

# DATA SHEET



**LATROBE SPECIALTY  
STEEL COMPANY**

Latrobe, PA 15650-0031 USA

Issue 1

## LSS™ A6 Tool Steel (ASTM A6)

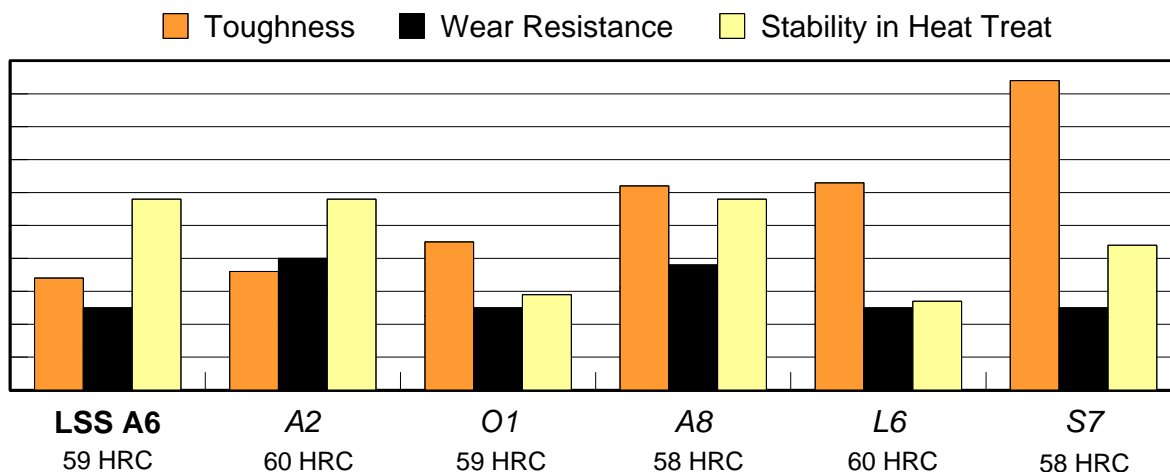
Typical Composition

C	Mn	Si	Cr	Mo
0.70	2.00	0.30	1.00	1.25

**LSS A6 tool steel** is a medium-alloy, air-hardening tool steel that is characterized by its ability to be through hardened while using the low austenitizing temperatures which are typically associated with oil-hardening tool steels. LSS A6 exhibits good toughness and excellent dimensional stability in heat treatment. LSS A6 is intermediate in wear resistance between O1 oil-hardening tool steel and D2 high-carbon, high-chromium tool steel.

Typical applications for LSS A6 tool steel include blanking and forming dies, trim dies, bending and forming tools, mandrels, chuck jaws, tooling for plastic injection molding, dowel pins, shear knives, and gages.

### Relative Properties



### Physical Properties

Density: 0.283 lb/in<sup>3</sup> (7833 kg/m<sup>3</sup>)  
 Specific Gravity: 7.83  
 Modulus of Elasticity: 30x10<sup>6</sup> psi (207 GPa)

Machinability: 80% of a 1% carbon steel

Coefficient of Thermal Expansion: (at 58-59 HRC)

Temperature, °F	in/in °Fx10 <sup>-6</sup>	Temperature, °C	mm/mm °Cx10 <sup>-6</sup>
70 - 200	6.6	21 - 93	11.9
70 - 600	7.3	21 - 316	13.1
70 - 900	7.9	21 - 482	14.2
70 - 1300	8.2	21 - 704	14.7

# LSS™ A6

## HEAT TREATING INSTRUCTIONS

(See Tech-Topics Bulletin 102 for a more thorough explanation of heat treating.)

### HARDENING:

#### Critical Temperature:

Ac1: 1340°F (727°C)

**Preheating:** Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1200-1300°F (649-704°C) and equalize.

**Austenitizing (High Heat):** Heat slowly from the preheat.

Furnace or Salt: 1525-1625°F (829-885°C)

Soak for 30 minutes for the first inch (25.4 mm) of thickness, plus 15 minutes for each additional inch (25.4 mm).

**Quenching:** Air or pressurized gas to 150-125°F (66-51°C). Sizes up to 4 inches (101.6 mm) in thickness will through harden when air cooled from 1575°F (857°C). Sizes up to 6 inches (152.4 mm) in thickness will through harden when air cooled from 1625°F (885°C)

**Tempering:** Temper immediately after quenching. Hold at temperature for 1 hour per inch (25.4 mm) of thickness, 2 hours minimum, then air cool to ambient temperature. The typical tempering range is 350 to 400°F (177 to 204°C)

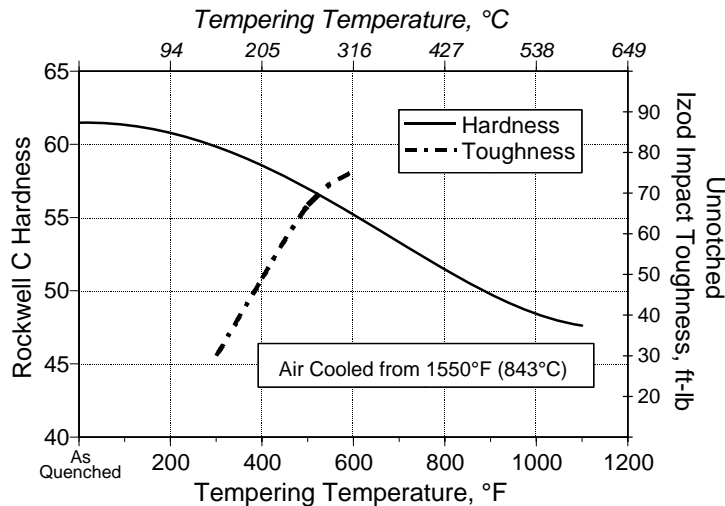
To minimize internal stresses in cross sections greater than 6 inches (152.4 mm) and to improve stability in tools that will be EDM'd after heat treatment, a soaking time of 4 to 6 hours at the tempering temperature is strongly recommended.

**Cryogenic Treatment:** Some prefer to do cryogenic treatment as an extension of the quench from the austenitizing treatment. Others prefer to cryogenically treat after tempering.

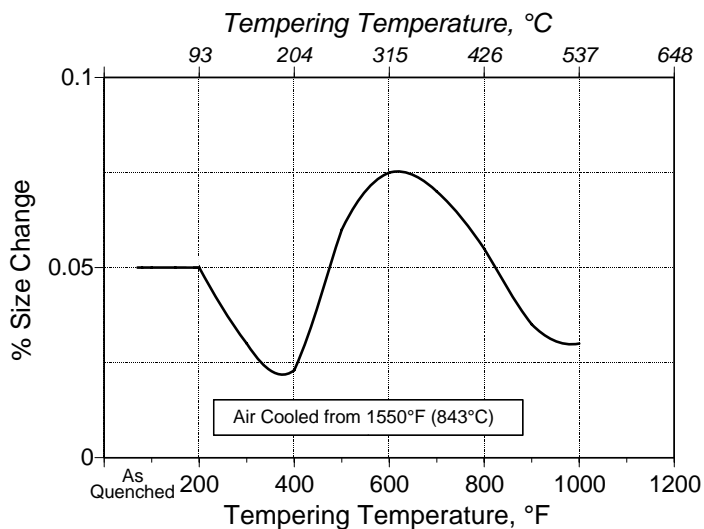
**ANNEALING:** Annealing must be performed after hot working and before rehardening.

Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1370°F (743°C), and hold at temperature for 1 hour per inch (25.4mm) of maximum thickness; 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 20°F per hour (11°C per hour) to 950°F (510°C). Continue cooling to ambient temperature in the furnace or in air. The resultant hardness should be a maximum of 248 HBW.

## HEAT TREATMENT RESPONSE



## Size Change During Hardening



The data presented herein are typical values, and do not warrant suitability for any specific application or use of this material. Normal variations in the chemical composition, the size of the product, and heat treatment parameters may result in different values for the various physical and mechanical properties.



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