DATA SHEET

LATROBE SPECIALTY STEEL COMPANY
Latrobe, PA 15650-0031 USA

Issue 2

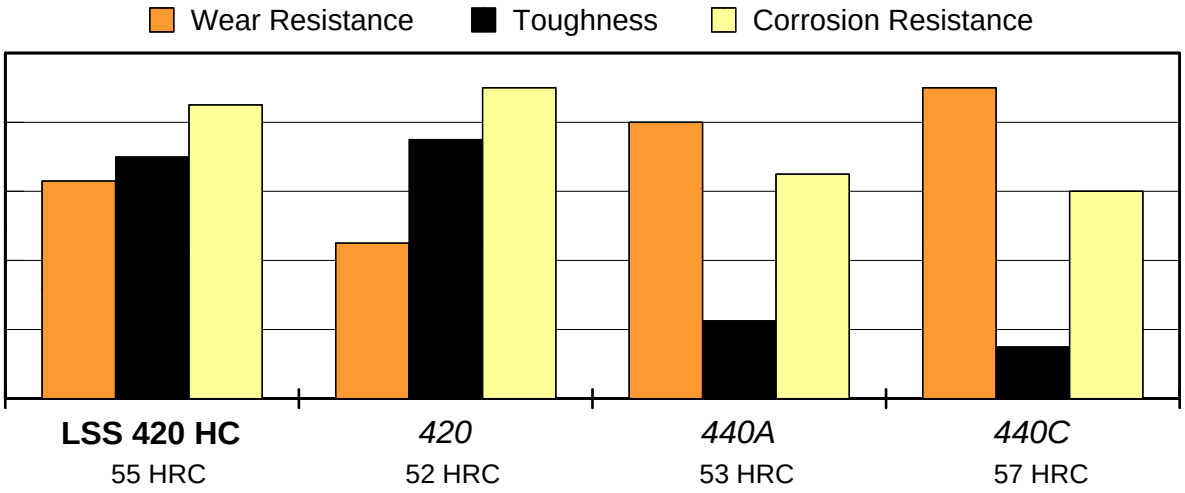
LSS™ 420 HC (High Carbon) Stainless Steel

Typical Composition

C	Mn	Si	Cr	V
0.46	0.40	0.40	13.00	0.30

LSS 420 HC is a high-carbon martensitic stainless steel that exhibits an attainable hardness of approximately 55 HRC and good wear resistance. LSS 420 HC should be considered for applications such as specialty knives, industrial knives, cutlery, rolls, plastic extrusion tooling, scissors, surgical knives, bearings, and other applications that require a combination of corrosion resistance and wear resistance.

Relative Properties



Physical Properties

Density: 0.278 lb/in^3 (7700 kg/m^3)
Specific Gravity: 7.70
Modulus of Elasticity: 30x10^6 psi (207 GPa)
Electrical Resistivity: 54.8 µOhm-cm at 70°F (21°C)

Machinability: 50-55% of a 1% carbon steel

Thermal Conductivity:

Temperature °F	Btu/ hr-ft-°F	Temperature °C	W/ m-°C
68	17.34	20	30
390	17.98	199	31.11
750	18.75	399	32.44

Coefficient of Thermal Expansion:

Temperature °F	in/in/ °F x 10^{-6}	Temperature °C	mm/mm/ °C x 10^{-6}
68 - 212	5.8	20 - 100	10.5
68 - 392	6.1	20 - 200	11.0
68 - 572	6.5	20 - 300	11.6
68 - 752	6.7	20 - 400	12.0
68 - 932	6.7	20 - 500	12.0

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LSS 420 HC
HEAT TREATING INSTRUCTIONS

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

CRITICAL TEMPERATURES

Ac1: 1470°F (799°C)
Ac3: 1580°F (860°C)

HARDENING:

Preheating: To minimize distortion in complex tools use a double preheat. Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1150-1250°F (621-677°C), equalize, then raise to 1400-1500°F (760-816°C) and equalize. For normal tools, use only the second temperature range as a single preheating treatment.

Austenitizing (High Heat): Heat rapidly from the preheat.

Furnace or Salt: 1800-1875°F (982-1025°C)

For maximum toughness, use 1800°F (982°C)

For maximum hardness and wear resistance, use 1875 (1025°C).

Soak at temperature for a minimum of 30 minutes for sections up to 5 inches (127mm) in thickness. Add an additional 10 minutes of soak time for each additional inch (25.4 mm) of thickness.

Quenching: Air, pressurized gas, or warm oil. Section thicknesses up to and including 5 inches (127 mm) will typically fully through harden when cooled in still air from the austenitizing treatment. Sections greater than 5 inches (127 mm) in thickness will require accelerated cooling by using forced air, pressurized gas, or an interrupted oil quench to obtain maximum hardness, corrosion resistance, and toughness.

For pressurized gas, a minimum quench rate of approximately 30°F (18°C) per minute to below 1000°F (538°C) is required to obtain the optimum properties in the steel.

For oil, quench until black, about 900°F (482°C), then cool in still air to 150-125°F (66-51°C).

Tempering: *Temper immediately after quenching*. The typical tempering temperature of 300°F (149°C) will result in a hardness of approximately 53 to 54 HRC. However, tempering temperatures in the range of 250 to 775°F (121-413°C) may be used.

Tempering in the range of 800 to 1025°F (427-552°C) will decrease both the corrosion resistance and toughness of the steel.

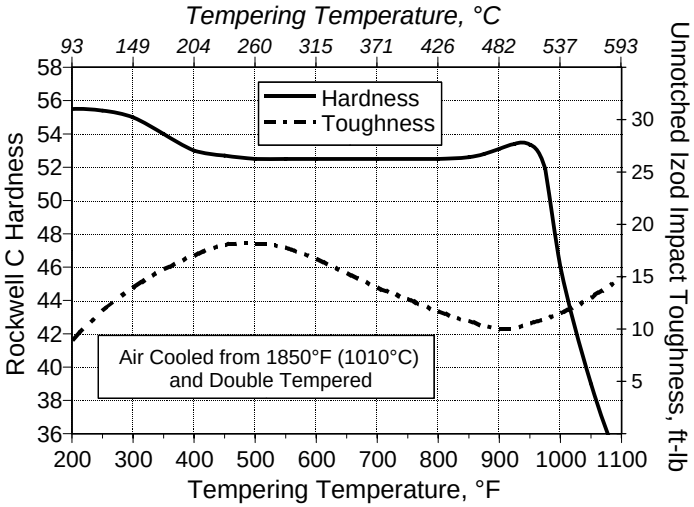
Hold at the tempering temperature for 1 hour per inch (25.4 mm) of thickness, but for no less than 4 hours, then air cool to ambient temperature. Double tempering is required. To maximize toughness, a third temper is recommended.

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 1525-1625°F (830-885°C), and hold at temperature for 1 hour per inch (24.5 mm) of maximum thickness; 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 40°F per hour (22°C per hour) to 1000°F (538°C). Continue cooling to ambient temperature in the furnace or in air. The resultant hardness should be a maximum of 235 HBW.

HEAT TREATMENT RESPONSE

As Air Cooled from	HRC
1800°F (982°C), 30 minutes	54
1850°F (1010°C), 30 minutes	56
1875°F (1025°C), 30 minutes	57



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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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