



# **SWG GPM58 VICTORY ESR**

**Improved hardness.**

**Improved wear resistance.**

Heading forward with you



**Schmiedewerke Gröditz**  
**GMH GRUPPE**



# SWG GPM58 VICTORY ESR

**SWG GPM58 VICTORY ESR** is a multi-functional mold steel with an exceptional combination of high ductility and high hardness. Tool steels from SWG are used wherever reliable quality, long service life, innovation and a competent service with an international sales network are required.

As one of the world's leading suppliers for high quality tool steel we are working in close collaboration with our customers and consistently develop new possibilities to meet the challenges of tomorrow.

In recent years, our customers have shown a growing interest in the correct mold steel selection for the injection of fiber-reinforced plastics (FRP). Reinforced plastic products have become more popular and contribute a constantly increasing share in the injection molding industry. FRP are nowadays widely used in the applications of various sectors: automotive, home appliances, aerospace, construction and marine. Besides the growing volume of consumption, it is also the content of fibers in the plastic which is continually rising, e.g. up to 70%.

Up to now, mold makers' standard choices for injection of reinforced plastics are steel grades 1.2083, 1.2344, 1.2767, 1.2357. This selection typically allows sufficient mold service lifetime for fiber contents of up to 30%. However, when facing 40% and higher of glass fiber or carbon fiber content, severe wear is encountered which results in early mold failure.

Based on our long-term experience in making first class plastic mold steel we have developed a new and advanced special steel grade: **SWG GPM58 VICTORY ESR**.

## Innovation

**SWG GPM58 VICTORY ESR** is your steel of choice when it comes to plastic injection with high fiber contents. It is SWG's special plastic mold steel grade which provides high wear resistance and high hardness in combination with high toughness.

By means of electro-slag-remelting (ESR), **SWG GPM58 VICTORY ESR** allows mirror surface finish acc. to ISO No. N1 and SPI finish A-1. Subsequently, re-polishing intervals are prolonged and higher mold service lifetime can be achieved.

**SWG GPM58 VICTORY ESR** provides elevated hot strength, thermal fatigue resistance and can also be used for hot and warm forming, extrusion, hot shearing etc.

<b>material characteristics</b>	<b>material number / grade</b>	<b>SWG GPM58 VICTORY ESR</b>						
	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 <sup>2</sup>			
			-	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				

variation upon request

<b>technological properties</b>		0	1	2	3	4	5	comment	
	toughness		■	■	■				
	hot strength at working temp.		■	■	■	■	■		in relation to service hardness 54 - 58 HRC
	wear resistance		■	■	■	■	■		
	corrosion resistance	■							
	machinability		■	■					annealed
	polishability		■	■	■	■			ISO/SP1: 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

<b>physical properties</b>	thermal conductivity [W · m <sup>-1</sup> · K <sup>-1</sup> ]	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 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	400 °C	
		12.6	12.7	13.0	13.4	
	elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
		195	-	-	-	

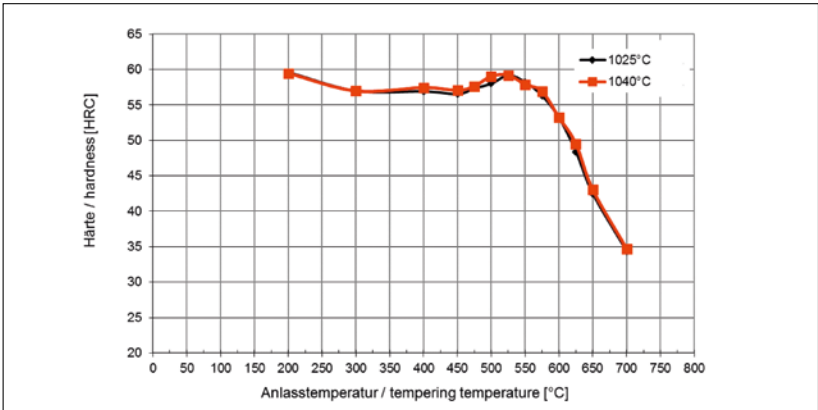
<b>application</b>	technology	mold making for plastic injection, cold and hot working applications
	tools	molds and inserts for reinforced plastic injection, press forming, cutting, stamping, thread rolling, hot shears, die casting
	process temperature	< 600 °C
	tool size	small- and medium-sized dies
	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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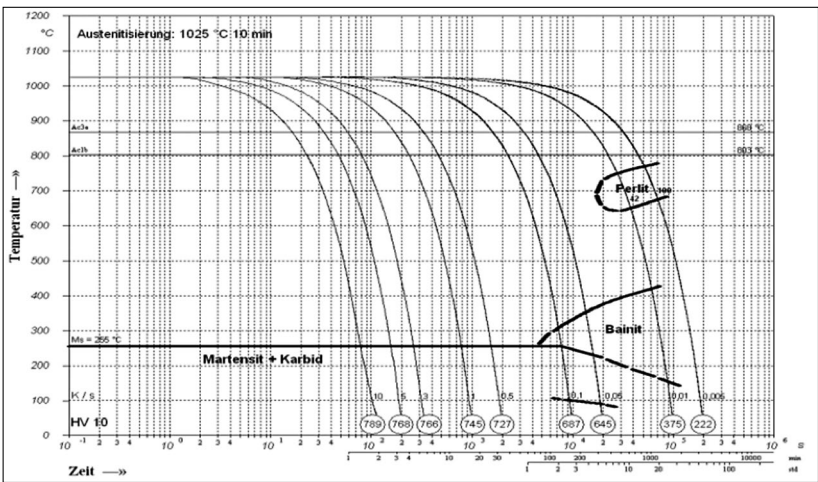
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	800	850	furnace until 650°C, air
	hardening	1010	1040	vacuum, oil
	tempering	530	600	air, protective gas
	stress relieving	500	600	max. 30°C below tempering temp.
	pre-heating before welding	300	320	
	nitriding	480	550	max. 30°C below tempering temp.
	PVD-treating	480	550	

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

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



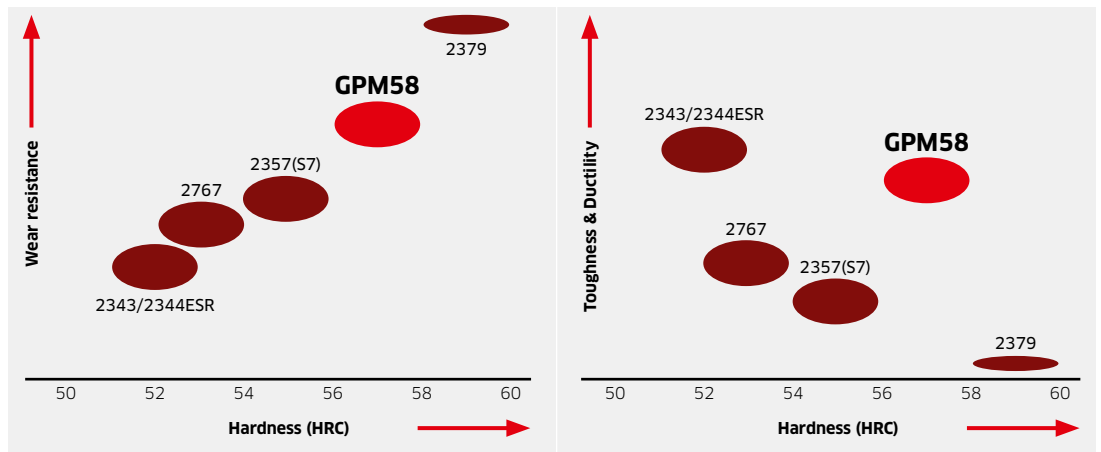
**CCT-diagram**



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# SWG GPM58 VICTORY ESR – properties

- High wear resistance and durability
- Very good vacuum hardenability to approx. 58HRC
- High toughness and ductility at high hardness level
- High cleanliness and homogeneity, isotropic properties
- High surface treatment/coating-ability



## Tailored to your needs!

**SWG GPM58 VICTORY ESR is tailored to your needs: Especially designed to meet the growing number of fiber-reinforced plastic applications. High glass fiber and carbon fiber contents enable you to thrive your plastic products to the top performance level!**



### For plastic applications

- High fiber content injection molds
- Non-corrosive thermoplastic injection molds for long lasting series
- Thermosetting plastic molds
- Injection mold inserts for high wear resistance
- Mirror surface finish molds (ISO N1)

### For hot work applications

- Hot and warm forming
- Hot shearing
- Extrusion
- Small- and medium-sized low temperature alloy die casting



### For cold work applications

Can be used for cold work tools with very harsh working conditions, where high chipping resistance is required such as:

- Heavy duty blanking
- Cold forging
- Thread rolling

For any other high-end application, please do not hesitate to contact us.

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