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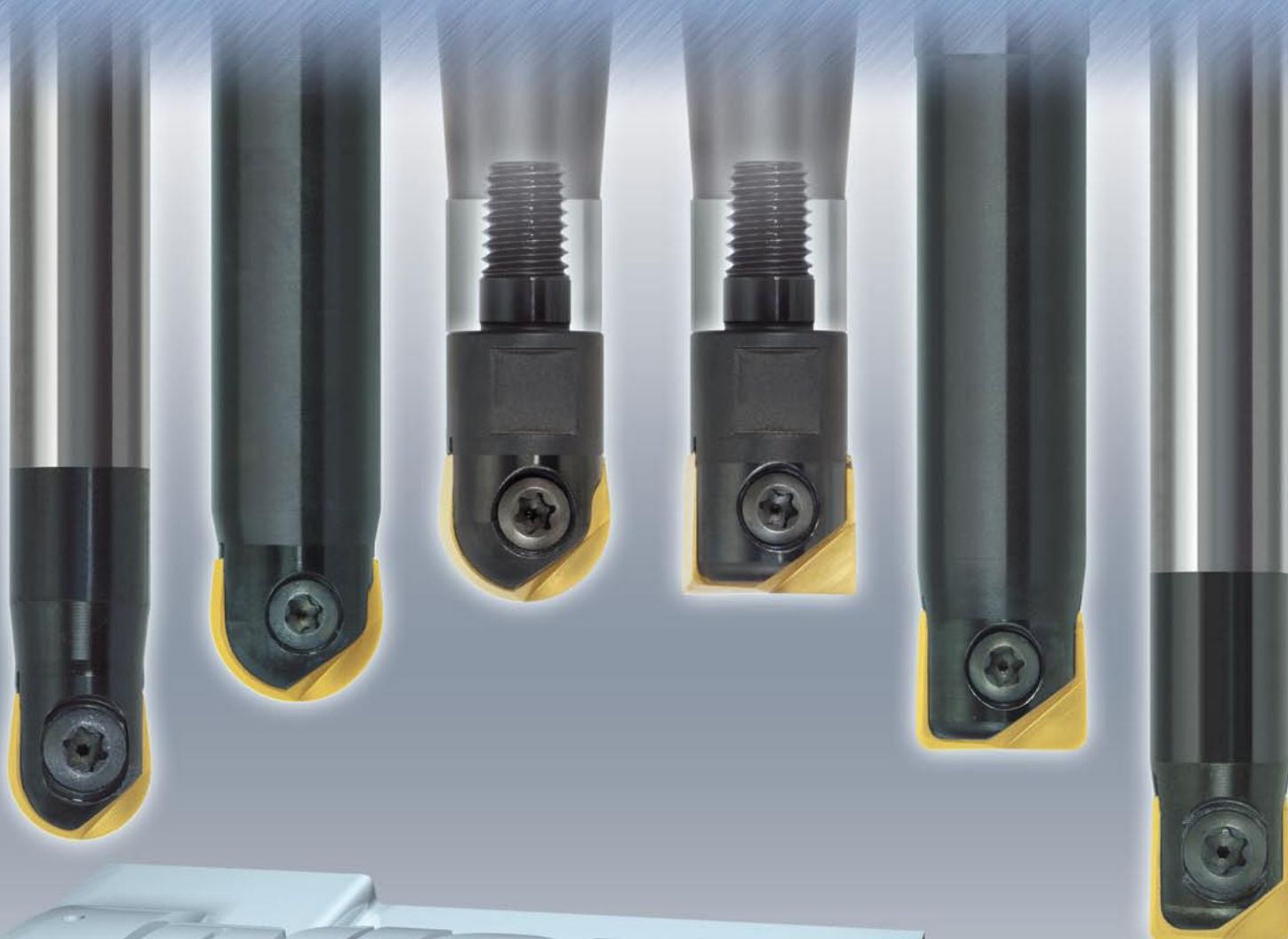
Indexable  
Milling  
+Modular Series

No. 315.2

**ABPF/M** Ball High Precision Finish + Modular










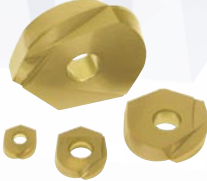
**ARPF/M** Radius High Precision Finish + Modular

Ø 8 ~ Ø 32 · ~ HRC 65 **Century+TH Coating**



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**Indexable Milling Tools**

Type		
Ball High Precision Finish - Carbide Shank Regular <b>ABPF-W</b>	8 – 32 mm	4
		
Ball High Precision Finish - Carbide Shank Long Neck <b>ABPF-WL</b>	8 – 12 mm	4
		
Ball High Precision Finish - Carbide Shank Extra Long <b>ABPF-WE</b>	16 – 32 mm	4
		
Ball High Precision Finish - Regular <b>ABPF-S</b>	8 – 32 mm	5
		
Ball High Precision Finish - Long Neck <b>ABPF-L</b>	8 – 32 mm	5
		
Ball High Precision Finish - MT Shank <b>ABPF-MT</b>	20 – 32 mm	6
		
Ball High Precision Finish - Modular <b>ABPF-M</b>	10 – 32 mm	6
		
Ball High Precision Finish <b>INSERTS</b>		7
		

**Recommended cutting conditions** · Empfohlene Schnittwerte **13**  
 Condiciones de corte recomendadas · Condizioni di taglio raccomandate  
 Conditions de coupe recommandées

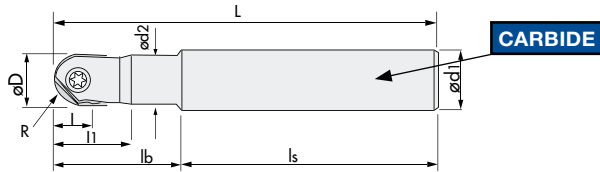
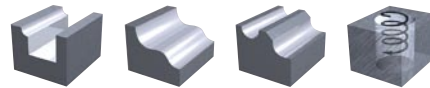
**Indexable Milling Tools**

Type		
Radius High Precision Finish - Carbide Shank Regular <b>ARPF-W</b>	8 – 32 mm	8
		
Radius High Precision Finish - Carbide Shank Long Neck <b>ARPF-WL</b>	8 – 12 mm	8
		
Radius High Precision Finish - Carbide Shank Extra Long <b>ARPF-WE</b>	16 – 32 mm	8
		
Radius High Precision Finish - Regular <b>ARPF-S</b>	8 – 32 mm	9
		
Radius High Precision Finish - Long Neck <b>ARPF-L</b>	8 – 32 mm	9
		
Radius High Precision Finish - Extra Long <b>ARPF-E</b>	16 – 32 mm	9
		
Radius High Precision Finish - Modular <b>ARPF-M</b>	10 – 32 mm	10
		
Radius High Precision Finish <b>INSERTS</b>		11
		
<b>Recommended cutting conditions</b> · Empfohlene Schnittwerte Condiciones de corte recomendadas · Condizioni di taglio raccomandate Conditions de coupe recommandées		15

**Indexable Milling Tools**

**ABPF | Ball High Precision Finish - Carbide Shank**

<b>V max</b> High Speed	Semi Finishing	Finishing	<b>HRC</b> 65	<b>No. of Teeth</b> 2
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R	± 0.005
Set-up	± 0.010



**ABPF-W** Ball High Precision Finish - Carbide Shank Regular

ID Code	Item Code	Stock	Flutes	ØD	R	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 393	<b>ABPF-08S08W</b>	■	2	8	4	100	4.4	18	30	70	8	7.8	ZPFG080
FH 394	<b>ABPF-10S10W</b>	■	2	10	5	100	5.5	23	35	65	10	9.8	ZPFG100
FH 395	<b>ABPF-12S12W</b>	■	2	12	6	110	6.6	26	45	65	12	11.8	ZPFG120
FH 478	<b>ABPF-16S16W</b>	■	2	16	8	140	8.8	19	35	105	16	15.5	ZPFG160
FH 479	<b>ABPF-20S20W</b>	■	2	20	10	160	11	22	40	120	20	19.5	ZPFG200
FH 480	<b>ABPF-25S25W</b>	■	2	25	12.5	180	13.7	25	45	135	25	24.5	ZPFG250
FH 481	<b>ABPF-32S32W</b>	■	2	32	16	180	17.6	30	55	125	32	31.5	ZPFG320



**ABPF-WL** Ball High Precision Finish - Carbide Shank Long Neck

ID Code	Item Code	Stock	Flutes	ØD	R	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 396	<b>ABPF-08S08WL</b>	■	2	8	4	130	4.4	18	65	65	8	7.8	ZPFG080
FH 397	<b>ABPF-10S10WL</b>	■	2	10	5	140	5.5	23	75	65	10	9.8	ZPFG100
FH 398	<b>ABPF-12S12WL</b>	■	2	12	6	150	6.6	26	85	65	12	11.8	ZPFG120



**ABPF-WE** Ball High Precision Finish - Carbide Shank Extra Long

ID Code	Item Code	Stock	Flutes	ØD	R	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 458	<b>ABPF-16S16WE</b>	■	2	16	8	200	8.8	19	120	80	16	15.8	ZPFG160
FH 459	<b>ABPF-20S20WE</b>	■	2	20	10	250	11	22	150	100	20	19.8	ZPFG200
FH 460	<b>ABPF-25S25WE</b>	■	2	25	12.5	300	13.7	25	190	110	25	24.8	ZPFG250
FH 482	<b>ABPF-32S32WE</b>	■	2	32	16	350	17.6	30	230	120	32	31.8	ZPFG320

■ = Stock | Germany

Inserts p. 7

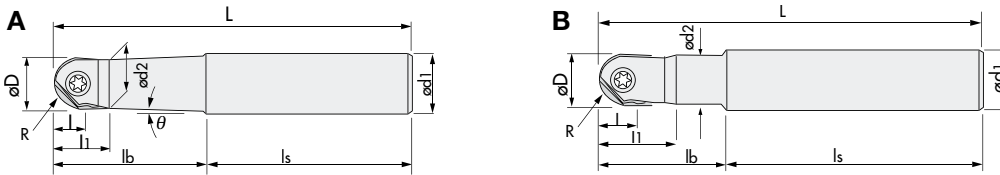
**Parts** **Clamp Screw** **Wrench**

	Body	ID-Code	Item-Code	ID-Code	Item-Code
<b>ABPF-W</b>		<b>ABPF-08S08W</b>	ET 153	581-141	ET 13
		<b>ABPF-10S10W</b>	ET 154	581-142	ET 11
		<b>ABPF-12S12W</b>	ET 155	581-143	ET 14
		<b>ABPF-16S16W</b>	ET 156	581-144	ET 14
		<b>ABPF-20S20W</b>	ET 157	581-145	ET 9
		<b>ABPF-25S25W</b>	ET 168	581-146	ET 167
		<b>ABPF-32S32W</b>	ET 169	581-147	ET 167
<b>ABPF-WL</b>		<b>ABPF-08S08WL</b>	ET 153	581-141	ET 13
		<b>ABPF-10S10WL</b>	ET 154	581-142	ET 11
		<b>ABPF-12S12WL</b>	ET 155	581-143	ET 14
<b>ABPF-WE</b>		<b>ABPF-16S16WE</b>	ET 156	581-144	ET 14
		<b>ABPF-20S20WE</b>	ET 157	581-145	ET 9
		<b>ABPF-25S25WE</b>	ET 168	581-146	ET 167
		<b>ABPF-32S32WE</b>	ET 169	581-147	ET 167

**Indexable Milling Tools**

**ABPF | Ball High Precision Finish**

<b>V max</b> High Speed	<b>▽▽</b> Semi Finishing	<b>▽▽▽</b> Finishing	<b>HRC</b> 65	<b>No. of Teeth</b> 2	
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R	± 0.005
Set-up	± 0.010



**ABPF-S** Ball High Precision Finish - Regular

ID Code	Item Code	Stock	Flutes	ØD	R	L	l	l <sub>1</sub>	l <sub>b</sub>	l <sub>s</sub>	θ	Ød <sub>1</sub>	Ød <sub>2</sub>	Type	Inserts x1
FH 387	<b>ABPF-08S12</b>	■	2	8	4	100	4.4	10	22	78	9.5°	12	7.5	A	ZPFG080
FH 388	<b>ABPF-10S12</b>	■	2	10	5	100	5.5	13	25	75	5°	12	9.5	A	ZPFG100
FH 389	<b>ABPF-12S12</b>	■	2	12	6	110	6.6	15	30	80		12	11.5	B	ZPFG120
FH 447	<b>ABPF-16S20</b>	■	2	16	8	130	8.8	19	50	80	2.5°	20	15.5	A	ZPFG160
FH 448	<b>ABPF-20S25</b>	■	2	20	10	140	11	22	60	80	2.5°	25	19.5	A	ZPFG200
FH 449	<b>ABPF-25S32</b>	■	2	25	12.5	150	13.7	25	70	80	3°	32	24.5	A	ZPFG250
FH 450	<b>ABPF-32S32</b>	■	2	32	16	160	17.6	30	80	80		32	31.5	B	ZPFG320



**ABPF-L** Ball High Precision Finish - Long Neck

ID Code	Item Code	Stock	Flutes	ØD	R	L	l	l <sub>1</sub>	l <sub>b</sub>	l <sub>s</sub>	θ	Ød <sub>1</sub>	Ød <sub>2</sub>	Type	Inserts x1
FH 390	<b>ABPF-08S12L</b>	■	2	8	4	130	4.4	10	50	80	3°	12	7.5	A	ZPFG080
FH 391	<b>ABPF-10S16L</b>	■	2	10	5	150	5.5	13	50	100	5°	16	9.5	A	ZPFG100
FH 392	<b>ABPF-12S16L</b>	■	2	12	6	160	6.6	20	60	100	3°	16	10.8	A	ZPFG120
FH 451	<b>ABPF-16S20L</b>	■	2	16	8	160	8.8	19	65	95	2°	20	15.5	A	ZPFG160
FH 452	<b>ABPF-20S25L</b>	■	2	20	10	180	11	22	80	100	2°	25	19.5	A	ZPFG200
FH 453	<b>ABPF-20S20L120</b>	■	2	20	10	220	11	22	120	100		20	19.5	B	ZPFG200
FH 454	<b>ABPF-20S20L150</b>	■	2	20	10	250	11	22	150	100		20	19.5	B	ZPFG200
FH 455	<b>ABPF-25S32L</b>	■	2	25	12.5	200	13.7	25	90	110	3°	32	24.5	A	ZPFG250
FH 456	<b>ABPF-25S32L150</b>	■	2	25	12.5	250	13.7	25	150	100		32	24.5	B	ZPFG250
FH 493	<b>ABPF-32S32L200</b>	■	2	32	16	300	17.6	30	200	100		32	31.5	B	ZPFG320
FH 457	<b>ABPF-32S32L</b>	■	2	32	16	220	17.6	30	100	120		32	31.5	B	ZPFG320

■ = Stock | Germany



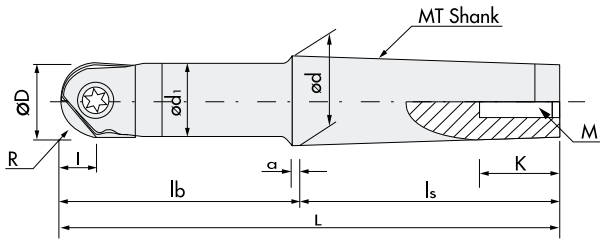
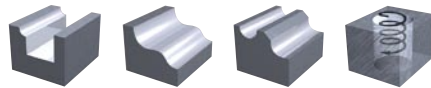
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Parts	Clamp Screw	Wrench		
<b>ABPF-S</b>				
<b>ABPF-L</b>				
<b>Body</b>	<b>ID-Code</b>	<b>Item-Code</b>	<b>ID-Code</b>	<b>Item-Code</b>
<b>ABPF-08S12</b>	ET 153	581-141	ET 13	104-T8
<b>ABPF-10S12</b>	ET 154	581-142	ET 11	104-T10
<b>ABPF-12S12</b>	ET 155	581-143	ET 14	105-T20
<b>ABPF-16S20</b>	ET 156	581-144	ET 14	105-T20
<b>ABPF-20S25</b>	ET 157	581-145	ET 9	101-T25S
<b>ABPF-25S32</b>	ET 168	581-146	ET 167	105-T30A
<b>ABPF-32S32</b>	ET 169	581-147	ET 167	105-T30A
<b>ABPF-08S12L</b>	ET 153	581-141	ET 13	104-T8
<b>ABPF-10S16L</b>	ET 154	581-142	ET 11	104-T10
<b>ABPF-12S16L</b>	ET 155	581-143	ET 14	105-T20
<b>ABPF-16S20L</b>	ET 156	581-144	ET 14	105-T20
<b>ABPF-20S25L</b>	ET 157	581-145	ET 9	101-T25S
<b>ABPF-20S20L120</b>	ET 157	581-145	ET 9	101-T25S
<b>ABPF-20S20L150</b>	ET 157	581-145	ET 9	101-T25S
<b>ABPF-25S32L</b>	ET 168	581-146	ET 167	105-T30A
<b>ABPF-25S32L150</b>	ET 168	581-146	ET 167	105-T30A
<b>ABPF-32S32L200</b>	ET 169	581-147	ET 167	105-T30A
<b>ABPF-32S32L</b>	ET 169	581-147	ET 167	105-T30A

**Indexable Milling Tools**

**ABPF | Ball High Precision Finish**

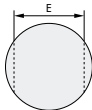
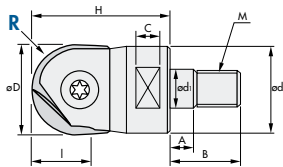
<b>V max</b> High Speed	Semi Finishing	Finishing	<b>HRC</b> 65	<b>No. of Teeth</b> 2
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R	± 0.005
Set-up	± 0.010

**ABPF-MT** Ball High Precision Finish - MT Shank

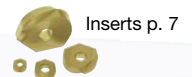
ID Code	Item Code	Stock	Flutes	ØD	R	l	MT	L	lb	ls	Ød	Ød <sub>1</sub>	a	K	M	Inserts x1
FH 461	<b>ABPF-20MT2</b>	■	2	<b>20</b>	10	11	MT2	129	65	64	17.78	19.5	5	24	M10	ZPFG200
FH 462	<b>ABPF-25MT3</b>	■	2	<b>25</b>	12.5	13.7	MT3	166	85	81	23.825	24.5	5	28	M12	ZPFG250
FH 463	<b>ABPF-32MT4</b>	■	2	<b>32</b>	16	17.6	MT4	217.5	115	102.5	31.267	30.8	6.5	32	M16	ZPFG320



**ABPF-M** Ball High Precision Finish Modular

ID Code	Item Code	Stock	Flutes	ØD	R	l	H	Ød <sub>1</sub>	M	Ød <sub>2</sub>	A	B	C	E	Inserts
FH 510	<b>ABPFM-10</b>	■	2	<b>10</b>	5	5.5	26	6.5	M6	9.8	5	14.5	5	7	ZPFG100
FH 511	<b>ABPFM-12</b>	■	2	<b>12</b>	6	6.6	26	6.5	M6	9.8	5	14.5	5	7	ZPFG120
FH 512	<b>ABPFM-16</b>	■	2	<b>16</b>	8	8.8	32	8.5	M8	12.8	6	17	8	10	ZPFG160
FH 513	<b>ABPFM-20</b>	■	2	<b>20</b>	10	11	38	10.5	M10	17.8	6	19	10	15	ZPFG200
FH 514	<b>ABPFM-25</b>	■	2	<b>25</b>	12.5	13.7	38	12.5	M12	20.8	7	22	10	17	ZPFG250
FH 515	<b>ABPFM-32</b>	■	2	<b>32</b>	16	17.6	43	17	M16	28.8	7	23	12	22	ZPFG320

■ = Stock | Germany



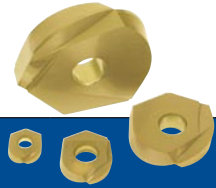
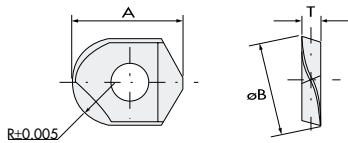
Parts	Clamp Screw	Wrench
<b>ABPF-MT</b>		
<b>ABPF-M</b>		

	Body	ID-Code	Item-Code	ID-Code	Item-Code
<b>ABPF-MT</b>	<b>ABPF-20MT2</b>	ET 157	581-145	ET 9	101-T25S
	<b>ABPF-25MT3</b>	ET 168	581-146	ET 167	105-T30A
	<b>ABPF-32MT4</b>	ET 169	581-147	ET 167	105-T30A
<b>ABPF-M</b>	<b>ABPFM-10</b>	ET 154	581-142	ET 11	104-T10
	<b>ABPFM-12</b>	ET 155	581-143	ET 14	105-T20
	<b>ABPFM-16</b>	ET 156	581-144	ET 14	105-T20
	<b>ABPFM-20</b>	ET 157	581-145	ET 9	101-T25S
	<b>ABPFM-25</b>	ET 168	581-146	ET 167	105-T30A
	<b>ABPFM-32</b>	ET 169	581-147	ET 167	105-T30A

**Indexable Milling Tools** | Grades Overview

**INSERTS** | Ball High Precision Finish



ID Code	Item Code	Grade	C-Coated		G-Coated		TH-Coated		R	I(A)	T	W(B)
			PCA08M	PCA12M			PTH08M					
WF 645	<b>ZPFG-080</b>	PTH08M					■		4	9.7	2.1	8
WF 594	<b>ZPFG-080</b>	PCA08M	■						4	9.7	2.1	8
WF 547	<b>ZPFG-080</b>	PCA12M		■					4	9.7	2.1	8
WF 646	<b>ZPFG100</b>	PTH08M					■		5	12.1	2.7	10
WF 595	<b>ZPFG100</b>	PCA08M	■						5	12.1	2.7	10
WF 548	<b>ZPFG100</b>	PCA12M		■					5	12.1	2.7	10
WF 647	<b>ZPFG120</b>	PTH08M					■		6	14.6	3.2	12
WF 596	<b>ZPFG120</b>	PCA08M	■						6	14.6	3.2	12
WF 549	<b>ZPFG120</b>	PCA12M		■					6	14.6	3.2	12
WF 648	<b>ZPFG160</b>	PTH08M					■		8	16.6	4.2	16
WF 597	<b>ZPFG160</b>	PCA08M	■						8	16.6	4.2	16
WF 598	<b>ZPFG160</b>	PCA12M		■					8	16.6	4.2	16
WF 649	<b>ZPFG200</b>	PTH08M					■		10	20.3	5.2	20
WF 599	<b>ZPFG200</b>	PCA08M	■						10	20.3	5.2	20
WF 600	<b>ZPFG200</b>	PCA12M		■					10	20.3	5.2	20
WF 650	<b>ZPFG250</b>	PTH08M					■		12.5	24.1	6.2	25
WF 601	<b>ZPFG250</b>	PCA08M	■						12.5	24.1	6.2	25
WF 602	<b>ZPFG250</b>	PCA12M		■					12.5	24.1	6.2	25
WF 651	<b>ZPFG320</b>	PTH08M					■		16	30	7.2	32
WF 603	<b>ZPFG320</b>	PCA08M	■						16	30	7.2	32
WF 604	<b>ZPFG320</b>	PCA12M		■					16	30	7.2	32

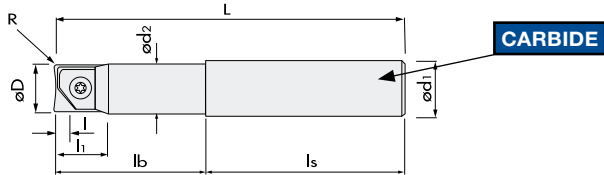
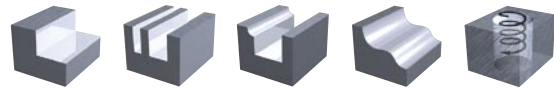
■ = Stock | Germany

ISO														
P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	K40
PTH08M										PTH08M				
PCA08M										PCA08M				
PCA12M					PCA12M					PCA12M				
N01	N10	N20	N30	N40	S01	S10	S20	S30	S40	H01	H10	H20	H30	H40
												PTH08M		
												PCA08M		
												PCA12M		

## Indexable Milling Tools

### ARPF | Radius High Precision Finish - Carbide Shank

<b>V max</b> High Speed	<b>▽▽</b> Semi Finishing	<b>▽▽▽</b> Finishing	<b>HRC</b> 62	<b>No. of Teeth</b> 2
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R	± 0.015
Set-up	± 0.010



#### ARPF-W Radius High Precision Finish - Carbide Shank Regular

ID Code	Item Code	Stock	Flutes	ØD	L	l	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 473	ARPF-08S08W	■	2	8	100	2.5	30	70	8	7.8	ZCFW080-R □.□
FH 474	ARPF-10S10W	■	2	10	100	3	35	65	10	9.8	ZCFW100-R □.□
FH 475	ARPF-12S12W	■	2	12	110	4	35	75	12	11.8	ZCFW120-R □.□
FH 483	ARPF-16S16W	■	2	16	140	5	35	105	16	15.5	ZCFW160-R □.□
FH 484	ARPF-20S20W	■	2	20	160	6	40	120	20	19.5	ZCFW200-R □.□
FH 485	ARPF-25S25W	■	2	25	180	8	45	135	25	24.5	ZCFW250-R □.□
FH 486	ARPF-32S32W	■	2	32	180	10	55	125	32	31.5	ZCFW320-R □.□



#### ARPF-WL Radius High Precision Finish - Carbide Shank Long Neck

ID Code	Item Code	Stock	Flutes	ØD	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 411	ARPF-08S08WL	■	2	8	130	2.5	18	65	65	8	7.8	ZCFW080-R □.□
FH 412	ARPF-10S10WL	■	2	10	140	3	23	75	65	10	9.8	ZCFW100-R □.□
FH 413	ARPF-12S12WL	■	2	12	150	4	26	85	65	12	11.8	ZCFW120-R □.□






#### ARPF-WE Radius High Precision Finish - Carbide Shank Extra Long

ID Code	Item Code	Stock	Flutes	ØD	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 429	ARPF-16S16WE	■	2	16	200	5	29	120	80	16	15.8	ZCFW160-R □.□
FH 430	ARPF-20S20WE	■	2	20	250	6	36	150	100	20	19.8	ZCFW200-R □.□
FH 476	ARPF-25S25WE	■	2	25	300	8	41	190	110	25	24.8	ZCFW250-R □.□
FH 477	ARPF-32S32WE	■	2	32	350	10	51	230	120	32	31.8	ZCFW320-R □.□

■ = Stock | Germany

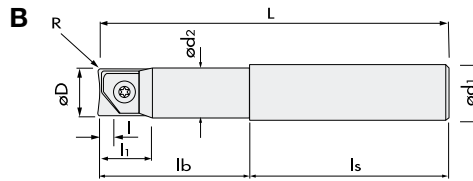
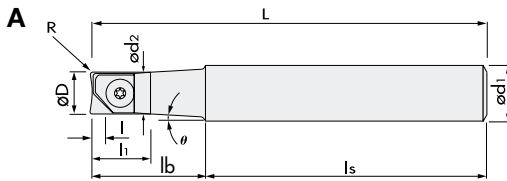
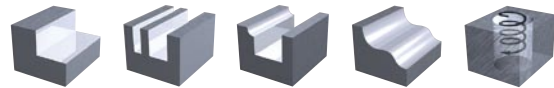


Parts	Clamp Screw	Wrench
<b>ARPF-W</b>		
	<b>Body</b>	<b>ID-Code</b>
	ARPF-08S08W	ET 153
	ARPF-10S10W	ET 154
	ARPF-12S12W	ET 155
	ARPF-16S16W	ET 156
	ARPF-20S20W	ET 157
	ARPF-25S25W	ET 168
	ARPF-32S32W	ET 169
<b>ARPF-WL</b>		
	<b>Item-Code</b>	<b>ID-Code</b>
	581-141	ET 13
	581-142	ET 11
	581-143	ET 14
<b>ARPF-WE</b>		
	<b>Item-Code</b>	<b>ID-Code</b>
	581-144	ET 14
	581-145	ET 9
	581-146	ET 167
	581-147	ET 167

**Indexable Milling Tools**

**ARPF | Radius High Precision Finish**

<b>V max</b> High Speed	<b>▽▽</b> Semi Finishing	<b>▽▽▽</b> Finishing	<b>HRC</b> 62	<b>No. of Teeth</b> 2
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R	± 0.015
Set-up	± 0.010



**ARPF-S** Radius High Precision Finish - Regular

ID Code	Item Code	Stock	Flutes	ØD	L	l	l <sub>1</sub>	lb	ls	θ	Ød <sub>1</sub>	Ød <sub>2</sub>	Type	Inserts x1
FH 399	ARPF-08S12	■	2	8	100	2.5	10	22	78	9.5°	12	7.5	A	ZCFW080-R □.□
FH 400	ARPF-10S12	■	2	10	100	3	13	25	75	3°	12	9.5	A	ZCFW100-R □.□
FH 401	ARPF-12S12	■	2	12	110	4	15	30	80		12	11.5	B	ZCFW120-R □.□
FH 402	ARPF-16S16	■	2	16	130	5	17	50	80		16	15.5	B	ZCFW160-R □.□
FH 403	ARPF-20S20	■	2	20	140	6	21	60	80		20	19.5	B	ZCFW200-R □.□
FH 464	ARPF-25S25	■	2	25	150	8	24	70	80		25	24.5	B	ZCFW250-R □.□
FH 465	ARPF-32S32	■	2	32	160	10	30	80	80		32	31.5	B	ZCFW320-R □.□



**ARPF-L** Radius High Precision Finish - Long Neck

ID Code	Item Code	Stock	Flutes	ØD	L	l	l <sub>1</sub>	lb	ls	θ	Ød <sub>1</sub>	Ød <sub>2</sub>	Type	Inserts x1
FH 404	ARPF-08S12L	■	2	8	130	2.5	10	50	80	3°	12	7.5	A	ZCFW080-R □.□
FH 405	ARPF-10S16L	■	2	10	150	3	13	50	100	4.5°	16	9.5	A	ZCFW100-R □.□
FH 406	ARPF-12S16L	■	2	12	160	4	15	60	100	2°	16	11.5	A	ZCFW120-R □.□
FH 407	ARPF-16S16L	■	2	16	165	5	17	65	100		16	15.5	B	ZCFW160-R □.□
FH 408	ARPF-20S20L	■	2	20	180	6	21	80	100		20	19.5	B	ZCFW200-R □.□
FH 466	ARPF-20S20L120	■	2	20	220	6	21	120	100		20	19.5	B	ZCFW200-R □.□
FH 467	ARPF-20S20L150	■	2	20	250	6	21	150	100		20	19.5	B	ZCFW200-R □.□
FH 468	ARPF-25S25L	■	2	25	200	8	24	90	110		25	24.5	B	ZCFW250-R □.□
FH 469	ARPF-25S32L150	■	2	25	250	8	24	150	100		32	24.5	B	ZCFW250-R □.□
FH 470	ARPF-32S32L	■	2	32	220	10	30	100	120		32	31.5	B	ZCFW320-R □.□



**ARPF-E** Radius High Precision Finish - Extra Long

ID Code	Item Code	Stock	Flutes	ØD	L	l	l <sub>1</sub>	lb	ls	Ød <sub>1</sub>	Ød <sub>2</sub>	Inserts x1
FH 409	ARPF-16S16E	■	2	16	200	5	17	65	135	16	15.5	ZCFW160-R □.□
FH 410	ARPF-20S20E	■	2	20	250	6	21	80	170	20	19.5	ZCFW200-R □.□
FH 471	ARPF-25S25E	■	2	25	300	8	24	90	210	25	24.5	ZCFW250-R □.□
FH 472	ARPF-32S32E	■	2	32	350	10	30	100	250	32	31.5	ZCFW320-R □.□

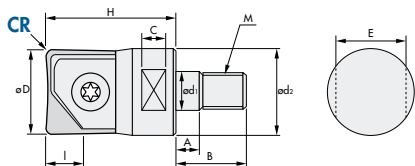
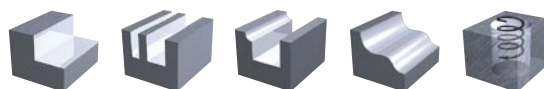
■ = Stock | Germany



**Indexable Milling Tools**

**ARPF | Radius High Precision Finish**

<b>V max</b> High Speed	<b>▽▽</b> Semi Finishing	<b>▽▽▽</b> Finishing	<b>HRC</b> 62	<b>No. of Teeth</b> 2
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<b>CR</b>	± 0.015
<b>Set-up</b>	± 0.010







**ARPF-M** Radius High Precision Finish Modular

ID Code	Item Code	Stock	Flutes	ØD	I	H	Ød <sub>1</sub>	M	Ød <sub>2</sub>	A	B	C	E	Inserts
FH 516	<b>ARPFM-10</b>	■	2	<b>10</b>	3	26	6.5	M6	9.8	5	14.5	5	7	ZCFW100-R....
FH 517	<b>ARPFM-12</b>	■	2	<b>12</b>	4	26	6.5	M6	9.8	5	14.5	5	7	ZCFW120-R....
FH 518	<b>ARPFM-16</b>	■	2	<b>16</b>	5	32	8.5	M8	12.8	6	17	8	10	ZCFW160-R....
FH 519	<b>ARPFM-20</b>	■	2	<b>20</b>	6	38	10.5	M10	17.8	6	19	10	15	ZCFW200-R....
FH 520	<b>ARPFM-25</b>	■	2	<b>25</b>	8	38	12.5	M12	20.8	7	22	10	17	ZCFW250-R....
FH 521	<b>ARPFM-32</b>	■	2	<b>32</b>	10	43	17	M16	28.8	7	23	12	22	ZCFW320-R....

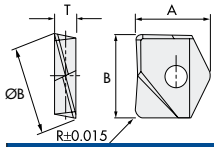
■ = Stock | Germany



Parts	Clamp Screw	Wrench
<b>ARPF-S</b>		
	<b>Body</b>	<b>ID-Code</b>   <b>Item-Code</b>   <b>ID-Code</b>   <b>Item-Code</b>
	ARPF-08S12	ET 153   581-141   ET 13   104-T8
	ARPF-10S12	ET 154   581-142   ET 11   104-T10
	ARPF-12S12	ET 155   581-143   ET 14   105-T20
	ARPF-16S16	ET 156   581-144   ET 14   105-T20
	ARPF-20S20	ET 157   581-145   ET 9   101-T25S
	ARPF-25S25	ET 168   581-146   ET 167   105-T30A
	ARPF-32S32	ET 169   581-147   ET 167   105-T30A
<b>ARPF-L</b>		
	<b>Body</b>	<b>ID-Code</b>   <b>Item-Code</b>   <b>ID-Code</b>   <b>Item-Code</b>
	ARPF-08S12L	ET 153   581-141   ET 13   104-T8
	ARPF-10S16L	ET 154   581-142   ET 11   104-T10
	ARPF-12S16L	ET 155   581-143   ET 14   105-T20
	ARPF-16S16L	ET 156   581-144   ET 14   105-T20
	ARPF-20S20L	ET 157   581-145   ET 9   101-T25S
	ARPF-20S20L120	ET 157   581-145   ET 9   101-T25S
	ARPF-20S20L150	ET 157   581-145   ET 9   101-T25S
	ARPF-25S25L	ET 168   581-146   ET 167   105-T30A
	ARPF-25S32L150	ET 168   581-146   ET 167   105-T30A
	ARPF-32S32L	ET 169   581-147   ET 167   105-T30A
<b>ARPF-E</b>		
	<b>Body</b>	<b>ID-Code</b>   <b>Item-Code</b>   <b>ID-Code</b>   <b>Item-Code</b>
	ARPF-16S16E	ET 156   581-144   ET 14   105-T20
	ARPF-20S20E	ET 157   581-145   ET 9   101-T25S
	ARPF-25S25E	ET 168   581-146   ET 167   105-T30A
	ARPF-32S32E	ET 169   581-147   ET 167   105-T30A
<b>ARPF-M</b>		
	<b>Body</b>	<b>ID-Code</b>   <b>Item-Code</b>   <b>ID-Code</b>   <b>Item-Code</b>
	ARPFM-10	ET 154   581-142   ET 11   104-T10
	ARPFM-12	ET 155   581-143   ET 14   105-T20
	ARPFM-16	ET 156   581-144   ET 14   105-T20
	ARPFM-20	ET 157   581-145   ET 9   101-T25S
	ARPFM-25	ET 168   581-146   ET 167   105-T30A
	ARPFM-32	ET 169   581-147   ET 167   105-T30A

**Indexable Milling Tools** | Grades Overview

**INSERTS** | Radius High Precision Finish



ID Code	Item Code	Grade	C-Coated			PCA12M	G-Coated		TH-Coated		R	I(A)	T	W(B)
WF 551	ZCFW-080-03	PCA12M				■					0.3	9.7	2.1	8
WF 605	ZCFW-080-05	PCA12M				■					0.5	9.7	2.1	8
WF 552	ZCFW-080-10	PCA12M				■					1	9.7	2.1	8
WF 553	ZCFW-100-03	PCA12M				■					0.3	12	2.7	10
WF 606	ZCFW-100-05	PCA12M				■					0.5	12	2.7	10
WF 554	ZCFW-100-10	PCA12M				■					1	12	2.7	10
WF 555	ZCFW-100-15	PCA12M				■					1.5	12	2.7	10
WF 556	ZCFW-100-20	PCA12M				■					2	12	2.7	10
WF 557	ZCFW-120-03	PCA12M				■					0.3	14.6	3.2	12
WF 607	ZCFW-120-05	PCA12M				■					0.5	14.6	3.2	12
WF 558	ZCFW-120-10	PCA12M				■					1	14.6	3.2	12
WF 559	ZCFW-120-15	PCA12M				■					1.5	14.6	3.2	12
WF 560	ZCFW-120-20	PCA12M				■					2	14.6	3.2	12
WF 652	ZCFW-120-30	PCA12M				■					3	14.6	3.2	12
WF 561	ZCFW-160-03	PCA12M				■					0.3	16.6	4.2	16
WF 608	ZCFW-160-05	PCA12M				■					0.5	16.6	4.2	16
WF 562	ZCFW-160-10	PCA12M				■					1	16.6	4.2	16
WF 563	ZCFW-160-15	PCA12M				■					1.5	16.6	4.2	16
WF 564	ZCFW-160-20	PCA12M				■					2	16.6	4.2	16
WF 653	ZCFW-160-30	PCA12M				■					3	16.6	4.2	16
WF 565	ZCFW-200-03	PCA12M				■					0.3	19.9	5.2	20
WF 609	ZCFW-200-05	PCA12M				■					0.5	19.9	5.2	20
WF 566	ZCFW-200-10	PCA12M				■					1	19.9	5.2	20
WF 567	ZCFW-200-15	PCA12M				■					1.5	19.9	5.2	20
WF 568	ZCFW-200-20	PCA12M				■					2	19.9	5.2	20
WF 654	ZCFW-200-30	PCA12M				■					3	19.9	5.2	20
WF 610	ZCFW-250-03	PCA12M				■					0.3	22.6	6.2	25
WF 611	ZCFW-250-05	PCA12M				■					0.5	22.6	6.2	25
WF 612	ZCFW-250-10	PCA12M				■					1	22.6	6.2	25
WF 613	ZCFW-250-20	PCA12M				■					2	22.6	6.2	25
WF 655	ZCFW-250-30	PCA12M				■					3	22.6	6.2	25
WF 614	ZCFW-320-03	PCA12M				■					0.3	27.2	7.2	32
WF 615	ZCFW-320-05	PCA12M				■					0.5	27.2	7.2	32
WF 616	ZCFW-320-10	PCA12M				■					1	27.2	7.2	32
WF 617	ZCFW-320-20	PCA12M				■					2	27.2	7.2	32
WF 656	ZCFW-320-30	PCA12M				■					3	27.2	7.2	32

■ = Stock | Germany

ISO														
P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	K40
PCA12M					PCA12M					PCA12M				
N01	N10	N20	N30	N40	S01	S10	S20	S30	S40	H01	H10	H20	H30	H40
												PCA12M		

## Indexable Milling Tools

### ABPF/M / ARPF/M | Cutting Conditions | Long up to 10x Dia



Long condition are based on short condition data-sheet, please adopt like follow:

#### Option I: Higher feed ( $V_f$ ) in combination with lower depth ( $a_p$ )

OH	$V_c$	$V_f$	$a_p$
till 3x Dia	100%	100%	100%
~ 5x Dia	100%	100%	80%
~ 8x Dia	90%	90%	50%
~ 10x Dia	80%	80%	25%

The most important factor is to reduced drastically  $a_p$  and not  $V_c$  or  $V_f$   
The main factor for flections is the contact and not the movement

**Info: double over-hang length = 8 times increased flections!**

#### Option II: Depth ( $a_p$ ) kept in combination with reduced speed ( $V_c$ ) and feed ( $V_f$ )

OH	$V_c$	$V_f$	$a_p$
till 3x Dia	100%	100%	100%
~ 5x Dia	70%	70%	100%
~ 8x Dia	60%	60%	100%
~ 10x Dia	50%	50%	100%

The most important is to reduced the force in case of bigger depth ( $a_p$ )  
In case of bigger Dia (20~32) the flections and cutting-force is less

**Info: double tool Dia = 16 times reduced flections!**

### General-Info

These are recommended conditions which has to be adopted to material-machine-strategy

#### Conditions

- If no problems in long using, speeds - feeds - depth can be improved like short conditions
- If wear problems occurs,  $V_c$  should be reduced or feed per tooth ( $f_z$ ) should be increased
- If chipping problems occurs, OH or depth ( $a_p$ ) should be reduced

#### Insert & screw

- Insert should be replaced if wear or chipping occurs in order not to damage the body
- Before fixing new insert, body-seat - screw and new insert has to be cleaned
- Screw for insert should be tightened not to strong - paste should be used
- Screw should be replaced when damaged or difficult for tightening - to keep tolerance

#### Surface-quality

- Surface roughness should be decide from cusp-height formula or by  $f_z$  concept
- Air-blow will help to evacuate chip's from the cutting zone in order not to have re-cuttings
- Air or high-pressure emulsion can help to reach better optical surface
- Down-cutting (climb milling) and may 45° machining is recommended

**Indexable Milling Tools**

**ABPF/M** | Recommended Cutting Conditions

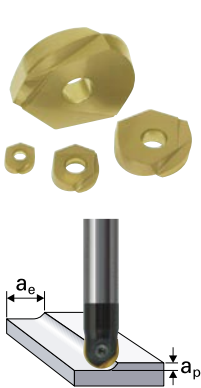


Work piece material	Insert Grade	Parameter	Ø 8			Ø 10			Ø 12		
			Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing
			➡	➡➡		➡	➡➡		➡	➡➡	
			General	High Feed	General	High Feed	General	High Feed			
I Carbon steel II Alloy steel (<30HRC)	PCA08M	n (min <sup>-1</sup> )	6,370	12,340	12,340	5,100	9,240	11,150	4,250	7,170	10,080
		V <sub>c</sub> (m/min)	160	310	310	160	290	350	160	270	380
		V <sub>f</sub> (mm/min)	2,550	9,870	4,940	2,040	7,390	4,460	1,700	5,740	4,030
	PCA12M	f <sub>z</sub> (mm)	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4	0.2
		a <sub>p</sub> (mm)	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
		a <sub>e</sub> (mm)	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
III Tool steel Alloy steel (30-40HRC)	PCA08M	n (min <sup>-1</sup> )	4,780	10,750	10,750	3,820	7,640	9,550	3,180	6,100	8,760
		V <sub>c</sub> (m/min)	120	270	270	120	240	300	120	230	330
		V <sub>f</sub> (mm/min)	1,910	8,600	4,300	1,530	6,110	3,820	1,270	4,880	3,500
	PCA12M	f <sub>z</sub> (mm)	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4	0.2
		a <sub>p</sub> (mm)	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
		a <sub>e</sub> (mm)	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
IV Tool steel Pre-hardened steel (40-50HRC)	PCA08M	n (min <sup>-1</sup> )	3,980	9,160	9,160	3,180	6,690	8,280	2,650	5,310	7,700
		V <sub>c</sub> (m/min)	100	230	230	100	210	260	100	200	290
		V <sub>f</sub> (mm/min)	800	3,660	3,660	640	2,680	3,310	530	2,120	3,080
	PCA12M	f <sub>z</sub> (mm)	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
		a <sub>p</sub> (mm)	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
		a <sub>e</sub> (mm)	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
V Tool steel (50-65HRC)	PCA08M	n (min <sup>-1</sup> )	3,180	7,170	7,170	2,550	5,410	6,370	2,120	4,250	6,100
		V <sub>c</sub> (m/min)	80	180	180	80	170	200	80	160	230
		V <sub>f</sub> (mm/min)	640	2,870	2,870	510	2,160	2,550	420	1,700	2,440
	PCA12M	f <sub>z</sub> (mm)	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
		a <sub>p</sub> (mm)	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
		a <sub>e</sub> (mm)	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
VIII Cast iron GG GGG	PCA08M	n (min <sup>-1</sup> )	6,370	12,340	12,340	5,090	9,240	11,150	4,240	7,170	10,080
		V <sub>c</sub> (m/min)	160	310	310	160	290	350	160	270	380
		V <sub>f</sub> (mm/min)	3,820	14,810	4,940	3,050	11,090	6,690	2,550	8,600	6,050
	PCA12M	f <sub>z</sub> (mm)	0.3	0.6	0.2	0.3	0.6	0.3	0.3	0.6	0.3
		a <sub>p</sub> (mm)	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
		a <sub>e</sub> (mm)	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Maximum f <sub>z</sub> (mm)			<0.8			<0.8			<0.8		
Maximum a <sub>p</sub> (mm)			<4.0			<5.0			<6.0		

**Note: Ø 3xD – 10xD s. page 12**

**Indexable Milling Tools**

**ABPF/M** | Recommended Cutting Conditions

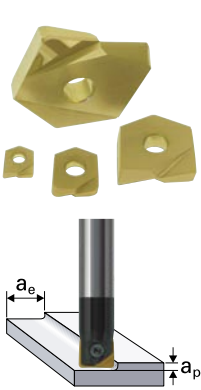


Work piece material	Insert Grade	Parameter	Ø 16			Ø 20			Ø 25			Ø 32		
			Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing
			➡	➡➡	▽▽▽	➡	➡➡	▽▽▽	➡	➡➡	▽▽▽	➡	➡➡	▽▽▽
			General	High Feed		General	High Feed		General	High Feed		General	High Feed	
I Carbon steel II Alloy steel (<30HRC)	PCA08M	n (min <sup>-1</sup> )	3,180	4,180	9,950	2,550	3,340	9,080	2,040	2,680	8,030	1,590	2,090	7,170
		V <sub>c</sub> (m/min)	160	210	500	160	210	570	160	210	630	160	210	720
		V <sub>f</sub> (mm/min)	1,590	4,180	5,970	1,280	3,340	7,260	1,020	2,680	8,030	800	2,090	8,600
	PCA12M	f <sub>z</sub> (mm)	0.25	0.5	0.3	0.25	0.5	0.4	0.25	0.5	0.5	0.25	0.5	0.6
		a <sub>p</sub> (mm)	0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1
		a <sub>e</sub> (mm)	1.6	1.1	0.35	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.5
III Tool steel Alloy steel (30-40HRC)	PCA08M	n (min <sup>-1</sup> )	2,390	2,990	7,560	1,910	2,550	6,690	1,530	2,040	5,990	1,190	1,590	5,370
		V <sub>c</sub> (m/min)	120	150	380	120	160	420	120	160	470	120	160	540
		V <sub>f</sub> (mm/min)	1,200	2,990	4,540	960	2,550	5,350	770	2,040	5,990	600	1,590	6,440
	PCA12M	f <sub>z</sub> (mm)	0.25	0.5	0.3	0.25	0.5	0.4	0.25	0.5	0.5	0.25	0.5	0.6
		a <sub>p</sub> (mm)	0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1
		a <sub>e</sub> (mm)	1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6
IV Tool steel Pre-hardened steel (40-50HRC)	PCA08M	n (min <sup>-1</sup> )	1,990	2,990	6,970	1,590	2,390	6,370	1,270	1,910	5,730	1,000	1,490	4,980
		V <sub>c</sub> (m/min)	100	150	350	100	150	400	100	150	450	100	150	500
		V <sub>f</sub> (mm/min)	480	1,440	4,180	380	1,150	5,100	305	920	5,730	240	715	5,980
	PCA12M	f <sub>z</sub> (mm)	0.12	0.24	0.3	0.12	0.24	0.4	0.12	0.24	0.5	0.12	0.24	0.6
		a <sub>p</sub> (mm)	0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1
		a <sub>e</sub> (mm)	1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6
V Tool steel (50-65HRC)	PCA08M	n (min <sup>-1</sup> )	1,590	2,390	5,570	1,270	1,910	5,100	1,020	1,530	4,590	800	1,190	3,980
		V <sub>c</sub> (m/min)	80	120	280	80	120	320	80	120	360	80	120	400
		V <sub>f</sub> (mm/min)	380	1,150	3,340	300	920	4,080	240	730	4,590	190	570	4,780
	PCA12M	f <sub>z</sub> (mm)	0.12	0.24	0.3	0.12	0.24	0.4	0.12	0.24	0.5	0.12	0.24	0.6
		a <sub>p</sub> (mm)	0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1
		a <sub>e</sub> (mm)	1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6
VIII Cast iron GG GGG	PCA08M	n (min <sup>-1</sup> )	3,200	4,180	9,950	2,550	3,340	9,080	2,050	2,680	8,030	1,590	2,090	7,170
		V <sub>c</sub> (m/min)	160	210	500	160	210	570	160	210	630	160	210	720
		V <sub>f</sub> (mm/min)	2,240	5,850	5,970	1,790	4,680	7,260	1,440	3,750	8,030	1,110	2,930	8,600
	PCA12M	f <sub>z</sub> (mm)	0.35	0.7	0.3	0.35	0.7	0.4	0.35	0.7	0.5	0.35	0.7	0.6
		a <sub>p</sub> (mm)	0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1
		a <sub>e</sub> (mm)	1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6
Maximum f <sub>z</sub> (mm)			<1.0			<1.0			<1.0			<1.0		
Maximum a <sub>p</sub> (mm)			<8.0			<10.0			<12.5			<16.0		

**Note: Ø 3xD – 10xD s. page 12**

**Indexable Milling Tools**

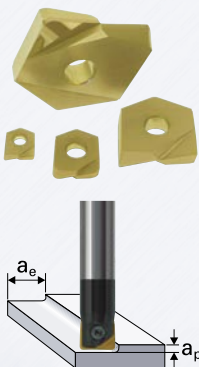
**ARPF/M** | Recommended Cutting Conditions



Work piece material	Insert Grade	Parameter	Ø 8			Ø 10			Ø 12		
			Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing
			➡	➡➡	⋈	➡	➡➡	⋈	➡	➡➡	⋈
			General	High Speed		General	High Speed		General	High Speed	
I Carbon steel II Alloy steel (<30HRC)	PCA12M	n (min <sup>-1</sup> )	6,370	11,940	11,940	5,090	9,550	9,550	4,240	7,960	7,960
		V <sub>c</sub> (m/min)	160	300	300	160	300	300	160	300	300
		V <sub>f</sub> (mm/min)	2,550	3,580	3,580	2,040	2,870	2,870	1,700	2,390	2,390
		f <sub>z</sub> (mm)	0.2	0.15	0.15	0.2	0.15	0.15	0.2	0.15	0.15
		a <sub>p</sub> (mm)	0.2	0.2	0.1	0.25	0.25	0.1	0.1	0.3	0.1
		a <sub>e</sub> (mm)	0.8	0.4	0.2	1	0.5	0.2	1.2	0.6	0.2
III Tool steel Alloy steel (30-40HRC)	PCA12M	n (min <sup>-1</sup> )	4,770	11,150	11,150	3,820	8,920	8,920	3,180	7,430	7,430
		V <sub>c</sub> (m/min)	120	280	280	120	280	280	120	280	280
		V <sub>f</sub> (mm/min)	1,910	3,350	3,350	1,530	2,680	2,680	1,270	2,230	2,230
		f <sub>z</sub> (mm)	0.2	0.15	0.15	0.2	0.15	0.15	0.2	0.15	0.15
		a <sub>p</sub> (mm)	0.2	0.2	0.1	0.25	0.25	0.1	0.3	0.3	0.1
		a <sub>e</sub> (mm)	0.8	0.4	0.2	1	0.5	0.2	1.2	0.6	0.2
IV Tool steel Pre-hardened steel (40-50HRC)	PCA12M	n (min <sup>-1</sup> )	3,980	11,150	11,150	3,180	8,920	8,920	2,650	7,430	7,430
		V <sub>c</sub> (m/min)	100	280	280	100	280	280	100	280	280
		V <sub>f</sub> (mm/min)	800	1,120	1,120	640	890	890	530	740	740
		f <sub>z</sub> (mm)	0.1	0.05	0.05	0.1	0.05	0.05	0.1	0.05	0.05
		a <sub>p</sub> (mm)	0.2	0.2	0.1	0.25	0.25	0.1	0.3	0.3	0.1
		a <sub>e</sub> (mm)	0.8	0.2	0.2	1	0.25	0.2	1.2	0.3	0.2
V Tool steel (50-62HRC)	PCA12M	n (min <sup>-1</sup> )	3,180	8,760	8,760	2,550	7,000	7,000	2,120	5,840	5,840
		V <sub>c</sub> (m/min)	80	220	220	80	220	220	80	220	220
		V <sub>f</sub> (mm/min)	640	880	880	510	700	700	420	580	580
		f <sub>z</sub> (mm)	0.1	0.05	0.05	0.1	0.05	0.05	0.1	0.05	0.05
		a <sub>p</sub> (mm)	0.2	0.2	0.1	0.25	0.25	0.1	0.3	0.3	0.1
		a <sub>e</sub> (mm)	0.8	0.2	0.2	1	0.25	0.2	1.2	0.3	0.2
VIII Cast iron GG GGG	PCA12M	n (min <sup>-1</sup> )	6,370	15,130	15,130	5,090	12,100	12,100	4,240	10,080	10,080
		V <sub>c</sub> (m/min)	160	380	380	160	380	380	160	380	380
		V <sub>f</sub> (mm/min)	3,820	6,050	6,050	3,050	4,840	4,840	2,550	4,030	4,030
		f <sub>z</sub> (mm)	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2
		a <sub>p</sub> (mm)	0.2	0.2	0.1	0.25	0.2	0.1	0.3	0.3	0.1
		a <sub>e</sub> (mm)	0.8	0.4	0.2	1	0.4	0.2	1.2	0.6	0.2
Maximum f <sub>z</sub> (mm)			<0.5			<0.5			<0.5		
Maximum a <sub>p</sub> (mm)			<2.5			<3.0			<4.0		

**Note: Ø 3xD - 10xD s. page 12**

## ARPF/M | Recommended Cutting Conditions



Work piece material	Insert Grade	Parameter	Ø 16			Ø 20			Ø 25			Ø 32		
			Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing
			→	↗		→	↗		→	↗		→	↗	
			General	High Speed	General	High Speed	General	High Speed	General	High Speed	General	High Speed		
I Carbon steel	PCA12M	n (min <sup>-1</sup> )	3,200	5,970	5,970	2,550	4,780	4,780	2,050	3,820	3,820	1,590	2,990	2,990
		V <sub>c</sub> (m/min)	160	300	300	160	300	300	160	300	300	160	300	300
		V <sub>f</sub> (mm/min)	1,600	2,390	2,390	1,300	1,910	1,910	1,030	1,530	1,530	800	1,200	1,200
		f <sub>z</sub> (mm)	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	1.6	0.2	2	2	0.2	2.5	1.25	0.2	3.2	3.2	0.2
II Alloy steel (<30HRC)	PCA12M	n (min <sup>-1</sup> )	3,200	5,970	5,970	2,550	4,780	4,780	2,050	3,820	3,820	1,590	2,990	2,990
		V <sub>c</sub> (m/min)	160	300	300	160	300	300	160	300	300	160	300	300
		V <sub>f</sub> (mm/min)	1,600	2,390	2,390	1,300	1,910	1,910	1,030	1,530	1,530	800	1,200	1,200
		f <sub>z</sub> (mm)	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	1.6	0.2	2	2	0.2	2.5	1.25	0.2	3.2	3.2	0.2
III Tool steel Alloy steel (30-40HRC)	PCA12M	n (min <sup>-1</sup> )	2,400	5,570	5,570	1,910	4,460	4,460	1,530	3,570	3,570	1,190	2,790	2,790
		V <sub>c</sub> (m/min)	120	280	280	120	280	280	120	280	280	120	280	280
		V <sub>f</sub> (mm/min)	1,200	2,230	2,230	955	1,780	1,780	765	1,430	1,430	600	1,120	1,120
		f <sub>z</sub> (mm)	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2	0.25	0.2	0.2
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	1.6	0.2	2	2	0.2	2.5	2.5	0.2	3.2	3.2	0.2
IV Tool steel Pre-hardened steel (40-50HRC)	PCA12M	n (min <sup>-1</sup> )	1,990	5,570	5,570	1,590	4,460	4,460	1,270	3,570	3,570	1,000	2,790	2,790
		V <sub>c</sub> (m/min)	100	280	280	100	280	280	100	280	280	100	280	280
		V <sub>f</sub> (mm/min)	480	670	670	380	535	535	305	430	430	240	335	335
		f <sub>z</sub> (mm)	0.12	0.06	0.06	0.12	0.06	0.06	0.12	0.06	0.06	0.12	0.06	0.06
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	0.8	0.2	2	1	0.2	2.5	1.25	0.2	3.2	1.6	0.2
V Tool steel (50-62HRC)	PCA12M	n (min <sup>-1</sup> )	1,590	4,380	4,380	1,270	3,500	3,500	1,020	2,800	2,800	800	2,190	2,190
		V <sub>c</sub> (m/min)	80	220	220	80	220	220	80	220	220	80	220	220
		V <sub>f</sub> (mm/min)	380	530	530	300	420	420	240	340	340	190	260	260
		f <sub>z</sub> (mm)	0.12	0.06	0.06	0.12	0.06	0.06	0.12	0.06	0.06	0.12	0.06	0.06
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	0.8	0.2	2	1	0.2	2.5	1.25	0.2	3.2	1.6	0.2
VIII Cast iron GG GGG	PCA12M	n (min <sup>-1</sup> )	3,200	7,560	7,560	2,550	6,050	6,050	2,050	4,840	4,840	1,590	3,780	3,780
		V <sub>c</sub> (m/min)	160	380	380	160	380	380	160	380	380	160	380	380
		V <sub>f</sub> (mm/min)	2,240	4,540	4,540	1,790	3,630	3,630	1,440	2,900	2,900	1,110	2,270	2,270
		f <sub>z</sub> (mm)	0.35	0.3	0.3	0.35	0.3	0.3	0.35	0.3	0.3	0.35	0.3	0.3
		a <sub>p</sub> (mm)	0.8	0.8	0.2	1	1	0.2	1.25	1.25	0.2	1.6	1.6	0.2
		a <sub>e</sub> (mm)	1.6	1.6	0.2	2	2	0.2	2.5	2.5	0.2	3.2	3.2	0.2
Maximum f <sub>z</sub> (mm)			<0.6			<0.6			<0.6			<0.6		
Maximum a <sub>p</sub> (mm)			<5.0			<6.0			<8.0			<10.0		

Note: Ø 3xD - 10xD s. page 12

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