

Quenching Chart for Water, Oil and Air Hardening Steels

How fast the common quenchants remove heat on the nickel ball scale, and the quench speed that each tool and knife steel grade needs to reach full hardness.

Reference only. The values on this sheet are reproduced from the source named at the foot of it. They are a published reference rather than a specification of ours, and the sheet carries no tolerances. The group boundaries of the second table are approximate, as the source states them, and the nickel ball time ranks quenchants against each other rather than naming a hardness.

Nickel ball cooling time of five common quenchants

Source, nickel ball cooling time for different quenchants, Table 21.1 on printed page 258 of the source, which is PDF page 268 of the copy consulted.

Quenchant	Nickel ball cooling time, seconds
Fast oil	7-10
Medium oil	11-14
Slow or normal oil	15-20
Deionized water	2
9 per cent saltwater	1.5

The nickel ball time ranks quenchants against each other and is not a hardness specification. The values are printed as the source gives them. A reference table only, it is not an Aobo Steel specification.

28 steel grades grouped by the quench speed they need

Source, ranking knife steels by hardenability, Table 21.2 on printed page 260 of the source, which is PDF page 270 of the copy consulted.

Steel grade	Quench speed group
W2	Water hardening
White #1	Water hardening
W1 / 1095	Water hardening
Blue Super	Water hardening
1.2562	Water hardening
Blue #1	Water hardening
1.2442	Water hardening
Blue #2	Water hardening
26C3	Water hardening
V-Toku1	Water hardening
V-Toku2	Water hardening
1084 / 1075	Fast oil
80CrV2	Fast oil
15N20	Fast oil
1.2519	Fast oil
52100	Fast oil
8670	Medium oil
CruForgeV	Medium oil
5160	Medium oil
O1	Medium oil
O2	Medium oil
L6	Medium oil
S5	Medium oil
D3	Air hardening
D2	Air hardening
A6	Air hardening
A2	Air hardening
4%+ Cr steels	Air hardening

The group boundaries are approximate, as the source states, so a grade at the bottom of a group can often be quenched in the next slower medium when the section is thin. The last row stands for steels of 4 per cent chromium and above. A reference table only, it is not an Aobo Steel specification.

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, M10, H21, M2, M42, 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 Knife Engineering, Steel, Heat Treating, and Geometry (Larrin Thomas). Table 21.1 is printed on page 258 and Table 21.2 on page 260 of the printed book, which are PDF pages 268 and 270 of the copy consulted. Both tables on this page were read from the page image rather than from an automatic text layer.

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