

••• O-6 Cold Work Tool Steel

(ASTM O6)

WM O-6 is an oil-hardening, graphitic tool steel with outstanding resistance to metal-to-metal sliding wear and galling. The steel contains a uniform dispersion of graphite particles, which impart excellent machinability and non-seizing characteristics. The graphite particles make the steel self-lubricating in dry environment, and help to retain oil in lubricated environments.

WM O-6 can be hardened to over 60 Rockwell C from a relatively low hardening temperature, which minimizes size change and distortion during heat treatment.

Chemical Composition

Carbon	1.45
Manganese	1.00
Silicon	0.90
Molybdenum	0.25

Typical Applications

Thread gauges, master gages, cams, bushings, sleeves, meat granulator plates, arbors, forming rolls, shear blades, punches, dies, bar feed guides, and other machine tool parts.



Physical Properties

Density – 0.278 lb/in³

Specific gravity – 7.70

Coefficient of Thermal Expansion

70 - 400°F	6.23 x 10 ⁻⁶ in/in/°F
70 - 600°F	6.74
70 - 800°F	7.06
70 - 1000°F	7.23
70 - 1200°F	7.56

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Preheating

Heat at a rate not exceeding 400°F per hour to 1200-1250°F and equalize.

Austenitizing (high heat)

Heat slowly from the preheat to 1450-1550°F

- Less than ½ inch thickness: use 1450°F
- ½ to 2 inches thickness: use 1475°F
- Over 2 inches thickness: use 1500°F

Quenching

Oil or pressurized gas.

For oil, quench to 150-125°F

For pressurized gas, the quench rate to below 1000°F should be a minimum of 400°F per minute, and is critical for obtaining the desired properties.

Tempering

Temper immediately after quenching.

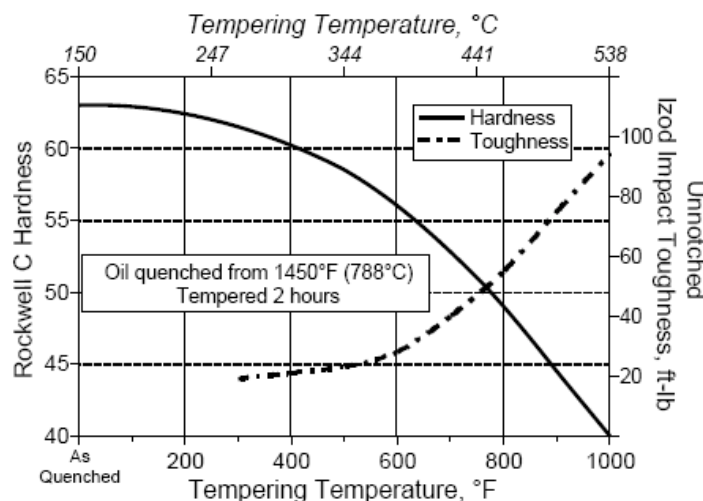
The typical tempering range is 300-400°F. Hold at temperature for 1 hour per inch of thickness, 2 hours minimum, then air cool to ambient temperature. The actual hardness obtained is dependent upon the section size of the part being quenched and tempered.

To minimize internal stresses in cross sections greater than 3 inches and to improve stability in parts that will be EDM'd after heat treatment, a soaking time of 4-6 hours at the tempering temperature is strongly recommended.

Cryogenic Treatment: Refrigeration treatments should typically be performed after the temper, and must be followed by a second temper.

HEAT TREATMENT RESPONSE

As Air Cooled from	HRC
1425°F (774°C), 30 minutes	62
1450°F (788°C), 30 minutes	64
1475°F (802°C), 30 minutes	65.5
1500°F (816°C), 30 minutes	65
1600°F (871°C), 30 minutes	64



Annealing

Annealing must be performed after hot working and before rehardening.

Heat at a rate not exceeding 400°F per hour to 1450°F, and hold at temperature for 1 hour per inch of maximum thickness, 2 hours minimum. Then cool at 10°F per hour to 1300°F. Then cool at 25°F per hour from 1300°F to 1000°F. Then cool in air to ambient temperature. The resultant hardness should be a maximum of 229 HBW.

This information is intended to provide general data on our products and their uses and is based on our knowledge at the time of publication. No information should be construed as a guarantee of specific properties of the products described or suitability for a particular application. Walter Metals reserves the right to make changes in practices which may render some information outdated or obsolete. Walter Metals should be consulted for current information & capabilities.

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