



SB Specialty Metals LLC

Your *First Choice* in Specialty Metals

O1 - Technical Data

General Descriptions:

O1 is an oil hardening tool steel which may be hardened from fairly low temperatures with little size change.

This grade combines good hardening qualities with a fine-grained structure, capable of reaching hardness over 60 HRC.

Example of applications:

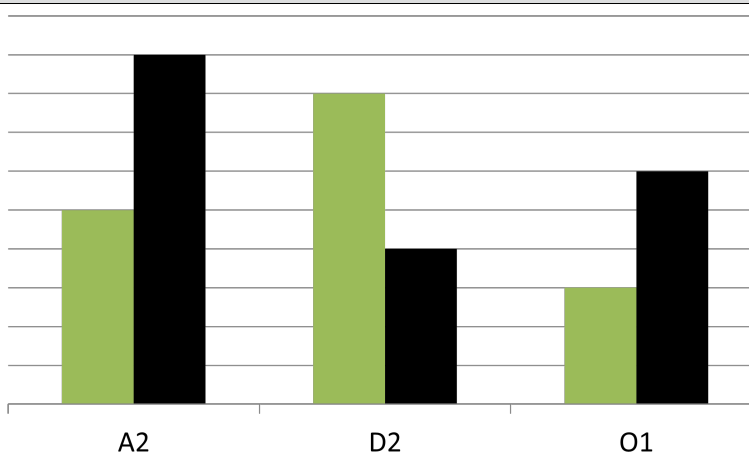
Blanking dies, engraving tools, forming tools, gauges, jewelers hobs, paper knives, hand taps, trim dies.

Chemical Composition

Carbon	Manganese	Silicon	Chromium	Vanadium	Tungsten
0.85-1.00%	1.00-1.40%	0.10-0.50%	0.40-0.70%	up to 0.30%	0.40-0.60%

Comparison Chart

■ Wear Resistance ■ Toughness



Typical Heat Treat Response

Tempering Temp °F	Hardness HRC	Toughness Charpy C-Notch Ft.-lbs
As Quenched	63-65	-
300	63-65	14
350	62-64	28
400	61-63	30
500	58-60	30
600	55-57	32
700	51-53	
800	48-50	
900	43-45	
1000	39-41	

Size Changes During Hardening

Hardening °F	Tempering Temp °F	HRC	Longitudinal Size Change %
1475	300	64	+ 0.12%
1475	450	61	+ 0.18%

Surface Treatment

O1 can be given standard surface treatments such as hard chrome plating if desired. Nitriding is not generally practical due to a substantial loss of core hardness.



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Heat Treatment

Annealing

Heat to 1425/1450 °F, hold for two hours, cool slowly, 50°F per hour maximum, to below 1000°F, then air cool.

Typical annealed hardness is 187/221 BHN

Stress Relieving

Annealed Material: 1100/1300°F, hold 2 hours, cool in still air.

Hardened Material: 50°F below last tempering temperature, hold two hours, cool in still air.

Hardening

Note: Full hardness will only be attained in sections less than about 3" thick.

Critical temperature: 1370°F.

Preheat: 1250/1350°F, let parts equalize.

High Heat (Austenitizing)

1450/1500 °F, hold 10/30 minutes at temperature.

Quench

Oil quench to room temperature.

Temper immediately after quench.

Tempering

350/600 °F, two hours at tempering temperature minimum, four hours preferred.

Physical Properties

Modulus of Elasticity	30 psi x 10 ⁶ (207 GPa)	Density	0.283 lbs/in ³
Annealed Hardness	187/221 BHN	Machinability	O1 is the standard