

Electric radiant heating OR “Why are plumbers getting our work?”

By Gerry Lemieux

Until a few years ago, electric radiant heating (ERH) was a business that was solely in the hands of the electrical contractor. Ceiling heat was all the rage: it was simple to install, energy efficient, silent and virtually trouble-free. It was a great money maker for the electrical industry for many years, too, and many of the original systems are still working perfectly.

Then along came some products that caused problems, like carbon-printed elements. Manufactured in rolls, they were lightweight and easier to install than cables in the ceiling—you simply stapled them to the underside of the joist, connected them to a thermostat and *voilà!* you had a radiant ceiling heating system. Unfortunately, there were drawbacks and, in the days prior to GFCIs, some installations were done in a dangerous and haphazard manner. Because of this, carbon element products were removed from CSA's list of approved products, and the section that covered them was eliminated—never to be used again.

With the elimination of these carbon elements it seemed that ERH systems were a thing of the past, but that isn't the case. The systems are alive and well, and prospering in many parts of the country. They are being installed in a 100% safe manner in a way that makes more sense than before, as they are now installed in the floor! Be it carpet, hardwood, concrete, tile, laminate or virtually any other floor type, there's a safe and proved method for installing these products that will earn you above-average profits, great referrals and a new product line

that's growing in leaps and bounds across the country.

Floor warming system installations—electric and hydronic—have seen a huge increase in sales over the past 10 years. This market is highly profitable and trouble-free when installed properly and with the right equipment. Floor warming is also being used in commercial applications where the building owner—in consideration of liability issues—wants his floors dry to reduce the chance of slips and falls.

The acceptance of floor warming and radiant heating systems has opened up a new market for electric heating cable systems. ERH systems have been installed in Europe for over 50 years. In Canada, the radiant heating market has been virtually exclusive to the hydronic heating (plumbing) industry. In fact, a recent industry report shows that sales of hydronics is up 18% year-to-date, and up 24% November 2008 versus November 2007.

The electrical contractor that's willing to explore this market can realize a huge potential for profit.

Understanding radiant heating

In the Canadian market, radiant heating systems are considered the ultimate in comfort. They warm your feet and the objects in a room; they're energy efficient and do not cause drafts; and they're very quiet. ERH systems have these same advantages over standard forced-air systems, and are also superior to hydronics in many ways.

Radiant heating systems come in two standard forms. The first, a hydronic system, consists of a boiler that sends heated water throughout tubes located in or under the floor. The second, electric radiant heating, consists of a series of resistant heating cables installed in the floor of each room, controlled by a thermostat.

Heating cables in the floor are usually supplied as loose cable or mats (where the cable is attached to a cloth, plastic or fiber glass mesh and arrayed in a serpentine fashion). Cables come in various lengths—factory- or custom-made—that are sized for the required area. Mats are known for their thin cables, fast installation, multiple connections in larger areas and high cost. Cables come as either thin cables that employ tracks with predetermined spacings or more rugged, heavier cables that can be stapled onto wooden subfloors, or tied onto concrete reinforcing mesh and installed in poured concrete.

The latter “construction-site tough” cables are normally used for ERH/floor warming systems because they are more resistant to potential damage caused by other trades, like tile setters.

ERH systems are 100% energy efficient; there are no combustion efficiencies to worry about, no piping to leak, no pumps to maintain, and no large room needed to house a boiler. And with no tanks, fittings, manifolds and tubing connections, there's virtually nothing to maintain on the ERH system. Any qualified electrician can analyze the application and troubleshoot it, if need be. ERH systems offer room-by-room comfort whereas hydronic systems usually zone a home by floor or area—often creating hot and cold spots.

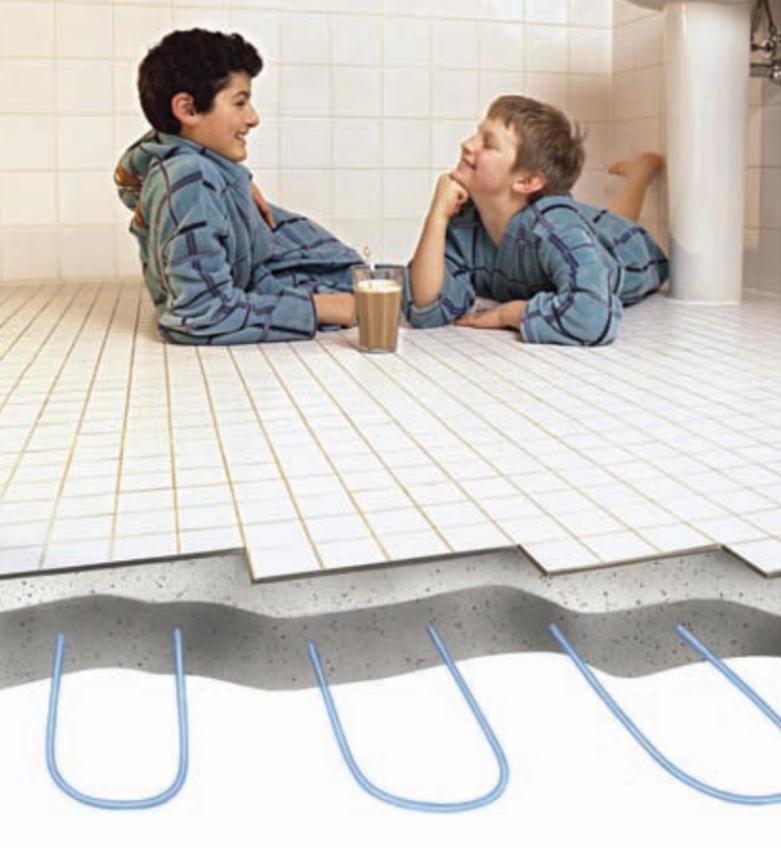
These systems can be even more efficient when you program temperature setbacks on a room-by-room basis—turning off/down the heat in unoccupied areas, or only heating areas such as kitchens and bathrooms in intermittent-use buildings, such as cottages. Further advantages, such as thermal storage applications, can be applied for use now or in the future without any cost.

ERH systems are 100% safe, as every cable has a GFCI installed. They reduce or eliminate additional floor height requirements, and are less expensive than a fully zoned hydronic system.

Getting the most out of the system

Electric *thermal storage systems* are somewhat new to the Canadian market. They're very similar to electric radiant heating systems with the added advantage of the home or building owner being able to store heat in the floors. This is especially useful in Nova Scotia and Ontario, where time-of-use (TOU) electric metering is in place or being installed.

Nova Scotia Power and Ontario's Hydro One have systems



Together we stand... for electric heat!

AS AN INDUSTRY, we've let electric heating decline and allowed hydronics and forced-air systems to grow and dominate. It's time for us to band together, as has the Radiant Panel Association in the States or the Canadian Institute of Plumbing and Heating (CIPH), and combat our present situation.

Electric radiant heating, floor warming, electric thermal storage—even electric solar-powered systems—are all viable systems that can contribute to a greener Canada. An association of like-minded individuals and companies could band together to advertise, lobby governments and produce real data on the benefits with these technologies.

After all, everyone understands the harmful effects of thousands of oil-, propane- and natural gas-powered heating systems and their contribution to greenhouse gases. We could help police the market and eliminate dangerous products being sold in Canada, raise our profile, employ Canadians and contribute to cleaner air.

I invite manufacturers, distributors, agents and contractors across the country to start a dialogue and lay the foundation for a truly Canadian method of 100% energy-efficient comfort and peace of mind.

in place whereby the occupant is charge a reduced rate on weekends, holidays and off-peak times. By employing an electric thermal storage system, the occupant can store heat in the floors during low-peak periods, and then allow it to radiate during high-demand (and more expensive) energy periods.

Nova Scotia Power has been promoting electric thermal storage for years, as it has been found to be a cost-effective method of reducing demand during peak times. Thus, the utility is able to provide power to homes and industries at peak times without having to buy power or build more generating capacity.

The installation of electric radiant/thermal storage heating cables is relatively simple. In the basement or ground-level slab, the cables are tied onto the rebar or mesh with standard plastic cable ties. The rebar is centred in the slab, and the concrete poured and finished as usual.

On upper floors with wooden subfloors, the heating cables are laid out according to the areas to be heated. Because the electrical code specifies that individual areas must have their own temperature control, it is necessary to provide separate cables for each distinct area. For instance, a bathroom cannot be considered to be part of the adjacent hall, but a dining room/kitchen combination—where there is no threshold—could be considered one area.

Some heating cables can be stapled to the wooden subfloor—resulting in a very fast, secure installation—then covered with a 2-in. layer of “thermal” (gypsum) concrete. Each distinct area will require its own temperature control device or thermostat. Standard, commercially available thermostats designed for radiant heating may also be suitable for floor warming. These thermostats should be equipped with a seven-day programmable timer that has two On/Off cycles per day, with separate functions for weekends, and an integral GFCI.

The thermostat should also have a floor sensor and an ambient air sensor. The ambient air sensor controls the space heating in conjunction with the floor sensor, which acts as a high-limit thermostat. Commercially available programmable thermostats for this application can control the room and floor temperatures to take maximum advantage of the TOU cycle and provide maximum energy efficiency.

The thermostat allows the heating system to control the temperature of the room and the floor on a schedule that meets the TOU cycles prescribed by the local utility, providing heat when economically feasible. However, should the heat drop for some reason—maybe someone opened a window—the heat will be maintained in the space.

The ground-level slab or basement will be a 4-in. slab, insulated underneath with 2 in. of SM or equivalent insulation. The cables are normally tied onto the mesh with tie wraps on 4-in. to 6-in. centres. This is the optimum spacing for energy efficiency, allowing for fast warm up, ensuring the slab is up to temperature and holding its maximum heat storage potential during off-peak periods.

Get educated, and get good product

The only drawback to electric radiant heating/storage systems is the lack of knowledge regarding application, installation and troubleshooting—both the parts and the system as a whole. Some progressive manufacturers offer seminars and courses on these things, usually in conjunction with a local electrical distributor.

The electrical contractor must also be aware of the products being sold in the Canadian market that do not meet the demands of a heating system and are meant only to be used on an intermittent basis for floor warming. There are also many products being imported into Canada that are not approved for use by CSA (or equivalent testing lab).

Substandard cables and carbon elements in rolls or panels are being distributed across Canada. Many of these are UL approved, but not necessarily approved by Underwriters' Laboratories of Canada (ULC). For example, UL says carbon elements are acceptable for floor warming and heating, though many of these do not meet Canadian standards. Installers and building owners only realize the mistake after the installation is complete and inspection agencies have informed them of the problem. There have also been instances where these products have slipped by the local electrical inspectors due to mislabelling by the manufacturer or distributor. Many of these products are installed by unlicensed contractors chasing a fast buck.

Many of the products being distributed carry a UL label that is restricted to an appliance wiring standard that does not meet the drop tests, cold bend or flammability standards for radiant heating or floor warming. Some of the offshore testing labs are approving these cables without thoroughly investigating Canadian standards. The installer or specifier must be diligent in his selection. Do your homework, talk to people, and deal only with trusted channel partners. Then you'll be able to realize the potential revenue stream that comes with electric radiant/storage heating systems. 

Gerry Lemieux a recognized author and applications specialist in the heating industry. He is the president of Britech, a provider of heating and warming equipment, and the exclusive Canadian distributor of Nexans Floor-Warming Systems, and ASE Snow and Ice Control Systems.