

MillLine

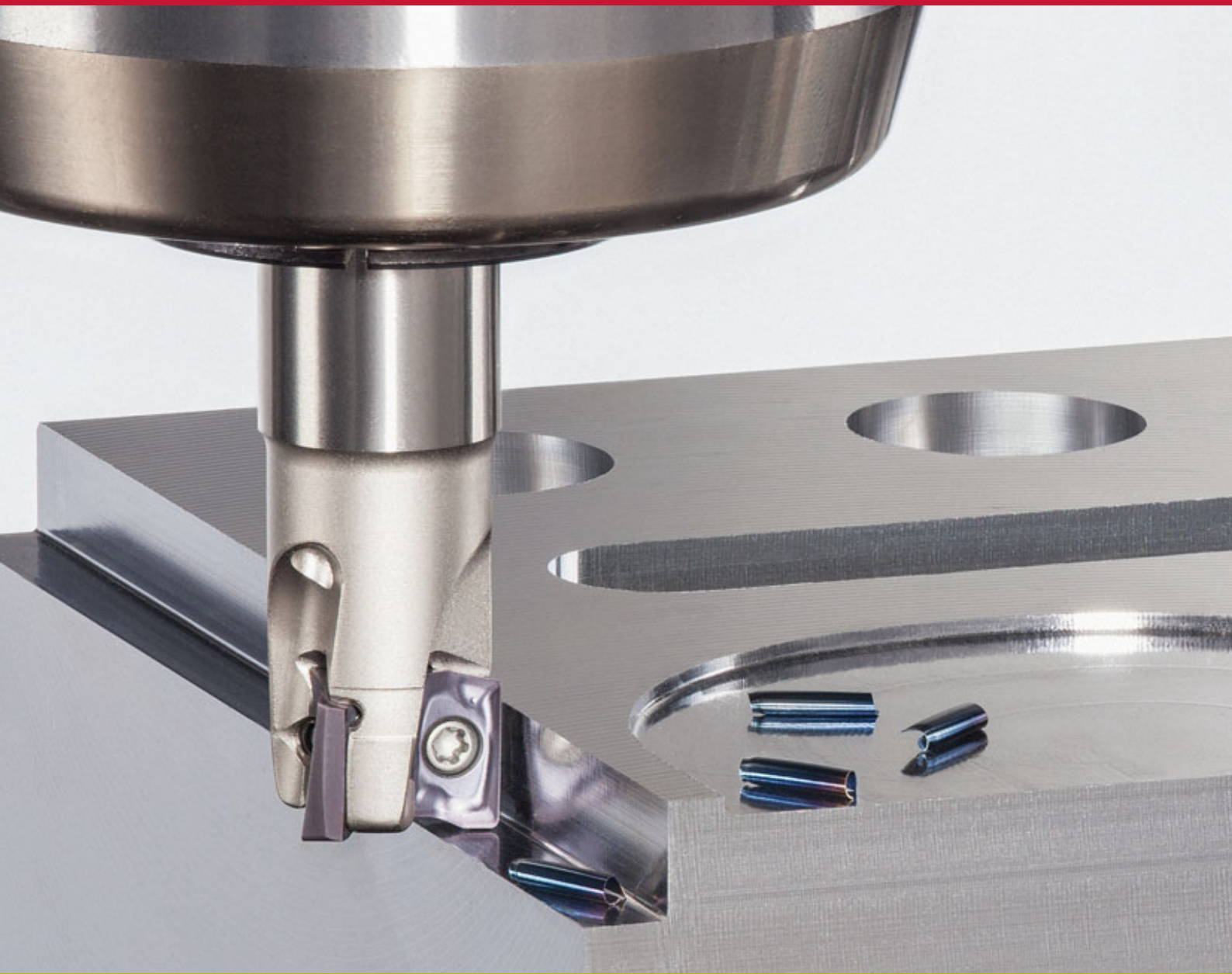
**TUNG**<sup>ORCE</sup>**FREC**

www.tungaloy.com

Tungaloy Report No. 506-G

TUNGFORCE-REC

# Miniature shoulder milling cutter with incomparable stability





ACCELERATED MACHINING



MillLine

**TUNG**<sup>ORCE</sup>**FREC**  
TUNGALOY

**TUNG**<sup>ORCE</sup>**MILL**  
ACCELERATED MACHINING



TungForce-Rec, a **new miniature shoulder milling series**, features a unique clamping system offering **exceptional stability** in machining small pockets and slots.

[www.tungaloy.com](http://www.tungaloy.com)



# Square shoulder milling endmills with small diameter **with exceptional stability and productivity**

## Exceptional reliability and stability

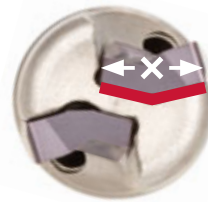
### Chatter-free milling

- Unique insert and seat interface allows for a robust body structure and secure insert performance.



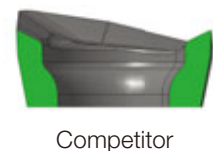
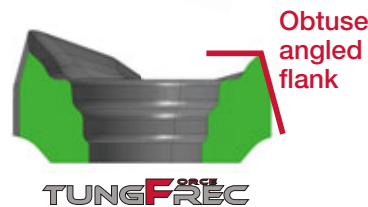
### Secure insert clamping

- **V** shaped design keeps the inserts securely in place when fixed to the body. This prevents unwanted insert movements during machining, eliminating premature insert failures, while improving machining accuracy.



### High fracture resistance

- Obtuse-angled flank face of the insert strengthens cutting edge and avoids chipping.
- Thicker insert design increases the insert robustness and allows larger screws to be used for added fixture security.



### Strong and easy-to-handle insert screws

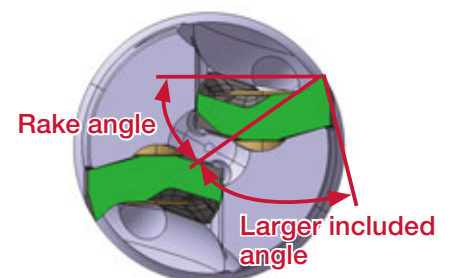
- M2 screws reduce screw neck shears under high cutting forces. Large-sized screws enhances insert fixturing and facilitates handlings.



## High precision shoulder milling - with less tooling cost than solid tools

### High accuracy on wall and bottom surfaces

- Secure and rigid insert fixturing enhances the indexing accuracy.
- Sharp cutting edge with large rake angle ensures smooth cutting.
- Ground to high precision, the insert provides highly accurate wall and surface finish.



## Inserts

2 types of insert geometries cover wide variety of material machining from steel, stainless, cast iron, aluminum to heat resistant superalloys.

### MJ type

- Suitable for tough materials with appropriate cutting edge preparation allows well-balanced sharpness and toughness.
- 3 sizes of corner radii available,  $R = 0.2, 0.4, \& 0.8$  mm
- 3 types of grades are available;
  - AH3135:** Suitable for steel and stainless steel machining with high toughness
  - AH120:** Ideal for machining of cast iron and heat resistant alloy



**AVGT-MJ**

**New AH130: Optimized for titanium alloys and heat resistant alloy. First choice for wet machining**

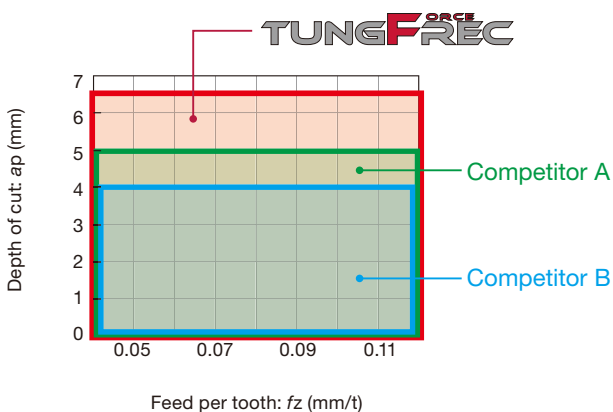
### AJ type

- Ideal insert for aluminum or non-ferrous metals machining.
- Precise ground flank face and polished rake surface creates excellent sharpness on the cutting edge.
- 3 sizes of corner radii available,  $R = 0.2, 0.4, \& 0.8$  mm
- Uncoated carbide grade, KS05F with fine grain cemented carbide has high wear resistance for non-ferrous machining.



**AVGT-AJ**

## APPLICATION RANGE

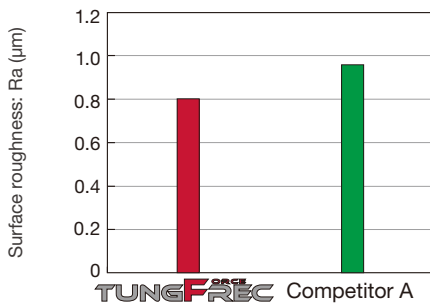


Cutter : EPAV06M010C10.0R02 ( $\phi D_c = 10$  mm)  
 Insert : AVGT060302PBER-MJ AH3135  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 270$  m/min  
 Machining : Slotting  
 Cutting width :  $a_e = 10$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40 18.5kW

**TungForce-Rec is applicable for a wider range of cutting condition than competitors'.**

## CUTTING PERFORMANCE

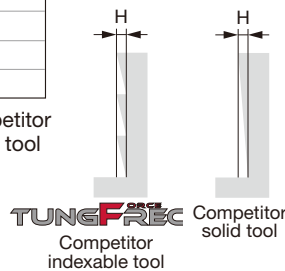
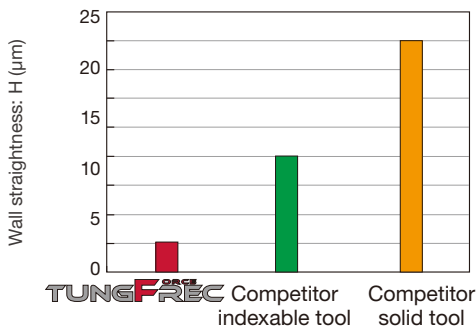
### Surface finish: Carbon steel



Cutter : EPAV06M010C10.0R02  
 ( $\phi Dc = 10 \text{ mm}$ ,  $z = 2$ )  
 Insert : AVGT060302PBER-MJ AH3135  
 Workpiece material : S55C / C55 (180HB)  
 Cutting speed :  $Vc = 270 \text{ m/min}$   
 Feed per tooth :  $fz = 0.07 \text{ mm/t}$   
 Depth of cut :  $ap = 2.0 \text{ mm}$   
 Cutting width :  $ae = 7.0 \text{ mm}$   
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**TungForce-Rec provides good surface finish compared with the competitors.**

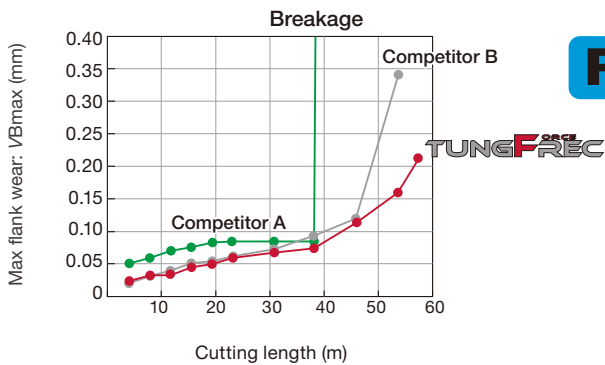
### Wall straightness: Carbon steel



Cutter : EPAV06M012C12.0R03  
 ( $\phi Dc = 12 \text{ mm}$ ,  $z = 3$ )  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S50C / C50 (180HB)  
 Cutting speed :  $Vc = 330 \text{ m/min}$   
 (Solid tool:  $Vc = 60 \text{ m/min}$ )  
 Feed per tooth :  $fz = 0.1 \text{ mm/t}$   
 (Solid tool:  $fz = 0.04 \text{ mm/t}$ )  
 Depth of cut :  $ap = 4.0 \text{ mm} \times 3 \text{ pass}$   
 (Solid tool:  $ap = 12 \text{ mm}$ )  
 Cutting width :  $ae = 2.0 \text{ mm}$   
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**TungForce-Rec has achieved the best wall finish quality.**

## Tool life: Carbon steel

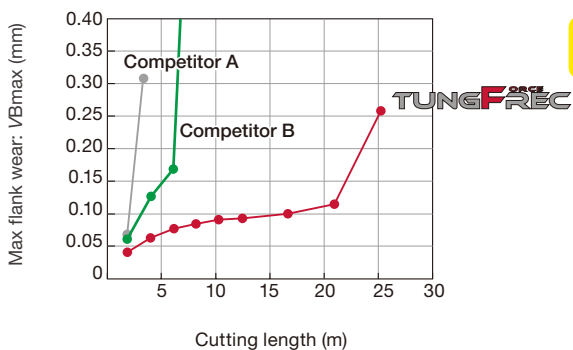


**P**

Cutter : EPAV06M010C10.0R02 ( $\phi D_c = 10$  mm,  $z = 2$ )  
 Insert : AVGT060302PBER-MJ AH3135  
 Workpiece material : S55C / C55 (180HB)  
 Cutting speed :  $V_c = 270$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 3.0$  mm  
 Cutting width :  $a_e = 2.7$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**A highly wear resistant, PremiumTec grade, AH3135 has significantly improved insert life over the competitor's grade.**

## Tool life: Stainless steel



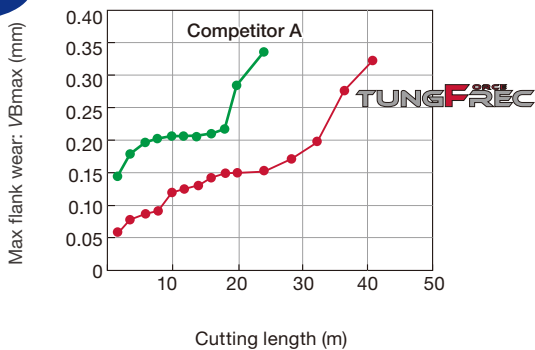
**M**

Cutter : EPAV06M010C10.0R02 ( $\phi D_c = 10$  mm,  $z = 2$ )  
 Insert : AVGT060302PBER-MJ AH3135  
 Workpiece material : SUS304 / X5CrNi18-9  
 Cutting speed :  $V_c = 260$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 3.0$  mm  
 Cutting width :  $a_e = 2.9$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**Light cutting action, reduced buildup-edge and thermal cracking, and improved insert life.**

## Tool life: Superalloys

**New**



**S**

Cutter : EPAV06M016C16.0R04 ( $\phi D_c = 16$  mm,  $z = 4$ )  
 Insert : AVGT060304PBER-MJ AH130  
 Workpiece material : Ti6Al4V  
 Cutting speed :  $V_c = 80$  m/min  
 Feed per tooth :  $f_z = 0.08$  mm/t  
 Depth of cut :  $a_p = 5.0$  mm  
 Cutting width :  $a_e = 5.0$  mm  
 Coolant : Emulsion  
 Machine : Vertical M/C, BT40, 18.5 kW

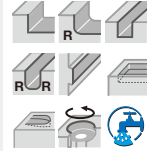
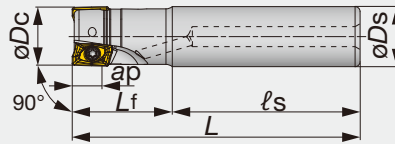
**Highly wear resistant in a wet cutting, AH130 has dramatically improved the tool life.**

## Mini square shoulder milling cutter

### CUTTER - SHANK TYPE

TungForce-Rec EPAV

A.R. = +6.0°~ +7.6°, R.R. = -37.1°~ -32.4°



	Designation	Max. ap	$\phi D_c$	z	$\phi D_s$	$l_s$	$L_f$	L	Kg	Insert
	EPAV06M008C10.0R01	6	8	1	10	60	20	80	0.04	AVGT06...
	EPAV06M010C10.0R02	6	10	2	10	60	20	80	0.04	AVGT06...
	EPAV06M010C10.0R02L	6	10	2	10	65	35	100	0.06	AVGT06...
<b>New</b>	EPAV06M010C08.0R02L	6	10	2	8	80	20	100	0.04	AVGT06...
	EPAV06M012C12.0R02	6	12	2	12	60	20	80	0.06	AVGT06...
	EPAV06M012C12.0R03	6	12	3	12	60	20	80	0.06	AVGT06...
	EPAV06M012C12.0R02L	6	12	2	12	85	35	120	0.09	AVGT06...
<b>New</b>	EPAV06M012C10.0R02L	6	12	2	10	100	20	120	0.07	AVGT06...
<b>New</b>	EPAV06M012C10.0R03	6	12	3	10	60	20	80	0.04	AVGT06...
<b>New</b>	EPAV06M014C12.0R03	6	14	3	12	60	20	80	0.07	AVGT06...
<b>New</b>	EPAV06M014C12.0R03L	6	14	3	12	120	20	140	0.11	AVGT06...
	EPAV06M016C16.0R03	6	16	3	16	70	20	90	0.12	AVGT06...
	EPAV06M016C16.0R04	6	16	4	16	70	20	90	0.12	AVGT06...
	EPAV06M016C16.0R03L	6	16	3	16	105	35	140	0.20	AVGT06...
<b>New</b>	EPAV06M018C16.0R04	6	18	4	16	70	20	90	0.13	AVGT06...
<b>New</b>	EPAV06M018C16.0R03	6	18	3	16	70	20	90	0.13	AVGT06...
<b>New</b>	EPAV06M018C16.0R03L	6	18	3	16	160	20	180	0.26	AVGT06...
<b>New</b>	EPAV06M020C20.0R05	6	20	5	20	70	30	100	0.21	AVGT06...
<b>New</b>	EPAV06M020C20.0R04	6	20	4	20	70	30	100	0.23	AVGT06...
<b>New</b>	EPAV06M020C20.0R04L	6	20	4	20	165	35	200	0.45	AVGT06...
<b>New</b>	EPAV06M020C16.0R04	6	20	4	16	80	30	110	0.17	AVGT06...
<b>New</b>	EPAV06M025C25.0R06	6	25	6	25	80	35	115	0.4	AVGT06...
<b>New</b>	EPAV06M025C25.0R05	6	25	5	25	80	35	115	0.4	AVGT06...
<b>New</b>	EPAV06M025C25.0R04L	6	25	4	25	160	40	200	0.72	AVGT06...
<b>New</b>	EPAV06M025C20.0R06	6	25	6	20	80	35	115	0.27	AVGT06...
<b>New</b>	EPAV06M032C32.0R08	6	32	8	32	80	40	120	0.7	AVGT06...
<b>New</b>	EPAV06M032C32.0R06L	6	32	6	32	155	45	200	1.2	AVGT06...

#### SPARE PARTS

Designation	Clamping screw	Lubricant	Wrench
EPAV06M...	CSPB-2H	M-1000	IP-6DB

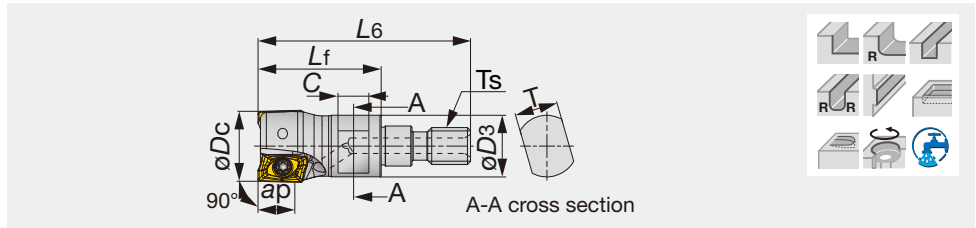


## Mini square shoulder milling cutter

### CUTTER - MODULAR TYPE - METRIC THREAD

TungForce-Rec HPAV-M

A.R. = +6.0°~ +7.6°, R.R. = -37.1°~ -32.4°



Designation	Max. ap	øDc	z	L6	Lf	C	T	øD3	Ts	Kg	Insert
HPAV06M010M06R02	6	10	2	34.5	20	5	7	9.5	M6	0.01	AVGT06...
HPAV06M012M06R02	6	12	2	34.5	20	5	7	10	M6	0.01	AVGT06...
HPAV06M012M06R03	6	12	3	34.5	20	5	7	10	M6	0.01	AVGT06...
HPAV06M016M08R03	6	16	3	42	25	8	10	13	M8	0.03	AVGT06...
HPAV06M016M08R04	6	16	4	42	25	8	10	13	M8	0.03	AVGT06...

For details of metric shank, please refer to TungFlex series in TR419 TungFlex

#### SPARE PARTS

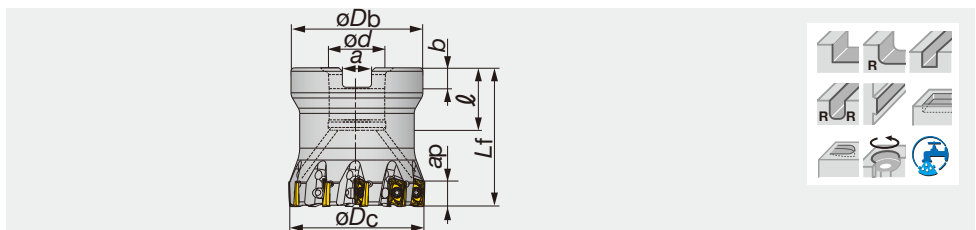


Designation	Clamping screw	Lubricant	Wrench
EPAV06M...	CSPB-2H	M-1000	IP-6DB

**New**

### CUTTER - BORE TYPE

TungForce-Rec TPAV



Designation	Max. ap	øDc	z	øDb	ød	ℓ	Lf	a	b	Kg	Insert
TPAV06M040B16.0R10	6	40	10	38	16	18	40	8.4	5.6	0.24	AVGT06...

#### SPARE PARTS

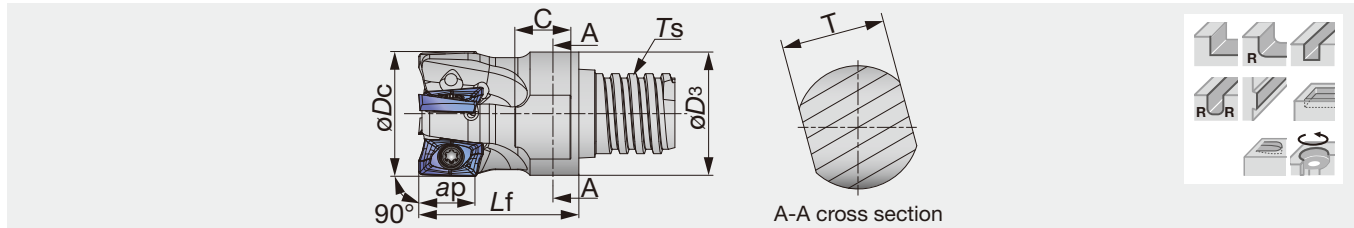


Designation	Clamping screw	Lubricant	Wrench	Center bolt
TPAV06M040B16.0R10	CSPB-2H	M-1000	IP-6DB	CM8X30H

## Mini square shoulder milling cutter

### CUTTER - MODULAR HEAD - TUNGMEISTER THREAD

TungForce-Rec HPAV06-S



Designation	Max. ap	$\phi D_c$	z	$L_f$	C	T	$\phi D_3$	$T_s$	Kg	Insert
HPAV06M010S06R02	6	10	2	16	5	8	9.8	S06	0.01	AVGT06...
HPAV06M012S08R02	6	12	2	18	5	10	11.7	S08	0.02	AVGT06...
HPAV06M012S08R03	6	12	3	18	5	10	11.7	S08	0.02	AVGT06...
HPAV06M016S10R03	6	16	3	20	7	13	15.4	S10	0.03	AVGT06...
HPAV06M016S10R04	6	16	4	20	7	13	15.4	S10	0.03	AVGT06...

- For details of shanks, please refer to TR381 TungMeister

Shank types: VSSD, VTSD, VSC, VSTD

- For connections between metric shank and TungMeister thread, please use VAD-M type connector

Spanner for clamping	Cat. No.	Connection screw size
	KEYV-S06	S06
	KEYV-S08	S08
	KEYV-S10	S10

Optional- to be ordered separately.

#### SPARE PARTS

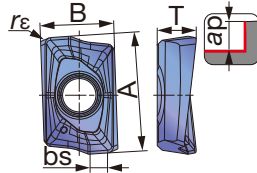
Designation	Clamping screw	Lubricant	Wrench
EPAV06M...	CSPB-2H	M-1000	IP-6DB



## INSERTS

AVGT-MJ

AVGT-AJ



<b>P</b> Steel	☆	★								
<b>M</b> Stainless		☆	★							
<b>K</b> Cast iron	★									
<b>N</b> Non-ferrous				★						
<b>S</b> Superalloys	☆	★								
<b>H</b> Hard materials	★									

★ : First choice  
☆ : Second choice

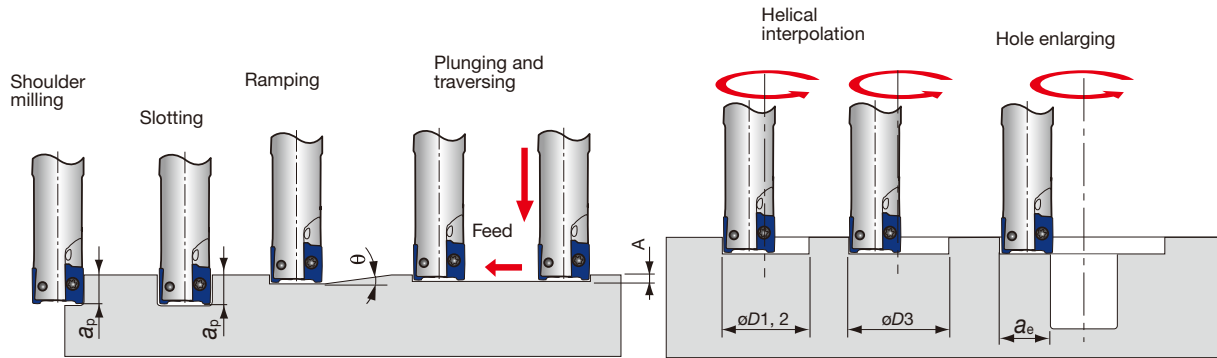
Designation	rε	Max. ap	Coated			Carbide					A	B	T	bs				
			AH120	AH130	AH3135	KS05F												
AVGT060302PBER-MJ	0.2	6	●	●	●													
AVGT060304PBER-MJ	0.4	6	●	●	●													
AVGT060308PBER-MJ	0.8	6	●	●	●													
AVGT060302PBFR-AJ	0.2	6				●												
AVGT060304PBFR-AJ	0.4	6				●												
AVGT060308PBFR-AJ	0.8	6				●												

● : New product  
● : Line up

## STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	
<b>P</b>	Low carbon steel (S15C / C15E4, SS400 / E275A, etc.)	- 200 HB	First choice	AH3135	230 - 430	0.07 - 0.12	
	Carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.)	- 300 HB	First choice	AH3135	150 - 350	0.07 - 0.12	
	Prehardend steel (NAK80, PX5, etc.)	30 - 40 HRC	First choice	AH3135	100 - 230	0.07 - 0.12	
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.)	-	First choice	AH3135	150 - 220	0.06 - 0.1	
<b>K</b>	Grey cast iron (FC250 / 250, FC300 / 300, etc.)	150 - 250 HB	First choice	AH120	200 - 330	0.07 - 0.12	
	Ductile cast iron (FCD400, FCD600 / 600-3, etc.)	150 - 250 HB	First choice	AH120	150 - 240	0.07 - 0.12	
<b>N</b>	Aluminium alloys (Si < 13%)	-	First choice	KS05F	650 - 1000	0.07 - 0.12	
	Aluminium alloys (Si ≥ 13%)	-	First choice	KS05F	100 - 230	0.04 - 0.12	
<b>S</b>	Titanium alloys (Ti-6Al-4V, etc.)	-	First choice	AH130	40 - 90	0.04 - 0.1	
	Superalloys (Inconel718, etc.)	-	First choice	AH130	45 - 65	0.04 - 0.09	
<b>H</b>	Hardened steel	(SKD61 / X40CrMoV5-1, etc.)	40 - 50 HRC	First choice	AH120	45 - 70	0.04 - 0.08
		(SKD11 / X153CrMoV12, etc.)	50 - 60 HRC		AH120	40 - 65	0.04 - 0.06

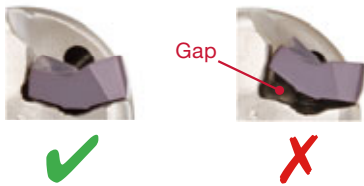
## MACHINING APPLICATIONS



Designation	$\phi D_c$	Max. depth of cut $a_p$	Max. ramping angle $\theta$	Max. plunging $A$	Min. machining $\phi D_1$	Max. machining $\phi D_2$	$\phi D_3^*$	Max. cutting width in enlarging $a_e$
EPAV06_008...	8	6	-	-	-	-	-	-
EPAV/HPAV06_010...	10	6	3°	0.3	15	19	18	9.5
EPAV/HPAV06_012...	12	6	3°	0.3	18	23	22	11.5
<b>New</b> EPAV/HPAV06_014...	14	6	2.3°	0.3	22	27	26	13.5
EPAV/HPAV06_016...	16	6	2°	0.3	28	31	30	15.5
<b>New</b> EPAV/HPAV06_018...	18	6	1.6°	0.3	30	35	34	17.5
<b>New</b> EPAV/HPAV06_020...	20	6	1.4°	0.3	34	39	38	19.5
<b>New</b> EPAV/HPAV06_025...	25	6	1.1°	0.3	44	49	48	24.5
<b>New</b> EPAV/HPAV06_032...	32	6	0.8°	0.3	58	63	62	31.5
<b>New</b> TPAV06_040...	40	6	0.6°	0.3	74	79	78	39.5

\*Flat bottom hole

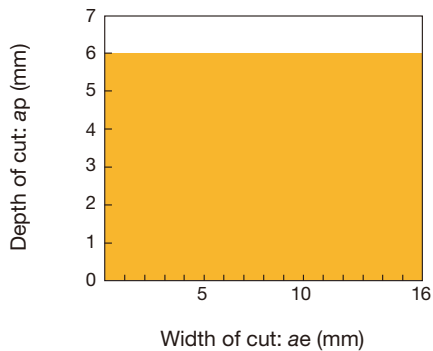
When clamping the insert, please confirm that there is no gap between the cutter body and the insert as shown in the picture.



## Caution for using a large diameter cutter (over $\varnothing 18$ mm)

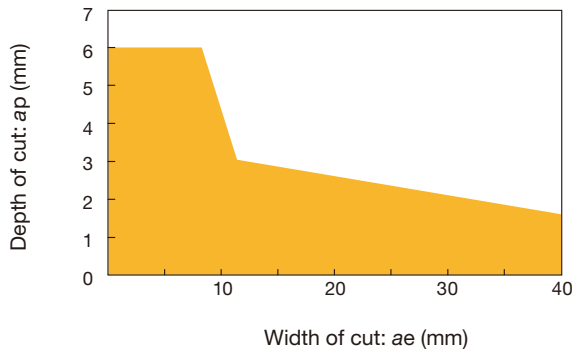
When using a cutter diameter over 18 mm, please note that the applicable range of cutting depth significantly drops as the cutting width applied increases, thus an additional finishing process may be required.

### Cutting depth in relation to cutting width (for up to $\varnothing 16$ mm)



Cutter : EPAV06M016C16.0R04 ( $\varnothing D_c = 16$  mm,  $z = 4$ )  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Machining : Slot milling  
 Coolant : Dry  
 Machine : Vertical M/C, BT40, 18.5 kW

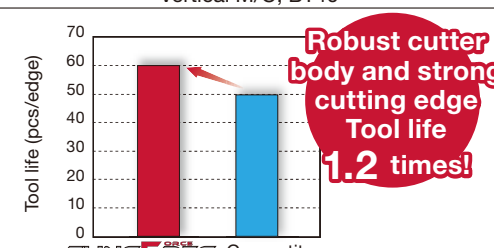
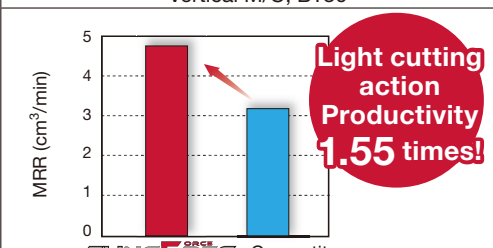
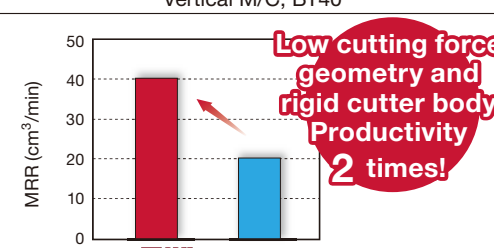
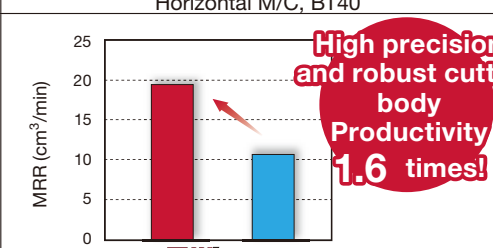
### Cutting depth in relation to cutting width (for $\varnothing 18$ mm and up)



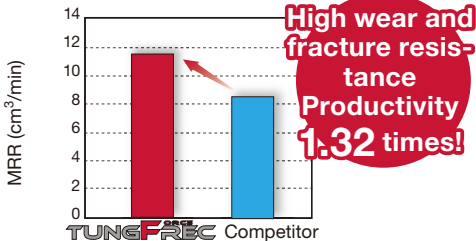
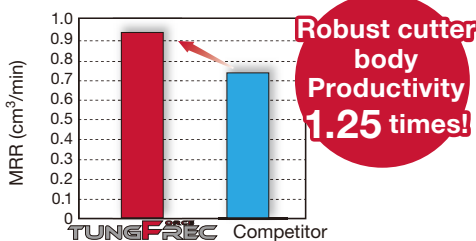


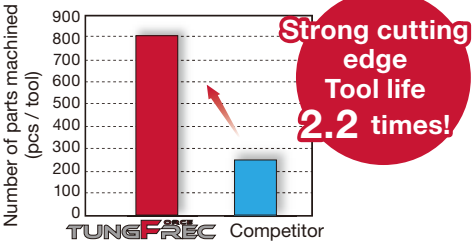
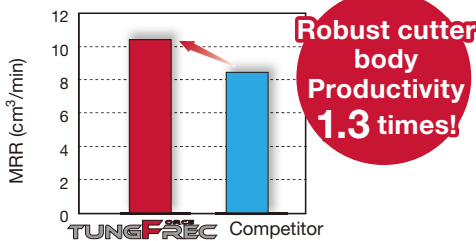


Cutter : EPAV06M032C32.0R08 ( $\varnothing D_c = 32$  mm,  $z = 8$ )  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Coolant : Dry  
 Machine : Vertical M/C, BT40, 18.5 kW



## PRACTICAL EXAMPLES

Workpiece type		Guide shift	Spindle
Cutter		EPAV06M010C10.0R02 (ø10, z = 2)	EPAV06M012C12.0R03 (ø12, z = 3)
Insert		AVGT060304PBER-MJ	AVGT060304PBER-MJ
Grade		AH3135	AH3135
Workpiece material		S45C / C45 (25HRC)	Alloy steel (low carbon, 30HRC)
Cutting conditions			
Cutting speed: Vc (m/min)		151 (Competitor: Vc = 60)	143 (Competitor: Vc = 72)
Feed per tooth: fz (mm/t)		0.05	0.04
Feed speed: Vf (m/min)		481 (Competitor: Vf = 382)	601 (Competitor: Vf = 382)
Depth of cut: ap (mm)		0.1	1
Width of cut: ae (mm)		2.5	1.6
Machining		Shoulder milling	Shoulder milling
Coolant		Wet	Dry
Machine		Vertical M/C, BT40	Vertical M/C, BT30
Results		 <p>High MRR thanks to the rigid body design. Optimized geometry has allowed for high speed milling.</p>	 <p>The sharp cutting edge geometry has enabled a smoother, vibration-free cutting at higher parameters even on a low power machine.</p>
Workpiece type		Machine parts	Bracket
Cutter		EPAV06M016C16.0R04 (ø16, z = 4)	EPAV06M016C16.0R03L (ø16, z = 3)
Insert		AVGT060403PBER-AJ	AVGT060304PBER-MJ
Grade		KS05F	AH120
Workpiece material		A5025 / AlMg2.5	FC250 / 250 / GG25
Cutting conditions			
Cutting speed: Vc (m/min)		251	200 (Competitor: Vc = 145)
Feed per tooth: fz (mm/t)		0.1	0.08 (Competitor: fz = 0.06)
Feed speed: Vf (m/min)		1998 (Competitor: Vf = 999)	955 (Competitor: Vf = 554)
Depth of cut: ap (mm)		2	5.0
Width of cut: ae (mm)		10	4
Machining		Shoulder milling	Shoulder milling
Coolant		Wet	Dry
Machine		Vertical M/C, BT40	Horizontal M/C, BT40
Results		 <p>Thanks to light cutting action and body rigidity, stable, chatter-free milling was possible with a high MRR.</p>	 <p>The tool rigidity and accuracy has improved the MRR and surface quality. The result: the roughing and finishing processes are now integrated into a single operation.</p>

Workpiece type		Blocks	Machine parts
Cutter		EPAV06M016C16.0R04 ( $\phi 16, z = 4$ )	EPAV06M010C10.0R02 ( $\phi 10, z = 2$ )
Insert		AVGT060308PBER-M	AVGT060302PBER-MJ
Grade		AH130 Ti6Al4V	AH3135 SUS304 / X5CrNi18-9
Workpiece material		 <b>S</b>	 <b>M</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	50 (Competitor: $V_c = 40$ )	94 (Competitor: $V_c = 50$ )
	Feed per tooth: $f_z$ (mm/t)	0.12	0.05 (Competitor: $f_z = 0.03$ )
	Feed speed: $V_f$ (m/min)	478	299 (Competitor: $V_f = 239$ )
	Depth of cut: $a_p$ (mm)	1.5 (Competitor: $a_p = 0.5$ )	0.5
	Width of cut: $a_e$ (mm)	16	6.3
	Machining	Shoulder milling	Face milling
	Coolant	Internal	External
Machine		With angle head, BT50	Lathe (Swiss type)
Results		 <p>High wear and fracture resistance Productivity 1.32 times!</p> <p>High wear and fracture resistant, AH130 has enabled a high M.R.R. with stability, eliminating premature insert failures.</p>	 <p>Robust cutter body Productivity 1.25 times!</p> <p>Enhanced machining stability has improved the MRR at high cutting parameters.</p>
Workpiece type		Screw	Machine parts
Cutter		EPAV06M010C10.0R02 ( $\phi 10, z = 2$ )	HPAV06M010M06R02 ( $\phi 10, z = 2$ )
Insert		AVGT060302PBER-MJ	AVGT060304PBER
Grade		AH3135 S45C / C45	AH3135 Alloy steel (Nickel-Chromium-Molybdenum)
Workpiece material		 <b>P</b>	 <b>S</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	101	140 (Competitor: $V_c = 110$ )
	Feed per tooth: $f_z$ (mm/t)	0.06 (Competitor: $f_z = 0.04$ )	0.08 (Competitor: $f_z = 0.04$ )
	Feed speed: $V_f$ (m/min)	386	713 (Competitor: $V_f = 560$ )
	Depth of cut: $a_p$ (mm)	2	1.5
	Width of cut: $a_e$ (mm)	10	10
	Machining	Face milling	Grooving
	Coolant	External	External
Machine		Lathe (Swiss type)	Lathe
Results		 <p>Strong cutting edge Tool life 2.2 times!</p> <p>The robust edge geometry has improved the tool life stability, eliminating premature failures.</p>	 <p>Robust cutter body Productivity 1.3 times!</p> <p>The high tool rigidity has allowed for a stable, chatter-free machining at high cutting parameters.</p>

### Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi  
Iwaki-city, Fukushima, 970-1144 Japan  
Phone: +81-246-36-8501  
Fax: +81-246-36-8542  
www.tungaloy.co.jp

### Tungaloy America, Inc.

3726 N Ventura Drive  
Arlington Heights, IL 60004, U.S.A.  
Phone: +1-888-554-8394  
Fax: +1-888-554-8392  
www.tungaloyamerica.com

### Tungaloy Canada

432 Elgin St. Unit 3  
Brantford, Ontario N3S 7P7, Canada  
Phone: +1-519-758-5779  
Fax: +1-519-758-5791  
www.tungaloy.co.jp/ca

### Tungaloy de Mexico S.A.

C Los Arellano 113,  
Parque Industrial Siglo XXI  
Aguascalientes, AGS, Mexico 20290  
Phone: +52-449-929-5410  
Fax: +52-449-929-5411  
www.tungaloy.co.jp/mx

### Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora  
13280-000 Vinhedo, São Paulo, Brasil  
Phone: +55-19-38262757  
Fax: +55-19-38262757  
www.tungaloy.com/br

### Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.de

### Tungaloy France S.A.S.

ZA Courtaboef - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboef Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.fr

### Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.it

### Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.cz

### Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.es

### Tungaloy Scandinavia AB

Bultgatan 38  
442 40 Kungälv, Sweden  
Phone: +46-462119200  
www.tungaloy.se

### Tungaloy Rus, LLC

Andropova avenue, h.18/7,  
11 floor, office 3, 115432,  
Moscow, Russia  
Phone: +7-499-683-01-80  
Fax: +7-499-683-01-81  
www.tungaloy.co.jp/ru

### Tungaloy East LLC

620075, Russian Federation, Sverdlovsk  
Region, Ekaterinburg, Mamina-Sibiryaka str.,  
bldg. 101, room 202  
Phone: +7-343-286-48-23/24  
Fax: +7-912-284-91-69  
www.tungaloy.co.jp/ru

### Tungaloy Polska Sp. z o.o.

ul. Genewska 24  
03-963 Warszawa, Poland  
Phone: +48-22-617-0890  
Fax: +48-22-617-0890  
www.tungaloy.co.jp/pl

### Tungaloy U.K. Ltd

The Technology Centre,  
Wolverhampton Science Park  
Glaisher Drive, Wolverhampton  
West Midlands WV10 9RU, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.co.jp/uk  
salesinfo@tungaloyuk.co.uk

### Tungaloy Hungary Kft

Erzsébet királyné útja 125  
H-1142 Budapest, Hungary  
Phone: +36 1 781-6846  
Fax: +36 1 781-6866  
www.tungaloy.co.jp/hu  
info@tungaloytools.hu

### Tungaloy Turkey

Dudullu, OSB 4. Cad No:4  
34776 Umraniye Istanbul, TURKEY  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com.tr  
info@tungaloy.com.tr

### Tungaloy Benelux b.v.

Tjalk 70  
NL-2411 NZ Bodegraven, Netherlands  
Phone: +31 172 630 420  
Fax: +31 172 630 429  
www.tungaloy-benelux.com

### Tungaloy Croatia

Josipa Kozarca 4  
10432 Bregana, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.hr

### Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Rm No 401 No.88 Zhabei  
Jiangchang No.3 Rd  
Shanghai 200436, China  
Phone: +86-21-3632-1880  
Fax: +86-21-3621-1918  
www.tungaloy.co.jp/tcts

### Tungaloy Cutting Tool (Thailand) Co.,Ltd.

Interlink tower 4th Fl.  
1858/5-7 Bangna-Trad Road  
km.5 Bangna, Bangna, Bangkok 10260  
Thailand  
Phone: +66-2-751-5711  
Fax: +66-2-751-5715  
www.tungaloy.co.th

### Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.co.jp/tspl

### Tungaloy Vietnam

LE 04-38, Lexington Residence  
67 Mai Chi Tho, Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-8-37406660  
Fax: +84-8-37406662  
www.tungaloy.co.jp/tspl

### Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai-400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.co.jp/in

### Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha  
Beotkkot-ro 244, Geumcheon-gu  
153-788 Seoul, Korea  
Phone: +82-2-2621-6161  
Fax: +82-2-6393-8952  
www.tungaloy.co.jp/kr

### Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14  
Kelana Jaya, 47301  
Petaling Jaya, Selangor Darul Ehsan  
Malaysia  
Phone: +603-7805-3222  
Fax: +603-7804-8563  
www.tungaloy.co.jp/my

### Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,  
Victoria 3178, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com.au

### PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.co.jp/id



www.tungaloy.com

follow us at:

facebook.com/tungaloyjapan

twitter.com/tungaloyjapan

To see this product in action visit:

# Tung-TV

www.youtube.com/tungaloycorporation

Distributed by:



DOWNLOAD  
Dr. Carbide App



Available on the  
App Store



GET IT ON  
Google play



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26