

Mold Steel Property Ranking Chart for P2 to P21 and Stainless Grades

A mold steel is bought for the job the cavity has to do, and the properties that decide the choice pull against one another. The grade that hobs most easily is not the grade with the most wear resistance, and the stainless grades that hold up against a corrosive plastic are the weakest of the group in core strength. The tables below rank the mold steels of the P group and three martensitic stainless grades against each other on seven properties, with the steels that rate equally bracketed together.

Reference only. This is a reference summary of published practice and not a specification of ours. The steels are grouped by equal rating and the groups are listed from the highest rating on that property down to the lowest, and the rank number restarts in every column, so a 5 in one column has nothing to do with a 5 in another. The letter (a) marks the carburized condition. Confirm the heat treatment for the grade before the design is fixed.

Performance properties

Wear resistance

Rank	Mold steels, highest first
5	P4 (a), 17Cr-0.65C
4	P5 (a), P6 (a)
3	P2 (a), P3 (a), P20 (a), 13Cr-0.35C
2	13Cr-0.12C
1	P20, P21

Source, Tool Steels (G. A. Roberts and G. Krauss), Table 15-8, Properties and ranking of mold steels, printed page 303, PDF page 296 of the copy consulted. Steels with an equal rating are grouped and the groups run from the highest rating on that property down to the lowest. The letter (a) marks the carburized condition. This is a reference summary of published practice and not an Aobo Steel specification.

Toughness

Rank	Mold steels, highest first
9	P2, P3, P4, P5, P6
8	P20, P21, 13Cr-0.12C
6	13Cr-0.35C
5	17Cr-0.65C

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Hot hardness

Rank	Mold steels, highest first
6	13Cr-0.35C, 17Cr-0.65C
5	P4 (a), 13Cr-0.12C
4	P6 (a), P21
3	P5 (a)
2	P2 (a), P3 (a), P20

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Mold making properties

Machinability

Rank	Mold steels, highest first
8	P20
7	P2, P3, P5
6	P6
5	P4, P21
4	13Cr-0.12C, 13Cr-0.35C, 17Cr-0.65C

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Hubbability

Rank	Mold steels, highest first
7	P2, P5
6	P3
5	P4
4	P20, 13Cr-0.12C
3	13Cr-0.35C
2	P6, 17Cr-0.65C
1	P21

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Service properties

Core strength

Rank	Mold steels, highest first
6	13Cr-0.35C, 17Cr-0.65C
5	P20
4	P21, 13Cr-0.12C
3	P4, P6
2	P2, P3, P5

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Corrosion resistance

Rating	Mold steels, highest first
High	13Cr-0.12C, 13Cr-0.35C, 17Cr-0.65C
Low	All others

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Read the seven columns together rather than one at a time, because no mold steel leads on more than a few of them. The low carbon grades hobs and machines well and take wear resistance from carburizing, the stainless grades alone resist corrosion but are last on hubbability and core strength, and P20 sits in the middle of most columns and at the top of machinability, which is why it is the default for a machined cavity.

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including D2, D3, O1, O2, A2, S7, H13, H11, H10, H21, M2, M42, L6, P20, P20+Ni and 420 and 440C stainless. Forged or hot rolled, annealed or pre-hardened, cut to your sizes, with test certificates. Compiled from Tool Steels (G. A. Roberts and G. Krauss), Table 15-8, Properties and ranking of mold steels, on printed page 303, the mold steels chapter. Every rank integer and every grade group was read from the page image rather than from the searchable text of the file. The table is reproduced as published and is a reference summary rather than an Aobo Steel specification, so treat it as the selection view of one metallurgical textbook and confirm the heat treatment for the grade before the design is fixed.

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