

YU-HPC23

AMERICAS

BEST VALUE IN THE WORLD OF CUTTING TOOLS

FOR ALUMINUM, ALUMINUM DIE CAST, NON-FERROUS ALLOYS AND PLASTICS



ALU-POWER HPC

3-FLUTE, HIGH-PERFORMANCE,
SOLID CARBIDE END MILLS

**Keep Your Edge:
Speed, Strength & Sharpness**

- /// 3 Flute
- /// Square End & Corner Radius
- /// Standard and Extended Length
- /// Coated and Uncoated
- /// Chip Breakers
- /// Ball Nose **NEW**



ALU-POWER HPC

Built to Handle High-Speed Cutting Without Buildup.

- ▶ Excels in Ultra High-Speed, High HP Applications Up to 35,000 RPM
- ▶ Rigid Design for Excellent Ramping
- ▶ Reduced Vibration in Heavy Cutting

While other 3-flute End mills can muster up the speed for rough cutting aluminum, few can make it through without melting down the aluminum that surrounds the work itself. That's where the ALU-POWER HPC has a distinct advantage – speed, strength and sharpness.

Why ALU-POWER HPC Keeps Its Edge Under Tough Conditions

ALU-POWER HPC's highly polished 3-flute design provides more balanced cutting performance – without excessive heat buildup. In fact, while other End mills can gum up at surface speeds of 3,000 or less, ALU-POWER HPC keeps its cool by dissipating heat and providing outstanding chip evacuation. Adding it to its ultra-micrograin carbide design, the results are:

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation
- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



ALU-POWER HPC 3-FLUTE END MILLS

▶▶▶ The Anatomy of Efficiency

Specialized Design of Corner Gash

- ▶ Unique flute design and superior corner protection enhance both tool life and protection against catastrophic failure in high feed applications
- ▶ Polished flutes for excellent chip flow



Cylindrical Land

- ▶ Increased performance in a variety of cutting conditions
- ▶ Helps reduce vibration and chatter



Available in a Wide Variety of Sizes and Corner Radii

Ideal Symmetrical Shape

- ▶ 3-flute design "to the center" (all 3 flutes come to center)
- ▶ Designed with high spindle speeds in mind
- ▶ Highly effective in vertical ramping up to 20 degrees and step-over plunging applications

DLC Diamond-Like Carbon

- ▶ Excels in hard aluminum and high speeds
- ▶ Provides edge strength and unsurpassed tool life

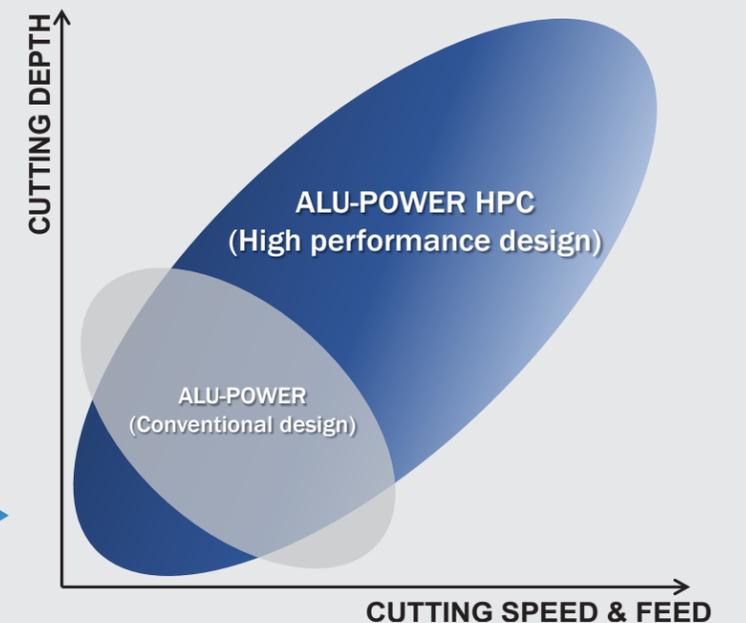


Engineered Flute Design

- ▶ Effective chip evacuation at high feed rates with lower cutting forces than competitive products

What do you get when you add 3-flute to the center, polished ultra-micrograin carbide, extra-large chip gullets and a razor- sharp cylindrical land design? In technical terms, it's called the ALU-POWER HPC. In a machinist's term, it's called an extremely sharp, highly durable milling monster that won't back down, cut after cut.

Compared to conventional aluminum-specific End mills, the ALU-POWER HPC provides more versatile performance. Its high-performance design allows you to cut deeper and run at both faster and slower cutting speeds and feeds.



From Side Cuts to Rough Cuts to Aggressive Ramping, No One Withstands Extreme Radial Forces Better-or Longer.



▲ Rough Cutting
Ultra-micrograin carbide supplies the rigidity to keep the chips flying. Highly polished 3-flute design ensures they'll keep flying – cut after cut.



▲ Ramping
In steep, aggressive ramping conditions, the ALU-POWER HPC holds its own to resist the torsional stress from extreme helical output.



▲ Side cutting
No one offers a cooler-running super high-speed End mill. While others melt down the materials they're cutting, ALU-POWER HPC keeps machining cool in aluminum and soft alloys, to boot.

The Benefits of Balanced Cutting

When you lock an ALU-POWER HPC into your milling machine, you've unleashed the fastest-running, lowest-heat-producing End mill in the business. And that means you've got the speed and sharpness to take on not only the tough materials but also even more fragile mixed alloy castings with ease. Discover the ALU-POWER HPC and start pushing your productivity higher.

Another Advantage of YG-1's Perfect Geometry and Superior Coating

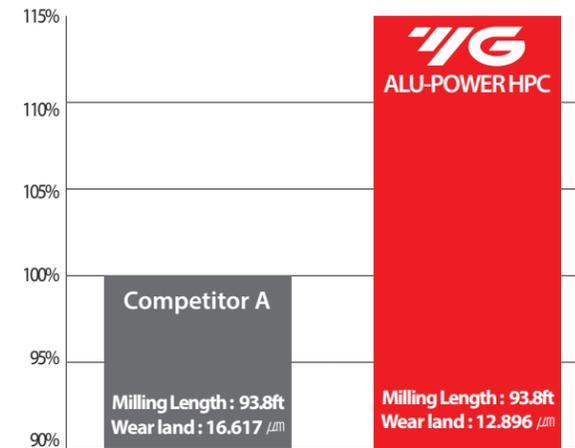
Whether you're running parts in today's most advanced 5-axis machining centers on the market today, or in machines built decades ago, ALU-POWER HPC makes the most of your manufacturing assets. That's because its unique 3-flute, 37-degree helix design can operate at lower speeds with higher efficiency.



CASE STUDY

TEST I Slotting Application

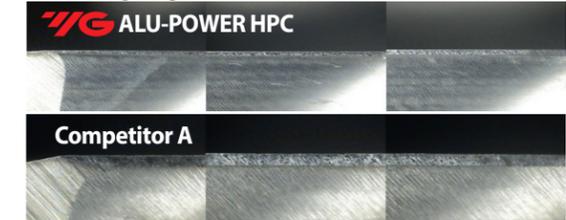
Ø1/2(R.090) 3 Flute Corner radius



Cutting Condition (Slotting)

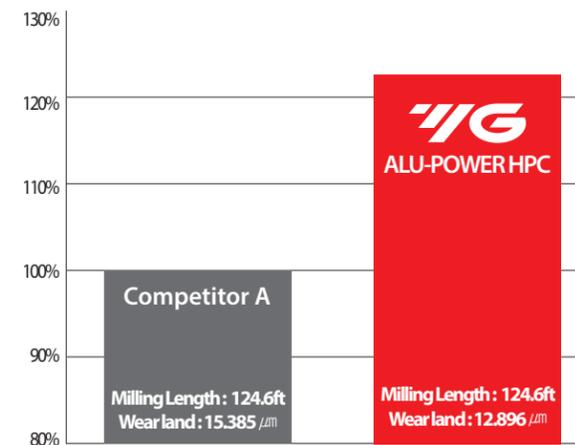
Tool	Ø1/2(R.090) x Ø1/2 x 1-1/4 x 3-1/2
Work Material	AL7075
R.P.M (rev./min.)	12224
IPM (Feed, in/min.)	220
Cutting Depth (in)	.5 (Axial)
Coolant	Wet Cut (9% emulsion)
Overhang (in)	1.8898
Milling Method	Slotting
Machine	Machining Center

Total Milling Length : 125ft



TEST II Pocketing Application

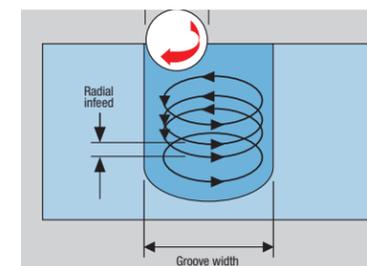
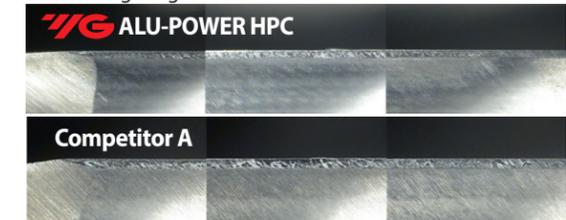
Ø1/2(R.090) 3 Flute Corner radius



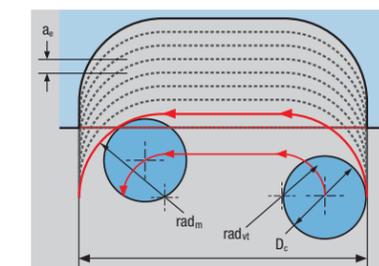
Cutting Condition (Pocketing)

Tool	Ø1/2(R.090) x Ø1/2 x 1-1/4 x 3-1/2
Work Material	AL7075
R.P.M (rev./min.)	12224
IPM (Feed, in/min.)	220
Cutting Depth (in)	.5(Axial) / .4803 (Radial)
Coolant	Wet Cut (9% emulsion)
Overhang (in)	1.8898
Milling Method	Pocketing
Machine	Machining Center

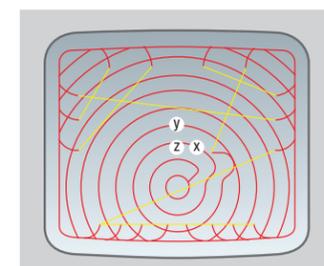
Total Milling Length : 125ft



In trochoidal milling applications, the cutter follows a spiral path by moving radially as it rotates providing faster machining times, lower tooling costs and reduced loads on machine components.



Peel milling applications benefit from ALU-POWER HPC's super sharp high-speed milling ability.



Outstanding chip evacuation through deep gullet design coupled with high speed milling leaves **a well-defined clean cutter path.**



ALU-POWER HPC CHIP BREAKER 3-FLUTE END MILLS

- Unique Geometry provides the Balance cutting with less vibration during the High Speed Machining.
- Provides long tool life and high productivity on aluminum by Chip breaker releasing stresses on the tool and prevents acceleration rate of wear on the cutting edge.
- Chip Breaker Improves chip evacuation by shortening the chip length during the High Speed Machining.

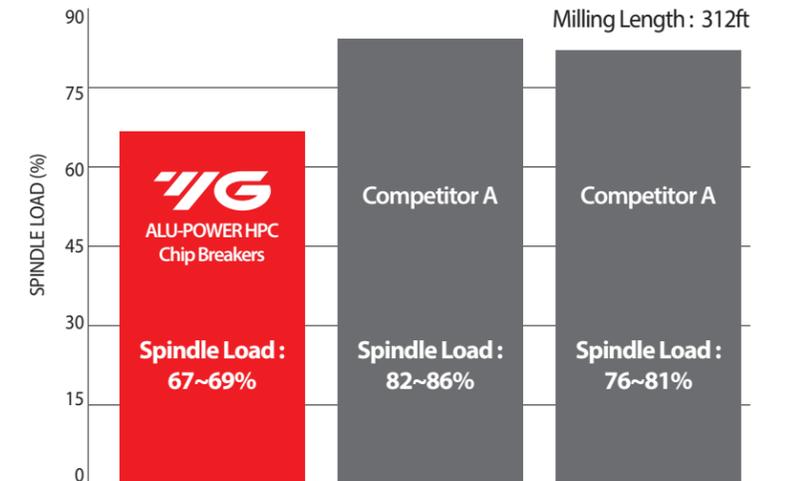
CASE STUDY

TEST Chip Breakers - Side Cutting Application

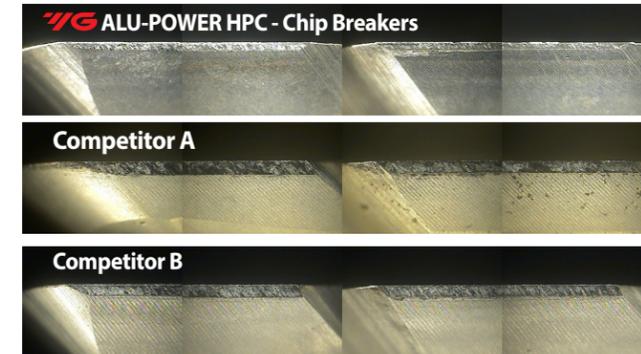
Ø1/2(R.03") 3 Flute Chip Breakers

Cutting Conditions	
Tool	1/2(R.03) x 1/2 x 1-1/4 x 3
Work Material	Al7075
R.P.M (rev./min.)	16,800
IPM (Feed, in/min.)	151
Cutting Depth (in)	.750 (Axial=1.5D) .175 (Radial=0.35D)
Coolant	Wet Cut
Holder	BT40 - High Feed Milling Chuck
Milling Method	Profiling
Machine	Machining Center

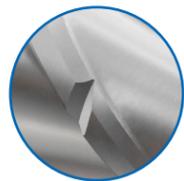
Cutting Resistance



Cutting Edge (Total Milling Length : 312ft)

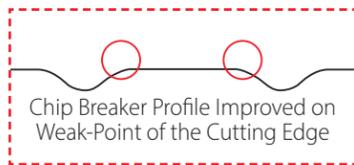


Surface Roughness



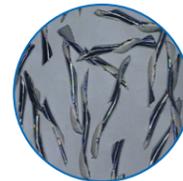
Chip Breakers

- ▶ Through Special Chip Breaker Design, the length of the chip is formed short to improve chip evacuation performance.

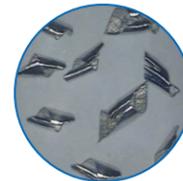


Optimized Chip Breaker Profile Design

- ▶ Optimized Chip Breaker Profile design boasts the best performance in Aluminum high-speed processing.



General End mill Chip Geometry



Chip Breaker End mill Chip Geometry

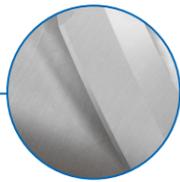
Unique Geometries

- ▶ Applied suitable Flute Design for Aluminum high speed machining to have an effective chip evacuation effect.
- ▶ Excellent Corner Protect Design improves tool life.



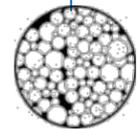
Cylindrical Land

- ▶ Improves tool performance by reducing vibration and chattering in high-speed processing.



Premium Tungsten Carbide

- ▶ Excellent wear resistance by using Premium Carbide material.



DLC Diamond-Like Carbon

- ▶ Excellent in high-speed processing in the Aluminum area.
- ▶ Superior tool life by complementing rigidity to cutting edge.

GUIDE TO ICONS



The tool is made of micrograin carbide



Helix Angle



Tool Ends:
Square / Corner Radius



No. of Flutes



Type of Shank



Cutting Conditions

SERIES	JAG95	JAG97	E5G95	E5G97	JAG96	JAG98
FLUTE	3		3		3	
HELIX ANGLE	37°		37°		37°	
CUTTING EDGE SHAPE	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS
SIZE MIN	1/8	1/8	1/8	1/8	1/4	1/4
SIZE MAX	1	1	1	1	1	1
PAGE	10-11		12-13		14	

SOLID CARBIDE
ALU-POWER HPC
END MILLS

3-Flute, High-Performance,
For Aluminum, Aluminum Die Cast,
Non-Ferrous Alloys And Plastics



Recommended cutting conditions: p.22-24

◎ : Excellent ○ : Good

STANDARD LENGTH	STANDARD LENGTH	EXTENDED NECK
DLC	Uncoated	DLC

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment	HB	HRc							
P	1	Non-alloy steel	About 0.15% C Annealed	125								
	2		About 0.45% C Annealed	190	13							
	3		About 0.45% C Quenched & Tempered	250	25							
	4		About 0.75% C Annealed	270	28							
	5		About 0.75% C Quenched & Tempered	300	32							
	6	Low alloy steel	Annealed	180	10							
	7		Quenched & Tempered	275	29							
	8		Quenched & Tempered	300	32							
	9		Quenched & Tempered	350	38							
	10		High alloyed steel, and tool steel	Annealed	200	15						
	11		Quenched & Tempered	325	35							
M	12	Stainless steel	Ferritic / Martensitic Annealed	200	15							
	13		Martensitic Quenched & Tempered	240	23							
	14		Austenitic	180	10							
K	15	Grey cast iron	Pearlitic / ferritic	180	10							
	16		Pearlitic (Martensitic)	260	26							
	17	Nodular cast iron	Ferritic	160	3							
	18	Cast iron	Pearlitic	250	25							
	19	Malleable cast iron	Ferritic	130								
20		Pearlitic	230	21								
N	21	Aluminum-wrought alloy	Not Curable	60								
	22		Curable Hardened	100								
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable	75								
	24		≤ 12% Si, Curable Hardened	90								
	25		> 12% Si, Not Curable	130								
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%	110								
	27		CuZn, CuSnZn (Brass)	90								
	28		CuSn, lead-free copper and electrolytic copper	100								
	29		Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic Rubber, Wood, etc.								
	30											
S	31	Heat Resistant Super Alloys	Fe Based Annealed	200	15							
	32		Cured	280	30							
	33		Annealed	250	25							
	34		Ni or Co Based Cured	350	38							
	35		Cast	320	34							
	36	Titanium Alloys	Pure Titanium	400 Rm								
37		Alpha + Beta Alloys Hardened	1050 Rm									
H	38	Hardened steel	Hardened	550	55							
	39		Hardened	630	60							
	40		Chilled Cast Iron	Cast	400	42						
	41		Hardened Cast Iron	Hardened	550	55						

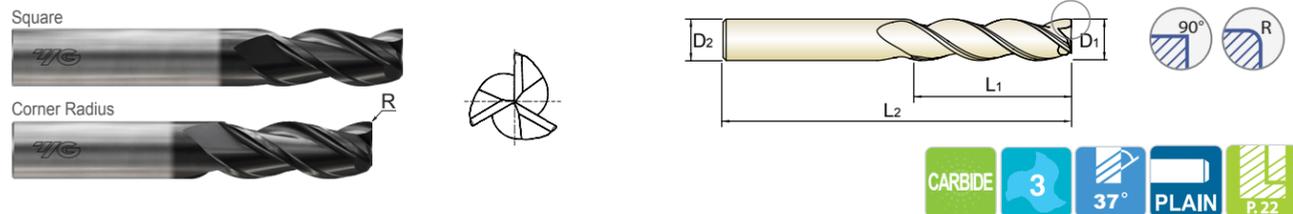
E5G96	E5G98	JAI58	E5I58	JAI59	E5I59	JAI38	E5I36	E5I38	JAI39	E5I37	E5I39	
3		3		3		3		3		3		
37°		37°		37°		37°		37°		37°		
SQUARE	CORNER RADIUS	BALL NOSE		BALL NOSE		CORNER RADIUS	SQUARE	CORNER RADIUS	CORNER RADIUS	SQUARE	CORNER RADIUS	
1/4	1/4	1/8	1/8	3/8	3/8	1/8	1/2	1/8	1/4	1/2	1/4	
1	1	1	1	1	1	1	3/4	1	1	1/2	1	
15			16			17			18		19	
EXTENDED NECK		STANDARD LENGTH			EXTENDED NECK		STANDARD LENGTH			EXTENDED NECK		
Uncoated		DLC		Uncoated		DLC		Uncoated		DLC		
CHIP BREAKER												

**HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH – COATED**

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life

SERIES
Square **JAG95**
Corner Radius **JAG97**



Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	OAL (L2)	Square End EDP No.	Corner Radius							
					.010	.030	.060	.090	.120	.190	.250	
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	
1/8	1/8	1/4	1-1/2	JAG95008	JAG97008	JAG97901						
		3/8	1-1/2	JAG95901	JAG97902	JAG97903						
3/16	3/16	5/16	2	JAG95012	JAG97012	JAG97904						
		9/16	2	JAG95902	JAG97905	JAG97906						
1/4	1/4	3/8	2	JAG95016	JAG97016	JAG97907	JAG97908					
		5/8	2-1/2	JAG95903	JAG97909	JAG97910	JAG97911					
		7/8	3	JAG95929	JAG97892	JAG97893	JAG97894					
		1-1/4	3-1/4	JAG95904	JAG97912	JAG97913	JAG97914					
5/16	5/16	7/16	2	JAG95020	JAG97020	JAG97915	JAG97916	JAG97917				
		5/8	2-1/2	JAG95905	JAG97918	JAG97919	JAG97920	JAG97921				
		13/16	3	JAG95930	JAG97895	JAG97896	JAG97897	JAG97898				
		1-1/4	3-1/2	JAG95906	JAG97922	JAG97923	JAG97924	JAG97925				
3/8	3/8	1/2	2	JAG95024	JAG97024	JAG97926	JAG97927	JAG97928	JAG97929			
		1	2-1/2	JAG95907	JAG97930	JAG97931	JAG97932	JAG97933	JAG97934			
		1-1/2	3-1/2	JAG95908	JAG97935	JAG97936	JAG97937	JAG97938	JAG97939			
		2	4	JAG95909	JAG97940	JAG97941	JAG97942	JAG97943	JAG97944			
7/16	7/16	9/16	2-1/2	JAG95028	JAG97028	JAG97945	JAG97946	JAG97947	JAG97948			
		1-1/4	2-3/4	JAG95910	JAG97949	JAG97950	JAG97951	JAG97952	JAG97953			
		2	4	JAG95911	JAG97954	JAG97955	JAG97956	JAG97957	JAG97958			

NEXT PAGE ►

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	h6
1/8 – 3/16	+0/-0.0032	
1/4 – 3/8	+0/-0.0035	
1/2 – 5/8	+0/-0.0043	
3/4 – 1	+0/-0.0051	

◎ : Excellent ○ : Good

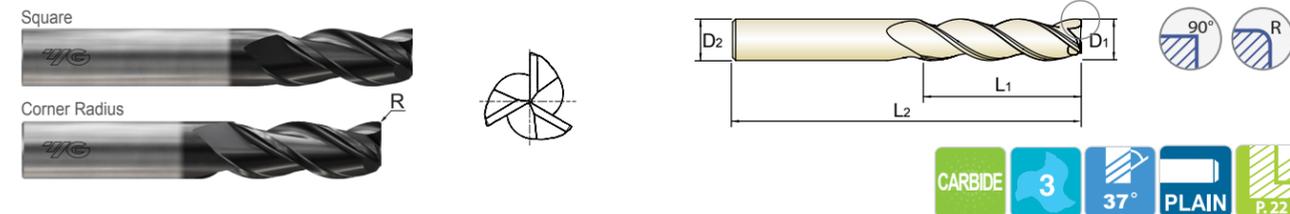
ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

**HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH – COATED**

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SERIES
Square **JAG95**
Corner Radius **JAG97**



Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	OAL (L2)	Square End EDP No.	Corner Radius							
					.010	.030	.060	.090	.120	.190	.250	
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	
1/2	1/2	5/8	2-1/2	JAG95032	JAG97032	JAG97959	JAG97960	JAG97961	JAG97962	JAG97963		
		1	3	JAG95927	JAG97879	JAG97880	JAG97881	JAG97882	JAG97883	JAG97884		
		1-1/4	3	JAG95912	JAG97964	JAG97965	JAG97966	JAG97967	JAG97968	JAG97969		
		1-5/8	4	JAG95913	JAG97970	JAG97971	JAG97972	JAG97973	JAG97974	JAG97975		
		2	4	JAG95914	JAG97976	JAG97977	JAG97978	JAG97979	JAG97980	JAG97981		
		2-1/2	5	JAG95915	JAG97982	JAG97983	JAG97984	JAG97985	JAG97986	JAG97987		
5/8	5/8	3	5	JAG95916	JAG97988	JAG97989	JAG97990	JAG97991	JAG97992	JAG97993		
		3/4	3	JAG95040	JAG97040	JAG97994	JAG97995	JAG97996	JAG97997	JAG97998		
		1-5/8	3-1/2	JAG95917	JAG97999	JAG97801	JAG97802	JAG97803	JAG97804	JAG97805		
		2-1/2	5	JAG95918	JAG97806	JAG97807	JAG97808	JAG97809	JAG97810	JAG97811		
3/4	3/4	3	5-1/4	JAG95919	JAG97812	JAG97813	JAG97814	JAG97815	JAG97816	JAG97817		
		1	3	JAG95048	JAG97048	JAG97818	JAG97819	JAG97820	JAG97821	JAG97822	JAG97823	
		1-5/8	4	JAG95920	JAG97824	JAG97825	JAG97826	JAG97827	JAG97828	JAG97829	JAG97830	
		2-1/4	5	JAG95921	JAG97831	JAG97832	JAG97833	JAG97834	JAG97835	JAG97836	JAG97837	
		3-1/4	6	JAG95922	JAG97838	JAG97839	JAG97840	JAG97841	JAG97842	JAG97843	JAG97844	
1	1	4	6-1/4	JAG95923	JAG97845	JAG97846	JAG97847	JAG97848	JAG97849	JAG97850	JAG97851	
		1-1/4	3	JAG95064	JAG97064	JAG97852	JAG97853	JAG97854	JAG97855	JAG97856	JAG97857	
		1-1/4	4	JAG95928	JAG97885	JAG97886	JAG97887	JAG97888	JAG97889	JAG97890	JAG97891	
		2	5	JAG95924	JAG97858	JAG97859	JAG97860	JAG97861	JAG97862	JAG97863	JAG97864	
		3-1/4	6	JAG95925	JAG97865	JAG97866	JAG97867	JAG97868	JAG97869	JAG97870	JAG97871	
		4	7	JAG95926	JAG97872	JAG97873	JAG97874	JAG97875	JAG97876	JAG97877	JAG97878	

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	h6
1/8 – 3/16	+0/-0.0032	
1/4 – 3/8	+0/-0.0035	
1/2 – 5/8	+0/-0.0043	
3/4 – 1	+0/-0.0051	

◎ : Excellent ○ : Good

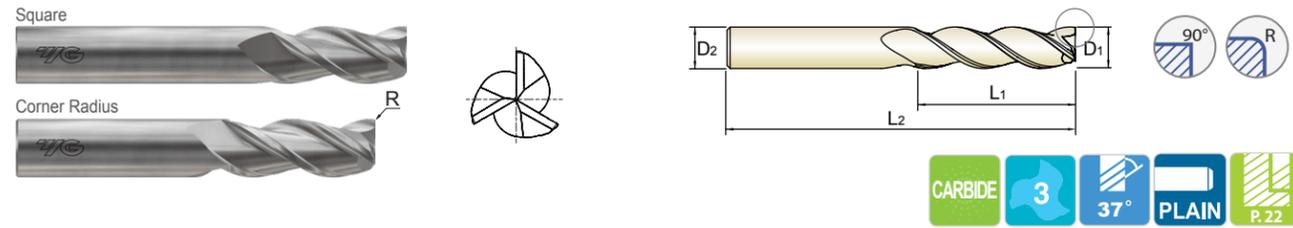
ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH - UNCOATED

SERIES
Square E5G95
Corner Radius E5G97

- Balanced cutting with less vibration
- Ability to run at higher speeds with less heat in aluminum

- More efficient chip evacuation
- Ability to counteract extreme radial forces



Unit: INCH

OD (D ₁)	SD (D ₂)	LOC (L ₁)	OAL (L ₂)	Square End EDP No.	Corner Radius							
					.010	.030	.060	.090	.120	.190	.250	
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	
1/8	1/8	1/4	1-1/2	E5G95008	E5G97008	E5G97901						
		3/8	1-1/2	E5G95901	E5G97902	E5G97903						
3/16	3/16	5/16	2	E5G95012	E5G97012	E5G97904						
		9/16	2	E5G95902	E5G97905	E5G97906						
1/4	1/4	3/8	2	E5G95016	E5G97016	E5G97907	E5G97908					
		5/8	2-1/2	E5G95903	E5G97909	E5G97910	E5G97911					
		7/8	3	E5G95929	E5G97892	E5G97893	E5G97894					
		1-1/4	3-1/4	E5G95904	E5G97912	E5G97913	E5G97914					
5/16	5/16	7/16	2	E5G95020	E5G97020	E5G97915	E5G97916	E5G97917				
		5/8	2-1/2	E5G95905	E5G97918	E5G97919	E5G97920	E5G97921				
		13/16	3	E5G95930	E5G97895	E5G97896	E5G97897	E5G97898				
		1-1/4	3-1/2	E5G95906	E5G97922	E5G97923	E5G97924	E5G97925				
3/8	3/8	1/2	2	E5G95024	E5G97024	E5G97926	E5G97927	E5G97928	E5G97929			
		1	2-1/2	E5G95907	E5G97930	E5G97931	E5G97932	E5G97933	E5G97934			
		1-1/2	3-1/2	E5G95908	E5G97935	E5G97936	E5G97937	E5G97938	E5G97939			
		2	4	E5G95909	E5G97940	E5G97941	E5G97942	E5G97943	E5G97944			
7/16	7/16	9/16	2-1/2	E5G95028	E5G97028	E5G97945	E5G97946	E5G97947	E5G97948			
		1-1/4	2-3/4	E5G95910	E5G97949	E5G97950	E5G97951	E5G97952	E5G97953			
		2	4	E5G95911	E5G97954	E5G97955	E5G97956	E5G97957	E5G97958			

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 – 3/16	+0/-0.00032	h6
1/4 – 3/8	+0/-0.00035	
1/2 – 5/8	+0/-0.00043	
3/4 – 1	+0/-0.00051	

NEXT PAGE ►

◎ : Excellent ○ : Good

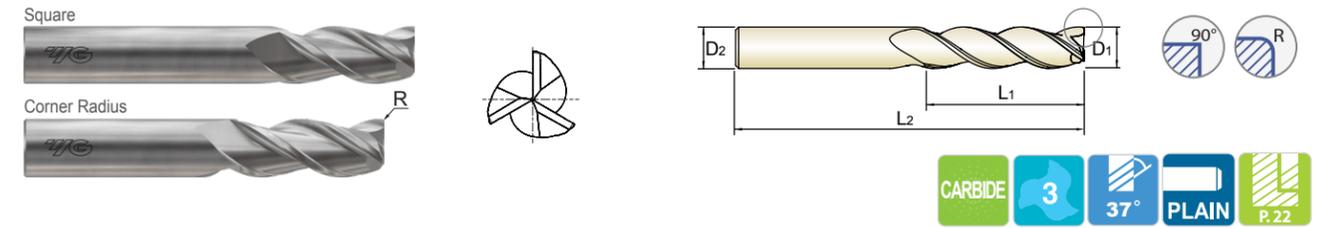
ISO	N									
Material Description	Aluminum-wrought alloy			Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH - UNCOATED

SERIES
Square E5G95
Corner Radius E5G97

- Balanced cutting with less vibration
- Ability to run at higher speeds with less heat in aluminum

- More efficient chip evacuation
- Ability to counteract extreme radial forces



Unit: INCH

OD (D ₁)	SD (D ₂)	LOC (L ₁)	OAL (L ₂)	Square End EDP No.	Corner Radius							
					.010	.030	.060	.090	.120	.190	.250	
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	
1/2	1/2	5/8	2-1/2	E5G95032	E5G97032	E5G97959	E5G97960	E5G97961	E5G97962	E5G97963		
		1	3	E5G95927	E5G97879	E5G97880	E5G97881	E5G97882	E5G97883	E5G97884		
		1-1/4	3	E5G95912	E5G97964	E5G97965	E5G97966	E5G97967	E5G97968	E5G97969		
		1-5/8	4	E5G95913	E5G97970	E5G97971	E5G97972	E5G97973	E5G97974	E5G97975		
		2	4	E5G95914	E5G97976	E5G97977	E5G97978	E5G97979	E5G97980	E5G97981		
		2-1/2	5	E5G95915	E5G97982	E5G97983	E5G97984	E5G97985	E5G97986	E5G97987		
		3	5	E5G95916	E5G97988	E5G97989	E5G97990	E5G97991	E5G97992	E5G97993		
5/8	5/8	3/4	3	E5G95040	E5G97040	E5G97994	E5G97995	E5G97996	E5G97997	E5G97998		
		1-5/8	3-1/2	E5G95917	E5G97999	E5G97801	E5G97802	E5G97803	E5G97804	E5G97805		
		2-1/2	5	E5G95918	E5G97806	E5G97807	E5G97808	E5G97809	E5G97810	E5G97811		
		3	5-1/4	E5G95919	E5G97812	E5G97813	E5G97814	E5G97815	E5G97816	E5G97817		
3/4	3/4	1	3	E5G95048	E5G97048	E5G97818	E5G97819	E5G97820	E5G97821	E5G97822	E5G97823	
		1-5/8	4	E5G95920	E5G97824	E5G97825	E5G97826	E5G97827	E5G97828	E5G97829	E5G97830	
		2-1/4	5	E5G95921	E5G97831	E5G97832	E5G97833	E5G97834	E5G97835	E5G97836	E5G97837	
		3-1/4	6	E5G95922	E5G97838	E5G97839	E5G97840	E5G97841	E5G97842	E5G97843	E5G97844	
1	1	4	6-1/4	E5G95923	E5G97845	E5G97846	E5G97847	E5G97848	E5G97849	E5G97850	E5G97851	
		1-1/4	3	E5G95064	E5G97064	E5G97852	E5G97853	E5G97854	E5G97855	E5G97856	E5G97857	
		1-1/4	4	E5G95928	E5G97885	E5G97886	E5G97887	E5G97888	E5G97889	E5G97890	E5G97891	
		2	5	E5G95924	E5G97858	E5G97859	E5G97860	E5G97861	E5G97862	E5G97863	E5G97864	
1	1	3-1/4	6	E5G95925	E5G97865	E5G97866	E5G97867	E5G97868	E5G97869	E5G97870	E5G97871	
		4	7	E5G95926	E5G97872	E5G97873	E5G97874	E5G97875	E5G97876	E5G97877	E5G97878	

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 – 3/16	+0/-0.00032	h6
1/4 – 3/8	+0/-0.00035	
1/2 – 5/8	+0/-0.00043	
3/4 – 1	+0/-0.00051	

◎ : Excellent ○ : Good

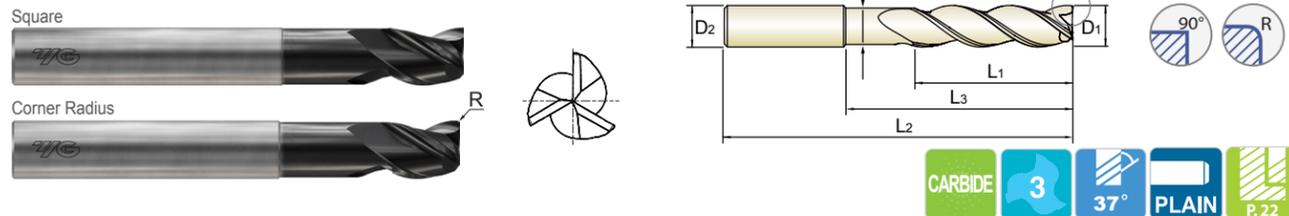
ISO	N									
Material Description	Aluminum-wrought alloy			Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE EXTENDED LENGTH – COATED

SERIES
Square **JAG96**
Corner Radius **JAG98**

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



Unit : INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	OAL (L2)	Neck Dia. (D3)	Square End EDP No.	Corner Radius							
							.010 EDP No.	.030 EDP No.	.060 EDP No.	.090 EDP No.	.120 EDP No.	.190 EDP No.	.250 EDP No.	
1/4	1/4	3/8	3/4	2-1/2	.220	JAG96016	JAG98016	JAG98901	JAG98902					
		3/8	1-1/8	3	.220	JAG96901	JAG98903	JAG98904	JAG98905					
3/8	3/8	1/2	1-1/8	3	.345	JAG96024	JAG98024	JAG98906	JAG98907	JAG98908	JAG98909			
		1/2	2-1/8	4	.345	JAG96902	JAG98910	JAG98911	JAG98912	JAG98913	JAG98914			
1/2	1/2	5/8	1-3/8	3	.470	JAG96032	JAG98032	JAG98915	JAG98916	JAG98917	JAG98918	JAG98919		
		5/8	2-1/4	4	.470	JAG96903	JAG98920	JAG98921	JAG98922	JAG98923	JAG98924	JAG98925		
		5/8	3-3/8	5	.470	JAG96904	JAG98926	JAG98927	JAG98928	JAG98929	JAG98930	JAG98931		
		5/8	4-1/4	6	.470	JAG96905	JAG98932	JAG98933	JAG98934	JAG98935	JAG98936	JAG98937		
5/8	5/8	3/4	1-5/8	4	.585	JAG96040	JAG98040	JAG98938	JAG98939	JAG98940	JAG98941	JAG98942		
		3/4	3-3/8	6	.585	JAG96906	JAG98943	JAG98944	JAG98945	JAG98946	JAG98947	JAG98948		
3/4	3/4	1	2	4	.710	JAG96048	JAG98048	JAG98949	JAG98950	JAG98951	JAG98952	JAG98953	JAG98954	
		1	3-3/8	6	.710	JAG96907	JAG98955	JAG98956	JAG98957	JAG98958	JAG98959	JAG98960	JAG98961	
		1	5	7	.710	JAG96908	JAG98962	JAG98963	JAG98964	JAG98965	JAG98966	JAG98967	JAG98968	
1	1	1-1/4	2-5/8	5	.960	JAG96064	JAG98064	JAG98969	JAG98970	JAG98971	JAG98972	JAG98973	JAG98974	
		1-1/4	3-3/8	6	.960	JAG96909	JAG98975	JAG98976	JAG98977	JAG98978	JAG98979	JAG98980	JAG98981	
		1-1/4	4-3/8	7	.960	JAG96910	JAG98982	JAG98983	JAG98984	JAG98985	JAG98986	JAG98987	JAG98988	
		1-1/4	6	9	.960	JAG96911	JAG98989	JAG98990	JAG98991	JAG98992	JAG98993	JAG98994	JAG98995	

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 – 3/16	+0/-.00032	
1/4 – 3/8	+0/-.00035	
1/2 – 5/8	+0/-.00043	
3/4 – 1	+0/-.00051	

◎ : Excellent ○ : Good

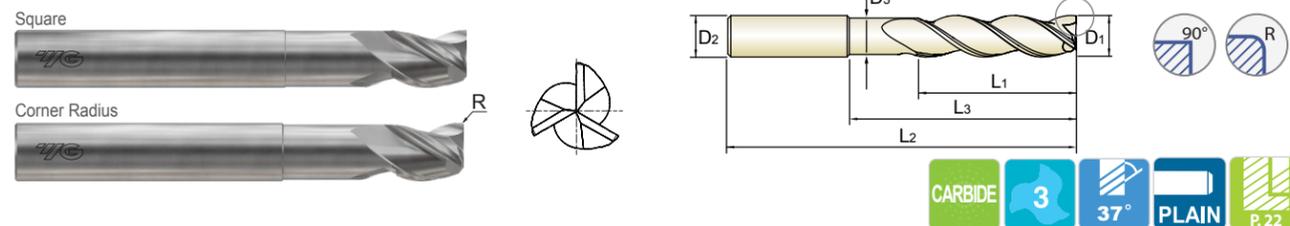
ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC	60	100	75	90	130	110	90	100		
HB										
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE EXTENDED LENGTH – UNCOATED

SERIES
Square **E5G96**
Corner Radius **E5G98**

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum

- ▶ More efficient chip evacuation
- ▶ Ability to counteract extreme radial forces



Unit : INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	OAL (L2)	Neck Dia. (D3)	Square End EDP No.	Corner Radius							
							.010 EDP No.	.030 EDP No.	.060 EDP No.	.090 EDP No.	.120 EDP No.	.190 EDP No.	.250 EDP No.	
1/4	1/4	3/8	3/4	2-1/2	.220	E5G96016	E5G98016	E5G98901	E5G98902					
		3/8	1-1/8	3	.220	E5G96901	E5G98903	E5G98904	E5G98905					
3/8	3/8	1/2	1-1/8	3	.345	E5G96024	E5G98024	E5G98906	E5G98907	E5G98908	E5G98909			
		1/2	2-1/8	4	.345	E5G96902	E5G98910	E5G98911	E5G98912	E5G98913	E5G98914			
1/2	1/2	5/8	1-3/8	3	.470	E5G96032	E5G98032	E5G98915	E5G98916	E5G98917	E5G98918	E5G98919		
		5/8	2-1/4	4	.470	E5G96903	E5G98920	E5G98921	E5G98922	E5G98923	E5G98924	E5G98925		
		5/8	3-3/8	5	.470	E5G96904	E5G98926	E5G98927	E5G98928	E5G98929	E5G98930	E5G98931		
		5/8	4-1/4	6	.470	E5G96905	E5G98932	E5G98933	E5G98934	E5G98935	E5G98936	E5G98937		
5/8	5/8	3/4	1-5/8	4	.585	E5G96040	E5G98040	E5G98938	E5G98939	E5G98940	E5G98941	E5G98942		
		3/4	3-3/8	6	.585	E5G96906	E5G98943	E5G98944	E5G98945	E5G98946	E5G98947	E5G98948		
3/4	3/4	1	2	4	.710	E5G96048	E5G98048	E5G98949	E5G98950	E5G98951	E5G98952	E5G98953	E5G98954	
		1	3-3/8	6	.710	E5G96907	E5G98955	E5G98956	E5G98957	E5G98958	E5G98959	E5G98960	E5G98961	
		1	5	7	.710	E5G96908	E5G98962	E5G98963	E5G98964	E5G98965	E5G98966	E5G98967	E5G98968	
1	1	1-1/4	2-5/8	5	.960	E5G96064	E5G98064	E5G98969	E5G98970	E5G98971	E5G98972	E5G98973	E5G98974	
		1-1/4	3-3/8	6	.960	E5G96909	E5G98975	E5G98976	E5G98977	E5G98978	E5G98979	E5G98980	E5G98981	
		1-1/4	4-3/8	7	.960	E5G96910	E5G98982	E5G98983	E5G98984	E5G98985	E5G98986	E5G98987	E5G98988	
		1-1/4	6	9	.960	E5G96911	E5G98989	E5G98990	E5G98991	E5G98992	E5G98993	E5G98994	E5G98995	

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 – 3/16	+0/-.00032	
1/4 – 3/8	+0/-.00035	
1/2 – 5/8	+0/-.00043	
3/4 – 1	+0/-.00051	

◎ : Excellent ○ : Good

ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRC	60	100	75	90	130	110	90	100		
HB										
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

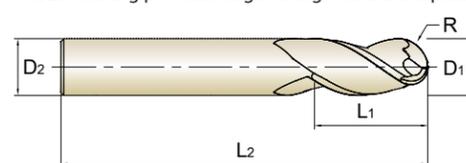
HIGH-PERFORMANCE SOLID CARBIDE END MILLS NEW
3-FLUTE STANDARD LENGTH BALL NOSE

SERIES

DLC **JAI58**
Bright **E5I58**

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



Unit : INCH

Radius of Ball Nose R (±.0005)	OD (D ₁)	SD (D ₂)	LOC (L ₁)	OAL (L ₂)	Ball Nose	
					DLC	Uncoated
1/16	1/8	1/8	1/4	1-1/2	JAI58008	E5I58008
1/16			3/8	1-1/2	JAI58901	E5I58901
3/32	3/16	3/16	5/16	2	JAI58012	E5I58012
3/32			9/16	2	JAI58902	E5I58902
1/8	1/4	1/4	3/8	2	JAI58016	E5I58016
1/8			5/8	2-1/2	JAI58903	E5I58903
5/32	5/16	5/16	5/8	2-1/2	JAI58020	E5I58020
5/32			1-1/4	3-1/2	JAI58904	E5I58904
3/16	3/8	3/8	1/2	2	JAI58024	E5I58024
3/16			1	2-1/2	JAI58905	E5I58905
3/16			1-1/2	3-1/2	JAI58906	E5I58906
7/32	7/16	7/16	9/16	2-1/2	JAI58028	E5I58028
7/32			1-1/4	2-3/4	JAI58907	E5I58907
1/4	1/2	1/2	5/8	2-1/2	JAI58032	E5I58032
1/4			1	3	JAI58908	E5I58908
1/4			1-5/8	4	JAI58909	E5I58909
1/4			2	4	JAI58910	E5I58910
5/16	5/8	5/8	3/4	3	JAI58040	E5I58040
5/16			1-5/8	3-1/2	JAI58911	E5I58911
5/16			2-1/2	5	JAI58912	E5I58912
3/8	3/4	3/4	1	3	JAI58048	E5I58048
3/8			1-5/8	4	JAI58913	E5I58913
1/2	1	1	1-1/4	4	JAI58064	E5I58064
1/2			2	5	JAI58914	E5I58914

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

◎ : Excellent ○ : Good

ISO	N									
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRc										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

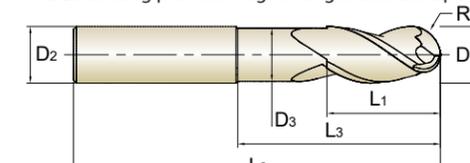
HIGH-PERFORMANCE SOLID CARBIDE END MILLS NEW
3-FLUTE EXTENDED LENGTH BALL NOSE

SERIES

DLC **JAI59**
Bright **E5I59**

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



Unit : INCH

Radius of Ball Nose R (±.0005)	OD (D ₁)	SD (D ₂)	LOC (L ₁)	LBS (L ₃)	OAL (L ₂)	Neck Dia. (D ₃)	Ball Nose	
							DLC	Uncoated
3/16	3/8	3/8	1/2	2-1/8	4	.345	JAI59024	E5I59024
1/4	1/2	1/2	5/8	2-1/4	4	.470	JAI59032	E5I59032
1/4			5/8	3-3/8	5	.470	JAI59901	E5I59901
5/16	5/8	5/8	3/4	3-3/8	6	.585	JAI59040	E5I59040
3/8	3/4	3/4	1	2	4	.710	JAI59048	E5I59048
3/8			1	3-3/8	6	.710	JAI59902	E5I59902
3/8			1	5	7	.710	JAI59903	E5I59903
1/2	1	1	1-1/4	2-5/8	5	.960	JAI59064	E5I59064
1/2			1-1/4	3-3/8	6	.960	JAI59904	E5I59904
1/2			1-1/4	4-3/8	7	.960	JAI59905	E5I59905

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

◎ : Excellent ○ : Good

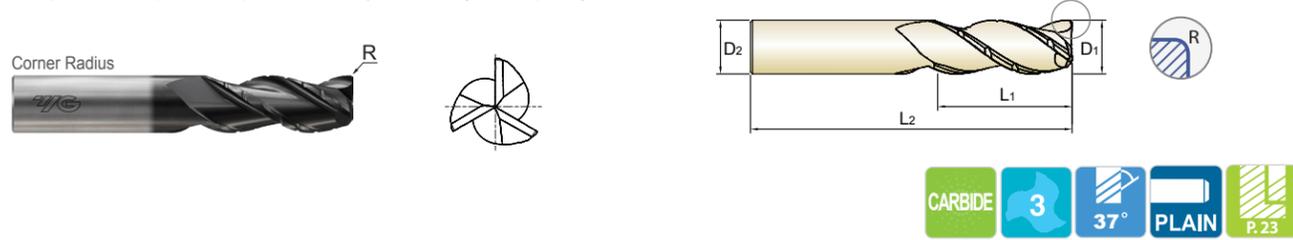
ISO	N									
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRc										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

**HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH - CHIP BREAKER - COATED**

Corner Radius **JAI38** SERIES

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ Chip Breaker Improves chip evacuation by shortening the chip length

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	OAL (L2)	Corner Radius			
				.010 EDP No.	.030 EDP No.	.060 EDP No.	.120 EDP No.
1/8	1/8	1/4	1-1/2	JAI38008			
		3/8	1-1/2	JAI38901			
		1/2	2-1/2	JAI38902			
3/16	3/16	5/16	2	JAI38012			
		9/16	2	JAI38903	JAI38904		
1/4	1/4	3/8	2	JAI38016	JAI38905		
		5/8	2-1/2	JAI38906	JAI38907		
		1-1/4	3-1/4	JAI38908	JAI38909	JAI38910	
		1/2	2	JAI38024	JAI38911		
3/8	3/8	1	2-1/2	JAI38912	JAI38913	JAI38914	
		1-1/2	3-1/2	JAI38915	JAI38916	JAI38917	
		2	4			JAI38918	
		5/8	2-1/2	JAI38032	JAI38919	JAI38920	
1/2	1/2	1-1/4	3	JAI38921	JAI38922	JAI38923	
		1-5/8	4	JAI38924	JAI38925	JAI38926	
		2	4	JAI38927	JAI38928	JAI38929	
		2-1/2	5		JAI38930	JAI38931	
		3	5		JAI38932		
5/8	5/8	3/4	3			JAI38040	
		1-5/8	3-1/2			JAI38933	
		2-1/2	5		JAI38934		
3/4	3/4	1	3	JAI38048	JAI38935	JAI38936	
		1-5/8	4	JAI38937	JAI38938	JAI38939	JAI38940
		2-1/4	5		JAI38941	JAI38942	JAI38943
1	1	1-1/4	3	JAI38064			
		2	5	JAI38944	JAI38945	JAI38946	
		3-1/4	6	JAI38947			

Outside Diameter Tolerances (inch)		Shank Dimeter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

◇ : Call for availability

◎ : Excellent ○ : Good

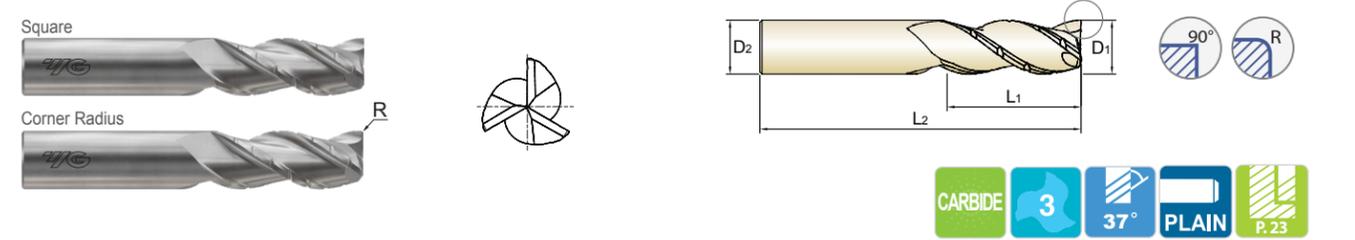
ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRc										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

**HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE STANDARD LENGTH - CHIP BREAKER - UNCOATED**

Square Corner Radius **E5I36** **E5I38** SERIES

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum

- ▶ Chip Breaker Improves chip evacuation by shortening the chip length
- ▶ Ability to counteract extreme radial forces



Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	OAL (L2)	Square End EDP No.	Corner Radius			
					.010 EDP No.	.030 EDP No.	.060 EDP No.	.120 EDP No.
1/8	1/8	1/4	1-1/2		E5I38008			
		3/8	1-1/2		E5I38901			
		1/2	2-1/2		E5I38902			
3/16	3/16	5/16	2		E5I38012			
		9/16	2		E5I38903	E5I38904		
1/4	1/4	3/8	2		E5I38016	E5I38905		
		5/8	2-1/2		E5I38906	E5I38907		
		1-1/4	3-1/4		E5I38908	E5I38909	E5I38910	
		1/2	2		E5I38024	E5I38911		
3/8	3/8	1	2-1/2		E5I38912	E5I38913	E5I38914	
		1-1/2	3-1/2		E5I38915	E5I38916	E5I38917	
		2	4				E5I38918	
		5/8	2-1/2		E5I38032	E5I38919	E5I38920	
1/2	1/2	1-1/4	3	E5I36032	E5I38921	E5I38922	E5I38923	
		1-5/8	4		E5I38924	E5I38925	E5I38926	
		2	4	E5I36901	E5I38927	E5I38928	E5I38929	
		2-1/2	5			E5I38930	E5I38931	
		3	5	E5I36902		E5I38932		
5/8	5/8	3/4	3	E5I36040			E5I38040	
		1-5/8	3-1/2				E5I38933	
		2-1/2	5			E5I38934		
3/4	3/4	1	3	E5I36048	E5I38048	E5I38935	E5I38936	
		1-5/8	4	E5I36903	E5I38937	E5I38938	E5I38939	E5I38940
		2-1/4	5			E5I38941	E5I38942	E5I38943
1	1	1-1/4	3		E5I38064			
		2	5		E5I38944	E5I38945	E5I38946	
		3-1/4	6		E5I38947			

Outside Diameter Tolerances (inch)		Shank Dimeter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

◇ : Call for availability

◎ : Excellent ○ : Good

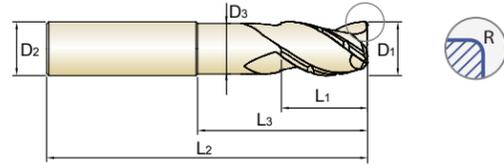
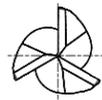
ISO Material Description	N									
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30
HRc										
HB	60	100	75	90	130	110	90	100		
Recommend	◎	◎	◎	◎	○	○	○	○	○	○

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE EXTENDED LENGTH - CHIP BREAKER - COATED

Corner Radius **JAI39** SERIES

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ Chip Breaker Improves chip evacuation by shortening the chip length

- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life



CARBIDE 3 37° PLAIN P.23

Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	Neck Dia. (D3)	OAL (L2)	Corner Radius		
						.010	.030	.060
						EDP No.	EDP No.	EDP No.
1/4	1/4	3/8	3/4	.220	2-1/2	JAI39016		
3/8	3/8	1/2	1-1/8	.345	3		JAI39024	
		1/2	2-1/8	.345	4		JAI39901	
1/2	1/2	5/8	1-3/8	.470	3		JAI39032	JAI39902
		5/8	2-1/4	.470	4		JAI39903	JAI39904
		5/8	3-3/8	.470	5		JAI39905	JAI39906
		5/8	4-1/4	.470	6	JAI39907	JAI39908	JAI39909
3/4	3/4	1	2	.710	4		JAI39048	JAI39910
		1	3-3/8	.710	6		JAI39911	JAI39912
		1	5	.710	7		JAI39913	JAI39914
1	1	1-1/4	4-3/8	.960	7	JAI39064		

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

◎ : Excellent ○ : Good

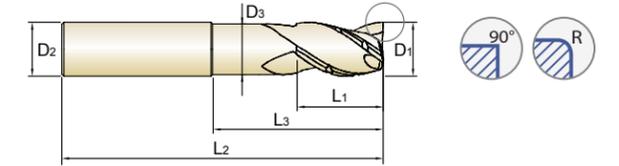
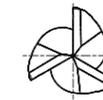
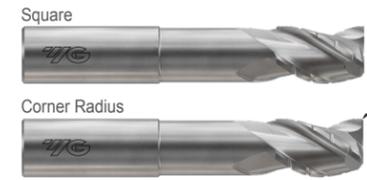
ISO	N										
Material Description	Aluminum-wrought alloy			Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30	
HRc											
HB	60	100	75	90	130	110	90	100			
Recommend	◎	◎	◎	◎	○	○	○	○	○	○	

HIGH-PERFORMANCE SOLID CARBIDE END MILLS
3-FLUTE EXTENDED LENGTH - CHIP BREAKER - UNCOATED

Square **E5137**
 Corner Radius **E5139** SERIES

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum

- ▶ Chip Breaker Improves chip evacuation by shortening the chip length
- ▶ Ability to counteract extreme radial forces



CARBIDE 3 37° PLAIN P.23

Unit: INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	Neck Dia. (D3)	OAL (L2)	Square End EDP No.	Corner Radius		
							.010	.030	.060
							EDP No.	EDP No.	EDP No.
1/4	1/4	3/8	3/4	.220	2-1/2		E5139016		
3/8	3/8	1/2	1-1/8	.345	3			E5139024	
		1/2	2-1/8	.345	4			E5139901	
1/2	1/2	5/8	1-3/8	.470	3	E5137032		E5139032	E5139902
		5/8	2-1/4	.470	4	E5137901		E5139903	E5139904
		5/8	3-3/8	.470	5			E5139905	E5139906
		5/8	4-1/4	.470	6		E5139907	E5139908	E5139909
3/4	3/4	1	2	.710	4			E5139048	E5139910
		1	3-3/8	.710	6			E5139911	E5139912
		1	5	.710	7			E5139913	E5139914
1	1	1-1/4	4-3/8	.960	7		E5139064		

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.00032	h6
1/4 - 3/8	+0/-0.00035	
1/2 - 5/8	+0/-0.00043	
3/4 - 1	+0/-0.00051	

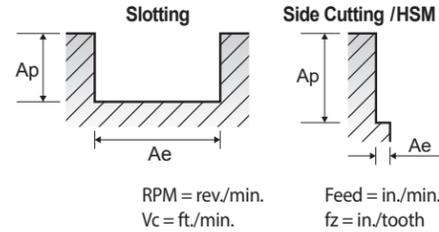
◇ : Call for availability

◎ : Excellent ○ : Good

ISO	N										
Material Description	Aluminum-wrought alloy			Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	
VDI 3323	21	22	23	24	25	26	27	28	29	30	
HRc											
HB	60	100	75	90	130	110	90	100			
Recommend	◎	◎	◎	◎	○	○	○	○	○	○	

RECOMMENDED CUTTING CONDITIONS - INCH

JAG96 | JAG98 | JAG95 | JAG97 SERIES (COATED)
E5G95 | E5G97 | E5G96 | E5G98 SERIES (UNCOATED)



3 FLUTE - SLOTTING

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	1.0D	1.0D	SFM (Vc)	2000	2000	2000	2000	2000	2000	2000
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	61100	30500	20400	15300	12200	10200	7600
						IPM (FEED)	183	275	275	275	242	230	228
	23-25	Aluminum-cast, alloyed	75 / 90 / 130	1.0D	1.0D	SFM (Vc)	600	600	600	600	600	600	600
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	18340	9170	6110	4580	3670	3060	2290
						IPM (FEED)	55	83	83	83	73	69	69
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	1.0D	1.0D	SFM (Vc)	880	880	880	880	880	880	880
						IPT (fz)	.0008	.0020	.0040	.0050	.0055	.0060	.0070
						RPM	26890	13450	8960	6720	5380	4480	3360
						IPM (FEED)	65	81	108	101	89	81	71
29.1	Non Metallic Materials (Duroplastic)	-	1.0D	1.0D	SFM (Vc)	1670	1670	1670	1670	1670	1670	1670	
					IPT (fz)	.0015	.0040	.0075	.0100	.0110	.0120	.0140	
					RPM	51040	25520	17010	12760	10210	8510	6380	
					IPM (FEED)	230	306	383	383	337	306	268	

3 FLUTE - SIDE CUTTING

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	1.5D	0.5D	SFM (Vc)	3000	3000	3000	3000	3000	3000	3000
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	91700	45800	30600	23000	18300	15300	11500
						IPM (FEED)	275	412	413	414	362	344	345
	23-25	Aluminum-cast, alloyed	75 / 130	1.5D	0.5D	SFM (Vc)	800	800	800	800	800	800	800
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	24450	12220	8150	6110	4890	4080	3060
						IPM (FEED)	73	110	110	110	97	92	92
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	1.5D	0.5D	SFM (Vc)	1150	1150	1150	1150	1150	1150	1150
						IPT (fz)	.0008	.0020	.0040	.0050	.0055	.0060	.0070
						RPM	35140	17570	11720	8790	7030	5860	4390
						IPM (FEED)	84	105	141	132	116	105	92
29.1	Non Metallic Materials (Duroplastic)	-	1.5D	0.5D	SFM (Vc)	2070	2070	2070	2070	2070	2070	2070	
					IPT (fz)	.0015	.0040	.0075	.0100	.0110	.0120	.0140	
					RPM	63260	31630	21090	15820	12650	10540	7910	
					IPM (FEED)	285	380	474	474	418	380	332	

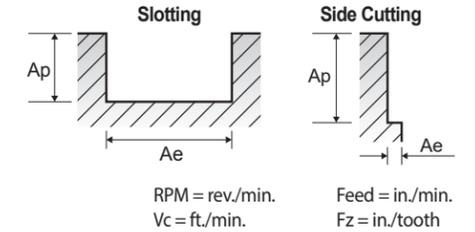
3 FLUTE - SIDE CUTTING HSM (Light)

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	2.0D	0.05D	SFM (Vc)	8000	8000	8000	8000	8000	8000	8000
						IPT (fz)	.0021	.0055	.0105	.0140	.0150	.0165	.0195
						RPM	244500	122200	81500	61100	48900	40700	30600
						IPM (FEED)	1540	2016	2567	2566	2201	2015	1790
	23-25	Aluminum-cast, alloyed	75 / 130	2.0D	0.05D	SFM (Vc)	1200	1200	1200	1200	1200	1200	1200
						IPT (fz)	.0021	.0055	.0105	.0140	.0150	.0165	.0195
						RPM	36670	18340	12220	9170	7330	6110	4580
						IPM (FEED)	231	303	385	385	330	303	268
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	2.0D	0.05D	SFM (Vc)	1850	1850	1850	1850	1850	1850	1850
						IPT (fz)	.0017	.0045	.0085	.0115	.0130	.0140	.0160
						RPM	56540	28270	18850	14130	11310	9420	7070
						IPM (FEED)	288	382	481	488	441	396	339
29.1	Non Metallic Materials (Duroplastic)	-	2.0D	0.05D	SFM (Vc)	3350	3350	3350	3350	3350	3350	3350	
					IPT (fz)	.0034	.0090	.0170	.0230	.0250	.0275	.0320	
					RPM	102380	51190	34130	25590	20480	17060	12800	
					IPM (FEED)	1044	1382	1740	1766	1536	1408	1229	

- NOTES:**
- ▶ All cutting data are target values
 - ▶ Maximum recommended depth shown
 - ▶ Finish cuts typically require reduced feed rates and/or higher spindle speed, with radial width of 2% x D or less
 - ▶ Reduce speed and feed recommendations for materials harder than listed
 - ▶ Reduce cut depth and feed by 50% for long-flute or long-reach tools
 - ▶ Above recommendations are based on ideal conditions. Adjust parameters accordingly for smaller taper machining centers or less rigid conditions
 - ▶ HSM = high-speed machining

RECOMMENDED CUTTING CONDITIONS - INCH

JAI38 | JAI39 SERIES (COATED)
E5I36 | E5I38 | E5I37 | E5I39 SERIES (UNCOATED)



3 FLUTE CHIP BREAKER- SLOTTING

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	1.0D	1.0D	SFM (Vc)	2000	2000	2000	2000	2000	2000	2000
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	61100	30500	20400	15300	12200	10200	7600
						IPM (FEED)	183	275	275	275	242	230	228
	23-25	Aluminum-cast, alloyed	75 / 130	1.0D	1.0D	SFM (Vc)	600	600	600	600	600	600	600
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	18340	9170	6110	4580	3670	3060	2290
						IPM (FEED)	55	83	83	83	73	69	69
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	1.0D	1.0D	SFM (Vc)	880	880	880	880	880	880	880
						IPT (fz)	.0008	.0020	.0040	.0050	.0055	.0060	.0070
						RPM	26890	13450	8960	6720	5380	4480	3360
						IPM (FEED)	65	81	108	101	89	81	71
29.1	Non Metallic Materials (Duroplastic)	-	1.0D	1.0D	SFM (Vc)	1670	1670	1670	1670	1670	1670	1670	
					IPT (fz)	.0015	.0040	.0075	.0100	.0110	.0120	.0140	
					RPM	51040	25520	17010	12760	10210	8510	6380	
					IPM (FEED)	230	306	383	383	337	306	268	

3 FLUTE CHIP BREAKER- SIDE CUTTING

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	1.5D	0.5D	SFM (Vc)	3000	3000	3000	3000	3000	3000	3000
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	91700	45800	30600	23000	18300	15300	11500
						IPM (FEED)	275	412	413	414	362	344	345
	23-25	Aluminum-cast, alloyed	75 / 130	1.5D	0.5D	SFM (Vc)	800	800	800	800	800	800	800
						IPT (fz)	.0010	.0030	.0045	.0060	.0066	.0075	.0100
						RPM	24450	12220	8150	6110	4890	4080	3060
						IPM (FEED)	73	110	110	110	97	92	92
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	1.5D	0.5D	SFM (Vc)	1150	1150	1150	1150	1150	1150	1150
						IPT (fz)	.0008	.0020	.0040	.0050	.0055	.0060	.0070
						RPM	35140	17570	11720	8790	7030	5860	4390
						IPM (FEED)	84	105	141	132	116	105	92
29.1	Non Metallic Materials (Duroplastic)	-	1.5D	0.5D	SFM (Vc)	2070	2070	2070	2070	2070	2070	2070	
					IPT (fz)	.0015	.0040	.0075	.0100	.0110	.0120	.0140	
					RPM	63260	31630	21090	15820	12650	10540	7910	
					IPM (FEED)	285	380	474	474	418	380	332	

- NOTES:**
- ▶ All cutting data are target values
 - ▶ Maximum recommended depth shown
 - ▶ Finish cuts typically require reduced feed rates and/or higher spindle speed, with radial width of 2% x D or less
 - ▶ Reduce speed and feed recommendations for materials harder than listed
 - ▶ Reduce cut depth and feed by 50% for long-flute or long-reach tools
 - ▶ Above recommendations are based on ideal conditions. Adjust parameters accordingly for smaller taper machining centers or less rigid conditions
 - ▶ HSM = high-speed machining

Tech Tip: The tables above are based on common machining calculations. We realize that shops may not have RPM capability shown in the tables. To adapt the tables to machining conditions available, use the following calculation:
(Recommended Feed (IPM) / Recommended RPM) X Available RPM = IPM
Example for 1/8" Side Milling in N21-22 WorkPiece Materials:
(275 IPM / 91700 RPM) X 15,000 = 45 IPM

RECOMMENDED CUTTING CONDITIONS – INCH

JAI58 | JAI59 SERIES (COATED)
E5158 | E5159 SERIES (UNCOATED)

3 FLUTE - PROFILING

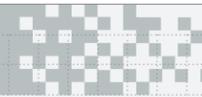
RPM = rev./min. Feed = in./min.
Vc = ft./min. fz = in./tooth

ISO	VDI 3323	Material Description	Hardness (HB)	Ae	Ap	Parameter	Mill Diameter (Ø)						
							1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-wrought alloy	60 / 100	0.2D	0.1D	SFM (Vc)	3690	3690	3690	3690	3690	3690	3690
						IPT (fz)	.0013	.0025	.0038	.0050	.0063	.0075	.0100
						RPM	112770	56380	37590	28190	22550	18790	14100
						IPM (FEED)	440	423	429	423	426	423	423
	23-25	Aluminum-cast, alloyed	75 / 90 / 130	0.2D	0.1D	SFM (Vc)	2950	2950	2950	2950	2950	2950	2950
						IPT (fz)	.0010	.0020	.0030	.0040	.0050	.0060	.0080
						RPM	90150	45080	30050	22540	18030	15030	11270
						IPM (FEED)	270	270	270	270	270	271	270
	26-28	Copper and Copper Alloys (Bronze / Brass)	110 / 90 / 100	0.2D	0.1D	SFM (Vc)	1700	1700	1700	1700	1700	1700	1700
						IPT (fz)	.0009	.0018	.0026	.0035	.0044	.0053	.0070
						RPM	51950	25980	17320	12990	10390	8660	6490
						IPM (FEED)	140	140	135	136	137	138	136
29.1	Non Metallic Materials (Duroplastic)	-	0.2D	0.1D	SFM (Vc)	1840	1840	1840	1840	1840	1840	1840	
					IPT (fz)	.0011	.0023	.0034	.0045	.0056	.0068	.0090	
					RPM	56230	28120	18740	14060	11250	9370	7030	
					IPM (FEED)	186	194	191	190	189	191	190	

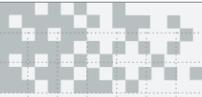
- NOTES:**
- ▶ All cutting data are target values
 - ▶ Maximum recommended depth shown
 - ▶ Finish cuts typically require reduced feed rates and/or higher spindle speed, with radial width of 2% x D or less
 - ▶ Reduce speed and feed recommendations for materials harder than listed
 - ▶ Reduce cut depth and feed by 50% for long-flute or long-reach tools
 - ▶ Above recommendations are based on ideal conditions. Adjust parameters accordingly for smaller taper machining centers or less rigid conditions

Tech Tip: The tables above are based on common machining calculations. We realize that shops may not have RPM capability shown in the tables. To adapt the tables to machining conditions available, use the following calculation:
 (Recommended Feed (IPM) / Recommended RPM) X Available RPM = IPM
 Example for 1/8" Side Milling in N21-22 WorkPiece Materials:
 (440 IPM / 112770 RPM) X 15,000 = 58 IPM

MEMO



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