
HeatPex Product Installation

Installation And Design Considerations

When planning the installation of HeatPex Radiant Floor Heating System, there are a number of important factors that need to be considered.

Heat Source and Energy Costs

Due to the low input temperature required by radiant floor heating systems, typically in the range of 40oC to 55oC, a number of heat sources may be considered. The choice may be determined by the initial cost of the plant, the ongoing cost of the required fuel, Environmental Considerations or a combination. Options include Natural Gas and LP Gas, Electric Heat Pumps and Geothermal Systems as well as Thermal Solar Systems.

Plant and Manifold Locations

It is simpler to install and commission a radiant under floor heating system if the manifold(s) is centrally located within the building. Centrally locating the manifold will make circuit lengths of even length possible. It is important that the manifold is positioned at the highest part of the system, i.e., if installing floor heating in a split level or multi story building with under floor heating on each level, then the manifold must be installed on the upper level. Alternatively, a manifold could be placed on each level.

Heat Outputs, Room and Floor Temperatures

HeatPex Under Floor Heating Systems installed with pipe spacing's at 200mm centres produce a maximum of 100W / m2 with a 20°C designed room air temperature and a 27°C floor temperature. This is generally easily achievable with new-build applications. On applications where the heat loss of the building exceeds 100W / m2, designs for additional under floor heating pipe work with spacing's of 100mm centres need to be implemented and /or additional heating sources may be required.

Floor temperatures must not exceed 29°C and the input temperature must be adjusted and lowered.

The sizing of the heat source or boiler is determined by calculating the heat requirement for the area that needs to be heated. It is important to check that the boiler has sufficient capacity for the total heated area. If the calculations are close, it is recommended to increase the boiler size to the next level above its' nominated requirement.

Floor Finishes and Coverings

Ceramic Floor Tiles

Ceramic and porcelain tiles work very well with HeatPex underfloor heating ensuring minimal levels of resistance to heat transfer. Flexible tile adhesive and mastic edge seal and joints should be used to allow for expansion and avoid cracking of the tiled surface. Please check with the manufacturer of the adhesives for suitability for use with underfloor heating systems.

Carpets

Carpets and their underlays have high levels of resistance to heat transfer. Thick rubber and felt underlays provide significant levels of insulation leading to a reduction of heat outputs of the system. Any adhesives must be suitable for temperatures up to 45°C. It is recommended to seek specific advice from the suppliers of these materials.

Vinyl

As a rule, this type of flooring works well with under floor heating systems as there is typically very little resistance to heat transfer. It is important that it be discussed with the flooring manufacturer that the flooring and adhesives are suitable for under floor heating to avoid loss of adhesion and softening of material.

Timber

Timber floor coverings work well, however, being a natural material, all timbers behave in different manners and thus it is recommended to seek advice from the flooring manufacturer in regards to the installation and initial start-up procedures. When installing over a structural slab or screed with underfloor heating, the finished surface must be fully cured before the covering is installed. At the completion of the curing, it is advised that the materials that are to be installed are placed in the area, with the heating system operating for approximately two weeks to reduce moisture in the area and allow the flooring materials to acclimatise.

It is strongly advised that specific information be obtained from the manufacturer or supplier of the proposed floor covering to make an informed judgement on the suitability of the floor covering for use in conjunction with underfloor heating.

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Areas To Be Heated

It is possible to achieve higher floor temperatures and therefore higher thermal outputs than are normally permissible under certain circumstances where there is more rapid heat loss. The pipe spacing along the perimeter of the room may be reduced to 100mm to increase thermal delivery in areas of higher heat loss. Examples of areas typical of greater heat losses include large external glazing and walls of high thermal mass such as double brick or rammed earth.

Controls

As with all climate control systems, suitable controls are required to achieve and maintain the desired comfort levels. An Underfloor Heating System may be used in conjunction with radiators or sub floor trench convectors.

Radiant Under Floor heating systems are most efficient in constant operation and although its operation is not as responsive as other heating systems, in order to minimise energy consumption, it is recommended that controls have a "set back" or "basil" temperature setting that simply reduces the temperature by 4 or 5°C during times of lower demand such as overnight, rather than switching the system completely off.

Manifold Position & Circuit Lengths

The choice of manifold size will be calculated by the number of heating circuits and separate zones that are required for the dwelling. HeatPex Radiant Underfloor heating pipe is available in 100 and 200 metre coiled rolls.

To avoid excessive pressure drops in the pipe installation, the maximum loop length is limited to no more than 100m. The number of circuits in each area will depend on the size of the area and the pipe centres calculated. The amount of pipe required can be calculated using the following guide.

Spacing	Max Area (m/m ²)	Max Circuit (m)
100	8.5	100
200	5.0	100

For example: If heating a living room of 19m² with 200mm pipe centres, then the length of Heat Pex pipe required would be 95m. (19m² x 5m/m² = 95metres) Installation Manual. However, if the length of the run of the flow and return to the manifold is 9m each way, this adds a further 18m of pipe to complete the loop, giving a total length of 113m. In this situation 2 loops are required to adequately heat the room. Once the number of heating loops is calculated, then a manifold with the required number of ports may be selected, pipe coils ordered and the pipe layout planned.

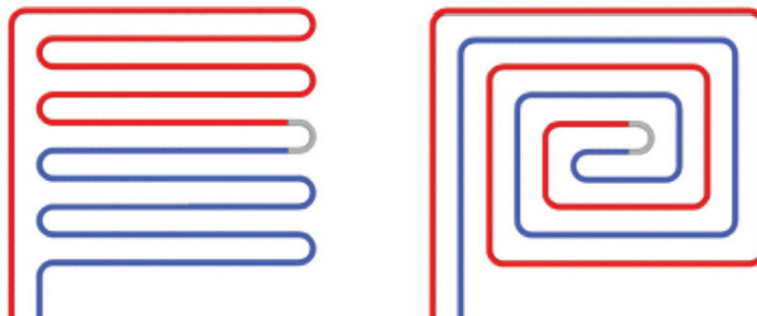
Planning Pipe Layouts

When planning and installing HeatPex Radiant Underfloor Heating pipes, there are two main considerations:

- > 1. **The pipes are laid out in such a way as to provide an even dispersant of the heat**
- > 2. **The pipes are laid out in such a way so there is a relatively even surface temperature across the finished floor.**

The optimum pipe layout needs to allow for the increased heating requirement for areas that also have colder exterior surfaces. Different patterns in the pipe work design can be used depending on each specific installation, considering external walls and windows where the highest heat losses will occur.

There are two main variations in pipe work layout design. They are:



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Serpentine patterns distribute heat to the exterior perimeter first, where heat loss is greatest, and then move towards the centre of the room, decreasing in temperature as it goes.

Counter Flow patterns provide for the optimum pipe layout by laying the supply and return lines next to each other, creating a closer average temperature between the pipes.

Note: In practice, both of these designs can be combined in order to achieve the desired heat requirements of a given space. Whichever layout pattern is chosen, the pipes MUST NEVER CROSS OVER in the floors and each pipe must start and end at its corresponding port on the manifold.

The pipe work is typically laid at 200mm centres. This is the same as most standard rebar weld mesh. With the pipe laid at 200mm centres, an input water temperature of 45°C and a desired room temperature of 20°C, the calculated output of the system is 100W/m². This combination results in a floor temperature of approximately 27°C.

Note: Floor temperatures must not exceed 29°C and the input temperature must be adjusted and lowered.

Pipe should be laid in a continuous length. Connections should not be made in an area to be concreted or screeded.

If an incident occurs and a join needs to be installed, then a HeatPex joiner may be used. Ensure the pipes are clean and bevelled and that no foreign material has entered the pipes. Ream the ends of the pipe and push the pipes onto the joiner until the pipe material can be seen in the indicator windows. Using the HeatPex crimp tool, compress the sleeve. HeatPex joiners are made from high quality DZR brass but it is still advisable to wrap the installed joiner with a layer of "Denzo" tape for protection.

Fix the pipe to the rebar on either side of the newly installed joiner using the DF-16 rebar tier tool. Pipe should be laid in a continuous length. Connections should not be made in an area to be concreted or screeded.

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Installing The Manifold & Pump Pack (Mixing Centre)

The manifold must be installed level, with a minimum of 400mm spacing from the finished floor level to the underside of the manifold. The manifold will need to be fixed onto a firm point such as a wall or a bracket tied into the slab steel. This will prevent the manifold from being twisted by the torque of the connected pipes.

The pump pack (mixing centre) is fixed to the side of the manifold and is essential in maintaining the appropriate water delivery temperature into the slab. The Mixing header will adjust the higher temperature water from the boiler from entering the underfloor heating pipes and potentially damaging the slab.

Connecting The Flow and Return (F & R) Pipes

Connecting the Flow and Return pipes from the heat source to the under floor heating manifold can be done in two ways.

The first is to run the F&R pipe work either below or on the top of the steel mesh. This is usually done using the pre-insulated HeatPex piping. Typically, for a manifold with 6 ports or less, 20mm Insulated Heat Pex pipe can be used, and for 8 to 12 ports a minimum 25mm insulated Heat Pex piping is used. The F&R pipe work MUST be insulated as the high temperature water from the heat source will crack the slab if not properly insulated.

The second is to run the F&R pipe work through the walls or ceiling cavity. It is recommended that the pipe be 25mm insulated Heat Pex and that an Automatic Air Eliminator be installed if any part of the pipe work exceeds the height of boiler.

Fixing The HeatPex Piping To The Mesh In The Slab

Starting at the manifold, connect the flow pipe for the first under floor pipe circuit to the flow side of the manifold. To do this, cut the end of the pipe square using a set of pipe cutters and remove the sharp edges and burrs.

Insert the 16mm HeatPex manifold core connector nut and tail making sure not to damage the O-ring seals. Join the nut and tail to the manifold.

From the manifold, proceed to lay the pipe to the first circuit as per pre-designed configuration. Secure the pipe to the steel mesh at intervals of 400mm (2 mesh squares) using the Wacker Neuson DF-16 Rebar tying machine. Radius bends should not be tighter than 150mm.

The Wacker Neuson DF-16 Rebar automatic tying tool allows the HeatPex pipe to be tied to the reinforcing mesh in a slab in a fraction of the time it normally takes. The ergonomic design of the tool means that tying the pipe to the mesh is no longer a back-breaking job. Not only will you significantly increase your working speed when compared to conventional methods for tying pipe to rebar with a pair of pliers or cable ties, the ease of operator use improves productivity thanks to the unit's outstanding ergonomics. The operator can work in an upright and easy posture and the strain to backs, wrists and fingers is reduced considerably.

Once the pipe loop has been completed, continue to run the pipe back to the manifold and connect into the corresponding return connection.

It is important to note that when installing the piping through holes in the construction, through larger masses of concrete such as through steps or through expansion joints, the pipe should always be sleeved with a section of HeatPex corrugated conduit or "Arma flex" type insulation to allow for sufficient expansion and movement.

When all zone loops have been installed, complete the installation by adding the pump pack to the manifold and connecting it to the boiler flow and returns. At this point it is time to fill the system and conduct a pressure test.

Filling and Pressure Testing The System

The following procedure can be followed to successfully fill the system:

- a. Make sure all connections on the manifold and pump pack are done up tight and firm and that all valves are closed
- b. Connect a water hose from the mains supply to the lowest fill port and then connect a second hose to the upper fill port and terminate the other end of this second hose in a bucket that is half full of water. This bucket should be placed on the proposed slab area and in a position that will drain well
- c. Open both the upper and lower fill ports
- d. Turn on the mains water supply and fill the hydronic under floor system, circuit by circuit, by opening the individual circuit valves. Flush each pipe watching until there are no more air bubbles coming out of the hose that is terminating in the bucket
- e. Close the circuit valves and repeat for all other circuits, closing the fill ports when complete
- f. Pressure test the system using a hydraulic test bucket, or a hydronic fill valve. The system should be tested at twice the operating pressure. For example, if the operating pressure is 1.5 Bar then test at $2 \times 1.5 \text{ Bar} = 3 \text{ Bar}$
- g. The pipe work and fittings should be visually inspected for leaks at the test pressure. Leave the system under pressure during the pouring of the concrete
- h. The concrete should be poured as soon as possible after laying the pipe circuits and completing the pressure testing
- i. During the curing of the concrete, it is usual for the pressure in the pipe work to rise, as often there is an increase of temperature as the slab cures.

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Note: Under no circumstances should the system be used to reduce curing times of the concrete.

Initial Start Up

Following the installation and pressure testing of the system, the Start Up procedure for the system is as follows:

- a. The slab or screed should be allowed to cure in accordance with the manufacturer, specifier or engineer's instructions
- b. Set the room thermostat/thermostats to the desired comfort level, which must be a temperature above the current room temperature so that the thermostat enables the heating system
- c. The initial Start Up should have the input flow temperature entering the system at no greater than 25°C and shall be maintained at this for the next 3 to 4 days of operation. With the pump pack manifold pump operating, adjust the mixing valve so that the outlet/flow temperature gauge shows the temperature to be no greater than 25°C
- d. After 3 days, the flow temperature may be increased a further 5°C to 10°C per day until a temperature of 45°C is achieved.
The mixing valve will automatically maintain the input flow temperature
- e. The final operating temperature should be maintained for a further 7 days minimum
- f. At this stage, for system safety, the overheat thermostat should be set 10°C to 15°C above the 45°C that is set on the mixing valve
- g. The Under Floor Heating system should be operated for a minimum of 2 weeks before any floor coverings are laid.

Commissioning

Ensure that the entire Hydronic system, including any radiators, is operating to the required temperatures. Each under floor zone circuit can be slowly adjusted using the flow set valves on the flow manifold. This will ensure that each circuit has an even flow and that all areas will heat up at the same rate. It is advisable to do the final commissioning once all the floor coverings have been laid. This will allow for a complete balance of the system.

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The information contained in this installation manual is general in nature and is intended to provide an overview of the installation techniques and issues to be addressed when installing the HeatPex underfloor heating system. It is not intended to be a comprehensive guide to installing under floor heating systems and has been provided for professional installers. Should specific information be required for an installation application, please email us at info@coutagroup.com.au and we will be happy to provide more detail for a specific installation application.