Steel grade

Material No. / Werkstoff-Nr.	PREMIUM 1.2344 ESU
Description	X40CrMoV5-1
BS	BH 13 ESR
AISI/SAE	H13 ESR; T20813 ESR
Search for alternatives in the ABRAMS STEEL GUIDE®	**www.steel-guide.co.uk/alternatives/BH13ESR**

Specifications

€co-Präz® [€co]
L: 300 mm
L: 500 mm

Chemical composition BS BH 13 ESR (reference value %)

C	Si	Mn	P	S	Cr	Mo	V
0.35 – 0.42	0.8 – 1.2	0.25 – 0.5	0 – 0.03	0 – 0.02	4.8 – 5.5	1.2 – 1.5	0.85 – 1.15

Physical properties

Hardness (delivery condition)	max. 229 HB, annealed						
Tensile strength R_m (as received condition)	approx. 770 N/mm²						
Working hardness	max. 56 HRC						
Thermal expansion coefficient 10^{-6}m/(m • K)	20 - 100°C	20 - 200°C	20 - 300°C	20 - 400°C	20 - 500°C	20 - 600°C	20 - 700°C
	10.9	11.9	12.3	12.7	13.0	13.3	13.5
Thermal conductivity W/(m • K)	20°C	350°C	700°C				
Annealed	27.2	30.5	33.4				
Tempered	25.5	27.6	30.3				

Technical properties

Hot work steel with excellent heat resistance and wear resistance (slightly higher than BS BH 11). Good toughness and thermal conductivity. Can be cooled with water and is resistant to thermal shock. The ESR production (Electro Slag Remelted Steel) guarantees pureness and homogeneousness, as well as improved toughness.

Applications

Forging tools and dies, hot shear knives, hot extrusion tools, extrusion press tools, press tools, block receivers, die casting tools, light metal die casting, press mandrels, press dies, piecer plugs, screw production, rivet production, bolts production, ejectors, plastic moulds.

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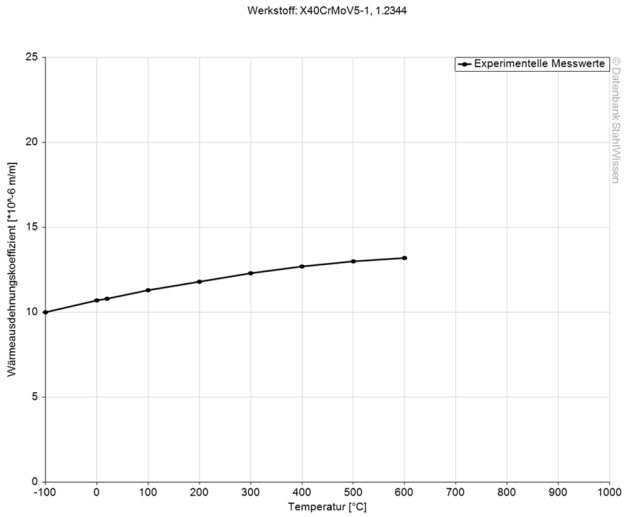
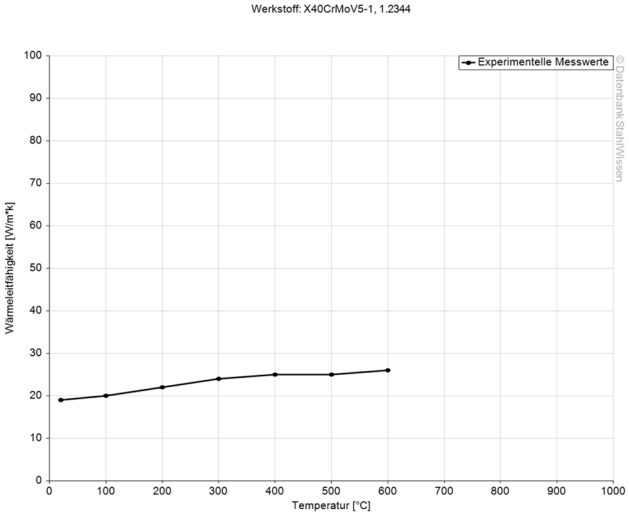
Heat treatment

Soft annealing	**Temperature**		**Cooling**			**Hardness**			
	750 - 800°C		Furnace			max. 229 HB			
Stress relief annealing	**Temperature**		**Cooling**						
	600 - 650 °C		Furnace						
Hardening	**Temperature**		**Quenching in**			**Hardness after quenching**			
	1010 - 1030 °C		Air, oil, hot basin (500 - 550°C)			54 HRC			
Tempering	100°C	200°C	300°C	400°C	500°C	550°C	600°C	650°C	700°C
	53 HRC	52 HRC	52 HRC	54 HRC	56 HRC	54 HRC	50 HRC	42 HRC	32 HRC

Thermal expansion coefficient diagram



Thermal conductivity diagram



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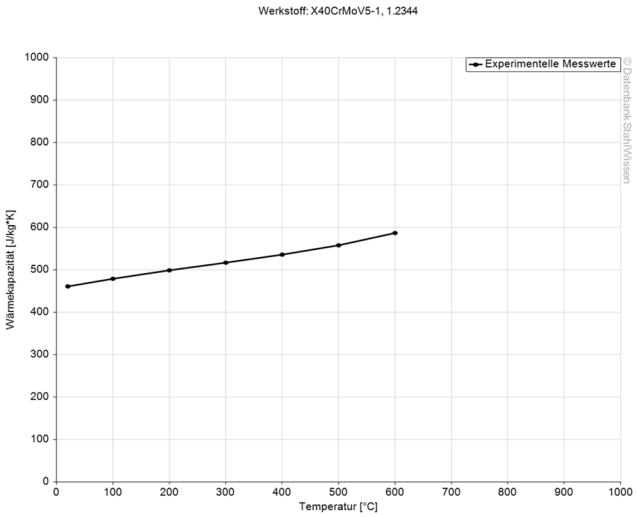
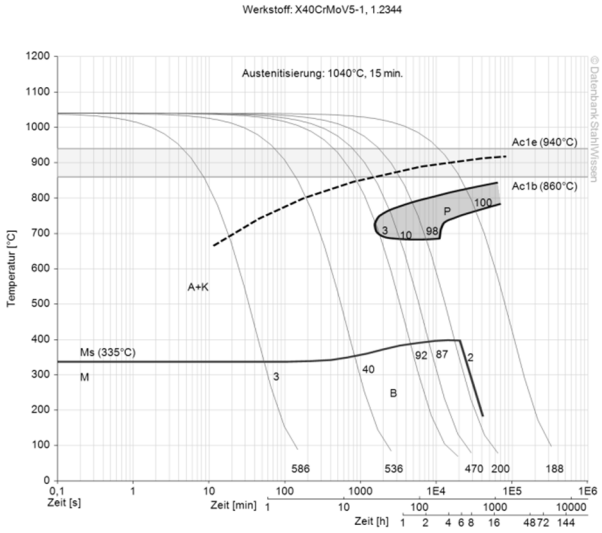
Thermal capacity diagram



Continuous ZTU-diagram



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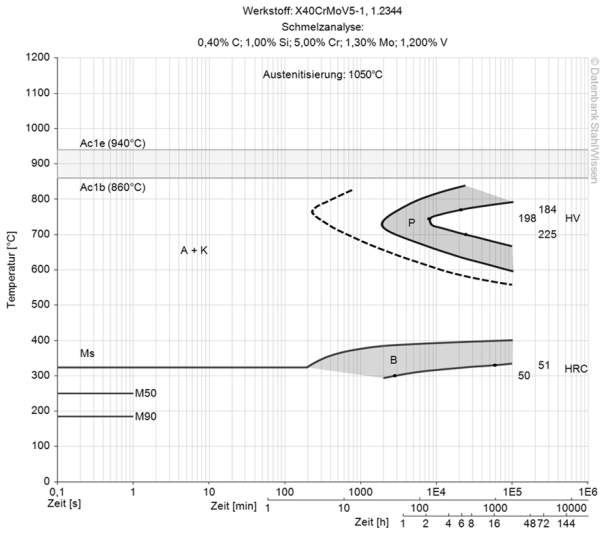
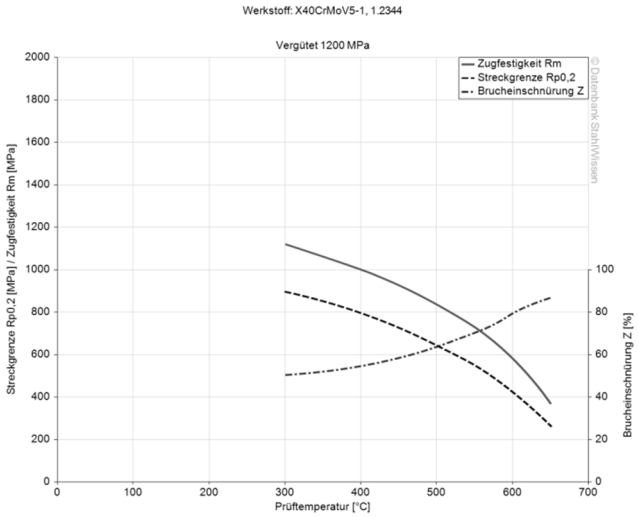
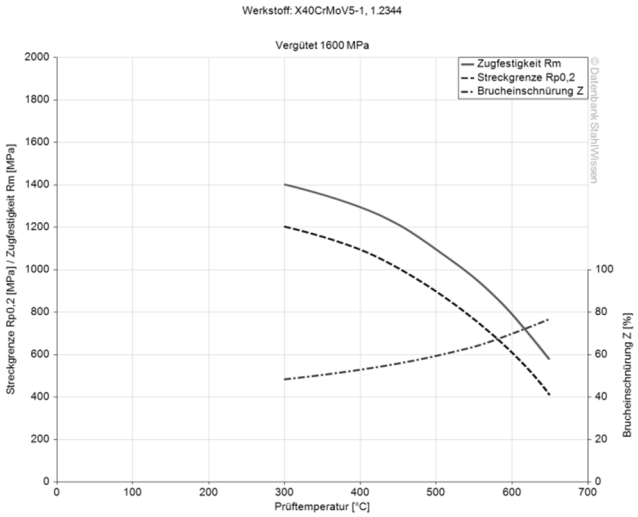
Isothermical ZTU-diagram

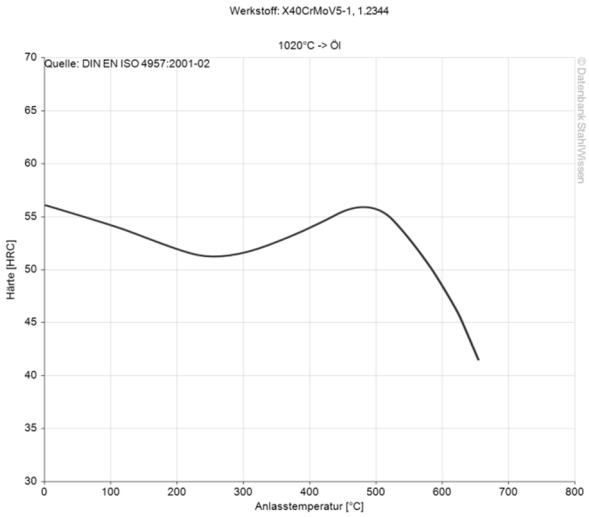


Hardening and tempering diagrams





Tempering diagram



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