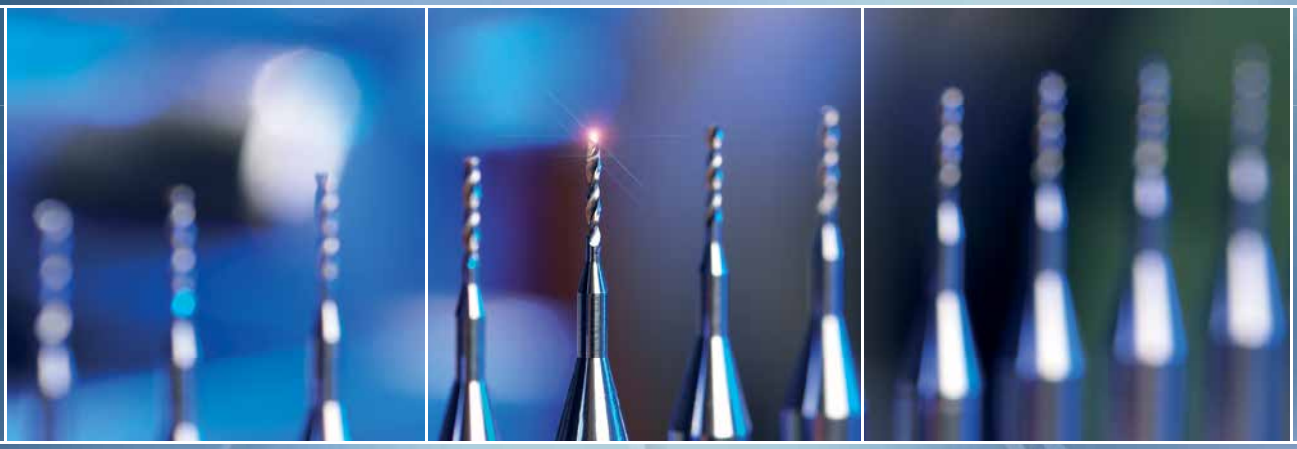

Anwendungstechnik / Schnittdaten

Application de la technologie / Données de coupe
Applicazione della tecnologia / Parametri di lavoro
Application technology / Cutting data

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Anwendungstechnik
Application de la technologie
Applicazione della tecnologia
Application technology

Erklärung Schnittdaten
Explication données de coupe
Spiegazione parametri di lavoro
Explication cutting data

Formel Schnittgeschwindigkeit v:
Formule vitesse de coupe v:
Formula velocità di taglio v:
Formula cutting speed v:

$$v = \frac{d \times \pi \times n}{1000}$$

Formel Drehzahl n:
Formule vitesse n:
Formula giri n:
Formula spindle speed n:

$$n = \frac{v \times 1000}{d \times \pi}$$

Bohrer, Reibahlen
Forets, alésoir
Punte, alesatore
Drill, reamer

Vc = Schnittgeschwindigkeit in m/min
Vitesse de coupe en m/min
Velocità di taglio in m/min
Cutting speed in m/min

Vf = Vorschubgeschwindigkeit mm/U
Avance en mm/t
Avanzamento in mm/g
Cutting feed in mm/rev

Fräser
Fraises
Frese
End mill

Vc = Schnittgeschwindigkeit in m/min
Vitesse de coupe en m/min
Velocità di taglio in m/min
Cutting speed in m/min

fz = Vorschubgeschwindigkeit in mm/Zahn
Avance en mm/dent
Avanzamento in mm/tagliente
Cutting speed in mm/tooth

Vf = Vorschubgeschwindigkeit mm/U = $fz \times Z \times n$
Avance en mm/t = $fz \times d \times n$
Avanzamento in mm/g = $fz \times d \times n$
Cutting speed in mm/rev = $fz \times t \times n$

ap = Schnitttiefe
Profondeur de coupe
Profondità di taglio
Cutting depth

ae = Schnittbreite
Largeur de coupe
Larghezza di taglio
Cutting width

Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

50806 / 50809

Mat.		ø 0.50–1.00	ø 1.10–2.90	ø 3.00–6.00
P1	v_c	15–25	25–40	25–40
	f_z	0.020–0.080	0.060–0.140	0.120–0.250
P2	v_c	12–20	20–35	20–35
	f_z	0.010–0.060	0.040–0.120	0.100–0.220
P3	v_c	8–18	12–30	12–30
	f_z	0.010–0.040	0.030–0.090	0.080–0.200
M1	v_c	6–12	10–20	10–20
	f_z	0.020–0.050	0.030–0.070	0.050–0.150
M2	v_c	5–10	8–16	8–16
	f_z	0.010–0.040	0.030–0.060	0.040–0.080
K1	v_c	15–25	25–40	25–40
	f_z	0.010–0.050	0.030–0.080	0.070–0.150
K2	v_c	12–20	20–35	20–35
	f_z	0.010–0.040	0.030–0.060	0.050–0.100
N1	v_c	30–45	45–60	45–60
	f_z	0.030–0.080	0.060–0.120	0.100–0.250
N2	v_c	20–35	30–45	30–45
	f_z	0.040–0.080	0.070–0.150	0.130–0.300
N3	v_c	15–30	25–40	25–40
	f_z	0.020–0.070	0.060–0.120	0.100–0.250
N4	v_c	15–25	25–40	25–40
	f_z	0.010–0.050	0.030–0.08	0.060–0.150
N5	v_c	30–45	45–60	45–60
	f_z	0.040–0.080	0.070–0.130	0.100–0.250
N6	v_c	15–30	25–40	25–40
	f_z	0.010–0.040	0.038–0.065	0.060–0.090
N7	v_c	15–25	25–40	25–40
	f_z	0.010–0.040	0.030–0.080	0.050–0.130
N8	v_c	8–18	12–30	12–30
	f_z	0.010–0.040	0.020–0.050	0.030–0.100
S1	v_c	20–35	30–45	30–45
	f_z	0.010–0.040	0.020–0.0560	0.040–0.100
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c	20–35	30–45	30–45
	f_z	0.020–0.060	0.050–0.120	0.100–0.250
O2	v_c			
	f_z			
O3	v_c			
	f_z			

56005

Mat.		ø 0.10–0.30	ø 0.35–0.80	ø 0.85–1.50
P1	v_c	8–18	15–30	30–60
	f_z	0.001–0.003	0.002–0.010	0.010–0.020
P2	v_c	6–16	12–25	20–40
	f_z	0.001–0.002	0.002–0.008	0.006–0.015
P3	v_c	6–13	10–20	18–35
	f_z	0.001–0.002	0.002–0.005	0.004–0.012
M1	v_c	5–12	10–18	15–30
	f_z	0.001–0.002	0.002–0.005	0.004–0.010
M2	v_c	5–10	8–15	13–25
	f_z	0.001–0.002	0.002–0.004	0.003–0.009
K1	v_c	8–18	15–30	30–60
	f_z	0.003–0.008	0.006–0.010	0.008–0.025
K2	v_c	6–16	12–25	20–40
	f_z	0.002–0.004	0.005–0.008	0.007–0.020
N1	v_c	12–20	18–35	35–65
	f_z	0.001–0.004	0.003–0.008	0.006–0.015
N2	v_c	10–18	15–30	25–50
	f_z	0.002–0.005	0.004–0.010	0.008–0.025
N3	v_c	8–18	15–30	30–60
	f_z	0.002–0.005	0.004–0.008	0.006–0.020
N4	v_c	8–18	15–30	30–60
	f_z	0.001–0.004	0.003–0.006	0.005–0.015
N5	v_c	12–20	18–35	35–65
	f_z	0.002–0.005	0.004–0.010	0.009–0.025
N6	v_c	8–18	15–30	30–60
	f_z	0.002–0.005	0.004–0.008	0.007–0.020
N7	v_c	8–18	15–30	30–60
	f_z	0.002–0.005	0.004–0.008	0.007–0.020
N8	v_c	6–13	10–20	18–35
	f_z	0.001–0.004	0.002–0.007	0.005–0.015
S1	v_c	15–30	28–45	30–45
	f_z	0.002–0.006	0.005–0.010	0.008–0.020
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c	8–18	15–30	30–60
	f_z	0.005–0.010	0.008–0.015	0.013–0.035
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Questi valori sono valori raccomandati che devono essere adattati secondo le condizioni della macchina, del serraggio, del lubrificante etc.
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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 56030 / 56033

Mat.		ø 0.03–0.10	ø 0.11–0.50	ø 0.51–0.80	ø 0.81–1.50	ø 1.51–2.00
P1	v_c	1.5–5	4–10	10–30	30–60	30–60
	f_z	0.001–0.003	0.002–0.010	0.008–0.0015	0.012–0.025	0.020–0.035
P2	v_c	1.2–4	3.5–8	8–25	25–50	25–50
	f_z	0.001–0.002	0.002–0.008	0.007–0.013	0.010–0.022	0.018–0.032
P3	v_c	1–3	3–6	6–20	20–45	20–45
	f_z	0.001–0.002	0.002–0.007	0.006–0.012	0.009–0.020	0.016–0.030
M1	v_c	1.2–4	3.5–8	8–20	20–45	20–45
	f_z	0.001–0.002	0.002–0.007	0.005–0.010	0.008–0.018	0.016–0.025
M2	v_c	1–3	3–6	5–15	15–30	15–30
	f_z	0.001–0.002	0.002–0.005	0.005–0.008	0.007–0.015	0.013–0.020
K1	v_c	1.5–5	4–10	10–30	30–60	30–60
	f_z	0.001–0.004	0.003–0.008	0.006–0.012	0.010–0.022	0.018–0.035
K2	v_c	1.2–4	3.5–8	8–25	25–50	25–50
	f_z	0.001–0.003	0.002–0.007	0.005–0.011	0.009–0.020	0.016–0.030
N1	v_c	2–6	5–15	15–40	40–70	40–70
	f_z	0.001–0.003	0.002–0.006	0.005–0.010	0.008–0.018	0.015–0.028
N2	v_c	1.8–5.5	5–15	15–40	40–65	40–65
	f_z	0.001–0.003	0.002–0.007	0.006–0.012	0.011–0.020	0.018–0.030
N3	v_c	1.5–5	4–12	12–30	30–60	30–60
	f_z	0.001–0.002	0.002–0.006	0.005–0.010	0.009–0.018	0.016–0.025
N4	v_c	1.5–5	4–12	12–30	30–60	30–60
	f_z	0.001–0.002	0.002–0.005	0.004–0.008	0.007–0.015	0.013–0.020
N5	v_c	2–6	5–15	15–35	35–65	35–65
	f_z	0.001–0.003	0.002–0.006	0.005–0.010	0.009–0.018	0.016–0.025
N6	v_c	1.5–5	4–12	12–30	30–60	30–60
	f_z	0.001–0.003	0.002–0.005	0.004–0.009	0.008–0.015	0.013–0.018
N7	v_c	1.5–5	4–12	12–30	30–60	30–60
	f_z	0.001–0.002	0.002–0.004	0.003–0.008	0.006–0.013	0.012–0.020
N8	v_c	1–3	3–6	6–20	20–45	20–45
	f_z	0.001–0.002	0.002–0.004	0.006–0.006	0.005–0.011	0.010–0.016
S1	v_c	0.8–5	4–7	7–15	15–30	15–30
	f_z	0.001–0.002	0.002–0.004	0.003–0.008	0.007–0.015	0.013–0.020
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	1.5–5	4–10	10–25	20–35	30–60
	f_z	0.001–0.003	0.003–0.008	0.007–0.015	0.013–0.025	0.022–0.040
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 56036

Mat.		ø 0.40–0.90	ø 1.00–1.90	ø 2.00–3.00
P1	v_c	40–80	80–130	80–130
	f_z	0.020–0.050	0.050–0.090	0.090–0.150
P2	v_c	35–75	70–100	70–100
	f_z	0.015–0.040	0.040–0.080	0.080–0.140
P3	v_c	35–50	50–90	50–90
	f_z	0.010–0.020	0.020–0.060	0.060–0.100
M1	v_c	30–40	40–80	40–80
	f_z	0.005–0.008	0.008–0.040	0.040–0.080
M2	v_c	20–30	30–70	30–70
	f_z	0.005–0.008	0.008–0.040	0.040–0.080
K1	v_c	50–100	100–150	100–150
	f_z	0.020–0.050	0.040–0.100	0.100–0.150
K2	v_c	40–80	80–130	80–130
	f_z	0.015–0.040	0.040–0.080	0.080–0.120
N1	v_c	60–90	90–140	90–140
	f_z	0.020–0.040	0.030–0.070	0.070–0.120
N2	v_c	60–120	120–150	120–150
	f_z	0.020–0.040	0.040–0.090	0.090–0.150
N3	v_c	60–120	120–150	120–150
	f_z	0.020–0.040	0.040–0.090	0.090–0.150
N4	v_c	40–70	70–100	70–100
	f_z	0.018–0.035	0.035–0.070	0.070–0.120
N5	v_c	60–120	120–150	120–150
	f_z	0.025–0.050	0.050–0.100	0.100–0.200
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c	30–40	40–80	40–80
	f_z	0.015–0.030	0.025–0.080	0.070–0.120
S2	v_c			
	f_z			
H1	v_c	15–25	20–35	20–35
	f_z	0.005–0.015	0.015–0.030	0.030–0.050
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 16004

Mat.		ø 0.10–0.30	ø 0.35–0.50	ø 0.55–0.80	ø 0.85–1.50
P1	Vc	1.0–2.0	2.0–5.5	3.5–11	9.0–15
	fz	0.001–0.005	0.004–0.007	0.006–0.011	0.010–0.015
P2	Vc	0.8–1.5	1.2–4.0	3.5–8.0	7.0–12
	fz	0.001–0.003	0.002–0.006	0.005–0.007	0.006–0.010
P3	Vc	0.5–1.2	1.0–3.5	2.0–5.0	3.0–7.5
	fz	0.001–0.002	0.002–0.004	0.003–0.006	0.005–0.010
M1	Vc	0.8–1.5	1.2–4.0	3.5–8.0	7.0–12
	fz	0.001–0.002	0.002–0.004	0.003–0.006	0.005–0.010
M2	Vc	0.5–1.2	1.0–3.5	2.0–5.0	3.0–7.5
	fz	0.001–0.002	0.002–0.004	0.003–0.005	0.004–0.008
K1	Vc	1.0–2.0	2.0–5.5	3.5–11	9.0–15
	fz	0.001–0.005	0.004–0.008	0.007–0.011	0.010–0.015
K2	Vc	0.8–1.5	1.2–4.0	3.5–8.0	7.0–12
	fz	0.001–0.003	0.002–0.006	0.005–0.007	0.006–0.010
N1	Vc	1.0–2.0	2.0–5.5	3.5–11	9.0–15
	fz	0.001–0.006	0.005–0.010	0.008–0.015	0.013–0.025
N2	Vc	0.8–1.5	1.2–4.0	3.5–8.0	7.0–12
	fz	0.002–0.006	0.005–0.010	0.008–0.015	0.013–0.025
N3	Vc				
	fz				
N4	Vc				
	fz				
N5	Vc	1.0–2.0	2.0–5.5	3.5–11	9.0–15
	fz	0.002–0.006	0.005–0.010	0.008–0.015	0.013–0.020
N6	Vc				
	fz				
N7	Vc				
	fz				
N8	Vc				
	fz				
S1	Vc				
	fz				
S2	Vc				
	fz				
H1	Vc				
	fz				
H2	Vc				
	fz				
H3	Vc				
	fz				
O1	Vc				
	fz				
O2	Vc				
	fz				
O3	Vc				
	fz				

Art. 50695 / 50699

Mat.		ø 0.05–0.30	ø 0.31–0.50	ø 0.51–0.80	ø 0.81 + 1.20	ø 1.21–2.00
P1	Vc	1.0–6.0	6.0–15	10–23	23–60	23–60
	fz	0.001–0.004	0.003–0.008	0.007–0.013	0.012–0.018	0.016–0.025
P2	Vc	1.0–6.0	2.0–10	3.5–16	7.0–30	7.0–30
	fz	0.001–0.003	0.002–0.007	0.006–0.012	0.010–0.016	0.014–0.022
P3	Vc	0.5–5.0	1.0–8.0	2.5–13	5.0–25	5.0–25
	fz	0.001–0.002	0.002–0.006	0.005–0.010	0.008–0.014	0.012–0.020
M1	Vc	0.5–3.0	1.0–6.0	4.0–10	8.0–18	8.0–18
	fz	0.001–0.002	0.002–0.005	0.004–0.008	0.007–0.012	0.010–0.016
M2	Vc					
	fz					
K1	Vc	2.0–8.0	6.0–15	10–23	23–60	23–60
	fz	0.001–0.004	0.003–0.008	0.007–0.013	0.012–0.018	0.016–0.025
K2	Vc	1.0–6.0	2.0–10	3.5–16	7.0–30	7.0–30
	fz	0.001–0.003	0.002–0.007	0.006–0.012	0.010–0.016	0.014–0.022
N1	Vc					
	fz					
N2	Vc	3.0–16	8.0–26	13–55	30–100	30–100
	fz	0.001–0.004	0.004–0.007	0.007–0.011	0.010–0.016	0.015–0.022
N3	Vc	2.5–13	6.0–22	10–40	20–80	20–80
	fz	0.001–0.004	0.004–0.006	0.005–0.010	0.009–0.015	0.014–0.020
N4	Vc	2.0–8.0	6.0–15	10–23	23–60	23–60
	fz	0.001–0.002	0.002–0.005	0.004–0.008	0.007–0.017	0.010–0.016
N5	Vc	3.0–16	8.0–26	13–55	30–100	30–100
	fz	0.001–0.004	0.004–0.006	0.005–0.010	0.009–0.015	0.014–0.020
N6	Vc					
	fz					
N7	Vc	2.0–8.0	6.0–15	10–23	23–60	23–60
	fz	0.001–0.004	0.004–0.006	0.005–0.010	0.009–0.015	0.014–0.020
N8	Vc	1.0–6.0	2.0–10	3.5–16	7.0–30	7.0–30
	fz	0.001–0.002	0.002–0.005	0.004–0.008	0.007–0.010	0.008–0.013
S1	Vc					
	fz					
S2	Vc					
	fz					
H1	Vc					
	fz					
H2	Vc					
	fz					
H3	Vc					
	fz					
O1	Vc					
	fz					
O2	Vc					
	fz					
O3	Vc					
	fz					

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 51200

Mat.		ø 0.03–0.30	ø 0.31–0.50	ø 0.51–1.00	ø 1.01–2.00	ø 2.01–3.00
P1	Vc	1.5–5	4–10	10–30	30–60	30–60
	fz	0.001–0.004	0.003–0.008	0.007–0.015	0.014–0.025	0.023–0.035
P2	Vc	1.2–4	3.5–8	8–25	25–50	25–50
	fz	0.001–0.003	0.002–0.007	0.006–0.014	0.012–0.023	0.021–0.032
P3	Vc	1–3	3–6	6–20	20–45	20–45
	fz	0.001–0.002	0.002–0.006	0.005–0.013	0.011–0.020	0.018–0.030
M1	Vc	1.2–4	3.5–8	8–20	20–45	20–45
	fz	0.001–0.002	0.002–0.005	0.004–0.011	0.010–0.018	0.016–0.028
M2	Vc	1–3	3–6	5–15	15–30	15–30
	fz	0.001–0.002	0.002–0.004	0.003–0.009	0.008–0.016	0.016–0.028
K1	Vc	1.5–5	4–10	10–30	30–60	30–60
	fz	0.001–0.004	0.003–0.008	0.007–0.015	0.014–0.025	0.023–0.035
K2	Vc	1.2–4	3.5–8	8–25	25–50	25–50
	fz	0.001–0.003	0.002–0.007	0.006–0.014	0.012–0.022	0.020–0.032
N1	Vc	2–6	5–15	15–40	40–70	40–70
	fz	0.001–0.003	0.002–0.006	0.005–0.013	0.012–0.020	0.018–0.030
N2	Vc	1.8–5.5	5.0–15	15–40	40–65	40–65
	fz	0.001–0.004	0.003–0.007	0.006–0.015	0.014–0.022	0.020–0.035
N3	Vc	1.5–5	4–12	12–30	30–60	30–60
	fz	0.001–0.004	0.003–0.006	0.006–0.013	0.012–0.020	0.018–0.032
N4	Vc	1.5–5	4–12	12–30	30–60	30–60
	fz	0.001–0.002	0.002–0.005	0.004–0.010	0.009–0.016	0.015–0.025
N5	Vc	2–6	5–15	15–35	35–65	35–65
	fz	0.001–0.004	0.003–0.006	0.005–0.013	0.012–0.020	0.018–0.032
N6	Vc	1.5–5	4–12	12–30	30–60	30–60
	fz	0.001–0.002	0.002–0.005	0.004–0.010	0.009–0.016	0.015–0.020
N7	Vc	1.5–5	4–12	12–30	30–60	30–60
	fz	0.001–0.004	0.003–0.006	0.005–0.012	0.011–0.018	0.016–0.025
N8	Vc	1–3	2.5–6	6–20	20–45	20–45
	fz	0.001–0.002	0.002–0.005	0.004–0.009	0.008–0.013	0.012–0.018
S1	Vc	0.8–5	4–7	7–15	15–30	15–30
	fz	0.001–0.003	0.002–0.006	0.005–0.013	0.012–0.020	0.018–0.030
S2	Vc					
	fz					
H1	Vc					
	fz					
H2	Vc					
	fz					
H3	Vc					
	fz					
O1	Vc	1.5–5	4–10	10–25	20–35	30–60
	fz	0.001–0.004	0.003–0.010	0.009–0.018	0.016–0.028	0.026–0.040
O2	Vc					
	fz					
O3	Vc					
	fz					

Art. 51201

Mat.		ø 0.30–0.50	ø 0.51–1.00	ø 1.01–2.00	ø 2.01–3.00
P1	Vc	5–12	12–35	35–65	35–60
	fz	0.003–0.008	0.007–0.015	0.014–0.025	0.023–0.035
P2	Vc	4–9	9–28	28–55	28–55
	fz	0.002–0.007	0.006–0.014	0.012–0.023	0.021–0.032
P3	Vc	3.3–7	7–23	23–50	23–50
	fz	0.002–0.006	0.005–0.013	0.011–0.020	0.018–0.030
M1	Vc	4–9	9–28	28–55	28–55
	fz	0.002–0.005	0.004–0.011	0.010–0.018	0.016–0.028
M2	Vc	3–8	8–20	18–35	18–35
	fz	0.002–0.004	0.003–0.009	0.008–0.016	0.016–0.028
K1	Vc	5–12	12–35	35–65	35–60
	fz	0.003–0.008	0.007–0.015	0.014–0.025	0.023–0.035
K2	Vc	4–10	10–30	30–55	30–50
	fz	0.002–0.007	0.006–0.014	0.012–0.022	0.020–0.032
N1	Vc	6–19	19–45	45–80	45–80
	fz	0.002–0.006	0.005–0.013	0.012–0.020	0.018–0.030
N2	Vc	5.5–17	17–45	45–70	45–70
	fz	0.003–0.007	0.006–0.015	0.014–0.022	0.020–0.035
N3	Vc	5.5–15	15–35	35–65	35–65
	fz	0.003–0.006	0.006–0.013	0.012–0.020	0.018–0.032
N4	Vc	5.5–15	15–35	35–65	35–65
	fz	0.002–0.005	0.004–0.010	0.009–0.016	0.015–0.025
N5	Vc	6.5–18	18–40	40–70	40–70
	fz	0.003–0.006	0.005–0.013	0.012–0.020	0.018–0.032
N6	Vc	5.5–15	15–35	35–65	35–65
	fz	0.002–0.005	0.004–0.010	0.009–0.016	0.015–0.020
N7	Vc	5.5–15	15–35	35–65	35–65
	fz	0.003–0.006	0.005–0.012	0.011–0.018	0.016–0.025
N8	Vc	3–7	7–23	23–50	23–50
	fz	0.002–0.005	0.004–0.009	0.008–0.013	0.012–0.018
S1	Vc	5–8	8.0–18	18–35	18–35
	fz	0.002–0.006	0.005–0.013	0.012–0.020	0.018–0.030
S2	Vc	2.5–7	6–12	11–20	11–20
	fz	0.002–0.004	0.003–0.007	0.006–0.011	0.010–0.018
H1	Vc	2.5–7	6–12	11–20	11–20
	fz	0.002–0.004	0.003–0.007	0.006–0.011	0.010–0.018
H2	Vc				
	fz				
H3	Vc				
	fz				
O1	Vc	5–12	12–35	35–65	35–60
	fz	0.003–0.010	0.009–0.018	0.016–0.028	0.026–0.040
O2	Vc	2.5–6	6–20	20–45	20–45
	fz	0.002–0.009	0.008–0.016	0.015–0.025	0.022–0.035
O3	Vc				
	fz				

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 50620 / 50621

Mat.		ø 0.20–0.50	ø 0.51–1.00	ø 1.01–2.00
P1	V_c	6–15	15–35	15–35
	f_z	0.001–0.007	0.006–0.012	0.011–0.021
P2	V_c	5–13	13–30	13–30
	f_z	0.001–0.005	0.004–0.008	0.007–0.012
P3	V_c	4–10	10–25	10–25
	f_z	0.001–0.004	0.003–0.007	0.006–0.010
M1	V_c	4–10	10–25	10–25
	f_z	0.001–0.004	0.003–0.007	0.006–0.010
M2	V_c			
	f_z			
K1	V_c	6–15	15–35	15–35
	f_z	0.001–0.007	0.006–0.012	0.011–0.021
K2	V_c	5–13	13–30	13–30
	f_z	0.001–0.005	0.004–0.008	0.007–0.012
N1	V_c			
	f_z			
N2	V_c	8–20	20–50	20–50
	f_z	0.001–0.007	0.006–0.012	0.011–0.022
N3	V_c	6.5–18	18–45	18–45
	f_z	0.001–0.007	0.006–0.011	0.010–0.020
N4	V_c			
	f_z			
N5	V_c	6.5–18	18–45	18–45
	f_z	0.001–0.008	0.007–0.014	0.013–0.025
N6	V_c			
	f_z			
N7	V_c			
	f_z			
N8	V_c			
	f_z			
S1	V_c			
	f_z			
S2	V_c			
	f_z			
H1	V_c			
	f_z			
H2	V_c			
	f_z			
H3	V_c			
	f_z			
O1	V_c			
	f_z			
O2	V_c			
	f_z			
O3	V_c			
	f_z			

Art. 50622

Mat.		ø 0.20–0.50	ø 0.51–1.00	ø 1.01–2.00
P1	V_c	6.5–17	17–40	17–40
	f_z	0.001–0.007	0.006–0.012	0.011–0.021
P2	V_c	6–15	15–35	15–35
	f_z	0.001–0.005	0.004–0.008	0.007–0.012
P3	V_c	5–13	13–28	13–28
	f_z	0.001–0.004	0.003–0.007	0.006–0.010
M1	V_c	5–13	13–28	13–28
	f_z	0.001–0.004	0.003–0.007	0.006–0.010
M2	V_c			
	f_z			
K1	V_c	6.5–17	17–40	17–40
	f_z	0.001–0.007	0.006–0.012	0.011–0.021
K2	V_c	6–15	15–35	15–35
	f_z	0.001–0.005	0.004–0.008	0.007–0.012
N1	V_c			
	f_z			
N2	V_c	9–25	25–55	25–55
	f_z	0.001–0.007	0.006–0.012	0.011–0.022
N3	V_c	8–22	22–50	22–50
	f_z	0.001–0.007	0.006–0.011	0.010–0.020
N4	V_c			
	f_z			
N5	V_c	8–22	22–50	22–50
	f_z	0.001–0.008	0.007–0.014	0.013–0.025
N6	V_c			
	f_z			
N7	V_c			
	f_z			
N8	V_c			
	f_z			
S1	V_c			
	f_z			
S2	V_c			
	f_z			
H1	V_c	2–5	5–12	5–12
	f_z	0.001–0.004	0.003–0.010	0.009–0.020
H2	V_c			
	f_z			
H3	V_c			
	f_z			
O1	V_c			
	f_z			
O2	V_c			
	f_z			
O3	V_c			
	f_z			

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 50941

Mat.		ø 0.50–0.90	ø 1.00–1.60	ø 1.70–2.40
P1	V_c	40–80	80–130	80–130
	f_z	0.020–0.050	0.050–0.090	0.090–0.150
P2	V_c	35–75	70–100	70–100
	f_z	0.015–0.040	0.040–0.080	0.080–0.140
P3	V_c	30–50	50–90	50–90
	f_z	0.010–0.020	0.020–0.060	0.060–0.100
M1	V_c	30–40	40–80	40–80
	f_z	0.005–0.008	0.008–0.040	0.040–0.080
M2	V_c	20–30	30–70	30–70
	f_z	0.005–0.008	0.008–0.060	0.060–0.100
K1	V_c	50–100	100–150	100–150
	f_z	0.020–0.050	0.050–0.100	0.100–0.150
K2	V_c	40–80	80–130	80–130
	f_z	0.015–0.040	0.040–0.080	0.080–0.120
N1	V_c			
	f_z			
N2	V_c	60–120	120–150	120–150
	f_z	0.020–0.040	0.040–0.090	0.090–0.150
N3	V_c	60–120	120–180	120–180
	f_z	0.020–0.040	0.040–0.090	0.090–0.150
N4	V_c			
	f_z			
N5	V_c			
	f_z			
N6	V_c			
	f_z			
N7	V_c			
	f_z			
N8	V_c			
	f_z			
S1	V_c	20–30	30–60	30–60
	f_z	0.003–0.005	0.005–0.015	0.012–0.030
S2	V_c			
	f_z			
H1	V_c	10–20	15–30	15–30
	f_z	0.002–0.004	0.003–0.012	0.010–0.015
H2	V_c			
	f_z			
H3	V_c			
	f_z			
O1	V_c			
	f_z			
O2	V_c			
	f_z			
O3	V_c			
	f_z			

Art. 55652

Mat.		ø 0.20–0.50	ø 0.51–1.00	ø 1.01–2.00	ø 2.01–2.99
P1	V_c	10–25	25–40	40–60	40–60
	f_z	0.005–0.008	0.007–0.015	0.013–0.040	0.035–0.050
P2	V_c	8.0–20	20–30	30–50	30–50
	f_z	0.004–0.007	0.006–0.015	0.013–0.035	0.030–0.045
P3	V_c				
	f_z				
M1	V_c	8–15	15–25	25–40	25–40
	f_z	0.003–0.006	0.005–0.012	0.010–0.020	0.018–0.030
M2	V_c				
	f_z				
K1	V_c	20–45	45–60	60–100	60–100
	f_z	0.004–0.008	0.007–0.015	0.013–0.040	0.035–0.050
K2	V_c	15–30	30–40	40–80	40–80
	f_z	0.002–0.006	0.005–0.013	0.011–0.032	0.030–0.045
N1	V_c				
	f_z				
N2	V_c	20–50	50–80	80–120	80–120
	f_z	0.005–0.010	0.008–0.020	0.018–0.050	0.040–0.080
N3	V_c	20–40	30–70	60–100	60–100
	f_z				
N4	V_c				
	f_z				
N5	V_c				
	f_z				
N6	V_c	20–40	30–70	60–100	60–100
	f_z				
N7	V_c				
	f_z				
N8	V_c				
	f_z				
S1	V_c	10–20	20–30	30–50	30–50
	f_z	0.002–0.005	0.004–0.010	0.008–0.030	0.028–0.040
S2	V_c				
	f_z				
H1	V_c				
	f_z				
H2	V_c				
	f_z				
H3	V_c				
	f_z				
O1	V_c	8.0–20	20–30	30–50	30–50
	f_z	0.004–0.007	0.006–0.015	0.013–0.035	0.030–0.045
O2	V_c				
	f_z				
O3	V_c				
	f_z				

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 12604

Mat.		ø 0.05–0.30	ø 0.31–0.80	ø 0.81-1.50	ø 1.55–3.17
P1	v_c	1.0–2.0	2.0–8.0	8.0–20	8.0–20
	f_z	0.001–0.005	0.005–0.011	0.010–0.015	0.014–0.021
P2	v_c	0.5–1.5	1.5–7.0	7.0–16	7.0–16
	f_z	0.001–0.002	0.002–0.006	0.005–0.009	0.008–0.012
P3	v_c				
	f_z				
M1	v_c	0.5–1.5	1.5–7.0	7.0 -16	7.0–16
	f_z	0.001–0.002	0.002–0.006	0.005–0.009	0.008–0.015
M2	v_c	0.5–1.2	1.2–6.0	6.0–15	6.0–15
	f_z	0.001–0.002	0.002–0.005	0.004–0.007	0.006–0.012
K1	v_c	1.0–5.0	5.0–10	10–20	10–20
	f_z	0.001–0.005	0.004–0.011	0.010–0.015	0.014–0.020
K2	v_c	0.8–4.0	4.0–8.0	8.0–18	8.0–18
	f_z	0.001–0.004	0.003–0.008	0.007–0.011	0.010–0.016
N1	v_c	2.0–7.0	7.0–13	13–25	13–25
	f_z	0.001–0.004	0.003–0.010	0.009–0.016	0.015–0.022
N2	v_c	1.5–6.0	6.0–12	12–22	12–22
	f_z	0.001–0.005	0.004–0.011	0.010–0.020	0.018–0.035
N3	v_c				
	f_z				
N4	v_c				
	f_z				
N5	v_c	2.0–7.0	7.0–13	13–25	13–25
	f_z	0.001–0.004	0.003–0.010	0.009–0.018	0.017–0.030
N6	v_c				
	f_z				
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c				
	f_z				
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

Art. 11654

Mat.		ø 0.50–1.00	ø 1.050–1.70	ø 1.70–2.30
P1	v_c	2.0–8.0	8.0–20	8.0–20
	f_z	0.006–0.012	0.011–0.019	0.018–0.026
P2	v_c	1.5–7.0	7.0–16	7.0–16
	f_z	0.005–0.010	0.009–0.016	0.015–0.022
P3	v_c			
	f_z			
M1	v_c			
	f_z			
M2	v_c			
	f_z			
K1	v_c	5.0–10	10–20	10–20
	f_z	0.006–0.012	0.011–0.019	0.018–0.025
K2	v_c	4.0–8.0	8.0–18	8.0–18
	f_z	0.004–0.010	0.009–0.017	0.015–0.022
N1	v_c			
	f_z			
N2	v_c			
	f_z			
N3	v_c			
	f_z			
N4	v_c			
	f_z			
N5	v_c	7.0–13	13–25	13–25
	f_z	0.006–0.012	0.011–0.020	0.018–0.035
N6	v_c			
	f_z			
N7	v_c	2.0–8.0	8.0–20	8.0–20
	f_z	0.006–0.012	0.011–0.019	0.018–0.030
N8	v_c	1.5–7.0	7.0–16	7.0–16
	f_z	0.003–0.008	0.007–0.013	0.012–0.018
S1	v_c			
	f_z			
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 70030–70090/70130–70190

Mat.			
P1	v_c	180–280	
	f_z	80–180	mm/min
P2	v_c	180–280	
	f_z	70–160	mm/min
P3	v_c	180–280	
	f_z	70–150	mm/min
M1	v_c	180–280	
	f_z	70–150	mm/min
M2	v_c	180–280	
	f_z	70–150	mm/min
K1	v_c	180–280	
	f_z	80–180	mm/min
K2	v_c	180–280	
	f_z	70–160	mm/min
N1	v_c	180–280	
	f_z	60–140	mm/min
N2	v_c	180–280	
	f_z	80–180	mm/min
N3	v_c	180–280	
	f_z	70–160	mm/min
N4	v_c	180–280	
	f_z	60–120	mm/min
N5	v_c	180–280	
	f_z	80–200	mm/min
N6	v_c	180–280	
	f_z	60–150	mm/min
N7	v_c	180–280	
	f_z	80–200	mm/min
N8	v_c	180–280	
	f_z	80–200	mm/min
S1	v_c	180–280	
	f_z	50–120	mm/min
S2	v_c		
	f_z		
H1	v_c		
	f_z		
H2	v_c		
	f_z		
H3	v_c		
	f_z		
O1	v_c	180–280	
	f_z	80–200	mm/min
O2	v_c		
	f_z		
O3	v_c		
	f_z		

Art. 72075/72150

Mat.		ø 0.10–0.30	ø 0.40–1.50	ø 1.50–3.0	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.5×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.3×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.001–0.004	0.003–0.20	0.015–0.035	1×d1	0.2×d1
M1	v_c	30–50	30–50	30–50		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.4×d1
M2	v_c	25–40	25–40	25–40		
	f_z	0.001–0.004	0.003–0.016	0.014–0.028	1×d1	0.25×d1
K1	v_c	40–70	40–70	40–70		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	1×d1
K2	v_c	30–60	30–60	30–60		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.4×d1
N1	v_c	70–100	70–100	70–100		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	1×d1
N2	v_c	80–120	80–120	80–120		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.9×d1
N3	v_c	60–100	60–100	60–100		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.9×d1
N4	v_c					
	f_z					
N5	v_c	40–80	40–80	40–80		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	1×d1
N6	v_c	25–50	25–50	25–50		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.5×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	25–50	25–50	25–50		
	f_z	0.001–0.003	0.002–0.015	0.012–0.030	1×d1	0.4×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	80–120	80–120	80–120		
	f_z	0.001–0.006	0.005–0.025	0.020–0.045	1×d1	1×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Genannte Werte sind Richtwerte, die je nach Maschine, Aufspannung, Kühlschmierstoff usw. noch angepasst werden müssen.
Les valeurs mentionnées sont des valeurs recommandées qui doivent être adaptées selon les conditions de la machine, du serrage, du lubrifiant etc.
Questi valori sono valori raccomandati che devono essere adattati secondo le condizioni della macchina, del serraggio, del lubrificante etc.
These are recommended values that depend on the condition of the machine, fixture, coolant etc., and they may have to be adapted yet.

Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 42000

Mat.		ø 0.10–0.30	ø 0.40–1.50	ø 1.50–3.0	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.5×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.3×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.001–0.004	0.003–0.20	0.015–0.035	1×d1	0.2×d1
M1	v_c	30–50	30–50	30–50		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.4×d1
M2	v_c	25–40	25–40	25–40		
	f_z	0.001–0.004	0.003–0.016	0.014–0.028	1×d1	0.25×d1
K1	v_c	40–70	40–70	40–70		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	1×d1
K2	v_c	30–60	30–60	30–60		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.4×d1
N1	v_c	70–100	70–100	70–100		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	1×d1
N2	v_c	80–120	80–120	80–120		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.9×d1
N3	v_c	60–100	60–100	60–100		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	0.9×d1
N4	v_c					
	f_z					
N5	v_c	40–80	40–80	40–80		
	f_z	0.001–0.005	0.004–0.020	0.018–0.040	1×d1	1×d1
N6	v_c	25–50	25–50	25–50		
	f_z	0.001–0.004	0.003–0.020	0.015–0.035	1×d1	0.5×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	25–50	25–50	25–50		
	f_z	0.001–0.003	0.002–0.015	0.012–0.030	1×d1	0.4×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	80–120	80–120	80–120		
	f_z	0.001–0.006	0.005–0.025	0.020–0.045	1×d1	1×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 72500/72800

Mat.		ø 0.30–0.70	ø 0.70–1.50	ø 1.50–2.50	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.45×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.25×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.004–0.010	0.006–0.020	0.0015–0.035	1×d1	0.15×d1
M1	v_c	30–50	30–50	30–50		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.35×d1
M2	v_c	25–40	25–40	25–40		
	f_z	0.004–0.008	0.005–0.016	0.014–0.028	1×d1	0.2×d1
K1	v_c	40–70	40–70	40–70		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.8×d1
K2	v_c	30–60	30–60	30–60		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.35×d1
N1	v_c	70–100	70–100	70–100		
	f_z	0.004–0.01	0.006–0.020	0.015–0035	1×d1	0.8×d1
N2	v_c	80–120	80–120	80–120		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.7×d1
N3	v_c	60–100	60–100	60–100		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.7×d1
N4	v_c					
	f_z					
N5	v_c	40–80	40–80	40–80		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.8×d1
N6	v_c	25–50	25–50	25–50		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.45×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	25–50	25–50	25–50		
	f_z	0.003–0.008	0.006–0.015	0.012–0.030	1×d1	0.3×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	80–120	80–120	80–120		
	f_z	0.006–0.012	0.010–0.025	0.020–0.045	1×d1	0.9×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Questi valori sono valori raccomandati che devono essere adattati secondo le condizioni della macchina, del serraggio, del lubrificante etc.
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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 73130/73200/73300

Mat.		ø 0.30–0.70	ø 0.70–1.50	ø 1.50–2.90	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.9×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.8×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.004–0.010	0.006–0.020	0.0015–0.035	1×d1	0.7×d1
M1	v_c	30–50	30–50	30–50		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.6×d1
M2	v_c	25–40	25–40	25–40		
	f_z	0.004–0.008	0.005–0.016	0.014–0.028	1×d1	0.5×d1
K1	v_c	40–70	40–70	40–70		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	1.0×d1
K2	v_c	30–60	30–60	30–60		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.9×d1
N1	v_c	70–100	70–100	70–100		
	f_z	0.004–0.01	0.006–0.020	0.015–0035	1×d1	0.9×d1
N2	v_c	80–120	80–120	80–120		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.9×d1
N3	v_c	60–100	60–100	60–100		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	0.9×d1
N4	v_c					
	f_z					
N5	v_c	40–80	40–80	40–80		
	f_z	0.005–0.010	0.008–0.020	0.018–0.040	1×d1	1×d1
N6	v_c	25–50	25–50	25–50		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.8×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	25–50	25–50	25–50		
	f_z	0.003–0.008	0.006–0.015	0.012–0.030	1×d1	0.7×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 43105

Mat.		ø 0.30–0.70	ø 0.80–1.50	ø 1.60–3.00	a_e	a_p
P1	v_c	80–120	80–120	80–120		
	f_z	0.002–0.005	0.003–0.015	0.005–0.03	1×d1	0.8×d1
P2	v_c	70–100	70–100	70–100		
	f_z	0.001–0.004	0.003–0.012	0.005–0.025	1×d1	0.6×d1
P3	v_c	40–70	40–70	40–70		
	f_z	0.001–0.003	0.002–0.012	0.003–0.018	1×d1	0.5×d1
M1	v_c	60–90	60–90	60–90		
	f_z	0.001–0.003	0.002–0.012	0.003–0.016	1×d1	0.5×d1
M2	v_c	30–60	30–60	30–60		
	f_z	0.001–0.003	0.002–0.010	0.003–0.013	1×d1	0.4×d1
K1	v_c	150–200	150–200	150–200		
	f_z	0.002–0.005	0.003–0.014	0.005–0.028	1×d1	0.8×d1
K2	v_c	60–100	60–100	60–100		
	f_z	0.001–0.006	0.003–0.012	0.005–0.023	1×d1	0.8×d1
N1	v_c	150–300	150–300	150–300		
	f_z	0.001–0.004	0.002–0.012	0.004–0.025	1×d1	1×d1
N2	v_c	150–300	150–300	150–300		
	f_z	0.002–0.005	0.003–0.014	0.005–0.028	1×d1	1×d1
N3	v_c	130–250	130–250	130–250		
	f_z	0.002–0.015	0.004–0.030	0.006–0.060	1×d1	2×d1
N4	v_c	60–100	60–100	60–100		
	f_z	0.001–0.009	0.003–0.018	0.004–0.036	1×d1	0.8×d1
N5	v_c	100–250	100–250	100–250		
	f_z	0.002–0.010	0.004–0.020	0.006–0.040	1×d1	1×d1
N6	v_c	80–150	80–150	80–150		
	f_z	0.001–0.008	0.002–0.018	0.004–0.035	1×d1	0.8×d1
N7	v_c	80–130	80–130	80–130		
	f_z	0.002–0.010	0.003–0.020	0.006–0.050	1×d1	1×d1
N8	v_c	80–130	80–130	80–130		
	f_z	0.002–0.010	0.003–0.020	0.006–0.050	1×d1	1×d1
S1	v_c	40–70	40–70	40–70		
	f_z	0.001–0.005	0.003–0.012	0.005–0.025	1×d1	0.8×d1
S2	v_c	20–40	20–40	20–40		
	f_z	0.001–0.002	0.001–0.004	0.002–0.008	1×d1	0.2×d1
H1	v_c	20–45	20–45	20–45		
	f_z	0.001–0.002	0.001–0.003	0.002–0.006	1×d1	0.2×d1
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	100–150	100–150	100–150		
	f_z	0.003–0.025	0.006–0.055	0.010–0.095	1×d1	2×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Questi valori sono valori raccomandati che devono essere adattati secondo le condizioni della macchina, del serraggio, del lubrificante etc.
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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 43305

Mat.		ø 0.30–0.70	ø 0.80–1.50	ø 1.60–3.00	a_e	a_p
P1	v_c	80–120	80–120	80–120		
	f_z	0.001–0.004	0.002–0.012	0.004–0.025	1×d1	0.6×d1
P2	v_c	70–100	70–100	70–100		
	f_z	0.001–0.003	0.002–0.008	0.003–0.020	1×d1	0.4×d1
P3	v_c	40–70	40–70	40–70		
	f_z	0.001–0.003	0.001–0.010	0.002–0.015	1×d1	0.3×d1
M1	v_c	60–90	60–90	60–90		
	f_z	0.001–0.003	0.002–0.008	0.002–0.012	1×d1	0.3×d1
M2	v_c	30–60	30–60	30–60		
	f_z	0.001–0.003	0.002–0.008	0.002–0.009	1×d1	0.2×d1
K1	v_c	150–200	150–200	150–200		
	f_z	0.001–0.004	0.001–0.010	0.002–0.023	1×d1	0.6×d1
K2	v_c	60–100	60–100	60–100		
	f_z	0.001–0.005	0.002–0.010	0.003–0.019	1×d1	0.6×d1
N1	v_c	150–300	150–300	150–300		
	f_z	0.001–0.003	0.001–0.010	0.002–0.020	1×d1	0.8×d1
N2	v_c	150–300	150–300	150–300		
	f_z	0.001–0.005	0.002–0.011	0.003–0.024	1×d1	0.8×d1
N3	v_c	130–250	130–250	130–250		
	f_z	0.001–0.012	0.002–0.025	0.003–0.050	1×d1	1.5×d1
N4	v_c	60–100	60–100	60–100		
	f_z	0.001–0.007	0.001–0.016	0.002–0.032	1×d1	0.6×d1
N5	v_c	100–250	100–250	100–250		
	f_z	0.001–0.008	0.002–0.018	0.003–0.030	1×d1	0.8×d1
N6	v_c	80–150	80–150	80–150		
	f_z	0.001–0.006	0.001–0.015	0.002–0.030	1×d1	0.6×d1
N7	v_c	80–130	80–130	80–130		
	f_z	0.001–0.008	0.001–0.015	0.002–0.035	1×d1	0.8×d1
N8	v_c	80–130	80–130	80–130		
	f_z	0.001–0.008	0.001–0.016	0.003–0.040	1×d1	0.8×d1
S1	v_c	40–70	40–70	40–70		
	f_z	0.001–0.003	0.002–0.008	0.003–0.018	1×d1	0.6×d1
S2	v_c	20–40	20–40	20–40		
	f_z	0.001–0.002	0.001–0.003	0.002–0.005	1×d1	0.1×d1
H1	v_c	20–45	20–45	20–45		
	f_z	0.001–0.002	0.001–0.003	0.002–0.006	1×d1	0.1×d1
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	100–150	100–150	100–150		
	f_z	0.002–0.020	0.005–0.050	0.008–0.090	1×d1	1.5×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 74075 / 74150 / 74300

Mat.		ø 0.20–0.70	ø 0.70–1.50	ø 1.50–2.80	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.45×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.25×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.003–0.010	0.006–0.020	0.0015–0.035	1×d1	0.15×d1
M1	v_c	30–50	30–50	30–50		
	f_z	0.003–0.010	0.006–0.020	0.015–0.035	1×d1	0.35×d1
M2	v_c	25–40	25–40	25–40		
	f_z	0.003–0.008	0.005–0.016	0.014–0.028	1×d1	0.2×d1
K1	v_c	40–70	40–70	40–70		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.8×d1
K2	v_c	30–60	30–60	30–60		
	f_z	0.003–0.010	0.006–0.020	0.015–0.035	1×d1	0.35×d1
N1	v_c	70–100	70–100	70–100		
	f_z	0.003–0.01	0.006–0.020	0.015–0035	1×d1	0.8×d1
N2	v_c	80–120	80–120	80–120		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.7×d1
N3	v_c	60–100	60–100	60–100		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.7×d1
N4	v_c					
	f_z					
N5	v_c	40–80	40–80	40–80		
	f_z	0.004–0.010	0.008–0.020	0.018–0.040	1×d1	0.8×d1
N6	v_c	25–50	25–50	25–50		
	f_z	0.004–0.010	0.006–0.020	0.015–0.035	1×d1	0.45×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	25–50	25–50	25–50		
	f_z	0.002–0.008	0.006–0.015	0.012–0.030	1×d1	0.3×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	80–120	80–120	80–120		
	f_z	0.005–0.012	0.010–0.025	0.020–0.045	1×d1	0.9×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Questi valori sono valori raccomandati che devono essere adattati secondo le condizioni della macchina, del serraggio, del lubrificante etc.
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Art. 73000

Mat.		ø 0.50–1.50	ø 1.50–3.00
P1	v_c	70–120	70–120
	f_z	0.004–0.015	0.013–0.030
P2	v_c	60–100	60–100
	f_z	0.003–0.012	0.010–0.025
P3	v_c	50–90	50–90
	f_z	0.002–0.012	0.010–0.023
M1	v_c	50–90	50–90
	f_z	0.002–0.012	0.010–0.016
M2	v_c	40–70	40–70
	f_z	0.001–0.010	0.008–0.013
K1	v_c	120–150	120–150
	f_z	0.004–0.014	0.012–0.028
K2	v_c	100–130	100–130
	f_z	0.003–0.012	0.010–0.025
N1	v_c	150–200	150–200
	f_z	0.005–0.015	0.013–0.030
N2	v_c	150–200	150–200
	f_z	0.006–0.018	0.016–0.035
N3	v_c	150–200	150–200
	f_z	0.005–0.015	0.013–0.030
N4	v_c		
	f_z		
N5	v_c	150–200	150–200
	f_z	0.006–0.018	0.016–0.035
N6	v_c		
	f_z		
N7	v_c		
	f_z		
N8	v_c		
	f_z		
S1	v_c	40–70	40–70
	f_z	0.002–0.010	0.008–0.023
S2	v_c		
	f_z		
H1	v_c		
	f_z		
H2	v_c		
	f_z		
H3	v_c		
	f_z		
O1	v_c		
	f_z		
O2	v_c		
	f_z		
O3	v_c		
	f_z		

Art. 47330

Mat.		ø 0.50–2.00	ø 2.10–5.00	a_e	a_p
P1	v_c	40–60	40–60		
	f_z	0.005–0.025	0.015–0.035	0.2×d1	1×d1
P2	v_c	30–50	30–50		
	f_z	0.004–0.020	0.013–0.030	0.2×d1	1×d1
P3	v_c				
	f_z				
M1	v_c	25–40	25–40		
	f_z	0.004–0.020	0.013–0.030	0.1×d1	1×d1
M2	v_c	20–35	20–35		
	f_z	0.003–0.015	0.012–0.020	0.1×d1	1×d1
K1	v_c	40–60	40–60		
	f_z	0.005–0.025	0.015–0.035	0.2×d1	1×d1
K2	v_c	35–55	35–55		
	f_z	0.004–0.020	0.013–0.030	0.2×d1	1×d1
N1	v_c				
	f_z				
N2	v_c				
	f_z				
N3	v_c				
	f_z				
N4	v_c				
	f_z				
N5	v_c	100–130	100–130		
	f_z	0.006–0.030	0.015–0.060	0.2×d1	1×d1
N6	v_c				
	f_z				
N7	v_c	120–150	120–150		
	f_z	0.006–0.030	0.015–0.060	0.2×d1	1×d1
N8	v_c	120–150	120–150		
	f_z	0.005–0.025	0.010–0.050	0.1×d1	1×d1
S1	v_c				
	f_z				
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

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Art. 47344

Mat.		ø 0.50–2.00	ø 2.10–5.00	ø 5.10–8.00	a_e	a_p
P1	v_c					
	f_z					
P2	v_c					
	f_z					
P3	v_c					
	f_z					
M1	v_c					
	f_z					
M2	v_c					
	f_z					
K1	v_c					
	f_z					
K2	v_c					
	f_z					
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c	100–130	100–130	100–130		
	f_z	0.006–0.030	0.015–0.060	0.040–0.100	0.2×d1	1×d1
N6	v_c					
	f_z					
N7	v_c	120–150	120–150	120–150		
	f_z	0.006–0.030	0.015–0.060	0.040–0.100	0.2×d1	1×d1
N8	v_c	120–150	120–150	120–150		
	f_z	0.005–0.025	0.010–0.050	0.040–0.090	0.1×d1	1×d1
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 50810 / 50812 / 50814 / 50818

Mat.		ø 3.00–6.00	ø 6.00–12.00	ø 12.00–20.00
P1	v_c	25–40	25–40	25–40
	f_z	0.120–0.250	0.200–0.300	0.280–0.400
P2	v_c	20–35	20–35	20–35
	f_z	0.100–0.200	0.150–0.250	0.200–0.350
P3	v_c	12–30	12–30	12–30
	f_z	0.080–0.150	0.140–0.220	0.180–0.300
M1	v_c	10–20	10–20	10–20
	f_z	0.050–0.150	0.110–0.200	0.150–0.250
M2	v_c	8–16	8–16	8–16
	f_z	0.040–0.080	0.060–0.140	0.100–0.150
K1	v_c	25–40	25–40	25–40
	f_z	0.070–0.150	0.130–0.200	0.180–0.350
K2	v_c	20–35	20–35	20–35
	f_z	0.050–0.100	0.080–0.150	0.120–0.250
N1	v_c	45–60	45–60	45–60
	f_z	0.100–0.250	0.200–0.300	0.260–0.350
N2	v_c	30–45	30–45	30–45
	f_z	0.130–0.300	0.260–0.350	0.330–0.500
N3	v_c	25–40	25–40	25–40
	f_z	0.100–0.250	0.200–0.300	0.260–0.350
N4	v_c	25–40	25–40	25–40
	f_z	0.006–0.150	0.120–0.180	0.160–0.220
N5	v_c	45–60	45–60	45–60
	f_z	0.100–0.250	0.200–0.300	0.260–0.350
N6	v_c	25–40	25–40	25–40
	f_z	0.060–0.090	0.080–0.110	0.100–0.130
N7	v_c	25–40	25–40	25–40
	f_z	0.050–0.130	0.100–0.180	0.160–0.250
N8	v_c	12–30	12–30	12–30
	f_z	0.030–0.100	0.080–0.130	0.100–0.150
S1	v_c	30–45	30–45	30–45
	f_z	0.040–0.120	0.080–0.160	0.150–0.220
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c	30–45	30–45	30–45
	f_z	0.100–0.250	0.220–0.400	0.350–0.700
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Art. 50950

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.10–12.00	ø 12.10 -16.00	ø 16.10–20.00
P1	v_c	80–120	80–120	80–120	80–120	80–120
	f_z	0.060–0.150	0.120–0.250	0.220–0.350	0.320–0.450	0.400–0.500
P2	v_c	60–80	60–80	60–80	60–80	60–80
	f_z	0.050–0.120	0.100–0.220	0.200–0.300	0.280–0.360	0.340–0.450
P3	v_c	50–70	50–70	50–70	50–70	50–70
	f_z	0.040–0.100	0.090–0.180	0.160–0.260	0.240–0.320	0.300–0.380
M1	v_c	40–60	40–60	40–60	40–60	40–60
	f_z	0.030–0.080	0.070–0.150	0.140–0.180	0.170–0.250	0.230–0.320
M2	v_c	30–50	30–50	30–50	30–50	30–50
	f_z	0.030–0.080	0.070–0.130	0.120–0.160	0.150–0.220	0.200–0.300
K1	v_c	100–130	100–130	100–130	100–130	100–130
	f_z	0.100–0.250	0.230–0.350	0.320–0.450	0.400–0.500	0.450–0.600
K2	v_c	60–80	60–80	60–80	60–80	60–80
	f_z	0.060–0.200	0.180–0.280	0.250–0.350	0.320–0.450	0.420–0.500
N1	v_c					
	f_z					
N2	v_c	130–160	130–160	130–160	130–160	130–160
	f_z	0.100–0.250	0.220–0.320	0.300–0.380	0.360–0.450	0.420–0.500
N3	v_c	150–200	150–200	150–200	150–200	150–200
	f_z	0.100–0.270	0.250–0.350	0.330–0.400	0.380–0.480	0.460–0.55
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	30–60	30–60	30–60	30–60	30–60
	f_z	0.005–0.040	0.030–0.070	0.060–0.110	0.100–0.150	0.140–0.180
S2	v_c					
	f_z					
H1	v_c	60–90	60–90	60–90	60–90	60–90
	f_z	0.050–0.120	0.100–0.220	0.200–0.300	0.280–0.360	0.340–0.400
H2	v_c	40–60	40–60	40–60	40–60	40–60
	f_z	0.030–0.070	0.060–0.130	0.110–0.180	0.160–0.240	0.200–0.260
H3	v_c	15–35	15–35	15–35	15–35	15–35
	f_z	0.005–0.030	0.020–0.050	0.040–0.070	0.060–0.100	0.080–0.120
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 50830

Mat.		ø 0.30–1.00	ø 1.10–5.00	ø 5.10–10.00	ø 10.10–15.00	ø 15.10–20.00
P1	v_c	30–60	50–90	50–90	50–90	50–90
	f_z	0.010–0.040	0.038–0.080	0.076–0.110	0.100–0.180	0.170–0.260
P2	v_c	20–35	30–60	30–60	30–60	30–60
	f_z	0.010–0.030	0.028–0.070	0.065–0.090	0.085–0.160	0.150–0.230
P3	v_c	15–30	25–50	25–50	25–50	25–50
	f_z	0.005–0.020	0.018–0.060	0.057–0.085	0.080–0.130	0.125–0.200
M1	v_c	15–30	25–50	25–50	25–50	25–50
	f_z	0.005–0.020	0.018–0.060	0.057–0.085	0.080–0.130	0.125–0.200
M2	v_c	10–20	15–40	15–40	15–40	15–40
	f_z	0.004–0.018	0.016–0.050	0.048–0.090	0.085–0.120	0.110–0.160
K1	v_c	40–80	70–120	70–120	70–120	70–120
	f_z	0.010–0.060	0.055–0.090	0.085–0.110	0.100–0.280	0.260–0.500
K2	v_c	30–50	40–80	40–80	40–80	40–80
	f_z	0.010–0.030	0.028–0.070	0.067–0.100	0.095–0.180	0.170–0.300
N1	v_c	30–60	50–90	50–90	50–90	50–90
	f_z	0.012–0.045	0.042–0.085	0.080–0.140	0.135–0.250	0.230–0.300
N2	v_c	40–80	70–120	70–120	70–120	70–120
	f_z	0.015–0.050	0.480–0.100	0.095–0.180	0.170–0.280	0.260–0.450
N3	v_c	30–70	60–110	60–110	60–110	60–110
	f_z	0.010–0.045	0.040–0.085	0.080–0.160	0.150–0.260	0.240–0.400
N4	v_c	20–40	30–70	30–70	30–70	30–70
	f_z	0.005–0.030	0.028–0.070	0.065–0.090	0.085–0.160	0.150–0.230
N5	v_c					
	f_z					
N6	v_c	15–30	25–50	25–50	25–50	25–50
	f_z	0.012–0.045	0.042–0.085	0.080–0.140	0.135–0.250	0.230–0.300
N7	v_c	15–30	25–50	25–50	25–50	25–50
	f_z	0.012–0.045	0.042–0.085	0.080–0.140	0.135–0.250	0.230–0.300
N8	v_c	10–20	15–35	15–35	15–35	15–35
	f_z	0.004–0.018	0.016–0.050	0.048–0.090	0.085–0.120	0.110–0.180
S1	v_c	20–30	25–50	25–50	25–50	25–50
	f_z	0.020–0.040	0.038–0.070	0.065–0.100	0.095–0.150	0.145–0.200
S2	v_c	10–20	15–35	15–35	15–35	15–35
	f_z	0.004–0.018	0.016–0.050	0.048–0.090	0.085–0.120	0.110–0.180
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	20–40	30–70	30–70	30–70	30–70
	f_z	0.015–0.050	0.048–0.100	0.095–0.180	0.170–0.280	0.260–0.450
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Art. 50838

Mat.		ø 0.30–1.00	ø 1.05–3.00	ø 3.105–6.00
P1	v_c	30–60	50–90	50–90
	f_z	0.010–0.040	0.038–0.050	0.045–0.060
P2	v_c	20–35	30–60	30–60
	f_z	0.010–0.030	0.028–0.045	0.040–0.055
P3	v_c	15–30	25–50	25–50
	f_z	0.005–0.020	0.018–0.035	0.030–0.050
M1	v_c	15–30	25–50	25–50
	f_z	0.005–0.020	0.018–0.035	0.030–0.050
M2	v_c	10–20	15–40	15–40
	f_z	0.004–0.018	0.016–0.030	0.028–0.040
K1	v_c	40–80	70–120	70–120
	f_z	0.010–0.060	0.055–0.070	0.065–0.100
K2	v_c	30–50	40–80	40–80
	f_z	0.010–0.030	0.028–0.055	0.050–0.080
N1	v_c	30–60	50–90	50–90
	f_z	0.012–0.045	0.042–0.060	0.055–0.090
N2	v_c	40–80	70–120	70–120
	f_z	0.015–0.050	0.048–0.070	0.065–0.110
N3	v_c	30–70	60–110	60–110
	f_z	0.010–0.045	0.040–0.065	0.060–0.100
N4	v_c	20–40	30–70	30–70
	f_z	0.005–0.030	0.028–0.050	0.048–0.075
N5	v_c	30–60	50–90	50–90
	f_z	0.015–0.050	0.048–0.070	0.065–0.110
N6	v_c	15–30	25–50	25–50
	f_z	0.012–0.045	0.040–0.065	0.060–0.100
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c	20–35	30–60	30–60
	f_z	0.010–0.030	0.028–0.045	0.040–0.055
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c	20–40	30–70	30–70
	f_z	0.015–0.050	0.048–0.070	0.065–0.120
O2	v_c			
	f_z			
O3	v_c			
	f_z			

Art. 50820

Mat.		ø 0.70–2.50	ø 2.60–6.00	ø 6.10–9.00	ø 9.10–11.00	ø 11.10–14.00
P1	v_c	30–60	50–90	50–90	50–90	50–90
	f_z	0.010–0.020	0.018–0.040	0.038–0.065	0.060–0.090	0.085–0.120
P2	v_c	20–35	30–60	30–60	30–60	30–60
	f_z	0.008–0.018	0.016–0.035	0.033–0.055	0.050–0.075	0.070–0.100
P3	v_c					
	f_z					
M1	v_c					
	f_z					
M2	v_c					
	f_z					
K1	v_c	20–40	30–70	30–70	30–70	30–70
	f_z	0.010–0.025	0.023–0.045	0.042–0.075	0.072–0.110	0.100–0.150
K2	v_c	15–30	25–50	25–50	25–50	25–50
	f_z	0.010–0.020	0.018–0.040	0.038–0.065	0.060–0.090	0.085–0.120
N1	v_c					
	f_z					
N2	v_c	80–120	110–160	110–160	110–160	110–160
	f_z	0.010–0.030	0.028–0.080	0.075–0.120	0.110–0.160	0.150–0.200
N3	v_c	60–100	50–120	50–120	50–120	50–120
	f_z	0.010–0.030	0.028–0.080	0.075–0.120	0.110–0.160	0.150–0.200
N4	v_c					
	f_z					
N5	v_c	40–70	60–120	60–120	60–120	60–120
	f_z	0.010–0.025	0.023–0.045	0.042–0.075	0.072–0.110	0.100–0.150
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Art. 50938

Mat.		ø 1.00–2.40	ø 2.50–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	v_c	50–80	120–180	120–180	120–180
	f_z	0.050–0.150	0.120–0.250	0.200–0.300	0.280–0.400
P2	v_c	45–70	100–160	100–160	100–160
	f_z	0.040–0.140	0.100–0.220	0.180–0.280	0.260–0.380
P3	v_c	40–60	90–150	90–150	90–150
	f_z	0.020–0.100	0.080–0.200	0.180–0.250	0.230–0.350
M1	v_c	30–50	80–130	80–130	80–130
	f_z	0.010–0.080	0.060–0.150	0.130–0.200	0.180–0.260
M2	v_c	25–45	70–120	70–120	70–120
	f_z	0.010–0.070	0.060–0.140	0.130–0.180	0.170–0.240
K1	v_c	60–80	150–200	120–200	120–200
	f_z	0.040–0.150	0.120–0.220	0.200–0.350	0.300–0.500
K2	v_c	50–70	130–180	130–180	130–180
	f_z	0.040–0.120	0.100–0.230	0.200–0.310	0.280–0.450
N1	v_c				
	f_z				
N2	v_c	80–110	150–200	150–200	150–200
	f_z	0.400–0.150	0.130–0.280	0.250–0.330	0.310–0.500
N3	v_c	90–130	200–250	200–250	200–250
	f_z	0.400–0.150	0.130–0.300	0.280–0.400	0.380–0.550
N4	v_c				
	f_z				
N5	v_c				
	f_z				
N6	v_c				
	f_z				
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c	20–40	40–60	40–60	40–60
	f_z	0.010–0.030	0.025–0.050	0.040–0.070	0.060–0.100
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

Art. 50940

Mat.		ø 1.00–2.40	ø 2.50–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	v_c	120–180	120–180	120–180	120–180
	f_z	0.050–0.150	0.120–0.250	0.200–0.300	0.280–0.400
P2	v_c	100–160	100–160	100–160	100–160
	f_z	0.040–0.140	0.100–0.220	0.180–0.280	0.260–0.380
P3	v_c	90–150	90–150	90–150	90–150
	f_z	0.020–0.100	0.080–0.200	0.180–0.250	0.230–0.350
M1	v_c	80–130	80–130	80–130	80–130
	f_z	0.010–0.080	0.060–0.150	0.130–0.200	0.180–0.260
M2	v_c	70–120	70–120	70–120	70–120
	f_z	0.010–0.070	0.060–0.140	0.130–0.180	0.170–0.240
K1	v_c	150–200	150–200	150–200	150–200
	f_z	0.040–0.150	0.120–0.220	0.200–0.350	0.300–0.500
K2	v_c	130–180	130–180	130–180	130–180
	f_z	0.040–0.120	0.100–0.230	0.200–0.310	0.280–0.450
N1	v_c				
	f_z				
N2	v_c	150–200	150–200	150–200	150–200
	f_z	0.400–0.150	0.130–0.280	0.250–0.330	0.310–0.500
N3	v_c	200–250	200–250	200–250	200–250
	f_z	0.400–0.150	0.130–0.300	0.280–0.400	0.380–0.550
N4	v_c				
	f_z				
N5	v_c				
	f_z				
N6	v_c				
	f_z				
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c	40–60	40–60	40–60	40–60
	f_z	0.010–0.030	0.025–0.050	0.040–0.070	0.060–0.100
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

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Art. 50942

Mat.		ø 1.00–2.40	ø 2.50–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	Vc	50–80	120–180	120–180	120–180
	fz	0.040–0.080	0.060–0.150	0.130–0.220	0.200–0.330
P2	Vc	45–70	100–160	100–160	100–160
	fz	0.040–0.075	0.070–0.190	0.130–0.200	0.180–0.300
P3	Vc	40–60	90–150	90–150	90–150
	fz	0.030–0.070	0.060–0.130	0.120–0.190	0.170–0.260
M1	Vc	30–50	80–130	80–130	80–130
	fz	0.010–0.050	0.040–0.120	0.100–0.160	0.150–0.220
M2	Vc	25–45	70–120	70–120	70–120
	fz	0.010–0.045	0.040–0.100	0.080–0.140	0.130–0.200
K1	Vc	60–80	150–200	120–200	120–200
	fz	0.050–0.100	0.090–0.230	0.210–0.320	0.300–0.400
K2	Vc	50–70	130–180	130–180	130–180
	fz	0.040–0.080	0.070–0.180	0.160–0.280	0.250–0.350
N1	Vc				
	fz				
N2	Vc	80–110	150–200	150–200	150–200
	fz	0.040–0.130	0.120–0.260	0.240–0.360	0.320–0.450
N3	Vc	90–130	200–250	200–250	200–250
	fz	0.040–0.140	0.130–0.280	0.260–0.380	0.350–0.480
N4	Vc				
	fz				
N5	Vc				
	fz				
N6	Vc				
	fz				
N7	Vc				
	fz				
N8	Vc				
	fz				
S1	Vc	20–40	40–60	40–60	40–60
	fz	0.010–0.030	0.025–0.040	0.035–0.070	0.060–0.120
S2	Vc				
	fz				
H1	Vc				
	fz				
H2	Vc				
	fz				
H3	Vc				
	fz				
O1	Vc				
	fz				
O2	Vc				
	fz				
O3	Vc				
	fz				

Art. 52100 / 52200

Mat.		ø 3.00–4.00	ø 4.10–8.00	ø 8.10–12.00	ø 12.10–16.00	ø 16.10–20.00
P1	Vc					
	fz					
P2	Vc					
	fz					
P3	Vc					
	fz					
M1	Vc					
	fz					
M2	Vc					
	fz					
K1	Vc	60–110	60–110	60–110	60–110	60–110
	fz	0.040–0.060	0.050–0.200	0.160–0.300	0.280–0.400	0.380–0.500
K2	Vc	50–100	50–100	50–100	50–100	50–100
	fz	0.020–0.050	0.040–0.160	0.140–0.250	0.220–0.350	0.320–0.400
N1	Vc					
	fz					
N2	Vc	200–250	200–250	200–250	200–250	200–250
	fz	0.040–0.060	0.050–0.150	0.140–0.260	0.250–0.400	0.380–0.600
N3	Vc	220–280	220–280	220–280	220–280	220–280
	fz	0.040–0.060	0.050–0.150	0.140–0.260	0.250–0.400	0.380–0.600
N4	Vc					
	fz					
N5	Vc	80–120	80–120	80–120	80–120	80–120
	fz	0.040–0.060	0.050–0.150	0.140–0.250	0.230–0.330	0.300–0.400
N6	Vc					
	fz					
N7	Vc					
	fz					
N8	Vc					
	fz					
S1	Vc					
	fz					
S2	Vc					
	fz					
H1	Vc					
	fz					
H2	Vc					
	fz					
H3	Vc					
	fz					
O1	Vc	20–40	20–40	20–40	20–40	20–40
	fz	0.030–0.050	0.040–0.100	0.080–0.150	0.130–0.180	0.160–0.200
O2	Vc					
	fz					
O3	Vc					
	fz					

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Art. 52150

Mat.		ø 4.00–7.00	ø 7.10–10.00	ø 10.10–13.00	ø 13.10–16.00	ø 16.10–20.00
P1	Vc	90–120	90–120	90–120	90–120	90–120
	fz	0.080–0.200	0.180–0.350	0.300–0.400	0350–0.450	0.400–0.600
P2	Vc	80–150	80–150	80–150	80–150	80–150
	fz	0.050–0.180	0.160–0.250	0.220–0.350	0.330–0.400	0.380–0.550
P3	Vc					
	fz					
M1	Vc					
	fz					
M2	Vc					
	fz					
K1	Vc	200–250	200–250	200–250	200–250	200–250
	fz	0.100–0.250	0.220–0.350	0.330–0.450	0.420–0.550	0.520–0.70
K2	Vc	160–200	160–200	160–200	160–200	160–200
	fz	0.080–0.180	0.160–0.250	0.230–0.350	0.330–0.500	0.450–0.550
N1	Vc					
	fz					
N2	Vc					
	fz					
N3	Vc	250–300	250–300	250–300	250–300	250–300
	fz	0.050–0.150	0.130–0.250	0.230–0.350	0.330–0.450	0.430–0.550
N4	Vc					
	fz					
N5	Vc	80–120	80–120	80–120	80–120	80–120
	fz	0.050–0.120	0.100–0.220	0.200–0.320	0.300–0.400	0.380–0.450
N6	Vc					
	fz					
N7	Vc					
	fz					
N8	Vc					
	fz					
S1	Vc					
	fz					
S2	Vc					
	fz					
H1	Vc	70–100	70–100	70–100	70–100	70–100
	fz	0.050–0.100	0.080–0.180	0.160–0.260	0.240–0.300	0.280–0.350
H2	Vc					
	fz					
H3	Vc					
	fz					
O1	Vc					
	fz					
O2	Vc					
	fz					
O3	Vc					
	fz					

Art. 50909

Mat.		ø 1.00–2.40	ø 2.50–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	Vc	120–180	120–180	120–180	120–180
	fz	0.040–0.080	0.060–0.150	0.130–0.220	0.200–0.330
P2	Vc	110–160	100–160	100–160	100–160
	fz	0.040–0.075	0.070–0.190	0.130–0.200	0.180–0.300
P3	Vc	100–150	90–150	90–150	90–150
	fz	0.030–0.070	0.060–0.130	0.120–0.190	0.170–0.260
M1	Vc	80–130	80–130	80–130	80–130
	fz	0.010–0.050	0.040–0.120	0.100–0.160	0.150–0.220
M2	Vc	70–120	70–120	70–120	70–120
	fz	0.010–0.045	0.040–0.100	0.080–0.140	0.130–0.200
K1	Vc	150–200	150–200	120–200	120–200
	fz	0.050–0.100	0.090–0.230	0.210–0.320	0.300–0.400
K2	Vc	130–180	130–180	130–180	130–180
	fz	0.040–0.080	0.070–0.180	0.160–0.280	0.250–0.350
N1	Vc				
	fz				
N2	Vc	150–200	150–200	150–200	150–200
	fz	0.040–0.130	0.120–0.260	0.240–0.360	0.320–0.450
N3	Vc	200–250	200–250	200–250	200–250
	fz	0.040–0.140	0.130–0.280	0.260–0.380	0.350–0.480
N4	Vc				
	fz				
N5	Vc	90–150	90–150	90–150	90–150
	fz	0.050–0.100	0.090–0.230	0.210–0.320	0.300–0.400
N6	Vc				
	fz				
N7	Vc				
	fz				
N8	Vc				
	fz				
S1	Vc	40–70	40–70	40–70	40–70
	fz	0.010–0.030	0.025–0.040	0.035–0.070	0.060–0.120
S2	Vc				
	fz				
H1	Vc	40–80	40–80	40–80	40–80
	fz	0.010–0.020	0.018–0.035	0.030–0.060	0.050–0.100
H2	Vc				
	fz				
H3	Vc				
	fz				
O1	Vc				
	fz				
O2	Vc				
	fz				
O3	Vc				
	fz				

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Art. 50912 / 50916

Mat.		ø 1.00–1.90	ø 2.00–5.00	ø 5.10–8.00	ø 8.10 -12.70
P1	v_c	70–130	70–130	70–130	70–130
	f_z	0.040–0.060	0.050–0.120	0.110–0.250	0.240–0.400
P2	v_c	60–120	60–120	60–120	60–120
	f_z	0.030–0.050	0.045–0.100	0.090–0.220	0.200–0.350
P3	v_c	50–100			
	f_z	0.030–0.050			
M1	v_c	50–70			
	f_z	0.030–0.050			
M2	v_c	35–60			
	f_z	0.025–0.045			
K1	v_c	80–120	80–120	80–120	80–120
	f_z	0.050–0.080	0.070–0.150	0.140–0.300	0.280–0.500
K2	v_c	60–100	60–100	60–100	60–100
	f_z	0.040–0.070	0.060–0.130	0.120–0.260	0.250–0.450
N1	v_c				
	f_z				
N2	v_c				
	f_z				
N3	v_c				
	f_z				
N4	v_c				
	f_z				
N5	v_c				
	f_z				
N6	v_c				
	f_z				
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c	30–60			
	f_z	0.010–0.040			
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

Art. 50920 / 50925 / 50930

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.00–10.00
P1	v_c	70–120	70–120	70–120
	f_z	0.050–0.150	0.140–0.250	0.240–0.380
P2	v_c	70–110	70–110	70–110
	f_z	0.040–0.130	0.120–0.230	0.220–0.360
P3	v_c			
	f_z			
M1	v_c			
	f_z			
M2	v_c			
	f_z			
K1	v_c	70–110	70–110	70–110
	f_z	0.050–0.170	0.160–0.280	0.260–0.450
K2	v_c	60–100	60–100	60–100
	f_z	0.050–0.140	0.130–0.250	0.240–0.400
N1	v_c			
	f_z			
N2	v_c			
	f_z			
N3	v_c			
	f_z			
N4	v_c			
	f_z			
N5	v_c			
	f_z			
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c			
	f_z			
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Art. 52903 / 52906 / 52909

Mat.		ø 1.00–1.90	ø 2.00–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	v_c	70–110	70–110	70–110	70–110
	f_z	0.025–0.055	0.050–0.130	0.125–0.170	0.165–0.215
P2	v_c	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.190
P3	v_c	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.190
M1	v_c	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.190
M2	v_c	50–90	50–90	50–90	50–90
	f_z	0.015–0.045	0.040–0.100	0.090–0.130	0.120–0.150
K1	v_c	90–140	90–140	90–140	90–140
	f_z	0.050–0.110	0.100–0.270	0.260–0.340	0.320–0.420
K2	v_c	80–120	80–120	80–120	80–120
	f_z	0.040–0.100	0.090–0.250	0.240–0.300	0.280–0.360
N1	v_c	120–170	120–170	120–170	120–170
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.420
N2	v_c	150–200	150–200	150–200	150–200
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.420
N3	v_c	200–250	200–250	200–250	200–250
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.420
N4	v_c	90–130	90–130	90–130	90–130
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.420
N5	v_c	150–200	150–200	150–200	150–200
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.420
N6	v_c	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.190
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c	30–60	30–60	30–60	30–60
	f_z	0.015–0.035	0.030–0.085	0.080–0.110	0.100–0.135
S2	v_c	20–50	20–50	20–50	20–50
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.190
H1	v_c	70–110	70–110	70–110	70–110
	f_z	0.010–0.020	0.018–0.050	0.045–0.065	0.060–0.080
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c	70–110	70–110	70–110	70–110
	f_z	0.025–0.055	0.050–0.130	0.125–0.170	0.165–0.215
O2	v_c				
	f_z				
O3	v_c				
	f_z				

Art. 52912 / 52916

Mat.		ø 1.00–1.90	ø 2.00–5.00	ø 5.10–8.00	ø 8.10–10.00
P1	v_c	70–110	70–110	70–110	70–110
	f_z	0.020–0.060	0.050–0.130	0.125–0.170	0.165–0.190
P2	v_c	60–100	60–100	60–100	60–100
	f_z	0.015–0.050	0.045–0.120	0.115–0.150	0.140–0.160
P3	v_c	50–90	50–90	50–90	50–90
	f_z	0.015–0.045	0.040–0.100	0.090–0.130	0.120–0.120
M1	v_c	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.045–0.120	0.115–0.150	0.140–0.160
M2	v_c	50–90	50–90	50–90	50–90
	f_z	0.015–0.045	0.040–0.100	0.090–0.130	0.120–0.120
K1	v_c	90–140	90–140	90–140	90–140
	f_z	0.050–0.110	0.100–0.270	0.260–0.340	0.320–0.350
K2	v_c	80–120	80–120	80–120	80–120
	f_z	0.040–0.100	0.090–0.250	0.240–0.300	0.280–0.300
N1	v_c	90–130	90–130	90–130	90–130
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.350
N2	v_c	150–200	150–200	150–200	150–200
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.350
N3	v_c	170–220	170–220	170–220	170–220
	f_z	0.050–0.110	0.100–0.250	0.240–0.340	0.320–0.350
N4	v_c	90–130	90–130	90–130	90–130
	f_z	0.025–0.055	0.050–0.130	0.125–0.170	0.165–0.195
N5	v_c	150–200	150–200	150–200	1050–200
	f_z	0.040–0.100	0.090–0.250	0.240–0.300	0.280–0.300
N6	v_c	60–100	60–100	60–100	60–100
	f_z	0.015–0.045	0.040–0.100	0.090–0.130	0.120–0.110
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c	30–60	30–60	30–60	30–60
	f_z	0.015–0.035	0.030–0.085	0.080–0.110	0.100–0.100
S2	v_c	20–50	20–50	20–50	20–50
	f_z	0.010–0.040	0.030–0.100	0.080–0.130	0.10–0.110
H1	v_c	60–100	60–100	60–100	60–100
	f_z	0.010–0.020	0.018–0.050	0.045–0.065	0.060–0.080
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c	70–110	70–110	70–110	70–110
	f_z	0.020–0.060	0.050–0.130	0.125–0.170	0.165–0.190
O2	v_c				
	f_z				
O3	v_c				
	f_z				

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Art. 52920 / 52930

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.10–10.00
P1	v_c			
	f_z			
P2	v_c			
	f_z			
P3	v_c	40–80	40–80	40–80
	f_z	0.050–0.085	0.080–0.110	0.100–0.150
M1	v_c	30–70	30–70	30–70
	f_z	0.045–0.070	0.065–0.085	0.080–0.120
M2	v_c	25–55	25–55	25–55
	f_z	0.035–0.050	0.045–0.065	0.080–0.110
K1	v_c	70–110	70–110	70–110
	f_z	0.100–0.200	0.180–0.250	0.230–0.280
K2	v_c	60–100	60–100	60–100
	f_z	0.090–0.180	0.170–0.240	0.220–0.260
N1	v_c	60–100	60–100	60–100
	f_z	0.130–0.250	0.230–0.340	0.320–0.380
N2	v_c	65–100	65–100	65–100
	f_z	0.130–0.250	0.230–0.340	0.320–0.380
N3	v_c	70–110	70–110	70–110
	f_z	0.130–0.250	0.230–0.340	0.320–0.380
N4	v_c			
	f_z			
N5	v_c			
	f_z			
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c	30–60	30–60	30–60
	f_z	0.035–0.070	0.065–0.085	0.080–0.110
S2	v_c	20–50	20–50	20–50
	f_z	0.030–0.060	0.050–0.080	0.070–0.100
H1	v_c	20–40	20–40	20–40
	f_z	0.010–0.035	0.030–0.040	0.035–0.060
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c	60–100	60–100	60–100
	f_z	0.090–0.180	0.170–0.240	0.220–0.260
O2	v_c			
	f_z			
O3	v_c			
	f_z			

Art. 54906 / 54909

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.10–12.70
P1	v_c	70–110	70–110	70–110
	f_z	0.050–0.130	0.125–0.170	0.165–0.215
P2	v_c	60–100	60–100	60–100
	f_z	0.045–0.120	0.115–0.150	0.140–0.190
P3	v_c			
	f_z			
M1	v_c			
	f_z			
M2	v_c			
	f_z			
K1	v_c	90–140	90–140	90–140
	f_z	0.100–0.270	0.260–0.340	0.320–0.420
K2	v_c	80–120	80–120	80–120
	f_z	0.090–0.250	0.240–0.300	0.280–0.360
N1	v_c			
	f_z			
N2	v_c			
	f_z			
N3	v_c	170–220	170–220	170–220
	f_z	0.100–0.250	0.240–0.340	0.320–0.420
N4	v_c			
	f_z			
N5	v_c	150–200	150–200	150–200
	f_z	0.100–0.250	0.240–0.340	0.320–0.420
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c			
	f_z			
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Art. 54912 / 54916

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.10–10.00
P1	v_c	70–110	70–110	70–110
	f_z	0.050–0.130	0.125–0.170	0.165–0.190
P2	v_c	60–100	60–100	60–100
	f_z	0.045–0.120	0.115–0.150	0.140–0.160
P3	v_c			
	f_z			
M1	v_c			
	f_z			
M2	v_c			
	f_z			
K1	v_c	90–130	90–130	90–130
	f_z	0.100–0.250	0.240–0.340	0.320–0.350
K2	v_c	150–200	150–200	150–200
	f_z	0.100–0.250	0.240–0.340	0.320–0.350
N1	v_c			
	f_z			
N2	v_c			
	f_z			
N3	v_c	170–220	170–220	170–220
	f_z	0.100–0.250	0.240–0.340	0.320–0.350
N4	v_c			
	f_z			
N5	v_c	150–200	150–200	150–200
	f_z	0.100–0.250	0.240–0.340	0.320–0.350
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c			
	f_z			
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

Art. 54920 / 54930

Mat.		ø 3.00–5.00	ø 5.10–8.00	ø 8.10–10.00
P1	v_c	70–120	70–120	70–120
	f_z	0.050–0.150	0.140–0.250	0.240–0.380
P2	v_c	70–110	70–110	70–110
	f_z	0.040–0.130	0.120–0.230	0.220–0.360
P3	v_c			
	f_z			
M1	v_c			
	f_z			
M2	v_c			
	f_z			
K1	v_c	70–110	70–110	70–110
	f_z	0.050–0.170	0.160–0.280	0.260–0.450
K2	v_c	60–100	60–100	60–100
	f_z	0.050–0.140	0.130–0.250	0.240–0.400
N1	v_c			
	f_z			
N2	v_c			
	f_z			
N3	v_c	70–110	70–110	70–110
	f_z	0.050–0.170	0.160–0.280	0.260–0.450
N4	v_c			
	f_z			
N5	v_c	50–100	50–100	50–100
	f_z	0.050–0.130	0.120–0.230	0.220–0.360
N6	v_c			
	f_z			
N7	v_c			
	f_z			
N8	v_c			
	f_z			
S1	v_c			
	f_z			
S2	v_c			
	f_z			
H1	v_c			
	f_z			
H2	v_c			
	f_z			
H3	v_c			
	f_z			
O1	v_c			
	f_z			
O2	v_c			
	f_z			
O3	v_c			
	f_z			

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Art. 50840

Mat.		ø 2.00–5.00	ø 5.10–8.00	ø 8.10–11.00	ø 11.10–14.00
P1	v_c	30–60	30–60	30–60	30–60
	f_z	0.020–0.050	0.045–0.090	0.080–0.150	0.130–0.200
P2	v_c	25–50	25–50	25–50	25–50
	f_z	0.015–0.045	0.040–0.080	0.075–0.120	0.100–0.150
P3	v_c				
	f_z				
M1	v_c	20–45	20–45	20–45	20–45
	f_z	0.15–0.040	0.035–0.070	0.065–0.100	0.090–0.130
M2	v_c	15–35	15–35	15–35	15–35
	f_z	0.010–0.035	0.030–0.060	0.055–0.085	0.080–0.110
K1	v_c	30–60	30–60	30–60	30–60
	f_z	0.020–0.050	0.45–0.090	0.080–0.150	0.130–0.200
K2	v_c	25–50	25–50	25–50	25–50
	f_z	0.015–0.045	0.040–0.080	0.075–0.120	0.100–0.150
N1	v_c	30–60	30–60	30–60	30–60
	f_z	0.020–0.050	0.045–0.090	0.080–0.150	0.130–0.200
N2	v_c	60–100	60–100	60–100	60–100
	f_z	0.030–0.080	0.070–0.150	0.140–0.220	0.200–0.300
N3	v_c	50–90	50–90	50–90	50–90
	f_z	0.025–0.070	0.060–0.130	0.120–0.190	0.180–0.250
N4	v_c	50–90	50–90	50–90	50–90
	f_z	0.030–0.090	0.080–0.150	0.130–0.200	0.180–0.300
N5	v_c				
	f_z				
N6	v_c				
	f_z				
N7	v_c				
	f_z				
N8	v_c				
	f_z				
S1	v_c				
	f_z				
S2	v_c				
	f_z				
H1	v_c				
	f_z				
H2	v_c				
	f_z				
H3	v_c				
	f_z				
O1	v_c				
	f_z				
O2	v_c				
	f_z				
O3	v_c				
	f_z				

Art. 55654 / 55338

Mat.		ø 1.00–2.00	ø 2.10–5.00	ø 5.10–8.00	ø 8.10–11.00	ø 11.10–14.00
P1	v_c	40–60	40–60	40–60	40–60	40–60
	f_z	0.015–0.040	0.035–0.080	0.075–0.170	0.160–0.230	0.200–0.300
P2	v_c	30–50	30–50	30–50	30–50	30–50
	f_z	0.010–0.035	0.030–0.075	0.070–0.155	0.150–0.210	0.190–0.250
P3	v_c					
	f_z					
M1	v_c	25–40	25–40	25–40	25–40	25–40
	f_z	0.010–0.030	0.025–0.070	0.060–0.100	0.090–0.140	0.120–0.200
M2	v_c					
	f_z					
K1	v_c	60–100	60–100	60–100	60–100	60–100
	f_z	0.020–0.050	0.040–0.090	0.080–0.180	0.160–0.280	0.250–0.350
K2	v_c	40–80	40–80	40–80	40–80	40–80
	f_z	0.015–0.040	0.035–0.080	0.700–0.170	0.150–0.230	0.210–0.300
N1	v_c					
	f_z					
N2	v_c	80–120	80–120	80–120	80–120	80–120
	f_z	0.020–0.060	0.050–0.120	0.100–0.230	0.210–0.340	0.330–0.450
N3	v_c	60–100	60–100	60–100	60–100	60–100
	f_z	0.020–0.060	0.050–0.120	0.100–0.230	0.210–0.340	0.330–0.450
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	30–50	30–50	30–50	30–50	30–50
	f_z	0.010–0.030	0.025–0.070	0.060–0.130	0.100–0.160	0.150–0.200
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Art. 58000 / 58500

Mat.		ø 0.99–2.00	ø 2.01–3.00	ø 3.01–4.00	ø 4.01–5.00	ø 5.01–6.00
P1	v_c	20–30	20–30	20–30	20–30	20–30
	f_z	0.050–0.100	0.080–0.130	0.120–0.180	0.170–0.230	0.220–0.280
P2	v_c	15–25	15–25	15–25	15–25	15–25
	f_z	0.040–0.080	0.070–0.120	0.110–0.170	0.160–0.220	0.210–0.260
P3	v_c	10–20	10–20	10–20	10–20	10–20
	f_z	0.035–0.070	0.060–0.100	0.090–0.150	0.130–0.180	0.170–0.200
M1	v_c	10–20	10–20	10–20	10–20	10–20
	f_z	0.040–0.080	0.070–0.120	0.110–0.170	0.160–0.220	0.200–0.260
M2	v_c	10–15	10–15	10–15	10–15	10–15
	f_z	0.035–0.070	0.060–0.100	0.090–0.150	0.130–0.180	0.170–0.200
K1	v_c	20–30	20–30	20–30	20–30	20–30
	f_z	0.050–0.100	0.080–0.150	0.140–0.220	0.200–0.260	0.030–0.280
K2	v_c	15–25	15–25	15–25	15–25	15–25
	f_z	0.050–0.090	0.75–0.140	0.130 0.200	0.180–0.240	0.200–0.260
N1	v_c					
	f_z					
N2	v_c	30–40	30–40	30–40	30–40	30–40
	f_z	0.060–0.120	0.110–0.160	0.150–0.220	0.200–0.260	0.240–0.300
N3	v_c	25–35	25–35	25–35	25–35	25–35
	f_z	0.060–0.120	0.110–0.160	0.150–0.220	0.200–0.260	0.240–0.300
N4	v_c	15–25	15–25	15–25	15–25	15–25
	f_z	0.035–0.070	0.060–0.100	0.090–0.150	0.130–0.180	0.170–0.200
N5	v_c	30–40	30–40	30–40	30–40	30–40
	f_z	0.035–0.070	0.060–0.100	0.090–0.150	0.130–0.180	0.170–0.200
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	10–15	10–15	10–15	10–15	10–15
	f_z	0.035–0.070	0.060–0.100	0.090–0.150	0.130–0.180	0.170–0.200
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 40000

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	60–90	60–90	60–90		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.5×d1
P2	v_c	50–80	50–80	50–80		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.3×d1
P3	v_c					
	f_z					
M1	v_c					
	f_z					
M2	v_c					
	f_z					
K1	v_c	40–60	40–60	40–60		
	f_z	0.020–0.070	0.050–0.110	0.060–0.140	1×d1	1×d1
K2	v_c	30–50	30–50	30–50		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.4×d1
N1	v_c	100–150	100–150	100–150		
	f_z	0.015–0.060	0.040–0.120	0.060–0.200	1×d1	1×d1
N2	v_c	200–250	200–250	200–250		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N3	v_c	180–220	180–220	180–220		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N4	v_c	50–100	50–100	50–100		
	f_z	0.015–0.050	0.030–0.080	0.060–0.120	1×d1	0.5×d1
N5	v_c	100–150	100–150	100–150		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N6	v_c	30–60	30–60	30–60		
	f_z	0.015–0.050	0.040–0.100	0.060–0.140	1×d1	0.7×d1
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Schnittdaten
Données de coupe
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Art. 40600

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	80–100	80–100	80–100		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.5×d1
P2	v_c	70–90	70–90	70–90		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.3×d1
P3	v_c	60–80	60–80	60–80		
	f_z					
M1	v_c	40–60	40–60	40–60		
	f_z	0.015–0.050	0.050–0.080	0.080–0.120	1×d1	0.3×d1
M2	v_c					
	f_z					
K1	v_c	60–80	60–80	60–80		
	f_z	0.020–0.070	0.050–0.110	0.060–0.140	1×d1	1×d1
K2	v_c	40–60	40–60	40–60		
	f_z	0.015–0.060	0.050–0.100	0.060–0.140	1×d1	0.4×d1
N1	v_c					
	f_z					
N2	v_c	230–280	230–280	230–280		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N3	v_c	200–250	200–250	200–250		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N4	v_c					
	f_z					
N5	v_c	120–170	120–170	120–170		
	f_z	0.020–0.070	0.050–0.120	0.070–0.200	1×d1	1×d1
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 40002

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–2.00	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.015–0.060	0.030–0.110	0.060–0.140	1×d1	1×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.015–0.060	0.030–0.110	0.050–0.130	1×d1	0.6×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.5×d1
M1	v_c	40–60	40–60	40–60		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.5×d1
M2	v_c					
	f_z					
K1	v_c	60–80	60–80	60–80		
	f_z	0.015–0.060	0.030–0.110	0.060–0.140	1×d1	1×d1
K2	v_c	50–70	60–80	60–80		
	f_z	0.015–0.060	0.030–0.100	0.050–0.130	1×d1	0.6×d1
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Art. 40602

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	70–100	70–100	70–100		
	f_z	0.015–0.060	0.030–0.110	0.060–0.140	1×d1	1× ×d1
P2	v_c	60–90	60–90	60–90		
	f_z	0.015–0.060	0.030–0.110	0.050–0.130	1×d1	0.6×d1
P3	v_c	50–80	50–80	50–80		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.5×d1
M1	v_c	50–80	50–80	50–80		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.5×d1
M2	v_c					
	f_z					
K1	v_c	70–10	70–10	70–10		
	f_z	0.015–0.060	0.030–0.110	0.060–0.140	1×d1	1×d1
K2	v_c	60–90	60–90	60–90		
	f_z	0.015–0.060	0.030–0.100	0.050–0.130	1×d1	0.6×d1
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c	60–90	60–90	60–90		
	f_z	0.010–0.050	0.020–0.060	0.040–0.070	1×d1	0.05×d1
H2	v_c	50–70	50–70	50–70		
	f_z	0.010–0.040	0.020–0.050	0.030–0.060	1×d1	0.05×d1
H3	v_c	40–60	40–60	40–60		
	f_z	0.005–0.030	0.015–0.035	0.030–0.050	1×d1	0.05×d1
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 40004

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.020–0.060	0.030–0.110	0.060–0.140	1×d1	0.5×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.015–0.060	0.030–0.110	0.050–0.130	1×d1	0.5×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.4×d1
M1	v_c	40–60	40–60	40–60		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.4×d1
M2	v_c					
	f_z					
K1	v_c	60–80	60–80	60–80		
	f_z	0.020–0.060	0.030–0.110	0.060–0.140	1×d1	0.80×d1
K2	v_c	50–70	50–70	50–70		
	f_z	0.150–0.050	0.030–0.100	0.060–0.130	1×d1	0.70×d1
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Schnittdaten
Données de coupe
Parametri di lavoro
Cutting data

Art. 40604

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	70–100	70–100	70–100		
	f_z	0.020–0.060	0.030–0.110	0.060–0.140	1×d1	0.5×d1
P2	v_c	60–90	60–90	60–90		
	f_z	0.015–0.060	0.030–0.110	0.050–0.130	1×d1	0.5×d1
P3	v_c	50–80	50–80	50–80		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.4×d1
M1	v_c	50–80	50–80	50–80		
	f_z	0.010–0.050	0.020–0.100	0.040–0.120	1×d1	0.4×d1
M2	v_c					
	f_z					
K1	v_c	70–100	70–100	70–100		
	f_z	0.020–0.060	0.030–0.110	0.060–0.140	1×d1	0.80×d1
K2	v_c	60–90	60–90	60–90		
	f_z	0.150–0.050	0.030–0.100	0.060–0.130	1×d1	0.70×d1
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c	60–90	60–90	60–90		
	f_z	0.010–0.050	0.020–0.060	0.040–0.070	1×d1	0.05×d1
H2	v_c	50–70	50–70	50–70		
	f_z	0.010–0.040	0.020–0.050	0.030–0.060	1×d1	0.05×d1
H3	v_c	40–60	40–60	40–60		
	f_z	0.005–0.030	0.015–0.035	0.030–0.050	1×d1	0.05×d1
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

Art. 40006 / 40008

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c	60–80	60–80	60–80		
	f_z	0.010–0.020	0.015–0.070	0.060–0.110	0.5×d1	1.5×d1
P2	v_c	50–70	50–70	50–70		
	f_z	0.010–0.020	0.015–0.070	0.060–0.110	0.5×d1	1.5×d1
P3	v_c	40–60	40–60	40–60		
	f_z	0.010–0.020	0.015–0.060	0.050–0.090	0.4×d1	1.5×d1
M1	v_c	50–70	50–70	50–70		
	f_z	0.010–0.020	0.015–0.060	0.050–0.090	0.4×d1	1.5×d1
M2	v_c	40–60	40–60	40–60		
	f_z	0.005–0.150	0.010–0.050	0.040–0.080	0.3×d1	1.5×d1
K1	v_c	50–70	50–70	50–70		
	f_z	0.010–0.020	0.015–0.070	0.060–0.110	0.5×d1	1.5×d1
K2	v_c	40–60	40–60	40–60		
	f_z	0.010–0.020	0.015–0.060	0.050–0.090	0.4×d1	1.5×d1
N1	v_c					
	f_z					
N2	v_c					
	f_z					
N3	v_c					
	f_z					
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c	50–70	50–70	50–70		
	f_z	0.010–0.020	0.015–0.060	0.050–0.090	0.4×d1	1.5×d1
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c					
	f_z					
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Schnittdaten
Données de coupe
Parametri di lavoro
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Art. 47000 / 47500

Mat.		ø 2.00–5.00	ø 6.00–12.00	ø 13.00–20.00	a_e	a_p
P1	v_c					
	f_z					
P2	v_c					
	f_z					
P3	v_c					
	f_z					
M1	v_c					
	f_z					
M2	v_c					
	f_z					
K1	v_c					
	f_z					
K2	v_c					
	f_z					
N1	v_c	300–600	300–600	300–600		
	f_z	0.030–0.050	0.050–0.120	0.120–0.200	1×d1	0.5×d1
N2	v_c	300–1000	300–1000	300–1000		
	f_z	0.030–0.060	0.060–0.140	0.140–0.250	1×d1	0.5×d1
N3	v_c	300–1000	300–1000	300–1000		
	f_z	0.030–0.060	0.060–0.140	0.140–0.250	1×d1	0.5×d1
N4	v_c					
	f_z					
N5	v_c					
	f_z					
N6	v_c					
	f_z					
N7	v_c					
	f_z					
N8	v_c					
	f_z					
S1	v_c					
	f_z					
S2	v_c					
	f_z					
H1	v_c					
	f_z					
H2	v_c					
	f_z					
H3	v_c					
	f_z					
O1	v_c	300–600	300–600	300–600		
	f_z	0.030–0.050	0.050–0.120	0.120–0.200	1×d1	0.5×d1
O2	v_c					
	f_z					
O3	v_c					
	f_z					

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Anwendungen
Applications

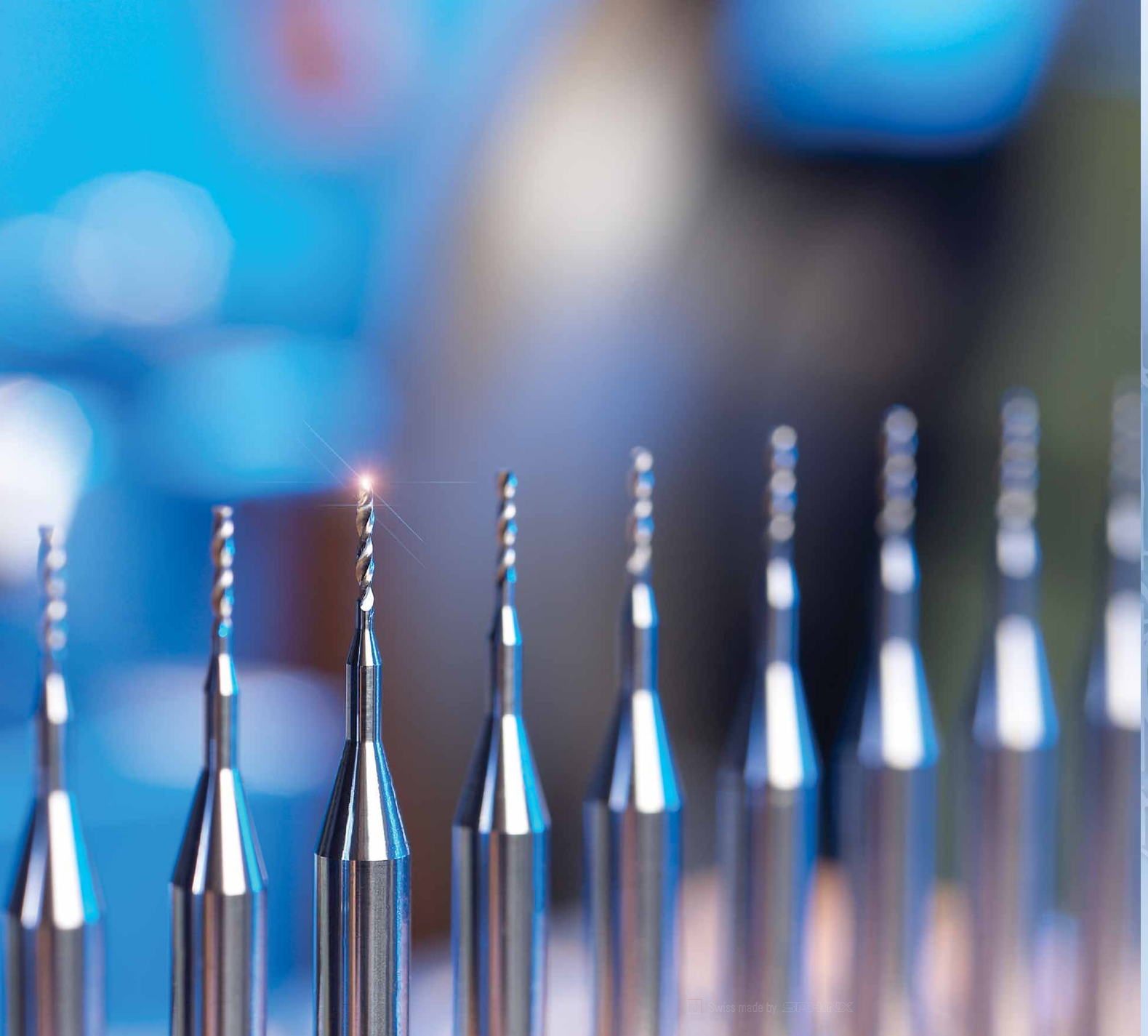
Sackloch Blind hole	
Sackloch mit Senkung Blind hole with countersink	
Stufenbohrung Step hole	
Gravierstichel flach Graver for groove, flat bottom	
Gravierstichel rund Graver for groove, full bottom radius	
Radius einstechen Plunge radius	
Radius längs Straight radius milling	
Durchgangsbohrung Through hole	
Durchgang mit Senkung Through hole with countersink	
Mehrere Schichten Multi-composite material	
Querbohrung Cross hole	
In Rundung Round surface	
In Schräge Inclined surface	
Kantenbruch 60° Chamfer 60°	
Kantenbruch 90° Chamfer 90°	

Kantenbruch 120° Chamfer 120°	
Senkung 60° Countersink 60°	
Senkung 90° Countersink 90°	
Senkung 120° Countersink 120°	
Senkung 130° Countersink 130°	
Senkung 140° Countersink 140°	
Senkung 90°–140° Double angle countersink 90°–140°	
Einstechen Plunge	
Nuten normal Straight groove milling	
Nuten schräg Angular groove milling	
Schlichten Stirnseite Front side finishing	
Schlichten mit Umfang Side finishing	
Schruppen Stirnseite Front side roughing	
Zyklisch eckig Angular milling	
Zyklisch rund Circular milling	

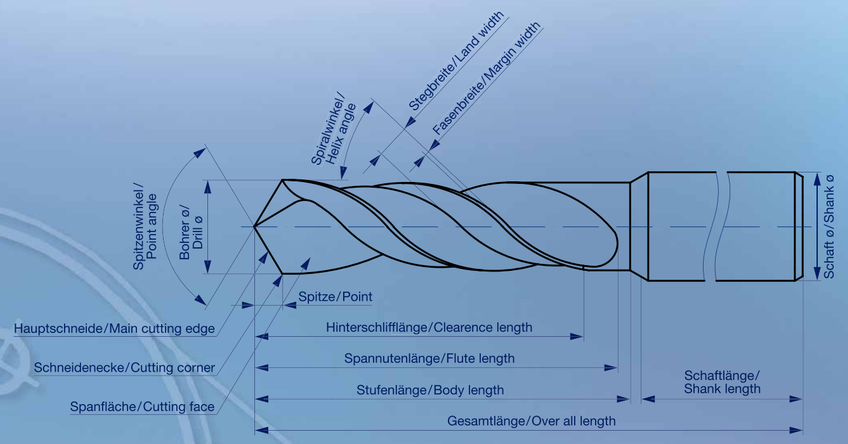
Werkstoffgruppen
Workpiece materials

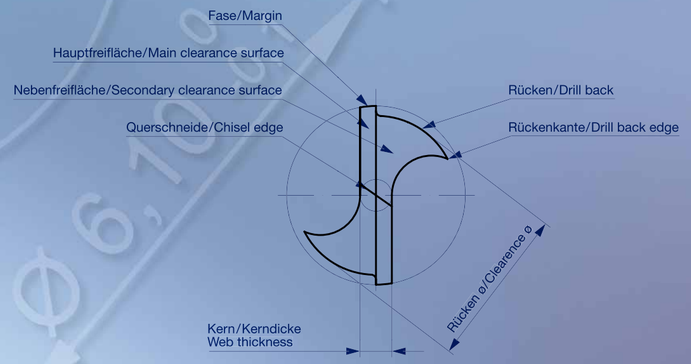
		Material Material	Festigkeit (N/mm²) Härte hardness	Beispiel example
P	P1	unlegierte Stähle, Stahlguss unalloyed steels, steel casting	bis up to 700 N/mm²	St37, St42, C22, GS38, St50, St60, C35, GS52
	P2	legierte Stähle alloyed steels	bis up to 700–1000 N/mm²	St70, C45, GS62, 16MnCr5, 42CrMo4, 90MnCrV8, 100Cr6
	P3	hochlegierte Stähle High alloyed/high-grade steels	bis/up to 1400 N/mm²	S210Cr12, 34CrAlNi7
M	M1	nichtrostender Stahl ferritische/martensitische Ferritic/martensitic stainless steels		
	M2	nichtrostender Stahl austenitisch Austenitic stainless steels		
K	K1	Grauguss grey cast iron		
	K2	Gusseisen mit Kugelgraphit ferritisch, perrlitisch Spheroidal/ductile cast iron		
N	N1	Alu-Knetlegierungen malleable alu alloy	bis up to 350 N/mm²	Al99.5, AlMg1, AlCuSiPb, G-AlCu5Ni1,5, AlZnMgCu0,5
	N2	Alu-Gusslegierung <10% Si cast alu alloy <10% Si	bis up to 300 N/mm²	G-AlCu4TiMg, G-AlSi7Mg, G-AlSi9Mg, G-AlSi10Mg, G-AlSi12
	N3	Alu-Gusslegierung >10% Si cast alu alloy >10% Si	bis up to 450 N/mm²	G-AlSi17Cu4, G-AlSi21CuNiMg
	N4	Magnesiumlegierungen Magnesium, magnesium alloys		
	N5	Kupfer und Kupferlegierungen kurzspanend Copper nickel alloys, brass		
	N6	Kupfer und Kupferlegierungen langspanend Copper, forging copper alloys		
	N7	Silber Silver		
	N8	Gold Gold		
S	S1	Titan, Titanlegierungen Titanium, titanium alloys	über over 700 N/mm²	Ti6Al4V, Ti-4Al-4Mo-2Sn
	S2	Warmfeste Legierungen Ni- oder Co-Basis Ni/Co based super alloys		
H	H1	gehärtete Stähle, 50–55 HRC Hardened steels 50–55 HRC		
	H2	gehärtete Stähle, 55–60 HRC Hardened steels 55–60 HRC		
	H3	gehärtete Stähle, >60 HRC Hardened steels >60 HRC		
O	01	Thermoplaste, Duroplaste ohne abrasive Füllstoffe Thermoplast, thermosetting plastics		
	02	Kunststoffe Faserverstärkt Fiber-reinforced plastics		
	03	Graphit Graphite		EDM36

		Material Material
P	P1	unlegierte Stähle, Stahlguss unalloyed steels, steel casting
	P2	legierte Stähle alloyed steels
	P3	hochlegierte Stähle High alloyed/high-grade steels
M	M1	nichtrostender Stahl ferritische/martensitische Ferritic/martensitic stainless steels
	M2	nichtrostender Stahl austenitisch Austenitic stainless steels
K	K1	Grauguss grey cast iron
	K2	Gusseisen mit Kugelgraphit ferritisch, perrlitisch Spheroidal/ductile cast iron
N	N1	Alu-Knetlegierungen malleable alu alloy
	N2	Alu-Gusslegierung <10% Si cast alu alloy <10% Si
	N3	Alu-Gusslegierung >10% Si cast alu alloy >10% Si
	N4	Magnesiumlegierungen Magnesium, magnesium alloys
	N5	Kupfer und Kupferlegierungen kurzspanend Copper nickel alloys, brass
	N6	Kupfer und Kupferlegierungen langspanend Copper, forging copper alloys
	N7	Silber Silver
	N8	Gold Gold
S	S1	Titan, Titanlegierungen Titanium, titanium alloys
	S2	Warmfeste Legierungen Ni- oder Co-Basis Ni/Co based super alloys
H	H1	gehärtete Stähle, 50–55 HRC Hardened steels 50–55 HRC
	H2	gehärtete Stähle, 55–60 HRC Hardened steels 55–60 HRC
	H3	gehärtete Stähle, >60 HRC Hardened steels >60 HRC
O	01	Thermoplaste, Duroplaste ohne abrasive Füllstoffe Thermoplast, thermosetting plastics
	02	Kunststoffe Faserverstärkt Fiber-reinforced plastics
	03	Graphit Graphite



Spiralbohrer
Twist drill



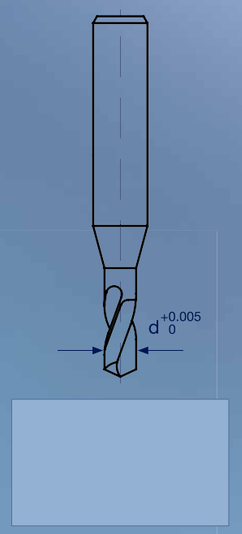


Bearbeitungsverfahren Mikrobohren
Machining process for micro drilling

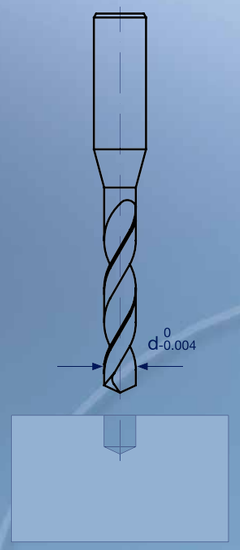
Zentrier- oder Pilotbohrung wird bei Bohr-ø < 1.00 mm empfohlen.

For holes ø < 1.00 mm a center- or pilothole is recommended.

Art. 56033 – ø 0.50



Art. 51200 – ø 0.50



Tieflochbohrzyklus für langspanende Werkstoffe

Deep-hole drilling cycle for long-chipping materials

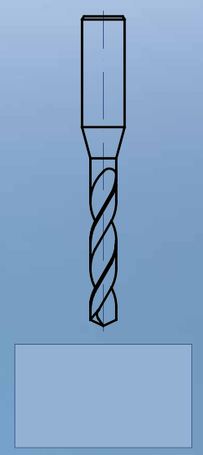
Entspänen
Pecking cycle

Zentrierbohren
Center drilling

Saubere Eintrittsfläche

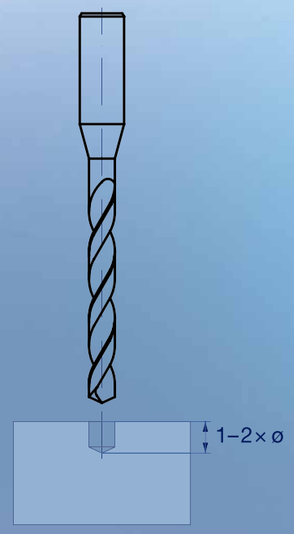
Smooth entering surface

≤ 9 × d



· Keine Pilotbohrung
· No pilothole

> 9 × d

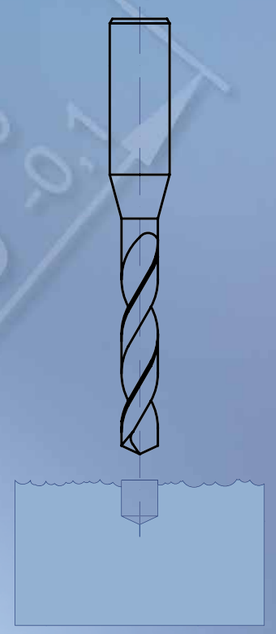


· Pilotbohrung 1–2 × ø empfohlen
· Pilothole, 1–2 × ø deep, recommended

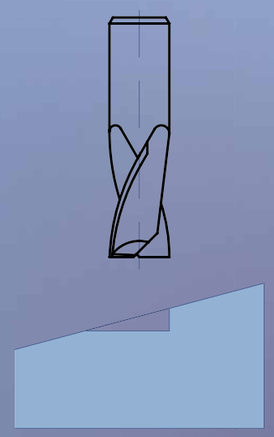
Zentrieren auf rauer / schräger Eintrittsfläche

Centering on a rough or inclined entering surface

Pilotbohrung / Pilothole



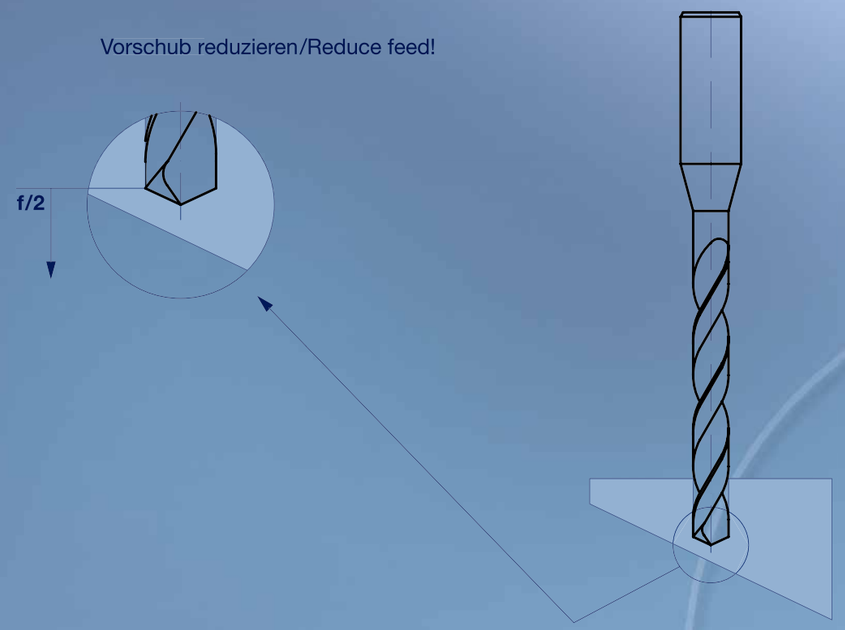
Fräsen einer Fläche /
Milling a flat



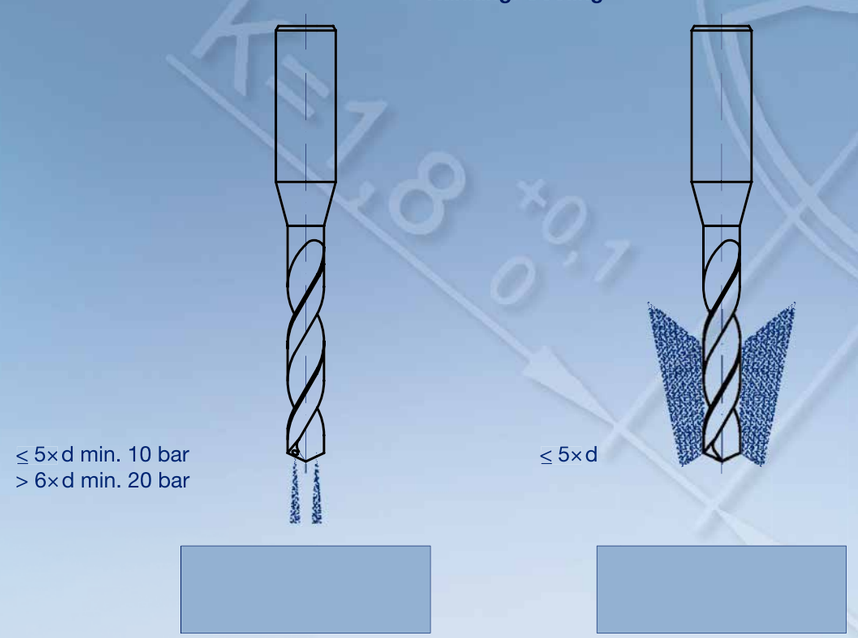
Bohreraustritt und Kühlung
Drill exit and cooling

Bohreraustritt in schräger Fläche/Drill exit in an inclined surface

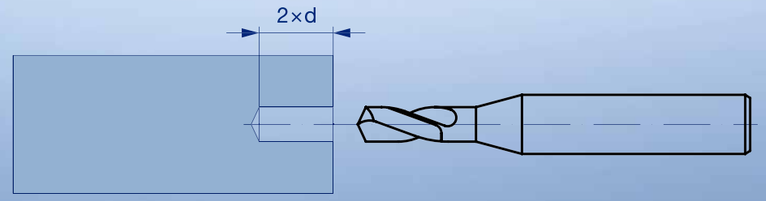
Vorschub reduzieren/Reduce feed!



Kühlung/Cooling



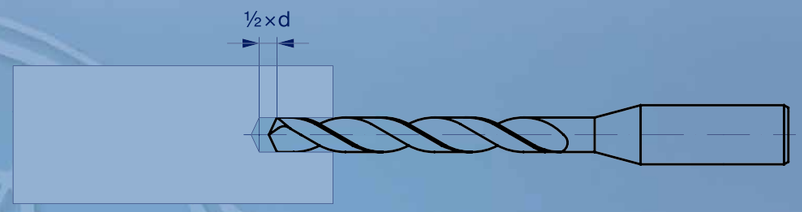
Bearbeitungsverfahren Tieflochbohren Schritt für Schritt
Machining process deep-hole drilling, step by step



< ø 3.00 mm Art. 56033
≥ ø 3.00 mm Art. 50950

1. Pilotloch bohren

1. Pilothole drilling



n = max. 500 min^{-1}
v_f = 25 %

2. Phoenix Bohrer bei langsamdrehender Spindel einführen.

2. Insert the Phoenix drill with reduced rpm into the pilothole.

v_f = 100%
v_c = 100%

3. Spindeldrehzahl auf Nennwert, Kühlmittel in Betrieb setzen, ohne entspänen auf gewünschte Tiefe bohren.

3. Increase the rpm to the nominal value and switch ON the coolant, drilling full depth without pecking cycle.

n = max. 500 min^{-1}
v_f = 25 %

4. Nach Erreichen der gewünschten Tiefe die Spindeldrehzahl reduzieren, Kühlmittel ausschalten und Bohrer herausziehen.

4. After reaching the required drilling depth, reduce the spindle speed, switch OFF the coolant and retract the drill.

Produkteübersicht
Gamme d'outils
Programma di fabbricazione
Product overview

Die Fertigungsstätten in Derendingen und Porrentruy, eine Referenz für «Made in Switzerland».
Les ateliers de fabrication à Derendingen et Porrentruy, une référence «Made in Switzerland».
Gli stabilimenti di produzione a Derendingen e Porrentruy, una referenza di «Made in Switzerland».
Production facilities in Derendingen and Porrentruy, a reference for «Made in Switzerland».

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