ROBBENS SYSTEMS
UNDERFLOOR HEATING
is a part of FRÄNKISCHE

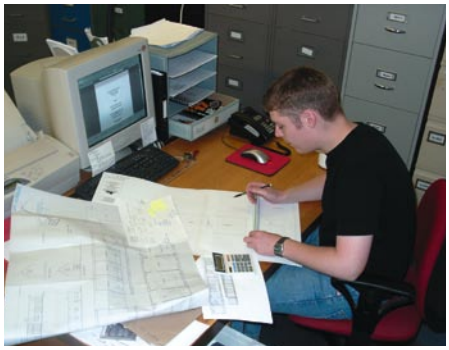
Robbens Systems – Underfloor Heating Guide

For Architects, Engineers & Developers

www.underfloorheating.co.uk

Content

1. The Company



David Robbens Underfloor Heating Systems Ltd.

Experience is the key

Robbens Systems have been at the forefront of the UK underfloor heating market for nearly 15 years, developing design methods and products to their current high level of function and reliability. Through excellent products, high levels of customer service, and responsible trading, Robbens have continued to make and maintain lasting customer relationships.

Customer focus

At Robbens, each customer is an individual, and each project is a one off, both receiving the advice and personal attention they deserve. Our technology is definitely of the modern world, but we have a strong belief in old fashioned service!
Proven technology together with high qualified staff and top quality service make your project now and in the future to a resounding success.

Quality background

Since becoming part of FRÄNKISCHE in the year 2004, Robbens Systems has been able to fulfill potential both in the domestic and commercial industry, not only by providing excellent back up but by being at the leading edge of technological advances from all across Europe. When dealing with Robbens, you can trust in the knowledge that the pipe used is from a trusted source and carries no risk of supply chain breakdown.

FRÄNKISCHE – the strong brand behind

Pipe solutions

Robbens Systems is part of FRÄNKISCHE, one of the world wide leading developer and manufacturer of corrugated and plastic pipe systems.

At their headquarter and different locations in Germany and other branch office locations, subsidiaries, and affiliates in Europe, Asia and the U.S., almost 1,650 highly motivated employees work on solutions for drainage and electrical systems, building technology, industrial applications and mechanical engineering, and on developing and manufacturing production lines. The pipe systems are for multiple applications.

Some examples of the first-class system solutions include: highly complex drainage systems for use in civil engineering and road construction, a broad range of electric conduit systems for use in civil and mechanical engineering, heating and potable water pipes for use in building technology or cable protection systems and fluid lines for use in the automotive industry.

With over 100 years of experience FRÄNKISCHE combines know-how and ambition for intelligent future innovations, which makes them to the ideal partner for complex and technically challenging tasks.

History – multilayer pipe

After World War I and II, FRÄNKISCHE started successful experimenting with utilizing plastics for pipe production.
In 1994, FRÄNKISCHE was among the first in the industry to produce plastic/metal multi-layer composite pipes.
Today FRÄNKISCHE's Building Technology Division plays a leading role in the field of plastic pipe production and focuses on its core business competencies:
Innovative and technically ingenious potable hot and cold water plumbing and heating systems and pipes for use in radiant heat and special applications.
FRÄNKISCHE focuses on producing high-quality plastic/metal multilayer composite pipes in dimensions ranging from 14 to 63 mm.

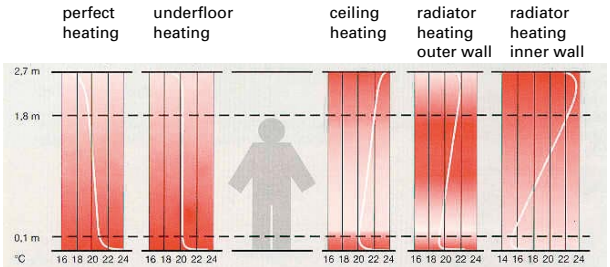
2. Underfloor Heating - Benefits

The Benefits

Using underfloor heating has its obvious benefits opposed to traditional heating methods (radiators, insulation) like comfort, reliability and reduced costs.

Heating Comfort

Most systems heat from the top down, which can cause to over head your head, leading to being uncomfortable and stuffiness.
The heat is concentrated into relatively small areas (e.g. near a radiator) and the heaters heat the air next to them. The air then rises up the wall, along the ceiling into the centre of the room. When it reaches the centre of the room, it cools slightly, and then descends towards the floor. The result is a warm head and cool feet.
To get warmer feet, you usually have to overheat your head; as the feet naturally act our ‚thermostat' warm feet generally means we feel more comfortable.
Underfloor heating heats the whole floor area resulting in the opposite vertical heat stratification - warm feet and a cool head. (see graphic)



Interior Design Flexibility

Using an underfloor heating system in place of radiators presents you with more useable space. You no longer have to arrange your furniture which can cause radiators to be blocked.

Individual Control

Most underfloor systems are installed on a room by room basis, each running off of its own programmable thermostat. For example, while you may wish to have a warm floor in the bathroom and kitchen in the morning, you probably dont care if the lounge is on until the evening. With a direct-acting (on when you want it on) underfloor heating, you can individually adjust temperature settings in each room to suit your needs.

System Efficiency

Underfloor heating can result in a 15% energy saving over traditional electric heating, assuming the item has been installed and is running using a programmable thermostat.

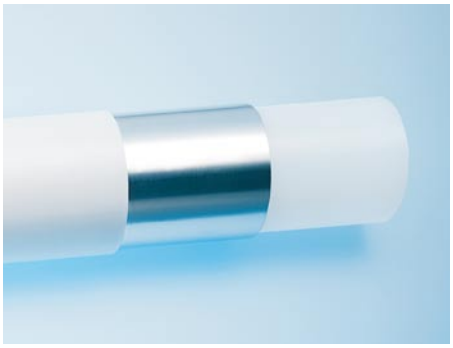
Cleanliness

Underfloor Heating reduces the number of airborne allergens (substances that cause an allergic reaction) by lowering air moisture levels in areas such as bathrooms by drying wet floors and walls. It also helps reduce drafts, aiding people with asthma or other breathing complications.

Low Maintenance

With underfloor heating there are no rads to bleed, no pipes to burst and nothing to flush. An occasional dusting of the thermostat is all that is required to keep the system maintained.

3. Pipe Features



The multi-layer composite pipe

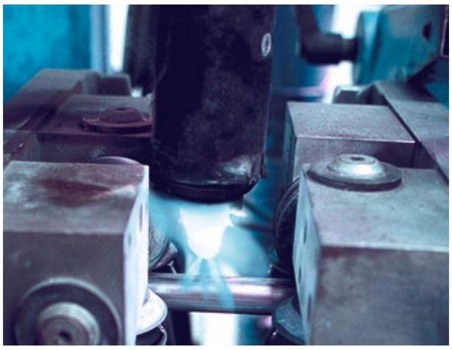
The high-quality and cross-linked multilayer composite pipe with a TIG welded aluminium core for use in Robbens underfloor heating systems is made by FRÄNKISCHE. The two plastic layers and the aluminium layer are permanetly bonded togehter by intermediate adhesive layers - providing execellent reliability, extreme durability and longevity.

The Advantages

In the past, copper pipes were mainly used in domestic installations. Today, plastic and multi-layer composite pipes are more and more used. The benefits are obvious: Multi-layer composite pipes feature excellent flow properties and are highly resistant to incrustation, thanks to their superior chemical resistance. FRÄNKISCHE „alpex“ pipes are physiologically sound and suitable– a combination that ensures safe and easy handling, and reliability in daily use. Unlike copper pipes, plastic/metal multi-layer composite pipes are not prone to pitting corrosion.

Further advantages of plastic/metal multi-layer composite pipes are the corrosion resistance, a low thermal expansion coefficient – similar to copper - and a high temperature resistance of up to 95°C. Furthermore, FRÄNKISCHE has only manufactured butt-welded pipes since they began manufacturing multi-layer composite pipes. If this production method is applied, the thickness of the aluminum layer is almost the same at any point on the diameter of the pipe and there is no seam thickening. When the pipe is bent, the same forces exist consistently throughout the pipe.

3. Pipe Features



Advantage of the multi-layer composite pipe

- **Excellent sound absorption properties**
- **Optimum flow properties**
- **Corrosion resistant**
- **High chemical resistance**
- **Good compatibility with other materials**
- **Low linear thermal expansion; comparable to copper**
- **Withstands operating temperatures of up 95 °C (long-term) and 110 °C (short-term)**
- **Withstands operating pressure of up to 10 bar**
- **Hygienic and toxic-free**
- **Incrustation-free**
- **100% oxygen-tight**

Down to the last detail

The underfloor heating pipe can be easily bent which reduces or eliminates the need for connections and fittings. The multi-layer composite pipe allows for optimum bend radii.
No special tools are required to bend the pipe of a diameter of 16 x 2.0 mm. All bends needed for underfloor heating applications can be easily made by hand.
The continuously welded aluminium mid layer is gives the pipe dimensional stability and reduces its tendency to spring back on bending.

Reliability guaranteed

FRÄNKISCHE stands behind all its products and provides a 10-year warranty for all pipes.

FRÄNKISCHE

BUILDING TECHNOLOGY

CERTIFICATE

FRÄNKISCHE develops and manufactures technically superior plastic corrugated pipe systems. With many years of experience FRÄNKISCHE combines expertise and ambition for intelligent future innovations, which makes us the ideal partner for complex and technically challenging tasks.

FRÄNKISCHE hereby grants to the entitled parties the following rights for the products listed below

alpex-duo® Composite pipe system for plumbing and heating applications

alpex-therm® XS Panel radiator piping

turatec multi® Composite pipe system for plumbing and heating applications

ff-therm® PE-Xa pipe for panel heating

fripex-san® PEX drinking water installation system

if products are purchased from
DAVID ROBBENS UNDERFLOOR HEATING SYSTEMS, LTD.

for the duration of

ten (10) years

Who is entitled to present a claim ?

Only those persons who purchased those aforementioned products directly from David Robbens Underfloor Heatings Systems, Ltd. (registered in England and Wales with number 02800236) are entitled to present a claim ("Entitled Party"); provided, however, that the installation was done under a valid contract by contractors who own and operate a registered and certified business, that the products were properly installed, per our handbooks and instruction manuals, and used for their intended purpose taking into consideration legal and project related provisions. The Entitled Party must furnish proof that the above requirements have been fulfilled.

When can rights be exercised?

FRÄNKISCHE hereby grants the below rights; provided, however, that the products are proven to be defective and that the product defect is exclusively due to a FRÄNKISCHE manufacturing defect – error in product manufacture or assembly – or a design defect (hereinafter referred to as "Defect"). This applies to the above product whether used alone or in combination with other FRÄNKISCHE products.

When does the claims period expire?

Rights may be exercised by the Entitled Party within ten (10) years from the original purchase date. The Entitled Party must retain the dated sales receipt as evidence of the date of purchase and must furnish proof to FRÄNKISCHE upon request.

What must be taken into consideration?

FRÄNKISCHE must be notified immediately in writing regarding any defects. Defects and damage must be listed and described in detail.

What obligations will FRÄNKISCHE assume?

FRÄNKISCHE will ship replacement products free of charge (packaging and shipping included; transport insurance not included). Furthermore, FRÄNKISCHE will reimburse any actual costs accrued by repairing the defect or by installing the replacement of the product; provided, however, that FRÄNKISCHE approved these measures in writing before any work was commenced. FRÄNKISCHE reserves the right to repair the defect itself or have a third party repair the defect, if this can be reasonably expected of the Entitled Party. If the Defect has caused direct damage to property and if the Entitled Party is held liable for the property damage by a third party, who owns this property, justifiably and not time-barred, or if the Entitled Party owns this property, FRÄNKISCHE will also compensate for the actual direct damage and the costs based on the replacement value. Pecuniary losses and fictitious costs or fictitious damage of the Entitled Party or of the third party will not be replaced. Entitled Party must furnish proof of all costs and/or about the damage. It is necessary to submit original receipts.

What is the maximum claim amount?

FRÄNKISCHE has procured product liability insurance from or placed product liability insurance with a renowned German insurance company. Claims shall be limited to an amount not to exceed

EUR 5,200,000.00

for each claimant, including the total number of all claims presented to FRÄNKISCHE (also by third parties) resulting from this manufacturing defect – error in product manufacture or assembly – or design defect.

Please note

This Certificate does neither establish a warranty right under a purchase or service contract nor do we warrant or make any representation regarding appearance and workmanship and durability or any warranty whatsoever.

Other mandatory legal requirements and the rights of any member of any respective association shall remain unaffected by this Certificate.

This Certificate shall be exclusively governed by the laws of the Federal Republic of Germany. Exclusive jurisdiction and venue for all matters relating to this Certificate shall be in courts located in Hassfurt, Germany.

Last modified: September 2006

FRÄNKISCHE ROHRWERKE Gebr. Kirchner GmbH & Co. KG | Hellinger Str. 1 | 97486 Königsberg/Germany

4.1 Load-bearing foundation

The load-bearing foundation must meet the static requirements for the establishment of floor structures and the requisite traffic load. The level surface of the load-bearing foundation must be within tolerances and reflect the requirements of DIN 18202.
A level mark representing the specified installation thickness of the floor structure must be drawn in every room to control the elevation of the subfloor. The elevation reference point is to be specified and marked by the building planner or construction supervisor.

Piping, electrical lines, etc., which are to be laid upon the load-bearing foundation, must be securely fastened. Through re-leveling, an even surface must again be created for the establishment of the insulation layer, or at least, the sound insulation layer. The necessary construction elevation is to be considered during planning. Self-levelling (Perlite, etc.) may not be used for full surface leveling. If the heated floor structure is to receive an effective downward gradient (> 1.5 %), i.e. in showers, etc., then this gradient must also be installed in the load-bearing foundation in order to meet the requirement of an even thickness in the screed.

Building joints present in the load-bearing foundation must have an even width, be fully sharp-edged, run in straight and correct alignment and be consistent from foundation up to the floor covering. The load-bearing foundation must dry before it is covered and must be free from impurities and loose components.

4.2 Edge Insulation

The edge insulating strip must be made of a ductile material. Its thickness is to be measured in such a way that after hardening of the screed, a horizontal compressibility of at least 5 mm is enabled with respect to all adjacent and floor-penetrating building components. The edge insulating strip is laid in a continuous strip and reaches from the concrete up over the finished floor. When using multi-layered insulation layers, the edge insulating strip must be installed on the top insulating layer. The edge insulating strip must be securely fastened and must be bent into an angle for room corners without losing its function.
The remnant pieces and pulled-off foil may only be cut off after installation of the floor covering is completed.

4.3 Insulation layer and loading

The insulation layers are installed in unison and are pressed closely together. Different layers are to be laid against each other with the impact edges staggered. With multi-layered insulating layers, it is to be noted that they contain-at the most-two layers of sound insulating materials (i.e. DES sm/sg). According to DIN 18560, Part 2, the maximum compressibility of all insulating materials is limited-depending on the traffic load- to 3 kN/m² for a max. of 5 mm and 5 kN/m² for a max. of 3 mm. When using a combination of sound and heat insulation, the insulation with lower compressibility (sh) be placed on top. This does not apply to sound insulating system tiles. The insulating layer is covered and protected from moisture during the screed pouring and curing. The covering prevents the screed from penetrating the joints between the insulating panels and in case of movement between the insulation layers and the edge insulating strip. Thus, it is possible to avoid heat and sound bridges. A min. 0.2 mm thick PE-foil is to be used as a covering at the joints with an overlap of 80 mm and taped together as necessary.

4.4 Heated screed and heat distribution layer

4.4.1 Cement screeds

The cement screed should be poured in a soft, plastic consistency. The plasticity of the cement screed can be improved by using suitable additives. When pouring, the temperature of the cement screed may not fall below 5° C. After pouring, it must be held at 5° C for a period of at least three days. Furthermore, at low temperatures or for slow hardening cement, the screed must be protected for at least three days from drying out and at least a week from other harmful effects, i.e. heat and drafty conditions, in order to minimize shrinking. For smaller construction projects, this can usually be achieved without taking any special precautions, if the building is closed. Weight should not be placed on cement screeds until after three days have passed and heavy weight only after the passing of seven days. Please also pay attention to the manufacturer's requirements.

4.4.2 Calcium sulfate screeds

With anhydrite screeds, it is necessary to ensure the temperature in the area of the heating elements is kept below the maximum temperature of 55° C, as indicated in DIN 18560, Part 2. The maximum qualifying temperatures should therefore be limited accordingly. Movement joints are necessary when using cement screeds. When pouring, the temperature of the anhydrite screed may not fall below 5° C. After pouring, it must be held at 5° C for at least two days. Furthermore, the screed must be protected for two days from harmful incidents, such as heat, driving rain and drafty conditions. For smaller construction projects, this can usually also be achieved without taking any special precautions, if the building is closed. Anhydrite screed should be allowed to dry out unhindered and may not be exposed to continued moist conditions. Weight should not be placed on anhydrite screeds until after two days have passed and heavy weight only after the passing of five days.
Anhydrite floors are to be installed in strict compliance with the manufacturer's instructions. Special diligence is necessary for laying insulation and final floor coverings. The thickness of the drip tray-type cover and/or shaping of the insulation must correspond to the consistency of the flowing screed. Other coverings are permissible, if the equivalent function is met. For example, use of an insulating cover can be avoided, if insulating system panels are used, which have a functional surface equivalent and which effectively prevent the escape of the screed mortar at their joints. Please also pay attention to the manufacturer's requirements

4.5 Movement Joints

A joint plan should be created covering the arrangement of the joints, from which instructions as to the type and installation of the joint should be gathered. The joint plan should be created by the building planner and provided as part of the performance specifications to the builder. In order to determine the screed field sizes and distances between joints, the floor coverings must be considered. With heated screeds, which are intended for the use of stone or tile coverings, screed fields with surface sizes of approximately 40 m² or greater should be separated with movement joints. For surface sizes of less than 40 m², movement joints should also be installed at any side which is longer than 8 m. The aspect ratio of the screed layer should not exceed the ratio of 1:2, whenever possible. Heating elements and heating mats may not be separated by movement joints. In doorways, surfaces of differing sizes normally meet one another. In this instance, contraction- or movement joints are to be employed. Heating circuits may not cross movement joints. Heating pipes may only cross movement joints as pipe connectors in protective form (i.e. pipe sleeves). In order to prevent a vertical misalignment of the movement joints, the screed layers must be connected in this area with suitable anchor plugs, so that horizontal expansion is not obstructed.

4.5.1 Executing Movement joints

Joints must be formed in such a manner that at least 5 mm of compressible space is available between the screed flanks. Movement joints extend from the upper edge of the thermal insulation to the upper edge of the floor covering and may not be bridged by reinforcing elements or underlayment mats. After completion they must be filled elastically or sealed with joint profiles.

4.6 Curing the screed

Anhydrite and cement screeds must be heated prior to laying floor coverings in accordance with DIN EN 1264, Part 4. As is the case with unheated screed, it is the responsibility of the company laying the floor to verify readiness for the laying of the floor prior to starting work. This is part of its testing requirement in accordance with VOB, Part C DIN 18365 “Floor laying work.” No. 3.1.1. Starting the laying process depends on the load distribution layer. The functional heating period usually lasts at least seven days! Please review the heating log and execution instruction sheet.

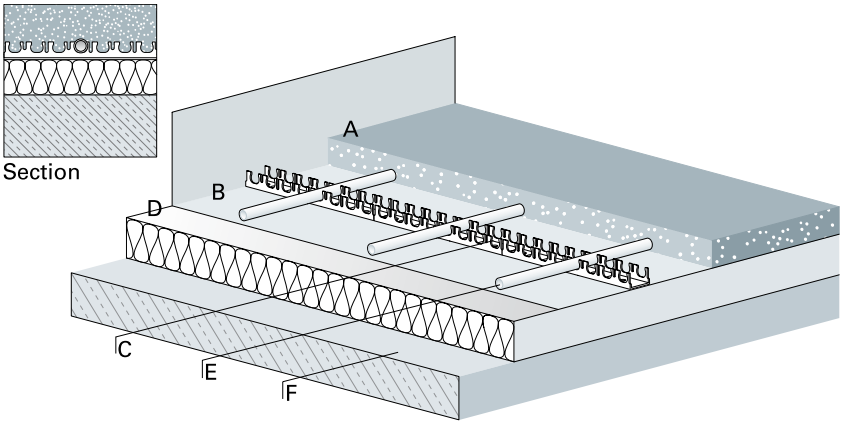
The heat-up process is as follows:

1. At the earliest, the heat-up process can start seven days after application, for calcium sulfate screed (anhydrite screed), and 21 days after application for cement screed.

2. Flow temperature of 25° C must be maintained for three days.

3. Maximum flow temperature (max. 55° C AE/60° C ZE) must be maintained for four days.

5. Floor Constructions



Legend:

A = Screed
B = Vapour Barrier
C = Clip Rail System
D = Insulation
E = Underfloor Heating Pipe
F = Oversite Slab

5.1 Screed / Solid Floor System

Screed Floors

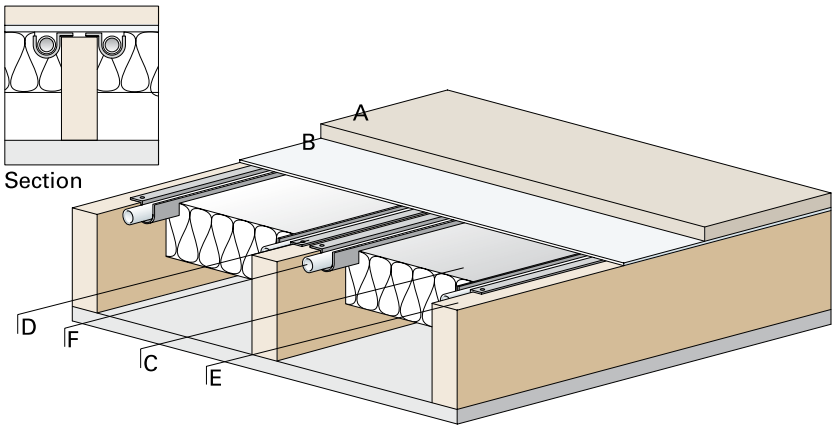
These are suitable for a wide range of floor coverings and construction methods. The system is simple and straightforward to install. The most widely used underfloor heating system, performing in ooo's of homes countrywide. Due to the high thermal mass, this system has a relatively slow thermal response, but this is largely over-come by using individual room control and close set-back tempe-ratures.

Installation

Edge insulation (client to supply) should be fitted against external walls to avoid cold bridging and to allow for expansion of the screed The Pipe Rail is stapled to the floor insulation using plastic staples, at approx. 1.5m centres. The pipes are clipped into the pipe channel at the centres specified in the design. Once the system of loops has been filled and pressure tested, the conventional sand cement screed (65mm min depth) or proprietary flowable screed can be laid.

Characteristics

Max. 100w/m2 @ 20° C Rm/T
Thermal mass heat storage
Minimum supply temperature 40° C ± 2° C.
Ideal for geo-thermal / low temperature supply systems



Legend:
A = Floor Deck
B = Aluminium Conducting Sheet
C = Insulation
D = Pipe Clips
E = Joists

5.2 Suspended Floor System

Timber Joist Floor

This System is used in suspended timber frame construction and often in refurbishment situations. The use of thin, highly conductive aluminium sheets in the system ensures heat is distributed across the floor. The system does not add significantly to the floor loading

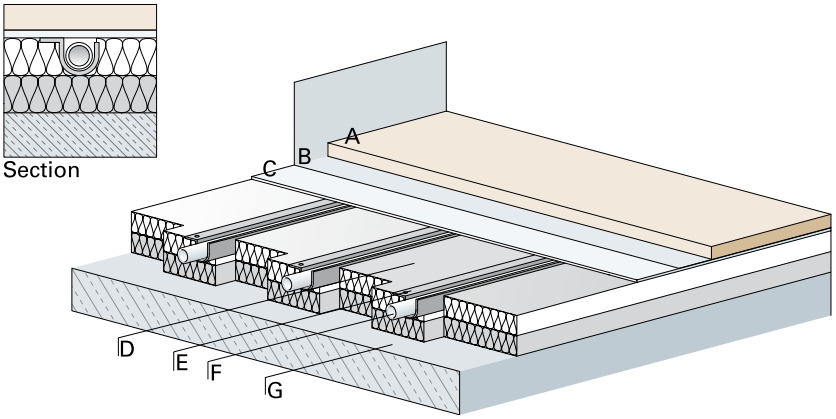
Installation

Insulation is fixed between the joists to top of the void
Steel Pipe Channels are nailed to the joists.
Joists are notched at one end to allow for pipes.
Where engineered joists are used, the return pipe is taken through the web of the joist.
Conducting Sheets (0.6mm thick) are laid in rows across the floor
On ground floors, a vapour barrier is placed over the plates.
The flooring is fixed to the joists, through the conducting sheets

Characteristics

Max. 70w/m2 @ 20° C Rm/T
Low thermal mass therefore responds well to temperature change.
Minimum supply temperature 55° C ± 2° C.
Can be installed from above or below.
Maximum joist spacing 600mm
Ideal for retrofit.

5. Floor Constructions



Legend:

A = Floor Deck
B = Vapour Barrier
C = Aluminium Conducting Sheet
D = Pre-Grooved Insulation
E = Pipe Clips
F = Underfloor Heating Pipe
G = Oversite Slap

5.3 Floating Floor System

Floating floor

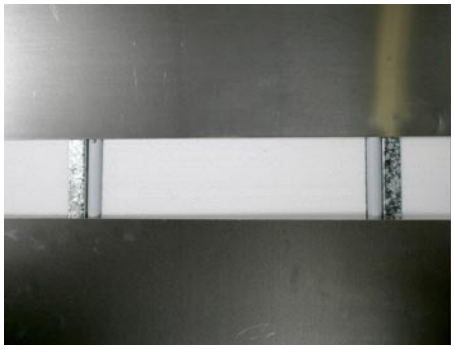
This system has been specificly developed for use with sheet flooring materials and engineered boards, with a laminate, or natural timber finish.
It is particularly easy and quick to install and being a totally dry system, can be commissioned immediately after installation.

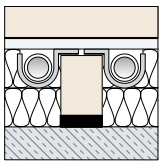
Installation

- The flooring insulation is laid on the oversite concrete (supplied by others).
- Robbens 50mm routed HD floo ring grade polystyrene insulation is laid on the flooring insulation.
- Pipe clips are pushed into the slots leaving 50mm approx. between clips.
- The pipes are pressed into the clips.
- Aluminium Heat Conducting Sheets are laid across the floor in rows.
- A vapour barrier is laid over the con ducting sheets and the sheet flooring or engineered boards laid over.

Characteristics

Max. 70w/m2 @ 20° C Rm/T.
Low thermal mass therefore responds well to temperature change.
Minimum supply temperature 55° C ± 2° C.

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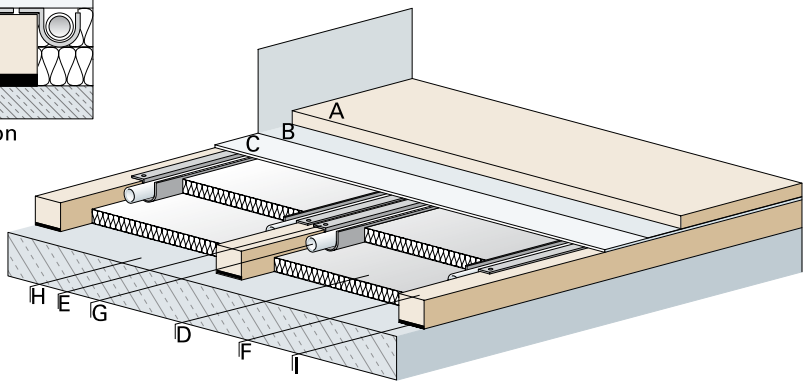


Legend:
A = Floor Deck
B = Vapour Barrier
C = Aluminium Conducting Sheet
D = Insulation
E = Pipe Clips
F = Battens
G = Underfloor Heating Pipe
H = Oversite Slap
I = Resilient Pad (Optional for sprung floors)

5.4 Batten / Sprung Floor System

Batten / Sprung floors

This system is designed for use with conventional floorboards, when the battens give a secure position for traditional fixings. Can be used in new build or refurbishment where the low build-up height can be useful.

Installation

50mm battens are fixed to the floor. (or similar).
Pipe Channels are nailed to the battens.
The pipes are taken around the top of the batten, allowing them to return down the other side.
Aluminium Heat Conducting Sheets plates (0.6mm thick) are laid in rows across the floor.
On ground floors a vapour barrier is usually placed over the plates.
The flooring is fixed to the joists, through the Conducting Sheets.

Characteristics

Max. 70w/m2 @ 20° C Rm/T.
Low thermal mass therefore responds well to temperature change.
Minimum supply temperature 55° C ± 2° C.
Maximum batten spacing 600mm.

6. Controls

6.1 Manifolds

At the heart of every underfloor heating system is the manifold. All the pipework in the building is brought back to a central distribution point, which is called the manifold. The flow and return is taken from the manifold back to the heat source of the building.

Project specific modification

An incorrect set up can inefficient control, extended run time and overall dissatisfaction with the system. Therefore each manifold is delivered to site pre assembled, board mounted and labelled. The flow rates are set during production saving further time during site commissioning.
Many aspects influence the design of the manifold, at Robbens we can assemble the manifolds to suit any project. Geo thermal / pumped tempered supply may not require water temperature control, separate pump sets can be specified – no matter what the set-up might be Robbens can provide a manifold and system specific for the project.

Maintenance

All manifolds are positioned above ground ensuring that there are no pipe connections under the floor. All working parts of the system are on the manifold ensuring easy maintenance for heating engineers. All components on the system have universal fittings promoting system life span.

Cost of ownership

Electrical components are guaranteed for 3yrs, we recommend a routine service is completed on a yearly basis. A breakdown of replacement parts can be provided.

Characteristics

We design each ‘standard’ manifold will provide up to 10kW of output to a maximum of 200m2. Our commercial manifolds will operate up to 23kW and have the option of 16mm or 20mm pipe connections. Pressure drop across the manifold is generally 38kpa – depending on the type.

6.2 Individual room controls

Most underfloor systems are installed on a room by room basis, each running with its own programmable thermostat. For example, while you may wish to have a warm floor in the bathroom and kitchen in the morning, you probably don't care if the lounge is on until the evening. With individual room controls, you can individually adjust temperature settings in each room to suit your needs. Individual room control that is adapted to the building has a significant influence on the well-being and therefore the productivity of the occupants.

Building management Integration

There are many control available and BMS is not only present in the commercial world but becoming the 'norm' in the domestic control market too. We are able to provide a control system with full building management controls with operation via a PC. We can also provide systems with minimal controls which will be suitable to link up with any system already specified for the project.

240v / 12v Controls

We have a range of controls suited to our systems ranging from programmable, remote sensing and floor temperature sensors. Our technical team can provide a best option or provide control suited to the project specification.

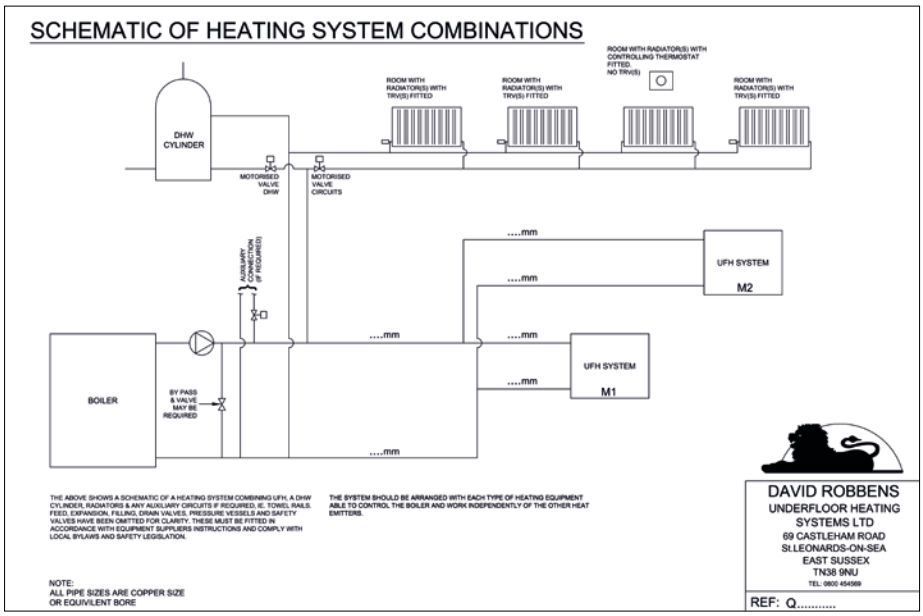
Touch screen control

Our standard control setup is highly effective and simple to operate – for those high specification projects we can upgrade the options best suited to the end user.

Oversized / brail

Projects, particularly in health care, may require specific room controls, we can offer a wide range of products from all the well known UK manufacturers

7. Installation



7.1 Installation Manual

Each system is supplied complete with a full installation manual detailing preparation, pipe handling, fixing systems, pressure testing and commissioning. As well as providing an accurate output requirement we will detail flow and return pipe sizes to ensure correct pressure and optimum performance. Installation manuals contain full plumbing schematic diagrams specific to the project.

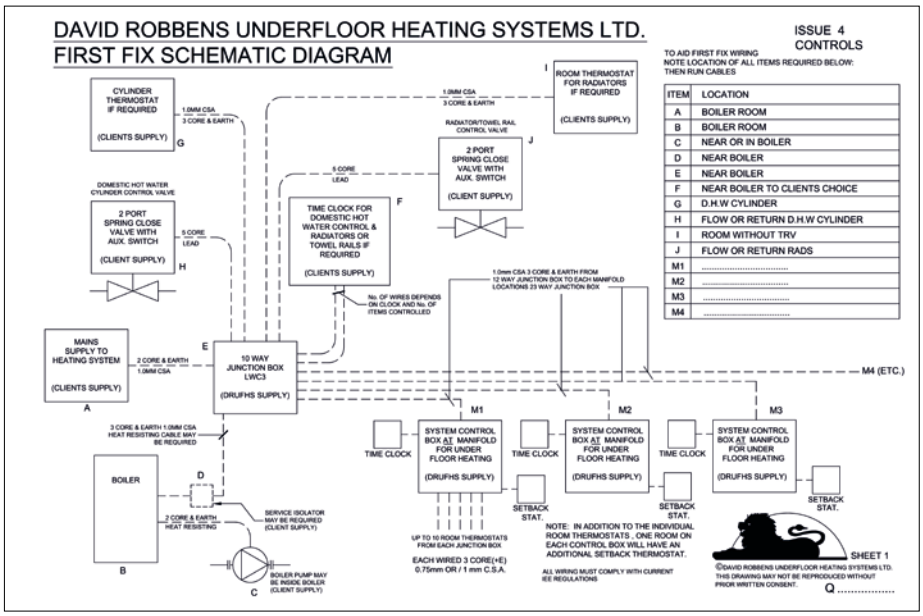
Beside the possibility to install one floor construction (like timber joist floor) on one or more floors, there are two more ways how Robbens underfloor heating components can be connected to your heat source:

Different floor constructions

The underfloor heating system will need to run at different temperatures for each floor with different floor constructions.
If you have a concrete floor downstairs the system will typically operate between 35 - 40° C while a possible suspended timber floor upstairs runs between 50 - 60° C.

Combined with Radiators

Underfloor heating systems can be combined with conventional radiator systems. Please note that the underfloor heating system needs to be a complete separate system , ie the flow and return for the underfloor heating needs to go all the way back to the boiler.
The two systems are controlled and pumped separately using the zone valve and boiler pump.



7.2 Wiring diagrams

Project specific electrical schematics are supplied in simplest form. Each component of the system has individual wiring diagram to assist the installer with correct installation.

Method statement

The installation manuals detail specific installation details that can be used when writing the site method statement.

Installer network

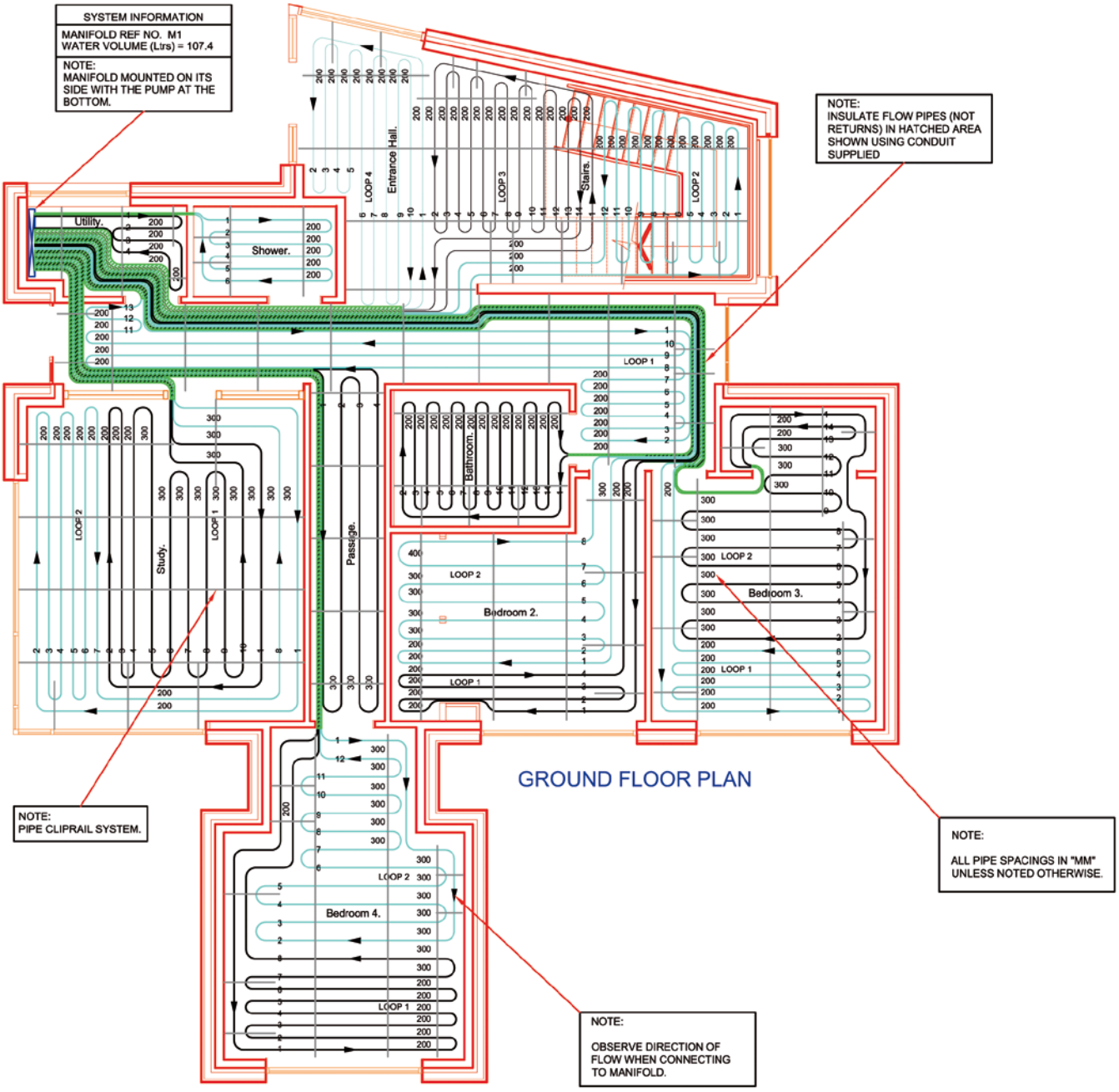
Robbens Systems accumulated a high level of installers who have experience of fitting our systems. Just contact our experts to get more information and help on site for the installation.

Technical assistance

Every technical sheet contains system reference details and our helpline number. For special needs on site guidance is also available.

7.3 Pipe layout diagrams

Easy to follow, colour coded schematics are provided for each project helping the installation progress without difficulty. Each room is specifically design to not only cater for the overall heating requirement but tailored to suit room characteristics.



For all further requirements there are at least 3 copies produced, one for the installer, one for end user and one for our own hard copy. Should there be any future alterations to the project all people involved have access to the relevant data quickly. Along with the hard copies we can provide the layout diagrams in pdf or CAD format.
Each installation manual comes complete with a number of caution signs to display onsite making sure all contractors know of the inclusion of underfloor heating

8. Energy Efficiency

Energy efficiency

We pride ourselves on providing systems with project specific output ratings. Underfloor heating generally is at least 10% to 15% more efficient than traditional forms of heating, in domestic situations. Some commercial buildings i.e open plan or high ceilings can expect a saving of up to 40%. Each quotation will detail a total output requirement to help you assess the difference a Robbens underfloor heating system can make.

Geo thermal

Air source heat pumps are now widely available in the UK market and can complement a Robbens System with ease. Best suited to traditional screed floors our systems can be factory modified to suits the selected heat pump characteristics.

Thermal store

Heat pumps, solar energy and condensing boilers can easily be integrated to a thermal store giving optimum energy efficiency. Differential pre set outlets can provide underfloor heating manifolds with separate water temperatures ideal for projects with multiple floor structures.

9. Quotations

Quotations

We pride ourselves on our quotation process. Each quotation considers heating requirements, sighting of materials, installation issues and performance. We also provide details regarding floor finishes that can be cross referenced to the floor temperature details in the heating requirement table.

Heat loss assessments

We provide individual room assessment based on external elements and usable floor area.

Guaranteed performance

As per the below table, each quotation is supplied with guaranteed room and floor temperatures based on an external ambient temperature with consideration to geographical site location

What you have to do...

Getting a detailed and quality quotation for your project is simple! Fill out our Free Quotation Form or e-mail your contact details including postal adress along with the following.

Plans

We need to identify room areas and possible void areas for pipe work.

Elevations

Glazing levels, roof lights and doors are important to our design methods.

Cross Sections

Each zone volume also needs to be considered when assessing differential pipe volume.

Proposed Care Facility, Whinney Moor House, Woodbeck Meadow						
ROOM	Manifold	Area (m)	Watts	Flow Vs	Room T.	Floor Temp °C
Staff Office	1	24,32	1252,01	0,04985	21	25,4
Store	1	12,6	369,765	0,01472	18	20,5
Bedroom 1A	1	24,93	1161,96	0,04626	22	26
Bedroom 1B	1	24,12	1272,46	0,05066	22	26,5
Bedroom 1C	1	30,619	1616,51	0,06436	22	26,5
Bedroom 2A	1	24,93	1161,96	0,04626	22	26
Bedroom 2B	1	24,12	1272,46	0,05066	22	26,5
Bedroom 2C	1	30,619	1616,51	0,06436	22	26,5
Reception	2	29,63	1385,43	0,05516	20	24
Kitchen	2	18,32	736,777	0,02933	19	22,5
Hall	2	37,194	1248,15	0,04969	18	20,9
Lounge	2	43,62	1967,76	0,07835	21	24,9
Physio Room	2	18,63	739,337	0,02944	21	24,4
Assisted Bath 1	2	20,25	912,066	0,03631	22	25,9
Assisted Bath 2	2	25,39	1130,86	0,04502	22	25,8

Free Quotation Form

Mr/Mrs/Ms _____

Company _____

Address _____

_____

_____

Post Code _____

Telephone _____

Mobile _____

E-mail _____

To produce an accurate quotation we need good information.
Please supply the following

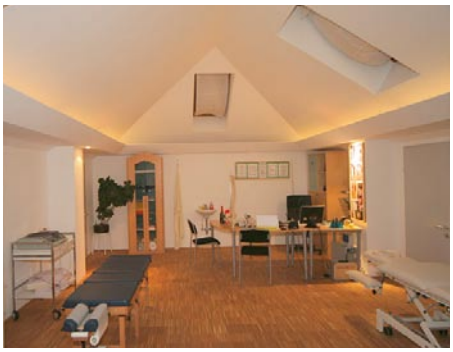
- ❑ A set of floor plans (please add 2 dimensions if sending by fax)
- ❑ A set of elevations & cross sections
- ❑ Detail of wall structure(s) or target U values
- ❑ Glazing details
- ❑ Floor Construction

E-mail
Send the above information to:
robbensquotes@underfloorheating.co.uk

Post / Fax
Please print this page and send it along with the above information to:
Quotations Office, Lion House, 39a Smallgate, Beccles, Suffolk NR34 94E
01502 712993

If you would prefer to meet with one of our representatives to discuss the project in detail, please call 0800454569 or your local office (see contact) and we can arrange a meeting

10. Fields of Applications



10.1 Health Care Facilities

Underfloor heating is now widely used throughout the health care industry mainly because of its low surface temperature credentials, individual room control and options of tamper proof controls.

The use of underfloor heating in healthcare facilities means there will be no units within the rooms for cleaners to struggle to keep clean, as the heating form is radiant there won´t be additional air movement to carry dust particles.

Should there be an incident resulting in someone falling to the floor the comfortable temperature could help delay the onset of shock.

An array of controls available today means that the level of temperature control supplied to the room can either be removed or restricted depending on the requirements of the facility. The controls can also be oversized with brail for those with visibility problems.
Manifolds can be located in areas such as plant rooms and therefore during inspections no access to the individual rooms is required.

10.2 Education facilities

Many education facilities endure the relentless issue of vandalism, with a Robbens System manifolds are located in secure areas, room temperature control is via a temperature probe/unit which should be placed out of reach and, as with all underfloor heating system, there are no additional surface areas to be vandalized.
A Robbens System is designed with control being of the up most importance, over heating can be common if outputs are overcompensated and assisted with minimal control – our individual room designs along with a system setback facility prevents delayed heat build up in the floor and also over rides the system should there be a drop in temperature. Our systems can also be easily linked up with a Building Management System.

Weald of Kent

Like any modern school The Weald of Kent Grammar School for Girls at Tonbridge has adapted to the technology that is an essential feature of education in the 21st Century. A whole campus of buildings has grown up on the school site to provide the laboratories, workshops and special study areas that are needed.

Title

The „Canteen“ building is the latest development – designed like all the best schoolprojects with versatility in mind. The two-storey structure provides a galleried dining hall with adjacent classrooms plus a fully equipped kitchen, together with toilets and changing facilities including a disabled shower.

System specification

Robbens underfloor heating systems have been used throughout the building, serving a total area of some 650 m2. Remote, tamper proof thermostats were specified in all zones.

10. Fields of Applications

10.3 Housing Developments

We can design full house or ground floor only systems which ever best suits the project specification & budget. Underfloor heating has had an expensive stigma in the past, however at Robbens Systems our prices are considerably lower than recent years without compromising quality. When contemplating underfloor heating as a viable option you should consider the improved quality of environment, increased value of the project, usable area within the development, efficiency levels and the life-of-system support offered by Robbens.

On-site training is provided to the heating engineers working on the project, this is free of charge and specific to the project. As we provide pre assembled manifolds, individual pipe layout diagrams and plumbing/wiring schematics no specialist underfloor heating knowledge is required.

The Jam Factory

Robbens underfloor heating systems have helped turn an Edwardian factory in the heart of London into one of the capital most exciting residential developements.

The Jam Factory once did exactly what it said on the tin - or rather jar! Built in 1901 it was the centre of Hartley's jam making operations for over sixty years.

Today The Jam Factory is at the heart of the vibrant Bankside scene with its restaurants, wine bars and Globe Theatre echoing the Days when the area was home to Shakespeare and his fellow players.

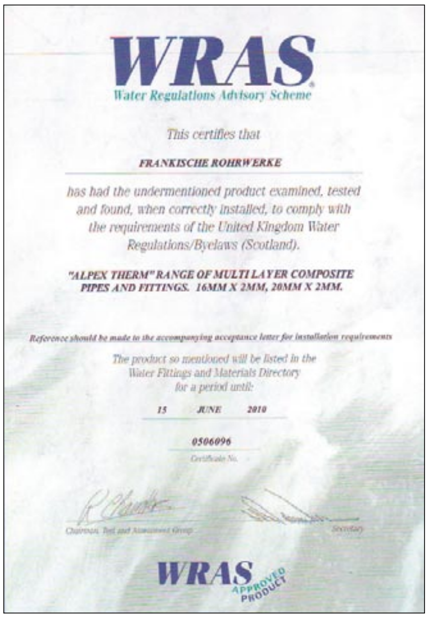
Phil Hughson of Inside Out, the project developers, has a clear understanding of the advantages Robbens underfloor heating offers to this kind of project.

„Many of the Jam Factory apartments were sold as „shells". Our clients briefed us to turn them into individual homes.

That was an easier task without the clutter of radiators taking up wall and floor space. Underfloor heating also makes a perfect partner for modern hard floor finishes and provides a better standard of comfort."

Airport Bank Café Casino Castle Hotel Changing Room Church Fire Station Sports Area Housing Hall Kindergarten Library Lighthouse Museum Office Pool Surround Police Station Prison Research Laboratory Restaurant Training Centre Veterinary Centre Village Hall Workshop Zoo.....

11. Guarantee



WRAS
Water Regulations Advisory Scheme

This certifies that

FRANKISCHE ROHRWERKE

has had the undermentioned product examined, tested and found, when correctly installed, to comply with the requirements of the United Kingdom Water Regulations/Byelaws (Scotland).

"ALPEX THERM" RANGE OF MULTI LAYER COMPOSITE PIPES AND FITTINGS. 16MM X 2MM, 20MM X 2MM.

Reference should be made to the accompanying acceptance letter for installation requirements

The product so mentioned will be listed in the Water Fittings and Materials Directory for a period until:

15 JUNE 2010

0506096
Certificate No.

Chairman, Test and Assessment Group — Secretary

WRAS APPROVED PRODUCT

FRÄNKISCHE
BUILDING TECHNOLOGY

CERTIFICATE

FRÄNKISCHE develops and manufactures technically superior plastic corrugated pipe systems. With many years of experience FRÄNKISCHE combines expertise and ambition for intelligent future innovations, which makes us the ideal partner for complex and technically challenging tasks.

FRÄNKISCHE hereby grants to the entitled parties the following rights for the products listed below

alpex-duo® Composite pipe system for plumbing and heating applications

alpex-therm® XS Panel radiator piping

turatec multi® Composite pipe system for plumbing and heating applications

ff-therm® PE-Xa pipe for panel heating

fripex-san® PEX drinking water installation system

if products are purchased from
DAVID ROBBENS UNDERFLOOR HEATING SYSTEMS, LTD.

for the duration of

ten (10) years

Who is entitled to present a claim ?

Only those persons who purchased those aforementioned products directly from David Robbens Underfloor Heatings Systems, Ltd. (registered in England and Wales with number 02800236) are entitled to present a claim ("Entitled Party"); provided, however, that the installation was done under a valid contract by contractors who own and operate a registered and certified business, that the products were properly installed, per our handbooks and instruction manuals, and used for their intended purpose taking into consideration legal and project related provisions. The Entitled Party must furnish proof that the above requirements have been fulfilled.

When can rights be exercised?

FRÄNKISCHE hereby grants the below rights; provided, however, that the products are proven to be defective and that the product defect is exclusively due to a FRÄNKISCHE manufacturing defect – error in product manufacture or assembly – or a design defect (hereinafter referred to as "Defect"). This applies to the above product whether used alone or in combination with other FRÄNKISCHE products.

When does the claims period expire?

Rights may be exercised by the Entitled Party within ten (10) years from the original purchase date. The Entitled Party must retain the dated sales receipt as evidence of the date of purchase and must furnish proof to FRÄNKISCHE upon request.

What must be taken into consideration?

FRÄNKISCHE must be notified immediately in writing regarding any defects. Defects and damage must be listed and described in detail.

What obligations will FRÄNKISCHE assume?

FRÄNKISCHE will ship replacement products free of charge (packaging and shipping included; transport insurance not included). Furthermore, FRÄNKISCHE will reimburse any actual costs accrued by repairing the defect or by installing the replacement of the product; provided, however, that FRÄNKISCHE approved these measures in writing before any work was commenced. FRÄNKISCHE reserves the right to repair the defect itself or have a third party repair the defect, if this can be reasonably expected of the Entitled Party. If the Defect has caused direct damage to property and if the Entitled Party is held liable for the property damage by a third party, who owns this property, justifiably and not time-barred, or if the Entitled Party owns this property, FRÄNKISCHE will also compensate for the actual direct damage and the costs based on the replacement value. Pecuniary losses and fictitious costs or fictitious damage of the Entitled Party or of the third party will not be replaced. Entitled Party must furnish proof of all costs and/or about the damage. It is necessary to submit original receipts.

What is the maximum claim amount?

FRÄNKISCHE has procured product liability insurance from or placed product liability insurance with a renowned German insurance company. Claims shall be limited to an amount not to exceed

EUR 5,200,000.00

for each claimant, including the total number of all claims presented to FRÄNKISCHE (also by third parties) resulting from this manufacturing defect – error in product manufacture or assembly – or design defect.

Please note

This Certificate does neither establish a warranty right under a purchase or service contract nor do we warrant or make any representation regarding appearance and workmanship and durability or any warranty whatsoever.

Other mandatory legal requirements and the rights of any member of any respective association shall remain unaffected by this Certificate.

This Certificate shall be exclusively governed by the laws of the Federal Republic of Germany. Exclusive jurisdiction and venue for all matters relating to this Certificate shall be in courts located in Hassfurt, Germany.

Last modified: September 2006

FRÄNKISCHE ROHRWERKE Gebr. Kirchner GmbH & Co. KG | Hellinger Str. 1 | 97486 Königsberg/Germany

The pipes supplied by Robbens are manufactured under ISO 9001 Quality Management Systems and are covered by a 10-year insurance backed warranty, which includes consequential damage cover. This means that, should furniture and fittings be damaged as a result of manufacturing defects, they are covered by our insurance (conditions apply).

Under the performance testing for underfloor heating pipes DIN EN 4726, they are required to show an expected life of 50 years, under high pressures (10 bar) and high temperature (90C). As the pressures and operating temperatures for underfloor heating system are low by comparison,
we expect much longer actual service life from the pipes.

Robbens controls, manifolds and other components are covered by our 3-year warranty.

Design work is covered by PI insurance up to a value of £5million

Notes

Notes

Notes

ROBBENS SYSTEMS
UNDERFLOOR HEATING
is a part of FRÄNKISCHE

THE UNDERFLOOR HEATING MANUFACTURERS' ASSOCIATION

HEAD OFFICE

69 Castleham Road
St. Leonards-on-Sea
East Sussex
TN38 9NU
TEL: 01424 851111
FAX: 01424 851135

Order process, manufacturing, technical team, regional sales/site support (South Wales, South England & Scotland)

EASTERN OFFICE

Lion House
39a Smallgate
Beccles
Suffolk
NR34 9AE
TEL: 01502 717517
FAX: 01502 712993

Quotations, regional sales/site support (East Anglia)

NORTHERN OFFICE

Office 10
27 Grove Street
Retford
Nottinghamshire
DN22 6JP
TEL / FAX: 01777 711621

Installers, regional sales/site support (East/West Midlands, North Wales and Northern England)

Visit our website or contact us per e-mail:
www.underfloorheating.co.uk
e-mail: robbens@underfloorheating.co.uk

ROBBENS SYSTEMS – Underfloor Heating
Reg. in UK: 02800236
David Robbens Underfloor Heating Systems, Ltd.
Registered Office: 2 Upperton Gardens, Eastbourne, East Sussex, BN21 2AH