SGS®
Solid Carbide Tools

VALUE AT THE SPINDLE®

77 H-CARB

Series 77
High Performance End Mills

New Expanded Offering

www.kyocera-sgstool.com

ISO 9001:2015 Certified

KYOCERA

H-CARB

INTRODUCING THE H-CARB SEVEN FLUTE HIGH EFFICIENCY END MILL

The H-Carb Seven Flute High Efficiency Endmill specializes in deep axial trochoidal and high-speed machining applications offered at various lengths of cut. The specialized core and flute design improves rigidity and chip flow while reducing deflection. The seven-flute design allows for superior finishes at higher rates over 5 and 6 flute tools. The series is offered in a variety of cut lengths and end configurations with two cutting edge styles. The H-Carb is available with either Ti-NAMITE®-M or Ti-NAMITE®-A coatings for superior tool life and performance in a variety of ferrous materials and high-temp alloys.

THE H-CARB IS IDEAL FOR HIGH-EFFICIENCY ROUGHING AND FINISHING IN THE FOLLOWING TARGET MATERIALS:

- Titanium
- High-Temperature Alloys
- Stainless Steels
- Carbon & Alloyed Steels
- Cast Iron

EXPANSIVE OFFERING

- Over 1,000 items in portfolio
- Available in 3 lengths of cut
- Full complement of corner radii available
- Specials and alterations are available upon request
- Available coatings are suitable for machining in ferrous based materials such as carbon and alloy steels stainless steels, cast irons, high-temp alloys and titanium
- Coolant-through designs offered as standard options
- Chip Breaker profile offered as standard options

TI-NAMITE®-M

Features of TI-NAMITE®-M include high wear resistance, reduced friction, and excellent prevention of cutting edge build up. The coating provides superior material removal rates and tool life when used in high performance operations in cast iron and steel and with difficult to machine materials like titanium.

Hardness (HV): 3600
Oxidation Temperature: 1150°C / 2100°F
Coefficient of Friction: 0.45
Thickness: 1 – 5 Microns (based on tool diameter)

TI-NAMITE®-A

The H-Carb is available with an abrasive resistant and hard coating. The coating has a high hardness giving ultimate protection against abrasive wear and erosion. Ideal for high temperature alloys and stainless-steel applications.

Hardness (HV): 3700
Oxidation Temperature: 1100°C / 2010°F
Coefficient of Friction: 0.30
Thickness: 1 – 5 Microns (based on tool diameter)

FEATURES

END WORK

- Open center design delivers efficiency during entry movements into the workpiece
- Specially engineered gash provides increased strength at the end of the tool

THROUGH COOLANT

- Central hole delivers coolant effectively to the cutting zone
- Enhances chip removal when pocketing or slotting
- Fractional and metric coolant-through diameters in stock

CHIP BREAKER

- Breaks up the chips formed by the long flute length allowing for better chip flow and evacuation in deep pocketing operations
- Specialized design enhances edge strength and reduces load

FLUTING & HELIX ANGLE

- The innovative seven flute design allows for higher feed rates, decreasing cycle time and improving productivity
- An optimized core improves rigidity, chip flow and reduced deflection
- The variable flute indexing provides advanced chatter suppression
- Optimized Helix angle provides enhanced shearing capabilities

CAPABILITIES

ROUGHING

- 2.5xD length of cut is capable of 20% radial engagement at full axial depth of cut
- 3xD length of cut is capable of 15% radial engagement at full axial depth of cut
- 4xD length of cut is capable of 10% radial engagement at full axial depth of cut

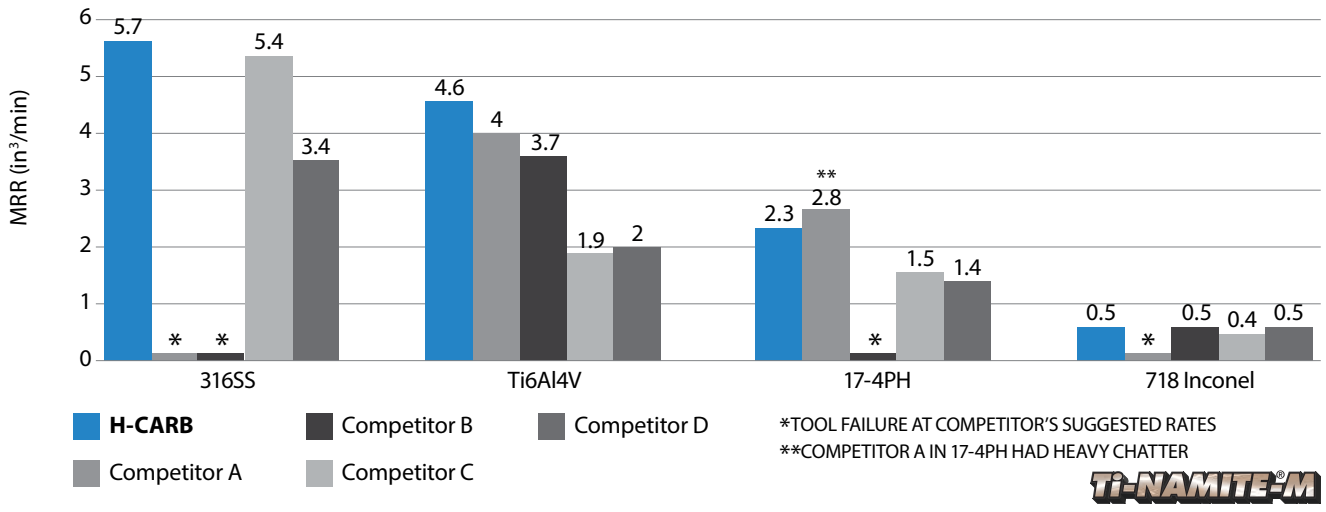
FINISHING

- Varying length of cuts available to attain an optimal surface finish
- The seven-flute design allows for superior finishes at higher rates over 5 and 6 flute tools, allowing for superior finishes in a shorter cycle time

HIGH-SPEED MACHINING

- Long flute length enables deep axial cuts at high speeds and feeds, enhancing material removal rate in a wide range of difficult to machine materials
- Exclusive TI-NAMITE®-M coating for high heat resistance to enhance tool life in difficult to machine materials like titanium
- Available with TI-NAMITE®-A coating for superior wear, edge build-up resistance and extended tool life in difficult to machine materials like stainless steel

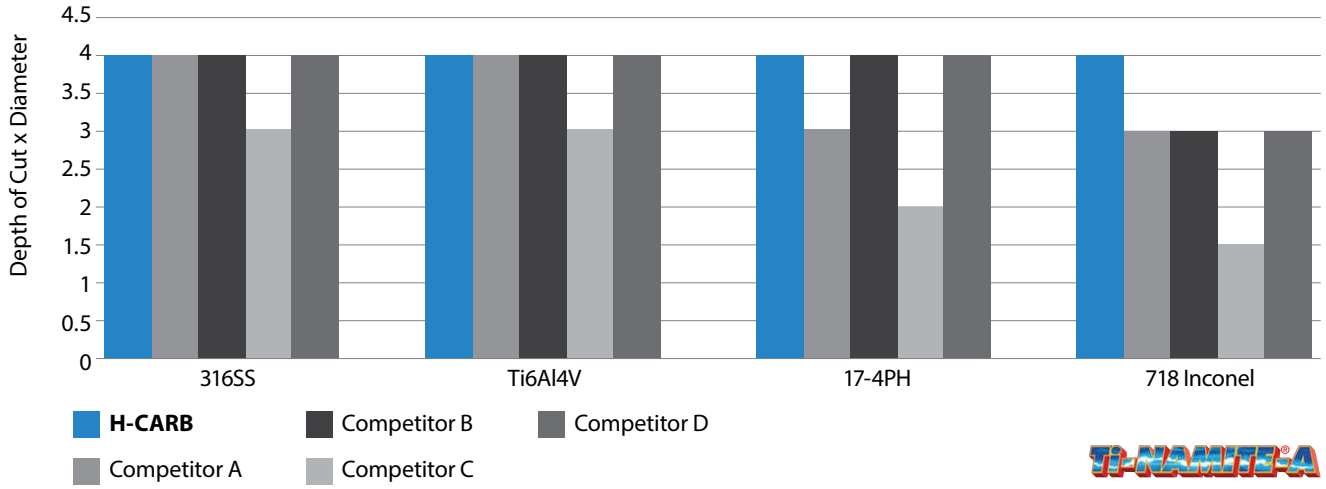
MATERIAL REMOVAL RATE COMPARISON
(Suggested Parameters for 5% Ae)



*TOOL FAILURE AT COMPETITOR'S SUGGESTED RATES
**COMPETITOR A IN 17-4PH HAD HEAVY CHATTER

Ti-NAMITE®-M

MAX SUGGESTED AXIAL DEPTH OF CUT
10% Ae (4xD Tools)



Ti-NAMITE®-A

TOTAL COST SAVINGS
$18,649

Industry
General Engineering

Material
1040 Steel
(20-28 Hrc Hardness)

Product
Series 77 H-Carb

Application
5% Profile

Competitor
Indexable Face Mill

Coolant
N/A / Dry

Tool Information
3/4" DIA
1-7/8" LOC
4" OAL

Scan Code to See the Series 77 H-Carb IN ACTION!

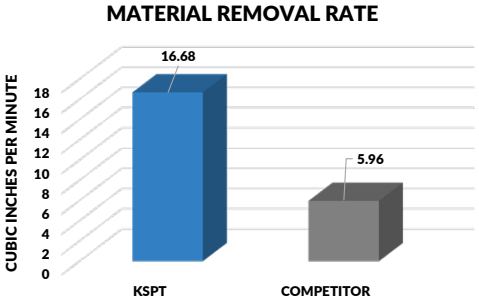
Goals

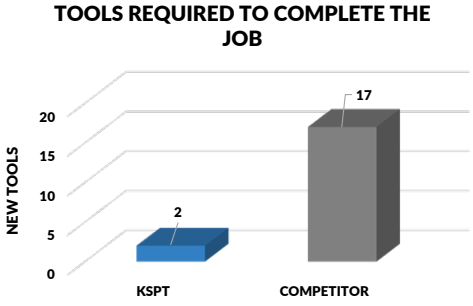
In this study, the goal was to significantly reduce job costs by reducing cycle time and maximizing material removal rates.

Strategy

KYOCERA SGS used a 7 flute H-Carb high performance dynamic milling end mill for this job. In addition to high metal removal rates, the H-Carb produces an optimal surface finish compared to conventional tools with five or six flutes.

	KSPT	COMPETITOR
TOOL DIAMETER	3/4"	3"
SPEED	5042 RPM	750 RPM
FEED	254 IPM	23.9 IPM
AXIAL DEPTH (AP)	1-3/4	0.1
RADIAL WIDTH (AE)	0.0375"	2-1/2"
CYCLE TIME	1:05 MINUTES	9:35 MINUTES





Results

A 179% improvement in material removal rate was achieved by replacing the indexable face mill with the high performance H-Carb. Aside from increasing parts per tool, the H-Carb also increased tool life. The customer was able to reduce new tool costs by 59%, going from 17 new tools to 2. The total cost of this customer decreased by 87% from $21,425 to $2,776 for an annual savings of $18,649.


Square


Corner


Straight


Right Spiral

2.5xD Length of Cut

3xD Length of Cut

4xD Length of Cut


Flute Spacing Unequal


Positive Rake Angle


Internal Coolant


External Coolant


Chip Breaker

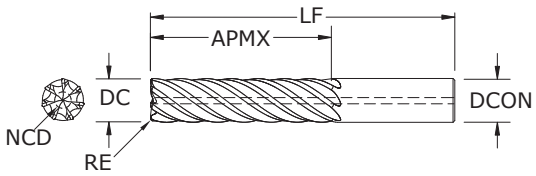
Flutes

TOLERANCES (inch)

DC	DC	DCON
1/8 - 1/4	+0.0000 / –0.0012	h6
> 1/4 - 3/8	+0.0000 / –0.0016	h6
> 3/8 - 1	+0.0000 / –0.0020	h6

CORNER RADIUS TOLERANCES (inch)

RE = +0.0000 / –0.0020



NEW EXPANDED TOOLS

Cutting Diameter	Length of Cut	Overall Length	Shank Diameter	Corner Radius	Non-Cutting Center Dia.	TI-NAMITE®-A (TA)				TI-NAMITE®-M (TM)			
						External Coolant		Internal Coolant		External Coolant		Internal Coolant	
DC	APMX	LF	DCON	RE	NCD	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker
1/4	5/8	2-1/2	1/4	–	0.0845	77100	77102	–	–	77101	77103	–	–
1/4	5/8	2-1/2	1/4	0.015	0.0845	77104	77106	–	–	77105	77107	–	–
1/4	5/8	2-1/2	1/4	0.030	0.0845	77108	77110	–	–	77109	77111	–	–
1/4	3/4	2-1/2	1/4	–	0.0845	77112	77114	–	–	77113	77115	–	–
1/4	3/4	2-1/2	1/4	0.015	0.0845	77116	77118	–	–	77117	77119	–	–
1/4	3/4	2-1/2	1/4	0.030	0.0845	77120	77122	–	–	77121	77123	–	–
1/4	1	3	1/4	–	0.0845	77124	77126	–	–	77125	77127	–	–
1/4	1	3	1/4	0.015	0.0845	77128	77130	–	–	77129	77131	–	–
1/4	1	3	1/4	0.030	0.0845	77132	77134	–	–	77133	77135	–	–
3/8	15/16	3	3/8	–	0.1268	77136	77138	–	–	77137	77139	–	–
3/8	15/16	3	3/8	0.015	0.1268	77140	77142	–	–	77141	77143	–	–
3/8	15/16	3	3/8	0.030	0.1268	77144	77146	–	–	77145	77147	–	–
3/8	1-1/8	3-1/4	3/8	–	0.1268	77148	77150	–	–	77149	77151	–	–
3/8	1-1/8	3-1/4	3/8	0.015	0.1268	77152	77154	–	–	77153	77155	–	–
3/8	1-1/8	3-1/4	3/8	0.030	0.1268	77156	77158	–	–	77157	77159	–	–
3/8	1-1/2	3-1/2	3/8	–	0.1268	77160	77162	–	–	77161	77163	–	–
3/8	1-1/2	3-1/2	3/8	0.015	0.1268	77164	77166	–	–	77165	77167	–	–
3/8	1-1/2	3-1/2	3/8	0.030	0.1268	77168	77170	–	–	77169	77171	–	–
1/2	1-1/4	3-1/4	1/2	–	0.1690	77172	77174	77340	77342	77173	77175	77341	77343
1/2	1-1/4	3-1/4	1/2	0.030	0.1690	77176	77178	77344	77346	77177	77179	77345	77347
1/2	1-1/4	3-1/4	1/2	0.060	0.1690	77180	77182	77348	77350	77181	77183	77349	77351
1/2	1-1/2	3-1/2	1/2	–	0.1690	77184	77186	77352	77354	77185	77187	77353	77355
1/2	1-1/2	3-1/2	1/2	0.030	0.1690	77188	77190	77356	77358	77189	77191	77357	77359
1/2	1-1/2	3-1/2	1/2	0.060	0.1690	77192	77194	77360	77362	77193	77195	77361	77363
1/2	2	4	1/2	–	0.1690	77196	77198	77364	77366	77197	77199	77365	77367
1/2	2	4	1/2	0.030	0.1690	77200	77202	77368	77370	77201	77203	77369	77371
1/2	2	4	1/2	0.060	0.1690	77204	77206	77372	77374	77205	77207	77373	77375
5/8	1-9/16	3-3/4	5/8	–	0.2113	77208	77210	77376	77378	77209	77211	77377	77379
5/8	1-9/16	3-3/4	5/8	0.030	0.2113	77212	77214	77380	77382	77213	77215	77381	77383
5/8	1-9/16	3-3/4	5/8	0.060	0.2113	77216	77218	77384	77386	77217	77219	77385	77387
5/8	1-7/8	4	5/8	–	0.2113	77220	77222	77388	77390	77221	77223	77389	77391
5/8	1-7/8	4	5/8	0.030	0.2113	77224	77226	77392	77394	77225	77227	77393	77395

(continued on next page)

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Square | Corner | Straight | Right Spiral | 2.5xD Length of Cut | 3xD Length of Cut | 4xD Length of Cut

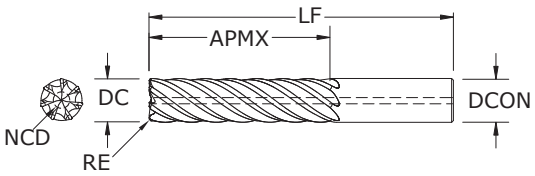
Flute Spacing Unequal | Positive Rake Angle | Internal Coolant | External Coolant | Chip Breaker | 7 Flutes

TOLERANCES (inch)

DC	DC	DCON
1/8 - 1/4	+0.0000 / –0.0012	h6
> 1/4 - 3/8	+0.0000 / –0.0016	h6
> 3/8 - 1	+0.0000 / –0.0020	h6

CORNER RADIUS TOLERANCES (inch)

RE = +0.0000 / –0.0020



NEW EXPANDED TOOLS

Cutting Diameter	Length of Cut	Overall Length	Shank Diameter	Corner Radius	Non-Cutting Center Dia.	TI-NAMITE®-A (TA)				TI-NAMITE®-M (TM)			
						External Coolant		Internal Coolant		External Coolant		Internal Coolant	
DC	APMX	LF	DCON	RE	NCD	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker
5/8	1-7/8	4	5/8	0.060	0.2113	77228	77230	77396	77398	77229	77231	77397	77399
5/8	2-1/2	4-1/2	5/8	–	0.2113	77232	77234	77400	77402	77233	77235	77401	77403
5/8	2-1/2	4-1/2	5/8	0.030	0.2113	77236	77238	77404	77406	77237	77239	77405	77407
5/8	2-1/2	4-1/2	5/8	0.060	0.2113	77240	77242	77408	77410	77241	77243	77409	77411
3/4	1-7/8	4	3/4	–	0.2535	77244	77246	77412	77414	77245	77247	77413	77415
3/4	1-7/8	4	3/4	0.030	0.2535	77248	77250	77416	77418	77249	77251	77417	77419
3/4	1-7/8	4	3/4	0.060	0.2535	77252	77254	77420	77422	77253	77255	77421	77423
3/4	1-7/8	4	3/4	0.120	0.2535	77256	77258	77424	77426	77257	77259	77425	77427
3/4	2-1/4	4-1/2	3/4	–	0.2535	77260	77262	77428	77430	77261	77263	77429	77431
3/4	2-1/4	4-1/2	3/4	0.030	0.2535	77264	77266	77432	77434	77265	77267	77433	77435
3/4	2-1/4	4-1/2	3/4	0.060	0.2535	77268	77270	77436	77438	77269	77271	77437	77439
3/4	2-1/4	4-1/2	3/4	0.120	0.2535	77272	77274	77440	77442	77273	77275	77441	77443
3/4	3	5-1/4	3/4	–	0.2535	77276	77278	77444	77446	77277	77279	77445	77447
3/4	3	5-1/4	3/4	0.030	0.2535	77280	77282	77448	77450	77281	77283	77449	77451
3/4	3	5-1/4	3/4	0.060	0.2535	77284	77286	77452	77454	77285	77287	77453	77455
3/4	3	5-1/4	3/4	0.120	0.2535	77288	77290	77456	77458	77289	77291	77457	77459
1	2-1/2	5-1/2	1	–	0.3380	77292	77294	77460	77462	77293	77295	77461	77463
1	2-1/2	5-1/2	1	0.030	0.3380	77296	77298	77464	77466	77297	77299	77465	77467
1	2-1/2	5-1/2	1	0.060	0.3380	77300	77302	77468	77470	77301	77303	77469	77471
1	2-1/2	5-1/2	1	0.120	0.3380	77304	77306	77472	77474	77305	77307	77473	77475
1	3	6	1	–	0.3380	77308	77310	77476	77478	77309	77311	77477	77479
1	3	6	1	0.030	0.3380	77312	77314	77480	77482	77313	77315	77481	77483
1	3	6	1	0.060	0.3380	77316	77318	77484	77486	77317	77319	77485	77487
1	3	6	1	0.120	0.3380	77320	77322	77488	77490	77321	77323	77489	77491
1	4	7	1	–	0.3380	77324	77326	77492	77494	77325	77327	77493	77495
1	4	7	1	0.030	0.3380	77328	77330	77496	77498	77329	77331	77497	77499
1	4	7	1	0.060	0.3380	77332	77334	77500	77502	77333	77335	77501	77503
1	4	7	1	0.120	0.3380	77336	77338	77504	77506	77337	77339	77505	77507


Square


Corner


Straight


Right Spiral

2.5xD Length of Cut

3xD Length of Cut

4xD Length of Cut


Flute Spacing Unequal


Positive Rake Angle


Internal Coolant


External Coolant


Chip Breaker

7 Flutes

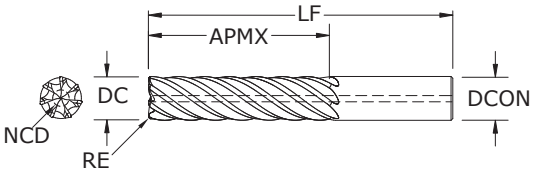
77 H-CARB

TOLERANCES (mm)

DC	DC	DCON
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

RE = +0,000 / –0,050



NEW EXPANDED TOOLS

Cutting Diameter	Length of Cut	Overall Length	Shank Diameter	Corner Radius	Non-Cutting Center Dia.	TI-NAMITE®-A (TA)				TI-NAMITE®-M (TM)			
						External Coolant		Internal Coolant		External Coolant		Internal Coolant	
DC	APMX	LF	DCON	RE	NCD	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker
6,0	15,0	63,0	6,0	–	2,03	74300	74302	–	–	74301	74303	–	–
6,0	15,0	63,0	6,0	0,3	2,03	74304	74306	–	–	74305	74307	–	–
6,0	15,0	63,0	6,0	0,5	2,03	74308	74310	–	–	74309	74311	–	–
6,0	18,0	63,0	6,0	–	2,03	74316	74318	–	–	74317	74319	–	–
6,0	18,0	63,0	6,0	0,3	2,03	74320	74322	–	–	74321	74323	–	–
6,0	18,0	63,0	6,0	0,5	2,03	74324	74326	–	–	74325	74327	–	–
6,0	24,0	75,0	6,0	–	2,03	74332	74334	–	–	74333	74335	–	–
6,0	24,0	75,0	6,0	0,3	2,03	74336	74338	–	–	74337	74339	–	–
6,0	24,0	75,0	6,0	0,5	2,03	74340	74342	–	–	74341	74343	–	–
8,0	20,0	75,0	8,0	–	2,71	74348	74350	–	–	74349	74351	–	–
8,0	20,0	75,0	8,0	0,5	2,71	74352	74354	–	–	74353	74355	–	–
8,0	20,0	75,0	8,0	1,0	2,71	74356	74358	–	–	74357	74359	–	–
8,0	20,0	75,0	8,0	2,0	2,71	74360	74362	–	–	74361	74363	–	–
8,0	24,0	75,0	8,0	–	2,71	74364	74366	–	–	74365	74367	–	–
8,0	24,0	75,0	8,0	0,5	2,71	74368	74370	–	–	74369	74371	–	–
8,0	24,0	75,0	8,0	1,0	2,71	74372	74374	–	–	74373	74375	–	–
8,0	24,0	75,0	8,0	2,0	2,71	74376	74378	–	–	74377	74379	–	–
8,0	32,0	85,0	8,0	–	2,71	74380	74382	–	–	74381	74383	–	–
8,0	32,0	85,0	8,0	0,5	2,71	74384	74386	–	–	74385	74387	–	–
8,0	32,0	85,0	8,0	1,0	2,71	74388	74390	–	–	74389	74391	–	–
8,0	32,0	85,0	8,0	2,0	2,71	74392	74394	–	–	74393	74395	–	–
10,0	25,0	75,0	10,0	–	3,38	74396	74398	–	–	74397	74399	–	–
10,0	25,0	75,0	10,0	0,5	3,38	74400	74402	–	–	74401	74403	–	–
10,0	25,0	75,0	10,0	1,0	3,38	74404	74406	–	–	74405	74407	–	–
10,0	30,0	80,0	10,0	–	3,38	74408	74410	–	–	74409	74411	–	–
10,0	30,0	80,0	10,0	0,5	3,38	74412	74414	–	–	74413	74415	–	–
10,0	30,0	80,0	10,0	1,0	3,38	74416	74418	–	–	74417	74419	–	–
10,0	40,0	100,0	10,0	–	3,38	74420	74422	–	–	74421	74423	–	–
10,0	40,0	100,0	10,0	0,5	3,38	74424	74426	–	–	74425	74427	–	–
10,0	40,0	100,0	10,0	1,0	3,38	74428	74430	–	–	74429	74431	–	–

(continued on next page)

77 H-CARB

Square | Corner | Straight | Right Spiral | 2.5xD Length of Cut | 3xD Length of Cut | 4xD Length of Cut

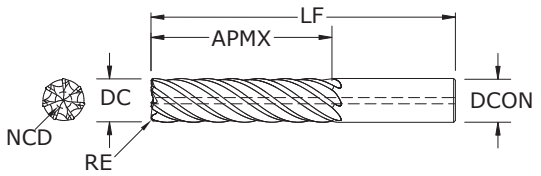
Flute Spacing Unequal | Positive Rake Angle | Internal Coolant | External Coolant | Chip Breaker | 7 Flutes

TOLERANCES (mm)

DC	DC	DCON
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

RE = +0,000 / –0,050



NEW EXPANDED TOOLS

Cutting Diameter	Length of Cut	Overall Length	Shank Diameter	Corner Radius	Non-Cutting Center Dia.	TI-NAMITE®-A (TA)				TI-NAMITE®-M (TM)			
						External Coolant		Internal Coolant		External Coolant		Internal Coolant	
DC	APMX	LF	DCON	RE	NCD	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker
12,0	30,0	83,0	12,0	–	4,06	74432	74434	74672	74674	74433	74435	74673	74675
12,0	30,0	83,0	12,0	0,5	4,06	74436	74438	74676	74678	74437	74439	74677	74679
12,0	30,0	83,0	12,0	1,0	4,06	74440	74442	74680	74682	74441	74443	74681	74683
12,0	30,0	83,0	12,0	2,0	4,06	74600	74601	74684	74686	74602	74603	74685	74687
12,0	30,0	83,0	12,0	3,0	4,06	74604	74605	74688	74690	74606	74607	74689	74691
12,0	36,0	83,0	12,0	–	4,06	74444	74446	74692	74694	74445	74447	74693	74695
12,0	36,0	83,0	12,0	0,5	4,06	74448	74450	74696	74698	74449	74451	74697	74699
12,0	36,0	83,0	12,0	1,0	4,06	74452	74454	74700	74702	74453	74455	74701	74703
12,0	36,0	83,0	12,0	2,0	4,06	74608	74609	74704	74706	74610	74611	74705	74707
12,0	36,0	83,0	12,0	3,0	4,06	74612	74613	74708	74710	74614	74615	74709	74711
12,0	48,0	100,0	12,0	–	4,06	74456	74458	74712	74714	74457	74459	74713	74715
12,0	48,0	100,0	12,0	0,5	4,06	74460	74462	74716	74718	74461	74463	74717	74719
12,0	48,0	100,0	12,0	1,0	4,06	74464	74466	74720	74722	74465	74467	74721	74723
12,0	48,0	100,0	12,0	2,0	4,06	74616	74617	74724	74726	74618	74619	74725	74727
12,0	48,0	100,0	12,0	3,0	4,06	74620	74621	74728	74730	74622	74623	74729	74731
16,0	40,0	92,0	16,0	–	5,41	74468	74470	74732	74734	74469	74471	74733	74735
16,0	40,0	92,0	16,0	0,5	5,41	74472	74474	74736	74738	74473	74475	74737	74739
16,0	40,0	92,0	16,0	1,0	5,41	74476	74478	74740	74742	74477	74479	74741	74743
16,0	40,0	92,0	16,0	2,0	5,41	74624	74625	74744	74746	74626	74627	74745	74747
16,0	40,0	92,0	16,0	3,0	5,41	74628	74629	74748	74750	74630	74631	74749	74751
16,0	48,0	100,0	16,0	–	5,41	74480	74482	74752	74754	74481	74483	74753	74755
16,0	48,0	100,0	16,0	0,5	5,41	74484	74486	74756	74758	74485	74487	74757	74759
16,0	48,0	100,0	16,0	1,0	5,41	74488	74490	74760	74762	74489	74491	74761	74763
16,0	48,0	100,0	16,0	2,0	5,41	74632	74633	74764	74766	74634	74635	74765	74767
16,0	48,0	100,0	16,0	3,0	5,41	74636	74637	74768	74770	74638	74639	74769	74771
16,0	64,0	115,0	16,0	–	5,41	74492	74494	74772	74774	74493	74495	74773	74775
16,0	64,0	115,0	16,0	0,5	5,41	74496	74498	74776	74778	74497	74499	74777	74779
16,0	64,0	115,0	16,0	1,0	5,41	74500	74502	74780	74782	74501	74503	74781	74783
16,0	64,0	115,0	16,0	2,0	5,41	74640	74641	74784	74786	74642	74643	74785	74787
16,0	64,0	115,0	16,0	3,0	5,41	74644	74645	74788	74790	74646	74647	74789	74791

(continued on next page)


Square


Corner


Straight


Right Spiral

2.5xD
Length of Cut

3xD
Length of Cut

4xD
Length of Cut


Flute Spacing
Unequal


Positive
Rake Angle


Internal Coolant


External Coolant


Chip Breaker

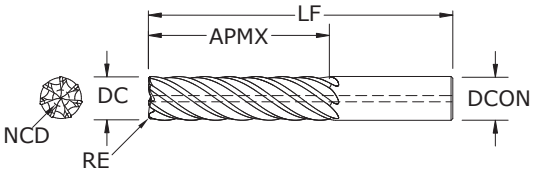
7
Flutes

TOLERANCES (mm)

DC	DC	DCON
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

RE = +0,000 / –0,050



NEW EXPANDED TOOLS

Cutting Diameter	Length of Cut	Overall Length	Shank Diameter	Corner Radius	Non-Cutting Center Dia.	TI-NAMITE®-A (TA)				TI-NAMITE®-M (TM)			
						External Coolant		Internal Coolant		External Coolant		Internal Coolant	
DC	APMX	LF	DCON	RE	NCD	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker	EDP No.	EDP No. with Chipbreaker
20,0	50,0	100,0	20,0	–	6,76	74504	74506	74792	74794	74505	74507	74793	74795
20,0	50,0	100,0	20,0	0,5	6,76	74508	74510	74796	74798	74509	74511	74797	74799
20,0	50,0	100,0	20,0	1,0	6,76	74512	74514	74800	74802	74513	74515	74801	74803
20,0	50,0	100,0	20,0	2,0	6,76	74516	74518	74804	74806	74517	74519	74805	74807
20,0	50,0	100,0	20,0	3,0	6,76	74648	74649	74808	74810	74650	74651	74809	74811
20,0	50,0	100,0	20,0	4,0	6,76	74652	74653	74812	74814	74654	74655	74813	74815
20,0	60,0	115,0	20,0	–	6,76	74520	74522	74816	74818	74521	74523	74817	74819
20,0	60,0	115,0	20,0	0,5	6,76	74524	74526	74820	74822	74525	74527	74821	74823
20,0	60,0	115,0	20,0	1,0	6,76	74528	74530	74824	74826	74529	74531	74825	74827
20,0	60,0	115,0	20,0	2,0	6,76	74532	74534	74828	74830	74533	74535	74829	74831
20,0	60,0	115,0	20,0	3,0	6,76	74656	74657	74832	74834	74658	74659	74833	74835
20,0	60,0	115,0	20,0	4,0	6,76	74660	74661	74836	74838	74662	74663	74837	74839
20,0	80,0	140,0	20,0	–	6,76	74536	74538	74840	74842	74537	74539	74841	74843
20,0	80,0	140,0	20,0	0,5	6,76	74540	74542	74844	74846	74541	74543	74845	74847
20,0	80,0	140,0	20,0	1,0	6,76	74544	74546	74848	74850	74545	74547	74849	74851
20,0	80,0	140,0	20,0	2,0	6,76	74548	74550	74852	74854	74549	74551	74853	74855
20,0	80,0	140,0	20,0	3,0	6,76	74664	74665	74856	74858	74666	74667	74857	74859
20,0	80,0	140,0	20,0	4,0	6,76	74668	74669	74860	74862	74670	74671	74861	74863
25,0	63,0	135,0	25,0	–	8,45	74552	74554	74864	74866	74553	74555	74865	74867
25,0	63,0	135,0	25,0	1,0	8,45	74556	74558	74868	74870	74557	74559	74869	74871
25,0	63,0	135,0	25,0	2,0	8,45	74560	74562	74872	74874	74561	74563	74873	74875
25,0	63,0	135,0	25,0	3,0	8,45	74564	74566	74876	74878	74565	74567	74877	74879
25,0	75,0	150,0	25,0	–	8,45	74568	74570	74880	74882	74569	74571	74881	74883
25,0	75,0	150,0	25,0	1,0	8,45	74572	74574	74884	74886	74573	74575	74885	74887
25,0	75,0	150,0	25,0	2,0	8,45	74576	74578	74888	74890	74577	74579	74889	74891
25,0	75,0	150,0	25,0	3,0	8,45	74580	74582	74892	74894	74581	74583	74893	74895
25,0	100,0	170,0	25,0	–	8,45	74584	74586	74896	74898	74585	74587	74897	74899
25,0	100,0	170,0	25,0	1,0	8,45	74588	74590	74900	74902	74589	74591	74901	74903
25,0	100,0	170,0	25,0	2,0	8,45	74592	74594	74904	74906	74593	74595	74905	74907
25,0	100,0	170,0	25,0	3,0	8,45	74596	74598	74908	74910	74597	74599	74909	74911

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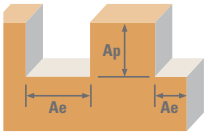

	Series 77, 77CR Fractional	Hardness		Ae x DC	Ap x DC	Vc (sfm)		DC • inch 1/4	3/8	1/2	5/8	3/4	1
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc					RPM	11552	7701	5776	4621	3851	2888
			HSM	2.5xD		816 (653-979)	Fz	0.0015	0.0024	0.0031	0.0035	0.0038	0.0042
				≤ 0.2	≤ APMX		Feed (ipm)	121	129	125	113	102	85
			HSM	3xD		845 (676-1014)	Fz	0.0017	0.0027	0.0035	0.0040	0.0043	0.0047
				≤ 0.15	≤ APMX		Feed (ipm)	136	146	140	129	116	95
			HSM	4xD		756 (605-907)	Fz	0.0018	0.0028	0.0036	0.0041	0.0044	0.0049
				≤ 0.1	≤ APMX		Feed (ipm)	146	151	146	133	119	99
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc					RPM	8419	5613	4210	3368	2806	2105
			HSM	2.5xD		595 (476-714)	Fz	0.0009	0.0019	0.0026	0.0028	0.0031	0.0035
				≤ 0.2	≤ APMX		Feed (ipm)	53	75	77	66	61	52
			HSM	3xD		616 (493-739)	Fz	0.0010	0.0021	0.0030	0.0033	0.0035	0.0039
				≤ 0.15	≤ APMX		Feed (ipm)	59	83	88	78	69	57
			HSM	4xD		551 (441-661)	Fz	0.0011	0.0022	0.0031	0.0034	0.0036	0.0041
				≤ 0.1	≤ APMX		Feed (ipm)	65	86	91	80	71	60
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc					RPM	3851	2567	1925	1540	1284	963
			HSM	2.5xD		272 (218-326)	Fz	0.0006	0.0011	0.0014	0.0017	0.0020	0.0024
				≤ 0.2	≤ APMX		Feed (ipm)	16	20	19	18	18	16
			HSM	3xD		282 (226-338)	Fz	0.0007	0.0012	0.0016	0.0019	0.0022	0.0027
				≤ 0.15	≤ APMX		Feed (ipm)	19	22	22	20	20	18
			HSM	4xD		252 (202-302)	Fz	0.0007	0.0013	0.0017	0.0020	0.0023	0.0028
				≤ 0.1	≤ APMX		Feed (ipm)	19	23	23	22	21	19
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc					RPM	9137	6092	4569	3655	3046	2284
			HSM	2.5xD		646 (517-775)	Fz	0.0009	0.0017	0.0023	0.0025	0.0028	0.0032
				≤ 0.2	≤ APMX		Feed (ipm)	58	72	74	64	60	51
			HSM	3xD		669 (535-803)	Fz	0.0010	0.0019	0.0026	0.0029	0.0031	0.0036
				≤ 0.15	≤ APMX		Feed (ipm)	64	81	83	74	66	58
			HSM	4xD		598 (478-718)	Fz	0.0011	0.0020	0.0027	0.0030	0.0033	0.0037
				≤ 0.1	≤ APMX		Feed (ipm)	70	85	86	77	70	59
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc					RPM	6020	4014	3010	2408	2007	1505
			HSM	2.5xD		425 (340-510)	Fz	0.0007	0.0014	0.0019	0.0023	0.0026	0.0030
				≤ 0.2	≤ APMX		Feed (ipm)	29	39	40	39	37	32
			HSM	3xD		440 (352-528)	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0034
				≤ 0.15	≤ APMX		Feed (ipm)	34	45	44	42	41	36
			HSM	4xD		394 (315-473)	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
				≤ 0.1	≤ APMX		Feed (ipm)	34	45	46	44	42	37
	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc					RPM	5776	3851	2888	2310	1925	1444
			HSM	2.5xD		408 (326-490)	Fz	0.0007	0.0014	0.0019	0.0023	0.0026	0.0030
				≤ 0.2	≤ APMX		Feed (ipm)	28	38	38	37	35	30
			HSM	3xD		422 (338-506)	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0034
				≤ 0.15	≤ APMX		Feed (ipm)	32	43	42	40	39	34
			HSM	4xD		378 (302-454)	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
				≤ 0.1	≤ APMX		Feed (ipm)	32	43	44	42	40	35

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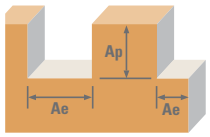

	Series 77, 77CR Fractional	Hardness		Ae x DC	Ap x DC	Vc (sfm)		DC • inch 1/4	3/8	1/2	5/8	3/4	1
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc					RPM	10100	6733	5050	4040	3367	2525
			HSM	2.5xD		714 (571-857)	Fz	0.0010	0.0018	0.0024	0.0028	0.0033	0.0037
				≤ 0.2	≤ APMX		Feed (ipm)	71	85	85	79	78	65
			HSM	3xD		739 (591-887)	Fz	0.0011	0.0020	0.0027	0.0033	0.0037	0.0042
				≤ 0.15	≤ APMX		Feed (ipm)	78	94	95	93	87	73
			HSM	4xD		661 (529-793)	Fz	0.0012	0.0021	0.0028	0.0034	0.0039	0.0043
				≤ 0.1	≤ APMX		Feed (ipm)	85	99	99	96	92	76
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc					RPM	6020	4014	3010	2408	2007	1505
			HSM	2.5xD		425 (340-510)	Fz	0.0007	0.0014	0.0019	0.0023	0.0026	0.0030
				≤ 0.2	≤ APMX		Feed (ipm)	29	39	40	39	37	32
			HSM	3xD		440 (352-528)	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0037
				≤ 0.15	≤ APMX		Feed (ipm)	34	45	44	42	41	39
			HSM	4xD		394 (315-473)	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
				≤ 0.1	≤ APMX		Feed (ipm)	34	45	46	44	42	37
S	HIGH TEMP ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc					RPM	1925	1284	963	770	642	481
			HSM	2.5xD		136 (109-163)	Fz	0.0006	0.0011	0.0016	0.0018	0.0021	0.0025
				≤ 0.2	≤ APMX		Feed (ipm)	8	10	11	10	9	8
			HSM	3xD		141 (113-169)	Fz	0.0007	0.0012	0.0018	0.0021	0.0024	0.0028
				≤ 0.15	≤ APMX		Feed (ipm)	9	11	12	11	11	9
			HSM	4xD		126 (101-151)	Fz	0.0007	0.0013	0.0018	0.0022	0.0025	0.0029
				≤ 0.1	≤ APMX		Feed (ipm)	9	12	12	12	11	10
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc					RPM	1207	805	604	483	402	302
			HSM	2.5xD		85 (68-102)	Fz	0.0005	0.0009	0.0013	0.0015	0.0018	0.0022
				≤ 0.2	≤ APMX		Feed (ipm)	4	5	5	5	5	5
			HSM	3xD		88 (70-106)	Fz	0.0005	0.0010	0.0015	0.0018	0.0020	0.0025
				≤ 0.15	≤ APMX		Feed (ipm)	4	6	6	6	6	5
			HSM	4xD		79 (63-95)	Fz	0.0006	0.0011	0.0015	0.0018	0.0021	0.0026
				≤ 0.1	≤ APMX		Feed (ipm)	5	6	6	6	6	5
	TITANIUM ALLOYS Pure Ttanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc					RPM	4095	2730	2048	1638	1365	1024
			HSM	2.5xD		289 (231-347)	Fz	0.0008	0.0015	0.0021	0.0024	0.0028	0.0032
				≤ 0.2	≤ APMX		Feed (ipm)	23	29	30	28	27	23
			HSM	3xD		299 (239-359)	Fz	0.0009	0.0017	0.0023	0.0025	0.0028	0.0036
				≤ 0.15	≤ APMX		Feed (ipm)	26	32	33	29	27	26
			HSM	4xD		268 (214-322)	Fz	0.0009	0.0018	0.0024	0.0029	0.0033	0.0037
				≤ 0.1	≤ APMX		Feed (ipm)	26	34	34	33	32	27
	TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 420 Bhn or ≤ 45 HRc					RPM	2399	1599	1199	960	800	600
			HSM	2.5xD		170 (136-204)	Fz	0.0008	0.0015	0.0021	0.0024	0.0028	0.0032
				≤ 0.2	≤ APMX		Feed (ipm)	13	17	18	16	16	13
			HSM	3xD		176 (141-211)	Fz	0.0009	0.0017	0.0023	0.0025	0.0028	0.0036
				≤ 0.15	≤ APMX		Feed (ipm)	15	19	19	17	16	15
			HSM	4xD		157 (126-188)	Fz	0.0009	0.0018	0.0024	0.0029	0.0033	0.0037
				≤ 0.1	≤ APMX		Feed (ipm)	15	20	20	19	18	16

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
rpm = Vc x 3.82 / DC ipm = Fz x 7 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x DC maximum)
feed rates listed have chip thinning adjustments included where applicable
refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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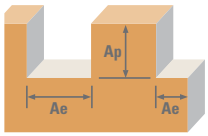
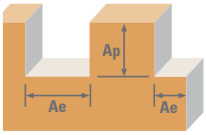


	Series 77M, 77MCR Metric	Hardness		Ae x DC	Ap x DC	Vc (m/min)		DC • mm 6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc					RPM	12208	9156	7325	6104	4578	3662	2930
			HSM	2.5xD		284 (227-341)	Fz	0.0413	0.0411	0.0640	0.0711	0.0889	0.1013	0.1050
				≤ 0.2	≤ APMX		Feed (mm/min)	3529	2634	3282	3038	2849	2597	2154
			HSM	3xD		257 (206-308)	Fz	0.0347	0.0461	0.0717	0.0797	0.0996	0.1135	0.1176
				≤ 0.15	≤ APMX		Feed (mm/min)	2965	2955	3676	3405	3192	2910	2412
			HSM	4xD		230 (184-276)	Fz	0.0362	0.0480	0.0747	0.0830	0.1037	0.1182	0.0919
				≤ 0.1	≤ APMX		Feed (mm/min)	3094	3076	3830	3546	3323	3030	1885
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc					RPM	8068	6051	4841	4034	3025	2420	1936
			HSM	2.5xD		132 (106-159)	Fz	0.0213	0.0285	0.0512	0.0610	0.0711	0.0827	0.0875
				≤ 0.2	≤ APMX		Feed (mm/min)	1203	1207	1735	1723	1506	1401	1186
			HSM	3xD		138 (111-166)	Fz	0.0239	0.0319	0.0574	0.0683	0.0797	0.0926	0.0980
				≤ 0.15	≤ APMX		Feed (mm/min)	1350	1351	1945	1929	1688	1569	1328
			HSM	4xD		152 (122-182)	Fz	0.0249	0.0332	0.0597	0.0711	0.0830	0.0964	0.1021
				≤ 0.1	≤ APMX		Feed (mm/min)	1406	1406	2023	2008	1758	1633	1384
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc					RPM	4087	3065	2452	2044	1533	1226	981
			HSM	2.5xD		83 (66-100)	Fz	0.0140	0.0183	0.0294	0.0356	0.0457	0.0560	0.0625
				≤ 0.2	≤ APMX		Feed (mm/min)	401	393	505	509	490	481	429
			HSM	3xD		86 (69-103)	Fz	0.0157	0.0205	0.0330	0.0398	0.0512	0.0627	0.0700
				≤ 0.15	≤ APMX		Feed (mm/min)	449	440	566	569	549	538	481
			HSM	4xD		77 (62-92)	Fz	0.0163	0.0213	0.0344	0.0415	0.0533	0.0653	0.0729
				≤ 0.1	≤ APMX		Feed (mm/min)	466	457	590	594	572	560	501
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc					RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	2.5xD		197 (158-236)	Fz	0.0216	0.0285	0.0448	0.0533	0.0635	0.0747	0.0800
				≤ 0.2	≤ APMX		Feed (mm/min)	1461	1445	1818	1803	1610	1515	1298
			HSM	3xD		204 (163-245)	Fz	0.0242	0.0319	0.0502	0.0598	0.0711	0.0837	0.0896
				≤ 0.15	≤ APMX		Feed (mm/min)	1636	1618	2037	2022	1803	1698	1454
			HSM	4xD		182 (146-218)	Fz	0.0252	0.0332	0.0523	0.0622	0.0741	0.0871	0.0933
				≤ 0.1	≤ APMX		Feed (mm/min)	1704	1684	2122	2104	1879	1767	1514
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc					RPM	6369	4777	3822	3185	2389	1911	1529
			HSM	2.5xD		130 (104-156)	Fz	0.0168	0.0221	0.0371	0.0432	0.0584	0.0693	0.0750
				≤ 0.2	≤ APMX		Feed (mm/min)	749	739	993	963	976	927	803
			HSM	3xD		134 (107-161)	Fz	0.0188	0.0248	0.0416	0.0484	0.0655	0.0777	0.0840
				≤ 0.15	≤ APMX		Feed (mm/min)	838	829	1113	1079	1095	1039	899
			HSM	4xD		120 (96-144)	Fz	0.0196	0.0258	0.0433	0.0504	0.0682	0.0809	0.0875
				≤ 0.1	≤ APMX		Feed (mm/min)	874	863	1158	1124	1140	1082	936
	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc					RPM	6104	4578	3662	3052	2289	1831	1465
			HSM	2.5xD		124 (99-149)	Fz	0.0168	0.0221	0.0371	0.0432	0.0584	0.0693	0.0750
				≤ 0.2	≤ APMX		Feed (mm/min)	718	708	952	923	936	888	769
			HSM	3xD		129 (103-155)	Fz	0.0188	0.0248	0.0416	0.0484	0.0655	0.0777	0.0840
				≤ 0.15	≤ APMX		Feed (mm/min)	803	795	1066	1034	1050	996	861
			HSM	4xD		115 (92-138)	Fz	0.0196	0.0258	0.0433	0.0504	0.0682	0.0809	0.0875
				≤ 0.1	≤ APMX		Feed (mm/min)	837	827	1110	1077	1093	1037	897

(continued on next page)



77 H-CARB

	Series 77M, 77MCR Metric	Hardness		Ae x DC	Ap x DC	Vc (m/min)		DC • mm 6	8	10	12	16	20	25
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc					RPM	10722	8041	6433	5361	4021	3217	2573
			HSM	2.5xD		218 (174-262)	Fz	0.0239	0.0315	0.0474	0.0559	0.0762	0.0880	0.0925
				≤ 0.2	≤ APMX		Feed (mm/min)	1794	1773	2135	2098	2145	1981	1666
			HSM	3xD		225 (180-270)	Fz	0.0268	0.0353	0.0531	0.0626	0.0854	0.0986	0.1036
				≤ 0.15	≤ APMX		Feed (mm/min)	2011	1987	2391	2349	2404	2220	1866
			HSM	4xD		202 (162-242)	Fz	0.0279	0.0368	0.0553	0.0652	0.0889	0.1027	0.1079
				≤ 0.1	≤ APMX		Feed (mm/min)	2094	2071	2490	2447	2502	2312	1944
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc					RPM	6369	4777	3822	3185	2389	1911	1529
			HSM	2.5xD		130 (104-156)	Fz	0.0168	0.0221	0.0371	0.0432	0.0584	0.0693	0.0750
				≤ 0.2	≤ APMX		Feed (mm/min)	749	739	993	963	976	927	803
			HSM	3xD		134 (107-161)	Fz	0.0188	0.0248	0.0416	0.0484	0.0655	0.0777	0.0840
				≤ 0.15	≤ APMX		Feed (mm/min)	838	829	1113	1079	1095	1039	899
			HSM	4xD		120 (96-144)	Fz	0.0196	0.0258	0.0433	0.0504	0.0682	0.0809	0.0875
				≤ 0.1	≤ APMX		Feed (mm/min)	874	863	1158	1124	1140	1082	936
S	HIGH TEMP ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc					RPM	2017	1513	1210	1008	756	605	484
			HSM	2.5xD		41 (33-49)	Fz	0.0140	0.0183	0.0294	0.0356	0.0457	0.0560	0.0625
				≤ 0.2	≤ APMX		Feed (mm/min)	198	194	249	251	242	237	212
			HSM	3xD		43 (34-52)	Fz	0.0157	0.0205	0.0330	0.0398	0.0512	0.0627	0.0700
				≤ 0.15	≤ APMX		Feed (mm/min)	222	217	280	281	271	266	237
			HSM	4xD		38 (30-46)	Fz	0.0163	0.0213	0.0344	0.0415	0.0533	0.0653	0.0729
				≤ 0.1	≤ APMX		Feed (mm/min)	230	226	291	293	282	277	247
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc					RPM	1274	955	764	637	478	382	306
			HSM	2.5xD		26 (21-31)	Fz	0.0114	0.0152	0.0243	0.0305	0.0381	0.0480	0.0550
				≤ 0.2	≤ APMX		Feed (mm/min)	102	102	130	136	127	128	118
			HSM	3xD		27 (22-32)	Fz	0.0128	0.0171	0.0273	0.0342	0.0427	0.0538	0.0616
				≤ 0.15	≤ APMX		Feed (mm/min)	114	114	146	152	143	144	132
			HSM	4xD		24 (19-29)	Fz	0.0133	0.0178	0.0284	0.0356	0.0445	0.0560	0.0642
				≤ 0.1	≤ APMX		Feed (mm/min)	119	119	152	159	149	150	137
	TITANIUM ALLOYS Pure Ttanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc					RPM	4352	3264	2611	2176	1632	1306	1045
			HSM	2.5xD		88 (70-106)	Fz	0.0191	0.0254	0.0397	0.0483	0.0635	0.0747	0.0800
				≤ 0.2	≤ APMX		Feed (mm/min)	582	580	726	736	725	683	585
			HSM	3xD		91 (73-109)	Fz	0.0213	0.0285	0.0445	0.0541	0.0711	0.0837	0.0896
				≤ 0.15	≤ APMX		Feed (mm/min)	649	651	813	824	812	765	655
			HSM	4xD		82 (66-98)	Fz	0.0222	0.0296	0.0463	0.0563	0.0741	0.0871	0.0933
				≤ 0.1	≤ APMX		Feed (mm/min)	676	676	846	858	847	796	682
	TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 420 Bhn or ≤ 45 HRc					RPM	2548	1911	1529	1274	955	764	611
			HSM	2.5xD		52 (42-62)	Fz	0.0163	0.0254	0.0397	0.0483	0.0635	0.0747	0.0800
				≤ 0.2	≤ APMX		Feed (mm/min)	291	340	425	431	425	400	342
			HSM	3xD		54 (43-65)	Fz	0.0182	0.0285	0.0445	0.0541	0.0711	0.0837	0.0896
				≤ 0.15	≤ APMX		Feed (mm/min)	325	381	476	482	476	448	384
			HSM	4xD		48 (38-58)	Fz	0.0190	0.0296	0.0463	0.0563	0.0741	0.0871	0.0933
				≤ 0.1	≤ APMX		Feed (mm/min)	339	396	495	502	496	466	399

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
rpm = (Vc x 1000) / (DC x 3.14)
mm/min = Fz x 7 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x DC maximum)
feed rates listed have chip thinning adjustments included where applicable
refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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