

P-20 High Hard Technical Data Sheet

UNISTEEL

Chemistry

Typical Analysis %	C	Mn	Si	Cr	Mo
	.34	.80	.40	1.75	.40

Description

- P-20 High Hard is an improved pre-hardened mold steel that has been specially designed for large plastic molds.
- Material is forged on a 5000 ton press assuring maximum deformation during the forging process.
- Supplied hardness of 321—352 HB (34-38 HRC).
- Hardness loss in large cross sections is minimal.

Characteristics

- Improved polishability compared to P-20 modified
- Excellent compressive strength
- Minimum hardness loss in large cross sections

Applications

- Injection molds
- Compression molds
- Mold frames
- Forming tools
- Die holders

Physical Properties

Density: 0.284 lbs/in³ (room temperature)

Coefficient of Thermal Expansion	70°F - 200°F 6.8 X 10 ⁻⁶ /°F	70°F - 400°F 7.0 X 10 ⁻⁶ /°F	70°F - 575°F 7.1 X 10 ⁻⁶ /°F
Thermal Conductivity	70°F 202 Btu/in/ft ² /hr/°F	400°F 209 Btu/in/ft ² /hr/°F	800°F 216 Btu/in/ft ² /hr/°F

Mechanical Properties

Room Temperature, hardened and tempered to 321 BHN (34 HRC)

Yield Strength	Tensile Strength	Elongation	Reduction Area
130 KSI	150 KSI	15%	35%

Polishing

P-20 High Hard can yield an A-2 surface finish when proper polishing procedures are followed. Caution must be taken to avoid over polishing which can lead to orange peel effect and pitting.

Heat Treatment

Stress Relieving

Temperature	Cooling	Note
850°F - 900°F Hold 1 hour/inch	Air Cool	Large cross sections require accurate control of temperatures and times.

Tempering

- Heat uniformly and thoroughly at the selected temperature and hold at temperature for one hour per inch of total thickness.

Temperature °F	700	800	900	1000	1050	1100	1150
Hardness HRC	51	50	47	43	40	35	33

- Tempering hardness is approximate and based on two hours at temperature

Welding

- Preheat insert to 600°F to 700°F. Maintain temperature above 600°F during welding.
- Use TIG with D.C. positive polarity.
- Depending on the application, various welding rods can be used. P20 filler which will match the hardness of the base metal after welding and tempering is commonly used. Please contact our heat treatment facility for recommendations.
- Slowly cool down to 100°F– 150°F, preferably under an insulating blanket, before post heat.
- Post heat at 1000°F one hour per inch of weld depth plus one additional hour—double temper if possible. Exceeding 1050°F could result in the loss of hardness.

Electrode Dia. (mm)	Filler Rod Dia (mm)	Welding AMPS	Argon Flow Lt/min	Nozzle Dia (mm)
1.0	1.0	15-80	4-8	8
1.6	1.6	70-150	6-9	8-10
2.4	2.4	100-250	7-10	8-10
3.2	3.2	250-400	10-15	8-10

General Note

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