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无苯乙烯树脂系列产品册
Styrene Free Resin Product Catalog

低VOC | 高性能 | 绿色复材解决方案
Low VOC | High Performance | Green Composite Solutions



常州华科聚合物股份有限公司
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- 低VOC
- 性能等效
- 储运安全
- 适用性广

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01 / ABOUT HUAKEMER 企业简介

本公司专业从事不饱和聚酯树脂、乙烯基酯树脂等系列产品的研发、生产与销售。深耕行业二十余年，公司始终致力于以技术创新为客户提供优质产品及复合材料领域的全方位解决方案。依托强大的研发实力和产学研用紧密结合的创新模式，公司以防腐蚀树脂为基本盘，发展出围绕新能源、环境保护、航空航天、船海工程、风电光伏、轨道交通、汽车、建筑等领域需要的可持续技术与绿色环保方案基体树脂，致力于提供环保型新材料一体化解决方案。

公司产品已广泛应用于汽车与轨道交通、风电、电气与通信、光伏、卫浴、船舶、建筑与基础设施、模具等多个行业。公司已通过ISO 9001质量管理体系、ISO 14001环境管理体系、ISO 45001职业健康安全管理体系等认证。

Our company specializes in the R&D, production, and sales of a comprehensive range of products including unsaturated polyester resins and vinyl ester resins. With over two decades of deep-rooted experience in the industry, we are consistently committed to delivering high-quality products and comprehensive solutions in the field of composite materials to our customers through technological innovation. Backed by strong R&D capabilities and an innovation model that closely integrates industry, academia, and research, we have established corrosion-resistant resins as our core business foundation. Building on this, we have developed sustainable technologies and green resin solutions catering to diverse sectors such as new energy, environmental protection, aerospace, marine engineering, wind power, photovoltaics, rail transit, automotive, and construction. We are dedicated to providing integrated, environmentally friendly new material solutions.

Our products are widely used across various industries, including automotive and rail transit, wind power, electrical and communications, photovoltaics, sanitary ware, marine, building and infrastructure, and mold manufacturing. The company has obtained ISO 9001 Quality Management System, ISO 14001 Environmental Management System, and ISO 45001 Occupational Health and Safety Management System certifications.







02 / INTRODUCTION TO STYRENE FREE RESIN 无苯乙烯树脂技术概述

2.1 市场与法规背景 Market & Regulatory Background

全球环保监管日趋严格，欧盟REACH等海外法规将低VOC释放作为海外项目重要采购准入门槛。

国内政策双重驱动行业迭代：2027年1月VOCs环保税试点开征，化工行业原辅材料、储存、设备密封点等全源项VOC排放全部纳入计税；同时玻璃钢、树脂相关VOC排放标准落地，对苯乙烯等挥发性物质的有组织、无组织排放设立硬性管控限值。

传统含苯乙烯树脂苯乙烯挥发量大，很难满足现行及即将实施的排放、职业健康要求，后期废气治理成本高，合规风险突出。**想要同时满足环保税管控、废气排放限值、施工现场人员职业健康防护这一套完整标准，只能选用无苯乙烯低挥发树脂，从原材料源头削减VOC产生，是实现合规的必要技术路径。**

Global environmental regulations are becoming increasingly stringent. Overseas regulations such as EU REACH have made low VOC emissions a key procurement criterion for international projects.

Domestic policies are also driving industry transformation on two fronts: starting in January 2027, a pilot VOC environmental tax will be levied, covering all VOC emission sources in the chemical industry, including raw materials, storage, and equipment sealing points. At the same time, VOC emission standards specifically for FRP and resin applications have been implemented, imposing mandatory limits on both organized and fugitive emissions of volatile substances such as styrene.

Traditional styrene-containing resins release significant amounts of styrene, making it difficult to meet current and upcoming emission and occupational health requirements. They also incur high costs for end-of-pipe treatment and carry considerable compliance risks. **To simultaneously meet environmental tax controls, emission limits, and on-site worker health protection, styrene-free low-VOC resins are the only viable choice. Reducing VOC generation at the source through raw material substitution is an essential technical pathway to achieving full compliance.**

全球市场趋势 Global Market Trends

- 2024 年全球无苯乙烯树脂产量约为 42 万吨，产能为 52 万吨，产品价格区间在 2,600 至 5,400 美元 / 吨之间。
  In 2024, global production of styrene-free resin reached ~420,000 tons, with capacity of 520,000 tons and prices ranging from USD 2,600 to 5,400 per ton.
- 2025 年全球无苯乙烯树脂市场销售额达 12.69 亿美元，预计 2031 年将达到 18.10 亿美元，2025-2031 年复合增长率（CAGR）为 6.10% 。
  In 2025, the global styrene-free resin market reached a sales value of USD 1.269 billion. It is projected to grow to USD 1.810 billion by 2031, representing a compound annual growth rate (CAGR) of 6.10% from 2025 to 2031.
- 国内生态环保政策不断升级，VOCs 环境保护税于 2027 年 1 月 1 日启动试点征收，化工原料制造被纳入重点试点行业，原辅材料逸散、储存、生产装置密封点等全源项 VOC 排放均纳入计税管理，高挥发性材料将直接带来企业合规成本上升。
  Domestic environmental policies continue to escalate. The VOCs environmental protection tax will be piloted starting January 1, 2027, with the chemical raw material manufacturing industry designated as a key pilot sector. All VOC emission sources—including fugitive emissions from raw materials, storage, and sealing points in production equipment—will be included in the tax calculation. The use of high-volatility materials will directly increase corporate compliance costs.

法规驱动因素 Regulatory Drivers

- 中国发布新版 GB30981-2025 国家强制性标准，对工业涂料类产品加严 VOC 与新增 SVOC 含量限制，2026 年 6 月 1 日起实施。
  In 2025, China issued the updated mandatory standard GB 30981-2025, tightening VOC and adding SVOC limits for industrial coatings, effective June 1, 2026.

- 欧盟 REACH 法规持续更新，对有害物质管控日趋严格。
  EU REACH regulation continues to tighten controls on hazardous substances.
- 中国“双碳”目标推动环保型树脂产业升级。
  China's "Dual Carbon" goals are accelerating the upgrade of the eco-friendly resin industry.
- 美国加州 Proposition 65 持续扩大致癌物管控范围。
  California's Proposition 65 continues to expand its scope of carcinogen control.
- 在此背景下，无苯乙烯树脂作为绿色替代方案，市场需求持续增长。
  As a green alternative, styrene-free resin continues to see rising market demand.

2.2 技术优势与环保价值 Technical & Environmental Advantages

核心技术优势 Regulatory Drivers

低 VOC 排放： 无苯乙烯树脂可以降低 VOC 排放，TVOC<1ppm，符合市政环保标准，适配各种敏感场景。
Low VOC Emissions: Styrene-free resins significantly reduce VOC emissions, with TVOC < 1 ppm, complying with municipal environmental standards and suitable for various sensitive application scenarios.

极低气味： 显著改善操作人员工作环境，适合密闭空间作业。
Ultra-Low Odor: Improves workplace comfort, ideal for confined spaces.

性能等效： 力学性能、工艺性能可达到甚至超过含苯乙烯树脂的水平。
Performance Equivalence: Matches or outperforms styrene-based resins in mechanical properties and processability.

应用无缝对接： FRP 耐热性、气干性与含苯乙烯树脂相当，可实现无缝替换。
Seamless Substitution: Comparable heat resistance and air-drying performance for direct drop-in replacement.

非危险化学品： 部分产品属于非危险化学品，具备食品接触认证。
Non-Hazardous Chemical: Select products are classified as non-hazardous chemicals and are certified for food contact applications.

环保价值 Environmental Value

- 消除苯乙烯这一致癌性反应性溶剂的使用。
  Eliminates the use of styrene, a carcinogenic reactive diluent.
- 大幅降低生产和使用过程中的有害物质排放。
  Significantly reduces emissions of hazardous substances during production and application.
- 改善劳动者职业健康与安全条件。
  Improves occupational health and safety conditions for workers.
- 符合全球日益严格的环保法规要求。
  Meets increasingly stringent global environmental regulatory requirements.

03 / PRODUCT PORTFOLIO & QUICK SELECTION 产品总览 · 快速选型

3.1 产品矩阵一览表 Product Matrix Table

产品系列 Product Portfolio	产品类型 Product Types	主要特点 Key Features	典型应用 Typical Applications
通用型UPR系列 General-Purpose UPR Series	无苯乙烯不饱和聚酯树脂 Styrene-Free Unsaturated Polyester Resin	环保低气味、力学性能优良、工艺性好 Environmentally friendly with low odor, excellent mechanical properties, good processability	通用复合材料、建筑构件、卫浴制品 General composites, building components, sanitary ware products
耐蚀型VER系列 Corrosion-Resistant VER Series	无苯乙烯乙烯基酯树脂 Styrene-Free Vinyl Ester Resin	卓越耐腐蚀性、耐高温、高韧性 Excellent corrosion resistance, high temperature resistance, high toughness	化工防腐、管道、储罐 Chemical anti-corrosion, piping, storage tanks
特种定制系列 Specialty Custom-Designed Series	定制化无苯乙烯树脂 Custom-Designed Styrene-Free Resin	按需开发、性能可调 Custom-developed on demand, tunable / adjustable performance	风电叶片、轨道交通、船舶等高端领域 High-end sectors such as wind turbine blades, rail transit, and marine applications

3.2 适用工艺与应用汇总 Applicable Processes & Applications

应用汇总 Application Summary

行业领域 Product Portfolio	应用场景 Product Types	关键要求 Key Features
风电能源 Wind Energy	叶片灌注树脂、修补树脂、胶衣 Blade infusion resin, repair resin, gelcoat	力学性能、耐疲劳、环保 Mechanical properties, fatigue resistance, environmental friendliness
船舶海工 Marine & Offshore	船体、甲板、内饰 Hulls, decks, interiors	耐海水腐蚀、强度高 Seawater corrosion resistance, high strength
轨道交通 Rail Transit	车辆内饰、结构件 Vehicle interiors, structural components	阻燃 (EN 45545-2) (UL94 V-0) Flame retardant (EN 45545-2) (UL94 V-0)
化工防腐 Chemical Anti-Corrosion	储罐、管道、内衬 Storage tanks, piping, linings	耐化学腐蚀 (GB/T 11547-2008) Chemical corrosion resistance
建筑卫浴 Building & Sanitary Ware	浴缸、板材、装饰 Bathtubs, panels, decorations	低气味、美观、耐用 Low odor, aesthetic appeal, durability
汽车轻量化 Automotive Lightweighting	车身部件、内饰 Body parts, interiors	轻质高强、低VOC Lightweight & high strength, low VOC

适用工艺 Applicable Processes

类别 Category	牌号 Grade	产品类型 Product Types	产品特性 Characteristics
CIPP 光固化 UV-CIPP	UV-E7601	无苯乙烯 Styrene-Free	低毒性和低 VOC 排放，固化收缩率低，无需高温加热，可室温固化。Low toxicity and low VOC emissions, low curing shrinkage, and can be cured at room temperature without high-temperature heating.
	UV-E7602	无苯乙烯 Styrene-Free	优异的玻纤浸润性、卓越的力学性能，搭配氧化镁能够实现稳定的增稠，可通过紫外光固化，适用于紫外光固化非开挖管道修复工程（UV-CIPP)。Excellent glass fiber wettability and outstanding mechanical properties. When combined with magnesium oxide, it achieves stable thickening. It can also be cured by UV light, making it suitable for UV-CIPP trenchless pipe repair applications.
	UV-E2312	无苯乙烯 Styrene-Free	紫外光固化,机械强度优良,中等粘度,耐水、耐化学性优良。UV-curable, with excellent mechanical strength, medium viscosity, and outstanding water and chemical resistance.
	UV-E2306	无苯乙烯 Styrene-Free	高粘度、成型后具有优异的力学性能，可通过紫外光固化，适用于紫外光固化非开挖管道修复工程（UV-CIPP）。High viscosity, offering excellent mechanical properties after curing. It is UV-curable and suitable for UV-CIPP trenchless pipe rehabilitation applications.
	UV-E2310	无苯乙烯 Styrene-Free	紫外光固化,机械强度优良,高粘度,耐水、耐化学性优良。UV-curable, with excellent mechanical strength, high viscosity, and outstanding water and chemical resistance.
CIPP 热固化 Heat-CIPP	HS-E2506	无苯乙烯 Styrene-Free	热固化，放热峰低，施工稳定性好，成型速度快。Heat-curable, low peak exotherm, good handling stability, and fast molding speed.
模压 Molding	HS-E7703	无苯乙烯 Styrene-Free	中低粘度，低VOC排放，玻纤/碳纤浸润好，搭配氧化镁增稠稳定，适配SMC/B-MC工艺，可以用在车辆内饰件、结构件中。Low-to-medium viscosity, low VOC emissions, good wettability for glass and carbon fibers, stable thickening with magnesium oxide, suitable for SMC/BMC processes, applicable to vehicle interior components and structural parts.
	HS-E7702	无苯乙烯 Styrene-Free	中等粘度，低VOC排放，韧性好，搭配氧化镁增稠稳定，适配SMC/BMC工艺，可以用在车辆内饰件、结构件中，良好的玻纤、碳纤浸润性。Medium viscosity, low VOC emissions, good toughness, stable thickening with magnesium oxide, suitable for SMC/BMC processes, applicable to vehicle interior components and structural parts, with good wettability for both glass and carbon fibers.
手糊 Hand Lay-up	HS-E1805PT	无苯乙烯 Styrene-Free	具有很好的泡沫粘性，不会对聚苯乙烯等泡沫材质的原模发生溶解破坏，可直接在其表面手糊。具有优良的电气绝缘性、耐击穿电压、基材附着力好、流平性佳。Excellent foam tack, without dissolving or damaging polystyrene foam and other foam-based patterns, allowing direct hand lay-up on their surface. Also features outstanding electrical insulation, high dielectric strength, good substrate adhesion, and excellent leveling properties.
涂料 Coating	HS-E302-67W	无苯乙烯 Styrene-Free	含蜡透明聚酯涂料，具有镜面光泽，透明度，易于喷涂，淋涂应用，适用于木材，面板，钢琴等制品。Wax-containing clear polyester coating offering mirror-like gloss, excellent transparency, and easy application by spraying or curtain coating. Suitable for wood, panels, pianos, and similar products.
拉挤 Pultrusion	HS-E2235	无苯乙烯 Styrene-Free	粘度适中，固化速率快，收缩率低，尺寸稳定，耐热性能优秀，机械性能佳，耐腐蚀性能好，环保型树脂。Moderate viscosity, fast curing speed, low shrinkage, excellent dimensional stability, outstanding heat resistance, good mechanical properties, strong corrosion resistance, and environmentally friendly.
缠绕 Filament Winding	HS-E2066	无苯乙烯 Styrene-Free	低粘度，机械性能卓越，耐热性能佳，耐腐蚀性能优异，工艺适配。Low viscosity, excellent mechanical properties, good heat resistance, outstanding corrosion resistance, and good processability.
机制板 Mechanism board	HS-E1060	无苯乙烯 Styrene-Free	高通透，低粘度，玻纤浸润速度快，固化速率高，力学性能优异。High transparency, low viscosity, fast glass fiber wet-out, high curing speed, and excellent mechanical properties.
预浸料 Prepreg	HS-481	热固性乙烯基酯树脂组合料 Thermosetting Vinyl EsterResin Compound	具有固化速度快，高透明度，操作性好，碳纤/玻纤浸润性良好优点，适用于干法预浸料。Featuring fast curing, high transparency, excellent processability, and good wettability for both carbon and glass fibers, making it suitable for dry-process prepreg applications.

04 / DETAILED PRODUCT SPECIFICATIONS 核心产品技术详解

4.1 通用型无苯乙烯不饱和聚酯树脂 General Purpose Styrene Free UPR

核心卖点 Key Selling Points

无苯乙烯，低VOC排放
Styrene-free, low VOC emissions.

气味极低 改善作业环境
Extremely low odor, improving the working environment

力学性能优异
Excellent mechanical properties.

工艺性能优异，适用多种成型工艺
Excellent processability, suitable for a variety of molding processes

非危险化学品，部分产品具备食品接触认证
Non-hazardous, with select grades certified for food contact

4.2 耐蚀型无苯乙烯乙烯基酯树脂 Corrosion Resistant Styrene Free Vinyl Ester Resin



4.3 特种定制无苯乙烯树脂 Custom Designed Styrene Free Resin

本公司可根据客户需求提供定制化无苯乙烯树脂解决方案，覆盖以下特种应用场景：

We offer customized styrene-free resin solutions tailored to customer requirements, covering the following special application scenarios:

紫外光固化无苯乙烯树脂(UV系列) UV-Curable Styrene-Free Resin (UV Series)

- 可搭配氧化镁稳定增稠
  Can be stably thickened with magnesium oxide
- 玻纤浸润性好，固化速度快
  Good glass fiber wettability and fast curing speed
- 极低气味
  Ultra-low odor
- 综合机械性能优良
  Excellent overall mechanical properties
- 非危险化学品，具备食品认证
  Non-hazardous, with food-grade certification
- 适用工艺：UV 固化、CIPP 管道修复
  Applicable Processes: UV Curing, CIPP Pipe Rehabilitation

轨道交通专用无苯乙烯树脂 Styrene-Free Resin for Rail Transit Applications

- 符合 EN 45545-2 标准 HL-2、HL-3 等级要求
  Complies with EN 45545-2 HL-2 and HL-3 requirements
- 低 VOC、低气味
  Low VOC, low odor
- 优异的阻燃性能
  Excellent flame retardanc
- 中低粘度，与玻纤浸润性好
  Low to medium viscosity with good glass fiber wettability

风电叶片专用无苯乙烯树脂 Styrene-Free Resin for Wind Turbine Blades

- 优异的力学性能和耐疲劳性
  Excellent mechanical properties and fatigue resistance
- 低粘度，适合真空灌注工艺
  Low viscosity, suitable for vacuum infusion processing
- 与玻纤 / 碳纤维浸润性好
  Good wettability with glass and carbon fibers
- 适用于叶片主体灌注、修补及胶衣
  Suitable for blade infusion, repair, and gelcoat

定制开发能力 Custom Development Capabilities

- 根据客户工艺要求调整粘度、凝胶时间
  Viscosity and gel time adjusted to customer process requirements
- 针对特定应用优化力学性能
  Mechanical properties optimized for specific applications
- 特殊阻燃、耐温、增韧改性
  Custom flame-retardant, temperature-resistant, and toughening modifications
- 生物基含量定制
  Bio-based content tailored to requirements

05 / APPLICATION SOLUTIONS 行业应用解决方案

风电能源 Wind Energy



无苯乙烯树脂在风电领域的应用日益广泛，主要包括：

· 叶片主体灌注树脂：低粘度配方适合真空导入工艺，与玻纤浸润性好，力学性能优异

· 叶片修补树脂：常温固化，操作简便，与叶片基材粘接性好

· 无苯胶衣：为叶片提供表面防护，零 VOC 排放

Styrene-free resins are increasingly widely used in the wind power sector, primarily including:
Blade infusion resin: Low-viscosity formulation suitable for vacuum infusion processing, with good wettability for glass fibers and excellent mechanical properties.
Blade repair resin: Room-temperature curing, easy to handle, and good adhesion to blade substrates.
Styrene-free gelcoat: Provides surface protection for blades with zero VOC emissions.

船舶 Marine



船舶制造对材料的耐腐蚀性和环保性要求极高：

·船体外壳：耐海水腐蚀，强度高

·甲板与上层建筑：轻质高强，耐候性好

·舱室内饰：低气味，改善舱室空气质量

Shipbuilding demands exceptional corrosion resistance and environmental performance from materials:
Hulls: Seawater corrosion resistance and high strength
Decks and superstructures: Lightweight, high strength, and excellent weatherability
Cabin interiors: Low odor for improved cabin air quality

轨道交通 Rail Transit



轨道交通领域对材料的阻燃性和环保性有严格要求：

·车辆内饰件：符合EN 45545-2标准

·结构部件：轻质高强，低VOC

·阻燃要求：可通过UL94 V-0、EN45545-2等标准

The rail transit sector imposes strict requirements on the flame retardancy and environmental performance of materials:
Vehicle interior components: Compliant with EN 45545-2 standards
Structural components: Lightweight, high strength, and low VOC
Flame-retardant requirements: Can meet standards such as UL94 V-0 and EN 45545-2



化工防腐 Chemical Anti-Corrosion

无苯乙烯乙烯基酯树脂在化工防腐领域具有独特优势：

·储罐内衬：耐酸、碱、盐等多种介质腐蚀

·管道防腐：优异的耐化学性和耐温性

·地坪与池槽内衬：无溶剂、无苯乙烯，施工环境友好

Styrene-free vinyl ester resins offer unique advantages in the chemical anti-corrosion field:
Tank linings: Resistant to corrosion from a wide range of media including acids, alkalis, and salts
Pipe anti-corrosion: Excellent chemical resistance and temperature resistance
Flooring and trench linings: Solvent-free and styrene-free, providing an environmentally friendly application process



建筑卫浴 Building & Sanitary Ware

建筑和卫浴领域对材料的环保性和美观性要求日益提高：

·卫浴制品：浴缸、洗手盆等，低气味、表面光洁

·建筑板材：轻质高强，装饰性好

·透明制品：高透明度，适用于工艺品、透明浴缸等

The building and sanitary ware sectors have increasingly high requirements for material environmental performance and aesthetics:
Sanitary ware products: Bathtubs, washbasins, etc. — low odor and smooth surface finish
Building panels: Lightweight, high strength, and good decorative properties
Transparent products: High transparency, suitable for crafts, transparent bathtubs, and similar applications



车辆部件&内饰件 Vehicle Components & Interior Parts

SMC/BMC无苯乙烯树脂，用于车辆内饰件、结构件中和玻纤、碳纤都具有良好的浸润性

·车辆内饰件：仪表盘、内门板、操作台

·车辆结构件：踏板、外门板、车斗、车厢门板

SMC/BMC styrene-free resin offering good wettability for both glass and carbon fibers, suitable for vehicle interior components and structural parts.
Vehicle interior components: Instrument panels, inner door panels, consoles
Vehicle structural parts: Pedals, outer door panels, cargo beds, compartment door panels

06 / PROCESSING & SAFETY GUIDELINE 加工与安全操作指南

6.1 固化工艺要点 Key Curing Parameters

工艺要点 Processing Guidelines

使用前将树脂充分搅拌均匀
Thoroughly mix the resin before use

按推荐比例准确称量固化剂和促进剂
Accurately weigh the curing agent and accelerator according to the recommended ratios

避免固化剂与促进剂直接混合（防止剧烈反应）
Avoid direct mixing of curing agent and accelerator (to prevent violent reaction)

使用前将树脂充分搅拌均匀
Ensure adequate post-curing of the product to achieve optimal performance

根据环境温度调整配方(温度每升高10°C，凝胶时间缩短约一半)
Adjust the formulation according to ambient temperature (gel time is reduced by approximately half for every 10°C increase in temperature)

6.2 常见问题及对策 Troubleshooting

问题现象 Problem Phenomena	可能原因 Possible Causes	对策 Solutions
凝胶时间过长 Gel time too long	温度低、促进剂不足 Low temperature, insufficient accelerator	提高环境温度、增加促进剂用量 Raise ambient temperature and increase accelerator dosage
凝胶时间过短 Gel time too short	温度高、固化剂过多 High temperature, excess curing agent	降低环境温度、减少固化剂 Lower ambient temperature and reduce curing agent
制品表面发粘 Tacky surface	空气阻聚、固化不足 Air inhibition, insufficient curing	增加后固化、使用气干型配方 Increase post-curing or use air-drying formulation
气泡过多 Excessive bubbles	搅拌过度、脱泡不足 Excessive mixing, inadequate degassing	静置脱泡、真空脱气 Allow standing for degassing or apply vacuum degassing
固化不完全 Incomplete curing	固化剂不足、温度低 Insufficient curing agent, low temperature	增加固化剂、提高温度 Add more curing agent and raise temperature
与玻纤浸润不良 Poor glass fiber wet-out	树脂粘度过高 Resin viscosity too high	预热树脂、调整配方 Preheat resin and adjust formulation

6.3 储存、防护与安全提示 Storage, PPE & Safety

储存要求 Storage Requirement

储存温度：≤25℃，阴凉通风处	Storage temperature: ≤25°C, in a cool, well-ventilated place.
避免阳光直射，远离热源和火源	Avoid direct sunlight, keep away from heat sources and open flames.
包装密封，防止水分侵入	Keep containers sealed to prevent moisture ingress.
与过氧化物、金属盐等分开存放	Store separately from peroxides, metal salts, and other incompatible materials.
保质期：6-12个月（25℃）	Shelf life: 6-12 months (at 25°C).
注：温度越高，保质期越短，不同产品的保质期以该产品的TDS为准	Note: Higher temperatures shorten the shelf life. For specific product shelf life, please refer to the corresponding TDS (Technical Data Sheet).

个人防护(PPE) Personal Protective Equipment (PPE

操作时佩戴化学安全防护眼镜	Wear chemical safety goggles during operation.
佩戴防护手套（丁腈或氯丁橡胶）	Wear protective gloves (nitrile or neoprene).
穿戴防静电阻燃工作服	Wear anti-static and flame-retardant work clothing.
操作区域保持良好通风	Maintain good ventilation in the working area.
必要时佩戴过滤式防毒面具	Wear a filtered respirator if necessary.

安全提示 Safety Information

本品为可燃品，应远离明火
This product is combustible. Keep away from open flames.

避免皮肤长期接触
Avoid prolonged skin contact.

如不慎接触皮肤，立即用大量清水冲洗
In case of skin contact, rinse immediately with plenty of water.

废弃树脂按当地环保法规处理
Dispose of waste resin in accordance with local environmental regulations.

详细安全信息请参阅产品SDS (安全数据表)
For detailed safety information, please refer to the product SDS (Safety Data Sheet).

07 / QUALITY & TECHNICAL SERVICE 质量与研发服务

7.1 质量体系 Quality System

公司建立了完善的质量管理体系，确保产品品质稳定可靠。
The company has established a comprehensive quality management system to ensure stable and reliable product quality.

体系类别 System Category	认证标准 Certification Standards	说明 Description
质量管理体系 Quality Management System	ISO 9001:2015	全流程质量控制 Full-Process Quality Control
环境管理体系 Environmental Management System	ISO 14001:2015	绿色生产 Green Production
职业健康安全管理 Occupational Health and Safety Management	ISO 45001:2018	安全生产 Safe Production
产品认证 Product Certification	中国船级社（CCS） China Classification Society (CCS)	船用产品认证 Marine Product Certification
树脂：皮肤刺激试验 Resin: Skin Irritation Test	GB/T 16886.23-2023	该树脂动物皮肤接触条件下，判定为：无皮肤刺激性 Under animal skin contact conditions, this resin is classified as: Non-irritating to skin.

质量控制流程 Quality Control Proces

原材料入厂检验 Incoming raw material inspection	生产过程在线监控 In-process online monitoring	成品全项性能检测 Full performance testing of finished products	留样定期复检 Periodic retesting of retained samples	客户反馈闭环管理 Closed-loop management of customer feedback

7.2 技术支持与定制开发 Technical Support & Custom Development

技术支持服务 Technical Support Services

- 工艺参数优化建议 Process parameter optimization recommendations
- 现场施工技术指导 On-site construction technical guidance
- 产品选型与配方调整 Product selection and formulation adjustment
- 故障诊断与解决方案 Fault diagnosis and solution provision
- 操作人员培训 Operator training

定制开发能力 Custom Development Capabilities

- 根据客户特定需求开发专用配方 Developing custom formulations to meet specific customer requirements
- 针对特定工艺优化树脂性能 Optimizing resin performance for specific processes
- 特殊性能要求(阻燃、耐温、增韧等)定制 Customization for special performance requirements (flame retardancy, temperature resistance, toughening, etc.)
- 生物基含量定制 Tailoring bio-based content
- 小批量试制到规模化生产的全流程支持 Full-process support from small-batch trial production to large-scale manufacturing

研发实力 R&D Capabilities

- 依托产学研用紧密结合的创新模式 Leveraging an innovation model that closely integrates industry, academia, research, and application
- 专业的研发团队和先进的实验设备 Professional R&D team and advanced laboratory equipment
- 持续跟踪行业前沿技术和市场需求 Continuous tracking of cutting-edge technologies and market trends
- 拥有多项无苯乙烯树脂相关专利和技术成果 Holding multiple patents and technological achievements related to styrene free resins