

material characteristics	material number / grade	SWG 2083			
	DIN standard	X40Cr14			
	comparable grade	AISI 420			
	chemical composition - reference analysis [%]	C	Si	Mn	Cr
		0.40	0.40	0.70	13.00
	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 <sup>2</sup>
			-	32 - 52	-
	delivery condition	Q+T	308 - 341	32 - 36	980 - 1085
		annealed	≤ 250	-	-
maximum dimension	diameter		thickness		
	≤ 650 mm		≤ 450 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		
				variation upon request	

technological properties		0	1	2	3	4	5	comment	
	toughness		■	■					in relation to service hardness 48 - 52 HRC
	hot strength at working temp.		■	■	■				
	wear resistance		■	■	■	■			
	corrosion resistance		■	■	■				polished surface for best corrosion resistance
	machinability		■	■	■				annealed
	polishability		■	■	■				ISO/SPI: N2/A-2; 48 - 52 HRC
	weldability		■						CET = 1.12 % 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
		20.0	23.0	24.0	25.0
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		10.5	11.0	11.0	11.6
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
	218	206	198	180	

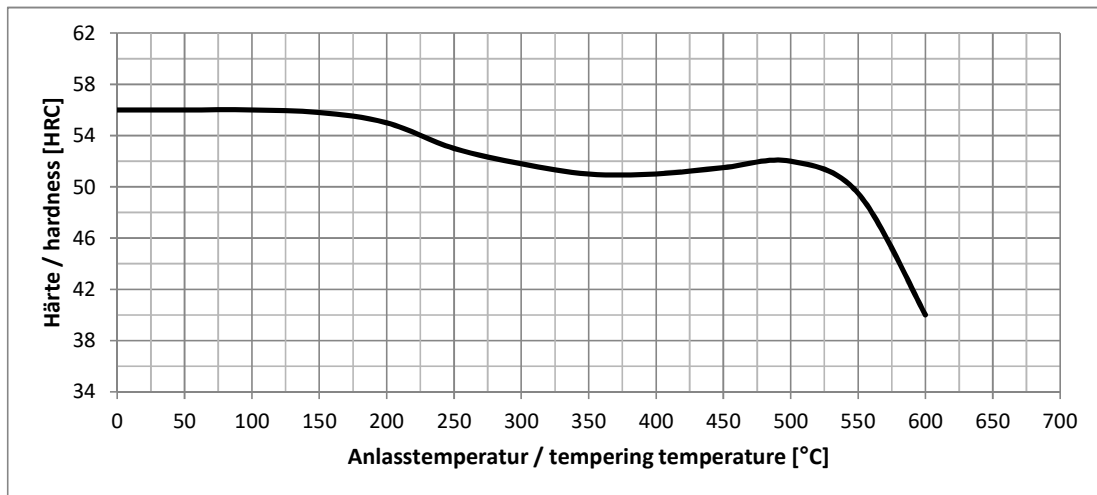
application	technology	mold making, injection molding, corrosion resistant
	tools	plastic molds, corrosion resistant
	process temperature	< 300 °C
	tool size	small- and medium-sized molds
	final products	plastic injection parts (medicine, compact discs)
	features	pre-hardened up to 36 HRC delivery hardness

SWG processing instructions	welding, texturing, vacuum hardening
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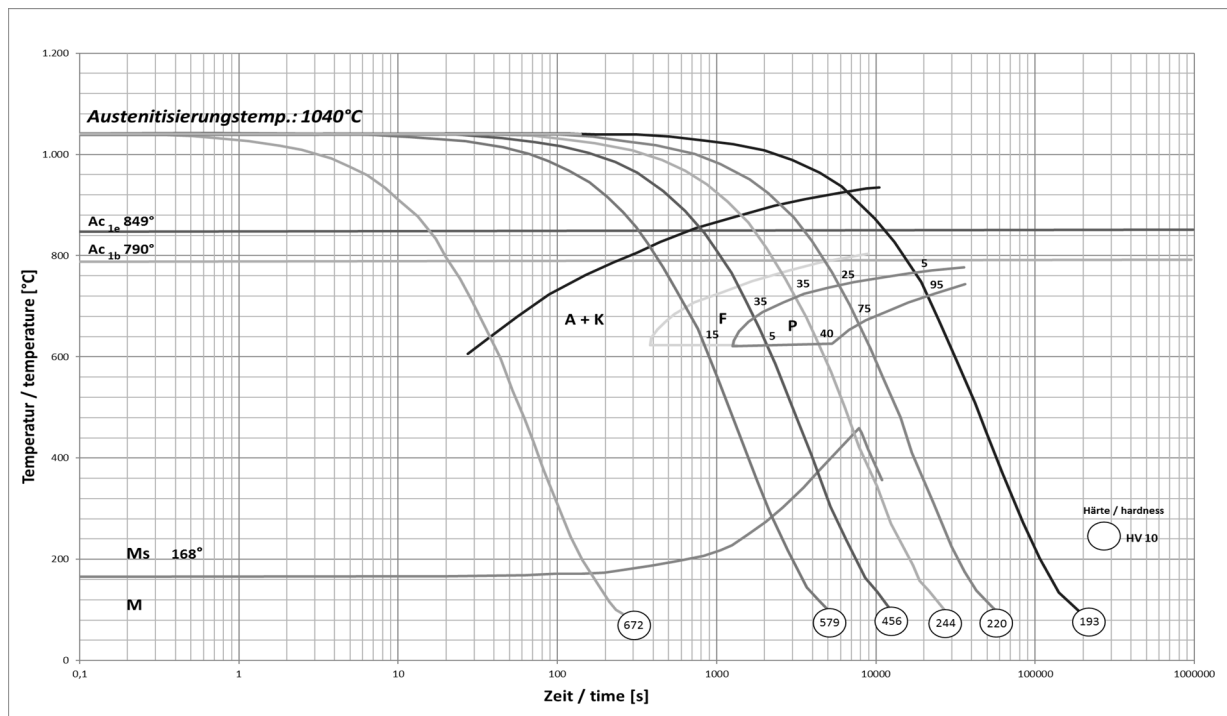
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	760	800	furnace, air
	hardening	1000	1030	vacuum, oil
	tempering	250	600	furnace, air
	stress relieving	450	500	min. 30 °C below tempering temp.
	pre-heating before welding	320	350	
	nitriding	400	500	min. 30 °C below tempering temp.
	PVD-treating	400	500	

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

**Tempering diagram:** Average values on samples dia 25 mm x length 50 mm; hardened at 1020 °C in oil



**CCT-diagram**



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