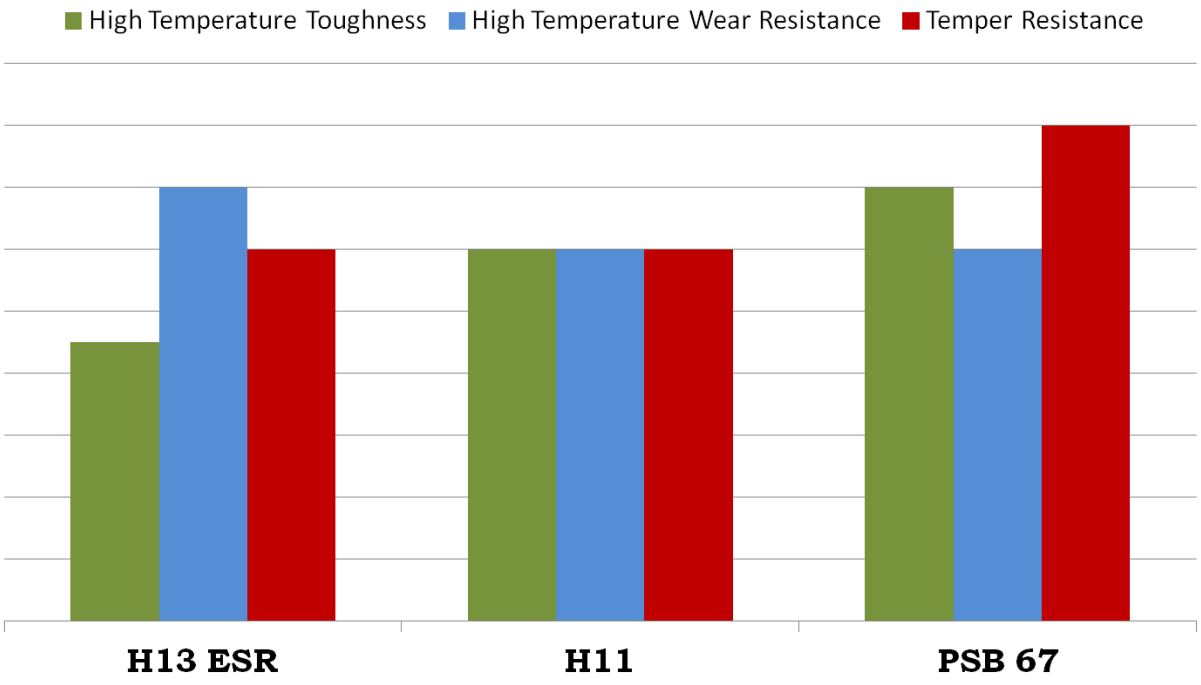
Specialty Metals LLC

Technical Information: H13 ESR

H13 ESR is a hot work tool steel with a good combination of hot hardness, hot toughness, and temper resistance
H13 ESR is used as an upgrade to standard H13
H13 ESR will have higher toughness and better polishability than standard H13

Typical Chemical Composition			
Carbon	0.40%	Chromium	5.20%
Molybdenum	1.40%	Silicon	1.00%
Vanadium	0.95%	Manganese	0.40%

SBSM Tool Steel Properties Comparison



Physical Properties

Modulus of Elasticity. . . . . 30 psi x 10^6 . . . . . (207 GPa)
Density. . . . . 0.283 lb/in^3
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 °F	Hardening Temp °C	Tempering Temp °F	Tempering Temp °C	Hardness HRC
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

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