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

S7 Shock Resisting Tool Steel

Technical Data Sheet

S7 is a shock-resisting tool steel with excellent impact properties. Because it is an air-hardening steel, it is safe and stable in heat treatment. S7's most important characteristic is its versatility. It is used widely for medium cold work tools and dies, for plastic-molding dies, shear blades, medium hot work dies, master hobs, and for component parts of many products. S7 is the benchmark shock resisting tool steel.

TYPICAL CHEMISTRY: C 0.50 Si 0.25 Mn 0.70 Cr 3.25 Mo 1.40

MACHINABILITY: When properly annealed, S7 has a machinability rating of 70 as compared to a 1% Carbon Steel rated at 100.

DIMENSIONAL STABILITY: When air quenched from the proper hardening temperature, this grade can be expected to expand approximately .001 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 atmosphere, vacuum, or neutral salt furnace environment.

1. Anneal: Heat to 1550° F, soak for one and one-half hours per inch of thickness. Cool 25° F per hour 900° F. Air cool to room temperature. Approximate annealed hardness 230 Max. 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 1250° F, hold at this temperature until thoroughly soaked.

   b. Harden: Heat to 1725 to 1750° F, soak at heat for 45 to 60 minutes per inch of thickness. Sizes under 1" thick should be held for 45 to 60 minutes minimum.

   c. Quench: Air quench sections up to 2-1/2" thick in still air. Quench to 150° F. Temper immediately after quenching in all cases.

   d. Temper: Double temper is mandatory. Soak for two hours per inch of thickness for each temper. Air cool to room temperature between tempers. For cold work applications, the normal tempering range is 400 to 500° F. For hot work applications, a tempering temperature of 900 to 1000° F is suggested. Never temper S7 under 400° F.

Temper° F	Rockwell "C"	Temper° F	Rockwell "C"
As-quenched	58/60	800	53
400	58	900	52
500	56	1000	51
600	55	1100	47
700	54	1200	38

1" diameter specimens, three inches long were air-hardened from 1725° F.