



SB Specialty Metals LLC

Your **First Choice** for Specialty Metals

S7- Technical Data

General Description:

S7 is an air hardening, shock resistant, cold work tool steel.
S7 is characterized by high impact toughness at relatively high hardness levels (55/57 HRC).
S7 has high impact toughness allowing it to withstand chipping and breaking while still having good wear resistance at relatively high hardness levels.

Example of applications:

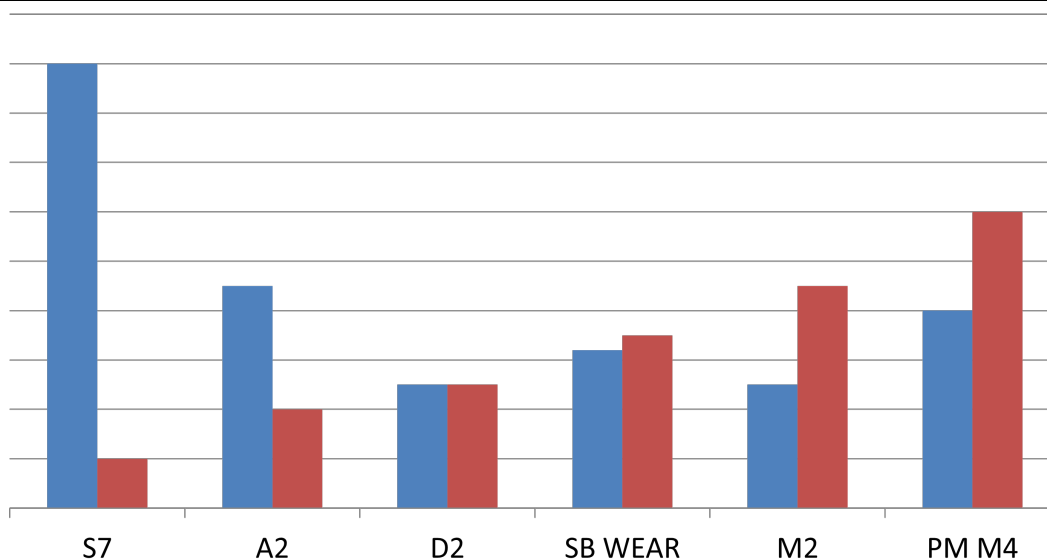
Punches and dies subject to heavy impact, warm forging/heading dies, plastic injection molds and heavy duty shear blades.

Chemical Composition

| Carbon | Molybdenum | Vanadium | Chromium | Silicon | Manganese |
|--------------|--------------|-----------|--------------|--------------|--------------|
| 0.45 - 0.55% | 1.30 - 1.80% | 0.35% max | 3.00 - 3.50% | 0.20 - 1.00% | 0.20 - 0.90% |

Comparison Chart

■ Toughness ■ Wear Resistance



Typical Heat Treat Response

| Hardening Temp °F | Tempering Temp °F | Hardness HRC | Charpy C-Notch Toughness Ft.-lbs |
|-------------------|-------------------|--------------|----------------------------------|
| 1740 | 300 | 59 | 85 |
| | 400 | 57 | 125 |
| | 500 | 55 | 125 |
| | 600 | 54 | 115 |
| | 700 | 53 | 105 |
| | 800 | 53 | 105 |
| | 900 | 52 | 120 |
| | 1000 | 51 | 150 |
| | 1100 | 47 | 190 |

Size Changes During Hardening

| Hardening Temp °F | Tempering Temp °F | HRC | Longitudinal Size Change % |
|-------------------|-------------------|-----|----------------------------|
| 1740 | 400 | 57 | +0.04% |
| 1740 | 1000 | 51 | +0.05% |

Surface Treatment

Because of the low tempering temperatures normally used, S7 is not typically suitable for nitriding or similar treatments.



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Heat Treatment

Annealing

Heat to 1550°F, hold two hours, slow cool (50°F/hour max) to 1000°F, then air cool to room temperature. Typical annealed hardness: 187/220 BHN.

Stress Relieving

Annealed Material: Heat to 1200/1250°F, hold two hours, cool in still air.

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

Hardening

Preheat to 1350/1400°F, equalize.

High Heat (Austenitizing)

1725/1750°F, hold 30/45 minutes at temperature.

Quench

Air, positive pressure vacuum, interrupted oil to 150°F.

Parts with cross sections over 2" thick may require oil quenching to attain full hardness.

Tempering

350/1000°F, two hours at tempering temperature per temper, air cool to room temperature between tempers.

Double tempering is recommended.

Physical Properties

| | | | |
|------------------------------|--|----------------------|--------------------------|
| Modulus of Elasticity | 30 PSI x 10 ⁶(207GPa) | Density | 0.283 lb/In ³ |
| Annealed Hardness | 187/220 Brinell Hardness (BHN) | Machinability | 75-80% of O1 |