3 Glycidoxypropyltrimethoxysilane Full-Scenario Common Fault Troubleshooting Guide

Contents

As a new type of foreign trade service provider driven by technological transformation and foreign trade services, HiSiaddi has established a "1+2+3+4=1" service system and can supply multiple well-known original manufacturers of 3 Glycidoxypropyltrimethoxysilane. Having deeply cultivated the foreign trade market of 3 Glycidoxypropyltrimethoxysilane for more than ten years as a R&D-oriented foreign trade service provider, we have sorted out key points to note during the entire purchasing decision-making process of 3 Glycidoxypropyltrimethoxysilane to share with you.

If you have various questions regarding 3 Glycidoxypropyltrimethoxysilane, please contact HiSiaddi customer service or visit our official website www.hisiaddi.com

I. Basic Product Overview

3-Glycidoxypropyltrimethoxysilane (KH-560, GPTMS, abbreviated as 3-Glycidoxypropyltrimethoxysilane) is an epoxy silane coupling agent containing both epoxy active groups and trimethoxysilyl groups in its molecular structure. It appears as colorless to pale light yellow transparent homogeneous liquid; methoxy groups undergo hydrolysis upon contact with water to generate silanol groups, and epoxy groups can undergo ring-opening crosslinking reactions with amino, hydroxyl, carboxyl and phenolic hydroxyl groups.

Physicochemical Properties: Density 1.065~1.075 g/cm³ (25℃), refractive index 1.427~1.432, flash point ≥110℃; miscible with alcohols, ketones, esters and aromatic solvents, capable of hydrolysis compounding with water; stable storage pH range 5~7; strong acid, strong alkali and high temperature accelerate methoxy hydrolysis and epoxy ring-opening deterioration; iron and copper metal ions catalyze yellowing; excessive moisture easily causes self-polymerization to generate siloxane gel; no precipitation at low temperature, long-term storage above 60℃ leads to loss of epoxy groups.

Main Application Scenarios: Epoxy resin composite materials, glass fiber sizing agents, epoxy floor coatings, water-based industrial paints, adhesives and sealants, PCB electronic potting materials, powder filler modification (calcium carbonate, talc, silica powder), polyurethane systems, metal anti-corrosion primer and resin mortar. Conventional Addition Dosage: 0.5%~2.0% for filler modification, 0.3%~1.2% for coating resin systems, 1.0%~3.0% for glass fiber sizing.

Core Deterioration and Fault Inducing Factors: Water absorption and self-polymerization gelation due to damaged packaging, loss of epoxy groups under high-temperature storage, yellowing catalyzed by metal ions, rapid hydrolysis failure due to unbalanced system acid-base, pinholes and bubbles in coatings caused by water-containing fillers, poor interface adhesion due to insufficient coupling agent addition, brittle and matte paint films due to excessive addition, premature gelation upon rapid reaction with strong amino groups, attenuation of crosslinking capacity due to decreased epoxy value after long-term storage. High-Frequency Faults: Raw material yellowing and turbidity, gel precipitate at barrel bottom, dense pinholes and bubbles in coatings, sharp drop of paint film adhesion, delamination and peeling of composite materials, premature gelation and scrap of epoxy resin, brittle cracking of finished paint films, poor dispersion and agglomeration of powder fillers, shortened shelf life, failure of metal substrate anti-corrosion.

II. Core Quality Control Standards and General Pre-Troubleshooting Process

2.1 Judgment Benchmark for Core Quality Control Indicators of 3-Glycidoxypropyltrimethoxysilane

Test Indicator	Qualified Product Standard	Applicable Scenarios	Intuitive Abnormal Performance
Appearance & Color	Colorless to pale light yellow transparent liquid, free of gel, flocculent precipitate and delamination	All general scenarios	Dark yellow/brown color, turbid liquid, jelly-like gel particles at barrel bottom
Epoxy Value	0.42~0.46 mol/100g	Epoxy composite materials, electronic potting, anti-corrosion primer	Insufficient epoxy activity, weak crosslinking, poor adhesion and water resistance
Methoxy Content	≥28.0%	Filler modification, water-based coating systems	Insufficient hydrolyzed silanol groups, failure of powder wetting and dispersion
Moisture	≤0.05%	Resin synthesis, paint production	Dense pinholes and internal bubble bulges in paint films after mixing paint
Color (APHA)	≤60	Transparent epoxy coatings,	Yellowing and loss of transparency of

Test Indicator	Qualified Product Standard	Applicable Scenarios	Intuitive Abnormal Performance
		electronic transparent potting adhesive	finished paint films after raw material storage
Iron Ion Content	≤5 ppm	Long-term storage, high-end transparent products	Rapid yellowing in short term, attenuation of outdoor weather resistance
Free Methanol	≤1.0%	Indoor coatings, food contact composite materials	Pungent odor, large volatile emission during high-temperature construction

2.2 General Four-Step Pre-Troubleshooting Method

1. Batch Comparison: Conduct simultaneous hydrolysis test, resin compounding small test and filler modification test of new raw materials and qualified reference samples, compare adhesion, paint film bubbles and storage gelation trend to distinguish raw material deterioration from water-related problems of fillers and resins or processes;
2. Core Screening: Prioritize testing five key fault points: raw material moisture, epoxy value, color, storage tank tightness and system pH during paint mixing;
3. Working Condition Tracing: Record workshop environmental humidity, water content of powder fillers, acid value/amino content of resin, storage tank material, paint mixing temperature and paint film curing maintenance conditions;
4. Root Cause Determination: Core weaknesses of epoxy silane — trace moisture triggers hydrolysis and self-polymerization gelation, high temperature loses epoxy groups to reduce crosslinking activity, strong acid and alkali rapidly deactivate hydrolysis, excessive addition leads to increased paint film brittleness, premature gelation and agglomeration in high-amino systems.

III. Full-Scenario Fault Troubleshooting, Root Causes and Disposal Plans

3.1 Raw Material Storage Basic Faults

3.1.1 Raw Material Yellowing, Continuous Deepening of Brown Color and Continuous Drop of Epoxy Value

Fault Phenomenon: Pale light yellow liquid deepens continuously within 2~3 months of storage, adhesion and water resistance of paint films with equal addition amount decrease significantly, yellowing and loss of transparency of transparent epoxy products.

Core Root Causes: Storage temperature above 30℃ causes slow oxidation of epoxy groups; rust of carbon steel storage tanks dissolves iron ions to catalyze oxidation; poor packaging seal leads to continuous air intake; long inventory cycle causes loss of epoxy ring-opening.

Disposal Plan: Store raw materials in light-proof sealed PE-lined 304 stainless steel barrels at 10~25℃; slightly pale yellow materials can be used for dark industrial filler modification and ordinary epoxy mortar; directly scrap raw materials with dark brown discoloration and epoxy value ＜0.40 mol/100g, prohibit use in transparent electronic adhesive, high-end anti-corrosion topcoat and glass fiber sizing agent.

3.1.2 Gel and Jelly-Like Precipitate at Storage Tank Bottom, Frequent Blockage of Metering Pumps and Filters During Material Conveying

Fault Phenomenon: Elastic gel particles form at barrel bottom after raw material standing, flocs are entrained during pumping, frequent blockage of metering pumps and filters.

Core Root Causes: Damaged packaging and repeated opening absorb water vapor from air, trimethoxy hydrolysis and self-polymerization condensation; workshop storage humidity above 60%; unqualified excessive moisture of raw materials upon delivery.

Disposal Plan: Strictly test moisture ≤0.05% upon warehousing; fill barrels with nitrogen to isolate air for sealed storage; filter clear liquid through 80-mesh screen for downgraded use of gel-containing raw materials, scrap entire barrels with excessive gel.

3.1.3 Unqualified Epoxy Value After Storage and Complete Failure of Crosslinking Enhancement

Fault Phenomenon: Adhesion of paint films with fresh raw materials meets standard in parallel small tests, while adhesion of raw materials stored for a long time is poor and bubbling and peeling occur after boiling water test.

Core Root Causes: Dual effects of high temperature and oxygen cause ring-opening loss of epoxy groups; iron ions accelerate epoxy degradation; long-term open storage of raw materials consumes active groups via hydrolysis.

Disposal Plan: Implement first-in first-out, control inventory cycle within 3 months; store tanks under sealed nitrogen filling and light-proof conditions; re-test epoxy value quarterly, scrap raw materials with unqualified indicators directly.

3.2 Faults of Epoxy Coatings, Floor and Metal Anti-Corrosion Primer Systems

3.2.1 Dense Pinholes on Paint Film, Surface Bubbles and Dense Sectional Holes

Fault Phenomenon: Dense concave spots on paint film surface after curing, bulges in thick coating areas, massive bubbling and peeling after boiling water test, failure of anti-corrosion and waterproof performance.

Core Root Causes: Excessive moisture of silane raw materials; un-dried water contained in talc powder and silica powder fillers; high humidity in paint mixing workshop brings water vapor during paint mixing; methanol gas generated from silane hydrolysis fails to fully volatilize before curing.

Disposal Plan: Recheck moisture of silane before feeding, conduct negative pressure dehydration at 40~50℃ for raw materials with excessive moisture; dry powder fillers at 110℃ for 2h to remove water; control workshop humidity ≤45% during paint mixing; stand for 15~30 min after paint mixing to release small molecule methanol before construction.

3.2.2 Poor Paint Film Adhesion and Entire Peeling from Metal and Cement Substrates

Fault Phenomenon: Massive peeling of paint film in cross-hatch test, rapid peeling of anti-corrosion layer after salt water immersion and substrate rusting.

Core Root Causes: Insufficient addition of silane coupling agent leads to inadequate chemical bond connection between silanol groups and substrates; low epoxy value of raw materials results in insufficient crosslinking activity; oil stain and dust on substrate surface fail to be cleaned; excessively acidic system pH destroys silane hydrolysis balance.

Disposal Plan: Increase silane addition ratio according to system; replace qualified raw materials with high epoxy value; sandblast/polish and remove contaminants on substrate surface before construction; adjust system pH to neutral range of 5~7 to guarantee sufficient hydrolysis.

3.2.3 Brittle Paint Film, Cracking Upon Bending and Decreased Impact Resistance

Fault Phenomenon: Thin coating film fractures directly upon bending, cracks appear under heavy impact, cracking and peeling of floors after long-term use.

Core Root Causes: Excessive addition of silane coupling agent leads to excessive crosslinking, increased paint film rigidity and loss of toughness; low proportion of matched flexible resin; excessive hydrolysis of raw materials forms dense rigid siloxane network.

Disposal Plan: Reduce silane addition to standard range; compound flexible epoxy/polyester resin; control silane hydrolysis time to avoid mixing with resin after complete hydrolysis.

3.2.4 Coating Delamination After Storage, Bottom Precipitation and Uneven Pigment Dispersion

Fault Phenomenon: Powder agglomerates and precipitates after coating standing, particles remain after stirring, color spots and color difference appear on paint film after spraying.

Core Root Causes: Incomplete hydrolysis of silane fails to fully wet powder fillers; gel impurities of raw materials mix into the system; powder fillers lack surface modification pre-treatment.

Disposal Plan: Pre-hydrolyze silane with water completely before adding into coating; filter to remove raw material gel impurities; dry fillers first and conduct high-speed mixing modification with silane before paint mixing.

3.3 Faults of Glass Fiber and Powder Filler Modification Systems

3.3.1 Excessive Fuzz of Glass Fiber Filaments and Delamination and Peeling After Compound with Epoxy Resin

Fault Phenomenon: Fuzz and broken filaments during glass fiber drawing and weaving, easy separation of interlayers after manufacturing epoxy composite materials, sharp attenuation of tensile strength.

Core Root Causes: Insufficient addition of silane sizing agent; low epoxy value of raw materials leads to poor compatibility with epoxy resin; excessively high glass fiber drawing temperature destroys silane active groups; excessively acidic sizing liquid pH hydrolyzes silane.

Disposal Plan: Increase silane ratio in sizing agent; select refined silane with high epoxy value; control drawing drying temperature ≤120℃; stabilize sizing liquid pH 5~7.

3.3.2 Agglomeration and Caking of Calcium Carbonate/Silica Powder, Poor Fluidity of Resin Filling

Fault Phenomenon: Powder agglomerates during mixing, intermittent discharge during extrusion granulation, excessive particle defects on product surface.

Core Root Causes: Insufficient addition of silane fails to wrap powder and reduce surface energy; silane without pre-hydrolysis has poor wetting and dispersion capacity; water contained in fillers consumes silane active groups.
Disposal Plan: Increase silane modification addition ratio; pre-hydrolyze silane for spray modification of powder; thoroughly dry fillers to remove water before modification treatment.

3.4 Faults of Epoxy Adhesive and PCB Electronic Potting Systems

3.4.1 Low Adhesive Strength of Adhesive Layer and Debonding of Components After Cold and Thermal Cycles

Fault Phenomenon: Potting colloid peels from metal and PCB substrates after cold and thermal cycle test, failure of insulation and sealing.
Core Root Causes: Insufficient silane addition leads to weak interface bonding; loss of crosslinking capacity due to epoxy deterioration of raw materials; release agent and oil stain on substrate surface block chemical bonding.
Disposal Plan: Moderately increase silane ratio; replace fresh silane with high epoxy value; plasma/solvent cleaning of substrates to remove oil stains.

3.4.2 Premature Gelation of Epoxy Adhesive During Storage and Unconstructable State

Fault Phenomenon: Resin mixed with curing agent rapidly agglomerates and gels within short time, drastically shortened operable time.
Core Root Causes: Silanol groups generated from silane hydrolysis rapidly crosslink with amino curing agent; excessive addition of silane; excessively high system pH accelerates epoxy ring-opening reaction.
Disposal Plan: Reduce silane addition amount; pre-hydrolyze silane separately to volatilize methanol before mixing with resin; adjust system to weak neutrality to reduce reaction rate.

IV. Special Troubleshooting of Compatibility Conflicts and Adaptable Systems

4.1 Incompatible Systems with Compatibility Taboos and Prone to Failure

1. Strong acid system with pH＜4, strong alkali system with pH＞9: Rapid hydrolysis of trimethoxy groups and simultaneous ring-opening of epoxy groups, complete loss of coupling activity and permanent deterioration of adhesion.
2. Un-dried water-containing powder fillers: Water and silane hydrolyze to generate gas, leading to mass pinholes and bubbles in paint films.
3. Carbon steel and rusty storage tanks and conveying pipelines: Iron ions continuously catalyze oxidation yellowing of silane and discoloration of finished paint films.

4. Long-term storage temperature above 30℃ and long-time baking processing temperature above 120℃: Loss of epoxy groups and attenuation of crosslinking adhesion.
5. Systems with high content of primary and secondary amine curing agents: Silane epoxy groups rapidly react with amino groups to prematurely gel adhesive liquid and shorten operable time.
6. Long-term open storage: Continuous absorption of water and oxygen from air leads to dual deterioration of hydrolysis and oxidation simultaneously.

4.2 Optimal Synergistic Efficiency Blending Systems

1. 3-Glycidoxypropyltrimethoxysilane + Bisphenol A Epoxy Resin: Improve interface adhesion of glass fiber and metal, suitable for floor and anti-corrosion primer.
2. 3-Glycidoxypropyltrimethoxysilane + Water-Based Acrylic Emulsion: Improve adhesion of water-based paint to metal and cement substrates and reduce pinholes.
3. 3-Glycidoxypropyltrimethoxysilane + Titanate Coupling Agent: Synergistically modify inorganic powder for finer powder dispersion and improved mechanical strength of products.
4. 3-Glycidoxypropyltrimethoxysilane + Aliphatic Amine Curing Agent: Slow stepwise crosslinking to extend adhesive liquid operable time, suitable for electronic potting.
5. 3-Glycidoxypropyltrimethoxysilane + Anhydrous Ethanol Hydrolysis Solvent: Mild and controllable hydrolysis, reduced methanol volatilization and stable gel-free system.

4.3 Standard Specifications for Storage, Feeding, Paint Mixing and Modification Processes

1. Storage Specifications: Seal with PE-lined 304 stainless steel barrels, store at 10~25℃ under light-proof and dry conditions, inventory cycle ≤3 months; fill barrels with nitrogen to isolate air; prohibit carbon steel open storage.
2. Hydrolysis Pre-Treatment: Dilute silane with ethanol/pure water at ratio 1:3 as required, conduct weak acid catalyzed hydrolysis for 10~20 min to fully release silanol groups before adding into system; conduct negative pressure dehydration at 40~50℃ for raw materials with excessive moisture.

3. Powder Modification Specifications: Dry powder at 110℃ for 2h to remove water; spray hydrolyzed silane in high-speed mixer to fully wrap powder surface.
4. Temperature Control Specifications: Maximum temperature during paint mixing and glass fiber drawing drying ≤120℃, prohibit long-time high-temperature baking; store finished coatings under cool and light-proof conditions.
5. Ratio Specifications: Adopt lower addition limit of silane for transparent high-end products, moderately increase dosage for dark filling systems; strictly control silane addition amount in high-amino systems to prevent premature gelation.
6. Equipment Specifications: All conveying pipelines and paint mixing kettles and sizing tanks adopt 304 stainless steel/plastic materials, regularly clean gel deposits at pipeline dead zones.

V. Deterioration Failure Judgment of Products and Standardized Rectification

5.1 Deterioration Failure Judgment Standards

1. Raw Material Deterioration: Dark yellow and turbid liquid, massive gel precipitate at barrel bottom, moisture ＞0.08%, epoxy value ＜0.40 mol/100g, iron ion ＞5 ppm.
2. Process Deterioration: Direct feeding of un-dehydrated raw materials, long-term storage in carbon steel tanks, direct mixing with resin without pre-hydrolysis, un-dried fillers, long-time high-temperature baking, excessive silane addition in high-amino systems.
3. Finished Product Failure Characteristics: Dense pinholes and bubbles in paint films, extremely poor substrate adhesion, premature gelation of adhesive layers, glass fiber delamination, powder agglomeration, brittle cracking of paint films, rapid peeling after salt water anti-corrosion test.
4. Safety Failure: Excessive free methanol with pungent odor, failing to meet environmental raw material standards for indoor coatings and electronic potting.

5.2 Standardized Rectification Measures

1. Raw Material Control: Mandatory inspection of appearance color, epoxy value, moisture, methoxy content and iron ion upon warehousing, reject or downgrade after dehydration and filtration for unqualified raw materials; store under low-temperature light-proof nitrogen filling, implement first-in first-out.
2. Process Control: Mandatory filler drying and silane pre-hydrolysis dehydration pre-treatment; dehumidify and control workshop humidity

during paint mixing; full-line stainless steel equipment to avoid iron contamination; strictly control baking temperature, reduce silane dosage for high-amino systems.

3. Formula Control: Precisely control silane addition range by scenario; compound flexible resin and titanate auxiliary agents to jointly optimize interface; stabilize system pH within neutral range of 5~7.
4. Quality Control: Conduct small test film forming and powder filler modification test for each batch to detect adhesion, pinholes and storage stability; store samples at room temperature for 90 days to track changes of epoxy value and color.

VI. On-Site Fault Troubleshooting of Storage and Production Equipment

6.1 Mass Yellowing of Raw Materials and Gel at Barrel Bottom After Storage in Carbon Steel Tanks

Fault Root Causes: Rust of carbon steel dissolves iron ions that simultaneously catalyze oxidative discoloration of silane and self-polymerization of trimethoxy groups to generate gel precipitate.

Disposal Plan: Fully replace PE-lined stainless steel storage tanks and conveying pipelines; prohibit storage of silane in old carbon steel containers; seal tanks with nitrogen filling and clean gel residues at barrel bottom per batch.

6.2 Mass Pinholes and Bubbles in Paint Films Due to Un-dehydrated Raw Materials Containing Water

Fault Root Causes: Silane carries inherent moisture or absorbs moisture without dehydration; hydrolysis generates methanol gas during paint mixing, which is trapped after curing to form pinhole bulges.

Disposal Plan: Conduct unified negative pressure dehydration for raw materials with excessive moisture upon warehousing; dehumidify and control workshop humidity; mandatory drying of powder fillers; stand to fully degas after paint mixing before construction.

6.3 Poor Powder Dispersion and Paint Film Adhesion Due to Direct Feeding Without Pre-Hydrolysis

Fault Root Causes: Silane without pre-hydrolysis lacks active silanol groups, failing to form chemical bonds with inorganic powder and metal substrates and sharply reducing wetting dispersion and bonding performance.

Disposal Plan: Implement pre-hydrolysis process, conduct weak acid catalyzed full hydrolysis before mixing with resin/fillers.

6.4 Rapid Gelation and Scrap of Adhesive Liquid Due to Excessive Addition in High-Amino Systems

Fault Root Causes: Silane epoxy groups rapidly undergo ring-opening crosslinking with primary/secondary amino groups, instantaneous surge of system molecular weight and agglomeration loss of construction fluidity.
Disposal Plan: Reduce silane addition ratio; pre-hydrolyze silane separately to volatilize small molecules before separate feeding with curing agent components and mix before use.

VII. Three-Level Emergency Disposal Process for Faults

7.1 Level I Minor Fault (Online Adjustment, No Production Shutdown)
Fault Performance: Slightly pale yellow raw materials, trace moisture 0.05%~0.07%, filterable fine gel in small quantity; tiny pinholes in small quantity on paint film, slight drop of adhesion without massive cracking and peeling.
Disposal: Dehydrate and filter raw materials for clear liquid use; slightly increase silane addition ratio to compensate active loss; only applicable to dark ordinary epoxy floor and filled powder modification.
7.2 Level II Moderate Fault (Reduce Load and Restrict Production)
Fault Performance: Moderate yellowish brown raw materials, epoxy value 0.40~0.42 mol/100g, small quantity of gel precipitate; slight pinholes on paint film, unqualified adhesion without severe brittle cracking.
Disposal: Downgrade for ordinary industrial anti-corrosion primer and black filling masterbatch, prohibit production of transparent electronic potting adhesive, high-end glass fiber sizing agent and light-colored topcoat.
7.3 Level III Severe Fault (Shutdown and Discontinue Use, Scrap Raw Materials)
Fault Performance: Dark brown turbid raw materials, massive gel precipitate, moisture ＞0.08%, epoxy value ＜0.40 mol/100g; mass pinholes on paint films, complete failure of adhesion, rapid gelation of adhesive liquid unconstructable.
Disposal: Immediately isolate failed silane raw materials, thoroughly clean storage tanks, pipelines and paint mixing kettles; replace all new qualified raw materials, scrap and rework all unqualified semi-finished products.

VIII. Long-Term Preventive Management Specifications

1. Warehousing Quality Inspection: Mandatory inspection of appearance color, epoxy value, moisture, methoxy content, iron ion and free methanol per batch, allow production only after all indicators pass inspection.
2. Storage Red Lines: Store in constant temperature stainless steel lined sealed barrels at 10~25℃ under light-proof nitrogen filling, inventory

cycle ≤3 months, prohibit carbon steel containers, high temperature, high humidity and long-term open storage.

3. Process Red Lines: Prohibit direct feeding of un-dehydrated raw materials, direct mixing without pre-hydrolysis, un-dried fillers, baking temperature above 120℃, excessive addition in high-amino systems and long-term storage of silane in iron equipment.
4. Formula Red Lines: Adopt low addition dosage for transparent high-end products, moderately increase ratio for powder modification; stabilize system pH 5~7; compound flexible resin and coupling auxiliary agents to balance toughness and adhesion.
5. Sample Retention Monitoring: Retain batch samples at room temperature for 90 days, re-test epoxy value, moisture and color monthly; conduct adhesion and water resistance small test per batch to predict finished product faults in advance.

IX. On-Site Quick Self-Inspection Reference Table

Intuitive On-Site Phenomenon	**Priority Test Indicators**	**Core Root Cause**	**Quick Mitigation Measures**
Deepened yellowing of silane raw materials and decreased adhesion	Storage tank material, storage temperature, iron ion, inventory duration	Oxidation catalyzed by iron ions, epoxy loss under high temperature, degradation after long storage	Replace stainless steel lined barrels, store under low-temperature nitrogen sealing, downgrade slightly yellowed materials, scrap severely deteriorated ones
Gel precipitate at barrel bottom and frequent blockage of conveying filter screens	Raw material moisture, storage humidity, packaging tightness	Self-polymerization via water absorption hydrolysis, moisture absorption in high-humidity environment	Negative pressure dehydration of raw materials, sealed nitrogen storage, filter clear liquid for downgraded production
Dense pinholes on paint film, surface bubbling	Silane moisture, filler water content,	Gas generation from hydrolysis of water-containing	Pre-dehydration of silane, drying of fillers at 110℃, stand to

Intuitive On-Site Phenomenon	Priority Test Indicators	Core Root Cause	Quick Mitigation Measures
and peeling after boiling water	degassing after paint mixing	raw materials, un-dried fillers, unvolatilized methanol	degas after paint mixing before construction
Entire peeling of paint film from metal/cement substrates	Epoxy value, silane addition amount, system pH, substrate cleaning	Insufficient epoxy activity, low dosage, acid-base destruction of hydrolysis, oil stain on substrate	Replace silane with high epoxy value, increase ratio, neutralize to neutrality, thoroughly remove contaminants on substrate
Brittle paint film and impact cracking upon bending	Silane addition ratio, resin flexible components	Excessive coupling agent leads to over-crosslinking, insufficient resin toughness	Reduce silane addition amount, compound flexible epoxy/polyester resin
Agglomeration and caking of powder fillers and particle defects during extrusion	Silane hydrolysis state, filler water content, modification process	Insufficient wetting without pre-hydrolysis, consumption of silane by water-containing fillers	Pre-hydrolyze silane with weak acid, modify powder by spraying after drying fillers
Rapid gelation of epoxy adhesive after mixing and extremely short operable time	Silane addition amount, curing agent amino content, pre-hydrolysis process	Rapid crosslinking of epoxy and amino groups, excessive silane, unvolatilized small molecule methanol	Reduce silane ratio, separate feeding after individual hydrolysis of silane, mix before use
Excessive glass fiber fuzz and interlayer separation of epoxy composite materials	Silane epoxy value, sizing liquid pH, drawing drying temperature	Insufficient activity, silane destroyed by acid-base, epoxy loss under high drying temperature	Replace silane with high epoxy value, stabilize sizing liquid pH 5~7, reduce drying temperature

Intuitive On-Site Phenomenon	Priority Test Indicators	Core Root Cause	Quick Mitigation Measures
Yellowing and loss of transparency of transparent coatings after storage	Raw material iron ion, APHA color, inventory cycle	Oxidation catalyzed by metal ions, discoloration after long storage	Select refined silane with low iron content, shorten inventory cycle, store under light-proof sealing

If you require more professional and in-depth analysis regarding various issues of 3 Glycidoxypropyltrimethoxysilane, please contact HiSiaddi customer service or visit our official website www.hisiaddi.com

Disclaimer

All technical process and compliance information related to 3 Glycidoxypropyltrimethoxysilane contained in this document, including but not limited to product basic parameters, application guidelines, addition ratios, production processes, mass production optimization, fault troubleshooting, material compatibility, product selection, testing methods, national regulatory standards and market access, are only reference materials for industry popular science and technical exchange. They do not constitute professional engineering design, production operation specifications, third-party test reports, product quality warranties, chemical safety operation instructions, import and export compliance legal opinions, nor form contractual commitments for sales, technical services or commissioned processing. We cannot guarantee full adaptability of the content to your production, procurement and export scenarios.