Buffalo Precision Products, Inc.
"Charging the Industry with excellent Quality and Service"

O1 Oil Hardening Tool Steel

Technical Data Sheet

O1 Tool Steel is a general purpose oil-hardening tool and die steel. Normal care in heat treatment gives good results in hardening and produces small dimensional changes. O1 has good abrasion resistance and sufficient toughness for a wide variety of tool and die applications.

TYPICAL CHEMISTRY: C 0.90 Mn 1.20 V 0.20 W 0.50 Cr 0.50

MACHINABILITY: When properly annealed, O1 has a machinability rating of 90 when compared to a 1% Carbon Steel rated at 100.

DIMENSIONAL STABILITY: When oil quenched from the proper hardening temperature, this grade can be expected to expand approximately .0015 in. per in. Note: Distortion (bending, bowing and twisting) and part geometry can add to the variations in movement of a part being hardened.

THERMAL CYCLING: In order to avoid decarburization, this grade should be annealed and/or hardened in a controlled neutral atmosphere, vacuum, or neutral salt furnace.

1. Anneal: Heat slowly to 1450° F, soak thoroughly. Cool 25° F per hour to 900° F. Air cool to room temperature. Approximate annealed hardness, 221 Maximum Brinell.

2. Stress Relief of Unhardened Material: Heat slowly to 1250° F. Soak for two hours per inch of thickness at heat. Slow cool (furnace cool if possible) to room temperature.

3. Hardening:
   a. Preheat: Heat to 1200° F, and hold at this temperature until thoroughly soaked.

   b. Hardening: Heat to 1475 to 1500° F. Soak at heat for 30 minutes per inch of thickness.

   c. Quench: Oil quench to 150 to 200° F. Temper immediately.

   d. Temper: Normally oil hardening steels need to be single tempered only. However, double tempering may sometimes be preferred. Soak at heat for 2 hours per inch of thickness for each temper. Air cool to room temperature between tempers. The normal tempering range for this grade is 300 to 450° F.

Temper° F	Rockwell "C"	Temper° F	Rockwell "C"P
As-quenched	64/65	700	53
350	62/63	800	50
400	62	900	47
500	60	1000	44
600	57	1100	39

1" diameter specimens, oil quenched from 1475° F.

4. Stress Relief Temper: A stress relief temper for hardened material is strongly recommended after significant grinding, or welding, or EDM. Select a temperature that is 25 or 50° F lower than the last tempering temperature used.