



ROUTING

		VDI 3323		CARBIDE Vc [m/min]	TiAlN Vc [m/min]	DLC Vc [m/min]	ae (mm)	ap (mm)
P	Unalloyed steel, leaded steel	1 - 5			135		<0.3×ØD1	<1×L1
	Low alloyed steel < 800 N/mm²	6 - 9			105		<0.3×ØD1	<1×L1
	High-alloy steel > 800 N/mm², stainless steel ferr.- marten.	10 - 13			80		<0.2×ØD1	<1×L1
M	Austenitic stainless steel < 700 N/mm²	14.1-14.2			100		<0.2×ØD1	<1×L1
	Nickel-free stainless steel/DUPLEX>700 N/mm²	14.3-14.4			80		<0.2×ØD1	<1×L1
K	Grey cast iron < 250 HB	15 - 16		180	200		<0.4×ØD1	<1×L1
	Ductile, malleable, nodular cast iron > 250 HB	17 - 20		95	130		<0.4×ØD1	<1×L1
N	Wrought aluminium alloy < 12% Si	21 - 22		320		170	<0.4×ØD1	<1×L1
	Cast aluminium alloy >12% Si	23 - 25		265		400	<0.4×ØD1	<1×L1
	Copper alloy good machinability with Pb	26		155			<0.4×ØD1	<1×L1
	Copper alloy with difficult machinability	27 - 28		135		190	<0.4×ØD1	<1×L1
	Plastic, wood	29 - 30		215		330	<0.4×ØD1	<1×L1
	Gold, silver	-		180		230	<0.4×ØD1	<1×L1
S	Titanium, titanium alloy	36 - 37		65	70		<0.3×ØD1	<1×L1

$$n \text{ [rpm]} = \frac{V_c \text{ [m/min]} \times 1000}{\pi \times D_1 \text{ [mm]}}$$

$$V_f \text{ [mm/min]} = n \text{ [rpm]} \times f_z \text{ [mm]} \times Z$$

Feed per tooth fz [mm]							
Ø D ₁ 0.30 - 0.50	Ø D ₁ 0.60 - 1.00	Ø D ₁ 1.10 - 1.50	Ø D ₁ 1.60 - 2.00	Ø D ₁ 2.50 - 3.00	Ø D ₁ 4.00 - 6.00	Ø D ₁ 8.00 - 12.00	Ø D ₁ 16.00 - 20.00
0.002 - 0.005	0.005 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.065 - 0.085	0.100 - 0.125
0.002 - 0.004	0.005 - 0.009	0.009 - 0.013	0.014 - 0.017	0.021 - 0.026	0.034 - 0.050	0.060 - 0.080	0.095 - 0.120
0.002 - 0.004	0.005 - 0.008	0.009 - 0.012	0.013 - 0.016	0.020 - 0.024	0.032 - 0.050	0.060 - 0.075	0.090 - 0.110
0.002 - 0.004	0.005 - 0.008	0.009 - 0.012	0.013 - 0.016	0.020 - 0.024	0.032 - 0.050	0.060 - 0.075	0.090 - 0.110
0.002 - 0.004	0.004 - 0.007	0.008 - 0.011	0.011 - 0.014	0.018 - 0.021	0.028 - 0.040	0.050 - 0.065	0.080 - 0.100
0.003 - 0.006	0.007 - 0.012	0.013 - 0.018	0.019 - 0.024	0.030 - 0.036	0.048 - 0.070	0.085 - 0.115	0.135 - 0.170
0.002 - 0.005	0.006 - 0.010	0.011 - 0.015	0.016 - 0.020	0.025 - 0.030	0.040 - 0.060	0.070 - 0.095	0.110 - 0.140
0.004 - 0.008	0.009 - 0.015	0.017 - 0.023	0.024 - 0.030	0.038 - 0.045	0.060 - 0.090	0.110 - 0.145	0.170 - 0.210
0.003 - 0.007	0.008 - 0.013	0.014 - 0.020	0.021 - 0.026	0.033 - 0.039	0.052 - 0.080	0.095 - 0.125	0.145 - 0.180
0.004 - 0.008	0.009 - 0.015	0.017 - 0.023	0.024 - 0.030	0.038 - 0.045	0.060 - 0.090	0.110 - 0.145	0.170 - 0.210
0.003 - 0.006	0.007 - 0.012	0.013 - 0.018	0.019 - 0.024	0.030 - 0.036	0.048 - 0.070	0.085 - 0.115	0.135 - 0.170
0.004 - 0.008	0.009 - 0.015	0.017 - 0.023	0.024 - 0.030	0.038 - 0.045	0.060 - 0.090	0.110 - 0.145	0.170 - 0.210
0.002 - 0.005	0.006 - 0.010	0.011 - 0.015	0.016 - 0.020	0.025 - 0.030	0.040 - 0.060	0.070 - 0.095	0.110 - 0.140
0.002 - 0.005	0.006 - 0.010	0.011 - 0.015	0.016 - 0.020	0.025 - 0.030	0.040 - 0.060	0.070 - 0.095	0.110 - 0.140

SLOTTING

		VDI 3323		CARBIDE Vc [m/min]	TiAlN Vc [m/min]	DLC Vc [m/min]	ae (mm)	ap (mm)
P	Unalloyed steel, leaded steel	1 - 5			100		1×ØD1	<1×ØD1
	Low alloyed steel < 800 N/mm²	6 - 9			85		1×ØD1	<1×ØD1
	High-alloy steel > 800 N/mm², stainless steel ferr.- marten.	10 - 13			55		1×ØD1	<0.8×ØD1
M	Austenitic stainless steel < 700 N/mm²	14.1-14.2			75		1×ØD1	<0.8×ØD1
	Nickel-free stainless steel/DUPLEX>700 N/mm²	14.3-14.4			45		1×ØD1	<0.7×ØD1
K	Grey cast iron < 250 HB	15 - 16		125	145		1×ØD1	<1×ØD1
	Ductile, malleable, nodular cast iron > 250 HB	17 - 20		65	75		1×ØD1	<1×ØD1
N	Wrought aluminium alloy < 12% Si	21 - 22		225		280	1×ØD1	<1×ØD1
	Cast aluminium alloy >12% Si	23 - 25		185		230	1×ØD1	<1×ØD1
	Copper alloy good machinability with Pb	26		110		140	1×ØD1	<1×ØD1
	Copper alloy with difficult machinability	27 - 28		95		120	1×ØD1	<1×ØD1
	Plastic, wood	29 - 30		150		190	1×ØD1	<1×ØD1
	Gold, silver	-		125		160	1×ØD1	<1×ØD1
S	Titanium, titanium alloy	36 - 37		45	55		1×ØD1	<1×ØD1

Feed per tooth fz [mm]							
Ø D ₁ 0.30 - 0.50	Ø D ₁ 0.60 - 1.00	Ø D ₁ 1.10 - 1.50	Ø D ₁ 1.60 - 2.00	Ø D ₁ 2.50 - 3.00	Ø D ₁ 4.00 - 6.00	Ø D ₁ 8.00 - 12.00	Ø D ₁ 16.00 - 20.00
0.002 - 0.004	0.004 - 0.007	0.008 - 0.011	0.011 - 0.014	0.017 - 0.020	0.028 - 0.040	0.050 - 0.060	0.080 - 0.090
0.002 - 0.003	0.004 - 0.007	0.007 - 0.010	0.011 - 0.013	0.016 - 0.020	0.026 - 0.040	0.050 - 0.060	0.070 - 0.090
0.002 - 0.003	0.004 - 0.006	0.007 - 0.009	0.010 - 0.012	0.015 - 0.018	0.024 - 0.040	0.050 - 0.060	0.070 - 0.080
0.002 - 0.003	0.004 - 0.006	0.007 - 0.009	0.010 - 0.012	0.015 - 0.018	0.024 - 0.040	0.050 - 0.060	0.070 - 0.080
0.002 - 0.003	0.003 - 0.005	0.006 - 0.008	0.008 - 0.011	0.014 - 0.016	0.022 - 0.030	0.040 - 0.050	0.060 - 0.080
0.002 - 0.005	0.005 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.060 - 0.090	0.100 - 0.130
0.002 - 0.004	0.005 - 0.008	0.008 - 0.011	0.012 - 0.015	0.019 - 0.023	0.030 - 0.045	0.050 - 0.070	0.080 - 0.110
0.003 - 0.006	0.007 - 0.011	0.013 - 0.017	0.018 - 0.023	0.029 - 0.034	0.046 - 0.070	0.080 - 0.110	0.130 - 0.160
0.002 - 0.005	0.006 - 0.010	0.011 - 0.015	0.016 - 0.020	0.025 - 0.029	0.040 - 0.060	0.070 - 0.090	0.110 - 0.140
0.003 - 0.006	0.007 - 0.011	0.013 - 0.017	0.018 - 0.023	0.029 - 0.034	0.046 - 0.070	0.080 - 0.110	0.130 - 0.160
0.002 - 0.005	0.005 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.060 - 0.090	0.100 - 0.130
0.003 - 0.006	0.007 - 0.011	0.013 - 0.017	0.018 - 0.023	0.029 - 0.034	0.046 - 0.070	0.080 - 0.110	0.130 - 0.160
0.002 - 0.004	0.005 - 0.008	0.008 - 0.011	0.012 - 0.015	0.019 - 0.023	0.030 - 0.045	0.050 - 0.070	0.080 - 0.110
0.002 - 0.004	0.005 - 0.008	0.008 - 0.011	0.012 - 0.015	0.019 - 0.023	0.030 - 0.045	0.050 - 0.070	0.080 - 0.110

Values based on cutting oil use. The cutting parameters are very strongly influenced by external parameters, such as tool and workpiece stability, etc.
The cutting conditions must be adapted to the operating conditions !



RAMPING

		VDI 3323		CARBIDE Vc [m/min]	TiAlN Vc [m/min]	DLC Vc [m/min]	Ramp anlge α	ap (mm)
P	Unalloyed steel, leaded steel	1 - 5			100		<6°	<1×ØD1
	Low alloyed steel < 800 N/mm²	6 - 9			85		<4°	<1×ØD1
	High-alloy steel > 800 N/mm², stainless steel ferr.- marten.	10 - 13			55		<3°	<0.8×ØD1
M	Austenitic stainless steel < 700 N/mm²	14.1-14.2			75		<3°	<0.8×ØD1
	Nickel-free stainless steel/DUPLEX > 700 N/mm²	14.3-14.4			45		<2°	<0.7×ØD1
K	Grey cast iron < 250 HB	15 - 16		125	145		<7°	<1×ØD1
	Ductile, malleable, nodular cast iron > 250 HB	17 - 20		65	75		<4°	<1×ØD1
N	Wrought aluminium alloy < 12% Si	21 - 22		225		280	<6°	<1×ØD1
	Cast aluminium alloy >12% Si	23 - 25		185		230	<4°	<1×ØD1
	Copper alloy good machinability with Pb	26		110		140	<7°	<1×ØD1
	Copper alloy with difficult machinability	27 - 28		95		120	<4°	<1×ØD1
	Plastic, wood	29 - 30		150		190	<6°	<1×ØD1
	Gold, silver	-		125		160	<3°	<1×ØD1
S	Titanium, titanium alloy	36 - 37		45	55		<2°	<1×ØD1

$$n \text{ [rpm]} = \frac{V_c \text{ [m/min]} \times 1000}{\pi \times D_1 \text{ [mm]}}$$

$$V_f \text{ [mm/min]} = n \text{ [rpm]} \times f_z \text{ [mm]} \times Z$$

Feed per tooth fz [mm]							
Ø D ₁ 0.30 - 0.50	Ø D ₁ 0.60 - 1.00	Ø D ₁ 1.10 - 1.50	Ø D ₁ 1.60 - 2.00	Ø D ₁ 2.50 - 3.00	Ø D ₁ 4.00 - 6.00	Ø D ₁ 8.00 - 12.00	Ø D ₁ 16.00 - 20.00
0.002 - 0.003	0.003 - 0.006	0.006 - 0.009	0.009 - 0.011	0.014 - 0.016	0.022 - 0.030	0.040 - 0.050	0.060 - 0.070
0.002 - 0.002	0.003 - 0.006	0.006 - 0.008	0.009 - 0.010	0.013 - 0.016	0.020 - 0.030	0.040 - 0.050	0.060 - 0.070
0.002 - 0.002	0.003 - 0.005	0.006 - 0.007	0.008 - 0.010	0.012 - 0.014	0.020 - 0.030	0.040 - 0.050	0.060 - 0.065
0.002 - 0.002	0.003 - 0.005	0.006 - 0.007	0.008 - 0.010	0.012 - 0.014	0.020 - 0.030	0.040 - 0.050	0.060 - 0.065
0.002 - 0.002	0.002 - 0.004	0.005 - 0.006	0.006 - 0.009	0.011 - 0.013	0.018 - 0.025	0.030 - 0.040	0.050 - 0.065
0.002 - 0.004	0.004 - 0.007	0.008 - 0.011	0.011 - 0.014	0.018 - 0.022	0.028 - 0.045	0.050 - 0.070	0.080 - 0.105
0.002 - 0.003	0.004 - 0.006	0.006 - 0.009	0.010 - 0.012	0.015 - 0.018	0.024 - 0.035	0.040 - 0.060	0.060 - 0.090
0.002 - 0.005	0.006 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.060 - 0.090	0.100 - 0.130
0.002 - 0.004	0.005 - 0.008	0.009 - 0.012	0.013 - 0.016	0.020 - 0.023	0.032 - 0.050	0.060 - 0.070	0.090 - 0.110
0.002 - 0.005	0.006 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.060 - 0.090	0.100 - 0.130
0.002 - 0.004	0.004 - 0.007	0.008 - 0.011	0.011 - 0.014	0.018 - 0.022	0.028 - 0.045	0.050 - 0.070	0.080 - 0.105
0.002 - 0.005	0.006 - 0.009	0.010 - 0.014	0.014 - 0.018	0.023 - 0.027	0.036 - 0.055	0.060 - 0.090	0.100 - 0.130
0.002 - 0.003	0.004 - 0.006	0.006 - 0.009	0.010 - 0.012	0.015 - 0.018	0.024 - 0.035	0.040 - 0.060	0.060 - 0.090
0.002 - 0.003	0.004 - 0.006	0.006 - 0.009	0.010 - 0.012	0.015 - 0.018	0.024 - 0.035	0.040 - 0.060	0.060 - 0.090