Material data sheet
SWG 2312

Schmiedewerke Gröditz
GMH GRUPPE

material characteristics

material number / grade	SWG 2312						
DIN standard	40CrMnMoS8-6						
comparable grade	AISI P20+S						
chemical composition - reference analysis [%]	C	Si	Mn	S	Cr	Mo	
	0.40	0.30	1.50	0.05	1.90	0.20	
production technology	EAF/LF/VD, forging, Q+T						
service hardness / strength converted acc. to DIN EN ISO 18265 table B2		HB	HRC	N/mm²			
		280 - 325	28.3 - 34.2	890 - 1030			
delivery condition	Q+T	280 - 325	28.3 - 34.2	890 - 1030	variation upon request		
maximum dimension	diameter			thickness			
	≤ 800 mm			≤ 700 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 ≤ 20 (oxides only)			B,C,D ≤ 2			

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		■	■	■	■	■	Q+T
polishability	■						sulfur alloyed
weldability		■	■	■			CET = 0.65 % acc. DIN EN 1011-2
texturability	■						sulfur alloyed
nitridability		■	■	■			nitriding hardness 700 - 850 HV1
chrome-platability	■						sulfur alloyed

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
	34.2	33.8	32.0	27.5
coefficient of thermal expansion between 20 °C and ... [10^{-6} · K^{-1}]	100 °C	200 °C	300 °C	500 °C
	12.6	12.9	13.4	14.2
elastic modulus [kN/mm^2]	20 °C	200 °C	300 °C	500 °C
	212	207	192	175

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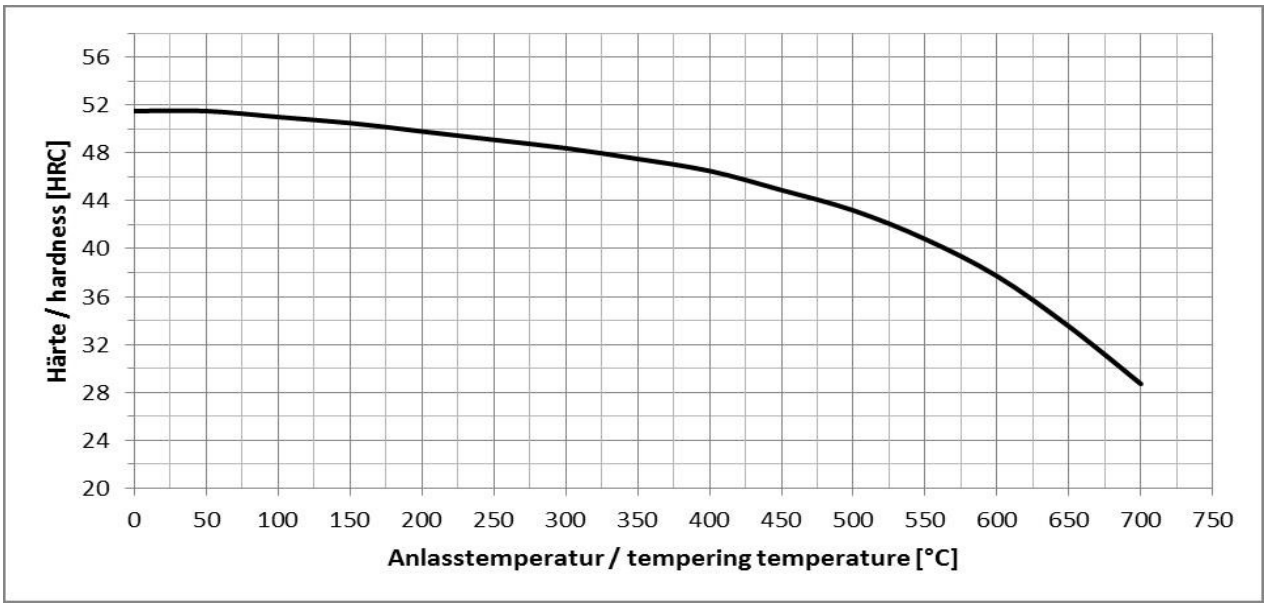
application	technology	mold making, injection molding
	tools	plastic molds, mold frames, mold base, casting tools
	process temperature	< 250 °C
	tool size	small- and medium-sized molds up to 400 mm thickness
	final products	plastic injection parts
	features	sulfur alloyed, not suitable for cavities

SWG processing instructions	welding

		T min [°C]	T max [°C]	medium / comment
heat treatment	annealing	720	750	air
	hardening	840	870	oil, polymer
	tempering	550	680	air
	stress relieving	500	550	min. 30 °C below tempering temp.
	pre-heating before welding	320	350	
	nitriding	400	550	min. 30 °C below tempering temp.
	PVD-treating	400	550	

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	pre-hardened
	microstructure	mainly bainitic + manganese sulfides

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 850 °C in oil



CCT-diagram