	0.0004	0.0006	0.0008	0.0010	0.0011	0.0015	0.0018	0.0022
				Finishing									
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	Rough-Tech 48	Slotting	384	0.0004	0.0007	0.0010	0.0013	0.0014	0.0018	0.0022	0.0033
			Rough-Tech 48	Roughing	432	0.0004	0.0008	0.0011	0.0014	0.0017	0.0020	0.0025	0.0036
				Finishing									
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	Rough-Tech 56	Slotting	336	0.0004	0.0007	0.0008	0.0011	0.0013	0.0017	0.0020	0.0027
			Rough-Tech 56	Roughing	384	0.0004	0.0007	0.0010	0.0013	0.0014	0.0018	0.0022	0.0033
				Finishing									
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	Rough-Tech ALU	Slotting	1350	0.0005	0.0010	0.0013	0.0018	0.0021	0.0025	0.0030	0.0044
			Rough-Tech ALU	Roughing	1620	0.0006	0.0011	0.0014	0.0019	0.0022	0.0028	0.0031	0.0047
				Finishing									
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	Rough-Tech ALU	Slotting	621	0.0005	0.0008	0.0011	0.0014	0.0016	0.0021	0.0025	0.0038
			Rough-Tech ALU	Roughing	756	0.0005	0.0010	0.0013	0.0016	0.0019	0.0022	0.0028	0.0041
				Finishing									
Magnesium Alloys		-	Rough-Tech ALU	Slotting	486	0.0004	0.0008	0.0010	0.0013	0.0014	0.0019	0.0022	0.0031
			Rough-Tech ALU	Roughing	594	0.0005	0.0010	0.0013	0.0016	0.0019	0.0022	0.0028	0.0041
				Finishing									
Non-ferrous **Copper Alloys, Brass, Bronze**		up to 28 HRc	Rough-Tech ALU	Slotting	675	0.0004	0.0008	0.0010	0.0013	0.0014	0.0019	0.0022	0.0031
			Rough-Tech ALU	Roughing	810	0.0005	0.0010	0.0013	0.0016	0.0019	0.0022	0.0028	0.0041
				Finishing									

Feed and Speed Table - Uni-Pro 2-3-4 flutes

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d
HPC-roughing**	0.25 to 0.5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to 0.25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	No. Flutes	Type of application	SFM	Feed (inches per tooth) by diameter							
						1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	2	Slotting	378	0.0005	0.0010	0.0012	0.0017	0.0019	0.0025	0.0028	0.0041
			3	Roughing	420	0.0006	0.0011	0.0015	0.0019	0.0023	0.0028	0.0033	0.0047
			4	Finishing	588	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	2	Slotting	336	0.0005	0.0010	0.0012	0.0017	0.0019	0.0025	0.0028	0.0041
			3	Roughing	378	0.0006	0.0011	0.0015	0.0019	0.0023	0.0028	0.0033	0.0047
			4	Finishing	462	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	2	Slotting	283.5	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
			3	Roughing	336	0.0006	0.0011	0.0014	0.0018	0.0022	0.0026	0.0030	0.0044
			4	Finishing	420	0.0004	0.0008	0.0011	0.0014	0.0017	0.0019	0.0025	0.0036
Hardened Steels **Carbon and Alloy Steels, Tool & Die Steels**	H	up to 54 HRC	2	Slotting	147	0.0003	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	0.0024
			3	Roughing	231	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
			4	Finishing	315	0.0004	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0031
	H	54-60 HRC	2	Slotting									
			3	Roughing									
			4	Finishing									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	2	Slotting	252	0.0004	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0031
			3	Roughing	294	0.0004	0.0008	0.0011	0.0014	0.0017	0.0021	0.0024	0.0035
			4	Finishing	378	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0022	0.0033
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	2	Slotting	168	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
			3	Roughing	252	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0022	0.0033
			4	Finishing	294	0.0004	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0031
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	2	Slotting	147	0.0003	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	0.0024
			3	Roughing	210	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
			4	Finishing	252	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
High-Temperature Alloys **Nimonic, Inconel, Monel, Hastelloy**		up to 42 HRc	2	Slotting	63	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009	0.0012	0.0014
			3	Roughing	73.5	0.0002	0.0005	0.0007	0.0008	0.0009	0.0013	0.0015	0.0019
			4	Finishing	94.5	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	2	Slotting	126	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0019	0.0028
			3	Roughing	189	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0022	0.0033
			4	Finishing	273	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0022	0.0033
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	2	Slotting	336	0.0005	0.0009	0.0012	0.0015	0.0019	0.0022	0.0026	0.0038
			3	Roughing	378	0.0005	0.0009	0.0013	0.0017	0.0020	0.0024	0.0028	0.0040
			4	Finishing	462	0.0004	0.0008	0.0011	0.0014	0.0017	0.0021	0.0024	0.0035
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	2	Slotting	294	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0022	0.0033
			3	Roughing	336	0.0005	0.0009	0.0012	0.0015	0.0019	0.0022	0.0026	0.0038
			4	Finishing	420	0.0004	0.0008	0.0011	0.0014	0.0017	0.0021	0.0024	0.0035
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	2	Slotting	1050	0.0006	0.0011	0.0014	0.0018	0.0022	0.0026	0.0030	0.0044
			3	Roughing	1260	0.0006	0.0011	0.0015	0.0019	0.0023	0.0028	0.0033	0.0047
			4	Finishing	2100	0.0005	0.0010	0.0012	0.0017	0.0019	0.0025	0.0028	0.0041
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	2	Slotting	483	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
			3	Roughing	588	0.0006	0.0011	0.0014	0.0018	0.0022	0.0026	0.0030	0.0044
			4	Finishing	735	0.0005	0.0010	0.0012	0.0017	0.0019	0.0025	0.0028	0.0041
Magnesium Alloys		-	2	Slotting	378	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
			3	Roughing	462	0.0006	0.0011	0.0014	0.0018	0.0022	0.0026	0.0030	0.0044
			4	Finishing	588	0.0005	0.0010	0.0012	0.0017	0.0019	0.0025	0.0028	0.0041
Non-ferrous **Copper Alloys, Brass, Bronze**		up to 28 HRc	2	Slotting	525	0.0004	0.0007	0.0010	0.0012	0.0014	0.0018	0.0022	0.0033
			3	Roughing	630	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039
			4	Finishing	840	0.0004	0.0008	0.0011	0.0015	0.0018	0.0022	0.0026	0.0039

Feed and Speed Table - GF 500 B / GF 300 B (Ball) METRIC

Tool length/ reach up to 3xD m/min (Vc) and mm/T (fz) 100%

Tool length/ reach up to 3-5xD m/min (Vc) and mm/T (fz) -20%

Tool length/ reach up to 5-10xD m/min (Vc) and mm/T (fz) -40%

Application										
	Drm.	(mm)	2	3	4	6	8	10	12	16
Roughing	ap	(mm)	0.10	0.15	0.20	0.40	0.60	0.75	1.00	1.20
	ae	(mm)	0.15	0.15	0.30	0.50	0.75	1.00	1.50	1.50
Finishing	ap	(mm)	0.05	0.07	0.10	0.14	0.16	0.18	0.20	0.30
	ae	(mm)	0.05	0.05	0.07	0.10	0.15	0.20	0.25	0.30

Material	Color Ball	Hardness	Use Type	Type of application	Vc m/min	fz feed (mm/Tooth) by diameter							
						2	3	4	6	8	10	12	16
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	GF 500	Roughing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	300	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Hardened Steels **Carbon and Alloy Steels, Tool & Die Steels**	H	up to 54 HRC	GF 500	Roughing	180	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
	H	54-60 HRC	GF 300	Roughing	150	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 300	Finishing	230	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	GF 500	Roughing	180	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	GF 500	Roughing	130	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	200	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	GF 500	Roughing	80	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	130	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
High-Temperature Alloys **Nimonic, Inconel, Monel, Hastelloy**		up to 42 HRc	GF 500	Roughing	40	0.010	0.020	0.030	0.035	0.040	0.050	0.070	0.080
			GF 500	Finishing	60	0.020	0.025	0.030	0.040	0.045	0.060	0.080	0.090
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	GF 500	Roughing	80	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	150	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	GF 500	Roughing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	300	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	GF 500	Roughing	150	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	230	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	GF 500	Roughing	350	0.040	0.045	0.050	0.070	0.100	0.120	0.150	0.170
			GF 500	Finishing	600	0.040	0.045	0.050	0.070	0.100	0.120	0.150	0.170
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	GF 500	Roughing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Magnesium Alloys		-	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Non-ferrous **Copper Alloys, Brass, Bronze**		up to 28 HRc	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	400	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
				Finishing									

Feed and Speed Table - GF 500 T / GF 300 T (Torus) METRIC

Tool length/ reach up to 3xD m/min (Vc) and mm/T (fz) 100%

Tool length/ reach up to 3-5xD m/min (Vc) and mm/T (fz) -20%

Tool length/ reach up to 5-10xD m/min (Vc) and mm/T (fz) -40%

Application										
	Drm.	(mm)	2	3	4	6	8	10	12	16
Roughing	ap	(mm)	0.15	0.20	0.30	0.40	0.60	0.75	1.00	1.50
	ae	(mm)	1.00	1.50	2.00	3.00	4.00	5.00	6.00	8.00
Finishing	ap	(mm)	0.08	0.11	0.13	0.15	0.20	0.30	0.40	0.50
	ae	(mm)	0.20	0.30	0.40	0.70	1.00	1.50	2.00	3.00

Material	Color Ball	Hardness	Use Type	Type of application	Vc m/min	fz feed (mm/Tooth) by diameter							
						2	3	4	6	8	10	12	16
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc	GF 500	Roughing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	300	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc	GF 500	Roughing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	300	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc	GF 300	Roughing	180	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 300	Finishing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Hardened Steels **Carbon and Alloy Steels, Tool & Die Steels**	H	up to 54 HRC	GF 300	Roughing	140	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 300	Finishing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
	H	54-60 HRC	GF 300	Roughing	80	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 300	Finishing	130	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc	GF 500	Roughing	180	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc	GF 500	Roughing	120	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	180	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc	GF 500	Roughing	80	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	130	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
High-Temperature Alloys **Nimonic, Inconel, Monel, Hastelloy**		up to 42 HRc	GF 500	Roughing	40	0.010	0.020	0.030	0.035	0.040	0.050	0.070	0.080
			GF 500	Finishing	60	0.020	0.025	0.030	0.040	0.045	0.060	0.080	0.090
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc	GF 500	Roughing	90	0.020	0.030	0.035	0.040	0.050	0.070	0.080	0.100
			GF 500	Finishing	150	0.025	0.030	0.040	0.045	0.050	0.070	0.100	0.120
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30	GF 500	Roughing	200	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 300	Finishing	300	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30	GF 300	Roughing	150	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 300	Finishing	230	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	GF 500	Roughing	350	0.040	0.045	0.050	0.070	0.100	0.120	0.150	0.170
			GF 500	Finishing	600	0.040	0.045	0.050	0.070	0.100	0.120	0.150	0.170
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	GF 500	Roughing	280	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Magnesium Alloys		-	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	350	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
Non-ferrous **Copper Alloys, Brass, Bronze**		up to 28 HRc	GF 500	Roughing	250	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
			GF 500	Finishing	400	0.030	0.040	0.045	0.050	0.070	0.100	0.120	0.150
				Finishing									

Feed and Speed Table - Alumi-Tech (GA 200 A)

IPT - adjustment: *
DOC (ap) = 2 x d ; IPT -30%
IPT - adjustment: **
DOC (ap) = 1-2 x d ; IPT+25%
IPT - adjustment: ***
DOC (ap) = 1-2 x d ; IPT+60%

HPC *= High Performance Cutting*
= High Metal Removal Rate

HSC *= High Speed Machining*
= Good Surface Quality

Application	Width of cut (ae)	Depth of cut (ap)
Slotting*	1 x d	.5 to 1.0 x d
Roughing*	.5 to .9 x d	.5 to 1.0 x d
Finishing	.05 to .1 x d	1.0 to 2.0 x d
HPC-roughing**	.25 to .5 x d	1.0 to 2.0 x d
HSC-roughing***	0.05 to .25 x d	1.0 to 2.0 x d

Material	Color Ball	Hardness	Use Type	Type of application	SFM	Feed (inches per tooth) by diameter 1/8"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330		up to 28 HRc											
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310		28 to 38 HRc											
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7		28 to 44 HRc											
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	H	up to 54 HRC											
	H	54-60 HRC											
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F		up tp 28 HRc											
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH		up tp 28 HRc											
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic		over 28 HRc											
High-Temperature Alloys Nimonic, Inconel, Monel, Hastelloy		up to 42 HRc											
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Ai-8V-6Cr4Mo-4Zr, 10V-2Fe-3Ai, 13V-11Cr-3Ai		up to 42 HRc											
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40		up to 240 HB 30											
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450		above 240 HB 30											
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075		up to 3% Si	Alumi-Tech	Slotting	1500	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			Alumi-Tech	Roughing	1800	0.0008	0.0016	0.0022	0.0028	0.0033	0.0039	0.0047	0.0067
			Alumi-Tech	Finishing	3000	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9, 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg		above 3% Si	Alumi-Tech	Slotting	690	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			Alumi-Tech	Roughing	840	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			Alumi-Tech	Finishing	1050	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Magnesium Alloys		-	Alumi-Tech	Slotting	540	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			Alumi-Tech	Roughing	660	0.0008	0.0016	0.0020	0.0026	0.0031	0.0037	0.0043	0.0063
			Alumi-Tech	Finishing	840	0.0007	0.0014	0.0018	0.0024	0.0028	0.0035	0.0039	0.0059
Non-ferrous Copper Alloys, Brass, Bronze		up to 28 HRc	Alumi-Tech	Slotting	750	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0031	0.0047
			Alumi-Tech	Roughing	900	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055
			Alumi-Tech	Finishing	1200	0.0006	0.0012	0.0016	0.0022	0.0026	0.0031	0.0037	0.0055

STANDARD & SPECIAL PRODUCT RANGE

• HSS, HSCO & PM Standards •

GU 500 DZ Universal Drills
GT 500 DZ High Performance Drills New!
GT 100 Parabolic Flute Deep Hole Drills
Coolant-Through GT 100 IC Parabolic Flute Deep Hole Drills New!
GT 80 Parabolic Flute Deep Hole Drills New!
Coolant-Through GT 80 IC Parabolic Flute Deep Hole Drills
GT 50 Parabolic Flute Deep Hole Drills
General Purpose Drills
Heavy Duty Drills
Heavy Duty Split Point Drills
Low Helix Drills
High Helix Drills
Micro-Precision Drills
NC Spot Drills
Drill-Countersinks
High Performance HSS-E Taps
High Performance PM HSS-E Taps

• HSS & HSCO Specials •

Drills
Step Drills
Step Drill Reamers
Step Core Drills
Step Core Drill Reamers
Reamers
Step Reamers
Subland Drills
Subland Drill Reamers
Subland Core Drills
Taps

• Carbide Standards •

RT 100 U/F High Penetration Drills
RT 100 X High Penetration Drills
RT 100 R High Penetration Drills
RT 100 T Deep Hole Drills
RT 100 VA Drills for Stainless Steels
Coolant-Through RT 100 U/F/C High Penetration Drills
Coolant-Through RT 150 GG Straight-Flute High Penetration Drills
Coolant-Through HT/RT 800 WP Interchangeable Insert Drills
GS 200 U/G Three-Flute High Precision Drills
GT 100 Parabolic Flute Deep Hole Drills
Exclusive Line® Small-Diameter Drills
EB 100 Small-Diameter Single-Flute Gun Drills
General Purpose Drills
NC Spot Drills
PRO-Line Universal End Mills
TECH-Line High Performance End Mills

• Carbide Specials •

Drills
RT High Performance Drills
G Drills
Gun Drills
Three- & Four-Flute Drills
Step Drills
Step Drill Reamers
Step Core Drills
Step Core Drill Reamers
Reamers
Step Reamers
Subland Drills
Subland Drill Reamers
Subland Core Drills
Taps
End Mills

• PCD Specials •

• Coating Services •

Titanium Nitride (TiN)
Titanium Carbonitride (TiCN)
Titanium Aluminum Nitride (TiAlN)
FIREX® Special Multilayer Hard Coating
Super A (AlTiN)
MolyGlide® Lubricating Soft Coating
Nitride / Steam Oxide
nano-FIREX® micro thin film gradient structure New!
nano-A™ micro thin film gradient structure New!

• Reconditioning Service •

• GM 300 Modular HSK • Toolholding System

Hydraulic / Shrink / Collet Chucks
Adapters
Collets

• GE 100 Modular • Tooling System

DISTRIBUTED BY:

GUHRING
The Tool Company
ISO 9001:2000 CERTIFIED

Guhring, Inc.
P.O. Box 643, Brookfield, WI 53008-0643

Shipping Address
1445 Commerce Avenue
Brookfield, WI 53045
Tel (262) 784-6730 (800) 776-6170
Fax (262) 784-9096

West Coast Distribution Center
17902 Georgetown Lane
Huntington Beach, CA 92647
Tel (714) 841-3582 (800) 877-7202
Fax (714) 841-3592

Guhring Corporation
20 Steckle Place, Unit #14
Kitchener, ON N2E 2C3
Tel (519) 748-9664 (800) 463-5555
Fax (519) 748-2954

Form 01-0668 08/2010