MATERIAL GRADES

IN MOULD MAKING

With so many options when it comes to selecting the right material grades in mould making, customers are spoilt for choice. For us as a standard parts manufacturer, our top priority is to offer the right material for virtually every application.

Exactly which material is right depends on many factors. In the following we will show you the different material grades in mould making, their classification and their basic application. That way it is much easier to select the suitable material grade.

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OVERVIEW OF MATERIAL GRADES

MATERIAL GRADES IN MOULD AND DIE MAKING		
Unalloyed steel	1.0577	1.1730
Steel for case-hardening	1.2162	1.7131
Hardened and tempered steel	1.2311	1.2312
	1.2714HH	1.2738
	1.2085	1.2316
	1.2738TSHH	
Corrosion resistant steel	1.2083	1.2083 ESR
	1.2085	1.2316
Steel for through hardening	1.2083	1.2083 ESR
	1.2210	1.2343
	1.2343 ESR	1.2344
	1.2344 ESR	1.2363
	1.2379	1.2714
	1.2767	1.2842
HSS High speed steel	1.3343	
Powder metallurgical steel	1.3343PM	MV10PM
	MW10PM	
Quenched and tempered alloy steel	1.7225	
Non-ferrous metals	3.3547 ALU	3.4365 ALU

For more information on our material grades, see:
www.meusburger.com/material-grades

THE MATERIAL GRADES IN DETAIL

Classification in **hot-work steel and cold-work steel** provides information about which temperatures can be used for the different types of steel. The prerequisite for this is that the characteristics which they obtain through the heat treatment can also be exhibited after. **Hot-work steels** are suited for operating temperatures of up to approx. 400 °C and are for example suitable for zinc or die-cast aluminium. **Cold-work steels,** on the other hand, can be used for temperatures up to approx. 200 °C. These are preferably used in injection moulding.

Unalloyed structural steels, for example 1.0577, provide very good weldability due to their low carbon content and are suited for making simple moulds, dies, jigs and fixtures. If the weldability is not relevant, it is advisable to select an **unalloyed tool steel** (for example 1.1730). This offers not only a high strength, but also a better machinability. Unalloyed tool steel is used mainly for unhardened components in mould, die, and jig construction as well as plates and frames for mould bases.

After heat treatment, **steels for case-hardening** are characterised by high surface hardness with a very tough core and are ideally suited for materials with fillers such as glass fibre or carbon fibre, resin press moulds for processing thermoplastics and thermosets, or for guide parts or core inserts.

As for structuring materials (polishing, graining...) very good results can be achieved through the **hardened and tempered steel** 1.2311. This is due to its low sulphur content. For larger plate dimensions, the material 1.2738 is also often used here. The alloyed, hardened and tempered tool steel 1.2312 has a strength of 950 – 1100 N/mm^2 and through the sulphur additive achieves the best machinability. Nitriding is a suitable process to increase the wear resistance of these steels.

With the **corrosion resistant**, high alloyed and hardened and tempered tool steel 1.2085 corrosive plastics such as PVC or POM can be processed due to the high chromium content of 16 %. Moreover the mould maintenance requirements are reduced.

Another low-corrosion tool steel suitable for hardening with the best properties for mirror polishing as well as good photoetchability, good machinability, high wear resistance and high dimensional stability is steel 1.2083. It should be noted that corrosion resistance occurs only after hardening. This steel is also available in ESR grade. In the electro-slag-remelting process (ESR for short), a conventionally produced steel block is remelted. When the melt passes through the slag, the sulphur and non-metallic inclusions are absorbed by the slag and later separated. The new block solidifies under the slag.

The **highly hardened and tempered materials** include the material grades 1.2714 HH and 1.2738TS HH. The steel 1.2714 HH has a strength of 1.300 – 1.450 N/mm². Its good high temperature wear resistance makes it ideal for extrusion moulds. Due to these characteristics, it is also often used for mould inserts in the die casting sector. The modified hardened and tempered plastic mould steel 1.2738TS HH, which is characterised by good polishability and best grain resistance, has high thermal conductivity and high wear resistance. This steel is ideally suited for cavity plates without dimensional restrictions with deep cavities and high core loads. If visible parts are required that have a lasered or etched surface, this steel is just as suitable for this purpose.

Another indispensable group of steel in mould and die making are the **through hardening steels** . The high alloyed hot-work steel 1.2343 has a high toughness and high-temperature resistance, hot crack resistance and good thermal conductivity, which makes it suitable for cavity plates or inserts for die casting moulds (Al, Mg, Zn, etc.). To meet the very high requirements on the material characteristics like toughness, polishability, or uniform characteristics over the entire block cross-section, this steel is also available in ESR grade. The nickel alloyed steel for through hardening 1.2767 is best suited for mirror polishing due to it's metallurgical characteristics. Typical applications are for example complex cavity plates and inserts with high surface requirements. To avoid unwanted warping during plastic injection, the tempering temperature after hardening must exceed the operating temperature by 50 °C.

In addition to steels, **aluminium** also offers advantages in mould and die making. The very good thermal conductivity and the low weight of aluminium allow very good processing and welding. The material is suitable for plates for mould bases as well as foaming and prototype moulds.

THE MATERIAL GRADES IN DETAIL

F 50 Cavity plates

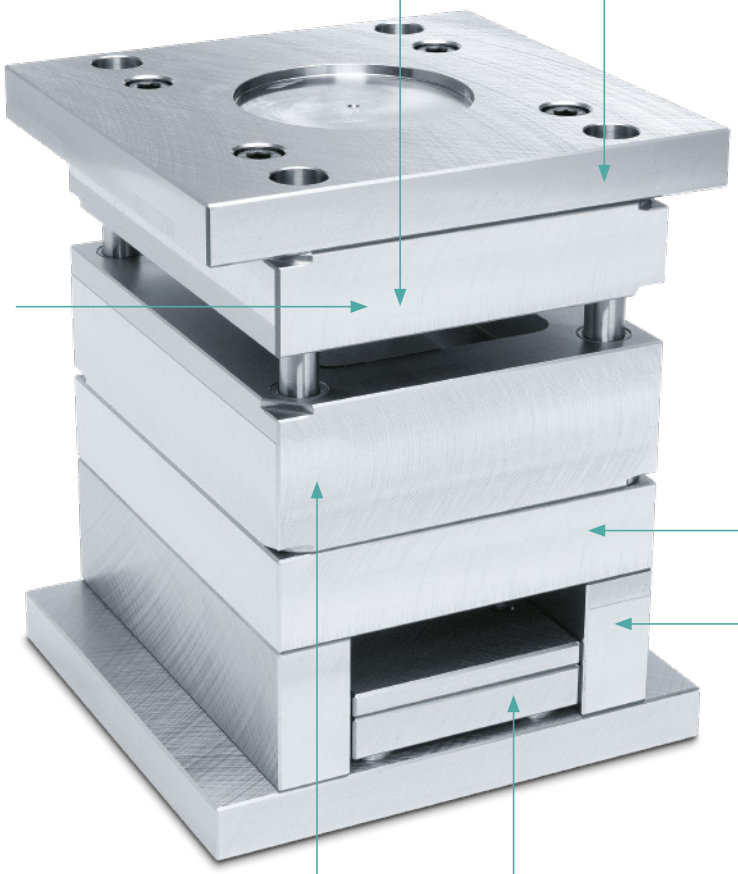
1.2312 (ca. 40 %)*
1.1730 (ca. 25 %)
1.2085 (ca. 10 %)
1.2311 (ca. 10 %)
1.2714HH (ca. 5 %)
1.2738TSHH (ca. 5 %)
3.4365 (ca. 3 %)
1.2738 (ca. 2 %)

F 55 Cavity plates

1.2343 (ca. 35 %)
1.2767 (ca. 30 %)
1.2312 (ca. 15 %)
1.2083 (ca. 10 %)
1.2085 (ca. 5 %)
1.2343ESU (ca. 5 %)

F 53 Cavity plates

1.2312 (ca. 45 %)
1.1730 (ca. 45 %)
1.2085 (ca. 10 %)



Clamp plates

1.1730 (ca. 85 %)
1.2312 (ca. 10 %)
1.2085 (ca. 5 %)

Backing plates

1.1730 (ca. 70 %)
1.2312 (ca. 20 %)
1.2085 (ca. 10 %)

Risers

1.1730 (ca. 95 %)
1.2085 (ca. 5 %)

Ejector set plates

1.1730 (ca. 85 %)
1.2312 (ca. 10 %)
1.2085 (ca. 5 %)

* 40 % of all F 50 cavity plates are bought in material grade 1.2312.

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