

Cold Work Tool Steel — AISI O1

AISI O1 general purpose oil-hardening tool steel is a versatile manganese-chromium-tungsten steel suitable for a wide variety of cold-work applications.

1. Main characteristics:

Good machinability

Good dimensional stability in hardening

A good combination of high surface hardness and toughness after hardening and tempering.

These characteristics combine to give a steel suitable for the manufacture of tooling with good tool-life and production economy.

2. AISI O1 can be supplied in various finishes including hot-rolled, pre-machined, fine-machined and precision ground. It is also available in the form of hollow bar.

Typical	C	Mn	Cr	W
Analysis %	0.95	1.1	0.6	0.6
Standard				
Specification	AISI O1, W.-Nr. 1.2510			
Delivery				
Condition	Soft annealed approx. 190 HB			

3. Heat treatment:

Soft annealing: Protect the steel and heat through to 1435 F (780 C). Then cool in the furnace at 27 F (15 C) per hour to 1200 F (650 C), then freely in air.

Stress – Relieving: After rough machining the tool should be heated through to 1200 F (650 C), holding time 2 hours. Cool slowly to 930 F (500 C) then freely in air.

Hardening: *Preheating temperature:* 1110–1290 F (600–700 C)

Austenitizing temperature: 1450–1560 F (790–850 C)

Protect the part against decarburization and oxidation during hardening.

Quenching Media:

(1). Oil

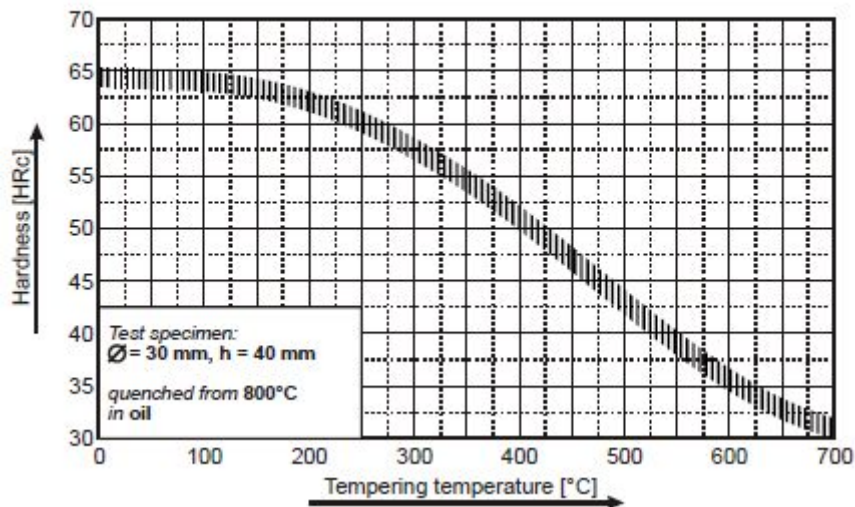
(2). Martempering bath. Temperature 360–435 F (180–225 C), then cooling in air.

Note: Temper the tool as soon as its temperature reaches 120–160 F (50–70 C).

Tempering:

Choose the tempering temperature according to the hardness required by reference to the tempering graph. Temper twice with intermediate cooling to room temperature. Lowest tempering temperature 360 F (180 C). Holding time at temperature minimum 2 hours.

Tempering Diagram



Martempering:

Tools at austenitizing temperature are immersed in the martempering bath for the time indicated, then cooled in air to not lower than 210°F (100°C). Temper immediately as with oil-quenching.

Austenitizing temperature		Temp. of martemp. bath		Holding time in martemp. bath, minutes	Surface hardness prior to tempering (obtained by martempering)
$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$		
1520	825	435	225	max. 5	64 2 HRC
1520	825	390	200	max. 10	63 2 HRC
1520	825	355	180	max. 20	62 2 HRC
1560	850	435	225	max. 10	62 2 HRC

4. Applications:

- (1). **Cutting:** Blanking, punching, piercing, cropping, shearing, trimming, clipping
- (2). Short cold shears, Clipping and trimming tools for forgings
- (3). **Forming:** Bending, raising, drawing, rim rolling, spinning and flow forming, Small coining dies, Gauges, measuring tools, Turning centres, Guide bushes, ejector pins, high duty, small / medium drills and taps, Small gear wheels, pistons, nozzles, cams