



HTA

Revolutionary Geometry
for **High Temperature Alloys**

Based on the original Z-Carb, the new Z-Carb-HTA (High Temperature Alloy) features geometric enhancements that make it uniquely suited for difficult-to-machine materials.

The newest member of the Z-Carb family, Z-Carb-HTA makes quick work of:

- Inconel
- Waspaloy
- Hastelloy
- Rene
- A-286
- Stellite
- IN-738
- MAR-M200
- Udimet 500
- FSX-414





Engineered for enhanced performance in a variety of heat

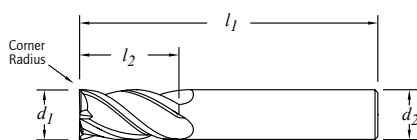
Features and Benefits



- **Maximum Rigidity**
Provides additional resistance against chipping and breakage
Allows higher material removal rates
- **Reduced Cutting Forces**
Provides superior dimensional control and workpiece finishes
Lower heat generation and improved wear resistance
- **Certified Premium Micro-Grain Carbide**
- **Ti-Namite-A® (AlTiN) Coating**

FRACTIONAL

Z-Carb-HTA Series ZH1CR Fractional Corner Radius



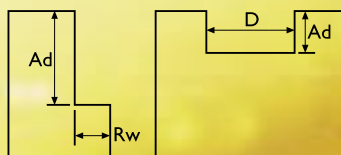
TOLERANCES	
Cutting Diameter d_1	Shank Diameter d_2
1/4 = +.0000/- .0012	1/4 - 3/8 = -.0001/- .0003
>1/4 - 3/8 = +.0000/- .0016	>3/8 - 1 = -.0001/- .0004
>3/8 - 1 = +.0000/- .002	

Ti-NAMITE-A (AlTiN)						
Cutting Diameter d_1	Length of Cut l_2	Overall Length l_1	Shank Diameter d_2	Corner Radius	EDP Number	EDP Number w/Flat
1/4	1/2	2-1/2	1/4	.015 - .020	36570	—
5/16	13/16	2-1/2	5/16	.015 - .020	36571	—
3/8	7/8	2-1/2	3/8	.015 - .020	36572	36555
7/16	1	2-3/4	7/16	.015 - .020	36573	36556
1/2	1	3	1/2	.025 - .030	36574	36557
9/16	1-1/8	3-1/2	9/16	.025 - .030	36575	36558
5/8	1-1/4	3-1/2	5/8	.035 - .040	36576	36559
3/4	1-1/2	4	3/4	.035 - .040	36577	36560
1	1-1/2	4	1	.035 - .040	36578	36561

Speed and Feed Recommendations-Inch

		Cutting Diameter																	
High Temp. Alloys	Bhn	1/4		5/16		3/8		7/16		1/2		9/16		5/8		3/4		1	
		rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min	rpm	in/min
Profile—Semi-Rough	<300	1,990	9.6	1,600	9.7	1,325	9.8	1,135	9.9	995	9.9	885	9.9	795	9.9	660	9.7	500	9.7
Profile—Rough	<300	1,680	6.4	1,345	6.5	1,120	6.6	960	6.7	840	6.7	750	6.7	670	6.7	560	6.5	420	6.5
Slotting	<300	1,380	3.9	1,100	4.0	920	4.1	785	4.2	690	4.2	610	4.2	550	4.2	460	4.0	345	4.0
Profile—Semi-Rough	>300	1,840	7.1	1,470	7.2	1,220	7.3	1,050	7.4	920	7.4	815	7.4	735	7.4	610	7.2	460	7.2
Profile—Rough	>300	1,530	4.0	1,225	4.1	1,020	4.2	875	4.3	765	4.3	680	4.3	610	4.3	510	4.1	380	4.1
Slotting	>300	1,220	2.2	980	2.3	815	2.4	700	2.5	610	2.5	545	2.5	490	2.5	410	2.3	305	2.3

- Profile – Semi-Rough:** Radial Width .125 x Diameter (max.)
Axial Depth 1.5 x Diameter (max.)
- Profile – Rough:** Radial Width .250 x Diameter (max.)
Axial Depth 1.5 x Diameter (max.)
- Slotting:** Axial Depth 1 x Diameter (max.)



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

Design Benefits

The Z-CARB-HTA end mill maximizes stock removal and improves productivity in most milling operations. Chatter is the most common problem associated with aggressive milling. The SGS Z-CARB-HTA design features reduce chatter, increase tool life and optimize performance. Z-CARB-HTA tools are coated with SGS Ti-NAMITE-A® coating that resists heat generated in aggressive cutting operations.

Z-Carb-HTA combines the patented anti-chatter design of the original Z-Carb end mill with specific geometry enhancements for exceptional performance in high temperature alloys.

METRIC

Z-Carb-HTA Series ZH1CR Metric Specific Corner Radius

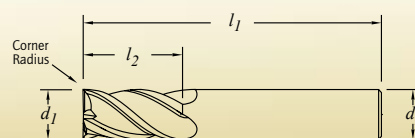
Ti-NAMITE-A (AlTiN)						
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Corner Radius	EDP Number	EDP Number w/Flat
6	13	57	6	0.5	46450	
6	13	57	6	1.0	46451	
6	13	57	6	1.5	46452	
8	19	63	8	0.5	46453	
8	19	63	8	1.0	46454	
8	19	63	8	1.5	46455	
10	22	72	10	0.5	46456	
10	22	72	10	1.0	46457	
10	22	72	10	1.5	46458	
10	22	72	10	2.0	46459	
12	26	83	12	0.5	46460	46471
12	26	83	12	1.0	46461	46472
12	26	83	12	1.5	46462	46473
12	26	83	12	2.0	46463	46474
12	26	83	12	3.0	46464	46475
16	32	92	16	1.5	46465	46476
16	32	92	16	2.0	46466	46477
16	32	92	16	3.0	46467	46478
20	38	104	20	3.0	46468	46479
20	38	104	20	4.0	46469	46480
20	38	104	20	5.0	46470	46481

Chatter Reduction Design

The unique patented design of the SGS Z-CARB-HTA decreases chatter, which improves workpiece finish. Less tuning (manually adjusting speed and feed rates) increases operator confidence and productivity. Increases in axial depth of cut to 275% have been realized without chatter. SGS Z-CARB-HTA can achieve a 100% increase in radial width of cut over standard geometry end mills.

Application Tips

- Tool holders with adequate gripping pressure are required
- Stub length solid holders are recommended for heavy stock removal
- Avoid remilling chips
- Avoid straight plunging - ramp or spiral plunge into pockets
- Regrind and recondition services are available from SGS
- Set-up rigidity critical during heavy roughing



TOLERANCES	
Cutting Diameter	Shank Diameter
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	



Speed and Feed Recommendations-Metric

Cutting Diameter

High Temp. Alloys	Bhn	6		8		10		12		16		20	
		rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min
Profile—Semi-Rough	<300	2,100	244	1,575	246	1,260	248	1,050	252	790	252	630	246
Profile—Rough	<300	1,780	163	1,335	165	1,070	168	890	170	670	170	535	165
Slotting	<300	1,455	100	1,090	102	875	104	730	108	545	108	440	102
Profile—Semi-Rough	>300	1,940	180	1,455	182	1,165	185	970	188	730	188	585	182
Profile—Rough	>300	1,620	102	1,215	104	970	106	810	110	610	110	485	104
Slotting	>300	1,295	55	970	58	775	60	650	64	485	64	390	58

Performance Comparison 1

Inconel 718 32 Rc-Slotting • 1/2" Diameter • 610 rpm • 4 ipm



The 4-flute end mill of Competitor A broke after 4.5 parts. The Z-Carb-HTA produced 12 parts **without breaking**.

Performance Comparison 2

Inconel 718 32 Rc-Slotting • 1/2" Diameter • 610 rpm • .0016" feed/tooth



Z-Carb-HTA out-produced the 3-flute end mill of Competitor B by 38%. Also, Competitor B broke at 11 parts and the Z-Carb-HTA easily produced 12 parts **without breaking**.

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