



SB Specialty Metals LLC

Your *First Choice* for Specialty Metals

S5 - Technical Data

General Descriptions:

S5 is a shock resisting tool steel capable of maximum toughness at relatively high hardness. It has excellent impact resistance with good edge retention.

Example of applications:

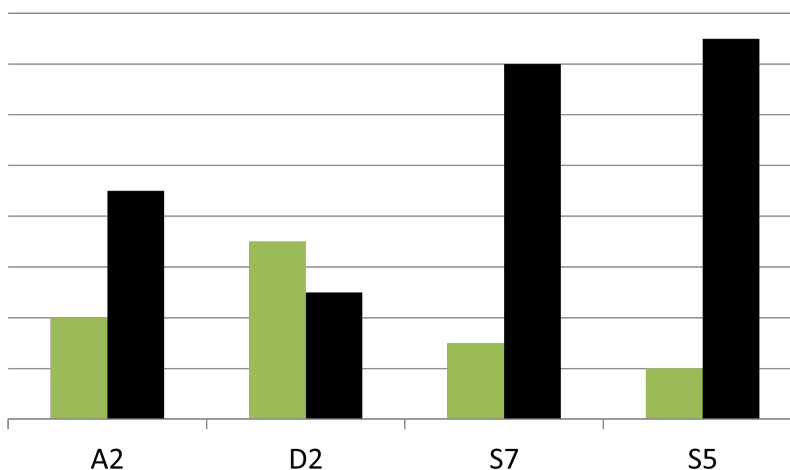
Heading tools, chisels, rivet sets, stamps, hand tools, punches, shear blades, concrete breakers, hammers.

Chemical Composition

Carbon	Manganese	Silicon	Chromium	Vanadium	Molybdenum
0.50-0.65%	0.60-1.00%	1.75-2.25%	0.10-0.50%	0.15-0.35%	0.20-0.40%

Comparison Chart

■ Wear Resistance ■ Toughness



Typical Heat Treat Response

Tempering Temp °F	Hardness HRC 1650 °F	Toughness, Charpy C-Notch Ft.-lbs
As Quenched	60-61	49
300	60-61	138
400	58-60	146
500	58-59	142
600	57-58	156
700	56-57	
800	51-52	
900	47-48	
1000	44-45	

Size Changes During Hardening

Hardening Temp °F	Tempering Temp °F	HRC	Longitudinal Size Change %
1650	300	60-61	+0.08%
1650	600	57-78	+0.09%

Surface Treatment

S5 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 two hours, cool slowly, 50 °F per hour maximum, to below 1100 °F, then air cool.

Typical annealed hardness is 187-235 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 achieved in sections less than a few inches thick.

Preheat: 1250-1400 °F let parts equalize.

High Heat (Austenitizing)

1550-1650 °F, hold 10-20 minutes at temperature.

Quench

Oil quench to 150 °F or below. For minimum distortion, parts may be removed from the oil quench once they are below 400 °F, and then air cooled to room temperature.

Tempering

350-900 °F; hold two hours minimum per temper.

Physical Properties

Modulus of Elasticity	30 psi x 10 ⁶ (207 GPa)	Density	0.280 lbs/in ³
Annealed Hardness	187/235 BHN	Machinability	90% of O1