

Floor Constructions for Underfloor Heating

Underfloor heating is very much an integral part of a building and there are several variations of the Evenheat system designed to suit the differing floor types found in building construction. Evenheat has the expertise to advise on selecting the best system for your project.

Standard Screed Floors

Within this system, insulation is placed on top of a ground bearing floor slab, block and beam, or suspended concrete floor to prevent the downward passage of heat. The insulation is covered with a lapped Vapour Barrier to protect it from chemicals in the screed. It is essential that the architect specifies the grade and thickness of the insulation to comply with building regulations and whether acoustic insulation is required to a Robust Detail, as this can affect the choice of pipe fixing systems.

The Evenheat cliprail system is secured through the vapour barrier into the insulation by way of plastic staples. The pipe is then pushed into the cliprail at varying centres to suit the Evenheat design. At the ends of loops, and at any other points where the pipe is 'sitting up' from the insulation, additional staples should be used to secure the pipe to the insulation before screeding.

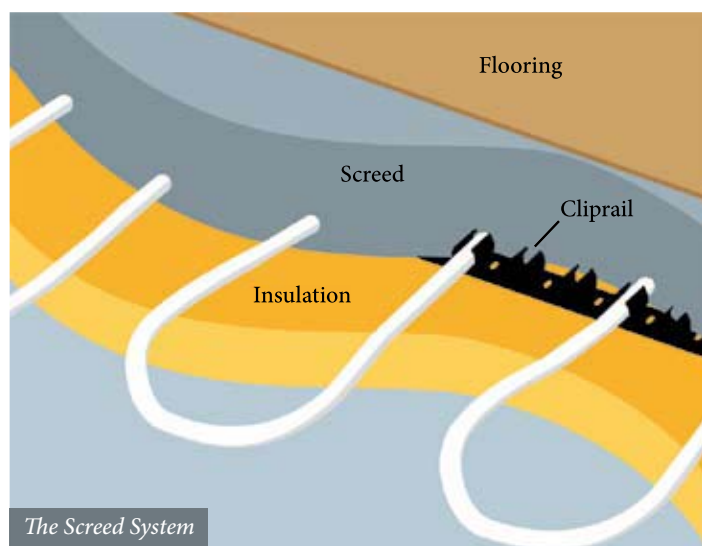
In some instances where the cliprail cannot be secured to the insulation, A98 or A142 reinforcing steel mesh* is laid on the vapour barrier. This provides a fixing point for the pipe (using cable ties) and forms a layout grid, so ensuring uniform centres.

Perimeter edge insulation* must be installed to prevent thermal bridging between the screed floor and the wall. Any expansion joint positions must be made clear to Evenheat prior to design and marked on site, prior to installation.

The screed must comply with British Standard Codes of Practice and be allowed to dry out slowly and naturally.

Liquid Flow Screeds

Flow screeds, by the nature of their application, can be very fast to lay and will chemically harden within hours to allow foot traffic. However, overall drying times for the laying of floor finishes can be slower than desirable. Fortunately, it is possible to accelerate the drying time by slowly inputting energy via the floor



heating system. Screed thicknesses can be reduced and in some cases, smaller pipe diameters can be used, if floor heights need to be kept to a minimum.

The floor heating installation for flow screed is similar to standard screed, utilising cliprail for pipe fixing. However, due to its density, the liquid screed can tend to lift any inadequately secured pipe. We therefore recommend using additional cliprail and staples to prevent this. The vapour barrier will also need to be taped and tanked up the wall to prevent the screed from lifting the insulation.

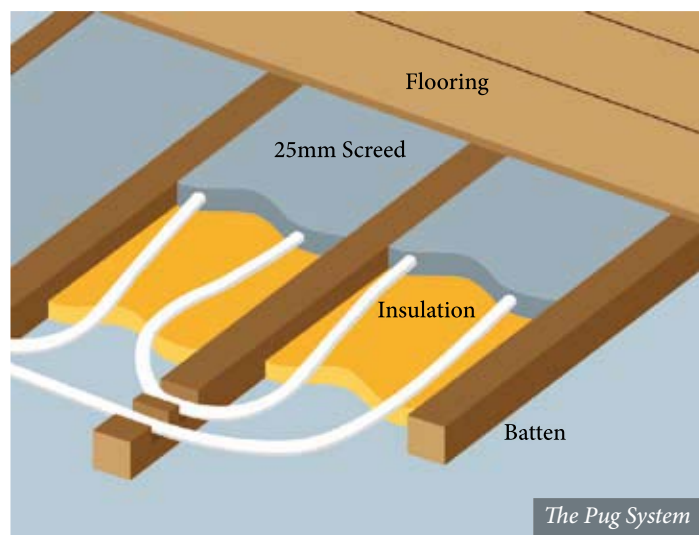
Preparation for liquid screed, including decisions on thickness and drying times, should be discussed directly with the screed manufacturer.

Power Floated Slab

Concrete is a great conductor of heat, so extra thickness of construction does not necessarily create a heat output issue, but the increased mass will slow the reaction times.

The Evenheat pipe can be tied to the reinforcing mesh. In the case of a thin ground bearing slab, the fixing mesh should be sat on 'chairs' to lift the pipe deeper into the concrete. In most cases, it is beneficial to position the pipe towards the top of the slab, although in practice this can be difficult.

Evenheat can advise on the thermal requirements for the heating system. However, it is the responsibility of others to ensure that all building regulations are met for the project.



The Pug System

The 'Pug system' (a thin biscuit of screed) is used where a mechanical fixing is required for a timber floor finish. The Pug system can be used with solid or suspended concrete floors and occasionally in timber suspended floors.

The Pug system is installed between battens, usually set at 400mm centres, allowing 200mm centres for the pipe layout design. The system requires a minimum base of a 25mm dense insulation board, depending on building regulations. In some instances, a vapour barrier may be required (as specified by the relevant manufactures). Plastic cliprail is fastened to the insulation and the PEX pipe then fixed into it. A minimum of 25mm screed is

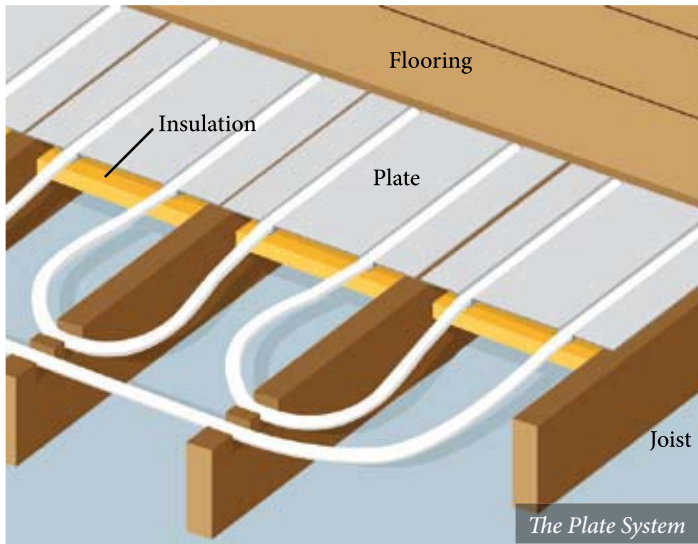
then laid, ensuring that it penetrates fully underneath the pipe and sits level with the top of the batten. As the screed is directly beneath the covering board, heat conductivity is increased. Once the screed has been allowed to cure, the timber floor finish can be screwed into the still exposed timber battens.

It is important to remember that the screed is to be mixed fairly dryly and is for heat distribution only. Any cracking will not effect system performance.

The Pug system is ideal for constructions where floor build up is restricted. This particular system can lower overall floor constructions by 20mm in comparison to standard screed floors.

The Pug system can also be installed into timber suspended floors. Our preference is for timber boards to be fixed on battens between joists to support the system. An alternative is to use the insulation board to support the system. However if the board was to de-gas, this could result in the screed breaking away from the underneath of the floor, inhibiting the systems performance.

Evenheat's experience indicates that pug systems installed into timber suspended first floors are very labour intensive. A plated system is recommend in preference.



The Plate System

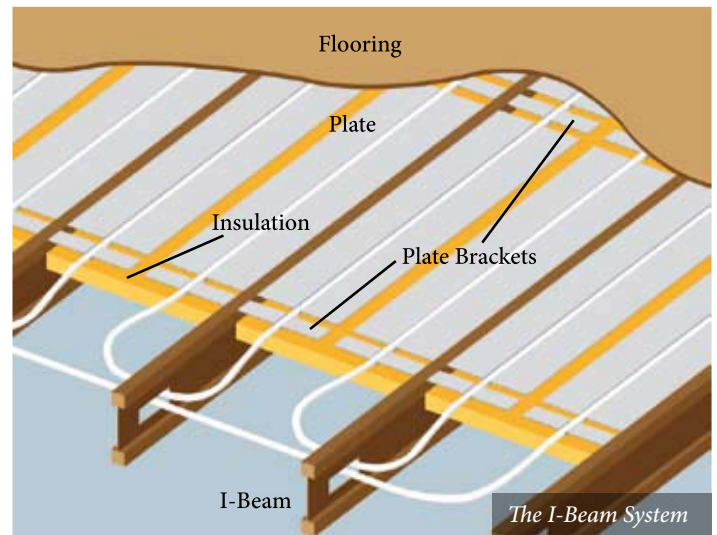
The Evenheat 'double plate' system was developed to fit traditional 400mm (16") joist centres. Two pipes are installed between each joist†, boosting response times. The 0.5mm pressed aluminium heat diffuser plates hold two pipe channels shaped to ensure good conductivity to the plate.

The Plate system can be installed with the plates stapled directly to the joists. However, care must be taken to ensure that any notching of the joists is carried in compliance with building regulations. We recommend using the alternative Cross Battened method. This avoids the need to notch the joists, and also avoids fitting problems on any that are irregularly spaced.

Minimum batten thickness to suit the plates is 20mm. However, the thickness of batten must satisfy the structural spanning of the floor decking or covering. As with all floor heating systems, insulation is required to prevent downward transmission of heat.

I-Beams

The 'I-Beam' presents a challenge to floor heating designers because the top and bottom of the joists can't be notched. If space



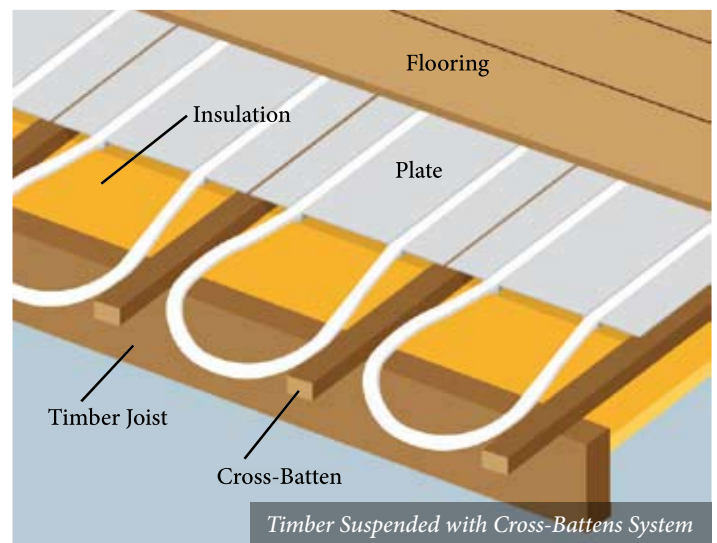
allows, we recommend cross battening to lift the heating system above the joists. Although it is possible to install from below, threading the pipe runs through the joists (as pictured), is very time consuming. Please contact a member of the Evenheat team to discuss the most appropriate method to suit your project.

Floating Floors

A floating floor utilising chipboard with glued joints 'floating' on insulation can be used in place of screed if a 'wet trade' is not desired. The Evenheat system uses insulated board routed to accept aluminium plates and pipes based around 200mm centres.

The insulation board can be varied in type and thickness of material to suit the needs of the particular project and building regulation compliance. It is therefore important to specify your project's requirements when requesting a quotation.

As with all underfloor systems utilising aluminium plates, the response time is faster than high mass floor constructions giving shorter warm up and cool down times. It may be counter intuitive, but this is not always an advantage. This is why it so important to discuss any underfloor heating project with the experts.



* Unless specifically detailed as an additional item in the Evenheat underfloor heating quotation, this item will need to be supplied and installed by others.

†Please note that when installing at 200mm centres, the pipe must bend on a 300mm radius (creating a "light bulb" shape).

Controls and Heat Sources

Specifying Controls

In determining the best form of control for your underfloor heating system, we will need to know how the building will be used and what the heat source will be. Below are some points that need to be reviewed in determining the control package. Evenheat's experts can help you determine the control system that is best suited to your project's needs.

Room Control

This generally takes the form of a wall mounted room thermostat. This sends a signal to open or close a small electronic actuator on the underfloor heating manifold. These thermostats are hard wired* as part of the first fix building operation.

An alternative is to use radio frequency (RF) thermostats. The thermostat "sender" goes in the room to be regulated and the "receiver" is mounted near the manifold and hard wired to the electronic actuator. The radio link between the two units avoids the need for hard wiring from the room thermostat to the manifold.

Wiring Centre

This generally requires a time feed from a programmer. The switched live from the thermostats open their relevant individual control actuator and runs the underfloor heating pump. A relay within the wiring centre then can activate the heat source.

Zone Control

A zone within a building may have a different occupancy time from the rest of the building. In this instance, if a single zone is required served by one manifold, we would provide a motorised valve at the manifold to isolate the zone. The motorised valve can then be time controlled to suit the zone's usage.

Night Set Back

Many buildings and offices are not used at weekends, but need to be operational first thing on a Monday morning. While the building is unoccupied, it is best to run the underfloor heating at a low back-stop temperature in order to avoid the fabric of the building becoming too cold†. This will ensure the system reaches the normal operating temperature promptly on Monday morning.

Weather Compensation

The principle of weather compensation is to vary the output of the heating system in relation to the outside temperature and internal conditions. It is achieved by mixing hot water from the boiler primary circuit with the cooler water from the underfloor heating circuit using a motorised mixing valve controlled by an outside temperature sensor and compensation controller. The outside sensor needs to be sited carefully, avoiding direct sunlight and other heat sources.

Heating Appliances

It is important to advise us if there are any other heaters being supplied by the same boiler as the underfloor system. These other heat emitters need to be on their own piped circuit from the boiler, so that each heating circuit can be individually time controlled on a multi-channel programmer.

In some larger buildings, all the pumping and water temperature control may be done within the main boiler plant room. This alleviates the need for the Evenheat manifolds to be equipped with pumps and mixing valves.

Type of Boiler

For energy saving reasons, building regulations now stipulate that condensing boilers are to be used on new installations. An Evenheat underfloor heating system is the ideal partner for this type of boiler. The low flow temperatures used for the underfloor heating manifold connections enables the boiler to operate in its most efficient mode, maximising the energy saving benefits.

Heat Pumps

Just like the condensing boiler, these are ideal for underfloor heating systems. It is worth noting that a heat pump's coefficient of performance (COP) is greater at low water flow temperatures. Evenheat can design to reduce flow temperatures to a minimum, so optimising heat pump efficiency.

* This item is normally installed by the electrician doing the general electrical installation, therefore the installation labour for this is not included as standard in an Evenheat quotation.

† Please note that well insulated buildings with high mass systems lose heat very slowly, so with multiple time controls such as programmable thermostats, the set back periods can become "off" periods.



Manifold Assembly



An Order Ready for Packing & Shipment