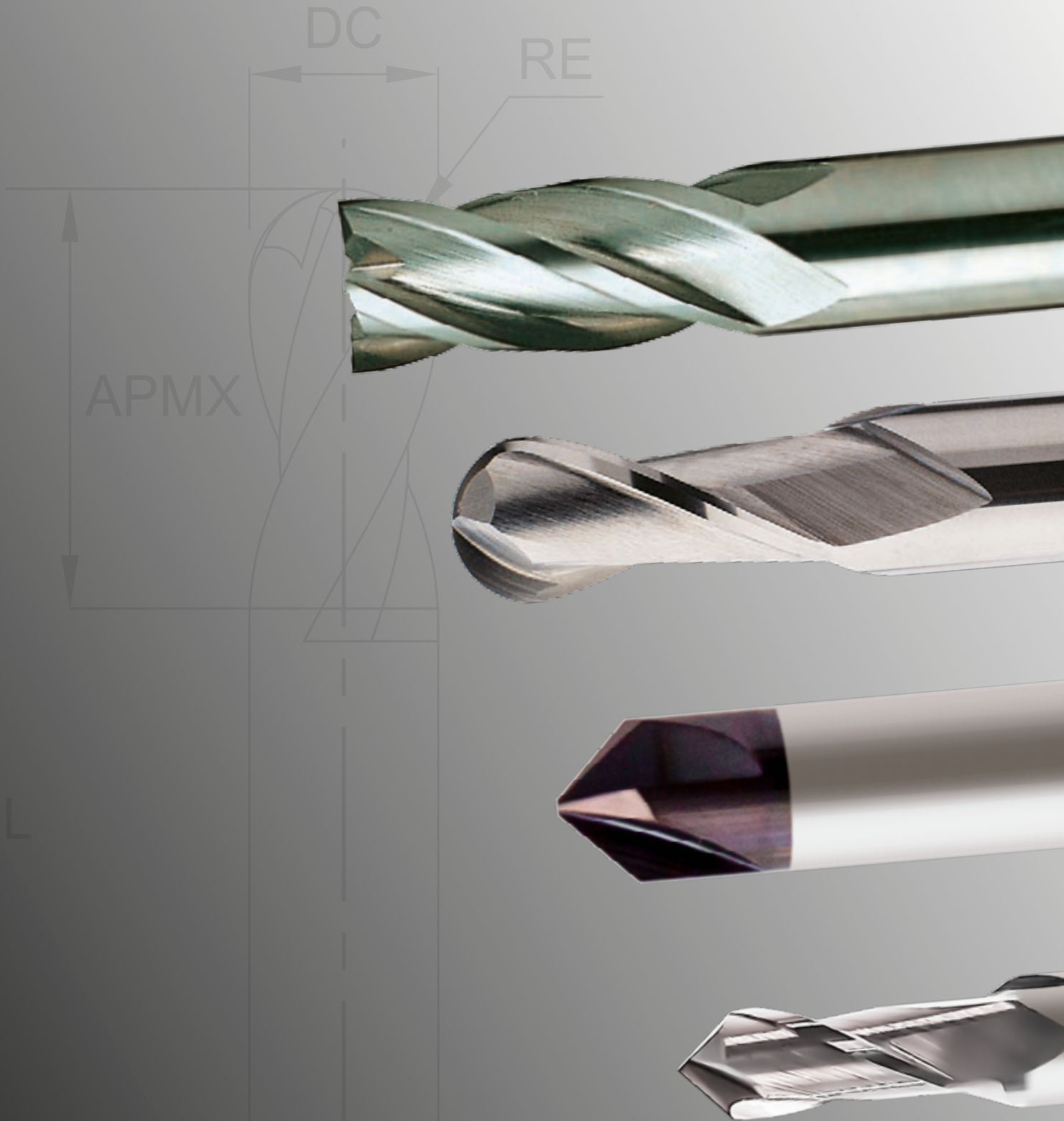


# K30 END MILLS

General purpose  
carbide end mills

EUROPA  
TOOL

Clarkson







## CHAMFERING END MILLS

Uncoated	TiAIN	Item	Description	Page No.
<b>197303</b>			<b>Drill Mill 90°</b> ø3.0mm - 20.0mm	<b>P.8</b>
-	<b>199323</b>		<b>Chamfer Mill 90° &amp; 60°</b> ø4.0mm - 12.0mm	<b>P.22</b>







## 2-FLUTE END MILLS

<b>301303</b>	<b>301323</b>		<b>Standard Length</b> ø1.0mm - 25.0mm	<b>P.3</b>
<b>302303</b>	<b>302323</b>		<b>Long Series</b> ø3.0mm - 25.0mm	<b>P.4</b>
-	<b>120323</b>		<b>Standard Length</b> Corner Radius ø2.0mm - 12.0mm	<b>P.5-6</b>
-	<b>121323</b>		<b>Long Series</b> Corner Radius ø3.0mm - 12.0mm	<b>P.7</b>
<b>313303</b>	<b>313323</b>		<b>Standard Length</b> Ball Nose ø1.0mm - 25.0mm	<b>P.9</b>
<b>314303</b>	<b>314323</b>		<b>Long Series</b> Ball Nose ø3.0mm - 25.0mm	<b>P.10</b>

## 3-FLUTE END MILLS

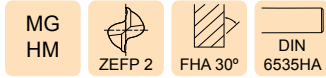
<b>304303</b>	<b>304323</b>		<b>Standard Length</b> ø1.0mm - 25.0mm	<b>P.11</b>
<b>305303</b>	<b>305323</b>		<b>Long Series</b> ø3.0mm - 25.0mm	<b>P.12</b>
<b>307303</b>	<b>307323</b>		<b>Standard Length</b> Ball Nose ø1.0mm - 16.0mm	<b>P.13</b>
<b>308303</b>	<b>308323</b>		<b>Long Series</b> Ball Nose ø3.0mm - 25.0mm	<b>P.14</b>

## 4-FLUTE END MILLS

<b>310303</b>	<b>310323</b>		<b>Standard Length</b> ø1.0mm - 25.0mm	<b>P.15</b>
<b>311303</b>	<b>311323</b>		<b>Long Series</b> ø3.0mm - 25.0mm	<b>P.16</b>
-	<b>140323</b>		<b>Standard Length</b> Corner Radius ø2.0mm - 12.0mm	<b>P.17-18</b>
-	<b>142323</b>		<b>Long Series</b> Corner Radius ø3.0mm - 12.0mm	<b>P.19</b>
<b>315303</b>	<b>315323</b>		<b>Standard Length</b> Ball Nose ø1.0mm - 25.0mm	<b>P.20</b>
<b>316303</b>	<b>316323</b>		<b>Long Series</b> Ball Nose ø3.0mm - 25.0mm	<b>P.21</b>
			<b>Cutting Data</b>	<b>P.23-35</b>

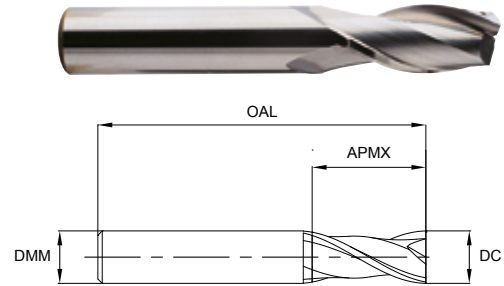


## 2-FL STANDARD LENGTH



Series No. 301303, 301323

► cutting conditions : p.24



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3013030100	3013230100	1.0	3.0	4.0	38.0
3013030150	3013230150	1.5		4.5	
3013030200	3013230200	2.0		6.3	
3013030250	3013230250	2.5		9.5	
3013030300	3013230300	3.0		12.0	
3013030350	3013230350	3.5	4.0	12.0	50.0
3013030400	3013230400	4.0		14.0	
3013030450	3013230450	4.5		16.0	
3013030500	3013230500	5.0	6.0	16.0	58.0
3013030600	3013230600	6.0		19.0	
3013030800	3013230800	8.0	8.0	20.0	63.0
3013031000	3013231000	10.0	10.0	22.0	75.0
3013031200	3013231200	12.0	12.0	25.0	
3013031400	3013231400	14.0	14.0	32.0	89.0
3013031600	3013231600	16.0	16.0	32.0	
3013032000	3013232000	20.0	20.0	38.0	100.0
3013032500	3013232500	25.0	25.0	38.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / - 0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

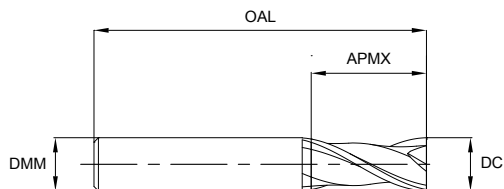
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary	●	●		○		○	○	●	○							
○ Secondary																

## 2-FL LONG LENGTH



Series No. 302303, 302323

► cutting conditions : p.24



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3023030300	3023230300	3.0	3.0	25.0	65.0
3023030400	3023230400	4.0	4.0	25.0	
3023030500	3023230500	5.0	5.0	25.0	
3023030600	3023230600	6.0	6.0	25.0	75.0
3023030800	3023230800	8.0	8.0	25.0	
3023031000	3023231000	10.0	10.0	38.0	
3023031200	3023231200	12.0	12.0	50.0	100.0
3023031400	3023231400	14.0	14.0	75.0	
3023031600	3023231600	16.0	16.0	75.0	
3023032000	3023232000	20.0	20.0	75.0	150.0
3023032500	3023232500	25.0	25.0	75.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

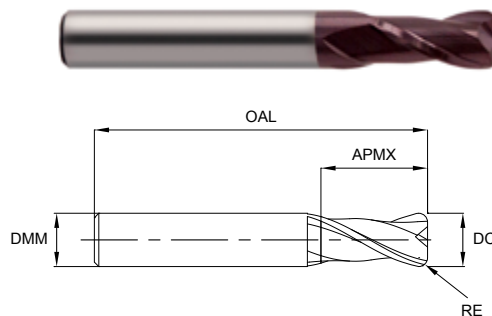
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

## 2-FL STANDARD LENGTH, CORNER RADIUS



Series No. 120323

► cutting conditions : p.32

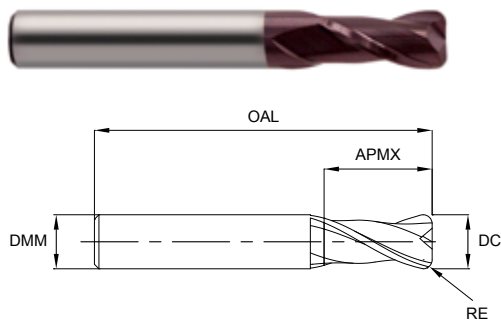


EUROPA CODE ORCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1203230200	2.0	0.2	4	4	50
1203239001	2.0	0.3	4	4	50
1203239002	2.0	0.5	4	4	50
1203230250	2.5	0.2	4	5	50
1203239003	2.5	0.3	4	5	50
1203239004	2.5	0.5	4	5	50
1203230300	3.0	0.2	4	6	50
1203239005	3.0	0.3	4	6	50
1203239006	3.0	0.5	4	6	50
1203239007	3.0	1.0	4	6	50
1203230400	4.0	0.2	4	8	50
1203239008	4.0	0.3	4	8	50
1203239009	4.0	0.5	4	8	50
1203239010	4.0	1.0	4	8	50
1203230500	5.0	0.2	6	10	50
1203239011	5.0	0.3	6	10	50
1203239012	5.0	0.5	6	10	50
1203239013	5.0	1.0	6	10	50
1203230600	6.0	0.2	6	12	50
1203239014	6.0	0.3	6	12	50
1203239015	6.0	0.5	6	12	50
1203239016	6.0	1.0	6	12	50

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary	●	●		○		○	○	●	○							
○ Secondary																

## 2-FL STANDARD LENGTH, CORNER RADIUS



Series No. 120323

► cutting conditions : p.32

EUROPA CODE ORDCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1203230800	8.0	0.5	8	16	60
1203239017	8.0	1.0	8	16	60
1203239018	8.0	1.5	8	16	60
1203239019	8.0	2.0	8	16	60
1203239020	8.0	2.5	8	16	60
1203231000	10.0	0.5	10	20	75
1203239021	10.0	1.0	10	20	75
1203239022	10.0	1.5	10	20	75
1203239023	10.0	2.0	10	20	75
1203239024	10.0	2.5	10	20	75
1203231200	12.0	0.5	12	24	75
1203239025	12.0	1.0	12	24	75
1203239026	12.0	1.5	12	24	75
1203239027	12.0	2.0	12	24	75
1203239028	12.0	2.5	12	24	75

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

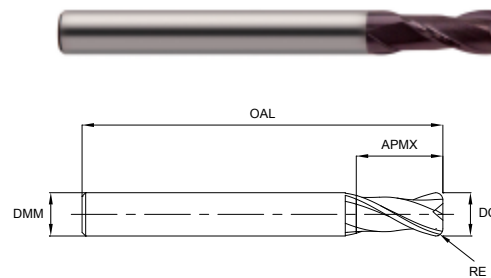
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

## 2-FL LONG LENGTH, CORNER RADIUS



Series No. 121323

► cutting conditions : p.32



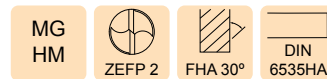
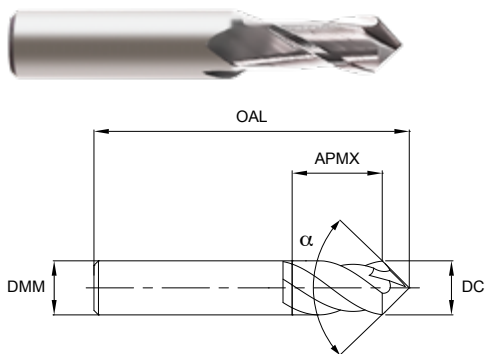
EUROPA CODE ORDCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1213239006	3.0	0.5	4	6	75
1213239007	3.0	1.0	4	6	75
1213239009	4.0	0.5	4	8	75
1213239010	4.0	1.0	4	8	75
1213239012	5.0	0.5	6	10	75
1213239013	5.0	1.0	6	10	75
1213239015	6.0	0.5	6	12	75
1213239016	6.0	1.0	6	12	75
1213230800	8.0	0.5	8	16	100
1213239017	8.0	1.0	8	16	100
1213239018	8.0	1.5	8	16	100
1213239019	8.0	2.0	8	16	100
1213239020	8.0	2.5	8	16	100
1213231000	10.0	0.5	10	20	100
1213239021	10.0	1.0	10	20	100
1213239022	10.0	1.5	10	20	100
1213239023	10.0	2.0	10	20	100
1213239024	10.0	2.5	10	20	100
1213231200	12.0	0.5	12	24	100
1213239025	12.0	1.0	12	24	100
1213239026	12.0	1.5	12	24	100
1213239027	12.0	2.0	12	24	100
1213239028	12.0	2.5	12	24	100

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							



## 2-FL MILL DRILL



Series No. 197303

► cutting conditions : p.34-35

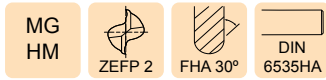
UNCOATED ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL	CHAMFER ANGLE $\alpha$
1973030300	3.0	4	6	50	90°
1973030400	4.0	5	8	50	
1973030500	5.0	6	10	50	
1973030600	6.0	8	12	60	
1973030800	8.0	10	16	70	
1973031000	10.0	12	18	70	
1973031200	12.0	12	20	70	
1973031400	14.0	14	24	80	
1973031600	16.0	16	26	80	
1973032000	20.0	20	32	100	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC	Shank Dia. Tolerance TCDMM
3.0 - 10.0	h9	h6
12.0 - 20.0	d9	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●	●	○				●								

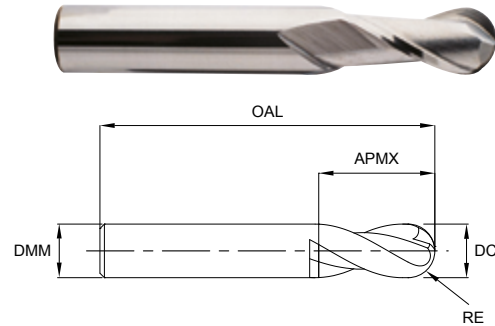


## 2-FL STANDARD LENGTH, BALL NOSE



Series No. 313303, 313323

► cutting conditions : p.25



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3133030100	3133230100	1.0	0.5	3.0	4.0	38.0
3133030150	3133230150	1.5	0.75		4.5	
3133030200	3133230200	2.0	1.0		6.3	
3133030250	3133230250	2.5	1.25		9.5	
3133030300	3133230300	3.0	1.5		12.0	
3133030400	3133230400	4.0	2.0	4.0	14.0	50.0
3133030500	3133230500	5.0	2.5	6.0	16.0	
3133030600	3133230600	6.0	3.0		19.0	58.0
3133030800	3133230800	8.0	4.0		8.0	20.0
3133031000	3133231000	10.0	5.0	10.0	22.0	75.0
3133031200	3133231200	12.0	6.0	12.0	25.0	
3133031600	3133231600	16.0	8.0	16.0	32.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / - 0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●				○	○	●								

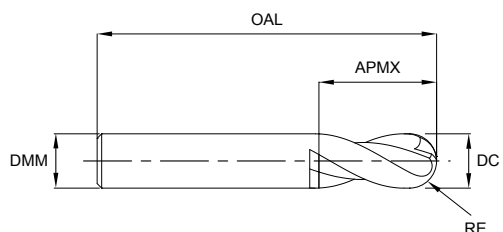


## 2-FL LONG LENGTH, BALL NOSE



Series No. 314303, 314323

► cutting conditions : p.25



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3143030300	3143230300	3.0	1.5	3.0	25.0	75.0
3143030400	3143230400	4.0	2.0	4.0	25.0	
3143030500	3143230500	5.0	2.5	6.0	25.0	
3143030600	3143230600	6.0	3.0	6.0	25.0	
3143030800	3143230800	8.0	4.0	8.0	25.0	
3143031000	3143231000	10.0	5.0	10.0	38.0	100.0
3143031200	3143231200	12.0	6.0	12.0	50.0	
3143031600	3143231600	16.0	8.0	16.0	75.0	150.0

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

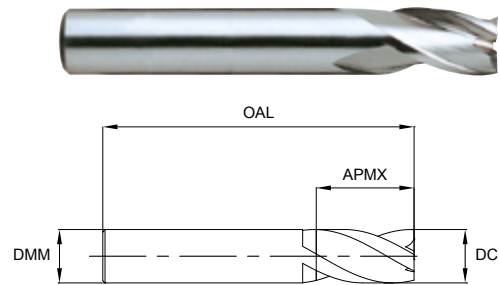
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●				○	○	●								

### 3-FL STANDARD LENGTH


 MG  
HM


## Series No. 304303, 304323

► cutting conditions : p.26-27

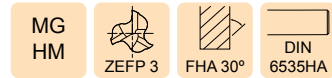
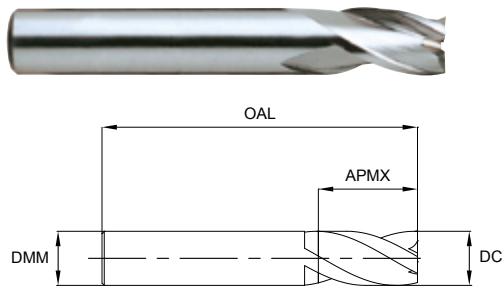


UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3043030400	3043230400	1.0	3.0	4.0	38.0
3043030450	3043230450	1.5		4.5	
3043030200	3043230200	2.0		6.3	
3043030250	3043230250	2.5		9.5	
3043030300	3043230300	3.0		12.0	
3043030350	3043230350	3.5	4.0	12.0	50.0
3043030400	3043230400	4.0		14.0	
3043030450	3043230450	4.5	6.0	16.0	
3043030500	3043230500	5.0		16.0	
3043030600	3043230600	6.0		19.0	
3043030800	3043230800	8.0	8.0	20.0	63.0
3043031000	3043231000	10.0	10.0	22.0	75.0
3043031200	3043231200	12.0	12.0	25.0	
3043031400	3043231400	14.0	14.0	32.0	89.0
3043031600	3043231600	16.0	16.0	32.0	
3043031800	3043231800	18.0	18.0	38.0	100.0
3043032000	3043232000	20.0	20.0	38.0	
3043032500	3043232500	25.0	25.0	38.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

## 3-FL LONG LENGTH



Series No. 305303, 305323

► cutting conditions : p.26-27

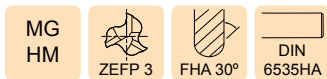
UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3053030300	3053230300	3.0	3.0	25.0	75.0
3053030400	3053230400	4.0	4.0	25.0	
3053030500	3053230500	5.0	6.0	25.0	
3053030600	3053230600	6.0	6.0	25.0	
3053030800	3053230800	8.0	8.0	25.0	
3053031000	3053231000	10.0	10.0	38.0	100.0
3053031200	3053231200	12.0	12.0	50.0	
3053031400	3053231400	14.0	14.0	75.0	150.0
3053031600	3053231600	16.0	16.0	75.0	
3053031800	3053231800	18.0	18.0	75.0	
3053032000	3053232000	20.0	20.0	75.0	
3053032500	3053232500	25.0	25.0	75.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDDM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

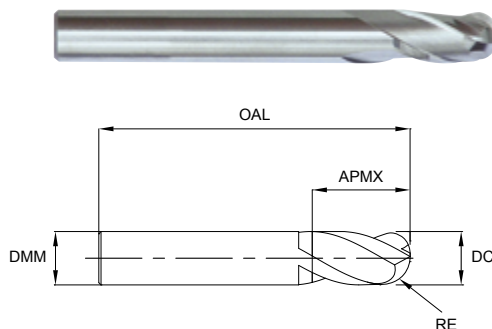


## 3-FL STANDARD LENGTH, BALL NOSE



Series No. 307303, 307323

► cutting conditions : p.28



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3073030100	3073230100	1.0	0.5	3.0	4.0	38.0
3073030200	3073230200	2.0	1.0		6.3	
3073030300	3073230300	3.0	1.5		12.0	
3073030400	3073230400	4.0	2.0	4.0	14.0	51.0
3073030500	3073230500	5.0	2.5	6.0	16.0	
3073030600	3073230600	6.0	3.0		19.0	58.0
3073030800	3073230800	8.0	4.0	8.0	20.0	63.0
3073031000	3073231000	10.0	5.0	10.0	22.0	73.0
3073031200	3073231200	12.0	6.0	12.0	25.0	74.0
3073031600	3073231600	16.0	8.0	16.0	32.0	89.0

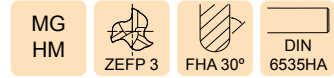
◆ TiAIN coating available to order

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TC DMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary	●	●				○	○	●								
○ Secondary																

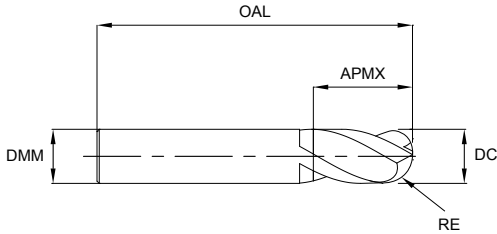


## 3-FL LONG LENGTH, BALL NOSE



Series No. 308303, 308323

► cutting conditions : p.28



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3083030300	3083230300	3.0	1.5	3.0	25.0	75.0
3083030400	3083230400	4.0	2.0	4.0	25.0	
3083030500	3083230500	5.0	2.5	6.0	25.0	
3083030600	3083230600	6.0	3.0	6.0	25.0	
3083030800	3083230800	8.0	4.0	8.0	25.0	
3083031000	3083231000	10.0	5.0	10.0	38.0	100.0
3083031200	3083231200	12.0	6.0	12.0	50.0	
3083032000	3083232000	20.0	10.0	20.0	75.0	150.00

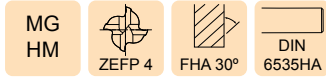
◆ TiAIN coating available to order

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●				○	○	●								

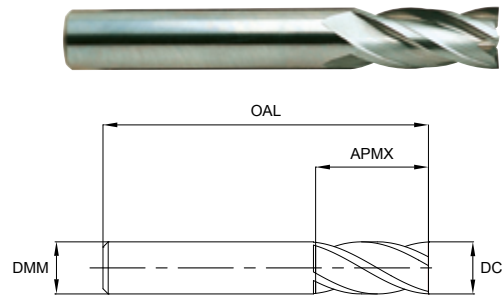


## 4-FL STANDARD LENGTH



Series No. 310303, 310323

► cutting conditions : p.29



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3103031000	3103231000	1.0	3.0	4.0	38.0
3103031050	3103231050	1.5		4.5	
3103030200	3103230200	2.0		6.3	
3103030250	3103230250	2.5		9.5	
3103030300	3103230300	3.0		12.0	
3103030350	3103230350	3.5	4.0	12.0	50.0
3103030400	3103230400	4.0		14.0	
3103030450	3103230450	4.5		16.0	
3103030500	3103230500	5.0	6.0	16.0	58.0
3103030600	3103230600	6.0		19.0	
3103030800	3103230800	8.0	8.0	20.0	63.0
3103031000	3103231000	10.0	10.0	22.0	75.0
3103031200	3103231200	12.0	12.0	25.0	
3103031400	3103231400	14.0	14.0	32.0	89.0
3103031600	3103231600	16.0	16.0	32.0	
3103031800	3103231800	18.0	18.0	38.0	100.0
3103032000	3103232000	20.0	20.0	38.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / - 0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary	●	●		○		○	○	●	○							
○ Secondary																

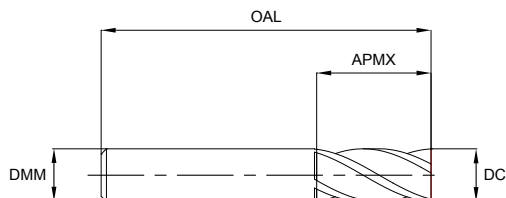


## 4-FL LONG LENGTH



Series No. 311303, 311323

► cutting conditions : p.29



UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3113030300	3113230300	3.0	3.0	25.0	65.0
3113030400	3113230400	4.0	4.0	25.0	
3113030500	3113230500	5.0	5.0	25.0	
3113030600	3113230600	6.0	6.0	25.0	75.0
3113030800	3113230800	8.0	8.0	25.0	
3113031000	3113231000	10.0	10.0	38.0	
3113031200	3113231200	12.0	12.0	50.0	100.0
3113031600	3113231600	16.0	16.0	75.0	
3113032000	3113232000	20.0	20.0	75.0	
3113032500	3113232500	25.0	25.0	75.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

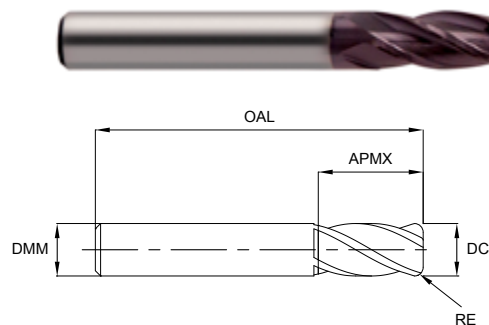


## 4-FL STANDARD LENGTH, CORNER RADIUS



Series No. 140323

► cutting conditions : p.31

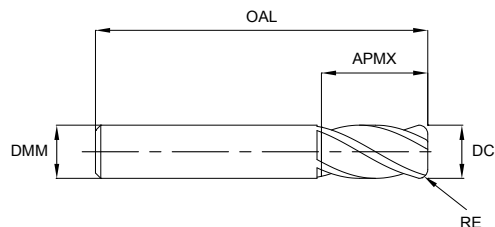


EUROPA CODE ORDCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1403230200	2.0	0.2	4	4	50
1403239001	2.0	0.3	4	4	50
1403239002	2.0	0.5	4	4	50
1403230250	2.5	0.2	4	5	50
1403239003	2.5	0.3	4	5	50
1403239004	2.5	0.5	4	5	50
1403230300	3.0	0.2	4	6	50
1403239005	3.0	0.3	4	6	50
1403239006	3.0	0.5	4	6	50
1403239007	3.0	1.0	4	6	50
1403230400	4.0	0.2	4	8	50
1403239008	4.0	0.3	4	8	50
1403239009	4.0	0.5	4	8	50
1403239010	4.0	1.0	4	8	50
1403230500	5.0	0.2	6	10	50
1403239011	5.0	0.3	6	10	50
1403239012	5.0	0.5	6	10	50
1403239013	5.0	1.0	6	10	50
1403230600	6.0	0.2	6	12	50
1403239014	6.0	0.3	6	12	50
1403239015	6.0	0.5	6	12	50
1403239016	6.0	1.0	6	12	50

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

## 4-FL STANDARD LENGTH, CORNER RADIUS



Series No. 140323

► cutting conditions : p.31

EUROPA CODE ORDCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1403230800	8.0	0.5	8	16	60
1403239017	8.0	1.0	8	16	60
1403239018	8.0	1.5	8	16	60
1403239019	8.0	2.0	8	16	60
1403239020	8.0	2.5	8	16	60
1403231000	10.0	0.5	10	20	75
1403239021	10.0	1.0	10	20	75
1403239022	10.0	1.5	10	20	75
1403239023	10.0	2.0	10	20	75
1403239024	10.0	2.5	10	20	75
1403231200	12.0	0.5	12	24	75
1403239025	12.0	1.0	12	24	75
1403239026	12.0	1.5	12	24	75
1403239027	12.0	2.0	12	24	75

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

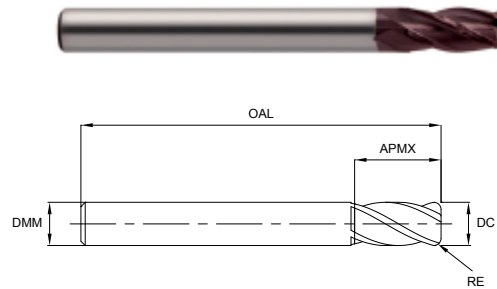
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

## 4-FL LONG LENGTH, CORNER RADIUS



Series No. 142323

► cutting conditions : p.31



EUROPA CODE ORDCODE	DIAMETER DC	CORNER RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
1423239006	3.0	0.5	4	6	75
1423239007	3.0	1.0	4	6	75
1423239009	4.0	0.5	4	8	75
1423239010	4.0	1.0	4	8	75
1423239012	5.0	0.5	6	10	75
1423239013	5.0	1.0	6	10	75
1423239015	6.0	0.5	6	12	75
1423239016	6.0	1.0	6	12	75
1423230800	8.0	0.5	8	16	100
1423239017	8.0	1.0	8	16	100
1423239018	8.0	1.5	8	16	100
1423239019	8.0	2.0	8	16	100
1423239020	8.0	2.5	8	16	100
1423231000	10.0	0.5	10	20	100
1423239021	10.0	1.0	10	20	100
1423239022	10.0	1.5	10	20	100
1423239023	10.0	2.0	10	20	100
1423239024	10.0	2.5	10	20	100
1423231200	12.0	0.5	12	24	100
1423239025	12.0	1.0	12	24	100
1423239026	12.0	1.5	12	24	100
1423239027	12.0	2.0	12	24	100
1423239028	12.0	2.5	12	24	100

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDDM
0.00 / -0.03	h6

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●		○		○	○	●	○							

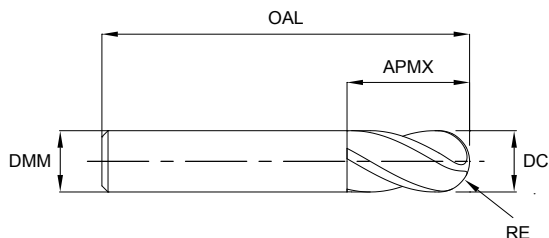


## 4-FL STANDARD LENGTH, BALL NOSE



Series No. 315303, 315323

► cutting conditions : p.30

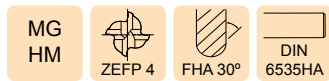


UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3153030100	3153230100	1.0	0.5	3.0	4.0	38.0
3153030150	3153230150	1.5	0.75		4.5	
3153030200	3153230200	2.0	1.0		6.3	
3153030250	3153230250	2.5	1.25		9.5	
3153030300	3153230300	3.0	1.5		12.0	
3153030400	3153230400	4.0	2.0	4.0	14.0	58.0
3153030500	3153230500	5.0	2.5	6.0	16.0	
3153030600	3153230600	6.0	3.0		19.0	63.0
3153030800	3153230800	8.0	4.0	8.0	20.0	75.0
3153031000	3153231000	10.0	5.0	10.0	22.0	
3153031200	3153231200	12.0	6.0	12.0	25.0	
3153031600	3153231600	16.0	8.0	16.0	32.0	89.0

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / - 0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

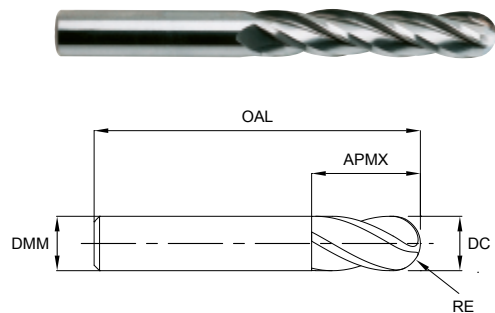
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●				○	○	●								

## 4-FL LONG LENGTH, BALL NOSE



Series No. 316303, 316323

► cutting conditions : p.30

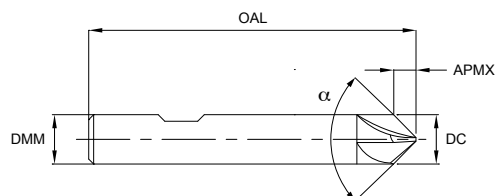


UNCOATED ORDCODE	TiAIN ORDCODE	DIAMETER DC	RADIUS RE	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL
3163030300	3163230300	3.0	1.5	3.0	25.0	75.0
3163030400	3163230400	4.0	2.0	4.0	25.0	
3163030500	3163230500	5.0	2.5	6.0	25.0	
3163030600	3163230600	6.0	3.0	6.0	25.0	
3163030800	3163230800	8.0	4.0	8.0	25.0	
3163031000	3163231000	10.0	5.0	10.0	38.0	100.0
3163031200	3163231200	12.0	6.0	12.0	50.0	

Mill Dia. DC (mm)	Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
≤3.0	0.00 / -0.040	h6
>3.0 - 6.0	0.00 / -0.048	
>6.0 - 10.0	0.00 / -0.058	
>10.0 - 18.0	0.00 / -0.070	
>18.0 - 30.0	0.00 / -0.084	

ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary ○ Secondary	●	●				○	○	●								

## 4-FL CHAMFER MILL

MG  
HM

ZEFP 4

FHA 0°

DIN  
6535HBDIN  
6535HA

Series No. 199323

► cutting conditions : p.33

EUROPA ORDCODE	DIAMETER DC	SHANK DIAMETER DMM	LENGTH OF CUT APMX	O/ALL LENGTH OAL	CHAMFER ANGLE α
1993230400*	4.0	4.0	2.0	54	90°
1993230600	6.0	6.0	3.0	54	
1993230800	8.0	8.0	4.0	58	
1993231000	10.0	10.0	5.0	66	
1993231200	12.0	12.0	6.0	73	
1993230401*	4.0	4.0	3.4	54	60°
1993230601	6.0	6.0	5.2	54	
1993230801	8.0	8.0	6.9	58	
1993231001	10.0	10.0	8.6	66	
1993231201	12.0	12.0	10.4	73	

\* Plain shank to DIN6535HA

Mill Dia. Tolerance TCDC (mm)	Shank Dia. Tolerance TCDMM
0.00 / -0.03	h6

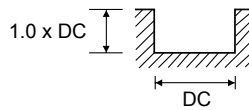
ISO	P			M		K		N				S		H		
VDI GROUP	1-5	6-9	10-11	12, 13	14	15-16	17-20	21-25	26-28	29.1	29.2	30	31-35	36-37	38-39	40-41
● Primary	●	●	●	○	○	●	●	●					○	○		
○ Secondary																



# **K30 CARBIDE CUTTING DATA**

## CUTTING DATA

301303, 301323, 302303, 302323 (2 Flute)															
VDI MATERIAL GROUP		HRc		Size (mm)											
				2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0	
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	50	55	65	70	70	70	70	70	75	75	70
				$n$	7960	5835	5170	4455	3715	2785	2225	1855	1705	1490	1115
				$f_z$	0.008	0.015	0.025	0.031	0.039	0.057	0.064	0.064	0.063	0.062	0.063
	$f$ (mm/min)	150	175	260	275	290	315	285	240	215	185	140			
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	50	55	65	70	70	70	70	70	75	75	70
				$n$	7960	5835	5170	4455	3715	2785	2225	1855	1705	1490	1115
$f_z$				0.008	0.015	0.025	0.031	0.039	0.057	0.064	0.064	0.063	0.062	0.063	
$f$ (mm/min)	150	175	260	275	290	315	285	240	215	185	140				
M	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	30	35	35	35	35	35	35	35	35	35	35
			$n$	3980	3180	2785	2225	1855	1390	1115	925	795	695	555	
			$f_z$	0.009	0.016	0.025	0.031	0.04	0.053	0.059	0.058	0.059	0.068	0.064	
			$f$ (mm/min)	70	100	140	140	150	150	130	105	95	95	70	
K	15-20	Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55	55	55	55	55
			$n$	9550	5835	4775	3500	2920	2185	1910	1460	1250	1095	875	
			$f_z$	0.012	0.018	0.024	0.03	0.043	0.063	0.077	0.102	0.119	0.145	0.189	
			$f$ (mm/min)	230	210	230	210	250	275	295	300	300	315	330	
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	140	145	145	140	
			$n$	22280	15385	11140	9230	7690	5770	4615	3715	3295	2885	2230	
			$f_z$	0.01	0.015	0.021	0.025	0.032	0.043	0.053	0.065	0.073	0.085	0.11	
	$f$ (mm/min)	445	460	465	460	490	495	490	480	480	490	490			
	26-27	Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	105	110	105	
			$n$	16710	11140	8755	6685	5570	4375	3340	2785	2385	2190	1670	
$f_z$			0.01	0.015	0.019	0.025	0.033	0.043	0.055	0.066	0.048	0.085	0.11		
$f$ (mm/min)	335	335	330	335	365	375	370	365	370	370	365				



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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

$f$  - feed rate (mm/min)

$a_p$  - axial depth of cut

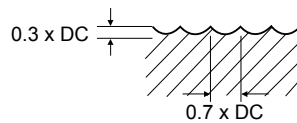
$a_e$  - radial depth of cut



## CUTTING DATA

313303, 313323, 314303, 314323, (2 Flute, Ball Nose)

VDI MATERIAL GROUP	HRC	Size (mm)												
		2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0		
P	1-5 Non-alloy Steel	<25	$v_c$ (m/min)	80	105	110	125	135	155	170	190	200	205	225
			$n$	12730	11140	8755	7960	7160	6165	5410	5040	4545	4080	3580
			$f_z$	0.026	0.025	0.035	0.045	0.06	0.089	0.122	0.15	0.165	0.18	0.201
	$f$ (mm/min)	660	555	615	715	860	1100	1320	1510	1500	1470	1440		
	6-9 Low alloy Steel	25-35	$v_c$ (m/min)	80	105	110	125	135	155	170	190	200	205	225
			$n$	12730	11140	8755	7960	7160	6165	5410	5040	4545	4080	3580
$f_z$			0.026	0.025	0.035	0.045	0.06	0.089	0.122	0.15	0.165	0.18	0.201	
$f$ (mm/min)	660	555	615	715	860	1100	1320	1510	1500	1470	1440			
K	15-20 Cast Iron	$v_c$ (m/min)	65	65	65	65	65	65	65	65	60	65	65	
		$n$	10345	6895	5170	4140	3450	2585	2070	1725	1365	1295	1035	
		$f_z$	0.01	0.016	0.028	0.04	0.053	0.092	0.112	0.131	0.164	0.177	0.2	
		$f$ (mm/min)	205	220	290	330	365	475	460	450	445	460	415	
N	21-24 Aluminium/ Aluminium Alloys	$v_c$ (m/min)	195	195	195	190	195	200	195	195	190	195	185	
		$n$	31035	20690	15520	12095	10345	7960	6205	5170	4320	3880	2945	
		$f_z$	0.006	0.01	0.013	0.019	0.023	0.034	0.044	0.061	0.073	0.07	0.092	
		$f$ (mm/min)	370	415	400	460	475	540	545	630	630	540	540	



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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

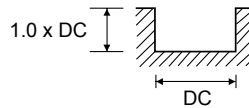
$f$  - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

304303, 304323, 305303, 305323 (3 Flute)															
VDI MATERIAL GROUP		HRc	SLOTTING	Size (mm)											
				2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0	
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	50	55	65	70	70	70	70	70	75	75	70
				n	7960	5835	5170	4455	3715	2785	2230	1855	1705	1490	1115
				$f_z$	0.005	0.007	0.012	0.015	0.018	0.027	0.03	0.031	0.029	0.029	0.029
				f (mm/min)	120	120	185	200	200	225	200	170	150	130	95
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	50	55	65	70	70	70	70	70	75	75	70
				n	7960	5835	5170	4455	3715	2785	2230	1855	1705	1490	1115
				$f_z$	0.005	0.007	0.012	0.015	0.018	0.027	0.03	0.031	0.029	0.029	0.029
				f (mm/min)	120	120	185	200	200	225	200	170	150	130	95
M	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	30	35	35	35	35	35	35	35	35	35	
			n	3980	3180	2785	2230	1855	1390	1115	930	795	695	555	
			$f_z$	0.004	0.007	0.011	0.015	0.019	0.025	0.028	0.026	0.027	0.031	0.03	
			f (mm/min)	45	65	90	100	105	105	95	70	65	65	50	
K	15-20	Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55	55	55	55	
			n	9550	5835	4775	3500	2920	2190	1910	1460	1250	1095	875	
			$f_z$	0.007	0.011	0.013	0.018	0.026	0.036	0.046	0.063	0.073	0.086	0.115	
			f (mm/min)	200	190	185	190	230	235	265	275	275	280	300	
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	145	140	145	145	140
			n	22280	15385	11140	9230	7690	5770	4615	3715	3300	2885	2230	
			$f_z$	0.006	0.009	0.013	0.015	0.019	0.026	0.032	0.038	0.043	0.05	0.065	
			f (mm/min)	400	415	435	415	435	450	440	420	425	430	435	
	26-27	Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	105	110	105	
			n	16710	11140	8755	6685	5570	4375	3340	2785	2385	2190	1670	
			$f_z$	0.006	0.009	0.012	0.015	0.005	0.025	0.032	0.039	0.046	0.05	0.065	
			f (mm/min)	300	300	315	300	335	330	320	325	330	325	325	



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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

n - RPM (rev/min)

$f_z$  - feed per tooth (mm)

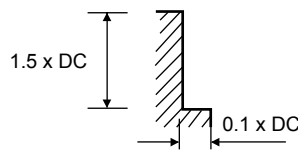
f - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

304303, 304323, 305303, 305323 (3 Flute)															
VDI MATERIAL GROUP		HRc	SIDE CUTTING	Size (mm)											
				2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0	
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	60	70	80	85	90	90	85	90	90	95	90
				$n$	9550	7425	6365	5410	4775	3580	2705	2385	2045	1890	1430
				$f_z$	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.047
				$f$ (mm/min)	170	200	360	390	430	450	380	335	290	270	200
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	60	70	80	85	90	90	85	90	90	95	90
				$n$	9550	7425	6365	5410	4775	3580	2705	2385	2045	1890	1430
				$f_z$	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.047
				$f$ (mm/min)	170	200	360	390	430	450	380	335	290	270	200
M	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	35	35	40	40	45	45	45	45	45	45	45	
			$n$	5570	3715	3180	2545	2385	1790	1430	1195	1020	895	715	
			$f_z$	0.006	0.009	0.018	0.027	0.03	0.042	0.045	0.045	0.044	0.048	0.048	
			$f$ (mm/min)	100	100	170	180	215	225	190	160	135	130	105	
K	15-20	Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55	55	55	55	
			$n$	9550	5835	4775	3500	2920	2190	1910	1460	1250	1095	875	
			$f_z$	0.017	0.026	0.035	0.044	0.064	0.093	0.115	0.154	0.181	0.22	0.285	
			$f$ (mm/min)	485	455	500	460	560	610	660	675	680	720	750	
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	140	145	145	140	
			$n$	22280	15385	11140	9230	7690	5770	4615	3715	3295	2885	2230	
			$f_z$	0.016	0.021	0.031	0.037	0.048	0.064	0.08	0.098	0.444	0.129	0.167	
			$f$ (mm/min)	1070	970	1035	1025	1110	1105	1105	1090	1100	1115	1115	
	26-27	Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	105	110	105	
			$n$	16710	11140	8755	6685	5570	4375	3340	2785	2385	2190	1670	
			$f_z$	0.016	0.023	0.029	0.037	0.048	0.063	0.081	0.096	0.115	0.125	0.162	
			$f$ (mm/min)	800	770	760	740	800	825	810	800	825	820	810	



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

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All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

$f$  - feed rate (mm/min)

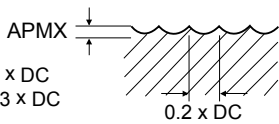
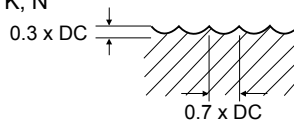
$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

307303, 307323, 308303, 308323 (3 Flute, Ball Nose)														
VDI MATERIAL GROUP		HRc		Size (mm)										
				3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	105	110	125	135	155	170	190	200	205	225
				n	11140	8755	7960	7160	6165	5410	5040	4545	4080	3580
				$f_z$	0.019	0.026	0.033	0.046	0.068	0.089	0.112	0.135	0.15	0.15
				f (mm/min)	635	685	790	990	1259	1445	1695	1610	1470	1290
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	105	110	125	135	155	170	190	200	205	225
				n	11140	8755	7960	7160	6165	5410	5040	4545	4080	3580
				$f_z$	0.019	0.026	0.033	0.046	0.068	0.089	0.112	0.135	0.15	0.15
				f (mm/min)	635	685	790	990	1259	1445	1695	1610	1470	1290
K	15-20	Cast Iron	$v_c$ (m/min)	65	65	65	65	65	65	65	60	65	65	
			n	6895	5170	4140	3450	2585	2070	1725	1365	1295	1035	
			$f_z$	0.012	0.021	0.03	0.04	0.068	0.083	0.097	0.135	0.149	0.149	
			f (mm/min)	250	325	375	415	525	515	500	485	460	370	
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	195	195	190	195	200	195	195	190	195	185	
			n	20690	15520	12095	10345	7960	6205	5170	4320	3880	2945	
			$f_z$	0.007	0.01	0.015	0.017	0.026	0.033	0.046	0.053	0.069	0.069	
			f (mm/min)	435	465	545	530	620	615	715	600	640	490	

MATERIAL GROUP P	MATERIAL GROUPS K, N
<p>APMX : <math>\varnothing 3.0\text{mm} - \varnothing 6.0\text{mm} = 0.2 \times \text{DC}</math>  APMX : <math>\varnothing 8.0\text{mm} - \varnothing 25.0\text{mm} = 0.3 \times \text{DC}</math></p> 	<p>0.3 x DC</p> 

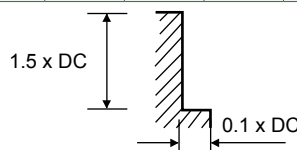
► The feed rate for long, long reach and uncoated tools should be reduced by up to 50%

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All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.  
**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)  
n - RPM (rev/min)  
 $f_z$  - feed per tooth (mm)  
f - feed rate (mm/min)  
 $a_p$  - axial depth of cut  
 $a_e$  - radial depth of cut

## CUTTING DATA

310303, 310323, 311303, 311323 (4 Flute)														
VDI MATERIAL GROUP	HRC	Size (mm)												
		2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0		
P	1-5 Non-alloy Steel	<25	$v_c$ (m/min)	60	70	80	85	90	90	85	90	90	95	90
			$n$	9550	7425	6365	5410	4775	3580	2705	2385	2045	1890	1430
			$f_z$	0.006	0.009	0.019	0.024	0.029	0.043	0.047	0.047	0.047	0.047	0.047
	$f$ (mm/min)	230	265	485	520	555	615	510	450	385	355	270		
	6-9 Low alloy Steel	25-35	$v_c$ (m/min)	60	70	80	85	90	90	85	90	90	95	90
			$n$	9550	7425	6365	5410	4775	3580	2705	2385	2045	1890	1430
$f_z$			0.006	0.009	0.019	0.024	0.029	0.043	0.047	0.047	0.047	0.047	0.047	
$f$ (mm/min)	230	265	485	520	555	615	510	450	385	355	270			
M	12-13 Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	35	35	40	40	45	45	45	45	45	50	45	
		$n$	5570	3715	3180	2545	2385	1790	1430	1195	1020	995	715	
		$f_z$	0.006	0.009	0.018	0.024	0.029	0.042	0.044	0.045	0.045	0.045	0.046	
		$f$ (mm/min)	135	135	230	245	275	300	250	215	185	180	130	
K	15-20 Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55	55	55	55	
		$n$	9550	5835	4775	3500	2920	2190	1910	1460	1250	1095	875	
		$f_z$	0.017	0.026	0.065	0.044	0.065	0.093	0.116	0.155	0.182	0.22	0.288	
		$f$ (mm/min)	650	605	665	615	760	815	885	905	910	960	1010	
N	21-24 Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	140	145	145	140	
		$n$	22280	15385	11140	9230	7690	5770	4615	3715	3295	2885	2230	
		$f_z$	0.015	0.021	0.03	0.036	0.047	0.063	0.078	0.095	0.108	0.125	0.163	
		$f$ (mm/min)	1335	1290	1335	1330	1445	1455	1440	1410	1425	1440	1450	
	26-27 Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	105	110	105	
		$n$	16710	11140	8755	6685	5570	4375	3340	2785	2385	2190	1670	
		$f_z$	0.016	0.024	0.029	0.038	0.048	0.063	0.081	0.096	0.115	0.125	0.162	
		$f$ (mm/min)	1070	1070	1015	1015	1070	1100	1080	1070	1100	1095	1080	



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**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

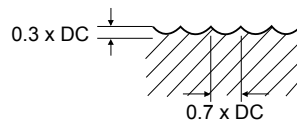
$f$  - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

315303, 315323, 316303, 316323 (4 Flute, Ball Nose)														
VDI MATERIAL GROUP	HRC	Size (mm)												
		2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0		
P	1-5 Non-alloy Steel	<25	$v_c$ (m/min)	85	110	110	125	135	155	170	190	200	205	225
			n	13530	11670	8755	7960	7160	6165	5410	5040	4545	4080	3580
			$f_z$	0.013	0.019	0.027	0.033	0.046	0.068	0.089	0.112	0.124	0.136	0.15
	f (mm/min)	700	885	945	1050	1320	1675	1925	2260	2255	2220	2150		
	6-9 Low alloy Steel	25-35	$v_c$ (m/min)	85	110	110	125	135	155	170	190	200	205	225
			n	13530	11670	8755	7960	7160	6165	5410	5040	4545	4080	3580
$f_z$			0.013	0.019	0.027	0.033	0.046	0.068	0.089	0.112	0.124	0.136	0.15	
f (mm/min)	700	885	945	1050	1320	1675	1925	2260	2255	2220	2150			
K	15-20 Cast Iron	$v_c$ (m/min)	65	65	65	65	65	65	65	65	60	65	65	
		n	10345	6895	5170	4140	3450	2585	2070	1725	1365	1295	1035	
		$f_z$	0.008	0.012	0.021	0.03	0.04	0.068	0.083	0.097	0.125	0.135	0.15	
		f (mm/min)	330	330	435	495	550	700	685	670	680	695	620	
N	21-24 Aluminium/ Aluminium Alloys	$v_c$ (m/min)	195	195	195	190	195	200	195	195	190	195	185	
		n	31035	20690	15520	12095	10345	7960	6205	5170	4320	3880	2945	
		$f_z$	0.005	0.007	0.01	0.015	0.017	0.026	0.033	0.046	0.055	0.053	0.069	
		f (mm/min)	620	580	620	725	700	830	820	950	950	820	815	



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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

n - RPM (rev/min)

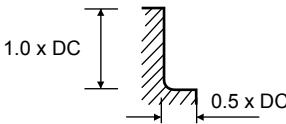
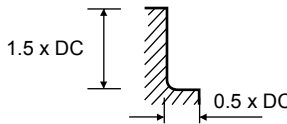
$f_z$  - feed per tooth (mm)

f - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

140323, 142323 (4 Flute, Corner Radius)											
VDI MATERIAL GROUP	HRC	Size (mm)									
		2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0		
P	1-5 Non-alloy Steel	<25	$v_c$ (m/min)	60	70	80	85	90	90	85	90
			$n$	9550	7425	6365	5410	4775	3580	2705	2385
			$f_z$	0.006	0.009	0.019	0.024	0.029	0.043	0.047	0.047
	6-9 Low alloy Steel	25-35	$v_c$ (m/min)	60	70	80	85	90	90	85	90
			$n$	9550	7425	6365	5410	4775	3580	2705	2385
			$f_z$	0.006	0.009	0.019	0.024	0.029	0.043	0.047	0.047
M	12-13 Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	35	35	40	40	45	45	45	45	
		$n$	5570	3715	3180	2545	2385	1790	1430	1195	
		$f_z$	0.006	0.009	0.018	0.024	0.029	0.042	0.044	0.045	
		$f$ (mm/min)	135	135	230	245	275	300	250	215	
K	15-20 Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55	
		$n$	9550	5835	4775	3500	2920	2190	1910	1460	
		$f_z$	0.017	0.026	0.065	0.044	0.065	0.093	0.116	0.155	
		$f$ (mm/min)	650	605	665	615	760	815	885	905	
N	21-24 Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	140	
		$n$	22280	15385	11140	9230	7690	5770	4615	3715	
		$f_z$	0.015	0.021	0.03	0.036	0.047	0.063	0.078	0.095	
		$f$ (mm/min)	1335	1290	1335	1330	1445	1455	1440	1410	
	26-27 Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	
		$n$	16710	11140	8755	6685	5570	4375	3340	2785	
		$f_z$	0.016	0.024	0.029	0.038	0.048	0.063	0.081	0.096	
		$f$ (mm/min)	1070	1070	1015	1015	1070	1100	1080	1070	
MATERIAL GROUPS P, M			MATERIAL GROUPS K, N								
											

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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

$f$  - feed rate (mm/min)

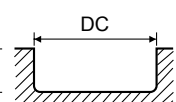
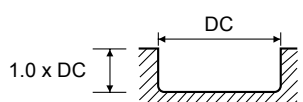
$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

120323, 121323 (2 Flute, Corner Radius)													
VDI MATERIAL GROUP		HRc		Size (mm)									
				2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0		
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	50	55	65	70	70	70	70	70	
				n	7960	5835	5170	4455	3715	2785	2225	1855	
				$f_z$	0.008	0.015	0.025	0.031	0.039	0.057	0.064	0.064	
					$f$ (mm/min)	150	175	260	275	290	315	285	240
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	50	55	65	70	70	70	70	70	70
				n	7960	5835	5170	4455	3715	2785	2225	1855	
$f_z$				0.008	0.015	0.025	0.031	0.039	0.057	0.064	0.064		
				$f$ (mm/min)	150	175	260	275	290	315	285	240	
M	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	30	35	35	35	35	35	35	35	
			n	3980	3180	2785	2225	1855	1390	1115	925		
			$f_z$	0.009	0.016	0.025	0.031	0.04	0.053	0.059	0.058		
			$f$ (mm/min)	70	100	140	140	150	150	130	105		
K	15-20	Cast Iron	$v_c$ (m/min)	60	55	60	55	55	55	60	55		
			n	9550	5835	4775	3500	2920	2185	1910	1460		
			$f_z$	0.012	0.018	0.024	0.03	0.043	0.063	0.077	0.102		
			$f$ (mm/min)	230	210	230	210	250	275	295	300		
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	140	145	140	145	145	145	145	145	140	
			n	22280	15385	11140	9230	7690	5770	4615	3715		
			$f_z$	0.01	0.015	0.021	0.025	0.032	0.043	0.053	0.065		
					$f$ (mm/min)	445	460	465	460	490	495	490	480
	26-27	Copper/ Copper Alloys	$v_c$ (m/min)	105	105	110	105	105	110	105	105	105	
			n	16710	11140	8755	6685	5570	4375	3340	2785		
$f_z$			0.01	0.015	0.019	0.025	0.033	0.043	0.055	0.066			
$f$ (mm/min)	335	335	330	335	365	375	370	365					

MATERIAL GROUPS P, M	MATERIAL GROUPS K, N
$< \varnothing 3.0\text{mm}: 0.2 \times DC$ $> \varnothing 3.0\text{mm}: 0.5 \times DC$ 	$1.0 \times DC$ 

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

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

n - RPM (rev/min)

$f_z$  - feed per tooth (mm)

f - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut



## CUTTING DATA

199323 (4 Flute Chamfer Mill)									
VDI MATERIAL GROUP		HRc		Size (mm)					
				4.0	6.0	8.0	10.0	12.0	
P	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	90	90	90	85	90
				n	7165	4775	3580	2705	2385
				$f_z$	0.02	0.029	0.043	0.047	0.047
				f (mm/min)	570	555	615	510	450
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	90	90	90	85	90
				n	7165	4775	3580	2705	2385
				$f_z$	0.02	0.029	0.043	0.047	0.047
				f (mm/min)	570	555	615	510	450
M	12-14	Stainless Steel	$v_c$ (m/min)	45	45	45	45	45	
			n	3580	2385	1790	1430	1195	
			$f_z$	0.02	0.029	0.042	0.044	0.045	
			f (mm/min)	285	275	300	250	215	
K	15-20	Cast Iron	$v_c$ (m/min)	55	55	55	60	55	
			n	4380	2920	2190	1910	1460	
			$f_z$	0.05	0.065	0.093	0.116	0.155	
			f (mm/min)	875	760	815	885	905	
N	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	145	145	145	145	140	
			n	11545	7690	5770	4615	3715	
			$f_z$	0.04	0.047	0.063	0.078	0.095	
			f (mm/min)	1845	1445	1455	1440	1410	
S	31-35	HRSA Fe & Ni/Co Based	$v_c$ (m/min)	25	25	25	25	25	
			n	1990	1325	995	795	660	
			$f_z$	0.01	0.014	0.018	0.02	0.02	
			f (mm/min)	80	75	70	60	50	
	36-37	Titanium/ Titanium Alloys	$v_c$ (m/min)	45	45	45	45	45	
			n	3580	2385	1790	1430	1195	
			$f_z$	0.02	0.029	0.042	0.044	0.045	
			f (mm/min)	285	275	300	250	215	

Recommended cutting depths are **maximum** depths, and **speeds and feeds are a starting point** based on these depths.

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up.

**For long series and long necked tools** it may be necessary to reduce feed rate by up to 50%.

$v_c$  - cutting speed (m/min)

n - RPM (rev/min)

$f_z$  - feed per tooth (mm)

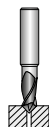
f - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut

## CUTTING DATA

197303 (2 Flute Drill Mill) <b>CHAMFERING</b>													
VDI MATERIAL GROUP		HRc		Size (mm)									
				3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	
<b>P</b>	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	35	40	40	40	40	40	40	30	45
				$n$	3500	3000	2400	2000	1540	1300	1100	950	750
				$f_z$	0.023	0.027	0.035	0.043	0.058	0.073	0.091	0.105	0.140
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	35	40	40	40	40	40	40	30	45
				$n$	3500	3000	2400	2000	1540	1300	1100	950	750
				$f_z$	0.023	0.027	0.035	0.043	0.058	0.073	0.091	0.105	0.140
<b>M</b>	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	25	30	25	25	25	30	15	35	
			$n$	2400	2000	1760	1400	1000	870	730	550	530	
			$f_z$	0.021	0.025	0.03	0.038	0.55	0.063	0.079	0.109	0.123	
			$f$ (mm/min)	100	100	105	105	110	110	115	120	130	
<b>N</b>	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	105	115	110	105	110	125	130	85	140	
			$n$	11000	9000	6900	5600	4400	4000	3500	2750	2200	
			$f_z$	0.025	0.032	0.045	0.057	0.075	0.085	0.1	0.135	0.175	
			$f$ (mm/min)	550	580	620	640	660	680	700	740	770	

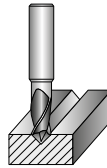


197303 (2 Flute Drill Mill) <b>CHAMFERING &amp; SIDE CUTTING</b>													
VDI MATERIAL GROUP		HRc		Size (mm)									
				3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	
<b>P</b>	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	35	40	40	40	40	40	40	45	45
				$n$	3900	3200	2500	2000	1540	1300	1100	900	700
				$f_z$	0.008	0.01	0.013	0.018	0.024	0.031	0.041	0.05	0.064
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	35	40	40	40	40	40	40	45	45
				$n$	3900	3200	2500	2000	1540	1300	1100	900	700
				$f_z$	0.008	0.01	0.013	0.018	0.024	0.031	0.041	0.05	0.064
<b>M</b>	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	25	30	25	30	30	30	35	30	
			$n$	2400	2000	1760	1400	1100	1000	840	660	440	
			$f_z$	0.008	0.01	0.013	0.018	0.025	0.028	0.036	0.045	0.068	
			$f$ (mm/min)	40	40	45	50	55	55	60	60	60	
<b>N</b>	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	130	150	150	145	145	160	165	165	165	
			$n$	14000	12000	9500	7700	5800	5100	4400	3300	2640	
			$f_z$	0.008	0.01	0.013	0.019	0.03	0.037	0.045	0.05	0.064	
			$f$ (mm/min)	230	240	250	300	350	280	400	330	340	



## CUTTING DATA

197303 (2 Flute Drill Mill) <b>V-GROOVING</b>													
VDI MATERIAL GROUP		HRc		Size (mm)									
				3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	
<b>P</b>	1-5	Non-alloy Steel	<25	$v_c$ (m/min)	40	40	40	40	40	40	40	45	45
				$n$	4000	3300	2500	2000	1540	1300	1000	900	700
				$f_z$	0.004	0.005	0.006	0.008	0.011	0.013	0.02	0.022	0.029
		$f$ (mm/min)	30	30	30	30	35	35	40	40	40		
	6-9	Low alloy Steel	25-35	$v_c$ (m/min)	40	40	40	40	40	40	40	45	45
				$n$	4000	3300	2500	2000	1540	1300	1000	900	700
$f_z$				0.004	0.005	0.006	0.008	0.011	0.013	0.02	0.022	0.029	
	$f$ (mm/min)	30	30	30	30	35	35	40	40	40			
<b>M</b>	12-13	Ferritic/ Martensitic Stainless Steel	$v_c$ (m/min)	25	25	30	25	30	30	20	35	30	
			$n$	2400	2000	1760	1400	1100	1000	840	660	440	
			$f_z$	0.004	0.005	0.006	0.007	0.009	0.01	0.012	0.019	0.028	
			$f$ (mm/min)	20	20	20	20	20	20	20	25	25	
<b>N</b>	21-24	Aluminium/ Aluminium Alloys	$v_c$ (m/min)	130	150	150	145	145	155	165	165	165	
			$n$	14000	11800	9500	7700	5800	5000	4400	3300	2600	
			$f_z$	0.008	0.01	0.013	0.016	0.022	0.026	0.03	0.041	0.052	
			$f$ (mm/min)	220	230	240	250	260	260	260	270	270	



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$v_c$  - cutting speed (m/min)

$n$  - RPM (rev/min)

$f_z$  - feed per tooth (mm)

$f$  - feed rate (mm/min)

$a_p$  - axial depth of cut

$a_e$  - radial depth of cut