## Steel grade

| | |
|---|---|
| **Material No. / Werkstoff-Nr.** | PREMIUM 1.2344 |
| **Description** | X40CrMoV5-1 |
| **BS** | BH 13 |
| **AISI/SAE** | H13; T20813 |
| **Search for alternatives in the ABRAMS STEEL GUIDE®** | **www.steel-guide.co.uk/alternatives/BH13** |

## Specifications

**Precision round steel**
**with machining allowance [PRS/BA]**
peeled / rough-turned
L: 500 mm
L: 1,000 mm

## Chemical composition BS BH 13 (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 high wear resistance (slightly higher than BS BH 11). Good toughness and thermal conductivity. Can be cooled with water and is resistant to thermal shock.

## Applications

Forging tools, forging dies, hot shearing knives, hot extrusion tools, extrusion press tools, compression moulding dies, block receivers, die casting tools, light metal die casting, press mandrels, pressing dies, piecer plugs, screw production, rivet production, bolts production, ejectors, plastic moulds.



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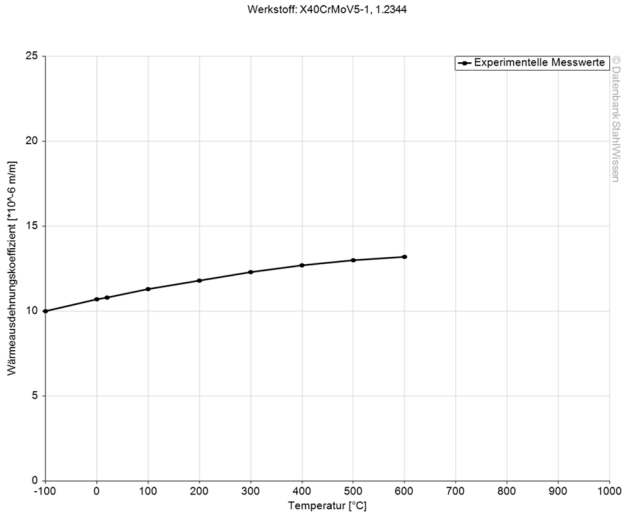
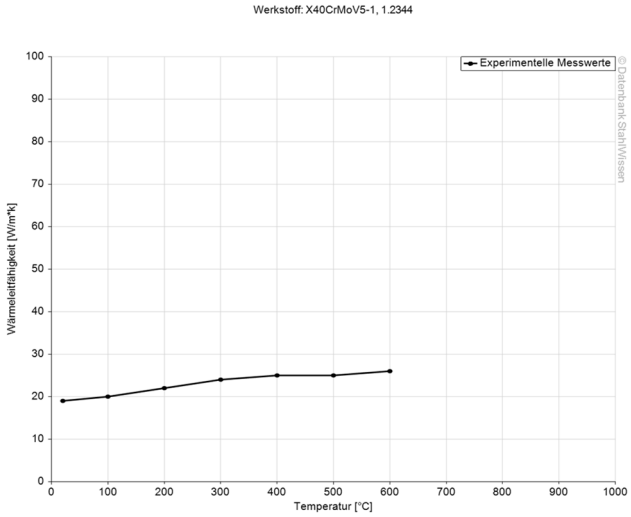
## Heat treatment

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **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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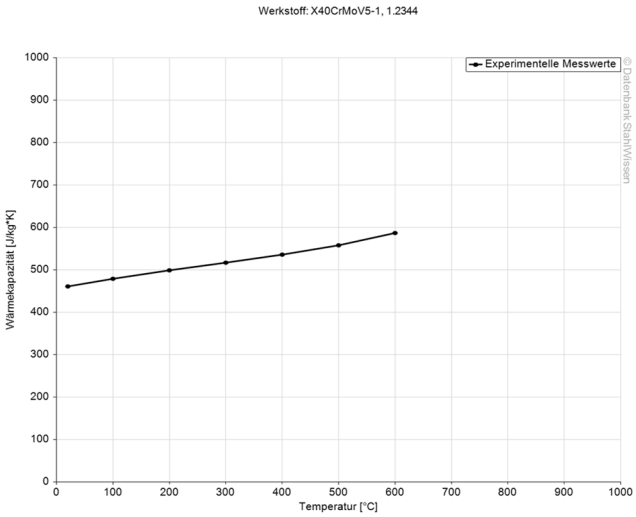
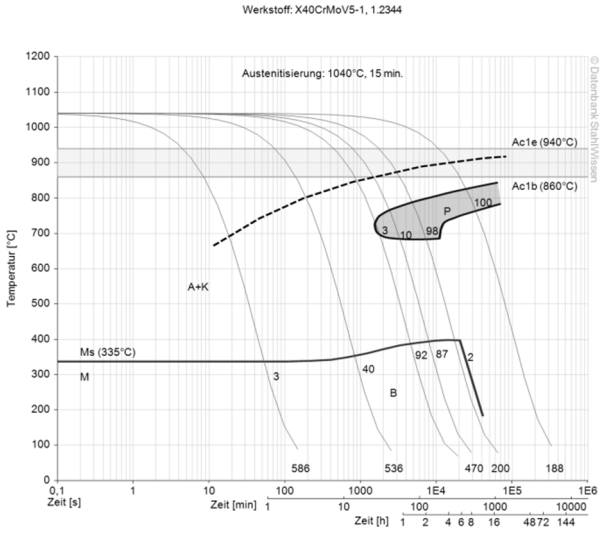
## Thermal capacity diagram




## Continuous ZTU-diagram







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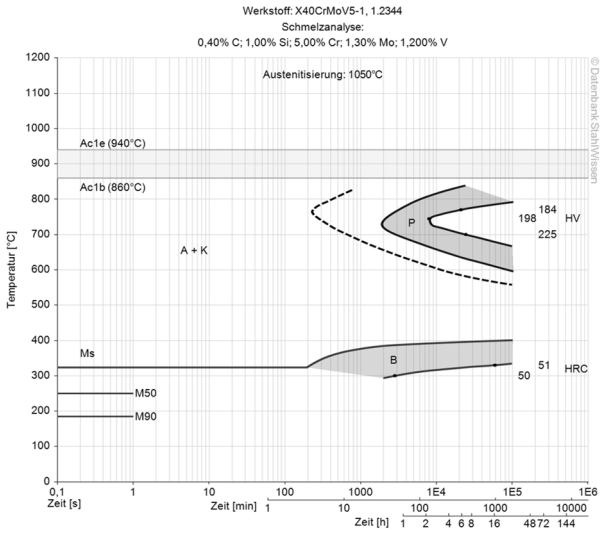
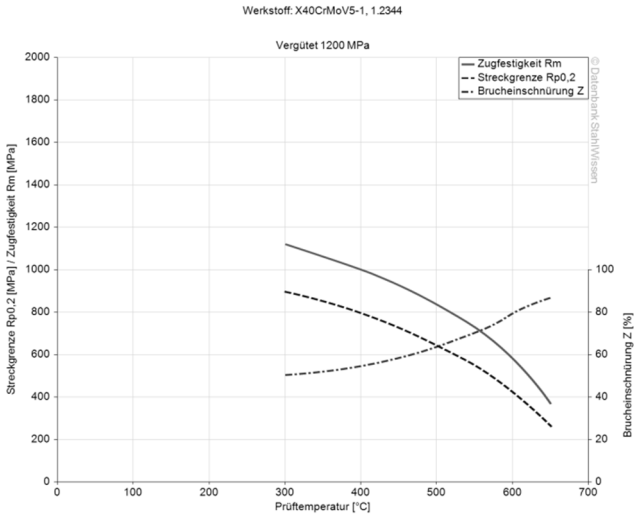
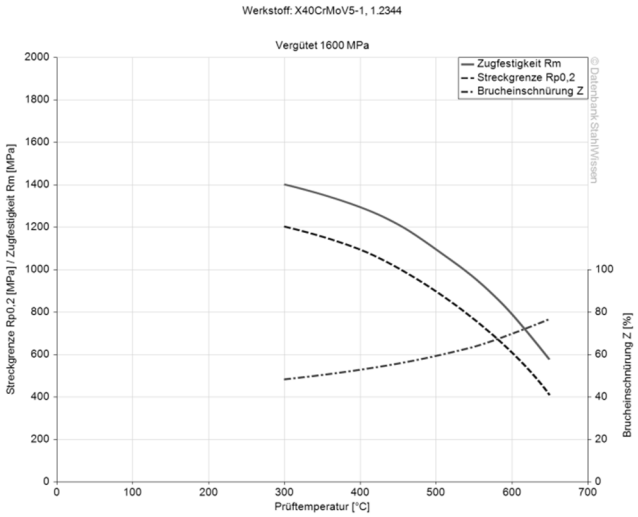
## Isothermical ZTU-diagram

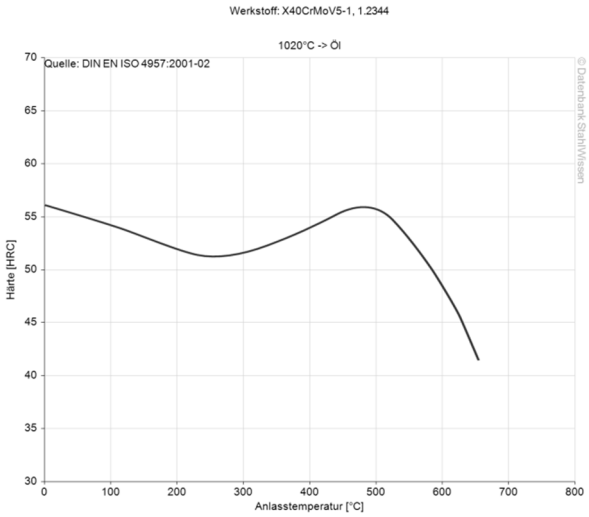



## Hardening and tempering diagrams



## Tempering diagram





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