

Reinforced Polypropylene Tanks for Corrosive Chemical Service

A 3,000-gallon mining application combining an embedded carbon-mesh tank structure with integrated secondary containment.

By Ron Elkana | Houston PolyTank, LLC

Executive overview

Industrial chemical-handling systems must withstand aggressive fluids, mechanical loads and operational constraints without allowing leaks to escape the containment area. To meet a mining facility's requirements, Houston PolyTank developed a horizontal polypropylene vessel reinforced with embedded carbon mesh and supported within a fabricated polypropylene containment basin.

The 3,000-gallon assembly underwent a reported hydrostatic test at 50 psi with no measurable deformation observed during testing. The project illustrates an engineering approach to integrating chemical resistance, reinforcement and secondary containment in a single system; additional qualification is necessary before extending the design to regulated transport applications.

3,000 GAL	50 PSI	POLYPROPYLENE	22 × 8 FT
PRIMARY VESSEL	REPORTED HYDROSTATIC TEST	REINFORCED MATERIAL	CONTAINMENT FOOTPRINT

The application challenge

The mining facility needed a transportable tank for handling highly corrosive acids inside a secondary containment environment. The assembly had to mount on a truck platform, remain stable under expected handling and operating loads, and contain a potential release without relying solely on the primary vessel.

Lined metal tanks can require maintenance when protective layers deteriorate. Conventional polymer tanks offer chemical resistance but may need additional reinforcement when pressure and mobile loading conditions are involved. The design challenge was to combine the relevant advantages in one engineered arrangement.

The reinforced vessel

Houston PolyTank fabricated an approximately 5.5-foot-diameter, 20-foot-long horizontal vessel from polypropylene with carbon-mesh reinforcement embedded in the polymer structure. The design incorporated reinforced flat end closures intended to distribute pressure loads and polypropylene saddle supports to transfer operating loads into the containment assembly.

The reinforcement was intended to improve tensile and circumferential load resistance while retaining polypropylene's chemical-compatibility advantages for the intended service. The material selection and reinforcement design remain dependent on chemical concentration, operating temperature and project-specific loading assumptions.

Secondary containment built as part of the system

The secondary containment basin was formed from a single 22-foot-by-8-foot extruded polypropylene sheet with one-foot-high welded perimeter walls. Using one continuous sheet for the base eliminated welded seams across the containment floor, reducing potential leakage paths at that surface.

Polypropylene saddle supports were welded to the containment structure to stabilize the vessel and distribute its weight. The resulting configuration integrated the pressure vessel, support arrangement and spill-control basin into a coordinated assembly.

Controlled drainage and isolation

A drain beneath the horizontal vessel passed through a welded polypropylene penetration in the containment wall and connected to a flanged external ball-valve assembly. A second valve and flange connection outside the containment boundary provided an additional isolation point.

This arrangement was designed to support deliberate, controlled drainage while keeping the containment boundary defined. Final valve selection, penetration detailing and operating procedures should reflect the chemicals being handled and site-specific safety requirements.

Hydrostatic testing and observations

The completed vessel was hydrostatically tested at a reported pressure of 50 psi. According to the project account, no measurable vessel movement or deformation was observed during the test, and subsequent inspection found no visible indications of reinforcement-layer separation or structural anomalies.

These observations provide useful evidence for the tested configuration. They do not, on their own, establish a certified maximum allowable working pressure, fatigue performance under transport loading or compliance with applicable truck and rail tank requirements.

WHAT THE PROJECT DEMONSTRATED

A reinforced polypropylene vessel and a seam-free containment floor can be designed as a coordinated chemical-handling assembly. The reported 50 psi hydrostatic test documents one prototype evaluation, not a universal pressure rating for other tank sizes or services.

Key engineering considerations

- Chemical compatibility — verify resin performance against the specific acid or caustic, concentration and service temperature.
- Structural design — account for pressure, fluid weight, end-closure loads, support reactions and dynamic conditions.
- Containment integrity — evaluate welds, penetrations, saddle interfaces, drain controls and inspection access.
- Application approval — establish required design codes, testing protocols and transport regulations before commercial deployment.

From project solution to technology platform

The project informed Houston PolyTank's broader work on reinforced thermoplastic pressure-vessel systems. Its design principles—polymer-based corrosion resistance, integrated structural reinforcement and coordinated primary/secondary containment—can be explored for other challenging chemical-handling applications.

Potential uses include mining operations, chemical processing and selected industrial storage or transfer systems. Wastewater treatment applications may also benefit where chemical compatibility and containment are priorities. Use on road tankers or rail equipment would require separate design review, testing and regulatory qualification for those specific service conditions.

The broader engineering value

The significance of this installation is not simply the use of a different vessel material. It is the system-level approach: pressure loads, material compatibility, containment geometry, support points and controlled drainage were considered together rather than as unrelated components.

That approach can help owners and engineers investigate alternatives to conventional lined-metal vessels when corrosion exposure and long-term maintenance are important design drivers. A project-specific assessment is still required to compare total ownership costs and validate performance against the actual operating conditions.

Conclusion

Houston PolyTank's 3,000-gallon reinforced polypropylene vessel demonstrates a practical direction for engineered chemical containment. In the reported mining application, embedded carbon-mesh reinforcement was paired with a seam-free polypropylene containment floor, integral supports and redundant drainage isolation. The vessel was hydrostatically tested to 50 psi without observed measurable deformation.

For industrial operators seeking corrosion-resistant solutions, the case study illustrates the value of integrating vessel design and secondary containment from the outset. Further qualification can determine where the technology is suitable for additional pressure, mobile and regulated transport applications.

About Houston PolyTank

Houston PolyTank is a U.S.-based manufacturer of custom-engineered polypropylene (PP) and high-density polyethylene (HDPE) systems for demanding industrial and municipal applications. Specializing in advanced extrusion-wound, solid-wall thermoplastic manufacturing, the company produces corrosion-resistant industrial tanks, process vessels, secondary containment systems, and wastewater infrastructure solutions. Its manufacturing technology enables monolithic, solid-wall structures with engineered wall thicknesses and no longitudinal weld seams, supporting application-specific design and structural performance requirements. Building on this expertise, Houston PolyTank developed MagnaPlast™, an innovative HDPE sanitary sewer manhole system, and offers engineered HDPE lift station and pump station structures. Through advanced manufacturing and engineering-driven design, Houston PolyTank delivers customized solutions that address complex chemical storage, containment, and wastewater infrastructure challenges.

For project-specific technical guidance: www.houstonpolytank.com