

material characteristics	material number / grade	SWG CRM13S					
	short designation	~ X10CrMnS13					
	comparable grade	~ 1.2085mod					
	chemical composition - reference analysis [%]	C	Si	Mn	S	Cr	others
		≤ 0.10	0.25	1.30	0.14	12.50	alloyed
	production technology	EAF/LF/VOD, forging, Q+T					
	service hardness / strength <small>converted acc. to DIN EN ISO 18265 table B2</small>	HB	HRC	N/mm <sup>2</sup>			
		278 - 308	28 - 32	885 - 980			
	delivery condition	Q+T	278 - 308	28 - 32	885 - 980		
	maximum dimension	diameter			thickness		
-			≤ 400 mm				
US-specification	EN 10228-3			SEP 1921			
	table 3 - type 1 - qual. class 2			group 3 - class C,c			
cleanliness	DIN 50602			ASTM E45 method A			
	K4 ≤ 40 (oxides only)			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		■	■	■	■	■		
	polishability	■							sulphur alloyed
	weldability		■						CET = 0.83 % 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 <sup>-1</sup> · K <sup>-1</sup> ]	20 °C	200 °C	300 °C	500 °C
		24.7	25.7	26.3	26.6
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		11.0	11.6	11.9	12.4
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
	218	202	198	180	

application	technology	mold making, injection molding, corrosion resistant
	tools	plastic molds: mold base, frames, cores
	process temperature	< 300 °C
	tool size	small- and medium-sized molds
	final products	plastic injection parts
	features	to be used for chemically aggressive plastics, not for cavities and parts with surface requirements

SWG processing instructions	welding
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heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	720	750	air
	hardening	1020	1040	oil
	tempering	550	600	air
	stress relieving	500	530	min. 30 °C below tempering temp., air
	pre-heating before welding	320	350	
	nitriding	400	530	min. 30 °C below tempering temp.
	PVD-treating	400	530	

diagrams/ structure	CCT-diagram	no
	tempering diagram	no
	advice on heat treatment	pre-hardened
	microstructure	martensitic + manganese sulfides

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