RADHIKA ALLOYS

H-13 | 1.2344 | SKD-61

H13 chromium hot-work steel is widely used in hot and cold work tooling applications. Due to its excellent combination of high toughness and fatigue resistance H13 is used more than any other tool steel in tooling applications.

CHEMICAL COMPOSITION

W.nr	EQUIVALENT			C	Si	Mn	S	P	Cr	Mo	V
	JIS	DIN	AISI/ASTM								
1.2344 (ESR/NON ESR)	SKD61	X40CrMoV5-1	H-13	0.32-0.42	0.80-1.20	0.25-0.50	<0.03	<0.03	5.00-5.50	1.20-1.50	0.80-1.20

Critical points

Ac1 860 °C
Ac3 940 °C
Ms 340 °C

Production technology

Electro-slag-remelting (ESR) - Forging – Heat treatment +EFS

US specification

In according to standard EN10228-3 Class 4 and standard SEP 1921 Class E/e

Delivery condition

WW.NR. 1.2344 ESR is delivered in annealed condition (EFS), with hardness max 230 HB (21 HRC)

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PROPERTIES

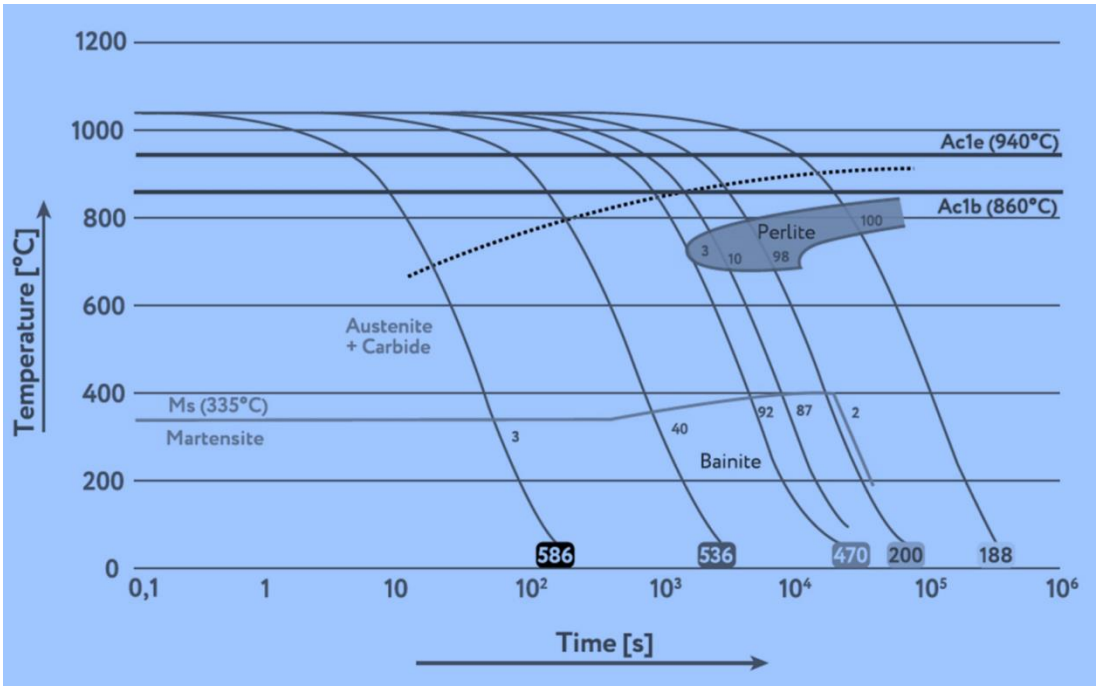
Physical Properties	Metric	Imperial
Density (@20°C/68°F)	7.80 g/cm^3	0.282 lb/in^3
Melting point	1427°C	2600°F
Mechanical Properties	**Metric**	**Imperial**
Tensile strength, ultimate (@20°C/68°F, varies with heat treatment)	1200 - 1590 MPa	174000 - 231000 psi
Tensile strength, yield (@20°C/68°F, varies with heat treatment)	1000 - 1380 MPa	145000 - 200000 psi
Reduction of area (@20°C/68°F)	50.00%	50.00%
Modulus of elasticity (@20°C/68°F)	215 GPa	31200 ksi
Poisson's ratio	0.27-0.30	0.27-0.30
Properties	**Conditions**	
	T (ºC)	**Treatment**
Thermal expansion 10.4 x 10-6/ºc	20-100	-
Thermal conductivity 28.6 W/mK	215	-

HEAT TREATMENT

TREATMENT	TEMPERATURE	HOLDING TIME (HT)	COOLING	COMMENTS
Annealing	Heat to 850 °C	Min. H.T. for 2 minute /mm	Furnace up to 550°C than in air	-
Stress relieving	Heat to 650-700°C	Min. H.T. for 2 minute /mm	furnace up to 300-350°C	To be carried out after machining, is recommended to eliminate the residual stresses induced by mechanical working

Hardening	Preheating to 350-400°C Second preheating to 750-850°C Heat to hardening temperature to 1000-1020°C	Min. H.T. for 1 minute /mm	Air or pressure gas by vacuum	Quenched hardness 52-56HRC
Tempering	In the range 550 – 600°C for at least 3 h according to hardness requirements and conditions of use. Tempering must be repeated a second time at a temperature equal to or 20°C lower than the previous. Before tempering, the parts must be preheated to 200 – 300°C	Air	Usual service hardness: 44-52 HRC	

C.C.T. curve



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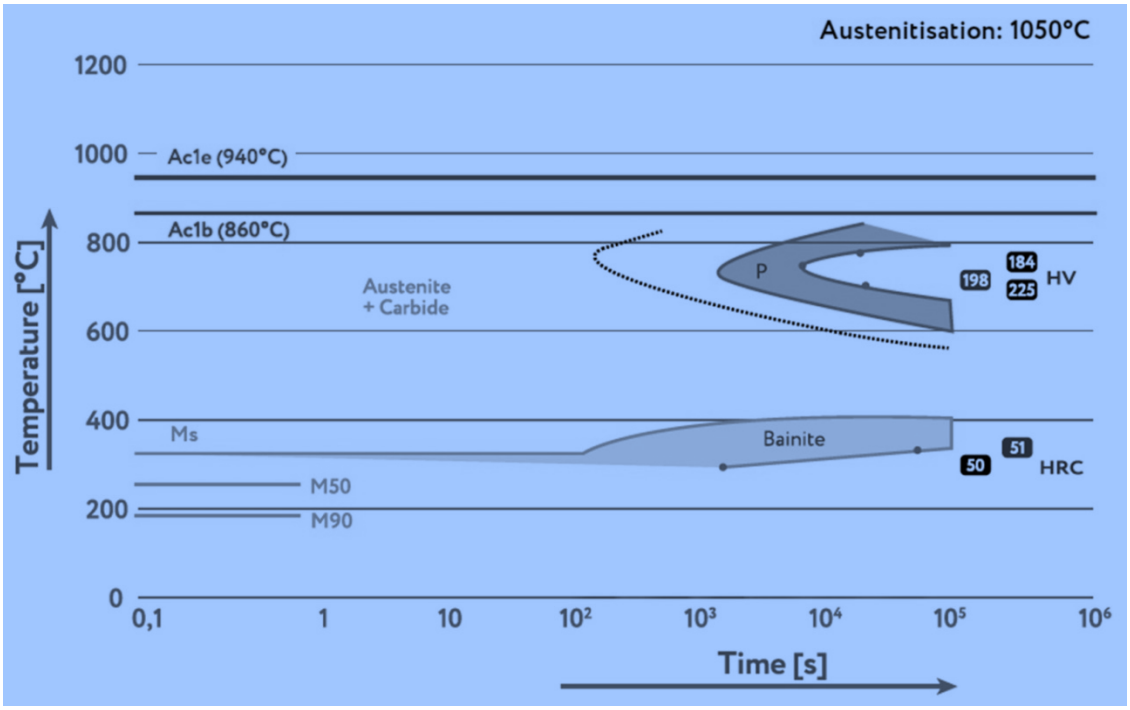
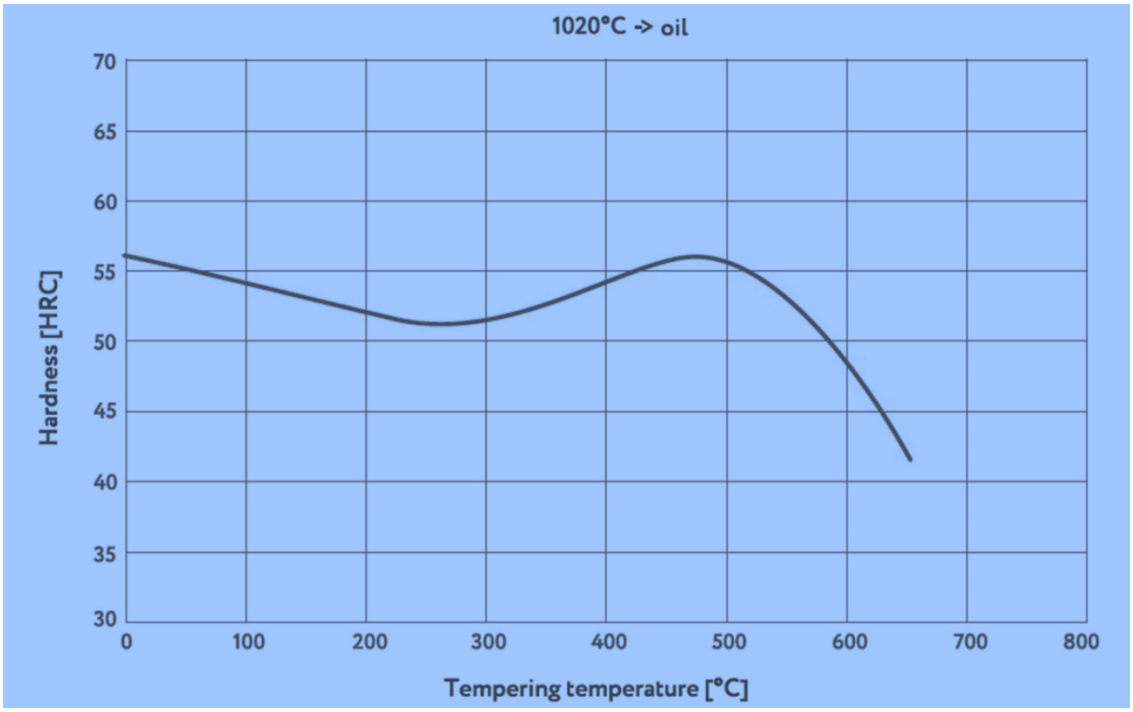
Tempering curve





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APPLIACTION

Main applications:

- Dies for the pressure casting of light alloys.
- Wear resistance plastic moulds.
- Tooling for the extrusion of light alloys and steels.
- Hot work shear blades.
- Rolls for profiling tools (welding area).
- Forging dies.