

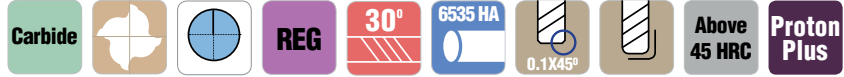


4 Flute

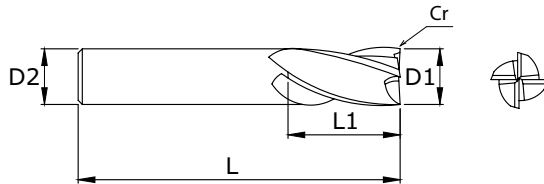
Centre cutting Proton Plus end mill for 45-60 HRC steel



END MILLS



H1-H3



Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Cr (mm)	EDP No
3	12	38	3	-	FBK0503424
3	12	38	3	0.5	FBK0503425
3	12	38	3	1.0	FBK0503426
4	14	51	4	-	FBK0503427
4	14	51	4	0.5	FBK0503428
4	14	51	4	1.0	FBK0503429
5	15	60	5	-	FBK0503430
5	15	60	5	0.5	FBK0503431
5	15	60	5	1.0	FBK0503432
6	15	60	6	-	FBK0503433
6	15	60	6	0.5	FBK0503434
6	15	60	6	1.0	FBK0503435
8	19	60	8	-	FBK0503436
8	19	60	8	0.5	FBK0503437
8	19	60	8	1.0	FBK0503438
10	22	75	10	-	FBK0503439
10	22	75	10	0.5	FBK0503440
10	22	75	10	1.0	FBK0503441
12	22	76	12	-	FBK0503442
12	22	76	12	0.5	FBK0503443
12	22	76	12	1.0	FBK0503444
16	32	100	16	-	FBK0503445
16	32	100	16	0.5	FBK0503446
16	32	100	16	1.0	FBK0503447



Solid Carbide End Mills

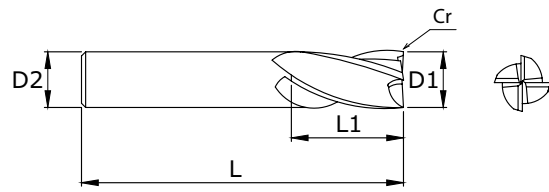
Proton Plus-L Series

**4 Flute**

**Centre cutting Proton Plus end mill 45-60 HRC for steel**



END MILLS



H1-H3

Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Cr (mm)	EDP No
3	12	60	3	-	FBK0503448
3	12	60	3	0.5	FBK0503449
3	12	60	3	1.0	FBK0503450
4	14	76	4	-	FBK0503451
4	14	76	4	0.5	FBK0503452
4	14	76	4	1.0	FBK0503453
5	15	76	5	-	FBK0503454
5	15	76	5	0.5	FBK0503455
5	15	76	5	1.0	FBK0503456
6	20	80	6	-	FBK0503457
6	20	80	6	0.5	FBK0503458
6	20	80	6	1.0	FBK0503459
8	25	80	8	-	FBK0503460
8	25	80	8	0.5	FBK0503461
8	25	80	8	1.0	FBK0503462
10	25	100	10	-	FBK0503463
10	25	100	10	0.5	FBK0503464
10	25	100	10	1.0	FBK0503465
12	30	102	12	-	FBK0503466
12	30	102	12	0.5	FBK0503467
12	30	102	12	1.0	FBK0503468
16	40	150	16	-	FBK0503469
16	40	150	16	0.5	FBK0503470
16	40	150	16	1.0	FBK0503471



Solid Carbide End Mills

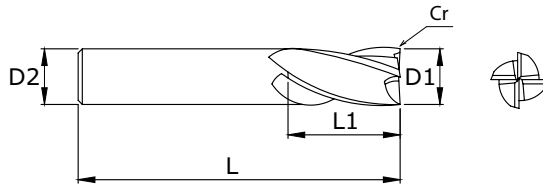
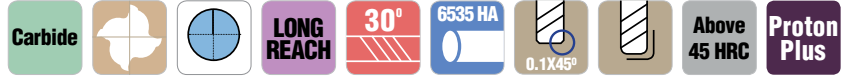
Proton Plus-LR Series

4 Flute

Centre cutting Proton Plus end mill for 45-60 HRC



END MILLS



H1-H3

Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Cr (mm)	EDP No
6	25	100	6	-	FBK0503472
6	25	100	6	0.50	FBK0503473
6	25	100	6	1.00	FBK0503474
8	25	100	8	-	FBK0503475
8	25	100	8	0.50	FBK0503476
8	25	100	8	1.00	FBK0503477
10	30	150	10	-	FBK0503478
10	30	150	10	0.50	FBK0503479
10	30	150	10	1.00	FBK0503480
12	30	150	12	-	FBK0503481
12	30	150	12	0.50	FBK0503482
12	30	150	12	1.00	FBK0503483



Solid Carbide End Mills


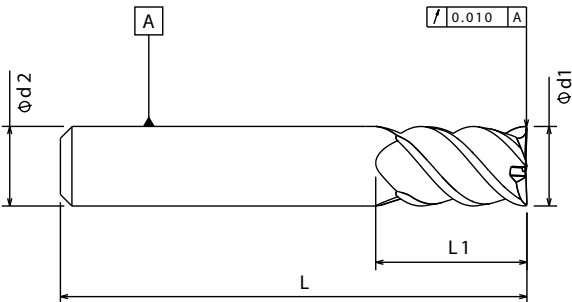
Proton Plus Series

4 Flute

Centre cutting Proton Plus end mill for 45-60 HRC with 50° helix



END MILLS

					<b>H1-H3</b>
					Unit : mm
ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Z	EDP No
3	5	50	6	4	FBK0508765
4	6	50	6	4	FBK0508766
5	8	50	6	4	FBK0508767
6	9	50	6	4	FBK0508768
8	12	63	8	4	FBK0508769
10	15	76	10	4	FBK0508770
12	18	76	12	4	FBK0508771
16	24	89	16	4	FBK0508772
20	30	104	20	4	FBK0508773
25	38	121	25	5	FBK0508774



Solid Carbide End Mills

Proton Plus-Long Flute Series

4 Flute

Centre cutting Proton Plus end mill for 45-60 HRc with 50° helix



Carbide



LONG

50°

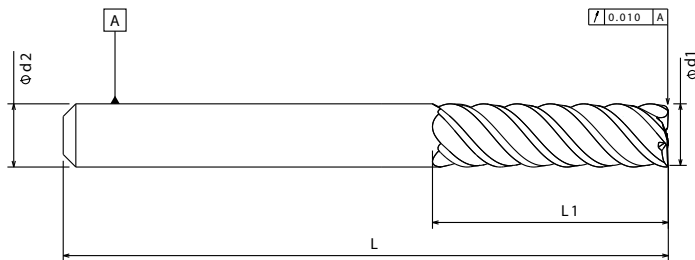
6535 HA

0.1X45°

Above 45 HRC

Proton Plus

END MILLS



H1-H3

Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Z (mm)	EDP No
6	21	76	6	4	FBK0508775
8	28	100	8	4	FBK0508776
10	35	100	10	5	FBK0508777
12	42	125	12	6	FBK0508778
16	56	125	16	6	FBK0508779
20	70	150	20	6	FBK0508780
25	88	150	25	6	FBK0508781



Solid Carbide End Mills

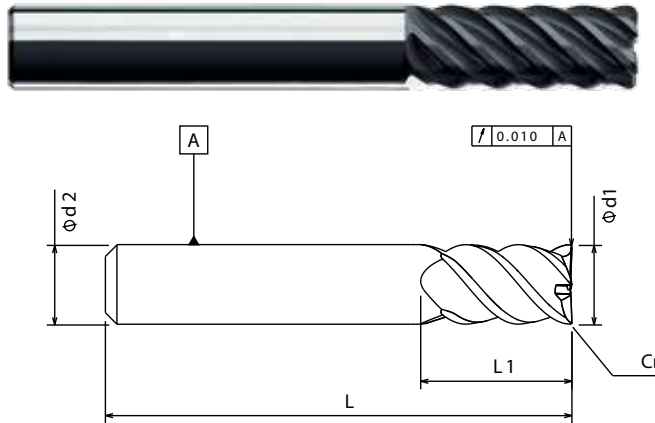
Proton Plus-Cr Series

4 Flute

Centre cutting proton plus end mill for 45-60 HRC with 50° helix



END MILLS



H1-H3

Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	Cr (mm)	EDP No
3	4.5	50	6	0.25	FBK0508851
3	4.5	50	6	0.50	FBK0508852
4	6	50	6	0.25	FBK0508853
4	6	50	6	0.50	FBK0508854
5	8	50	6	0.25	FBK0508855
5	8	50	6	0.50	FBK0508856
6	6	50	6	0.25	FBK0508857
6	6	50	6	0.50	FBK0508858
6	6	50	6	0.75	FBK0508859
6	6	50	6	1.00	FBK0508860
8	12	63	8	0.50	FBK0508861
8	12	63	8	0.75	FBK0508862
8	12	63	8	1.00	FBK0508863
8	12	63	8	1.50	FBK0508864
10	15	76	10	0.50	FBK0508865
10	15	76	10	1.00	FBK0508866
10	15	76	10	1.50	FBK0508867
10	15	76	10	2.00	FBK0508868
12	18	76	12	0.50	FBK0508869
12	18	76	12	1.00	FBK0508870
12	18	76	12	1.50	FBK0508871
12	18	76	12	2.00	FBK0508872
16	24	89	16	0.50	FBK0508873
16	24	89	16	1.50	FBK0508874
16	24	89	16	2.00	FBK0508875
20	30	104	20	0.50	FBK0508876
20	30	104	20	1.00	FBK0508877
20	30	104	20	2.00	FBK0508878



Solid Carbide End Mills

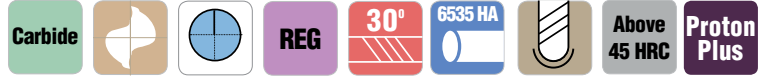
Proton Plus Series

2 Flute

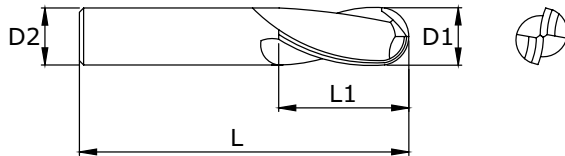
Centre cutting proton plus ball nose end mill for 45-60 HRc Steel



END MILLS



H1-H3



Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	EDP No
1	2	60	4	FBK0501561
1.5	3	60	4	FBK0501562
2	4	60	4	FBK0501563
2.5	4	60	4	FBK0501564
3	5	60	4	FBK0501565
4	6	60	4	FBK0501566
5	4	80	6	FBK0501571
6	10	60	6	FBK0501553
8	16	60	8	FBK0501554
10	19	75	10	FBK0501555
12	22	80	12	FBK0501556



Solid Carbide End Mills

Proton Plus Series

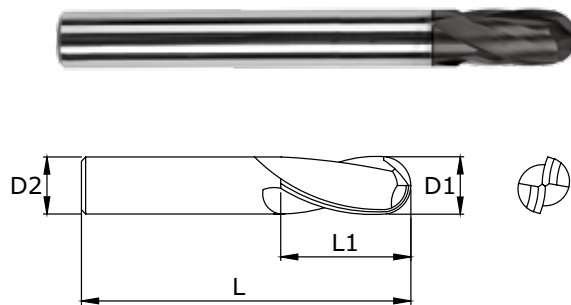
**2 Flute**

**Centre cutting proton plus ball nose end mill for 45-60 HRc**



END MILLS

H1-H3



Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	EDP No
1	2	80	4	FBK0501567
2	3	80	4	FBK0501568
3	4	80	6	FBK0501569
4	4	80	6	FBK0501570
6	10	80	6	FBK0501557
8	16	80	8	FBK0503390
10	19	100	10	FBK0501559
10	25	102	10	FBK0503513
12	22	100	12	FBK0501560





Solid Carbide End Mills

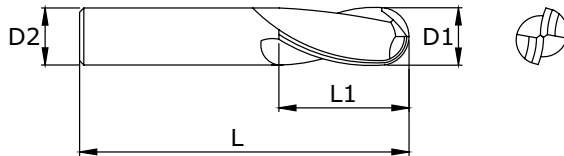
Proton Plus Series

2 Flute

Centre cutting proton plus ball nose end mill for 45-60 HRc



END MILLS



H1-H3

Unit : mm

ØD1 (mm)	L1 (mm)	L (mm)	ØD2 (mm)	EDP No
6	12	102	6	FBK0503367
8	16	100	8	FBK0501558
10	32	152	10	FBK0503912
12	32	152	12	FBK0503913



## Solid Carbide End Mills

### Cutting speed & feed rate chart

Centre cutting Proton Plus end mill for 45-60 HRc  
 Centre cutting Proton Plus ball nose end mill for 45-60 HRc Steel

Material group	Hardness	Cutting speed	Coolant
	HRc	Vc m/min	
H1	48-50 HRc	120-150	min.lub.
H2	50-55 HRc	150-180	min.lub.
H3	55-70 HRc	180-200	min.lub.

#### Advantages

- Higher tool life
- Consistency
- Better surface finish



#### Tips:

- All suggested Parameters are starting values and they may be increased based on the rigidity of the setup
- If ap and ae are lesser than the recommended values the feed rates can be increased

FBK0501557		
Workpiece material: H13, 52HRc		
	Competitor	Totem
Ø	6mm	6mm
Z	2 Flutes	2 Flutes
Vc	226 m/min	226 m/min
n	12000 rpm	12000 rpm
Fz	0.08 mm/t	0.08 mm/t
Vf	2000mm/min	2000mm/min
ap	0.15mm	0.15mm
ae	0.15mm	0.15mm
Coolant	Air	Air
Q	45mm <sup>3</sup> /min	45mm <sup>3</sup> /min
Tool Life	13 Hrs	21 Hrs

Ød (mm)	ap max. (mm)	ae max. (mm)	fz (mm/tooth)
1	0.04	0.07	0.015-0.025
1.5	0.06	0.10	0.022-0.032
2	0.08	0.20	0.030-0.040
2.5	0.10	0.25	0.040-0.050
3	0.12	0.30	0.050-0.060
4	0.16	0.40	0.071-0.081
5	0.20	0.50	0.078-0.088
6	0.24	0.60	0.104-0.111
8	0.32	0.80	0.131-0.141
10	0.40	1.00	0.158-0.168
12	0.48	1.20	0.213-0.223
16	0.56	1.50	0.245-0.255
20	0.64	2.00	0.280-0.290



## Solid Carbide End Mills

### HSM Series (32-45 HRc)

END MILLS



#### Features

- Superior micro grain structure raw material
- Wear resistant grade
- Same tool for Roughing and Finishing for Mould Machining
- Ideal to machine upto 42 HRc

#### Functions

- Operates at high cutting speeds on Moulds

#### Benefits

- Higher Tool Life and consistency