



中国建材

中材江西电瓷电气有限公司

Sinoma Jiangxi Insulator and Electricity Co.,Ltd

中材电瓷混合绝缘子介绍

Introduction of Sinoma Hybrid Insulators

发展高新材料 服务全球电网

To develop advanced materials, to serve global power network

中材江西电瓷电气有限公司
Sinoma Jiangxi Insulator and Electricity Co., Ltd.

Introduction of New Hybrid Insulators

Taking advantage of our strong R&D platform, Sinoma Jiangxi Insulator and Electricity Co., Ltd has been committing to the research and innovation of new hybrid insulators. We have achieved breakthroughs in key technologies, and have applied for four Patents of Invention and two Utility Model Patents.

Owning the dual advantages of both porcelain and silicone rubber composite coating, the new porcelain-composite hybrid insulators have such outstanding features as high bending strength, good seismic resistance, high rigidity, small deformation, strong anti-pollution performance, reliable insulation capability, light weight, etc., so acting as key insulation parts in Ultra High Voltage and Extra High Voltage Power Transmission and Transformation Projects.

新型瓷芯复合绝缘子介绍

中材江西电瓷电气有限公司依托自身强大的科研平台，积极开展新型复合绝缘子的研究创新，取得了关键技术的突破，已申请4项发明专利、2项实用新型专利。

新型瓷芯复合绝缘子具有瓷和硅橡胶复合外套的双重优点，抗弯抗震性能好、刚度高、变形量小、耐污能力强、绝缘性能可靠、重量较轻等显著特点，用作超高压、特高压输变电工程中的关键绝缘器件。



High Modulus
高模量

High Strength
高强度

High Stability
高稳定性

Hydrophobicity
憎水性

Anti-Aging
耐老化

Hydrophobic Mobility
憎水迁移性



Introduction 介绍

New hybrid insulators are of light weight and high strength, and the Al_2O_3 content is high in the formula, so the internal structure of the porcelain body is uniform and dense.

Porcelain core is assembled by porcelain body, flange and cement. Glazed porcelain core is non-puncture type, and it is the main part for sustaining mechanical load; high-temperature silicone rubber sheath and sheds are main parts for outer insulation, with excellent hydrophobic performance and excellent hydrophobicity transference performance, strong anti-pollution capabilities, anti-corona and electric tracking proof performances as well.

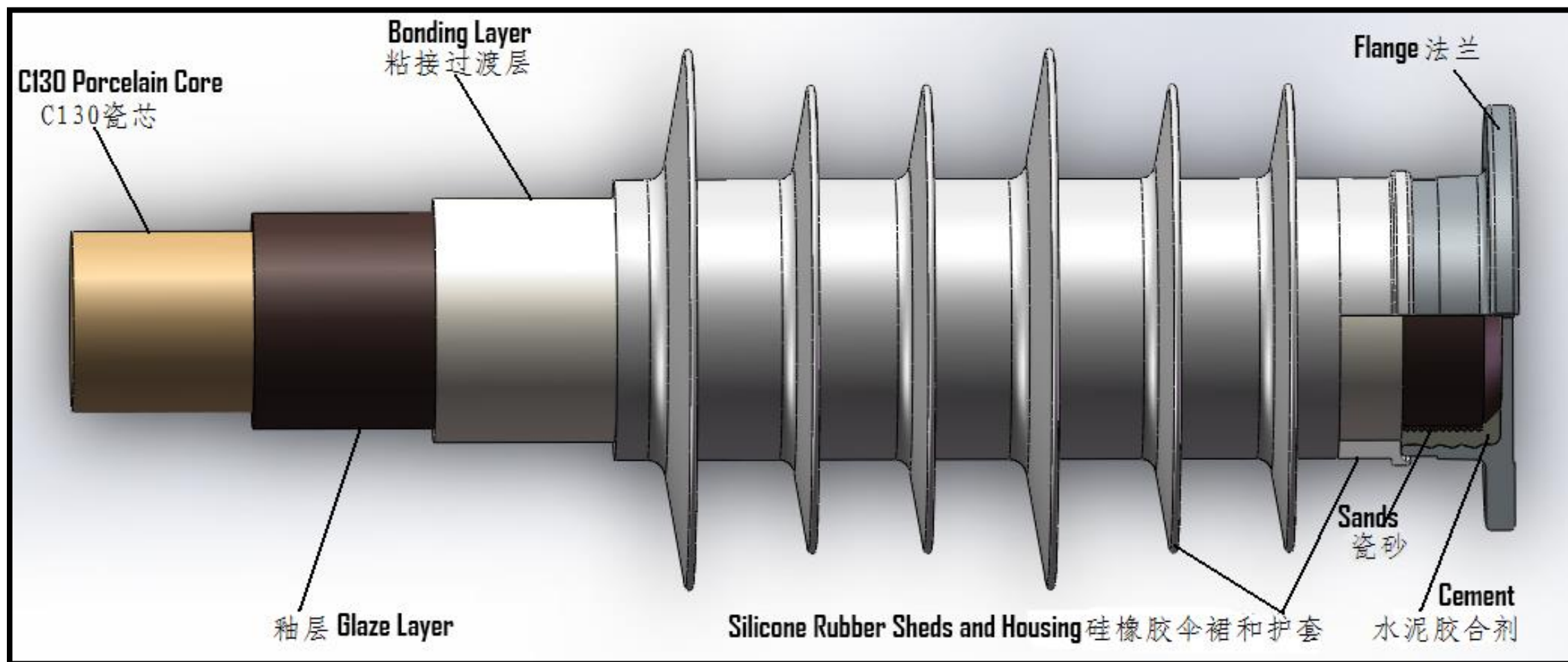
Through advanced interface processing technology, porcelain core and high temperature silicone rubber achieve mechanical nesting and chemical bonding, and the firm combination plays an important role in the insulator quality and reliability.

新型瓷复合绝缘子轻型高强，配方 Al_2O_3 含量高，瓷体内部结构均匀、致密。

瓷芯是由瓷件、法兰借助水泥胶合剂胶装而成，有釉瓷芯属于不可击穿型结构，它是绝缘子承受机械负荷的主要零件，高温硫化硅橡胶护套和伞裙是外绝缘的主要零件，憎水性能优异、憎水迁移性优良，耐污能力强，抗电晕和电痕。

通过先进的界面处理技术，瓷芯和高温硅橡胶实现机械嵌套和化学键结合，粘接牢固，对绝缘子的质量和可靠性起着重要的作用。

Schematic Diagram 示意图



Product Photos 产品照片



Main Types and Dimensions 主要型号及参数

35 kV~1100kV Hybrid Insulators
35 kV~1100kV瓷芯复合支柱绝缘子

Type 产品型号	Rated voltage 额定电压 kV	Mechanical Failing Load \geq 机械破坏负荷(不小于)		Nominal creepage distance 公称爬电距离 mm	Main Dimensions 主要尺寸				Weight 重量 kg	Unit 元件
		Bending 弯曲kN	Torsion 扭转kN.m		H	D	$n_1.d_1-a_1$	$n_2.d_2-a_2$		
FC24-185-1255	40.5	24	6	1255	550	320	4- Φ 18- Φ 225	4- Φ 18- Φ 225	48	/
FC18-325-2250	72.5	18	6	2250	770	320	4- Φ 18- Φ 225	4- Φ 18- Φ 225	60	/
FC12-550-3910	126	12	6	3910	1150	320	4- Φ 18- Φ 225	4- Φ 18- Φ 225	81	/
FC8-650-4500	145	8	4	4500	1500	320	4- Φ 18- Φ 225	4- Φ 18- Φ 225	101	/
FC6-1050-7812	252	6	4	7812	2400	320	4- Φ 18- Φ 225	4- Φ 18- Φ 225	185	/
FC16-2250-29600	\pm 660	16	8	29600	8000	467	12- Φ 22- Φ 400	12- Φ 22- Φ 400	1948	/
FC12.5-3200-42000	\pm 800	12.5	6	42000	11000	467	12- Φ 22- Φ 400	12- Φ 22- Φ 400	2665	/
FC12.5-3200-37000	1100	12.5	6	37000	10000	467	12- Φ 22- Φ 400	12- Φ 22- Φ 400	2435	/

Technical Comparison Examples 技术参数对比样例



Technical Comparison of Hybrid Insulator and Porcelain Insulator
瓷绝缘子与瓷芯复合绝缘子技术参数对比

Insulator Type 产品类型	Product Type 产品型号	Product Code 产品代号	Core Diameter 主体直径 (mm)	Height 产品高度 (mm)	Mechanical Failing Load Requirement (kN) 机械破坏负荷 要求值	Mechanical Failing Load Test Result (kN) 机械破坏负荷 实测值	Nominal Creepage Distance 公称爬距 (mm)	Creepage Distance marked 图测爬距 (mm)	Weight 重量 (kg)
Porcelain Insulator 瓷绝缘子	D46266	36209	155	1346	8.9	16	2934	3126	117
Hybrid Insulator 瓷芯复合绝缘子	TR289	36004	145	1372	9.78	16.8	2946	5347	101
Porcelain Insulator 瓷绝缘子	TR362	2215	150	2337 (1168.5+1168.5)	10.2	12.7	5029	5128	195
Hybrid Insulator 瓷芯复合绝缘子	FC8-1050-7812	51001	145	2400 (1200+1200)	8	12.6	7812	9152	175

Product Main Advantages 产品主要优势



1. Advanced interface processing techniques of ceramic and silicone rubber, with strong binding.

陶瓷和硅橡胶界面的先进处理技术，粘接牢固

2. Ceramic has good high-temperature resistance capability, thus the high temperature vulcanization process does not affect ceramic strength.

陶瓷耐高温能力好，高温硫化的过程不影响陶瓷强度。

3. Silicone rubber shed and sheath have excellent Hydrophobic Nature (HC1 Level), and good aging resistance capability.

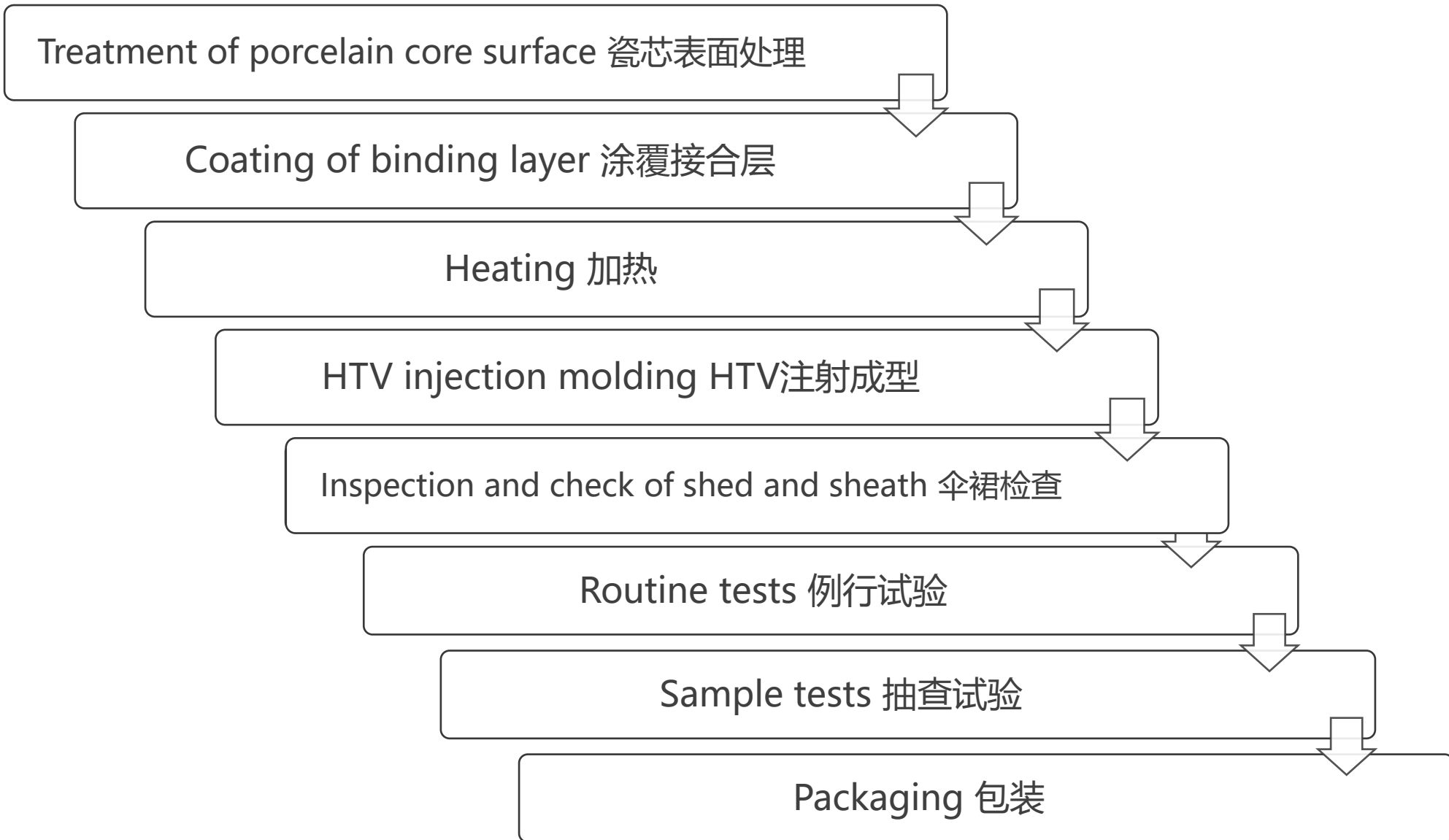
伞裙和护套憎水性优异(HC1级)，耐老化性能好。

4. The modulus of porcelain core is as high as 110Gpa, which is 7-10 times that of the winding FRP.

瓷芯模量高达110Gpa，是缠绕玻璃钢的7~10倍。



Main Processes 主要流程



Assembling and Sealing 胶装和封装

Porcelain core can be produced by both Isostatic dry method and wet process, mainly determined by the core diameter and insulator height.

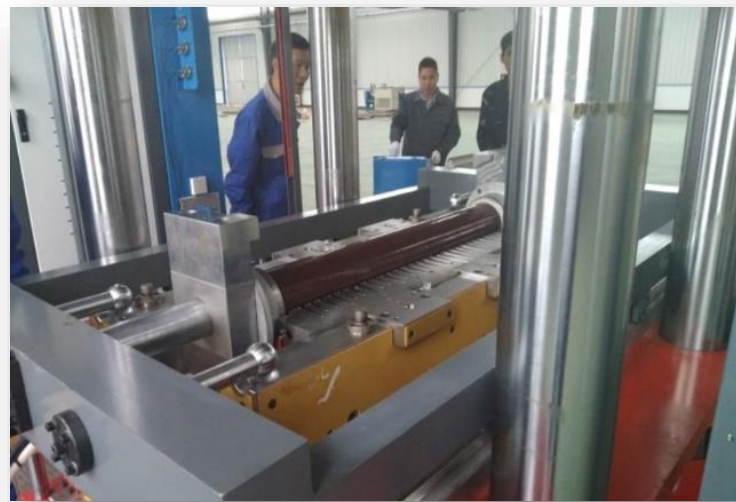
瓷芯根据直径和高度可选择湿法或干法等静压生产。

After trimming, drying, glazing, firing, etc., porcelain cores undertake assembling and curing.

经过修坯、烘干、上釉、烧成后，瓷芯进行胶装和养护。



Assembled Porcelain Cores
胶装好的瓷芯



Porcelain Core into the Mold
瓷芯置入模具



Injection Molding Completed
注射完成后出模

Sealing 封装

We use high temperature high pressure silicone injection molding technology. And there are two methods of sealing. **We have tested results of the two methods, and they both work well.**

我司采用高温高压注射技术，封装可采取两种方式。我们试验过两种方法，都很有效。

1. The metal sealing ring is applied to the flange via turning, and the silicone rubber wraps integrally, and adheres directly to the fitting, without the need for artificial/manual sealing.

法兰上车削出密封槽，注射硅橡胶时包覆法兰，整体密封，无需人工粘接。

2. The other one is artificial sealing by using RTV between fittings and silicone rubber.

法兰和硅橡胶之间通过涂抹RTV密封胶，人工粘接。



Assembled Porcelain Cores
胶装好的瓷芯

Finished Products
成品



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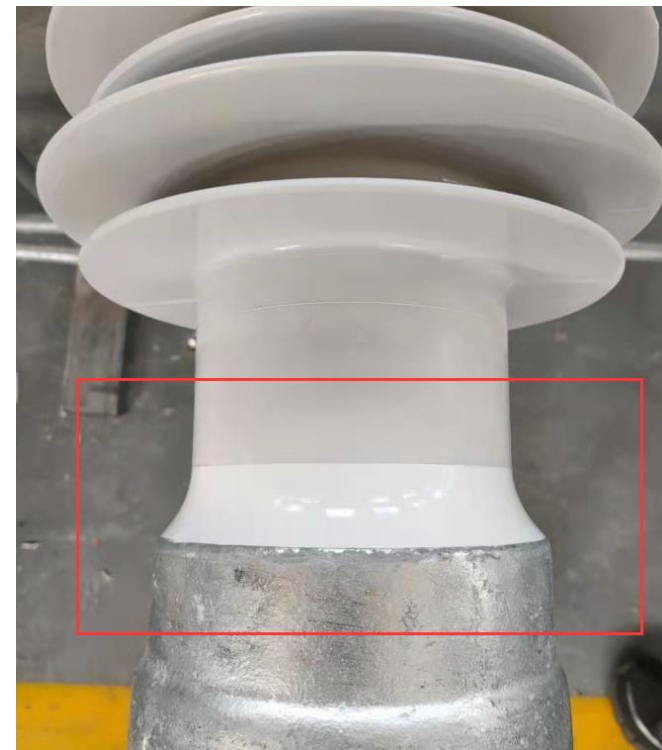
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法兰和硅橡胶之间通过涂抹RTV密封胶，人工粘接。

Moreover, unlike fiberglass materials, glazed porcelain products are inorganic materials, which will not be corroded by water penetration.

此外，与玻璃钢材料不同，上釉瓷芯作为无机材料，不会被水汽腐蚀。



Finished Products
成品

Photos of Production Line 生产线照片



800 Ton Silicone Rubber
Injection Machine
800吨橡胶注射机



1600 Ton Silicone Rubber
Injection Machine
1600吨橡胶注射机



Assembling Machines
胶装机



Complete R&D and Testing Equipment 完备的研发及检测设备



Tests in Sinoma Lab 中材电瓷实验室试验



Water Immersion Pre-stressing Test
水煮试验



Steep-front Impulse Voltage Test
陡波试验



Penetration and Peeling Test
渗透和剥离试验

Tests in National Lab ($\pm 800\text{kV}$ Product) 国家级实验室试验 ($\pm 800\text{kV}$ 产品)



Anti-seismic Test

抗震试验



Bending Test

抗弯试验

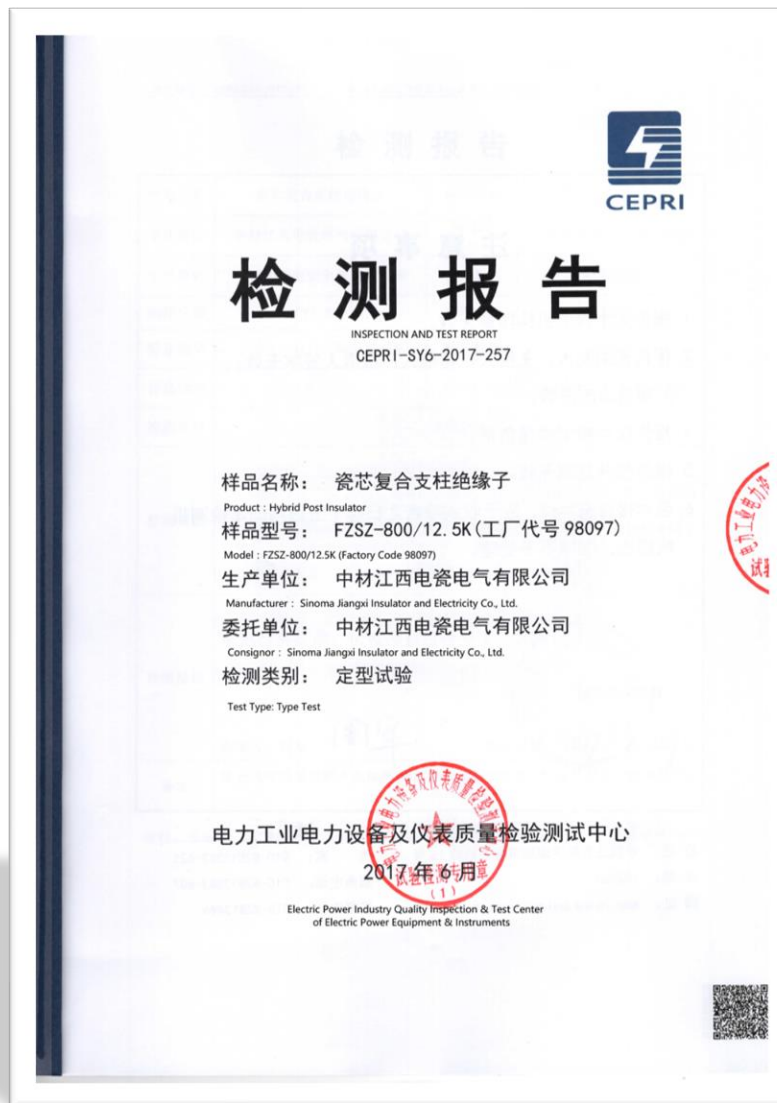


Electrical Test

电气试验

±800kV Hybrid Insulator 0.2G Seismic Type Test 抗震试验

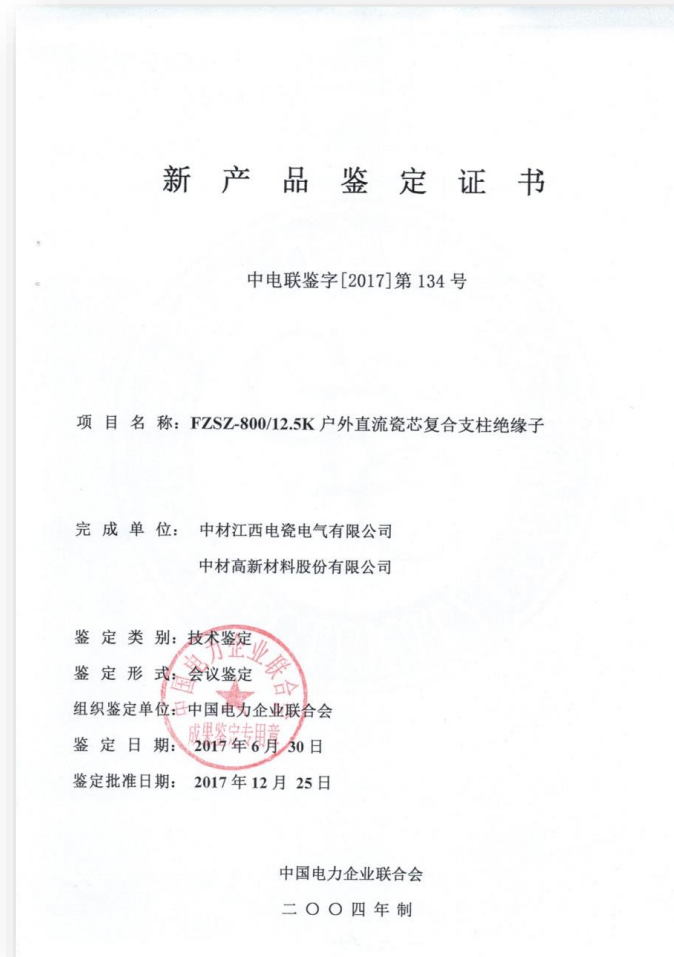




Appraisal Conference of $\pm 800\text{kV}/\text{C12.5}$ Hybrid Insulator 产品鉴定会



Product Appraisal Certificate of $\pm 800\text{kV}/\text{C}12.5$ Hybrid Insulator 产品鉴定证书



Performance List 供货业绩



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Customer 客户	Product Models 产品型号	Quantity 发货数量	Delivery Year 发货年份
Shaanxi Herong Electric Co.,Ltd. 陕西合容电气集团有限公司	±800kV Insulators	6	2017
State Grid of China (Shanxi- Wuzhai 550kV Project) 国家电网有限公司 (山西五寨550kV项目)	550kV Insulators	6	2017
Jiangsu Rugao High Voltage Electric Apparatus Co.,Ltd. 江苏省如高高压电器有限公司	220kV FZSW-252-6K-4-2400	24	2017
Jiangsu Rugao High Voltage Electric Apparatus Co.,Ltd. (Russian Project) 江苏省如高高压电器有限公司 (俄罗斯项目)	FZSW-252/6-4	48	2018
Grantel Equipamentos Ltda 巴西Grantel设备公司	C16-550-3910 Grey	2	2018
	C4-1675-11000 Grey	2	
	C4-1800-13750 Grey	2	
	TR289 Grey	2	
	TR278 Grey	2	
Trench Austria 传奇 (奥地利)	C12.5-200-1147 Grey	1	2018
	C8-200-1990 Grey	1	
	C8-200-1150 Grey	1	
	C8-200-1600 Grey	1	
	C12.5-200-11 Grey	24	
	C8-200-1990 Grey	24	
	C8-200-1150 Grey	9	
	C8-200-1150 Grey	9	
	C8-200-1600 Grey	9	
C8-200-1600 Grey	9		
Shandong Taikai Disconnecter Co., Ltd. (Ugandan project) 山东泰开隔离开关有限公司 (乌干达项目)	FZSW-145/6-4-GW-0617121	660	2021
Vanguard Electric, LLC 美国先锋电气	TR316-350Inch	100	2022
	TR362-350Inch	141	



敬请指正！
Humbly request your advice!

发展高新材料 服务全球电网

To develop advanced materials

To serve global power network

Confidential Information

内部资料 严禁外传