Material data sheet
SWG 2316

Schmiedewerke Gröditz
GMH GRUPPE

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	15.50	1.00	0.50	
production technology	EAF/LF/VD, forging, Q+T or annealing						
service hardness / strength converted acc. to internal hardness table		HB	HRC	N/mm²			
		276 - 335	28 - 34	872 - 1059			
delivery condition	Q+T	276 - 335	28 - 34	872 - 1059	variation upon request		
	annealed	≤ 248 HB	-	-			
maximum dimension	diameter		thickness				
	≤ 750 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				

technological properties

	0	1	2	3	4	5	comment
toughness		■	■	■			in relation to service hardness 276 - 335 HB
hot strength at working temp.		■	■	■			
wear resistance		■	■				
corrosion resistance		■	■	■			polished surface for best corrosion resistance
machinability		■	■				Q+T
polishability		■	■				ISO/SPI: N3/A-3
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

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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

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

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

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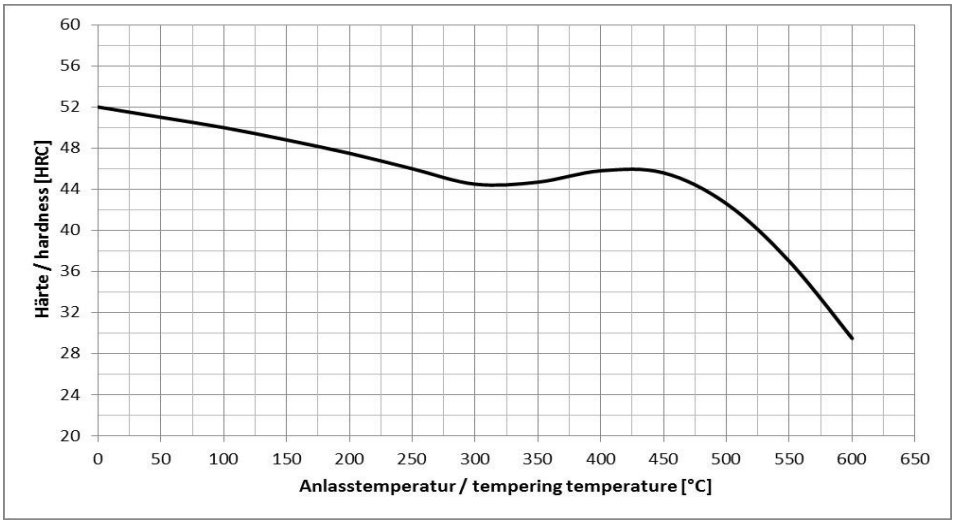
Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 1010 °C in oil



CCT-diagram