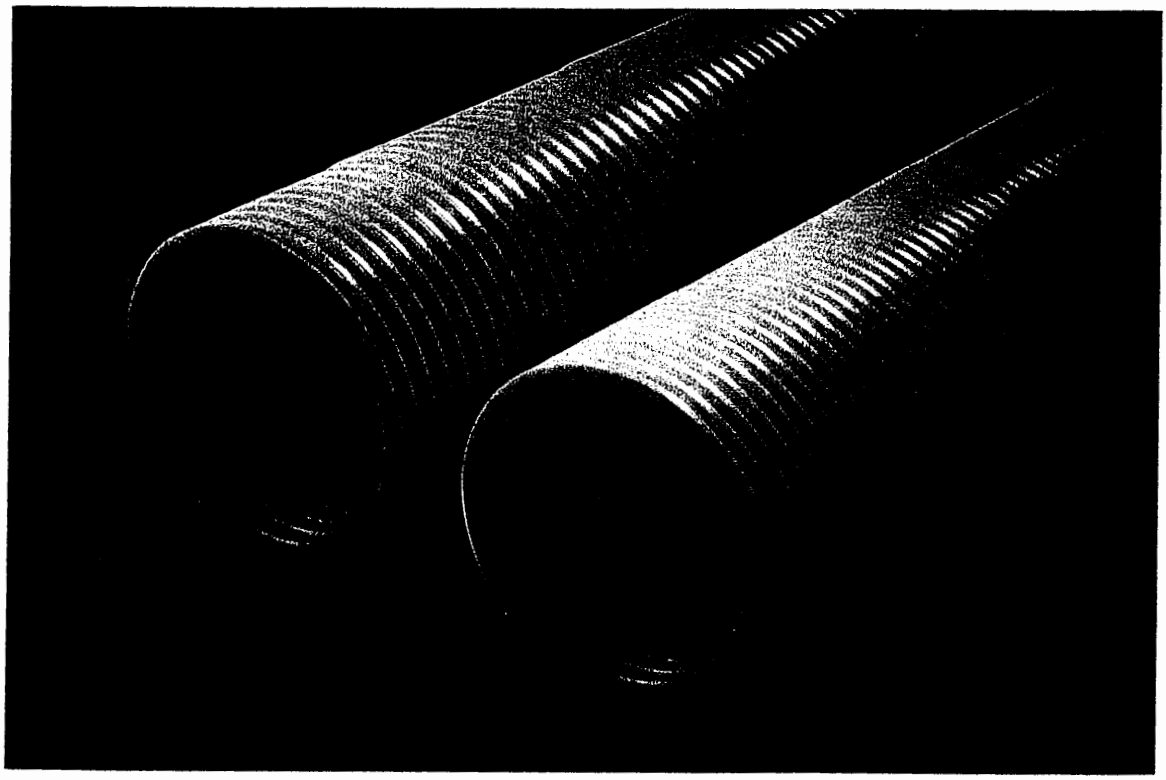
Shell Chemicals

CARILON POLYMERS CASE HISTORY

Cleveland Tubing



The processing and permeation resistance properties of Shell Chemicals CARILON™ Polymers convinced Cleveland Tubing and its customer, a supplier of underground fuel delivery systems, to give it a try. CARILON Polymers processed well on Cleveland Tubing's existing single-screw extrusion equipment. The materials resistance to permeation by fuels and chemicals enabled Cleveland Tubing's customer to remain competitive in the U.S. and expand its business to Europe. For more information about CARILON Polymers, call 1-888-CARILON (888-227-4566).

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PRESS INFORMATION

CARILON Polymers Meet Demands of Multi-Layer Extrusion and Offer Solid Barrier Performance

Cleveland Tubing Case History

The new generation of oxygenated gasolines, while perhaps friendlier to the environment than traditional blends, was making it tough for one Shell Chemical Company customer to expand its business. The customer, a major supplier of underground fuel delivery systems, was looking for a semi-crystalline material with good extrusion characteristics that would be chemically resistant to a variety of fuels. One look at the processing, chemical and permeation resistance properties of Shell Chemicals[1] CARILON[2] Polymers convinced the customer that the material would not only help it stay competitive in the U.S. but would enable it to expand its business into Europe.

Oxygenated gasolines help reduce automobile emissions, but in lab tests, these fuels demonstrated an ability to permeate through the extruded nylon inner liner of the conventional fuel delivery system at relatively high rates. Replacing nylon with CARILON Polymers reduced permeation rates to about one-tenth of the maximum allowable limit.

Cleveland Tubing, Inc. (Cleveland, Tenn.) has extruded the inner liner of fuel systems for more than five years and was intrigued when its customer initially asked it to evaluate CARILON Polymers for the application. "We wondered how the new material would perform on our existing single-screw extrusion equipment," remembers Daryl Miller, operations manager, Cleveland Tubing. "There were so many attractive qualities with the new Shell product -- from the onset it looked like the perfect solution to our dilemma."

Cleveland Tubing's Ronnie Malone, warehouse supervisor, and Charles Snyder, first shift supervisor, spearheaded the product trial. Teaming up with Shell technical support representatives, Malone and Snyder converted the manufacture of the inner liner from nylon to CARILON Polymers over a several-month period.

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[1] The expression 'Shell Chemicals' refers to the companies of the Royal Dutch/Shell Group which are engaged in the chemicals business. Each of the companies which make up the Royal Dutch/Shell Group of companies is an independent entity and has its own separate identity.
[2] CARILON is a Shell trademark.

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Not only did CARILON Polymers run well on Cleveland Tubing's existing equipment, but it cost less than the nylon it replaced and possessed better chemical resistance and barrier properties. "We made minor adjustments to the melt temperature to bond CARILON Polymers with the hose's outer urethane layer. CARILON Polymers have a limited melt temperature range of variation (15° - 20°); a material that accurate is very rare," Miller says.

"We were impressed by CARILON Polymers' easy processability," Snyder explains. "It sets up better than nylon and its flow is smoother and more consistent."

"Overall, our experience with CARILON Polymers has been very positive," Miller says. "Shell Chemicals' technical folks helped make our conversion to CARILON polymers as smooth as possible so that we and our customer could reap the benefits of using the material."

Cleveland Tubing representatives estimate that since March 1995, the company has extruded more than 6 million feet of hose from the material, giving the company extensive experience in processing CARILON Polymers.

CARILON Polymers are engineering thermoplastics with a unique combination of physical properties compared to traditional materials such as polyamides and polyacetals. These properties include strength, stiffness, performance over a broad temperature range, toughness, superior wear and friction characteristics, low hydrocarbon permeability and resistance to a variety of aggressive chemicals.

CARILON Polymers are available in extrusion grades and a variety of injection molding grades, including glass reinforced, flame retardant, mineral filled and lubricated compounds. The polymers can be easily processed on conventional molding and extrusion equipment, and their fast set-up can lead to significantly reduced cycle times in injection molding applications.

For more information on CARILON Polymers, visit Shell's Web site at *www.shellchemicals.com*. In the United States, customers can write to Shell Chemical Company, P.O. Box 2463, Houston, Texas 77252-2463 or call toll free at 1-888-CARILON (1-888-227-4566). In Europe, customers can write to Shell Chemicals Ltd., Shell Centre, SEI 7NA or call +44 171 934 3300.

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