

material characteristics	material number / grade	SWG 2344 VICTORY ESR					
	DIN standard	X40CrMoV5-1					
	comparable grade	AISI H13 ESR					
	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/ESR, (3D) forging, EFS annealing					
	service hardness / strength		HB	HRC	N/mm ²		
			-	36 - 54	-		
	delivery condition	annealed	≤ 229	-	-		
	maximum dimension	diameter			thickness		
	≤ 600 mm			≤ 400 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 48 - 54 HRC
	hot strength at working temp.		■	■	■	■			
	wear resistance		■	■	■	■	■		
	corrosion resistance	■							
	machinability		■	■	■	■			annealed
	polishability		■	■	■	■			ISO/SPI: N0/A-1, 48 - 54 HRC
	weldability		■						CET = 0.83 % acc. DIN EN 1011-2
	texturability		■	■	■	■	■		
	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 ⁻¹ · K ⁻¹]	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 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	500 °C
		10.9	11.9	12.3	13.0
elastic modulus [kN/mm ²]	20 °C	200 °C	300 °C	500 °C	
		212	199	192	175

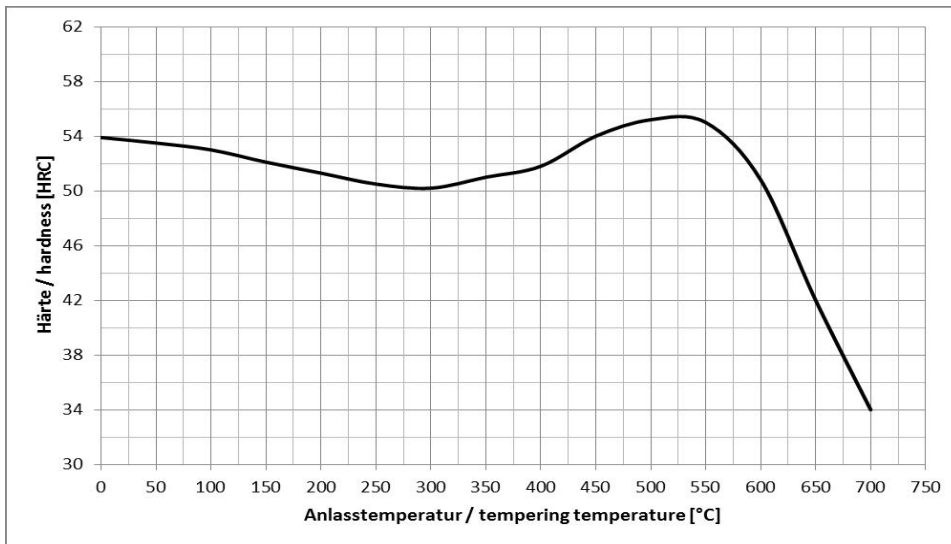
application	technology	mold making, injection molding, die-casting, hot forming
	tools	die-casting molds and inserts, extrusion tools, plastic injection molds high polished and wear resistant
	process temperature	< 600 °C
	tool size	small- and medium-sized tools
	final products	light metall, steel, plastic parts (reinforced, transparent, high gloss)
	features	-

SWG processing instructions	welding, texturing, vacuum hardening
-----------------------------	---

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	

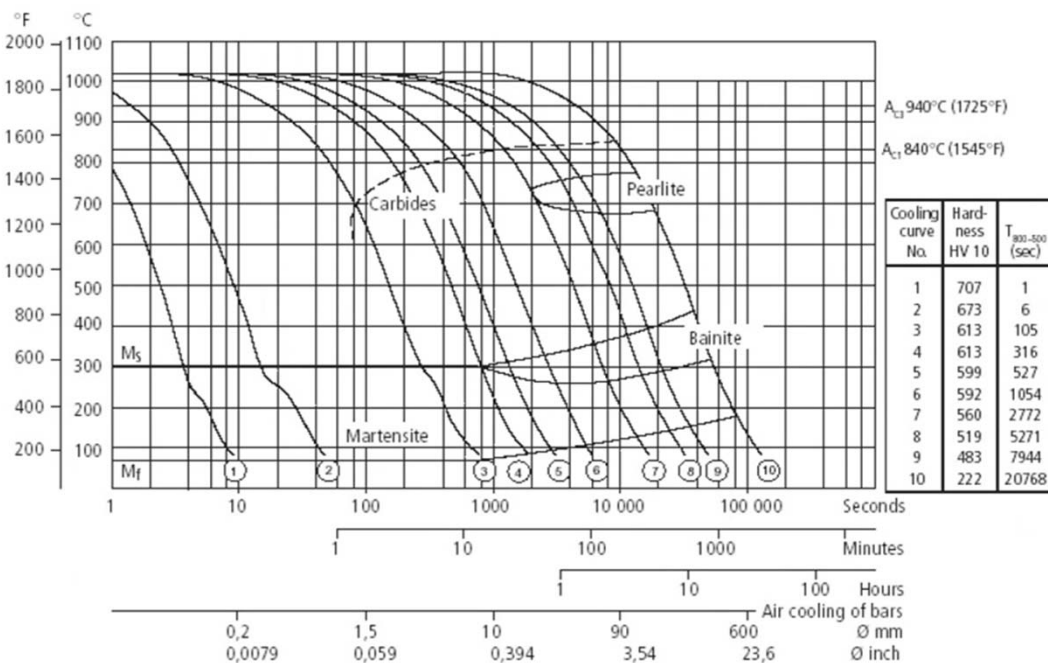
diagrams/ structure	TTT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	vacuum hardening after pre-machining or warmbath
	microstructure	martensitic

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.



PLEASE NOTE: The information contained in this data sheet is unbinding. It merely serves the first orientation of the user. Therefore, we do not assume any liability for the correctness, completeness or up-to-dateness of such data. In case of an order, the properties of the product are exclusively subject to the provisions of the respective contract.

© Schmiedewerke Gröditz GmbH, Gröditz