



# Underfloor Heating

## Brochure & Technical Guide





# More design.

# More flexibility.





In recent years underfloor heating has been widely acknowledged as one of the most effective methods of heating. It has become the fastest growing market for both domestic and commercial heating sectors. As one of New Zealand's leading names in heating technology, **KE KELIT CLIMATE CONTROL** is at the forefront of the underfloor heating revolution. In addition to our manufacturing and technical expertise, we provide full planning, design and supply services to help you achieve your perfect home.





## The Concept of Underfloor Heating



## Underfloor Heating Systems



## Screeded Floor Systems



## Floor Finishes



## Design Approach & Heat Sources



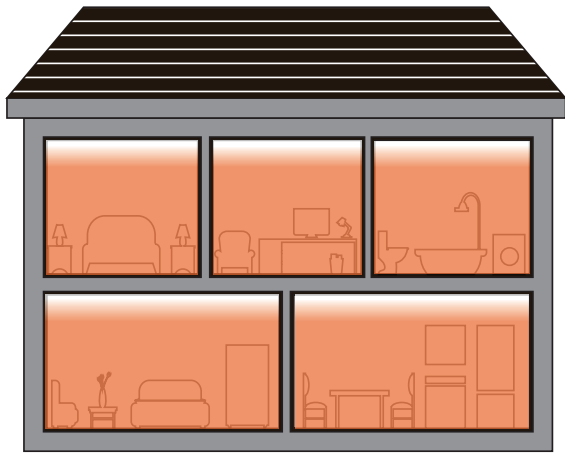
## Control Systems

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## A better kind of heat.



### Central Heating

Central heating through underfloor heating or radiators heats every room in your home evenly via natural convection.

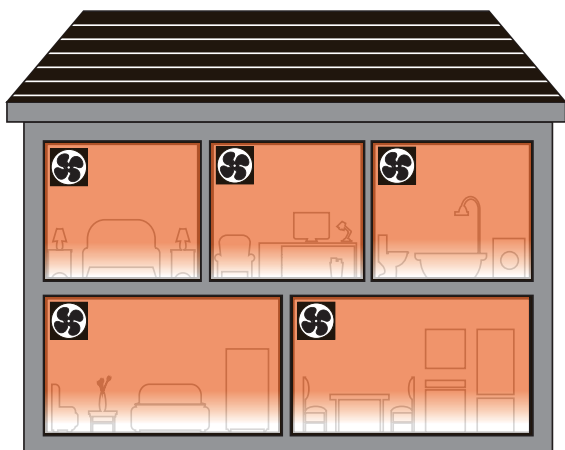
Thanks to this natural convection, there are no hot or cold draughts. Homeowners can be assured maximum comfort, as their home is heated silently via hot water flowing through underfloor pipework.



### Single Room Heating

Single room heating involves having a heating unit in each room that needs to be heated. A common example of this is a fireplace.

This method of heating keeps one room extremely warm but does not transfer the heat throughout the house, creating significant temperature differences between rooms. This results in the need for additional heat sources such as electric heaters, which inevitably leads to higher heating bills.



### Forced Air Heating

Heating systems that blow hot air throughout your home e.g. heat pumps often create uneven heat within a room, background noise and create a dry and uncomfortable environment for occupants.

This method of heating circulates dust and allergens which can be harmful to people with asthma and allergies.

## Natural, comfortable warmth.

The main advantage of underfloor heating is its high level of performance. Radiant heat means that the warmth is concentrated where you need it most. Room temperatures higher up are usually around 2°C lower than at floor level. So it's perfect for human comfort - you won't get cold feet and you will keep a cool head!

It's a highly controllable heat too. You can make each room a separate zone, varying heat output according to the time of day and location. You'll enjoy uniform heat even in the largest rooms, with no cold spots and no draughts caused by air circulation. It's even good for furniture, with its gentler, more even heat and smaller variations in humidity!



## More benefits. More flexibility.

Underfloor heating is extremely discrete. With nothing showing above floor level, it does not interfere with either your living space or your décor. This leaves you free to make the most of every square foot of your floor and wall space.

It is a cost-effective option. Although installation costs are generally higher than traditional heating methods, underfloor heating's superior efficiency means that your running costs will be significantly lowered so the ongoing savings on your energy bills quickly outweigh your higher initial outlay.

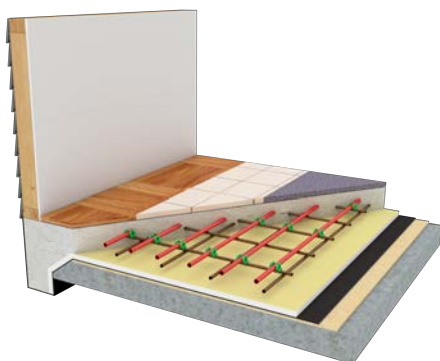
Underfloor heating is a practical option. Underfloor heating can be used with most types of floors and floor coverings (images below detail the types of underfloor heating systems **KE KELIT CLIMATE CONTROL** offer). It is suitable for use with all sorts of hydronic (water based) central heating systems. Underfloor heating is easy to install and gives you several useful options. Underfloor heating can be installed throughout your house, on one level only or in individual rooms. Underfloor heating can be used alone or combined with radiators or other heating systems elsewhere in your home.



KELOX FB Fixing Plate



KELOX FB Staple Plate



KELOX FB Mesh Pipe



KELOX FB Velcro Plate





## More service, More confidence.

**KE KELIT CLIMATE CONTROL** has introduced a complete system assurance that promotes the advantages of both tried and tested component compatibility and correct system design. We are confident that, when installed correctly, our systems will perform to the highest standards, eliminating unnecessary problems.



If you decide to buy individual components from different manufacturers, unfortunately, there is no overall responsibility for your underfloor heating system, should things go wrong. Buy a bespoke system from **KE KELIT** and our complete system assurance means you will benefit from complete peace of mind. In addition, you will benefit from our technical support, training, and reputation. Once your central heating system is installed, all you have to do is sit back and enjoy the performance, efficiency, and design freedom that **KE KELIT CLIMATE CONTROL** underfloor heating provides.









## 1.0 General Heating Description

In New Zealand, there are no technical standards for underfloor heating. **KE KELIT CLIMATE CONTROL** and the installers they have partnered with use the European Standard EN 1264 as the technical standard for the design and installation of underfloor heating purposes. This provides consumers the assurance of correctly designed and installed underfloor heating systems that are efficient and reliable.

**KE KELIT CLIMATE CONTROL** underfloor heating is suitable for use with all types of hydronic central heating systems, including gas, oil/diesel, hot water heat pumps or solid fuels and conventional, combination or condensing boilers. **KE KELIT CLIMATE CONTROL** recommends high efficiency condensing boilers and the use of weather compensation controllers to ensure energy savings that can exceed 35% in comparison to conventional boilers.

Underfloor heating is ideal for mixed systems with, for example, underfloor heating on the ground floor and radiators on the first floor. Due to its lower flow temperatures, underfloor heating works especially well with condensing boilers and renewable energy heat sources, such as heat pumps taking full advantage of the high efficiencies available.

Underfloor heating can be fitted under screed, floating or timber joist floors, and whether your preference is for fitted carpets, vinyl, wood block, ceramic or stone floors, it will provide a warm and comfortable surface underfoot.

The choice of floor covering will, of course, affect the output of the underfloor circuit and this should be considered at the design stage. **KE KELIT CLIMATE CONTROL** uses sophisticated software in accordance with EN 1264, this ensures the outputs through floor coverings are calculated correctly.

Depending on how cold it is outside, underfloor heating requires water temperatures that vary throughout the day and season to keep your home at a constant temperature. Typically, water temperatures of between 30°C and 50°C. These temperatures are easily obtained using weather compensating controllers and if required, blending flow water and return water from the underfloor by means of the thermostatic mixing facility.

The use of weather compensation controllers to regulate the water temperature that flows through your underfloor heating will provide a very consistent indoor temperature and reduced energy consumption.

### Heat Pumps

Heat pumps save energy by extracting heat from an outside source and delivering it within the building. Heat pumps are ideally supplied for use with underfloor heating due to the lower running temperatures required.

### When to Use Underfloor Heating

#### Underfloor heating is suitable for;

- Most housing applications
- Buildings or areas with low heat loss
- Buildings or areas that are continually or frequently used
- Buildings or areas with high ceilings.

#### Underfloor heating is not suitable for;

- Buildings or areas that are used intermittently or infrequently
- Buildings or areas that have high, or sudden heat losses
- Applications where large amounts of equipment or fittings will be fixed into the floor, e.g. racking or shelving
- Buildings where future partitioning or internal wall changes may occur

## 2.0 General Specifications: Concrete Floors

### Description

Underfloor heating systems have the underfloor heating pipework embedded in screed or concrete. They include concrete slab floors or screeded topping floors that are installed on top of concrete slabs or timber flooring with a screeded finish. **KE KELIT CLIMATE CONTROL** underfloor heating systems are available for all these constructions.

The design and installation of the concrete slabs must conform to local regulations and the New Zealand Building Code (NZBC).

**KE KELIT CLIMATE CONTROL** underfloor heating can offer a solution for all types of screeded and concrete floor constructions with few constraints.

**KE KELIT CLIMATE CONTROL** underfloor heating pipework is laid and held in place with one of the three primary anchoring systems, detailed below.

### Underfloor Heating in Concrete & Mesh Floors

Concrete systems consist of **KE KELIT CLIMATE CONTROL** underfloor heating pipework being attached to a steel reinforcing mesh, which itself is laid over the floor insulation. "Claw clips" or "cable ties" are the normal method of connection between the underfloor heating pipe and the mesh.

The insulation, which must meet the requirements of the local Building Regulations (NZBC), is laid directly on to the sub-floor. To avoid moisture ingress a vapour barrier is installed between the sub-floor (ground) and concrete slab components.

Concrete floor underfloor heating systems have the underfloor heating pipework connected to reinforcing mesh or stapled to the insulation and embedded in concrete. This is a relatively inexpensive way to install underfloor heating and is most common in New Zealand, consideration should be given to insulation underneath the concrete slab and perimeter insulation to prevent heat loss.

Although underfloor heating embedded in concrete slabs provide an inexpensive solution and the thermal mass of these systems retain heat. The reaction times are much slower than thin topping screed systems and comfort levels can be compromised due to the slower reaction times.

The large thermal mass of concrete slabs can release the stored heat when the room is already up to temperature creating overheating and because of the time taken to heat concrete slabs the temperatures can be cooler than desired during the heat up periods.

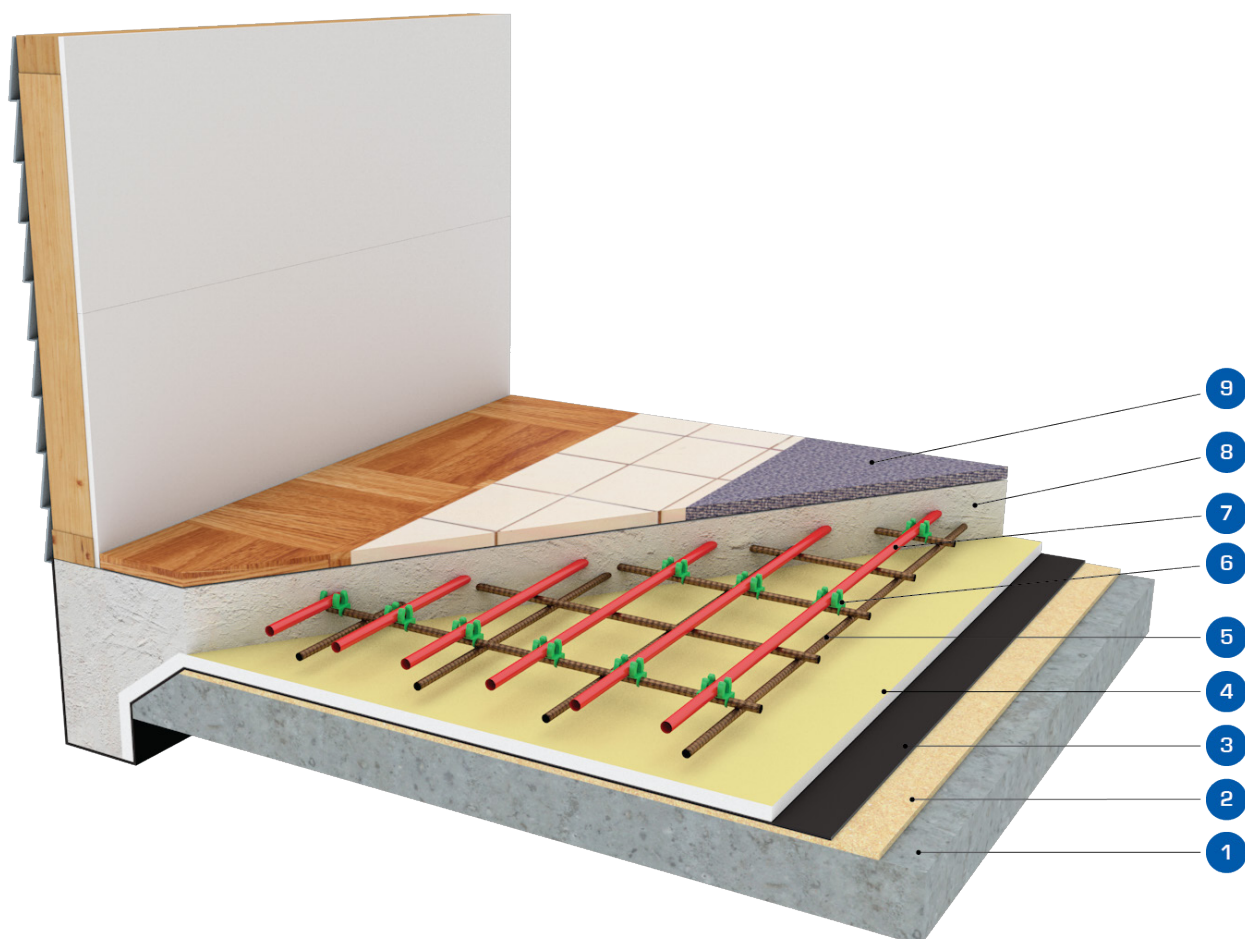
Typical concrete and mesh floor sections are detailed on page 14 showing the **KE KELIT CLIMATE CONTROL** underfloor heating pipework in the structure.

A smart weather compensation control system can combat these too warm/too cool times by anticipating the requirements of the home and regulating the water temperature in advance reducing energy consumption and helping to create a much more even and consistent heat in accordance with the desired room temperature.

## 2.1 Concrete Floor Underfloor Heating - Typical New Zealand Mesh

Number	Description	Dimensions
1	Typical Hard-fill	-
2	Sand	-
3	Polyethylene Vapour Diffusion	-
4	Typical New Zealand Underfloor Polystyrene Insulation	50 - 100mm
5	Typical Mesh	Vary from 3 - 8mm
6	Winkler Claw Clip	As per mesh: from 3 - 8mm
7	KU100 ULTRA PE-RT Pipe or KMU120 PE-RT/Al/PE-RT Pipe	16 x 2mm - 300m 20 x 2.25mm - 300m 25 x 2.5mm - 300m
8	Typical New Zealand Concrete Slab	100mm
9	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table can be found on page 15





## 2.2 Concrete Floor Underfloor Heating - Typical New Zealand Mesh Components

### KE KELIT Products Compatible with Mesh Concrete Underfloor Heating System

Code	Description	Dimensions	Quantity
<b>KU100 KELOX FB - ULTRA PE-RT Pipe</b> ULTRA PE-RT pipe Industrial surface pipe in accordance with ÖNORM EN ISO 22391, oxygen tight and water-vapour-tight with EVOH barrier in accordance with DIN 4724. The joints can be created with KM screw fittings, with KMP, KWP, KMU and KWU fittings. Operating conditions: tmax 70°C/6 bar			
7012030	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	300m
7012060	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	600m
7012530	KU100 KELOX FB - ULTRA PE-RT Pipe	25 x 2.5mm	300m
7011650	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	500m
7011630	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	300m
<b>KMU120 KELOX-ULTRAX FB Pipe</b> ULTRA X FB pipe conforming to EN ISO 21003, oxygen and water vapour barrier; 5-layered composite pipe made of PE-RT/Al/PE-RT Operating conditions: tmax 70°C/10 bar			
7001602	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	200m
7001603	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	300m
7001605	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	500m
<b>Winkler Claw Clips for 16mm and 20mm Pipe</b> Specifically designed to connect to wire mesh (3mm up to 8mm) that is used in New Zealand construction of concrete slabs, the Under Floor heating pipes are then clipped into the claw clips.			
KR1420/3	Winkler Claw Clip for 16mm and 20mm Pipe	3mm	400 Box
KR1420/4	Winkler Claw Clip for 16mm and 20mm Pipe	4mm	400 Box
KR1420/5	Winkler Claw Clip for 16mm and 20mm Pipe	5mm	400 Box
KR1420/6	Winkler Claw Clip for 16mm and 20mm Pipe	6mm	400 Box
KR1420/8	Winkler Claw Clip for 16mm and 20mm Pipe	8mm	400 Box

### 3.0 General Specifications: Screeded Floor Systems Without Insulation

#### Underfloor Heating - Screeded Floors with no Insulation

Underfloor heating in screeded floors with no insulation other than what's installed under the sub-floor provides a more cost-effective solution than those that include additional insulation if the budget can't extend to include additional floor insulation.

Screeded floors are laid onto a sub-base which can be of concrete or timber construction. To avoid moisture ingress a vapour barrier should be installed between the sub-floor (ground) and concrete slab components.

When installing screed topping floors on timber floors consideration to correct fastening of timber floor to the supporting beams must be given. The EZYMIX calcium sulphate floor screed EM4193 that is typically installed as a 30mm thick topping screed has a weight of 54kg/m<sup>2</sup>, the strength of the timber or concrete sub-floor must be calculated to ensure adequate strength, this is particularly important when retrofitting to an existing home.

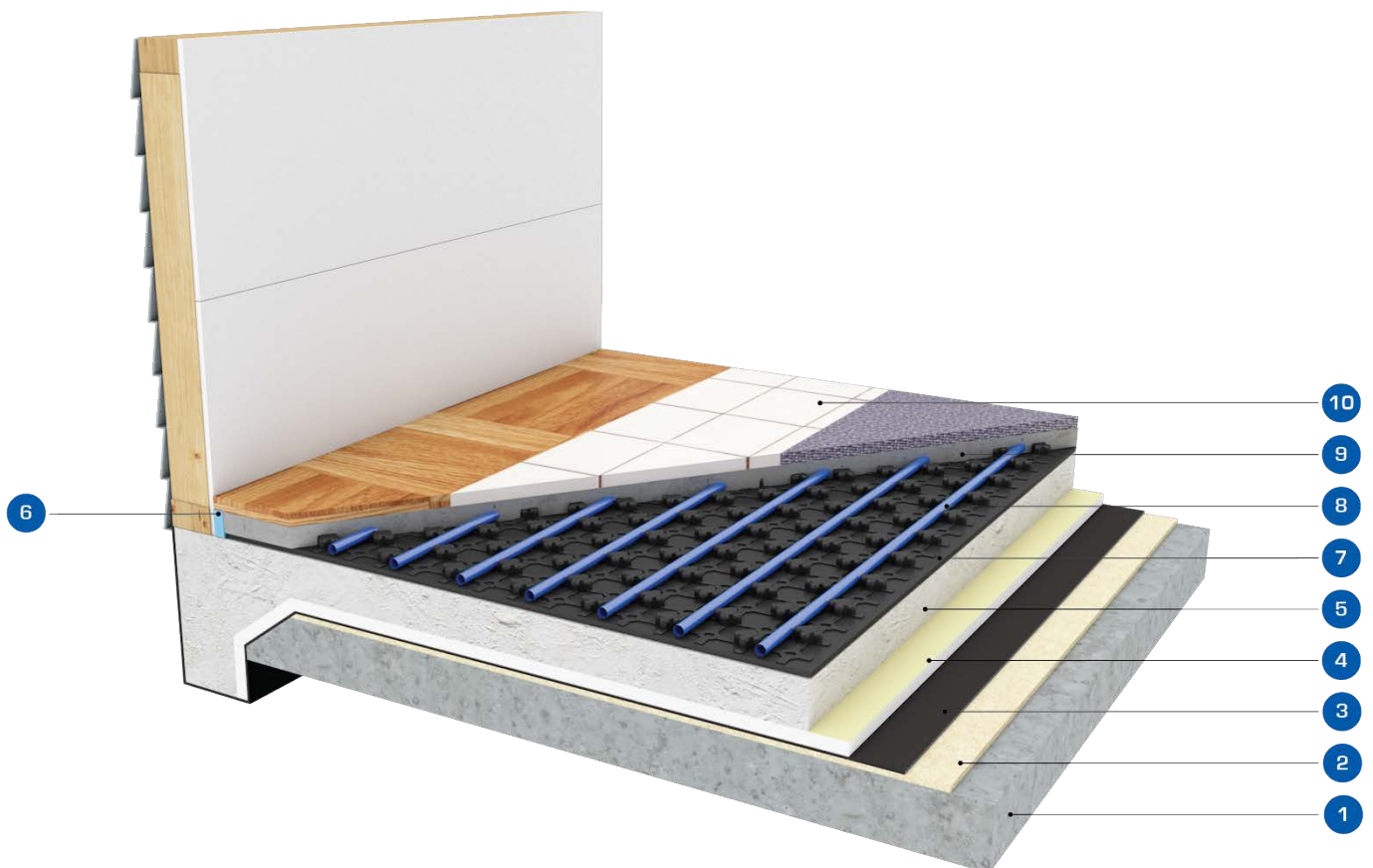
Typical screeded topping floors with no insulation & *KELOX FB Fixing Plate System* are detailed on pages 17 and 18, showing the **KE KELIT CLIMATE CONTROL** underfloor heating pipework in the structure.

With a topping screed of only 30mm, the reaction times are significantly faster than traditional concrete and mesh underfloor heating systems. This thinner topping screeded in conjunction with a smart weather compensation control system that anticipates the heating requirements and regulates the water temperature in advance significantly reduce energy consumption and vastly improve the comfort levels by ensuring a constant heat in accordance with the desired room temperature.

### 3.1 Screeded Floor Systems - KELOX FB Fixing Plate - Concrete Slab

Number	Description	Dimensions
1	Typical Hard-fill	-
2	Sand	-
3	Polyethylene Vapour Diffusion	-
4	Typical New Zealand Underfloor Polystyrene Insulation	30 - 100mm
5	Typical New Zealand Concrete Slab	100mm
6	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
7	KM613 KELOX FB Fixing Plate	1.45 x 0.85m
8	KMU120 PE-RT/Al/PE-RT Pipe or KU100 ULTRA PE-RT Pipe	16 x 2mm
9	EZYMIX EM4193 Calcium Sulphate Screed	25 - 40mm
10	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table for this system can be found on page 19





## 3.1 Screeded Floor Systems - KELOX FB Fixing Plate - Timber Floor

Number	Description	Dimensions
1	Typical Timber Underfloor Insulation	-
2	Typical New Zealand Timber Joists	-
3	Typical New Zealand Timber Flooring	-
4	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
5	KM613 KELOX FB Fixing Plate	1.45 x 0.85m
6	KMU120 PE-RT/Al/PE-RT Pipe or KU100 ULTRA PE-RT Pipe	16 x 2mm
7	EZYMIX EM4193 Calcium Sulphate Screed	25 - 40mm
8	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table for this system can be found on page 19



### 3.2 KELOX FB Fixing Plate - System Components

#### KE KELIT Products Compatible with KELOX FB Fixing Plate Underfloor Heating System

Code	Description	Dimensions	Quantity
<b>KU100 KELOX FB - ULTRA PE-RT Pipe</b> ULTRA PE-RT pipe Industrial surface pipe in accordance with ÖNORM EN ISO 22391, oxygen tight and water-vapour-tight with EVOH barrier in accordance with DIN 4724. The joints can be created with KM screw fittings, with KMP, KWP, KMU and KWU fittings. Operating conditions: tmax 70°C/6 bar			
7012030	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	300m
7012060	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	600m
7012530	KU100 KELOX FB - ULTRA PE-RT Pipe	25 x 2.5mm	300m
7011650	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	500m
7011630	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	300m
<b>KMU120 KELOX-ULTRAX FB Pipe</b> ULTRA X FB pipe conforming to EN ISO 21003, oxygen and water vapour barrier; 5-layered composite pipe made of PE-RT/Al/PE-RT Operating conditions: tmax 70°C/10 bar			
7001602	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	200m
7001603	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	300m
7001605	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	500m
<b>KM634 KELOX FB Edge Insulating Strips</b> Made of foamed PE, reverse side self-adhesive incl. 5 tear-off strips, front with self-adhesive, welded-on overlapping foil for tight connection of edge insulating strips and footfall sound insulation Reel length: 25m			
6060100	KM634 KELOX FB Edge Insulating Strips	8 x 150mm	200m Box
<b>KM613 KELOX FB Fixing Plate</b> Deep-drawn pipe holding nubs for sturdy fastening of the KELOX module pipe d16mm, connection of the individual plates by overlapping. One longitudinal and one lateral edge is designed as a scaled-down father nub, which is marked with the KELIT logo in between the nubs, the installation should preferably start on the right-hand side of a room. Installation distance: ID 5, 10, 15, 20, 25 and 30cm Height: 20mm			
6106310	KM613 KELOX FB Fixing Plate	1.45 x 0.85m	160 Pallet

### 3.3 General Specifications: Screeded Floor Systems With Insulation

#### Underfloor Heating - Screeded Floors with Insulation

Screeded floors are laid onto a sub-base which can be of concrete or timber construction. To avoid moisture ingress a vapour barrier should be installed between the sub-floor (ground) and concrete slab components.

When installing screeded floors onto timber floors consideration to correct fastening of timber floor to the supporting beams must be given. The EZYMIX calcium sulphate floor screed EM490 that is typically installed as a 50mm thick topping screed has a weight of 90kg/m<sup>2</sup>, the strength of the timber or concrete sub-floor must be calculated to ensure adequate strength. This is particularly important when retrofitting to an existing home.

Typical screeded floors with insulation & stapling floor sections are detailed on pages 21 and 22, showing the **KE KELIT CLIMATE CONTROL** underfloor heating pipework in the structure.

Typical screeded floors with insulation & Velcro floor sections are detailed on pages 24 and 25, showing the **KE KELIT CLIMATE CONTROL** underfloor heating pipework in the structure.

The composition of the floor above the sub-base shall be identical in both cases.

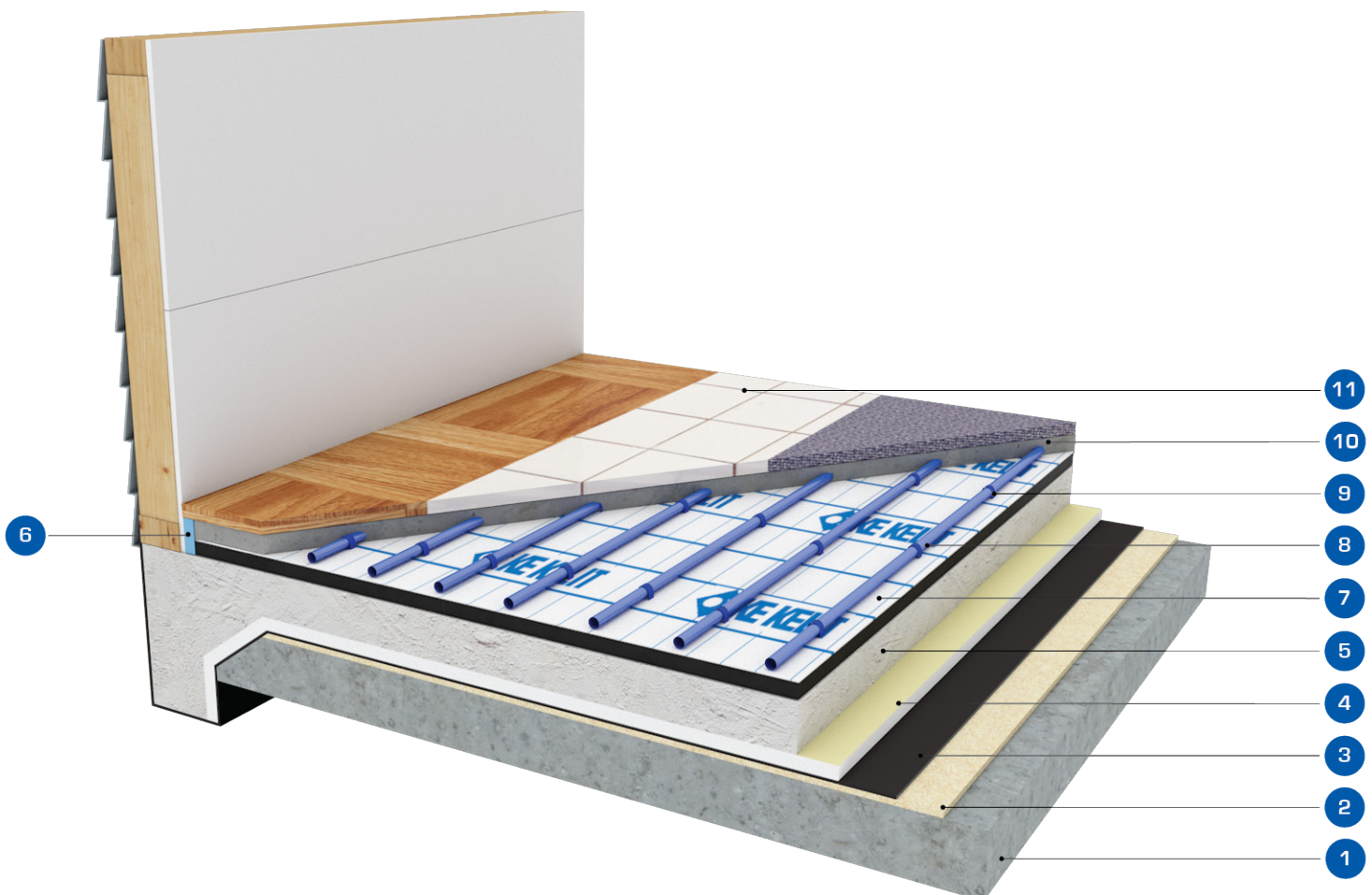
With a topping screed of only 50mm, the reaction times are significantly faster than traditional concrete and mesh underfloor heating systems. This thinner topping screeded in conjunction with a smart weather compensation control system that anticipates the heating requirements and regulates the water temperature in advance significantly reduce energy consumption and vastly improve the comfort levels by ensuring a constant heat in accordance with the desired room temperature.



### 3.4 Screeded Floor Systems - KELOX FB Staple Plate - Concrete Slab

Number	Description	Dimensions
1	Typical Hard-fill	-
2	Sand	-
3	Polyethylene Vapour Diffusion	-
4	Typical New Zealand Underfloor Polystyrene Insulation	30 - 100mm
5	Typical New Zealand Concrete Slab	100mm
6	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
7	KM635 KELOX FB Staple Plate	28 / 25mm - 6.5kN 28 / 25mm - 10kN
8	KMU120 PE-RT/Al/PE-RT Pipe or KU100 ULTRA PE-RT Pipe	16 x 2mm
9	KM611 KELOX FB Staple	40mm - 50mm
10	EZYMIX EM490 Calcium Sulphate Screed	51 - 80mm
11	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

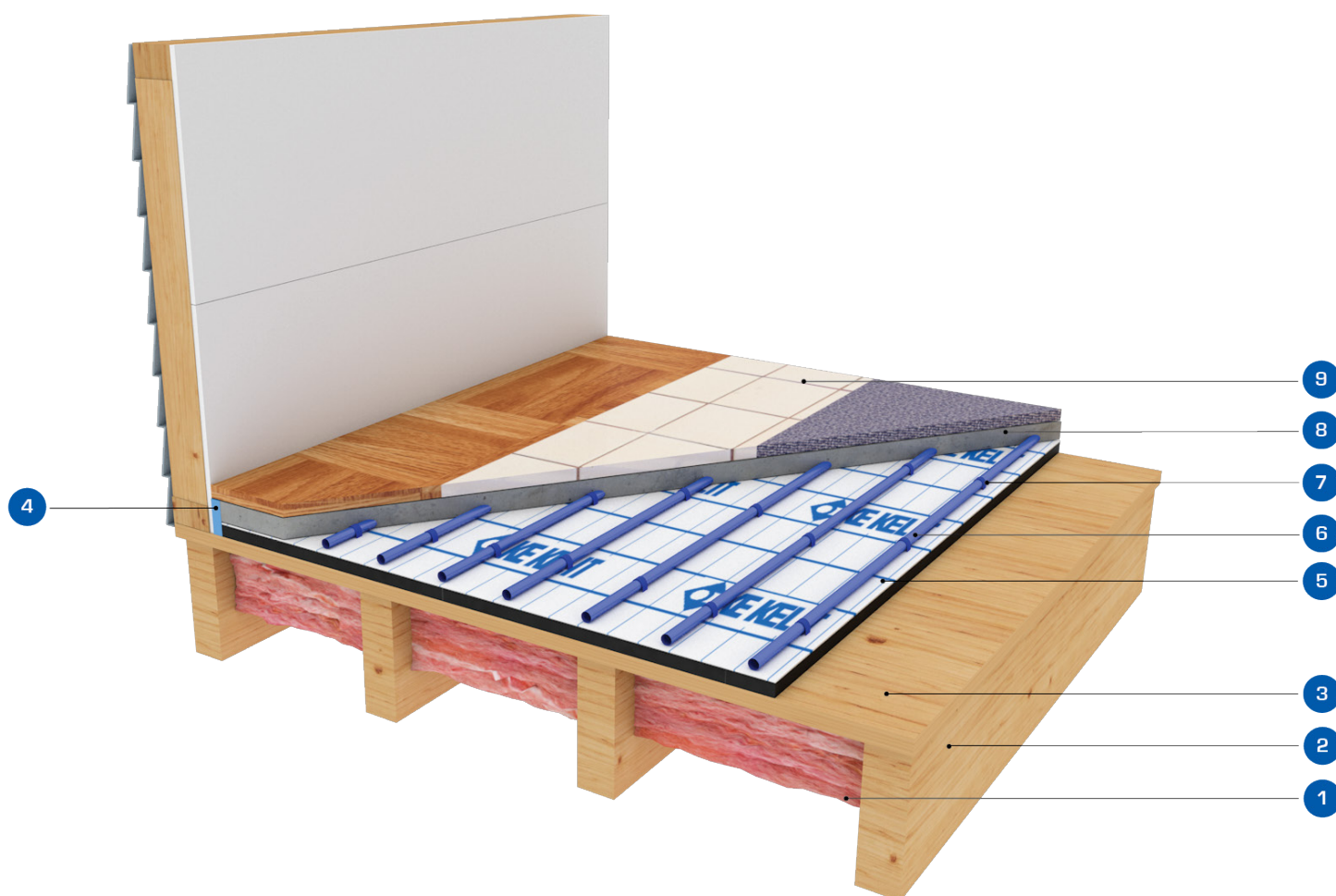
A detailed KE KELIT product summary table for this system can be found on page 23



## 3.4 Screeded Floor Systems - KELOX FB Staple Plate - Timber Floor

Number	Description	Dimensions
1	Typical Timber Underfloor Insulation	-
2	Typical New Zealand Timber Joists	-
3	Typical New Zealand Timber Flooring	-
4	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
5	KM635 KELOX FB Staple Plate	28 / 25mm - 6.5kN 28 / 25mm - 10kN
6	KMU120 PE-RT/Al/PE-RT Pipe or KU100 ULTRA PE-RT Pipe	16 x 2mm
7	KM611 KELOX FB Staple	40 - 50mm
8	EZYMIX EM490 Calcium Sulphate Screed	51 - 80mm
9	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table for this system can be found on page 23



### 3.5 KELOX FB Staple Plate - System Components

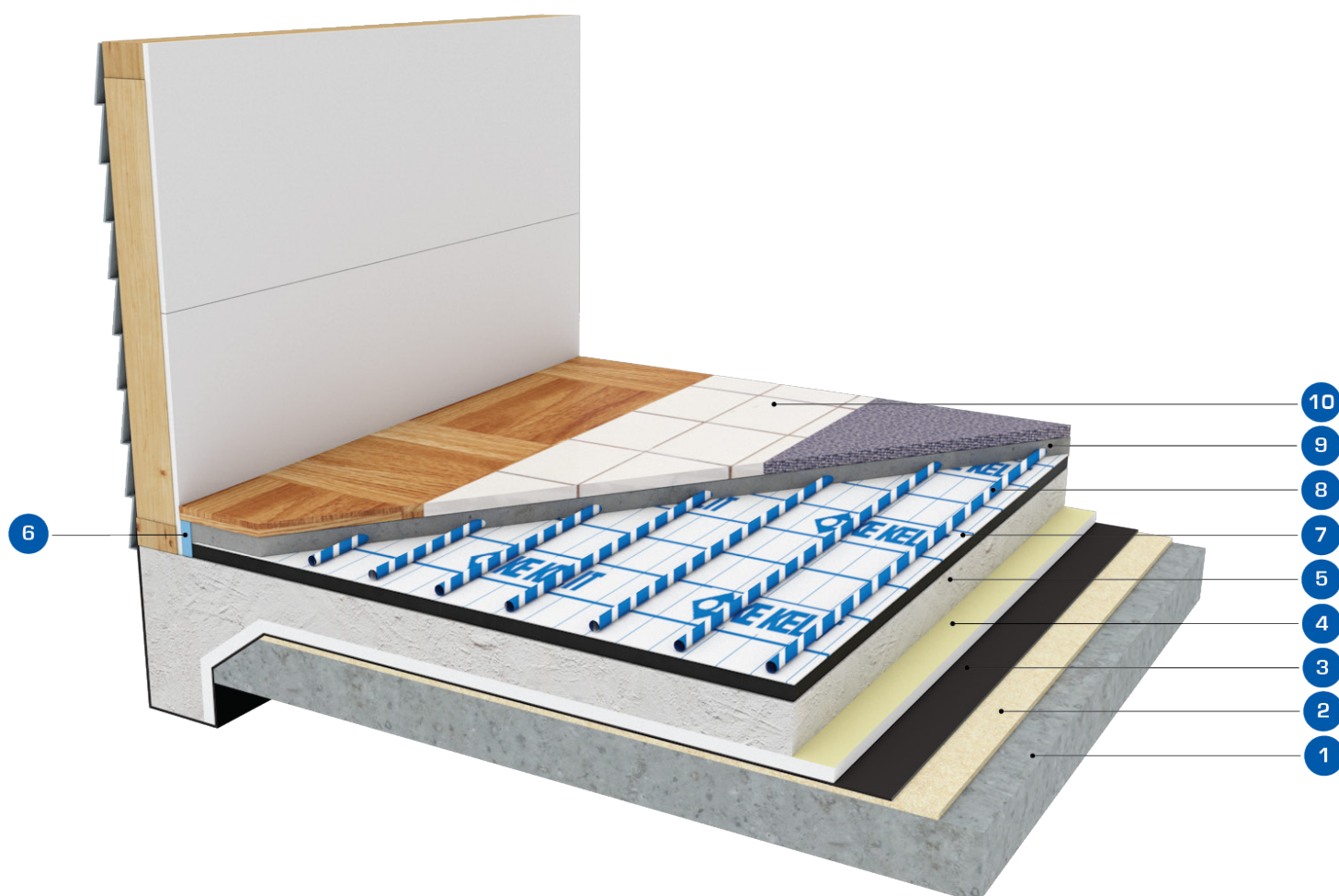
#### KE KELIT Products Compatible with KELOX FB Staple Plate Underfloor Heating System

Code	Description	Dimensions	Quantity
<b>KU100 KELOX FB - ULTRA PE-RT Pipe</b>			
ULTRA PE-RT pipe Industrial surface pipe in accordance with ÖNORM EN ISO 22391, oxygen tight and water-vapour-tight with EVOH barrier in accordance with DIN 4724. The joints can be created with KM screw fittings, with KMP, KWP, KMU and KWU fittings. Operating conditions: t <sub>max</sub> 70°C/6 bar			
7012030	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	300m
7012060	KU100 KELOX FB - ULTRA PE-RT Pipe	20 x 2.5mm	600m
7012530	KU100 KELOX FB - ULTRA PE-RT Pipe	25 x 2.5mm	300m
7011650	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	500m
7011630	KU100 KELOX FB - ULTRA PE-RT Pipe	16 x 2mm	300m
<b>KMU120 KELOX-ULTRAX FB Pipe</b>			
ULTRA X FB pipe conforming to EN ISO 21003, oxygen and water vapour barrier; 5-layered composite pipe made of PE-RT/Al/PE-RT Operating conditions: t <sub>max</sub> 70°C/10 bar			
7001602	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	200m
7001603	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	300m
7001605	KMU120 KELOX FB - Multilayer Pipe	16 x 2mm	500m
<b>KM634 KELOX FB Edge Insulating Strips</b>			
Made of foamed PE, reverse side self-adhesive incl. 5 tear-off strips, front with self-adhesive, welded-on overlapping foil for tight connection of edge insulating strips and footfall sound insulation Reel length: 25m			
6060100	KM634 KELOX FB Edge Insulating Strips	8 x 150mm	200m Box
<b>KM635 KELOX FB Staple Plate</b>			
Lambdapor made of expanded polystyrene EPS-T 650 plus Q33 in accordance with ÖNORM B 6000, free from HFC and CFC, lamination HDPE fabric with PE coating, incl. adhesive overlapping edge, for stapling and fastening the KELOX FB pipe with KM611 staples Thickness: 28/25mm Load-bearing capacity: max. 6,5 kN/m <sup>2</sup> Load-bearing capacity: max. 10 kN/m <sup>2</sup>			
6060700	KM635 KELOX FB Staple Plate	28/25mm - 6.5kN	10m <sup>2</sup> Roll
6060750	KM635 KELOX FB Staple Plate	28/25mm - 10kN	10m <sup>2</sup> Roll
<b>KM611 KELOX FB Staple</b>			
For stapling the KELOX FB pipe onto the KM635 FB staple plate with WZ945 KELIT staples. Magazined with 25 units each, made of plastic Requirement: approx. 2–3 units/ running metre of pipe			
1008040	KM611 KELOX FB Staple	40mm	1000 Box
1008050	KM611 KELOX FB Staple	50mm	250 Box

## 3.6 Screeded Floor Systems - KELOX FB Velcro Plate - Concrete Slab

Number	Description	Dimensions
1	Typical Hard-fill	-
2	Sand	-
3	Polyethylene Vapour Diffusion	-
4	Typical New Zealand Underfloor Polystyrene Insulation	30 - 100mm
5	Typical New Zealand Concrete Slab	100mm
6	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
7	KM636 KELOX FB Velcro Plate	6mm x 20m <sup>2</sup>
8	KMU121K KELOX ULTRAX FB Velcro Pipe	16 x 2mm
9	EZYMIX EM490 Calcium Sulphate Screed	51 - 80mm
10	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table for this system can be found on page 26

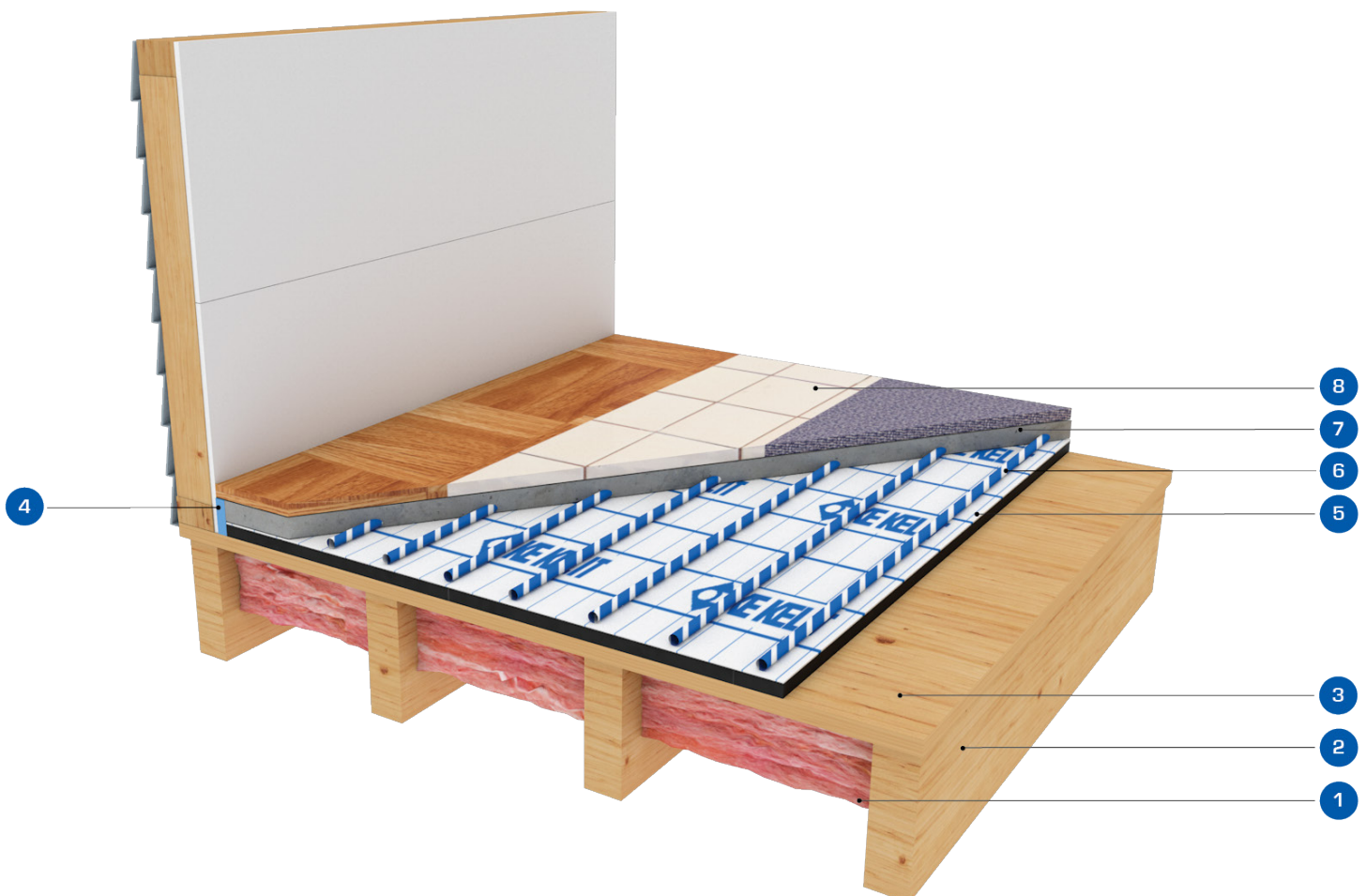




### 3.6 Screeded Floor Systems - KELOX FB Velcro Plate - Timber Floor

Number	Description	Dimensions
1	Typical Timber Underfloor Insulation	-
2	Typical New Zealand Timber Joists	-
3	Typical New Zealand Timber Flooring	-
4	KM634 KELOX FB Edge Insulating Strips	8 x 150mm
5	KM636 KELOX FB Velcro Plate	6mm x 20m <sup>2</sup>
6	KMU121K KELOX ULTRAX FB Velcro Pipe	16 x 2mm
7	EZYMIX EM490 Calcium Sulphate Screed	51 - 80mm
8	Floor Coverings - polished concrete, tiles, vinyl timber or carpet	-

A detailed KE KELIT product summary table for this system can be found on page 26



## 3.7 KELOX FB Velcro Plate - System Components

## KE KELIT Products Compatible with KELOX FB Velcro Plate Underfloor Heating System

Code	Description	Dimensions	Quantity
<b>KMU121 KELOX ULTRAX FB Velcro Pipe</b> ULTRA X FB Velcro pipe in accordance with EN ISO 21003, oxygen tight and water-vapour-tight 5-layer composite pipe made of PE-RT/Al/PE-RT, incl. wrapped Velcro strip for direct attachment to the KM636 KELOX FB Velcro plate without additional fastening. Operating conditions: t <sub>max</sub> 70°C/10 bar			
7001613	KMU121K KELOX FB - Velcro Multilayer Pipe	16 x 2mm	300m
<b>KU101K ULTRA PE-RT FB Velcro Pipe</b> ULTRA PE-RT FB Velcro pipe in accordance with EN ISO 22391, oxygen-tight and water-vapour-tight PE-RT pipe with EVOH barrier in accordance with DIN 4724, incl. wrapped Velcro strip for direct attachment to the KM636 KELOX FB Velcro plate without additional fastening. The joints can be created with KM screw fittings, KMP, KWP, KMU and KWU fittings. Operating conditions: t <sub>max</sub> 70°C/6 bar			
7011613	KU101K ULTRA PE-RT FB Velcro Pipe	16 x 2mm	300m
<b>KM634 KELOX FB Edge Insulating Strips</b> Made of foamed PE, reverse side self-adhesive incl. 5 tear-off strips, front with self-adhesive, welded-on overlapping foil for tight connection of edge insulating strips and footfall sound insulation Reel length: 25m			
6060100	KM634 KELOX FB Edge Insulating Strips	8 x 150mm	200m Box
<b>KM636 KELOX FB Velcro Plate</b> Lambdapor made of expanded polystyrene EPS-T 650 plus Q33 in accordance with ÖNORM B 6000, free from HFC and CFC, lamination Velour fabric with PE coating, including adhesive overlapping edge, for attaching the KELOX FB Velcro pipe without additional fastening. Thickness: 28/25mm Load-bearing capacity: max. 6,5 kN/m²			
6060510	KM636K KELOX FB Velcro Sheet	6mm	20m²

## 4.0 General Specifications: EZYMIX Screeded Floor Systems

### Description

A screeded underfloor heating system has been developed by **KE KELIT CLIMATE CONTROL** to meet the increasing demand for this type of flooring structure using EZYMIX EM4193 Screed, EM490 Screed and EM4095 Screed. Screeded underfloor heating systems have a low thermal mass and consequently, have a swift response time to changes in temperature. There are weight limitations for using EZYMIX Screed as a screeded underfloor heating system, please contact **KE KELIT CLIMATE CONTROL** for more information on these limitations.

EZYMIX EM4193, EM490 and EM4095 Screeds can be installed as a bonded screed to the existing substrate or as a floating screed over insulation and/or separating layers from the existing floor.

- Low shrinkage
- Low surface tension
- Eco-friendly
- Suitable for underfloor heating
- Large area installation possible
- Virtually self-levelling
- Short installation and drying time

### Installation Outline

The European CIBSE Underfloor Heating Design and Installation Guide 2004, section 7.2.4 states: Thermal expansion of plastic pipes above ground is considerable, and 10mm per linear metre must be expected at 60°C. However, expansion of pipes embedded in solid concrete is prevented and results in a microscopic bore reduction. **KE KELIT CLIMATE CONTROL** therefore recommend ample provision for pipe expansion is provided in all systems where the heating pipe is not buried in screed or concrete. This may be accommodated by regular changes of pipe direction.

Once the screed has been laid the **KE KELIT CLIMATE CONTROL** underfloor heating should be set at a flow temperature of 30°C and elevate the flow temperature by 3°C per day until the operating temperature is reached. Operating temperatures must be held for a minimum of 5 days before the **KE KELIT CLIMATE CONTROL** underfloor heating is turned off and the flooring can be laid. The requirement for preconditioning of screeds is detailed in EN 1264 and must be followed.

A limit thermostat can be fitted to the floor to ensure its surface does not exceed any maximum temperature specified by the floor covering manufacturer.

All screeds have the potential to crack during the drying period, which can possibly extend into the floor finish.

To eliminate the possibility of screed cracking:

- All wing-walls and columns must have two layers of edge expansion strips. Other walls only require a single layer.
- When room size exceeds 200m<sup>2</sup>, control joints must be placed in the screed. Any control joints in the structural slab must also be followed in the screed.
- All windows and doors must be closed for a minimum of 24 - 48 hours to protect the screed from any draughts or direct sunlight.

For more information, please contact KE KELIT Climate Control via [climatecontrol@kekelit.co.nz](mailto:climatecontrol@kekelit.co.nz)

## 4.1 Screeding Procedure for EZYMIX Concrete Screeds

### Screeding Procedure for EZYMIX EM4193 Screed

- Proposed screed option for underfloor heating slab on suspended timber floor. KM613 KELOX FB Fixing Plate will be bonded/adhered with timber floor-suitable adhesive to be confirm for fixing the plate.
- KM634 KELOX FB Wall edge insulation will be placed, tear-off strip will be stuck on timber floor or fixing plate.
- Please confirm edge insulating plastic strips are stuck around the perimeter of the wall and the plastic coating sheet is stuck to the Fixing plate or onto the insulation Staple/Velcro plate. This will prevent flow of concrete under the fixing plate or on insulation plate or anywhere in wall cavity at time of screeding.
- **KE KELIT** underfloor pipe will be placed as per underfloor heating circuit requirement and specification. Pipe leakage test should be performed before concrete pouring to check any leakages in the pipe.
- To achieve the desired screed level, a laser level should be used to mark a line around the perimeter of the room prior to installation. During installation of the EM4193 screed measure from the marked line down onto the surface of the screed to identify the correct finished level. Tripods should be installed periodically within the area to identify the correct finished level at central locations.
- The m-tec duo-mix 2000 is especially suitable for mixing and pumping self-levelling screeds. All mortar hoses should be lubricated with a slurry before pumping. The slurry must be fully recovered at the end and must not be mixed with the screed.
- Begin pumping the EM4193 screed at the far end of the area working back towards the exit point. Focus on pumping conjoining areas of around 8 - 10m<sup>2</sup> at a time. This will allow sufficient build-up of fresh product ensuring a satisfactory finished level can be achieved. Continually check the finished level and if required top-up.
- As soon as the desired level of screed is reached, it should be dappedled immediately to obtain the best surface finish. The first pass with the dappling bar should be made with a deep, tamping motion. This creates a wave-like ripple across the surface, removing any air bubbles and levelling the screed.
- During the second pass, at right angles to the first, the bar should only just penetrate the surface of the EM4193 and performed with a faster action to complete the surface levelling.
- Keep all doors and windows closed for min. 24 hours to protect from rapid drying during this time caused by direct sun or draughts.



## 4.1 Screeding Procedure for EZYMIX Concrete Screeds

### Screeding Procedure for EZYMIX EM490 Screed

- Proposed screed option for underfloor heating slab on suspended timber floor. KM635 KELOX FB Staple Plate or KM636 KELOX FB Velcro Plate will be bonded/adhered with timber floor-suitable adhesive to be confirm for fixing the plate.
- KM634 KELOX FB Wall edge insulation will be placed, tear-off strip will be stuck on timber floor or fixing plate.
- Please confirm edge insulating plastic strips are stuck around the perimeter of the wall and the plastic coating sheet is stuck to the fixing plate or onto the insulation Staple/Velcro plate. This will prevent flow of concrete under the fixing plate or on insulation plate or anywhere in wall cavity at time of screeding.
- **KE KELIT** underfloor pipe will be placed as per underfloor heating circuit requirement and specification. Pipe leakage test should be performed before concrete pouring to check any leakages in the pipe.
- To achieve the desired screed level, a laser level should be used to mark a line around the perimeter of the room prior to installation. During installation of the EM490 screed measure from the marked line down onto the surface of the screed to identify the correct finished level. Tripods should be installed periodically within the area to identify the correct finished level at central locations.
- The m-tec duo-mix 2000 is especially suitable for mixing and pumping self-levelling screeds. All mortar hoses should be lubricated with a slurry before pumping. The slurry must be fully recovered at the end and must not be mixed with the screed.
- Begin pumping the EM490 screed at the far end of the area working back towards the exit point. Focus on pumping conjoining areas of around 8 - 10m<sup>2</sup> at a time. This will allow sufficient build-up of fresh product ensuring a satisfactory finished level can be achieved. Continually check the finished level and if required top-up.
- As soon as the desired level of screed is reached, it should be dapped immediately to obtain the best surface finish. The first pass with the dappling bar should be made with a deep, tamping motion. This creates a wave-like ripple across the surface, removing any air bubbles and levelling the screed.
- During the second pass, at right angles to the first, the bar should only just penetrate the surface of the EM490 and performed with a faster action to complete the surface levelling.
- Keep all doors and windows closed for min. 24 hours to protect from rapid drying during this time caused by direct sun or draughts.

## 4.1 Screeding Procedure for EZYMIX Concrete Screeds

### Screeding Procedure for EZYMIX EM4095 Screed

- Proposed screed option for underfloor heating slab on suspended timber floor. KM613 KELOX FB Fixing Plate will be bonded/adhered with timber floor-suitable adhesive to be confirm for fixing the plate.
- KM634 KELOX FB Wall edge insulation will be placed, tear-off strip will be stuck on timber floor or fixing plate.
- Please confirm edge insulating plastic strips are stuck around the perimeter of the wall and the plastic coating sheet is stuck to the Fixing plate or onto the insulation Staple/Velcro plate. This will prevent flow of concrete under the fixing plate or on insulation plate or anywhere in wall cavity at time of screeding.
- **KE KELIT** underfloor pipe will be placed as per underfloor heating circuit requirement and specification. Pipe leakage test should be performed before concrete pouring to check any leakages in the pipe.
- To achieve the desired screed level, a laser level should be used to mark a line around the perimeter of the room prior to installation. During installation of the EM4095 screed measure from the marked line down onto the surface of the screed to identify the correct finished level. Tripods should be installed periodically within the area to identify the correct finished level at central locations.
- The m-tec duo-mix 2000 is especially suitable for mixing and pumping self-levelling screeds. All mortar hoses should be lubricated with a slurry before pumping. The slurry must be fully recovered at the end and must not be mixed with the screed.
- Begin pumping the EM4095 screed at the far end of the area working back towards the exit point. Focus on pumping conjoining areas of around 8 - 10m<sup>2</sup> at a time. This will allow sufficient build-up of fresh product ensuring a satisfactory finished level can be achieved. Continually check the finished level and if required top-up.
- As soon as the desired level of screed is reached, it should be dapped immediately to obtain the best surface finish. The first pass with the dappling bar should be made with a deep, tamping motion. This creates a wave-like ripple across the surface, removing any air bubbles and levelling the screed.
- During the second pass, at right angles to the first, the bar should only just penetrate the surface of the EM4095 and performed with a faster action to complete the surface levelling.
- Keep all doors and windows closed for min. 24 hours to protect from rapid drying during this time caused by direct sun or draughts.

## 4.2 Post Installation Treatment for EZYMIX Screeds

### Post Installation Treatment for EM490 & EM4193 Calcium Sulphate Screeds

The information below must be followed to ensure the EM490 & EM4193 Calcium Sulphate screeds perform as they should and will protect the screed itself and future floor coverings from damage.

All windows, doors and other openings must be closed at the time of the screed installation and kept closed for a minimum of 24 - 48 hours.

- In warm temperatures keep the home closed for a minimum of 24 hours.
- In cooler temperatures keep the home closed for a minimum of 48 hours.

After the above time frames have been met, it is important to open the windows and doors of the building to allow air to flow through the building and remove the moisture that has built up over the first 24 - 48 hours. Keep windows and doors open daily for the next 28 days.

### Access to Installed Screeds & Curing Times

Following installation of the EM490 & EM4193 screeds, no traffic is permitted over the screed for the first **24 hours**.

Following installation, only light access (up to 250kg) is permitted for the subsequent **74 hours**.

Following installation, any heavy access (> 250kg) is not permitted for a minimum period of **28 days**. This includes mechanical scissor lifts and any other heavy equipment.

Final curing of the floor will be based on the thickness of the screed. Curing occurs at a rate of 1 week per cm of thickness (e.g. 51mm thick screed will take 5.1 weeks to fully cure).

The curing speed can be accelerated by turning on the underfloor heating system; EZYMIX encourage this, as it is better for the floor.

Time Frame	Temperature Change
7 days after pouring	Turn the underfloor heating on to reach a temperature of 25°C. Maintain this temperature for 24 hours
After 24 hours	Increase the temperature to 35°C. Maintain this temperature for 24 hours
After 24 hours	Increase the temperature to 45°C. Maintain this temperature for 24 hours
After 24 hours	Increase the temperature to 50°C. Maintain this temperature for 7 days
After 7 days	Decrease the temperature to 45°C. Maintain this temperature for 24 hours
After 24 hours	Decrease the temperature to 35°C. Maintain this temperature for 24 hours
After 24 hours	Decrease the temperature to 25°C. Maintain this temperature for 24 hours

#### Note:

Never apply a moisture barrier over EM490 & EM4193 Calcium Sulphate screeds to try and speed up the installation of floor coverings.

Prior to covering EM490 & EM4193 screeds, a moisture content test must be undertaken and the result must comply with the following:

- A residual content of < 0.5% must be achieved for unheated screeds prior to covering
- A residual moisture content of < 0.3% must be achieved for heated screeds prior to covering

### 4.3 Technical Information for EZYMIX Concrete Screeds

#### EZYMIX EM4193 Technical Information

Yield	550 litres per 1000kg dry material
Coverage	18 kg/m <sup>2</sup> per cm thickness
Water Demand	Approx. 19%
Drying Time - Foot Traffic	After 6 hours
Drying Time - Light & Heavy Traffic	After 24 hours
Minimum Thickness Over Solid Substrate	25mm (over 16mm pipes)
Minimum Thickness Over Insulation	35mm (over hard insulation board)
Maximum Thickness Single Application	60mm
Compressive Strength - 28 Days	≥ 30 mPa
Flexural Strength - 28 Days	≥ 6 mPa
Shrinkage - 28 Days	< 0.2mm / m
Poured Density	1700 kg/m <sup>3</sup>
Elasticity Modulus	Approx. 18000 N/mm <sup>2</sup>
Thermal Conductivity	1.2 – 1.8 W/mK
Thermal Expansion Coefficient	0.011 mm/mK
Fire Rating	A1 EN 13813
Application Temperature	Ambient air: +10°C to +25°C Substrate: +10°C to +25°C
Working Time	Up to 30 minutes
Flow Rate	22 - 25cm

#### EZYMIX EM490 Technical Information

Yield	550 litres per 1000kg dry material
Coverage	18 kg/m <sup>2</sup> per cm thickness
Water Demand	Approx. 15%
Drying Time - Foot Traffic	After 24 hours
Drying Time - Light Traffic	After 3 days
Drying Time - Heavy Traffic	After 28 days
Minimum Thickness Over Solid Substrate	30mm (over 16mm pipes)
Minimum Thickness Over Insulation	51mm
Maximum Thickness Single Application	80mm
Compressive Strength - 28 Days	≥ 20 mPa
Flexural Strength - 28 Days	≥ 5 mPa
Shrinkage - 28 Days	< 0.2mm / m
Poured Density	1700 kg/m <sup>3</sup>
Elasticity Modulus	Approx. 18000 N/mm <sup>2</sup>
Thermal Conductivity	1.2 – 1.8 W/mK
Thermal Expansion Coefficient	0.011 mm/mK
Fire Rating	A1 EN 13813
Application Temperature	Ambient air: +5°C to +30°C Substrate: +5°C to +25°C
Working Time	Approx. 35 minutes
Flow Rate	15 - 17cm dia.



### 4.3 Technical Information for EZYMIX Concrete Screeds

#### EZYMIX EM4095 Technical Information

Yield	550 litres per 1000kg dry material
Coverage	1.6 kg/m <sup>2</sup> per mm layer thickness
Water Demand	Approx. 24% - 25%
Drying Time - Foot Traffic	After approx. 2 - 4 hours
Drying Time - Light & Heavy Traffic	After approx. 24 hours
Minimum Thickness Over Solid Substrate	5mm (over heating pipes)
Minimum Thickness Over Insulation	N/A (not for use over insulation)
Maximum Thickness Single Application	10mm
Compressive Strength - 28 Days	≥ 25 N/mm <sup>2</sup>
Flexural Strength - 28 Days	7 N/mm <sup>2</sup>
Shrinkage - 28 Days	0
Poured Density	1.0
Elasticity Modulus	N/A
Thermal Conductivity	1.2 – 1.8 W/mK
Thermal Expansion Coefficient	0.011 mm/mK
Fire Rating	A1 - EN13813
Application Temperature	Ambient air: +10°C to ≤ 30°C Substrate: +10°C to +25°C
Working Time	25 - 30 minutes at 20°C and 65% relative humidity
Flow Rate	24 - 26cm

## 5.0 Floor Finishes

### General Specifications

When calculating the output from the underfloor heating pipe network, the floor finish must also be taken into account. Floor finishes with greater thermal resistance reduce the output from the underfloor heating and depending on various factors, the water flow temperature and pipe spacing may need to be adjusted.

There are four basic floor finish types which should be considered: polished concrete/ceramic tiles, plastic or vinyl floor coverings; timber and timber products; and carpet.

Typical floor finishes and their corresponding resistance to heat transfer are detailed in the table below. Ceramic finishes have the least thermal resistance with carpets having the greatest. When selecting carpet and underlay combinations the combined thermal resistance should not exceed a value of approximately 0.15m<sup>2</sup> K/W (or a 1.5 tog rating\*).

### Polished Concrete/Tile Floor Finishes

Polished concrete and tiles have a low thermal resistance, typically 0.02m<sup>2</sup> K/W, and will function very well with **KE KELIT CLIMATE CONTROL** underfloor heating systems. This low thermal resistance is the reason for this type of floor finish feeling cold to the touch (without the benefit of underfloor heating).

### Typical Output

Floor Finish	Typical Thermal Resistance m <sup>2</sup> K/W	Typical Tog Rating *	Output Watts/m <sup>2</sup>
Polished Concrete/Ceramic Tile	0.020	0.20	112
Vinyl	0.075	0.75	87
Timber Flooring	0.15	1.50	62
Carpet	0.10	1.00	73

Note: Thermal outputs above are calculated in accordance with EN 1264. Should a floor heat output exceed the maximum surface temperature of 29°C for occupied zones, it is represented in blue.

\* A tog rating is a unit of measurement for the thermal resistance of a material. The higher a material's tog rating, the more heat it will retain and the better it will be as an insulating material. However, higher thermal resistance reduces the output of underfloor heating.

Temperature constraints do not apply to polished concrete and tile floor finishes and these can be run at the maximum design floor surface temperatures, 29°C in general areas and 33°C in the bathroom, perimeter and wet areas.

Differential thermal expansion between the polished concrete/tiles and the screed must be taken into account during the floor design. This differential expansion limits the areas that can be laid without the inclusion of a thermal expansion joint. Underfloor heating standard EN 1264 limits this area to 40m<sup>2</sup> with a maximum length of 8m, after which the area should be split using a flexible expansion material. Specific advice must be sought from the tile supplier.

### General Performance

#### Outputs

Outputs (watts/m<sup>2</sup>) are based on a flow water temperature of 50°C, a return water temperature of 40°C, pipe centres of 200mm and a room temperature of 20°C.

For accurate performance outputs a detailed thermal analysis is required in accordance with EN 1264 and thermal output in accordance with EN 12831. **KE KELIT CLIMATE CONTROL** always design their underfloor heating systems in accordance with these standards (detailed in section 6.0).

## 5.0 Floor Finishes

### Plastic or Single Floor Coverings

In general vinyl and plastic type floor finishes have a low thermal resistance,  $0.07\text{m}^2 \text{ K/W}$  and will function well with **KE KELIT CLIMATE CONTROL** underfloor heating. There are a small number of specialist plastic floor finishes that can be classified, as plastic but these will have higher thermal resistance. Some sports hall floor coverings are made from a 'foamed' plastic and the thermal resistance of such coverings should be checked before their use with **KE KELIT CLIMATE CONTROL** underfloor heating. A resistance of up to  $0.15\text{m}^2 \text{ K/W}$  to  $0.20\text{m}^2 \text{ K/W}$  will function satisfactorily with **KE KELIT CLIMATE CONTROL** underfloor heating but above this value the design of the system must be checked and outputs verified in accordance with EN 1264.

Vinyl and plastic floor coverings are flexible in nature and therefore differential expansion will not cause any problems to the stability of the floor structure. The floor covering manufacturer must be contacted for specific advice as most vinyl and plastic floors must not be subjected to temperatures in excess of  $27^\circ\text{C}$ .

A vinyl covering will seal the surface of the screed and therefore the curing and drying of the screed must be carried out before the floor covering is laid. If this is not done, damage to the screed or the floor covering could result either with moisture being trapped between the screed and the floor covering. The screed must be allowed to cure for a minimum of 28 days and then heated by the **KE KELIT CLIMATE CONTROL** underfloor heating until the moisture has been removed.

### Timber and Timber Products

Timber products present their own problems with regards to use with **KE KELIT CLIMATE CONTROL** underfloor heating which relate to the moisture content of the timber and screed. Thermal resistances of timber products usually fall within the acceptable range for use with **KE KELIT CLIMATE CONTROL** underfloor heating ( $0.15\text{m}^2 \text{ K/W}$ , 1.5 tog).

Timber is a natural material and in its raw state will have high moisture contents. If this were laid onto a **KE KELIT CLIMATE CONTROL** underfloor heating system without due consideration the timber would shrink when heated, causing excessive gaps between 'planks' as well as the possibility of warping. To avoid these problems the timber product moisture content must be no greater than 10% with kiln dried timber being most widely used. Where older 'well-seasoned' timber is to be used this should be stacked in the heated room for a minimum of two weeks with the heating running at its operating temperature, which will ensure that the moisture within the timber is removed.

As the floor is heated the residual moisture in the timber will be removed and the timber will shrink. This shrinkage is minimal as long as the timber used has a low moisture content and the maximum surface temperature is limited to approximately  $27^\circ\text{C}$ .

When laid onto a screed it is essential that the moisture within the screed be removed before the timber is laid otherwise the moisture will penetrate the timber resulting in warping. The same process is used to dry the screed allowing it to fully cure for a minimum of 28 days.

### Carpets

Although care in the selection of carpets and their associated underlay must be taken to avoid excessive thermal resistance they present few problems to **KE KELIT CLIMATE CONTROL** underfloor heating. The thermal resistance of the carpet and underlay combination should not exceed  $0.15\text{m}^2 \text{ K/W}$  (1.5 tog).

Carpet is flexible and therefore does not present any differential expansion problems, it is also permeable to moisture transfer and therefore will allow moisture to be expelled from the screed during the drying process.

## 6.0 KE KELIT CLIMATE CONTROL Design Approach

**KE KELIT CLIMATE CONTROL** designs are always completed in accordance with the following standards to provide assurance that the performance outputs of the system will be satisfied.

- Radiator heating design with VDI 6030
- Heat load in accordance with EN 12831
- Underfloor heating design with EN 1264
- Pipe network with EnEv 2009

It is recommended that when designing radiator heating systems the use of sophisticated thermal simulation software and adherence to these standards is incorporated to ensure correct performance.

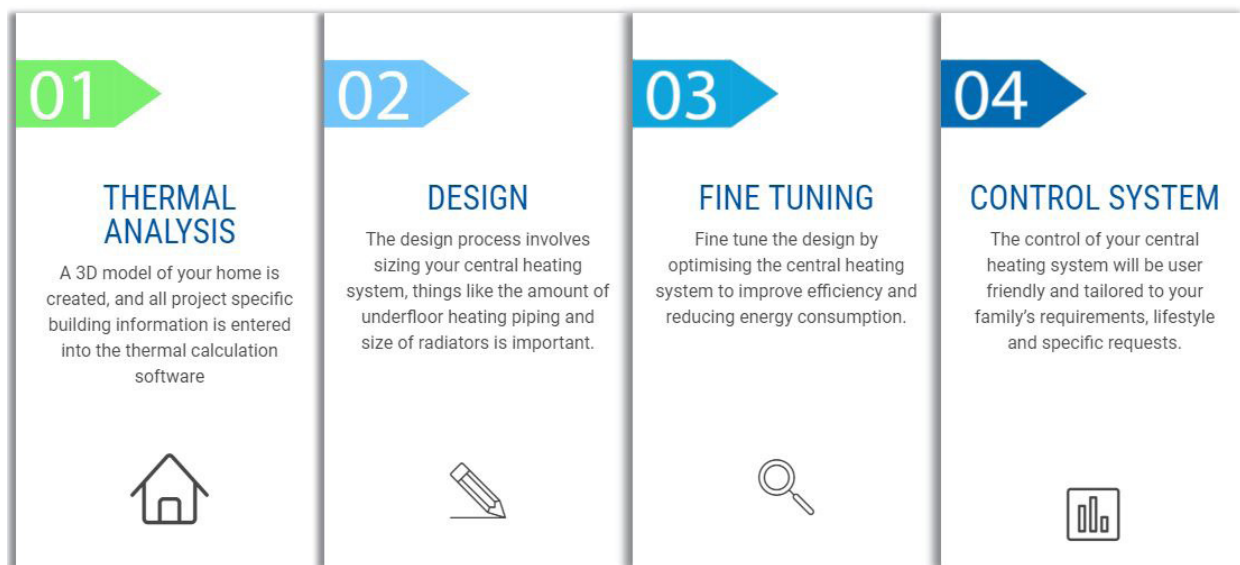
To help achieve this optimal performance, **KE KELIT CLIMATE CONTROL** recommend the use of advanced European technology heat sources supplied by **Viessmann**.

**Viessmann** high efficiency condensing gas and diesel boilers ensure efficient operating costs and overall customer satisfaction. Details of these boilers can be found on pages 37 - 40.

**KE KELIT CLIMATE CONTROL** provide full design services in accordance with these standards.

For further information visit: [www.kekelit.co.nz](http://www.kekelit.co.nz)

Or contact **KE KELIT CLIMATE CONTROL** via: [climatecontrol@kekelit.co.nz](mailto:climatecontrol@kekelit.co.nz)



Brief Overview of the **KE KELIT CLIMATE CONTROL** Central Heating System Design Process



## 7.0 Heat Sources: Gas Boilers

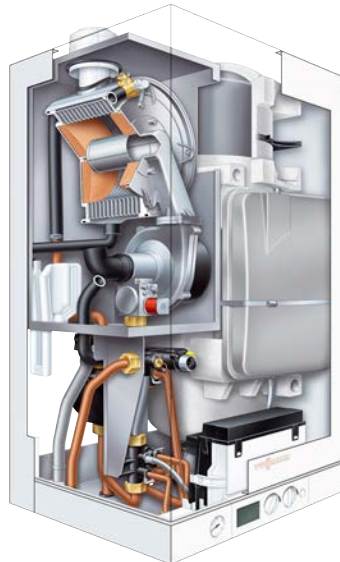
### How Condensing Technology Works

Condensing technology not only utilizes the heat from the combustion of gas, but also the unused heat that would escape up the chimney with a traditional heating system. Condensing boilers achieve excellent efficiency by extracting almost all of the heat contained in the flue gases and converting it into additional heating energy.

To do this, **Viessmann** condensing boilers are equipped with a corrosion-resistant, stainless steel Inox-Radial heat exchanger, which cools the flue gases before they are routed into the flue. By doing this, the water vapour contained within the gases is deliberately condensed, and the additional heat released is transferred into the heating system.

**Viessmann Gas and Diesel boilers are best paired with Vogel & Noot's range of panel radiators (excluding the ULOW-E2) due to their higher operating temperature compared to hot water heat pumps.**

# VIESSMANN



Intelligent  
Controls



Compatible  
with Solar

MatriX  
Burner  
- Patented  
Technology

Installable  
in all  
Domestic  
Applications

European  
Product  
Quality

## 7.0 Heat Sources: Gas Boilers

Code	Description	Rated Output (kW)	Image
<b>Viessmann Vitodens 100-W Condensing Boilers</b> <ul style="list-style-type: none"> <li>• Vitodens 100-W system and combi boilers fit any home and budget with high performance at an attractive price.</li> <li>• Outstanding efficiency of 95% A.F.U.E. (Annual Fuel Utilisation Efficiency) on all models.</li> <li>• Low-emission combustion with fully-modulating Viessmann stainless steel MatriX cylinder burner for natural gas or LPG.</li> <li>• Extremely quiet operation; quieter than most refrigerators.</li> <li>• Domestic hot water (DHW) with Vitodens 100-W Combi boiler. Ideal for apartment units or houses with small mechanical rooms and a single DHW draw point.</li> </ul>			
7639524	Viessmann Vitodens 100-W System Boiler	19 kW	
7639527	Viessmann Vitodens 100-W System Boiler	35 kW	
7639526	Viessmann Vitodens 100-W Combination Boiler	26 kW	
7639528	Viessmann Vitodens 100-W Combination Boiler	35 kW	
<b>Viessmann Vitodens 111-W Condensing Boilers</b> <ul style="list-style-type: none"> <li>• High DHW convenience through cylinder loading system and integrated stainless steel storage tank (46 litres)</li> <li>• Hot water capability of &gt;18 l/min</li> <li>• Standard efficiency up to 97% (Hs) / 108% (Hi)</li> <li>• No requirement to be un-vented cylinder assessed</li> <li>• Ideal for low water pressure areas</li> </ul>			
7570732	Viessmann Vitodens 111-W Storage Combination Boiler	26 kW	
7570733	Viessmann Vitodens 111-W Storage Combination Boiler	35 kW	

## 7.1 Heat Sources: Diesel Boilers

**Viessmann** diesel boilers with condensing boiler technology convert up to 98 percent of the energy used into heat. Through the condensation of the water vapour contained in the flue gas, additional heat is extracted from the flue gas and returned to the heating system. This increases efficiency, reduces heating costs and reduces the burden on the environment.

**Viessmann** diesel condensing boilers come with the future already built in. From the factory they are already prepared for a conversion from fossil oil exclusively to fuel oil with a proportion of bio-oil and can thus also be operated with renewable energy sources.

Ultimately, the new heating system can be combined with solar energy. All diesel boilers are designed for the connection of a solar system for domestic hot water heating or central heating backup.

Due to their compact dimensions, **Viessmann** diesel boiler are extremely space-saving and can be operated with open or room sealed flues. So they can fit in the garage, laundry or any room you see fit and are ideal for the renewal of heating systems. In a new building, valuable space can be used for other purposes.

**Viessmann Gas and Diesel boilers are best paired with Vogel & Noot's range of panel radiators (excluding the ULOW-E2) due to their higher operating temperature compared to hot water heat pumps.**

# VIESSMANN



Unbeaten High  
Efficiency of  
98%



Compatible  
with Solar

Environment  
Friendly  
- Bio Oil  
Compatible

Flexibility  
- New Build  
- Modernisation

European  
Product  
Quality

## 7.1 Heat Sources: Diesel Boilers

Code	Description	Rated Output (kW)	Image
<b>Viessmann Vitorondens 200-T Room Sealed Condensing Boilers</b> <ul style="list-style-type: none"><li>Proven components for high operational reliability and a long service life</li><li>Stainless steel Inox-Radial heat exchanger, ensures residue-free condensation of the flue gasses</li><li>Clean combustion thanks to the Vitoflame 300 blue flame oil burner</li><li>Quiet operation thanks to external silencer</li><li>Flexible gaskets permanently seal the individual sections on the hot gas side</li><li>Horizontal hot gas flue layout enables straightforward and affordable maintenance.</li></ul>			
BR2A091	Viessmann Vitorondens 200-T Coaxial Room Sealed	20kW	
BR2A092	Viessmann Vitorondens 200-T Coaxial Room Sealed	24kW	
BR2A093	Viessmann Vitorondens 200-T Coaxial Room Sealed	28kW	
BR2A094	Viessmann Vitorondens 200-T Coaxial Room Sealed	35kW	
BR2A095	Viessmann Vitorondens 200-T Coaxial Room Sealed	42kW	
BR2A096	Viessmann Vitorondens 200-T Coaxial Room Sealed	53kW	
<b>Viessmann Vitorondens 300 - C Room Sealed Condensing Boilers</b> <ul style="list-style-type: none"><li>Highly efficient and compact floor standing oil unit condensing boiler</li><li>Biferral composite heating surface with stainless steel Inox-Radial heat exchanger</li><li>Clean combustion thanks to the compact blue flame burner</li><li>Quiet operation thanks to external silencer</li><li>Space saving installation of the neutralising system in the boiler plinth or on the wall</li><li>Safety assembly included in standard delivery of boiler</li></ul>			
Available on indent - please email <a href="mailto:climatecontrol@kekelit.co.nz">climatecontrol@kekelit.co.nz</a> for information			



## 7.2 Heat Sources: Heat Pumps

As systems for heating only, or as systems that provide heating and cooling, **Viessmann** heat pumps are ideal for new build and modernisation. They are characterised by separation into a quiet indoor unit and an air handling outdoor unit. This design does not require costly wall outlets or the routing of air ducts.

As with other heating systems, the actual heat generator is installed inside the building. **Viessmann** heat pumps are designed with compact dimensions so that the indoor units can be sited in a basement or even close to the living space in a utility room, or even wall mounted.

**Viessmann** heat pumps are extremely efficient and economical. Split heat pumps operate with astonishing efficiency in partial load operation. The inverter technology accurately matches the compressor output to the current heat demand through modulation, resulting in high efficiency at every operating point.

**Viessmann** heat pump outdoor units are very easy on the eye due to their timeless design. In addition to extremely quiet operation, they offer very good performance data, an excellent finish and superb product quality.

**Viessmann Heat Pumps are best paired with Vogel & Noot ULOW-E2 low temperature radiators, due to their lower operating temperature compared to gas and diesel boilers.**

**AVAILABLE ON INDENT ONLY - please contact KE KELIT Climate Control for more information via: [climatecontrol@kekelit.co.nz](mailto:climatecontrol@kekelit.co.nz)**

# VIESSMANN



Heating Only  
or  
Heating/Cooling

Extremely  
Quiet  
Operation

Solar &  
Renewable  
Energy  
Compatible

Flexibility  
- New Build  
- Modernisation



European  
Product  
Quality

### 7.3 Heat Sources: Hot Water Cylinders

The demand for hot water is completely different in every household. One factor is the number of residents and another is their bathing and showering habits. For example, several people in one household frequently go to work and school at the same time, so lots of hot water needs to be continuously available for the shower in a short space of time.

Those who prefer a bath will also want to have enough hot water to fill the tub. Finally, the DHW cylinder should also provide sufficient water if, in an apartment block for example, hot water is drawn from more than one outlet at the same time.

KE KELIT Climate Control offer a wide cylinder range, so you'll find exactly the right DHW cylinder for your requirements.

Code	Description	Rated Capacity (L)	Image
<b>Viessmann Hard Shell Hot Water Cylinder</b> <ul style="list-style-type: none"> <li>• Heating of the entire domestic hot water content with the heat exchanger coil extending to the bottom of tank.</li> <li>• Reliable hot water comfort with fast, even heating via generously sized heat exchanger surfaces.</li> <li>• All-round rigid PUR foam insulation enclosed within an epoxy-coated sheet steel casing with a white finish</li> <li>• Adjacent mounted horizontal to the boiler</li> <li>• Standard magnesium anode provides active corrosion protection to ensure operational reliability and long service life.</li> </ul>			
7534000	Viessmann HS Hot Water Cylinder - 200L	200L	
7534001	Viessmann HS Hot Water Cylinder - 300L	300L	
<b>Flamco Stainless Steel Heat Pump Water Heater</b> <ul style="list-style-type: none"> <li>• A water heater specially developed for combination with heat pumps.</li> <li>• The large surface area of the heating coils guarantee very efficient potable hot water production.</li> <li>• Efficient: Minimum heat loss and very fast heating up.</li> <li>• Requires little maintenance and no anode.</li> <li>• Excellent stratification of the water in the vessel.</li> </ul>			
19930	Flamco WPS-E Storage Vessel - Stainless Steel - 200L	200L	
19931	Flamco WPS-E Storage Vessel - Stainless Steel - 300L	300L	

## 8.0 Control Systems: Traditional Heating Methods

**KE KELIT CLIMATE CONTROL** believe that all heating systems should be designed with weather compensating controls rather than traditional time and temperature controls. Weather compensation heats your home automatically in conjunction with the changing outside temperature. This not only keeps your home at a comfortable temperature throughout the year but also saves you money, and prolongs the life expectancy of your boiler.

### Traditional Heating Methods

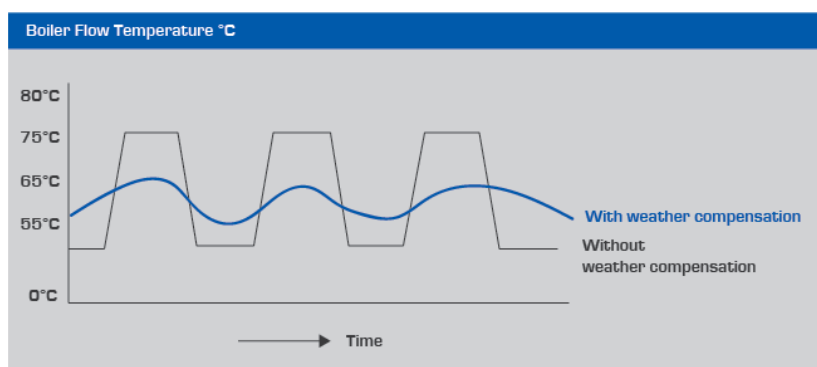
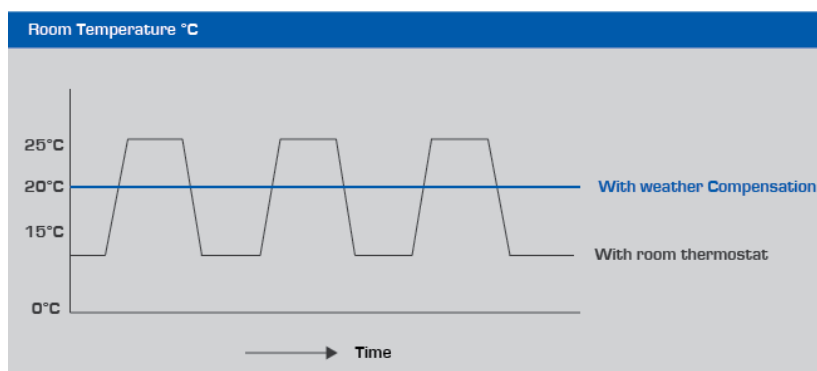
Traditionally control systems were used that had a room temperature set-point controller and a time clock programmed for occupied and unoccupied (set back) times. These are often referred to as time and temperature control.

The problem with these time and temperature controllers is that before the temperature set point was reached, the room is below the desired temperature and feels cold. This type of control system keeps calling for heat until the temperature set point is reached and although the controller stops calling for heat once the set point is reached, the energy within the radiator keeps coming out creating environments that are often warmer than required so a perpetual cycle of too hot and cold is created.

These control systems tell the heat source only two things “turn on - heating required” or “switch off - no heating required”. The boiler will start operating until the temperature set point is reached and then switches off once the temperature set point is reached. This means the boiler is always subjected to extremes of temperature, very hot during heating and cold when in standby or off.

This on again and off again control system can cause excessive wear and tear on your heat source and often results in increased service, maintenance and repair costs. This time and temperature control can be very inefficient and more often than not, the heat source works outside of its most efficient operating condition causing excessive energy consumption.

This method of heating is inefficient and outdated. This is why **KE KELIT CLIMATE CONTROL** systems are always designed with smart weather compensation controls.



## 8.1 Control Systems: Weather Compensation

### How Does Weather Compensation Work?

A small temperature sensor is located on the outside of the building, on a south facing wall (coldest side of the house). This is wired to the internal controls of the heat source and information about the outside temperature is sent to the heat source controller constantly.

When the temperature changes outside the heat source responds and starts to increase or decrease the heating water temperature to compensate. This pro-active mechanism means that people inside the building won't even notice that the temperature has changed outside.

For example, when the outside temperature drops at night, more heat is lost through the walls of the building. Because the outdoor sensor detects the fall as soon as it happens, the heat source is able to raise the heating water temperature and keep the inside temperature stable. With a conventional system, the temperature is dependent on a room thermostat, which will only take effect after the inside of the building has become too hot or too cold.

In summary, weather compensation controls enable the heat source to respond to outside temperature changes and adjust the radiator and/or central heating output to use only the energy required. This ensures a constant temperature is maintained indoors.

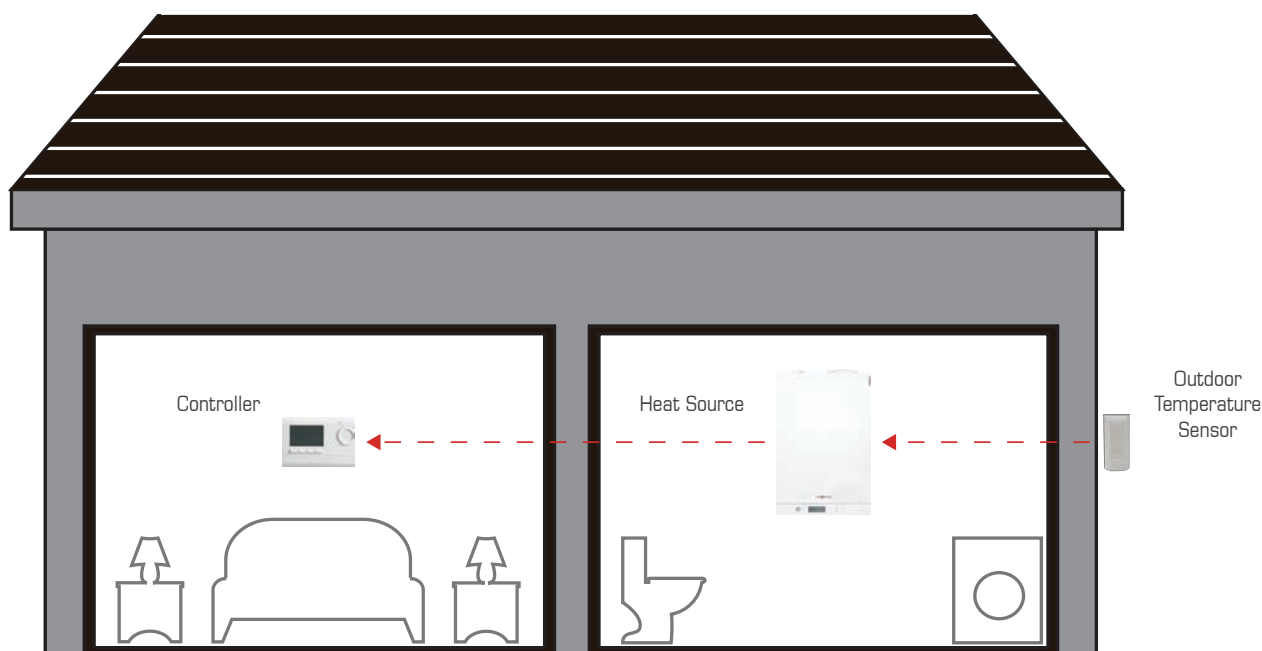
### What Does Weather Compensation Mean to the Homeowner?

**Lower fuel bills** - save up to 15% of your annual fuel bill - that's on top of the savings you'll make by changing a conventional boiler for a high efficiency condensing boiler.

**A comfortable home** - a constant temperature is maintained inside, despite the changing weather.

**You won't even notice the changes** - with central heating you won't notice the weather compensation control working, you will simply feel a very consistent and comfortable room temperature. If radiators are incorporated into your central heating system, you may notice changes to your radiator temperature automatically changing as the outside temperature increases and decreases to maintain the desired room temperature.

With weather compensation the boiler should fire so infrequently that for the first few months you'll probably keep checking it's still on!










## 8.2 Viessmann Weather Compensating Controls

When **KE KELIT CLIMATE CONTROL** design a central heating system the standard control configuration is to utilise the built-in controls that come standard with **Viessmann** heat sources (hot water heat pumps, condensing gas and oil/diesel boilers). However, additional **Viessmann** controls and thermostats are available. Benefits of **Viessmann** controls and thermostats include:





- Multiple programmes and functions
- Weather compensation
- Option of wireless control via smart phone with additional accessory

Code	Description	Voltage
<b>Viessmann Vitodens 100-W Outdoor Temperature Sensor</b>  <ul style="list-style-type: none"> <li>• Compatible with all Viessmann Vitodens 100-W gas condensing boilers</li> <li>• To be used in conjunction with Viessmann Vitotrol 100 Open Therm Indoor Thermostats</li> <li>• Automatically changes indoor temperature to compensate with the changing outdoor temperature</li> <li>• Placed on the outside of the building on a south-facing wall</li> </ul>		
7554227	Viessmann Vitodens 100-W Outdoor Temperature Sensor	-
<b>Viessmann Vitodens 111-W Outdoor Temperature Sensor</b>  <ul style="list-style-type: none"> <li>• Compatible with all Viessmann Vitodens 111-W gas condensing boilers</li> <li>• To be used in conjunction with Viessmann Vitotrol 100 Open Therm Indoor Thermostats</li> <li>• Automatically changes indoor temperature to compensate with the changing outdoor temperature</li> <li>• Placed on the outside of the building on a south-facing wall</li> </ul>		
7837053	Viessmann Vitodens 111-W Outdoor Temperature Sensor	-
<b>Viessmann Vitotrol 100 Open Therm Indoor Thermostat</b>  <ul style="list-style-type: none"> <li>• To be used in conjunction with Viessmann Open Therm Mixing Circuit Control Module</li> <li>• Compatible with Viessmann Vitodens 100-W and Vitodens 111-W</li> <li>• Easy to read function display and control buttons</li> <li>• Weather compensated mode</li> <li>• 3 pre-set time programs or reduced temperature, frost protection mode and holiday programmes</li> </ul>		
Z014134	Viessmann Vitotrol 100 OT Indoor Thermostat for Vitodens 100 W and 111 W	230V
<b>Viessmann Vitotrol UTDB Indoor Thermostat</b>  <ul style="list-style-type: none"> <li>• Room temperature controller with switching output (two-point output)</li> <li>• With menu-guided operation and digital timer</li> <li>• Menu-driven operation with digital timer (daily and weekly program)</li> <li>• Mains-independent operation (two 1.5V Alkaline AA batteries, operating time approx. 1.5 years).</li> </ul>		
7537230	Viessmann Vitotrol UTDB Indoor Thermostat	3V
<b>Viessmann Vitotrol UTDB-RF Wireless Indoor Thermostat</b>  <ul style="list-style-type: none"> <li>• With integrated radio transmitter and separate receiver with switching output (two-point output)</li> <li>• Including menu-driven operation and digital timer</li> <li>• The room temperature controller is battery operated (3V), the receiver runs on mains voltage (230V)</li> <li>• Digital timer with day and week program.</li> <li>• Receiver with display of relay status.</li> </ul>		
7537231	Viessmann Vitotrol UTDB-RF Indoor Thermostat	3V





### 8.3 KE KELIT KELOX Controls: Room Thermostats

**KE KELIT CLIMATE CONTROL** have additional controls for heating systems that do not include Viessmann boilers with built-in controllers. **KE KELIT CLIMATE CONTROL** controls can be connected to any heating system. All **KE KELIT CLIMATE CONTROL** central heating systems are supplied with a comprehensive range of controls. Benefits of KELOX thermostats include:

- Smart Start technology
- Night set back temperatures
- Individual room control

Code	Description	Voltage
<b>KM691 KELOX Connection Unit</b>		
<ul style="list-style-type: none"> <li>• 6 zones</li> <li>• Up to 15 thermal motors connectible</li> <li>• For heating and cooling systems</li> <li>• Easy intuitive installation and operation</li> <li>• Lowering channel for time-controlled lowering of the room temperature</li> <li>• Maintenance free</li> </ul>		
5881160	KM691 KELOX Connection Unit - 230V	230V
<b>KM690 KELOX Room Thermostat - Analogue</b>		
<ul style="list-style-type: none"> <li>• Flat, high-quality design</li> <li>• Easy installation</li> <li>• Multiple functions</li> <li>• Easy operation through rotary knob</li> </ul>		
5881100	KM690 KELOX Room Thermostat - Analogue	230V
<b>KM690D KELOX Room Thermostat - Digital-Standard</b>		
<ul style="list-style-type: none"> <li>• Standalone controller or realisable in the system</li> <li>• Correction of the actual temperature recording</li> <li>• Limitation of the adjustment range of the target temperature</li> <li>• Valve and frost protection function</li> <li>• High functional stability</li> </ul>		
5881120	KM690D KELOX Room Thermostat Digital - Standard	230V
<b>KM690U KELOX Room Thermostat - Digital-Control</b>		
<p>Same as the Digital-Standard, with additional features:</p> <ul style="list-style-type: none"> <li>• Large, clearly laid out LC display with back-lighting – enables the display to be read even in the dark</li> <li>• For heating and cooling systems</li> <li>• Smart start/smart stop function</li> <li>• Comfort programmes of heating and cooling mode</li> <li>• Change over input</li> <li>• Suitable for NC and NO mode</li> </ul>		
5881140	KM690U KELOX Room Thermostat Digital - Control	230V

## 8.4 KE KELIT KELOX Controls: Wireless &amp; BUS Room Thermostats

Code	Description	Voltage
<b>KM693 KELOX BUS Connection Unit</b> <ul style="list-style-type: none"> <li>To be used in conjunction with KM692K KELOX BUS Room Thermostats</li> <li>Connection of up to 12 KM596 24V thermostat heads (1 to 2 per heating zone)</li> <li>Smart Start function for even more energy-efficient operation</li> <li>Perfect interaction of up to 7 connection units via syBUS technology</li> <li>Smart Home ready and therefore easily integratable into overriding building automation systems via XML</li> <li>Web-based application software for convenient control via PC, smart-phone and via the Internet</li> </ul> 		
5881560	KM693 KELOX BUS Connection Unit	24V
<b>KM695 KELOX Wireless Receiver - 24V</b> <ul style="list-style-type: none"> <li>To be used in conjunction with KM694K KELOX Wireless Room Thermostats</li> <li>Connection of up to 12 KM596 24V thermostat heads (1 to 2 per heating zone)</li> <li>Smart Start function for even more energy-efficient operation</li> <li>Perfect interaction of up to 7 connection units via wireless technology</li> <li>Smart Home ready and therefore easily integratable into overriding building automation systems via XML</li> <li>Web-based application software for convenient control via PC, smart-phone and via the Internet</li> </ul> 		
5881360	KM695 KELOX Wireless Receiver	24V
<b>KM692K KELOX BUS Room Thermostat - Digital</b> <ul style="list-style-type: none"> <li>To be used in conjunction with KM693 KELOX BUS Connection Unit</li> <li>Fast, delay-free data communication via bus connection</li> <li>Limitation of the adjustment range of the room temperature</li> <li>Adjustment range 5 - 30 °C</li> <li>Permanent display of room temperature, system time and operating state</li> </ul> 		
5881520	KM692K KELOX BUS Room Thermostat Digital	24V
<b>KM694K KELOX Wireless Room Thermostat - Digital</b> <ul style="list-style-type: none"> <li>To be used in conjunction with KM695 KELOX Wireless Receiver</li> <li>Power Supply of 2x AAA batteries</li> <li>Fast, delay-free data communication via bus connection</li> <li>Limitation of the adjustment range of the room temperature</li> <li>Adjustment range 5 - 30 °C</li> <li>Permanent display of room temperature, system time and operating state</li> </ul> 		
5881330	KM694K KELOX Wireless Room Thermostat Digital	24V

## 8.5 Advantages of KELOX Wireless & BUS Room Thermostats

### Advantages of KELOX Wireless & Bus Room Thermostats

#### Smart Home Ready

The connection units enable the controlling of the KELOX individual room control unit system locally through a home network and worldwide via the internet.

Via the XML interface, the option is available to straight forwardly integrate the KELOX individual room control unit into overriding building automation systems. The existing home network can be used for this router, WLAN, Switch etc.). Integration scenarios into the building control technology and with EIB/KNX applications are also realisable.

#### KELOX Individual Room Control Unit with Ethernet

Monitoring and control via PC or smart-phone via the home network or the internet for worldwide access.

#### MicroSD Card Slot

The connection units/receivers have a MicroSD card slot for firmware upgrade or for convenient, clearly laid out online parametrisation on the PC.

#### Ethernet Interface

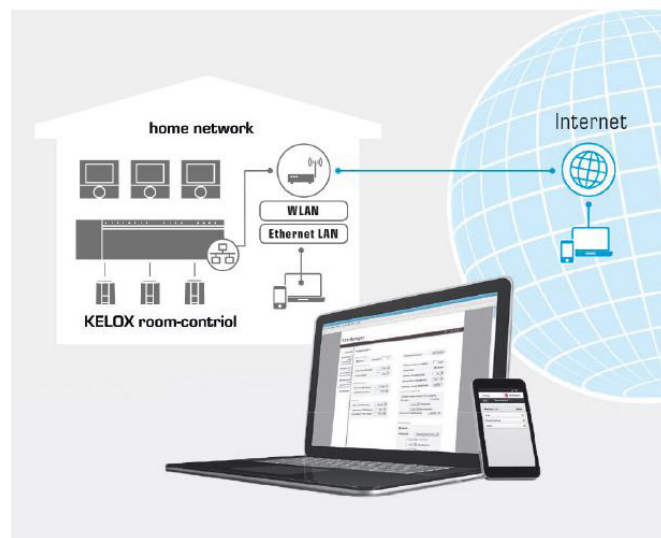
- Easy integration into the home network & worldwide access
- Web-based application software for comfortable control and visualisation of the states via PC or smart-phone
- XML data exchange with any external systems

#### Easy Installation and Start-up

Clear connection with the system due to the tried and tested cable feed and strain relief, as well as the screw-free plug-in/clip connection technology, guarantees fast, secure installation.

#### Everything Under Control

The state of the current operation and proper functionality are always in view with LEDs: operating state, NO/NC, lock, pairing, cooling, system error, alarm, heating zone, dew-point.









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