

CPM50 ESR

A new type of corrosion-resistant **pre-hardened** tool steel, applied on LCD/LED screen shell steam mold, with excellent corrosion resistance, good machining performance, toughness, and polishing properties.

material characteristics	material number / grade	SWG CPM50 VICTORY ESR					
	short designation	X28CrNiMo13					
	comparable grade	1.4021mod, AISI 420mod					
	chemical composition - reference analysis [%]	C	Si	Mn	Cr	Ni	N
		0.28	0.30	0.40	14.00	0.60	alloyed
	production technology	EAF/LF/VD/ESR, forging, Q+T					
	service hardness / strength converted acc. to DIN EN ISO 18265 table B2			HB	HRC	N/mm²	
				360 - 400	38 - 42	1145 - 1265	
	delivery condition	Q+T	360 - 400		38 - 42	1145 - 1265	
	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

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		■	■				Q+T
	polishability		■	■	■	■		ISO: N1/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
		24.7	25.7	26.3	26.6
	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	202	198	180

application	technology	plastic injection molding, rapid heat cycle molding
	tools	plastic molds, corrosion resistant for "weldless molding"
	process temperature	< 300 °C
	tool size	small- and medium sized molds
	final products	injection molding parts, high gloss, transparent
	features	pre-hardened ~ 40 HRC delivery hardness, corrosion resistant

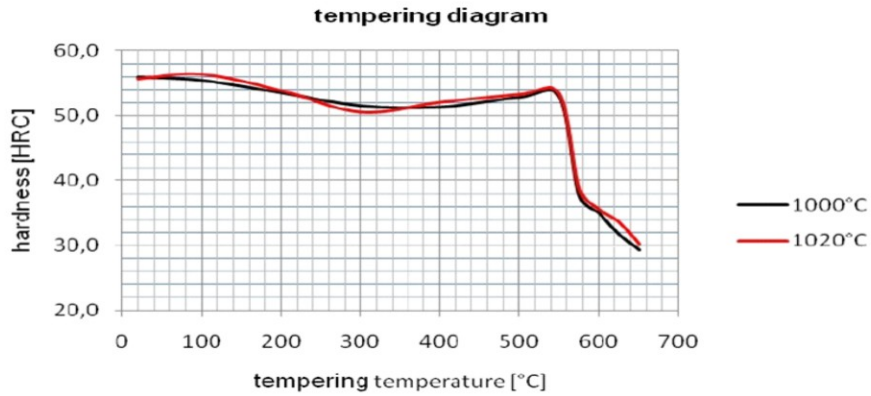
SWG processing instructions

welding, texturing, polishing

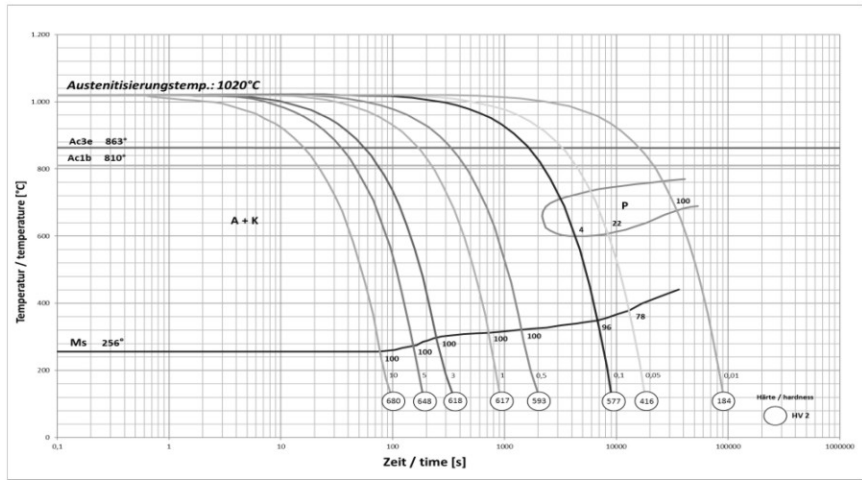
heat treatment		T min [°C]	T max [°C]	medium / comment
	annealing	760	800	furnace
	hardening	1000	1030	vacuum, oil
	tempering	250	600	air, protective atmosphere
	stress relieving	450	500	min. 30 °C below tempering temp.
	pre-heating before welding	320	350	
	nitriding	400	500	min. 30 °C below tempering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

diagrams/ structure	CCT-diagram	yes
	tempering diagram	yes
	advice on heat treatment	pre-hardened
	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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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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.

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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

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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																														
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2083	0.40	0.40	0.70	13.00																																	
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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						
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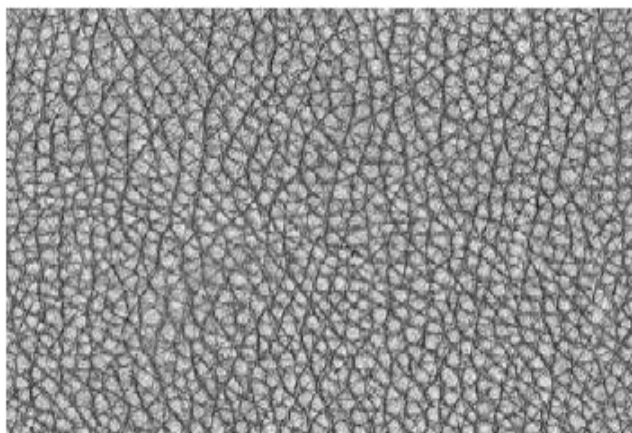
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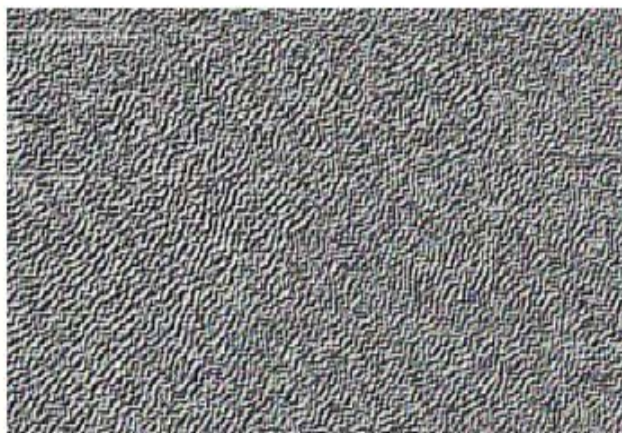
Plastic 塑料		Plastic type 胶料种类	Recommendation 推荐	
			Steel grade 钢种	Hardness 硬度
Normal plastic 常用型胶料	Without corrosion 不带腐蚀性	PP, ABS, PE ,PS ,	2738/2738H 738HH XPM/XPMESR 2343/2344(EX3/EX4) 2343ESR/2344ESR(EX3ESR/EX4ESR) 2083/2083ESR	HRC29-38 HRC32-38 HRC35-42 HRC44-52 HRC48-52 HRC42-52
	With corrosion 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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Normal Texturing
SWG 738HH



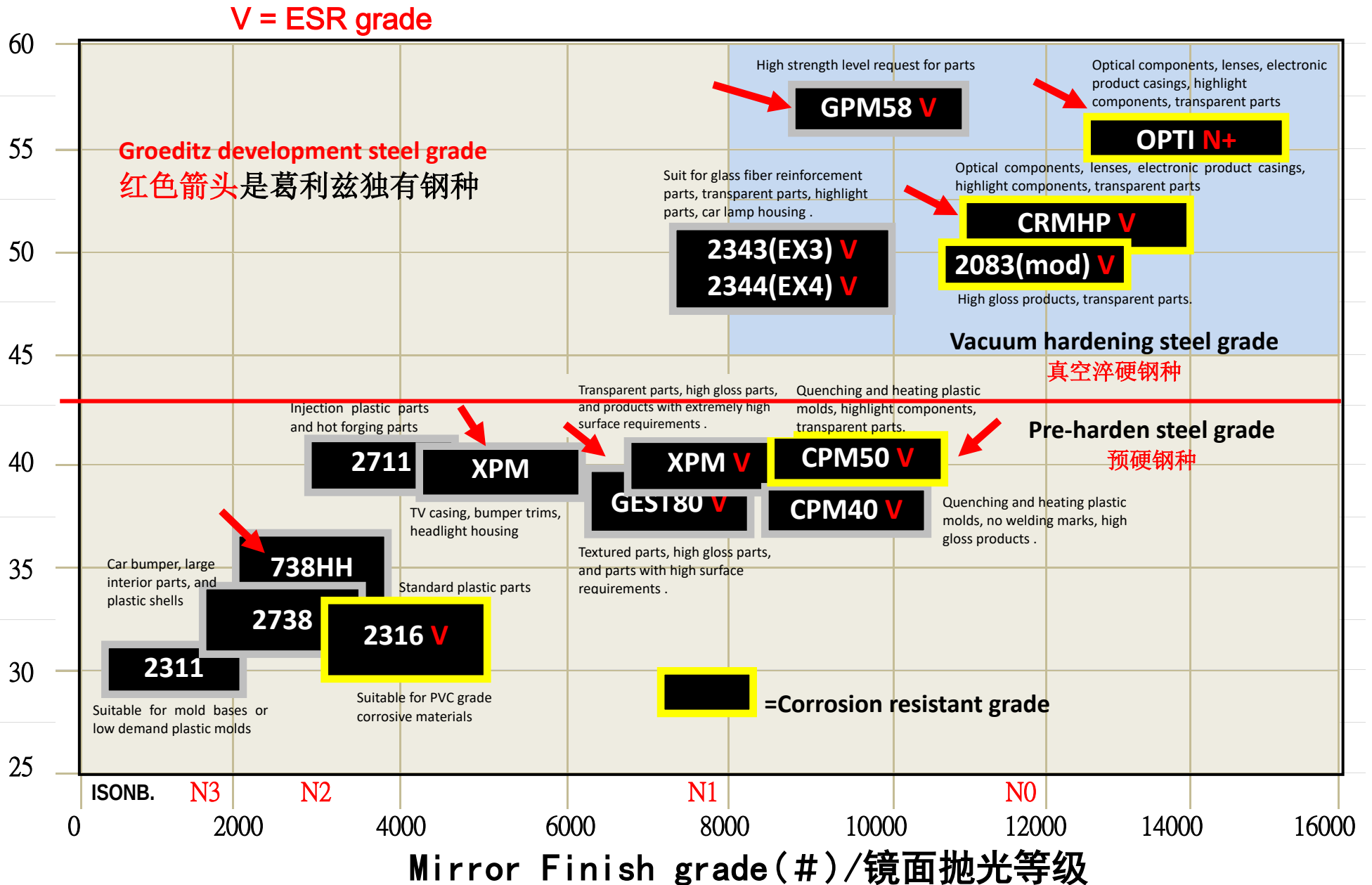
High Texturing
SWG XPM



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



硬度
Hardness in HRC





Schmiedewerke Gröditz
GMH GRUPPE



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广东 · 山东 · 浙江
— 德国葛利兹专卖

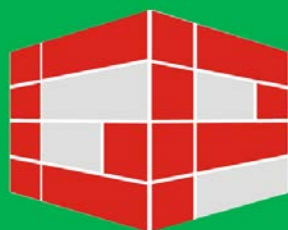
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GP GROUPE

Gröditz Tooling Steel
Exclusive Chain Stores



Gröditz Partner



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