



## LSS™ P20 Mold Steel (ASTM P20)

### Typical Composition

| C    | Mn   | Si   | Cr   | Mo   |
|------|------|------|------|------|
| 0.33 | 0.80 | 0.65 | 1.75 | 0.40 |

**LSS P20 mold steel** is a versatile, low-alloy tool steel that is characterized by good toughness at moderate strength levels. The steel is commonly used for plastic injection mold cavities and tooling and for die casting dies for zinc. LSS P20 is typically sold in the prehardened condition at a hardness of approximately 300 HBW.

Density: 0.284 lb/in<sup>3</sup> (7861 kg/m<sup>3</sup>)  
Specific Gravity: 7.86  
Modulus of Elasticity: 30x10<sup>6</sup> psi (207 GPa)  
Thermal Conductivity: 24 BTU/hr/ft/°F (41.5 W/m/°K)

Machinability: 60 - 65% of a 1% carbon steel

### Coefficient of Thermal Expansion:

| Temperature, °F | in/in °Fx10 <sup>-6</sup> | Temperature, °C | mm/mm °Cx10 <sup>-6</sup> |
|-----------------|---------------------------|-----------------|---------------------------|
| 70 - 200        | 6.7                       | 21 - 93         | 12.0                      |
| 70 - 500        | 7.2                       | 21 - 260        | 12.9                      |
| 70 - 1000       | 7.6                       | 21 - 538        | 13.7                      |

## HEAT TREATING INSTRUCTIONS

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

### STRESS RELIEVING:

Because LSS P20 is sold in a prehardened condition, hardening heat treatment is not necessary. After machining and intermittently during service, the steel may be thermally stress relieved by heating to 900°F (482°C), equalizing and holding for one hour per inch (25.4mm) of thickness, and cooling in air to ambient temperature.

In those rare circumstances where the steel must be rehardened, the steel must first be annealed prior to hardening.

### HARDENING:

#### Critical Temperature:

Ac1: 1405°F (763°C)

**Preheating:** Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1150-1250°F (621-677°C) and equalize.

**Austenitizing (High Heat):** Heat rapidly from the preheat to 1550°F (843°C). Soak for 30 minutes for the first inch (25.4 mm) of thickness, plus 15 minutes for each additional inch (25.4 mm).

**Quenching:** Pressurized gas, or interrupted oil to 150-125°F (66-51°C).

For the oil quench, 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.* Hold at temperature for 1 hour per inch (25.4 mm) of thickness, 2 hours minimum, then air cool to ambient temperature. Tempering temperatures and hardnesses are given below.

| Temperature   | HRC   | Temperature    | HRC   |
|---------------|-------|----------------|-------|
| 400°F (204°C) | 48-49 | 1000°F (538°C) | 39-40 |
| 600°F (316°C) | 46-47 | 1100°F (593°C) | 33-34 |
| 800°F (427°C) | 43-44 | 1150°F (621°C) | 30-31 |

**ANNEALING:** Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1450°F (788°C), and hold at temperature for 1 hour per inch (25.4mm) of maximum thickness; 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 50°F per hour (28°C per hour) to 1150°F (621°C). Continue cooling to ambient temperature in the furnace or in air.

The data presented herein are typical values, and do not warrant suitability for any specific application or use of this material. Normal variations in the chemical composition, the size of the product, and heat treatment parameters may result in different values for the various physical and mechanical properties.