

# MATERIAL GRADES

| MATERIAL NO.     | DESIGNATION  | CHEMICAL COMPOSITION   | STRENGTH   | COLOUR                  | CHARACTER  | APPLICATIONS  |
|------------------|--|--|--|-------------------------|--|---|
| 1.0577           | DIN: S 355 J2 (St 52-3)<br>AFNOR: A 52 FP<br>AISI: A738                                    | C ≤ 0.22<br>Si ≤ 0.55<br>Mn ≤ 1.60   | ≈ 550 N/mm <sup>2</sup>                                  | Fluorescent yellow      | <b>Structural steel</b><br>unalloyed, with good weldability  | For common applications in mould, die, and jigs and fixtures construction   |
| 1.1730           | DIN: C 45 U<br>AFNOR: XC 48<br>AISI: 1045  | C - 0.45<br>Si - 0.30<br>Mn - 0.70   | ≈ 640 N/mm <sup>2</sup>                                  | Traffic blue            | <b>Tool steel</b><br>unalloyed, suitable for flame hardening   | Unhardened parts for mould, die and jig construction; plates and frames for mould bases and die sets  |
| 1.2083           | DIN: X 40 Cr 14<br>AFNOR: Z 40 C 14<br>AISI: 420   | C - 0.40<br>Si - 0.40<br>Mn - 0.30<br>Cr - 13.00   | ≈ 720 N/mm <sup>2</sup>                                  | Lemon yellow            | <b>Steel for through hardening</b><br>low corrosion, high-alloy  | Cavity plates and inserts for the processing of plastics, mainly used for processing corrosive plastics   |
| 1.2083 ESR       | DIN: X 40 Cr 14<br>AFNOR: Z 40 C 14<br>AISI: 420 ESR                                       | C - 0.40<br>Si - 0.40<br>Mn - 0.30<br>Cr - 13.00   | ≈ 720 N/mm <sup>2</sup>                                  | Reseda green            | <b>Steel for through hardening</b><br>low corrosion, suitable for mirror polishing, electro-slag remelted, high-alloy  | Cavity plates and inserts for the processing of plastics, mainly used for processing corrosive plastics   |
| 1.2085           | DIN: X 33 CrS 16<br>AFNOR: Z 35 CD 17.5<br>AISI: ≈ 422+S                                   | C - 0.33<br>Si - 0.30<br>Mn - 0.80<br>Cr - 16.00<br>S - 0.06<br>Ni - 0.30                            | ≈ 1080 N/mm <sup>2</sup>                                 | Yellow green            | <b>Tool steel</b><br>pre-hardened, corrosion resistant, good machinability, high-alloy   | Cavity for corrosion resistant mould bases and die sets; moulds for processing corrosive plastics   |
| 1.2162           | DIN: 21 MnCr 5<br>AFNOR: 20 MC 5<br>AISI: 5120   | C - 0.21<br>Si - 0.25<br>Mn - 1.25<br>Cr - 1.20  | ≈ 660 N/mm <sup>2</sup>                                  | Mint green              | <b>Steel for case-hardening</b><br>alloyed   | Cavity plates and machine parts   |
| 1.2210           | DIN: 115 CrV 3<br>AFNOR: 100 C3<br>UNI: 107 CrV 3 KU<br>AISI: L2                           | C - 1.18<br>Si - 0.25<br>Mn - 0.30<br>Cr - 0.70<br>V - 0.10  | ≈ 740 N/mm <sup>2</sup>                                  | Bronze lacquer – gold   | <b>Cold-work steel</b><br>alloyed, wear-resistant  | Core pins, punches, small turned parts  |
| 1.2311           | DIN: 40 CrMnMo 7<br>AFNOR: 40 CMD 8<br>UNI: 35 CrMo 8 KU<br>AISI: P20                      | C - 0.40<br>Si - 0.40<br>Mn - 1.50<br>Cr - 1.90<br>Mo - 0.20   | ≈ 1080 N/mm <sup>2</sup>                                 | Pure white              | <b>Tool steel</b><br>alloyed, hardened and tempered, ideal for nitriding, suitable for polishing   | Cavity plates, inserts and high-tensile machine parts   |
| 1.2312           | DIN: 40 CrMnMoS 8.6<br>AFNOR: 40 CMD 8.5<br>AISI: P20+S                                    | C - 0.40<br>Si - 0.40<br>Mn - 1.50<br>Cr - 1.90<br>Mo - 0.20<br>S - 0.06                             | ≈ 1080 N/mm <sup>2</sup>                                 | Traffic purple          | <b>Tool steel</b><br>alloyed, hardened and tempered; good machinability  | Plates for mould bases and die sets with increased strength requirements  |
| 1.2316           | DIN: X 38 CrMo 16<br>AFNOR: Z 35 CD 17<br>UNI: X 38 CrMo 16 KU<br>AISI: ≈ 422              | C - 0.36<br>Cr - 16.00<br>Mo - 1.20  | ≈ 1010 N/mm <sup>2</sup>                                 | Fluorescent red         | <b>Tool steel</b><br>hardened and tempered, corrosion resistant, polishable, high-alloy  | Moulds for processing corrosive plastics  |
| 1.2343           | DIN: X 37 CrMoV 5-1<br>AFNOR: Z 38 CDV 5<br>UNI: X 37 CrMoV 5-1 KU<br>AISI: H11            | C - 0.38<br>Si - 1.00<br>Mn - 0.40<br>Cr - 5.30<br>Mo - 1.20<br>V - 0.40                             | ≈ 780 N/mm <sup>2</sup>                                  | Carmine red             | <b>Hot-work steel</b><br>high-alloy  | Cavity plates and inserts for injection moulds  |
| 1.2343 ESR       | DIN: X 37 CrMoV 5-1<br>AFNOR: Z 38 CDV 5<br>UNI: X 37 CrMoV 5-1 KU<br>AISI: H11 ESR        | C - 0.38<br>Si - 1.00<br>Mn - 0.40<br>Cr - 5.30<br>Mo - 1.20<br>V - 0.40                             | ≈ 780 N/mm <sup>2</sup>                                  | Light pink              | <b>Hot-work steel</b><br>suitable for mirror polishing, electro-slag remelted, high-alloy  | Cavity plates and inserts for die casting (Al, Mg, Zn etc.) and injection moulds  |
| 1.2344           | DIN: X 40 CrMoV 5-1<br>AFNOR: Z 40 CDV 5<br>UNI: X 40 CrMoV 5-1 KU<br>AISI: H13            | C - 0.40<br>Si - 1.00<br>Cr - 5.30<br>Mo - 1.40<br>V - 1.00  | ≈ 780 N/mm <sup>2</sup>                                  | Pastel turquoise        | <b>Hot-work steel</b><br>high-temperature resistant, high temperature wear resistant, excellent thermal conductivity, high-alloy   | Standard material for hot-work tools, extrusion moulds, dies, tools for plastic processing  |
| 1.2344 ESR       | DIN: X 40 CrMoV 5-1<br>AFNOR: Z 40 CDV 5<br>UNI: X 40 CrMoV 5-1 KU<br>AISI: H13 ESR        | C - 0.40<br>Si - 1.00<br>Cr - 5.30<br>Mo - 1.40<br>V - 1.00  | ≈ 780 N/mm <sup>2</sup>                                  | Steel blue              | <b>Hot-work steel</b><br>suitable for mirror polishing, electro-slag remelted, high-alloy  | Standard material for hot-work tools, extrusion moulds, dies, tools for plastic processing  |
| 1.2363           | DIN: X 100 CrMoV 5<br>AFNOR: Z 100 CDV 5<br>UNI: X 100 CrMoV 5-1 KU<br>AISI: A2            | C - 1.00<br>Si - 0.30<br>Mn - 0.50<br>Cr - 5.20<br>Mo - 1.10<br>V - 0.20                             | ≈ 810 N/mm <sup>2</sup>                                  | Concrete grey           | <b>Steel for through hardening</b><br>dimensional stability and high hardenability; wear-resistant, cold-work steel with good machinability                                | Cavity plates and inserts as well as cutting punches, wear plates and cutting dies with high toughness requirements                                     |
| 1.2379           | DIN: X 153 CrMoV 12<br>AFNOR: Z 160 CDV 12<br>AISI: ≈ D2                                   | C - 1.53<br>Si - 0.30<br>Mn - 0.35<br>Cr - 12.00<br>Mo - 0.80<br>V - 0.80                            | ≈ 850 N/mm <sup>2</sup>                                  | Pastel orange           | <b>Steel for through hardening</b><br>wear-resistant, high-alloy cold-work steel   | Cavity plates and inserts as well as wear plates and cutting dies with increased wear resistance  |
| 1.2714           | DIN: 56 NiCrMoV 7<br>AFNOR: 55 NCDV 7<br>AISI: L6  | C - 0.56<br>Cr - 1.10<br>Mo - 0.50<br>Ni - 1.70<br>V - 0.10  | ≈ 850 N/mm <sup>2</sup>                                  | Pastel green            | <b>Steel for through hardening</b><br>good high-temperature resistance and toughness   | Extrusion dies, hot-forging tools, dies for processing tin, lead and zinc alloys  |
| 1.2714 HH        | DIN: 56 NiCrMoV 7<br>AFNOR: 55 NCDV 7<br>AISI: L6  | C - 0.56<br>Cr - 1.10<br>Mo - 0.50<br>Ni - 1.70<br>V - 0.10  | ≈ 1320 N/mm <sup>2</sup><br>(≈ 42 HRC)                   | Beige                   | <b>Steel for through hardening</b><br>hardened and tempered; good high-temperature resistance and toughness  | Mould inserts, cores and slides for injection moulds  |
| 1.2738           | DIN: 40 CrMnNiMo 8-6-4<br>AFNOR: 40 CMND 8<br>AISI: ≈ P20 + Ni                             | C - 0.40<br>Mn - 1.50<br>Cr - 1.90<br>Mo - 0.20<br>Ni - 1.10<br>Si - 0.30                            | ≈ 1080 N/mm <sup>2</sup>                                 | Turquoise blue          | <b>Tool steel</b><br>hardened and tempered; uniform strength even in plates and bars with larger dimensions; suitable for polishing and nitriding                          | Large cavity plates with deep cavities for items such as bumpers or dashboards  |
| 1.2767           | DIN: 45 NiCrMo 16<br>AFNOR: 45 NCD 16<br>UNI: 40 NiCrMoV 16 KU<br>AISI: ≈ 6F7              | C - 0.45<br>Si - 0.25<br>Mn - 0.40<br>Cr - 1.35<br>Mo - 0.25<br>Ni - 4.00                            | ≈ 830 N/mm <sup>2</sup>                                  | Jet black               | <b>Steel for through hardening</b><br>special alloy, suitable for polishing, with high resistance to pressure and good flexural strength                                   | High-performance cavity plates and inserts; cutting and bending inserts for high compressive loads  |
| 1.2842           | DIN: 90 MnCrV 8<br>AFNOR: 90 MV 8<br>UNI: 90 MnVCr 8 KU<br>AISI: ≈ O2                      | C - 0.90<br>Si - 0.20<br>Mn - 2.00<br>Cr - 0.40<br>V - 0.10  | ≈ 760 N/mm <sup>2</sup>                                  | Clay brown              | <b>Steel for through hardening</b><br>dimensional stability and high hardenability; wear-resistant, cold-work steel with very good machinability                           | Cavity plates and inserts exposed to abrasive stress; cutting punches; wear plates, cutting dies and guiding plates; guiding rails                      |
| 1.3343 (HSS)     | DIN: HS 6-5-2 C<br>AFNOR: Z 85 WDCV 6<br>UNI: X 82 WMoV 6 5<br>AISI: M 2 reg. C            | C - 0.90<br>Si - 0.30<br>Mn - 0.30<br>Cr - 4.00<br>Mo - 5.00<br>V - 1.90<br>W - 6.20                 | ≈ 920 N/mm <sup>2</sup>                                  | Daffodil yellow         | <b>High-speed steel (HSS)</b><br>very high resistance to adhesion and wear in combination with high toughness and compressive strength                                     | Blocks for eroding, cutting and fine blanking punches; impact extrusion punches and dies; inserts with a very high wear resistance                      |
| 1.3344 PM        | DIN: PM 6-5-3<br>AFNOR: X 130 WMoCrV 6-5-4-3<br>UNI: W 6 Mo 5 Cr 4 V 3<br>AISI: M 3-2 (PM) | C - 1.25<br>Si - 0.30<br>Mn - 0.30<br>Cr - 4.0<br>Mo - 5.0<br>V - 3.0<br>W - 6.2                     | ≈ 870 N/mm <sup>2</sup>                                  | Bronze lacquer – silver | <b>Powder metallurgical HSS steel</b><br>highest resistance to adhesion and wear in combination with optimal toughness, ideal for through hardening                        | Blocks for eroding, cutting punches and dies with particularly durable edges; inserts with highest wear resistance                                      |
| M V10 PM         | AISI: A11  | C - 2.45<br>Si - 0.90<br>Mn - 0.50<br>Cr - 5.20<br>Mo - 1.30<br>V - 9.75                             | ≈ 950 N/mm <sup>2</sup>                                  | Turquoise green         | <b>Powder metallurgical HSS steel</b><br>highest abrasive wear resistance and excellent toughness; good machinability through a homogeneous microstructure                 | Blocks for eroding, dies and cutting punches with extreme requirements, fine blanking punches, pressing punches for sinter press tools                  |
| M W10 PM         | EN: HS 10-2-5-8  | C - 1.60<br>Cr - 4.80<br>Mo - 2.00<br>V - 5.00<br>W - 10.50<br>Co - 8.00                             |  | Claret violet           | <b>Powder metallurgical steel</b><br>High adhesive wear resistance and excellent toughness; very high working hardness and therefore highest compressive strength possible | Blocks for eroding, dies, cutting punches and cutting tools for extremely high requirements, fine blanking punches, embossing tools, cold solid forming |
| 1.7131           | DIN: 16 MnCr 5<br>AFNOR: 16 MC 5<br>AISI: 5115   | C - 0.16<br>Si - 0.25<br>Mn - 1.15<br>Cr - 0.95  | ≈ 600 N/mm <sup>2</sup>                                  | Blue lilac              | <b>Steel for case-hardening</b><br>alloyed   | Guiding elements, cores and machine parts   |
| 1.7225           | DIN: 42 CrMo 4<br>AFNOR: 42 CD 4<br>UNI: 42 CrMo 4<br>AISI: 4140                           | C - 0.42<br>Si - 0.25<br>Mn - 0.75<br>S - <0.035<br>Cr - 1.10<br>Mo - 0.22                           | ≈ 720 N/mm <sup>2</sup>                                  | Night blue              | <b>Tempered steel</b><br>high strength and toughness, universally usable in jigs and fixtures  | Jigs and fixtures, base plates, shafts, gear shafts, gear wheels  |
| 3.3547 (AW-5083) | DIN: AlMg 4.5 Mn<br>EN: AW-5083<br>AFNOR: A-G4.5MC<br>UNI: 7790                            | Si - 0.40<br>Fe - 0.10<br>Mn - 0.70<br>Mg - 4.40<br>Cr - 0.15<br>Zn - 0.25<br>Ti - 0.15              | ■ 230-260 N/mm <sup>2</sup><br>● ≥ 270 N/mm <sup>2</sup> |                         | <b>Aluminium alloy</b>   | Plates for mould bases, jigs and fixtures   |
| 3.4365 (AW-7075) | DIN: AlZnMgCu 1.5<br>EN: AW-7075<br>AFNOR: A-Z5GU<br>UNI: 9007/2                           | Si - 0.40<br>Fe - 0.50<br>Cu - 1.60<br>Mn - 0.30<br>Mg - 2.40<br>Cr - 0.23<br>Zn - 5.60<br>Ti - 0.20 | ≤ 540 N/mm <sup>2</sup><br>(depending on thickness)      |                         | <b>Aluminium – zinc alloy</b><br>high-strength, hardened   | Plates for mould bases and die sets with increased strength requirements  |
| CF-H40S+         | ISO: K40<br>US Industry: C11/C12   | WC - 86.6<br>Co - 11.8   |  |                         | <b>Carbide</b><br>The universal carbide grade – the ideal compromise between hardness and fracture toughness with high edge stability.                                     | Blocks for eroding, cutting punches and dies with maximum wear resistance; active parts for stamping, embossing, bending and forming                    |

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