# EXPK1-M02-0254 | EXPK1 SLOTMAKER Z5 3XD IC AFPX

| | |
|---|---|
| Cooling | |
| Tolerance | e8 |
| Coating | AlphaFerro Platin X |

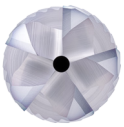
| | |
|---|---|
| Strategy | ETC, HPC |
| Application | |
| Features | HB, ≠, 3xD, R |

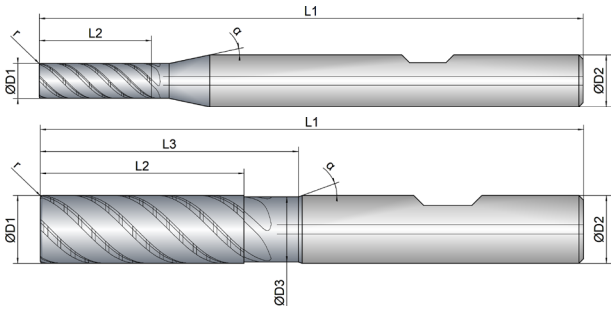
Expert

- Optimized roughing teeth for soft cut and small chips
- Ascending reinforced tool core for maximum stability
- Variable helical pitch and unequal tooth pitch for smooth running

- For roughing, up to 2xD full slot
- For process reliable, helical immersion

- With central inner cooling
- Extreme material removal at the highest performance
- Also ideally designed for trochoidal milling






**Roughing**

inappropriate — optimal

**Finishing**

inappropriate — optimal

| EXPK1-M02-0254 | D1 mm ø | D3 mm ø | L2 mm | L3 mm | L1 mm | D2 mm ø | z # | r mm | ° | α ° |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 4.0 | 0.0 | 13.0 | 0.0 | 63.0 | 6.0 | 5 | 0.10 | 45 | 12 |
| 6 | 6.0 | 5.6 | 18.0 | 24.0 | 63.0 | 6.0 | 5 | 0.20 | 45 | 20 |
| 8 | 8.0 | 7.6 | 24.0 | 30.0 | 70.0 | 8.0 | 5 | 0.20 | 45 | 20 |
| 10 | 10.0 | 9.6 | 30.0 | 38.0 | 80.0 | 10.0 | 5 | 0.32 | 45 | 20 |
| 12 | 12.0 | 11.4 | 36.0 | 46.0 | 93.0 | 12.0 | 5 | 0.32 | 45 | 20 |
| 16 | 16.0 | 15.4 | 48.0 | 58.0 | 110.0 | 16.0 | 5 | 0.32 | 45 | 20 |
| 20 | 20.0 | 19.4 | 60.0 | 74.0 | 125.0 | 20.0 | 5 | 0.50 | 45 | 20 |

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| | Material | Strength (N/mm²) | Full Slot | Side Milling | ETC | Materialgroup Factor fz / α | Materialgroup Factor ae ETC |
|---|---|---|---|---|---|---|---|
| **P** | STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | unalloyed | <500 | 205 | 205 | 313 | 1 | 1 |
| **1.2-1.5** | unalloyed | <1100 | 170 | 170 | 258 | 0.9 | 0.8 |
| **2.1-2.2** | low-alloyed | <950 | 160 | 160 | 236 | 0.9 | 0.8 |
| **2.3-2.4** | low-alloyed | <1300 | 135 | 135 | 162 | 0.8 | 0.75 |
| **3.1-3.2** | high-alloyed | <1100 | 150 | 150 | 177 | 0.8 | 0.7 |
| **3.3** | high-alloyed | <1400 | 125 | 125 | 156 | 0.7 | 0.68 |
| **K** | CASTINGS | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1-1.2** | Grey cast iron | <1000 | 190 | 190 | 212 | 0.9 | 0.8 |
| **2.1-2.2** | Modular cast iron | <850 | 150 | 150 | 167 | 0.8 | 0.75 |
| **3.1-3.2** | Malleable cast iron | <800 | 125 | 125 | 154 | 0.8 | 0.75 |
| **M** | STAINLESS STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | ferritic/martensitic | <850 | | 70 | 136 | 0.9 | 0.6 |
| **2.1** | austenitic | <650 | | 55 | 114 | 0.8 | 0.45 |
| **2.2** | austenitic | <750 | | 45 | 99 | 0.75 | 0.4 |
| **3.1** | DUPLEX STEEL \| super austenitic | <1100 | | | | | |

**ADVICE |** The values marked in turquoise are side applications!
All fz/α values in the table for material group 1.1, consider factors for the other groups!
When helical, ramping and drilling use fz 50 % of the full slot.
The specified values represent starting values for a solid clamping situation.
To determine the hmax values, please use the provided calculator.

**Material P 1.1**

| D1 | L2 | Immersion Angle | Full Slot | | | Side Milling | | | ETC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | mm | α° | 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) | hmax (mm) |
| 4 | 13 | 0.8° | 0.015 | 4 | 4 | 0.022 | 1.2 | L2max | 0.038 | 0.7 | L2max | 0.0289 |
| 6 | 18 | 1° | 0.025 | 6 | 6 | 0.035 | 1.8 | L2max | 0.062 | 1.1 | L2max | 0.048 |
| 8 | 24 | 1° | 0.035 | 8 | 8 | 0.05 | 2.4 | L2max | 0.086 | 1.4 | L2max | 0.0654 |
| 10 | 30 | 1.2° | 0.055 | 10 | 10 | 0.075 | 3 | L2max | 0.102 | 1.8 | L2max | 0.0784 |
| 12 | 36 | 1.2° | 0.06 | 12 | 12 | 0.085 | 3.6 | L2max | 0.125 | 2.1 | L2max | 0.095 |
| 16 | 48 | 1.5° | 0.065 | 16 | 16 | 0.09 | 4.8 | L2max | 0.142 | 2.8 | L2max | 0.108 |
| 20 | 60 | 2° | 0.075 | 20 | 20 | 0.11 | 6 | L2max | 0.166 | 3.5 | L2max | 0.126 |

# EXPLANATION

## APPLICATIONS

| | | | |
|---|---|---|---|
| Multipass milling | Trimming | Deburring | Engraving |
| Corner rounding | Full slot milling | Forward and backward deburring | |

## COOLINGS

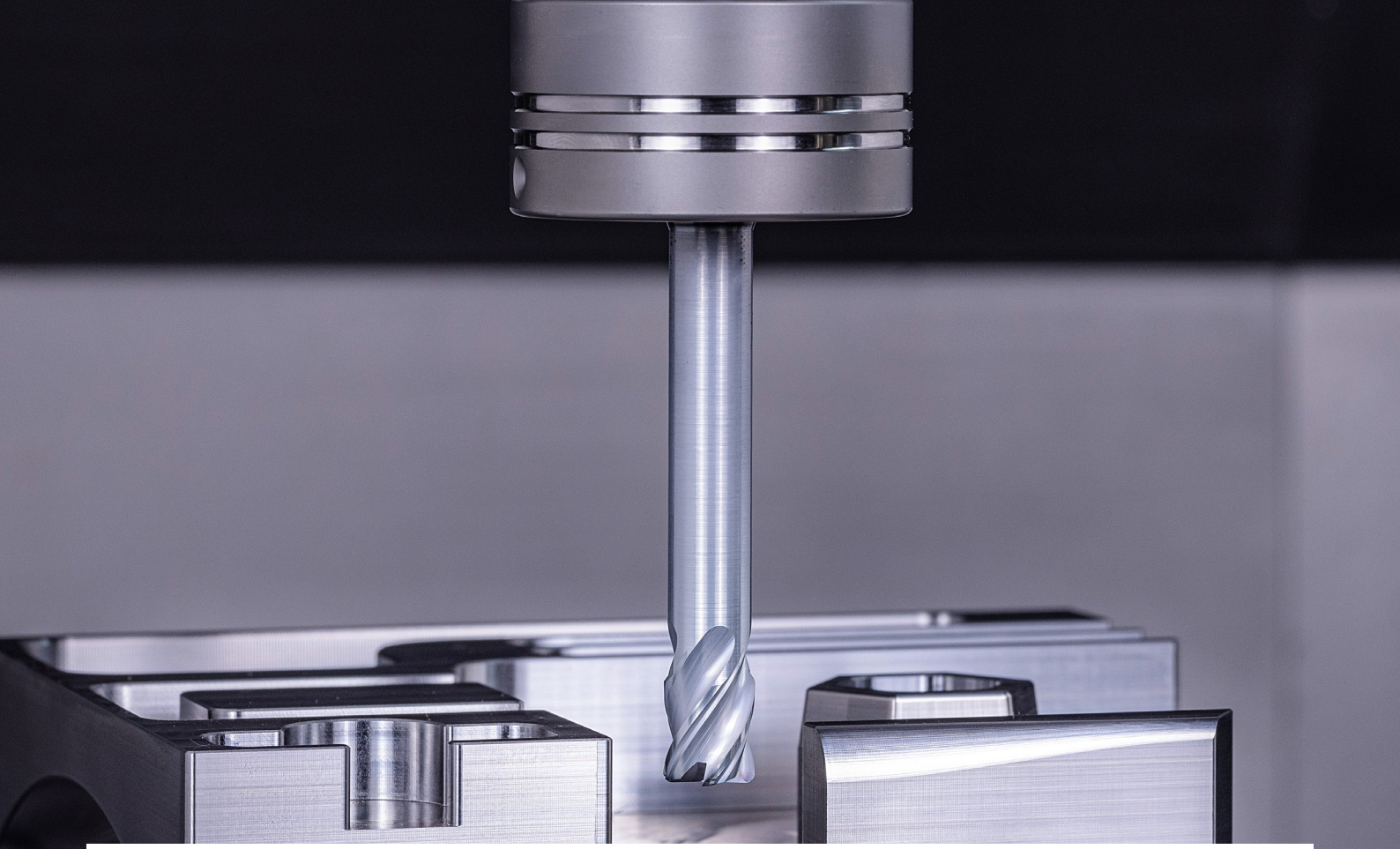
| | | | |
|---|---|---|---|
| Air-cooling | Dry machining | Oil cooling | Cooling Lubricant |
| Minimum quantity lubrication | | | |

## FEATURES

| | | | |
|---|---|---|---|
| 0,5xD | 1xD | 1,5xD | 2xD |
| 2,5xD | 3xD | 3,5xD | 4xD |
| 5xD | Center cutting | Non-center cutting | Without Weldon |
| With Weldon | Internal cooling | Dynamic helical pitch | Chip breaker |
| Unequal tooth pitch | Roughing teeth | Helical immersion | Feed directions x,y |
| Feed directions x, y, z | Feed directions x, y, (z) | Corner radius | Corner bevel |
| Sharp edged | | | |

## STRATEGY

| | | | |
|---|---|---|---|
| Extended Trochoidal Cutting | High Performance Cutting | High Speed Cutting | Multi Task Cutting |
| Universal Machining | | | |



## PROPERTIES

| | | | |
|---|---|---|---|
| Cutting diameter | Small cutting diameter | Large cutting diameter | Undercut diameter |
| Cutting length | Total bevel length | Undercut length | Total length |
| Shank diameter | Number of teeth | Corner radius | Corner bevel |
| Programming radius | Maximum cutting depth | Helical angle | Alpha angle |

## APPLICATION TABLE

**The** values given in the application table are only guidelines. These values are largely dependent on the machining situation and application.

## FIGURES

**All** technical drawings and photographs are given as an example. The product may deviate from the original in terms of colour and dimensions.

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.0498** | ST42.8 | | | | | | | STPT 42 | |
| **1.0044** | ST442 | | E28-2 | 4360-43 B | Fe 430 BFN | 1412 | AE 275-B | SM 41 B | 570 Gr. 40 |
| **1.0420** | GS38 | GE 200 | 230-400M | | | 1306 | | | |
| **1.0446** | GS45 | GE 230 | E23-45M | A1 | | 1305 | F.221 | SC 450 | |
| **1.0136** | St42-3 | | | | | | | | |
| **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 | | | | | | | | |
| **1.1151** | Ck22 | 2 C 22 | XC 25 | 050 A 20 | C 20 | | C 25 k | S 22 C | 1023 |
| **1.5523** | 19MnB4 | | | 170 H 20 | | | 20 Mn B 4 DF | SWRCHB | |
| **1.8961** | WTSt373 | | | | Fe 360 D FF | | | SMA 50 A | |
| **1.0035** | ST33 | | A 33 | | FE 320 | | | SS 330 | |
| **1.0037** | ST37-2 | | | | | | | STKR 400 | |
| **1.0710** | 15S10 | | | | | | | | |
| **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 |
| **1.0721** | 10S20 | 10 S 20 | 10 F 1 | 210 M 15 | CF 10 S 20 | | 10 S 20 | | 1108 |
| **1.0722** | 10SPb20 | 10 SPb 20 | 10 Pb F 2 | | CF 10 SPb 20 | | 10 SPb 20 | | 11 L 08 |
| **1.0736** | 9SMn36 | | S300 | 240 M 07 | CF 9 SMn 36 | | 12 SMn 35 | SUM 25 | 1215 |
| **1.0737** | 9SMnPB36 | | S 300 Pb | | CF 9 SMnPb 36 | 1926 | 12 SMnPb 35 | | 12 L 14 |

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.0553** | S244J0 | S355J0 | E 36-3 | En 50 C | Fe 510 C FN | | | SM 520 M | S355J0 |
| **1.0581** | ST52.4 | | | | | | | STS 49 | |
| **1.1140** | C15R | C15R | C15R | C15R | | | C 16 k-1 | | |
| **1.1141** | Ck15 | 2 C 15 | XC 15 | 080 M 15 | C 15 | 1370 | C 16 k | S 15 C | 1015 |
| **1.1190** | S355G15 | | | | | | | | |
| **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 |
| **1.0461** | STE255 | | | | | | | | |
| **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 |
| **1.0505** | STE315 | | | | | | | SM 50 A | |
| **1.0511** | C40 | 1 C 40 | | 080 M 40 | | | F.114.A | S 40 C | 1040 |
| **1.0528** | C30 | 1 C 30 | CC 32 | 080 M 30 | C30 | | | SUP 7 | 1030 |
| **1.0540** | C50 | 1 C 50 | | 080 M 50 | | 1674 | | S 50 C | 1050 |
| **1.0552** | GS52 | GE 260 | | | | | | | |
| **1.0558** | GS60 | GE 300 | 320-560M | A3 | C 45 | 1606 | | | |
| **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 |
| **1.0970** | 38Si7 | | 41 S 7 | | | | | | |
| **1.1106** | ESTE355 | | | P 355 NL 2 | | | | STK 500 | |
| **1.1127** | 36Mn6 | | | 212 M 36 | | | | SMn 443 | 1141 |
| **1.1133** | 20MN5 | | | 120 M 19 | G 22 Mn3 | | 20 Mn 6 | SMn 420 | 1022 |
| **1.1169** | 20Mn6 | | | | | | | | |
| **1.1520** | C70W1 | | | | C 70 KU | | | | |
| **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 | | |
| **1.1158** | Ck25 | 2 C 25 | XC 25 | 070 M 26 | C 25 | | C 25 k | S 25 C | 1025 |
| **1.1178** | Ck30 | 2 C 30 | XC 32 | 080 M 30 | C30 | | | S 30 C | 1030 |
| **1.1181** | Ck35 | 2 C 35 | XC 38 H1 | 080 M 36 | C35 | 1572 | C 35 k | S 35 C | 1034 |
| **1.1183** | Cf35 | | XC 38 TS | 060 A 35 | C35 | 1572 | | S 35 C | 1035 |
| **1.1191** | Ck45 | 2 C 45 | XC 42 | 080 M 46 | C40 | | C45 k | S 45 C | 1045 |
| **1.1206** | Ck50 | 2 C 50 | | 080 M 50 | C50 | 1674 | | S 50 C | 1050 |
| **1.1730** | C45W | C 45 U | Y3 42 | | | | | | |
| **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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.1165** | GS30Mn5 | | 35 M 5 | 120 M 36 | | 1330 | 30 Mn 5 | SMn 433 H | 1330 |
| **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 | |
| **1.1820** | C55W | | | | | | | | |
| **1.1830** | C85W | C 90 U | Y3 90 | | | | | SK 5 | 1084 |
| **1.1744** | C67W | | Y1 70 | | | | F.512 | | A-6 |
| **1.1750** | C75W | | | BW 1A | | | | | W 1 |
| **1.5404** | 21MoV53 | | | | | | | | |
| **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 | |
| **1.7258** | 24CrMo4 | | | | | | | SCM 822 H | |
| **1.7259** | 26CrMo7 | | | | | | | | |
| **1.7273** | 24CrMo10 | | | | | | | | |
| **1.7337** | 16CrMo44 | | | | A18 CrMo 4 5 KW | | | | A 387 Gr. 12 Cl. 2 |
| **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 | | | | | | |
| **1.7766** | 17CrMoV10 | | | | | | | | |
| **1.7779** | 20CrMoV135 | | | | | | | | |

## P 1.4 **STEEL |** unalloyed <950 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.0062** | ST601 | | | | | | | | |
| **1.0532** | ST522 | S 390 G 1 S | | | | | | | |
| **1.0535** | C55 | 1 C 55 | C 55 | 070 M 55 | C 55 | 1655 | | C 55 | 1055 |
| **1.0570** | ST523 | S 355 J2 F3 | E 36-3 | 4360-50 B | Fe 510 B | 2132 | A 510 C | SM 50 YB | |
| **1.0728** | 60S20 | 60 S 20 | 60 MF 4 | | | | | | 1151 |
| **1.1203** | Ck55 | 2 C 55 | XC 55 H1 | 070 M 55 | C 55 | 1655 | C 55 k | S 55 C | 1055 |
| **1.7276** | 10CrMo11 | | 12 CD 10 | | | | | | |
| **1.7281** | 16CrMo93 | | 20 CD 8 | | | | | | |

## P 1.5 **STEEL |** unalloyed <1100 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.0070** | ST702 | | A 70-2 | | Fe 70-2 | | A 690-2 | | |
| **1.0601** | C60 | 1 C 60 | AF 70 C 55 | 080 A 62 | C 60 | | | S 60 C-CSP | 1060 |
| **1.1221** | Ck60 | 2 C 60 | XC 60 | 060 A 62 | C 60 | 1678 | | S 58 C | 1060 |
| **1.1223** | Cm60 | 3 C 60 | C 60 R | 080 A 67 | C 60 R | | | | |
| **1.0603** | C67W | | | | | | | | |

## 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 |
| **1.2101** | 62SiMnCr4 | | | | | | | | |
| **1.2162** | 21MnCr5 | 21 MnCr 5 | 20 NC 5 | | | | | SCR 420 H | |
| **1.2208** | 31CrV3 | | | | | | | | |
| **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 |
| **1.2307** | 29CrMoV9 | | | | | | | | |
| **1.2323** | 48CrMoV67 | | 45 CDV 6 | | | | | | |
| **1.2382** | GX155CrVMo121 | | | | | | | | |
| **1.2414** | 120W4 | | | | | | F.532 | | |
| **1.2542** | 45WCrV7 | 45 WCrV 8 | | BS 1 | 45 WCrV 8 KU | 2710 | 45 WCrSi 8 | | S1 |
| **1.2552** | 80WCrV8 | | | | | | 60 WCrSi 8 | | |
| **1.2726** | 26NiCrMoV5 | | | | | | | | |
| **1.2737** | 28NiCrV5 | | | | | | | | |
| **1.2738** | 40CrMnNiMo864 | 40CrMnNiMo8-6-4 | | | | | | | |
| **1.2826** | 60MnSi4 | | 60 MSC 4 | | | | | | |
| **1.2838** | 145V33 | | | | | | | | |
| **1.2842** | 90MnCrV8 | 90 MnV 8 | 90 MV 8 | BO 2 | 90 MnVCr 8 KU | | | | 0 2 |
| **1.5752** | 14NiCr14 | 13 NiCr 12 | 16 NC 12 | 655 M 13 | 16 NiCr 11 | | | SNC 815 H | E3310 |
| **1.5919** | 15CrNi6 | 14 CrNi 6 | 16 NC 6 | S 107 | 16 CrNi 4 | | | SNCM 420 | |
| **1.7003** | 38Cr2 | 38 Cr 2 KD | 38 C 2 | 120 M 36 | 38 Cr 3 | | 38 Cr 3 | SMn 438 | 50 B40 |
| **1.7012** | 13Cr2 | | | | | | | | |
| **1.7045** | 42Cr4 | 40 NiCrMo 3 | 42 C 4 TS | 530 A 40 | 41 Cr 4 | 2245 | 42 Cr 4 | SCr 440 | 5140 |
| **1.7103** | 67SiCr5 | 67 SiCr 5 | | | 67 SiCr 5 | | | | |
| **1.7131** | 16MnCr5 | 16 MnCr 5 KD | 16 MC 5 | 527 M 17 | 16 MnCr 5 | 2173 | 16 MnCr 5 | SCR 415 | 5115 |
| **1.7271** | 23CrMoB33 | | | | | | | | |
| **1.7715** | 14MoV63 | 14 MoV 6-3 | | 1503-660-440 | | | 13 MoCrV 6 | | |
| **1.8907** | STE500 | | | | | | | SM 58 | |
| **1.8911** | ESTE380 | | | | | | | | |

## 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 | | |
| **1.0906** | 65Si7 | | | 250 A 61 | | | | | |
| **1.0985** | QSTE500N | | | | | | | | |
| **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 | |
| **1.2056** | 90Cr3 | | | | | | | | |
| **1.2057** | 105Cr4 | | | | | | F.120.J | SKC 11 | |
| **1.2108** | 90CrSi5 | P 280 GH | | | C 100 KU | 2092 | | SFVC 2A | |
| **1.2109** | 125CrSi5 | | | | | | | | |
| **1.2127** | 105MnCr4 | | | | 100 CrMn 4 KU | | | SUJ 3 | |
| **1.2206** | 140CrV1 | | 130 C 3 | | | | | | 0 6 |
| **1.2242** | 59CrV4 | | | | | | | | |
| **1.2243** | 61CrSiV5 | | | | | | | | |
| **1.2249** | 45SiCrV6 | | | | | | | | |
| **1.2303** | 100CrMo5 | | | | | | F.520.F | | L 7 |
| **1.2312** | 40CrMnMoS86 | | 40 CMD 8 | | | | | | |
| **1.2519** | 110WCrV5 | | | | | | 102 WCrV 5 | | |
| **1.2562** | 142WV13 | | | | | | | | |
| **1.2740** | 28NiCrMoV10 | | | | | | | | |
| **1.2743** | 60NiCrMoV124 | | | | | | | | |

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.2747** | 28NiMo17 | | | | | | | | |
| **1.2766** | 35NiCrMo16 | | | | | | | | |
| **1.2851** | 34CrAl6 | | | | | | | | |
| **1.3501** | 100Cr2 | | 100 C 2 | | | | | | E 50100 |
| **1.3503** | 105Cr4 | | | | | | | | E51100 |
| **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 2.3 **STEEL |** low alloyed <1100 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.2419** | 105WCr6 | 105 WCr 5 | 105 WC 13 | | 107 WcR 5 KU | 2140 | 105 WCr 5 | SKS 31 | |
| **1.2511** | 80WCrV3 | | | | | | | | |
| **1.2515** | 100WV4 | | | | | | | SKS 21 | |
| **1.3561** | 44Cr2 | 46 Cr 1 KD | 44 Cr 2 | | | | | | 5046 |
| **1.3563** | 43CrMo4 | | 43 CrMo 4 | | | | | | 4142 |
| **1.3565** | 48CrMo4 | | | | | | | | |
| **1.5023** | 38Si7 | | | | | | | | |
| **1.5025** | 51Si7 | 50 Si 7 | | | 48 Si 7 | 2090 | | | 9259 H |
| **1.5029** | 71Si7 | | | | | | | | |
| **1.5085** | 51Mn7 | | | | | | | | |
| **1.5094** | 38MnS6 | 38 MnS 6 | | | | | | | |
| **1.5131** | 50MnSi4 | | | | | | | | |
| **1.5141** | 53MnSi4 | | | | | | | | |
| **1.5142** | 60MnSi5 | | | | | | | | |
| **1.5213** | 15MnV5 | | | | | | | | |
| **1.5217** | 20MnV6 | | | | | | | | |
| **1.5223** | 42MnV7 | | | | | | | | |
| **1.5225** | 51MnV7 | | | | | | | | |
| **1.5231** | 38MnSiVS5 | | | | | | | | |
| **1.5232** | 27MnSiVS6 | | | | | | | | |
| **1.5233** | 44MnSiVS6 | | | | | | | | |
| **1.5403** | 17MnMoV64 | | | 1501-261 | | | | SBV 3 | |
| **1.5526** | 30MnB4 | | | | | | | | |
| **1.5710** | 36NiCr6 | | 30 NC 6 | 640 A 35 | | | | SNC 236 | 3135 |
| **1.5736** | 36NiCr10 | | 30 NC 11 | | 35 NiCr 9 | | | SNC 631 H | 3435 |
| **1.5755** | 31NiCr14 | | 18 NC 13 | 653 M 31 | | | | SNC 836 | |
| **1.6225** | 11NiMn54 | | | | | | | | |
| **1.6310** | 20MnMoNi55 | | 18 MND 5 | | | | | | |
| **1.6368** | 15NiCuMoNb5 | | | 3604-591 | | | | SBV 2 | |
| **1.6511** | 36CrNiMo4 | 36 CrNiMo 4 | 40 NCD 3 | 816 M 40 | 38 NiCrMo 4 KB | | 35 NiCrMo 4 | | 9840 |
| **1.6582** | 34CrNiMo6 | 34 CrNiMo 6 | 35 NCD 6 | 817 M 40 | 35 NiCrMo 6 KB | 2541 | 40 NiCrMo 7 | SNCM 447 | 4340 |
| **1.6946** | 30CrMoNiV511 | | | | | | | | |
| **1.6948** | 26NiCrMoV115 | | | | | | | | |
| **1.6971** | 79Ni1 | | | | | | | | |
| **1.6972** | 83Ni1 | | | | | | | | |
| **1.7038** | 37CrS4 | 37 CrS 4 | | | | | | SUP 11 | 50 B50 H |
| **1.7214** | 25CrMo4 | | | | 25 CrMo 4 F | | | | |
| **1.7389** | GX12CrMo101 | | | | | | | | |
| **1.7561** | 42CrV6 | | | | | | | | |
| **1.7701** | 51CrMoV4 | | 51 CDV 4 | | 51 CrMoV 4 | | | | |
| **1.7707** | 30CrMoV9 | | | | | | | | |
| **1.7711** | 40CrMoV47 | 40 CrMoV 4 6 | 42 CDV 4 | 1506-670-860 | | | | SNB 21-1-5 | |
| **1.7725** | GS30CrMoV64 | | | | | | | | |
| **1.7733** | 24CrMoV55 | | 20 CDV 6 | | 24 CrMoV 5 5 | | | | |
| **1.7735** | 14CrMoV69 | | | | | | | | |
| **1.7741** | 42CrMoV73 | | | | | | | | |

## P 2.3 **STEEL |** low alloyed <1100 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.7755** | GS45CrMoV104 | | | | | | | | |
| **1.7756** | GS36CrMoV104 | G 36 CrMoV 10 4 | | | | | | | |
| **1.8070** | 21CrMoV511 | | | | 21 CrMoV 5 11 | | | | |
| **1.8159** | 50CrV4 | 51 CrV 4 | 50 CV 4 | 735 A 50 | 50 CrV 4 | 2230 | 51 CrV 4 | SUP 10 | 6150 |
| **1.8212** | 21CrVMoW12 | | | | | | | | |
| **1.8521** | 15CrMoV59 | | | | | | | | |
| **1.8509** | 41CrAlMo7 | 41 CrAlMo 7 | 40 CAD 6. 12 | 905 M 39 | 41 CrAlMo 7 | 2940 | 41 CrAlMo 7 | SACM 645 | E 71400 |
| **1.8515** | 31CrMo12 | 31 CrMo 12 | 30 CD 12 | 722 M 24 | 31 CrMo 12 | 2240 | 31 CrMo 12 | | |
| **1.8523** | 39CrMoV139 | 39 CrMoV 13 9 | | 897 M 39 | 36 CrMoV 10 | | | | |
| **1.8550** | 34CrAlNi7 | 34 CrAlMo 5 | | | | | | | |
| **1.8827** | S460M | S 460 M | E 460 | S 460 M | S460M | | S460M | | |

## P 2.4 **STEEL |** low alloyed <1300 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.1273** | 90Mn4 | | | 060 A 96 | | | | SUP 4 | 1090 |
| **1.2311** | 40CrMnMo7 | | | BP 20 | 35 CrMo 8 KU | | | | P 20 |
| **1.2710** | 45NiCr6 | | | | | | | | |
| **1.2762** | 75CrMoNiW67 | | | | | | | | |
| **1.5864** | 35NiCr18 | | | | | | | | |
| **1.6587** | 17CrNiMo6 | 17 CrNiMo 7 | 18 NCD 6 | 820 A 16 | 18 NiCrMo 7 | 2523 | 14 NiCrMo 13 | SNCM 815 | |
| **1.7222** | 42CrMoPb4 | | | | | | | | |
| **1.7225** | 42CrMo4.M4S | 42 CrMo 4 | 42 CD 4 | 708 A 42 | 42 CrMo 4 | 2244 | | SCM 440 H | 4140 |
| **1.7227** | 42CrMoS4 | 42 CrMoS 4 | 42 CD | 708 H 42 | 42 CrMoS 4 | 2244 | 40 CrMo 4 | | |
| **1.7238** | 49CrMo4 | | | | | | | | |

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.2362** | X63CrMoV51 | | | | | | | | |
| **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 | | | | | | |
| **1.2376** | X96CrMoV12 | | | | | | | | |
| **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 |
| **1.2631** | X50CrMoW911 | | | | | | | | |
| **1.2786** | X13NiCrSi3615 | X 13 CrNiSi 36 15 | Z 35 NCS 37-18 | | | | | | |
| **1.2889** | X45CoCrMoV553 | | | | | | | | |

## 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 | | |
| **1.2622** | X60WCrMoV94 | | | | | | | | |
| **1.2678** | X45CrCoVW555 | | | | | | | | H 19 |
| **1.2731** | X50NiCrWV1313 | | | | | | | | |
| **1.2764** | X19NiCrMo4 | | | | | | | | |
| **1.2767** | X45NiCrMo4 | 40 NiCrMo 4 | Y 35 NCD 16 | | 42 NiCrMo 15 7 KU | | | | A 9 |
| **1.2779** | X6NiCrTi2615 | | | S 66286 | | | | | 660 |
| **1.2787** | X23CrNi17 | HS 6-5-2 | Z 85 WDCV 06 05 04 02 | BM 2 | HS 6 5 2 2 | 2722 | | SKH 9 | |
| **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 |

## P 3.3 **STEEL |** high alloyed <1400 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.2709** | X3NiCoMoTi1895 | | | | | | | | |
| **1.2790** | 72SiNiCrMoV54 | | | | | | | | |
| **1.2888** | X20CoCrWMo109 | | | | | | | | |
| **1.3202** | S12145 | HS12-1-5-5 | | BT 15 | HS 12-1-5-5 | | 12-1-5-5 | | T 15 |
| **1.3207** | S104310 | HS10-4-3-10 | Z130WKCDV10-10-04-04 | BT 42 | HS 10-4-3-10 | | 10-4-3-10 | SKH 57 | M 44 |
| **1.3243** | S6525 | HS6-5-2-5 | KCV 06-05-05-04-02 | | HS 6-5-2-5 | 2723 | 6-5-2-5 | SKH 55 | M 35 |
| **1.3246** | S7425 | HS1-8-1 | Z110 WKCDV 07-05-04 | T 11341 | HS 7-4-2-5 | | 7-4-2-5 | | M 41 |
| **1.3247** | S21018 | HS2-9-1-8 | Z110 DKCWV 09-08-04 | BM 42 | HS 2-9-1-8 | | 2-10-1-8 | | M 42 |
| **1.3249** | S2928 | | | BM 34 | | | 2-9-2-8 | | |
| **1.3255** | S18125 | HS18-1-1-4 | Z80 WKCV 18-05-04-01 | BT 4 | HS 18-1-1-5 | | 18-1-1-5 | SKH 3 | T 4 |
| **1.3257** | S181215 | | | | | | | | |
| **1.3265** | S181210 | HS18-0-1-10 | | BT 5 | HS 18-0-1-10 | | 18-0-2-10 | SKH 4A | T 5 |
| **1.3342** | SC652 | HS6-5-2 | Z90 WDCV 06-05-04-02 | | HSC 6-5-3 | | | | M 3 |
| **1.3343** | S652 | HS6-5-3 | Z85 WDCV 06-05-04-02 | BM 2 | HS 6-5-2 | 2722 | 6-5-2 | SKH 51 | M2 |
| **1.3344** | S653 | | Z120 WDCV 06-05-04-03 | | | | 6-5-3 | SKH 52 | M 3 Cl.2 |
| **1.3346** | S291 | HS1-8-1 | Z85 DCWV 08-04-02-01 | BM 1 | HS 1-8-1 | | | | M1 |
| **1.3348** | S292 | HS2-9-2 | Z100 DCWV 09-04-02-02 | | HS 2-9-2 | 2782 | 2-9-2 | | M 7 |
| **1.3355** | S1801 | HS18-0-1 | Z80 WCV 18-04-01 | BT 1 | HS 18-0-1 | | 18-0-1 | SKH 2 | T 1 |

## 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 |

## K 2.1 CASTINGS | MODULAR CAST IRON <650 N/mm² (200 HB)

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **0.7033** | GGG353 | | | | | 0717-15 | | | |
| **0.7040** | GGG40 | GJS-400-15 | FGS 400-12 | FGS 420/12 | GS 400-12 | 0717-02 | | FCD 400 | 60-40-18 |
| **0.7043** | GGG403 | GJS-400-18 | FGS 370-17 | FGS 370/17 | GSO 42/15 | 0717-15 | | FCD 370 | |
| **0.7050** | GGG50 | GJS-500-7 | FGS 500-7 | FGS 500/7 | GS 500/7 | 0727-02 | | FCD 500 | 65-45-12 |

## K 2.2 CASTINGS | MODULAR CAST IRON <850 N/mm² (250 HB)

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **0.7060** | GGG60 | GJS-600-3 | FGS 600-3 | SNG 600/3 | GS 600/3 | 0732-03 | | FCD 600 | 80-55-06 |
| **0.7070** | GGG70 | GJS-700-2 | FGS 700-2 | SNG 700/2 | GS 700-2 | 0737-01 | | FCD 700 | 100-70-03 |
| **0.7080** | GGG80 | GJS-800-2 | FGS 800-2 | SNG 800/2 | GS 800-2 | | | FCD 800 | |

## K 3.1 CASTINGS | MALLEABLE CAST IRON <440 N/mm² (130 HB)

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **0.8038** | GTWS3818 | GJMW-360-12 | MB 300-12 | W 38-12 | W38-12 | 5922 | | | |
| **0.8040** | GTW4005 | GJMW-400-5 | MB 400-5 | W 40-05 | GMB 40 | | | FCMW 370 | |
| **0.8045** | GTW4507 | GJMW-450-7 | MB 450-7 | W 40-07 | GMB 45 | | | FCMWP 440 | |
| **0.8055** | GTW55 | | | | GMB 55 | | | | |
| **0.8065** | GTW65 | | | | GMB 65 | | | | |
| **0.8135** | GTS3510 | GJMB-350-10 | MN 350-10 | B 340/12 | | 0815 | | FCMP 330 | 32510 |
| **0.8145** | GTS4506 | GJMB-450-6 | MP 45-06 | P 440/7 | | 0852 | | FCMP 440 c3 | 40010 |

## K 3.2 CASTINGS | MALLEABLE CAST IRON <800 N/mm² (230 HB)

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **0.8035** | GTW3504 | GJMW-350-4 | | | | | | FCMW 330 c1 | |
| **0.8155** | GTS5504 | GJMB-550-4 | MP 50-5 | P 510/4 | | 0854 | | FCMP 490 | 50005 |
| **0.8165** | GTS6502 | GJMB-650-2 | MP 60-3 | P 570/3 | | 0858 | | FCMP 540 | 70003 |
| **0.8170** | GTS7002 | GJMB-700-2 | Mn 700-2 | P 690/2 | GMN 70 | 0862 | | FCMP 690 | 90001 |

## 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 |
| **1.4003** | X2CrNi12 | X2CrNi12 | CLC 4003 | | F 12N | | | | |
| **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 |
| **1.4017** | X6CrNi171 | X 6 CrNi 17 1 | F 17 N | | X 6 CrNi 17 1 | | | | |
| **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 |
| **1.4031** | X40Cr13 | X 40 Cr 13 | Z 40 C 14 | | X 40 Cr 14 | 2304 | X 40 Cr 13 | SUS 420 | 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 |
| **1.4059** | GX22CrNi17 | | Z 20 CN 17.2 M | ANC 2 | | | | | |
| **1.4085** | GX70Cr29 | | | | | | | | |
| **1.4086** | GX120Cr29 | | | 425 C 11 | | | | | |
| **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 |
| **1.4106** | X10CrMo13 | | | | | | | | |
| **1.4107** | GX8CrNi12 | GX 8 CrNi 12 | GX 8 CrNi 12 | | GX 8 CrNi 12 | | | | |
| **1.4108** | X100CrMo13 | | | | | | | | |
| **1.4109** | X65CrMo14 | X 70 CrMo 15 | Z 70 CD 14 | | | | | SUS 440 A | 440 A |
| **1.4110** | X55CrMo14 | | Z 50 CD 13 | | | | | | |
| **1.4111** | X110CrMoV15 | | Z 4 CN b 17 | | X 6 CrNb 17 | | | SUS 430 LX | |
| **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 |
| **1.4115** | X20CrMo171 | | | | | | | | |
| **1.4116** | X45CrMoV15 | X 50 CrMoV 15 | Z 50 CD 15 | | X50 CrMoV 15 | | X 46 CrMo 16 | | |
| **1.4117** | X38CrMoV15 | | | | | | | | |
| **1.4119** | X15CrMo13 | | | | | | | | |
| **1.4120** | X20CrMo13 | | Z 20 CD 14 | | | | | | |
| **1.4122** | X35CrMo17 | X 39 CrMo 17 1 | X39CrMo17-1 | | X 35 CrMo 17 | | | | |
| **1.4123** | X15TN | | | | | | | | |
| **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 | | | | | | |
| **1.4138** | GX120CrMo292 | | | | | | | | |
| **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 | | | | |
| **1.4502** | X8CrTi18 | X 6 Cr 18 KE | | | | | | | |
| **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 |

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **1.4523** | X8CrMoTi17 | X 2 CrMoTiS 18 2 | X 2 CrMoTiS 18 2 | | | | | | |
| **1.4528** | X105CrCoMo182 | | | | | | | | |
| **1.4535** | X90CrCoMoV17 | | | | | | | | |
| **1.4543** | X3CrNiCuTi129 | | | | X 6 CrNiNB 18 11 | | | | |
| **1.4704** | X45SiCr4 | 45SiCr16-11 | | | | | | | HNV 2 |
| **1.4710** | GX30CrSi6 | GX 30 CrSi 6 | | | | | | | |
| **1.4712** | X10CrSi6 | | K 51255 | | | | | | |
| **1.4713** | X10CrAlSi7 | X 10 CrAlSi 7 | | | | | | | |
| **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 | | | | | | |
| **1.4729** | GX40CrSi13 | | | | GX 35 Cr 13 | | | SCH 1 | |
| **1.4740** | GX40CrSi17 | | | | GX 35 Cr 17 | | | | |
| **1.4742** | X10CrAl18 | | Z 10 CAS 18 | 403 S 15 | X 8 Cr 17 | | X 10 CrAl 18 | SUH 21 | 430 |
| **1.4745** | GX40CrSi23 | | | | | | | | |
| **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 | | | | | | | |
| **1.4773** | X8Cr30 | | | | | | | | |
| **1.4776** | GX40CrSi29 | | | 452 C 11 | GX 35 Cr 28 | | | SCH 2 | |

## 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 | | | | | | |

## M 2.2 **STAINLESS STEEL |** austenitic <750 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.4429** | X2CrNiMoN17133 | X 3 CrNiMoN 17 12 2 | Z 2 CND 17.13 Az | 316 S 62 | X 2 CrniMoN 17 13 | 2375 | | SUS 316 LN | 316 LN |
| **1.4432** | X2CrNiMo17123 | X 2 CrNiMo 17 12 2 | Z 3 CND 17 13 30 | 316 S 13 | X 2 CrNiMo 17 12 3 | | | SUS 316L | 316 L |
| **1.4434** | X2CrNiMoN18124 | | CLC 18.12.4.LN | | X 2 CrNiMoN 18 12 4 | | | | 317 LN |
| **1.4439** | X2CrNiMoN17135 | X 3 CrNiMo 17 13 5 | Z 3 CnD 18.14-05 Az | | | | | | |
| **1.4465** | X1CrNiMoN25252 | | | | | | | | |
| **1.4505** | X5NiCrMoCuNb2018 | | | | | | | | |
| **1.4506** | X5NiCrMoCuTi2018 | | | | | | | | |
| **1.4529** | X1NiCrMoCuN25206 | | | | | | | | |
| **1.4536** | GX2NiCrMoCuN2520 | GX 2 CrNiMoCuN 25 20 6 | | | | | | | |
| **1.4539** | X1NiCrMoCuN25205 | X 1 NiCrMoCu 25 20 5 | Z 1 NCDU 25.20 | 904 S 13 | | 2662 | | | |
| **1.4541** | X6CrNiTi1810 | X 6 CrNiTi 18 10 | Z 6 CNT 18.10 | 321 S 12 | X 6 CrNiTi 18 11 | 2337 | X 7 CrNiTi 18 11 | SUS 321 | 321 |
| **1.4542** | X5CrNiCuNb164 | X 5 CrNiCuNb 16 4 | Z 7 CNU 17.04 | | X 5 CrNiCuNb 16 4 | | | SUS 630 | 630 |
| **1.4550** | X6CrNiNb1810 | X 6 CrNiNb 18 10 | Z 6 CNNb 18.10 | 347 S 17 | X 6 CrNiNb 18 11 | 2338 | X 6 CrNiNb 18 11 | SUS 347 | 347 |
| **1.4551** | X5CrNiNb199 | X 5 CrNiNb 20 10 KE | Z 6 CNNb 20-10 | | | | | SUS 347 Y | |
| **1.4552** | GX5CrNiNb189 | GX 5 CrNiNb 19 11 | Z 4 CNNb 19.10 M | 347 C 17 | GX 5 CrNiNb 19 11 | | | SCS 21 | |
| **1.4571** | X6CrNiMoTi17122 | X 6 CrNiMoTi 17 12 2 | Z 6 CNDT 17.12 | 320 S 31 | X 6 CrNiMoTi 17 12 | 2350 | X 6 CrNiMoTi 17 12 03 | SUS 316 Ti | 316 Ti |
| **1.4573** | X10CrNiMoTi812 | | | 320 S 33 | X 6 CrNiMoTi 17 13 | | | SUS 316 Ti | 316 Ti |
| **1.4575** | X2CrNiMoNb2842 | | | | | | | | |
| **1.4577** | X3CrNiMoTi2525 | | | | | | | | |
| **1.4580** | X6CrNiMoNb17122 | X 6 CrNiMoNb 17 12 2 | Z 6 CNDNb 17.12 | 318 S 17 | X 6 CrNiMo 17 12 2 | | | | 316 Cb |
| **1.4581** | GX5CrnNiMoNb1810 | GX 5 CrNiMoNb 19 11 2 | Z 4 CNDNb 18.12 M | 318 C 17 | GX 6 CrNoMoNb 20 11 | | | SCS 22 | |
| **1.4582** | X4CrNiMoNb257 | | | | | | | SCS 22 | |
| **1.4583** | X10CrNiMoNb1812 | | | | X 6 CrNiMoNb 17 13 | | | | 318 |
| **1.4585** | GX7CrNiMoNb257 | | | | | | | | |
| **1.4586** | X5CrNiMoCuNb2218 | | | | | | | | |
| **1.4821** | X20CrNiSi254 | X 20 CrNiSi 25 4 | Z 20 CNS 25.04 | | | 2322 | | | |
| **1.4822** | GX40CrNi245 | | J 92605 | J 92605 | | | | | |
| **1.4823** | GX40CrNiSi274 | | | | | | | | |
| **1.4825** | GX25CrNiSi189 | | | 302 C 35 | GX 16 CrNi 20 10 | | | | |
| **1.4826** | GX40CrNiSi229 | | | | | | | SCH 12 | |
| **1.4828** | X15CrNiSi2012 | X 15 CrNiSi 20 12 | Z 15 CNS 20.12 | 309 S 24 | X 16 CrNiSi 20 12 | | X 15 CrNiSi 20 12 | SUH 309 | 309 |
| **1.4833** | X7CrNi2314 | X 12 CrNi 23 13 | Z 15 CN 24.13 | 309 S 24 | X 6 Cni 23 14 | | | SUS 309 S | 309 S |
| **1.4837** | GX40CrNiSi2512 | | | 309 C 30 | GX 35 CrNi 25 12 | | | SCS 17 | |
| **1.4841** | X15CrNiSi2520 | X 15 CrNiSi 25 20 | Z 15 CNS 25.20 | 314 S 25 | X 16 CrNiSi 25 20 | | X 15 CrNiSi 25 20 | SUH 310 | 310 |
| **1.4845** | X12CrNi2521 | X 8 CrNi 25 21 | Z 12 CN 25.20 | 310 S 24 | X 6 CrNi 25 20 | 2361 | F.331 | SUS 310 S | 310 S |
| **1.4848** | GX40CrNiSi2520 | | | 310 C 40 | GX 40 CrNi 26 20 | | X 40 CrNi 25 20 | SCH 21 | HK |
| **1.4861** | X10NiCr3220 | | | | | | | | |
| **1.4866** | X33CrNiMnN238 | X 33 CrNiMnN 23 8 | X 33 CrNiMnN 23 8 | | | | | | |
| **1.4871** | X53CrMnNiN219 | | Z 52 CMN 21.09 | 349 S 54 | X 53 CrMnNiN 21 9 | | X 53 CrMnNiN 21-09 | SUH 35 | EV 8 |
| **1.4873** | X45CrNiW189 | X 45 CrNiW 18 9 | Z 35 CNWS 14.14 | 331 S 40 | X 45 CrNiW 18 9 | | X 45 CrNiSiW 18-09 | SUH 31 | |
| **1.4878** | X12CrNiTi189 | X 10 CrNiTi 18 10 | Z 6 CNT 18.12 | 321 S 20 | X 6 CrNiTi 18.11 | 2337 | X 6 CrNiTi 18 11 | SUS 321 | 321 |
| **1.4881** | X70CrMnNiN216 | | | | X 70 CrMnNiN 21 6 | | | | EV 11 |
| **1.4882** | X50CrMnNiNbN219 | X 50 CrMnNiNbN 21 9 | Z 50 CMNNb 21.09 | | | | | | |
| **1.4919** | X6CrNiMo1713 | X 6 CrNiMo 17 12 2 | Z 6 CND 17.13 B | 316 S 51 | | | | | 316 H |
| **1.4948** | X6CrNi1811 | X 6 CrNi 18 10 | Z 6 CN 18.09 | 304 S 51 | X 5 CrNi 18 10 KW | 2333 | | | |
| **1.4949** | X3CrNi1811 | | | | X 2 CrNiN 18 11 | | | | |
| **1.4961** | X8CrNiNb1613 | | | 347 S 51 | | | X 7 CrNiNb 16 13 | | |
| **1.4981** | X8CrNiMoNb1616 | | | | | | X 7 CrNiMo 16 16 | | |

## M 3.1 DUPLEX STEEL | SUPER AUSTENITIC | super austenitic <1100 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.4162** | X2CrMnNiN2252 | X 2 CrMnNiN 22 5 2 | | | X2CrMnNiN21-5-1 | | S32101 | LDX 2101 | S321 01 |
| **1.4362** | X2CrNiN234 | X 2 CrNiN 23 4 | Z 3 CN 23 04 AZ | | | 2327 | | | S323 04 |
| **1.4410** | X2CrNiMoN2574 | X 2 CrNiMoN 25 7 4 | Z 5 CND 20.10 M | | X 2 CrNiMoN 25 7 4 | | | SCS 14 A | S327 50 |
| **1.4460** | X4CrNiMo2752 | X 3 CrNiMo 27 5 2 | X 2 CrNiMo 25 7 3 | | X 3 CrNiMo 27 5 2 | 2324 | X 8 CrNiMo 27 05 | SUS 329 J1 | S325 50 |
| **1.4462** | X2CrNiMoN2253 | X 2 CrNiMoN 22 5 3 | Z 3 CND 22.05 AZ | 318 S 13 | X 2 CrNiMoN 22 5 3 | 2377 | | SUS 329 J3L | S318 03 |
| **1.4465** | X1CrNiMoN25252 | X 1 CrNiMoN 25 25 2 | Z 1 CND 25.22 AZ | | | | | | S310 50 |
| **1.4501** | X2CrNiMoCuWN2574 | X 2 CrNiMoCuWN 25 7 4 | Z 3 CND 25.06 AZ | | | | | SM 25 Cr | S327 60 |
| **1.4507** | X2CrNiMoCuN2563 | X 2 CrNiMoCuN 25 6 3 | Z 3 CNDU 25.06 AZ | | | | | QSA 2505 | S325 20 |
| **1.4534** | 13-8 PH | X 3 CrNiMoAl 13 8 2 | Z 4 CNDAT 13.09 | | | | | | S138 00 |
| **1.4542** | 17-4 PH | X 5 CrNiCuNb 16 4 | Z 7 CNU 17 04 | | | | | SUS 630 | 630 |
| **1.4545** | 15-5 PH | X 5 CrNiCu 15 5 | Z 6 CNU 15 05 | | | | | | XM-12 |
| **1.4548** | 17-4 PH | X5CrNiCuNb1744 | X 5 CrNiCuNb 16 4 | | | | | SUS 630 | S174 00 |
| **1.4568** | 17-7 PH | X 7 CrNiAl 17 7 | Z 9 CNA 17 07 | 301 S 81 | X 7 CrNiAl 17 7 | 2388 | X 7 CrNiAl 17 7 | SUS 631 | S177 00 |

## Technical formulas

| | |
|---|---|
| **Calculate cutting speed (m/min)** | $Vc = \frac{D * \pi * n}{1000}$ |
| **Calculate rotational speed (rpm)** | $n = \frac{Vc * 1000}{D * \pi}$ |
| **Calculate feed rate (mm/min)** | $Vf = n * z * fz$ |
| **Calculate feed per tooth (mm/number of teeth)** | $fz = \frac{Vf}{n * z}$ |
| **Calculate chip removal rate (cm³/min)** | $Q = \frac{ap * ae * Vf}{1000}$ |
| **Calculate average chip thickness (mm)** | $hm = fz * \frac{\sqrt{ae}}{D}$ |

**Explanation of terms**

| | | |
|---|---|---|
| **Vc** | Cutting speed | in m/min |
| **n** | Rotational speed | in rpm |
| **Vf** | Feed rate | in mm/min |
| **Fz** | Feed per tooth | in mm/number of teeth |
| **z** | Number of teeth (cutting) | |
| **ap** | Depth of cut | in mm |
| **ae** | Width of cut | in mm |
| **hm** | Average chip thickness | in mm |
| **Q** | Chip removal rate | in cm³/min |
| **D** | Diameter of tool | in mm |

# EXPLANATION OF CUTTING DATA

## EXAMPLE FOR SIDE MILLING OF 1.3561 WITH Ø10:

P 2.3 **STEEL |** low alloyed <1100 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.2419** | 105WCr6 | 105 WCr 5 | 105 WC 13 | | 107 WcR 5 KU | 2140 | 105 WCr 5 | SKS 31 | |
| **1.2511** | 80WCrV3 | | | | | | | | |
| **1.2515** | 100WV4 | | | | | | | SKS 21 | |
| **1.3561** | 44Cr2 | 46 Cr 1 KD | 44 Cr 2 | | | | | | 5046 |
| **1.3563** | 43CrMo4 | | 43 CrMo 4 | | | | | | 4142 |

THE MATERIAL KEY WITH DETAILED BREAKDOWN OF MATERIALS BY MATERIAL GROUP CAN BE FOUND AT THE END OF THE CATALOGUE.

| | Material | Strength (N/mm²) | Side Milling | Finishing | ETC | Materialgroup Factor fz / a | Materialgroup Factor ae ETC |
|---|---|---|---|---|---|---|---|
| **P** | STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | unalloyed | <500 | 240 | 260 | 380 | 1 | 1 |
| **1.2-1.5** | unalloyed | <1100 | 200 | 220 | 316 | 0.9 | 0.8 |
| **2.1-2.2** | low-alloyed | <950 | 190 | 210 | 290 | 0.9 | 0.8 |
| **2.3-2.4** | low-alloyed | <1300 | 160 | 180 | 203 | 0.8 | 0.75 |
| **3.1-3.2** | high-alloyed | <1100 | 180 | 190 | 220 | 0.8 | 0.7 |
| **3.3** | high-alloyed | <1400 | 150 | 160 | 196 | 0.7 | 0.68 |
| **K** | CASTINGS | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1-1.2** | Grey cast iron | <1000 | 220 | 230 | 262 | 0.9 | 0.8 |
| **2.1-2.2** | Modular cast iron | <850 | 180 | 190 | 208 | 0.8 | 0.75 |
| **3.1-3.2** | Malleable cast iron | <800 | 160 | 170 | 193 | 0.8 | 0.75 |
| **M** | STAINLESS STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | ferritic/martensitic | <850 | 90 | 95 | 172 | 0.9 | 0.6 |
| **2.1** | austenitic | <650 | 75 | 80 | 146 | 0.8 | 0.45 |
| **2.2** | austenitic | <750 | 70 | 75 | 128 | 0.75 | 0.4 |
| **3.1** | DUPLEX STEEL \| super austenitic | <1100 | | | | | |

OVERVIEW OF THE DIFFERENT MATERIAL GROUPS FOR THIS TOOL INCLUDING FACTORS

**Material P 1.1**

| D1 | L2 | Immersion Angle | Side Milling | | | Finishing | | | ETC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | mm | α° | 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) |
| 6 | 13 | 1° | 0.045 | 1.8 | L2max | 0.02 | 0.2 | L2max | 0.072 | 1.3 | L2max | 0.0593 |
| 8 | 19 | 1° | 0.06 | 2.4 | L2max | 0.025 | 0.2 | L2max | 0.096 | 1.5 | L2max | 0.0749 |
| 10 | 22 | 1.2° | 0.07 | 3 | L2max | 0.03 | 0.2 | L2max | 0.112 | 1.8 | L2max | 0.0861 |
| 12 | 26 | 1.2° | 0.08 | 3.6 | L2max | 0.035 | 0.2 | L2max | 0.136 | 2.1 | L2max | 0.1034 |
| 16 | 32 | 1.5° | 0.09 | 4.8 | L2max | 0.04 | 0.2 | L2max | 0.152 | 2.6 | L2max | 0.1121 |
| 20 | 41 | 2° | 0.11 | 6 | L2max | 0.045 | 0.2 | L2max | 0.176 | 2.9 | L2max | 0.1239 |

ALL DATA GIVEN HERE IS FOR THE FIRST GROUP P1.1 IN THE MATERIAL GROUP OVERVIEW

### DETERMINATION OF CUTTING DATA:

From the material key results: **material group P2.3**
Vc= 160 m/min (as indicated in the table)
fz= 0.07 mm/Z (as indicated in the table) x Factor fz 0.8 = **fz 0.056 mm/Z**

VIDEO EXPLANATION

# EXAMPLE FOR ETC OF 1.3207 WITH Ø10:

P 3.3 **STEEL |** high alloyed <1400 N/mm²

| Materialnumber | Germany \| DIN | Europe \| EN | France \| AFNOR | Great Britain \| BS | Italy \| UNI | Sweden \| SIS | Spain \| UNE | Japan \| JIS | USA \| AISI |
|---|---|---|---|---|---|---|---|---|---|
| **1.2709** | X3NiCoMoTi1895 | | | | | | | | |
| **1.2790** | 72SiNiCrMoV54 | | | | | | | | |
| **1.2888** | X20CoCrWMo109 | | | | | | | | |
| **1.3202** | S12145 | HS12-1-5-5 | | BT 15 | HS 12-1-5-5 | | 12-1-5-5 | | T 15 |
| **1.3207** | S104310 | HS10-4-3-10 | Z130WKCDV10-10-04-04 | BT 42 | HS 10-4-3-10 | | 10-4-3-10 | SKH 57 | M 44 |

THE MATERIAL KEY WITH DETAILED BREAKDOWN OF MATERIALS BY MATERIAL GROUP CAN BE FOUND AT THE END OF THE CATALOGUE.

| | Material | Strength (N/mm²) | Side Milling | Finishing | ETC | Materialgroup Factor fz / a | Materialgroup Factor ae ETC |
|---|---|---|---|---|---|---|---|
| **P** | STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | unalloyed | <500 | 240 | 260 | 380 | 1 | 1 |
| **1.2-1.5** | unalloyed | <1100 | 200 | 220 | 316 | 0.9 | 0.8 |
| **2.1-2.2** | low-alloyed | <950 | 190 | 210 | 290 | 0.9 | 0.8 |
| **2.3-2.4** | low-alloyed | <1300 | 160 | 180 | 203 | 0.8 | 0.75 |
| **3.1-3.2** | high-alloyed | <1100 | 180 | 190 | 220 | 0.8 | 0.7 |
| **3.3** | high-alloyed | <1400 | 150 | 160 | 196 | 0.7 | 0.68 |
| **K** | CASTINGS | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1-1.2** | Grey cast iron | <1000 | 220 | 230 | 262 | 0.9 | 0.8 |
| **2.1-2.2** | Modular cast iron | <850 | 180 | 190 | 208 | 0.8 | 0.75 |
| **3.1-3.2** | Malleable cast iron | <800 | 160 | 170 | 193 | 0.8 | 0.75 |
| **M** | STAINLESS STEEL | | **Vc = m/min** | **Vc = m/min** | **Vc = m/min** | | |
| **1.1** | ferritic/martensitic | <850 | 90 | 95 | 172 | 0.9 | 0.6 |
| **2.1** | austenitic | <650 | 75 | 80 | 146 | 0.8 | 0.45 |
| **2.2** | austenitic | <750 | 70 | 75 | 128 | 0.75 | 0.4 |
| **3.1** | DUPLEX STEEL \| super austenitic | <1100 | | | | | |

OVERVIEW OF THE DIFFERENT MATERIAL GROUPS FOR THIS TOOL INCLUDING FACTORS

**Material P 1.1**

| D1 | L2 | Immersion Angle | Side Milling | | | Finishing | | | ETC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | mm | α° | 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) |
| 6 | 13 | 1° | 0.045 | 1.8 | L2max | 0.02 | 0.2 | L2max | 0.072 | 1.3 | L2max | 0.0593 |
| 8 | 19 | 1° | 0.06 | 2.4 | L2max | 0.025 | 0.2 | L2max | 0.096 | 1.5 | L2max | 0.0749 |
| 10 | 22 | 1.2° | 0.07 | 3 | L2max | 0.03 | 0.2 | L2max | 0.112 | 1.8 | L2max | 0.0861 |
| 12 | 26 | 1.2° | 0.08 | 3.6 | L2max | 0.035 | 0.2 | L2max | 0.136 | 2.1 | L2max | 0.1034 |
| 16 | 32 | 1.5° | 0.09 | 4.8 | L2max | 0.04 | 0.2 | L2max | 0.152 | 2.6 | L2max | 0.1121 |
| 20 | 41 | 2° | 0.11 | 6 | L2max | 0.045 | 0.2 | L2max | 0.176 | 2.9 | L2max | 0.1239 |

ALL DATA GIVEN HERE IS FOR THE FIRST GROUP P1.1 IN THE MATERIAL GROUP OVERVIEW

## DETERMINATION OF CUTTING DATA:

From the material key results: **material group P3.3**
Vc= 196 m/min (as indicated in the table)
fz= 0.112 mm/Z (as indicated in the table) x Factor fz 0.7 = **fz 0.0784 mm/Z**
ae= 1.8 mm (as indicated in the table) x Factor ae 0.68 = **1.224 mm ae**