

material characteristics	material number / grade	SWG EX6 VICTORY ESR					
	DIN standard	-					
	comparable grade	-					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V
		0.43	0.30	0.40	6.40	1.30	0.90
	production technology	EAF/LF/VD/ESR, forging, annealing					
	service hardness / strength <small>converted acc. to DIN EN ISO 18265 table B2</small>		HB	HRC	N/mm ²		
			-	52 - 56	-		
	delivery condition	annealed	≤ 285	-	-		
	maximum dimension	diameter		thickness			
	≤ 500 mm		≤ 300 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				
				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		■	■	■	■			annealed
	polishability		■	■	■	■			ISO/SPI: N0/A-1
	weldability		■						CET = 0.92 % acc. DIN EN 1011-2
	texturability		■	■	■	■			
	nitridability		■	■	■	■	■		nitriding hardness up to 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	500 °C
		22.3	23.8	25.4	25.5
	coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	500 °C
		10.5	11.2	11.6	12.2
elastic modulus [kN/mm ²]	20 °C	200 °C	300 °C	500 °C	
	211	198	192	173	

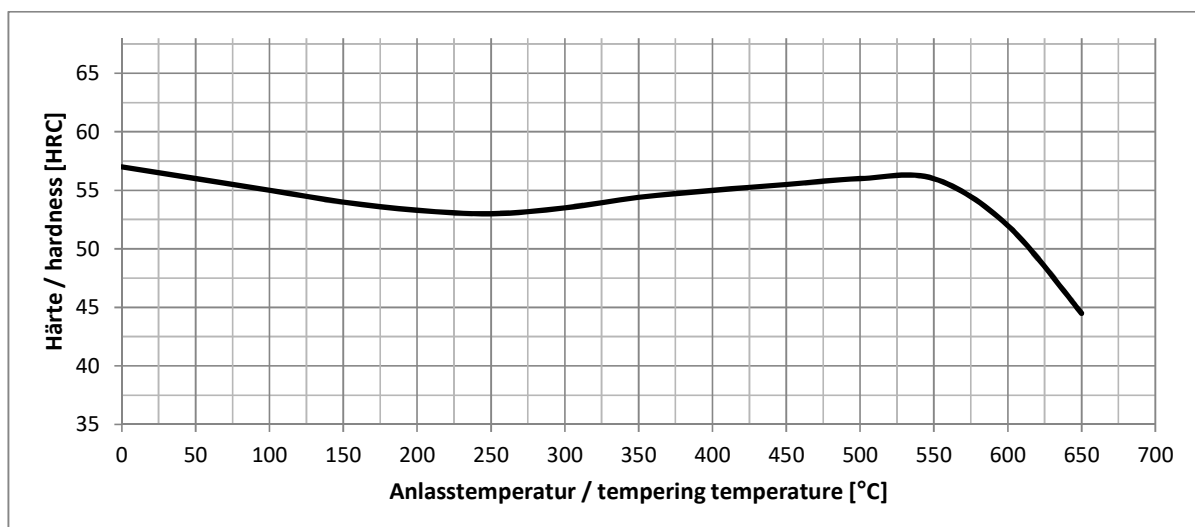
application	technology	cold and hot forming
	tools	die forging, cutting and stamping
	process temperature	< 300 °C, pre-heating of the tool to about 200 °C advised
	tool size	small- and medium-sized molds
	final products	blanks, structural parts, pipes
	features	high warm strength and wear resistance

SWG processing instructions	welding
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heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	810	850	furnace until min. 450 °C, air
	hardening	1030	1050	oil, vacuum
	tempering	200	600	air
	stress relieving	600	650	before hardening
	pre-heating before welding	350	-	
	nitriding	480	550	min. 30 °C below tempering temp.
	PVD-treating	480	550	

diagrams/ structure	CCT-diagram	no
	tempering diagram	yes
	advice on heat treatment	vacuum heat treatment after pre-machining
	microstructure	martensitic

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 1050 °C in oil



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