



# SB Specialty Metals LLC

Your **First Choice** for 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.

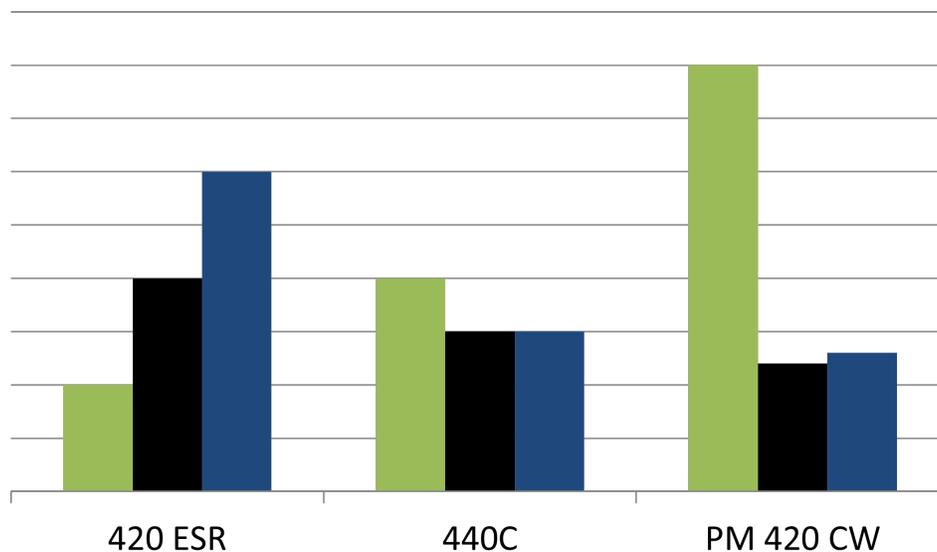
### Examples of applications:

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

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