SGS®
Solid Carbide Tools

Mold and Die Solutions

Power-Carb™
HIGH PERFORMANCE CARBIDE END MILLS

Turbo-Carb®
HIGH PERFORMANCE CARBIDE END MILLS

Z-CARB-MD
FOR MOLD & DIE

Order today! E: saleseu@kyocera-sgstool.com| T: +44 (0) 1189 795 200

Create a better way

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Published February 2021

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SGS: Experts in Mold & Die.

SGS has the tools you need when it comes to high efficiency, high accuracy machining of hardened mold & die materials. Mold & die work requires tools that can handle difficult workpiece materials, an array of shapes and sizes and the precision required for tight tolerance applications and superior finishes.

The mold & die industry offers many challenging and complex workpiece configurations in equally challenging materials, including carbon steels, hardened steels, stainless steels, tool steels and aluminum.

From the Turbo-Carb and Power-Carb to the groundbreaking Z-Carb-MD, SGS has the tools you need for profitable mold & die production.

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Mold & Die Machining Applications

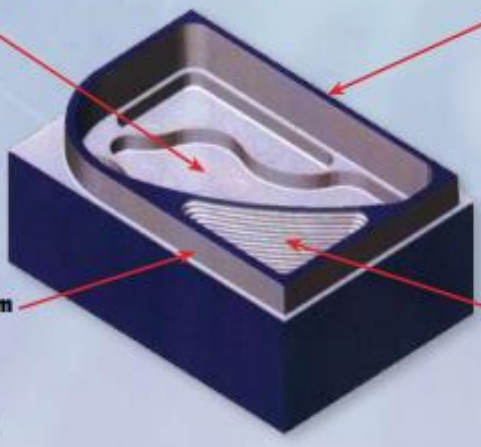
Z-CARB-MD SOLID CARBIDE END MILLS For Mold & Die

Power-Carb HIGH PERFORMANCE CARBIDE END MILLS

Material: NAK High Hard (45 HRc)
Cooling: Air
Machine: Haas VM3 and VF3

Pocketing with Z-Carb-MD ½"
(EDP 36786)
.25" (6.4mm) Ad
.20" (5mm) Rw
4,000 / 525 sfm (160 m/min)
50 ipm (1,270 mm/min) ramp feed
50 ipm (1,270 mm/min) feed rate

Slotting with Z-Carb-MD ½"
(EDP 36786)
.50" (12.7mm) Ad
.50" (12.7mm) Rw
2,300 / 300 sfm (90 m/min)
25 ipm (635 mm/min) feed rate



Finishing with Power-Carb 12mm
(EDP 46143)
.25" to .75" Ad (6.4mm to 19mm)
.002" (.05mm) Rw
7,500 rpm / 925 sfm (290 m/min)
75 ipm (1,900 mm/min) feed rate

Pocketing with Z-Carb-MD 10mm
(EDP 46565)
.075" (1.9mm) Ad
.050" (1.3mm) Rw
5,100 rpm / 525 sfm (160 m/min)
50 ipm (1,270 mm/min) ramp feed
100 ipm (2,540 mm/min) pocket feed

Turbo-Carb HIGH PERFORMANCE CARBIDE END MILLS

4140 Alloy Steel @ 28-30 HRc
4 in. x 4 in. x 3/4 in.

Roughing Operation
Tool: Z1MB 10mm (EDP 46345)
Speed: 6,500 rpm
Feed: 100 ipm
Radial Step: .155 (inch)
Axial Step: .075 (inch)
Ramp: 30° @ 50 ipm
Cooling: Air
Time: 1:12 minutes per pocket

Semi-Finishing
Tool: Turbo-Carb 8mm (EDP 91357)
Speed: 10,000 rpm
Feed: 150 ipm
Axial Step: .025 (inch)
Cooling: Air
Time: 1:19 minutes per pocket

Finishing
Tool: Turbo-Carb 8mm (EDP 91357)
Speed: 10,000 rpm
Feed: 100 ipm
Axial Step: .005 (inch)
Cooling: Air
Time: 9:55 minutes per pocket

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Z-CARB-MD
SOLID CARBIDE END MILLS
For Mold & Die

Chatter-Free Z-Carb-MD

Chatter poses a big problem when machining hardened steels. Conventional end mills simply can't leave a smooth surface finish when run at extremely high speeds. At high metal removal rates, the **Z-Carb-MD** produces a chatter-free finish, which leaves minimal stock for the **Power-Carb** End Mill.

Reduced Neck Diameters

Features & Benefits

- **Patented unequal helix design**
  - Significantly reduces chatter
  - Superior workpiece finishes
  - Extends tool life
- **Heavy duty core and negative rake**
  - Enhances edge strength
  - Lessens deflection, improving workpiece accuracy
  - Allows higher feed rates
- **Innovative carbide substrate**
  - Provides higher wear
  - Exceptional chip resistance
- **Available with extended reach and reduced neck diameters**
- **Special corner geometry provides maximum tool life**
- **Ti-NAMITE-A (AlTiN) coating eliminates the need for coolants**
- **Exceptional performance in steels up to 62 HRc**
- **Weldon flats available upon request**
- **200% improved tool life over the nearest competitive traditional product**

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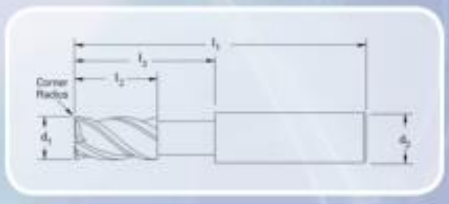
Fractional

Z-Carb-MD Series ZD1CR 4 Flute–Single End–Corner Radius

Cutting Diameter d1	Shank Diameter d2	Length of Cut l2	Overall Length l1	Reach l3	Corner Radius	EDP Number
1/8	1/4	5/32	2-1/2	1/2	.010	36780
3/16	1/4	7/32	2-1/2	3/4	.020	36781
1/4	1/4	9/32	2-1/2	3/4	.020	36782
5/16	5/16	13/32	2-1/2	1	.040	36783
3/8	3/8	15/32	2-1/2	1	.040	36784
7/16	7/16	9/16	2-3/4	1	.040	36785
1/2	1/2	5/8	3	1-1/4	.040	36786
1/2	1/2	5/8	4-1/2	2-1/4	.040	36787
5/8	5/8	3/4	3 1/2	1 1/2	.040	36788
5/8	5/8	3/4	4-1/2	2-1/4	.040	36789
5/8	5/8	3/4	5-1/2	3-1/4	.040	36790
3/4	3/4	15/16	4	1-3/4	.060	36791
3/4	3/4	15/16	4-1/2	2-1/4	.060	36792
3/4	3/4	15/16	5-1/2	3-1/4	.060	36793



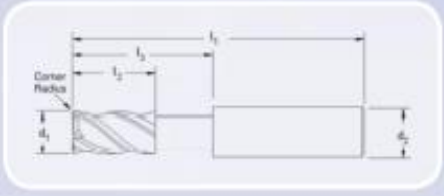
Fractional Tolerances:

Cutting Diameter	Shank Diameter
1/8-1/4 = +.0000/-.0012	
1/4 = +.0000/-.0012	1/8 - 3/8 = -.0001 / -.0003
> 1/4 - 3/8 = +.0000/-.0016	> 3/8 - 1 = -.0001 / -.0004
> 3/8 - 1 = +.0000/-.002	

Metric

Z-Carb-MD Series ZD1MCR 4 Flute–Single End–Corner Radius

Cutting Diameter d1 mm	Shank Diameter d2 mm	Length of Cut l2 mm	Overall Length l1 mm	Reach l3 mm	Corner Radius mm	EDP Number
3	6	4	57	15	0.2	46560
4	6	5	57	15	0.3	46561
5	6	6	57	15	0.5	46562
6	6	7	57	15	1	46563
8	8	10	63	25	1	46564
10	10	12	72	30	1	46565
12	12	15	83	35	1	46566
16	16	20	92	45	1.5	46567
20	20	24	104	55	2	46568



Metric Tolerances:

Cutting Diameter	Shank Diameter
3 - 6 = +0 / -0,030	6 - 10 = -0,0025 / -0,0075
6 = +0 / -0,030	6 - 10 = -0,0025 / -0,0075
> 6 - 10 = +0 / -0,040	> 10 - 20 = -0,0025 / -0,010
> 10 20 = +0 / 0,050	

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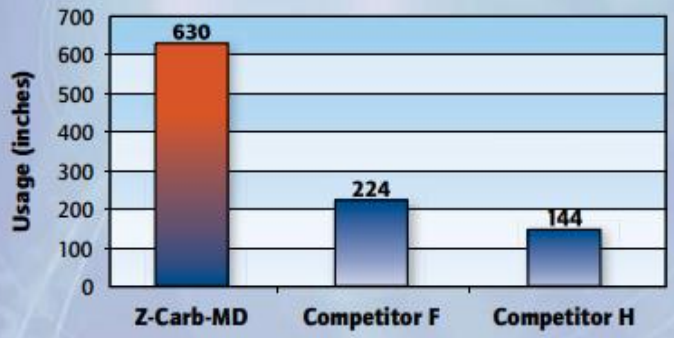
Z-CARB-MD
SOLID CARBIDE END MILLS
For Mold & Die

Tool Life Comparison



Rw = Dia
Ad = .5xDia

1,650 rpm / 22.5 ipm
H13 @ 50 HRc

Application Tips

- **Pressurized air with oil extends tool life in materials <40 HRc**
- **Use dry air when roughing materials harder than 40 HRc**
- **Unique coating eliminates flood coolant requirements**
- **Climb milling is preferred**
- **Attention to programming details, tool holders, TIR, balance, etc. contribute to additional tool life**
- **Ramping at 10 to 30 degrees is the preferred entry method. Use slotting speeds with 25-50 percent slotting feed. Avoid plunging.**

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Speed and Feed Recommendation

Slotting

Diameter (D)		Steels 30-45 HRc Rw 1xD Ad ≤.5xD		Steels >45-55 HRc Rw 1xD Ad ≤.5xD		Steels >55-60 HRc Rw 1xD Ad ≤.3xD	
		215 sfm in / tooth	65 m / min mm / tooth	120 sfm in / tooth	36 m / min mm / tooth	65 sfm in / tooth	20 m / min mm / tooth
1/8	3mm	0.0006	0.02	0.0005	0.01	0.0004	0.01
3/16	5mm	0.0009	0.02	0.0008	0.02	0.0006	0.02
1/4	6mm	0.0013	0.03	0.0010	0.03	0.0008	0.02
5/16	8mm	0.0016	0.04	0.0013	0.03	0.0009	0.02
3/8	10mm	0.0019	0.05	0.0015	0.04	0.0011	0.03
7/16		0.0022	0.06	0.0018	0.05	0.0013	0.03
1/2	12mm	0.0025	0.06	0.0020	0.05	0.0015	0.04
5/8	16mm	0.0031	0.08	0.0025	0.06	0.0019	0.05
3/4	20mm	0.0038	0.10	0.0030	0.08	0.0023	0.06

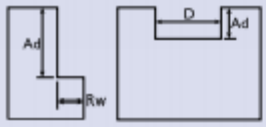
Profiling

Diameter (D)		Steels 30-45 HRc Rw ≤.5xD Ad ≤1xD		Steels >45-55 HRc Rw ≤.5xD Ad ≤1xD		Steels >55-60 HRc Rw ≤.3xD Ad ≤1xD	
		265 sfm in / tooth	80 m / min mm / tooth	150 sfm in / tooth	45 m / min mm / tooth	80 sfm in / tooth	24 m / min mm / tooth
1/8	3mm	0.0009	0.02	0.0007	0.02	0.0005	0.01
3/16	5mm	0.0013	0.03	0.0011	0.03	0.0008	0.02
1/4	6mm	0.0018	0.05	0.0014	0.04	0.0011	0.03
5/16	8mm	0.0022	0.06	0.0018	0.05	0.0013	0.03
3/8	10mm	0.0026	0.07	0.0021	0.05	0.0016	0.04
7/16		0.0031	0.08	0.0026	0.07	0.0018	0.05
1/2	12mm	0.0035	0.09	0.0028	0.07	0.0021	0.05
5/8	16mm	0.0044	0.11	0.0035	0.09	0.0026	0.07
3/4	20mm	0.0053	0.13	0.0042	0.11	0.0032	0.08

High Speed Profiling

Diameter (D)		Steels 30-45 HRc Rw ≤.1xD Ad ≤.1xD		Steels >45-55 HRc Rw ≤.1xD Ad ≤.1xD		Steels >55-60 HRc Rw ≤.1xD Ad ≤.1xD	
		560 sfm in / tooth	170 m / min mm / tooth	490 sfm in / tooth	150 m / min mm / tooth	250 sfm in / tooth	75 m / min mm / tooth
1/8	3mm	0.0011	0.03	0.0009	0.02	0.0006	0.02
3/16	5mm	0.0017	0.04	0.0013	0.03	0.0009	0.02
1/4	6mm	0.0022	0.06	0.0018	0.05	0.0013	0.03
5/16	8mm	0.0028	0.07	0.0022	0.06	0.0016	0.04
3/8	10mm	0.0033	0.08	0.0026	0.07	0.0019	0.05
7/16		0.0039	0.10	0.0031	0.08	0.0022	0.06
1/2	12mm	0.0044	0.11	0.0035	0.09	0.0025	0.06
5/8	16mm	0.0055	0.14	0.0044	0.11	0.0031	0.08
3/4	20mm	0.0066	0.17	0.0053	0.13	0.0038	0.10

Radial Width of Cut (Rw) Axial Depth of Cut (Ad) Tool Diameter (D)



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Turbo-Carb
HIGH PERFORMANCE CARBIDE END MILLS

Turbo-Carb Solid Carbide High Performance End Mills

For machining complex, contour shapes in tough and hardened mold & die steels.

- **Designed for high speed rough and finish milling of mold and die steels up to 60 Rc**
- **Application specific carbide improves wear resistance and toughness**
- **Ti-NAMITE-A (AlTiN) coated for maximum heat and wear resistance**
- **Helical ball gashing for improved shearing action**
- **Available with extended reach and reduced neck diameters**
- **Rigid construction**

Suggestions for using Turbo-Carb® End Mills

- Pressurized air with oil extends tool life in materials <40 Rc
- Use dry air when finish milling or roughing materials harder than 40 Rc
- Unique coating eliminates flood coolant requirements
- The Z-level cutting method and climb milling extend tool life in roughing applications
- Helical interpolation is the preferred entry method. Avoid direct plunging
- Attention to programming details, tool holders, TIR, & balance contribute to additional tool life
- Speed and feed recommendations are based on using the tool tip

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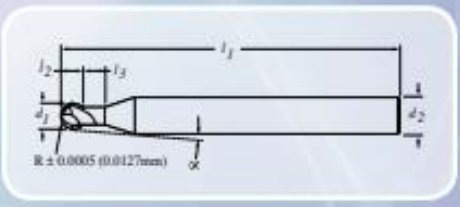
Fractional

Turbo-Carb®–Series 56B–2 Flute–Ball End–Extended Reach

Cutting Diameter d1	Length of Cut l2	Overall Length l1	Shank Diameter d2	α	Neck l3	TI-NAMITE-A (AlTiN) EDP No.
1/32	1/32	3	1/4	8° 20'	1/32	93272
1/16	1/16	3	1/4	7° 40'	1/16	93273
3/32	3/32	3	1/4	6° 50'	3/32	93274
1/8	1/8	3	1/4	6°	1/8	93275
3/16	3/16	3	1/4	3° 35'	3/16	93276
1/4	1/4	3 1/2	1/4	–	1/4	93277
5/16	5/16	4	5/16	–	5/16	93278
3/8	3/8	4	3/8	–	3/8	93279
1/2	1/2	4 1/2	1/2	–	1/2	93280
5/8	5/8	5 1/2	5/8	–	5/8	93281
3/4	3/4	6 1/2	3/4	–	3/4	93282



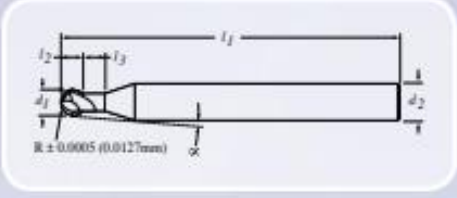
Fractional Tolerances:

Diameter	d1	d2
1/32 – 3/32	+.0000/–.0010	–.0001/–.0003
> 3/32 – 1/4	+.0000/–.0012	–.0001/–.0003
> 1/4 – 3/8	+.0000/–.0016	–.0001/–.0003
> 3/8 – 3/4	+.0000/–.0020	–.0001/–.0004

Metric

Turbo-Carb®–Series 56MB–2 Flute–Ball End–Extended Reach

Cutting Diameter d1 mm	Length of Cut l2 mm	Overall Length l1 mm	Shank Diameter d2 mm	α	Neck l3 mm	TI-NAMITE-A (AlTiN) EDP No.
1	1	76	6	8° 10'	1	91349
1.5	1.5	76	6	7° 45'	1.5	91350
2	2	76	6	7° 10'	2	91351
2.5	2.5	76	6	6° 35'	2.5	91352
3	3	76	6	6°	3	91353
4	4	76	6	4° 30'	4	91354
5	5	89	6	2° 30'	5	91355
6	6	89	6	–	6	91356
8	8	102	8	–	8	91357
10	10	102	10	–	10	91358
12	12	114	12	–	12	91359
16	16	140	16	–	16	91360
20	20	165	20	–	20	91361



Metric Tolerances:

Diameter	d1	d2
1 – 2.5	+0,000/–0,025	–0,0025/–0,0075
> 2.5 – 6	+0,000/–0,030	–0,0025/–0,0075
> 6 – 10	+0,000/–0,040	–0,0025/–0,0075
> 10 – 20	+0,000/–0,050	–0,0025/–0,0100

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HIGH PERFORMANCE CARBIDE END MILLS

Speed and Feed Recommendations - Roughing - Fractional

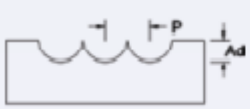
	Steels < 40 Rc Ad = 10% dia			Steels > 40 - 50 Rc Ad = 5% dia			Steels > 50 - 60 Rc Ad = 4% dia		
Diameter	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth
1/32	.0031	76,740	.0006	.0016	90,200	.0005	.0013	61,270	.0004
1/16	.0063	38,065	.0015	.0031	45,745	.0011	.0025	31,190	.0008
3/32	.0094	25,430	.0020	.0047	30,335	.0015	.0038	20,655	.0011
1/8	.0125	19,100	.0030	.0063	22,700	.0023	.0050	15,595	.0017
3/16	.0188	12,720	.0040	.0094	15,170	.0030	.0075	10,395	.0023
1/4	.0250	9,550	.0050	.0125	11,395	.0038	.0100	7,800	.0029
5/16	.0313	7,635	.0060	.0156	9,120	.0050	.0125	6,240	.0038
3/8	.0375	6,365	.0080	.0188	7,585	.0060	.0150	5,200	.0045
1/2	.0500	4,775	.0100	.0250	5,695	.0075	.0200	3,900	.0057
5/8	.0625	3,820	.0110	.0312	4,560	.0080	.0250	3,120	.0060
3/4	.0750	3,185	.0120	.0375	3,800	.0085	.0300	2,600	.0063

P (pitch) = up to 40% of dia

Speed and Feed Recommendations - Finishing - Fractional

	Steels < 40 Rc Ad = 3% dia			Steels > 40 - 50 Rc Ad = 2% dia			Steels > 50 - 60 Rc Ad = 1% dia		
Diameter	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth
1/32	.0010	116,925	.0007	.0006	144,870	.0006	.0003	125,465	.0005
1/16	.0019	58,370	.0017	.0013	69,595	.0012	.0006	62,680	.0009
3/32	.0030	38,890	.0022	.0019	46,975	.0017	.0010	39,655	.0012
1/8	.0040	29,185	.0033	.0025	35,470	.0025	.0013	30,125	.0019
3/16	.0060	19,455	.0044	.0038	23,495	.0033	.0019	20,340	.0025
1/4	.0075	14,590	.0055	.0050	17,735	.0042	.0025	15,355	.0032
5/16	.0095	11,675	.0066	.0063	14,135	.0055	.0031	12,335	.0042
3/8	.0110	9,730	.0088	.0075	11,825	.0066	.0038	10,170	.0050
1/2	.0150	7,295	.0110	.0100	8,870	.0082	.0050	7,680	.0063
5/8	.0200	5,835	.0120	.0125	7,095	.0090	.0063	6,120	.0067
3/4	.0230	4,865	.0130	.0150	5,645	.0100	.0075	5,120	.0071

P (pitch) = dependent on finish requirement (see formulas)



FORMULAS – FRACTIONAL

sfm = rpm x .262 x cutting diameter

rpm = sfm x 3.82 / cutting diameter

feed (inches / minute) = feed per tooth x number of teeth x rpm

cusp height* = (tool diameter / 2) - $\sqrt{\text{tool diameter}^2 - \text{pitch}^2}$ / 4

pitch = $\sqrt{4 \times (\text{cusp height} \times \text{tool diameter}) - 4 \times (\text{cusp height})^2}$

* on flat surface

1 suggested maximum

2 If recommendation exceeds your machine limit use the maximum available

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Speed and Feed Recommendations - Roughing - Metric

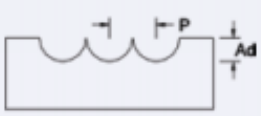
	Steels < 40 Rc Ad = 10% dia			Steels > 40 - 50 Rc Ad = 5% dia			Steels > 50 - 60 Rc Ad = 4% dia		
Diameter	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth
1	.10	60,640	.015	.05	72,285	.015	.04	49,485	.010
1.5	.15	40,400	.030	.08	48,155	.025	.06	32,965	.020
2	.20	30,335	.045	.10	36,160	.035	.08	24,755	.025
2.5	.25	24,265	.050	.13	28,920	.040	.10	19,800	.030
3	.30	20,215	.075	.15	24,100	.055	.12	16,495	.045
4	.40	15,160	.095	.20	18,070	.065	.16	12,370	.050
5	.50	12,125	.100	.25	14,455	.075	.20	9,895	.060
6	.60	10,110	.125	.30	12,050	.095	.24	8,250	.075
8	.80	7,580	.150	.40	9,035	.125	.32	6,185	.095
10	1.0	6,065	.205	.50	7,230	.150	.40	4,950	.115
12	1.2	5,055	.255	.60	6,025	.190	.48	4,125	.145
16	1.6	3,790	.280	.80	4,520	.200	.64	3,095	.150
20	2.0	3,030	.300	1.0	3,615	.215	.80	2,475	.160

P (pitch) = up to 40% of dia

Speed and Feed Recommendations - Finishing - Metric

	Steels < 40 Rc Ad = 3% dia			Steels > 40 - 50 Rc Ad = 2% dia			Steels > 50 - 60 Rc Ad = 1% dia		
Diameter	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth	Axial Depth1	rpm2	Feed / Tooth
1	.03	92,660	.020	.02	112,555	.020	.010	97,030	.010
1.5	.05	61,730	.045	.03	74,980	.030	.015	64,635	.025
2	.06	46,355	.050	.04	56,305	.040	.020	48,540	.030
2.5	.08	37,075	.055	.05	45,035	.045	.025	38,820	.040
3	.09	30,890	.085	.06	37,520	.065	.030	32,345	.050
4	.12	23,165	.100	.08	28,135	.075	.040	24,255	.060
5	.15	18,530	.110	.10	22,505	.085	.050	19,400	.065
6	.18	15,445	.140	.12	18,760	.105	.060	16,175	.080
8	.24	11,580	.170	.16	14,065	.140	.080	12,125	.105
10	.30	9,265	.225	.20	11,255	.170	.100	9,700	.130
12	.36	7,720	.280	.24	9,380	.210	.120	8,085	.160
16	.48	5,790	.305	.32	7,035	.230	.160	6,065	.170
20	.60	4,635	.320	.40	5,630	.255	.200	4,850	.180

P (pitch) = dependent on finish requirement (see formulas)



FORMULAS – METRIC

m / min = (3.14 x cutting diameter x rpm) / 1000

rpm = (1000 x m / min) / (3.14 x cutting diameter)

feed (mm / minute) = feed per tooth x number of teeth x rpm

cusp height* = (tool diameter / 2) - $\sqrt{\text{tool diameter}^2 - \text{pitch}^2}$ / 4

pitch = $\sqrt{4 \times (\text{cusp height} \times \text{tool diameter}) - 4 \times (\text{cusp height})^2}$

* on flat surface

1 suggested maximum

2 if recommendation exceeds your machine limit use the maximum available

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Create a better way

SGS®
Solid Carbide Tools

Power-Carb™
HIGH PERFORMANCE CARBIDE END MILLS

Maximize your Milling Performance of Mold Grade Steels up to 65 HRc

Power-Carb® Design Features

Eccentric Relief / Extreme Negative Radial Rake: These features significantly increase edge strength, and are especially critical when finish milling hard materials. Without exceptional strength, edges are prone to chip.

Engineered Carbide: This material is specifically designed for difficult machining operations.

High Helix / Multi-Edge Design: Multiple cutting edges increase rigidity and feed rate capabilities, while the 45 degree helix angle increases shearing ability without sacrificing edge strength. The combination of these features improves surface finishes by reducing cutter deflection and maintaining a more consistent cutter-to-workpiece contact.

Long Reach: Power-Carbs® are manufactured with extra long shanks for extended reach capabilities.

Superior Performance in High Temperature Applications

The chemical composition of aluminum titanium nitride (AlTiN) maximizes heat and wear resistance, making it most suitable for wet or dry milling in hardened steels, and many other applications.

Advantages of Dry Milling

Extensive testing has shown that elimination of flood coolant often prolongs tool life. Milling applications in hardened steels generate extremely high temperatures and the rapid quenching of conventional flood coolant can produce thermal shock, which reduces tool life. Semi-cooling and chip removal with air and oil blast stabilizes tool temperatures. Dry milling does require an effective heat resistant coating. Ti-NAMITE-A® provides this required protection and is a standard feature of the Power-Carb® end mill.

	Ti-NAMITE-A® (AlTiN)	(TiN)
Vickers Hardness (HV)	3000-3500	2300-3000
Oxidation Temperature	800° C 1472° F	600° C 1112° F

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Fractional

Power-Carb™–Series 57–6 Flute–Single End–End Mill

Cutting Diameter d1	Length of Cut l2	Overall Length l1	Shank Diameter d2	TI-NAMITE-A (AlTiN) EDP No.
1/4	17/32	3.5	1/4	36140
5/16	11/16	4.0	5/16	36141
3/8	13/16	4.0	3/8	36142
1/2	1 3/32	4.5	1/2	36143

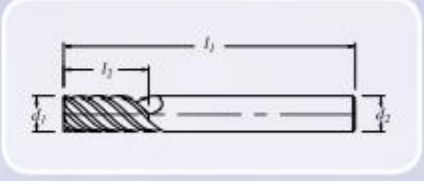
Fractional Tolerances:

Diameter	d1	d2
1/4	+.0000 / -.0012	-.0001 / -.0003
5/16	+.0000 / -.0016	-.0001 / -.0003
3/8	+.0000 / -.0016	-.0001 / -.0003
1/2	+.0000 / -.0020	-.0001 / -.0004

Metric

Power-Carb™–Series 57M–6 Flute–Single End–End Mill

Cutting Diameter d1 mm	Length of Cut l2 mm	Overall Length l1 mm	Shank Diameter d2 mm	TI-NAMITE-A (AlTiN) EDP No.
6	13	89	6	46140
8	18	102	8	46141
10	22	102	10	46142
12	26	114	12	46143



Metric Tolerances:

Diameter	d1	d2
6	+0,000 / -0,030	-0,0025 / -0,0075
8	+0,000 / -0,040	-0,0025 / -0,0075
10	+0,000 / -0,040	-0,0025 / -0,0075
12	+0,000 / -0,050	-0,0025 / -0,0100

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Power-Carb™

HIGH PERFORMANCE CARBIDE END MILLS

Performance Data

Milling D2 / (DIN 1.2379 / X 155 CrMoV 12 1) @ 58 HRc

TOOL USED:

.394" (10 mm)

CUTTING CONDITIONS:

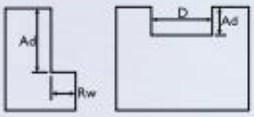
.472" (12mm) axial depth x .020" (0.5mm) radial width

COOLING METHOD:

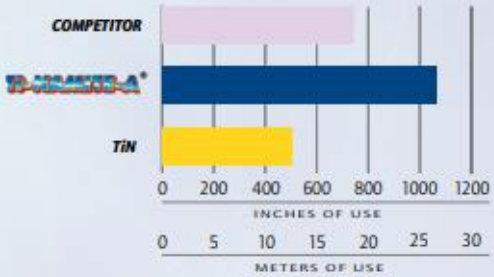
Air / Oil

TOOL SPEED / FEED RATE:

2384 rpm / 45 ipm (1143 mm/min)



Radial Width of Cut (Rw)
Axial Depth of Cut (Ad)



Features/Benefits

Exceptionally strong geometry, specifically engineered carbide and Ti-NAMITE-A® (AlTiN) coating for

- **Slot and finish milling applications**
- **Improved surface finishes**
- **High feed rates**
- **Wet or dry machining**
- **High speed or conventional machining**
- **Maximum hardness and fracture resistance**

Additional benefits of dry milling

- **Eliminates procurement costs for cutting fluids***
- **Eliminates coolant disposal costs**
- **Reduces chip disposal costs**
- **Reduces cutting fluid related health issues (stricter standards have been proposed)**

* Research shows coolants to be 17% of manufacturing costs

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Speed and Feed Recommendation

Slotting

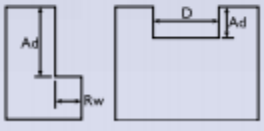
Diameter (D)		Steels 30-45 Rc		Steels 45-55 Rc		Steels 55-60 Rc		Steels 60-65 Rc	
		Rw 1 x D Ad ≤.3 x D		Rw 1 x D Ad ≤.2 x D		Rw 1 x D Ad ≤.1 x D		Rw 1 x D Ad ≤.1 x D	
		Speed		Speed		Speed		Speed	
		215 sfm	65 m / min	145 sfm	45 m / min	100 sfm	30 m / min	65 sfm	20 m / min
		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0014	.035	.0013	.033	.0012	.030	.0011	.028
5/16	8	.0016	.040	.0015	.040	.0014	.035	.0012	.030
3/8	10	.0020	.050	.0018	.045	.0016	.040	.0014	.035
1/2	12	.0024	.060	.0022	.055	.0020	.050	.0018	.045

Profiling

Diameter (D)		Steels 30-45 Rc		Steels 45-55 Rc		Steels 55-60 Rc		Steels 60-65 Rc	
		Rw ≤.1 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D	
		Speed		Speed		Speed		Speed	
		330 sfm	100 m / min	300 sfm	90 m / min	260 sfm	80 m / min	200 sfm	60 m / min
		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0018	.045	.0015	.040	.0014	.035	.0012	.030
5/16	8	.0022	.055	.0020	.050	.0018	.045	.0015	.040
3/8	10	.0024	.065	.0024	.060	.0022	.055	.0020	.050
1/2	12	.0030	.075	.0027	.070	.0026	.065	.0024	.060

High Speed Profiling

Diameter (D)		Steels 30-45 Rc		Steels 45-55 Rc		Steels 55-60 Rc		Steels 60-65 Rc	
		Rw ≤.04 x D Ad ≤1.5 x D		Rw ≤.04 x D Ad ≤1.5 x D		Rw ≤.01 x D Ad ≤1.5 x D		Rw ≤.01 x D Ad ≤1.5 x D	
		Speed		Speed		Speed		Speed	
		825 sfm	250 m / min	825 sfm	250 m / min	425 sfm	130 m / min	425 sfm	130 m / min
		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0040	.100	.0035	.090	.0030	.070	.0025	.060
5/16	8	.0045	.110	.0040	.100	.0035	.090	.0030	.070
3/8	10	.0050	.130	.0047	.120	.0040	.100	.0035	.090
1/2	12	.0055	.140	.0050	.130	.0047	.120	.0045	.110



Radial Width of Cut (Rw) Axial Depth of Cut (Ad) Tool Diameter (D)

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