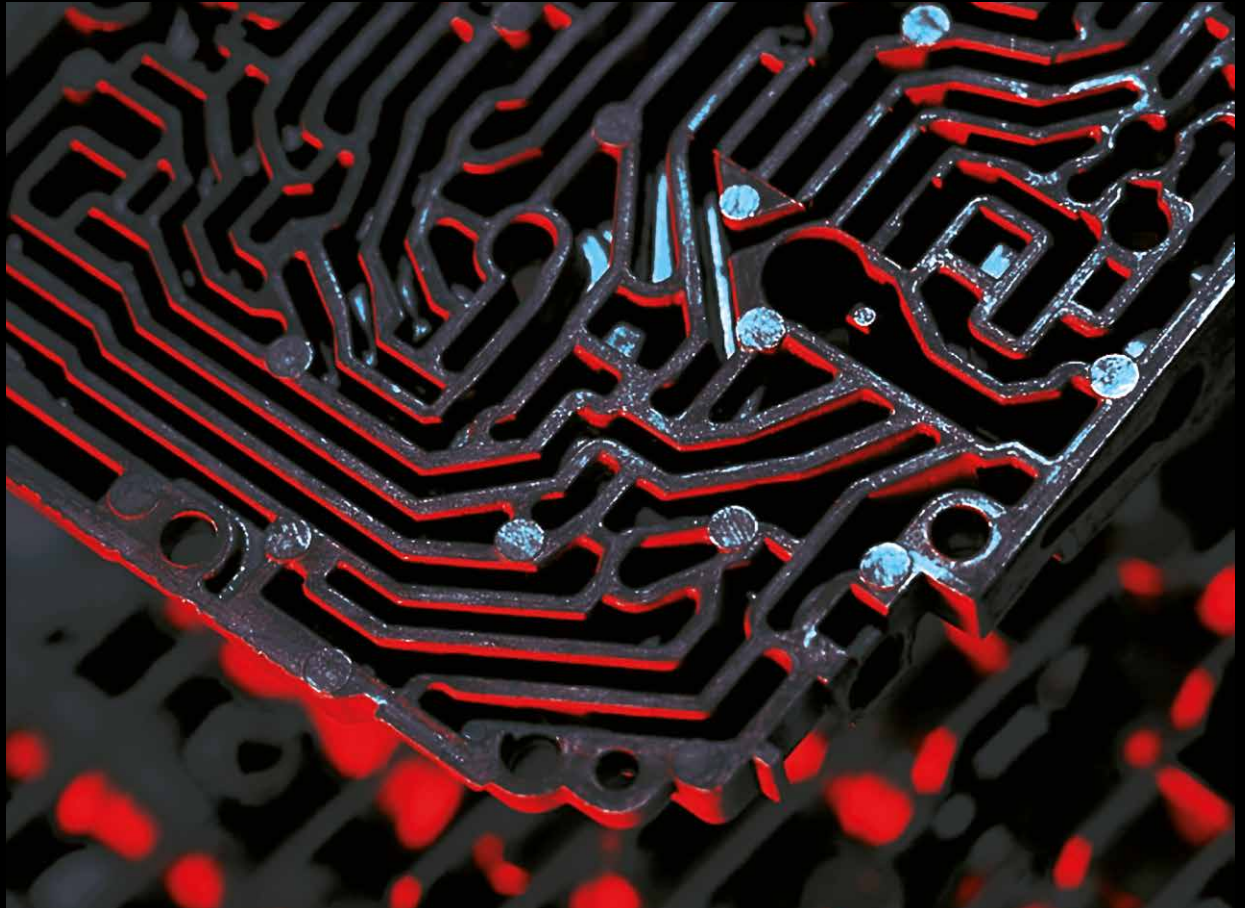


Thermodur® E 40 K Superclean

Slows down formation of hot
cracks effectively



Deutsche
Edelstahlwerke

Thermodur® E 40 K Superclean

Slows down formation of hot cracks effectively

During pressure die casting molten light metal is poured into a previously tempered mould at a tremendous velocity and at high pressure. In the process the mould is exposed to extreme mechanical and simultaneously thermal cyclic load. During the long production phases, fatigue cracks (hot cracks) form sooner or later due to these process-related factors.

At the latest when the cracks merge and chipping occurs, they are transferred to the surface of the die casting and result in the

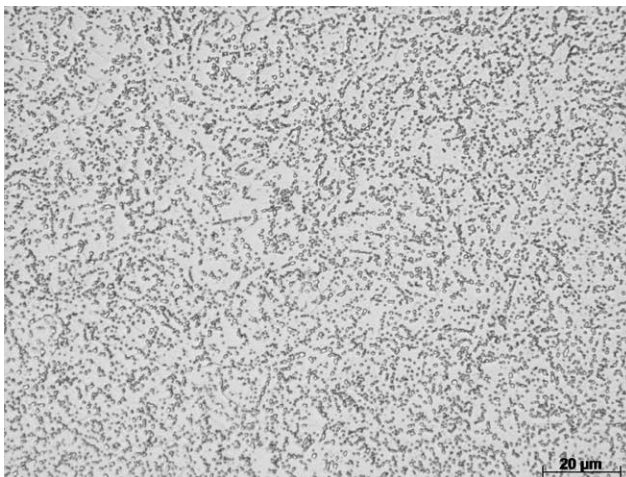
failure of the mould. Intelligent lightweight construction in the automotive industry is leading, among others, to an increasing use of aluminium die castings also for structural elements. To meet these ever-expanding requirements Deutsche Edelstahlwerke has developed a high-quality special steel with excellent mechanical properties: [Thermodur® E 40 K Superclean](#).

Outstanding material competence for maximum performance and efficiency

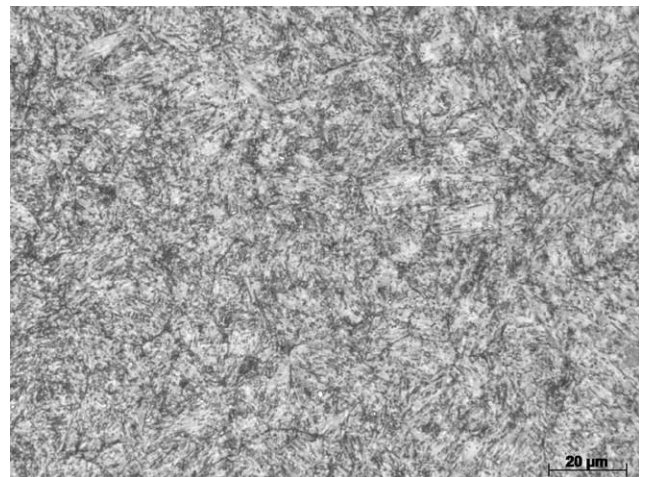
The chemical composition of this high-performance steel is precisely adjusted in the modern secondary metallurgic treatment facilities at Deutsche Edelstahlwerke.

Thermodur® E 40 K Superclean is treated to achieve an extremely homogeneous structure in both annealed and tempered condition by means of an electro-slag remelting process and a special structural heat treatment.

As a result, Thermodur® E 40 K Superclean features the required properties of improved temperature stability combined with high toughness.

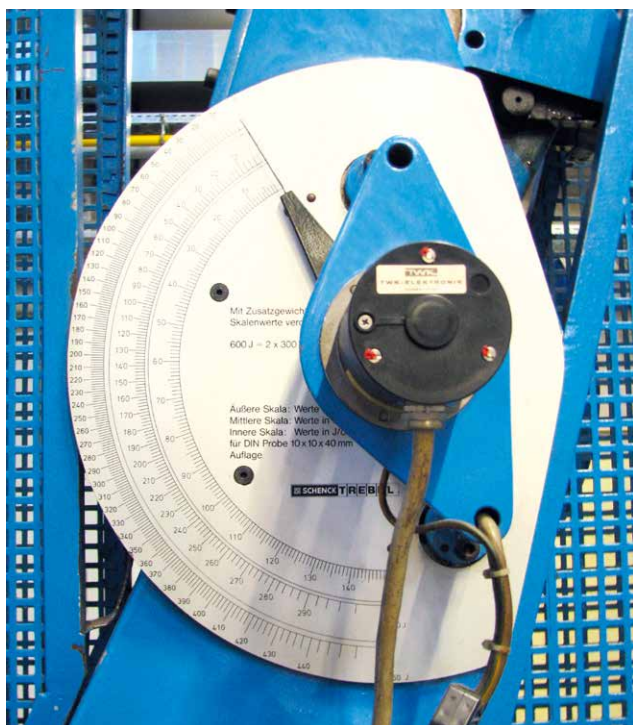
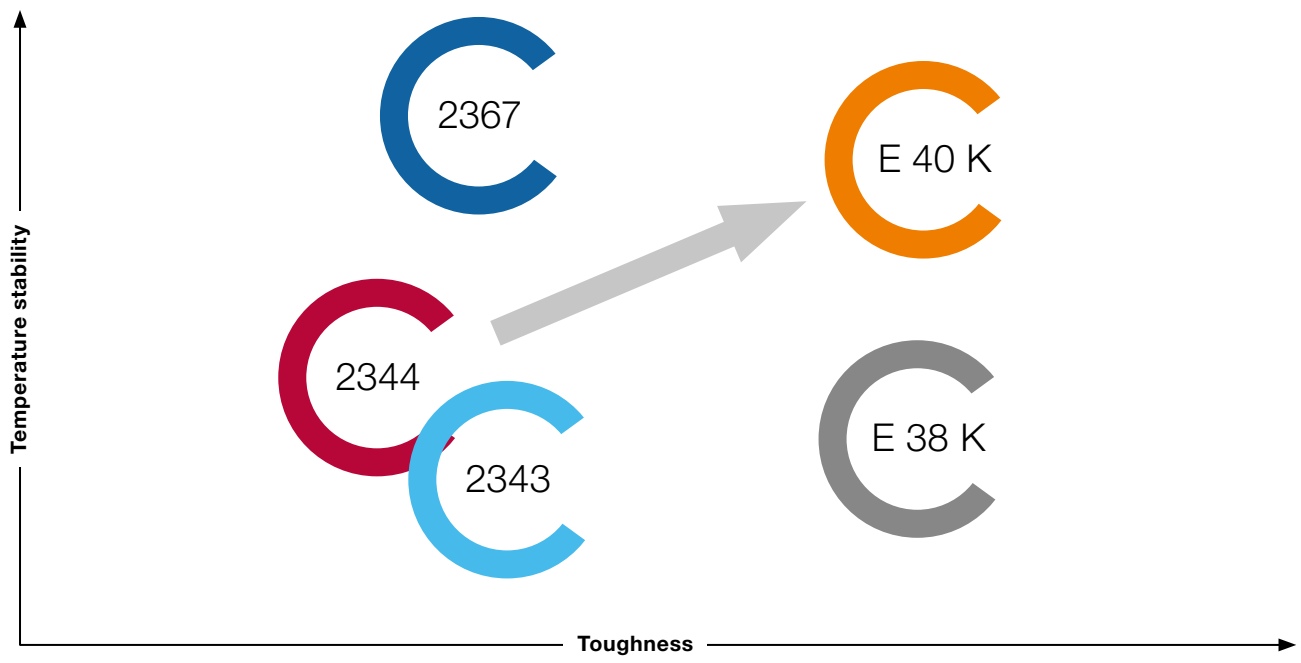


Annealed structure



Tempered structure

Compared to other proven Cr-Mo-V alloyed hot-work steels Thermodur® E 40 K Superclean offers the perfect combination of high temperature stability and toughness for highly stressed tools.



Impact bending samples (tempered to 44 - 46 HRC) after testing on a 450J pendulum impact testing machine

Chemical composition

in %

	C	Si	Mn	Cr	Mo	V
Richtanalyse	0.35	0.30	0.30	5.00	1.85	0.70

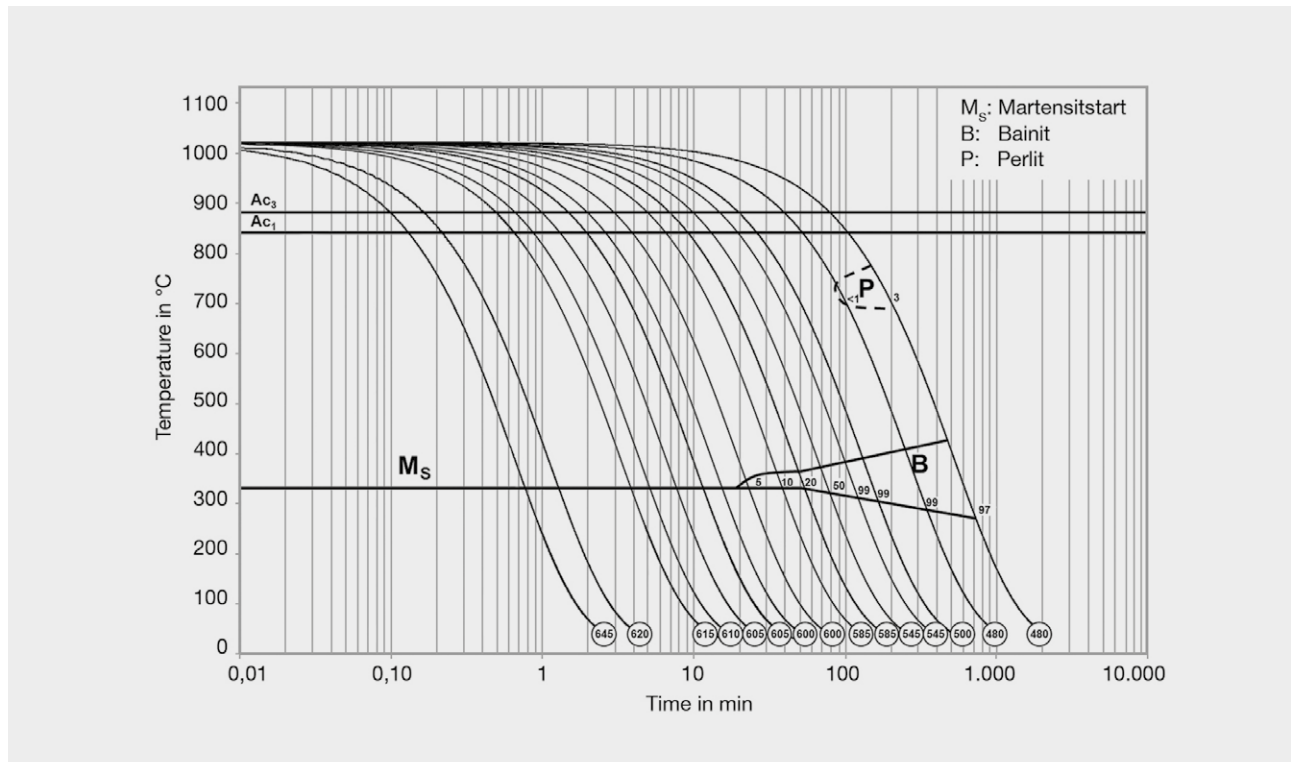
Steel properties

- High toughness combined with improved high-temperature strength, optimum insusceptibility to hot cracking
- High hot wear resistance
- Optimum homogeneity of the microstructure with high isotropy of mechanical properties

Applications

- Universally applicable hot-work tool steel thanks to outstanding temperature stability combined with excellent toughness
- Particularly suitable for highly stressed die casting moulds, extrusion dies and forging dies

Time-Temperature-Transformation diagram



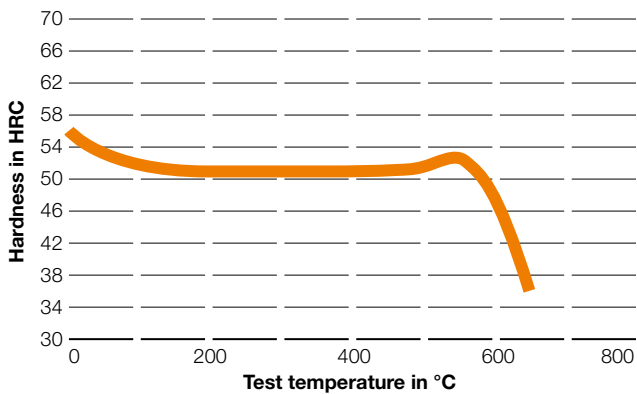
General note (liability)

Not liable for printing errors, omissions and/or changes. All statements regarding the properties and/or utilization of the materials or products mentioned are for purpose of description only. Product specific data sheet have priority over the information provided in this brochure. The desired performance characteristics are binding only if exclusively agreed upon in writing at the conclusion of the contract.

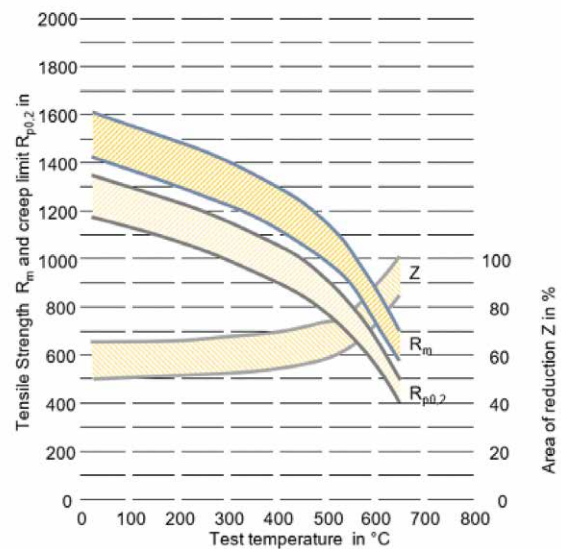
Physical properties

Coefficient of thermal expansion	in 10^{-6} K^{-1}	Thermal conductivity	in $\text{W}/(\text{m K})$
20 – 100 °C	11.5	20 °C	28.3
20 – 200 °C	12.0	100 °C	29.3
20 – 300 °C	12.3	200 °C	30.9
20 – 400 °C	12.6	300 °C	31.0
20 – 500 °C	12.9	400 °C	30.7
20 – 600 °C	13.2	500 °C	29.5
		600 °C	27.8

Tempering diagram



High-Temperature strength diagram



Heat treatment

Soft annealing (+A)	750 °C – 800 °C	Furnace	≤ 230 HB
Hardening	1020 °C – 1040 °C	Air, oil, saltbath	55 HRC Hardness after quenching
Tempering	300 °C 400 °C 500 °C 550 °C 600 °C 650 °C	Air	51 51 52 51 48 36



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