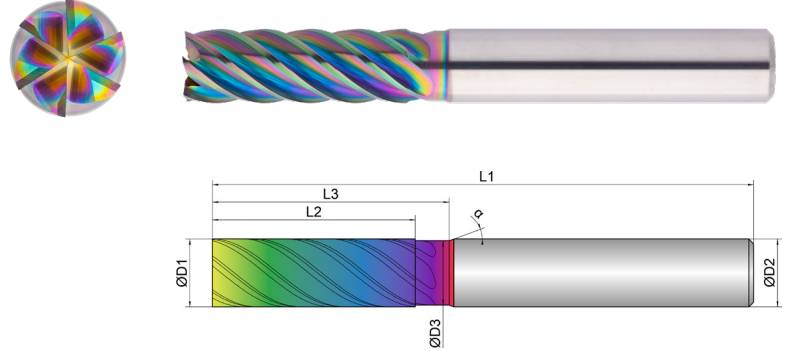


| | |
|--------------|--------------------|
| Kühlung | |
| Toleranz | h6 |
| Beschichtung | AlphaSlide Rainbow |

| | |
|---------------|---------------|
| Strategie | HPC |
| Anwendung | |
| Eigenschaften | HA \neq 3xD |



- Ultrascharfe und geläppte Schneiden
 - Spezielle Spankammern ausgelegt für den Abtransport besonders langer und feiner Späne
 - Stirn-Schlichtfase für glatte Werkstückoberflächen
-
- Für hervorragende Oberflächen und höchste Formgenauigkeit
-
- 6 Schneiden für höchste Vorschübe



| EXN1-M04-0033 | Schuppen | | | | Schichten | | | | | |
|---------------|---------------------|---------------------|------|------|-----------|---------------------|---|----------|----------|--|
| | D1 | D3 | L2 | L3 | L1 | D2 | z | α | α | |
| | mm \varnothing | mm \varnothing | mm | mm | mm | mm \varnothing | # | ° | ° | |
| 6 | 6,0 | 5,8 | 18,0 | 25,0 | 65,0 | 6,0 | 6 | 39 | 20 | |
| 8 | 8,0 | 7,8 | 24,0 | 30,0 | 70,0 | 8,0 | 6 | 39 | 20 | |
| 10 | 10,0 | 9,5 | 30,0 | 35,0 | 80,0 | 10,0 | 6 | 39 | 20 | |
| 12 | 12,0 | 11,5 | 36,0 | 45,0 | 93,0 | 12,0 | 6 | 39 | 20 | |
| 16 | 16,0 | 15,5 | 48,0 | 55,0 | 110,0 | 16,0 | 6 | 39 | 20 | |
| 20 | 20,0 | 19,5 | 60,0 | 70,0 | 125,0 | 20,0 | 6 | 39 | 20 | |



Download Catalog Pages (PDF)

| Material | | Strength (N/mm ²) | Finishing | Materialgroup Factor fz |
|----------|--------------------------|-------------------------------|------------|-------------------------|
| N | NON-FERROUS | | Vc = m/min | |
| 1.1 | ALUMINIUM alloyed | <500 | 380 | 1 |
| 1.2 | ALUMINIUM alloyed | <600 | 360 | 1 |
| 2.1-2.3 | ALUMINIUM cast | <600 | 320 | 0,9 |
| 3.1-3.3 | COPPER alloyed | <650 | 160 | 0,8 |
| 4.1 | MAGNESIUM alloyed | <250 | 350 | 1 |
| 5.1 | PLASTICS Thermoplastic | <100 | 300 | 0,8 |
| 5.2 | PLASTICS Duroplastic | <150 | 260 | 0,7 |








HINWEIS | Alle fz/a Werte in der Tabelle für Materialgruppe 1.1, Faktoren für die anderen Gruppen beachten!
 Je nach Material kann es nötig sein, den Vc oder Fz-Wert zu verändern.
 Für eine sehr gute Geradheit der Fläche, wird eine zusätzliche Leerbahn empfohlen.
 Die angegebenen Werte stellen Startwerte zum Schlichten dar.
 Für eine hohe Prozesssicherheit wird der Einsatz von Kühlschmiermittel empfohlen, Gefahr durch Aufbauschneidenbildung.

Material N 1.1

| D1 | L2 | Semi Finishing | | Finishing | |
|----|----|----------------|---------|-----------|---------|
| | | fz (mm/Z) | ae (mm) | fz (mm/Z) | ae (mm) |
| 6 | 18 | 0,04 | 0,2 | 0,03 | 0,2 |
| 8 | 24 | 0,044 | 0,2 | 0,032 | 0,2 |
| 10 | 30 | 0,046 | 0,2 | 0,034 | 0,2 |
| 12 | 36 | 0,048 | 0,2 | 0,036 | 0,2 |
| 16 | 48 | 0,05 | 0,2 | 0,038 | 0,2 |
| 20 | 60 | 0,052 | 0,2 | 0,04 | 0,2 |

LEGENDE


























ANWENDUNGEN

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






KÜHLUNGEN

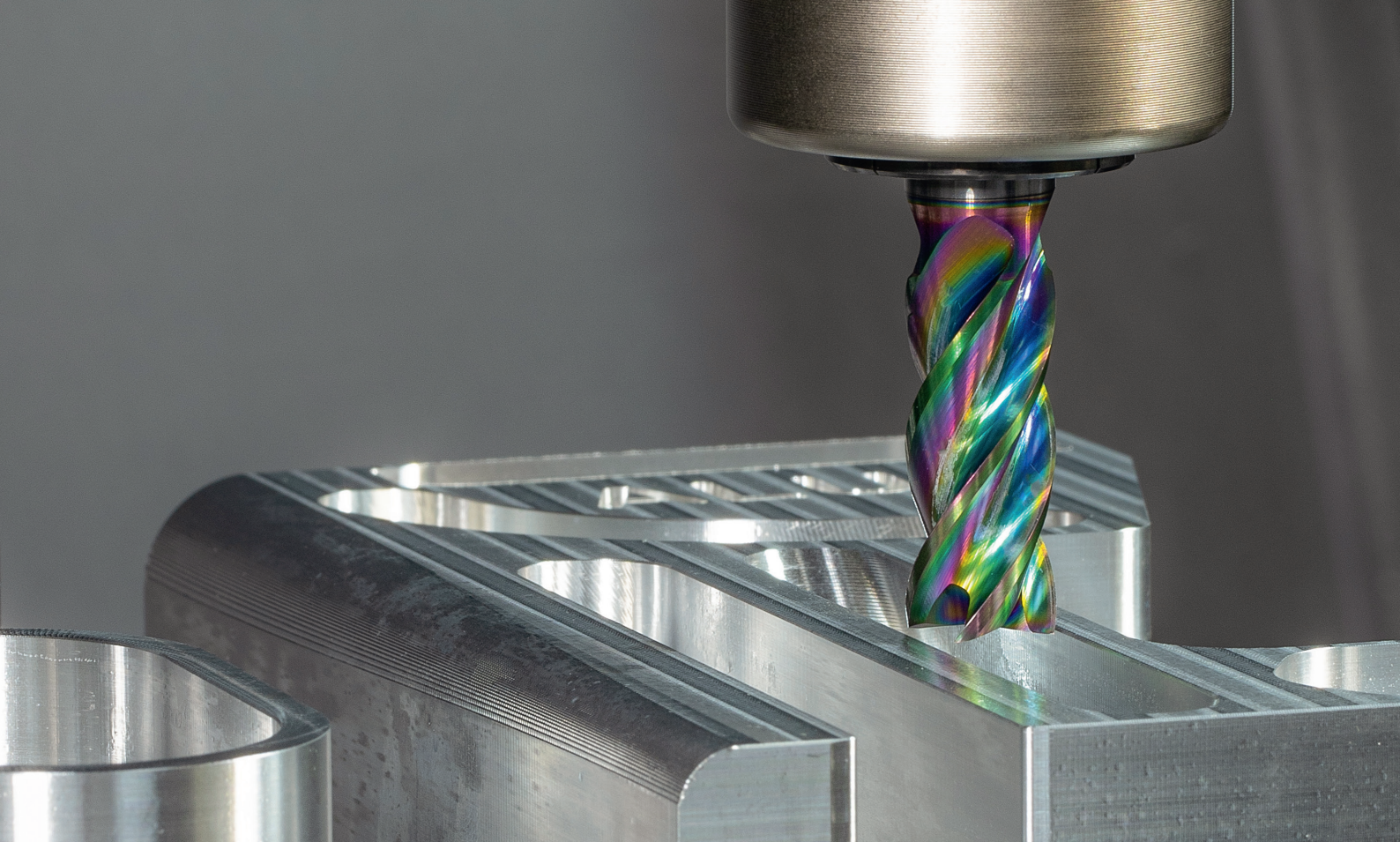
| | | | |
|---|---|--|--|
|  Luftgekühlt |  Trocken |  Öl |  Kühlschmierstoff (KSS) |
|  Minimalmengenschmierung (MMS) | | | |

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

| | | | |
|---|--|--|--|
|  Extended Trochoidal Cutting |  High Performance Cutting |  High Speed Cutting |  Multi Task Cutting |
|  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.

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 |
|----------------|--------------------|-------------|----------------|--------------------|-------------------|--------------|-------------|-------------|------------|
| 3.0205 | Al99 | AW-1200 | A 4 | 1 C | P-Al99,0 | 4010 | L-3001 | A1200 | AA1200 |
| 3.0250 | Al99.5H | | A 59050 C | L 31 | | | | | AA1000 |
| 3.0255 | Al99.5 | AW-1050 A | A 5 | L 31 | P-AIP99.5 | 4007 | L-3051 | A1050 | AA1050 A |
| 3.0275 | Al99.7 | AW-1070 A | A 7 | 2L 48 | P-AIP99.7 | 4005 | L-3071 | A1070 | AA1070 A |
| 3.0280 | Al99.8 | | | | | | | | |
| 3.0285 | Al99.8 | AW-1080 A | A 8 | 1A | P-Al99.8 | 4004 | L-3081 | A1080 | AA1080 A |
| 3.0305 | Al99.9 | AW-1090 | | | | | | | |
| 3.0505 | AlMn 0.5 Mg 0.5 | AW-3105 | | N 31 | | | | A3105 | AA3105 |
| 3.0506 | AlMn 0.6 | AW-3207 | | | | | | | |
| 3.0515 | AlMn 1 | AW-3103 | | N 3 | P-AlMn 1.2 | 4067 | L-3811 | A3103 | AA3103 |
| 3.0517 | AlMn 1 Cu | AW-3003 | A-M1 | | P-AlMn 1.2 Cu | | L-3810 | A3003 | AA3003 |
| 3.0525 | AlMn 1 Mg 0.5 | AW-3005 | A-MG0,5 | | | | | A3005 | AA3005 |
| 3.0526 | AlMn 1 Mg 1 | AW-3004 | A-M1G | | P-AlMn 1.2 Mg | GA/6511 | L-3820 | A3004 | AA3004 |
| 3.0915 | AlFeSi | AW-8011A | | | | | | | |
| 3.1255 | AlCu 4 SiMg | AW-2014 | A-U45G | 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 |
| 3.1371 | G-AlCu 4 TiMg | AC-21000 | | | | | | | |
| 3.1841 | G-AlCu 4 Ti | AC-21100 | | | | | | | |
| 3.2134 | G-AlSi 5 Cu 1,3 Mg | AC-45300 | | | | | | | |
| 3.2307 | Al99.85 MgSi | | | | | | | | |
| 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 |
| 3.3241 | G-AlMg 3 Si | | | | | | | | |
| 3.3261 | G-AlMg 5 Si | AC-51400 | | | | | | | |
| 3.3292 | GD-AlMg 9 | AC-51200 | | | | | | | |
| 3.3307 | Al99.85 Mg 0.5 | AW-5110 | | | | | | | |
| 3.3308 | Al99.9 Mg 0.5 | AW-5210 | | | | | | | |
| 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 4.5 Mn | AW-5083 | A-G4,5MC | N 8 | P-AlMg 4.5 | 4140 | L-3321 | A5083 | AA5083 |
| 3.3549 | AlMg 5 Mn | AW-5182 | | | | | | | |
| 3.3555 | AlMg 5 | AW-5019 | | | | | | | |
| 3.3561 | G-AlMg 5 | AC-51300 | | | | | | | |

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 - N 2.3 ALUMINIUM | cast <600 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 3.1841 | G-AlCu 4 Ti | | | | | | | AC1A | A 295.0 |
| 3.1871 | G-AlCu 4 TiMg | | | | | | | | |
| 3.2131 | G-AlSiCu1 | | | | | | | | |
| 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 |
| 3.2163 | GD-AlSi 9 Cu 3 | | | | | | | | |
| 3.2211 | G-AlSi 11 | | | | | | | | |
| 3.2341 | G-AlSi 5 Mg | | | | | | | | |
| 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 | | | | | | | |
| 3.2382 | GD-AlSi 10 Mg | | | | | | | | |
| 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 |
| 3.2582 | GD-AlSi 12 | | | | | 4247 | | ADC1 | A 413.0 |
| 3.2583 | G-AlSi 12 Cu | AC-44300 | A-S12-Y4 | LM 20 | 5079 | 4260 | | ADC1 | A 413.1 |
| 3.2585 | SG-AlSi12 | | | | | | | | |
| 3.2982 | GD-AlSi 12 Cu | | | | | | | | |
| 3.3241 | G-ALMg 3 Si | | | | | | | | |
| 3.3261 | G-ALMg 5 Si | | | | | | | | |
| 3.3561 | G-ALMg 5 | | | | | | | AC7A | A 514.0 |

N 3.1 - N 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 |
|----------------|-------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 2.0060 | E-Cu 57 | CW-004A | | | | | | | B-120 |
| 2.0065 | E-Cu 58 | CW-004A | Sn-a2 | C 101 | | | | | C 11000 |
| 2.0070 | SE-Cu | CW-020A | Cu-c1 | C 101 | | | | | C 10300 |
| 2.0082 | G-Cu L 45 | | | HCC 1 | | | | | C 81100 |
| 2.0085 | G-Cu L 50 | CC-040A | | HCC 1 | | | | | C 81100 |
| 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 |
| 2.0340 | G-CuZn 37 Pb | CC-754S-GM | | | | | | | |
| 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 |
| 2.0595 | G-KCuZn 37 Al 1 | CC-766S | | | | | | | |
| 2.0596 | G-CuZn 34 Al 2 | CC-764S | U-Z 36 N 3 | | | | | | |
| 2.0857 | CuNi 3 Si | CW-112C | | | | | | | |
| 2.0916 | CuAl 5 | | | | | | | | |
| 2.0927 | SG-CuAl 9 Ni 5 Fe | | | | | | | | |
| 2.0936 | CuAl 10 Fe 3 Mn 2 | CW-306G | U-A 10 Fe | CA 103 | | | | | |
| 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 |
| 2.1090 | G-CuSn 7 ZnPb | | UE 7 Z5 Pb 4 | | | | | | C 93200 |
| 2.1093 | G-CuSn 6 ZnNi | | | LG 4 | | | | | |
| 2.1096 | G-CuSn 5 ZnPb | | UE 5 Pb 5 Z 5 | LG 2 | | | | | C 83600 |
| 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 |
| 2.1322 | CuMg 0.4 | | | | | | | | |
| 2.1355 | CuMn 2 | | | | | | | | |
| 2.1461 | SG-CuSi 3 | CW-116C | | | | | | | |

N 4.1 MAGNESIUM | alloyed <200 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|-------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| 3.5101 | G-MgZn 4 SE1 Zr 1 | MC-35110 | G-Z 4 Tr | MAG-5 | | | | | ZE 41 |
| 3.5102 | G-MgZn 5 Th2 Zr1 | | | | | | | | |
| 3.5103 | MgSE 3 Zn2 Zr1 | MC-65120 | G-Tr 3 Z 2 | MAG-6 | | | | | EZ 33 |
| 3.5105 | G-MgTh 3 Zn2 Zr1 | | | | | | | | QE 22 |
| 3.5106 | G-MgAg 3 SE2 Zr1 | MC-65210 | G-Ag 22.5 | MAG-12 | | | | | |
| 3.5200 | G-MgAl 8 Zn 1 | MA-40020 | | | | | | | |
| 3.5312 | MgAl 3 Zn | MA-21130 | | | | | | | |
| 3.5314 | MgAl 3 Zn | | G-A3 Z1 | MAG-E-111 | | | | | AZ 31 B |
| 3.5470 | GD-MgAl 4 Si 1 | MC-21320 | | | | | | | |
| 3.5612 | GD-MgAl 6 Zn 3 | MC-21140 | | | | | | | |
| 3.5614 | MgAl 6 Zn | | G-A6 Z1 | MAG-E-121 | | | | | AZ 61 A |
| 3.5662 | GD-MgAl 6 | | | | | | | | |
| 3.5812 | G-MgAl 8 Zn 1 | MC-21110 | G-A9 | | | | | | AZ 81 |
| 3.5912 | G-MgAl 9 Zn 1 | MC-21120 | G-A 9 Z 1 | | | | | | AZ 91 |

N 5.1 PLASTICS | thermoplastics <100 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|-----------------------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|---------------|
| PC | Makralon | | Orgalan | Sirvet | | | | | Lexan |
| PC | Nuclon | | | | | | | | Merlon |
| PC | Plastocarbon | | | | | | | | |
| PE | Baylon | | | Fertene | Carlona | | | | Althon |
| PE | Dekalen | | | Eraclene | Escorene | | | | Bakellite |
| PE | Lupolen | | | | | | | | Chemplex |
| PE | Hostalen | | | | | | | | Dylan |
| PF | Alberit | | | Fenachem | | | | | Biralit |
| PF | Bakelit | | | Moldesile | | | | | Biratex |
| PF | Bulitol | | | | | | | | Birax |
| PF | Durax | | | | | | | | |
| PF | Harex | | | | | | | | |
| PF | Resinol | | | | | | | | |
| PFTE | Hostaflon | | Soreflon | | | | | | Halon; Teflon |
| PP | Vestolen PP | | Eitex P | Moplen | Carola P | | | | Profax |
| PP | Synalen PP | | Napryl | Kastilen | Procom | | | | Rexene |
| PP | Novolen | | | | | | | | Tenite |
| PP | Hostalen PP | | | | | | | | |
| PS | Hostylon | | | Sdistir | Lustrex | | | | Carinex |
| PS | Lorkalen | | | Lastinol | | | | | Dylene |
| PS | Polystyrol | | | | | | | | Toporex |
| PS | Styropor | | | | | | | | |
| PVC | Coroplast | | | | | | | | |
| PVC | Hostalit | | | | | | | | |
| PVC | Mipolam | | | | | | | | |
| PVC | Opalon | | | | | | | | |
| PVC | Solvec | | | | | | | | |
| PVC | Vinoflex | | | | | | | | |
| PP-H | Homopolymer | | | | | | | | |
| PP-C | Copolymer | | | | | | | | |
| ABS | Acrylnitrid Butadien Styrol | | | | | | | | |
| PMMA | Polymethyl metha Crylat | | | | | | | | |
| PMMA | Plexiglas; Resarit; Degluan | | | | | | | | |
| POMC | Polyoxymethylen | | | | | | | | |
| POMC | Hostaform; ultraform | | | | | | | | |
| PI | Polymid | | | | | | | | |
| PEI | Polytherimid | | | | | | | | |
| PVC-H | Polyvinylchlorid (hard) | | | | | | | | |
| PA | Polyamide | | | | | | | | |

N 5.2 PLASTICS | duroplastics <150 N/mm²

| Materialnumber | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| PUR 5220 | | | | | | | | | |
| PF 31 | | | | | | | | | |
| MP 183 | | | | | | | | | |

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 3.2151 MIT Ø10:

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

| Materialnummer | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|----------------------|-----------------|----------------|--------------------|-------------|--------------|-------------|-------------|----------------|
| 3.1841 | G-AlCu 4 Ti | | | | | | | AC1A | A 295.0 |
| 3.1871 | G-AlCu 4 TiMg | | | | | | | | |
| 3.2131 | G-AlSiCu1 | | | | | | | | |
| 3.2151 | G-AlSi 6 Cu 4 | AC-45000 | A-SSUZ | 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 |

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

| N | 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 | | |
| 1.1 | ALUMINIUM alloyed | <500 | 500 | 500 | 500 | 560 | 1 | 1 |
| 1.2 | ALUMINIUM alloyed | <600 | 480 | 480 | 480 | 540 | 1 | 1 |
| 2.1-2.3 | ALUMINIUM cast | <600 | 450 | 450 | 450 | 510 | 0,9 | 0,8 |
| 3.1-3.3 | COPPER alloyed | <650 | 200 | 200 | 200 | 260 | 0,8 | 0,7 |
| 4.1 | MAGNESIUM alloyed | <250 | 500 | 500 | 500 | 560 | 1 | 1 |
| 5.1 | PLASTICS Thermoplastic | <100 | 400 | 400 | 400 | 460 | 0,7 | 0,8 |
| 5.2 | PLASTICS Duroplastic | <150 | 350 | 350 | 350 | 410 | 0,6 | 0,7 |

ÜBERSICHT DER VERSCHIEDENEN MATERIALGRUPPEN FÜR DIESES WERKZEUG INKLUSIVE FAKTOREN

Material N 1.1

| D1 | L2 | Immersion Angle | Full Slot | | | Side Milling | | | Finishing | | | ETC | | | |
|----|----|-----------------|-----------|----------|----------|--------------|------------|-------|-----------|------|-------|--------|-------------|-------|--------|
| | | | fz | ae = 1xD | ap = 1xD | fz | ae = 0,3xD | ap | fz | ae | ap | fz | ae = 0,25xD | ap | hmax |
| Ø | mm | α° | (mm/Z) | (mm) | (mm) | (mm/Z) | (mm) | (mm) | (mm/Z) | (mm) | (mm) | (mm/Z) | (mm) | (mm) | (mm) |
| 2 | 6 | 1° | 0,02 | 2 | 2 | 0,03 | 0,6 | L2max | 0,018 | 0,2 | L2max | 0,045 | 0,5 | L2max | 0,039 |
| 3 | 10 | 1° | 0,03 | 3 | 3 | 0,04 | 0,9 | L2max | 0,02 | 0,2 | L2max | 0,055 | 0,75 | L2max | 0,0476 |
| 4 | 13 | 1,2° | 0,04 | 4 | 4 | 0,05 | 1,2 | L2max | 0,021 | 0,2 | L2max | 0,07 | 1 | L2max | 0,0606 |
| 5 | 14 | 1,2° | 0,045 | 5 | 5 | 0,065 | 1,5 | L2max | 0,023 | 0,2 | L2max | 0,08 | 1,25 | L2max | 0,0693 |
| 6 | 16 | 1,5° | 0,05 | 6 | 6 | 0,07 | 1,8 | L2max | 0,025 | 0,2 | L2max | 0,1 | 1,5 | L2max | 0,0866 |
| 8 | 22 | 2° | 0,07 | 8 | 8 | 0,09 | 2,4 | L2max | 0,03 | 0,2 | L2max | 0,12 | 2 | L2max | 0,1039 |
| 10 | 25 | 2,5° | 0,09 | 10 | 10 | 0,1 | 3 | L2max | 0,035 | 0,2 | L2max | 0,14 | 2,5 | L2max | 0,1212 |
| 12 | 28 | 3° | 0,1 | 12 | 12 | 0,13 | 3,6 | L2max | 0,04 | 0,2 | L2max | 0,16 | 3 | L2max | 0,1386 |
| 16 | 36 | 4° | 0,12 | 16 | 16 | 0,15 | 4,8 | L2max | 0,045 | 0,2 | L2max | 0,18 | 4 | L2max | 0,1559 |
| 20 | 41 | 5° | 0,15 | 20 | 20 | 0,18 | 6 | L2max | 0,05 | 0,2 | L2max | 0,22 | 5 | L2max | 0,1905 |

ALLE HIER ANGEgebenEN DATEN SIND FÜR DIE ERSTE GRUPPE N1.1 IN DER MATERIALGRUPPEN-ÜBERSICHT

SCHNITTDATENBESTIMMUNG:

Aus dem Materialschlüssel ergibt sich: **Materialgruppe N2.1-2.3**

Vc= 450 m/min (wie in der Tabelle angegeben)

fz= 0,1 mm/Z (wie in der Tabelle angegeben) x Faktor fz 0,9 = fz 0,09 mm/Z



ERKLÄRVIDEO

BEISPIEL FÜR ETC VON PE MIT Ø10:

N 5.1 PLASTICS | thermoplastics <100 N/mm²

| Materialnummer | Germany DIN | Europe EN | France AFNOR | Great Britain BS | Italy UNI | Sweden SIS | Spain UNE | Japan JIS | USA AISI |
|----------------|---------------|-------------|----------------|--------------------|-------------|--------------|-------------|-------------|------------|
| PC | Makralon | | Orgalan | Sinvet | | | | | Lexan |
| PC | Nuclon | | | | | | | | Merlon |
| PC | Plastocarbon | | | | | | | | |
| PE | Baylon | | | Fertene | Carlona | | | | Althon |
| PE | Dekalen | | | Eraclene | Escorene | | | | Bakelite |

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 | | |
| NON-FERROUS | | | | | | | |
| 1.1 | ALUMINIUM alloyed | <500 | 500 | 500 | 560 | 1 | 1 |
| 1.2 | ALUMINIUM alloyed | <600 | 480 | 480 | 480 | 1 | 1 |
| 2.1-2.3 | ALUMINIUM cast | <600 | 450 | 450 | 450 | 0,9 | 0,8 |
| 3.1-3.3 | COPPER alloyed | <650 | 200 | 200 | 200 | 0,8 | 0,7 |
| 4.1 | MAGNESIUM alloyed | <250 | 500 | 500 | 500 | 1 | 1 |
| 5.1 | PLASTICS Thermoplastic | <100 | 400 | 400 | 400 | 0,7 | 0,8 |
| 5.2 | PLASTICS Duroplastic | <150 | 350 | 350 | 350 | 0,6 | 0,7 |

ÜBERSICHT DER VERSCHIEDENEN MATERIALGRUPPEN FÜR DIESES WERKZEUG INKLUSIVE FAKTOREN

Material N 1.1

| 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 = 0,25xD (mm) | ap (mm) | hmax (mm) |
| 2 | 6 | 1° | 0,02 | 2 | 2 | 0,03 | 0,6 | L2max | 0,018 | 0,2 | L2max | 0,045 | 0,5 | L2max | 0,039 |
| 3 | 10 | 1° | 0,03 | 3 | 3 | 0,04 | 0,9 | L2max | 0,02 | 0,2 | L2max | 0,055 | 0,75 | L2max | 0,0476 |
| 4 | 13 | 1,2° | 0,04 | 4 | 4 | 0,05 | 1,2 | L2max | 0,021 | 0,2 | L2max | 0,07 | 1 | L2max | 0,0606 |
| 5 | 14 | 1,2° | 0,045 | 5 | 5 | 0,065 | 1,5 | L2max | 0,023 | 0,2 | L2max | 0,08 | 1,25 | L2max | 0,0693 |
| 6 | 16 | 1,5° | 0,05 | 6 | 6 | 0,07 | 1,8 | L2max | 0,025 | 0,2 | L2max | 0,1 | 1,5 | L2max | 0,0866 |
| 8 | 22 | 2° | 0,07 | 8 | 8 | 0,09 | 2,4 | L2max | 0,03 | 0,2 | L2max | 0,12 | 2 | L2max | 0,1039 |
| 10 | 25 | 2,5° | 0,09 | 10 | 10 | 0,1 | 3 | L2max | 0,035 | 0,2 | L2max | 0,14 | 2,5 | L2max | 0,1212 |
| 12 | 28 | 3° | 0,1 | 12 | 12 | 0,13 | 3,6 | L2max | 0,04 | 0,2 | L2max | 0,16 | 3 | L2max | 0,1386 |
| 16 | 36 | 4° | 0,12 | 16 | 16 | 0,15 | 4,8 | L2max | 0,045 | 0,2 | L2max | 0,18 | 4 | L2max | 0,1559 |
| 20 | 41 | 5° | 0,15 | 20 | 20 | 0,18 | 6 | L2max | 0,05 | 0,2 | L2max | 0,22 | 5 | L2max | 0,1905 |

ALLE HIER ANGEGEBENEN DATEN SIND FÜR DIE ERSTE GRUPPE N1.1 IN DER MATERIALGRUPPEN-ÜBERSICHT

SCHNITTDATENBESTIMMUNG:

Aus dem Materialschlüssel ergibt sich: **Materialgruppe N5.1**

Vc= 460 m/min (wie in der Tabelle angegeben)

fz= 0,14 mm/Z (wie in der Tabelle angegeben) x Faktor fz 0,7 = **fz 0,098 mm/Z**

ae= 2,5 mm (wie in der Tabelle angegeben) x Faktor ae 0,8 = **2,0 mm ae**