DATA SHEET

LATROBE SPECIALTY STEEL COMPANY

Latrobe, PA 15650-0031 USA

Issue 1

LSS™ 420 MQ Plastic Mold Steel

AISI Type 420 Stainless Steel

Typical Composition

C	Mn	Si	Cr	V
0.38	0.45	0.40	13.60	0.30

LSS 420 MQ is a highly-refined, Mold Quality stainless steel that is engineered to exhibit excellent polishability, good corrosion resistance, and good wear resistance. LSS 420 MQ is melted using an electric-arc furnace, is refined by the argon-oxygen-decarburization (AOD) process, and is further enhanced to aerospace quality levels using Vacuum-Arc or Electro-Slag Remelting. These special melting and forging practices result in ultra-high microcleanliness and a homogeneous microstructure.

LSS 420 MQ is a superior material for the manufacture of plastic molds that require high hardness for good parting line retention and sealing between colored resins. It also resists attack from the corrosive vapors that are produced during molding of some plastic resins. The corrosion resistance also enhances extended tool storage in humid environments. The high cleanliness and homogeneity make LSS 420 MQ a superb choice for mold cavities that require photoetching/texturizing or the highest, lens-quality polished finishes.

Typical applications include plastic mold cavities, plastic extrusion dies, cutlery, surgical and dental instruments, gauges, valves, shafts, cams, and ball bearings.

Physical Properties

Density: 0.280 lb/in^3 (7750 kg/m^3)
Specific Gravity: 7.75
Modulus of Elasticity: 29x10^6 psi (200 GPa)
Electrical Resistivity: 54.8 µOhm-cm at 70°F (21°C)

Machinability: 55-60% of a 1% carbon steel

Thermal Conductivity:

Temperature °F	Btu/ hr-ft-°F	Temperature °C	W/ m-°C
68	13.25	20	22.84
390	13.83	199	23.93
750	14.42	399	24.95

Coefficient of Thermal Expansion:

Temperature °F	in/in/ °F x 10^{-6}	Temperature °C	mm/mm/ °C x 10^{-6}
68 - 212	5.7	20 - 100	10.2
68 - 600	6.0	20 - 316	10.8
68 - 1000	6.5	20 - 538	11.7
68 - 1200	6.8	20 - 649	12.2

LSS 420 MQ
HEAT TREATING INSTRUCTIONS

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

CRITICAL TEMPERATURES

Ac1: 1475°F (802°C)
Ac3: 1585°F (863°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: 1800-1900°F (982-1038°C)

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

For maximum hardness and wear resistance, use 1900 (1038°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 700°F (371°C) will result in a hardness of approximately 51 to 53 HRC. However, tempering temperatures in the range of 400 to 775°F (204-413°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.

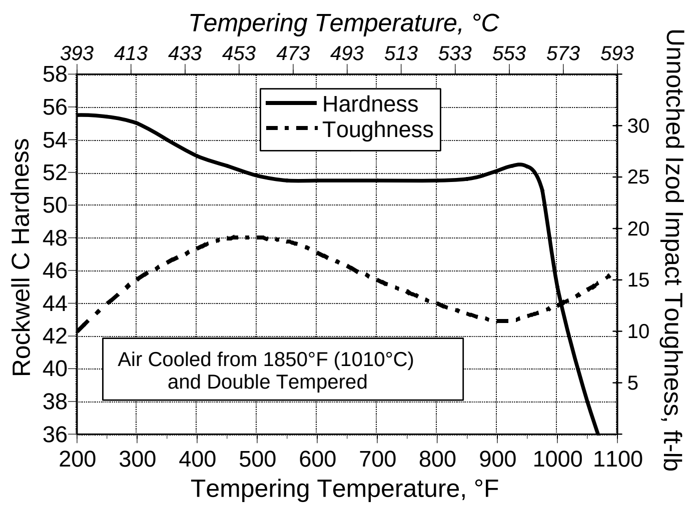
Hold at the tempering temperature for 1 hour per inch (25.4 mm) of thickness, but for no less than 4 hours, then air cool to ambient temperature. Double tempering is required. To maximize toughness, a third temper is recommended.

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	52
1850°F (1010°C), 30 minutes	55.5
1900°F (1038°C), 30 minutes	56.5



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