

M1 Tool Steel Heat Treatment

The chemistry, the hardening cycle and the tempering response of M1 molybdenum high speed steel, from the reference page on aobosteel.com. A reference summary of published practice and not an Aobo Steel specification.

Reference only. The chemistry, the hardening cycle and the tempering response are reproduced from the source named at the foot of this sheet. The figures are shop reference values rather than a specification, and the card carries no tolerances. Run a trial part before committing production work to this cycle.

Chemistry of M1

Source, heat treating reference information for M1, printed page 189.

Element	Percent
Carbon	0.85
Manganese	0.30
Silicon	0.30
Chromium	4.00
Molybdenum	8.50
Vanadium	1.00
Tungsten	1.50

The card prints one figure for each element rather than a specification range. Cobalt and sulfur are listed on the card with no figure against them, so those rows are left out of the table instead of being printed as blanks.

Hardening M1

Source, heat treating reference information for M1, printed page 189.

Step	M1
Preheat	1500 °F (815 °C)
Harden	2200 °F (1205 °C)
Quench	Oil or salt quench

The card prints one preheat step, one hardening temperature and two quench media for the grade, with no section size condition against any of them, so the figures stand for the load as written.

Tempering response of M1

Source, heat treating reference information for M1, printed page 189.

Temper, °F	°C	M1, HRC
As quenched	—	65
900	480	64
950	510	66
1000	540	67
1050	565	66
1100	595	65
1150	620	63
1200	650	58

The card prints the as quenched hardness inside the tempering block with no temperature against it, so that row carries a dash in the temperature column. Tempering runs from 900 °F to 1200 °F in 50 °F steps with one Rockwell C figure on each row.

The card carries 8.50% molybdenum against 1.50% tungsten, hardening the grade in oil or salt from 2200 °F (1205 °C) after a 1500 °F (815 °C) preheat, and stepping the tempering line up from 65 HRC as quenched to a peak of 67 HRC at 1000 °F (540 °C) before it falls to 58 HRC at 1200 °F (650 °C), with cobalt and sulfur listed on the card without a figure.

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, M2, L6, P20 and 420 and 440C stainless. Forged or hot rolled, annealed or pre-hardened, cut to your sizes, with test certificates.

Reference data compiled from Heat Treatment, Selection, and Application of Tool Steels (William E. Bryson, second edition, Hanser). The chemistry, the hardening cycle and the tempering response for M1 come from the heat treating reference information on printed page 189.

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