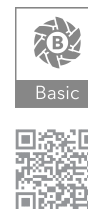
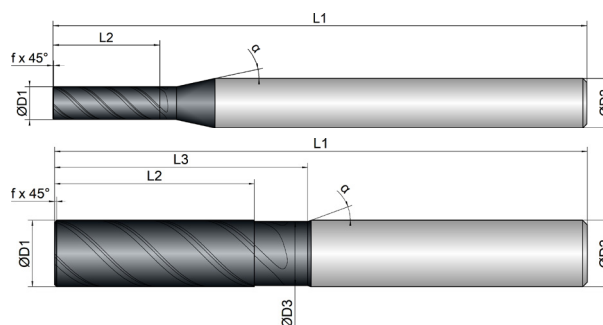
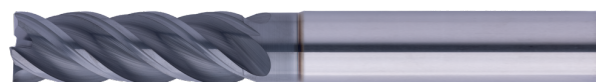
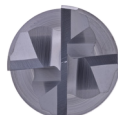


| | |
|--------------|--------------|
| Kühlung | |
| Toleranz | e8 |
| Beschichtung | BetaUni Iron |

| | | | | | |
|---------------|-----|-----|-----|--|-----|
| Strategie | ETC | HPC | UNI | | |
| Anwendung | | | | | |
| Eigenschaften | HA | ≠ | 3xD | | 45° |



- Angepasster Freiwinkel für eine prozesssichere Zerspanung
- Ungleichteilung für ruhigen Lauf
- Große Spannkammern für gute Abfuhr der Späne



Schuppen



Schichten



| BCU1-M01-0223 | D1 | D3 | L2 | L3 | L1 | D2 | z | 45° | | α |
|---------------|---------|---------|------|------|-------|---------|---|------|----|----------|
| | mm ∅ | mm ∅ | mm | mm | mm | mm ∅ | # | mm | ° | ° |
| 4 | 4,0 | 0,0 | 13,0 | 0,0 | 65,0 | 6,0 | 4 | 0,10 | 40 | 12 |
| 5 | 5,0 | 0,0 | 16,0 | 0,0 | 65,0 | 6,0 | 4 | 0,20 | 40 | 12 |
| 6 | 6,0 | 5,6 | 18,0 | 24,0 | 65,0 | 6,0 | 4 | 0,20 | 40 | 20 |
| 8 | 8,0 | 7,6 | 24,0 | 30,0 | 70,0 | 8,0 | 4 | 0,20 | 40 | 20 |
| 10 | 10,0 | 9,6 | 30,0 | 38,0 | 80,0 | 10,0 | 4 | 0,20 | 40 | 20 |
| 12 | 12,0 | 11,4 | 36,0 | 46,0 | 93,0 | 12,0 | 4 | 0,20 | 40 | 20 |
| 16 | 16,0 | 15,4 | 48,0 | 58,0 | 110,0 | 16,0 | 4 | 0,30 | 40 | 20 |
| 20 | 20,0 | 19,4 | 60,0 | 74,0 | 126,0 | 20,0 | 4 | 0,30 | 40 | 20 |



Download Catalog Pages (PDF)

| Material | Strength (N/mm ²) | Full Slot | Side Milling | Finishing | ETC | Materialgroup Factor fz / a | Materialgroup Factor ae ETC |
|------------------------------------|-------------------------------|------------|--------------|------------|------------|-----------------------------|-----------------------------|
| | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| P STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 unalloyed | <850 | 190 | 190 | 210 | 305 | 1 | 1 |
| 2.1-2.2 low alloyed | <950 | 180 | 180 | 200 | 222 | 0,9 | 0,8 |
| 3.1-3.2 high alloyed | <1100 | 160 | 160 | 180 | 188 | 0,8 | 0,7 |
| K CASTINGS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.2 grey cast iron | <1000 | 200 | 200 | 220 | 232 | 0,9 | 0,8 |
| M STAINLESS STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1 ferritic/martensitic | <850 | | 85 | 90 | 142 | 0,9 | 0,7 |
| 2.1 austenitic | <650 | | 75 | 80 | 122 | 0,8 | 0,5 |
| N NON-FERROUS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-2.3 ALUMINIUM alloyed/casted | <600 | 380 | 380 | 400 | 500 | 1,6 | 2 |
| 3.1-3.3 COPPER alloyed | <600 | 180 | 180 | 200 | 242 | 1,5 | 1,6 |
| T TITANIUM | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 2.1-2.2 pure/alloyed | <1000 | | 45 | 50 | 75 | 0,8 | 0,5 |
| S SUPER ALLOYS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 HRSA | <1450 | | 20 | 25 | 42 | 0,7 | 0,3 |








HINWEIS | Die in Türkis markierten Werte sind Nebenanwendungen!
 Alle fz/a Werte in der Tabelle für Materialgruppe 1.1, Faktoren für die anderen Gruppen beachten!
 Beim helikalen Eintauchen und Rampen fz 50 % der Vollnut verwenden.
 Die angegebenen Werte stellen Startwerte für eine solide Aufspannsituation dar.
 Zur Bestimmung der hmax Werte, bitte zur Verfügung gestellten Rechner verwenden.
 Bei Materialgruppe T und S wird der Einsatz von Kühlschmierstoff empfohlen!
 Bei größeren Schruppbearbeitungen und ETC empfehlen wir einen Weldon in Verbindung mit einem Flächenspannfutter.

Material P 1.1-1.3

| D1 | L2 | Immersion Angle | Full Slot | | | Side Milling | | | Finishing | | | ETC | | | |
|----|----|-----------------|-----------|---------------|---------------|--------------|-----------------|---------|-----------|---------|---------|-----------|---------|---------|-----------|
| | | | fz (mm/Z) | ae = 1xD (mm) | ap = 1xD (mm) | fz (mm/Z) | ae = 0,3xD (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | hmax (mm) |
| 4 | 13 | 0,5° | 0,012 | 4 | 4 | 0,018 | 1,2 | L2max | 0,015 | 0,2 | L2max | 0,04 | 0,48 | L2max | 0,026 |
| 5 | 16 | 0,5° | 0,022 | 5 | 5 | 0,028 | 1,5 | L2max | 0,02 | 0,2 | L2max | 0,05 | 0,6 | L2max | 0,0325 |
| 6 | 18 | 0,8° | 0,032 | 6 | 6 | 0,038 | 1,8 | L2max | 0,025 | 0,2 | L2max | 0,07 | 0,72 | L2max | 0,0455 |
| 8 | 24 | 1° | 0,042 | 8 | 8 | 0,052 | 2,4 | L2max | 0,03 | 0,2 | L2max | 0,09 | 0,96 | L2max | 0,0585 |
| 10 | 30 | 1,5° | 0,048 | 10 | 10 | 0,06 | 3 | L2max | 0,035 | 0,2 | L2max | 0,11 | 1,2 | L2max | 0,0715 |
| 12 | 36 | 2° | 0,052 | 12 | 12 | 0,07 | 3,6 | L2max | 0,04 | 0,2 | L2max | 0,12 | 1,44 | L2max | 0,078 |
| 16 | 48 | 2,5° | 0,06 | 16 | 16 | 0,08 | 4,8 | L2max | 0,045 | 0,2 | L2max | 0,14 | 1,92 | L2max | 0,091 |
| 20 | 60 | 3° | 0,075 | 20 | 20 | 0,09 | 6 | L2max | 0,05 | 0,2 | L2max | 0,16 | 2,4 | L2max | 0,104 |

LEGENDE


























ANWENDUNGEN

| | | | |
|--|--|---|---|
|  Abzeilen |  Besäumen |  Entgraten |  Gravieren |
|  Viertelkreisfräsen |  Vollnut |  Vorwärts-Rückwärtsentgraten | |






KÜHLUNGEN

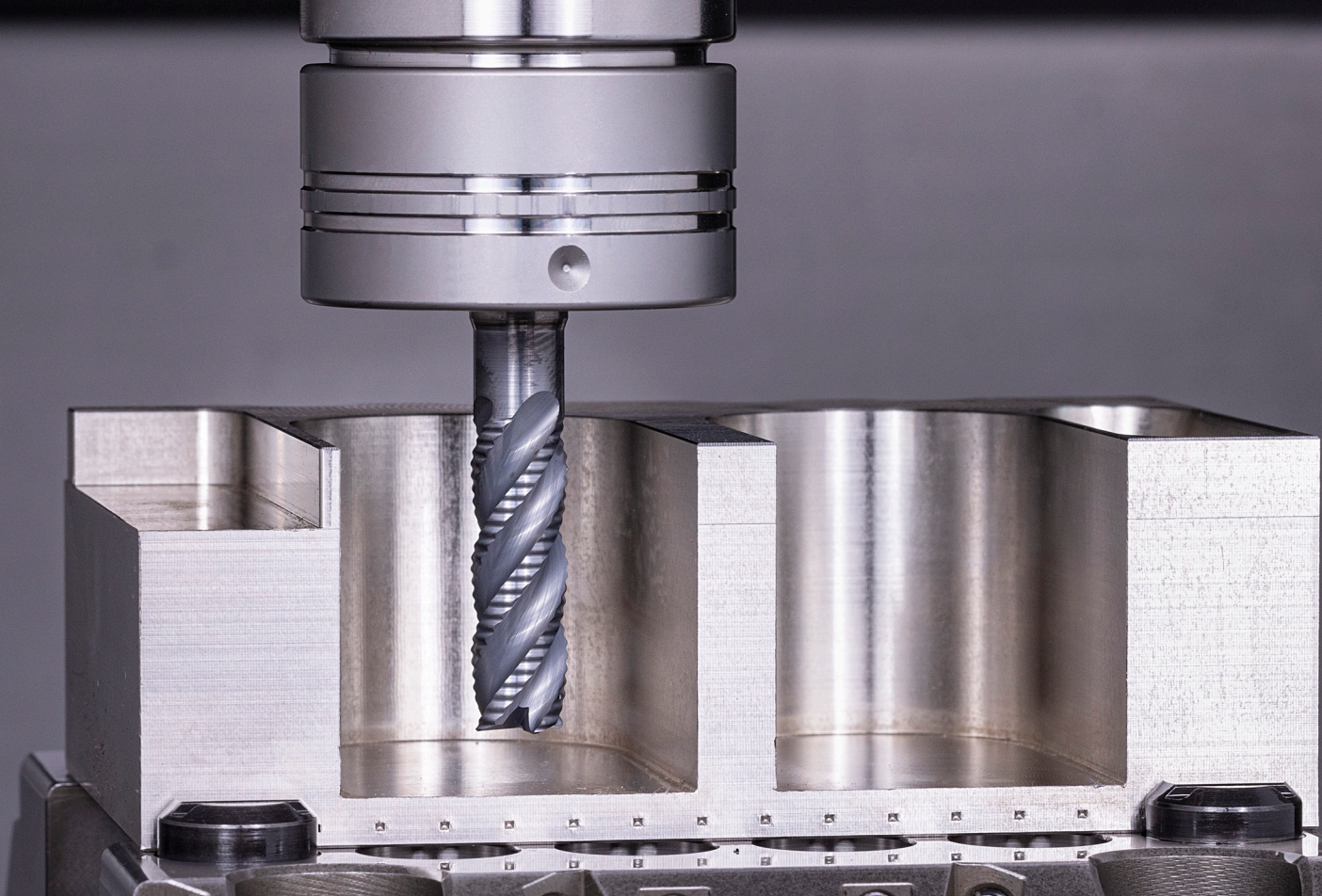
| | | | |
|---|---|--|--|
|  Luftgekühlt |  Trocken |  Öl |  Kühlschmierstoff (KSS) |
|  Minimalmengenschmierung (MMS) | | | |

EIGENSCHAFTEN

| | | | |
|---|---|--|---|
|  0,5xD |  1xD |  1,5xD |  2xD |
|  2,5xD |  3xD |  3,5xD |  4xD |
|  5xD |  Zentrumschneidend |  Nicht Zentrumschneidend |  Ohne Weldon |
|  Mit Weldon |  Kühlkanalsystem |  Dynamische Drallsteigung |  Spanbrecher |
|  Ungleiche Zahnteilung |  Wellenschliff |  Zustellung helikal |  Zustellrichtungen x,y |
|  Zustellrichtungen x, y, z |  Zustellrichtungen x, y, (z) |  Eckenradius |  Eckfase |
|  Scharfkantig | | | |

STRATEGIE

| | | | | | | | |
|---|-----------------------------|---|--------------------------|---|--------------------|---|--------------------|
|  ETC | Extended Trochoidal Cutting |  HPC | High Performance Cutting |  HSC | High Speed Cutting |  MTC | Multi Task Cutting |
|  UNI | Universal Machining | | | | | | |



EIGENSCHAFTEN

| | | | |
|--|--|---|--|
|  Schneidendurchmesser |  Kleiner Schneidendurchmesser |  Großer Schneidendurchmesser |  Freistichdurchmesser |
|  Schneidenlänge |  Gesamtfasenlänge |  Freistichlänge |  Gesamtlänge |
|  Schaftdurchmesser |  Schneidenanzahl |  Eckradius |  Eckfase |
|  Programmierradius |  Maximale Schnitttiefe |  Spiralwinkel |  Winkel Alpha |

ANWENDUNGSTABELLE

Bei den angegebenen Werten der Anwendungstabelle handelt es sich lediglich um Richtwerte. Diese sind stark abhängig von der individuellen Anwendungssituation.

ABBILDUNGEN

Alle abgebildeten technischen Zeichnungen und Fotografien sind beispielhaft. Abweichungen zum Originalprodukt bei Farbe und Abmessungen sind möglich.

P 1.1 STEEL | unalloyed <500 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|--------------|--------------|-------------|-------------|------------|
| 1.0254 | St37.0 | P235T1 | | | | | | STPG 38 | |
| 1.1120 | GS20Mn5 | | | | | | | SMnC 420 | |
| 1.1121 | Ck10 | 2 C.10 | XC 10 | 040 A 10 | C 10 | 1265 | C 10 k | S 10 C | 1010 |
| 1.1131 | GS15Mn5 | | | | | | | | |
| 1.8961 | WTS1373 | | | | Fe 360 D FF | | | SMA 50 A | |
| 1.0715 | 9SMn28 | 11 SMn 28 | S 250 | 230 M 07 | CF 9 SMn 28 | 1912 | 11 SMn 28 | SUM 22 | 1213 |
| 1.0718 | 9SMnPb28 | 11 SMnPb28 | S 250 Pb | | CF 9SMnPb 28 | 1914 | 11 SMnPb 28 | SUM 22 L | 12 L 13 |
| 1.0736 | 9SMn36 | | S300 | 240 M 07 | CF 9 SMn 36 | | 12 SMn 35 | SUM 25 | 1215 |

P 1.2 STEEL | unalloyed <700 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|--------------|
| 1.0116 | ST373 | | E 24-3 | 4360-40 C | Fe 37-3 | 1312 | A 360 C | | A 570 Gr. 36 |
| 1.0144 | ST443 | | E 28-3 | 4360-43 C | Fe 430 D FF | 1414 | AE 275-D | SM 41 B | A 573 Gr. 70 |
| 1.0401 | C15 | | CC12 | 080 M 15 | C 15 | 1350 | F.111 | S 15 C | 1015 |
| 1.0402 | C22 | 1 C.22 | CC 22 | 070 M 20 | C 22 | | C 22 k | SFVC 1 | |
| 1.0406 | C25 | 1 C.25 | CC 25 | 070 M 26 | C 25 | | C 25 k | S 22 C | 1025 |
| 1.0482 | 19Mn5 | | A 52 CP | 224-460 | | | | SG 37 | |
| 1.0486 | STE285 | | | | FE E 285 KG | | AE 285 KG | SM 41 A | |
| 1.0501 | C35 | 1 C.35 | CC 35 | 060 A 35 | C 35 | 1550 | F.113 | S 35 C | 1035 |
| 1.0503 | C45 | 1 C.45 | CC 45 | 080 M 46 | C 45 | 1650 | C 45 k | S 45 C | 1045 |
| 1.0528 | C30 | 1 C.30 | CC 32 | 080 M 30 | C30 | | | SUP 7 | 1030 |
| 1.0562 | STE355 | | E 355 R/FP | | Fe E 355 KG | 2132 | AE 355 KG | SM 50 YB | A 633 Gr. C |
| 1.0711 | 9S20 | | | 220 M 07 | CF 9 S 22 | | | G 11120 | 1212 |
| 1.1127 | 36Mn6 | | | 212 M 36 | | | | SMn 443 | 1141 |
| 1.1133 | 20Mn5 | | | 120 M 19 | G 22 Mn3 | | 20 Mn 6 | SMn 420 | 1022 |
| 1.5637 | 10Ni14 | | | 503 | 18 Ni 14 KT | | | | A 350-LF 5 |
| 1.8962 | 9CrNiCuP324 | | | WR 50 A | | | | SPA-H | |
| 1.0726 | 35S20 | 35 S 20 | 35 MF 4 | 212 M 36 | | 1957 | F.210G | | 1140 |
| 1.0760 | 38SMn28 | 38SMn28 | 38SMn28 | 38SMn28 | | | 38SMn28 | | |
| 1.5423 | 16Mo5 | | | 1503-245-420 | 16 Mo 5 | | 16 Mo 5 | SBC 690 | 4520 |

P 1.3 STEEL | unalloyed <850 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|---------------|----------------|--------------------|--------------|--------------|-------------|-------------|------------|
| 1.1525 | C80W1 | C 80 U | Y1 90 | | C 80 KU | 1880 | F.513 | | W 108 |
| 1.1545 | C105W1 | C 105 U | Y1 105 | BW 1A | C 100 KU | 1880 | F.515 | | W 110 |
| 1.1620 | C70W2 | C 70 U | | | | | | | |
| 1.1625 | C80W2 | | Y1 80 | BW 1B | C 80 KU | | C 80 | SKC 3 | W 1 |
| 1.1645 | C105W2 | | | | | | C 102 | SK 3 | |
| 1.1663 | C125W | C 120 U | Y2 120 | | C 120 KU | | C 120 | SK 2 | W 112 |
| 1.1673 | C135W | | Y2 140 | | C 140 KU | | | SK 1 | |
| 1.1740 | C60W | | Y3 55 | | | | | SK 7 | |
| 1.1830 | C85W | C 90 U | Y3 90 | | | | | SK 5 | 1084 |
| 1.1744 | C67W | | Y1 70 | | | | F.512 | | A-6 |
| 1.5406 | 17MoV84 | | | | | | | | |
| 1.5633 | 24Ni8 | G 9 Ni 10 | 22 N 8 | | G 9 Ni 10 | | | SCPL 21 | |
| 1.6311 | 20MnMoNi45 | 20 MnMoNi 4 5 | | | | | | SQV 2 B | |
| 1.7242 | 16CrMo4 | 18 CrMo 4 | 15 CD 3.5 | | 18 CrMo 4 | | 18 CrMo 4 | SCM 418 H | |
| 1.7350 | 22CrMo44 | | | | | | | | |
| 1.7362 | 12CrMo195 | X 12 CrMo 5 | Z 10 CD 5.05 | 3606-625 | 16 CrMo 20 5 | | | SCMV 6 | |
| 1.7709 | 21CrMoV57 | 21 CrMoV 5 7 | 20 CDV 5.07 | | | | | | |

P 2.1 STEEL | low alloyed <750 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|--------------|----------------|--------------------|---------------|--------------|-------------|-------------|------------|
| 1.0961 | 60SiCr7 | 60 SiCr 8 | 60 SC 7 | 250 A 61 | 60 SiCr 8 | | 60 SiCr 8 | SUP 7 | 9262 |
| 1.2162 | 21MnCr5 | 21 MnCr 5 | 20 NC 5 | | | | | SCR 420 H | |
| 1.2210 | 115CrV3 | 107 CrV 3 KU | 100 C 3 | | 107 CrV 3 KU | | F.520.L | | L2 |
| 1.2235 | 80CrV2 | | | | | | F.520.J | | |
| 1.2241 | 51CrV4 | 51 CRMnV 4 | | | 51 CrMnV 4 KU | | | | S6 |
| 1.2382 | GX155CrVMo121 | | | | | | | | |
| 1.2542 | 45WCrV7 | 45 WCrV 8 | | BS 1 | 45 WCrV 8 KU | 2710 | 45 WCrSi 8 | | S1 |
| 1.2552 | 80WCrV8 | | | | | | 60 WCrSi 8 | | |
| 1.2842 | 90MnCrV8 | 90 MnV 8 | 90 MV 8 | BO 2 | 90 MnVCr 8 KU | | | | 0 2 |
| 1.7003 | 38Cr2 | 38 Cr 2 KD | 38 C 2 | 120 M 36 | 38 Cr 3 | | 38 Cr 3 | SMn 438 | 50 B40 |
| 1.7131 | 16MnCr5 | 16 MnCr 5 KD | 16 MC 5 | 527 M 17 | 16 MnCr 5 | 2173 | 16 MnCr 5 | SCR 415 | 5115 |
| 1.7715 | 14MoV63 | 14 MoV 6-3 | | 1503-660-440 | | | 13 MoCrV 6 | | |

P 2.2 STEEL | low alloyed <950 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|---------------|--------------|-------------|-------------|------------|
| 1.0902 | 46Si7 | | 45 S7 | | | | 46 Si 7 | | |
| 1.1157 | 40Mn4 | | 35 M 5 | 150 M 36 | | | | | 1039 |
| 1.1167 | 36Mn5 | | 40 M 5 | 150 M 36 | | 2120 | 36 Mn 5 | | 1335 |
| 1.1170 | 28Mn6 | 28 Mn 6 | 35 M 5 | 150 M 17 | C 28 Mn | | 36 Mn 6 | SCMn 1 | 1330 |
| 1.1199 | 49MnVS3 | | | 280 M 01 | | | | | |
| 1.2002 | 125Cr1 | | Y2 120 C | | | | | | |
| 1.2003 | 75Cr1 | | 35 M 5 | 150 M 36 | | | | | |
| 1.2004 | 85Cr1 | | Y1 100 C 2 | | | | | | |
| 1.2008 | 140Cr3 | | Y2 140 C | | | | | SKS 8 | |
| 1.2108 | 90CrSi5 | P 280 GH | | | C 100 KU | 2092 | | SFVC 2A | |
| 1.2127 | 105MnCr4 | | | | 100 CrMn 4 KU | | | SUJ 3 | |
| 1.2303 | 100CrMo5 | | | | | | F.520.F | | L 7 |
| 1.2312 | 40CrMnMoS86 | | 40 CMD 8 | | | | | | |
| 1.2519 | 110WCrV5 | | | | | | 102 WCrV 5 | | |
| 1.3501 | 100Cr2 | | 100 C 2 | | | | | | E 50100 |
| 1.3505 | 100Cr6 | 100 Cr 6 | 100 C 6 | 535 A 99 | 100 Cr 6 | 2258 | 100 Cr 6 | SUJ 2 | E52100 |
| 1.3520 | 100CrMn6 | 100 Cr Mn 6 | 100 CM 6 | | | | 100 CrMn 6 | | |

P 3.1 STEEL | high alloyed <800 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-----------------|----------------|--------------------|---------------------|--------------|---------------|-------------|------------|
| 1.2363 | X100CrMoV51 | X 100 CrMoV 5 1 | Z 100 CDV 5 | BA 2 | X 100 CrMoV 5 1 KU | 2260 | X 100 CrMoV 5 | SKD 12 | A 2 |
| 1.2367 | X38CrMoV53 | | Z 38 CDV 5 3 | | | | | | |
| 1.2379 | X155CrVMo121 | X 153 CrMoV 12 | Z 160 CDV 12 | BD 2 | X 155 CrVMo 12 1 KU | 2310 | | SKD 11 | D 2 |
| 1.2453 | X130W5 | | | | | | | | |
| 1.2564 | X30WCrV41 | 30 WCrV 15 1 | | | | | F.527 | | |
| 1.2567 | X30WCrV53 | X 30 WCrV 5 3 | Z 32 WCV 5 | | X 30 WCrV 5 3 KU | | | SKD 4 | |
| 1.2606 | X37CrMoW51 | | Z 35 CWDV 5 | BH 12 | X 35 CrMoW 05 KU | | F.537 | SKD 62 | H 12 |

P 3.2 STEEL | high alloyed <1100 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|----------------|----------------|--------------------|--------------------------|--------------|----------------|-------------|------------|
| 1.2083 | X42Cr13 | X 42 Cr 13 | Z 40 C 14 | | X 41 Cr 13 KU | 2314 | | SUS 420 J2 | 420 |
| 1.2316 | X36CrMo17 | X 36 CrMo 17 | X38CrMo 16 1 | | X 38 CrMo 16 1 KU | | X 38 CrMo 16 | | D-4 |
| 1.2343 | X38CrMoVH1 | X 38 CrMoV 5 1 | Z 38 CDV 5 | BH 11 | X 37 CrMoV 5 1 KU | | X 37 CrMoV 5 | SKD 6 | H 11 |
| 1.2344 | X40CrMoV51 | X 40 CrMoV 5 1 | Z 40 CDV 5 | BH 13 | X 40 CrMoV 5 1 1 KU 2242 | | X 40 CrMoV 5 | SKD 61 | H 13 |
| 1.2436 | X210CrW12 | X 210 CrW 12 | Z 210 CW1 2 | | X 215 CrW 12 1 KU | 2312 | X 210 CrW 12 | SKD 2 | |
| 1.2581 | X30WCrV93 | X 30 WCrV 9 3 | Z 30 WCV 9 | BH 21 | X 30 WCrV 9 3 KU | | X 30 WCrV 9 | SKD 5 | H 21 |
| 1.2601 | X165CrMoV12 | X 165 CrMoV 12 | | | X 165 CrMoW 12 KU | 2310 | X 160 CrMoV 12 | | |
| 1.2767 | X45NiCrMo4 | 40 NiCrMo 4 | Y 35 NCD 16 | | 42 NiCrMo 15 7 KU | | | | A 9 |
| 1.2779 | X6NiCrTi2615 | | | S 66286 | | | | | 660 |
| 1.3302 | S1214 | HS 12 1 4 | | | X 150 WV 1305 KU | | | | A 7 |
| 1.3318 | S1212 | HS 02.01.12 | | | | | | | |
| 1.3401 | X120Mn12 | X 120 Mn 12 | Z 120 M 12 | BW 10 | X G 120 Mn 12 | 2183 | AM-X 120 Mn 12 | SCMnH 1 | A 128 |
| 1.3543 | X102CrMo17 | X 102 CrMo 17 | X100CrMo17 | | X 105 CrMo 17 | | X 100 CrMo 17 | | |
| 1.3549 | X89CrMoV81 | | | | | | | | |
| 1.3551 | 80MoCrV4216 | | 80 DCV 40 | T 11350 | X 80 MoCrV 4 4 | | 80 MoCrV 40-16 | | M 50 |
| 1.7225 | 42CrMo4.M45 | 42 CrMo 4 | 42 CD 4 | 708 A 42 | 42 CrMo 4 | 2244 | | SCM 440 H | 4140 |

K 1.1 GREY CAST IRON <600 N/mm² (180 HB)

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 0.6010 | GG10 | GJL-100 | FGL 100 | Grade 100 | G 10 | 0110-00 | FG 10 | FC 100 | A48-20 B |
| 0.6012 | GG150 HB | GJL-HB 170 | | | | | | | |
| 0.6015 | GG15 | GJL-150 | FGL 150 | Grade 150 | G 15 | 0115-00 | FG 15 | FC 150 | A48-25 B |
| 0.6017 | GG170 HB | GJL-HB 205 | | | | | | | |

K 1.2 GREY CAST IRON <1000 N/mm² (300 HB)

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 0.6020 | GG20 | GJL-200 | FGL 200 | Grade 220 | G 20 | 0120-00 | FG 20 | FC 200 | A48-30 B |
| 0.6022 | GG190 HB | GJL-HB 230 | | | | | | | |
| 0.6025 | GG25 | GJL-250 | FGL 250 | Grade 260 | G 25 | 0125-00 | FG 25 | FC 250 | A48-40 B |
| 0.6027 | GG220 HB | GJL-HB 250 | FGL 250 | | | | | | |
| 0.6030 | GG30 | GJL-300 | FGL 300 | Grade 300 | G 30 | 0130-00 | FG 30 | FC 300 | A48-45 B |
| 0.6032 | GG240 HB | GJL-HB 275 | | | | | | | |
| 0.6035 | GG35 | GJL-350 | FGL 350 | Grade 350 | G 35 | 0135-00 | FG 35 | FC 350 | A48-50 B |
| 0.6037 | GG260 HB | GJL-HB 275 | | | | | | | |
| 0.6040 | GG40 | GJL-400 | FGL 400 | Grade 400 | | 0140-00 | | | A48-60 B |

M 1.1 STAINLESS STEEL FERRITIC/MARTENSITIC <850 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|--------------------|--------------------|--------------------|--------------------|--------------|------------------|-------------|------------|
| 1.4000 | X6Cr13 | X 6 Cr 13 | Z 6 C 13 | 403 S 17 | X 6 Cr 13 | 2301 | X 6 Cr 13 | SUS 403 | 403 |
| 1.4002 | X6CrAl13 | X 6 CrAl 13 | Z 6 CA 13 | 405 S 17 | X 6 CrAl 13 | 2302 | X 6 CrAl 13 | SUS 405 | 405 |
| 1.4005 | X12CrS13 | X 12 CrS 13 | Z 12 CF 13 | 416 S 21 | X 12 CrS 13 | 2380 | X12 CrS 13 | SUS 416 | 416 |
| 1.4006 | X10Cr13 | X 12 Cr 13 KD | Z 12 C 13 | 410 S 21 | X 12 Cr 13 | 2302 | X 12 Cr 13 | SUS 410 | 410 |
| 1.4008 | GX8CrNi13 | GX 7 CrNiMo 12 1 | Z 12 CN 13 M | 410 C 21 | GX 12 Cr 13 | | | SCS 1 | 414 |
| 1.4016 | X6Cr17 | X 8 Cr 17 | Z 8 C 17 | 430 S 15 | X 8 Cr 17 KD | 2320 | X 8 Cr 17 | SUS 430 | 430 |
| 1.4021 | X20Cr13 | X 20 Cr 13 | Z 20 C 13 | 420 S 37 | X 20 Cr 13 | 2303 | X 20 Cr 13 | SUS 420 J1 | 420 |
| 1.4024 | X15Cr13 | X 15 Cr 13 | Z 12 C 13 M | 420 S 29 | X 12 Cr 13 | | | SUS 410 J1 | |
| 1.4027 | GX20Cr14 | | Z 20 C 13 M | 420 C 29 | | | | SCS 2 | |
| 1.4028 | X30Cr13 | X 30 Cr 13 | Z 30 Cr 13 | 420 S 45 | X 30 Cr 13 | 2304 | X 30 Cr 13 | SUS 420 J2 | 420 |
| 1.4034 | X45Cr13 | X 45 Cr 13 | Z 40 C 14 | 420 S 45 | X 40 Cr 14 | | X 46 Cr 13 | | 420 |
| 1.4057 | X19CrNi172 | X 19 CrNi 17 2 | Z 15 CN 16.02 | 431 S 29 | X 16 CrNi 16 | 2321 | X 15 CrNi 16 | SUS 431 | 431 |
| 1.4104 | X12CrMoS17 | X 14 CrMoS 17 | Z 10 CF 17 | 441 S 29 | X 10 CrS 17 | 2383 | X 10 CrS 17 | SUS 430 F | 430 F |
| 1.4105 | X4CrMoS18 | X 6 CrMoS 17 | Z 6 CDF 18-02 | | | | | SUS 430 F | 430 |
| 1.4107 | GX8CrNi12 | GX 8 CrNi 12 | GX 8 CrNi 12 | | GX 8 CrNi 12 | | | | |
| 1.4109 | X65CrMo14 | X 70 CrMo 15 | Z 70 CD 14 | | | | | SUS 440 A | 440 A |
| 1.4110 | X55CrMo14 | | Z 50 CD 13 | | | | | | |
| 1.4112 | X90CrMoV18 | X 90 CrMoV 18 | Z 3 CT 1 2 | 409 S 1 9 | X 6 Cr Ti 1 2 | | | SUS 440 B | 440 B |
| 1.4113 | X6CrMo171 | X 8 CrMo 17 | Z 8 CD 17.02 | 434 S 17 | X 8 CrMo 17 | 2325 | | SUS 434 | 434 |
| 1.4116 | X45CrMoV15 | X 50 CrMoV 15 | Z 50 CD 15 | | X50 CrMoV 15 | | X 46 CrMo 16 | | |
| 1.4122 | X35CrMo17 | X 39 CrMo 17 1 | X39CrMo17-1 | | X 35 CrMo 17 | | | | |
| 1.4125 | X105CrMo17 | X 105 CrMo 17 | Z 100 CD 17 | | X 105 CrMo 17 | | | SUS 440 C | 440 C |
| 1.4136 | GX70CrMo292 | | Z 60 CD 29.2 M | | | | | | |
| 1.4313 | X5CrNi134 | X 3 CrNiMo 13 4 | Z 4 CDN 13.4 | 425 C 11 | X 3 CrNiMo 13 4 | 2385 | | SCS 5 | CA 6-NM |
| 1.4317 | GX4CrNi134 | GX 4 CrNi 13 4 | GX 4 CrNi 13 4 | | GX 4 CrNi 13 4 | | | | |
| 1.4351 | X3CrNi134 | X 3 CrNi 14 04 KE | | | | | | | |
| 1.4405 | GX5CrNiMo165 | GX 4 CrNiMo 16 5 1 | GX 4 CrNiMo 16 5 1 | | GX 4 CrNiMo 16 5 1 | | | | |
| 1.4510 | X6CrTi17 | X 8 CrTi 17 | Z 8 CT 17 | | X 6 CrTi 17 | | X 8 CrTi 17 | SUS 430 LX | 430 Ti |
| 1.4511 | X6CrNb17 | X 3 CrNb 17 | Z 8 CNb 17 | | X 6 CrNb 17 | | | SUS 430 LX | 430 Nb |
| 1.4512 | X6CrTi12 | X 5 CrTi 12 | Z 6 CT 12 | 409 S 19 | X 6 CrTi12 | | | SUH 409 | 409 |
| 1.4523 | X8CrMoTi17 | X 2 CrMoTiS 18 2 | X 2 CrMoTiS 18 2 | | | | | | |
| 1.4704 | X45SiCr4 | 45SiCr16-11 | | | | | | | HNV 2 |
| 1.4718 | X45CrSi93 | X 45 CrSi 8 | Z 45 CS 9 | 401 S 45 | X 45 CrSi 8 | | F.3220 | SUH 1 | HNV 3 |
| 1.4722 | X10CrSi13 | | | | | | X 10 CrSi 13 | | |
| 1.4724 | X10CrAl13 | X 10 CrAl 13 | Z 10 C 13 | BH 12 | X 10 CrAl 12 | | X 10 CrAl 13 | SUS 405 | H-12 |
| 1.4725 | X8CrAl144 | CrAl 14 4 | K 91670 | | | | | | |
| 1.4747 | X80CrNiSi20 | X 80 CrNiSi 20 | Z 80 CSN 20.02 | 433 S 65 | X 80 CrSiNi 20 | | X 80 CrSiNi20-02 | SUH 4 | HNV 6 |
| 1.4762 | X10CrAl24 | X 10 CrAl 24 | Z 10 CAS 24 | | X 16 Cr 26 | 2322 | X 10 CrAl 24 | SUH 442 | 446 |
| 1.4767 | X8CrAl205 | CrAl 20 5 | | | | | | | |

M 2.1 STAINLESS STEEL | austenitic <650 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|------------------|------------------------|---------------------|--------------------|---------------------|--------------|---------------------|-------------|------------|
| 1.4300 | X12CrNi188 | | | 302 | | | | | |
| 1.4301 | X5CrNi1810 | X 6 CrNi 18 10 KD | Z 6 CN 18.09 | 304 S 15 | X 5 CrNi 18 10 | 2332 | X 5 CrNi 18 11 | SUS 304 | 304 H |
| 1.4302 | X5CrNi199 | X 6 CrNi 20 10 KE | | 308 S 96 | | | | | |
| 1.4303 | X5CrNi1812 | X 8 CrNi 18 12 KD | Z 8 CN 17.07 | 305 S 19 | X 8 CrNi 19 10 | | X 8 CrNi 18 12 | SUS 305 | 308 |
| 1.4305 | X10CrNiS189 | X 8 CrNiS 19 9 | Z 8 CNF 18.09 | 303 S 31 | X 8 CrNiS 18 9 | 2346 | F.310.C | SUS 303 | 303 |
| 1.4307 | X2CrNi189 | X 2 CrNi 18 9 | CLC 18.9.L | 304 S 11 | X 2 CrNi 18 9 | | | SUS 304 L | 304 L |
| 1.4308 | GX6CrNi189 | X 2 CrNi 18 7 | Z 6 CN 18.10 M | 304 C 15 | GX 5 CrNi 19 10 | 2333 | | SCS 13 | CF-8 |
| 1.4310 | X12CrNi177 | X 12 CrNi 17 7 | Z 12 CN 17.07 | 301 S 21 | X 12 CrNi 17 07 | | X 12 CrNi 17 07 | SUS 301 | 301 |
| 1.4311 | X2CrNiN1810 | X 2 CrNiN 18 10 | Z 8 CN 18.12 | 304 S 62 | X 8 CrNi 19 10 | 2371 | X 8 CrNi 18 12 | SUS 304 LN | 304 LN |
| 1.4312 | GX10CrNi188 | | Z 10 CN 18.9 M | 302 C 25 | | | | SCS 12 | |
| 1.4318 | X 2 CrNiN 18 7 | X 2 CrNiN 18 7 | 18-7L | | 18-7L | | | | |
| 1.4319 | X3CrNiN178 | | | 302 S 26 | X 10 CrNi 18 09 | | | SUS 302 | |
| 1.4350 | X5CrNi189 | | Z 6 CN 18.09 | 304 S 31 | X 5 CrNi 18 10 | | | | 304 |
| 1.4401 | X5CrNiMo17122 | X 6 CrNiMo 17 12 2 KD | Z 6 CND 17.11 | 316 S 16 | X 5 CrNiMo 17 12 | 2347 | X 5 CrNiMo 17 12 | SUS 316 | 316 |
| 1.4404 | X2CrNiMo17132 | GX 3 CrNiMo 17 12 2 KD | Z 3 CND 19.10 M | 316 S 12 | GX 2 CrNiMo 19 11 | 2348 | X 2 CrNiMo | SUS 316 L | 316 L |
| 1.4406 | X2CrNiMoN17122 | X 3 CrNiMoN 17 12 2 | Z 2 CND 17.12 Az | 316 S 61 | X 2 CrNiMoN 17 12 | | | SUS 316 LN | 316 LN |
| 1.4407 | GX 5 CrNiMo 13 4 | GX 5 CrNiMo 13 4 | J 91550 | | | | | | A757 |
| 1.4408 | GX6CrNiMo1810 | GX 5 CrNiMo 19 11 2 | GX 5 CrNiMo 19 11 2 | 316 C 16 | GX 5 CrNiMo 19 11 2 | 2343 | X 7 CrNiMo 20 10 | SCS 14 | CF-8M |
| 1.4435 | X2CrNiMo18143 | X 2 CrNiMo 18 16 | Z 2 CDN 17.13 | 316 S 11 | X 2 CrNiMo 17 13 | 2353 | | SVS 16 | 316 L |
| 1.4436 | X5CrNiMo17133 | X 6 CrNiMo 18 13 3 KD | Z 6 CND 17.12 | 316 S 16 | X 5 CrNiMo 17 13 | 2343 | X 6 CrNiMo 17 12 03 | SUS 316 | 316 |
| 1.4438 | X2CrNiMo18164 | X 3 CrNiMo 18 16 4 | Z 2 CND 19.15 | 317 S 12 | X 2 CrNiMo 18 15 | 2367 | | SUS 317 L | 317 L |
| 1.4440 | X2CrNiMo18165 | | | | | | | | |
| 1.4442 | X2CrNiMo18154 | | X 3 CrNiMoN 18 14 | | | | | | |

N 1.1 ALUMINIUM | alloyed <500 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------------|--------------|-------------|-------------|------------|
| 3.1255 | AlCu 4 SiMg | AW-2014 | A-U4SG | H 15 | P-AlCu 4.4 SiMnMg | | L-3130 | A2014 | AA2014 |
| 3.1305 | AlCu 2.5 Mg | AW-2117 | A-U2G | L 86 | P-AlCu 2.5 MgSi | | L-3180 | A2117 | AA2117 |
| 3.1324 | AlCu 4 MgSi | AW-2017 A | | | | | | | |
| 3.1325 | AlCuMg1 | AW-2017 A | A-U4G | H 14 | P-AlCu 4.5 MgMn | GA631 | L-3120 | A2017 | AA2017 A |
| 3.1355 | AlCuMg2 | AW-2024 | A-U4G1 | L 97 / L 98 | P-AlCu 4.5 MgMn | 5 | L-3140 | A2024 | AA2024 |
| 3.2315 | AlMgSi 1 | AW-6082 | A-SGM0,7 | H 30 | P-AlMgSi | 4212 | L-3453 | | AA6082 |
| 3.3206 | AlMgSi 0.5 | AW-6060 | A-GS | H 9 | P-AlMgSi | 4140 | L-3442 | | AA6060 |
| 3.3208 | Al99.9 MgSi | AW-6401 | | | | | | | |
| 3.3210 | AlMgSi 0.7 | AW-6005 A | | | | | | | |
| 3.3211 | AlMg 1 SiCu | AW-6061 | A-GSUC | H 20 | P-AlMg 1 SiCu | | L-3420 | A6061 | AA6061 |
| 3.3315 | AlMg1 | AW-5005 A | A-G0,6 | N 41 | P-AlMg 0.9 | 4106 | L-3350 | A5005 | AA5005 A |
| 3.3316 | AlMg 1.5 | AW-5050 | A-G1,5 | 3L 44 | P-AlMg 1.5 | | L-3380 | | AA5050 B |
| 3.3317 | Al99.85 Mg 1 | AW-5305 | | | | | | | |
| 3.3318 | Al99.9 Mg 1 | AW-5505 | | | | | | | |
| 3.3326 | AlMg 1.8 | AW-5051 A | | | | | | | |
| 3.3345 | AlMg 4.5 | AW-5082 | A-G4,5 | | P-AlMg 4.4 | | | A5082 | AA5082 |
| 3.3523 | AlMg 2.5 | AW-5052 | A-G2,5C | L 80 / L 81 | P-AlMg 2.5 | 4120 | L-3360 | A5052 | AA5052 |
| 3.3525 | AlMg 2 Mn 0.3 | AW-5251 | A-G2M | N4 | P-AlMg 2 Mn | | L-3361 | | AA5251 |
| 3.3527 | AlMg 2 Mn 0.8 | AW-5049 | A-G2,5MC | | | | | A5049 | AA5049 |
| 3.3535 | AlMg 3 | AW-5754 | A-G3M | | P-AlMg 3.5 | 4130 | L-3390 | | AA5754 |
| 3.3537 | AlMg 2.7 Mn | AW-5454 | A-G2,5MC | | P-AlMg 2.7 Mn | 4130 | L-3391 | | AA5454 |
| 3.3541 | G-AlMg 3 | AC-51100 | | | | | | | |
| 3.3545 | AlMg 4 Mn | AW-5086 | A-G4MC | | P-AlMg 4.4 | | L-3382 | | AA5086 |
| 3.3547 | AlMg 4 Mn | AW-5086 | A-G4MC | N8 | P-AlMg 4.5 | 4140 | L-3321 | A5083 | AA5083 |

N 1.2 ALUMINIUM | alloyed <600 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-----------------|--------------|-------------|-------------|------------|
| 3.0615 | AlMgSiPb | AW-6012 | A-SGPb | | P-AlSiMgMn | | L-3452 | | AA6012 |
| 3.1645 | AlCu 4 PbMgMn | AW-2007 | | | | 4355 | L-3121 | A2007 | AA2007 |
| 3.1655 | AlCu 6 BiPb | AW-2011 | A-U5PbBi | FC 1 | P-AlCu 5.5 PbBi | 4338 | L-3192 | A2011 | AA2011 |
| 3.4335 | AlZn 4.5 Mg 1 | AW-7020 | A-Z5G | H 17 | | 4425 | L-3741 | | AA7020 |
| 3.4345 | AlZnMgCu 0.5 | AW-7022 | A-Z4GU | | | | | | AA7022 |
| 3.4365 | AlZnMgCu 1.5 | AW-7075 | A-Z5GU | 2L 95 | P-AlZn 5.8 MgCu | | L-3710 | A7075 | AA7075 |

N 2.1 - 2.3 ALUMINIUM | casted <600 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 3.2151 | G-AlSi 6 Cu 4 | AC-45000 | A-S5UZ | LM 4 | | | | AC4B | A 319.0 |
| 3.2161 | G-AlSi 8 Cu 3 | AC-46200 | A-S9U3A-Y4 | LM 24 | 5075 | | | AC4D | A 328.0 |
| 3.2371 | G-AlSi 7 Mg 0,3 | AC-42100 | | | | | | AC4CH | A 356.0 |
| 3.2373 | G-AlSi 9 Mg | AC-43300 | | | | | | | |
| 3.2381 | G-AlSi 10 Mg | AC-43100 | | | | | | | |
| 3.2383 | G-AlSi 10 Mg(Cu) | AC-43400 | A-S10G | LM 9 | 3049 | 4253 | | ADC3 | A 360.2 |
| 3.2581 | G-AlSi 12 | AC-47100 | A-S13 | LM 6 | 4514 | 4261 | | AC3A | A 413.2 |
| 3.2583 | G-AlSi 12 Cu | AC-44300 | A-S12-Y4 | LM 20 | 5079 | 4260 | | ADC1 | A 413.1 |

N 3.1 - 3.3 COPPER | alloyed <600 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|-------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 2.0240 | CuZn 15 | CW-502L | CuZn 15 | CZ 102 | | | | C 2300 | C 23000 |
| 2.0265 | CuZn 30 | CW-505L | CuZn 30 | CZ 102 | | | | C 2600 | C 26000 |
| 2.0321 | CuZn 37 | CW-508L | CuZn 37 | CZ 180 | C 2720 | | | | C 27200 |
| 2.0492 | G-CuZn 15 Si 4 | CC-761S-GS | | | | | | | B-198 |
| 2.0592 | G-CuZn 35 Al 1 | CC-765S | U-Z 36 N 3 | HTB 1 | | | | | C 86500 |
| 2.0966 | CuAl 10 Ni 5 Fe 4 | CW-307G | U-A 10 N | CA 104 | | | | | C 63000 |
| 2.1006 | SG-CuSn | | | | | | | | |
| 2.1050 | G-CuSn 10 | CC-480K-GS | | CT 1 | | | | | C 90700 |
| 2.1052 | G-CuSn 12 | CC-483K-GS | UE 12 P | Pb 2 | | | | | C 91700 |
| 2.1060 | G-CuSn 12 Ni 2 | CC-484K-GS | | | | | | | C 91700 |
| 2.1176 | G-CuPb 10 Sn | CC-495K-GS | UE 10 Pb 10 | LB 2 | | | | | C 93700 |
| 2.1182 | G-CuPb 15 Sn | CC-496K-GS | U-Pb 15 E 8 | LB 1 | | | | | C 93800 |
| 2.1188 | G-CuPb 20 Sn | CC-497K-GS | U-Pb 20 | LB 5 | | | | | C 94100 |
| 2.1266 | CuCd 1 | | | | | | | | |
| 2.1292 | G-CuCrF 35 | CC-140C | | CC1-FF | | | | | C 81500 |
| 2.1293 | CuCrZr | CW-106C | U-Cr 0.8 Zr | CC 102 | | | | | C 81500 |

S 2.1 TITANIUM | commercially pure <600 N/mm²

| Material-number | Tradename | Germany DIN | Europe EN | France AFNOR | GB BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|-----------------|-----------|---------------|---------------|----------------|----------|-------------|--------------|-------------|-------------|------------|
| 3.7025 | | Ti 99,8 | Titan Grade 1 | AIR:9182T35 | 2 TA 1 | | | | | R 50250 |
| 3.7035 | | Ti 99,7 | Titan Grade 2 | AIR:9182T40 | 2 TA 2-1 | | | | | R 50400 |
| 3.7055 | | Ti-99,6 | Titan Grade 3 | AIR:9182T50 | TA 3 | | | | | R 50550 |
| 3.7065 | | Ti-99,5 | Titan Grade 4 | AIR:9182T60 | 2 TA 6-9 | | | | | R 50700 |

S 2.2 TITANIUM | alloyed <1000 N/mm²

| Material-number | Tradename | Germany DIN | Europe EN | France AFNOR | GB BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|-----------------|-----------|-----------------|----------------|----------------|----------|-------------|--------------|-------------|-------------|----------------|
| 3.7105 | | TiNi 0,8 Mo 0,3 | Titan Grade 12 | | | | | | | |
| 3.7115 | | TiAl 5 Sn 2,5 | Titan Grade 6 | T-A 5 E | | | | | | Ti 5 Al-2,5 Sn |
| 3.7195 | | TiAl 3 V 2,5 | Titan Grade 9 | | | | | | | |
| 3.7225 | | Ti 1 Pd | Titan Grade 11 | | TP 1 | | | | | R 52250 |
| 3.7235 | | Ti 2 Pd | Titan Grade 7 | | | | | | | T 52400 |
| 3.7164 | | TiAl 6 V 4-LN | Titan Grade 5 | | | | | | | R 56400 |
| 3.7165 | | TiAl 6 V4 | Titan Grade 5 | T-A 6 V | TA 10-13 | | | | | |

S 1.1 IRON-BASED ALLOY [HRSA] <1200 N/mm²

| Material-number | Tradename | Germany DIN | Europe EN | France AFNOR | GB BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|-----------------|---------------------|--------------------|------------------------|-----------------------|----------|-----------------------|--------------|-------------|-------------|------------|
| 1.3910 | Magnifer® 36 | Ni36 | D 1 | | | | | | | |
| 1.3926 | Magnifer® 50 | RNi12 | | | | | | | | |
| 1.4361 | X1CrNiSi1815 | X 1 CrNiSi 18-15-4 | X 1 CrNiSi 18 15 4 | | | | | | | |
| 1.4562 | Nicrofer® 3127 | X1NiCrMoCu32287 | X 1 NiCrMoCu 32 28 7 | | | | | | | |
| 1.4562 | Alloy 31 | X1NiCrMoCu32287 | X 1 NiCrMoCu 32 28 7 | | | | | | | |
| 1.4563 | Sanicro® 28 | X1NiCrMoCuN31274 | X 1 NiCrMoCuN 31-27-4 | X 1 NiCrMoCuN 31 27 4 | | X 1 NiCrMoCuN 31 27 4 | 2584 | | | |
| 1.4862 | INCOLOY® Alloy DS | X12NiCr3618 | | Z 12 NCS 37.18 | NA 17 | | | | | |
| 1.4980 | INCOLOY® Alloy 286 | X6NiCrTiMoVB21152 | X 6 NiCrTiMoVB 21 15 2 | Z 6 NCTDV 25.15 B | 286 S 31 | | | | | |
| 2.4478 | Alloy 52 (Nilo® 52) | FeNi 52 | Titan Grade 4 | AIR:9182T60 | 2 TA 6-9 | | | | | N 14052 |

S 1.2 NICKEL-BASED ALLOY [HRSA] <1450 N/mm²

| Material-number | Tradename | Germany DIN | Europe EN | France AFNOR | GB BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|-----------------|------------------|-----------------|-------------|----------------|--------------|----------------|--------------|-------------|-------------|------------|
| 2.4602 | INCONEL® 622 | NiCr21Mo14W | | | | INCONEL® 622 | | | | |
| 2.4632 | Nimonic® 90 | NiCr20Co80Ti | HR 2 | NC 20 KTA | NA 36 | Nimonic® 90 | | | | N 07090 |
| 2.4642 | INCONEL® 690 | NiCr29Fe | | NC 30 Fe | | INCONEL® 690 | | | NCF 690 | N 06690 |
| 2.4650 | Nimonic® C-263 | NiCo20Cr20MoTi | HR 10 | NCK 20 D | NA 38 | Nimonic® C-263 | | | NCF 690 | N 07263 |
| 2.4654 | Waspaloy® | NiCr19Co14Mo4Ti | | NC 20 K14 Y | | Waspaloy® | | | | N 07001 |
| 2.4662 | INCOLOY® 901 | NiCr13Mo6Ti3 | | Z 8 NCDT 42 | | | | | | N 09901 |
| 2.4663 | INCONEL® 617 | NiCr23Co12Mo | | NC 22 K12 D9 A | | INCONEL® 617 | | | | N 06617 |
| 2.4665 | Hastelloy® X | NiCr22Fe18Mo | HR 6 | NC 22 FeD | NA 40 | Hastelloy X | | | | |
| 2.4666 | Nimonic® PK25 | NiCr18CoMo | | NKCD 20 ATU | | | | | | |
| 2.4668 | INCONEL® 718 | NiCr19FeNbMo | HR 8 | NC 19 Fe Nb | INCONEL® 718 | INCONEL® 718 | | | | N 07718 |
| 2.4669 | INCONEL® X-750 | NiCr15Fe7TiAl | | NC 15 Fe 7 TA | | INCONEL® X-750 | | | | N 07750 |
| 2.4694 | INCONEL® 751 | NiCr16Fe7TiAl | | | | | | | | N 07751 |
| 2.4816 | INCONEL® 600 | NiCr15Fe | | NC 15 Fe | NA 14 | INCONEL® 600 | | | NFC 600 | N 06600 |
| 2.4819 | Nimonic® C-276 | NiMo16Cr15W | | NC 17 D | | Nimonic® C-276 | | | | N 10276 |
| 2.4851 | INCONEL® 601 | NiCr23Fe15 | | NC 23 Fe 14 A | | INCONEL® 601 | | | NCF 601 | N 06601 |
| 2.4856 | INCONEL® 625 | NiCr22Mo9Nb | | NC 22 Fe DNb | NA 21 | INCONEL® 625 | | | NCF 625 | N 06625 |
| 2.4858 | INCOLOY® 825 | NiCr21Mo | 3072.76 | NC 21 Fe DU | NA 16 | INCOLOY® 825 | | | NCF 825 TB | N 08825 |
| 2.4869 | Alloy 80/20 | NiCr80-20 | | | | | | | | N 06003 |
| 2.4879 | Centralloy® 4879 | G-NiCr38W | | | | | | | | |
| 2.4883 | Hastelloy® C276 | G-NiMo16Cr | | | | | | | | |
| 2.4889 | Nicrofer® 45 TM | NiCr28FeSiCe | | | | | | | | N 06045 |
| 2.4951 | Nicrofer® 7520 | NiCr20Ti | | NC 20 T | HR 5 | | | | | N 06075 |

S 1.3 COBALT-BASED ALLOY [HRSA] <1450 N/mm²

| Material-number | Tradename | Germany DIN | Europe EN | France AFNOR | GB BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|-----------------|-----------------|---------------|-------------|----------------|---------|-----------------|--------------|-------------|-------------|------------|
| 2.4681 | ULTIMET® alloy | CoCr26Ni9Mo5W | | | | | | | | |
| 2.4682 | Stellite® 31 | G-CoCr25NiW | | KC 25 WN | | | | | | ASTM A567 |
| 2.4683 | Conicro® 4023 W | CoCr22NiW | | | | | | | | |
| 2.4691 | HS 21 | G-CoCr28Mo | | KC 27 D5 NFe | | | | | | ASTM F-75 |
| 2.4964 | Stellite® 25 | CoCr20W15Ni | | KC 22 WN | HR 240 | L605 Haynes® 25 | | | | R 30605 |
| 2.4979 | S 816 | CoCr28Mo6 | | | | | | | | |

Technische Formeln

Schnittgeschwindigkeit
berechnen (m/min)

$$V_c = \frac{D \cdot \pi \cdot n}{1000}$$

Drehzahl
berechnen (U/min)

$$n = \frac{V_c \cdot 1000}{D \cdot \pi}$$

Vorschubgeschwindigkeit
berechnen (mm/min)

$$V_f = n \cdot z \cdot f_z$$

Zahnvorschub
berechnen (mm/Z)

$$f_z = \frac{V_f}{n \cdot z}$$

Zeitspanvolumen
berechnen (cm³/min)

$$Q = \frac{a_p \cdot a_e \cdot V_f}{1000}$$

Mittlere Spandicke
berechnen (mm)

$$h_m = f_z \cdot \frac{\sqrt{a_e}}{D}$$

Begriffserläuterung

| | | |
|----------------------|------------------------------|-------------------------|
| V_c | Schnittgeschwindigkeit | in m/min |
| n | Drehzahl | in U/min |
| V_f | Vorschubgeschwindigkeit | in mm/min |
| F_z | Zahnvorschub | in mm/Zahn |
| z | Anzahl der Zähne (Schneiden) | |
| a_p | Zustelltiefe | in mm |
| a_e | Eingriffsbreite | in mm |
| h_m | Mittlere Spandicke | in mm |
| Q | Zeitspanvolumen | in cm ³ /min |
| D | Durchmesser Werkzeug | in mm |

ERKLÄRUNG SCHNITTDATENBESTIMMUNG

BEISPIEL FÜR BESÄUMEN VON 1.2343 MIT Ø10:

P 3.2 STEEL | high alloyed <1100 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|----------------|----------------|--------------------|--------------------------|--------------|--------------|-------------|------------|
| 1.2083 | X42Cr13 | X 42 Cr 13 | Z 40 C 14 | | X 41 Cr 13 KU | 2314 | | SUS 420 J2 | 420 |
| 1.2316 | X36CrMo17 | X 36 CrMo 17 | X38CrMo 16 1 | | X 38 CrMo 16 1 KU | | X 38 CrMo 16 | | D-4 |
| 1.2343 | X38CrMoVH1 | X 38 CrMoV 5 1 | Z 38 CDV 5 | BH 11 | X 37 CrMoV 5 1 KU | | X 37 CrMoV 5 | SKD 6 | H 11 |
| 1.2344 | X40CrMoV51 | X 40 CrMoV 5 1 | Z 40 CDV 5 | BH 13 | X 40 CrMoV 5 1 1 KU 2242 | | X 40 CrMoV 5 | SKD 61 | H 13 |
| 1.2436 | X210CrW12 | X 210 CrW 12 | Z 210 CW1 2 | | X 215 CrW 12 1 KU | 2312 | X 210 CrW 12 | SKD 2 | |

DER MATERIALSCHLÜSSEL MIT DETAILLIERTEN AUFSCHLÜSSELUNGEN DER MATERIALIEN NACH MATERIALGRUPPEN BEFINDET SICH AM ENDE DES KATALOGS.

| Material | Strength (N/mm ²) | Full Slot | Side Milling | Finishing | ETC | Materialgroup Factor fz / a | Materialgroup Factor ae ETC |
|------------------------------------|-------------------------------|------------|--------------|------------|------------|-----------------------------|-----------------------------|
| | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| P STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 unalloyed | <850 | 200 | 200 | 220 | 315 | 1 | 1 |
| 2.1-2.2 low alloyed | <950 | 190 | 190 | 210 | 232 | 0,9 | 0,8 |
| 3.1-3.2 high alloyed | <1100 | 170 | 170 | 190 | 198 | 0,8 | 0,7 |
| K CASTINGS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.2 grey cast iron | <1000 | 210 | 210 | 230 | 242 | 0,9 | 0,8 |
| M STAINLESS STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1 ferritic/martensitic | <850 | 90 | 90 | 95 | 152 | 0,9 | 0,7 |
| 2.1 austenitic | <650 | 80 | 80 | 85 | 132 | 0,8 | 0,5 |
| N NON-FERROUS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-2.3 ALUMINIUM alloyed/casted | <600 | 400 | 400 | 420 | 500 | 1,6 | 2 |
| 3.1-3.3 COPPER alloyed | <600 | 200 | 200 | 220 | 262 | 1,5 | 1,6 |
| T TITANIUM | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 2.1-2.2 pure/alloyed | <1000 | 50 | 50 | 53 | 75 | 0,8 | 0,5 |
| S SUPER ALLOYS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 HRSA | <1450 | 25 | 25 | 28 | 42 | 0,7 | 0,3 |

ÜBERSICHT DER VERSCHIEDENEN MATERIALGRUPPEN FÜR DIESES WERKZEUG INKLUSIVE FAKTOREN

Material P 1.1-1.3

| D1 | L2 | Immersion Angle α° | Full Slot | | | Side Milling | | | Finishing | | | ETC | | | |
|----|----|--------------------|-----------|---------------|---------------|--------------|-----------------|---------|-----------|---------|---------|-----------|---------|---------|-----------|
| | | | fz (mm/Z) | ae = 1xD (mm) | ap = 1xD (mm) | fz (mm/Z) | ae = 0,3xD (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | hmax (mm) |
| 3 | 6 | 0,5° | 0,015 | 3 | 3 | 0,02 | 0,9 | L2max | 0,013 | 0,2 | L2max | 0,045 | 0,8 | L2max | 0,0398 |
| 4 | 8 | 0,5° | 0,015 | 4 | 4 | 0,02 | 1,2 | L2max | 0,013 | 0,2 | L2max | 0,06 | 1,1 | L2max | 0,0536 |
| 5 | 9 | 0,5° | 0,025 | 5 | 5 | 0,03 | 1,5 | L2max | 0,02 | 0,2 | L2max | 0,07 | 1,3 | L2max | 0,0614 |
| 6 | 10 | 0,8° | 0,035 | 6 | 6 | 0,04 | 1,8 | L2max | 0,025 | 0,2 | L2max | 0,09 | 1,6 | L2max | 0,0796 |
| 8 | 12 | 1° | 0,045 | 8 | 8 | 0,055 | 2,4 | L2max | 0,03 | 0,2 | L2max | 0,11 | 1,9 | L2max | 0,0936 |
| 10 | 14 | 1,5° | 0,05 | 10 | 10 | 0,065 | 3 | L2max | 0,033 | 0,2 | L2max | 0,13 | 2,3 | L2max | 0,1094 |
| 12 | 16 | 2° | 0,055 | 12 | 12 | 0,075 | 3,6 | L2max | 0,035 | 0,2 | L2max | 0,15 | 2,6 | L2max | 0,1236 |
| 16 | 22 | 2,5° | 0,065 | 16 | 16 | 0,085 | 4,8 | L2max | 0,04 | 0,2 | L2max | 0,17 | 3,3 | L2max | 0,1376 |
| 20 | 26 | 3° | 0,08 | 20 | 20 | 0,1 | 6 | L2max | 0,045 | 0,2 | L2max | 0,2 | 3,6 | L2max | 0,1537 |

ALLE HIER ANGEGBENEN DATEN SIND FÜR DIE ERSTE GRUPPE P1.1-1.3 IN DER MATERIALGRUPPEN-ÜBERSICHT

SCHNITTDATENBESTIMMUNG:

Aus dem Materialschlüssel ergibt sich: **Materialgruppe P3.2**

Vc= 170 m/min (wie in der Tabelle angegeben)

fz= 0,065 mm/Z (wie in der Tabelle angegeben) x Faktor fz 0,8 = fz 0,052 mm/Z



ERKLÄRVIDEO

BEISPIEL FÜR ETC VON 1.4303 MIT Ø10:

M 2.1 STAINLESS STEEL | austenitic <650 N/mm²

| Materialnummer | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------------|----------------|--------------------|----------------|--------------|----------------|-------------|------------|
| 1.4300 | X12CrNi188 | | | | | 302 | | | |
| 1.4301 | X5CrNi1810 | X 6 CrNi 18 10 KD | Z 6 CN 18.09 | 304 S 15 | X 5 CrNi 18 10 | 2332 | X 5 CrNi 18 11 | SUS 304 | 304 H |
| 1.4302 | X5CrNi199 | X 6 CrNi 20 10 KE | | 308 S 96 | | | | | |
| 1.4303 | X5CrNi1812 | X 8 CrNi 18 12 KD | Z 8 CN 17.07 | 305 S 19 | X 8 CrNi 19 10 | | X 8 CrNi 18 12 | SUS 305 | 308 |
| 1.4305 | X10CrNiS189 | X 8 CrNiS 19 9 | Z 8 CNF 18.09 | 303 S 31 | X 8 CrNiS 18 9 | 2346 | F.310.C | SUS 303 | 303 |

DER MATERIALSCHLÜSSEL MIT DETAILLIERTEN AUFSCHLÜSSELUNGEN DER MATERIALIEN NACH MATERIALGRUPPEN BEFINDET SICH AM ENDE DES KATALOGS.

| Material | Strength (N/mm ²) | Full Slot | Side Milling | Finishing | ETC | Materialgroup Factor fz / a | Materialgroup Factor ae ETC |
|------------------------------------|-------------------------------|------------|--------------|------------|------------|-----------------------------|-----------------------------|
| | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| P STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 unalloyed | <850 | 200 | 200 | 220 | 315 | 1 | 1 |
| 2.1-2.2 low alloyed | <950 | 190 | 190 | 210 | 232 | 0,9 | 0,8 |
| 3.1-3.2 high alloyed | <1100 | 170 | 170 | 190 | 198 | 0,8 | 0,7 |
| K CASTINGS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.2 grey cast iron | <1000 | 210 | 210 | 230 | 242 | 0,9 | 0,8 |
| M STAINLESS STEEL | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1 ferritic/martensitic | <850 | 90 | 95 | 152 | 152 | 0,9 | 0,7 |
| 2.1 austenitic | <650 | 80 | 85 | 132 | 132 | 0,8 | 0,5 |
| N NON-FERROUS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-2.3 ALUMINIUM alloyed/casted | <600 | 400 | 400 | 420 | 500 | 1,6 | 2 |
| 3.1-3.3 COPPER alloyed | <600 | 200 | 200 | 220 | 262 | 1,5 | 1,6 |
| T TITANIUM | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 2.1-2.2 pure/alloyed | <1000 | 50 | 53 | 75 | 75 | 0,8 | 0,5 |
| S SUPER ALLOYS | | Vc = m/min | Vc = m/min | Vc = m/min | Vc = m/min | | |
| 1.1-1.3 HRSA | <1450 | 25 | 28 | 42 | 42 | 0,7 | 0,3 |

ÜBERSICHT DER VERSCHIEDENEN MATERIALGRUPPEN FÜR DIESES WERKZEUG INKLUSIVE FAKTOREN

Material P 1.1-1.3

| D1 | L2 | Immersion Angle α° | Full Slot | | | Side Milling | | | Finishing | | | ETC | | | |
|----|----|--------------------|-----------|---------------|---------------|--------------|-----------------|---------|-----------|---------|---------|-----------|---------|---------|-----------|
| | | | fz (mm/Z) | ae = 1xD (mm) | ap = 1xD (mm) | fz (mm/Z) | ae = 0,3xD (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | fz (mm/Z) | ae (mm) | ap (mm) | hmax (mm) |
| 3 | 6 | 0,5° | 0,015 | 3 | 3 | 0,02 | 0,9 | L2max | 0,013 | 0,2 | L2max | 0,045 | 0,8 | L2max | 0,0398 |
| 4 | 8 | 0,5° | 0,015 | 4 | 4 | 0,02 | 1,2 | L2max | 0,013 | 0,2 | L2max | 0,06 | 1,1 | L2max | 0,0536 |
| 5 | 9 | 0,5° | 0,025 | 5 | 5 | 0,03 | 1,5 | L2max | 0,02 | 0,2 | L2max | 0,07 | 1,3 | L2max | 0,0614 |
| 6 | 10 | 0,8° | 0,035 | 6 | 6 | 0,04 | 1,8 | L2max | 0,025 | 0,2 | L2max | 0,09 | 1,6 | L2max | 0,0796 |
| 8 | 12 | 1° | 0,045 | 8 | 8 | 0,055 | 2,4 | L2max | 0,03 | 0,2 | L2max | 0,11 | 1,9 | L2max | 0,0936 |
| 10 | 14 | 1,5° | 0,05 | 10 | 10 | 0,065 | 3 | L2max | 0,033 | 0,2 | L2max | 0,13 | 2,3 | L2max | 0,1094 |
| 12 | 16 | 2° | 0,055 | 12 | 12 | 0,075 | 3,6 | L2max | 0,035 | 0,2 | L2max | 0,15 | 2,6 | L2max | 0,1236 |
| 16 | 22 | 2,5° | 0,065 | 16 | 16 | 0,085 | 4,8 | L2max | 0,04 | 0,2 | L2max | 0,17 | 3,3 | L2max | 0,1376 |
| 20 | 26 | 3° | 0,08 | 20 | 20 | 0,1 | 6 | L2max | 0,045 | 0,2 | L2max | 0,2 | 3,6 | L2max | 0,1537 |

ALLE HIER ANGEgebenEN DATEN SIND FÜR DIE ERSTE GRUPPE P1.1-1.3 IN DER MATERIALGRUPPEN-ÜBERSICHT

SCHNITTDATENBESTIMMUNG:

Aus dem Materialschlüssel ergibt sich: **Materialgruppe M2.1**
 Vc = 132 m/min (wie in der Tabelle angegeben)
 fz = 0,13 mm/Z (wie in der Tabelle angegeben) x Faktor fz 0,8 = **fz 0,104 mm/Z**
 ae = 2,3 mm (wie in der Tabelle angegeben) x Faktor ae 0,5 = **ae 1,15 mm**