

## GIACOMINI UNDERFLOOR HEATING

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## INTRODUCTION

# INTRODUCTION

### OUR CUSTOMER JOURNEY

At Glacomini UK we believe that installing an underfloor heating system should be easy.

- Our dedicated team of UK engineers will keep you informed all the way through your journey with us.
- All Glacomini products are manufactured to EU standards in our own factory in San Maurizio d'Opaglio, Northern Italy.
- We give a 10 year system warranty on all our designed and installed underfloor heating systems.

This underfloor heating guide is divided into three clear sections: system design, supply and installation.

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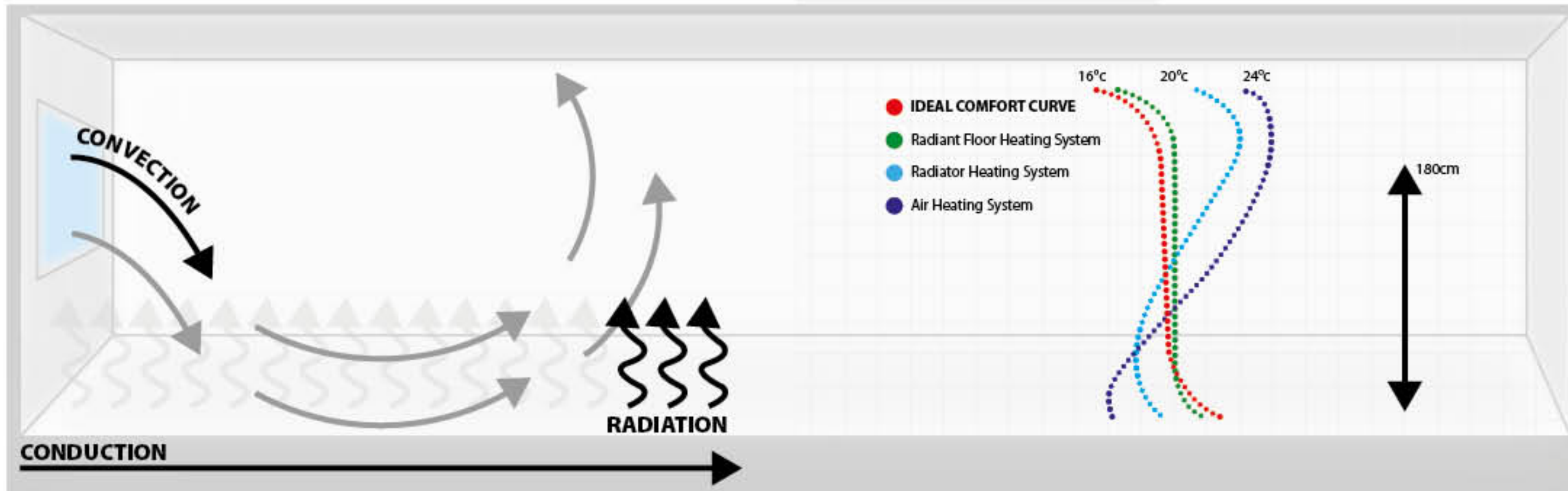
## HOW UNDERFLOOR HEATING WORKS

Radiant heating systems, such as underfloor heating, can work at low temperatures because the heat emitter is large, i.e. the entire floor!

The surface area of underfloor heating can cover a larger proportion of the room, whilst a radiator only covers roughly 5%. As the underfloor is a larger emitter of heat, it can work at a lower temperature and still give off the same amount of energy. Also, as the surface area of underfloor heating is close to the air temperature of the room, it does not drive natural convection.

There are two kinds of underfloor heating systems, wet and dry. The dry type of underfloor heating system consists of an electrical mat embedded in the floor. Electrical underfloor heating can be easy to install, however it can be very expensive to run.

Wet underfloor heating, which is what we specialise in, consists of pipes filled with warm water within the floor, this is a very energy efficient type of heating system, highly reliable and doesn't cost the earth to run!



## HEAT TRANSFER – BACK TO THE BASICS

Underfloor is often referred to as radiant heating as this is the primary type of heat transfer resulting from underfloor heating. It does however also partly work by convection and a small part is conduction.

There are three main types of heat transfer to consider:

- **Conduction**, the transfer of energy within solid objects or between objects that are in physical contact. This is the heat you can feel when you're holding a hot cup of tea.
- **Convection**, the transfer of energy between an object and its environment, due to fluid or gas movement. Radiators work mainly via convection when they heat the air up which then circulates around the room.
- **Radiation**, the transfer of energy by the emission of electromagnetic radiation. This is the type of heat you can feel when you are outside on a cold day and the sun comes out, you feel warm even though you are surrounded by cold air.

Radiant heat is not lost through windows, as it bounces back into the room, and it is not lost through ventilation, as it is not the air that has been heated up. The fact that underfloor heating works by radiation is one of the main reasons it is so efficient.

## WHY LOW TEMPERATURE SYSTEMS ARE EFFICIENT

A lot of modern technologies work better at lower temperatures, the obvious ones being heat pumps and solar thermal systems. But even conventional systems such as the condensing boiler, need low return temperatures for the exhaust gases to condense against. If the return temperature to a condensing boiler is too high, it will simply not condensate and a large part of its efficiency is lost.

In the case of heat networks, the flow and return temperatures are even more critical as not only will high temperatures prevent the use of a lot of modern technologies and prevent the boilers from condensing, the large amount of pipework that is involved will lead to higher heat losses with higher temperatures. If you are not getting a low return temperature from your secondary heating systems, it will be impossible to achieve a low return temperature in the primary system.

Another reason radiant heating systems are more efficient is that you can use a lower room temperature than you can with convection type systems, and still feel as comfortable.

## COMFORT EXPLAINED

How comfortable you feel with the temperature in a room will depend on the average temperature of the solid surfaces that surround you and the air temperature. As radiant heating systems heat up solid objects first, the warm surrounding surfaces will mean that you can have a lower air temperature and still feel just as comfortable. Again, think of how you feel when the sun is shining on you during a cold spring day.

Thermal comfort is highly individual, however, people tend to feel more comfortable when the temperature in a room is even, but their feet are only slightly warmer than their heads. This is called the Ideal temperature curve and underfloor heating naturally comes a lot closer to this Ideal temperature curve than radiators or other convection type heaters do.

## HOW UNDERFLOOR HEATING WORKS

### U-VALUES & HEAT LOSSES

The heating requirements of a property are worked out by looking at how much heat the property is losing, and how much heat needs to be added to replace any lost heat.

The two major ways in which buildings lose heat is through fabric heat losses, losses through walls, doors, windows, roofs and floors, and ventilation heat losses, losses through natural or forced air circulation.

U-Values are used to measure and calculate how fast energy flows through a layer of material and are expressed in Watts per square meter Kelvin ( $W/m^2K$ ). The lower the U-value, the better it is.

To be able to work out the U-value of say, a wall, you will need to know what the thermal resistance is of each layer, such as bricks, plaster and insulation. The thermal resistance is calculated using the thermal conductivity and thickness of each layer.

The thermal conductivity is expressed in  $W/mK$  and is the rate of which heat travels through a material.

Ventilation is important for any building to provide combustion air for gas boilers and cookers, to remove moisture from the air caused by cooking, washing or even breathing and to provide fresh air for the people living in the property. The building will either have natural or mechanical ventilation. It will also have infiltration to some extent, which is where there is unwanted air flow through gaps in the building, for example around doors or plumbing outlets.

When warm air leaves a building and is replaced with cooler air, the building is losing the energy contained in the air. To work out how much air is leaving the building you need to work out the ventilation rate, which is the rate at which air flows through the building.

As a lower air temperature is required when radiant heating systems are used compared to convection systems, you will have a lower rate of ventilation heat loss. Mechanical heat recovery units are heat exchangers which can be used to reduce ventilation heat losses from a building.

When you have calculated the rate of heat loss for your building through the building envelope and ventilation, you can work out your building heat loss based on the difference in temperature between indoors and outdoors. The outdoor temperature used is normally based on the coldest day of the year for the area.

## BENEFITS OF UNDERFLOOR HEATING

### REDUCED VENTILATION HEAT LOSSES

As it is solid objects that are primarily heated, less heat is carried in the air and you get lower heat losses overall.

### MIRRORS THE IDEAL COMFORT CURVE

The even room temperature will ensure more people feel comfortable.

### LOW SURFACE TEMPERATURES

No risk of burns.

### REDUCED AIR MOVEMENT

Radiant heating systems do not drive natural convection. This results in less circulation of dust, which is great for allergy sufferers, and also reduces draughts, which means greater comfort again!

### ARCHITECTURAL FREEDOM

Underfloor heating is invisible and will not interfere with the interior design. There are no bulky radiators or other heaters in the room taking up valuable wall space and furniture can be positioned freely.

### LOW LIFE CYCLE COST

Underfloor heating has a long system life cycle and requires little maintenance.

### LOW FLOW TEMPERATURES

As underfloor heating works at low flow temperatures, it can be combined with a large number of renewable energy sources that work best at lower temperatures. This can include solar thermal or different types of heat pumps.

### CONTROL

Unlike traditional existing radiator systems, which often use a single thermostat to control the whole system, an underfloor heating system can offer its users the ability to control individual rooms via separate thermostats linked to independent circuit actuators. This allows users the flexibility to program different areas to suit their application and demands, avoiding any unnecessary consumption of energy and money.

## UNDERFLOOR HEATING DESIGN

It is in our interest that you get the best out of your underfloor heating system, which is why we make sure to always design to the latest, most relevant standards.

In this part of the brochure we will go through what we need from you to be able to prepare your quote, as well as what you can expect from us.

We will talk about how to make sure we meet relevant standards and what to consider with regards to different design aspects, insulation, screed and floor coverings.

### PREPARING A QUOTE

Your Giacomini project engineer will return your quote as soon as possible. To speed up the turnaround time and to ensure the quote reflects the specific requirements of your project, we ask that we are given the following information:

#### QUOTE CHECKLIST

- Floor plans
- New build or existing?
- List of rooms requiring UFH
- Section drawings / floor build-up detail
- Heat source & any preferred manifold location(s)
- Mechanical & electrical specification
- Heat-losses & floor coverings, if available

## BS EN 1264 – WATER BASED SURFACE EMBEDDED HEATING AND COOLING SYSTEMS

BS EN 1264 is a European standard which includes all regulations which must be applied to water based radiant heating systems integrated in residential building structures, offices and other buildings which have uses similar to residential.

**PART 1** defines field of application, definitions and symbols used in the subsequent parts.

**PART 2** specifies conditions and methods to determine the thermal output of the system, based on the difference between the surface temperature and the ambient temperature. The thermal output is determined based on stated calculations and testing methods.

**PART 3** specifies the rules for dimensioning of the system. The system dimensions are set by determining pipe centres, flow temperature and flow rates through each circuit. This part specifies the maximum output that can be provided by a radiant heating system depending on the surface temperature.

For comfort reasons, it is suggested the floor temperature should not be more than 9°C above the ambient temperature of the room. In normally occupied areas with a room temperature of 20°C, this gives a maximum floor temperature of 29°C. This surface temperature will be high enough to give a sufficient output, but not so high it causes discomfort.

For bathrooms where the temperature requirement is often higher at 24°C, the 9°C rule will give you an acceptable surface temperature of 33°C. This is particularly useful in wet rooms, where it's necessary to dry out the floor quicker to reduce hazards.

If vinyl or timber floor coverings are used however, designers may need to limit surface temperature outside of these recommendations.

In areas where people are normally not seated, such as around the perimeter of the room and near doors and windows, the temperature difference between the floor and the room can be higher and up to 15°C. The floor temperature should still not exceed 35°C. Having a higher floor temperature near windows and doors where there is a natural drop in air temperature can mitigate the effect. The increase or decrease of surface temperature in certain areas should however not be done by means of controls, but by designing the flow rates to restrict output and by selecting an appropriate pipe spacing.

**PART 4** covers the installation of the system and defines the minimum requirements of the materials used and the provisions that must be complied with for a correct installation.

**PART 5** is for determining the thermal output of surfaces other than floors, such as walls and ceilings.

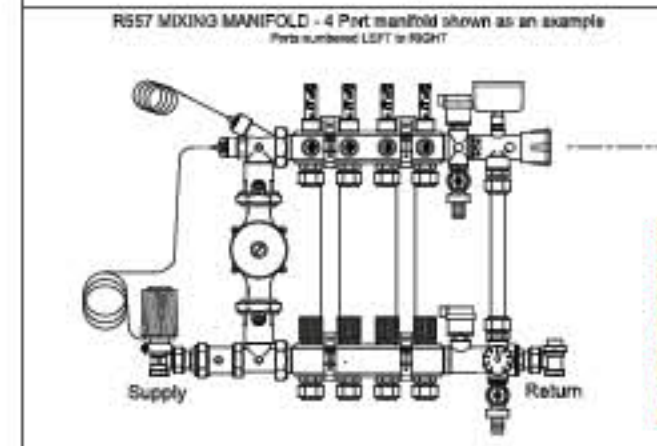
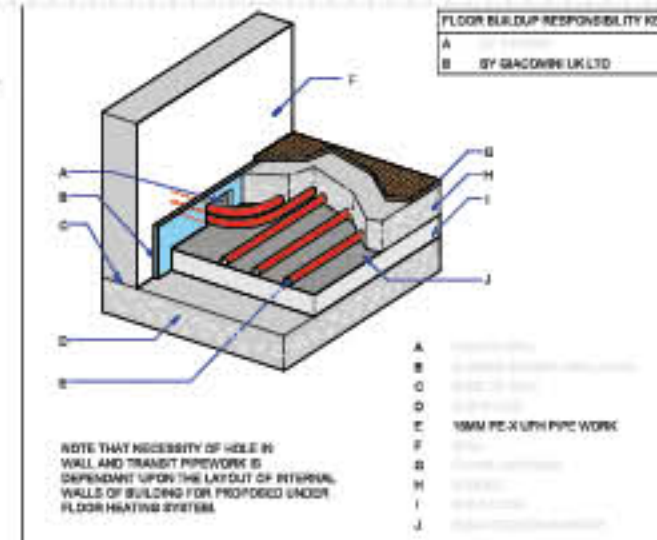
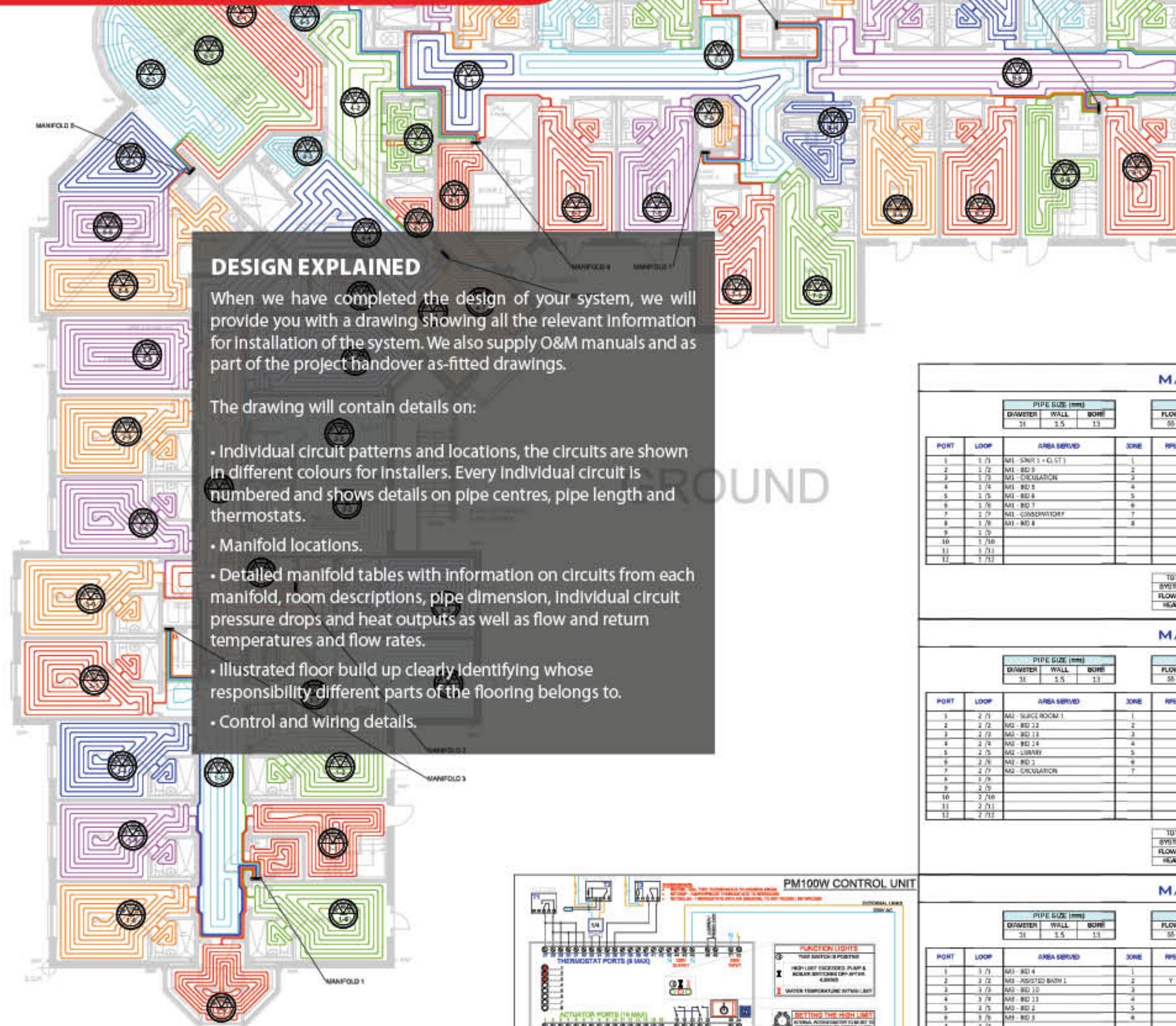
## UNDERFLOOR HEATING DESIGN

### DESIGN EXPLAINED

When we have completed the design of your system, we will provide you with a drawing showing all the relevant information for installation of the system. We also supply O&M manuals and as part of the project handover as-fitted drawings.

The drawing will contain details on:

- Individual circuit patterns and locations, the circuits are shown in different colours for installers. Every individual circuit is numbered and shows details on pipe centres, pipe length and thermostats.
- Manifold locations.
- Detailed manifold tables with information on circuits from each manifold, room descriptions, pipe dimension, individual circuit pressure drops and heat outputs as well as flow and return temperatures and flow rates.
- Illustrated floor build up clearly identifying whose responsibility different parts of the flooring belongs to.
- Control and wiring details.



Prepared depth from wall (see mounting bracket) - 170mm. Overall height of unit, excluding heating cable age units - 100mm. Dimensions do not allow for primary pipe work, fittings or any access space.

Copyright - This drawing is the property of Giacomini (UK) Ltd and may not be copied, reproduced, modified or otherwise used in any form or manner whatsoever without the written permission of Giacomini (UK) Ltd.

**NOTES:**  
THIS DRAWING IS INTENDED FOR INSTALLATION PURPOSES ONLY AND ANY ALTERATIONS TO THE INSTALLATION MUST BE NOTIFIED TO GIACOMINI (UK) LTD, UNIT 2, WESTERLEIGH BUSINESS PARK, YATE, BRISTOL, BS37 6YU.  
PRESSURE TESTING SHOULD BE CARRIED OUT AFTER LAYING THE PIPEWORK. ALL UPH PIPE SHOULD BE TESTED BETWEEN 2 AND 3 BAR (AIR) OR BETWEEN 3 AND 4 BAR (WATER) PRIOR TO FLOOR FLOORING / SCREEDING. THIS SHOULD THEN BE REDUCED AND LEFT AT 1 BAR AFTER THE TEST HAS BEEN COMPLETED.

THE UNDERFLOOR HEATING PIPEWORK SHOULD NOT BE LAID WITH AN AMBIENT TEMPERATURE OF BELOW 5 degC. SCREEDS SHOULD NOT BE LAID WITH AN AMBIENT TEMPERATURE OF BELOW 5 degC.

SCREED FLOORS - FOR SCREED DURING TIME AND CONDITIONING CONSULT SCREED SUPPLIER/MAUFACTURER. HEAT SHALL BE APPLIED TO THE FLOOR SCREED INITIALLY USING WARM WATER AT 25 degC ON THE FIRST DAY, AFTER WHICH THE FLOW TEMPERATURE CAN BE RAISED BY 3 degC PER DAY UNTIL THE DESIGN TEMPERATURE IS REACHED.

WOODEN FLOORS - BEFORE TIMBER FLOORING IS LAID UPON HEATED SCREEDS, THE SCREED MUST HAVE BEEN CURED AND CONDITIONED PREVIOUSLY TO MANUFACTURER'S SPECIFICATIONS (NORMALLY 27 degC). IF IN DOUBT, SEEK ADVICE FROM MANUFACTURER. IT IS NOT RECOMMENDED TO LAY TIMBER FINISHES WITH A MOISTURE CONTENT EXCEEDING 8% BY VOLUME AS THE RISK OF WARPING AND SHRINKAGE DAMAGE WILL BECOME UNACCEPTABLE.

THE TIMBER MANUFACTURER'S INSTRUCTIONS MUST PREVAIL.

THE OPERATIONAL SURFACE TEMPERATURE OF WOODEN FLOORS SHOULD NOT EXCEED 27 degC AS THIS CARRIES THE RISK OF SHRINKAGE. SUBSEQUENT COOLING MAY RESULT IN SWELLING AS EXTRA MOISTURE BECOMES ASSORBED INTO THE WOOD FROM THE ATMOSPHERE.

BATHROOM RENOVATION PROJECTS INVOLVING CERAMIC TILES ON WOODEN FLOORBOARDS REQUIRE EXTRA CONSIDERATION. FLOORBOARD SUBSTRUCTURES ARE REQUIRED TO BE REPLACED OR OVERLAIN WITH LARGE SHEETS OF WBP PLYWOOD TO ENSURE MINIMUM FLEXURAL MOVEMENT. SECURED USING ADHESIVE OR NAILS AT 150mm SPACING. CERAMIC TILE ADHESIVE MUST CONTAIN A FLEXIBLE LATEX ADDITIVE TO PERMIT MICRO MOVEMENT OF TILES DURING THE NORMAL OPERATION OF THE UNDERFLOOR HEATING SYSTEM.

IF CARPET IS TO BE USED AS THE FINAL FLOOR COVERING IT IS IMPORTANT THAT THE THERMAL RESISTANCE OF THE CARPET AND UNDERLAY COMBINATION DOES NOT EXCEED A RATING OF 2.5 TOG.

FAILURE TO COMPLY WITH THESE INSTRUCTIONS COULD RESULT IN DAMAGE TO THE PIPEWORK, SCREED OR FLOOR COVERING.

FLOW RATES AND PRESSURE DROPS ON DRAWING GIVEN PRIOR TO INSTALLATION OF SYSTEM ARE BASED UPON A 'WORST CASE' SCENARIO. EXACT FIGURES CAN ONLY BE CALCULATED UPON RECEIPT OF 'AS FITTED' DRAWINGS.

AIR TEMPERATURE THERMOSTATS ARE TO BE POSITIONED 1.5M FROM FLOOR SURFACE, AND OUT OF DIRECT SUNLIGHT. EXACT POSITIONS ARE NOT MARKED DRAWING.

ALL HOLES TO BE CUT PRIOR TO START OF UPH INSTALLATION. ALL HOLES TO BE CUT ACCORDING TO DIMENSIONS SHOWN ON SCHEDULE, AND 850MM FOR THICKNESS OF INSULATION FROM BASE OF WALL.

THE SITE MUST BE Tidy, CLEAR OF OTHER TRACES AND FULLY READY FOR OUR INSTALLERS ON THE AGREED INSTALL DATE. IF THE SITE IS NOT READY THEN WE RESERVE THE RIGHT TO CHARGE FOR AN ABORTED VISIT AT A STANDARD DAY RATE.

APPROVAL OF THIS DRAWING IS REQUIRED BY A MINIMUM OF 7 DAYS PRIOR TO THE INSTALLATION OF THE UNDERFLOOR HEATING. THIS APPROVAL IS ALSO CONFIRMATION THAT THE TERMS AND CONDITIONS SET OUT IN OUR QUOTE HAVE BEEN ACCEPTED. SHOULD WE NOT RECEIVE APPROVAL PRIOR TO INSTALL, THEN THE DRAWING WILL BE ASSUMED TO BE CORRECT AND INSTALLATION WILL PROCEED AS PER THE LAST DRAWING ISSUED.

Scale 1:100

ISSUE: AS FITTED

LEGEND

MANIFOLD POSITION

HOLE SCHEDULE

MANIFOLD POSITION

HOLE SCHEDULE

MANIFOLD POSITION

HOLE SCHEDULE

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HOLE SCHEDULE

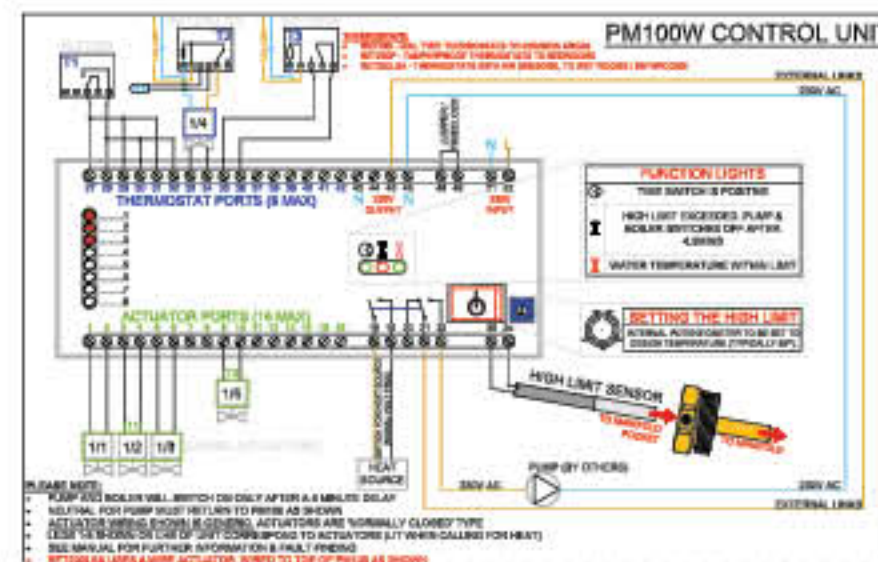
MANIFOLD POSITION

HOLE SCHEDULE

MANIFOLD POSITION

HOLE SCHEDULE

\*BALANCE OF MANIFOLD TABLES CONTINUED  
AT END OF DRAWING SERIES



### MANIFOLD 1 TYPE: MIXING

| PIPE SIZE (mm) |      |                     | WATER TEMPERATURES (°C) |        |            | MANIFOLD DIMENSIONS (m) |               |               |
|----------------|------|---------------------|-------------------------|--------|------------|-------------------------|---------------|---------------|
| DIAMETER       | WALL | BORE                | FLOW                    | RETURN | AVERAGE    | ΔT                      | R             | W             |
| 16             | 1.5  | 1.3                 | 55                      | 45     | 50         | 10                      | 500           | 720           |
|                |      |                     |                         |        |            |                         |               |               |
| PORT           | LOOP | AREA SERVED         | ZONE                    | RPS    | PITCH (mm) | LOOP LENGTH (m)         | HEAT LOSS (W) | SHORTFALL (W) |
| 1              | 1/1  | M1 - SDR 1 (4.5 ST) | 1                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 2              | 1/2  | M1 - SDR 2          | 2                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 3              | 1/3  | M1 - CIRCULATION    | 3                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 4              | 1/4  | M1 - SDR 4          | 4                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 5              | 1/5  | M1 - SDR 5          | 5                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 6              | 1/6  | M1 - SDR 6          | 6                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 7              | 1/7  | M1 - CIRCULATION    | 7                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 8              | 1/8  | M1 - SDR 8          | 8                       | 150    | 35         | 100                     | 0.02          | 1.80          |
| 9              | 1/9  |                     |                         |        |            |                         |               |               |
| 10             | 1/10 |                     |                         |        |            |                         |               |               |
| 11             | 1/11 |                     |                         |        |            |                         |               |               |
| 12             | 1/12 |                     |                         |        |            |                         |               |               |

|                    |        |
|--------------------|--------|
| TOTAL PIPE (m)     | 767    |
| SYSTEM VOLUME (l)  | 101.81 |
| FLOW RATE (kg/sec) | 0.14   |
| HEAD LOSS (mPa)    | 8.35   |

### MANIFOLD 2 TYPE: MIXING

| PIPE SIZE (mm) |      |                   | WATER TEMPERATURES (°C) |        |            | MANIFOLD DIMENSIONS (m) |               |               |
|----------------|------|-------------------|-------------------------|--------|------------|-------------------------|---------------|---------------|
| DIAMETER       | WALL | BORE              | FLOW                    | RETURN | AVERAGE    | ΔT                      | R             | W             |
| 16             | 1.5  | 1.3               | 55                      | 45     | 50         | 10                      | 500           | 720           |
|                |      |                   |                         |        |            |                         |               |               |
| PORT           | LOOP | AREA SERVED       | ZONE                    | RPS    | PITCH (mm) | LOOP LENGTH (m)         | HEAT LOSS (W) | SHORTFALL (W) |
| 1              | 2/1  | M2 - SUITE ROOM 1 | 1                       | 150    | 10         | 10                      | 0.01          | 0.20          |
| 2              | 2/2  | M2 - SDR 12       | 2                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 3              | 2/3  | M2 - SDR 13       | 3                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 4              | 2/4  | M2 - SDR 14       | 4                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 5              | 2/5  | M2 - LIBRARY      | 5                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 6              | 2/6  | M2 - SDR 1        | 6                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 7              | 2/7  | M2 - CIRCULATION  | 7                       | 150    | 36         | 100                     | 0.01          | 0.70          |
| 8              | 2/8  |                   |                         |        |            |                         |               |               |
| 9              | 2/9  |                   |                         |        |            |                         |               |               |
| 10             | 2/10 |                   |                         |        |            |                         |               |               |
| 11             | 2/11 |                   |                         |        |            |                         |               |               |
| 12             | 2/12 |                   |                         |        |            |                         |               |               |

|                    |       |
|--------------------|-------|
| TOTAL PIPE (m)     | 685   |
| SYSTEM VOLUME (l)  | 99.92 |
| FLOW RATE (kg/sec) | 0.10  |
| HEAD LOSS (mPa)    | 13.49 |

### MANIFOLD 3 TYPE: MIXING

| PIPE SIZE (mm) |      |                      | WATER TEMPERATURES (°C) |        |            | MANIFOLD DIMENSIONS (m) |               |               |
|----------------|------|----------------------|-------------------------|--------|------------|-------------------------|---------------|---------------|
| DIAMETER       | WALL | BORE                 | FLOW                    | RETURN | AVERAGE    | ΔT                      | R             | W             |
| 16             | 1.5  | 1.3                  | 55                      | 45     | 50         | 10                      | 500           | 670           |
|                |      |                      |                         |        |            |                         |               |               |
| PORT           | LOOP | AREA SERVED          | ZONE                    | RPS    | PITCH (mm) | LOOP LENGTH (m)         | HEAT LOSS (W) | SHORTFALL (W) |
| 1              | 3/1  | M3 - SDR 4           | 1                       | 150    | 62         | 100                     | 0.02          | 1.10          |
| 2              | 3/2  | M3 - ASSISTED BATH 1 | 2                       | 150    | 64         | 110                     | 0.01          | 0.50          |
| 3              | 3/3  | M3 - SDR 10          | 3                       | 150    | 113        | 110                     | 0.02          | 1.20          |
| 4              | 3/4  | M3 - SDR 12          | 4                       | 150    | 209        | 100                     | 0.02          | 1.60          |
| 5              | 3/5  | M3 - SDR 2           | 5                       | 150    | 215        | 100                     | 0.02          | 0.90          |
| 6              | 3/6  | M3 - SDR 3           | 6                       | 150    | 299        | 100                     | 0.02          | 1.10          |
| 7              | 3/7  |                      |                         |        |            |                         |               |               |
| 8              | 3/8  |                      |                         |        |            |                         |               |               |
| 9              | 3/9  |                      |                         |        |            |                         |               |               |
| 10             | 3/10 |                      |                         |        |            |                         |               |               |
| 11             | 3/11 |                      |                         |        |            |                         |               |               |
| 12             | 3/12 |                      |                         |        |            |                         |               |               |

|                    |       |
|--------------------|-------|
| TOTAL PIPE (m)     | 594   |
| SYSTEM VOLUME (l)  | 78.34 |
| FLOW RATE (kg/sec) | 0.09  |
| HEAD LOSS (mPa)    | 6.61  |

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01454 311012

SAMPLE DESIGN

CARE HOME PROJECT

UNDERFLOOR HEATING

AS FITTED PIPE LAYOUT

DATE: -

DRAWN: -

SCALE: 1:50 @ A1

DRAWING NO. GUK XXXX AF 002 OF 004

REV NO. -

TYPES OF UNDERFLOOR HEATING SYSTEMS

SYSTEM SELECTION

What type of underfloor heating system is right for you depends on a number of factors. Is it a new build where you have free reigns to choose the ultimate system? Or an existing building where there are restrictions due to existing flooring or ceiling height?

There are a lot of aspects you will need to consider to find the system that is right for you and you will need to weigh the speed of install against floor build up, cost and the thermal output.

SYSTEM OVERVIEW

We have created a quick overview of the benefits of different types of systems to help you with your system selection.

UNDERFLOOR HEATING SYSTEM COMPARISON CHART

|          | Overall Profile Depth | Design Output | Speed of Install | Price            |
|----------|-----------------------|---------------|------------------|------------------|
| Joisted  | Lowest                | Good          | Fast             | Most Competitive |
| Screeded | Medium                | Best          | Fastest          | Competitive      |
| Spider   | Lowest                | Best          | Very Fast        | Competitive      |
| Floating | Low                   | Good          | Fast             | Most Competitive |

SYSTEM DEPTHS

The depths of underfloor heating systems will vary from 25mm and up, depending on the type of system, insulation and floor covering. A conventional screeded system will normally require a minimum floor build-up of 75mm (depending on insulation depth), which is typically not a problem in new builds where this can be included for in the initial design.

Floating floor systems and our unique Spider system offer low build up alternatives.

JOISTED / PLATED FLOOR SYSTEM

Underfloor heating systems may be successfully installed within suspended floors providing the floor is constructed to suit the application. Therefore it is essential that planning begins at an early stage in the project and the building contractor is informed of the construction required for the radiant system. The underfloor heating plated system can be easily adapted to accommodate a number of special floor details, including sprung floors and cross battens.

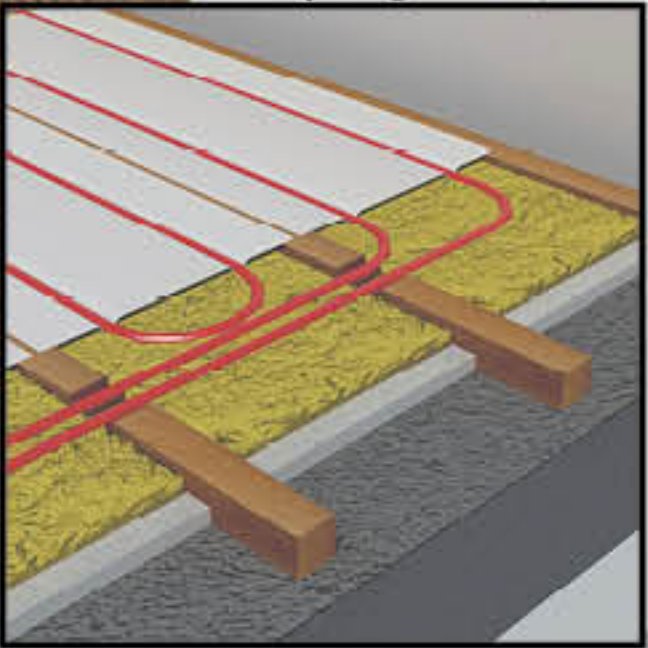
Suspended floor systems include both joisted floors with conventional joists, as well as solid floors with battens fixed to the floor. The underfloor heating system consists of aluminium diffusion plates spanning across the joists or battens and stapled in place. The diffusion plates are grooved to accept the heating pipework.

Where pipe returns to the manifold, it's necessary to cross the timbers and so notching is required. This isn't always possible with posi-joists or similar, so it's important to consider at design stage.

**CROSS BATTENS:** If joist centres are not consistently spaced at 400mm (centre to centre) to accommodate the diffusion plates, the floor can be boarded and then cross battened (this work must be completed prior to Giacomini installers arriving on site). The underfloor heating system can be installed on the cross battens. Outputs from the plated system are limited to around 70W/m<sup>2</sup>, but will depend upon a number of factors including floor coverings and flow/return temperatures etc.

**SPRUNG FLOOR:** With battens loose laid onto blocks supported on a solid base, the underfloor heating is fitted in the normal manner, using either double sided tape, screws or staples to hold the plates in position. This avoids dislodging the battens when fixing the plates.

Sprung Floor System



## FLOATING OR SUSPENDED FLOATING FLOOR SYSTEM

Floating floor installations are pre-formed insulation panels laid on top of an existing or new sub-floor. Spreader plates are recommended to be used on this type of application to spread the heat so that an even surface temperature can be achieved. Once the plate, followed by the pipe has been laid in the profile of the insulation, the finished flooring can be laid directly on top (manufacturer guidelines should be checked as some products may require an intermediate layer fitted between the underfloor heating and finished floor). This finished flooring is not fixed to the insulation panels below, but is "floating" on top.

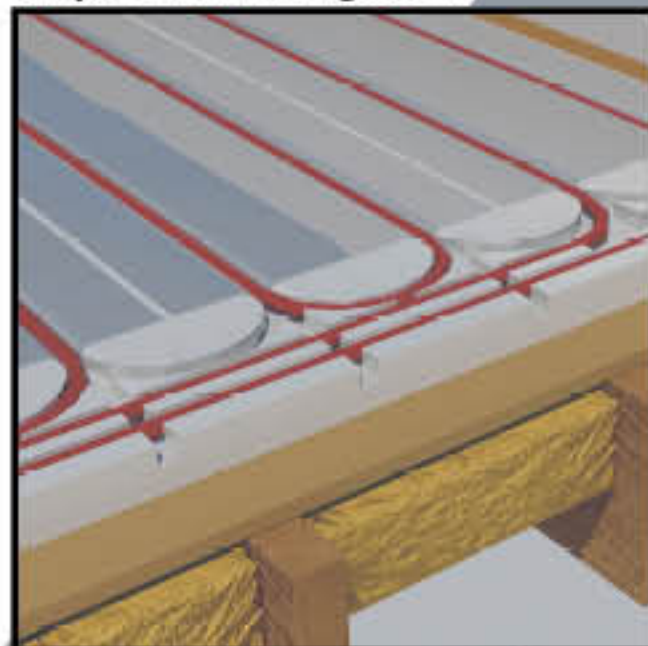
Floating floors reduce the overall loading within a building, reducing the weight and overall build-up depth of the floor compared to other floor systems.

Insulation panels are pre-grooved at 200mm centres with a bell shaped groove at one end of the panel to allow the pipe to turn at the end of its run. We can also route at 150mm spacing with a lightbulb shaped return groove, should heat losses require tighter spacing.

The grooves are made so that the underfloor heating materials can fit within the depth of insulation, creating space for both the plate used to dissipate heat and pipework to distribute water. A gap is left between each plate to prevent an uneven surface and to also limit any noise or movement.

The panels are produced in a range of thicknesses from 25mm and up, in either XPS or EPS as required. The installation of this system is very simple. Panels are laid with the bell at each end of the room, with panels butted up against each other and cut to size. A hot knife can also be used to cut additional transient paths into the insulation as required.

### Suspended Floating Floor



## SOLID FLOOR SYSTEM

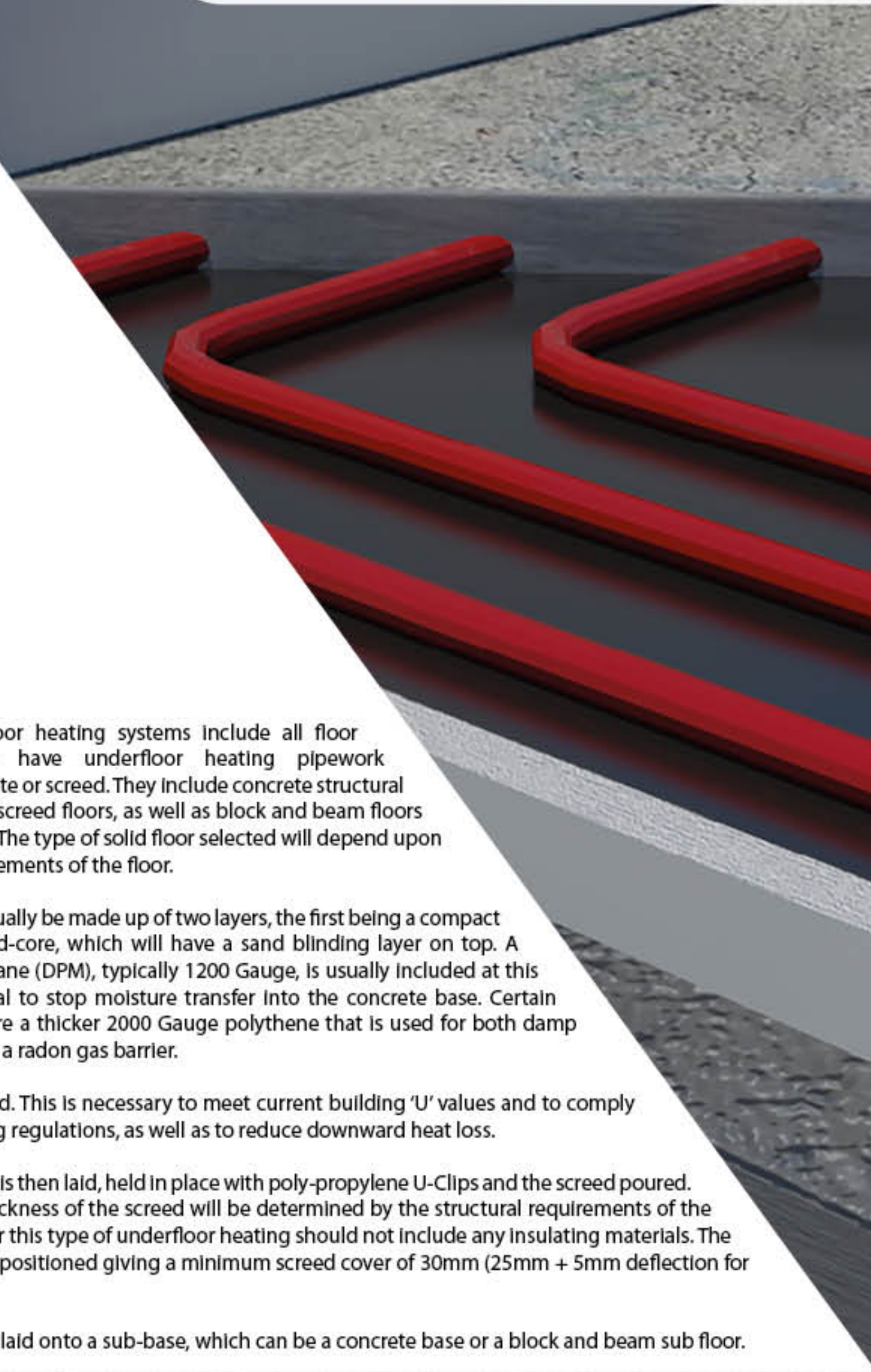
Solid floor underfloor heating systems include all floor constructions that have underfloor heating pipework embedded in concrete or screed. They include concrete structural floors and concrete screed floors, as well as block and beam floors with a screed finish. The type of solid floor selected will depend upon the structural requirements of the floor.

The sub-base will usually be made up of two layers, the first being a compact or consolidated hard-core, which will have a sand blinding layer on top. A damp proof membrane (DPM), typically 1200 Gauge, is usually included at this level; this is essential to stop moisture transfer into the concrete base. Certain locations may require a thicker 2000 Gauge polythene that is used for both damp proofing and also as a radon gas barrier.

Insulation is then laid. This is necessary to meet current building 'U' values and to comply with current building regulations, as well as to reduce downward heat loss.

Giacomini pipework is then laid, held in place with poly-propylene U-Clips and the screed poured. The makeup and thickness of the screed will be determined by the structural requirements of the floor. Screed used for this type of underfloor heating should not include any insulating materials. The heating pipework is positioned giving a minimum screed cover of 30mm (25mm + 5mm deflection for clips).

Screed floors will be laid onto a sub-base, which can be a concrete base or a block and beam sub floor.



## SPIDER – LOW BUILD UP SOLID FLOOR SYSTEM

Our Spider system consists of preformed plastic panels, which strengthen the screed, and as a result you can reduce the overall thickness of the screed. This is ideal for renovation works where there can be limits to the overall floor build up.

The reduced profile of the Spider system also enables the underfloor heating system to respond quicker, helping to reduce thermal inertia. Screed drying times are also reduced, which helps to minimise work delays, whilst the composite grid system helps to simplify and speed-up the system installation.

The spider system is available with an adhesive base for laying on existing floors (R979SY001), with pins for fixing on to insulation panels (R979SY011) and complete with a 6mm high-density insulation layer (R979SY021).

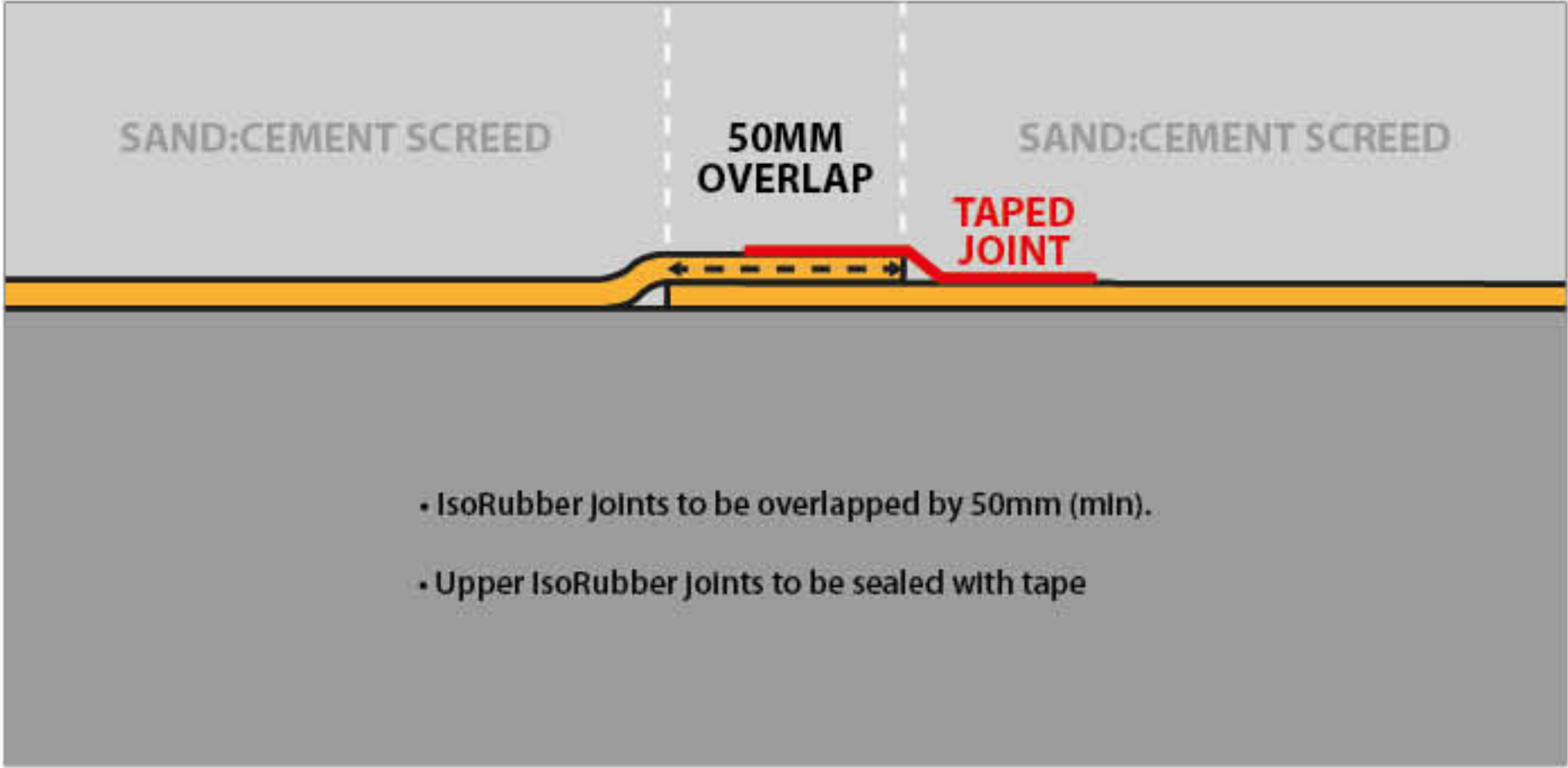
The patented thin, sturdy and versatile composite grid, enables you to completely submerge the radiant system in the screed.

The panels are from 22mm thick and offer pipe centres in multiples of 50mm.

Using a spider panel for your system will enable you to reduce the overall floor height to 25mm if used with self-levelling screed, such as Mapel Renovation Screed (UK tested).

| Product code | Version                      | Height [mm]             |
|--------------|------------------------------|-------------------------|
| R979SY001    | Self-adhesive                | 22 mm                   |
| R979SY011    | With pins                    | 22 mm + 13 mm pins      |
| R979SY021    | With high-density Insulation | 22 mm + 6 mm Insulation |

## ADDITIONAL SYSTEM CONSIDERATIONS



- IsoRubber joints to be overlapped by 50mm (min).
- Upper IsoRubber joints to be sealed with tape

### ACOUSTICS

Just as heat can escape through the fabric of a building, sound can also be transferred through them just as easily, unless acoustic layers are considered at the design stage. Where a suspended floor separates a dwelling at ground floor and first floor, or a party wall separates two adjoining properties, acoustic layers can be used as way of dampening the effect of sound transfer.

We will often work with architects when guidance is needed and refer to the robust details in Part E of the Building Regulations, when necessary.

### PIPE IN SLAB SYSTEM

#### ADVANTAGES

- + Concrete has a better conductivity when compared to screed so for comparable depths performs better in terms of output.
- + The concrete floor is the heat mass so the floor retains heat for much longer, requiring less support from the boiler to keep it at temperature.

#### DISADVANTAGES

- The slab is often much thicker than screed so takes longer to reach temperature and warm down again when not required.
- The slab often has large bays broken into multiple smaller bays using movement joints, so many more instances of UFH pipes crossing joints and requiring sleeving/protection.
- With insulation often under the slab, pipes need to be tie-wrapped to mesh instead of being clipped to insulation. This is more time intensive and therefore also more expensive.

SELECTING A SCREED

SCREED CONSIDERATIONS

When selecting a screed there are a number of considerations:

INSULATION

It's important to understand that insulation performs a variety of different functions within the floor build-up and so a 'standard' insulation does not exist when it comes to pricing this as part of an underfloor heating quotation.

As it's necessary to consider all of the following aspects when selecting a suitable insulation, we will often ask for architectural specification to confirm actual requirements before we include in a proposal:

- Thermal requirements
- Loading requirements
- Acoustic requirements
- Fire resistance
- Void filler (depth?)

The thermal conductivity is one aspect to consider when choosing insulation for your system and the chart below will give you a good overview. The thermal conductivity is a measurement of the heat loss through a material, depending on the thickness of the material and the temperature difference between either side of it. The lower the thermal conductivity, the longer it will take for heat to travel through it and the better it will be for making sure the heat from your heating pipes travels upwards into the room rather than down into the sub-floor.

The compressive strength is also noted in this table and you will be able to see that sometimes you will have to balance the thermal requirements against the loading requirements when selecting your insulation.

| Product Type                    | Abbreviations  | Compressive Strength (kPa) | Thermal Conductivity (W/mK) |      |      |      |
|---------------------------------|----------------|----------------------------|-----------------------------|------|------|------|
|                                 |                |                            | <0.02                       | 0.02 | 0.03 | 0.04 |
| Expanded Polystyrene            | EPS (LD - EHD) | 70 - 500                   |                             |      |      |      |
| Expanded Polystyrene Superplus  | EPS+           | 70 - 100                   |                             |      |      |      |
| Extruded Polystyrene            | XPS            | 200 - 700                  |                             |      |      |      |
| Polyisocyanurate                | PIR            | 120 - 175                  |                             |      |      |      |
| Quilt / Acoustic Partition Roll | APR            | -                          |                             |      |      |      |

- What is the depth available for the floor screed (after floor coverings, insulation etc. are taken into account).
- All screed products suited to UFH, will state a 'minimum cover depth' over heating pipes on their technical data sheets. This will affect the depth of product, so be sure to take this into account.
- For car garages, warehouses, etc. special care must be taken to select a product that is suitably load bearing. We can advise products that have a higher compressive strength, but overall responsibility must remain with the structural engineer to confirm products are suitable, as consideration of the whole floor build-up must be considered in this calculation.
- Thermal conductivity of screeds are often comparable, however none the less this can play an important part in the UFH output we can achieve.
- Drying time is also another important consideration. Faster drying screeds are premium products so will incur higher costs, however if programmes fall behind the extra cost can sometimes outweigh the down time on site from trades unable to work while waiting for screed to dryout.

BSEN1264 - SCREED DESIGN

Screed design is also important when we carry out our UFH design. The following must be taken into consideration:

- For heating screeds intended for application of stone or ceramic coverings, joint areas shall not exceed 40m<sup>2</sup> with a maximum length of 8m. In the case of rectangular rooms, joint areas can exceed these dimensions but maximum to the length relation of 2 to 1.
- If induced contraction joints are placed in heating screeds, these may be cut at depth of not more than one third of the screed thickness, subject to the location of pipes in the construction, and shall be sealed after heating up.
- The heating installer shall be supplied with a plan showing the joint position as a part of the specifications.
- In the case of heated screeds, movement joints and perimeter joints shall only be crossed by connecting pipes and only in one level. In this case, the connecting pipes shall be covered with a flexible insulation tube of some 0.3m in length.

SAND CEMENT SCREED

1. Allow the screed to dry through at its natural rate before switching on the underfloor heating system. Sand/cement screeds should not be force dried.
2. Start the system running at 25°C by having the thermostat call for heat constantly (this temperature can be set from the boiler).
3. Leave at this temperature for 3 days.
4. Raise the temperature by 5°C each day until the design flow temperature is reached (usually 50°C).
5. Run the system at this temperature for 4 days.
6. Bring the water temperature down by 5°C steps per day back to 25°C.
7. Switch the system off and allow the screed to cool down for 48hrs but not below 15°C.
8. Have the floor layer check the moisture content before applying any further materials/coverings.
9. Do not lay any further floor coverings until the above sequence has been followed and the floor layer is satisfied that the moisture content is suitable for the laying of their materials.



## SCREED INFORMATION

### FLOWING SCREED

1. Allow the screed to dry for at least 7 days before putting any heat into it.
2. Start the system running at 25°C by having the thermostat call for heat constantly (or set this temperature at the boiler).
3. Leave at this temperature for 3 days.
4. Raise the temperature by 5°C each day until the design flow temperature is reached (usually 50°C).
5. Run the system at this temperature for 4 days.
6. Bring the water temperature down by 5°C steps per day back to 25°C.
7. Switch the system off and allow the screed to cool down for 48hrs but not below 15°C.
8. Have the floor layer check the moisture content before applying any further materials/coverings.
9. Continue to use the underfloor heating to assist with the drying of the screed.
10. Do not lay any further floor coverings until the above sequence has been followed and the floor layer is satisfied that the moisture content is suitable for the laying of their materials.

## SCREED TYPES & ASSOCIATED DRYING TIMES.

| PRODUCT NAME     | MINIMUM THICKNESS               | DRYING TIMES |                    |                                                               |             |
|------------------|---------------------------------|--------------|--------------------|---------------------------------------------------------------|-------------|
|                  |                                 | FOOT TRAFFIC | SITE TRAFFIC       | DRYING TIME                                                   | CURING TIME |
| Mapei Topcem     | 55mm                            | 12 hours     | 24 hours           | 4 days at 50 mm                                               | n/a         |
| Mapei Renovation | 25mm                            | 4-6 hours    | n/a <sup>(1)</sup> | 10 mm per day                                                 | n/a         |
| 1:4 Fibrescreed  | 75mm commercial / 65mm domestic | 4 days       | 7 days             | 1mm per day up to 40 mm. 1/2 mm per day for further thickness | 7 days      |
| Liquid Screed    | 50 mm                           | 48 hours     | 7 days             | 1mm per day up to 40 mm. 1/2 mm per day for further thickness | n/a         |
| Tru Screed       | 75mm commercial / 65mm domestic | 3 days       | 5 days             | 2 - 3 mm per day                                              | 7 days      |
| Premier Screed   | 75mm commercial / 65mm domestic | 2 days       | 7 days             | 2 - 3 mm per day                                              | 7 days      |
| Premier HD       | 75mm                            | 2 days       | 7 days             | 2 - 3 mm per day                                              | 7 days      |
| Cem Screed       | 75mm commercial / 65mm domestic | 24 hours     | 3 days             | 7 days at 25 mm                                               | 7 days      |
| Cem Screed 5     | 75mm                            | 1 day        | 3 days             | 7 days at 50 mm                                               | 24 hours    |
| Flexi Dry F0     | 55mm                            | 12 hours     | 12 hours           | 3 days                                                        | n/a         |
| Flexi Dry F1     | 65mm                            | 12 hours     | 12 hours           | 7 days                                                        | n/a         |
| Flexi Dry F2     | 65mm                            | 12 hours     | 12 hours           | 14 days                                                       | n/a         |
| Flexi Dry F3     | 65mm                            | 12 hours     | 7 days             | 21 days                                                       | n/a         |
| Polymer Screed   | 75mm                            | 4 days       | 7 days             | 25 mm per month                                               | 7 days      |
| Ardex A35        | 75mm                            | 3 hours      | 24 hours           | 24 hours                                                      | n/a         |
| Knopp Contopp 10 | 75mm                            | 36 hours     | 7 days             | 3 mm per day                                                  | 2 days      |
| Knopp Contopp 15 | 75mm                            | 36 hours     | 48 hours           | 8-10 days                                                     | 2 days      |
| Knopp Contopp 20 | 75mm                            | 24 hours     | 24 hours           | 2-4 days                                                      | 2 days      |

### MAPEI WARRANTY

Working in partnership with leading screed manufacturer, Mapei, Giacomini UK is proud to be able to provide a back-to-back ten year system warranty. The back-to-back warranty package includes our 10 year underfloor heating system installation warranty alongside Mapei's 10 year Renovation and Topcem screed warranty.

Working with Mapei UK, we have tested our Spider panels with Mapei Renovation Screed at just 25mm total thickness.

The drying times shown are based on ideal site conditions and are intended for guidance only. Please check manufacturer's details for the most up-to-date information.

<sup>(1)</sup> N/A as not a wearing surface. Screed to be boarded / protected for site traffic

## FLOOR FINISHES

### SUITABILITY / CONSTRAINTS

When selecting the final floor finish, consideration must be given to its suitability and the effects that it may have on the performance of your UFH system. Three factors must be taken into account:

#### THERMAL RESISTANCE

This is the measurement of the rate of heat transfer you get through a material. The thermal resistance is influenced by factors such as the thickness and thermal conductivity of the material. The resistance of flooring is normally shown via its tog value. The higher the rating, the lower the output achievable from the underfloor heating system.

#### SUITABILITY OF THE FLOOR STRUCTURE

Depending on the type of underfloor heating system you choose, there may be additional factors within its build-up that could impact your floor selection. For example, when underfloor heating has been applied to a large area, expansion joints may be required in order to control any heat-induced expansion or contraction. It is important to consider this movement when selecting your floor finishes.

#### TEMPERATURE CONSTRAINTS

An important consideration to make with regards to surface temperatures is that certain flooring material and adhesives might be sensitive to high temperatures. If the surface temperature needs restricting, it will typically be to 27°C. To do this we will primarily reduce the flow rates to restrict output and in turn surface temperature. As a fail-safe and to monitor and control the surface temperature, we recommend the use of a floor sensor connected to the room thermostat.

#### CERAMIC - PLEASE NOTE:

- Please take into consideration expansion joints prior to laying the ceramic floor finish.
- Flexible adhesive must be used to reduce the risk of the tile or stone splitting or cracking.
- Thickness of bedding should also be considered in calculations.

#### PLASTIC & VINYL - PLEASE NOTE:

- Always check the manufacturer's recommended maximum floor surface temperature to ensure the product is suitable for use with UFH.

### TOG VALUES

There are four basic types of floor finish which should be considered: ceramic, which includes natural stone materials such as flag stones, plastic or vinyl floor coverings, timber and timber products, and carpet.

The table below demonstrates the tog values of different floor finishes. A higher thermal resistance (Tog value) will reduce the heat output into the designated space, instead raising the temperature within the underlying floor structure.

| TYPE              | K VALUE<br>CONDUCTIVITY<br>(W/MK) | THICKNESS<br>(MM) | R VALUE<br>RESISTANCE<br>(M <sup>2</sup> K/W) | TOG  | RESPONSIVENESS<br>OF UFH SYSTEM<br>WITH COVERING | If we take vinyl as an example;<br>- <b>K-Value</b> (λ) = 0.25W/mK<br>- If thickness = 2mm (0.002m)<br>- <b>C-Value</b> = 0.25 / 0.002 = 125W/m <sup>2</sup> K<br>- Then, <b>R-Value</b> can be calculated as reciprocal of thermal conductivity => 1/125 = <b>0.008m<sup>2</sup>K/W</b> |
|-------------------|-----------------------------------|-------------------|-----------------------------------------------|------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ceramic Tile      | 0.84                              | 10.00             | 0.012                                         | 0.12 | Best                                             |                                                                                                                                                                                                                                                                                          |
| Vinyl             | 0.25                              | 2.00              | 0.008                                         | 0.08 | Excellent                                        |                                                                                                                                                                                                                                                                                          |
| Oak               | 0.16                              | 22.00             | 0.138                                         | 1.38 | Very Good                                        |                                                                                                                                                                                                                                                                                          |
| Ply/ Chipboard    | 0.14 – 0.15                       | 22.00             | 0.152                                         | 1.52 | Good                                             |                                                                                                                                                                                                                                                                                          |
| Carpet & Underlay | 0.057                             | 10.00             | 0.175                                         | 1.75 | Average                                          |                                                                                                                                                                                                                                                                                          |

(Always check manufacturer's details – variation often occurs depending on product and nature of materials).

### C, K, R VALUES – WHAT ARE THEY?

'K-Value' – The K-value is commonly known as the lamda value (λ) and measured in W/mK. It is a measure of how easily heat passes across the material, i.e. its thermal conductivity.

'C-Value' – The C-value is thermal conductance of a material based on its thickness. This heat transfer coefficient is measured in W/m<sup>2</sup>K and calculated using the K-Value and thickness as follows; **C-Value = K-Value / Thickness**

'R-Value' – This is the thermal resistance of the material, which is the reciprocal of thermal conductivity; **R-Value = 1 / C-Value**

#### TIMBER - PLEASE NOTE:

- Take in to consideration board width and thickness when specifying the floor finish.
- Timber floor surface temperatures are limited to 27°C, to avoid problems with moisture within the wood.

#### CARPET - PLEASE NOTE:

- We recommend a maximum combined Tog value of 2.5 for carpet and underlay.

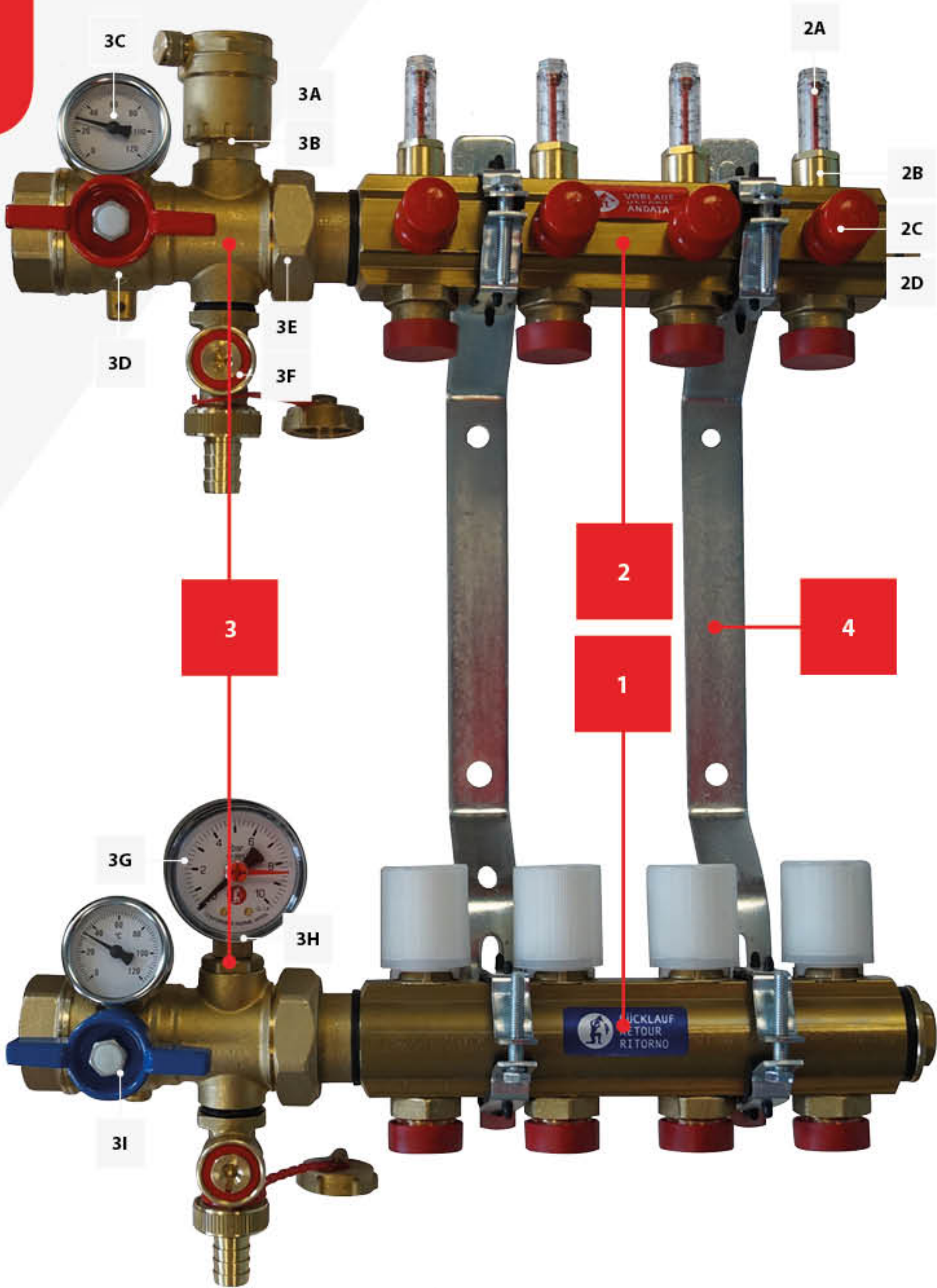
SUPPLY CHAPTER - MANIFOLDS

DISTRIBUTION MANIFOLD

Distribution manifolds consist of a flow and a return manifold and are used where the supply to the manifold is already at a suitable temperature for underfloor heating and does not require blending down or a local circulation pump.

The R553FK assembled manifold kit includes isolating ball valves, micrometric flow adjustment, pressure & temperature gauges, drain and fill points, flow meters, brackets and automatic air eliminator.

If the manifold is supplying one zone only it can be controlled by a simple 2-port valve. If the circuits coming off the manifold are supplying different zones, these can be controlled using individual actuators on each port.



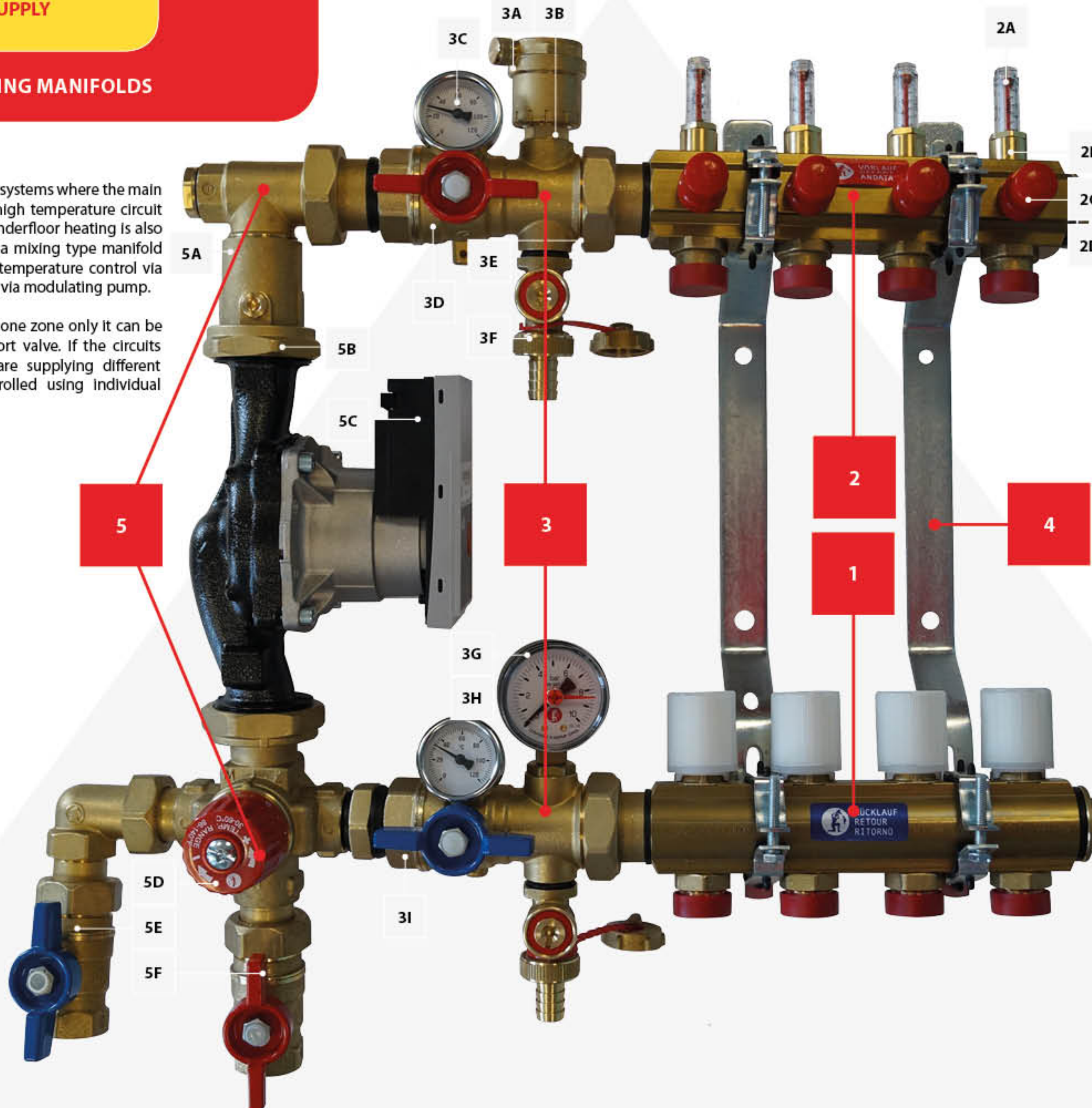
|    |                                                                                                                |            |
|----|----------------------------------------------------------------------------------------------------------------|------------|
| 1  | Return manifold with shut-off valves                                                                           | 010A1525P  |
| 2  | Flow manifold with lockshield valves and flow meters                                                           | 010A2791Q  |
| 2A | Flow meter 0.5÷5l/min                                                                                          | P78MY001   |
| 2B | M16x1 flow meter nut                                                                                           | 020A00212  |
| 2C | Cap for micrometric balancing valve                                                                            | 026P15464  |
| 2D | Key for regulating the manifold outlets                                                                        | R558Y001   |
| 3  | Pair of shut-off ball valves with AAV, filling/drain taps, thermometers, temperature probe inlet and manometer | 010A4685P  |
| 3A | Automatic air vent with O-ring                                                                                 | 026A0019P  |
| 3B | Shut-off valve for automatic air vent                                                                          | 010A0428P  |
| 3C | Thermometer Ø 40 mm, 0÷120 °C                                                                                  | R540Y015   |
| 3D | Pre-assembled body with red handle                                                                             | 010A3862P  |
| 3E | Rubber washer for tail piece                                                                                   | 057G00918  |
| 3F | Drainage ball valve, with hose and cap                                                                         | 010A2969Q  |
| 3G | Pressure gauge 0-10 bar                                                                                        | R225Y012   |
| 3H | Reducer for pressure gauge male-female                                                                         | 050A00042B |
| 3I | Pre-assembled body with blue handle                                                                            | 010A3866P  |
| 4  | Adjustable bracket                                                                                             | R588LY001  |

## UNDERFLOOR HEATING MANIFOLDS

### MIXING MANIFOLD

A mixing manifold is used in systems where the main heat source is supplying a high temperature circuit for other systems and the underfloor heating is also fed from it. In this instance a mixing type manifold would be fitted to provide temperature control via mixing valve and circulation via modulating pump.

If the manifold is supplying one zone only it can be controlled by a simple 2-port valve. If the circuits coming off the manifold are supplying different zones, these can be controlled using individual actuators on each port.



|    |                                                                                                                |            |
|----|----------------------------------------------------------------------------------------------------------------|------------|
| 1  | Return manifold with shut-off valves                                                                           | 010A1525P  |
| 2  | Flow manifold with lockshield valves and flow meters                                                           | 010A2791Q  |
| 2A | Flow meter 0.5÷5l/min                                                                                          | P78MY001   |
| 2B | M16x1 flow meter nut                                                                                           | 020A00212  |
| 2C | Cap for micrometric balancing valve                                                                            | 026P15464  |
| 2D | Key for regulating the manifold outlets                                                                        | R558Y001   |
| 3  | Pair of shut-off ball valves with AAV, filling/drain taps, thermometers, temperature probe inlet and manometer | 010A4685P  |
| 3A | Automatic air vent with O-ring                                                                                 | 026A0019P  |
| 3B | Shut-off valve for automatic air vent                                                                          | 010A0428P  |
| 3C | Thermometer Ø 40 mm, 0÷120 °C                                                                                  | R540Y015   |
| 3D | Pre-assembled body with red handle                                                                             | 010A3862P  |
| 3E | Rubber washer for tail piece                                                                                   | 057G00918  |
| 3F | Drainage ball valve, with hose and cap                                                                         | 010A2969Q  |
| 3G | Pressure gauge 0-10 bar                                                                                        | R225Y012   |
| 3H | Reducer for pressure gauge male-female                                                                         | 050A00042B |
| 3I | Pre-assembled body with blue handle                                                                            | 010A3866P  |
| 4  | Adjustable bracket                                                                                             | R588LY001  |
| 5  | Thermostatic group with circulator                                                                             | R557RY045  |
| 5A | Isolating pump valve with 90° tail piece                                                                       | 010A4672P  |
| 5B | Rubber washer for isolating pump valve                                                                         | 057G00888  |
| 5C | Wilo circulator Yonos Para 25/6                                                                                | 076S00238  |
| 5D | 4 way thermostatic mixer                                                                                       | 010A4671P  |
| 5E | Blue handle ball valve with 90° elbow                                                                          | 010A4673P  |
| 5F | Red handle standard port ball valve                                                                            | 010A1825P  |

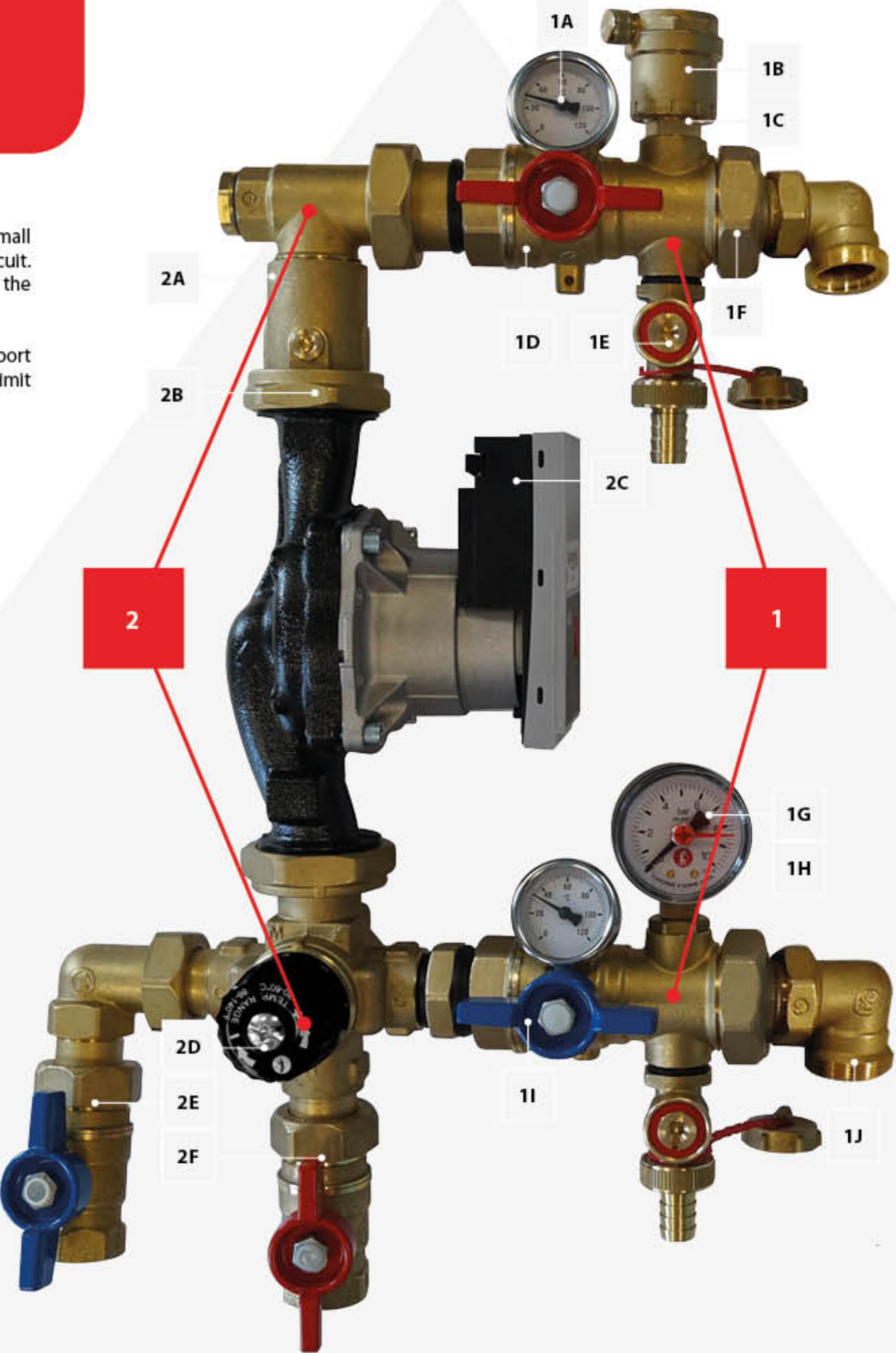
UNDERFLOOR HEATING MANIFOLDS

SINGLE CIRCUIT MANIFOLD

This single circuit manifolds are convenient when only a small area require heating and this can be covered by only one circuit. The manifold is neat and has all the components required for the underfloor heating to work as efficiently as possible.

The single circuit manifold is best controlled by a simple two port valve connected to the room thermostat and a separate high-limit thermostat to ensure flow temperature.

Dimensions: 500 x 336 x 135mm



|           |                                                                                                                |                   |
|-----------|----------------------------------------------------------------------------------------------------------------|-------------------|
| <b>1</b>  | Pair of shut-off ball valves with AAV, filling/drain taps, thermometers, temperature probe inlet and manometer | <b>010A4719P</b>  |
| <b>1A</b> | Thermometer Ø 40 mm, 0÷120 °C                                                                                  | <b>R540Y015</b>   |
| <b>1B</b> | Automatic air vent with O-ring                                                                                 | <b>026A0019P</b>  |
| <b>1C</b> | Shut-off valve for automatic air vent                                                                          | <b>010A0428P</b>  |
| <b>1D</b> | Pre-assembled body with red handle                                                                             | <b>010A3862P</b>  |
| <b>1E</b> | Drainage ball valve, with hose and cap                                                                         | <b>010A2969Q</b>  |
| <b>1F</b> | Rubber washer for tail piece                                                                                   | <b>057G00918</b>  |
| <b>1G</b> | Pressure gauge 0-10 bar                                                                                        | <b>R225Y012</b>   |
| <b>1H</b> | Reducer for pressure gauge male-female                                                                         | <b>050A00042B</b> |
| <b>1I</b> | Pre-assembled body with blue handle                                                                            | <b>010A3866P</b>  |
| <b>1J</b> | 90° elbow fitting                                                                                              | <b>010A4718P</b>  |
| <b>2</b>  | Thermostatic group with circulator                                                                             | <b>R557RY045</b>  |
| <b>2A</b> | Isolating pump valve with 90° tail piece                                                                       | <b>010A4672P</b>  |
| <b>2B</b> | Rubber washer for Isolating pump valve                                                                         | <b>057G00888</b>  |
| <b>2C</b> | Wilo circulator Yonos Para 25/6                                                                                | <b>076S00238</b>  |
| <b>2D</b> | 4 way thermostatic mixer                                                                                       | <b>010A4671P</b>  |
| <b>2E</b> | Blue handle ball valve with 90° elbow                                                                          | <b>010A4673P</b>  |
| <b>2F</b> | Red handle standard port ball valve                                                                            | <b>010A1825P</b>  |
| <b>3</b>  | Adjustable bracket                                                                                             | <b>R588LY001</b>  |

## UNDERFLOOR HEATING PIPEWORK

### PE-X

#### High density crossed linked polyethylene pipe with anti-oxygen barrier

PE-X pipes are the most commonly used pipes for underfloor heating systems. The polyethylene (PE) has been cross linked (X) to enhance the resistance to mechanical and temperature stresses. Our PE-X pipes are highly flexible which allows for quick and easy installation.

All physical and dimensional features of our PE-X pipes complies with EN-ISO 15875 Class 4 and 5, as well as DIN 16892.

There are three different manufacturing methods of cross-linking polyethylene producing different types of PE-X; Peroxide method (PE-Xa), Silane method (PE-Xb) and Radiation method (PE-Xc).

**PE-Xa** has the highest level of cross-linking and is therefore more flexible than the other two types, but the manufacturing process takes longer so the pipe end up being expensive.

**PE-Xb** is less flexible than PE-Xa, but has a higher bursting pressure, is produced with a more uniform wall thickness and tends to be lower in

price than both PE-Xa and PE-Xc.

**PE-Xc** is more flexible than PE-Xb but has the lowest percentage of cross-linking and kinks easily and can develop cracks.

### PB

#### Polybutylene multi layer pipe with anti-oxygen barrier for heating and cooling

Polybutylene pipework stands out for its high flexibility and offers great advantages in functionality and quickness of installation. This is a lightweight pipe, weighing approximately 9 times less than copper. PB pipes have a good resistance to prolonged stress, reduced thermal expansion and is made from a recyclable material.

Our PB pipework has been manufactured in compliance with DIN 16968, DIN 16837 and EN-ISO 15875 Class 4 and 5.

### PEX-AL-PEX

#### Multi layer pipe for heating, cooling and potable water services

Our Pex-Al-Pex pipe includes two layers, inner and outer, of PEX and one intermediate layer of aluminium. It combines the mechanical features of steel pipes with excellent resistance to wear and tear and possible electrochemical

### PERT

#### Polyethylene multi layer pipe with anti-oxygen barrier for warm water heating systems

PE-RT pipes made with polyethylene with enhanced thermal resistance, differs from PE-X right from the raw material. On a molecular level, it is a polymeric chain containing a very small percentage of the 1-octane molecule. It is this molecule which gives the PE-RT pipe this enhanced temperature resistance. This way the extruded pipe requires no additional molecular reinforcement.

Our PE-RT pipe complies with BS 7291-1, EN-ISO 22391-Class4, DIN 16833 and DIN 16837.

Interaction typical to plastic piping.

The aluminium layer offers a safe protection barrier against oxygen as well as great flexibility for bending with a reduced bending radius while maintaining the installation shape of the circuits.

Our Pex-Al-Pex pipe has been manufactured to comply with EN-ISO 22391 Class 1,2,4 and 5 and has also got full WRAS approval so can not only be used for the heating systems, but for any potable water installations as well.

### PIPE COIL SIZES

#### PEX-AL-PEX

##### 16 x 2mm

R999Y122 100m

R999Y123 200m

R999Y124 500m

##### 18 x 2mm

R999Y132 100m

R999Y133 200m

##### 20 x 2mm

R999Y142 100m

R999Y143 200m

##### 26 x 3mm

R999Y173 50m

##### 32 x 3mm

R999Y183 50m

#### PERT

##### 16 x 2mm

R978Y223 100m

R978Y226 240m

R978Y227 600m

##### 17 x 2mm

R978Y233 100m

R978Y235 240m

R978Y237 600m

##### 20 x 2mm

R978Y255 240m

R978Y256 400m

#### PEX

##### 16 x 1.5mm

R996Y048 240m

R996Y065 500m

##### 16 x 2mm

R996TY227 100m

R996TY219 240m

R996TY264 600m

##### 17 x 2mm

R996TY054 100m

R996TY033 240m

R996TY052 600m

##### 18 x 2mm

R996TY249 100m

R996TY220 240m

R996TY250 500m

##### 20 x 2mm

R996TY221 100m

R996TY222 240m

R996TY253 400m

##### 25 x 2.3mm

R996TY068 320m

#### PB

##### 16 x 2mm

R986Y116 100m

R986Y117 240m

R986Y130 500m

##### 18 x 2mm

R986Y118 100m

R986Y119 240m

##### 22 x 2mm

R986Y122 100m

## UNDERFLOOR HEATING CONTROLS

### CONTROLS

Underfloor heating installations must include system controls in order to function efficiently. Best practice is that each room has its own zone with an individual thermostat or sensor for each zone. The thermostats can be connected to a master controller that controls the pump and actuators/valves. The master controller also gives an on/off signal to the heat source (boiler, heat interface unit etc.).

For Part L compliance, a link is required between the controls and the boiler, so that the boiler can be switched off when there is no demand. However, to enhance the response time of the underfloor heating, it is better to use a night set back at times of no or lower demand, reducing the temperature of the floor rather than turning it off.

To increase the efficiency and accuracy of the system it can be combined with weather compensation, floor sensors and manifold temperature sensors.

If the main heat source also serves a radiator or other high temperature heat emitters, a mixing manifold may be required to reduce the temperature going to the underfloor heating manifolds.

At Giacomini we want to make sure you get the best controls for your system and your preferences. Please see our separate underfloor heating control guide for more detailed information.

### BASIC CONTROLS

A good, basic underfloor heating control system will be less expensive to install and very easy to use. It usually consists of stand-alone room thermostats directly connected to actuators fitted on a distribution manifold.

If a single manifold is controlling one zone only, the thermostat can be connected to a motorised 2-port valve, instead of controlling each circuit individually. If the single zone consists of one circuit only, a single zone manifold can be used.

It is possible to add floor sensors and pump control in a basic system. It is also possible to programme the times you want the heating to come on, as well as additional night set back. This depends on the chosen thermostat.



### ADVANCED CONTROLS

An advanced underfloor heating control system can have all the features of the intermediate level controls, such as programming, floor and flow sensors. What sets the advanced system apart is that it enables control from a central point within the building or even remotely. It can also be integrated with BMS so that the building owner can monitor and control the system.

If used with a weather compensator, the system will react quicker based on outdoor temperature changes, adjusting the flow temperature accordingly. Weather compensation will also make the overall system more energy efficient.



### INTERMEDIATE CONTROLS

An intermediate underfloor heating control system will be connected via a wiring centre, which gives you control over the boiler and pump. It also works with a mixing manifold with its own pump and mixing valve.

This system allows you to programme the heating to come on when you want it to, depending on the chosen thermostat or timeclock.

We recommend installing Differential Pressure Control Valves (DPCV) on commercial underfloor heating projects, where there are several manifolds and no hydraulic break in the system. One DPCV with a partner valve is required for each manifold.



DPCVs control the pressure differential for each manifold and as such the individual manifolds will not get affected by changes of pressure in other parts of the system. The whole system will remain balanced and this also means that each manifold can be commissioned individually.



## INSTALLATION CHAPTER

Prior to installation, the system will have been fully designed by one of our Project Engineers and a drawing will have been issued, detailing exactly how the system is to be installed.

Installation of the underfloor heating system can commence once the building has been made weather proof and all openings, such as windows and doors, have been sealed.

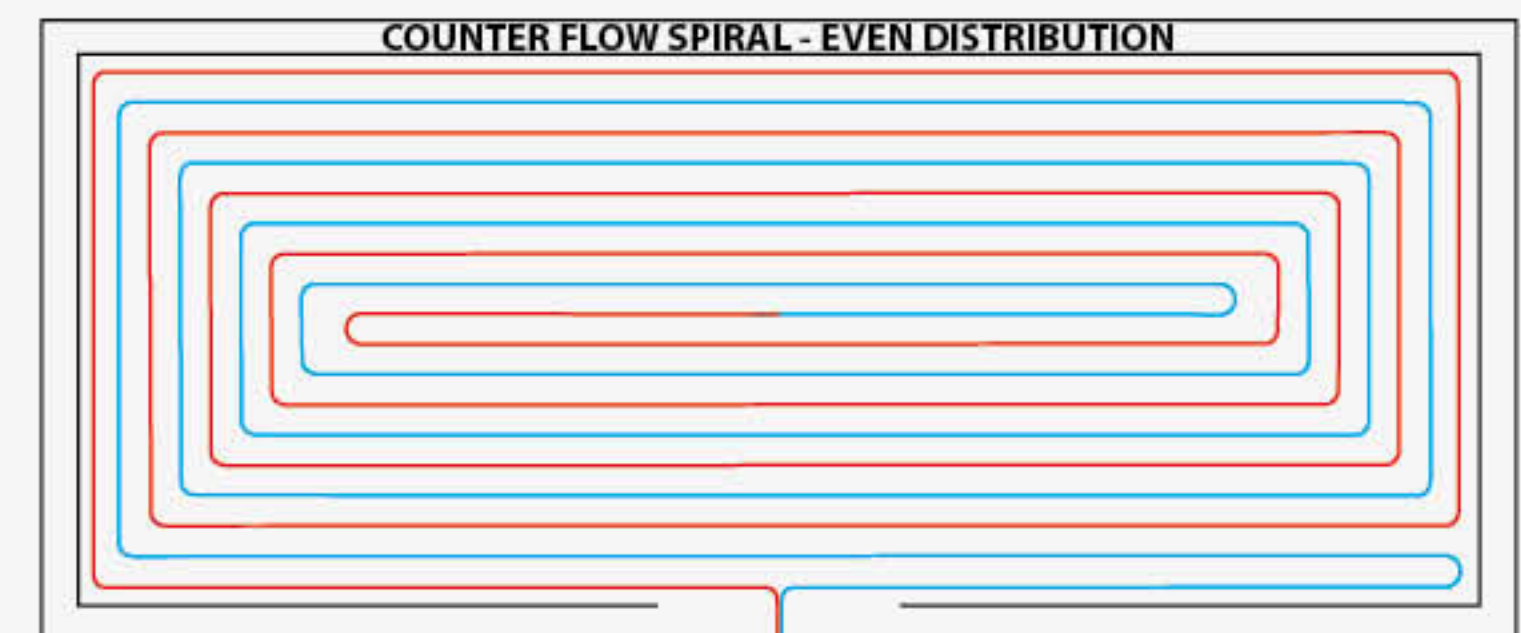
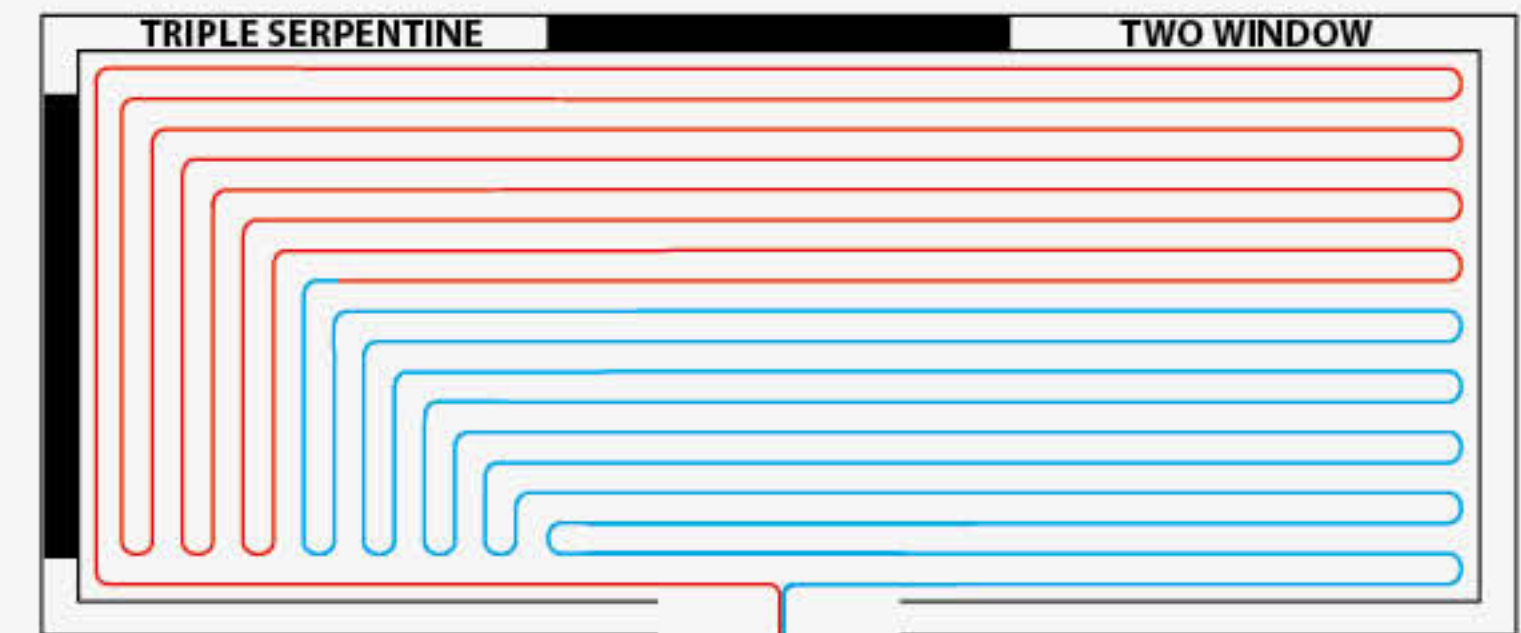
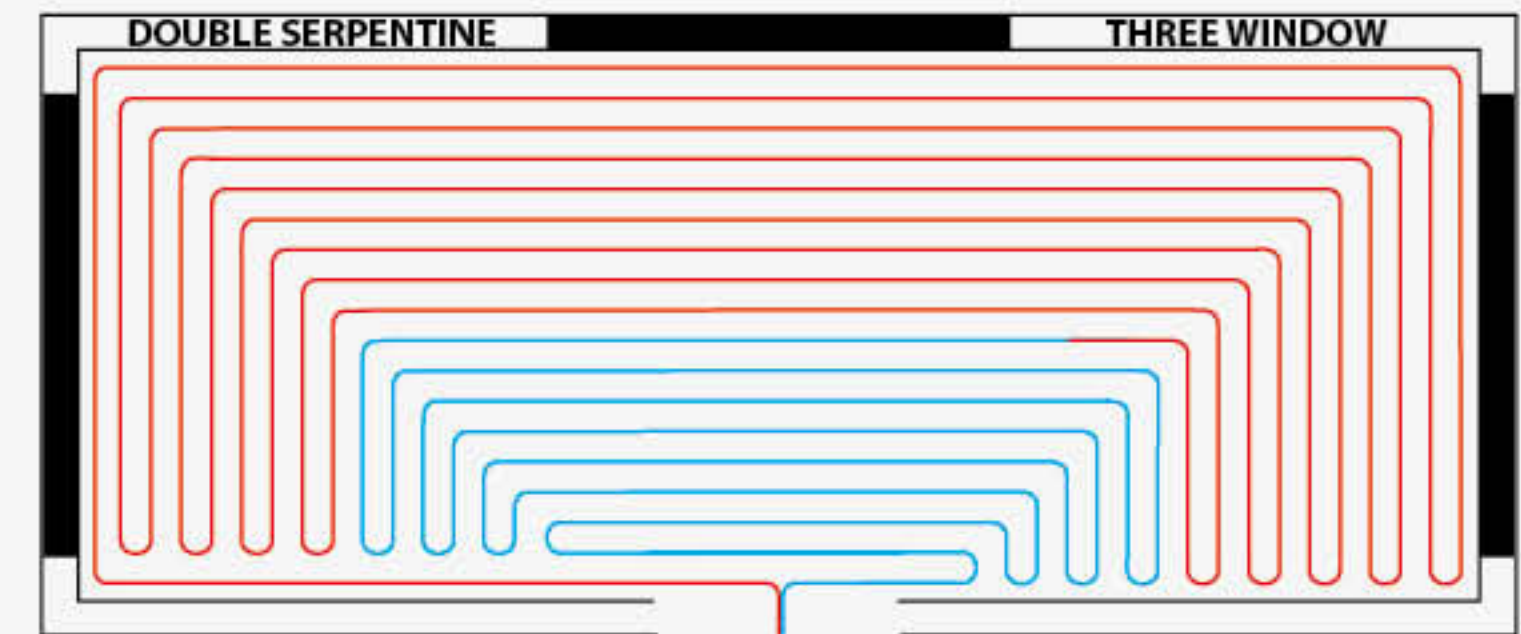
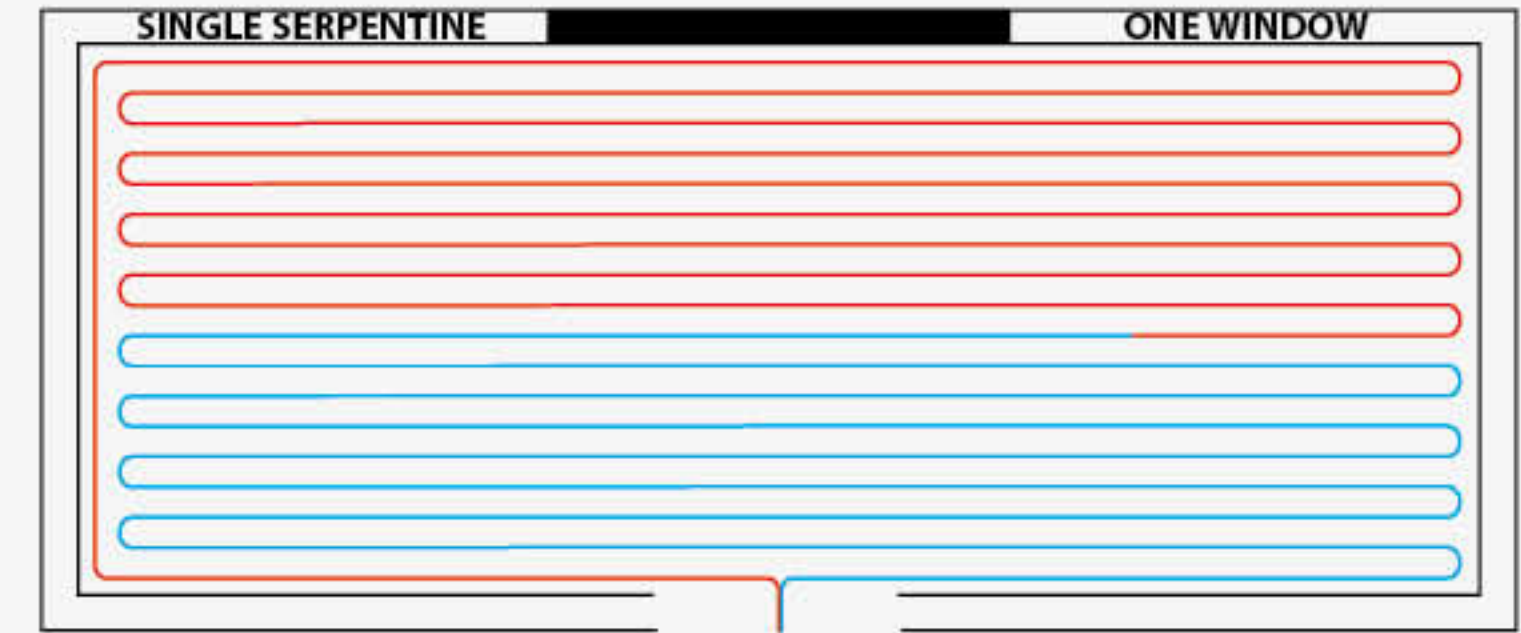
The manifold is typically the first part of the system to be installed and it should be positioned centrally to the circuits it will be feeding. It should also be positioned where access will be easy for future maintenance.

Pipes can be installed in a counter flow or serpentine pattern, the counter flow type is recommended as this offers a more even heat distribution. The latter type causes a gradual reduction in temperature as the water travels through the pipework. The laying pattern will have been decided during design stage.

It is important to pay attention to the bending radius of the pipework as over-bending can cause the pipe to kink and cause a restriction or blockage of flow.

The pipes will be laid close to each other just as they come out from the manifold, which can cause overheating of this section of floor. It is advisable to insulate this pipework until the pipes are laid at a suitable pitch to prevent excessive heat transfer.

Your Project Engineer will do a site visit prior to the installation and will look at everything from site restrictions to install phasing and coordination with other trades such as screeders.



## CASE STUDIES

### NEWRY LEISURE CENTRE

Total Project Value: **£18M\***

Location: **Newry, Co. Down**

System Type: **Spider Low-Profile**

System Area: **Leisure Centre & Sports Club**

Total Install Area: **1550m<sup>2</sup>\* (Supply Only)**

The Newry Leisure Centre is a £18 million-pound leisure complex with premium facilities. The key focus of the development was to promote wellbeing whilst enhancing the building's sustainability. Underfloor heating was installed in the changing and shower areas, the café, the meeting rooms and offices, and all communal areas.

The low-profile Spider system is available in three configurations, with Newry Leisure Centre using the R979SY011, which has 13 mm pins on the lower surface of the panel for anchoring it to a layer of insulation. By choosing to submerge the Spider system in Mapei Topcem screed, the Newry Leisure Centre project benefits from our 10 year back-to-back Mapei warranty package.

### ESTON COMMUNITY VILLAGE

Total Project Value: **£4.8M\***

Location: **Middlesbrough, North Yorkshire**

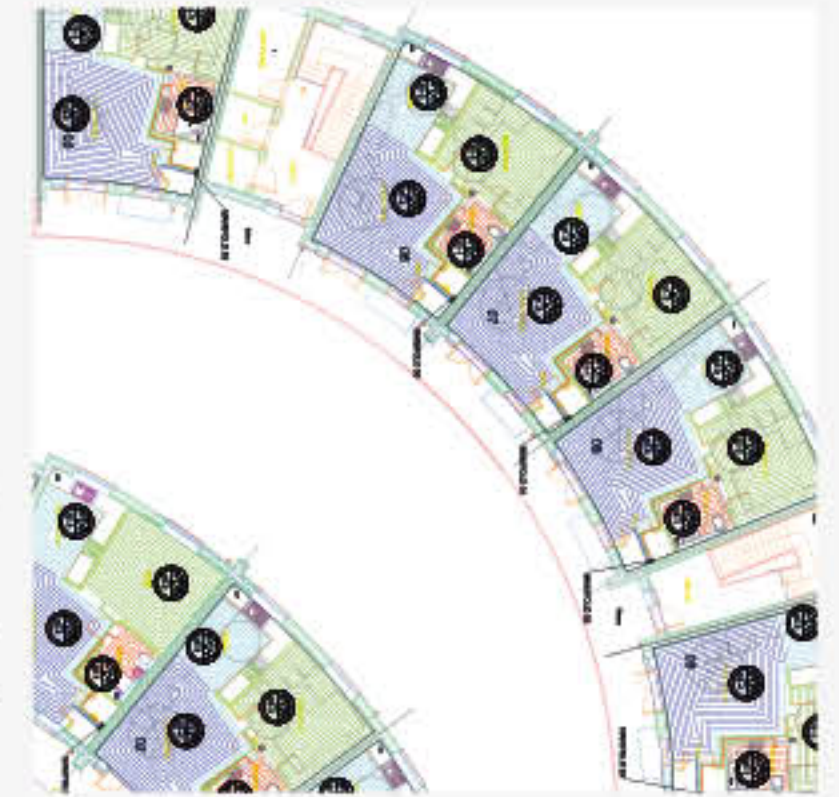
System Type: **Solid Floor**

System Area: **38 Apartments**

Total Install Area: **2000m<sup>2</sup>\***

Eston Community Village provides 38 apartments within 4 two storey blocks and 13 bungalows for the over 55s and for people with dementia.

Underfloor heating was selected within the apartments to free wall space from clutter and unnecessary hazards, such as the sharp edges on conventional radiators.



### AXON CONTROLS HEADQUARTERS

Location: **Dungannon, Co. Tyrone**

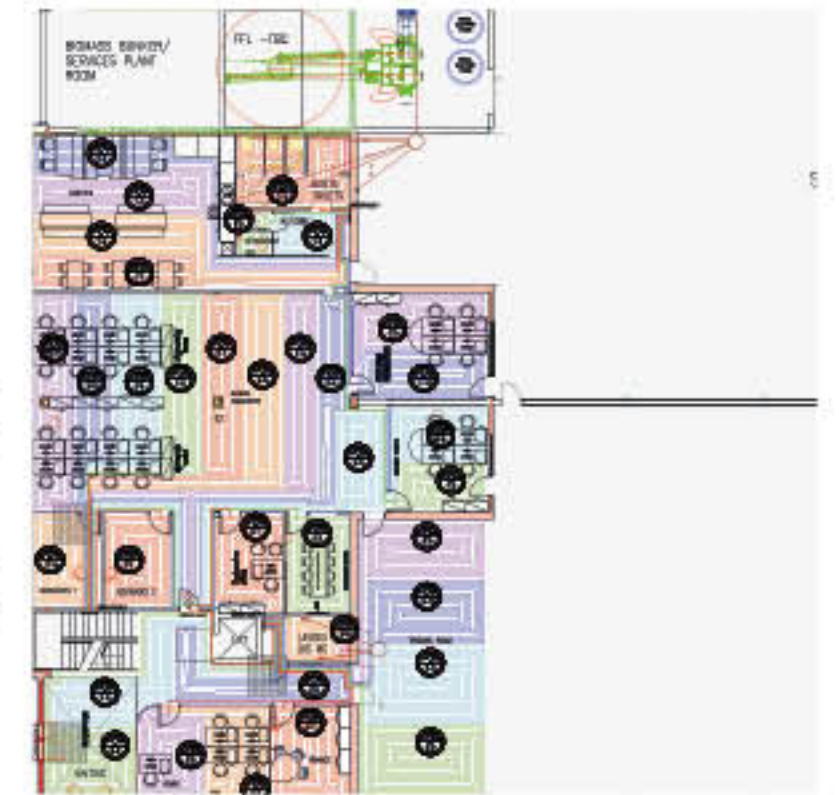
System Type: **Solid Floor**

System Area: **Ground Floor & First Floor Offices**

Total Install Area: **875m<sup>2</sup>\***

Axon Power & Controls selected a solid floor system to be installed throughout their new Dungannon Business Park headquarters.

The project was the first to benefit from our new 10 year combined warranty package, by selecting Mapei's Topcem screed to finish the solid floor system.



### BALDRAGON ACADEMY

Total Project Value: **£28.7M\***

Location: **Dundee, Scotland**

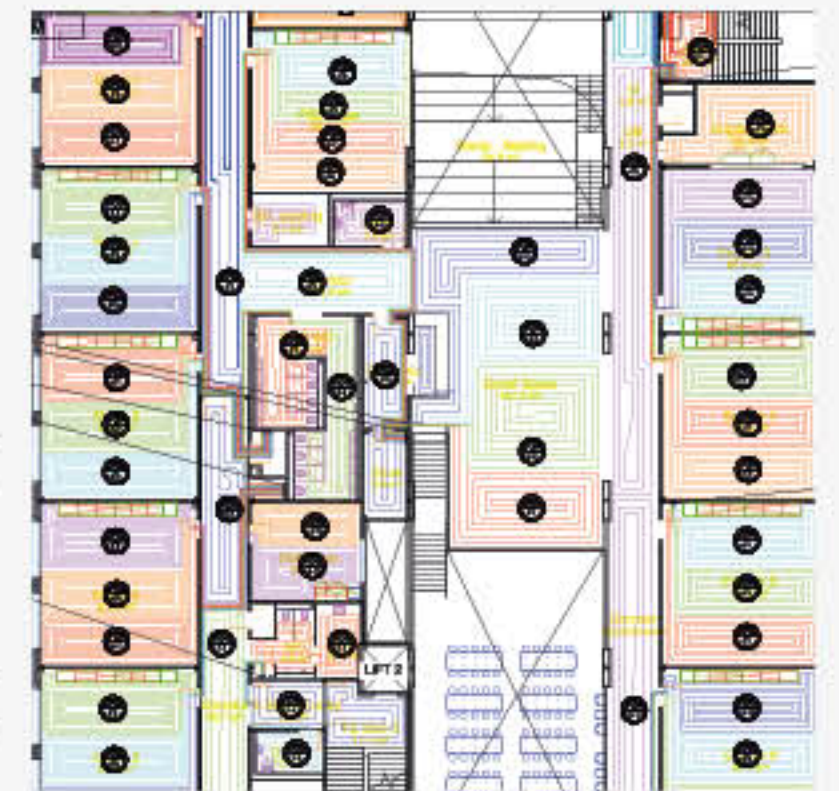
System Type: **Mesh & Solid Floor**

System Area: **Ground, First & Second Floor**

Total Install Area: **12625m<sup>2</sup>\***

The Baldrion Academy development is part of a new three-tier shared education campus backed by Dundee City Council and the Scottish Futures Trust.

Underfloor heating was installed to help create a healthy environment for staff and pupils. The reduced air movement from a UFH system means a reduction in dust and airborne germs, so rooms are cleaner and healthier.



\*Approximate figures

## CASE STUDIES



### GUY & WRIGHT NURSERIES

Location: **Hertfordshire**

System Type: **Solid Floor**

System Area: **Primary Digester**

Total Install Area: **2400m<sup>2</sup>\***

Underfloor heating was selected to assist Hertfordshire tomato growers, Guy and Wright, in the production of their Eco Tom tomatoes.

The solid floor system is used to heat the organic material within the farm's flexible primary digester bag, causing anaerobic fermentation. This is where microorganisms break down the organic matter of the waste vegetables, producing biogas, a mixture of biomethane CH<sub>4</sub> (65-70%) and CO<sub>2</sub> (30-35%) and small amounts of other gases. The biogas is collected and is converted into electricity to support the farm's tomato growing.

### PRAE WOOD PRIMARY SCHOOL

Total Project Value: **£3M\***

Location: **St Albans, Hertfordshire**

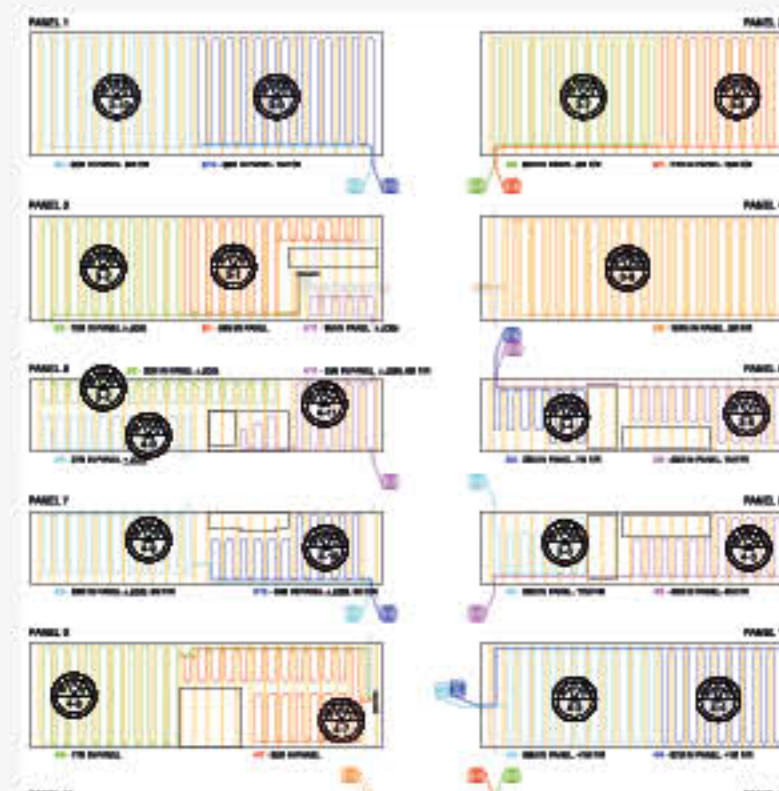
System Type: **Modular Joisted**

System Area: **Ground & First Floor**

Total Install Area: **564m<sup>2</sup>\* (Supply Only)**

To complete this primary school extension within the tight school timeframes, an off-site, modular approach was selected.

The underfloor heating was installed into pre-built transportable modules, that were created in a controlled factory environment. When delivered to site the panels were craned into position and simply connected together.



### ASHTON GATE STADIUM

Total Project Value: **£45M\***

Location: **Bristol, Avon**

System Type: **Solid Floor**

System Area: **Home & Away Changing Areas**

Total Install Area: **385m<sup>2</sup>\***

£45 million has been spent on Bristol City Football Club's & Bristol Rugby Club's ground to redevelop the Ashton Gate stadium

Alongside the construction of the 6,000 seater South Stand, new home and away teams' changing rooms were provided, both featuring underfloor heating.



### STEPS REHABILITATION CENTRE

Total Project Value: **£5M\***

Location: **Sheffield, South Yorkshire**

System Type: **Solid & Floating**

System Area: **Ground, First & Second Floor**

Total Install Area: **1670m<sup>2</sup>\* (Supply Only)**

The new £5m STEPS facility will provide rehabilitation to adults who have suffered brain and complex trauma.

Underfloor heating is commonly selected in care facilities due to its safer low flow and return temperatures, which reduces the risks of burns from high surface temperatures. It also allows facilities to free up wall space from clutter and unnecessary hazards, such as sharp edges.



\*Approximate figures

## ADDITIONAL INFORMATION

### WARRANTY

Our project specific 10-year system warranty promises that our pipework, manifolds and installation will be free of defects for the warranty period. This excludes electrical controls and pumps, which are guaranteed for two years.

Our 10-year system warranty can also be applied alongside Mapel's 10 year Renovation and Topcem screed warranty, providing a back-to-back ten year system warranty on screed and the underfloor heating installation.

### ACCREDITATION

Our components and systems meet the most stringent international standards and offer high quality and innovative technology.

Giacomini is committed to continuous improvement, maintaining the integrated certification according to UNI EN ISO 9001 for quality, 14001 Environment and OHSAS 18001 for occupational safety.



CIBSE APPROVED CPD COURSE PROVIDER



### CONTINUING PROFESSIONAL DEVELOPMENT

At Giacomini UK, we have a selection of informative and engaging Continuing Professional Development (CPD) modules, approved by a number of professional industry bodies.

To register your interest in our CPD courses visit  
**UK.GIACOMINI.COM/CPD-COURSES**

You'll find our CIBSE Approved CPDs in the **CIBSE Directory of CPD Course Providers**.

We're also delighted to have a RIBA Approved CPD 'Understanding Underfloor Heating' and to be part of the **RIBA CPD Providers Network**.

## ABOUT US



Giacomini was established in northern Italy in 1951 and water has always played a central role for us. We use it to heat and cool, we distribute it and measure it, we work with it on a daily basis. Water means inspiration to us, and stands for the ideal element to help us focus on human well-being.

Giacomini began to produce small brass components using a lathe. A few years later, the company moved to a new 1500 m<sup>2</sup> site, still in San Maurizio d'Opaglio: this point marked the beginning of a steady path of growth, driven by the development of innovative products and systems and by our instinctive drive to market these across national borders.



We are world leaders in the production of components and systems for the distribution of heating, cooling and domestic hot water, for use in the residential, tertiary and industrial sectors.

Giacomini has been established in the UK since 2003.

### CONTACT US

To speak with a member of the UK team, please call:

**UK Main Line - 01454 311012**

System Sales & Design - 01454 809100

Brassware Sales - 01454 809092

Accounts - 01454 809104

Marketing - 01454 809108

## OTHER PRODUCT RANGES

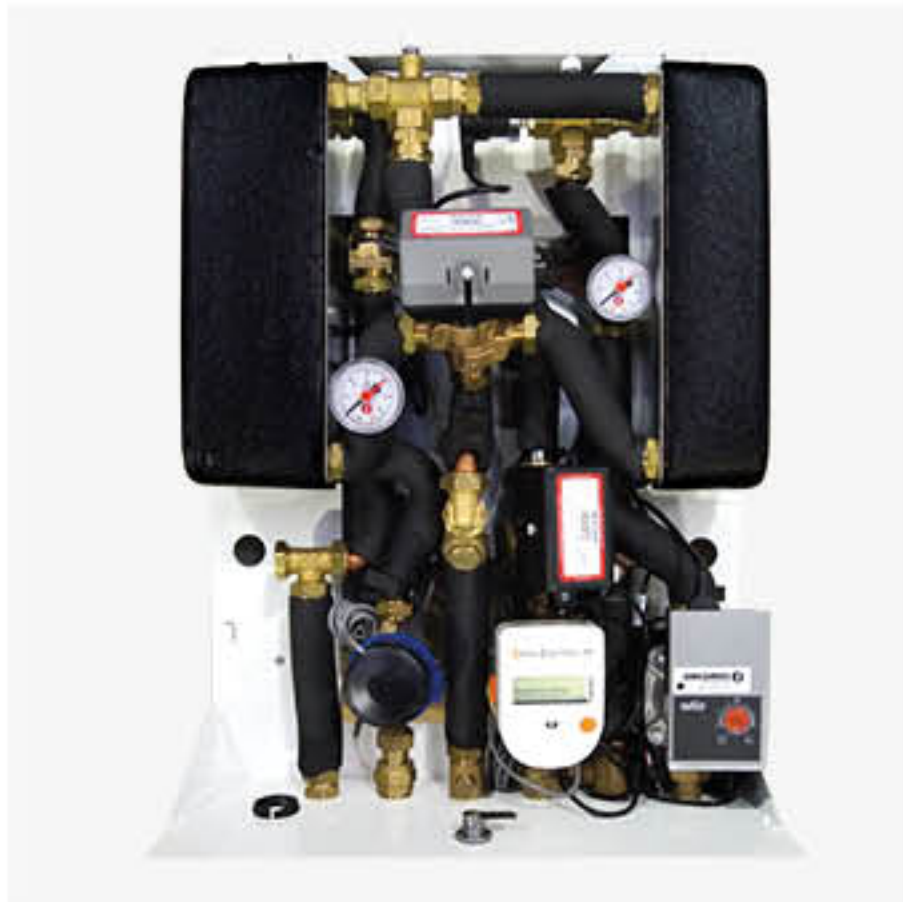
### BOILER ROOM COMPONENTS

The boiler room is the heart of any heating system and deserves only the best components to ensure a well functioning system over many years.



### HEAT INTERFACE UNITS

The introduction of Heat Interface Units (HIUs) to the heat network market has revolutionised the level of efficiency, control and comfort achievable in apartments and other types of dwellings. In our HIU brochure, we will guide you through our range of units and help you pick the right one for your project.



### FLOW CONTROL VALVES

In variable flow systems, the flow, velocity and system pressure losses vary frequently depending on demand. To balance a system where the flow frequently changes, it is important to choose the correct valves in the right positions. We help you optimise the flow in your system in our flow control brochure.



### RADIANT CEILINGS

Radiant ceiling systems are similar to underfloor heating systems in that they work based on the same theory of low temperature radiant heat. Many design aspects are the same and so are many of the components, however as there are still ways in which the systems differ, we have a dedicated brochure for radiant ceilings.



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**PLEASE DO NOT HESITATE TO CONTACT US  
WITH ANY QUESTIONS OR ENQUIRIES**



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