

1.2344 ESR

Hot working steel



1 Main characteristics and applications

High wear resistance hot-working steel, also be used for wear resistance and polished plastic moulds.

Steel is easy to machine in the annealed condition and needs a hardening process before final machining.

This steel also shows excellent toughness and high level insensitivity to thermal shock and thermal fatigue.

A nitriding surface treatment can be carried out to increase the life of the tooling.

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.

Hot working tools should be preheated to temperatures in the range 250 – 300°C before use.

2 Comparable standards

UNI	W.Nr	DIN	AFNOR	AISI/SAE	BS
(X40CrMoV5.1KU)	1.2344	X40CrMoV5-1	-	(H13)	(BH13)

3 Chemical composition (typical; in weight %)

C	Mn	Si	Cr	Mo	P	S	V
0.39	0.4	1	5	1.3	0.015	0.003	1

4 Critical points

Ac1	860 °C
Ac3	940 °C
Ms	340 °C

5 Production technology

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

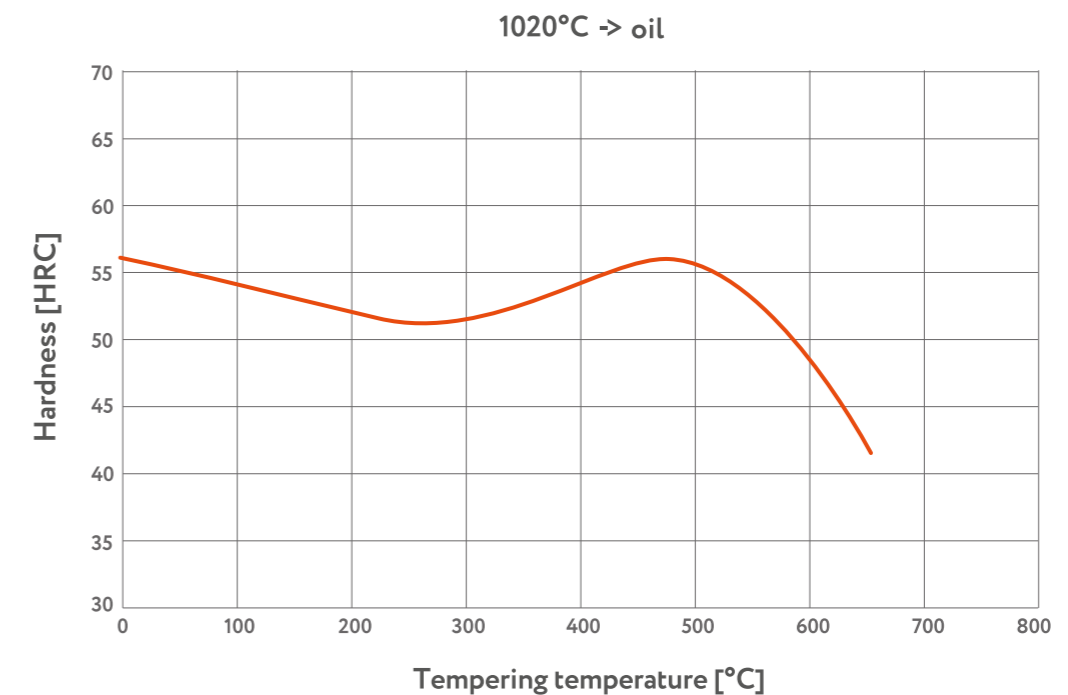
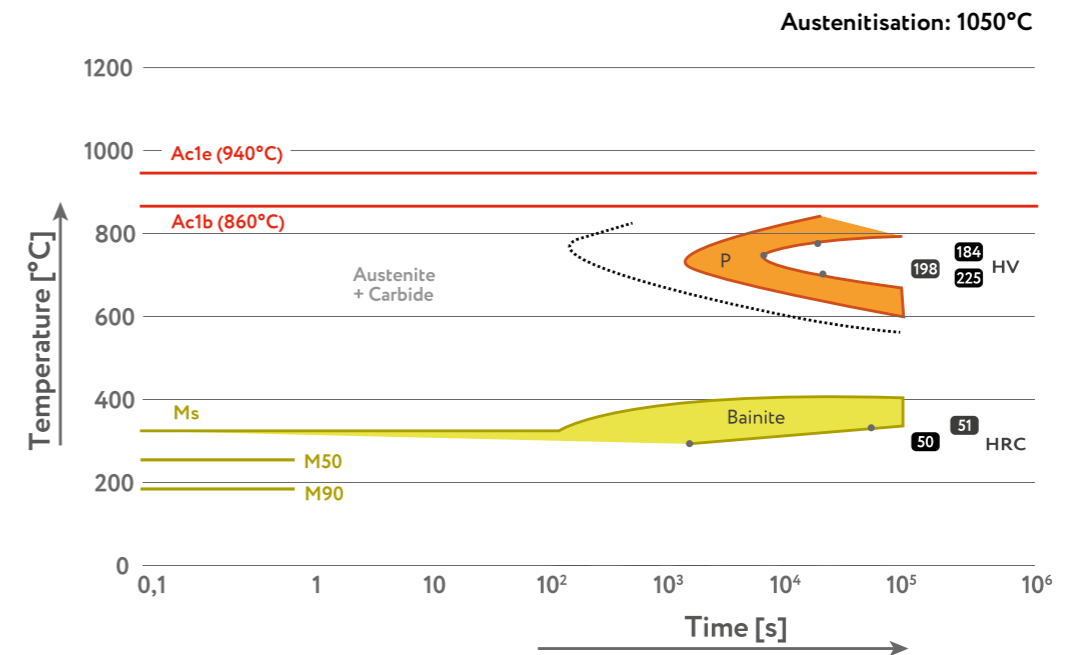
6 US specification

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

7 Delivery condition

W1.2344 is delivered in annealed condition (EFS), with hardness max 230 HB (21 HRC)

11 Tempering curve





8 Physical properties (reference values)

	20°C	100°C	250°C	500°C
Thermal expansion coefficient (10 ⁻⁶ /K)	11.3	11.6	12	13
Thermal conductivity (W/mk)	18.8	19	22.9	25.1
Young modulus (Kn/mm ²)	212	209	197	175

9 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

10 C.C.T. curve

