



2311

Suitable for mold bases or low demand plastic molds, application with maximum thickness not exceeding 400mm.

material characteristics	material number / grade	SWG 2311				
	DIN standard	40CrMnMo7				
	comparable grade	AISI P20				
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo
		0.40	0.30	1.50	2.00	0.20
	production technology	EAF/LF/VD, forging, Q+T				
	service hardness / strength converted acc. to DIN EN ISO 18265 table B2	HB	HRC		N/mm <sup>2</sup>	
			280 - 325	28.3 - 34.2	890 - 1030	
	delivery condition	Q+T	280 - 325	28.3 - 34.2	890 - 1030	
	maximum dimension	diameter		thickness		
≤ 600 mm		≤ 400 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
	hot strength at working temp.		■	■	■					
	wear resistance		■	■						
	corrosion resistance	■								
	machinability		■	■	■					Q+T
	polishability		■							ISO/SPI: N3/A-3
	weldability		■	■	■					CET = 0.65 % acc. DIN EN 1011-2
	texturability		■	■						for high texturing reliability: XPM
	nitridability		■	■	■					nitriding hardness 700 - 850 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
		34.2	33.8	32.0	27.5
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		12.6	12.9	13.4	14.2
	elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C
		212	207	192	175

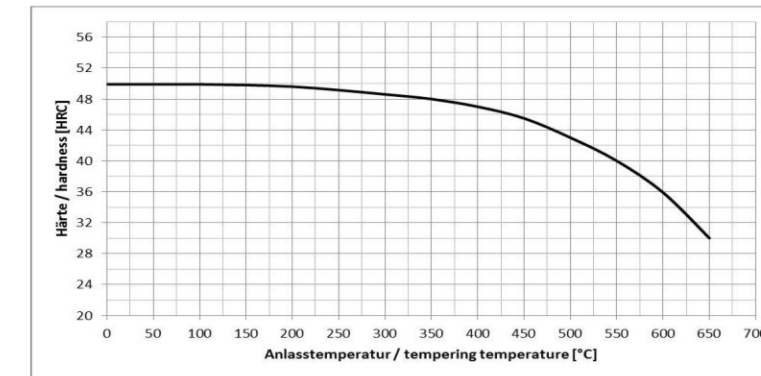
application	technology	mold making, injection molding
	tools	plastic molds, mold frames, mold base, casting tools
	process temperature	< 250 °C
	tool size	small- and medium-sized molds up to 400 mm thickness
	final products	plastic parts without special requirements
	features	quenched and tempered

SWG processing instructions	welding, texturing
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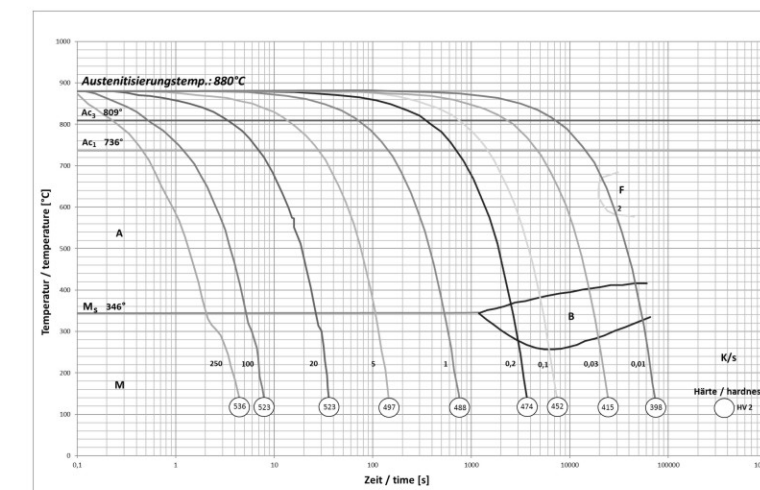
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	720	750	air
	hardening	840	870	oil, polymer
	tempering	550	680	air
	stress relieving	500	550	min. 30 °C below tempering temp.
	pre-heating before welding	320	350	
	nitriding	400	550	min. 30 °C below tempering temp.
	PVD-treating	400	550	

diagrams/structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	pre-hardened
	microstructure	mainly bainitic

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 850 °C in oil



CCT-diagram



PLEASE NOTE: The information contained in this data sheet is unbinding. It merely serves the first orientation of the user. Therefore, we do not assume any liability for the correctness, completeness or up-to-dateness of such data. In case of an order, the properties of the product are exclusively subject to the provisions of the respective contract.  
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### 德标钢种 Din Grades

应用 Application	交付状态 Delivery Condition	钢种 Grade	化学成分 % Typical SWG analysis in w%						硬度(表面) Service hardness (surface)
			C	Cr	Mo	Ni	V	其它 Others	
塑胶钢 Plastic Mold Steels	预硬 Q+T	2311	0.40	2.00	0.20	-	-	-	28-34 HRC
		2312	0.40	1.90	0.20	-	-	S-0.05	28-34 HRC
		2738 / 2738H / 2738HH	0.36	1.80	0.20	1.10	-	-	30-38 HRC
		2711mod	0.55	1.10	0.80	2.00	0.10	-	36-42 HRC
		2714	0.55	1.10	0.50	1.70	0.10	-	38-44 HRC
	退火annealed	2767	0.45	1.25	0.20	3.90	-	-	49-53 HRC
不锈钢 Corrosion Resistant Steels	预硬 Q+T	2085	0.33	16.00	-	<1.00	-	S-0.08	28-34 HRC
		2316	0.35	15.50	1.00	0.50	-	-	28-34 HRC
		2316 VICTORY ESR	0.35	15.50	1.00	0.50	-	-	28-34 HRC
		2316mod VICTORY ESR	0.26	15.00	1.00	0.70	-	-	28-34 HRC
	预硬 Q+T 退火 annealed	2083	0.40	13.00	-	-	-	-	32-52 HRC
		2083 VICTORY ESR	0.40	13.00	-	-	-	-	32-52 HRC
		2083mod VICTORY ESR	0.38	13.00	-	-	0.25	添加 alloyed	29-52 HRC
		2343 / EX3	0.36	5.00	1.20	-	0.40	-	36-52 HRC
热作钢 Hot Work Steels	超精细化 退火 EFS- annealed	2343 VICTORY ESR	0.36	5.00	1.20	-	0.40	-	36-52 HRC
		2344 / EX4	0.40	5.20	1.30	-	1.00	-	36-52 HRC
		2344 VICTORY ESR	0.40	5.20	1.30	-	1.00	-	36-52 HRC
		2367 VICTORY ESR	0.36	5.10	2.80	-	0.55	-	35-52 HRC
		2357	0.50	3.30	1.50	-	0.25	-	52-56 HRC
冷作钢 Cold Work Steels	退火 annealed	2379	1.55	12.00	0.90	-	0.90	-	58-62 HRC

### 葛利兹钢种 SWG Grades

交付状态 Delivery Condition	钢种 Grade	化学成分 % Typical SWG analysis in w%						硬度(表面) Service hardness (surface)
		C	Cr	Mo	Ni	V	其它 Others	
预硬 Q+T	738HH	0.27	1.35	添加 alloyed	1.00	-	添加 alloyed	32-38 HRC
	XPM	0.27	1.35	0.50	1.00	-	添加 alloyed	38-42 HRC
	XPM VICTORY ESR	0.30	1.35	0.70	1.00	-	添加 alloyed	38-42 HRC
	CPM40 VICTORY ESR	0.15	4.00	1.10	3.00	-	添加 alloyed	38-42 HRC
	GEST80 VICTORY ESR	0.14	0.30	0.30	2.80	-	Cu, Al	38-42 HRC
	退火annealed	GPM58 VICTORY ESR	0.50	5.00	2.20	添加 alloyed	0.70	-
预硬 Q+T	CPM50 VICTORY ESR	0.28	14.00	-	0.60	-	N	38-42 HRC
退火 annealed	CRMHP VICTORY ESR	0.25	14.00	-	0.60	-	N	50-52 HRC
	OPTI N+ PESR	0.15	14.00	-	0.60	-	N	50-57 HRC
	HNS28 PESR	0.25	14.00	-	0.60	-	N	57-59 HRC
	HNS40HC PESR	0.40	15.00	2.00	<0.50	<1.50	N	58-60 HRC
	Cronidur®30 PESR	0.30	15.00	1.00	0.50	-	N	58-60 HRC
退火 annealed	EX1 VICTORY ESR	0.35	5.00	2.20	-	0.55	-	40-52 HRC
	2343PLUS VICTORY ESR	0.38	5.00	1.80	-	0.55	-	40-52 HRC
	EX55 VICTORY ESR	定制产品 Customized Steel						40-52 HRC
	EX6 VICTORY ESR	0.43	6.40	1.30	-	0.90	-	52-56 HRC

# 葛利兹钢材特性-应用参考表

## Gröditz Steel Characteristic- Application Reference

特性比例(Characteristic ratio): 0=不适合(NA) / 1=低度(LOW) / 2=中度(Medium) / 3=好(Good) / 4=很好(Very good) / 5=非常好(Excellent)

Grade 钢种	Chemical Composition (%)化学成分-範圍值							Machin-Ability 机加性能					Polish-Ability 抛光性能					Grain-Ability 蚀纹性能					Wear-Ability 耐磨性能					Weld-Ability 焊接性能									
	C	Si	Mn	Cr	Mo	Ni	Others	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
	2311	0.40	0.30	1.50	2.00	0.20				■	■	■				■						■	■					■	■					■	■	■	
2312	0.40	0.30	1.50	1.90	0.20		S:0.05		■	■	■	■	■	■					■							■	■					■	■	■			
2738	0.36	0.25	1.50	1.80	0.20	1.10			■	■	■	■			■	■				■	■					■	■	■				■	■	■			
738HH	0.27	0.30	1.35	1.35	add	1.00	add		■	■	■	■			■	■	■			■	■	■				■	■	■	■			■	■	■	■		
XPM	0.27	0.30	1.55	1.35	0.50	1.0	add		■	■	■	■			■	■	■			■	■	■	■			■	■	■				■	■	■	■		
XPM ESR	0.30	0.30	1.55	1.35	0.70	1.00	add		■	■	■	■			■	■	■	■		■	■	■	■	■		■	■	■	■			■	■	■			
2711	0.55	0.25	0.70	0.70	0.30	1.70	V:0.1		■	■					■	■				■	■					■	■	■	■			■	■				
2714	0.55	0.25	0.70	1.10	0.50	1.70	V:0.1		■	■					■	■				■	■					■	■	■	■			■	■				
GEST 80 ESR	0.14		1.40	0.30	0.30	2.80	Cu:0.9 Al:0.3		■	■	■				■	■	■	■		■	■	■	■			■	■	■	■			■	■	■			
CPM 40	0.15	0.30	0.50	4.00	1.10	3.00	add		■	■					■	■	■	■		■	■	■	■			■	■	■	■			■	■				
2343(EX3)	0.36	1.00	0.35	5.00	1.20		V:0.4		■	■	■	■			■	■	■			■	■					■	■	■	■			■					
2343(EX3) ESR	0.36	1.00	0.35	5.00	1.20		V:0.4		■	■	■	■			■	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■		
2344(EX4)	0.4	1.00	0.40	5.20	1.30		V:1.0		■	■	■	■			■	■	■			■	■	■				■	■	■	■	■		■					
2344(EX4) ESR	0.4	1.00	0.40	5.20	1.30		V:1.0		■	■	■	■			■	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■		
2767	0.45	0.25	0.35	1.25	0.20	3.90			■	■	■	■			■	■	■			■	■	■	■			■	■	■	■	■		■	■				
GPM 58 ESR	0.5	≤0.5	0.50	5.00	2.20		V:0.7 Ni+		■	■					■	■	■	■		■	■	■	■			■	■	■	■	■		■					

交货状态 Delivery Status : (字段颜色 field color)---■ : 预硬模具钢料(Pre-hardened steel) / ■ : 退火模具钢料(Anneal steel)

※ The information provided in this table is based on our level of knowledge and is intended to provide general recommendations for the use of our products. This is not considered a guarantee of product quality characteristics, and every user of Gliese steel should make their own judgment on the suitability of choosing Groetiz steel products.

# 葛利兹钢材特性-应用参考表

## Gröditz Steel Characteristic- Application Reference

特性比例(Characteristic ratio) : 0=不适合(NA) / 1=低度(LOW) / 2=中度(Medium) / 3=好(Good) / 4=很好(Very good) / 5=非常好(Excellent)

Grade 钢种	Chemical Composition (%)化学成分-範圍值							Corrosion resistance 耐腐蚀能力					Toughness 韧性					Chrome platability 镀铬性能					Nitridability 氮化性能																	
	C	Si	Mn	Cr	Mo	Ni	Others	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5									
	2311	0.40	0.30	1.50	2.00	0.20			■						■	■						■	■						■	■	■									
2312	0.40	0.30	1.50	1.90	0.20		S:0.05	■						■							■							■	■	■										
2738	0.36	0.25	1.50	1.80	0.20	1.10		■						■	■	■					■	■	■					■	■	■										
738HH	0.27	0.30	1.35	1.35	add	1.00	add	■						■	■	■					■	■	■					■	■	■										
XPM	0.27	0.30	1.55	1.35	0.50	1.0	add	■						■	■	■					■	■	■	■				■	■	■										
XPM ESR	0.30	0.30	1.55	1.35	0.70	1.00	add	■						■	■	■	■				■	■	■	■	■			■	■	■										
2711	0.55	0.25	0.70	0.70	0.30	1.70	V:0.1	■						■	■	■					■	■						■	■											
2714	0.55	0.25	0.70	1.10	0.50	1.70	V:0.1	■						■	■	■					■	■						■	■											
GEST 80 ESR	0.14		1.40	0.30	0.30	2.80	Cu:0.9 Al:0.3	■						■	■						■	■	■	■				■	■	■	■									
CPM 40	0.15	0.30	0.50	4.00	1.10	3.00	add	■						■							■	■	■	■				■	■	■	■	■								
2343(EX3)	0.36	1.00	0.35	5.00	1.20		V:0.4	■						■	■						■	■						■	■	■	■									
2343(EX3) ESR	0.36	1.00	0.35	5.00	1.20		V:0.4	■						■	■	■					■	■	■	■	■			■	■	■	■	■								
2344(EX4)	0.4	1.00	0.40	5.20	1.30		V:1.0	■						■	■						■	■						■	■	■	■	■								
2344(EX4) ESR	0.4	1.00	0.40	5.20	1.30		V:1.0	■						■	■	■					■	■	■	■	■			■	■	■	■	■								
2767	0.45	0.25	0.35	1.25	0.20	3.90		■						■	■	■					■	■	■					■	■											
GPM 58 ESR	0.5	≤0.5	0.50	5.00	2.20		V:0.7 Ni+	■						■	■	■					■	■	■	■	■			■	■	■	■	■								

交货状态 Delivery Status : (字段颜色 field color)---■ : 预硬模具钢料(Pre-hardened steel) / ■ : 退火模具钢料(Anneal steel)

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# 葛利兹不锈钢钢材系列特性-应用参考表

## Gröditz Steel Characteristic- Application Reference

特性比例(Characteristic ratio) : 0=不适合(NA) / 1=低度(Low) / 2=中度(Medium) / 3=好(Good) / 4=很好(Very good) / 5=非常好(Excellent)

Grade 钢种	Chemical Composition (%)化学成分-范围值							Machin-Ability 机加性能					Polish-Ability 抛光性能					Grain-Ability 蚀纹性能					Wear-Ability 耐磨性能					Weld-Ability 焊接性能									
	C	Si	Mn	Cr	Mo	Ni	Others	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
	2316	0.35	0.35	0.70	15.50	1.00	0.50		0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4
2085	0.33	≤1.00	≤1.00	16.00		≤1.00	S:0.08	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
CPM50 ESR	0.28	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
2083	0.40	0.40	0.70	13.00				0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
2083 ESR	0.40	0.40	0.70	13.00				0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
2083 mod ESR	0.38	1.00	0.50	13.00			V:0.25	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
CRMHP	0.25	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
OPTI N+	0.15	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
Grade 钢种	Chemical Composition (%)化学成分-范围值							Corrosion resistance 耐蚀能力					Toughness 韧性					Chrome platability 镀铬性能					Nitridability 氮化性能														
	C	Si	Mn	Cr	Mo	Ni	Others	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
	2316	0.35	0.35	0.70	15.50	1.00	0.50		0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5					
2085	0.33	≤1.00	≤1.00	16.00		≤1.00	S:0.08	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
CPM50 ESR	0.28	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
2083	0.40	0.40	0.70	13.00				0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
2083 ESR	0.40	0.40	0.70	13.00				0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
2083 mod ESR	0.38	1.00	0.50	13.00			V:0.25	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
CRMHP ESR	0.25	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						
OPTI N+	0.15	0.30	0.40	14.00		0.60	+N	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5						

交货状态 Delivery Status : (字段颜色 field color)---■ : 预硬模具钢料(Pre-hardened steel) / ■ : 退火模具钢料(Anneal steel)

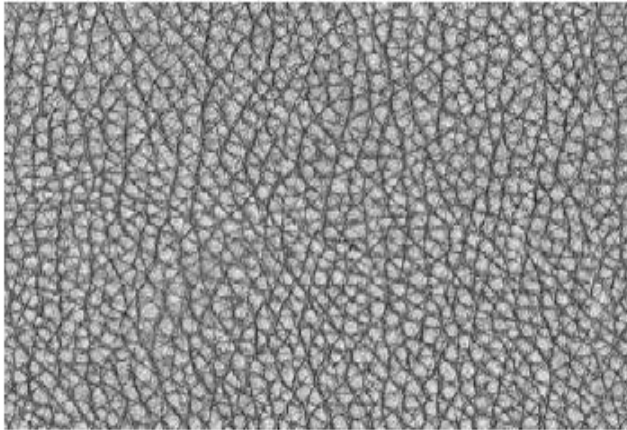
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Plastic 塑料		Plastic type 胶料种类	Recommendation 推荐	
			Steel grade 钢种	Hardness 硬度
Normal plastic 常用型胶料	Without corrosion 不带腐蚀性	PP, ABS, PE ,PS , .....	2738/2738H 738HH XPM/XPMESR 2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR	HRC29-38 HRC32-38 HRC35-42 HRC44-52 HRC48-52 HRC42-52
	With corrosion 带腐蚀性	PVC, POM , PA, SAN,PMMA .....	2316 2083/2083ESR CRMHP OPTI N+	HRC28-34 HRC42-52 HRC50-52 HRC54-57
Special plastic 特殊添加型胶料	+ < Plastic +GF% or Talc 加玻签或滑石粉.... 增强塑料	+ < 30% GF(Glass Fiber) or Talc 加 30%以下的增强型胶料	2738/2738H 738HH XPM/XPMESR GEST80 CPM40	HRC29-38 HRC32-38 HRC35-42 HRC38-42 HRC38-42
		+ > 30% GF(Glass Fiber) or Talc 加 30%以上的增强型胶料	2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR CRMHP OPTI N+ GPM58	HRC48-52 HRC48-52 HRC42-52 HRC50-52 HRC54-57 HRC54-58
	Plastic + fire retardant 阻燃增强胶料	Added Cl-,Br-,P3- based fire retardant product 添加 Cl-,Br,P3-基阻燃剂胶料	2316 2083/2083ESR CRMHP OPTI N+	HRC28-34 HRC42-52 HRC50-52 HRC54-57

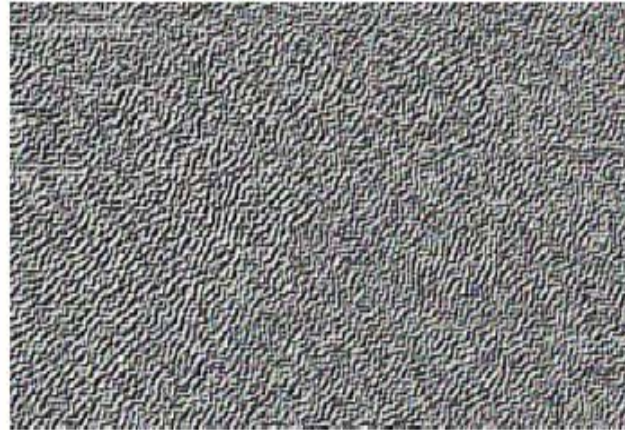
※ The information provided in this table is based on our level of knowledge and is intended to provide general recommendations for the use of our products. This is not considered a guarantee of product quality characteristics, and every user of Gliese steel should make their own judgment on the suitability of choosing Groetiz steel products.

Gröditz Steel Grade Application-Texture level

**Normal Texturing**  
**SWG 738HH**



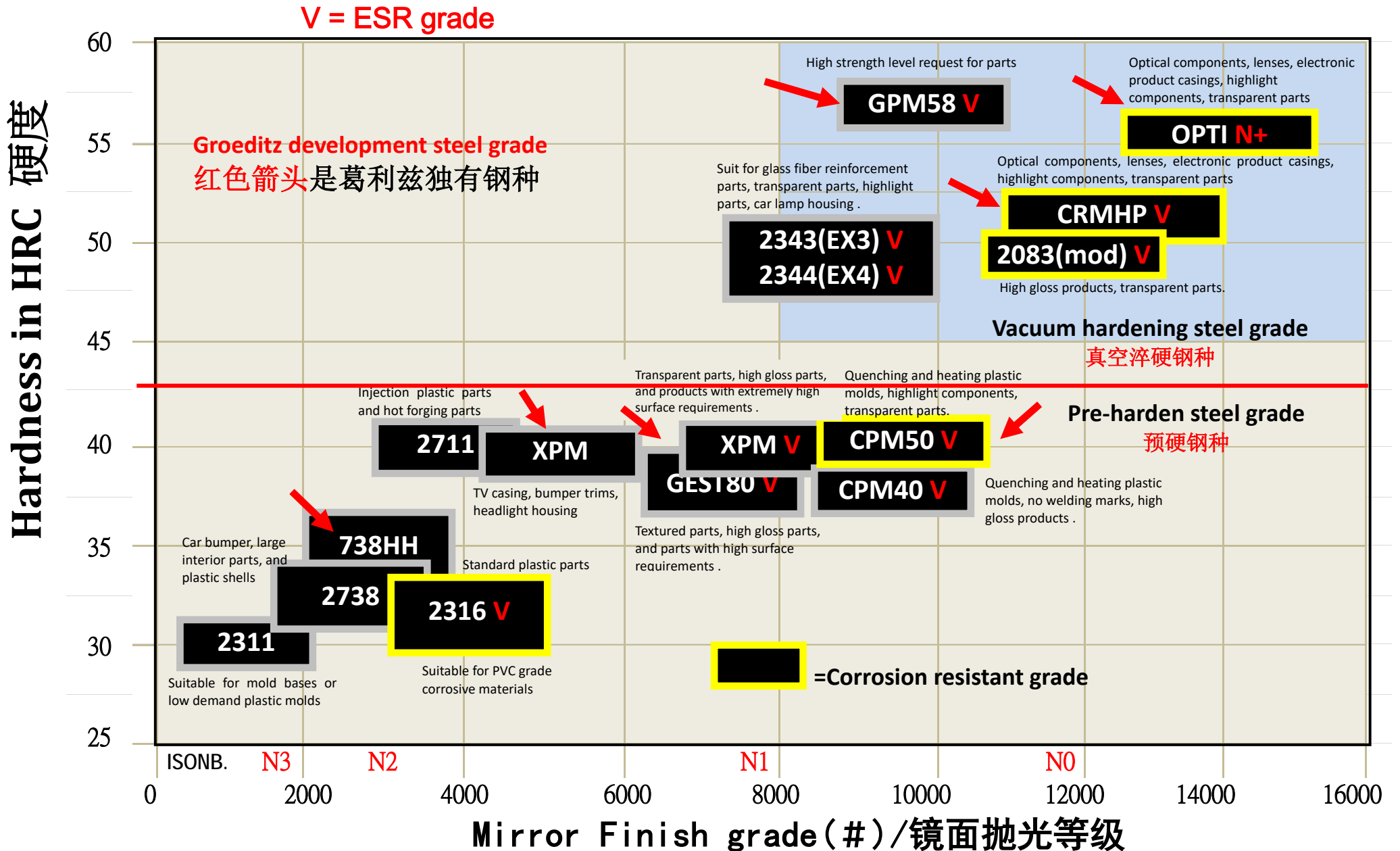
**High Texturing**  
**SWG XPM**



**Fine and Geometric Texturing**  
**SWG 2083ESR, CRMHP ESR, GEST80 ESR**







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Schmiedewerke Gröditz  
**GMH GRUPPE**



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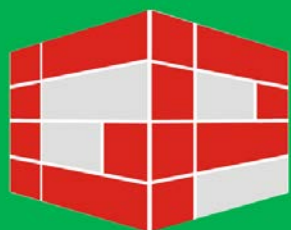
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**GP GROUPE**

Gröditz Tooling Steel  
Exclusive Chain Stores



Gröditz Partner



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