

material characteristics	material number / grade	SWG 2357 (AISI S7)					
	DIN standard	50CrMoV13-14					
	comparable grade	AISI S7					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V
		0.50	0.30	0.60	3.30	1.50	0.25
	production technology	EAF/LF/VD, forging, annealing					
	service hardness / strength		HB	HRC	N/mm <sup>2</sup>		
			-	52 - 56	-		
	delivery condition	annealed	≤ 285	-	-		
	maximum dimension	diameter		thickness			
≤ 600 mm		≤ 400 mm					
US-specification	EN 10228-3		SEP 1921				
	table 3 - type 1 - qual. class 3		group 3 - class D,d				
cleanliness	DIN 50602		ASTM E45 method A				
	K4 ≤ 30		A ≤ 1,5; B, C, D ≤ 2				
				variation upon request			

technological properties		0	1	2	3	4	5	comment	
	toughness		■	■					in relation to service hardness
	hot strength at working temp.		■	■	■				
	wear resistance		■	■	■	■			
	corrosion resistance	■							
	machinability		■	■	■	■			soft annealed
	polishability		■	■	■				ISO/SPI: N3/A-3
	weldability		■						CET = 0.89 % acc. DIN EN 1011-2
	texturability		■	■					
	nitridability		■	■	■	■			nitriding hardness 550 - 700 HV1
chrome-platability		■	■	■					

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	400 °C	500 °C
		31.1	32.1	31.9	31.1	30.7
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	400 °C	500 °C
		11.6	12.1	12.6	13.0	13.3
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C		
	210	199	191	172		

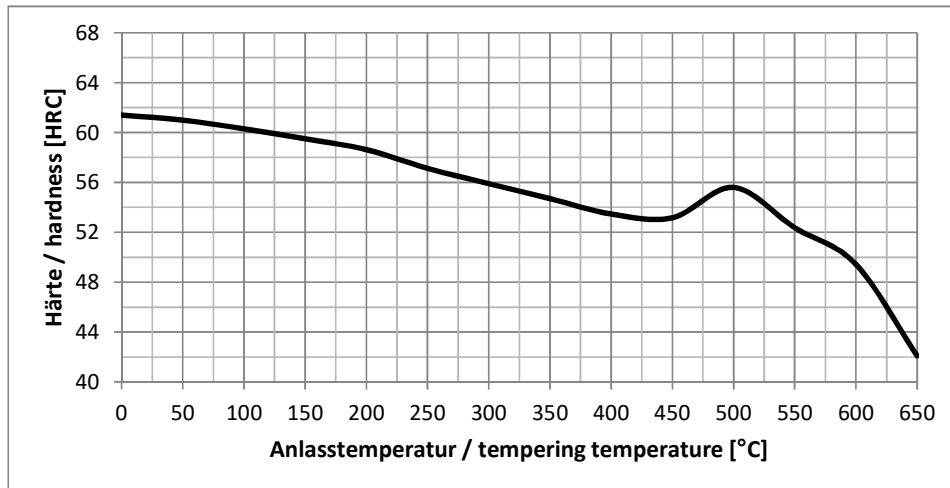
application	technology	mold making, steel cold forming, hot stamping
	tools	hot and cold stamping tools, cutting tools, plastic molds high hard
	process temperature	< 500 °C
	tool size	small- and medium - sized molds
	final products	steel sheets, strip steel, plastic injection parts
	features	low hardening distortion, high hardness, proper toughness

SWG processing instructions	welding, vacuum hardening
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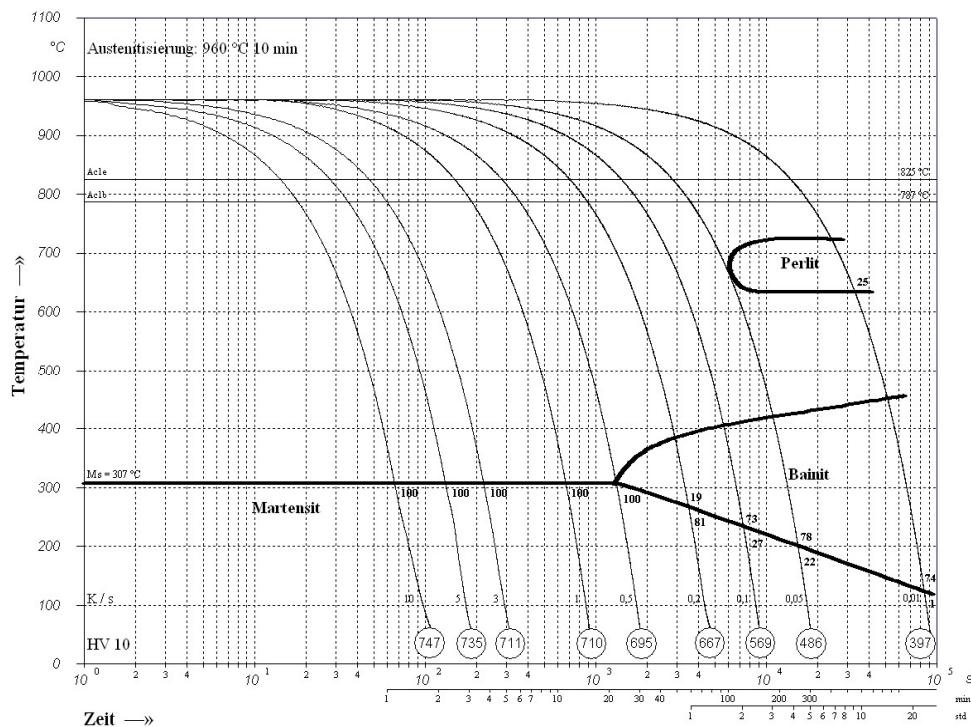
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	800	840	furnace until min. 600 °C, air
	hardening	950	1010	oil, vacuum
	tempering	200	600	air
	stress relieving	600	650	before hardening
	pre-heating before welding	350	-	
	nitriding	480	550	min. 30 °C below tempering temp.
	PVD-treating	480	550	

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	air or vacuum
	microstructure	martensitic

**Tempering diagram:** Average values on samples dia 25 mm x length 50 mm; hardened at 960 °C in oil



**CCT-diagram**



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