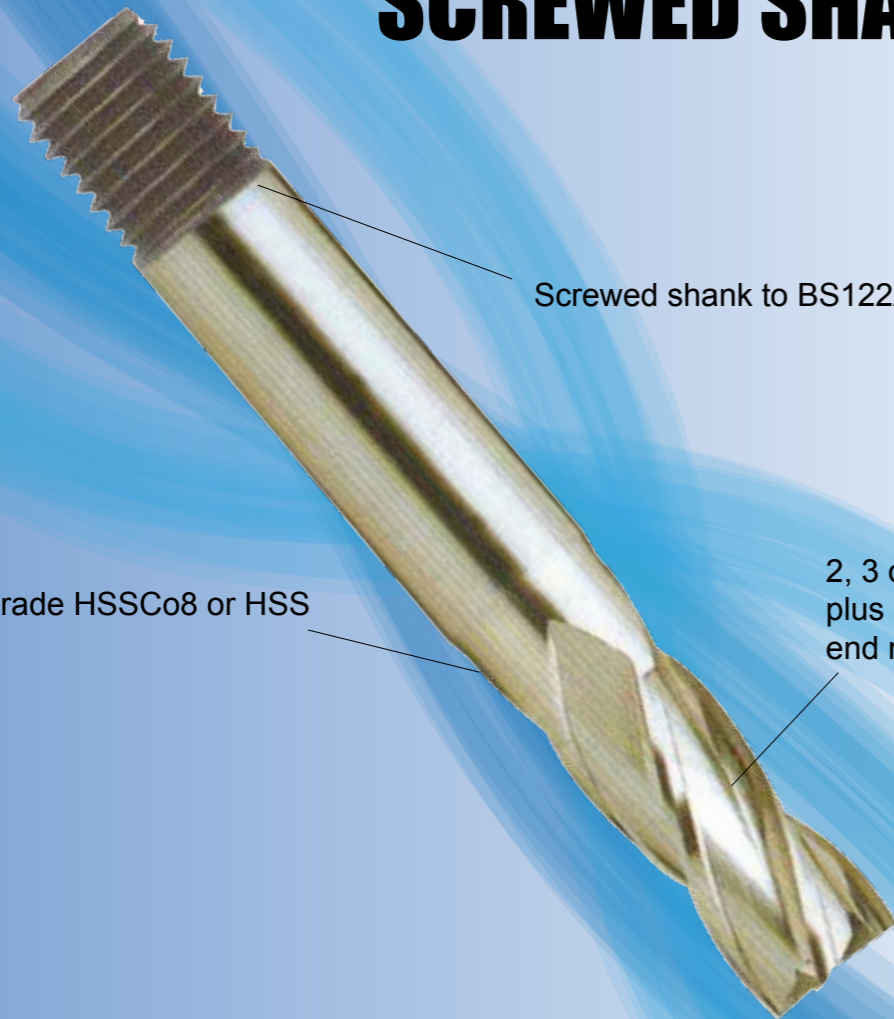


**SUPERIOR PERFORMANCE**



# END MILLS SCREWED SHANK



Screwed shank to BS122/4

Premium grade HSSCo8 or HSS substrate.

2, 3 or Multi flute, plus roughing end mills.

Multi flute end mills are centre cutting up to 20mm.

**IDEAL FOR MATERIAL GROUPS**



# HSSCo & HSS SCREWED SHANK















8% Cobalt and HSS milling cutters for general use on a variety of materials



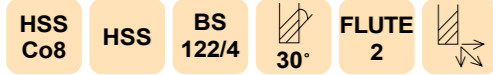
CLARKSON GmbH  
Heinrich-Hertz Str.52  
40699 Erkrath

Tel.:0211/72003-0  
Fax:0211/72003-33  
Email:info@clarkson.de  
Web: www.clarkson.de

●: Excellent ○: Good

P				H		M			K				S					N				O			2-FLUTE END MILLS										
11	12	13	14	15	16	21	22	23	31	32	33	34	41	42	43	51	52	53	61	62	63	64	71	72	73	74	81	82	83	Artikel Nummer	Europa Code	Clarkson Code	Item	Description	Page No.
○	○	○	○																				○	○	○				721 1721	301201 301202	10M/13M 10PM/13PM		Standard Length HSSCo & HSS ø1.5mm - 50.0mm	P.392-393	
○	○	○	○																				○	○	○				722 1722	302201 302202	11M/16M 11PM		Long Series HSSCo & HSS ø2.0mm - 50.0mm	P.394-395	
○	○	○	○																				○	○	○				1741	313201 313202	14M		Standard Length HSSCo & HSS B/N ø2.0mm - 30.0mm	P.402	
○	○	○	○																				○	○	○				1742	314201 314202	27M		Long Series HSSCo & HSS B/N ø3.0mm - 25.0mm	P.403	
<b>3-FLUTE END MILLS</b>																																			
○	○	○	○																				○	○	○				1731	304202	-		Standard Length HSSCo ø3.0mm - 50.0mm	P.396	
○	○	○	○																				○	○	○				1732	305202	-		Long Series HSSCo ø3.0mm - 50.0mm	P.397	
																							○	○	○				5113	124202	776A		Standard Length Alu Roughing Coarse ø6.0mm - 30.0mm	P.407	
<b>MULTI-FLUTE END MILLS</b>																																			
○	○	○	○																				○	○	○				711 1711	307201 307202	01M/03M 01PM/03PM		Standard Length HSSCo & HSS ø2.0mm - 50.0mm	P.398-399	
○	○	○	○																				○	○	○				712 1712	308201 308202	02M/04M 02PM/04PM		Long Series HSSCo & HSS ø3.0mm - 50.0mm	P.400-401	
○	○	○	○																				○	○	○				511	118202	776M/777M		Standard Length Roughing Coarse ø6.0mm - 50.0mm	P.404	
○	○	○	○																				○	○	○				512	119202	776L/777L		Long Series Roughing Coarse ø6.0mm - 40.0mm	P.405	
○	○	○	○																				○	○	○				5111	121202	776M		Standard Length Roughing Fine ø6.0mm - 32.0mm	P.406	
																																	Imperial End Mills	P.408	
																																	Cutting Data	P.409	

## 2 FLUTE, STANDARD SERIES



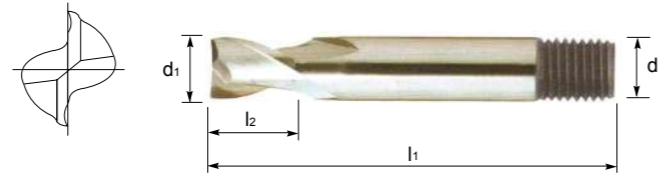
Series No. 301202, 301201

Clarkson No. 10PM/13PM, 10M/13M

Artikel Nr.: 721 / 1721

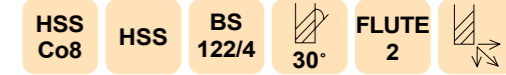
TiALN Beschichtung: 721-EX / 1721-EX

► cutting conditions : p.410-411



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
1.5	6	2.5	48.5	3012020150	–	10PM03	–
2.0	6	3	49	3012020200	–	10PM04	–
2.5	6	4.5	51	3012020250	–	10PM05	–
3.0	6	7	51	3012020300	–	10PM06	–
3.5	6	7.5	52.5	3012020350	–	10PM07	–
4.0	6	9.5	52.5	3012020400	–	10PM08	–
4.5	6	9.5	52.5	3012020450	–	10PM09	–
5.0	6	9.5	52.5	3012020500	–	10PM10	–
5.5	6	11	55.5	3012020550	–	10PM11	–
6.0	6	11	56.5	3012020600	–	10PM12	–
6.5	10	11	58.5	3012020650	3012010650	10PM13	10M13
7.0	10	11	58.5	3012020700	3012010700	10PM14	10M14
7.5	10	11	58.5	3012020750	3012010750	10PM15	10M15
8.0	10	12.5	59.5	3012020800	3012010800	10PM16	10M16
8.5	10	14.5	60.5	3012020850	3012010850	10PM17	10M17
9.0	10	14.5	60.5	3012020900	3012010900	10PM18	10M18
9.5	10	14.5	60.5	3012020950	3012010950	–	10M19
10.0	10	14.5	60.5	3012021000	3012011000	10PM20	10M20
10.5	12	17.5	65	3012021050	3012011050	–	10M21
11.0	12	17.5	65	3012021100	3012011100	10PM22	10M22
11.5	12	17.5	65	3012021150	3012011150	–	10M23
12.0	12	19	66.5	3012021200	3012011200	10PM24	10M24
13.0	12	19	66.5	3012021300	3012011300	10PM26	10M26
14.0	12	22	68.5	3012021400	3012011400	10PM28	10M28
15.0	16	22	72	3012021500	3012011500	10PM30	10M30
16.0	16	22	72	3012021600	3012011600	10PM32	10M32
17.0	16	24	72	3012021700	3012011700	10PM34	10M34
18.0	16	24	72	3012021800	3012011800	10PM36	10M36
19.0	16	25.5	77	3012021900	3012011900	10PM38	10M38
20.0	16	25.5	77	3012022000	3012012000	10PM40	10M40

## 2 FLUTE, STANDARD SERIES

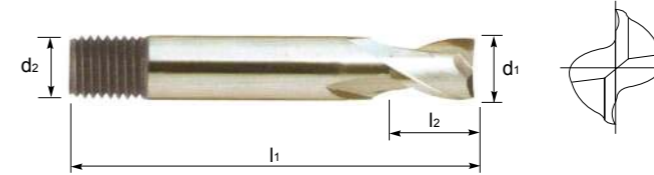


Series No. 301202, 301201

Clarkson No. 10PM/13PM, 10M/13M

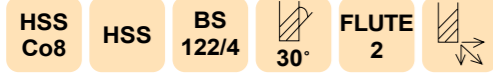
Artikel Nr.: 721 / 1721

TiALN Beschichtung: 721-EX / 1721-EX



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
21.0	25	25.5	98.5	3012022100	3012012100	–	10M42
22.0	25	25.5	100	3012022200	3012012200	10PM44	10M44
23.0	25	25.5	101.5	3012022300	3012012300	–	10M46
24.0	25	25.5	103	3012022400	3012012400	10PM48	10M48
25.0	25	27	95	3012022500	3012012500	10PM50	10M50
26.0	25	27	95	3012022600	3012012600	10PM52	10M52
27.0	25	28.5	93.5	3012022700	3012012700	–	10M54
28.0	25	30	95	3012022800	3012012800	10PM56	10M56
29.0	25	30	93.5	3012022900	3012012900	–	10M58
30.0	25	30	93.5	3012023000	3012013000	10PM60	10M60
32.0	32	35	117.5	3012023200	3012013200	13PM64	13M64
34.0	32	35	119	3012023400	3012013400	–	–
35.0	32	39.5	111	3012023500	3012013500	–	–
36.0	32	39.5	111	3012023600	3012013600	–	–
38.0	32	43	114.5	3012023800	3012013800	13PM76	–
40.0	32	46	117.5	3012024000	3012014000	13PM80	13M80
42.0	32	47.5	117.5	3012024200	3012014200	–	13M84
44.0	32	47.5	119	3012024400	3012014400	–	–
45.0	32	47.5	119	3012024500	3012014500	13PM90	–
50.0	32	51	117.5	3012025000	3012015000	13PM10	13M10

## 2 FLUTE, LONG SERIES

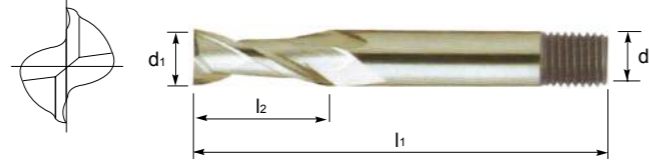


Series No. 302202, 302201

Clarkson No. 11PM, 11M/16M

Artikel Nr.: 722 / 1722

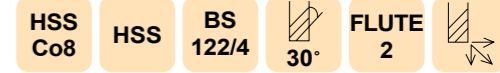
TiALN Beschichtung: 722-EX / 1722-EX



► cutting conditions : p.410.411

Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
2.0	6	3	51	3022020200	–	11PM04	–
2.5	6	6.5	54	3022020250	–	11PM05	–
3.0	6	11	60.5	3022020300	–	11PM06	–
3.5	6	12.5	66.5	3022020350	–	11PM07	–
4.0	6	12.5	66.5	3022020400	–	11PM08	–
4.5	6	12.5	66.5	3022020450	–	11PM09	–
5.0	6	12.5	70	3022020500	–	11PM10	–
5.5	6	16	76	3022020550	–	11PM11	–
6.0	6	16	76	3022020600	–	11PM12	–
6.5	10	16	76	3022020650	3022010650	11PM13	11M13
7.0	10	16	76	3022020700	3022010700	11PM14	11M14
7.5	10	16	76	3022020750	3022010750	11PM15	11M15
8.0	10	19	79.5	3022020800	3022010800	11PM16	11M16
8.5	10	22	82.5	3022020850	3022010850	–	–
9.0	10	22	82.5	3022020900	3022010900	11PM18	11M18
9.5	10	22	82.5	3022020950	3022010950	–	–
10.0	10	22	82.5	3022021000	3022011000	11PM20	11M20
11.0	12	22	89	3022021100	3022011100	–	11M22
12.0	12	25.5	95	3022021200	3022011200	11PM24	11M24
13.0	12	25.5	95	3022021300	3022011300	–	11M26
14.0	12	28.5	101.5	3022021400	3022011400	11PM28	11M28
15.0	16	31.5	108	3022021500	3022011500	–	11M30
16.0	16	31.5	108	3022021600	3022011600	11PM32	11M32
17.0	16	35	114.5	3022021700	3022011700	–	11M34
18.0	16	35	114.5	3022021800	3022011800	11PM36	11M36
19.0	16	38	120.5	3022021900	3022011900	–	11M38
20.0	16	38	120.5	3022022000	3022012000	11PM40	11M40
21.0	25	38	139	3022022100	3022012100	–	–
22.0	25	41.5	140	3022022200	3022012200	11PM44	11M44
24.0	25	41.5	152.5	3022022400	3022012400	11PM48	11M48

## 2 FLUTE, LONG SERIES

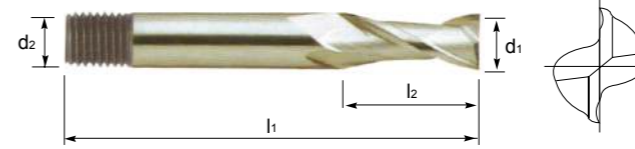


Series No. 302202, 302201

Clarkson No. 11PM, 11M/16M

Artikel Nr.: 722 / 1722

TiALN Beschichtung: 722-EX / 1722-EX



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
25.0	25	44.5	159	3022022500	3022012500	11PM50	11M50
26.0	25	44.5	159	3022022600	3022012600	–	11M52
27.0	25	44.5	159	3022022700	3022012700	–	11M54
28.0	25	47.5	159	3022022800	3022012800	–	11M56
30.0	25	51	159	3022023000	3022013000	11PM60	11M60
32.0	32	51	159	3022023200	3022013200	–	16M64
34.0	32	51	159	3022023400	3022013400	–	–
35.0	32	54	159	3022023500	3022013500	–	16M70
36.0	32	54	159	3022023600	3022013600	–	16M72
38.0	32	57	159	3022023800	3022013800	–	–
40.0	32	63.5	159	3022024000	3022014000	–	16M80
42.0	32	63.5	159	3022024200	3022014200	–	–
44.0	32	63.5	159	3022024400	3022014400	–	–
45.0	32	63.5	159	3022024500	3022014500	–	16M90
50.0	32	63.5	159	3022025000	3022015000	–	16M10

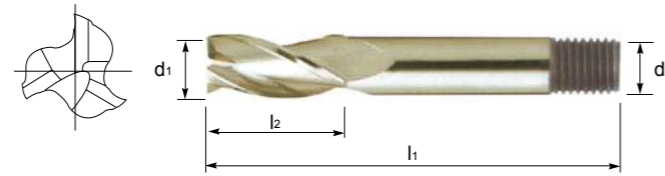
### 3 FLUTE, STANDARD SERIES



Series No. 304202

Artikel Nr.: 1731

TiALN Beschichtung: 1731-EX



▶ cutting conditions : p.412-413

Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
3.0	6	9.5	54	3042020300	-
3.5	6	12.5	57	3042020350	-
4.0	6	12.5	57	3042020400	-
4.5	6	12.5	57	3042020450	-
5.0	6	16	60.5	3042020500	-
5.5	6	16	60.5	3042020550	-
6.0	6	16	60.5	3042020600	-
8.0	10	18	63.5	3042020800	-
10.0	10	21	66.5	3042021000	-
12.0	12	24	70	3042021200	-
14.0	12	28.5	74.5	3042021400	-
16.0	16	26.5	77	3042021600	-
18.0	16	35	80	3042021800	-
20.0	16	38	83.5	3042022000	-
22.0	25	41.5	98.5	3042022200	-
24.0	25	41.5	98.5	3042022400	-
25.0	25	44.5	101.5	3042022500	-
26.0	25	43	101.5	3042022600	-
28.0	25	46	104.5	3042022800	-
30.0	25	46	104.5	3042023000	-
32.0	32	51	112.5	3042023200	-
35.0	32	54	116	3042023500	-
38.0	32	54	116	3042023800	-
40.0	32	55.5	117.5	3042024000	-
45.0	32	57	119	3042024500	-
50.0	32	65	127	3042025000	-

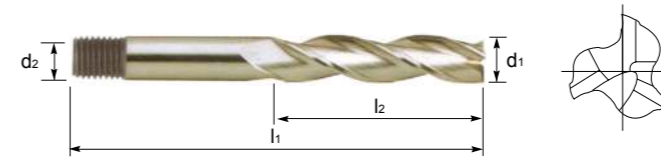
### 3 FLUTE, LONG SERIES



Series No. 305202

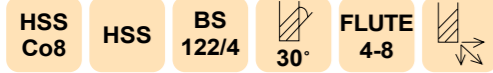
Artikel Nr.: 1732

TiALN Beschichtung: 1732-EX



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
3.0	6	19	63.5	3052020300	-
3.5	6	25.5	70	3052020350	-
4.0	6	25.5	70	3052020400	-
4.5	6	25.5	70	3052020450	-
5.0	6	31.5	76	3052020500	-
5.5	6	31.5	76	3052020550	-
6.0	6	31.5	76	3052020600	-
8.0	10	34	79.5	3052020800	-
10.0	10	37	82.5	3052021000	-
12.0	12	49.5	95	3052021200	-
14.0	12	57	101.5	3052021400	-
16.0	16	58.5	108.5	3052021600	-
18.0	16	70	115	3052021800	-
20.0	16	76	121.5	3052022000	-
22.0	25	85.5	143	3052022200	-
24.0	25	92	149	3052022400	-
25.0	25	100	157	3052022500	-
26.0	25	98.5	157	3052022600	-
28.0	25	98.5	157	3052022800	-
30.0	25	98.5	157	3052023000	-
32.0	32	98.5	163.5	3052023200	-
35.0	32	98.5	163.5	3052023500	-
38.0	32	98.5	163.5	3052023800	-
40.0	32	98.5	163.5	3052024000	-
45.0	32	98.5	163.5	3052024500	-
50.0	32	98.5	163.5	3052025000	-

# MULTI FLUTE, STANDARD SERIES



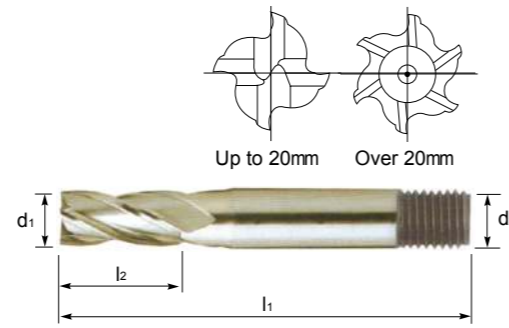
**Series No. 307202, 307201**

**Clarkson No. 01PM/03PM, 01M/03M**

**Artikel Nr.: 711 / 1711TiALN**

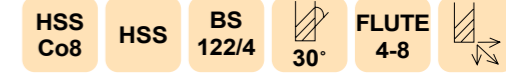
**Beschichtung: 711-EX / 1711-EX**

► cutting conditions : p.414-415



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code		Clarkson Code	
					HSS Co8	HSS	HSS Co8	HSS
2.0	6	4	51	4	3072020200	-	-	-
2.5	6	6.5	51	4	3072020250	-	01PM05	-
3.0	6	9.5	54	4	3072020300	-	01PM06	-
3.5	6	12.5	57	4	3072020350	-	01PM07	-
4.0	6	12.5	57	4	3072020400	-	01PM08	-
4.5	6	12.5	57	4	3072020450	-	01PM09	-
5.0	6	16	60.5	4	3072020500	-	01PM10	-
5.5	6	16	60.5	4	3072020550	-	01PM11	-
6.0	6	16	60.5	4	3072020600	-	01PM12	-
6.5	10	16	60.5	4	3072020650	3072010650	01PM13	01M13
7.0	10	16	60.5	4	3072020700	3072010700	01PM14	01M14
7.5	10	18	63.5	4	3072020750	3072010750	-	-
8.0	10	18	63.5	4	3072020800	3072010800	01PM16	01M16
8.5	10	21	66.5	4	3072020850	3072010850	-	01M17
9.0	10	21	66.5	4	3072020900	3072010900	01PM18	01M18
9.5	10	21	66.5	4	3072020950	3072010950	-	01M19
10.0	10	21	66.5	4	3072021000	3072011000	01PM20	01M20
10.5	12	19	66.5	4	3072021050	3072011050	-	01M21
11.0	12	19	66.5	4	3072021100	3072011100	01PM22	01M22
11.5	12	22.5	70	4	3072021150	3072011150	-	01M23
12.0	12	24	70	4	3072021200	3072011200	01PM24	01M24
13.0	12	24.5	70	4	3072021300	3072011300	01PM26	01M26
14.0	12	28.5	73.5	4	3072021400	3072011400	01PM28	01M28
15.0	16	26.5	77	4	3072021500	3072011500	01PM30	01M30
16.0	16	26.5	80	4	3072021600	3072011600	01PM32	01M32
17.0	16	32	80	4	3072021700	3072011700	01PM34	01M34
18.0	16	35	88	4	3072021800	3072011800	01PM36	01M36
19.0	16	38	83.5	4	3072021900	3072011900	01PM38	01M38
20.0	16	38	83.5	4	3072022000	3072012000	01PM40	01M40

# MULTI FLUTE, STANDARD SERIES

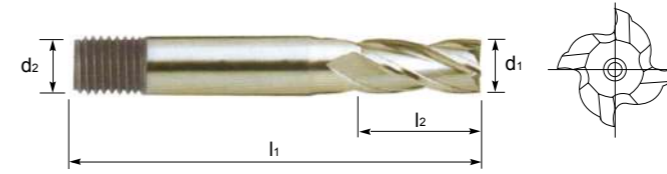


**Series No. 307202, 307201**

**Clarkson No. 01PM/03PM, 01M/03M**

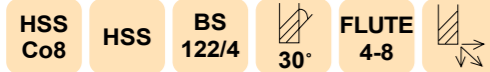
**Artikel Nr.: 711 / 1711**

**TiALN Beschichtung: 711-EX / 1711-EX**



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code		Clarkson Code	
					HSS Co8	HSS	HSS Co8	HSS
21.0	25	38.5	95	6	3072022100	3072012100	-	01M42
22.0	25	41.5	98.5	6	3072022200	3072012200	01PM44	01M44
23.0	25	41.5	98.5	6	3072022300	3072012300	-	01M46
24.0	25	41.5	98.5	6	3072022400	3072012400	01PM48	01M48
25.0	25	41.5	101.5	6	3072022500	3072012500	01PM50	01M50
26.0	25	43	101.5	6	3072022600	3072012600	01PM52	01M52
27.0	25	44	102	6	3072022700	3072012700	-	01M54
28.0	25	46	104.5	6	3072022800	3072012800	01PM56	01M56
29.0	25	46	105	6	3072022900	3072012900	-	-
30.0	25	46	104.5	6	3072023000	3072013000	01PM60	01M60
32.0	32	51	112.5	6	3072023200	3072013200	03PM64	03M64
33.0	32	51	112.5	6	3072023300	3072013300	-	-
34.0	32	51	112.5	6	3072023400	3072013400	-	-
35.0	32	54	116	6	3072023500	3072013500	03PM70	03M70
36.0	32	54	116	6	3072023600	3072013600	-	03M72
38.0	32	54	116	6	3072023800	3072013800	03PM76	03M76
40.0	32	55.5	117.5	8	3072024000	3072014000	03PM80	03M80
42.0	32	54	116	8	3072024200	3072014200	-	03M84
44.0	32	57	119	8	3072024400	3072014400	-	03M88
45.0	32	57	119	8	3072024500	3072014500	03PM90	03M90
50.0	32	65	127	8	3072025000	3072015000	03PM10	03M10

# MULTI FLUTE, LONG SERIES



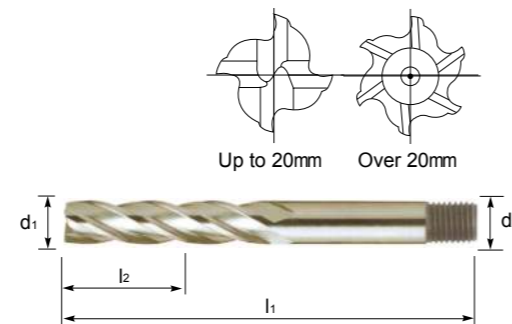
## Series No. 308202, 308201

Clarkson No. 02PM/04PM, 02M/04M

Artikel Nr.: 712 / 1712

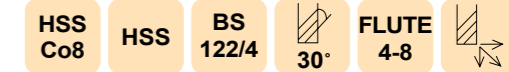
TiALN Beschichtung: 712-EX / 1712-EX

▶ cutting conditions : p.414-415



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code		Clarkson Code	
					HSS Co8	HSS	HSS Co8	HSS
3.0	6	19	63.5	4	3082020300	–	02PM06	–
3.5	6	25.5	70	4	3082020350	–	02PM07	–
4.0	6	25.5	70	4	3082020400	–	02PM08	–
4.5	6	25.5	70	4	3082020450	–	02PM09	–
5.0	6	31.5	76	4	3082020500	–	02PM10	–
5.5	6	31.5	76	4	3082020550	–	02PM11	–
6.0	6	31.5	76	4	3082020600	–	02PM12	–
6.5	10	35	79.5	4	3082020650	3082010650	–	02M13
7.0	10	34	79.5	4	3082020700	3082010700	02PM14	02M14
7.5	10	34	79.5	4	3082020750	3082010750	–	02M15
8.0	10	34	79.5	4	3082020800	3082010800	02PM16	02M16
8.5	10	37	82.5	4	3082020850	3082010850	–	02M17
9.0	10	37	82.5	4	3082020900	3082010900	02PM18	02M18
10.0	10	37	82.5	4	3082021000	3082011000	02PM20	02M20
11.0	12	41.5	89	4	3082021100	3082011100	–	02M22
12.0	12	49.5	95	4	3082021200	3082011200	02PM24	02M24
13.0	12	50	95	4	3082021300	3082011300	–	02M26
14.0	12	57	101.5	4	3082021400	3082011400	02PM28	02M28
15.0	16	58.5	108.5	4	3082021500	3082011500	02PM30	02M30
16.0	16	58.5	108.5	4	3082021600	3082011600	02PM32	02M32
17.0	16	67	115	4	3082021700	3082011700	–	02M34
18.0	16	70	115	4	3082021800	3082011800	02PM36	02M36
19.0	16	76	121.5	4	3082021900	3082011900	–	02M38
20.0	16	76	121.5	4	3082022000	3082012000	02PM40	02M40

# MULTI FLUTE, LONG SERIES

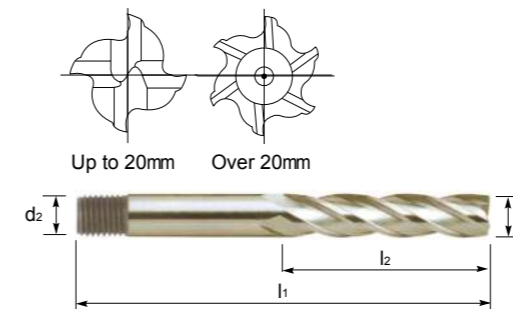


## Series No. 308202, 308201

Clarkson No. 02PM/04PM, 02M/04M

Artikel Nr.: 712 / 1712

TiALN Beschichtung: 712-EX / 1712-EX

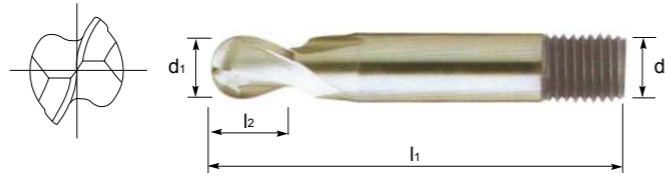


Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code		Clarkson Code	
					HSS Co8	HSS	HSS Co8	HSS
22.0	25	85.5	143	6	3082022200	3082012200	02PM44	02M44
23.0	25	92	149	6	3082022300	3082012300	–	–
24.0	25	92	149	6	3082022400	3082012400	02PM48	02M48
25.0	25	100	157	6	3082022500	3082012500	02PM50	02M50
26.0	25	98.5	157	6	3082022600	3082012600	02PM52	02M52
28.0	25	98.5	157	6	3082022800	3082012800	02PM56	02M56
29.0	25	98.5	157	6	3082022900	3082012900	–	–
30.0	25	98.5	157	6	3082023000	3082013000	02PM60	02M60
32.0	32	98.5	163.5	6	3082023200	3082013200	04PM64	04M64
34.0	32	98.5	163.5	6	3082023400	3082013400	–	–
35.0	32	98.5	163.5	6	3082023500	3082013500	04PM70	04M70
36.0	32	98.5	163.5	6	3082023600	3082013600	–	–
38.0	32	98.5	163.5	6	3082023800	3082013800	04PM76	04M76
40.0	32	98.5	163.5	8	3082024000	3082014000	04PM80	04M80
42.0	32	98.5	163.5	8	3082024200	3082014200	–	–
44.0	32	98.5	163.5	8	3082024400	3082014400	–	–
45.0	32	98.5	163.5	8	3082024500	3082014500	04PM90	04M90
50.0	32	98.5	163.5	8	3082025000	3082015000	04PM10	–

## 2 FLUTE, STANDARD SERIES, BALL NOSE

**Clarkson**

HSS Co8 HSS BS 122/4 30° FLUTE 2



**Series No. 313202, 313201**

**Clarkson No. 14M**

**Artikel Nr.: 741 / 1741TiALN**

**Beschichtung: 741-EX / 1741-EX**

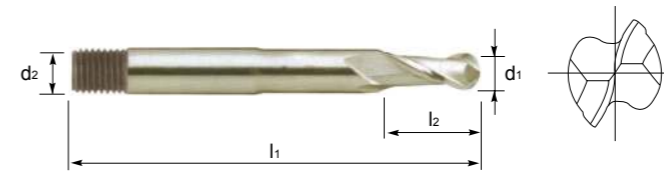
► cutting conditions : p.418

Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
2.0	6	3	49	3132020200	–	14M04	–
2.5	6	4.5	51	3132020250	–	14M05	–
3.0	6	7	51	3132020300	–	14M06	–
4.0	6	9.5	52.5	3132020400	–	14M08	–
5.0	6	9.5	52.5	3132020500	–	14M10	–
6.0	6	11	56.5	3132020600	–	14M12	–
7.0	10	11	58.5	3132020700	3132010700	–	14M14
8.0	10	12.5	59.5	3132020800	3132010800	–	14M16
9.0	10	14.5	58.5	3132020900	3132010900	–	14M18
10.0	10	14.5	60.5	3132021000	3132011000	–	14M20
11.0	12	17.5	65	3132021100	3132011100	–	14M22
12.0	12	19	66.5	3132021200	3132011200	–	14M24
13.0	12	19	66.5	3132021300	3132011300	–	14M26
14.0	12	22	68.5	3132021400	3132011400	–	14M28
15.0	16	22	72	3132021500	3132011500	–	14M30
16.0	16	22	72	3132021600	3132011600	–	14M32
17.0	16	24	73	3132021700	3132011700	–	14M34
18.0	16	24	74	3132021800	3132011800	–	14M36
19.0	16	25.5	77	3132021900	3132011900	–	14M38
20.0	16	25.5	77	3132022000	3132012000	–	14M40
22.0	25	25.5	100	3132022200	3132012200	–	14M44
24.0	25	25.5	103	3132022400	3132012400	–	14M48
25.0	25	28.5	97	3132022500	3132012500	–	14M50
26.0	25	28.5	97	3132022600	3132012600	–	14M52
28.0	25	30	95	3132022800	3132012800	–	14M56
30.0	25	30	93.5	3132023000	3132013000	–	14M60

## 2 FLUTE, LONG SERIES, BALL NOSE

**Clarkson**

HSS Co8 HSS BS 122/4 30° FLUTE 2



**Series No. 314202, 314201**

**Clarkson No. 27M**

**Artikel Nr.: 742 / 1742**

**TiALN Beschichtung: 742-EX / 1742-EX**

Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code		Clarkson Code	
				HSS Co8	HSS	HSS Co8	HSS
3.0	6	11	60.5	3142020300	–	27M06	–
4.0	6	12.5	66.5	3142020400	–	27M08	–
5.0	6	12.5	70	3142020500	–	27M10	–
6.0	6	16	76	3142020600	–	27M12	–
7.0	10	16	76	3142020700	3142010700	–	27M14
8.0	10	19	79.5	3142020800	3142010800	–	27M16
9.0	10	22	82.5	3142020900	3142010900	–	27M18
10.0	10	22	82.5	3142021000	3142011000	–	27M20
11.0	12	22	89	3142021100	3142011100	–	27M22
12.0	12	25.5	95	3142021200	3142011200	–	27M24
13.0	12	25.5	95	3142021300	3142011300	–	27M26
14.0	12	28.5	101.5	3142021400	3142011400	–	27M28
15.0	16	31.5	108	3142021500	3142011500	–	27M30
16.0	16	31.5	108	3142021600	3142011600	–	27M32
17.0	16	35	114.5	3142021700	3142011700	–	27M34
18.0	16	35	114.5	3142021800	3142011800	–	27M36
19.0	16	38	120.5	3142021900	3142011900	–	27M38
20.0	16	38	120.5	3142022000	3142012000	–	27M40
25.0	25	44.5	159	3142022500	3142012500	–	27M50



# MULTI FLUTE STANDARD LENGTH COARSE PITCH ROUGHING



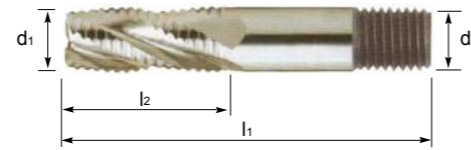
## Series No. 118202

Clarkson No. 776M/777M

Artikel Nr.: 511

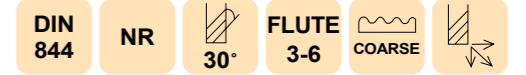
TiALN Beschichtung: 511-EX

▶ cutting conditions : p.416-417



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code	Clarkson Code
					HSS Co8	HSS Co8
6.0	6	13	57	3	1182020600	776M12G
7.0	10	16	66	3	1182020700	776M14G
8.0	10	19	69	3	1182020800	776M16G
9.0	10	19	69	3	1182020900	776M18G
10.0	10	22	72	4	1182021000	776M20G
11.0	12	22	79	4	1182021100	776M22G
12.0	12	26	83	4	1182021200	776M24G
13.0	12	26	83	4	1182021300	776M26G
14.0	12	26	83	4	1182021400	776M28G
15.0	12	26	83	4	1182021500	776M30G
16.0	16	32	92	4	1182021600	776M32G
17.0	16	32	92	4	1182021700	-
18.0	16	32	92	4	1182021800	776M36G
19.0	16	32	92	4	1182021900	-
20.0	16	38	98	4	1182029001	776M40G
20.0	20	38	104	5	1182022000	-
22.0	20	38	104	5	1182022200	776M44G
22.0	25	38	114	5	1182029002	-
24.0	25	45	121	5	1182022400	776M48G
25.0	25	45	121	5	1182022500	776M50G
26.0	25	45	121	6	1182022600	-
28.0	25	45	121	6	1182022800	776M56G
30.0	25	45	121	6	1182023000	776M60G
32.0	32	53	133	6	1182023200	777M64G
35.0	32	53	133	6	1182023500	777M70G
36.0	32	53	133	6	1182023600	777M72G
38.0	32	63	143	6	1182023800	777M76G
40.0	32	63	143	6	1182024000	777M80G
45.0	32	63	143	6	1182024500	777M90G
50.0	32	75	155	6	1182025000	-

# MULTI FLUTE LONG LENGTH COARSE PITCH ROUGHING

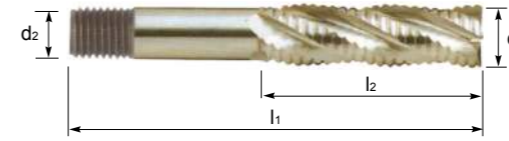


## Series No. 119202

Clarkson No. 776L/777L

Artikel Nr.: 512

TiALN Beschichtung: 512-EX



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code	Clarkson Code
					HSS Co8	HSS Co8
6.0	6	24	68	3	1192020600	776L12G
7.0	10	30	80	3	1192020700	776L14G
8.0	10	38	88	3	1192020800	776L16G
9.0	10	38	88	3	1192020900	776L18G
10.0	10	45	95	4	1192021000	776L20G
11.0	12	45	102	4	1192021100	776L22G
12.0	12	53	110	4	1192021200	776L24G
13.0	12	53	110	4	1192021300	-
14.0	12	53	110	4	1192021400	776L28G
15.0	12	53	110	4	1192021500	776L30G
16.0	16	63	123	4	1192021600	776L32G
17.0	16	63	123	4	1192021700	-
18.0	16	63	123	4	1192021800	776L36G
19.0	16	63	123	4	1192021900	-
20.0	16	75	135	4	1192029001	776L40G
20.0	20	75	141	4	1192022000	-
22.0	20	75	141	5	1192022200	776L44G
22.0	25	75	151	5	1192029002	-
24.0	25	90	166	5	1192022400	776L48G
25.0	25	90	166	5	1192022500	776L50G
26.0	25	90	166	6	1192022600	-
28.0	25	90	166	6	1192022800	776L56G
30.0	25	90	166	6	1192023000	776L60G
32.0	32	106	186	6	1192023200	777L64G
35.0	32	106	186	6	1192023500	777L70G
36.0	32	106	186	6	1192023600	777L72G
38.0	32	125	205	6	1192023800	777L76G
40.0	32	125	205	6	1192024000	777L80G

# MULTI FLUTE STANDARD LENGTH FINE PITCH ROUGHING



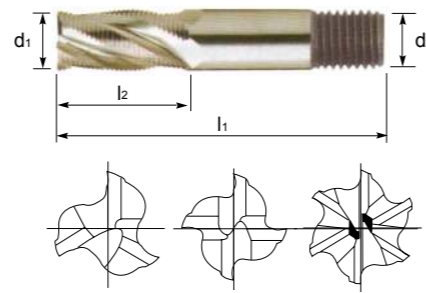
**Series No. 121202**

**Clarkson No. 776M**

**Artikel Nr.: 5111**

**TiALN Beschichtung: 5111-EX**

▶ cutting conditions : p.416-417



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	No. of Flute	Europa Code	Clarkson Code
					ORDER NO.	ORDER NO.
6.0	6	13	57	3	1212020600	776M12FP
8.0	10	19	69	3	1212020800	776M16FP
10.0	10	22	72	4	1212021000	776M20FP
12.0	12	26	83	4	1212021200	776M24FP
14.0	12	26	83	4	1212021400	776M28FP
16.0	16	32	92	4	1212021600	776M32FP
18.0	16	32	92	4	1212021800	776M36FP
20.0	20	38	104	4	1212022000	-
25.0	25	45	121	5	1212022500	776M50FP
30.0	25	45	121	6	1212023000	776M60FP
32.0	25	53	133	6	1212023200	776M64FP

# 3 FLUTE STANDARD LENGTH COARSE PITCH for ALUMINIUM

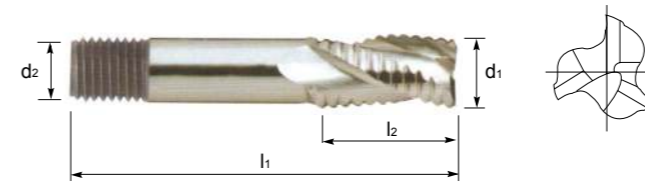


**Series No. 124202**

**Clarkson No. 776A**

**Artikel Nr.: 5113**

▶ cutting conditions : p.416-417



Mil Dia. d <sub>1</sub>	Shank Dia. d <sub>2</sub>	Length of Cut l <sub>2</sub>	Overall Length l <sub>1</sub>	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
6.0	6	13	57	1242020600	-
8.0	10	19	69	1242020800	-
10.0	10	22	72	1242021000	776A20G
12.0	12	26	83	1242021200	776A24G
14.0	12	26	83	1242021400	776A28G
16.0	16	32	92	1242021600	776A32G
18.0	16	32	92	1242021800	-
20.0	20	38	104	1242022000	-
22.0	20	38	104	1242022200	-
25.0	25	45	121	1242022500	776A50G
30.0	25	45	121	1242023000	-

Avialable only while stocks last

# IMPERIAL SIZE END MILLS



The following ranges are available in imperial sizes, although not listed fully in the catalogue. Please contact the sales office for full dimensions.

Code	Item	Description
<b>2-FLUTE END MILLS</b>		
501201		Standard Length HSSco & HSS $\phi 1/16'' - 2''$
501202		
502201		Long Series HSSco & HSS $\phi 1/16'' - 2''$
502202		
513201		Standard Length HSSco & HSS B/N $\phi 1/16'' - 1.1/2''$
513202		
514201		Long Series HSSco & HSS B/N $\phi 1/8'' - 1.1/2''$
514202		
<b>3-FLUTE END MILLS</b>		
504202		Standard Length HSSco $\phi 1/8'' - 2''$
505202		Long Series HSSco $\phi 1/8'' - 2''$
524202		Standard Length Roughing Coarse Pitch $\phi 1/4'' - 2''$
<b>MULTI FLUTE END MILLS</b>		
507201		Standard Length HSSco & HSS $\phi 1/16'' - 2''$
507202		
508201		Long Series HSSco & HSS $\phi 1/16'' - 2''$
508202		
518202		Standard Length Roughing Coarse Pitch $\phi 1/4'' - 2''$
519202		Long Series Roughing Coarse Pitch $\phi 5/16'' - 2''$
521202		Standard Length Roughing Fine Pitch $\phi 1/4'' - 2''$

# HSSCo & HSS SCREWED SHANK CUTTING DATA

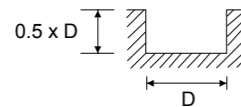
# SCREWED SHANK CUTTING CONDITION



301201, 301202, 302201, 302202  
501201, 501202, 502201, 502202 (2 Flute)



MATERIAL GROUP	HRc		Size (mm)										
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0		
<b>P</b>	< 20	11	$v_c$ (m/min)	30	30	30	30	30	30	30	30	30	
			12	$n$	4500	3200	2200	1800	1600	1100	900	800	700
				$f_z$	0.003	0.007	0.013	0.019	0.025	0.041	0.05	0.063	0.064
		12	$f$ (mm/min)	30	45	55	70	80	90	90	100	90	
			11	$v_c$ (m/min)	25	25	25	25	25	25	25	25	25
				12	$n$	4000	2500	1800	1600	1200	900	800	630
	12	$f_z$	0.004		0.008	0.013	0.019	0.025	0.039	0.05	0.063	0.071	
		13	$f$ (mm/min)	30	40	45	60	60	70	80	80	80	
			14	$v_c$ (m/min)	15	15	15	15	15	15	15	15	15
	14			$n$	2200	1600	1100	900	800	560	450	400	350
		14	$f_z$	0.003	0.006	0.014	0.019	0.025	0.04	0.05	0.063	0.071	
	71		$f$ (mm/min)	15	20	30	35	40	45	45	50	50	
72			$v_c$ (m/min)	75	105	100	100	105	100	95	95	95	
		73	$n$	12000	11000	8000	6300	5600	4000	3100	2500	2200	
73	$f_z$		0.007	0.011	0.018	0.025	0.028	0.049	0.065	0.076	0.08		
	73	$f$ (mm/min)	160	250	290	310	310	390	400	380	350		



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

$v_c$  - cutting speed (m/min)  
 $n$  - RPM (rev/min)  
 $f_z$  - feed rate (mm/tooth)  
 $f$  - feed rate (mm/rev)  
 $z$  - No. of teeth  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c * 1000}{\pi * \phi}$

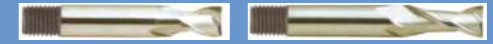
To calculate cutting speed from RPM:  $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

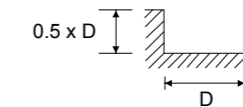
# SCREWED SHANK CUTTING CONDITION



301201, 301202, 302201, 302202  
501201, 501202, 502201, 502202 (2 Flute)



MATERIAL GROUP	HRc		Size (mm)									
			16.0	18.0	20.0	25.0	30.0	32.0	36.0	40.0		
<b>P</b>	< 20	11	$v_c$ (m/min)	30	30	30	30	30	30	30	30	
			12	$n$	560	500	450	400	310	280	250	224
				$f_z$	0.08	0.09	0.1	0.1	0.097	0.098	0.1	0.111
		12	$f$ (mm/min)	90	90	90	80	60	55	50	50	
			11	$v_c$ (m/min)	25	25	25	25	25	25	25	25
				12	$n$	450	400	400	310	250	220	200
	12	$f_z$	0.078		0.088	0.088	0.097	0.1	0.102	0.1	0.111	
		13	$f$ (mm/min)	70	70	70	60	50	45	40	40	
			14	$v_c$ (m/min)	15	15	15	15	15	15	15	15
	14			$n$	280	250	220	180	160	140	125	115
		14	$f_z$	0.08	0.09	0.102	0.097	0.094	0.107	0.1	0.111	
	71		$f$ (mm/min)	45	45	45	35	30	30	25	25	
72			$v_c$ (m/min)	100	100	100	95	105	100	105	100	
		73	$n$	2000	1800	1600	1200	1100	1000	900	800	
73	$f_z$		0.088	0.097	0.1	0.117	0.123	0.12	0.124	0.125		
	73	$f$ (mm/min)	350	350	320	280	270	240	235	200		



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

$v_c$  - cutting speed (m/min)  
 $n$  - RPM (rev/min)  
 $f_z$  - feed rate (mm/tooth)  
 $f$  - feed rate (mm/rev)  
 $z$  - No. of teeth  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM:  $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

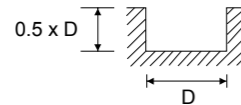
# SCREWED SHANK CUTTING CONDITION



304202, 305202, 504202, 505202 (3 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	
<b>P</b>	< 20	v <sub>c</sub> (m/min)	30	30	30	30	30	30	30	30	30
		n	4500	3200	2200	1800	1600	1100	900	800	800
		f <sub>z</sub>	0.002	0.004	0.007	0.01	0.014	0.021	0.026	0.033	0.033
		f (mm/min)	25	35	45	55	65	70	70	80	80
	20-30	v <sub>c</sub> (m/min)	25	25	25	25	25	25	25	25	25
		n	4000	2500	1800	1600	1200	900	800	630	630
		f <sub>z</sub>	0.002	0.003	0.006	0.008	0.011	0.019	0.023	0.029	0.029
		f (mm/min)	20	25	30	40	40	50	55	55	55
	30-40	v <sub>c</sub> (m/min)	15	15	15	15	15	15	15	15	15
		n	2200	1600	1100	900	800	560	450	400	400
		f <sub>z</sub>	0.002	0.003	0.006	0.007	0.01	0.018	0.022	0.029	0.029
		f (mm/min)	10	15	20	20	25	30	30	35	35
<b>N</b>		v <sub>c</sub> (m/min)	75	105	100	100	105	100	95	95	95
		n	12000	11000	8000	6300	5600	4000	3100	2500	2500
		f <sub>z</sub>	0.003	0.005	0.008	0.011	0.013	0.022	0.029	0.035	0.035
		f (mm/min)	110	170	200	210	210	260	270	260	260



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

v<sub>c</sub> - cutting speed (m/min)  
 n - RPM (rev/min)  
 f<sub>z</sub> - feed rate (mm/tooth)  
 f - feed rate (mm/rev)  
 z - No. of teeth  
 a<sub>p</sub> - axial depth of cut  
 a<sub>e</sub> - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM:  $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

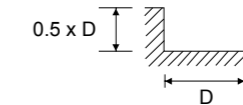
# SCREWED SHANK CUTTING CONDITION



304202, 305202, 504202, 505202 (3 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			14.0	16.0	18.0	20.0	22.0	25.0	28.0	30.0	
<b>P</b>	< 20	v <sub>c</sub> (m/min)	30	30	30	30	30	30	30	30	30
		n	700	560	500	450	450	400	350	310	310
		f <sub>z</sub>	0.033	0.042	0.047	0.052	0.052	0.054	0.052	0.054	0.054
		f (mm/min)	70	70	70	70	70	65	55	50	50
	20-30	v <sub>c</sub> (m/min)	25	25	25	25	25	25	25	25	25
		n	560	450	400	400	350	310	280	250	250
		f <sub>z</sub>	0.033	0.037	0.042	0.042	0.048	0.043	0.042	0.04	0.04
		f (mm/min)	55	50	50	50	50	40	35	30	30
	30-40	v <sub>c</sub> (m/min)	15	15	15	15	15	15	15	15	15
		n	350	280	250	220	220	180	160	160	160
		f <sub>z</sub>	0.033	0.036	0.04	0.045	0.045	0.37	0.042	0.042	0.042
		f (mm/min)	35	30	30	30	30	20	20	20	20
<b>N</b>		v <sub>c</sub> (m/min)	95	100	100	100	95	95	95	105	105
		n	2200	2000	1800	1600	1400	1200	1100	1100	1100
		f <sub>z</sub>	0.036	0.04	0.044	0.046	0.048	0.053	0.055	0.055	0.055
		f (mm/min)	240	240	240	220	200	190	180	180	180



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

v<sub>c</sub> - cutting speed (m/min)  
 n - RPM (rev/min)  
 f<sub>z</sub> - feed rate (mm/tooth)  
 f - feed rate (mm/rev)  
 z - No. of teeth  
 a<sub>p</sub> - axial depth of cut  
 a<sub>e</sub> - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM:  $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

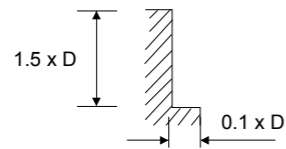
# SCREWED SHANK CUTTING CONDITION



307201, 307202, 308201, 308202  
507201, 507202, 508201, 508202 (Multiflute)



MATERIAL GROUP	HRc		Size (mm)									
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	
P	< 20	11	$v_c$ (m/min)	30	30	30	30	30	30	30	30	30
		12	n	4500	3200	2200	1800	1600	1100	900	800	700
			$f_z$	0.003	0.006	0.011	0.017	0.023	0.036	0.044	0.056	0.057
			f (mm/min)	55	80	100	125	145	160	160	180	160
		11	20-30	$v_c$ (m/min)	25	25	25	25	25	25	25	25
		12	n	4000	2500	1800	1600	1200	900	800	630	560
		$f_z$	0.003	0.006	0.009	0.014	0.019	0.029	0.038	0.048	0.054	
		f (mm/min)	45	60	65	90	90	105	120	120	120	
	13	30-40	$v_c$ (m/min)	15	15	15	15	15	15	15	15	
	14		n	2200	1600	1100	900	800	560	450	400	350
			$f_z$	0.002	0.005	0.01	0.014	0.019	0.029	0.036	0.047	0.054
		f (mm/min)	20	30	45	50	60	65	65	75	75	
N	71	$v_c$ (m/min)	75	105	100	100	105	100	95	95	95	
	72	n	12000	11000	8000	6300	5600	4000	3100	2500	2200	
	73	$f_z$	0.005	0.009	0.014	0.019	0.021	0.036	0.048	0.057	0.06	
		f (mm/min)	240	380	440	470	470	580	600	570	530	



- The feed rate for long and long reach tools should be reduced by up to 50%
- Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

$v_c$  - cutting speed (m/min)  
n - RPM (rev/min)  
 $f_z$  - feed rate (mm/tooth)  
f - feed rate (mm/rev)  
z - No. of teeth  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c * 1000}{\pi * \phi}$

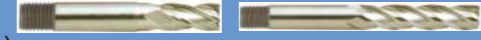
To calculate cutting speed from RPM:  $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

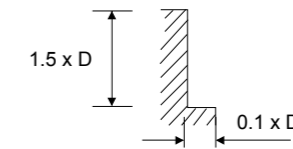
# SCREWED SHANK CUTTING CONDITION



307201, 307202, 308201, 308202  
507201, 507202, 508201, 508202 (Multiflute)



MATERIAL GROUP	HRc		Size (mm)									
			16.0	18.0	20.0	22.0	25.0	28.0	30.0	32.0		
P	< 20	11	$v_c$ (m/min)	30	30	30	30	30	30	30	30	
		12	n	560	500	450	450	400	350	310	310	
			$f_z$	0.071	0.08	0.089	0.059	0.06	0.06	0.059	0.09	
			f (mm/min)	160	160	160	160	145	125	110	100	
		11	20-30	$v_c$ (m/min)	25	25	25	25	25	25	25	20
		12	n	450	400	400	350	310	280	250	220	
		$f_z$	0.058	0.066	0.066	0.05	0.048	0.048	0.05	0.049		
		f (mm/min)	105	105	105	105	90	80	75	65		
	13	30-40	$v_c$ (m/min)	15	15	15	15	15	15	15	15	
	14		n	280	250	220	220	180	160	160	140	
			$f_z$	0.058	0.065	0.074	0.049	0.046	0.047	0.047	0.054	
		f (mm/min)	65	65	65	65	50	45	45	45		
N	71	$v_c$ (m/min)	100	100	100	95	95	95	105	100		
	72	n	2000	1800	1600	1400	1200	1100	1100	1000		
	73	$f_z$	0.066	0.074	0.075	0.054	0.058	0.061	0.061	0.06		
		f (mm/min)	100	100	100	95	95	95	105	100		



- The feed rate for long and long reach tools should be reduced by up to 50%
- Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

$v_c$  - cutting speed (m/min)  
n - RPM (rev/min)  
 $f_z$  - feed rate (mm/tooth)  
f - feed rate (mm/rev)  
z - No. of teeth  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM:  $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

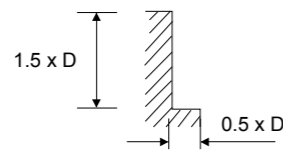
# SCREWED SHANK CUTTING CONDITION



118202, 119202, 121202, 124202  
518202, 519202, 521202, 524202 (Multiflute Roughing)



MATERIAL GROUP	HRc		Size (mm)								
			6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	
<b>P</b>	< 20	v <sub>c</sub> (m/min)	30	30	30	30	30	30	30	30	
		n	1600	1100	900	800	700	560	500	450	
		f <sub>z</sub>	0.013	0.023	0.033	0.044	0.05	0.063	0.07	0.078	
		f (mm/min)	60	75	120	140	140	140	140	140	
		v <sub>c</sub> (m/min)	25	25	25	25	25	25	25	25	
		n	1200	900	800	630	560	450	400	400	
	20-30	f <sub>z</sub>	0.015	0.024	0.034	0.044	0.049	0.061	0.069	0.069	
		f (mm/min)	55	65	110	110	110	110	110	110	
		30-40	v <sub>c</sub> (m/min)	15	15	15	15	15	15	15	15
			n	800	560	450	400	350	280	250	220
			f <sub>z</sub>	0.013	0.021	0.033	0.044	0.05	0.063	0.07	0.08
			f (mm/min)	30	35	60	70	70	70	70	70
<b>N</b>	v <sub>c</sub> (m/min)	85	80	80	75	80	80	80	75		
	n	4500	3100	2500	2000	1800	1600	1400	1200		
	f <sub>z</sub>	0.015	0.025	0.035	0.05	0.058	0.07	0.084	0.104		
	f (mm/min)	200	230	350	400	420	450	470	500		



► The feed rate for long and long reach tools should be reduced by up to 50%

v<sub>c</sub> - cutting speed (m/min)  
n - RPM (rev/min)  
f<sub>z</sub> - feed rate (mm/tooth)  
f - feed rate (mm/rev)  
z - No. of teeth  
a<sub>p</sub> - axial depth of cut  
a<sub>e</sub> - radial depth of cut

$$\text{To calculate RPM from cutting speed: } n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$$

$$\text{To calculate cutting speed from RPM: } v_c = \frac{n \cdot \pi \cdot \phi}{1000}$$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

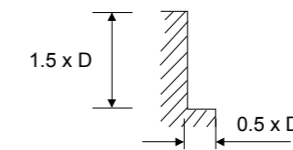
# SCREWED SHANK CUTTING CONDITION



118202, 119202, 121202, 124202  
518202, 519202, 521202, 524202 (Multiflute Roughing)



MATERIAL GROUP	HRc		Size (mm)								
			22.0	25.0	28.0	30.0	32.0	36.0	40.0	50.0	
<b>P</b>	< 20	v <sub>c</sub> (m/min)	30	30	30	30	30	30	30	30	
		n	450	400	350	310	280	250	220	180	
		f <sub>z</sub>	0.076	0.085	0.076	0.086	0.095	0.107	0.114	0.157	
		f (mm/min)	170	170	160	160	160	160	150	170	
		v <sub>c</sub> (m/min)	25	25	25	25	25	25	25	25	
		n	350	310	280	250	220	200	180	160	
	20-30	f <sub>z</sub>	0.08	0.09	0.077	0.087	0.098	0.108	0.111	0.146	
		f (mm/min)	140	140	130	130	130	130	120	140	
		30-40	v <sub>c</sub> (m/min)	15	15	15	15	15	15	15	15
			n	220	180	160	160	140	120	110	90
			f <sub>z</sub>	0.077	0.094	0.089	0.089	0.101	0.118	0.121	0.148
			f (mm/min)	85	85	85	85	85	85	80	80
<b>N</b>	v <sub>c</sub> (m/min)	75	80	80	85	80	80	80	80		
	n	1100	1000	900	900	800	700	630	500		
	f <sub>z</sub>	0.085	0.09	0.094	0.098	0.104	0.112	0.119	0.123		
	f (mm/min)	470	450	510	530	500	470	450	370		



► The feed rate for long and long reach tools should be reduced by up to 50%

v<sub>c</sub> - cutting speed (m/min)  
n - RPM (rev/min)  
f<sub>z</sub> - feed rate (mm/tooth)  
f - feed rate (mm/rev)  
z - No. of teeth  
a<sub>p</sub> - axial depth of cut  
a<sub>e</sub> - radial depth of cut

$$\text{To calculate RPM from cutting speed: } n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$$

$$\text{To calculate cutting speed from RPM: } v_c = \frac{n \cdot \pi \cdot \phi}{1000}$$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

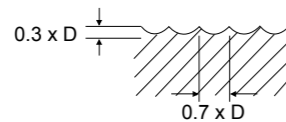
# SCREWED SHANK CUTTING CONDITION



313201, 313202, 314201, 314202  
513201, 513202, 514201, 514202 (2 Flute, Ball Nose)



MATERIAL GROUP	HRc		Size (mm)									
			3.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	
<b>P</b>	< 20	11	$v_c$ (m/min)	30	30	30	30	30	30	30	30	30
		12	n	3400	2400	1700	1200	1000	800	600	500	400
			$f_z$	0.01	0.017	0.026	0.044	0.06	0.066	0.083	0.085	0.088
			f (mm/min)	70	80	90	105	120	105	100	85	70
	20-30	11	$v_c$ (m/min)	20	20	20	20	20	15	20	20	15
		12	n	2000	1400	1000	700	560	450	350	300	220
			$f_z$	0.008	0.013	0.026	0.036	0.054	0.061	0.079	0.083	0.091
			f (mm/min)	30	35	45	50	60	55	55	50	40
	30-40	13	$v_c$ (m/min)	15	15	15	15	15	15	15	15	15
14		n	1400	1000	700	500	400	320	250	200	160	
		$f_z$	0.007	0.013	0.018	0.03	0.044	0.055	0.07	0.088	0.094	
		f (mm/min)	20	25	25	30	35	35	35	35	30	
<b>N</b>	71	$v_c$ (m/min)	105	100	105	100	100	95	100	100	100	
	72	n	11000	8000	5600	4000	3200	2500	2000	1600	1300	
	73	$f_z$	0.01	0.016	0.025	0.044	0.056	0.068	0.075	0.088	0.096	
		f (mm/min)	230	260	280	350	360	340	300	280	250	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ Data shown is for HSSCo tools. Reduce feed rates by up to 20% for HSS tools.

$v_c$  - cutting speed (m/min)  
n - RPM (rev/min)  
 $f_z$  - feed rate (mm/tooth)  
f - feed rate (mm/rev)  
z - No. of teeth  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

To calculate RPM from cutting speed:  $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM:  $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

