



material characteristics	material number / grade	SWG GPM58 VICTORY ESR						
	short designation	X50CrMoV5-2						
	comparable grade	-						
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V	Ni
		0.5	≤ 0.5	0.5	5.0	2.2	0.7	+
	production technology	EAF/LF/VD/ESR, forging, annealing						
	service hardness / strength		HB	HRC	N/mm ²			variation upon request
			-	54 - 58	-			
	delivery condition	annealed	≤ 250	-	-			
	maximum dimension	diameter			thickness			
-			≤ 400 mm					
US-specification	EN 10228-3			SEP 1921				
	table 3 - type 1 - qual. class 4			group 3 - class E,e				
cleanliness	DIN 50602			ASTM E45 method A				
	K1 ≤ 10			A ≤ 0,5; B, C, D ≤ 1				

technological properties		0	1	2	3	4	5	comment	
	toughness		■	■	■				in relation to service hardness 54 - 58 HRC
	hot strength at working temp.		■	■	■	■	■		
	wear resistance		■	■	■	■	■		
	corrosion resistance	■							
	machinability		■	■					annealed
	polishability		■	■	■	■			ISO/SPI: N1/A-1
	weldability		■						CET = 1.03 % acc. DIN EN 1011-2
	texturability		■	■	■				
	nitridability		■	■	■	■	■	■	nitriding hardness 900 - 1250 HV1
chrome-platability		■	■	■	■	■	■	high cleanliness	

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	400 °C	500 °C
		23.5	27.3	28.2	28.7	29.3
	coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	400 °C	
		12.6	12.7	13.0	13.4	
elastic modulus [kN/mm ²]	20 °C	200 °C	300 °C	500 °C		
	195	-	-	-		

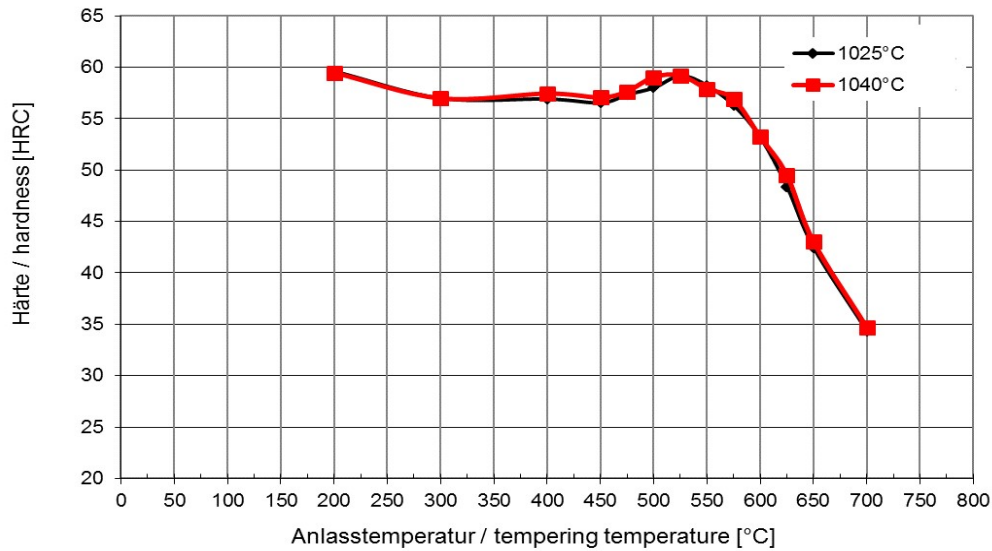
application	technology	mold making for plastic injection, cold and hot working applications
	tools	molds and inserts for reinforced plastic injection, press forming, cutting, stamping, thread rolling, hot shears, die casting
	process temperature	< 600 °C
	tool size	small- and medium-sized dies
	final products	high strength plastic parts, clippings, thread bolts, structure parts
	features	for high requirements on strength and toughness, wear resistance, lasting series tools

SWG processing instructions	vacuum hardening
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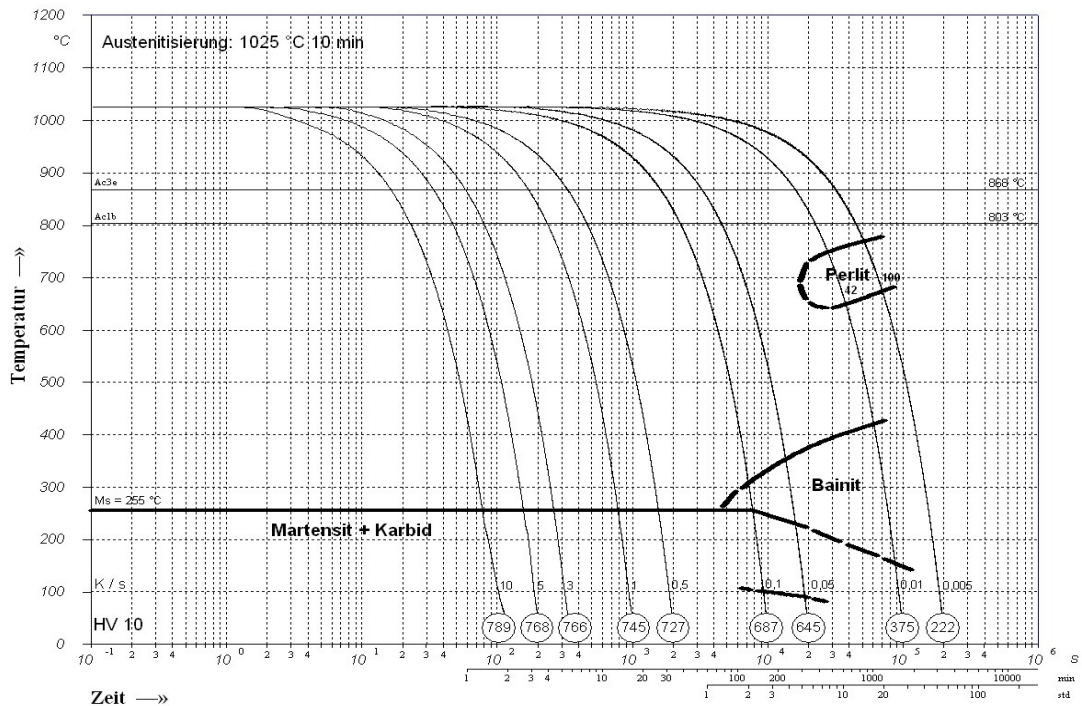
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	800	850	furnace until 650 °C, air
	hardening	1010	1040	vacuum, oil
	tempering	530	600	air, protective gas
	stress relieving	500	600	min. 30 °C below tempering temp.
	pre-heating before welding	300	320	
	nitriding	480	550	min. 30 °C below tempering temp.
	PVD-treating	480	550	

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	vacuum hardening after pre-machining
	microstructure	martensitic

Tempering diagram: Average values on samples 20mm x 28mm x 36mm, hardened at 1025 °C and 1040 °C (1h), fan cooling



CCT-diagram



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