

Indexable
Milling
+ Modular Series

ABPF/M Ball High Precision Finish + Modular

ARPF/M Radius High Precision Finish + Modular

D 8 ~ D 32 · ~ HRC 65

Available Coatings:

ATH10E

ACS05E

PCA12M

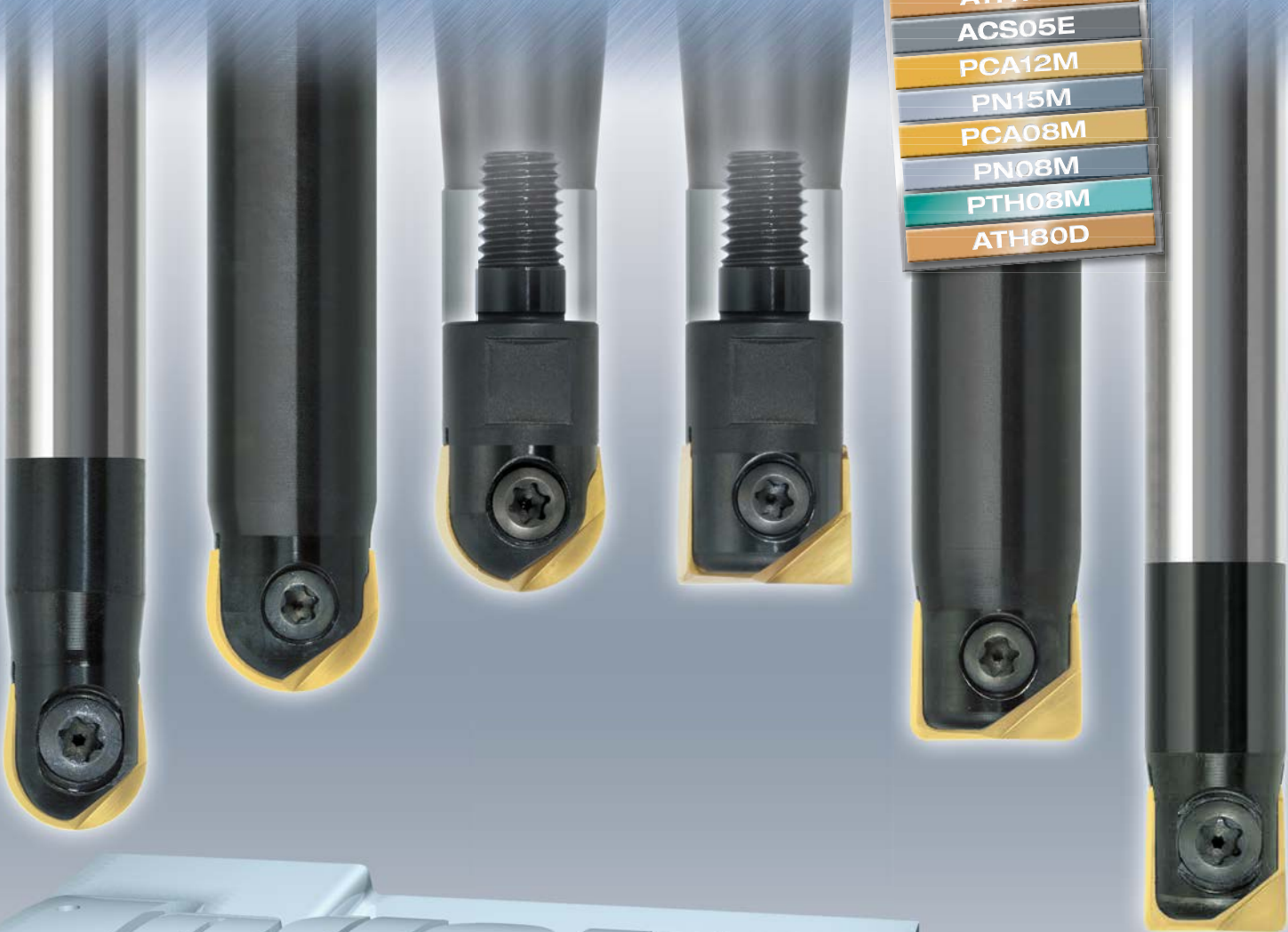
PN15M

PCA08M




PN08M





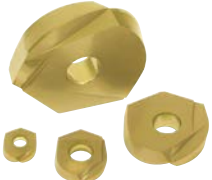

PTH08M

ATH80D












Indexable Milling Tools



Short	Name	Type: CARBIDE	D	Page
ABPF-W	Ball High Precision Finish - Carbide Shank Regular		8-25	4
ABPF-WL	Ball High Precision Finish - Carbide Shank Long Neck		8-12	4
ABPF-WE	Ball High Precision Finish - Carbide Shank Extra Long		16-25	4

Short	Name	Type: STEEL	D	Page
ABPF-S	Ball High Precision Finish - Regular		8-32	5
ABPF-L	Ball High Precision Finish - Long Neck		8-32	6
ABPF-MT	Ball High Precision Finish - MT Shank		20-32	6
ABPF-M	Ball High Precision Finish - Modular		10-32	6
Inserts	Ball High Precision Finish		8-32	7
Parts	Clamp Screws, Wrenches		8-32	10

Indexable Milling Tools

Short	Name	Type: CARBIDE	D	Page
ARPF-W	Radius High Precision Finish - Carbide Shank Regular		8-25	8
ARPF-WL	Radius High Precision Finish - Carbide Shank Long Neck		8-12	8
ARPF-WE	Radius High Precision Finish - Carbide Shank Extra Long		16-25	8

Short	Name	Type: STEEL	D	Page
ARPF-S	Ball High Precision Finish - Regular		8-32	9
ARPF-L	Radius High Precision Finish - Long Neck		8-25	9
ARPF-E	Radius High Precision Finish - Extra Long		16-25	9
ARPF-M	Radius High Precision Finish - Modular		10-32	10
Inserts	Radius High Precision Finish		8-32	11
Parts	Clamp Screws, Wrenches		8-32	10

Cutting Conditions		Page		Page
ARPF D8 - 32	Semi Finishing 	14-15	Finishing 	14-15

Indexable Milling Tools

ABPF | Ball High Precision Finish - Carbide Shank

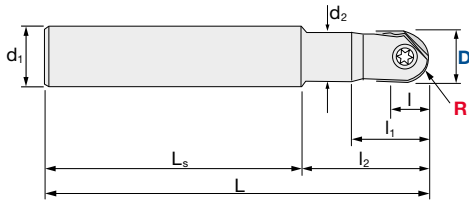
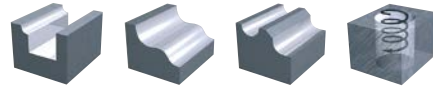
V max
High Speed

▽▽
Semi Finishing

▽▽▽
Finishing

HRC
65

No. of Teeth
2



Tolerance R:	Tolerance Dia.:
± 0.005 mm	± 0.01 mm

ABPF-W Ball High Precision Finish - Carbide Shank Regular

ID Code	Item Code	Flutes	D	R	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH393	ABPF-08S08W	2	8	4	100	4.4	18	30	70	8	7.8	Z...FG-080...
FH394	ABPF-10S10W		10	5		5.5	23	35	65	10	9.8	Z...FG-100...
FH395	ABPF-12S12W		12	6	110	6.6	26	45	65	12	11.8	Z...FG-120...
FH478	ABPF-16S16W		16	8	140	8.8	19	35	105	16	15.5	Z...FG-160...
FH479	ABPF-20S20W		20	10	160	11	22	40	120	20	19.5	Z...FG-200...
FH480	ABPF-25S25W		25	12.5	180	13.7	25	45	135	25	24.5	Z...FG-250...



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

ID Code	Item Code	Flutes	D	R	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH396	ABPF-08S08WL	2	8	4	130	4.4	18	65	65	8	7.8	Z...FG-080...
FH397	ABPF-10S10WL		10	5	140	5.5	23	75		10	9.8	Z...FG-100...
FH398	ABPF-12S12WL		12	6	150	6.6	26	85		12	11.8	Z...FG-120...





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

ID Code	Item Code	Flutes	D	R	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH458	ABPF-16S16WE	2	16	8	200	8.8	19	120	80	16	15.8	Z...FG-160...
FH459	ABPF-20S20WE		20	10	250	11	22	150	100	20	19.8	Z...FG-200...
FH460	ABPF-25S25WE		25	12.5	300	13.7	25	190	110	25	24.8	Z...FG-250...



Inserts p. 7

Parts	Clamp Screw				Wrench		
	Diameter	ID-Code	Item-Code	Tightening torque	ID-Code	Item-Code	
 ABPF-... / ABPFM-...	8	ET153	581-141	1.5 Nm	ET13	104-T8	
	10	ET154	581-142	2.0 Nm	ET11	104-T10	
	12	ET155	581-143	5.0 Nm	ET14	105-T20	
	16	ET156	581-144	5.0 Nm			
	 ARPF-... / ARPFM-...	20	ET157	581-145	7.0 Nm	ET9	101-T25S
		25	ET168	581-146	7.0 Nm	ET167	105-T30A
32		ET169	581-147	7.0 Nm			

Indexable Milling Tools

ABPF | Ball High Precision Finish

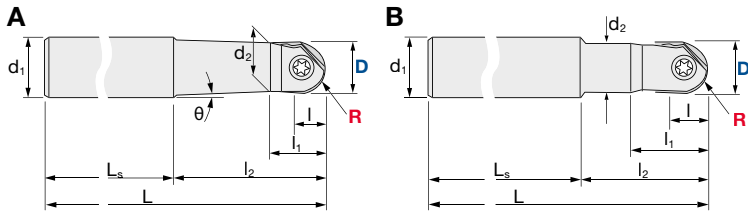
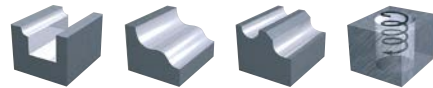
V max
High Speed

▽▽
Semi Finishing

▽▽▽
Finishing

HRC
65

No. of Teeth
2



Tolerance R:	Tolerance Dia.:
± 0.005 mm	± 0.01 mm

ABPF-S Ball High Precision Finish - Regular

ID Code	Item Code	Flutes	D	R	L	l	l ₁	l ₂	L _s	θ	d ₁	d ₂	Type	Inserts
FH387	ABPF-08S12	2	8	4	100	4.4	10	22	78	9.5°	12	7.5	A	Z...FG-080...
FH388	ABPF-10S12		10	5		5.5	13	25	75	5°		9.5		Z...FG-100...
FH389	ABPF-12S12		12	6	110	6.6	15	30	80	-	20	11.5	B	Z...FG-120...
FH447	ABPF-16S20		16	8	130	8.8	19	50		2.5°		15.5		Z...FG-160...
FH448	ABPF-20S25		20	10	140	11	22	60	3°	25	19.5	A	Z...FG-200...	
FH449	ABPF-25S32		25	12.5	150	13.7	25	70					24.5	Z...FG-250...
FH450	ABPF-32S32		32	16	160	17.6	30	80	-	32	31.5	B	Z...FG-320...	



ABPF-L Ball High Precision Finish - Long Neck

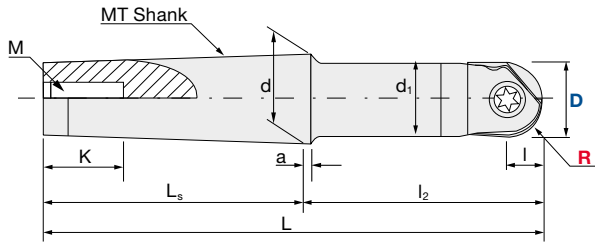
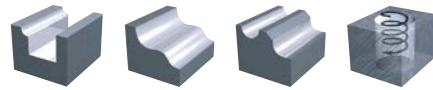
ID Code	Item Code	Flutes	D	R	L	l	l ₁	l ₂	L _s	θ	d ₁	d ₂	Type	Inserts
FH390	ABPF-08S12L	2	8	4	130	4.4	10	50	80	3°	12	7.5	A	Z...FG-080...
FH391	ABPF-10S16L		10	5	150	5.5	13		100	5°		16		9.5
FH392	ABPF-12S16L		12	6	160	6.6	20	60	3°	10.8	20	15.5	B	Z...FG-120...
FH451	ABPF-16S20L		16	8	160	8.8	19	65	95	2°		25		Z...FG-160...
FH452	ABPF-20S25L		20	10	180	11	22	80	100	-	20	19.5	B	Z...FG-200...
FH453	ABPF-20S20L120				120									
FH454	ABPF-20S20L150		150											
FH455	ABPF-25S32L		25	12.5	200	13.7	25	90	110	3°	32	24.5	A	Z...FG-250...
FH456	ABPF-25S32L150	150	100	-	32	B	Z...FG-250...							
FH457	ABPF-32S32L	32	16	220	17.6	30	100	120	-	32	31.5	B	Z...FG-320...	



Indexable Milling Tools

ABPF | Ball High Precision Finish

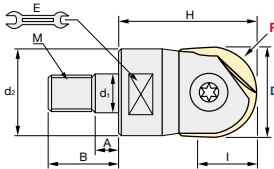
V max High Speed	Semi Finishing	Finishing	HRC 65	No. of Teeth 2
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Tolerance R:	Tolerance Dia.:
± 0.005 mm	± 0.01 mm

ABPF-MT Ball High Precision Finish - MT Shank

ID Code	Item Code	Flutes	D	R	I	MT	L	I ₂	L _s	d	d ₁	a	K	M	Inserts
FH461	ABPF-20MT2	2	20	10	11	MT2	129	65	64	17.78	19.5	5	24	M10	Z...FG-200...
FH462	ABPF-25MT3		25	12.5	13.7	MT3	166	85	81	23.825	24.5	5	28	M12	Z...FG-250...
FH463	ABPF-32MT4		32	16	17.6	MT4	217.5	115	102.5	31.267	30.8	6.5	32	M16	Z...FG-320...



ABPF-M Ball High Precision Finish Modular

ID Code	Item Code	Flutes	D	R	I	H	d ₁	M	d ₂	A	B	E	Inserts
FH510	ABPFM-10	2	10	5	5.5	26	6.5	M6	9.8	5	14.5	7	Z...FG-100...
FH511	ABPFM-12		12	6	6.6	26	6.5	M6	9.8	5	14.5	7	Z...FG-120...
FH512	ABPFM-16		16	8	8.8	32	8.5	M8	12.8	6	17	10	Z...FG-160...
FH513	ABPFM-20		20	10	11	38	10.5	M10	17.8	6	19	15	Z...FG-200...
FH514	ABPFM-25		25	12.5	13.7	38	12.5	M12	20.8	7	22	17	Z...FG-250...
FH515	ABPFM-32		32	16	17.6	43	17	M16	28.8	7	23	22	Z...FG-320...



Inserts p. 7

ABPF | Insert selection – Geometry + Grade

Tough ← **Toughness / Sharpness of Cutting Edge** → **Sharp**

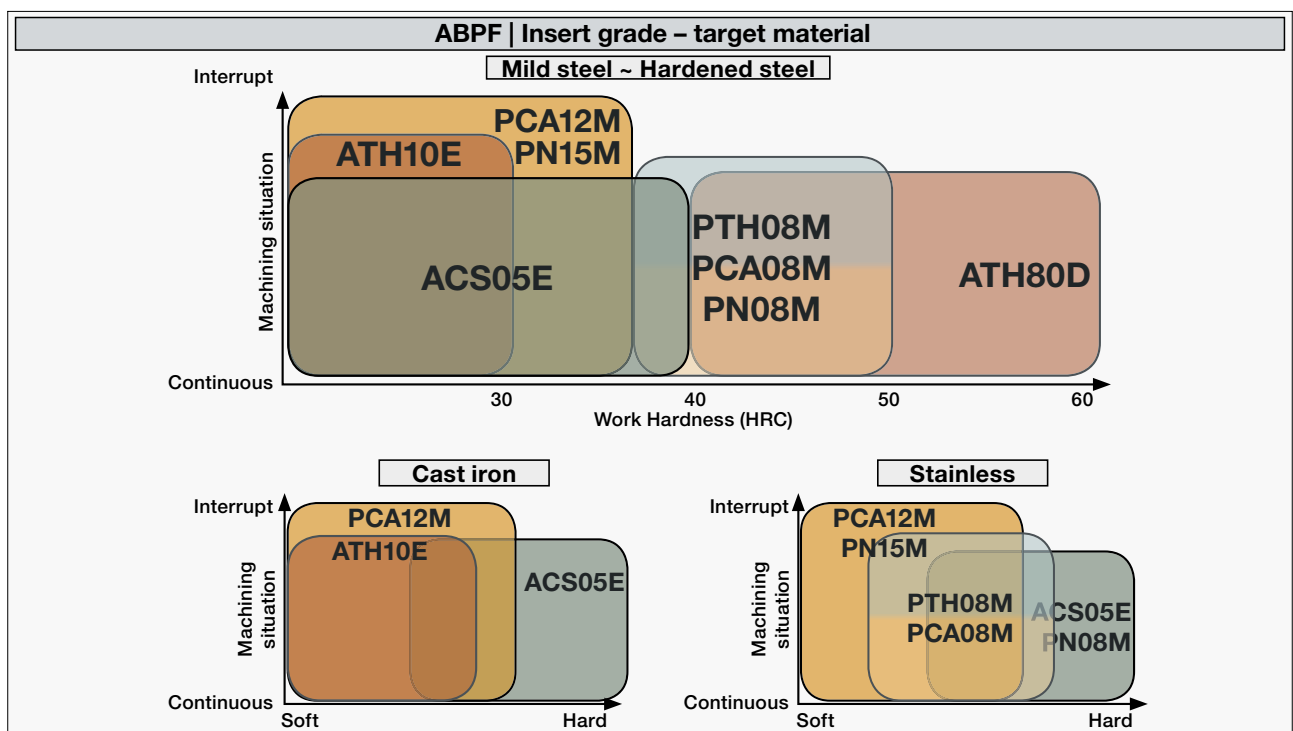
Insert Grade	ZPFG-xxx	ZPFG-xxx-GH	ZPFG-xxx-GF	ZDFG-xxx-ST	ZDFG-xxx-WH	ZDFG-xxx-WF	ZDFG-xxx-SC	ZDFG-xxx-SF
Ball geometry	180° 			180° + /underneck 	180° + /underneck 		180° + /underneck 	
Rake angle	Negative + Small helix			Negative High-helix	Neutral Straight		Positive High-helix	
Edge shape								
Chisel shape	Wide & Tough		Small & Sharp	Wide & Tough		Small & Sharp		
Available grades	PTH08M PCA08M PCA12M	ATH80D	ACS05E	ATH80D PN15M	ATH80D	ACS05E	PN08M	ATH10E

Soft ← **Target Hardness of Workpiece** → **Hard**

Insert Grade	ATH10E	ACS05E	PCA12M	PN15M	PCA08M	PN08M	PTH08M	ATH80D
Substrate								
Grain size	Ultra Micro	Ultra Micro	Ultra Micro	Ultra Micro	Ultra Micro	Ultra Micro	Ultra Micro	Ultra Micro
Hardness	93.0 HRA	93.4 HRA	93.0 HRA	93.0 HRA	93.3 HRA	93.3 HRA	93.3 HRA	94.0 HRA
Coating								
Code	ATH	ACS	PCA	PN	PCA	PN	TH	ATH
Hardness	3800Hv	3200Hv	2600Hv	3200Hv	2600Hv	3200Hv	3600Hv	3800Hv
Target hardness of workpiece	Cast iron Carbon steel (< 30HRC)	Cast iron Carbon steel (< 30HRC)	Tool steels < 45HRC	Tool steels < 45HRC	Tool steels, Pre hardened steels	Tool steels, Pre hardened steels	Pre hardened steel Hardened steel > 45HRC	Hardened steel > 50HRC

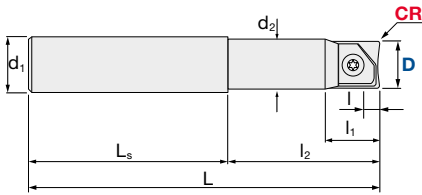
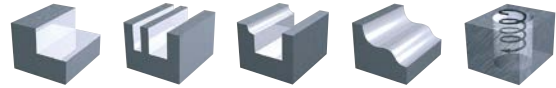
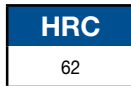
INSERTS | Ball High Precision Finish | Grades Overview

Item Code	Size				Grade								Shape			
	Dc	R	A	T	ATH10E	ACS05E	PCA12M	PN15M	PCA08M	PN08M	PTH08M	ATH80D				
ZPFG-080	8	4	9.7	2.1	ID-Code								<p>Fig. 1: ZPFG (Small helix / radius 180°)</p>			
ZPFG-080-GH																WF267
ZPFG-080-GF									WF266							
ZPFG-100	10	5	12.1	2.7			WF548		WF595		WF646					
ZPFG-100-GH															WF269	
ZPFG-100-GF								WF268								
ZPFG-120	12	6	14.6	3.2			WF549		WF596		WF647					
ZPFG-120-GH															WF271	
ZPFG-120-GF								WF270								
ZPFG-160	16	8	16.6	4.2			WF598		WF597		WF648					
ZPFG-160-GH															WF273	
ZPFG-160-GF								WF272								
ZPFG-200	20	10	20.3	5.2			WF600		WF599		WF649					
ZPFG-200-GH															WF275	
ZPFG-200-GF								WF274								
ZPFG-250	25	12.5	24.1	6.2			WF602		WF601		WF650					
ZPFG-250-GH														WF277		
ZPFG-250-GF								WF276								
ZPFG-320	32	16	30	7.2			WF604				WF651					
ZPFG-320-GH														WF279		
ZPFG-320-GF								WF278								
ZDFG-080-WH	8	4	9.7	2.1								WF281				
ZDFG-080-WF														WF280		
ZDFG-100-WH															WF283	
ZDFG-100-WF	10	5	12.1	2.7								WF282				
ZDFG-120-WH														WF285		
ZDFG-120-WF															WF284	
ZDFG-160-WH	16	8	16.6	4.2								WF164				
ZDFG-160-WF														WF168		
ZDFG-200-WH															WF165	
ZDFG-200-WF	20	10	20.3	5.2								WF169				
ZDFG-250-WH														WF166		
ZDFG-250-WF															WF170	
ZDFG-320-WH	32	16	30	7.2								WF167				
ZDFG-320-WF														WF171		
ZDFG-160-SF					16	8	16.6	4.2	WF263							
ZDFG-200-SF	20	10	20.3	5.2	WF264											
ZDFG-250-SF	25	12.5	24.1	6.2	WF265											
ZDFG-080-ST	8	4	9.7	2.1				WF391				WF385				
ZDFG-080-SC												WF397			WF386	
ZDFG-100-ST												WF392				
ZDFG-100-SC	10	5	12.1	2.7						WF398		WF387				
ZDFG-120-ST											WF393					
ZDFG-120-SC													WF399			
ZDFG-160-ST	16	8	16.6	4.2								WF388				
ZDFG-160-SC																
ZDFG-200-ST															WF389	
ZDFG-200-SC	20	10	20.3	5.2								WF395				
ZDFG-250-ST																
ZDFG-250-SC															WF396	
ZDFG-320-ST	25	12.5	24.1	6.2								WF400				
ZDFG-320-SC																
ZDFG-320-WF															WF401	
ZDFG-320-GF												WF402				



Indexable Milling Tools

ARPF | Radius High Precision Finish - Carbide Shank



Tolerance CR:	Set-up:
± 0.015mm	± 0.010mm

ARPF-W Radius High Precision Finish - Carbide Shank Regular

ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH473	ARPF-08S08W	2	8	100	2.5	30	70	8	7.8	7.8	ZCFW-080-R...
FH474	ARPF-10S10W		10	100	3	35	65	10	9.8	9.8	ZCFW-100-R...
FH475	ARPF-12S12W		12	110	4	35	75	12	11.8	11.8	ZCFW-120-R...
FH483	ARPF-16S16W		16	140	5	35	105	16	15.5	15.5	ZCFW-160-R...
FH484	ARPF-20S20W		20	160	6	40	120	20	19.5	19.5	ZCFW-200-R...
FH485	ARPF-25S25W		25	180	8	45	135	25	24.5	24.5	ZCFW-250-R...



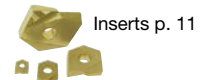
ARPF-WL Radius High Precision Finish - Carbide Shank Long Neck

ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH411	ARPF-08S08WL	2	8	130	2.5	18	65	65	8	7.8	ZCFW-080-R...
FH412	ARPF-10S10WL		10	140	3	23	75	65	10	9.8	ZCFW-100-R...
FH413	ARPF-12S12WL		12	150	4	26	85	65	12	11.8	ZCFW-120-R...



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

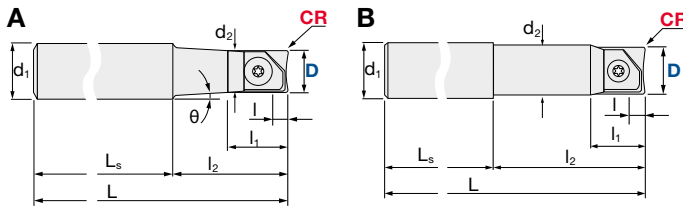
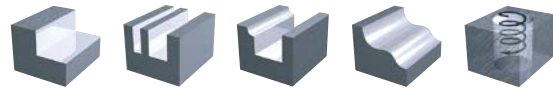
ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH429	ARPF-16S16WE	2	16	200	5	29	120	80	16	15.8	ZCFW-160-R...
FH430	ARPF-20S20WE		20	250	6	36	150	100	20	19.8	ZCFW-200-R...
FH476	ARPF-25S25WE		25	300	8	41	190	110	25	24.8	ZCFW-250-R...



Indexable Milling Tools

ARPF | Radius High Precision Finish

V max High Speed	Semi Finishing	Finishing	HRC 62	No. of Teeth 2
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Tolerance CR:	Set-up:
± 0.015mm	± 0.010mm

ARPF-S Radius High Precision Finish - Regular

ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	θ	d ₁	d ₂	Type	Inserts
FH399	ARPF-08S12	2	8	100	2.5	10	22	78	9.5°	12	7.5	A	ZCFW-080-R...
FH400	ARPF-10S12		10	100	3	13	25	75	3°		9.5		ZCFW-100-R...
FH401	ARPF-12S12		12	110	4	15	30	80	-		11.5	B	ZCFW-120-R...
FH402	ARPF-16S16		16	130	5	17	50			16	15.5		ZCFW-160-R...
FH403	ARPF-20S20		20	140	6	21	60			20	19.5		ZCFW-200-R...
FH464	ARPF-25S25		25	150	8	24	70			25	24.5		ZCFW-250-R...
FH465	ARPF-32S32		32	160	10	30	80	32	31.5	ZCFW-320-R...			



ARPF-L Radius High Precision Finish - Long Neck

ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	θ	d ₁	d ₂	Type	Inserts	
FH404	ARPF-08S12L	2	8	130	2.5	10	50	80	3°	12	7.5	A	ZCFW-080-R...	
FH405	ARPF-10S16L		10	150	3	13	50	100	4.5°				16	9.5
FH406	ARPF-12S16L		12	160	4	15	60	100	2°			16	11.5	ZCFW-120-R...
FH407	ARPF-16S16L		16	165	5	17	65	100	-	-	16	15.5	B	ZCFW-160-R...
FH408	ARPF-20S20L		20	180	6	21	80	100			20	19.5		ZCFW-200-R...
FH466	ARPF-20S20L120		20	220	6	21	120	100			20	19.5		ZCFW-200-R...
FH467	ARPF-20S20L150		20	250	6	21	150	100			20	19.5		ZCFW-200-R...
FH468	ARPF-25S25L	25	200	8	24	90	110	25	24.5	ZCFW-250-R...				
FH469	ARPF-25S32L150	25	250	8	24	150	100	32	24.5	ZCFW-250-R...				



ARPF-E Radius High Precision Finish - Extra Long

ID Code	Item Code	Flutes	D	L	l	l ₁	l ₂	L _s	d ₁	d ₂	Inserts
FH409	ARPF-16S16E	2	16	200	5	17	65	135	16	15.5	ZCFW-160-R...
FH410	ARPF-20S20E		20	250	6	21	80	170	20	19.5	ZCFW-200-R...
FH471	ARPF-25S25E		25	300	8	24	90	210	25	24.5	ZCFW-250-R...



Indexable Milling Tools

ARPF | Radius High Precision Finish

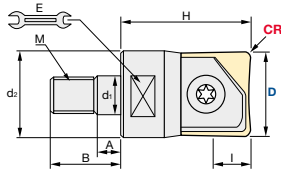
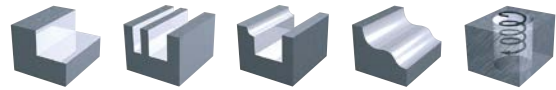
V max
High Speed

▽
Semi Finishing

▽▽
Finishing

HRC
62

No. of Teeth
2





Tolerance CR:	Set-up:
± 0.015mm	± 0.010mm

ARPF-M | Radius High Precision Finish Modular

ID Code	Item Code	Flutes	D	I	H	d ₁	M	d ₂	A	B	E	Inserts
FH516	ARPFM-10	2	10	3	26	6.5	M6	9.8	5	14.5	7	ZCFW-100-R...
FH517	ARPFM-12		12	4								
FH518	ARPFM-16		16	5	32	8.5	M8	12.8	6	17	10	ZCFW-160-R...
FH519	ARPFM-20		20	6	38	10.5	M10	17.8		19	15	ZCFW-200-R...
FH520	ARPFM-25		25	8		12.5	M12	20.8	7	22	17	ZCFW-250-R...
FH521	ARPFM-32		32	10	43	17	M16	28.8		23	22	ZCFW-320-R...



Parts	Clamp Screw				Wrench	
	Diameter	ID-Code	Item-Code	Tightening torque	ID-Code	Item-Code
 ARPF-... / ARPFM-...	8	ET153	581-141	1.5 Nm	ET13	104-T8
	10	ET154	581-142	2.0 Nm	ET11	104-T10
	12	ET155	581-143	5.0 Nm	ET14	105-T20
	16	ET156	581-144	5.0 Nm		
 ARPF-... / ARPFM-...	20	ET157	581-145	7.0 Nm	ET9	101-T25S
	25	ET168	581-146	7.0 Nm	ET167	105-T30A
	32	ET169	581-147	7.0 Nm		

Indexable Milling Tools | Grades Overview

INSERTS | Radius High Precision Finish

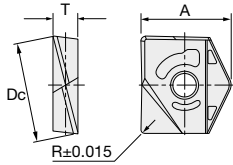
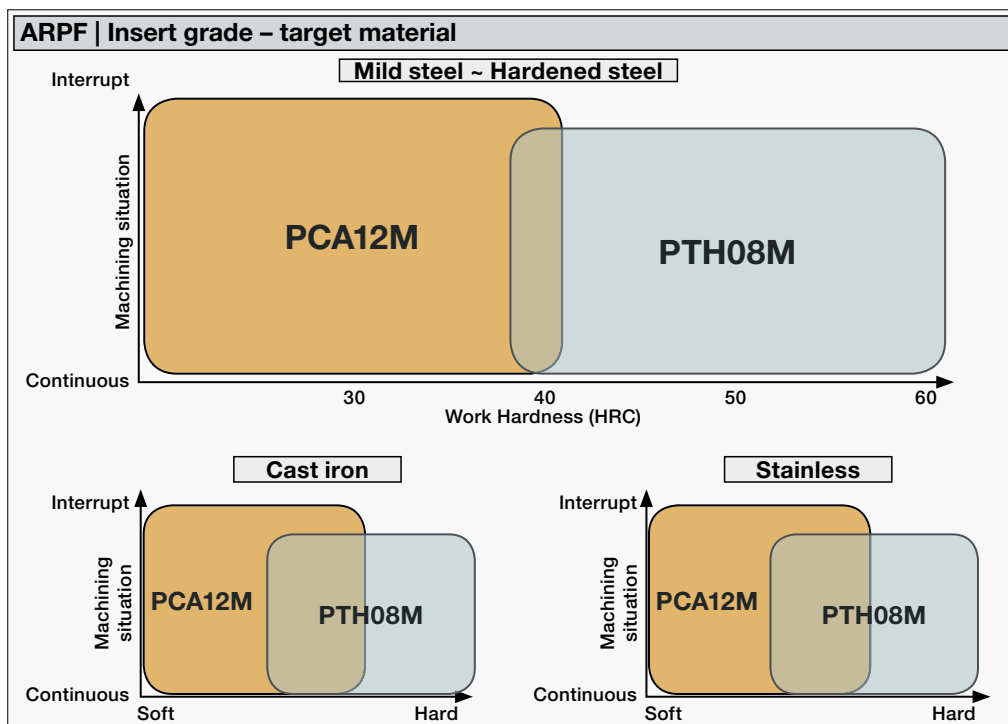


Fig. 1: ZCFW



Item Code	Size				Grade		Geometry					
	Dc	R	A	T	PCA12M	PTH08M						
ZCFW-080-03	8	0.3	9.7	2.1	WF551	WF286	Fig-1					
ZCFW-080-05		0.5			WF605	WF287						
ZCFW-080-10		1.0			WF552	WF288						
ZCFW-100-03		10			0.3	12		2.7	WF553	WF289		
ZCFW-100-05	0.5		WF606	WF290								
ZCFW-100-10	1.0		WF554	WF291								
ZCFW-100-15	1.5		WF555	WF292								
ZCFW-100-20	2.0	WF556	WF293	12	3.2	3.2		WF557	WF294			
ZCFW-120-03	0.3	14.6	3.2					WF607	WF295			
ZCFW-120-05	0.5							WF558	WF296			
ZCFW-120-10	1.0							WF559	WF297			
ZCFW-120-15	1.5				WF560	WF298						
ZCFW-120-20	2.0	WF561	WF300		16	4.2		4.2	WF652	WF299		
ZCFW-120-30	3.0	16.6	4.2						WF608	WF301		
ZCFW-160-03	0.3								16.6	4.2	WF562	WF302
ZCFW-160-05	0.5										WF563	WF303
ZCFW-160-10	1.0					WF564		WF304				
ZCFW-160-15	1.5	WF565	WF306									
ZCFW-160-20	2.0	19.9	5.2		WF609	WF307		20	5.2	WF566	WF308	
ZCFW-160-30	3.0			19.9	5.2	WF567				WF309		
ZCFW-200-03	0.3					19.9				5.2	WF568	WF310
ZCFW-200-05	0.5										19.9	5.2
ZCFW-200-10	1.0	22.6	6.2						WF610			
ZCFW-200-15	1.5			22.6	6.2				WF611			
ZCFW-200-20	2.0					22.6			6.2	WF612		
ZCFW-200-30	3.0									22.6	6.2	WF613
ZCFW-250-03	0.3	22.6	6.2									WF655
ZCFW-250-05	0.5			22.6	6.2							WF614
ZCFW-250-10	1.0					22.6		6.2	WF615			WF318
ZCFW-250-20	2.0								22.6	6.2	WF616	WF319
ZCFW-250-30	3.0	27.2	7.2				WF617				WF320	
ZCFW-320-03	0.3			27.2	7.2		WF618				WF321	
ZCFW-320-05	0.5					27.2	7.2	WF619			WF322	
ZCFW-320-10	1.0							27.2	7.2	WF620	WF323	
ZCFW-320-20	2.0	27.2	7.2							WF621	WF324	
ZCFW-320-30	3.0			27.2	7.2					WF622	WF325	



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