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Firebird®
Central to Heating

Envirofloor™

Underfloor Heating Systems

SUPERIOR HEATING SOLUTIONS
SINCE 1980

An economical and environmentally friendly alternative to traditional heating and hot water systems.

Firebird Products Ltd are market-leading manufacturers of heating products with a proven track record built on the global supply of heating systems. Established in Ireland in 1980, the Firebird name has become synonymous with performance, quality and innovative design.

At the forefront of technology, Firebird are committed to providing cost-effective, energy-efficient heating solutions that not only meet, but easily exceed today's stringent legislative requirements. Historically an oil-fired boiler manufacturer, the product range has been expanded to include air source heat pumps, biomass boilers & stoves, solar thermal systems and underfloor heating systems.

Underfloor Heating Systems

Underfloor heating is not a new concept and dates back to Roman times when hot gasses from a fire or furnace passed through a network of flues under the floor of the building. From the 1960's onwards, various modern systems have been introduced which include expensive to run electric underfloor heating and steel pipes, which had expensive material costs. In 1975 plastic underfloor heating pipe was introduced into the UK which greatly reduced the material cost and allowed wider access to this highly efficient way of heating.

Suitable for both new build and renovation projects, 'wet' underfloor heating is the most efficient way to provide space heating as it is up to 25% more efficient than traditional radiators. Heat is supplied directly to the floor as radiant heat (which is distributed evenly), creating a more comfortable environment than the convected air provided by conventional radiators. Generally running at around 45 degrees, as opposed to 80 degrees used in radiator systems, saves on energy and running cost, especially when used with a renewable heat source such as the Enviroair air source heat pump.

Envirofloor underfloor heating systems are suitable for a wide range of ground and upper floor constructions. Using the full range of system components it is simple to create individual heating systems to achieve required comfort levels. Envirofloor underfloor heating systems can be easily combined with radiator systems for extensions and conservatories, or to create a mixed heating system offering radiators on upper floors if desired.

Underfloor Heating Systems

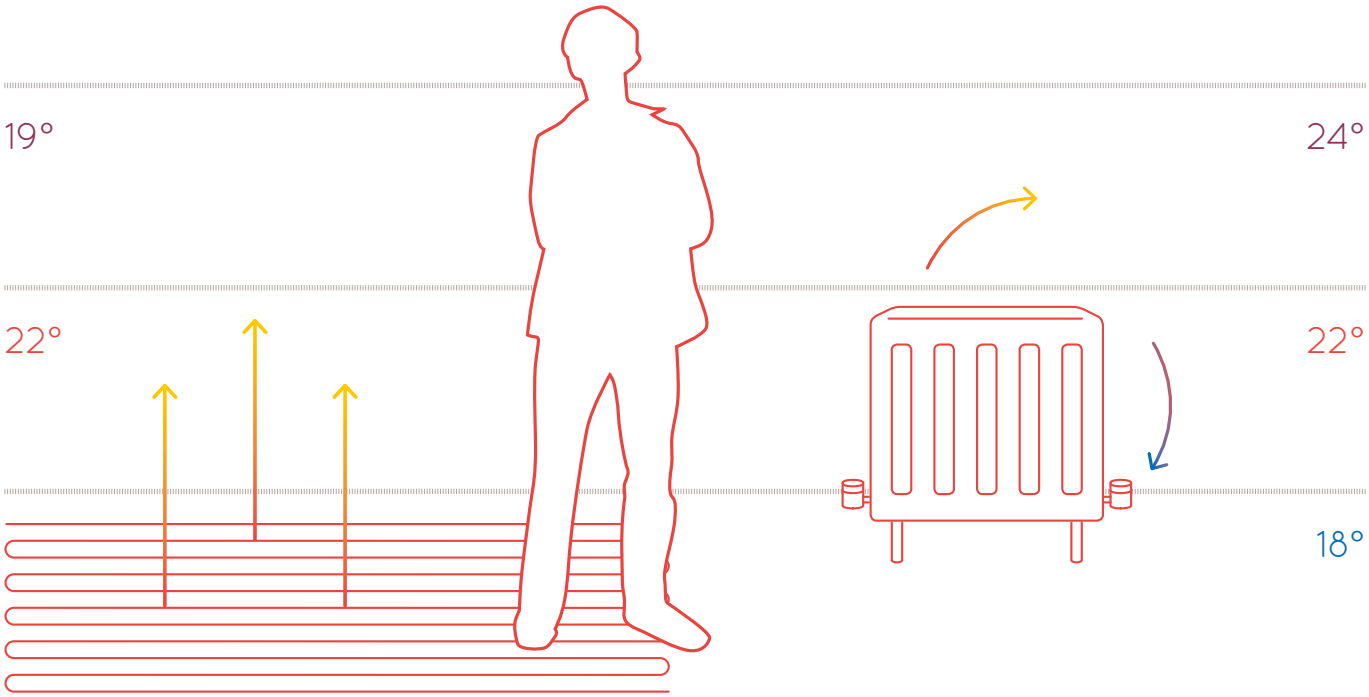
The Benefits

- Efficient and even heat distribution – heat rises uniformly from the floor, rather than having warm air pockets around radiators
- Up to 25% more efficient than traditional radiators
- Cost-effective – the lower water running temperature requires less energy and reduces heating bills
- Frees up wall space for room layouts
- Low maintenance
- Reduced airborne dust pollution – ideal for asthmatics
- Suitable for new build and renovation projects
- Rooms and zones can be controlled independently
- Replaces traditional radiators
- Suitable for use with solid and suspended floor constructions
- Virtually silent when running
- Suitable for use with a wide range of hot water sources
- More efficient than electric systems
- Lower fuel usage means lower CO_2 emissions

Underfloor v Conventional Heating Systems

An underfloor heating system can be slightly more expensive to install than a traditional radiator system; however since underfloor heating is more efficient, the running costs are lower. If whole life costs are considered, underfloor heating does provide the better option – see BSRIA 'whole life costs' for further information.

There are also huge advantages in terms of comfort for the occupants, increased usable floor space and quieter running. Underfloor heating systems utilise a high proportion of radiant heat, the most comfortable form of heating. This provides the occupants with warm feet and a cool head which is the ideal temperature profile.



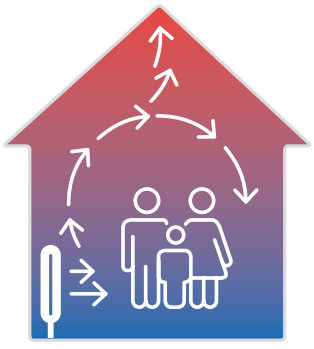
Underfloor heating provides an ideal temperature profile due to radiant heat.

How does a water underfloor heating system work?

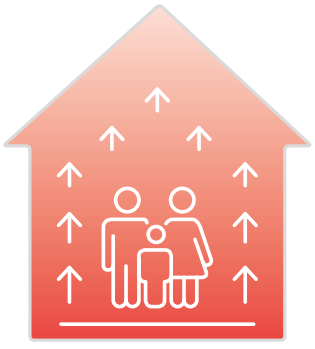
A 'wet' underfloor heating system is like a giant radiator at floor level. A series of plastic pipes are connected to a heat source to circulate warm water throughout the floor to heat the space by producing radiant heat. Since the floor (the radiator) is so large and the heat is more evenly distributed, it only needs to run at a low temperature to heat the room.

This means that the water flowing around the floor needs to be at a far lower temperature than a traditional radiator system. More efficient to run than electric underfloor heating systems a wet' system is also better suited to larger rooms and for use in multiple areas.

The diagrams below illustrate how the heat travels around the room in a radiator system (left) and in an underfloor heating system (right). The underfloor heating system heats the living area in the room, whilst the heat from the radiator system collects at the ceiling – a much less efficient heating method.

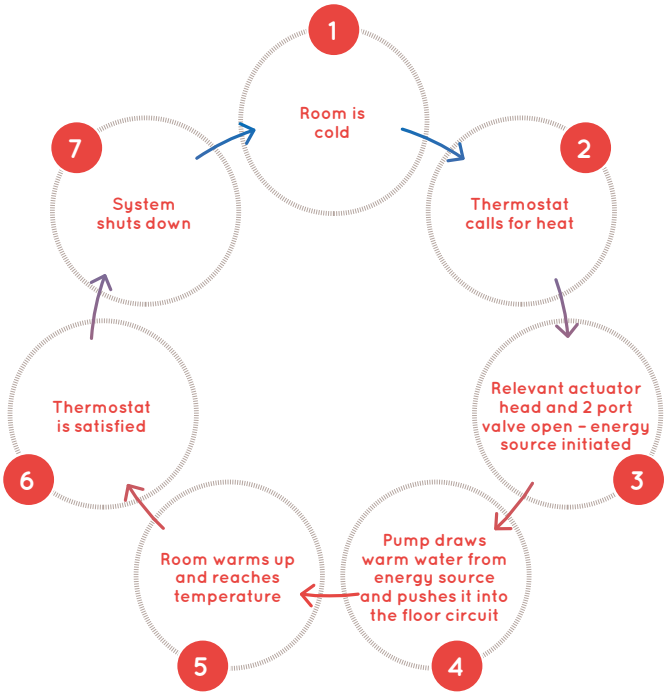


Typical Central Heating



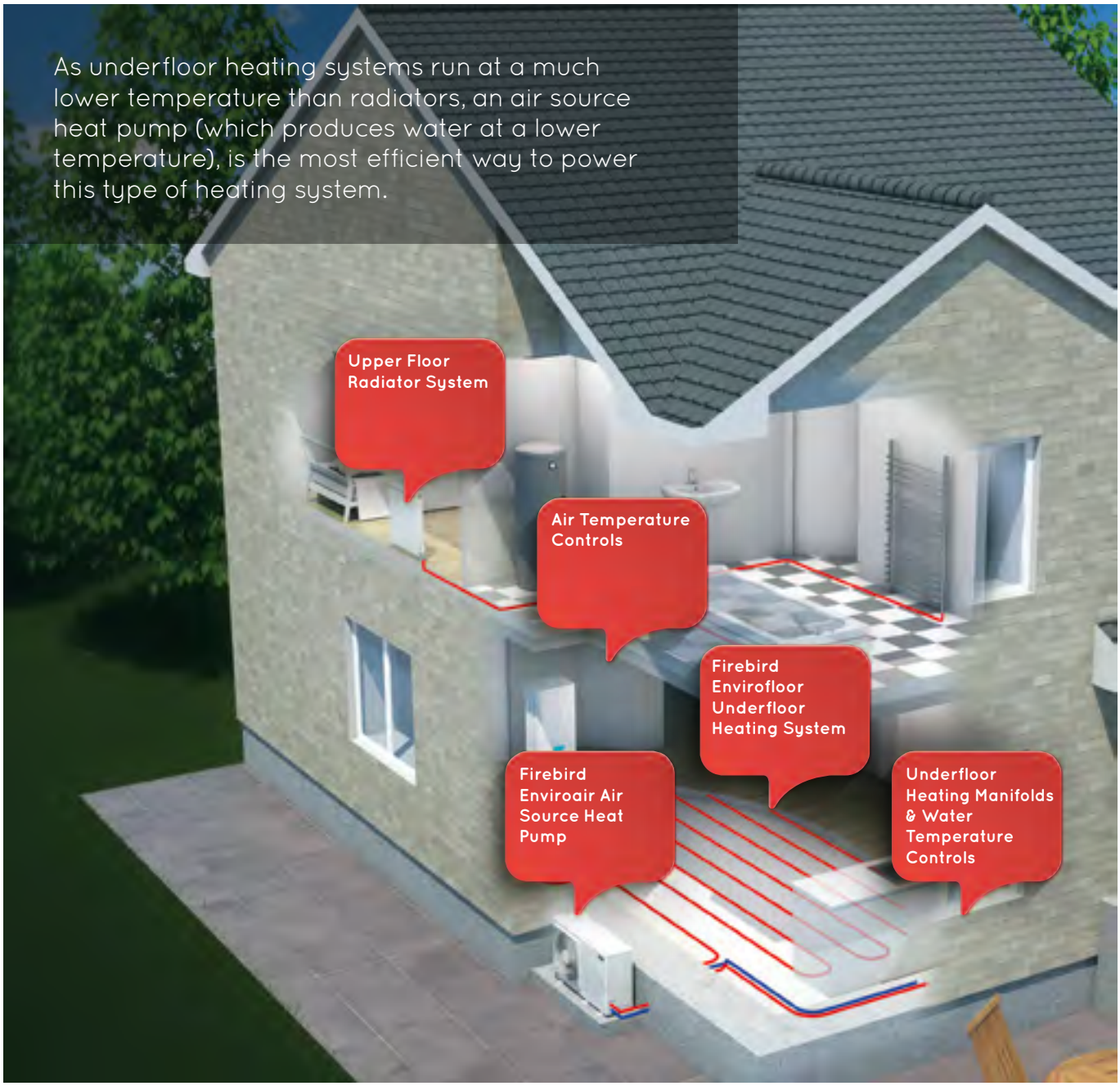
Radiant Central Heating

Following a basic sequence of operation, a typical controlled underfloor heating system will respond to the heat demand in the property as required.



Heat Sources

An underfloor heating system can work with a wide range of hot water sources, but the most efficient systems will incorporate renewable technologies such as air source heat pumps.



How does an Envirofloor underfloor heating system link with an Enviroair air source heat pump?

The underfloor heating system works in exactly the same way as a radiator system does when linked to a boiler in a traditional heating system. The water and air temperature are controlled through the Enviroair air source heat pump controller which operates the entire heating system.

Room temperatures are controlled effortlessly and efficiently with an intuitive, wired programmable thermostat, or by intelligent remote room sensors, which can be operated remotely via a smartphone app. The system controller automatically runs the entire heating system and has a built-in weather compensation control.

Enviroair air source heat pumps provide an economical and environmentally friendly alternative to traditional heating and hot water systems.

For further information on Enviroair air source heat pumps please contact the Firebird Technical Hub on **01752 691177** or **technicalhub@firebird.uk.com**.

System Design

Underfloor Heating Design

The process of designing an Envirofloor underfloor heating system is similar to that of any other heating system; but due to the nature of underfloor heating will ultimately lead to lower heat losses. This results in lower fuel costs for the homeowner and reduced carbon emissions which benefit the environment.

Over 50% of the heat output from an Envirofloor underfloor heating system is radiant heat, with the remainder made up by convective heating and a small proportion of the balance via conductive heat transfer. As the elevated temperature of the floor increases the rooms' mean radiant temperature, it is possible to reduce the air temperature while still creating a more comfortable environment for the occupants. When designing underfloor heating systems it is normal practice to use a 1-2°C lower design temperature.

The only exception to this is in bathrooms and ensuites where it is standard practice to use the same design temperature. This is due to higher ventilation rates, a lower available active floor area and the room usage. The use of towel rails is therefore recommended to supplement the underfloor heating.

Heat Loss Calculations

Building heat loss calculations should follow the conventional heat loss method but take into consideration the following minor variations:

- The lower design temperatures will mean the temperature difference between the external and internal temperature will be lower, hence lower heat losses.
- Since the floor is the heat emitter, the floor needs to be at a higher temperature than the internal environment. For this reason downward losses are not included in the heat loss calculations.

However the downward losses need to be considered when sizing heating plant and circuit flow rates. Downward losses should be minimised to below 10%.

Determining Heat Output

The nature of the radiant heat transfer will also mean lower convective currents and lower stratification, although this isn't evident in most heat loss calculations. The exception to this rule however is when a high ceiling is used. When designing a conventional system if the ceiling height is greater than 4.5m an additional factor should be added to the basic heat loss calculation with the percentage addition dependant on the ceiling height. With underfloor heating systems this is not necessary due to the absence of strong convective currents.

Floor Output

The output of an underfloor heating system is determined by the difference in floor surface to air temperature.

Maximum outputs are as follows:

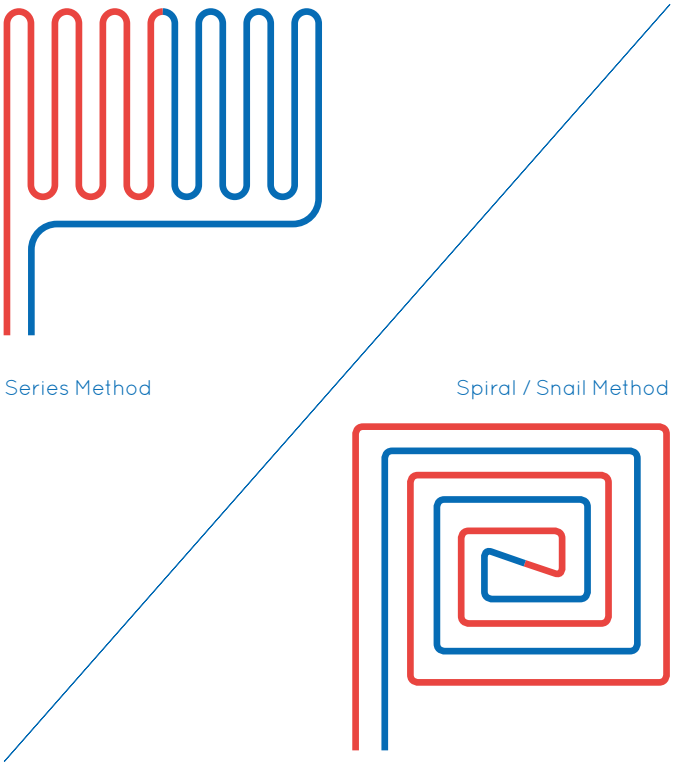
Underfloor Heating Manifold Locations

Manifolds should be located centrally in the building if possible. It is important to ensure that there is good access for maintenance or in the event of a problem. In domestic applications good locations would be underneath stairs, at the back of a kitchen cupboard, or in an airing cupboard on the first floor. If there is a requirement to conceal them, then manifolds can be located inside stud walls, behind an access hatch, or inside a dedicated cabinet.

When determining the location of a manifold, consideration needs to be given to minimise the amount of uncontrolled heating from pipes.

Underfloor Heating Pipe Layout

Typically two pipe layouts are used when installing pipe for underfloor heating:



Series Method

Spiral / Snail Method

The spiral method gives a slightly more even heat distribution in a room, however the series method is easier to plan and lay. The series method is more common in the UK.

Thermostat Locations

As thermostats operate by sensing the air temperature it is important to ensure that they are located in a position that is representative of the room overall. Areas to avoid include the following:

- Room corners
- Behind furniture units
- Behind curtains
- Close proximity to heat generating devices such as TVs, computer equipment, wall lights
- In direct sunlight
- On outside wall
- In line of draughts

Please note that this information is for guidance purposes only. For exact quotations and advice on system design please contact the Firebird Technical Hub on **01752 691177** or **technicalhub@firebird.uk.com**.

Key Components

Pipes

Firebird PE-RT (Polyethylene Raised Temperature Resistance) pipe is a key component of Enviroair underfloor heating systems. Developed in the 1990's, PE-RT pipe is used extensively across Europe and is particularly suited to solid floor constructions. A fully recyclable material, PE-RT derives its strength at high temperatures from its unique molecular structure.

Firebird PE-RT pipe is made up of 5 layers which are extruded together to produce a multilayer structure. This creates a homogeneous and very stable material bond.

The outer layer is made from PE-RT which serves as a protective layer for the EVOH (Ethylene Vinyl Alcohol) oxygen barrier. The smooth inner pipe is made from PE-RT to prevent pressure loss and pipe murmur.

- Oxygen barrier complies with the requirements of DIN 4726
- Installation protected from corrosion
- Resistant to chemicals
- Extremely flexible and easy to work with even at low temperatures
- High tensile strength
- Easily recycled

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Underfloor Heating Manifolds

The manifold allows for every loop of underfloor heating pipe in a building to be connected to and from the manifold, in a single continuous length, with no fittings in between. This completely removes the potential for any joint leaks. If there is a fault with an individual circuit, or maintenance is required then the relevant circuit can simply be turned off.

Underfloor heating manifolds are supplied complete with flowmeters for ease of commissioning. Also included within the manifold arrangement are fill and drain ports, automatic air vents and fixing brackets.

Water Temperature Controls

Firebird offer a wide range of products to control the water flow and temperature which include control packs, thermostatic mixing valves and weather compensators.

Air Temperature Controls

Room temperatures can be individually controlled using a wide range of wired and radio controlled systems, including app enabled technology. This allows the homeowner maximum flexibility, whilst increasing the energy efficiency of the building.

Envirofloor Underfloor Heating Kits

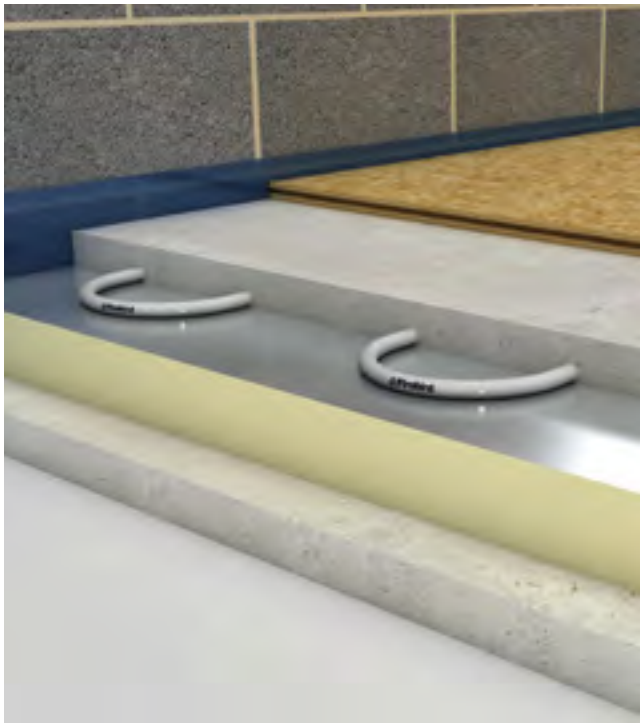
Envirofloor underfloor heating kits containing all the components required for use with an Enviroair air source heat pump are available for the following floor constructions.

Solid Floors

This type of construction is typically used on ground floors or block and beam floors. The Envirofloor underfloor heating pipes are laid on top of insulation board placed over a solid concrete base. Screed is then over the top of the pipes.

Envirofloor Underfloor Heating Kits for solid floor constructions include:

- Envirofloor underfloor heating pipe
- Pipe staples & clamp track
- Edge insulation
- Manifold including actuators, pipe connectors & isolating ball valves
- Circulating pump
- Wiring centre
- Programmable room thermostats
- Thermostatic mixing valve

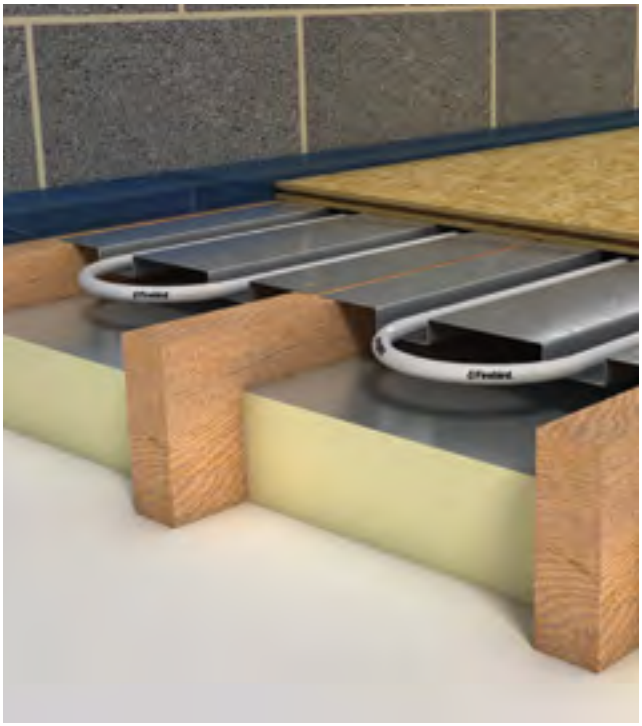


Suspended Floors

This type of construction is typically used on suspended timber floors. Envirofloor underfloor heating pipes are fitted into grooves in aluminium heat emission plates. Supported by the joists at 400mm centres the plates diffuse the heat, distributing it evenly across the floor.

Envirofloor Underfloor Heating Kits for suspended floor constructions include:

- Envirofloor underfloor heating pipe
- Heat emission plates
- Manifold including actuators, pipe connectors & isolating ball valves
- Circulating pump
- Wiring centre
- Programmable room thermostats
- Thermostatic mixing valve



Firebird Support

Customer Service

Firebird pride themselves on offering the highest levels of customer service possible. The level of service provided is monitored on a regular basis to ensure customers' requirements are always met.

Technical Support

Based at Firebird's UK headquarters, the **Technical Hub** provides customers with a comprehensive technical support package which is designed to make the specification and installation process as simple as possible. For technical support please contact the Firebird Technical Hub on **01752 691177** or **technicalhub@firebird.uk.com**.

Quality

Firebird Envirofloor™ underfloor heating systems are manufactured in accordance with the highest quality, environmental and energy management systems which include: **ISO 9001:2015**, **ISO 14001:2015** and **ISO 50001: 2011**. All products undergo rigorous testing procedures by external standards agencies to ensure optimum performance and efficiency. Every product is designed to meet a specific requirement and has been manufactured using premium quality materials to precise standards and tolerances.

Warranty

Firebird Envirofloor™ underfloor heating systems are covered by a 10-year* full consequential loss warranty. This excludes electrical components which are covered by a 2-year* product warranty from date of installation. For further information, please contact Firebird Products Ltd.

*Terms & Conditions apply.

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