

CORROSION & AIR POLLUTION CONTROL SYSTEM: - FABRICATOR OF CHEMICAL STORAGE TANK/VESSELS, HOODS, DUCTING, HEADER, DAMPER, BLOWER, SCRUBBER, CHIMNEY SYSTEMS IN FRP/PVDF/PPH/PP/PVC/HDPE.FRP STRUCTURAL PLATFORM, RAILING, LADDER, WALKWAY, GRATING, HDPE/PVC/PP/PVDF/CPVC/PPR/PPH PIPE AND FITTINGS.

PP/PVC/HDPE/PPGL/FRP/RUBBER LINING AND ALL TYPE OF EPOXY FLOORING/LINING/GROUTING/COATING.

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PROJECT REPORT

FRP LINING OF RCC TANKS IN EFFLUENT TREATMENT PLANT (ETP) Wastewater Collection Tank, Equalization Tank, and HRSCC Tank for SOLAR INDUSTRIES.

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1. EXECUTIVE SUMMARY

This project involves the application of Fiber Reinforced Plastic (FRP) lining using Vinyl Ester Resin on existing Reinforced Cement Concrete (RCC) tanks in the Effluent Treatment Plant (ETP) of Solar Industries. The tanks targeted are:

- Wastewater Collection Tank
- Equalization Tank
- High Rate Solid Contact Clarifier (HRSCC) Tank

FRP lining provides superior chemical resistance, leak-proofing, and corrosion protection against aggressive industrial effluents (acids, alkalis, salts, and organic compounds). The proposed system uses a 4–5 mm thick hand lay-up Vinyl Ester FRP lining with a corrosion barrier (veil + chopped strand mat) and structural reinforcement.

*Key Benefits:

- Extends tank life by 10-15+ years
- Prevents concrete degradation and groundwater contamination
- Complies with environmental norms (CPCB / SPCB)
- Minimal downtime during application

2. INTRODUCTION & PROJECT BACKGROUND

Solar Industries operates an ETP to treat industrial wastewater generated from manufacturing processes. The RCC tanks (Wastewater Collection, Equalization, and HRSCC) are exposed to highly corrosive effluents with fluctuating pH (2–12), chlorides, sulfates, and organic loads. Over time, this causes concrete spalling, cracking, and reinforcement corrosion, leading to leaks, structural weakening, and non-compliance risks.

FRP lining is the most effective and proven solution for protecting RCC surfaces in ETP applications. It forms a seamless, impermeable chemical-resistant barrier superior to epoxy or polyurethane coatings. Vinyl Ester Resin is specifically selected for its excellent resistance to acids, alkalis, and solvents commonly found in ETP wastewater.

3. PROJECT OBJECTIVES

- Provide long-term corrosion and chemical protection to RCC tanks
- Prevent leakage and environmental contamination
- Restore structural integrity without major civil repairs
- Ensure compliance with pollution control board guidelines
- Minimize plant downtime and operational disruption

4. SCOPE OF WORK

The scope includes (but is not limited to):

- Site survey and measurement of internal tank surface area,
- Complete emptying, cleaning, and safety preparation of tanks,
- Surface preparation of RCC (chipping, grinding, crack repair),
- Application of Vinyl Ester FRP lining (7-9 mm thick) on floors, walls, and up to 500 mm,
- Application of Vinyl Ester FRP lining (4–5 mm thick) on floors, walls, and up to 500 mm above maximum liquid level,
- Supply and installation of necessary fixtures (e.g., overflow nozzles sealing),
- Curing, inspection, and testing,
- Handover with warranty and as-built documentation,

5. TECHNICAL SPECIFICATIONS

5.1 Materials

- Resin: Bisphenol-A Epoxy Vinyl Ester Resin (e.g., equivalent to Derakane 470/411, CPOL 731/701 or similar) – excellent chemical resistance for ETP service.
- Reinforcement:
 - Corrosion barrier: Chopped Strand Mat (CSM) 450 gsm
 - Structural layers: Multiple plies of CSM 450 gsm
- Additives: MEKP catalyst, Cobalt accelerator, UV stabilizer in top coat
- Primer: Vinyl Ester compatible primer for concrete adhesion

5.2 Lining System (Typical 3–9 mm total thickness)

- Corrosion Barrier (inner layer ~2.5–3 mm): 1–2 layers veil + 2–3 layers CSM (95% resin rich initially)
- Structural Laminate (~1.5–2 mm): 3–4 layers CSM 450 gsm
- Top Coat: Resin-rich layer with paraffin wax or UV inhibitor (0.5 mm)
- Service temperature: Up to 60–80°C
- Chemical resistance: pH 1–14, acids, alkalis, salts, solvents (as per ETP effluent characteristics)

6. APPLICATION METHODOLOGY

1. Tank Preparation & Safety

- Isolate, dewater, and ventilate tanks
- Gas-free certification and confined-space safety protocols

2. Surface Preparation

- High-pressure water jetting / mechanical grinding to remove loose concrete, laitance, and contaminants
- Achieve Concrete Surface Profile (CSP 3–5)
- Repair honeycombs/cracks with epoxy mortar
- Ensure surface is dry (<4% moisture)

3. Primer Application

- Apply thin coat of Vinyl Ester primer for excellent bonding

4. FRP Lining Application (Hand Lay-up)

- Apply resin + veil for corrosion barrier
- Roll out air bubbles thoroughly
- Build successive layers of CSM saturated with resin
- Apply final resin-rich top coat

5. Curing

- Ambient cure (24–48 hours) + optional post-cure if required

6. Finishing

- Smooth edges and seal joints

Total layers: Minimum 5–7 plies depending on final thickness verification.

7. QUALITY ASSURANCE & TESTING

- Visual Inspection: No cracks, dry spots, or delamination
- Thickness Measurement: Vernier caliper – minimum 4 mm
- High Voltage Spark (Holiday) Test: 10–20 kV to detect pinholes (100% coverage)
- Third-party inspection (optional) at client’s cost.

All tests will be documented and submitted.

8. SAFETY & ENVIRONMENTAL MEASURES

- PPE for all workers (respirators, harnesses, gloves),
- Confined space entry permits,
- Proper ventilation and waste disposal (used resin/glass as hazardous waste),
- No smoking / hot work near resins,
- Compliance with Factory Act and OHSAS,

9. PROJECT SCHEDULE (Indicative – 4–6 Weeks)

Activity	Duration (Days)	Remarks
Site Survey & Mobilization	3–5	After work order
Tank Dewatering & Preparation	7–10	Sequential per tank
Surface Preparation	10–12	Parallel if multiple tanks
FRP Lining Application	12–15	Layer-by-layer curing
Curing, Testing & Inspection	5–7	Spark & adhesion tests
Demobilization & Handover	2	Documentation

10. ADVANTAGES OF PROPOSED FRP LINING

- Seamless & joint-free
- Excellent chemical & abrasion resistance
- Lightweight yet high strength
- Easy maintenance and repair
- Cost-effective compared to new RCC construction or rubber lining
- Proven performance in ETP applications across India

12. CONCLUSION

The proposed Vinyl Ester FRP lining system is the most reliable, durable, and economical solution for protecting the RCC tanks in Solar Industries ETP. It will ensure trouble-free operation, regulatory compliance, and significant reduction in long-term maintenance costs.