REHAU®
Unlimited Polymer Solutions

LUMENHAUS AT FARNSWORTH HOUSE

GEOTHERMAL GROUND LOOP HEAT EXCHANGE
PROJECT PROFILE

RAUGEO Ground Loop Heat Exchange System Installed in Zero-Energy LUMENHAUS

Virginia Polytechnic Institute and State University (Virginia Tech) developed LUMENHAUS as an entry in the U.S. Department of Energy's 2009 Solar Decathlon. Inspired by the Farnsworth House, designed by Ludwig Mies van der Rohe, LUMENHAUS is a zero-energy home. It epitomizes a "whole building design" construction approach in which all the home's components and systems have been designed to work together to maximize user comfort and environmental protection.

"To more completely mirror the Farnsworth House design that inspired them, the LUMENHAUS team decided to install a working geothermal system that would be operational as LUMENHAUS was on display on the Farnsworth grounds in Plano, Illinois," said Mike Dietrich, business team manager, building technology at REHAU. "While the LUMENHAUS was originally designed with a mechanical system that included heat pumps, the geothermal system had only been simulated in previous displays of the home."

As part of the original LUMENHAUS construction, REHAU designed the pipe layout and supplied its RAUPEX O_2 Barrier crosslinked polyethylene (PEXa) pipe for the home's radiant heating system. REHAU was subsequently approached to assist in the supply of a horizontal ground loop heat exchange system that would be integrated with the existing radiant heating system and geothermal heat pumps.

"We were excited to work with the LUMENHAUS team in providing an integrated system that could demonstrate the efficiency advantages of a radiant heating system when coupled with a geothermal ground loop heat exchange system," Dietrich said. "It's been rewarding to continue our work alongside this group, especially as we realize we're helping educate those that can make a true impact within tomorrow's building community."

Working through Mechanical Equipment Sales, Inc. in Virginia Beach, Va., REHAU supplied the RAUGEO 1 in. PEXa pipe. "Generally our company has used HDPE pipe in our geothermal installations, but we were enthusiastic to use the RAUGEO PEX-based system from REHAU on recommendation from Virginia Tech," said Charles Elks Jr., P.E., president of Mechanical Equipment Sales.

Mechanical Equipment Sales identified Elgin, Ill.-based J & R Herra, Inc. to install the system. The pipe system was then connected via manifold to water-to-water and water-to-air heat pumps. This facilitates the transfer of heat to a domestic water storage tank that then feeds into the home's radiant heating system.

Project: LUMENHAUS at Farnsworth House

Type of Construction: Solar house, built 2009

Owner: Virginia Polytechnic Institute and State University

Contractor: Mechanical Equipment Sales

Installer: J & R Herra, Inc.

REHAU System Used: RAUGEO™ group loop heat exchange

Website: www.lumenhaus.com

"I was already familiar with the REHAU radiant system, and this new experience with the RAUGEO system proved it was a strong, reliable geothermal piping option that was also easy to install," Elks added.

LUMENHAUS has been on display as part of numerous expos and conventions across the country related to sustainable building technologies.