# SARA® Solid carbide end milling cutter

- Please adjust these guideline values according to clamping operation and machine set-up!

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| ISO | Materials group | Strength/ Hardness N/mm² | Material example chemical | Material number | Cutting speed Vc m/min | Feed fz in mm/tooth in relation to milling cutter diameter in mm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ≤ Ø 2 | ≤ Ø 4 | ≤ Ø 8 | ≤ Ø 12 | ≤ Ø 16 | ≤ Ø 20 |
| P | Machining steel | Up to 700 | 9 SMn 28 | 1.0715 | 110 - 160 | 0.01 | 0.02 | 0.04 | 0.05 | 0.06 | 0.07 |
| | Unalloyed structural steel | Up to 700 | St-52 | 1.0052 | 90 - 160 | 0.01 - 0.015 | 0.02 - 0.03 | 0.04 - 0.05 | 0.05 | 0.06 - 0.07 | 0.07 - 0.08 |
| | Cast steel | Up to 950 | GS 40 | 1.0416 | 90 - 150 | 0.015 | 0.03 | 0.05 | 0.05 | 0.07 | 0.08 |
| | Case-hardened steel | Up to 1200 | 16 MnCr 5 | 1.7131 | 90 - 140 | 0.007 - 0.01 | 0.015 - 0.02 | 0.03 - 0.04 | 0.04 - 0.05 | 0.05 - 0.06 | 0.06 - 0.07 |
| | Tempering steel | 950 -1300 | 43CrMo4 | 1.3563 | 80-120 | 0.007 | 0.015 | 0.03 | 0.04 | 0.05 | 0.06 |
| | Nitriding steel | 950 - 1300 | 31CrMoV9 | 1.8519 | 80 - 110 | 0.007 | 0.015 | 0.03 | 0.04 | 0.05 | 0.06 |
| M | Stainless steel, ferr./marten. | 500 - 950 | X10Cr13 | 1.4006 | 70 - 84 | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |
| | Stainless steel, austenitic | 500 - 950 | X 5 CrNi 18 10 | 1.4301 | 70 | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |
| K | Grey cast iron | Up to 260 HB | GG 25 | 0.6025 | 90 - 156 | 0.007 - 0.018 | 0.015 - 0.035 | 0.03 - 0.06 | 0.04 - 0.07 | 0.05 - 0.09 | 0.06 - 0.12 |
| | Alloyed grey cast iron | Up to 310 HB | GGL-NiCr 35 2 | 0.6678 | 104 - 156 | 0.005 - 0.015 | 0.01 - 0.03 | 0.02 - 0.05 | 0.03 - 0.05 | 0.04 - 0.07 | 0.05 - 0.08 |
| | Ductile iron | Up to 280 HB | GGG 60 | 0.7060 | 130 - 156 | 0.018 | 0.035 | 0.06 | 0.07 | 0.09 | 0.12 |
| N | Al. alloy long-chipping | Up to 500 | AlMg 3 | 3.3535 | 100 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| | Al. alloy short-chipping | Up to 500 | G-AlSi 12 | 3.2581 | 120 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| | Copper alloy (bronze) long-chipping | Up to 1200 | CuSn4 | 2.1016 | 120 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| | Copper alloy (bronze) short-chipping | Up to 850 | CuNi12Zn24 | 2.0730 | 140 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| | Copper alloy (brass) long-chipping | Up to 600 | Cu ZN 20 | 2.0250 | 150 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| | Copper alloy (brass) short-chipping | Up to 600 | Cu Zn 39 Pb 3 | 2.0381 | 200 | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.12 |
| S | Titanium alloys | Up to 1300 | TiAl6Sn 2 | 3.7174 | 20 - 50 | 0.01 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |
| | Nickel-based alloys | Up to 1300 | NiCr19Fe19NbMo | Inconel 718 | 30 | 0.01 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 |

**Cutting speed and feed correction factors**

| ae | 10% | 20% | 50% | 100% |
|---|---|---|---|---|
| Factor for Vc | 1.3 | 1.1 | 1 | 0.85 |
| Factor for fz | 1.5 | 1.3 | 1 | 0.8 |

# Solid carbide high-performance end milling cutter

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- **Note:**
  The recommended cutting data are guide values for conventional roughing and assume stable machine conditions, low-vibration workpiece clamping and the application of suitable cooling lubricant. The cutting speed Vc can be increased by 20% for finishing. or full slot milling we recommend reducing the cutting speed Vc by approx. 15% and the feed Vf mm/min by 30%.

| ISO | **Grooving** ap: 1.00 x D/ ae: 1.00 x D Materials group | Strength/ Hardness N/mm² | Material examples | Material number | Cutting speed Vc m/min | Feed fz in mm/tooth in relation to milling cutter diameter range in mm | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 3-4 | 5 - 6 | 8 -10 | 12 - 16 | 18 - 25 |
| P | Unalloyed structural steel | Up to 700 | St-52 | 1.0052 | 156 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Machining steel | Up to 700 | 9 SMn 28 | 1.0715 | 170 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Unalloyed tempered steel | 500 - 950 | Ck45 | 1.1191 | 127 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Alloyed case-hardened steel | Up to 950 | 16 MnCr 5 | 1.7131 | 99 | 0.008 | 0.021 | 0.027 | 0.044 | 0.071 |
| | Tool steel | 950 - 1400 | X 38 CrMoV 5 1 | 1.2343 | 85 | 0.008 | 0.021 | 0.027 | 0.044 | 0.071 |
| | Cast steel | Up to 950 | GS 40 | 1.0416 | 105 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| M | Stainless steel, austenitic | 500 - 950 | X 5 CrNi 18 10 | 1.4301 | 156 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Stainless steel, sulphurised | 500 - 950 | X 12 CrMoS 17 | 1.4104 | 53 | 0.008 | 0.021 | 0.027 | 0.044 | 0.071 |
| | Stainless steel, martensitic | 500 - 950 | X 10 Cr 13 | 1.4006 | 53 | 0.008 | 0.021 | 0.027 | 0.044 | 0.071 |
| K | Grey cast iron | 100 - 400 | GG 25 | 0.6025 | 127 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Alloyed grey cast iron | 150-250 | GGL-NiCr 35 2 | 0.6678 | 99 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Ductile iron | 400 - 800 | GGG 60 | 0.7060 | 99 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| | Malleable cast iron | 350 - 700 | GTS 55 | 0.8155 | 99 | 0.01 | 0.029 | 0.038 | 0.063 | 0.101 |
| S | Titanium alloy | 900 - 1400 | TiAl6Sn 2 | 3.7174 | 25 | 0.006 | 0.013 | 0.021 | 0.027 | 0.059 |
| | Nickel-based alloy | 900 - 1400 | NiCr19Fe19NbMo | Inconel 718 | 25 | 0.006 | 0.013 | 0.021 | 0.027 | 0.059 |