Complete Formula and Application Specification for Storage Tank External Wall Anti-corrosion Coating

Implementation Standards:：SH/T 3022-2019、GB/T 50393-2017、ISO 8501-1

Overall Anti-corrosion System: Epoxy Zinc-rich Primer + Epoxy Mica Iron Intermediate Coat + Aliphatic Acrylic Polyurethane Topcoat

Design Total Dry Film Thickness: ≥200 μm

Design Service Life: 10–15 years in industrial environments; 8–10 years in coastal high-corrosion environments

Ⅰ、Complete Coating System Matching Summary

Coating Layer	Coating Type	Mixing Ratio	Application Passes	Dry Film per Pass	Cumulative Dry Film	Core Function
Primer	Epoxy Zinc-rich Primer (High Zinc)	Part A : Part B = 9:1	1	80 μm	80 μm	Cathodic anti-rust, excellent adhesion, prevents substrate rusting
Intermediate Coat	Epoxy Mica Iron Intermediate Coat	Part A : Part B = 5:1	2	50 μm per pass	100 μm	Labyrinth barrier, increases film thickness, blocks moisture corrosion
Topcoat	Aliphatic Acrylic Polyurethane Topcoat	Part A : Part B = 4:1	1	50 μm	50 μm	Weather resistance, anti-aging, gloss & color retention, UV resistance
Total	Full Heavy-duty Anti-corrosion System	—	4	—	≥200 μm	Long-term outdoor heavy-duty corrosion protection

Ⅱ、Complete Production Formulas

1. Epoxy Zinc-rich Primer (A:B = 9:1)

Component	Raw Material	Specification	Amount（KG）	Function
Part A (Paint Paste)	E-44 Epoxy Resin	Industrial grade, EEW 450–500	16.0	Main film former, provides adhesion & mechanical strength
	Zinc Powder	D50=8 μm, purity ≥98%	72.0	Core cathodic anti-rust; zinc content in dry film ≥80%
	Dispersant 110	General wetting & dispersing agent	0.6	Disperses zinc powder, prevents agglomeration & settling
	Leveling Agent	Modified leveling agent	0.5	Improves wetting & leveling
	Defoamer	Silicone defoamer	0.4	Eliminates bubbles during shearing
	Fumed Silica	Hydrophobic anti-settling agent	0.8	Anti-settling & thickening, stable storage
	Xylene	Industrial solvent	7.0	Adjusts viscosity for spray application
	n-Butanol	Industrial solvent	3.8	Adjusts evaporation rate, prevents blushing & pinholes
Part B (Curing Agent)	Polyamide 650 Curing Agent	Anti-corrosion grade	100	Crosslinks with epoxy resin to form dense film

2. Epoxy Mica Iron Intermediate Coat (A:B = 5:1)

Component	Raw Material	Specification	Amount（KG）	Function
Part A (Paint Paste)	E-20 Epoxy Resin	EEW 800–900	22.0	Film former, compatible with primer & topcoat, excellent adhesion
	Mica Iron Oxide (Scaly)	30–60 μm, high-purity gray	38.0	Forms labyrinth barrier, blocks moisture & salt spray penetration
	Zinc Phosphate Anti-rust Powder	Eco-friendly anti-rust filler	6.0	Auxiliary anti-rust, improves salt spray resistance

Component	Raw Material	Specification	Amount（KG）	Function
	Talc Powder	Ultrafine industrial grade	8.0	Increases film thickness & mechanical strength
	Dispersant	General industrial grade	0.6	Disperses fillers, avoids agglomeration
	Defoamer	Epoxy-specific defoamer	0.4	Eliminates application bubbles & pinholes
	Xylene	Industrial solvent	20.0	Adjusts application viscosity
	Cyclohexanone	Slow-evaporating solvent	5.0	Improves leveling, prevents film cracking
Part B (Curing Agent)	Phenalkamine Curing Agent	Medium/low temperature general grade	100	Fast curing, improves chemical & water resistance

3. Aliphatic Acrylic Polyurethane Topcoat (A:B = 4:1)

Component	Raw Material	Specification	Amount（KG）	Function
Part A (Paint Paste)	Hydroxy Acrylic Resin	OH value 90 mgKOH/g, weather-resistant	42.0	Main film former, gloss retention, anti-aging
	Rutile Titanium Dioxide	Outdoor weather-resistant grade	18.0	Tinting, hiding, UV blocking
	UV Absorber UV-327	High-efficiency weather additive	1.2	Prevents chalking, fading & cracking
	Antioxidant	Polyurethane-specific	0.8	Delays oxidative aging, extends service life
	Leveling Agent	Acrylic-specific	0.5	Improves smoothness, no orange peel / sagging
	Defoamer	General grade	0.3	Eliminates application bubbles, improves density
	Butyl Acetate	Industrial slow solvent	22.0	Optimizes leveling, prevents blushing
	Xylene	Industrial solvent	15.2	Adjusts viscosity for airless spraying
Part B (Curing Agent)	HDI Trimer Curing Agent	Non-yellowing aliphatic grade	100	Crosslinking curing, high weather resistance & hardness

Ⅲ、Coating Application Process Parameters

Item	Standard Requirement
Application temperature	5℃ – 35℃
Relative humidity	≤85%
Steel surface temperature	≥3℃ above dew point
Substrate rust removal grade	Sandblasting Sa2.5; local grinding St3
Surface roughness	30–75 μm
Primer application window after blasting	Within 4 hours
Airless spray pressure	15–20 MPa
Spray gun distance	20–30 cm
Overlap width	1/3 – 1/2 of spray width
Interval between primer & intermediate coat	≥24 h (25℃)
Interval between intermediate & topcoat	≥12 h and ≤7 d (25℃)
Induction time after mixing	Primer/topcoat 15 min; intermediate coat 10 min
Pot life after mixing	4 h (25℃)

Ⅳ、Finished Product Performance & Acceptance Criteria

Test Item	Technical Requirement
Film appearance	Smooth & uniform; no bubbles, pinholes, sags, holidays, peeling
Dry film thickness	90% of spots meet requirement; remaining 10% ≥90% of design value
Cross-cut adhesion	≤ Grade 1
Pull-off adhesion	≥5 MPa
Salt spray resistance	≥1000 h without rust, blistering or delamination
Accelerated weathering (QUV)	2000 h; gloss retention ≥80%, no chalking / cracking
Pencil hardness	Topcoat ≥3H; Intermediate ≥2H; Primer ≥H
Surface dry time (25℃)	Primer 2 h; Intermediate 2 h; Topcoat 1 h
Hard dry time (25℃)	Primer / Intermediate 24 h; Topcoat 16 h