Mountaintop Service for 23 Years

Fiber-reinforced polymer composite tanks provide running water to a rustic lodge atop the Smoky Mountains

By Ben Bogner

The late Carson Brewer, an international authority on Great Smoky Mountains National Park, said that charisma explained people's attraction to the park's 6,593-ft-high Mount LeConte. For thousands, each year the charismatic appeal includes a stay in rustic LeConte Lodge.

Reached only by a strenuous hike, the mountaintop lodge has no electricity but offers other comforts such as hot meals and beds with blankets and clean sheets. Because of 23-year-old storage tanks made with Vipel resin technology, guests also enjoy running water.

At outdoor faucets, guests can fill canteens or splash down after the hike. Some water is heated by propane to provide wash-basin bathing, and the readily available water is essential to food and beverage preparation in the lodge's dining hall. However, one of the more welcoming amenities that running water offers is the availability of flushing toilets.

The lodge's water system uses three fiber-reinforced polymer (FRP) composite tanks. The horizontal, above-ground tanks were airlifted by helicopter to the mountaintop in 1983 when the lodge upgraded its water system and increased capacity 50% by replacing a redwood storage tank.

Low Maintenance

"The composite tanks have been very dependable ever since they were installed," said Tim Line, general manager and owner of the lodge. "On occasion, we've wiped off a film that naturally builds on the exterior over time, but that's about the extent of any tank maintenance we've had to do."

One of the composite units is a 6-ft-diameter, 3,000-gal holding tank. The other two are 8-ft-diameter, 7,600-gal supply tanks installed side by side. The smaller holding tank is near the mountain's ever-reliable Basin Spring. Spring water naturally accumulates in three adjacent collector units that feed the holding tank. Gravity-powered water from the holding tank activates the hydraulic ram of a pump that transfers water uphill through piping to the supply tanks. "For every 10 gal of water used to move the ram, 1 gal is pumped up to the supply tanks," Line said. "The other 9 gal end up at Roaring Fork River, miles downstream."

When it is sunny enough, the ram can be activated using solar power. In rare cases, when holding tank water levels run low and sunlight is insufficient, a gasoline-powered pump is available for backup.

To create enough head pressure for good water flow, the two supply tanks are at an elevation higher than lodge facilities. To meet Tennessee state requirements, the water is batch-chlorinated through manholes atop the storage tanks. The lodge's water supply has consistently passed monthly state inspections and quarterly park service inspections for water quality.

At the end of the lodge's March through November season, the tanks are emptied for the winter when temperatures can drop to -20°F. The tanks also withstand total annual snowfall accumulations that can exceed 60 in., annual rainfall totals that can exceed 70 in. and high winds and debris.

Tank Construction

The tanks were made by the former tank division of Owens Corning, which sold the division to Containment Solutions, Inc. in 1995. Tank end caps and cylindrical shells were manufactured using a resin and chopped fiberglass spray-up process. The resin was an isopolyester, engineered for potable water use by the Owens Corning resins and coatings division, which became a cofounding partner of AOC.

Each tank has two exterior ribs that allow it to be supported by setting the ribs in metal cradles covered with a layer of resilient material. The shell wall thickness was increased in the locations where the ribs were applied.

The ribs were fabricated by wrapping the tank with a hollow rib form over which fiberglass-woven roving, chopped fiberglass and resin were applied. The crown or top of the rib form incorporated continuous glass fibers, which provide maximum stiffening by creating high modulus at the maximum distance from the shell wall.

To resist ultraviolet (UV) degradation, a UV inhibitor was incorporated into the resin for the exterior layers of the tank and ribs. For additional UV protection, the tanks were coated with a gel coat consisting of highly pigmented resin.

"The proven performance of Vipel resin at LeConte Lodge is a testament to AOC's corrosion resin technology," said Emilio Oramas, AOC business manager for the corrosion market. "Today's Vipel resin technology can offer the same combination of excellent corrosion resistance, structural properties and potable water code recognition." WWD

Ben Bogner is infrastructure market development manager at AOC. Bogner can be reached at 630.665.2675 or by e-mail at bbogner@aoc-resins.com.

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ARTICLE SUMMARY

Challenge: Running water and a good, steady flow is needed at this mountaintop lodge, which has no electricity and can only be reached by a long hike.

Solution: Three FRP composite tanks were airlifted to the top of the mountain in 1983—this increased water capacity at the lodge by 50%.

Conclusion: The tanks consistently pass state inspections, withstand harsh weather conditions year-round and provide a steady flow of running water to residents of the lodge.

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