

W1 Tool Steel Heat Treatment

The heat treatment cycle for W1 water hardening tool steel, with the preheat and austenitizing steps, the brine quench and the hardness each tempering temperature leaves. Printed from the reference page on aobosteel.com. A reference summary of published practice and not an Aobo Steel specification.

Reference only. The cycle, the soak rate and the tempering table are reproduced from the source named at the foot of this sheet. Water hardening grades are the most exposed of the tool steels to quench cracking and to growth, and the two tables in the source differ on the austenitizing temperature and on two lines of the tempering table. Both figures are printed as published. Run a trial part before committing a mould or die section to this cycle.

The W1 water hardening cycle

Source, Heat Treating W1 Tool Steel, printed pages 93 to 97.

Step	Temperature	Time or rate
Preheat	1200 °F (650 °C)	10 to 15 minutes, or until the part is uniformly heated
Austenitize and soak	1425 °F (775 °C)	5 minutes per inch of smallest cross section once the part reaches temperature, which is 15 minutes on the 3 in (75 mm) cube in the source
Quench	To 125 to 150 °F (52 to 65 °C)	Water with 10% salt, agitated for the whole quench, flat work entered on edge
First temper	350 °F (175 °C)	2 hours per inch of cross section, started as soon as the part is hand warm
Second temper, when used	325 °F (160 °C)	2 hours per inch of cross section, for parts with fine detail or hard service

The W1 chapter gives the austenitizing temperature as 1425 °F (775 °C). The heat treating reference information for the same grade on printed page 199 gives 1475 °F (800 °C). Both figures are printed in the source and both are shown here as published.

Tempering W1

Source, heat treating reference information for W1, printed page 199, read against the water hardening group table on printed page 142.

Temper, °F	°C	Hardness, HRC
As quenched	No temper	67
300	150	65
400	205	62
500	260	59
600	315	55

The two tables in the source differ on two lines. The reference table on page 199 prints 300 °F (150 °C) at 65 HRC and 400 °F (205 °C) at 62 HRC. The selection table on page 142 prints the same two tempers at 64 HRC and 61 HRC, and marks 300 °F (150 °C) as the optimum temper for the grade. W1 carries 1.05% carbon, 0.25% manganese and 0.20% silicon, and W2 carries 0.95% carbon with 0.20% vanadium.

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including D2, D3, O1, A2, H13, H11, M2, L6, P20 and 420 stainless. Forged or hot rolled, annealed, 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 cycle comes from the W1 chapter on printed pages 93 to 97, the tempering table and chemistry from the heat treating reference information for W1 on printed page 199, and the selection notes for the water hardening group from printed pages 142 and 143.

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