DATA SHEET

LATROBE SPECIALTY STEEL COMPANY
Latrobe, PA 15650-0031 USA

Issue 1

LSS™ 440C Stainless Knife Steel

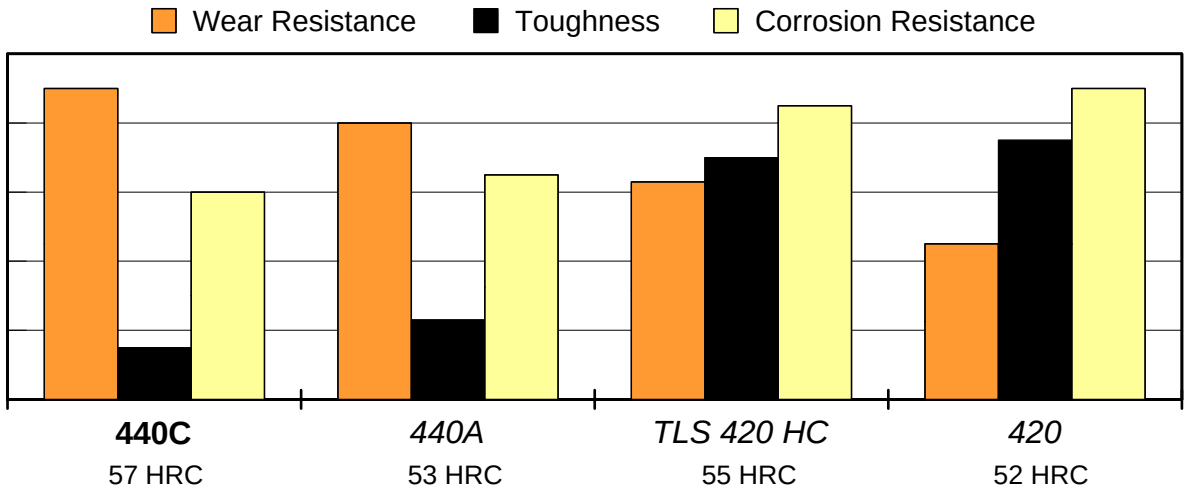
(ASTM A276, Type 440C)

Typical Composition

C	Mn	Si	Cr	Mo
1.05	.40	0.40	17.0	0.40

LSS 440C Stainless Knife Steel is a high-carbon martensitic stainless steel which exhibits an attainable hardness of approximately 60 HRC. The high carbon content results in a hard matrix and numerous chromium carbides in the microstructure, which in turn provide excellent wear resistance and retention of cutting edges. LSS 440C stainless knife steel should be considered for applications such as specialty knives, industrial knives, scissors, surgical knives, and other applications which require a combination of corrosion resistance, wear resistance, or edge retention.

Relative Properties



Physical Properties

Density: 0.275 lb/in^3 (7620 kg/m^3)
Specific Gravity: 7.62
Modulus of Elasticity: 29 x 10^6 psi (200 GPa)
Thermal Conductivity:
14.0 Btu/ft/hr/°F at 212°F
24.2 W/m/°K at 100°C
Specific Heat: 0.11 Btu/lb/°F

Coefficient of Thermal Expansion

Temperature °F	in/in/ °F x 10^{-6}	Temperature °C	mm/mm/ °C x 10^{-6}
68 - 392	5.8	20 - 200	10.0
68 - 1112	6.2	20 - 600	11.2

Electrical Resistivity: 600 nΩm at 68°F (20°C)
Machinability: 30 - 40% of an AISI B1112

LSS™440C Stainless Knife Steel

HEAT TREATING INSTRUCTIONS

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

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 1000-1050°F (538-566°C), equalize, then raise to 1400-1450°F (760-788°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 to 1850-1950°F (1010-1066°C) and soak for 30 minutes per inch of thickness, 30 minutes minimum.

Quenching: Air, pressurized gas, or warm oil.

For pressurized gas quenching, a minimum quench rate of approximately 50°F per minute (28°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).

Cryogenic Treatment: An optional cryogenic treatment may be used immediately after quenching to 150 to 125°F (66-51°C) to remove retained austenite. Cool to -100°F (-73°C), remove from cooling medium, and allow part to warm to ambient temperature in still air.

Tempering: *Temper immediately after quenching or cryogenic treatment*.

The typical tempering range is 300-750°F (149-399°C). *Tempering in the range of 800 to 1100°F (427-593°C) will decrease both the corrosion resistance and toughness of the steel.*

Hold at the tempering temperature for 1 hour minimum then air cool to ambient temperature.

ANNEALING:

Annealing must be performed after hot working (forging) and before rehardening.

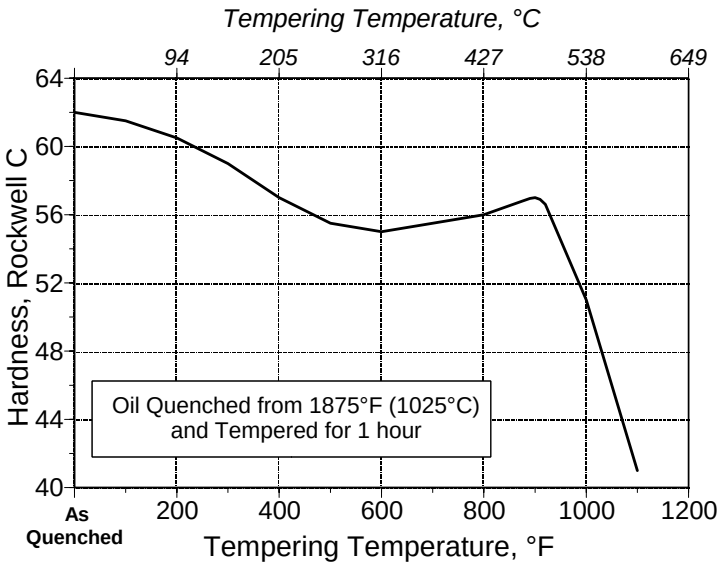
Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1550-1650°F (843-899°C), and hold until equalized. Then cool slowly with the furnace at a rate not exceeding 50°F per hour (28°C per hour) to 1000°F (538°C). Continue cooling to ambient temperature in the furnace or in air.

The resultant hardness should be 255 HBW or lower.

HEAT TREATMENT RESPONSE

*As Oil Quenched from	HRC
1850°F (1010°C), 30 minutes	60
1875°F (1038°C), 30 minutes	62
1900°F (1052°C), 30 minutes	60.5
1950°F (1066°C), 30 minutes	57.5
*As Air Quenched from	HRC
1850°F (1010°C), 30 minutes	59
1875°F (1038°C), 30 minutes	61
1900°F (1052°C), 30 minutes	60
1950°F (1066°C), 30 minutes	57.5

*0.110" Thick Sheet



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