



SB Specialty Metals LLC

Your **First Choice** in Specialty Metals

420 ESR - Technical Data

General Descriptions:

420 ESR is a high-quality stainless mold steel that is double melted using the Electro Slag Remelt (ESR) process. This grade is designed for applications that require a good combination of corrosion resistance and high polishability.

420 ESR molds can retain a highly polished finish, which makes this grade particularly suited for medical, electronic, food processing or other clean-room type molding environments, or molding of mildly corrosive resins.

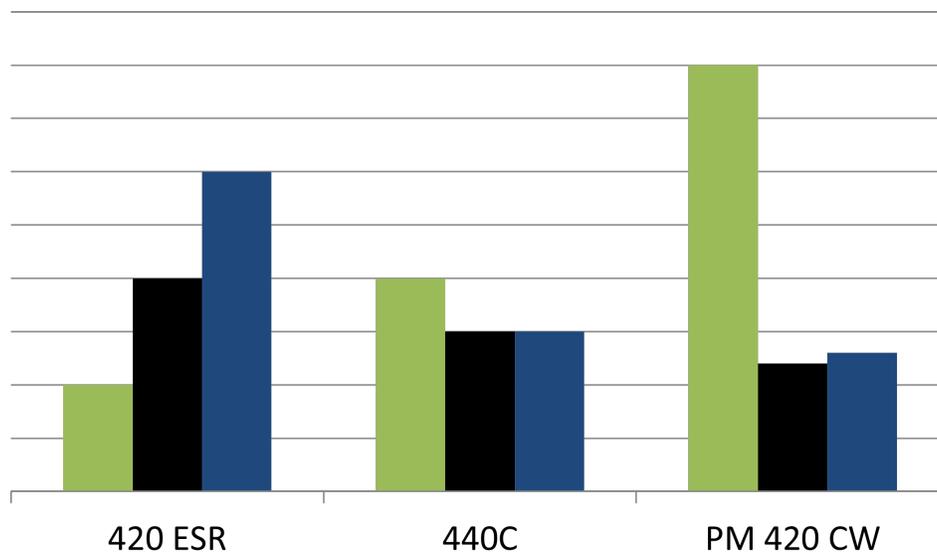
Example of applications:

Injection molds, compression molds, glass molds, rubber molds and plastic extrusion dies.

Chemical Composition

Carbon	Manganese	Silicon	Chromium	Vanadium	Sulphur
0.35-0.45%	0.40-0.65%	0.70-0.95%	13.00-14.00%	0.25-0.35%	<0.003%

Comparison Chart ■ Wear Resistance ■ Toughness ■ Corrosion Resistance



Typical Heat Treat Response

Tempering Temp Degrees °F	Hardness HRC		
	1850 °F	1880 °F	1920 °F
550	48/50	50/52	52/53
650	48/50	50/52	52/53
750	49/52	51/53	53/54
850	50/52	52/54	52/54
950	48/50	49/50	50/53
1050	36/50	37/40	38/40

Size Changes During Hardening

Hardening Temp (F)	Tempering Temp	HRC	Longitudinal Size Change %
1880 °F	750 °F	51/53	+0.09%



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Heat Treatment

Annealing

Heat to 1600 °F, equalize, hold for 6 hours, cool slowly in a furnace (25 °F /hour max) to 1200 °F, then air cool to room temperature.

Annealed hardness with be approximately 190/230 BHN.

Stress Relieving

Annealed material: Heat to 1100/1250 °F, hold two hours, and allow to cool in still air.

Hardened material: Heat to 25/50 °F below final tempering temperature, hold two hours, and allow to cool in still air.

Hardening

Preheat: 1400/1500 °F, let parts equalize.

High Heat (Austenitizing)

1850/1925 °F, 30/45 minutes holding time at temperature.

Higher temperatures produce higher hardnesses, but result in reduced toughness.

1850/1880°F is the recommended austenitizing temperature for best combination of properties.

Quench

Air, positive pressure vacuum or interrupted oil.

Interrupted oil quench may be required to produce maximum hardness in thicker sections.

Tempering

400/800 °F; temper twice at two hours per temper, cool to room temperature between tempers.

550/750 °F is recommended for best results.

Tempering above 800 °F may result in slightly increased hardness, but is not generally recommended, due to a resulting decrease in both toughness and corrosion resistance.

Physical Properties

Modulus of Elasticity	29 x 10 ⁶ psi (207 GPa)	Density	0.276 lb/in ³
Annealed Hardness	190-230 BHN	Machinability	80% of O1