



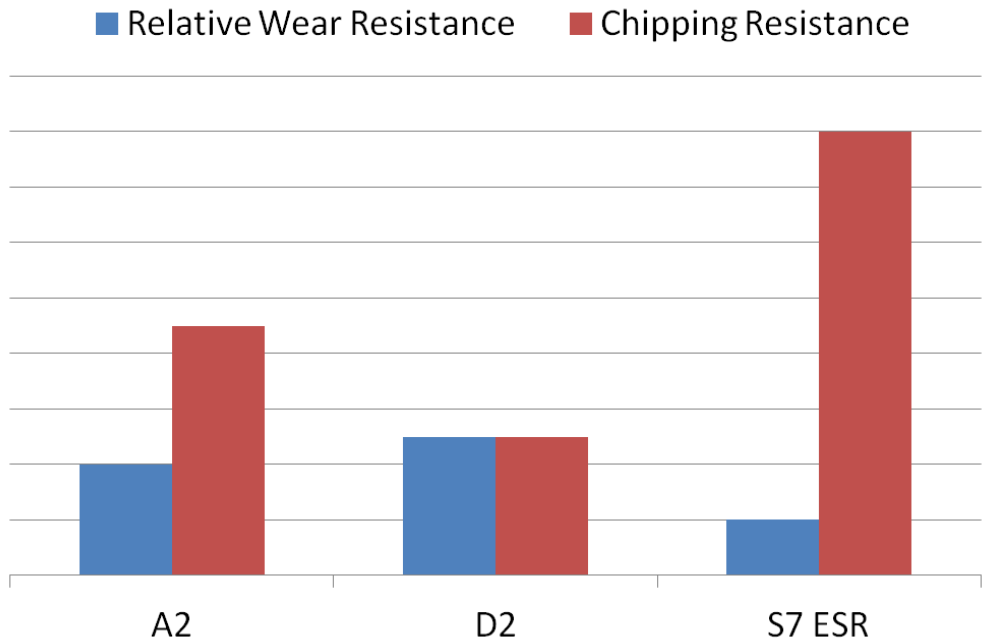
Technical Information: S7 ESR

S7 ESR IS AN AIR HARDENING, SHOCK RESISTANT, COLD WORK TOOL STEEL
 S7 ESR IS CHARACTERIZED BY HIGH IMPACT TOUGHNESS AT RELATIVELY HIGH HARDNESS LEVELS
 S7 ESR IS USED AS AN UPGRADE TO CONVENTIONAL S7
 S7 ESR WILL HAVE HIGHER TOUGHNESS AND BETTER CLEANLINESS THAN STANDARD S7

TYPICAL CHEMICAL COMPOSITION

CARBON	0.55%	CHROMIUM	3.25%
MOLYBDENUM	1.40%	SILICON	0.35%
VANADIUM	0.25%	MANGANESE	0.70%

SBSM TOOL STEEL PROPERTIES COMPARISON



PHYSICAL PROPERTIES

MODULUS OF ELASTICITY.....30 PSI X 10⁶(207 GPa)
 DENSITY..... 0.283 LB/IN³
 ANNEALED HARDNESS.....210-225 BRINELL HARDNESS (BHN)



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HEAT TREATMENT

ANNEALING

HEAT TO 1550°F, HOLD TWO HOURS
SLOW COOL 20°F/HOUR TO 900°F
THEN AIR OR FURNACE COOL TO ROOM TEMPERATURE

STRESS RELIEVING

PERFORMED PRIOR 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)

1750°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 900°F IS
CRITICAL TO ACHIEVE BEST HEAT TREAT RESPONSE.

TEMPER IMMEDIATELY FOLLOWING QUENCH WHEN MATERIAL REACHES 150°F OR BELOW.

TEMPERING

MINIMUM 400°F TEMPERING TEMPERATURE REQUIRED.
DOUBLE TEMPERING IS REQUIRED, TRIPLE TEMPERING RECOMMENDED.
AIR COOL TO ROOM TEMPERATURE BETWEEN TEMPER.

TYPICAL HEAT TREAT RESPONSE

TEMPERING TEMP		HARDENING	
°F	°C	1750°F	955°C
As QUENCHED		59 HRC	
400	205	57 HRC	
500	260	55 HRC	
600	315	54 HRC	
700	371	53 HRC	
800	427	53 HRC	
900	480	52 HRC	
1000	538	51 HRC	
1100	552	47 HRC	