

Material Group

STEP 1 - Identify workpiece Material Group



| DIN ISO 513 | Material | Condition | Tensile Strength (Kpsi) | Hardness HB | Material Group # VDI 3323 | Trade Names | |
|-----------------------|--|----------------------------------|-------------------------|-------------|---------------------------|--|--|
| P | Non-alloy steel, cast steel, free cutting steel | <0.25%C Annealed | 61 | 125 | 1 | 1010, 1015, 1018, 1020, 1023, 1102, 1108, 1109, 1213, 12L13, 1215 | |
| | | >=0.25%C Annealed | 94 | 190 | 2 | 1025, 1030, 1035, 1040, 1045, 1050, 1140, 1141, 1330 | |
| | | <0.55%C Quenched and tempered | 123 | 250 | 3 | 1025, 1030, 1035, 1040, 1045, 1050, 1140, 1141, 1330 | |
| | | >=0.55%C Annealed | 109 | 220 | 4 | 1055, 1060, 1070, 1080, 1151, W112 | |
| | Low alloy steel and cast steel (Less than 5% of alloying elements) | Quenched and tempered | 145 | 300 | 5 | 1055, 1060, 1151 | |
| | | Annealed | 87 | 200 | 6 | 3135, 3435, 3440, 4130, 4140, 4150, 4320, 4340, 5015, 5060, 5120, 5132, 5140, 5160, 6150, 8620, 8640, 9254, 9255, 9262, L1, L2, L3, O1, O2, S1, P2, P3, P5, P20, W1, W2, W5, 51100, 52100, | |
| | | Quenched and tempered | 135 | 275 | 7 | | |
| | | | 145 | 300 | 8 | | |
| | | | 174 | 350 | 9 | | |
| | High alloy steel, cast steel and tool steel | Annealed | 99 | 200 | 10 | A2, A3, A4, A,6 A7, A10, D2, D3, D4, D5, D7, H11, H12, H13, H14, H17, H22, H23, S7, M1, M2, M3, M4, M6, M7, M10, M30, M42, T1, T2, T4, T5, | |
| Quenched and tempered | | 160 | 325 | 11 | | | |
| M | Stainless steel and cast steel | Ferritic/martensitic | 99 | 200 | 12 | 203, 303, 303Plus X, 303Pb, 409, 430, 430F, 440, 444 | |
| | | Martensitic | 119 | 240 | 13 | 410, 420, 431, 440A, 416 | |
| | | Austenitic | 87 | 180 | 14 | 304, 310, 316, 316L, 317, Nitronic 40, Carpenter 20, 13-8, 15-5, 17-4 | |
| K | Gray cast iron (GG) | Ferritic | | 180 | 15 | ASTM A48 Classes 20, 25, SAEJ431c grades G1800, G2000, G2500 | |
| | | Pearlitic | | 260 | 16 | ASTM A48 Classes 30, 35, 40, 45, 50, SAEJ431c grades G3000, G3500 | |
| | Cast iron nodular (GGG) | Ferritic | | 160 | 17 | 60-40-18, 65-45-12 | |
| | | Pearlitic | | 250 | 18 | 80-55-06, 100-70-03, 120-90-02 | |
| | Malleable cast iron | Ferritic | | 130 | 19 | 22010, 325110 | |
| | | Pearlitic | | 230 | 20 | 40010, 50005, 70003, 90001 | |
| N | Aluminum - Wrought alloy | Not cureable | | 60 | 21 | 1000, 2011, 2014, 2124, 2024, 6061, 7075 | |
| | | Cured | | 100 | 22 | | |
| | Aluminum - cast, alloyed | <=12% Si Not cureable | | 75 | 23 | 319, 383, 356, 413, 535, A280, A380, A413 | |
| | | Cured | | 90 | 24 | | |
| | | >12% Si High temp | | 130 | 25 | | |
| | Copper alloys | >1% Pb Free cutting | | 110 | 26 | C23000, C36000, C83600, C93200, C93600 | |
| | | Brass | | 90 | 27 | C18200, C27200, C27700, C86500, Red Brass | |
| | | Electrolitic copper | | 100 | 28 | B-148-52, C63000, C81500, C90700, C90800 | |
| | Non-metallic | Duroplastics, fiber plastics | | | 29 | | |
| | | Hard rubber | | | 30 | | |
| S | High temp. alloys | Fe based | Annealed | | 200 | A286, Incoloy 800, Incoloy 801, Incoloy 802, N-155, W-545 | |
| | | | Cured | | 280 | | 32 |
| | | Ni or Co based | Annealed | | 250 | 33 | Astroloy, Hastelloy, C-272, IN-100, Inconel 625, Inconel 718, Inconel 750, Numonic, Rene, Udimet, Waspaoly, Haynes, Stellite, AR213, MP35N |
| | | | Cured | | 350 | 34 | |
| | | | Cast | | 320 | 35 | |
| | Titanium, Ti alloys | | Rm 58 | | 36 | Grade 1, Grade 2, Grade 2H, Grade 3 | |
| | | Alpha+beta alloys cured | Rm 152 | | 37 | Grade 5, Ti6AL4V, Ti6-4 | |
| H | Hardened steel | Hardened | | 55 HRC | 38 | Hardox 400, Hardox 500, W1, W210 | |
| | | Hardened | | 60 HRC | 39 | HSS, 90 MnV8 | |
| | Chilled cast iron | Cast | | 400 | 40 | Ni-Hard 1, Ni-Hard 2, Ni-Hard 4, A532, GX300 | |
| | Cast iron nodular | Hardened | | 55 HRC | 41 | | |

ISO Turning, CBN - Cutting Speeds

STEP 2 - Locate Cutting Speed by Insert Grade & Material Group

OPG-005 (07/2021)



| DIN ISO 513 | Material Group # VDI 3323 | Cutting Speed (SFM) | | | | |
|-------------------|---------------------------------|---------------------|-----------|-----------|-----------|-----------|
| | | PCBN | | | | |
| | | TB610 | TB650 | TB670 | TB730 | KB90A |
| P | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| | 6 | | | | | |
| | 7 | | | | | |
| | 8 | | | | | |
| | 9 | | | | | |
| | 10 | | | | | |
| | 11 | | | | | |
| M | 12 | | | | | |
| | 13 | | | | | |
| | 14 | | | | | |
| K | 15 | | | | 3935-5575 | 3935-5575 |
| | 16 | | | | 3445-4755 | 3445-4755 |
| | 17 | | 1640-2295 | 1475-2000 | | |
| | 18 | | 1310-1970 | 1150-1675 | | |
| | 19 | | | | | |
| | 20 | | | | | |
| N | 21 | | | | | |
| | 22 | | | | | |
| | 23 | | | | | |
| | 24 | | | | | |
| | 25 | | | | | |
| | 26 | | | | | |
| | 27 | | | | | |
| | 28 | | | | | |
| | 29 | | | | | |
| | 30 | | | | | |
| S | 31 | | | | | |
| | 32 | | | | | |
| | 33 | | | | | |
| | 34 | | | | | |
| | 35 | | | | | |
| | 36 | | | | | |
| | 37 | | | | | |
| H | 38 | 360-720 | 295-890 | 295-525 | 260-425 | |
| | 39 | 330-655 | 260-525 | 260-490 | 195-395 | |
| | 40 | | | 395-590 | 395-590 | 395-590 |
| | 41 | | | | 330-460 | 330-460 |