

Va. Home Has Ultimate Radiant, HVAC System

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CLIFTON, VA. — The owners of a custom home here, through their travels to Europe, understood the benefits of radiant floor heating. As a result, they were determined to find a hydronic system that would be ideal for their 18,000-sq.-ft. residence.

The house is divided into 23 individual zones including a home theater, recreation rooms, bedrooms and other living areas. The building, surrounded by landscaped gardens and fishpond, includes a snow-melting system, pool heating and even a tempering system for the fishpond. Foley Mechanical in Alexandria, Va., was hired to do the job.

Foley Mechanical installed the complete mechanical system, Dan Foley said, including the radiant zones, snow melting, pool heating via heat exchangers, air conditioning, HEPA air filtration, steam humidification, fresh air ventilation, plus the control work up to the point where it ties into the home automation system.

Foley said the job taught him that you can't look into your own bankbook and make assumptions about what the customer wants or can afford. The mechanical contract alone was worth about \$500,000.

In the main house mechanical room, Foley installed four Monitor Products MZ40 wall-hung boilers, each 140,000 Btuh. The boilers are staged through a tekmar 268 outdoor reset control. Each boiler has two stages of heat through the tekmar, so Foley actually had eight stages of heat available.

The boilers feed a primary loop that circles the mechanical room. The MZ40s are condensing boilers so that primary loop can be relatively cool.

The first zone is an indirect water heater, a 120-gal. Triangle Tube Phase III. The house has a whirlpool and seven bathrooms, Foley noted. The tank is set up as a priority load so it will override the reset control.

Next off the primary loop are six Danfoss pre-fabricated, pre-engineered and pre-wired Zone Control Panels, each handling four or five zones. Those handle the radiant floor heating zones.

Each panel has a circulator and four or five zone valves. Foley ran tubing from the panels to remote manifolds around the house with a combination of copper pipe, 58-in. PEX and 58-in. MultiCor, which is a Uponor Wirsbo PEX-Aluminum-PEX product. Tubing in the floor is Wirsbo hePEX.

The pump in the zone control panels is a high-head, high-flow pump, so the distance between the ZCPs and the manifolds was not an issue. Each zone has a sensor so all the loops on a manifold are controlled by one sensor that controls the zone valve.

The owners didn't want thermostats on the walls, so Foley used Aprilaire flush-mount sensors that can be painted over. The actual thermostats are in the mechanical room and can be set manually. The thermostats link to the home automation system and function solely as a backup to provide heat if the home automation system should fail.

The primary loop also feeds a Danfoss snow-melt panel for the front entrance and portico as well as a 2,000-sq.-ft. guesthouse. The first level of the guesthouse is a three-car garage and the second floor is an in-law style suite. Foley ran 70 to 80 ft. of Uponor Ecoflex pipe underground to the guesthouse. Ecoflex is a pre-insulated PEX with a corrugated cover. Foley also ran about 90 ft. of Ecoflex to a small pool house.

"Boiler room No. 2" is in what Foley calls the "pool vault," a poured concrete vault. It contains two Thermal Solutions commercial boilers, each a half-million Btuh. They supply two Danfoss heat exchangers. The heat exchangers supply the 1,000-gal. spa, the main pool and wading pool. They also temper a fishpond to 40°F.

The Thermal Solutions boilers provide 2,300 sq. ft. of snow melting to an auto court through a Danfoss snow-melt panel.

The snow-melt system has a tekmar 661 automatic snow sensor. The system also clears a walkway and steps that lead to the pool and hot tub.

A house in Virginia naturally needs air conditioning.

"We've got nine Carrier variable-speed air handlers and several of them, maybe three or four of them, are split into multiple zones with EWC zoning systems," Foley said. Foley selected Carrier commercial duty 12 SEER models, because the condensing units, set in two locations, have refrigerant line runs as long as 200 ft.

All ductwork is sheet metal with mastic-sealed joints, insulated where required in non-conditioned spaces. There are nine complete duct systems for the nine air handlers.

Every air handler has a 4-in. thick Honeywell cartridge filter. Foley selected the cartridge filter because he figured the homeowner wouldn't clean electronic air cleaners. Foley changes the filters twice a year when he services the house.

All nine zones contain fresh air ventilators.

Four of the zones contain EWC steam humidifiers. A demand for humidity turns on the steam humidifier that then turns the air handler on at its lowest setting. The EWC humidifiers will fill with water on a demand for humidity, then self-drain when finished so there's no standing water. The zones with the humidifiers also contain Abatement Technologies UV lights.

The four zones supplied from the basement contain Abatement Technologies HEPA filters.

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