

material characteristics	material number / grade	SWG 2344					
	DIN standard	X40CrMoV5-1					
	comparable grade	AISI H13					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V
		0.40	1.00	0.40	5.20	1.30	1.00
	production technology	EAF/LF/VD, forging, EFS annealing					
	service hardness / strength	HB		HRC	N/mm <sup>2</sup>		
		-		36 - 54	-		
	delivery condition	annealed	≤ 229	-	-		
	maximum dimension	diameter			thickness		
≤ 600 mm			≤ 500 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 ≤ 20			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 48 - 54 HRC
	hot strength at working temp.		■	■	■	■	■		
	wear resistance		■	■	■	■	■		
	corrosion resistance	■							
	machinability		■	■	■	■			annealed
	polishability		■	■					ISO/SPI: N2/A-2, for high polishing 1.2344 ESR, 48 - 52 HRC
	weldability		■						CET = 0,83 % acc. DIN EN 1011-2
	texturability		■	■	■				for texturing 2344 ESR
	nitridability		■	■	■	■	■		nitriding hardness 900 - 1250 HV1
chrome-platability		■	■					for chrome-plating 2344 ESR	

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
		24.4	26.2	26.5	26.0
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		10.9	11.9	12.3	13.0
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
	212	199	192	175	

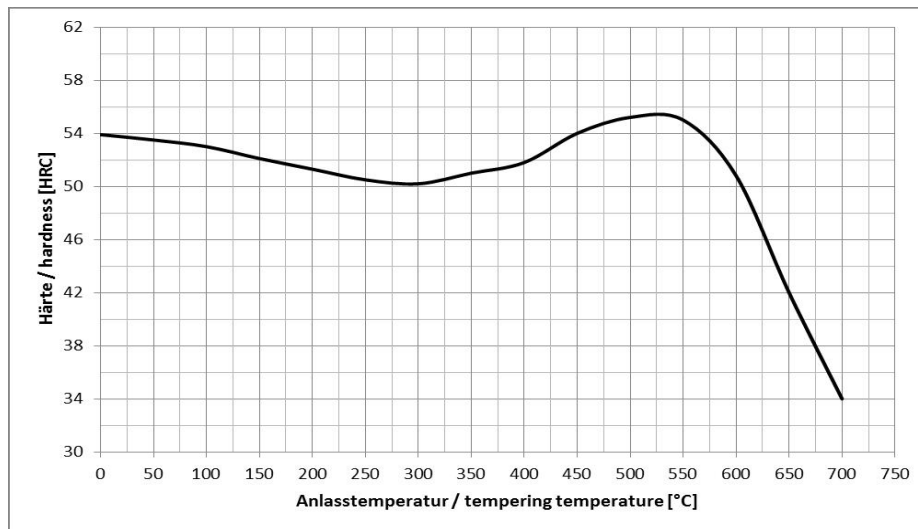
application	technology	mold making, injection molding, die-casting, gravity casting, hot forming
	tools	extrusion tools, press forging dies, hot shear blades, mold inserts, die-casting molds, gravity casting molds
	process temperature	< 600 °C
	tool size	small- and medium-sized tools
	final products	light metall, steel, plastic parts
	features	-

SWG processing instructions	welding, texturing, 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	max. 30 °C below tempering temp.
	pre-heating before welding	300	320	
	nitriding	480	550	max. 30 °C below tempering temp.
	PVD-treating	480	550	

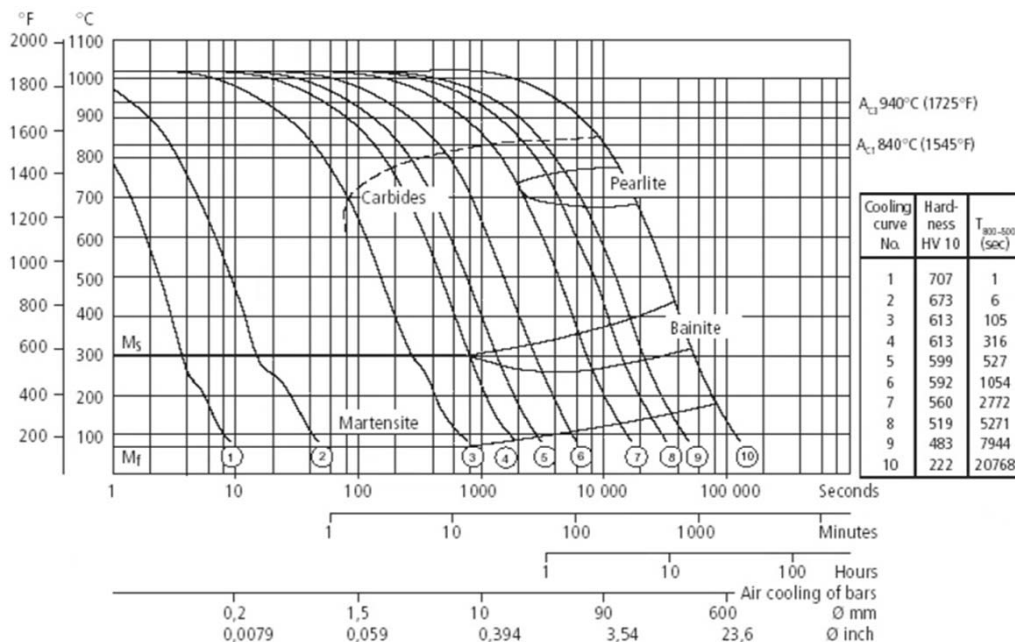
diagrams/ structure	TTT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	vacuum hardening after pre-machining
	microstructure	martensitic

**Tempering diagram:** Average values on samples dia 25 mm x length 50 mm; hardened at 1030 °C in oil



**TTT-diagram (continuous)**

Austenitizing temperature 1020°C (1870°F). Holding time 30 minutes.



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