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## How Europeans control radiant floor heating

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*Hydronic heating authority*

Europeans consider constant circulation one of the most important control parameters for radiant floor heating.

The Germans have an organization called "The Federal Association for Radiant Surface Heating," known by its German acronym bvf. The association recently published on the Internet the three most commonly used control strategies based on three different heat source applications.

As you can see in the two piping schematics, the systems are designed around constant circulation. The reason behind this mostly has to do with the self-regulating effect of floor heating, which cannot work without constant circulation.

Constant circulation is the only form of control for hydronic heating in Germany, where forced water heating is

the predominant method of heating buildings. It is a way of life. The self-regulating effect of radiant systems is probably the most important factor why floor heating needs constant circulation, and that is what bvf keeps emphasizing.

"The self-regulating effect of large heat-emitting surfaces constitutes the greatest benefits utilizing the laws of physics, giving all mechanical and electronic control strategies the role of secondary fine tuning," bvf says on its Internet site.

"The Btu-output of a radiant heating surface within a room happens nearly proportionally to the temperature differential ( $\Delta T$ ) between the heat-emitting surface temperature and the surrounding space temperature, i.e., the higher the  $\Delta T$ , the higher the output.

"Within a well-insulated building, the average heating sur-

face temperature of a radiant system during the course of a heating season is only 73.4°F (23°C).

"Because the temperature differential between floor surface and surrounding ambient temperature is very small (3°-5°F), a sudden increase in space temperature due to internal or external heat gains, from 68°F to 70°F for example, reduces the radiant heating output by one third," bvf continues. "Vice versa, the output is increased by the same amount if the space temperature drops by 2°F."

"The self-regulating effect of radiant systems is the elementary basis for the unsurpassed heating comfort we experience with this type of heating system."

Heating water must circulate continuously through the floor in order for a floor radiator to use the self-regulating effect, even if no demand for heat exists. The constantly circulating water carries the Btus from areas where the  $\Delta T$  is 0 to low, to areas where the  $\Delta T$  is sufficient to release heat where it is needed, near

outside walls or windows, for example.

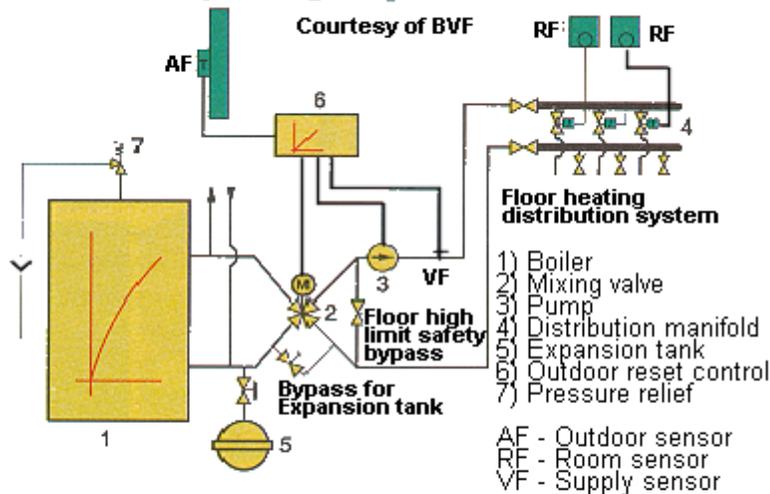
The floor radiator can even absorb solar gain Btus on the south side of the building and carry them to the northern side of the structure, thus heating the cold side without the boiler ever running during certain operating conditions.

This can result in return temperatures higher than supply temperatures. Only radiant floors, constant circulation and the self-regulating effect can accomplish this miracle. Your system is doing what it is supposed to do!

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### High temperature boiler with minimum operating temperature limit



### Low temperature boiler without minimum operating temperature limit

