

# CaseHistory

## From the Midwest to the Middle East

<b>Market Segment:</b>	Tanks
<b>Composite Application:</b>	Chemical Storage Tanks
<b>Resin:</b>	Vipel® F010 bisphenol A epoxy vinyl ester
<b>Manufacturing Processes:</b>	Filament winding Hand lay-up
<b>Diameter:</b>	20 feet (6.1 meters)
<b>Heights:</b>	47.7 feet (14.5 meters)
<b>Design Parameters:</b>	31.3 feet (12.6 meters) 8 inches water column positive pressure (+20 mbarg) 1.2 inches water column negative pressure (10 mbarg) 194°F (90°C)
<b>Installed:</b>	2009
<b>Location:</b>	Saudi Arabia



Tank sections manufactured under ASME-certified conditions were assembled at a riverside site.

Precision engineering and manufacturing were key to the way RL Industries overcame logistical obstacles to successfully fabricate composite storage tanks for a chemical plant in Saudi Arabia. To resist the highly acidic nature of the storage media, the resin for the tanks was Vipel® F010 bisphenol A, epoxy vinyl ester from AOC.

The job required three large composite tanks to store a 32% solution of hydrogen chloride or a 20% solution of sodium hydroxide. Based on previous experience, the U.S.-based engineer commissioned to design the tanks recommended RL Industries to give the customer the highest level of quality and structural integrity.

### Vipel® technology & AOC service

Making the tanks took foresight and planning. RL Industries' strategy started by filament winding cylindrical sections of Vipel resin-impregnated fiberglass roving. Winding was accomplished over a high performance corrosion barrier, formed with chopped

## From the Midwest to the Middle East, continued



The tanks were loaded on a barge for transport on the Ohio and Mississippi Rivers to the Gulf of Mexico.



For their final journey, the composite tanks were transferred to an ocean-going vessel at a Gulf of Mexico port.

### Vipel® technology & AOC service

Making the tanks took foresight and planning. RL Industries' strategy started by filament winding cylindrical sections of Vipel resin-impregnated fiberglass roving. Winding was accomplished over a high performance corrosion barrier, formed with chopped strand mat and two layers of carbon veil in the Vipel resin matrix. Nozzles and attachment features for ladders and rails were integrated into the wound sections.

To mold top and bottom end closures, the Vipel resin was vacuum-infused through fiberglass reinforcements and structural sandwich core. For enhanced load-bearing, RL Industries designed the bottom end closure with an integral, high-strength knuckle radius. The top and bottom end closures were integrated into the cylindrical shell during the shop winding process.

RL Industries Engineering Manager Brian Linnemann explained why Vipel resin technology was specified for all the work. "We turned to AOC because of our favorable history with them on other projects," he said. "They provide a very good corrosion resin recommendation with excellent documentation of process constituents and chemical service details. A Vipel resin is proven technology that is optimized for the application."

### Assembled for shipping

After the tank sections were manufactured, they were assembled at a site 20 miles (32 kilometers) away. Special permits were obtained to ship the tank sections over the road to the assembly site.

At the assembly site, the cylindrical sections were sequentially assembled using laminating techniques that are similar to the way chimney liner "can" sections are joined. The end-result for each tank was a high-strength, monolithic structure ready to go to work when installed.

RL Industries made three 20-foot (6.1-meter) diameter chemical storage tanks for the project. One tank was 47.7 feet (14.5 meters) high; the other two were 41.3 feet (12.6 meters) high. The tanks were design-engineered for 8 inches (+20 mbarg) positive pressure and 1.2 inches of water (10 mbarg) negative pressure. The design temperature is 194°F (90° C).

The contract also called for two 7-foot diameter by 16-foot high (2.1 meters by 4.9 meters), shop-fabricated tanks for holding non-potable water for emergency safety showers. To keep ambient Saudi temperatures from making the water too hot, these tanks have 2 inches (5 centimeters) of sprayed urethane foam insulation encapsulated within the laminate.

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After all tanks successfully passed hydro-testing protocols, they were loaded on a barge for transport down the Ohio and Mississippi Rivers to a Gulf of Mexico port. The equipment was then transferred to an ocean-going vessel for shipment to Saudi Arabia.

### About RL Industries

RL Industries, Inc., Fairfield, Ohio, USA, has been manufacturing high quality corrosion-resistant composite equipment and systems for more than 40 years. The company is accredited by the American Society of Mechanical Engineers to certify that the composite vessels that RL Industries builds meet the ASME RTP-1 standard and Section X of the ASME National Boiler and Pressure Vessel Code. For more information, phone (513) 874-2800 or e-mail [sales@rl-industries.com](mailto:sales@rl-industries.com).

### About AOC

AOC is a leading global supplier of resins, gel coats, colorants, additives and synergistic material systems for composites and cast polymers. AOC knows technology, lives quality and delivers service better than any other composites resin supplier. For more information, e-mail [corrosionresins@aoc-resins.com](mailto:corrosionresins@aoc-resins.com), phone (901) 854-2800 or go to [www.CorrosionResins.com](http://www.CorrosionResins.com).

