

# 2343 (EX3)

Suitable for Die casting, extrusion molds, core pins, and hot shear plastic molds, application of hot work molds and plastic molds and small and medium-sized high wear-resistant molds.

material characteristics	material number / grade	SWG 2343 (SWG EX3)					
	DIN standard	X37CrMoV5-1					
	comparable grade	AISI H11					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	V
		0.36	1.00	0.35	5.00	1.20	0.40
	production technology	EAF/LF/VD, forging, EFS annealing					
	service hardness / strength		HB	HRC	N/mm <sup>2</sup>		
			-	36 - 52	-		
	delivery condition	annealed	≤ 229	-	-		
	maximum dimension	diameter	thickness				
	≤ 800 mm	≤ 600 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					

technological properties		0	1	2	3	4	5	comment
	toughness		■	■				
	hot strength at working temp.		■	■	■	■		in relation to service hardness 42-48HRC
	wear resistance		■	■	■	■		
	corrosion resistance	■						
	machinability		■	■	■	■		annealed
	polishability		■	■				ISO/SPI:N2/A-2 48-52HRC; higher: 2343 ESR
	weldability		■					CET = 0.77 % acc. DIN EN 1011-2
	texturability		■	■				for texturing: 2343 ESR
	nitridability		■	■	■	■	■	nitriding hardness 900 - 1200 HV1
chrome-platability		■	■				for chrome plating: 2343 ESR	

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
		23.6	28.2	28.4	27.4
	coefficient of thermal expansion between 20 °C and ... [10 <sup>-6</sup> · K <sup>-1</sup> ]	100 °C	200 °C	300 °C	500 °C
		11.8	12.4	12.6	12.8
elastic modulus [kN/mm <sup>2</sup> ]	20 °C	200 °C	300 °C	500 °C	
		212	199	192	175

application	technology	mold making, injection molding, die-casting, gravity casting, drop forging
	tools	extrusion tools, forging dies, hot shear blades, mandrels, mold inserts, die-casting molds, prototyping molds
	process temperature	300 - 600 °C
	tool size	small- and medium-sized tools
	final products	light metal, steel forgings, strip steel, sheets and tubes, plastic parts (with glass fibre)
features	-	

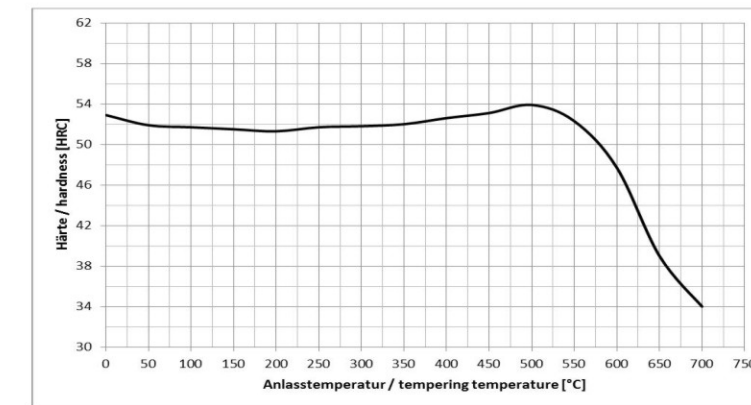
SWG processing instructions

welding, texturing, vacuum hardening

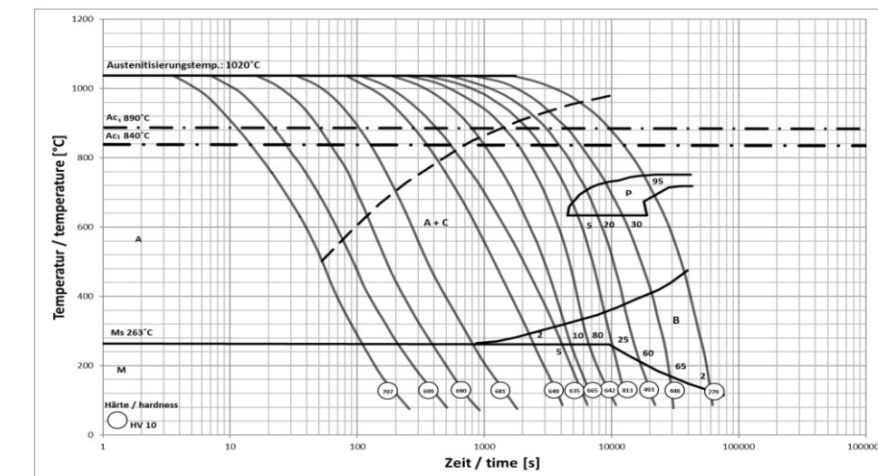
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	820	840	furnace until 650 °C, air
	hardening	990	1010	vacuum, oil
	tempering	530	650	air, protective gas
	stress relieving	500	550	min. 30 °C below tempering temp.
	pre-heating before welding	300	320	
	nitriding	480	550	min. 30 °C below 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 dia 25 mm x length 50 mm; hardened at 1020 °C in oil



CCT-diagram



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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)

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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	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	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						
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	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	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 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	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

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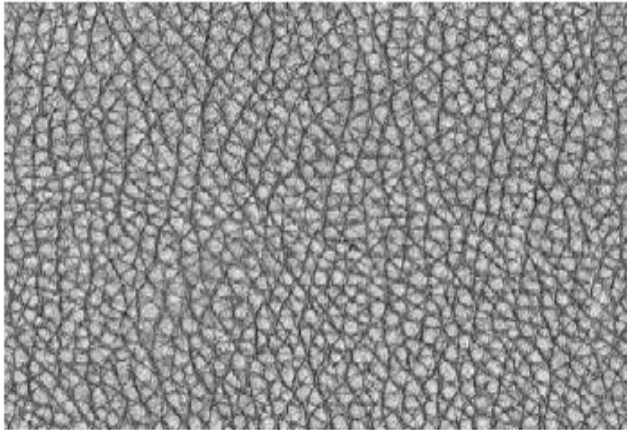
Plastic 塑料		Plastic type 胶料种类	Recommendation 推荐	
			Steel grade 钢种	Hardness 硬度
Normal plastic 常用型胶料	Without corrosion 不带腐蚀性	PP, ABS, PE ,PS , .....	2738/2738H 738HH XPM/XPMESR 2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR	HRC29-38 HRC32-38 HRC35-42 HRC44-52 HRC48-52 HRC42-52
	With corrosion 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

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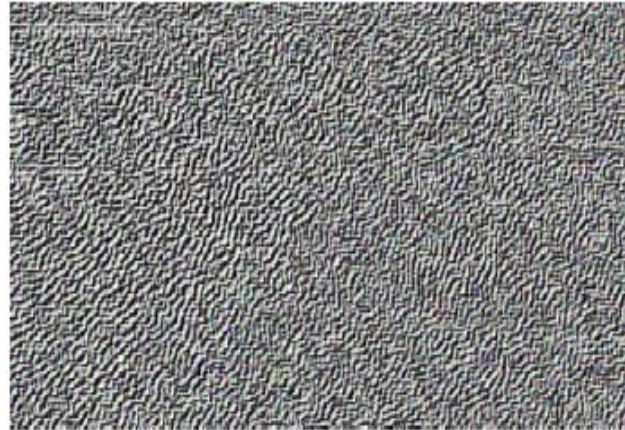


Gröditz Steel Grade Application-Texture level

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



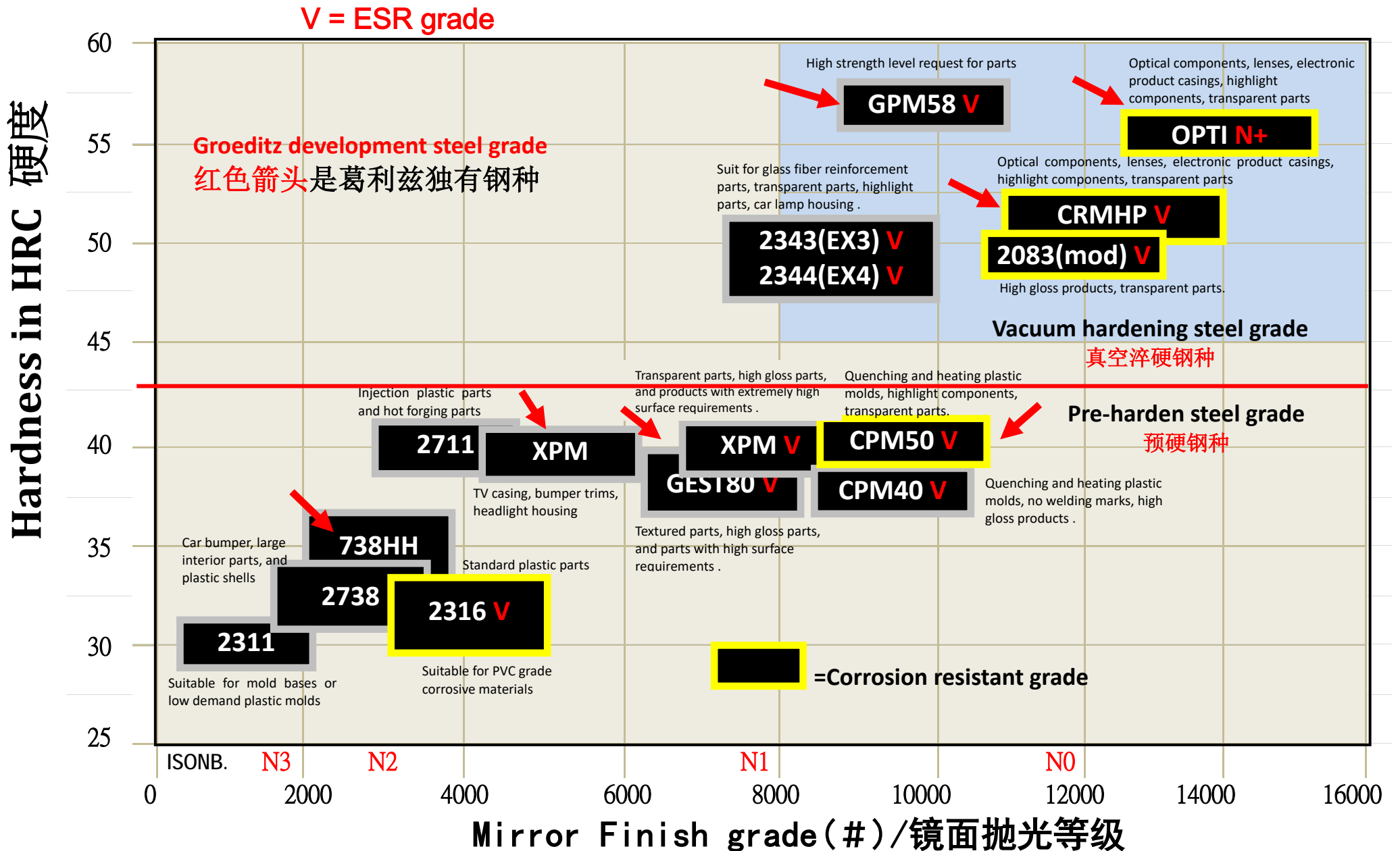
**High Texturing**  
**SWG XPM**



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







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Schmiedewerke Gröditz  
**GMH GRUPPE**



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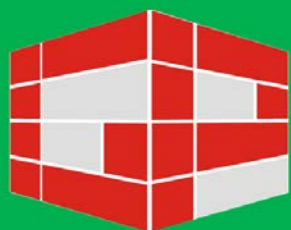
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Exclusive Chain Stores



Gröditz Partner



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