NESSteel Inc.

83 Gerber Drive, Tolland, CT 06084
800-654-2901 • Fax: (860) 875-4900 sales@nessteel.com

Mold Quality Steel
AISI 420

AISI 420 is an air- or oil-hardening ESR or VAR remelted stainless mold steel noted for its excellent polishability characterisitics. Typical analysis is shown in the chart below:

Carbon	Silicon	Manganese	Chromium	Vanadium
.38%	0.75%	0.5%	13.6%	0.3%

AISI 420 is used in mold applications requiring corrosion resistance, good machinability and dimensional stability, as well as good polishability. Typical applications are

- injection molds
- compression molds
- transfer molds
- fixtures
- jigs
- glass molds
- knives
- scissors
- meat choppers
- surgical instruments
- springs
- constructional parts
- die casting nozzles

Heat Treatment

Forging:

- Heat slowly to 1650° - 2010° F
- Allow steel to heat through before forging.
- After forging, allow 420 to cool slowly in furnace, sand, vermiculite or dry coke breeze.
- Anneal as soon as possible.

Soft Annealing

- Surface protection - pack in tubes/containers with cast-iron chips.
- Heat thoroughly to 1440°F, and allow to cool.
- Annealed hardness will be approximately 210 - 215 Brinnell.

Stress Relieving

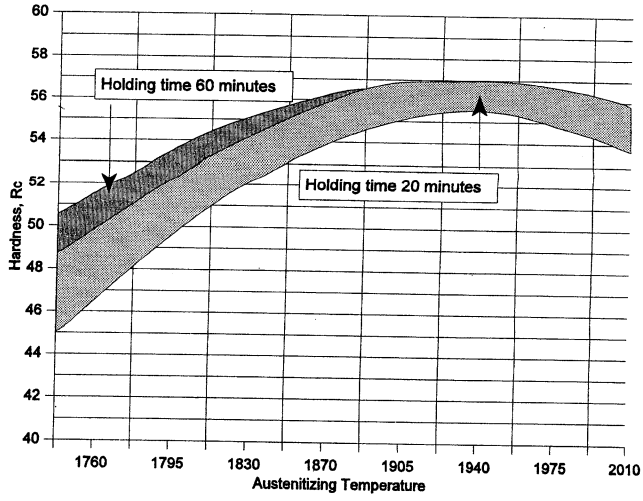
- Rough machine prior to stress relieving.
- Heat steel to 1250°F; hold at temperature for 2 hours.
- Cool in furnace to 900°F - 940°F, and then air-cool.

Hardening:

- Pre-heat to 1110°F - 1560°F
- Austenitizing temperature: 1800°F - 1920°F
- Hold steel at hardening temperature until workpiece is thoroughly heated through.
- Surface protection: pack hardening or controlled atmosphere furnaces.

Hardening Temperature, °F	Holding time, minutes	Surface hardness before tempering
1830	40	53±2 HRc
1880	30	55±2 HRc
1920	20	56±2 Hrc

Hardness as a Function of Austenitizing Temperature



- Quench using one of the following media:
  - Oil
  - Air blast
  - Circulating air or atmosphere
  - Martempering bath at 400°F-1020°F for up to 100 minutes, then cool in air.
- Temper immediately after tool cools to 160°F - 210°F.

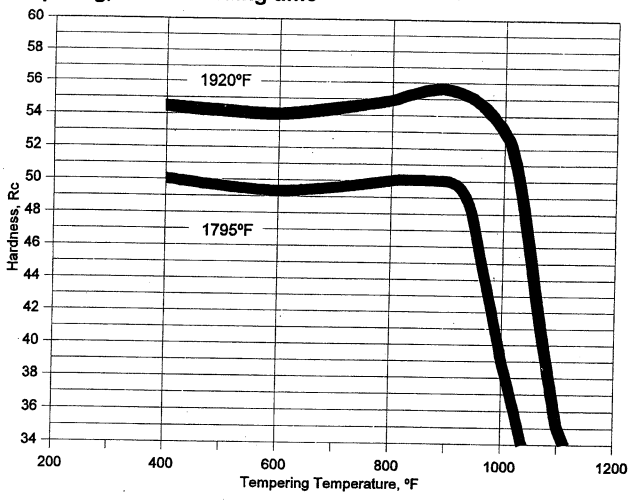
Tempering

Double tempering of 420 is preferred. Refer to tempering chart for desired hardness. Minimum tempering temperature is 360°F. Minimum holding time at temperature is 2 hours.

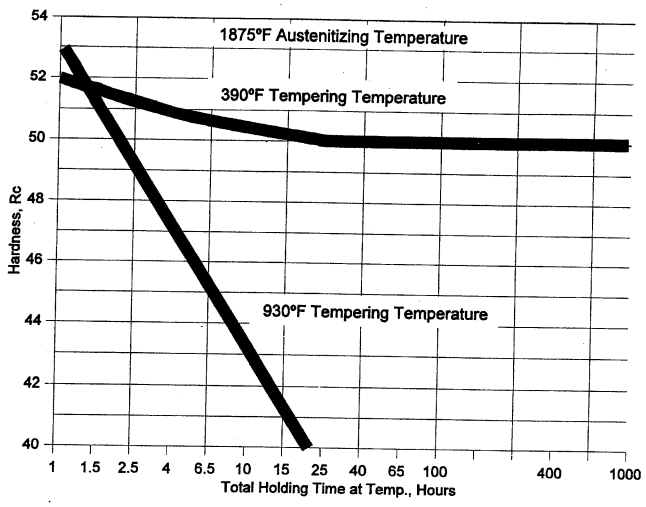
Tempering Temperature, °F	Hardness, Rc
360	53
390	52
440	52
480	52
930	53
1020	47
1110	36

(1-3/8" diameter test piece. Oil quenched from 1880°F.)

Tempering, 2 hour holding time



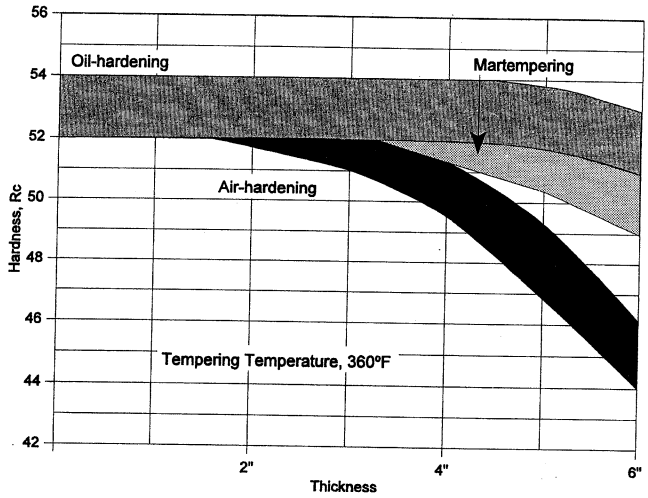
Time Effect on Tempering



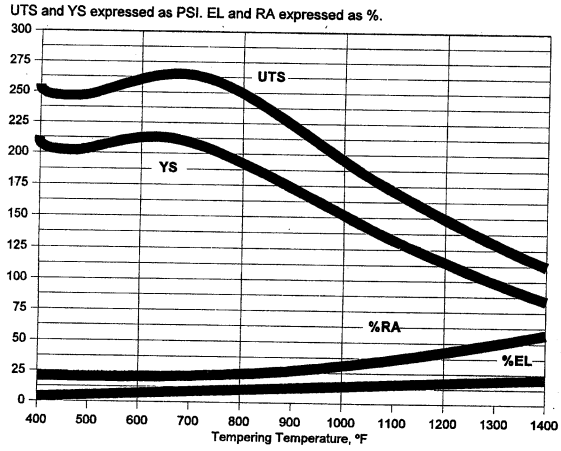
Physical & Mechanical Properties

Density, lbs/in³:		.282
Modulus of Elasticity:	**10^3 N/mm²**	220
(68°F)	**psi**	31.1 x 10^6
Coefficient of Thermal Expansion,		
68°F - 390°F	6.1 x 10^{-6}	
68°F - 750°F	6.4 x 10^{-6}	
Thermal conductivity,		
BTU/ft² x hr @:	**68°F**	159
°F/in	**390°F**	166
	750°F	173
Specific Heat, BTU/lb °F		0.110

Section Thickness Effect on Hardness



UTS and YS expressed as PSI. EL and RA expressed as %.



Dimensional Changes on Hardening

Flat size: 4" x 4" x 1", quenched from 1880°F in martempering bath.
Mean dimensional change values:

Width	Thickness	Length
+0.05%	+0.06%	-0.05%

Dimensional Changes on Tempering

Hardening and Tempering dimensional changes are cumulative.