

# **Cincinnati Tool Steel Company**

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## **AISI 420**

### **ESR Mold Quality Stainless Steel**

AISI 420 ESR Is an air or oil hardening mold steel having superior internal steel cleanliness combined with good resistance to corrosion. It is suitable for mold applications and is capable of providing an excellent polished surface.

The manufacture of 420 ESR includes an additional refining step. High quality 420 steel type is remelted in a process called Electro-Slag-Refining or ESR. This remelting process provides a 420 type steel with the very low inclusion content required by mold makers who polish mold surfaces.

### **Typical Analysis**

Carbon .30 - .40	Sulfur .030 Max
Manganese 1.00 Max	Silicon 1.00 Max
Phosphorus .030 Max	Chromium 12.00-14.00

### **Annealing**

Atmosphere controlled furnaces should be used. Heat uniformly to 1550°F to 1650°F and hold at the annealing temperature for 1 hour per inch of cross section. The lower temperature limit is recommended for small sections and the upper temperature limit for large sections. Cool in the furnace at a rate not exceeding 30°F until 1100°F, after which a faster rate can be allowed.

### **Stress Relieving**

Stresses developed from heavy machining cuts may be relieved by heating the steel to 1200°F to 1250°F and holding for 1 hour per inch of cross section (minimum 1hour) followed by an air cool.

### **Hardening**

Preheat at 1400°F to 1450°F long enough to equalize the temperature. Then raise temperature to 1850°F to 1950°F and hold until uniformly heated through. Use high side of hardening range for thicker sections or where maximum corrosion resistance and strength are required.

### **Quenching**

Quench in still air, dry air blast or warm oil. Warm oil is preferred because it provides maximum corrosion resistance. Once the part has cooled to 125°F, or when it can be handled with bare hands, temper it immediately.

## Tempering

420 ESR is usually tempered in the range of 300°F to 400°F for maximum hardness and resistance to corrosion. A double temper is beneficial. Allow part to cool to room temperature before the second temper:

Tempering	Rockwell C
<u>Temperature - °F</u>	<u>Hardness</u>
As quenched	51-53
300	51-53
400	50-52
500	49-50
600	49-50
700	48-49
800	48-49

NOTE: The above table is intended to serve as a guide. Variation in analysis, size, heat treatment, etc. may result in slight deviations from the above.

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Data shown are typical, and should not be construed as maximum or minimum values for specification or for final design.  
Data on any particular piece of material may vary from those herein.