Slabs

Plan The Installation—

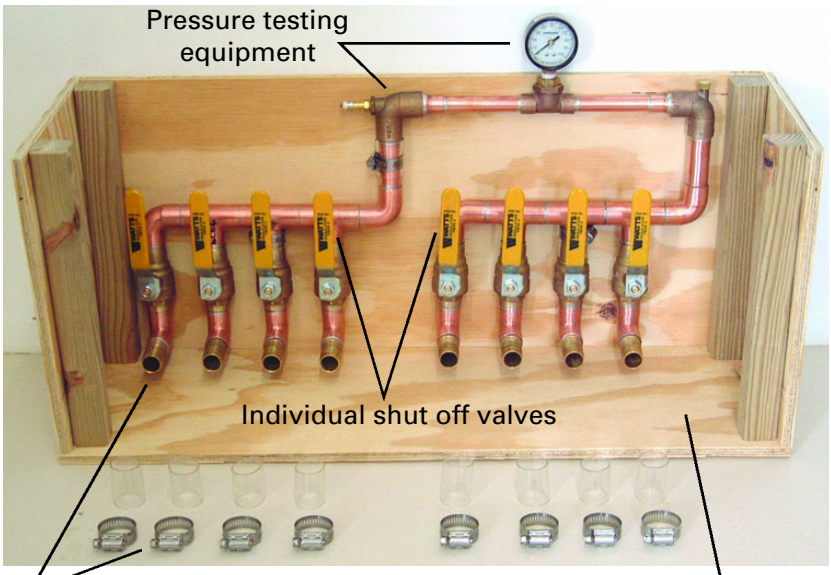
Make a layout and decide how many circuits you should have in each zone based upon minimum and maximum circuit lengths. (Radiantec can help you in person or over the telephone, 1-800-451-7593). Refer to your worksheet and underfloor material calculations provided with your price quote.

Slab Insulation

For maximum performance and efficiency, the slab should be insulated from the earth. Refer to Radiantec's Design & Construction Suggestions. For layout hints, refer to Radiantec's Layout Supplement.

Install the Tubing for a "Slab on Grade" Project—

Radiantec projects will use a "slab manifold". The manifold is the place where the main copper pipe that comes from the heater connects to one or more circuits of plastic tubing.



All connections are made at the manifold. No connections should be cast into the concrete. The entire manifold, including the plywood box, is cast into the floor. The plywood box serves to protect the manifold during construction and it also serves as a concrete form. The box can be knocked completely apart after the concrete has set. The manifold now sets in a hole in the floor (called a manifold well).

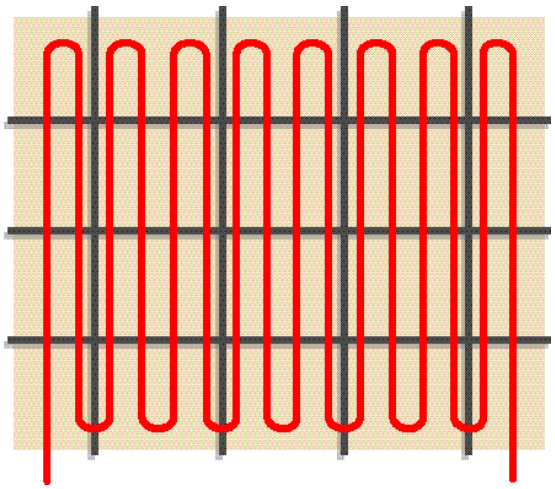
The plastic tubing does not come out of the floor where it could be damaged. Concrete does not come in contact with the copper manifold which would cause corrosion. Access to the fittings is preserved if necessary. If you want to conceal the manifold, fill the hole with sand and lay a skim coat of mortar over it. When the pressure testing equipment is removed, two pipes (one supply, one return) is all that is visible. Arrange for a partition to fall over these two pipes. You can also locate the manifold in a place where it will not be seen, such as a closet. Manifolds are available in custom configurations with no extra charge.

Lay Out the Reinforcing Steel

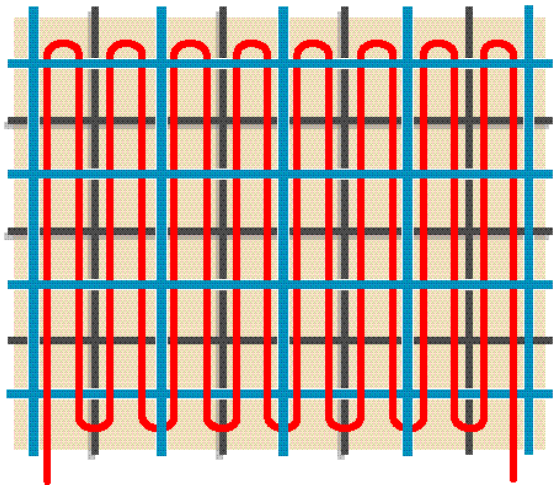
The heating system will perform better, and will be easier to install if some steel is placed both above and below the tubing. The slab will be very strong in the vicinity of the tubing and the steel will help to distribute the heat away from the tubing more effectively. Steel below the tubing gives the installer something to tie the tubing to. Steel above makes the tubing less likely to float to the surface and guards against potential damage from the power trowel.

The following procedure works well for many slabs and can be modified to suit different structural needs.

1. Find the type of bricks with three holes in them and bust them into four pieces at the holes.
2. Lay out a grid with reinforcing rod spaced four feet apart. Hold the rod up with the brick pieces.
3. Lay out the tubing and tie it to the rerod.
4. Lay out another grid of reinforcing rod spaced four feet apart but offset two feet so that the bird's eye view would be of a grid with two foot spacing (see below).
5. Instead of bricks, other alternatives are available to hold up your rerod, such as chairs, pieces of leftover insulation, or blocks of wood.
6. The tubing may also be sandwiched between two sheets of wire mesh.



The first layer of reinforcing steel



The second layer of reinforcing steel

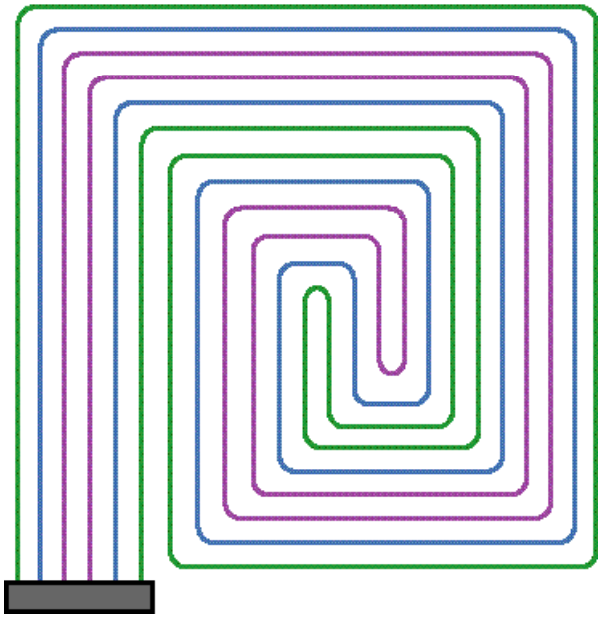
Arrange the Tubing According to the Layout

1. **Inspect the tubing as you lay it out**. Manufacturing defects in the tubing are uncommon, but they can happen. Shipping damage is also possible. Minor scratches or abrasions are permissible but deep gouges are not.
2. Do not kink the tubing. Refer to the minimum bending radius for the tubing that you are using. 1/2" tubing has a bending radius of 6 inches. 7/8" tubing has a bending radius of 1 foot.
3. Tubing may be concentrated in bathrooms and other areas where added heat and air circulation is wanted.
4. Tubing may be placed closer together around the outside perimeter walls beneath picture windows, and other high heat loss areas if you want. Any improvement in the evenness of the heating, however, will be insignificant if the building is energy efficient.
5. Work with the tubing at room temperature whenever possible.
6. Tie the tubing to the reinforcement steel with whatever you want. Inexpensive twine or (concrete) wire ties are both acceptable. Do not select something that is hard to undo, like some plastic ties. Tie the tubing very well (approx. every 2 ft.) to prevent floating if the concrete mix will be very soupy, and if the tubing will not be covered with another layer of steel.

(Note: The concrete mix should not be soupy. A mixture of 3-4" of slump will be stronger)

REVERSE RETURN SPIRAL

The reverse return spiral is ordinarily the easiest and best way to place tubing within a slab, however, other arrangements are also acceptable. Place the manifold at any convenient place along the perimeter of the slab. Start by running the tubing around the perimeter of the proposed slab and then inward towards the center. At the center, turn 180 degrees and spiral back to the manifold. The spiral is flexible and convenient. If there is too much tubing left over when you get back to the manifold, simply tighten up the spiral and the excess tubing will be taken up. If you have the opposite problem and you cannot get back to the manifold, simply relax the spiral and more tubing will be freed up.



Use multiple parallel circuits instead of just one long one. Refer to and comply with maximum circuit lengths for the tubing that you are working with. Multiple circuits require less pump work and the fluid will not cool off too much. Because additional circuits run parallel to the first, they will be easy to do once the first circuit is in place and arranged properly. An exact tubing arrangement is not required.

The important points are:

1. Put in the linear amount of tubing that is required.
2. Space out the tubing reasonably well.
3. Do not kink the tubing.

Absolute precision is usually not very important. An exact and perfect arrangement is a waste of time and can also waste tubing. It is acceptable if the tubes cross one another as long as the concrete has adequate thickness.

Connect Tubing to the Manifold and Pressure Test

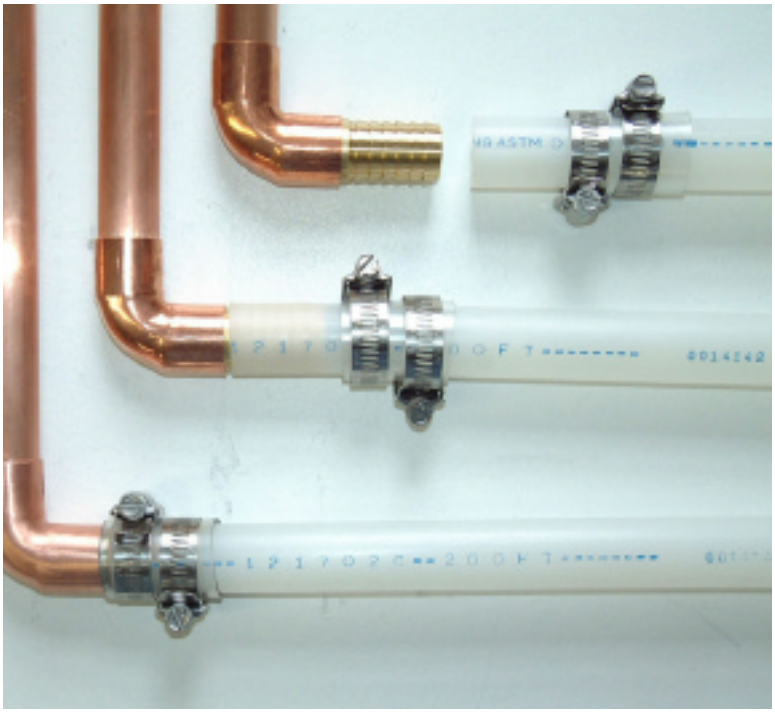
The manifold consists of a supply header and a return header that is connected across the top by the pressure testing equipment. At a later time, the headers will be separated for hookup to the heating unit and the pressure testing equipment will be discarded. At this time, however, the equipment will stay together so that it may be pressure tested prior to the concrete poor.

Partly take apart the manifold box so that the manifold is accessible. Secure the partly disassembled box with stakes so that it does not become crooked during the work. This is quite important because after the tubing is hooked up, it may not be possible to straighten the box and an unprofessional appearing installation could be the result.

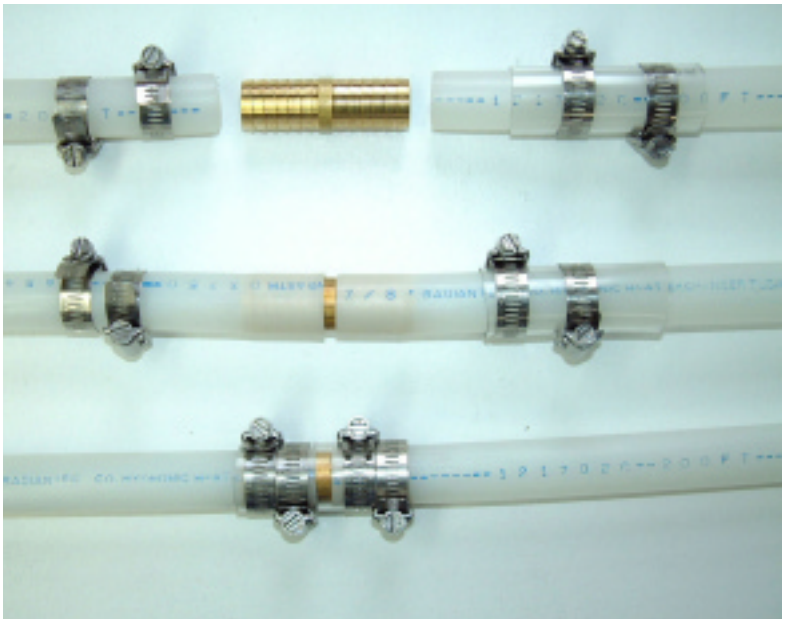
Designate one side as the supply header and the other as the return header (it doesn't matter which).

Connect each circuit of plastic tubing to a supply outlet on one side and to a return outlet on the other side. Run the tubing into the box through the opening at the bottom.

The tubing should come straight into the plywood box to avoid strain on the fitting. Excessive strain on the fitting may cause it to leak.



Adaptors for 7/8” tubing



Coupling for 7/8” tubing

To make the connection with 7/8” tubing, first slip the vinyl sleeve and stainless steel clamps over the end of the plastic tubing. Warm the tubing with a heat gun or boiling water to slightly soften it. Some workers will **very carefully** use a torch but we cannot recommend the practice.

Push the warmed plastic end onto the insert adaptor all the way to the shoulder of the fitting.

Bring the vinyl sleeve and the stainless steel clamps back down the plastic pipe to the serrated part of the adaptor and screw the clamp down tightly with the vinyl sleeve acting as a cushion.

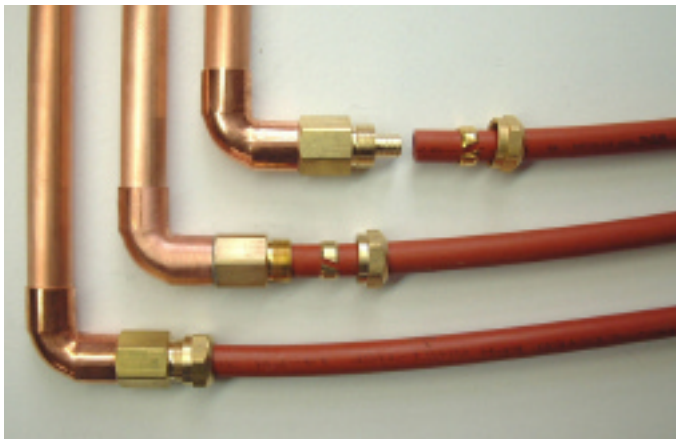
Double clamp the fitting for an extra strong connection. Plan the connection so that the hubs are opposite each other.

If a coupling is used, be sure to double clamp each end and be sure to use the vinyl sleeve so that concrete does not come in contact with the brass fittings.

In general, fittings should not be cast into concrete, but if absolutely necessary, these fittings are very reliable.

Do all soldering first. Do not solder close to the plastic fitting.

When using 1/2inch PEX tubing, the fittings will be of the compression type.



Adaptor for 1/2" PEX

Coupling for 1/2" PEX

Slide the locking nut and split compression ring up the tubing.

Insert the tubing onto the compression fitting.

Tighten the nut onto the compression fitting snugly.

Compression coupling fittings should be isolated from the concrete with electrical tape or equivalent.

Pressure Test

1. Charge with air to 50 psi. Wait two hours. There should be no loss of pressure.

Pressure test the work before you pour the concrete.

2. Use newspapers or rags to seal off the area of the box where the tubes enter so that concrete will not enter the box.

3. When you're ready to hook up your system, the pressure testing equipment can be taken off by applying heat to the elbows. One elbow is the air vent and the other has the air stem.

Suspended Slabs

When tubing is installed in suspended slabs or topping slabs, the process is very similar to that of a slab on grade. However, these slabs tend to be thinner, and reinforcing and-placement of reinforcing steel is more important. There should be a minimum of 1 inch of concrete covering the tubes.

Lay the tubing out and secure temporarily with duct tape, or something similar. Then place reinforcing mesh over the tubing and secure well with concrete nails if over a concrete sub-base, or wide head roofing nails if over plywood.

Tool List

1. Phillips and flathead screwdrivers.
2. 5/16" nut driver (optional).
3. Hacksaw (to cut the tubing).
4. Long tape measure.
5. Air compressor with "tire" type adaptor (for the pressure test).
6. Adjustable wrench.
7. Heat gun.
8. C clamps, screws, etc. to secure the manifold

Important notice *- These design and installation suggestions are of a general nature and they are based upon our 25 years of experience. It is important to understand that every project is a little different. It is the role of the designer to incorporate all available information into the project. Radiantec makes no representation that these general suggestions are applicable to any particular project. Radiantec takes no responsibility for the design of any heating project. Radiantec makes no representation about the completeness of the information provided. It is important to comply with all building codes.*

Revised on
1/18/04