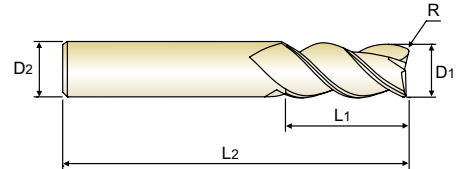
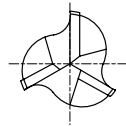


CARBIDE, 3 FLUTE 45° HELIX LONG LENGTH CORNER RADIUS

● **VOLLHARTMETALL, 3 SCHNEIDEN 45° RECHTSSPIRALE LANG ECKENRADIUS**
 ○ **Fraise carbure, 3 dents, torique, hélice 45°, longue**
 ○ **3 TAGLIENTI, ELICA 45°, TORICA, SERIE LUNGA**

- ▶ Excellent cutting qualities on aluminum and copper
- ▶ Increased tool life and higher cutting accuracy
- ▶ Mirror surface - Excellent surface finish
- ▶ Superior chip evacuation
- ▶ Reduces chipping of corner edges

- ▶ Ausgezeichnete Schneideigenschaften in Aluminium, Kupfer
- ▶ Verbesserte Standzeiten und höhere Fräsgenauigkeit.
- ▶ Spiegel-Oberfläche - Hervorragendes Oberflächenfinishing.
- ▶ Überlegene Spanabfuhr
- ▶ Reduzierung von Schneideckenausbrüchen.

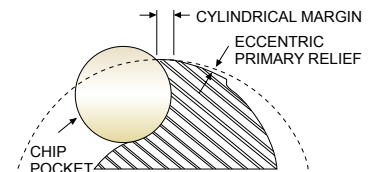


Unit : mm

| EDP No. | Corner Radius | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|---------------|----------------|---------------|----------------|
| | R | D1 | D2 | L1 | L2 |
| E5E51030 | R0.5 | 3.0 | 6 | 12 | 57 |
| E5E51901 | R1.0 | 3.0 | 6 | 12 | 57 |
| E5E51040 | R0.5 | 4.0 | 6 | 15 | 57 |
| E5E51902 | R1.0 | 4.0 | 6 | 15 | 57 |
| E5E51050 | R0.5 | 5.0 | 6 | 20 | 57 |
| E5E51903 | R1.0 | 5.0 | 6 | 20 | 57 |
| E5E51060 | R0.5 | 6.0 | 6 | 20 | 65 |
| E5E51904 | R1.0 | 6.0 | 6 | 20 | 65 |
| E5E51080 | R0.5 | 8.0 | 8 | 22 | 65 |
| E5E51905 | R1.0 | 8.0 | 8 | 22 | 65 |
| E5E51100 | R0.5 | 10.0 | 10 | 25 | 70 |
| E5E51906 | R1.0 | 10.0 | 10 | 25 | 70 |
| E5E51907 | R2.0 | 10.0 | 10 | 25 | 70 |
| E5E51120 | R0.5 | 12.0 | 12 | 25 | 75 |
| E5E51908 | R1.0 | 12.0 | 12 | 25 | 75 |
| E5E51909 | R2.0 | 12.0 | 12 | 25 | 75 |
| E5E51160 | R0.5 | 16.0 | 16 | 35 | 90 |
| E5E51910 | R1.0 | 16.0 | 16 | 35 | 90 |
| E5E51911 | R2.0 | 16.0 | 16 | 35 | 90 |
| E5E51200 | R0.5 | 20.0 | 20 | 40 | 100 |
| E5E51912 | R1.0 | 20.0 | 20 | 40 | 100 |
| E5E51913 | R2.0 | 20.0 | 20 | 40 | 100 |

▶ TiN, TiCN and TiAlN Coatings are available on your request.

| | |
|-------------------------|----------------------|
| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
| 0 ~ -0.015 | h5 |



◎ : Excellent ○ : Good

| ISO Material Description | P | | | | | | | | | | M | | | | K | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|------------------------|-----|------------------------|-----|-----|---|-----|-----|------------------------|-----|------------------------------------|-----|-----|-----|-----------------|--------|---------|-----------------|----------------|----------------|-------------------|--------------------|---------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|----|----|----|
| | Non-alloy steel | | | | | Low alloy steel | | | | | High alloyed steel, and tool steel | | | | Stainless steel | | | | Grey cast iron | | Nodular cast iron | | Malleable cast iron | | | | | | | | | | | | | | | | | | |
| VDI 3323 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
| HRc | 13 | 25 | 28 | 32 | 10 | 29 | 32 | 38 | 15 | 35 | 15 | 23 | 10 | 10 | 10 | 26 | 3 | 25 | 42 | 55 | 60 | 60 | 42 | 55 | | | | | | | | | | | | | | | | | |
| HB | 125 | 190 | 250 | 270 | 300 | 180 | 275 | 300 | 350 | 200 | 325 | 200 | 240 | 180 | 180 | 260 | 160 | 250 | 130 | 230 | | | | | | | | | | | | | | | | | | | | | |
| Recommend | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ISO Material Description | N | | | | | | | | | | S | | | | | | | H | | | | | | | | | | | | | | | | | | | | | | | |
| | Aluminum-wrought alloy | | Aluminum-cast, alloyed | | | Copper and Copper Alloys (Bronze / Brass) | | | Non Metallic Materials | | Heat Resistant Super Alloys | | | | | | | Titanium Alloys | | Hardened steel | Chilled Cast Iron | Hardened Cast Iron | | | | | | | | | | | | | | | | | | | |
| VDI 3323 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | |
| HRc | 60 | 100 | 75 | 90 | 130 | 110 | 90 | 100 | | | 200 | 280 | 250 | 350 | 320 | 400 Rm | 1050 Rm | 550 | 630 | 400 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 1050 | 1100 | 1150 | 1200 | 1250 | 1300 | 1350 | 1400 | | | |
| HB | 60 | 100 | 75 | 90 | 130 | 110 | 90 | 100 | | | 200 | 280 | 250 | 350 | 320 | 400 Rm | 1050 Rm | 550 | 630 | 400 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 1050 | 1100 | 1150 | 1200 | 1250 | 1300 | 1350 | 1400 | | | |
| Recommend | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ |

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

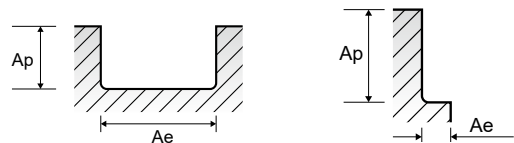
E5909 SERIES

2 FLUTE CORNER RADIUS - SLOTTING

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Mill Diameter (Ø) | | | | | | |
|------|----------|---|------|------|-----------|-------------------|-------|-------|-------|-------|-------|-------|
| | | | | | | 4.0 | 6.0 | 8.0 | 10.0 | 12.0 | 16.0 | 20.0 |
| N | 21~22 | Aluminum-wrought alloy | 1.0D | 0.5D | Vc | 130 | 195 | 200 | 250 | 300 | 320 | 250 |
| | | | | | fz | 0.046 | 0.058 | 0.09 | 0.11 | 0.135 | 0.156 | 0.2 |
| | | | | | RPM | 10345 | 10345 | 7958 | 7958 | 7958 | 6366 | 3979 |
| | 23~24 | Aluminum-cast, alloyed | 1.0D | 0.5D | Vc | 85 | 127 | 130 | 163 | 195 | 208 | 163 |
| | | | | | fz | 0.046 | 0.058 | 0.09 | 0.11 | 0.135 | 0.156 | 0.2 |
| | | | | | RPM | 6724 | 6724 | 5173 | 5173 | 5173 | 4138 | 2586 |
| | 26-28 | Copper and Copper Alloys (Bronze / Brass) | 1.0D | 0.5D | Vc | 40 | 60 | 60 | 75 | 90 | 95 | 75 |
| | | | | | fz | 0.038 | 0.049 | 0.075 | 0.092 | 0.114 | 0.132 | 0.167 |
| | | | | | RPM | 3183 | 3183 | 2387 | 2387 | 2387 | 1890 | 1194 |
| FEED | 242 | 312 | 358 | 439 | 544 | 499 | 399 | | | | | |

2 FLUTE CORNER RADIUS - SIDE CUTTING

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Mill Diameter (Ø) | | | | | | |
|------|----------|---|----------------------------|------|-----------|-------------------|-------|-------|-------|-------|-------|------|
| | | | | | | 4.0 | 6.0 | 8.0 | 10.0 | 12.0 | 16.0 | 20.0 |
| N | 21~22 | Aluminum-wrought alloy | ~Ø10=0.25D Ø12~Ø20=0.5D | 1.0D | Vc | 130 | 195 | 200 | 250 | 300 | 320 | 250 |
| | | | | | fz | 0.054 | 0.077 | 0.115 | 0.135 | 0.17 | 0.194 | 0.25 |
| | | | | | RPM | 10345 | 10345 | 7958 | 7958 | 7958 | 6366 | 3979 |
| | 23~24 | Aluminum-cast, alloyed | ~Ø10=0.25D Ø12~Ø20=0.5D | 1.0D | Vc | 85 | 127 | 130 | 163 | 195 | 208 | 163 |
| | | | | | fz | 0.054 | 0.077 | 0.115 | 0.135 | 0.17 | 0.194 | 0.25 |
| | | | | | RPM | 6724 | 6724 | 5173 | 5173 | 5173 | 4138 | 2586 |
| | 26-28 | Copper and Copper Alloys (Bronze / Brass) | ~Ø10=0.25D Ø12~Ø20=0.5D | 1.0D | Vc | 40 | 60 | 60 | 75 | 90 | 95 | 75 |
| | | | | | fz | 0.045 | 0.064 | 0.097 | 0.114 | 0.142 | 0.163 | 0.21 |
| | | | | | RPM | 3183 | 3183 | 2387 | 2387 | 2387 | 1890 | 1194 |
| FEED | 286 | 407 | 463 | 544 | 678 | 616 | 501 | | | | | |



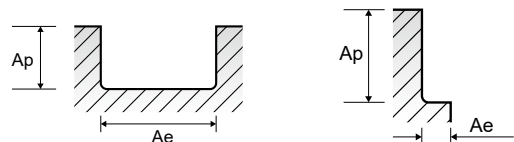
E5E51 SERIES

3 FLUTE CORNER RADIUS - SLOTTING

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Mill Diameter (Ø) | | | | | | | | |
|-----|----------|------------------------|------|------|-----------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 3.0 | 4.0 | 5.0 | 6.0 | 8.0 | 10.0 | 12.0 | 16.0 | 20.0 |
| N | 21~22 | Aluminum-wrought alloy | 1.0D | 0.5D | Vc | 95 | 125 | 155 | 190 | 200 | 250 | 300 | 300 | 250 |
| | | | | | fz | 0.039 | 0.050 | 0.055 | 0.066 | 0.096 | 0.117 | 0.145 | 0.174 | 0.220 |
| | | | | | RPM | 10080 | 9947 | 9868 | 10080 | 7958 | 7958 | 7958 | 5968 | 3979 |
| | 23~24 | Aluminum-cast, alloyed | 1.0D | 0.5D | Vc | 62 | 81 | 101 | 124 | 130 | 163 | 195 | 195 | 163 |
| | | | | | fz | 0.039 | 0.050 | 0.055 | 0.066 | 0.096 | 0.117 | 0.145 | 0.174 | 0.220 |
| | | | | | RPM | 6552 | 6466 | 6414 | 6552 | 5173 | 5173 | 5173 | 3879 | 2586 |
| | FEED | 767 | 970 | 1058 | 1297 | 1490 | 1816 | 2250 | 2025 | 1707 | | | | |

3 FLUTE CORNER RADIUS - SIDE CUTTING

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Mill Diameter (Ø) | | | | | | | | |
|-----|----------|------------------------|-------|------|-----------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 3.0 | 4.0 | 5.0 | 6.0 | 8.0 | 10.0 | 12.0 | 16.0 | 20.0 |
| N | 21~22 | Aluminum-wrought alloy | 0.15D | 2.5D | Vc | 95 | 125 | 155 | 190 | 200 | 250 | 300 | 300 | 250 |
| | | | | | fz | 0.050 | 0.061 | 0.072 | 0.083 | 0.125 | 0.145 | 0.179 | 0.220 | 0.262 |
| | | | | | RPM | 10080 | 9947 | 9868 | 10080 | 7958 | 7958 | 7958 | 5968 | 3979 |
| | 23~24 | Aluminum-cast, alloyed | 0.15D | 2.5D | Vc | 62 | 81 | 101 | 124 | 130 | 163 | 195 | 195 | 163 |
| | | | | | fz | 0.050 | 0.061 | 0.072 | 0.083 | 0.125 | 0.145 | 0.179 | 0.220 | 0.262 |
| | | | | | RPM | 6552 | 6466 | 6414 | 6552 | 5173 | 5173 | 5173 | 3879 | 2586 |
| | FEED | 983 | 1183 | 1385 | 1631 | 1940 | 2250 | 2778 | 2560 | 2033 | | | | |



SELECTION GUIDE



| SERIES | E5910 | E5908 | E5909 |
|--------------------|-----------|-----------|---------------|
| FLUTE | 2 | 3 | 2 |
| HELIX ANGLE | 50° | 40° | 30° |
| CUTTING EDGE SHAPE | BALL NOSE | BALL NOSE | CORNER RADIUS |
| SIZE MIN | R3.0 | R1.0 | D4.0 |
| SIZE MAX | R10.0 | R8.0 | D20.0 |
| PAGE | 480 | 481 | 482 |

SOLID CARBIDE
ALU POWER
END MILLS

Aluminium Alloys and Silent Cutting



Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : P 494



| ISO | VDI 3323 | Material Description | Composition / Structure / Heat Treatment | HB | HRc | | | |
|-----|------------------------------|-----------------------------|--|---------------------------------------|-----|----|---|---|
| P | 1 | Non-alloy steel | About 0.15% C Annealed | 125 | | | | |
| | 2 | | About 0.45% C Annealed | 190 | 13 | | | |
| | 3 | | About 0.45% C Quenched & Tempered | 250 | 25 | | | |
| | 4 | | About 0.75% C Annealed | 270 | 28 | | | |
| | 5 | | About 0.75% C Quenched & Tempered | 300 | 32 | | | |
| | 6 | Low alloy steel | Annealed | 180 | 10 | | | |
| | 7 | | Quenched & Tempered | 275 | 29 | | | |
| | 8 | | Quenched & Tempered | 300 | 32 | | | |
| | 9 | | Quenched & Tempered | 350 | 38 | | | |
| | 10 | | High alloyed steel, and tool steel | Annealed | 200 | 15 | | |
| | 11 | Quenched & Tempered | | 325 | 35 | | | |
| M | 12 | Stainless steel | Ferritic / Martensitic Annealed | 200 | 15 | | | |
| | 13 | | Martensitic Quenched & Tempered | 240 | 23 | | | |
| | 14 | | Austenitic | 180 | 10 | | | |
| K | 15 | Grey cast iron | Pearlitic / ferritic | 180 | 10 | | | |
| | 16 | | Pearlitic (Martensitic) | 260 | 26 | | | |
| | 17 | Nodular cast iron | Ferritic | 160 | 3 | | | |
| | 18 | | Pearlitic | 250 | 25 | | | |
| | 19 | | Ferritic | 130 | | | | |
| 20 | Malleable cast iron | Pearlitic | 230 | 21 | | | | |
| N | 21 | Aluminum-wrought alloy | Not Curable | 60 | | ◎ | ◎ | ◎ |
| | 22 | | Curable Hardened | 100 | | ◎ | ◎ | ◎ |
| | 23 | Aluminum-cast, alloyed | ≤ 12% Si, Not Curable | 75 | | ◎ | ◎ | ◎ |
| | 24 | | ≤ 12% Si, Curable Hardened | 90 | | ◎ | ◎ | ◎ |
| | 25 | | > 12% Si, Not Curable | 130 | | ○ | ○ | ○ |
| | 26 | Copper and Copper Alloys | Cutting Alloys, PB>1% | 110 | | ○ | ○ | ○ |
| | 27 | | CuZn, CuSnZn (Brass) | 90 | | ○ | ○ | ○ |
| | 28 | (Bronze / Brass) | CuSn, lead-free copper and electrolytic copper | 100 | | ○ | ○ | ○ |
| | 29 | | Non Metallic Materials | Duroplastic, Fiber Reinforced Plastic | | | | |
| | 30 | Rubber, Wood, etc. | | | | | | |
| S | 31 | Heat Resistant Super Alloys | Fe Based Annealed | 200 | 15 | | | |
| | 32 | | Cured | 280 | 30 | | | |
| | 33 | | Annealed | 250 | 25 | | | |
| | 34 | Ni or Co Based | Cured | 350 | 38 | | | |
| | 35 | | Cast | 320 | 34 | | | |
| | 36 | Titanium Alloys | Pure Titanium | 400 Rm | | | | |
| 37 | Alpha + Beta Alloys Hardened | | 1050 Rm | | | | | |
| H | 38 | Hardened steel | Hardened | 550 | 55 | | | |
| | 39 | | Hardened | 630 | 60 | | | |
| | 40 | Chilled Cast Iron | Cast | 400 | 42 | | | |
| | 41 | Hardened Cast Iron | Hardened | 550 | 55 | | | |

| E5930 | E5E51 | E5E47 | E5E48 | E5522 E5521 | E5E49 | E5E50 | E5742 E5711 | E5E39 E5E40 | EP922 EP923 | EP924 EP925 |
|---------------|---------------|----------|--------------|----------------|-------------|----------|----------------|----------------|----------------|----------------|
| 2 | 3 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| 25° | 45° | 30° | 45° | 45° | 45° | 45° | 30° | 30° | 42° | 42° |
| CORNER RADIUS | CORNER RADIUS | SQUARE | SQUARE | SQUARE | SQUARE | SQUARE | ROUGHING | ROUGHING | ROUGHING | ROUGHING |
| D2.0 | D3.0 | D2.0 | D3.0 | D3.0 | D3.0 | D3.0 | D6.0 | D6.0 | D12.0 | D12.0 |
| D20.0 | D20.0 | D12.0 | D20.0 | D20.0 | D20.0 | D20.0 | D25.0 | D20.0 | D28.0 | D32.0 |
| 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 |
| NECK | LONG LENGTH | - | SHORT LENGTH | LONG LENGTH | LONG LENGTH | NECK | LONG LENGTH | NECK | SHORT LENGTH | LONG LENGTH |
| Uncoated | Uncoated | Uncoated | Uncoated | Uncoated | Uncoated | Uncoated | Uncoated | Uncoated | TiAIN | TiAIN |



| | | | | | | | | | | | |
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| | | | | | | | ○ | ○ | | | 1 |
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| | | | | | | | ○ | ○ | ○ | ○ | 17 K |
| | | | | | | | ○ | ○ | ○ | ○ | 18 |
| | | | | | | | ○ | ○ | ○ | ○ | 19 |
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| ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | 22 |
| ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | 23 |
| ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | 24 |
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ALU-POWER
HPC
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ALU-
POWER
END MILLS

D-POWER
GRAPHITE
END MILLS

D-POWER
CFRP
END MILLS

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CRX S
END MILLS

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