

2767

Oil quenched tool steel, with small quenching deformation, high hardness, and high wear resistance, suitable for small and medium-size plastic molds and shear molds.

material characteristics	material number / grade	SWG 2767					
	DIN standard	45NiCrMo16					
	comparable grade	-					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Mo	Ni
		0.45	0.25	0.35	1.25	0.20	3.90
	production technology	EAF/LF/VD, forging, annealing					
	service hardness / strength		HB	HRC	N/mm ²		
			-	48.9 - 53.0	-		
	delivery condition	annealed	≤ 285	-	-		
	maximum dimension	diameter	thickness				
	≤ 750 mm	≤ 500 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 ≤ 30	A ≤ 1,5; B, C, D ≤ 2			variation upon request		

technological properties		0	1	2	3	4	5	comment
	toughness		■	■	■			
	hot strength at working temp.		■	■	■			in relation to service hardness
	wear resistance		■	■	■	■	■	
	corrosion resistance	■						
	machinability		■	■	■	■		annealed
	polishability		■	■	■			ISO/SPI: N3/A-3
	weldability		■	■				CET = 0.67 % acc. DIN EN 1011-2
	texturability		■	■	■	■		
	nitridability		■	■				nitriding hardness 550 - 700 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 ⁻¹ · K ⁻¹]	20 °C	200 °C	300 °C	500 °C
		30.0	32.0	32.0	30.0
	coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹]	100 °C	200 °C	300 °C	500 °C
		11.3	12.5	12.8	13.4
	elastic modulus [kN/mm ²]	20 °C	200 °C	300 °C	500 °C
		207	196	189	172

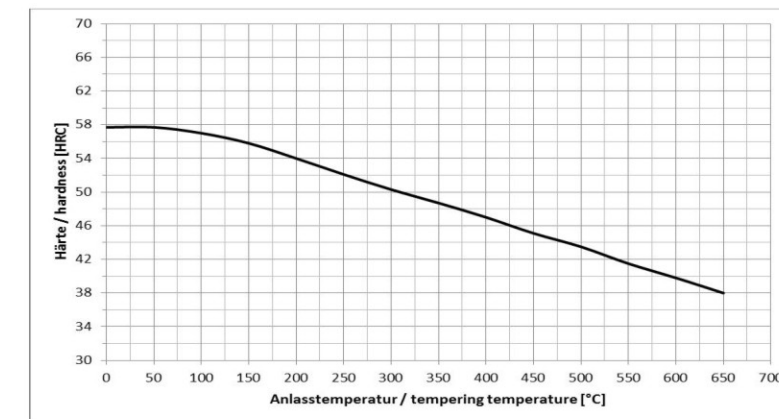
application	technology	mold making, steel cold forming
	tools	stamping tools, cutting tools, plastic molds high hard
	process temperature	< 300 °C
	tool size	small- and medium sized molds
	final products	steel sheets, strip steel, plastic injection parts
	features	low hardening distortion, high hardness, high toughness

SWG processing instructions	welding
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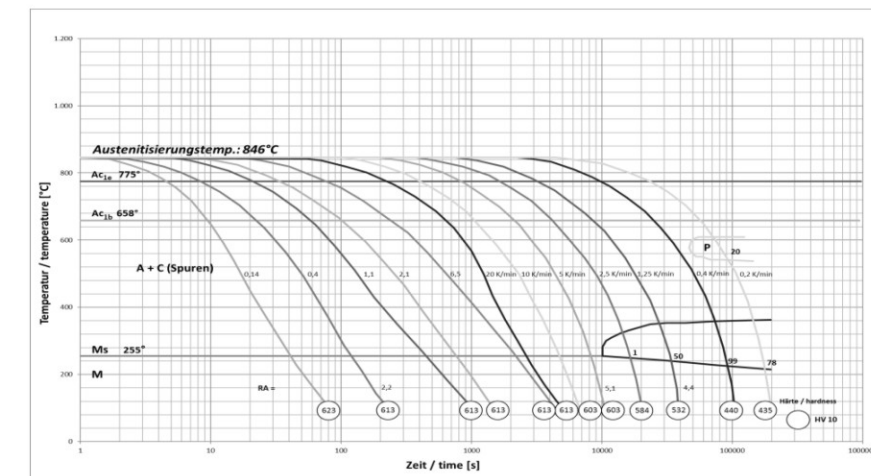
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	610	650	air
	hardening	840	870	vacuum, air, oil, polymer
	tempering	200	300	air
	stress relieving	550	600	before hardening only
	pre-heating before welding	280	320	
	nitriding	400	450	with lower hardness only
	PVD-treating	400	450	

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	air or vacuum
	microstructure	martensitic

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 850 °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
		冷作钢 Cold Work Steels	退火 annealed	2357	0.50	3.30	1.50	-	0.25
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

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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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葛利兹钢材特性-应用参考表

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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						
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		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						

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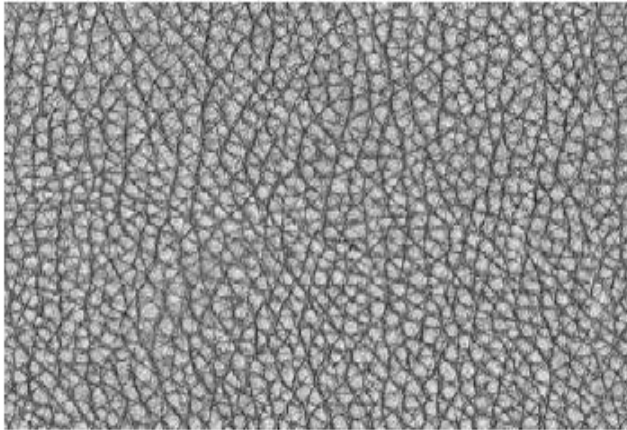
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Plastic 塑料		Plastic type 胶料种类	Recommendation 推荐	
			Steel grade 钢种	Hardness 硬度
Normal plastic 常用型胶料	Without corrosion 不带腐蚀性	PP, ABS, PE ,PS ,	2738/2738H 738HH XPM/XPMESR 2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR	HRC29-38 HRC32-38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

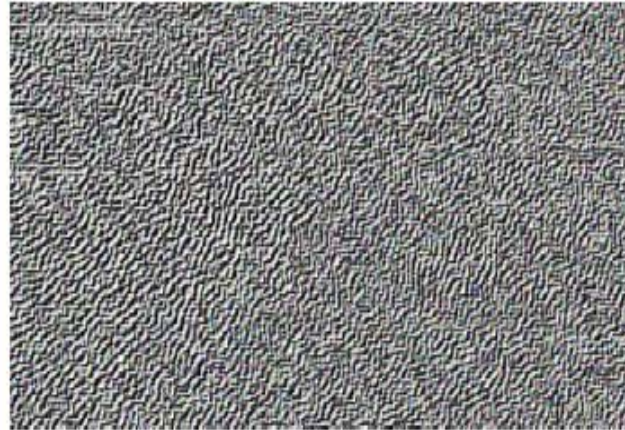
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Gröditz Steel Grade Application-Texture level

Normal Texturing
SWG 738HH

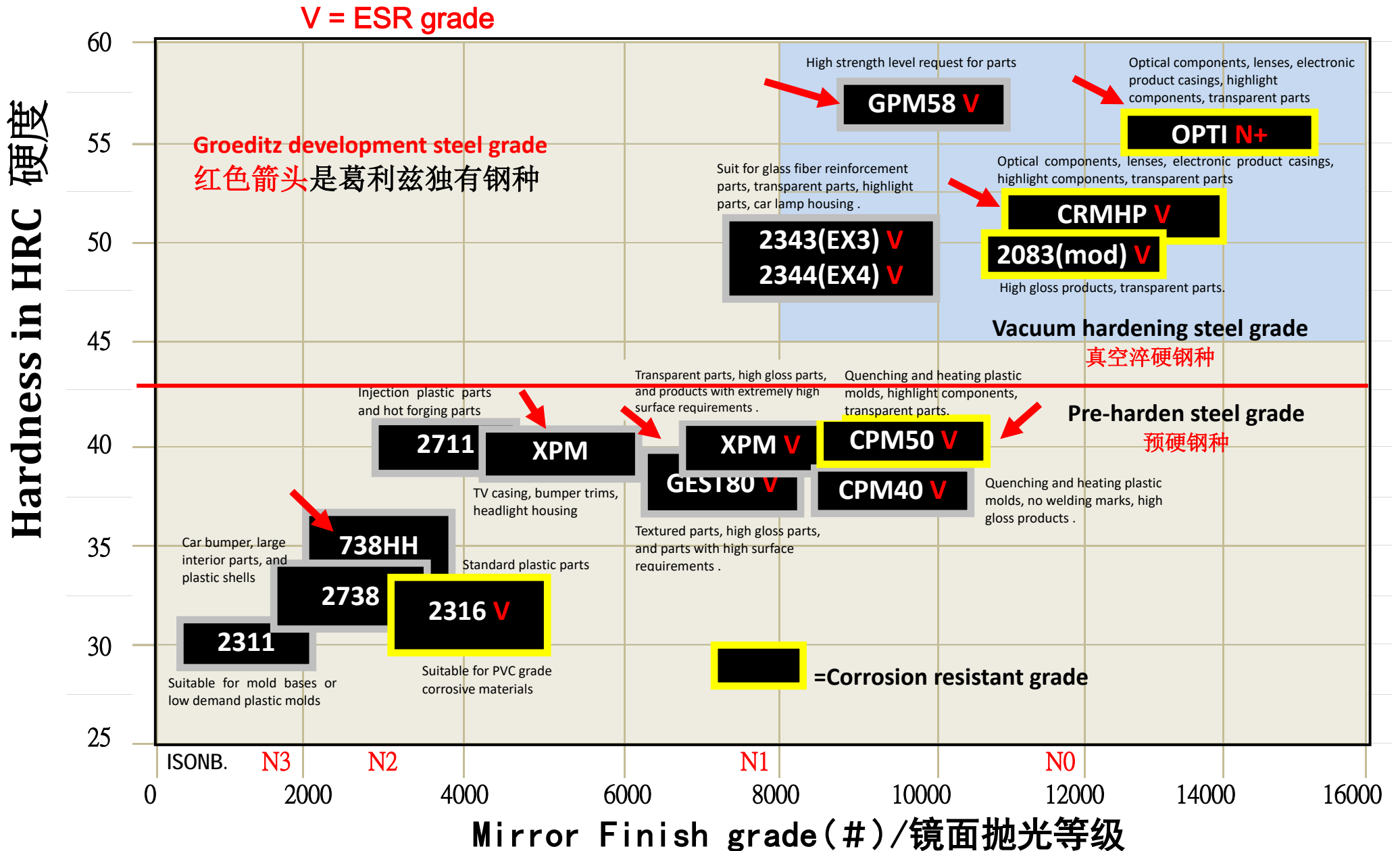


High Texturing
SWG XPM



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





※ 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 Groeditz steel products.



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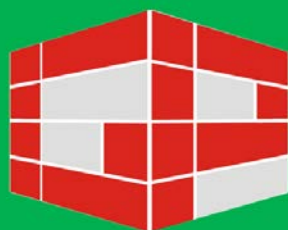
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