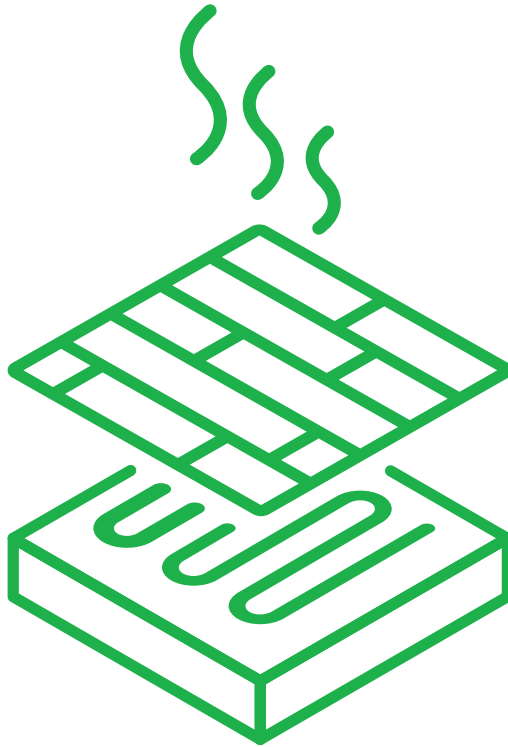




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CFA GUIDANCE DOCUMENT

Beyond Installation: Guidance on Underfloor Heating

Report compiled in partnership with BEAMA
(formerly the British Electro-technical and Allied Manufacturers' Association)

JANUARY 2024





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Beyond Installation: Guidance on Underfloor Heating

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We would like to thank all the CFA members who contributed to this document through the WG (working group) and wider manufacturers' committee, and particularly the WG Chairman and editor Garry Bateman of GJB Consults, for this important work.

Images kindly supplied by BEAMA.

Chief Executive Officer: Richard Catt

www.cfa.org.uk | Tel: 0115 941 1126 | Email: info@cfa.org.uk

Ground Floor, Unit 22 Eldon Business Park, Eldon Road, Chilwell, Nottingham, NG9 6DZ



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1. Overview

The use of underfloor heating systems (UFH) has increased over recent years, and they are now an established and popular heating option for commercial and domestic environments. This new CFA Guidance Note provides enhanced information to better reflect new legislation and requirements. It builds on the guidance in Section 8 (UFH) contained within the *2022 CFA Guide to Contract Flooring* by considering the declared government intention to transition to clean energy, which includes the initiative for the large-scale adoption of heat pumps in place of traditional heat sources. It is therefore important that our industry seriously considers these changes, specifically the impact on floor coverings and installation, how it may be affected and possibly need to respond.

This document is designed to provide advice and guidance within this changing context and addresses the impact of proposed new standards which are likely to dramatically change the landscape for UFH and therefore the installation of the main types of floor coverings included within this guidance: textile, resilient and timber-based floor coverings.

Effectively, the proposed new standards will mean that for any new build domestic properties, natural gas boilers will no longer meet the carbon reduction targets required (oil and LPG boilers will also be unable to meet the minimum threshold). Of the alternative, more environmentally-friendly heating systems available, air or ground source heat pumps will thereafter be the most common primary heat source for central heating systems for new build dwellings.

With a focus on new build, key to understanding the impact of these changes is the fact that air-to-water and ground source heat pumps are designed to be most efficient producing hot water at a much lower temperature (typically 35-40°C compared to 60-70°C for traditional fossil-fueled boilers), and thus the surface area of a radiator required to effectively heat a room using a heat pump frequently also has to significantly increase. Whilst this statement makes many assumptions, typically a wall mounted radiator would have to increase by up to 2.5 times in size to achieve the same output and heating potential.

Frequently, the developer decides that the wall space required or the visual intrusion of large radiators is not compatible with the compact room sizes of a typical 2020s new build dwelling, and so UFH becomes an option as a primary heat source coupled with a heat pump for the UK market.

The rationale behind this is that water-filled UFH heats in a different way to radiators. Radiators (despite the name) mainly heat by convection. UFH on the other hand, emits a far higher percentage of heat by radiation. This, combined with the large surface area of the floor, means that dwellings using UFH can effectively heat using lower temperatures than those using radiators, thereby maximizing system efficiency, and minimizing operating cost, whilst ensuring occupants have the same perception of warmth.

Why is this significant? UFH as a primary heat source and textile, resilient, and timber-based floor coverings have all been in existence for many years. The simple answer is that all floor coverings can be used in conjunction with UFH but like all materials they must be installed correctly to ensure they will perform as expected. It is also important that the UFH is operated correctly. Potential misuse during ongoing UFH operation, particularly high temperature spikes or systems consistently running at raised temperatures may seriously affect the product or installation integrity. Typical signs of misuse include discolouration and gapping

and are often because of variation from recommendations from a manufacturer's recommended "maximum temperature in use".

To provide context, in use, most homes will be very comfortable with a room temperature of between 21-22°C, and ALL the flooring types covered by this guide have been shown to perform in the range of common scenarios at temperatures required to achieve those ambient room conditions. Historically, a maximum agreed (flooring industry) temperature at the glue line (beneath the floor covering) has been 27°C.

As outlined above, any type of flooring can work well with warm water UFH (and indeed equivalent electrical systems), but it is important that the preferred floor covering option is discussed with the supplier and/or installer at an early stage, and specific manufacturers' recommendations considered alongside factors such as room size, levels of insulation (heat loss) and glazing, within the design. In addition, the pipe size and separation distance, expected water flow temperature (for water-based systems) and any requirements for intermittent higher running temperatures are essential to check against the suitability and long-term compatibility of the floor covering and installation method.

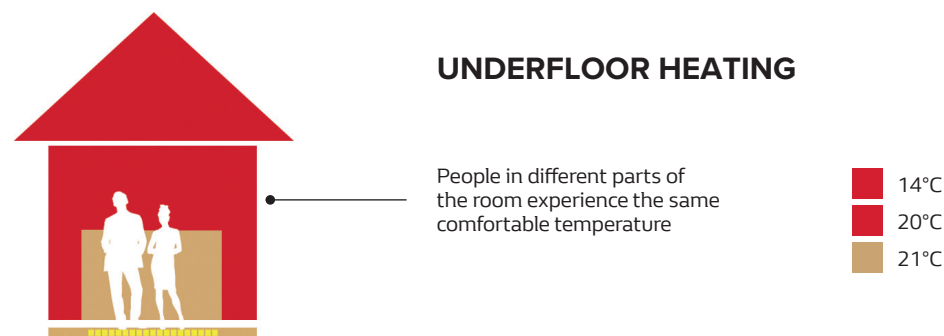
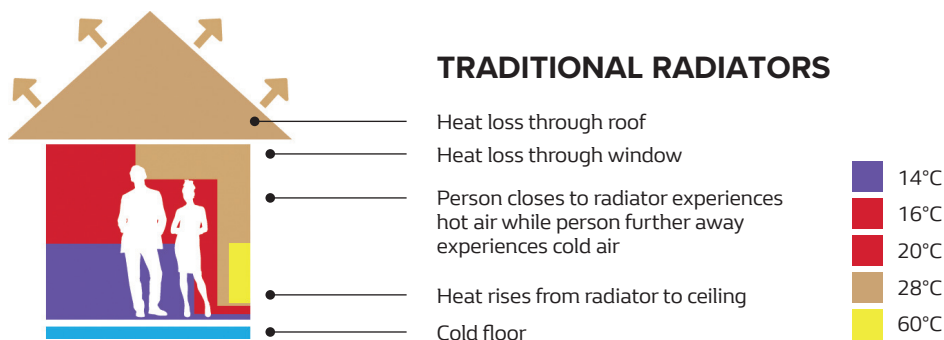
However, as the use of UFH is likely to increase significantly, this guide provides both a greater understanding of UFH systems and how they work, as well as a guide to key installation requirements for textile, resilient and timber-based flooring. It also provides some guidance as to how the UFH should be used to ensure that the floor covering is not accidentally damaged in use.

2. UFH vs. Radiator Heating Comparison

As previously described, traditional radiators predominantly transfer heat by convection, heating the air in a room as it circulates through and past the radiator. By comparison, UFH provides radiant heat from the floor surface to the area and objects above. A two bar electric fire provides radiant heat, but the application is very different: a heater with two heating elements with a small surface area which get very hot, versus UFH — in which you have a very large heater (your floor) that is likely cooler than the palm of your hand. Importantly, if the electrical input rating of both is the same, then both systems would emit the same amount of heat into the room. It would just be distributed differently!

For the floor to provide this gentle heat to the room, there are a couple of stages to go through. In simple terms, UFH systems either pump warm water through pipes, or use electrical elements which are laid within the floor to create a heating effect. Traditionally, the floor is solid (concrete or screed) but developments in technology mean that floating floor and suspended floor systems of varying types are also widely used. Heat is transferred from the pipe or electrical element into the floor structure, and then from the floor structure into the floor finish. The surface of the floor then gently radiates the heat into the room. Heat always flows from warmer to colder areas. The transfer of heat through a solid material is known as conduction.

The heat transfer between the UFH and floor surface (i.e., through solid materials) is therefore conduction. The thermal conductivity (the ease with which heat flows through the material) of both the floor and what is put over it, affect the transfer rate of the heat to the surface. So, in UFH applications, this heat transfer, or thermal conductivity, becomes an important factor in the selection of materials and the design of the system. As an initial guide, harder floor coverings such as ceramic tiles, slate or stone give a higher thermal conductivity due to lower thermal resistance, than softer coverings such as carpet.



NOTE

The implications of a UFH retrofit system within existing buildings must be carefully considered, as the building insulation factors may be less favourable than with a new build construction. The main challenges in considering installing floor coverings from the categories under consideration, is overheating of the floor covering installation, as lower insulation of buildings may cause users to run UFH systems at higher than recommended temperatures. For further guidance, please see the recommended temperature summary chart on page 10.

3. UFH System Types

UFH can be broadly categorised into two types of screed/subfloor embedded systems: water systems and electrical systems.

WATER SYSTEMS

The majority of modern UFH systems in new build projects are warm water systems heated by a conventional fossil-fuelled boiler or a heat pump and are used as the primary heating system for the home. Most water systems integrate high tech plastic pipe within the subfloor — warm water at temperatures of 30-55°C (in general) is circulated through this pipe and this warms the floor surface to a temperature range of between 23-29°C (in general). This of course, relies on the property being suitably insulated.

ELECTRIC HEATING SYSTEMS

Electrical heating systems require the installation of a flexible heating element beneath the floor covering or underlayment which come in the form of cables, mats or film, and can be installed within a standard screed or over the floor within a tile adhesive or levelling compound (minimum depth to be manufacturer recommended). These are normally installed as a supplement to the primary heating system when adding an extension or conservatory because the operating cost of using electricity as a primary heating system is more expensive than water heated by other means, e.g., gas. But with the continuing emphasis on house builders improving thermal performance, electric UFH is becoming more common as a primary heating system in new build flats and apartments.

It is extremely important to ensure there is an adequate amount of underlayment to cover the electric heating elements in the cables which distribute the heat, as there may be a tendency for the underlayment to crack directly when placed over the cables themselves, and to reduce the risk of damage to the elements from any point loads (minimum smoothing compound thickness to be obtained via compound manufacturer).

The heating elements come in the form of cables, mats or film/foils (consult the film/foil manufacturer for installation instructions) and are more commonly found in domestic and DIY installations. They are deemed to be particularly suitable for use with hard ceramic or natural stone tiling, but may be used with textile, resilient and timber floor coverings. Detailing of movement joints should be carried out as mentioned on page 15 and must be in accordance with the UFH manufacturers' recommendations.

NOTE

Sometimes these systems are applied over an insulating mat/tile backer board or plywood, and it is important to ensure that the insulation mat/board is capable of supporting the chosen floor finish. It must be securely fixed to the substrate and may require priming before an underlayment is applied.

The wire elements or heating mats are sometimes fixed to the insulation board with self-adhesive tape. Excessive tape use will reduce the potential contact area of the floor smoothing underlayment and may cause failure of the floor covering.

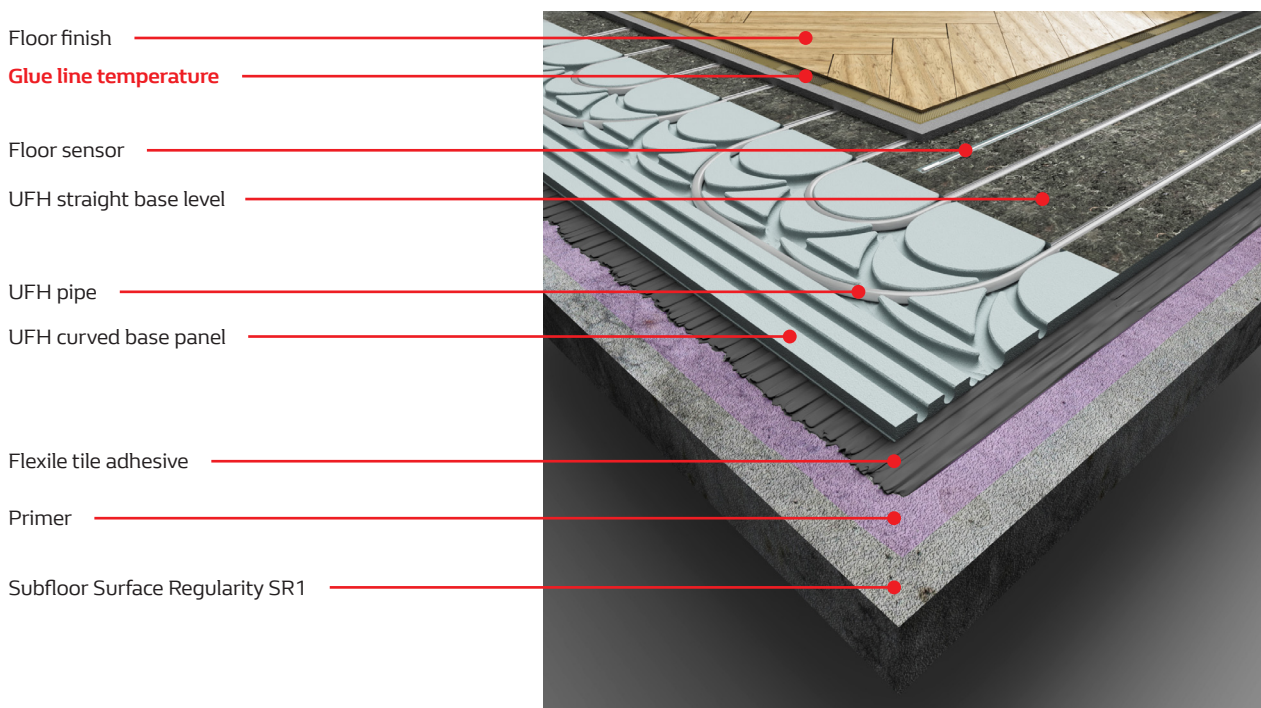
4. UFH Design Considerations

Whilst most floor coverings can be used over UFH systems, it is important to bear in mind that these systems rely on the upper surface of the floor covering being warmed to a temperature of between 23-29°C. This results in fully adhered installations having an adhesive glue line temperature that should not exceed a nominal 29°C.

Some floor covering manufacturers prefer to recommend a maximum adhesive glue line temperature of 27°C. Floor coverings and adhesives should therefore be specified and used by considering the following:

- **Heat output required**
- **Floor covering and resultant glue line floor temperatures**
- **Individual manufacturers' recommendations for the specific product(s) under consideration**

The diagram below indicates where the glue line is situated:



5. British Standards – Subfloors and Flooring

There are specific British Standards for 3* distinct types of generic floor covering:

- Resilient
- Timber (including Laminate)
- Textile

These have each been compiled to reflect the relevant generic product type requirements and use with underfloor heating.

BS 8204-1 Screeds, bases and in-situ flooring, states:

“... the usual operating surface temperature of a heated levelling screed is about 27°C; however, some locations operate at higher temperatures, e.g., 35°C”.

BS 8203 Code of practice for the installation of resilient floor coverings, states:

“When used with many flooring materials UFH can cause problems if the temperature at the interface between the subfloor and flooring exceeds 27°C or is subject to rapid fluctuations in temperature. In the majority of installations, this temperature will not need to be exceeded if the building insulation meets the requirements of Part L of the Building Regulations.”

BS 8425 Code of practice for installation of laminate floor coverings (now withdrawn by BSi) — see the reference section at end of this document for further details) and the code of practice issued by the Association of European Producers of Laminate Flooring, states:

“...the surface temperature should not exceed 28°C”.

BS 5325 Code of practice for installation of textile floor coverings (Annex A.1 Operating temperatures), states:

When used with many flooring materials, underfloor heating can cause problems if the temperature at the interface between the subfloor and the flooring exceeds 27°C or is subject to rapid fluctuations in temperature. In the majority of installations, this temperature does not need to be exceeded if the building insulation meets the requirements of the Building Regulations 2019, Approved Document L [5] and the Scottish Building Regulations [6].

BS EN 1264-2, which is used to design underfloor heating systems, allows for a maximum floor surface temperature of 9°C above the rooms design air temperature in occupied areas. In areas where the use of higher temperatures is unavoidable, agreement from both the adhesive manufacturers and the flooring manufacturers should be obtained.

***NOTE**

There are also British Standards for two other “main” generic floor covering types. Ceramic (marble and stone) that are covered by BS 5385, and resin floors which are covered under BS 8204. These product types are not dealt with by this guidance note as they are not supported by the CFA technical committees or generally installed by our members.

FOR FURTHER INFORMATION, PLEASE CONTACT:

The Tile Association
www.tiles.org.uk

FeRFA
www.ferfa.org.uk

The summary chart below provides an overview of the varying temperatures recommended:

PRODUCT TYPE	British Standard maximum 27°C	Recommended maximum 28°C	Design room air temperature + 9°C (maximum 29°C with the relevant manufacturer or supplier recommendation)
Vinyl sheet and tile	Yes	—	Yes
LVT	Yes	—	Yes
Rubber sheet and tile	Yes	—	Yes
Linoleum sheet and tile	Yes	—	Yes
Carpet on gripper	Yes	—	Yes
Carpet tile	Yes	—	Yes
Carpet fully bonded	Yes	—	Yes
Laminate	No	Yes	No
Real wood / timber	Yes	—	No

Whilst there are minor differences in actual temperature level recommendations, these are correct for the generic type and ability to withstand temperature. Specifiers should be aware of this and it is essential, therefore, when installing floors over UFH, to consult the flooring manufacturer and adhesive supplier for advice.

Opinions differ between the floor covering and UFH industries as to where temperatures should be measured. The 27°C “interface” may limit the choice of floor coverings that could be used over UFH, if for example, the normal heat output required to heat a room that is not well insulated, needs this temperature to be exceeded to reach the generally accepted comfortable room temperature of 21-22°C. Improvements in product performance and system understanding allow the successful pairing of many modern and traditional floor coverings with UFH. For example, some hardwood floor finishes are installed with a maximum floor surface temperature of 27°C.

6. Thermal Properties of Materials – How to Choose Floor Coverings to Pair with Underfloor Heating

Thermal Conductivity

As a technical definition, thermal conductivity is a measure of the ability of a material to conduct heat. It refers to the rate of heat transfer that occurs per unit of length of the material (thickness) at a temperature differential of 1° Kelvin. It is measured in watts per metre Kelvin (W/mK).

From this definition, it follows that heat is conducted better by materials with high thermal conductivity. This measurement is usually used to characterise a conductor of heat such as copper or aluminium.

Thermal Resistance

Thermal resistance is a measure of a material's ability to resist conductive heat flow, per unit area, and for a temperature differential of 1° Kelvin. It is measured in (m²K/W) and this measurement is defined as the "R-value".

The higher the R-value, the less heat transfer will occur through the material, and the better it is at reducing heat losses. This measurement is usually used to characterise an insulator, such as wall or loft insulation.

Tog Values

The term tog, widely used in English speaking countries, is derived from the slang word for clothes (togs) and it is used as a measure of thermal resistance. It is used typically in the textile industry, most seen in the rating of duvets.

The basic unit of insulation coefficient is the RSI, which is equal to 1m²K/W. One tog is one tenth of one RSI, therefore one tog is 0.1m²K/W — the standard launched in the 1940s by The Shirley Institute. The Shirley Togmeter is the standard apparatus for rating thermal resistance of textiles, commonly known as the Tog Test.

This apparatus, which is described in BS 4745, measures a sample of textile, either between two metal plates (for underclothing) or between a metal plate and free air (for outer layers). Typically, materials with tog values lower than 2.5 togs are used as floor coverings in underfloor heating systems.

7. Floor Temperature Interpretation

The UFH industry designs to *BS EN1264: Water-based surface embedded heating and cooling systems*, and *BS EN 50559: Electric room heating, UFH, characteristic of performance* — which contains parameters for allowable floor surface temperatures.

It is important to know the insulation or thermal resistance factors of floor coverings and installation method, as these may impact on the performance of the UFH, e.g., carpeted flooring, which has higher thermal resistance, will result in slightly longer times to heat up a space.

It is important to check whether flooring installations may be affected by constantly high subfloor temperatures and / or by large fluctuations in subfloor temperatures.

NOTE

Sudden, large, changes in the subfloor temperatures must be avoided by UFH system operators in all types of floor covering installation.

The following information is provided to assist the specifier to select the appropriate combination of UFH and flooring installation to provide the desired heat output.

The table on page 13 provides an overview of typical generic floor coverings and their use with varying output UFH systems. The comparisons show temperature difference between floor surface and room air versus heat output.

NOTE

All figures in the following table are for example only, and individual floor covering manufacturers should be consulted for exact details and recommendations.

Temperature Difference Between Air and Floor Surface vs. Heat Output

FLOOR HEAT OUTPUT	30W/m ²	50W/m ²	70W/m ²	90W/m ²
Approximate Construction Date of Property — Continuous Heating	2003 On	1983-2002	1976-1982	1967-1975
Approximate Construction Date of Property — Scheduled Heating	FHS	2003-FHS	1991-2002	1976-1990
Temperature Difference Between Air and Floor Surface	+3.0°C	+4.8°C	+6.5°C	+8.2°C

NOTE: FHS is the assumed performance under the Future Homes Standard

Temperature Difference Between Floor Surface and Glue Line (Interface/Thermostat Probe) vs. Heat Output

FLOOR FINISH	THERMAL RESISTANCE (Tog)	FLOOR HEAT OUTPUT			
		30W/m ²	50W/m ²	70W/m ²	90W/m ²
CERAMIC / NATURAL STONE					
10mm Tiles, inc. 4.5mm Adhesive	0.09	+0.3°C	+0.5°C	+0.6°C	+0.8°C
20mm Stone, inc. 4.5mm Adhesive	0.14	+0.4°C	+0.7°C	+1.0°C	+1.3°C
VINYL					
2.5mm Vinyl, inc. 0.25mm Adhesive	0.09	+0.3°C	+0.4°C	+0.6°C	+0.8°C
2.5mm Acoustic Vinyl, inc. 0.25mm Adhesive	0.19	+0.6°C	+0.9°C	+1.3°C	+1.7°C
LINOLEUM					
2.5mm Linoleum, inc. 0.25mm Adhesive	0.02	+0.1°C	+0.1°C	+0.1°C	+0.2°C
RUBBER					
3mm Rubber, inc. 0.25mm Adhesive	0.08	+0.2°C	+0.4°C	+0.6°C	+0.7°C
LAMINATE and CLICK					
7mm Laminate, HDF Core, 1.5mm Adhesive	0.54	+1.6°C	+2.7°C	+3.8°C	+4.8°C
7mm Laminate, HDF Core, 4mm UFH Underlay	0.83	+2.5°C	+4.2°C	+5.8°C	+7.5°C
5mm Click LVT, PVC Core, 1.5mm Adhesive	0.24	+0.7°C	+1.2°C	+1.7°C	+2.1°C
5mm Click LVT, PVC Core, 1.5mm Underlay	0.47	+1.4°C	+2.4°C	+3.3°C	+4.3°C
WOOD					
18mm Engineered, 1.5mm Adhesive	1.32	+4.0°C	+6.6°C	+9.3°C	+11.9°C
18mm Engineered, 4mm UFH Underlay	1.62	+4.9°C	+8.1°C	+11.3°C	+14.6°C
18mm Softwood, 1.5mm Adhesive	1.54	+4.6°C	+7.7°C	+10.8°C	+13.8°C
18mm Softwood, 4mm UFH Underlay	1.83	+5.5°C	+9.2°C	+12.8°C	+16.5°C
18mm Hardwood, 1.5mm Adhesive	1.16	+3.5°C	+5.8°C	+8.1°C	+10.5°C
18mm Hardwood, 4mm UFH Underlay	1.46	+4.4°C	+7.3°C	+10.2°C	+13.1°C
CARPET					
6mm Carpet Tile, Tackifier	0.75	+2.3°C	+3.8°C	+5.3°C	+6.8°C
12mm Carpet, 6mm UFH Underlay	2.25	+6.8°C	+11.3°C	+15.8°C	+20.3°C
12mm Carpet, 9mm Rubber Waffle Underlay	2.88	+8.7°C	+14.4°C	+20.2°C	+26.0°C
12mm Carpet, 9mm PU Foam Underlay	3.50	+10.5°C	+17.5°C	+24.5°C	+31.5°C
12mm Carpet, 9mm Wool Felt Underlay	4.07	+12.2°C	+20.4°C	+28.5°C	+36.6°C

Values in **RED** are unlikely to be achievable within the constraints of BS EN ISO 11855 or BS EN 1264

Example Glueline (Interface/Thermostat Probe) Temperature Calculation vs. Heat Output

	FLOOR HEAT OUTPUT			
	30W/m ²	50W/m ²	70W/m ²	90W/m ²
Room Air Temperature, e.g., 21°C	+21.0°C	+21.0°C	+21.0°C	+21.0°C
Temperature Difference Between Air and Floor Surface	+3.0°C	+4.8°C	+6.5°C	+8.2°C
Temperature Difference Between Floor Surface and Glueline e.g., Vinyl	+0.3°C	+0.4°C	+0.6°C	+0.8°C
RESULT	24.3°C	26.2°C	28.1°C	30.0°C

8. Comment on Temperature Compliance

There are many different types and construction of floor coverings on the market with new products being launched every year. This choice allows for a variety of products to be used on any one project, and whilst this is good for product selection, project aesthetics etc., the inevitable variance in type and construction will demand careful consideration of the requirements for each product in relation to the chosen UFH system. Flooring manufacturers can provide guidance on individual product use and installation at specification stage. It is also important that the UFH is operated correctly.

Potential misuse during ongoing UFH operation, particularly high temperature spikes or systems consistently running at raised temperatures, may seriously affect the product or installation integrity. Typical signs of misuse include discolouration and gapping and are often because of variation from recommendations for a manufacturer's recommended "maximum temperature in use".

In the UK where we have a very variable climate, common errors identified in the use of UFH systems in practice include turning the heating up well above 27°C to achieve a comfortable room temperature very quickly. Ironically, this has little, if any, real benefit on heat-up time and speaks to the need for end-users to be provided with an understanding of how to use their UFH systems at handover.

Such variances from the individual flooring product types "maximum temperature in use" may seriously affect the product or installation integrity. Typical signs of misuse include discolouration and gapping. These are entirely avoidable and do not indicate a product failure or fault.

Quite simply, the "maximum running temperature" is exactly that: the maximum allowed and guaranteed UFH running temperature for the flooring product type and installation.

9. Wet Subfloor Considerations

Floor screeds (e.g., concrete, sand and cement, anhydrite) that incorporate warm water or electric UFH systems, are commonly referred to as heated screeds and are usually installed as floating screeds and installed at an appropriate thickness on a slip membrane over thermal insulation.

NOTE

The slip membrane does not act as DPM for the screed and there should always be an operational DPM between screed and the subfloor. Typically, this will be a simple 1200-gauge polythene placed on top of the concrete subfloor before any insulation is laid. Although most types of screeds may be used with UFH, it is vital their selection and design are matched.

The most frequently cited problems of these types of subfloor curling, stress cracking and shrinkage cracking, can be exacerbated by early forced drying of a screed. This is commonly seen in traditional cementitious-based screed systems, whereas calcium sulphate, screeds generate far less dimensional stress.

Calcium sulphate screeds react in a different way to cementitious-based materials, therefore these systems can be force-dried from as early as seven days after install without any detrimental impact on the final screed performance. Some proprietary cementitious flowing screeds claim that early drying is possible outside the minimum 21 days usually associated with cement-based materials.

NOTE

ALWAYS consult the manufacturer.

Heated screeds expand and contract with the changes in temperature and the recommendations in British Standards are that movement joints should be placed within the screeds at door thresholds, between independently controlled heating zones, and at the perimeter of the rooms where heated subfloors abut walls/upstands, and where design criteria dictate. Additional joints should be considered at points of high thermal gain and between heated and unheated screed areas.

NOTE

For detailed information on the general requirements for movement joints, the screed manufacturer and heating designer should be consulted.

Under no circumstances should movement joints be covered. They should be carried through the subfloor to the floor finish and all applied layers terminated either side of the joint. The joint should be filled with a suitable flexible filler and a proprietary cover strip applied to cover the joint.

10. Screed Start Up / Drying Out

It is absolutely essential that before any floor covering is installed, that the screed is preheated as prescribed in BS EN ISO 11855-5, BS EN1264-4, BS 8204-1 and BS 8204-7.

In all instances, UFH systems must be run through a full drying/commissioning cycle of heating up and cooling down before any subfloor preparation or installation of decorative floor coverings are installed. This period of commissioning is usually around 21 days.

After a full cycle has been carried out, perform moisture tests, and, if necessary, repeat the process until a definitive moisture reading of $\leq 65-75\%$ RH has been achieved if moisture control systems are not being applied (depending on surface finish to be applied).

NOTE

In instances where commissioning drying time has not been sufficient to allow for a suitable RH/% moisture level to be achieved, some surface moisture control systems are available. However, they should only be considered when approved by the relevant manufacturer.

11. Dry Construction Subfloors Consideration (Timber / Acoustic / Floating Floors)

Common issues with floor screeds are usually avoided in dry constructions. Dependent on construction and thermal transfer properties of the materials, lightweight timber subfloors can provide benefits in lower flow temperatures.

Generally, this type of construction provides a more responsive system.

NOTE

Consideration should be given to the thermal properties of any acoustic floor construction.

12. Referral Section:

BS 8204-1:2003 Screeds, bases and in-situ floorings — Concrete bases and cementitious levelling screeds to receive floorings. Code of practice (+A1:2009)

BS 8201:2011 Code of practice for installation of flooring of wood and wood-based panels

BS 8203:2017 Code of practice for the Installation of resilient floor coverings

BS 5325:2021 Code of practice for installation of textile floor coverings

BS 5385-1:2018 Wall and floor tiling — Part 1: Design and installation of ceramic, natural stone and mosaic wall tiling in normal internal conditions — Code of practice

BS 8204-6:2008+A1:2010 Screeds, bases and in-situ floorings — Synthetic resin floorings. Code of practice.

Building Regulations 2019, Approved Document L [5] and the Scottish Building Regulations [6] — building insulation requirements

BEAMA publication: *Choosing your floor covering to maximise your underfloor heating efficiency* (April 2020)

BS EN 1264-4:2021 Water-based surface embedded heating and cooling systems installation

BS EN 50559:2013+A1:2020 Electric room heating, underfloor heating, characteristic of performance. Definitions, method of testing, sizing and formula symbols.

Preheated screeds as prescribed in *BS EN 1264-4*, *BS 8204-1*, and *BS 8204-7*.

NOTE

BS 8425 Code of practice for installation of laminate floor coverings and the code of practice issued by the Association of European Producers of Laminate Flooring has been withdrawn by the British Standard Institute (BSi) due to the age of the document and insufficient industry engagement.

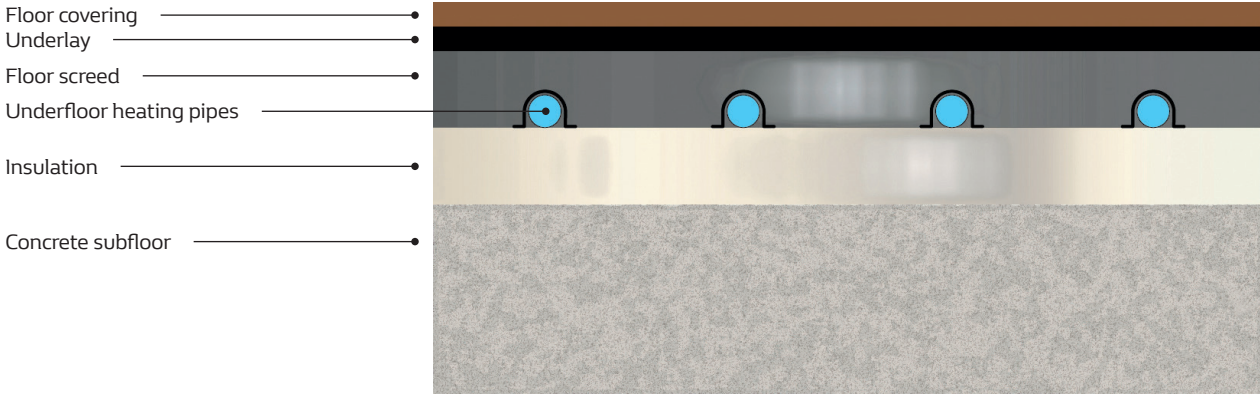
The CFA has been advised by a member of the BSi PRI/60 committee, that there is a document that may act as an alternative: *CEN/TS 14472-3:2004 Resilient, textile and laminate floor coverings — Design, preparation and installation — Part 3: Laminate floor coverings*.

CURRENT GOVERNMENT POSITION:

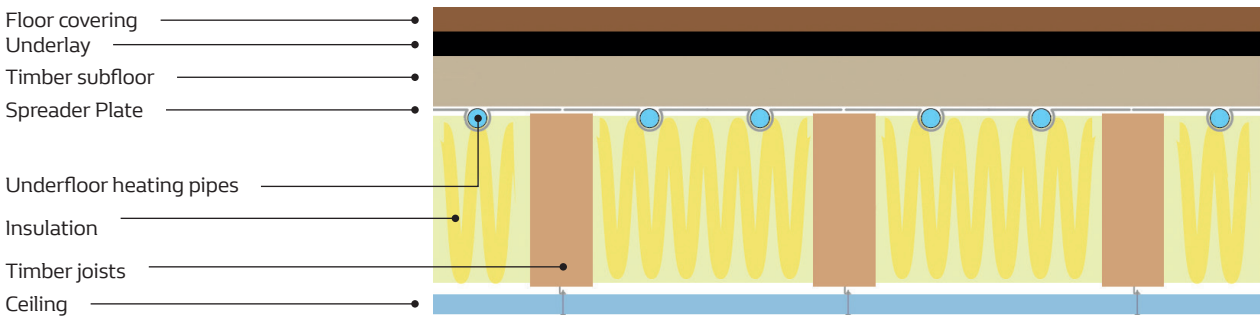
The proposed new Future Homes Standard is likely to emerge now as a Future Buildings Standard – covering both domestic dwellings and commercial property. The consultation on the technical implementation of the Standard is expected to come out before December 2023. The government still retains the ambition to achieve 600,000 heat pump installations annually by 2028.

13. Typical Subfloor Cross-Section Examples

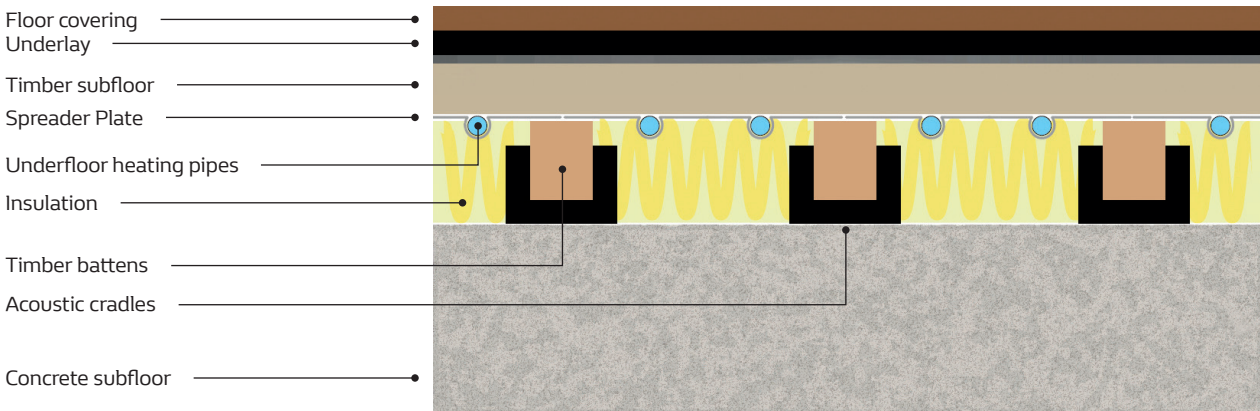
WET SUBFLOOR WITH PIPES IN CONCRETE



DRY SUBFLOOR WITH TIMBER JOISTS



DRY SUBFLOOR WITH ACOUSTIC CRADLES





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www.cfa.org.uk | Tel: 0115 941 1126 | Email: info@cfa.org.uk

Contract Flooring Association
Unit 22 Eldon Business Park, Eldon Road, Chilwell, Nottingham, NG9 6DZ

