Material data sheet
SWG 2347

Schmiedewerke Gröditz
GMH GRUPPE

material characteristics

material number / grade	SWG 2347							
DIN standard	X40CrMoVS5-1							
comparable grade	AISI H13+S							
chemical composition - reference analysis [%]	C	Si	Mn	S	Cr	Mo	V	
	0.40	1.00	0.40	0,09	5,00	1,30	0,95	
production technology	EAF/LF/VD, forging, Q+T (annealing)							
service hardness / strength converted acc. to DIN EN ISO 18265 table B2		HB	HRC	N/mm²				
		350 - 389	37 - 42	1113 - 1232				
delivery condition	Q+T	350 - 389	37 - 42	1113 - 1232				
	annealed	≤ 229	-	-				variation upon request
maximum dimension	diameter		thickness					
	≤ 750 mm		≤ 500 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)		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		■	■	■	■	■	annealed, higher than 2344
polishability	■						sulphur alloyed
weldability		■					CET = 0,83 % acc. DIN EN 1011-2
texturability	■						sulphur alloyed
nitridability		■	■	■	■	■	nitriding hardness 900 - 1250 HV1
chrome-platability	■						sulphur 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
	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

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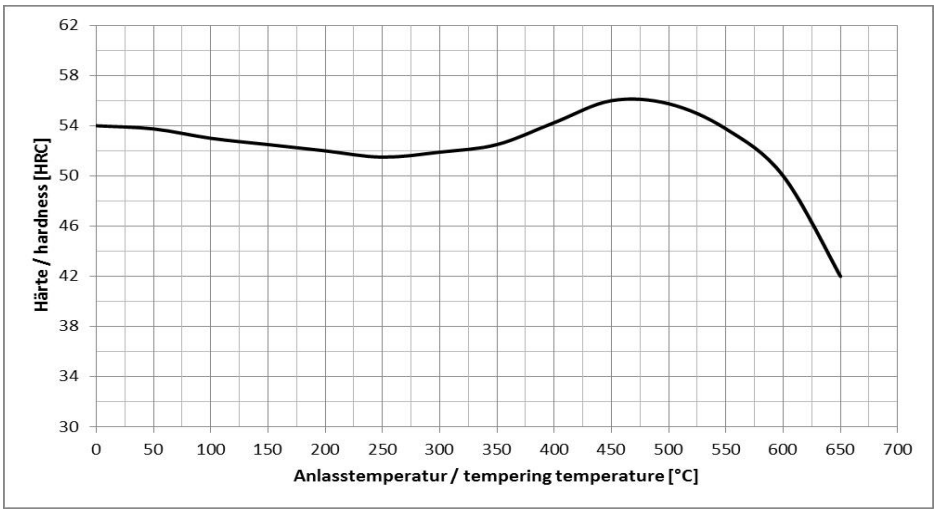
application	technology	mold making, injection molding
	tools	core parts for plastic injection molding
	process temperature	< 600 °C
	tool size	small- and medium-sized tools
	final products	light metall, steel, plastic parts
	features	not suitable for cavities with high requirements on the surface

SWG processing instructions	welding, vacuum hardening

		T min [°C]	T max [°C]	medium / comment
heat treatment	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
	microstructure	martensitic + manganese sulfides

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 1030 °C in oil



TTT-diagram (continuous)