



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.

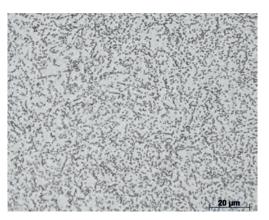
At the latest when the cracks merge together and chipping occur, they would be transferred to the surface of the die-cast component and result in the failure of the mould. Intelligent lightweight construction in the automotive industry leads among others to an increasing use of die-cast aluminium components 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

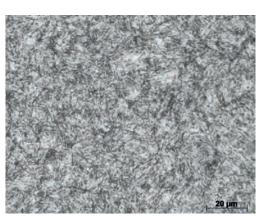
The chemical composition of this high-performance steel is precisely adjusted in the modern secondary metallurgic treatment facilities at Deutsche Edelstahlwerke.

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

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

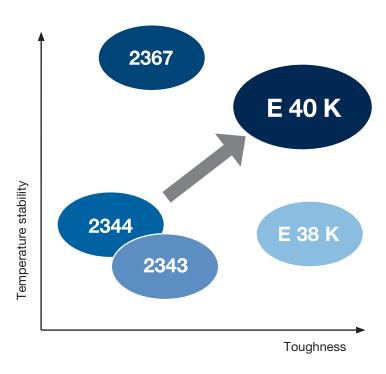


Annealed structure



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.





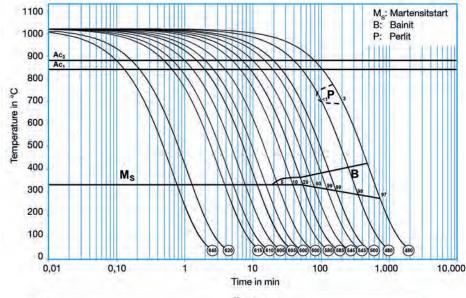


Impact bending samples (tempered to 44 - 46 HRC) after testing on a 450J pendulum impact testing machine

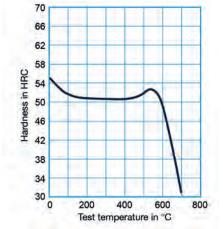
THERMODUR® E 40 K SUPERCLEAN

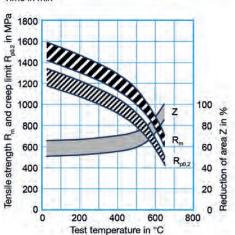
Chemical properties	C 0,35	Si 0,30	Mn 0,30	S < 0,003	Cr 5,00	Mo 1,75	V 0,80	Addition +	ıs		
Steel properties	crackin	High toughness combined with improved high-temperature strength, optimum insusceptibility to hot cracking, high hot wear resistance, optimum homogeneity of microstructure and isotropy of mechanical values.									
Physical properties	Coefficient of thermal expansion at °C										
	at 45 HRC			20 - 100	20 - 200	20 - 300	20 - 400	20 - 500	20 - 600)	
	10 ⁻⁶ m/(m • K)			11,5	12,0	12,3	12,6	12,9	13,2		
	Therm	al conduct	tivity at °C	RT	100	200	300	400	500	600	
	W/(m •	K)		28,3	29,3	30,9	31,0	30,7	29,5	27,8	
Applications		Universally usable hot-work steel thanks to an outstanding combination of temperature stability and toughness, particularly suitable for highly stressed die-casting moulds, extrusion dies and forging dies.									
Heat treatment	Soft annealing °C			Cooling			Hardness HB				
	750 - 800			Furnace			max. 230				
	Hardening °C			Quenching			Hardness after quenching HRC				
	1020 – 1040			Air, oil or saltbath			55				
	Tempe	ering °C		300	400	500	550	600	650		
	HRC			51	51	52	51	48	36		

TIME-TEMPERATURE-TRANSFORMATION DIAGRAM

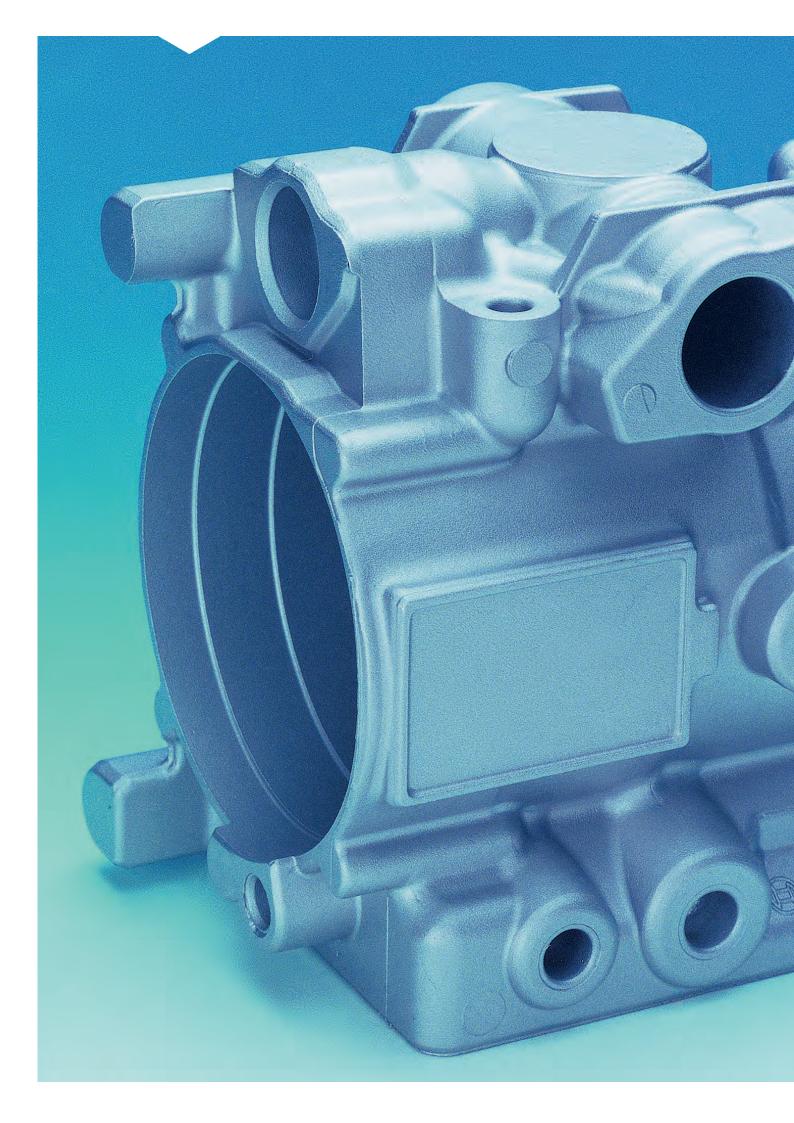


TEMPERING DIAGRAM, LEFT





HIGH-TEMPERATURE STRENGTH DIAGRAM, RIGHT



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