

material characteristics	material number / grade	SWG EX1 VICTORY ESR					
	short designation	X35CrMoV5-2					
	comparable grade	1.2343+Mo SuperClean ESR, AISI H11+Mo ESR					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V
		0.35	≤ 0.50	≤ 0.50	5.00	2.20	0.55
	production technology	EAF/LF/VD/ESR, (3D) forging, EFS annealing					
	service hardness / strength		HB	HRC	N/mm <sup>2</sup>		
			-	40 - 52	-		
	delivery condition	annealed	≤ 220	-	-		
	maximum dimension	diameter		thickness			
	≤ 800 mm		≤ 550 mm				
US-specification	EN 10228-3		SEP 1921				
	table 3 - type 1 - qual. class 4		group 3 - class E,e				
cleanliness	DIN 50602		ASTM E45 method A				
	K1 ≤ 10		A ≤ 0,5; B, C, D ≤ 1				
				variation upon request			

technological properties		0	1	2	3	4	5	comment	
	toughness		■	■	■	■			in relation to service hardness 42 - 48 HRC
	hot strength at working temp.		■	■	■	■	■		
	wear resistance		■	■	■	■	■		
	corrosion resistance	■							
	machinability		■	■					annealed
	polishability		■	■	■	■			ISO/SPI: N0/A-1, 48-52 HRC
	weldability		■						CET = 0.85 % acc. DIN EN 1011-2
	texturability		■	■	■	■	■		hardened
	nitridability		■	■	■	■	■		nitriding hardness 900 - 1250 HV1
chrome-platability		■	■	■	■	■		high cleanliness	

rating properties: 0 = not suitable; 1 = low; 2 = middle; 3 = good; 4 = very good; 5 = perfectly suitable

physical properties	thermal conductivity [W · m <sup>-1</sup> · K <sup>-1</sup> ]	20 °C	200 °C	300 °C	500 °C
		23.6	28.2	28.4	27.4
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		11.9	12.4	12.6	13.0
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
	212	199	192	175	

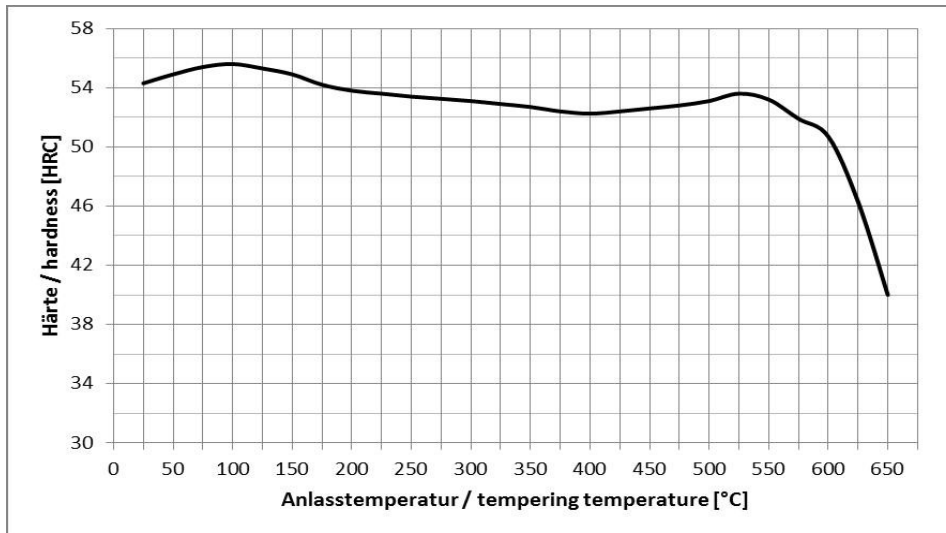
application	technology	mold making, die-casting
	tools	die-casting molds and inserts with high thermal load, high life time
	process temperature	< 600 °C
	tool size	medium- and large-sized dies
	final products	die-casting parts
	features	for highest requirements on hot strength and toughness, SuperClean technology

SWG processing instructions	welding, vacuum hardening
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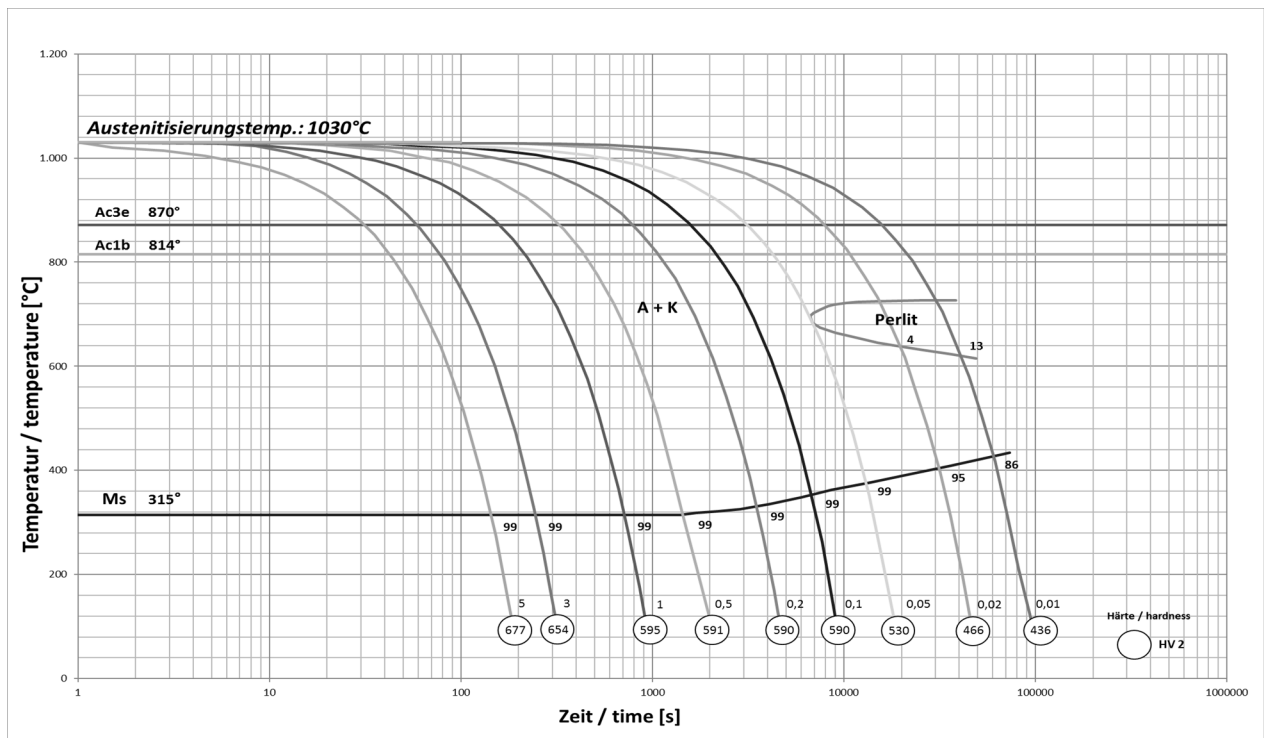
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	820	840	furnace until 650 °C, air
	hardening	1010	1030	vacuum, oil
	tempering	530	650	air, protective gas
	stress relieving	500	550	min. 30 °C below tempering temp.
	pre-heating before welding	300	320	
	nitriding	480	550	min. 30 °C below tempering temp.
	PVD-treating	480	550	

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	vacuum hardening or warmbath after pre-machining
	microstructure	martensitic

### Tempering diagram



### CCT-diagram



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