

Single and Double Tempering of T1 High-Speed Steel

T1 is a tungsten high speed steel, and its tempering schedule is run twice as often as it is run once. The published mechanical property data for T1 shows what the second temper buys. Hardness barely moves. Bend strength and torsion impact strength do.

Reference only. This is a reference summary of published practice and it is not a specification of ours. The values are the published test results for the T1 steel described in the source, and a different heat, section size or furnace will move them. Final cycle parameters are set by the heat treater.

Single and double tempering data for T1

Tempering	Time at 565 °C (1050 °F)	Hardness, HRC	Bend strength, MPa (ksi)	Torsion-impact strength, J (ft-lbf)
Single temper	6 min	65.1	2150 (312)	22 (16)
Single temper	1 h	65.7	1860 (270)	41 (30)
Single temper	2.5 h	65.0	2810 (408)	65 (48)
Single temper	5 h	64.5	2590 (376)	65 (48)
Double temper	2.5 h + 2.5 h	64.5	3130 (454)	85 (63)

Mechanical properties of T1 high speed steel after single and double tempering at 565 °C (1050 °F). The double temper was run as two equal holds with a cool to room temperature between them. Source, Table 11 of Heat Treating of Tool Steels, in ASM Handbook, Volume 4, Heat Treating.

What the table shows

Hardness is flat over the whole range, 64.5 to 65.7 HRC, from 6 min of single tempering to 5 h of single tempering and then through the double temper. Time at temperature buys almost no hardness on this grade at 565 °C (1050 °F).

Single tempering for 2.5 h gives 2810 MPa (408 ksi) of bend strength and 65 J (48 ft-lbf) of torsion impact strength. Doubling that same time as two holds gives 3130 MPa (454 ksi) and 85 J (63 ft-lbf) at the same 64.5 HRC.

Tempering practice for these grades

Forced air furnaces are the usual choice for tempering high speed steel, because the heat reaches the work by convection and the part is brought up gradually rather than shocked.

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. Source, Table 11 of Heat Treating of Tool Steels, in ASM Handbook, Volume 4, Heat Treating.

CONTACT

EMAIL

sales@aobosteel.com

WHATSAPP

+86 180 6294 5370

WEB

aobosteel.com



Scan for the full reference page