

material characteristics	material number / grade	SWG 2316					
	DIN standard	X38CrMo16					
	comparable grade	-					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	Ni
		0.35	0.35	0.70	15.5	1.00	0.50
	production technology	EAF/LF/VD, forging, Q+T or annealing					
	service hardness / strength <small>converted acc. to DIN EN ISO 18265 table B2</small>		HB	HRC	N/mm ²		
			280 - 325	28.3 - 34.2	890 - 1030		
	delivery condition	Q+T	280 - 325	28.3 - 34.2	890 - 1030		
		annealed	≤ 248 HB	-	-		
	maximum dimension	diameter		thickness			
		≤ 750 mm		≤ 500 mm			
US-specification	EN 10228-3		SEP 1921				
	table 3 - type 1 - qual. class 4		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 280 - 325 HB
	hot strength at working temp.		■	■	■				
	wear resistance		■	■					
	corrosion resistance		■	■	■				polished surface for best corrosion resistance
	machinability		■	■					Q+T
	polishability		■	■					ISO/SPI: N2/A-2
	weldability		■						CET = 1.33 % acc. DIN EN 1011-2
	texturability		■	■					
	nitridability		■	■	■	■			nitriding hardness 900 - 1200 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 ⁻¹ · K ⁻¹]	20 °C	200 °C	300 °C	500 °C
		23.5	24.2	24.3	23.2
	coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	500 °C
		10.3	10.8	11.2	11.9
elastic modulus [kN/mm ²]	20 °C	200 °C	300 °C	500 °C	
	218	206	198	180	

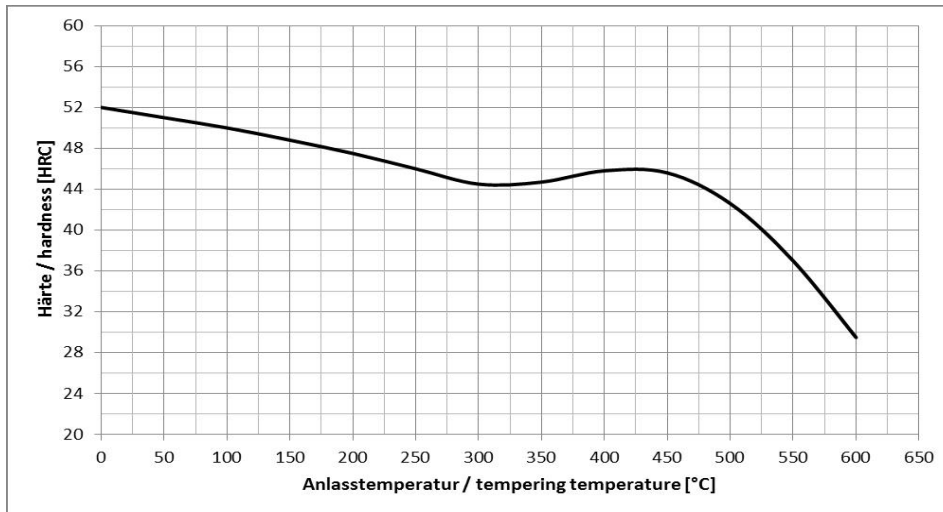
application	technology	mold making PVC processing, corrosion resistant
	tools	corrosion resistant plastic molds for PVC, extrusion tools, matrices
	process temperature	< 300 °C
	tool size	small- and medium-sized molds
	final products	PVC tubes, PVC profiles, PVC plastic parts
	features	processing of chemically aggressive plastics with chloride atmosphere

SWG processing instructions	welding, texturing
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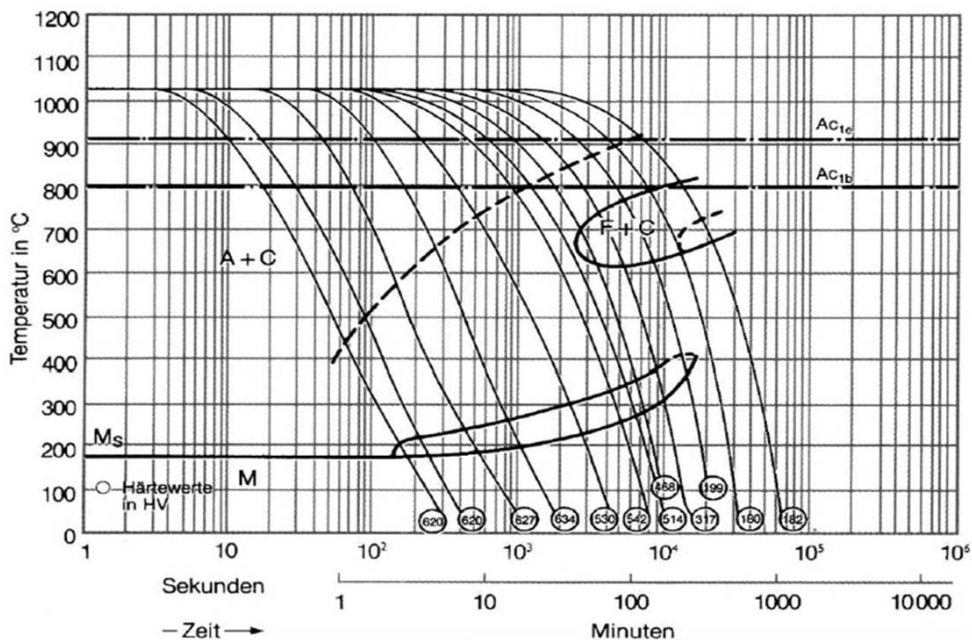
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	780	820	furnace
	hardening	1000	1040	vacuum, oil
	tempering	580	700	air, protective atmosphere
	stress relieving	520	550	max. 30 °C below tempering temp.
	pre-heating before welding	220	250	
	nitriding	450	550	max. 30 °C below tempering temp.
	PVD-treating	450	550	

diagrams/ structure	TTT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	soft annealing before new hardening
	microstructure	martensitic

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 1010 °C in oil



TTT-diagram (continuous)



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