

Chemistry

Comparable Standard: AISI S-7

Typical	C	Si	Mn	Cr	Mo	V
Analysis %	0.50	0.30	0.70	3.35	1.60	0.25

Description

2357 is a shock resistant tool steel with excellent toughness and high strength.

Suitable for cold and hot work applications up to 1000°F. Supplied in the annealed condition.

Characteristics

Excellent toughness
Good wear resistance (abrasion)
Good polishability

Applications

Compression molds Tablet compression dies
Injection molds Shears
Blanking dies Punches

Physical Properties

Density: 0.280 lbs/in³ (room temperature)

Coefficient of Thermal Expansion	70°F - 400°F 6.8 x 10 ⁻⁶ /°F	70°F - 750°F 7.0 x 10 ⁻⁶ /°F	
Thermal Conductivity	68°F 200Btu/in/ft ² /hr/°F	400°F 208Btu/in/ft ² /hr/°F	750°F 215Btu/in/ft ² /hr/°F

Mechanical Properties

Compressive Strength

Hardness HRc	Approximate Compressive Strength (KSI)
55	235
60	290
62	300

Polishing

For highly cosmetic applications, the tool should be heat treated to the highest hardness possible. Size of the tool will determine the maximum hardness.

Heat Treatment

Soft Annealing

Temperature	Cooling	Hardness
1130°F – 1200°F	Furnace 20°F/hr to 930°F then air cool	229 HB Max.

Stress Relieving

Condition	Temperature & Cooling
Annealed Parts	1200°F - 1250°F Hold time 2 hours, slowly cool to 930°F, then air cool
Hardened Parts	Heat to 25°F - 50°F below the original tempering temperature, hold for 2 hours, then cool in air

Hardening

Temperature	Cooling	Hardness
1690°F - 1775°F Hold at temperature for 30 minutes	Furnace quench to 350°F, air cool to 120°F. Immediately temper	60-62 Hrc Max quenched

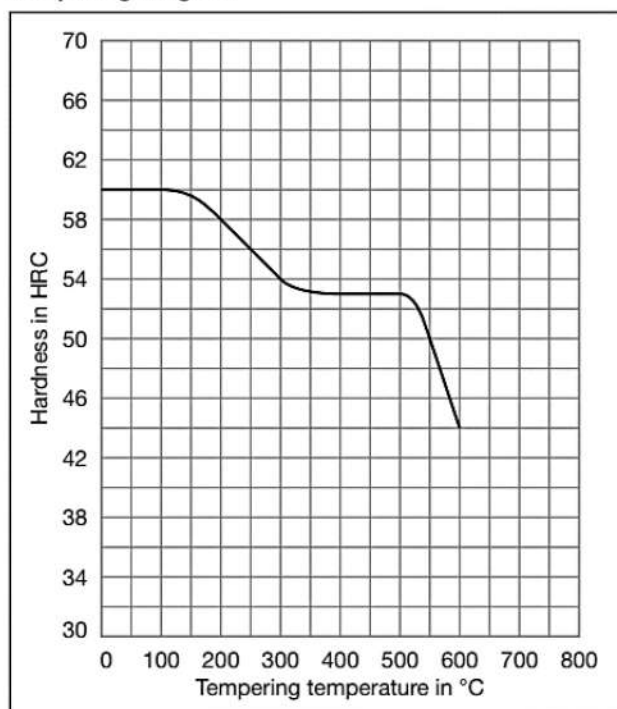
Tempering (Double Tempering Recommended)

Temperature °C	100	200	300	400	500	600
Hardness HRc	60	58	54	53	53	44

Tempering hardness is approximate and based on two hours at temperature Use S7 filler material.
 In order to achieve faster quench rates, generous radii should be left on during rough machining.

Welding

Tempering Diagram



Condition	Preheat	Maintained Temperature during welding	Cool down to:	Post Process
Annealed	400°F - 600°F	400°F	150°F	Reanneal or temper
Hardened	25°F - 50°F below last tempering temperature	350°F	150°F	Temper 25°- 50°F below last tempering temperature

General Note

All statements regarding the properties or utilization of the materials or products mentioned are for the purpose of description only. Guarantees regarding the existence of certain properties or a certain utilization are only valid if agreed upon in writing.