CONTRACTOR®

THE NEWSMAGAZINE OF MECHANICAL CONTRACTING

Reprint from December 1993

“Dry” radiant floor systems simplify retrofitting

BY JOE FIEDRICH
Hydronic heating authority

MOST PEOPLE think radiant floor heat systems can be applied only to new construction because the tubing has to lay in a poured slab. But there’s a way to retrofit radiant floor heat. It’s called a “dry system.”

A dry system sandwiches the tubing between aluminum or steel heat transfer plates and plywood, gypsum or concrete board. A typical system encased in lightweight concrete, conversely, is called a “wet system.”

In a dry system aluminum heat transfer plates have a heat conductivity value 120 times higher than that of concrete, assuring even heat distribution across the entire floor surface.

Because of their light weight, dry systems are fine for wood frame construction or in retrofit applications where floor buildup must be kept to a minimum. Dry systems are also suitable for use over existing concrete slabs or beneath wooden subfloors.

At present there are two basic types of dry systems being used in wood frame construction. Both are carpentry-intensive. But they’re also low in mass, lightweight, fast responding and easily controllable.

One is the **plywood sleeper method**, which sandwiches the tubing tightly between strips of plywood and aluminum heat transfer plates installed over the subfloor. The tubing is then covered with plywood, gypsum or concrete board, depending on the finished floor and floor usage. This is a shallow construction height method that raises the subfloor by approximately 1".

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The other is the **below-sub floor method.** It sandwiches the tubing and heat transfer plates tightly to the subfloor between the joists by using wood or plywood strapping on both sides of the tubing. This assures a tight fit of the pipe and heat transfer plate to the subfloor. This method can be applied to both new subflooring and existing finished floors that are accessible from below.

Insulation between the joists is vital to prevent heat loss away from the floor. Fiberglass insulation, with the aluminum foil facing the floor to provide additional heat reflection, is most commonly used.

Dry systems can also be used for radiant wall heating.

Interior or exterior walls in tiled bathrooms provide compensation areas where restricted floor space does not provide sufficient Btuh output.

Wall heating also can be used as an cost effective means of heating living areas. Wrapping the room from the floor up to a height of perhaps 4 ft with tubing will generate gentle radiant heating comfort at extremely low installation costs for both new and retrofit systems. Surface temperatures are less critical than in floor systems, so system design and installation is less labor intensive.

The sleeper method, using 5/8" aluminum-faced polyurethane sleepers applied perpendicular to the wall studs or over the existing drywall has proven to be the overall best method.

Small diameter tubing is then woven into the sleepers and covered with adhesive aluminum tape. The cover sheet can be any type of wall or concrete board, depending on the room usage. Insulation between the wall studs is important.

A big advantage of a dry system is that it's easier to control. Dry systems are low mass while wet systems embedded in a slab are high mass. If there is any disadvantage to residential radiant heating systems, it's the controllability challenge of the so-called fly-wheel effect of high mass concrete systems.

The high concrete mass acts as a giant heat sink storing large amounts of Btus, releasing the heat gradually into the heated space. The system responds only sluggishly to sudden changes in indoor or outdoor conditions — internal or external heat gains.

Low mass dry systems drastically reduce the flywheel effect, responding more quickly to changing temperature conditions. They are easier to control, especially in low mass wood frame structures with their associated quick changes in internal temperature.

The author is president of Stadler Corp. (tel. 781/275-3122), a Bedford, Mass.-based supplier of hydronic heating equipment