

CRMHP ESR

Stainless steel for Plastic molds ,**suit for** optical products and glass industry application, with unique properties such as toughness, wear resistance, and harden-ability, suitable for small and medium-size molds.

material characteristics	material number / grade	SWG CRMHP VICTORY ESR					
	short designation	X28CrNi13					
	comparable grade	1.4021mod ESR, AISI 420mod ESR					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Ni	N
		0.25	0.30	0.40	14.00	0.60	alloyed
	production technology	EAF/LF/VD/ESR, forging, annealing					
	service hardness / strength	HB		HRC		N/mm²	
		-		50 - 54		-	
	delivery condition	annealed	≤ 250	-	-	-	-
	maximum dimension	diameter			thickness		

variation upon request	-			≤ 500 mm		
	EN 10228-3			SEP 1921		
	table 3 - type 1 - qual. class 4			group 3 - class E,e		
	DIN 50602			ASTM E45 method A		
cleanliness	K1 ≤ 10			A ≤ 0,5; B, C, D ≤ 1		

technological properties		0	1	2	3	4	5	comment
	toughness		■	■				in relation to service hardness
	hot strength at working temp.		■	■	■			
	wear resistance		■	■	■	■		
	corrosion resistance		■	■	■	■	■	polished surface for best corrosion resistance
	machinability		■	■	■			annealed
	polishability		■	■	■	■	■	ISO/SPI: N0/A-1
	weldability		■					CET = 1.00 % acc. DIN EN 1011-2
	texturability		■	■	■	■		
	nitridability		■	■	■	■		nitriding hardness 900 - 1200 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
		20.0	21.0	-	-
	coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	500 °C
		10.5	11.0	11.0	-
	elastic modulus [kN/mm²]	20 °C	200 °C	300 °C	500 °C
		218	206	198	180

application	technology	mold making, corrosion resistant
	tools	corrosion resistant plastic molds with high requirements on surface quality
	process temperature	< 300 °C
	tool size	small- and medium-sized molds
	final products	transparent plastic parts, high gloss parts, lenses, optical parts, electronic covers
	features	for very high surface quality

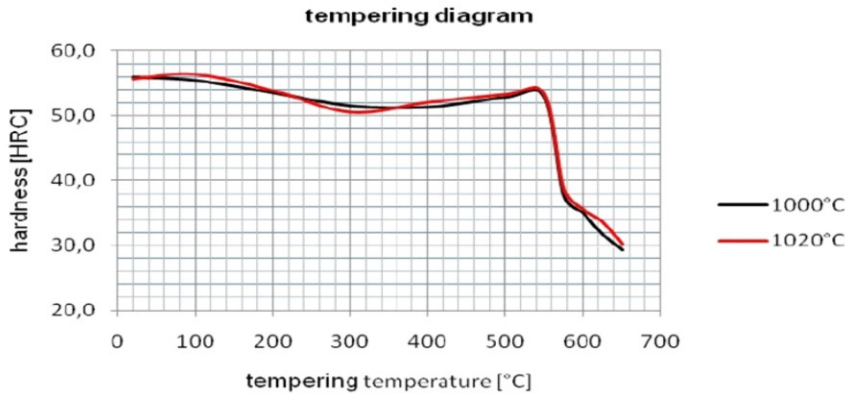
SWG processing instructions

welding, texturing, polishing, vacuum hardening

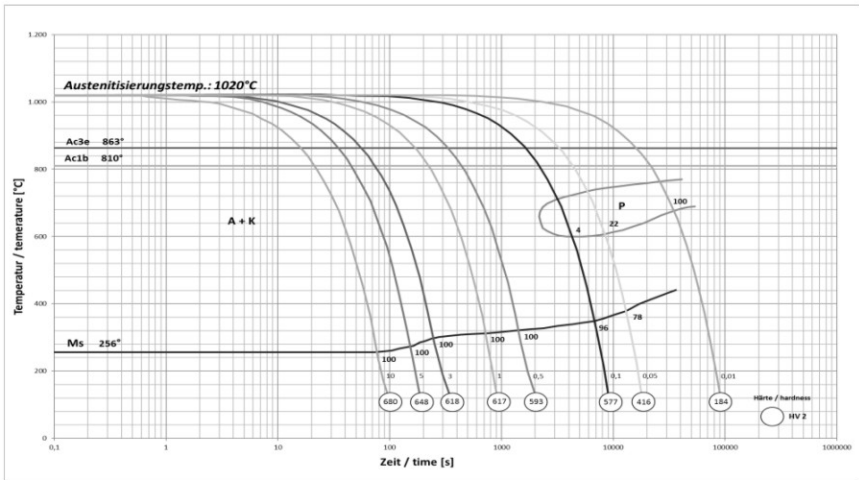
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	760	800	furnace
	hardening	1000	1030	vacuum, oil
	tempering	250	600	furnace
	stress relieving	450	500	min. 30 °C below tempering temp.
	pre-heating before welding	320	350	
	nitriding	400	500	min. 30 °C below tempering temp.
	PVD-treating	400	500	

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 1000°C and 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
热作钢 Hot Work Steels	超精细化 退火 EFS-annealed	2343 / EX3	0.36	5.00	1.20	-	0.40	-	36-52 HRC
		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
冷作钢 Cold Work Steels	退火 annealed	2357	0.50	3.30	1.50	-	0.25	-	52-56 HRC
		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	-	54-58 HRC
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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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2311	0.40	0.30	1.50	2.00	0.20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

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 耐腐蝕能力							Toughness 韌性							Chrome platability 鍍鉻性能							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	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 +																																						

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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																															
2085	0.33	≤1.00	≤1.00	16.00		≤1.00	S:0.08																														
CPM50 ESR	0.28	0.30	0.40	14.00		0.60	+N																														
2083	0.40	0.40	0.70	13.00																																	
2083 ESR	0.40	0.40	0.70	13.00																																	
2083 mod ESR	0.38	1.00	0.50	13.00			V:0.25																														
CRMHP	0.25	0.30	0.40	14.00		0.60	+N																														
OPTI N+	0.15	0.30	0.40	14.00		0.60	+N																														
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																															
2085	0.33	≤1.00	≤1.00	16.00		≤1.00	S:0.08																														
CPM50 ESR	0.28	0.30	0.40	14.00		0.60	+N																														
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2083 mod ESR	0.38	1.00	0.50	13.00			V:0.25																														
CRMHP ESR	0.25	0.30	0.40	14.00		0.60	+N																														
OPTI N+	0.15	0.30	0.40	14.00		0.60	+N																														

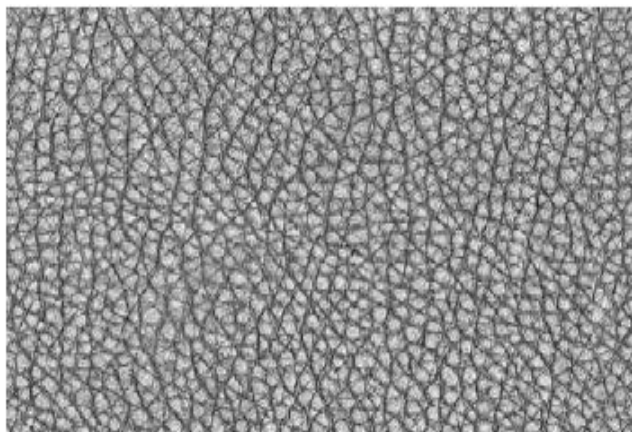
交货状态 Delivery Status : (字段颜色 field color)--- : 预硬模具钢料(Pre-hardened steel) / : 退火模具钢料(Anneal steel)

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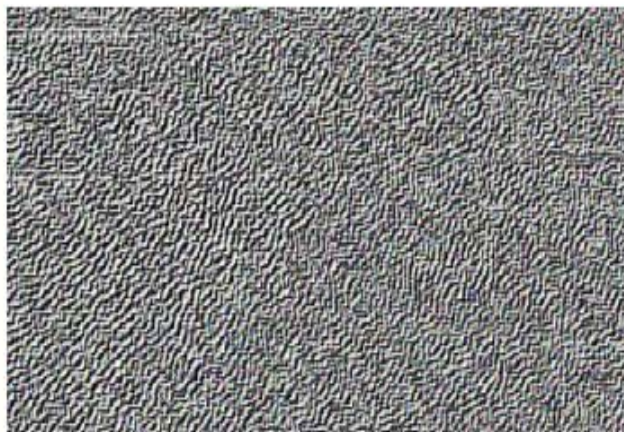
Plastic 塑料		Plastic type 胶料种类	Recommendation 推荐	
			Steel grade 钢种	Hardness 硬度
Normal plastic 常用型胶料	Without corrosion 不带腐蚀性	PP, ABS, PE ,PS ,	2738/2738H 738HH XPM/XPMESR 2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR	HRC29-38 HRC32-38 HRC35-42 HRC44-52 HRC48-52 HRC42-52
	With corrosion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

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Normal Texturing
SWG 738HH



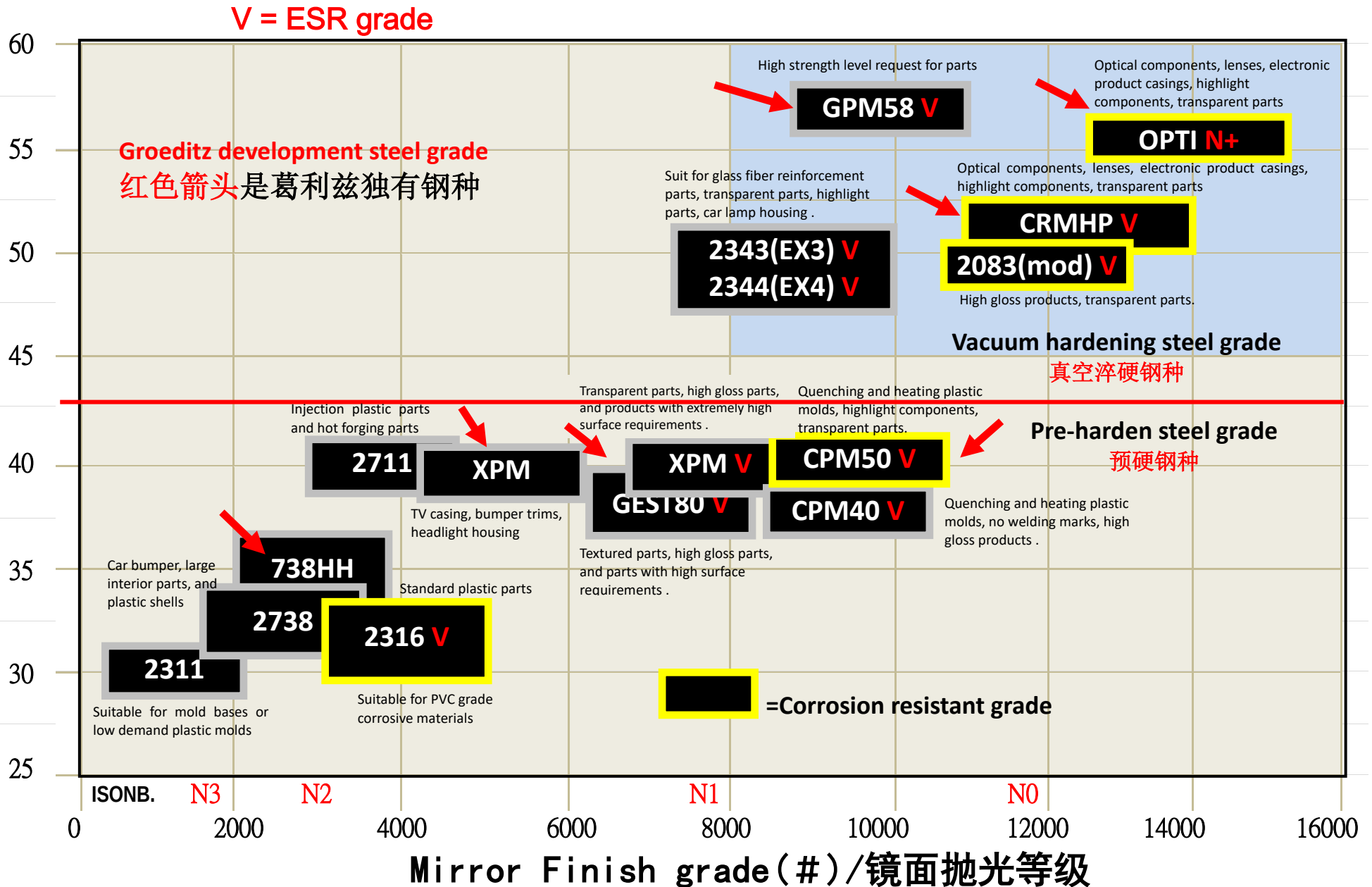
High Texturing
SWG XPM



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



硬度
Hardness in HRC



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Schmiedewerke Gröditz
GMH GRUPPE



万 润 利
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— 德国葛利兹专卖 —

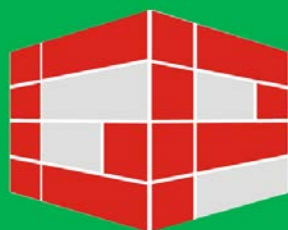
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中国区专卖

GP GROUPE

Gröditz Tooling Steel
Exclusive Chain Stores



Gröditz Partner



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