



Technical Information: H13

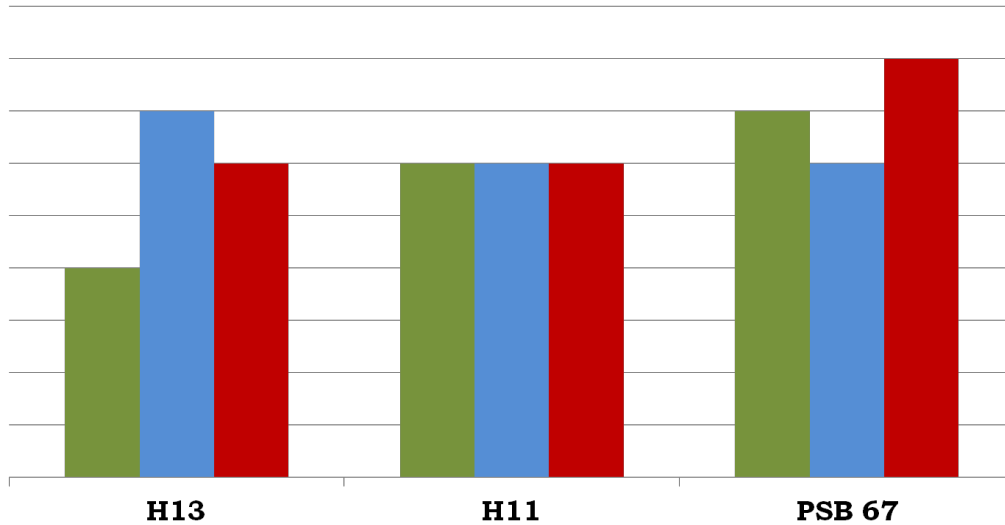
H13 IS A HOT WORK TOOL STEEL WITH A GOOD COMBINATION OF HOT HARDNESS, HOT TOUGHNESS, AND TEMPER RESISTANCE
 H13 IS USED IN GENERAL PURPOSE HOT FORGING AND FORMING APPLICATIONS

TYPICAL CHEMICAL COMPOSITION

CARBON	0.40%	CHROMIUM	5.20%
MOLYBDENUM	1.40%	SILICON	1.00%
VANADIUM	0.95%	MANGANESE	0.40%

TOOL STEEL PROPERTIES COMPARISON

■ High Temperature Toughness ■ High Temperature Wear Resistance ■ Temper Resistance



PHYSICAL PROPERTIES

MODULUS OF ELASTICITY.....30 PSI X 10⁶(207 GPA)
 DENSITY.....0.283 LB/IN³
 ANNEALED HARDNESS.....200-229 BRINELL HARDNESS (BHN)
 MACHINABILITY.....SIMILAR TO H11 TOOL STEEL

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HEAT TREATMENT

ANNEALING

HEAT TO 1600°F, HOLD TWO HOURS
SLOW COOL 20°F/HOUR TO 600°F
THEN AIR OR FURNACE COOL TO ROOM TEMPERATURE

STRESS RELIEVING

PERFORMED PRIOR TO OR AFTER MACHINING TO MINIMIZE DISTORTION IN HEAT TREATING
1100/1200°F, HOLD TWO HOURS
THEN AIR COOL TO ROOM TEMPERATURE

HARDENING

SALT BATH, PROTECTIVE ATMOSPHERE, OR VACUUM FURNACE EQUIPMENT PREFERRED

HIGH HEAT (AUSTENITIZING)

1850°F FOR 30 MINUTES AT HEAT.

QUENCH

SALT BATH QUENCH TO 1000-1100°F, EQUALIZE, THEN AIR COOL TO 150°F.
VACUUM OR ATMOSPHERE QUENCH RATE OF A MINIMUM 50 DEGREES F PER MINUTE DOWN TO 1200F IS
CRITICAL TO ACHIEVE BEST HEAT TREAT RESPONSE.
TEMPER IMMEDIATELY FOLLOWING QUENCH

TEMPERING

MINIMUM 1000°F TEMPERING TEMPERATURE REQUIRED.
DOUBLE TEMPERING IS REQUIRED, TRIPLE TEMPERING RECOMMENDED.
AIR COOL TO ROOM TEMPERATURE BETWEEN TEMPERS.

TYPICAL HEAT TREAT RESPONSE

HARDENING TEMP	TEMPERING TEMP		HARDNESS HRC	
	°F	°C		
1940 1060	1000	555	53	
	1050	570	50	
	1100	595	47	
	1150	620	30	
THERMAL CONDUCTIVITY	Room T	660 F 350 C	1262 F 700 C	
W/M*K	30.8	33.5	35.1	
THERMAL EXPANSION	Room T-100C	Room T-300C	Room T-500C	Room T-700C
10 ⁻⁶ M/M*K	11.9	12.6	13.1	13.5