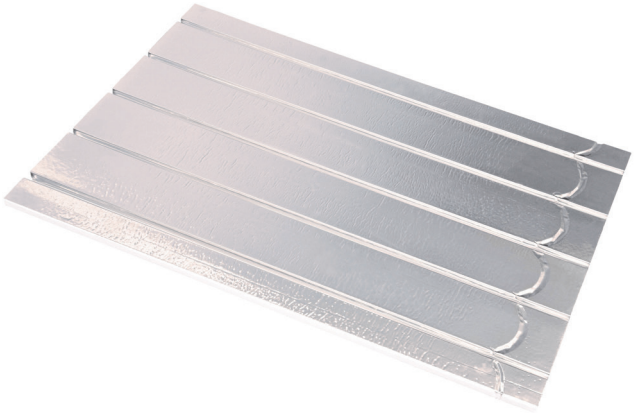


Rev. 11/2024

KILMA FUTURA SYSTEM

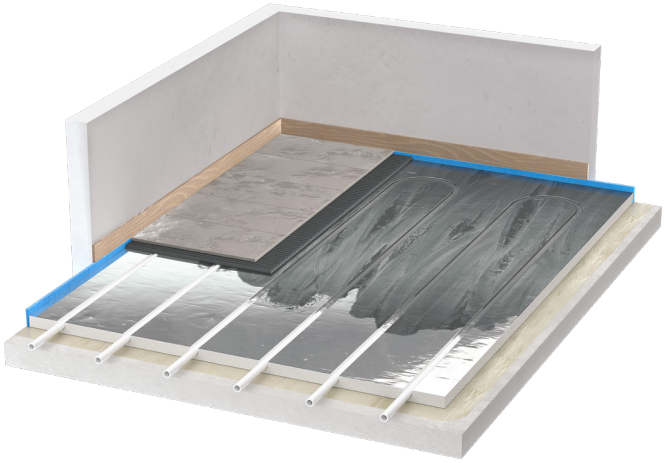
Radiant system without screed
for underfloor heating.

Rev. 11/2024

KILMA FUTURA SYSTEM

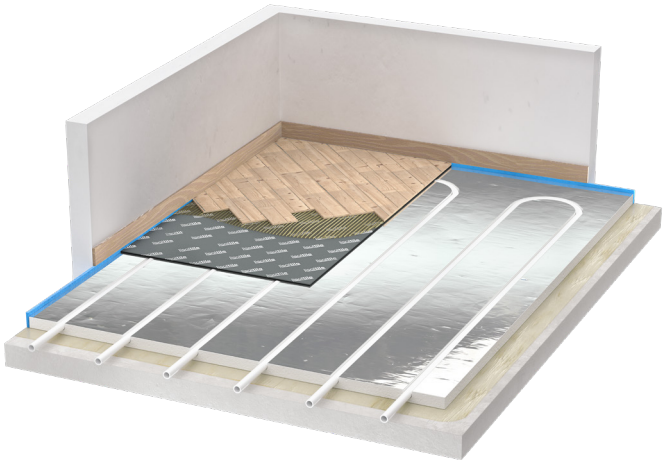
Radiant system without screed
for underfloor heating.

- Floor laid directly on the panel
- Simplicity of installation
- Quick system installation
- Immediate walkability
- Reduced thickness
- Panel equipped with thermal insulation
- Low thermal inertia: standard temperature reached rapidly
- Ideal for renovation projects
- Piping Ø16 mm



Kilma Futura system with **ceramic covering glued** directly onto the panel

Kilma Futura system with **floating parquet covering**



Kilma Futura System with **glued parquet covering**

PRODUCTION RANGE

	Description	Code	Panel dimensions [mm]	Th. Insulation [mm]	Heat Res. m^2 K/W	No. Panels per pack	Usable surface covered by 1 package
	Panel KILMA FUTURA installation pitch **150 mm**	**2926.17.02**	1175x750x17	17	0.265	10	8.80 m^2
		2926.25.02	1175x750x25	25	0.587	5	4.40 m^2
	Panel KILMA FUTURA Installation pitch **100 mm**	**2926.25.12**	1175x800x25	25	0.533	5	4.70 m^2
		2926.33.12	1175x800x33	33	0.780	5	4.70 m^2
		2926.48.12	1175x800x48	48	1.250	5	4.70 m^2

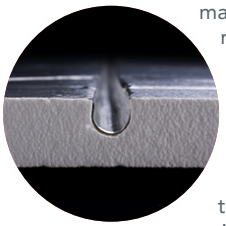
DESCRIPTION

Kilma Futura is a revolutionary radiant system, without screed and characterised by the reduced overall size that allows you to realise **systems finished in less than 3 cm of thickness**, floor included.

Fast installation and immediate walkability are the special features of the **Kilma Futura** system:

If installing the **Kilma Futura system, the same team can start, install and finish the floor** without waiting for the screed to dry (no downtime) and **the flooring can be used straight away.**

The panel is supplied already coupled with the upper layer of aluminium, with further reduction in installation time.



Compared to many dry systems available on the market, the **Kilma Futura** system also has a thermal insulation under the pipe, in order to limit heat dispersion.

Thanks to its features and its high mechanical strength, **the panel enables setting the floor directly on it***, without the need to provide load* allocator elements (loads for residential buildings).

The use of the **Kilma Futura** panel with 16 mm diameter RBM KILMA-HI PERFORMANCE PLUS pipes, code: 2517.16.X2 is prescribed. For complete order codes please refer to the dedicated data sheet.

USE

The **Kilma Futura** system is particularly suitable for renovation work and on mezzanines, and in all cases in which there is a reduced height of the room, but it is increasingly used in new buildings also, thanks to the low thermal inertia and therefore low system commissioning times, that combines well with the high inertia of the building. The **Kilma Futura** system can also be mounted on the wall. In this case, the radiant panel must be placed against the wall and then covered with a plasterboard or gypsum fibre coating.

LAYING THE PIPING

The panel has grooves in the EPS layer, designed for housing the KILMA-HI PERFORMANCE PLUS 16mm diameter pipe.

ADVANTAGES OF THE SYSTEM

The main advantages of the **Kilma Futura** system are:

- No screed;
- Quick, easy installation and immediate walkability (it is not necessary to wait for cement screed to dry);
- Minimum space required (**overall thickness min. 28 mm including flooring**);
- Low thermal inertia of the system;
- Reduced weight;
- Versatility (allows laying ceramic or parquet finishing coatings directly on the panel*).

WARNINGS

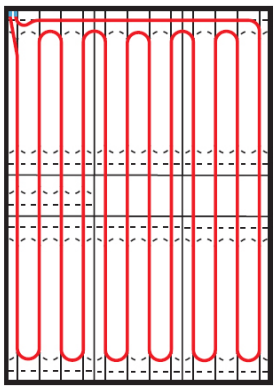
Before installing the **Kilma Futura** system, set up a perfectly **flat and even** substrate.

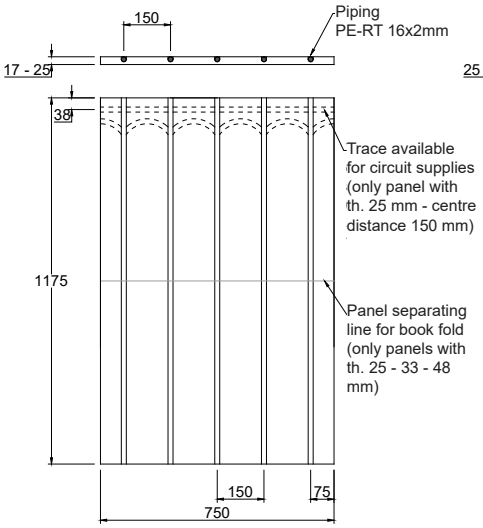
* Refer to the installation instructions and Warnings reported in the **"GUIDE TO INSTALLING THE KILMA FUTURA SYSTEM"** section of this sheet.

DIMENSIONAL FEATURES

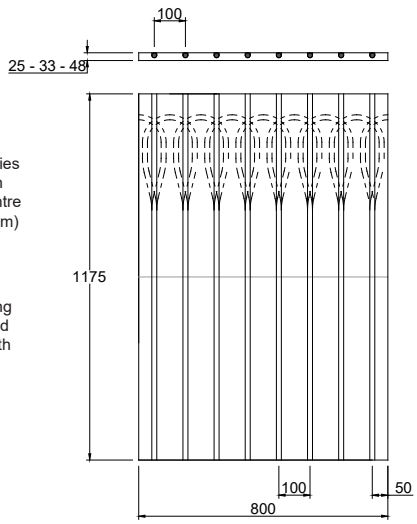
Milling centre distance, EPS panel, to allow the pipe to be housed	Pitch 150 mm (code 2926.XX.02) Pitch 100 mm (code 2926.XX.12)
Kilma Futura panel size	1175x750 mm - 0.88 m^2 usable surf. (code 2926.XX.02) 1175x800 mm - 0.94 m^2 usable surf. (code 2926.XX.12)
EPS insulating thickness	17/25/33/48 mm
Pipe diameter applicable to the panel	external Ø 16 mm

Example of coil pipe development and main dimensions





Panel with 150 mm installation centre distance



Panel with 100 mm installation centre distance

CONSTRUCTION FEATURES

Pre-shaped EPS 300 panel for the realisation of floor radiant heating system, coupled on the surface with a smooth heat-sealing aluminium sheet, having fittings for the laying of piping with 16 mm outer diameter.

TECHNICAL FEATURES OF THE INSULATING PANEL (EPS 300)

EPS Classification (according to UNI-EN 13163)	EPS 300	
Declared thermal conductivity	λ_D= 0.033	W / m K
Declared thermal resistance	R≈ 0.265 (th 17) R≈ 0.587 (th 25 - int. 150) / 0.533 (th. 25 - int.100) R≈ 0.780 (th. 33) R≈ 1.250 (th 48)	m^2 K / W m^2 K / W m^2 K / W m^2 K / W
Compressive strength at 10% crushing	σ_{10}≤ 300 CS(10)	kPa
Reaction to fire	Euroclass “F”	

ADVANTAGES OF THE KILMA-FUTURA SYSTEM

• The **Kilma Futura** system is much quicker in **reaching the operating temperature** compared to a traditional radiant panel with a screed. The image below compares the **commissioning time of a system with a Kilma Futura system with flooring directly applied to the panel and a radiant system with a traditional screed** (45 mm and 110 mm thick).

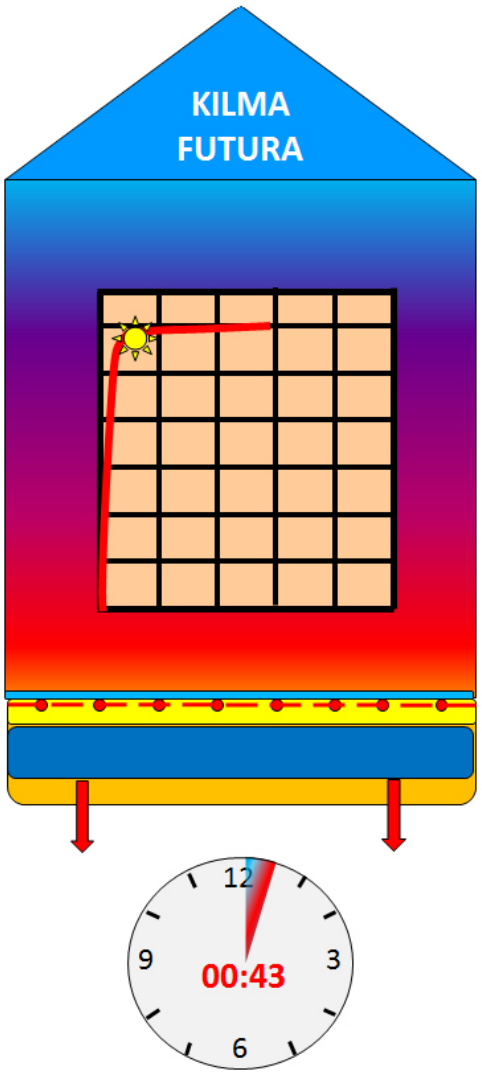
• This feature also makes it ideal for **intermittent programming or with attenuation of the system operation;**

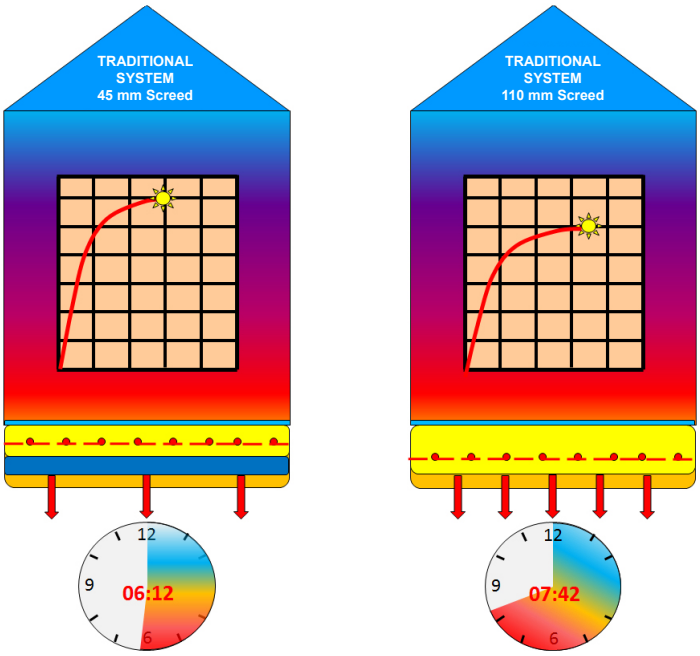
• More **uniform and quicker heat distribution compared to traditional systems**: this feature allows for a larger pitch and, as a result, a **decrease in the linear development of pipes**, which means using less pipes and quicker installation time;

• Benefits on living comfort and savings on running costs;

• The design of the system allows you to **limit installation thickness of the floor system as much as possible**;

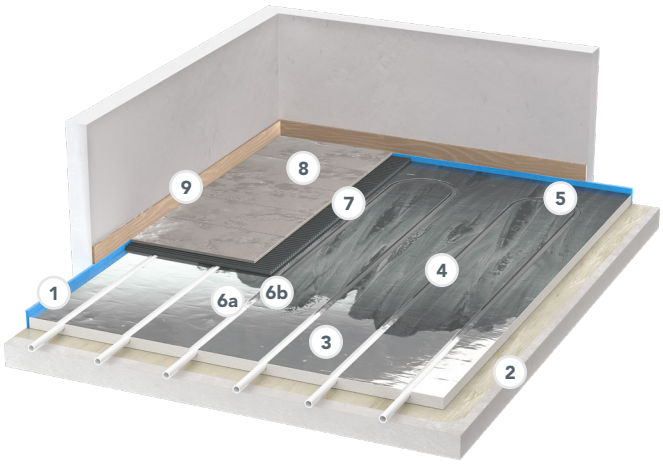
• The heat-sealing aluminium sheet already implemented at the top of the panel in EPS 300 collects the heat from the bottom side of the pipe and **takes it to the floor to be heated**, limiting the downward dispersions and optimising heat diffusion.





KILMA-FUTURA SYSTEM COMPONENTS

System with glued ceramic covering



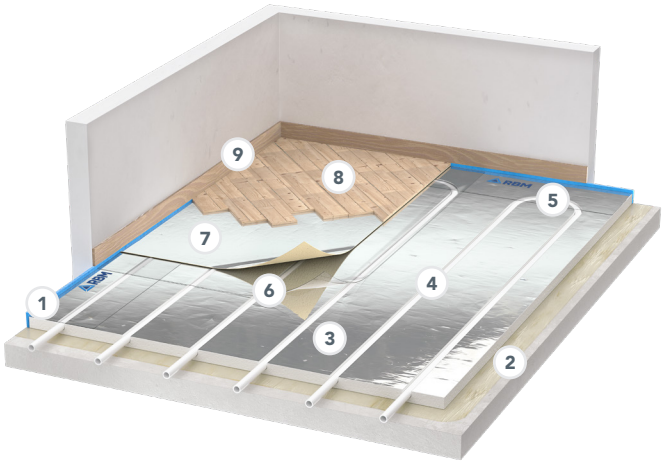
1. **Perimeter expansion joint**
2. **Glue for fixing the panel to the substrate (KILMA FUTURA AD)**
3. **KILMA FUTURA Panel**
4. **KILMA-FLEX PE-RT pipe Ø16x2 mm**
5. **If necessary, aluminised tape to secure the pipe on the bends** (about 1m/m²)

6a **Protection epoxy primer** (e.g. PRIMER MF RBM by Mapei)

6b **Acrylic primer for upper glue adhesion** (e.g. ACTIVE PRIME FIX by Kerakoll or ECO PRIM T PLUS by Mapei - not supplied)

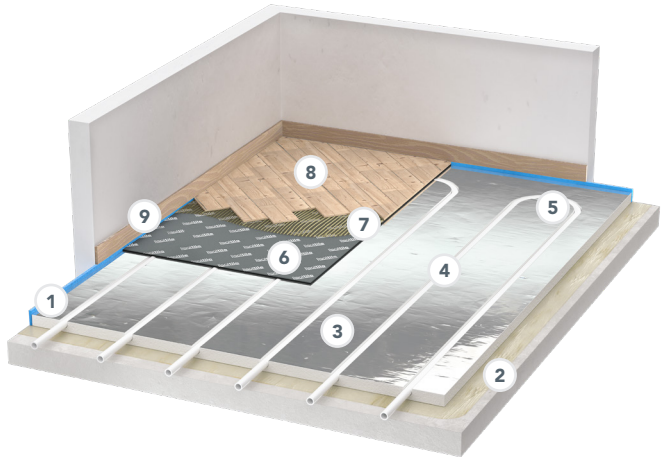
7. **Tile adhesive** (e.g. H40 NO LIMITS + TOP LATEX By Kerakoll or ELASTORAPID or KERABOND by Mapei - not supplied)
8. **Tiles** (minimum size 25x25 cm or alternatively 15x30 cm strips - for laying tiles directly on the KILMA FUTURA system please refer to chapter 7 of the following Manual)
9. **Skirting board**

System with floating parquet covering



1. **Perimeter expansion joint**
2. **Glue for fixing the panel to the substrate (KILMA FUTURA AD)**
3. **KILMA FUTURA Panel**
4. **KILMA-FLEX PE-RT pipe Ø16x2 mm**
5. **If necessary, aluminised tape to secure the pipe on the bends** (about 1m/m²)
6. **PE protective sheet**
7. **Specific support mat e.g. ISOLMANT TOP by Isolmant** (mat NOT supplied) (*)
8. **Floating parquet placed resting on the underlying surface**
9. **Skirting board**

System with glued parquet covering



1. **Perimeter expansion joint**
2. **Glue for fixing the panel to the substrate**
3. **KILMA FUTURA Panel**
4. **KILMA-FLEX PE-RT pipe Ø16x2 mm**
5. **If necessary, aluminised tape to secure the pipe on the bends** (about 1m/m²)
6. **Substrate mat PHONOFIX by RBM** (supplied by RBM) **or TOP INCOLLAPAVIMENTO by Isolmant** (mat NOT supplied) (*)
7. **Glue for parquet** (not supplied)
8. **Prefinished tapped parquet** (**)
9. **Skirting board**

(*) For the compatibility of the finishes with the mat models, please refer to their technical data sheets, which can be found on the manufacturer's website.
(**) For the types of parquet compatible with the system, see the appropriate section of this manual.

THERMAL CAPACITY OF THE KILMA FUTURA RADIANT SYSTEM

(values according to UNI EN 1264)

CERAMIC 12.5 MM

Specific surface density emission and surface temperature (**)

Delivery T [°C]	T Delta	Pipe centre distance			
		10 [cm]		15 [cm]	
		q [W/m²]	θf,m [°C]	q [W/m²]	θf,m [°C]
33	5	66	26.3	51	24.8
	6	62	25.9	48	24.6
	7	58	25.6	44	24.3
	8	54	25.3	41	24.1
34	5	73	26.9	56	25.3
	6	69	26.6	53	25.0
	7	65	26.3	50	24.8
	8	61	25.9	47	24.6
35	5	80	27.5	62	25.8
	6	76	27.2	59	25.5
	7	72	26.9	55	25.3
	8	68	26.6	52	25.0
36	5	87	28.1	67	26.3
	6	83	27.8	64	26.0
	7	79	27.5	61	25.8
	8	75	27.2	58	25.5
37	5	93	28.7	72	26.8
	6	90	28.4	69	26.5
	7	86	28.1	66	26.3
	8	82	27.8	63	26.0
38	5	100	29,3	78	27.3
	6	96	29.0	75	27.0
	7	92	28.7	72	26.8
	8	88	28.4	69	26.5
39*	5	107	30.0	83	27.7
	6	103	29.6	80	27.5
	7	99	29,3	77	27.3
	8	95	29.0	74	27.0
40	5	113	30.6	88	28.2
	6	110	30.3	85	28.0
	7	106	30.0	82	27.7
	8	102	29.6	79	27.5
41	5	120	31.2	94	28.7
	6	116	30.9	91	28.5
	7	113	30.6	88	28.2
	8	109	30.3	85	28.0
42	5	127	31.8	99	29.2
	6	123	31.5	96	29.0
	7	119	31.2	93	28.7
	8	116	30.9	90	28.5

* Recommended maximum delivery T. limit.

** Values obtained by meeting with the above operating conditions of the system.

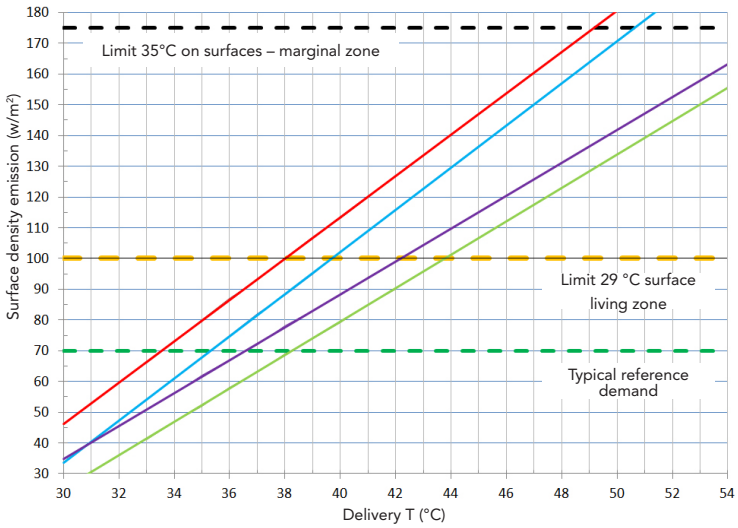
θf,m = Floor surface temperature.

q = Specific floor surface density emission.

Operating conditions of the system:

Floor thermal resistance (ceramic 12.5 mm)	$R\lambda_{,B}$	0.01 [m²K/W]
Pipe thermal conductivity (polyethylene pipe value)	λ_R	0.41 [W(mK]
External pipe diameter	D_a	16.0 [mm]
Pipe wall thickness	S_r	2.0 [mm]
Ambient temperature	Θ_i	20.0 [°C]

System heating efficiency curves:



Pitch 10 – Delta T = 8°C

Pitch 10 – Delta T = 5°C

Pitch 15 – Delta T = 8°C

Pitch 15 – Delta T = 5°C

THERMAL CAPACITY OF THE KILMA FUTURA RADIANT SYSTEM

(values according to UNI EN 1264)

FLOATING PARQUET 15 MM

Specific surface density emission and surface temperature (**)

Delivery T [°C]	T Delta	Pipe centre distance			
		10 [cm]		15 [cm]	
		q [W/m²]	θf,m [°C]	q [W/m²]	θf,m [°C]
33	5	32	23.1	26	22.4
	6	31	22.9	24	22.3
	7	29	22.7	22	22.2
	8	26	22.6	21	22.0
34	5	36	23.4	28	22.7
	6	34	23.2	27	22.5
	7	32	23.1	25	22.4
	8	30	22.9	23	22.3
35	5	39	23.7	31	22.9
	6	37	23.5	30	22.8
	7	35	23.4	28	22.7
	8	33	23.2	26	22.5
36	5	42	24.0	34	23.2
	6	41	23.8	32	23.0
	7	39	23.7	31	22.9
	8	37	23.5	29	22.8
37	5	46	24.3	37	23.4
	6	44	24.1	35	23.3
	7	42	24.0	34	23.2
	8	40	23.8	32	23.0
38	5	49	24.6	40	23.7
	6	47	24.4	38	23.6
	7	45	24.3	36	23.4
	8	43	24.1	35	23.3
39	5	52	24.9	42	23.9
	6	51	24.7	41	23.8
	7	49	24.6	39	23.7
	8	47	24.4	38	23.6
40	5	56	25.2	45	24.2
	6	54	25.0	44	24.1
	7	52	24.9	42	23.9
	8	50	24.7	40	23.8
41	5	59	25.5	48	24.5
	6	57	25.3	46	24.3
	7	55	25.2	45	24.2
	8	54	25.0	43	24.1
42	5	62	25.8	51	24.7
	6	61	25.7	49	24.6
	7	59	25.5	48	24.5
		57	25.3	46	24.3

** Values obtained while meeting the above-mentioned system operating conditions - precautionary values as a possible air layer between the parquet and the panel was considered.

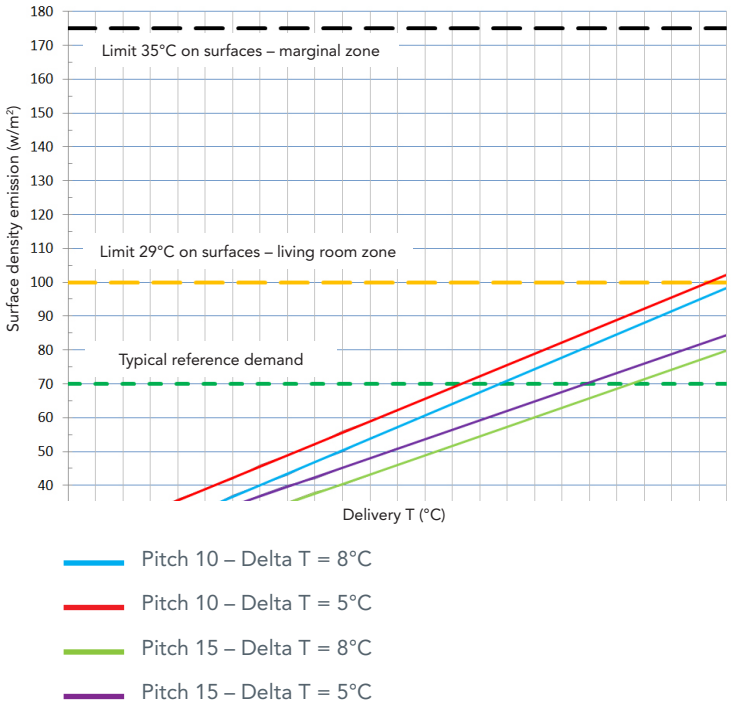
θf,m = Floor surface temperature.

q = Specific floor surface density emission.

Operating conditions of the system:

Floor thermal resistance (floating parquet 15 mm)	$R\lambda_{,B}$	0.1 [m²K/W]
Pipe thermal conductivity (polyethylene pipe value)	λ_R	0.41 [W(mK]
External pipe diameter	D_a	16.0 [mm]
Pipe wall thickness	S_r	2.0 [mm]
Ambient temperature	Θ_i	20.0 [°C]

System heating efficiency curves:



THERMAL CAPACITY OF THE KILMA FUTURA RADIANT SYSTEM

(values according to UNI EN 1264)

PLASTERBOARD WALL-MOUNTED SYSTEM 12.5 MM

Specific surface density emission and surface temperature (**)

Delivery T [°C]	T Delta	Pipe centre distance			
		10 [cm]		15 [cm]	
		q [W/m²]	θf,m [°C]	q [W/m²]	θf,m [°C]
33	5	42	25.4	33	24.1
	6	40	25.1	31	23.9
	7	37	24.8	28	23.7
	8	34	24.6	26	23.5
34	5	46	25.9	36	24.6
	6	44	25.6	34	24.4
	7	41	25.4	32	24.1
	8	39	25.1	30	23.9
35	5	51	26.4	40	25.0
	6	48	26.2	38	24.8
	7	46	25.9	36	24.6
	8	43	25.6	33	24.4
36	5	55	27.0	43	25.5
	6	53	26.7	41	25.2
	7	50	26.4	39	25.0
	8	48	26.2	37	24.8
37	5	59	27.5	47	25.9
	6	57	27.2	45	25.7
	7	55	27.0	43	25.5
	8	52	26.7	41	25.2
38	5	64	28.0	50	26.3
	6	61	27.8	48	26.1
	7	59	27.5	46	25.9
	8	56	27.2	44	25.7
39	5	68	28.6	54	26.8
	6	66	28.3	52	26.5
	7	63	28.0	50	26.3
	8	61	27.8	48	26.1
40	5	72	29.1	57	27.2
	6	70	28.8	55	27.0
	7	68	28.6	53	26.8
	8	65	28.3	51	26.5
41	5	77	29.6	61	27.6
	6	74	29.4	59	27.4
	7	72	29.1	57	27.2
	8	69	28.8	55	27.0
42	5	81	30.2	64	28.1
	6	79	29.9	62	27.9
	7	76	29.6	60	27.6
		74	29.4	58	27.4

** Values obtained by meeting with the above operating conditions of the system.

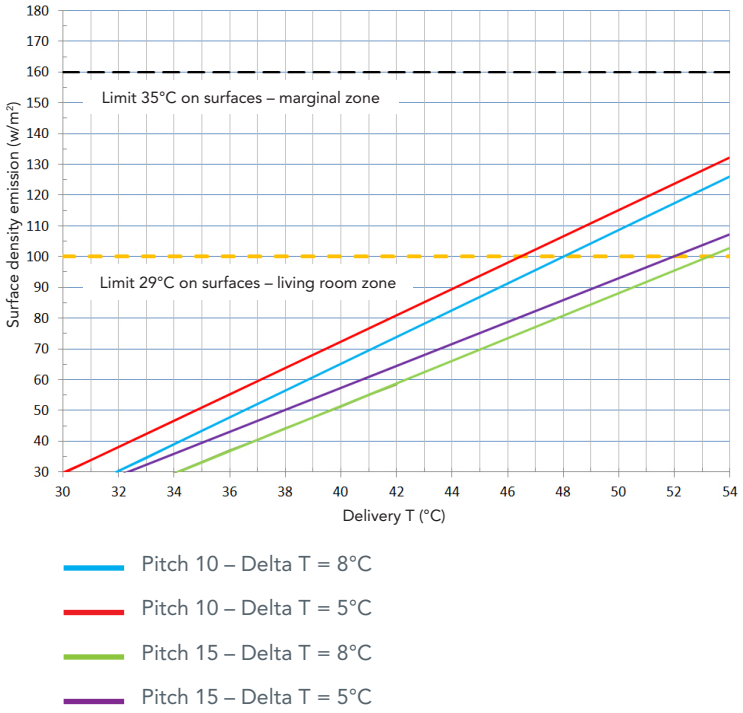
θf,m = Wall surface temperature.

q = Specific wall surface density emission.

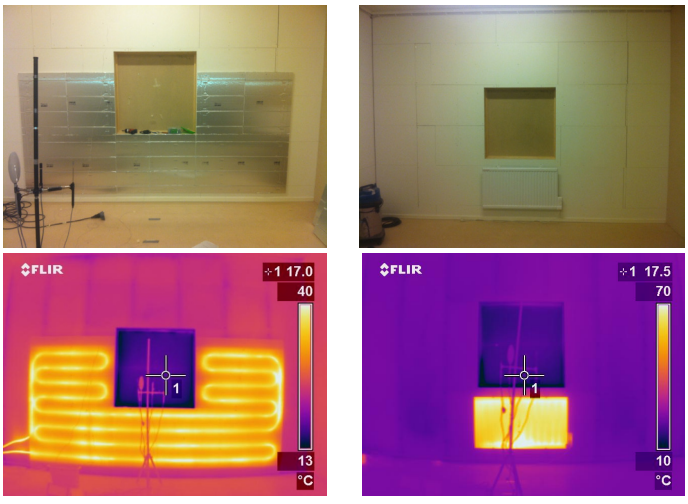
Operating conditions of the system:

Wall thermal resistance (plasterboard 12.5 mm)	$R\lambda_{,B}$	0.04 [m²K/W]
Pipe thermal conductivity (polyethylene pipe value)	λ_R	0.41 [W(mK]
External pipe diameter	D_a	16.0 [mm]
Pipe wall thickness	S_r	2.0 [mm]
Ambient temperature	Θ_i	20.0 [°C]

System heating efficiency curves:



Thermography Kilma-Futura radiant panel installed on the wall in comparison with radiator heating system:



Kilma-Futura Panel

Radiator heating

COOLING CAPACITY OF THE KILMA FUTURA RADIANT SYSTEM

(values according to UNI EN 1264)

CERAMIC 12.5 MM

Specific surface density emission and surface temperature (**)

Delivery T [°C]	T Delta	Pipe centre distance			
		10 [cm]		15 [cm]	
		q [W/m²]	θf,m [°C]	q [W/m²]	θf,m [°C]
13	3	53.34	17.75	44.99	19.05
14	3	48.58	18.48	40.94	19.66
15 (*)	3	43.84	19.20	36.91	20.28
16	3	39.10	19.92	32.87	20.89
17	3	34.35	20.65	28.83	21.51
18	3	29.58	21.37	24.78	22.12
19	3	24.84	22.09	20.75	22.74
20	3	20.09	22.82	16.71	23.35

* Recommended minimum delivery T. limit.

** Values obtained by meeting with the above operating conditions of the system.

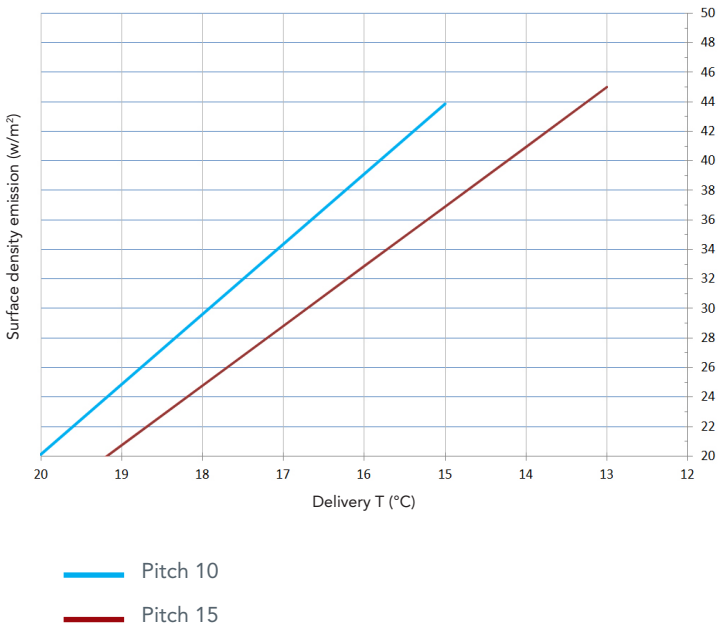
θf,m = Floor surface temperature.

q = Specific floor surface density emission.

Operating conditions of the system:

Floor thermal resistance (floating parquet 15 mm)	$R\lambda_{,B}$	0.01 [m²K/W]
Pipe thermal conductivity (polyethylene pipe value)	λ_R	0.41 [W(mK]
External pipe diameter	D_a	16.0 [mm]
Pipe wall thickness	S_r	2.0 [mm]
Ambient temperature	Θ_i	26.0 [°C]
Ambient relative humidity	Hr	65%
Delta T (delivery - return)	Δ T	3 °C

System cooling efficiency curves:



COOLING CAPACITY OF THE KILMA FUTURA RADIANT SYSTEM

(values according to UNI EN 1264)

FLOATING PARQUET 15 MM

Specific surface density emission and surface temperature (**)

Delivery T [°C]	T Delta	Pipe centre distance			
		10 [cm]		15 [cm]	
		q [W/m²]	θf,m [°C]	q [W/m²]	θf,m [°C]
12	3	33.65	20.81	28.43	21.61
13	3	30.89	21.23	26.06	21.97
14	3	28.12	21.65	23.70	22.33
15 (*)	3	25.37	22.07	21.40	22.69
16	3	22.61	22.49	18.98	23.05
17	3	19.85	22.91	16.61	23.41
18	3	17.08	23.33	14.24	23.77
19	3	14.33	23.75	11.88	24.13
20	3	11.57	24.17	9.51	24.49

* Recommended minimum delivery T. limit.

** Values obtained by meeting with the above operating conditions of the system.

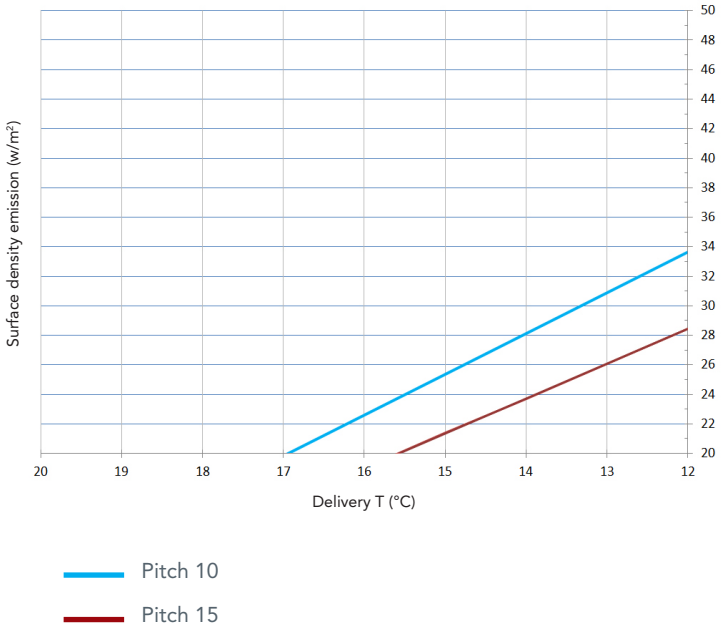
θf,m = Floor surface temperature.

q = Specific floor surface density emission.

Operating conditions of the system:

Floor thermal resistance (floating parquet 15 mm)	$R\lambda_{,B}$	0.1 [m²K/W]
Pipe thermal conductivity (polyethylene pipe value)	λ_R	0.41 [W(mK]
External pipe diameter	D_a	16.0 [mm]
Pipe wall thickness	S_r	2.0 [mm]
Ambient temperature	Θ_i	26.0 [°C]
Ambient relative humidity	Hr	65%
Delta T (delivery - return)	Δ T	3 °C

System cooling efficiency curves:



GUIDE TO INSTALLING THE KILMA-FUTURA SYSTEM

Technical solutions for gluing the panels and subsequent laying of floors

The following requirements are the result of the experience acquired in the installation of the **Kilma Futura** dry system by professional installers. The person installing this system must always use common sense, like in any other occasion. Installation is easier by following a specific design, in a way that the delivery and return ends of the pipes are connected in the same point. It is recommended that the hot part of the pipe (delivery) is placed on the outer side, to compensate for the added loss of heat, such as the outside of windows.

Always use safe tools and gloves to prevent cuts or injury. The aluminium covering panel can be extremely sharp during bending or tracing. Pay the utmost attention.

0 PRELIMINARY CHECKS

VERIFICATION OF THE SUBSTRATE

The screed on which the **Kilma Futura** panel is to be installed must have a smooth, flat and compact surface in order to ensure the best possible bonding and contact between the panel and the substrate itself.

Carry out the following checks before installation.

• Checking surface flatness: place a 2 m long straightedge on the substrate and check that there are no depressions greater than 2-3 mm.

• Checking structural soundness: hitting the surface of the screed with a hammer must not create cracks or deep dents.

• Checking surface firmness: by rubbing the surface with the tip of a nail, no deep grooves should be created and no dust should appear.

• Crack control: cracks resulting from the natural shrinkage of cement are permitted. All evident cracks, particularly those affecting the entire thickness of the substrate and those that are evolving, must be consolidated with appropriate products.

• Surface cleanliness check: the surface of the substrate must have been thoroughly cleaned.

• Checking the moisture content of the substrate: the moisture content of the substrate must be within the limits stipulated in relation to the type of substrate. Checking the moisture content of the substrate must be carried out strictly with a calcium carbide hygrometer (other instruments may give incorrect indications under certain conditions).

The maximum permissible installation values, which must be strictly adhered to, are as follows:

- 2.0% for a cement substrate (maximum thickness 80 mm);

- 0.4% for an anhydrite substrate;

- 10.0% for wood panels.

For other types of substrate, always refer to what is good practice and the directions of those in charge of its construction.

In the case of thick substrates, the check must be carried out on the entire thickness and not only on the surface.

In the event that the prescribed requirements are not met, the appropriate corrective measures must be taken before installation.

The installer must obtain a declaration/certificate from the company regarding the degree of moisture present at the time of installation in the substrate.

RBM recommends a joint preliminary inspection by the plumber, flooring specialist and building contractor to check the suitability of the substrate for the installation of the KILMA FUTURA system. It is important to understand that, before the system can be installed, the substrate must necessarily have the same characteristics as it would have if the flooring were to be installed directly on it. A report of the result of this inspection, which is attached to the declaration of plant conformity, will provide greater protection as to the correct implementation of the system.

The **Kilma Futura** panel may also be installed on pre-existing floors, provided that all the requirements regarding flatness, solidity, compactness, surface cleanliness and absence of cracks as well as residual or rising damp that are necessary to ensure correct contact at every point of the surface and protection from undesirable external agents are met.

Before laying on existing hard floors (ceramic tiles, stone, etc.), particular care must be taken to ensure that the surface is suitable for proper bonding. Where necessary, preliminary action must be taken with deep cleaning, degreasing and surface scratching treatments using mechanical means and/or suitable chemicals.

Before laying on an existing wooden floor, it must be sanded in order to remove all traces of surface varnish.

ATTENTION:

The installation is not compatible with pre-existing textile (e.g. carpet) or resilient (linoleum, PVC, etc.) floor coverings, which must therefore be removed.

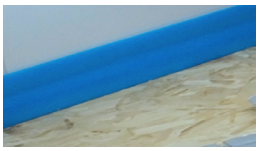
PRESERVATION OF THE KILMA FUTURA PANEL

The panel must be stored in rooms that are:

- safe, where there is no danger of damage from other materials or possible handling by unauthorised persons;

- closed and protected, in the sense that they must not be able to be influenced by rain or snowfall and must not have water stagnation.

1 LAYING THE PERIMETER STRIP



Place the adhesive perimeter strip **code 472.08.12**, along the whole perimeter of the rooms where the radiant system will be installed and on the perimeter of all the building elements which will be in contact with the system, as must always be done when laying radiant floor systems.

2 PRELIMINARY INSTALLATION OF THE SYSTEM

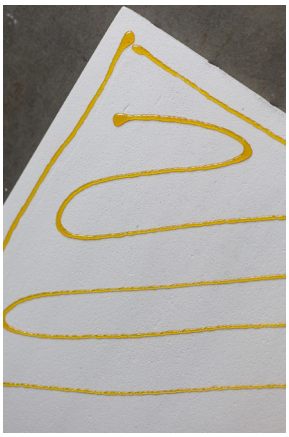
We recommend installing the entire **Kilma Futura** panel system before final gluing on the substrate.

This allows to make sure there are no problems and whether there is the need to make preventive additional marks.

It may be handy to number panels with a marker once laid, for easier final installation.

3 GLUING THE PANEL WITH KILMA FUTURA AD ADHESIVE

3a



Indication for adhesive application scheme.

For bonding the panels to the substrate, RBM SpA can supply and recommend **Kilma Futura AD (3a)** adhesive.

Apply **Kilma Futura AD** at a rate of approximately 100-150 g/m2 on the underside of the **RBM Kilma Futura** panel. It is suggested that the adhesive be applied as shown in the diagram opposite **(3a)**.

Glue the panel to the substrate, ensuring uniform adhesion. Check that the existing substrate on which the system will be installed (smoothed cement screed, cement smoothing, ceramic or natural stone floors, etc.) is free of dust and of separating substances, stable, flat, dry, free of rising damp and mechanically resistant.

In order to improve the bonding and complete adhesion of the panel to the substrate, resulting in an improved end result, it is strongly recommended to apply a light "rubbing" of the glued panel on the substrate, so that the glue spreads more evenly on the substrate.

For the same reasons, it is also recommended to apply light loads (e.g. primer containers or buckets half-full of site material) to the various panels for the duration of the first hardening of the adhesive.

For example, once the panels of a first room have been laid, after they have been properly loaded, it will be possible to proceed with the laying of the next room. After its installation is complete, the loads can be moved from the first room to the second and so on.

During the hardening phase (generally, about 30 minutes), **Kilma Futura AD** increases in volume, it is, therefore, recommended not to over-apply.

After this period, the panel will be firmly glued to the substrate. After glueing, with a suitable polyurethane thinner, clean away any excess product that has not hardened.

It is advisable, when using **Kilma Futura AD**, to use all personal protective equipment. For further indications/warnings, please refer to the safety data sheet of the product itself.

3 GLUING OF THE PANEL WITH CEMENT-BASED ADHESIVE

3b

In the case of substrates that are not suitable for direct installation of the system, consolidate them by means of appropriate operations to be carried out by the construction company:

- **for dusting substrates: PRYMER A dust-preventative by Chimiver Panseri SpA** or similar;
- **for crumbling substrates: PRYMER SF 1105 (A+B) by Chimiver Panseri SpA** or similar;
- **for uneven substrates or substrates made of lightened concrete:** proceed with appropriate filling and levelling (e.g. screeds).

In the event the substrate is excessively porous-absorbing or not suitable for the use of Kilma Futura AD, glue the panels using a cement-based adhesive type **ULTRA LITE S1 QUICK by MAPEI® (*) (3b)** or similar (use suitable adhesives without solvent that can attack the EPS of the panels).

If one prefers (and only if permitted), use of water-based glue, generally, it is possible to apply it with a spatula (2 mm teeth). The temperature must range from 15 to 35°C. Work by sections of the room in order to be able to walk without touching the glue. It is better to begin from the furthest corner of the room. Sprinkle the glue and let it dry for as long as it is sticky, to allow the panels to adhere better when installed.

The operation can take from 10 minutes to half an hour, on the basis of the substrate and the ambient temperature.

In case of a cement substrate, especially of a slab of the ground floor or basement, it is recommended to use a **cement-based adhesive for tiles**, spread with a toothed spatula (3-4 mm teeth).

Where applicable, it is possible to use "coating" glues (again solvent-free and not supplied by RBM SpA) with the same requirements commonly observed to use them.

In all cases where a glue other than **Kilma Futura AD** is used, it is important to glue the entire bottom surface of the panel for a uniform adhesion of the panel itself to the substrate, thus avoiding the presence of gaps, which generate noise when the system is used.

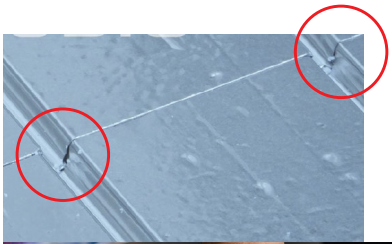
3c

When using water-based glue: Once the glue spread on the floor is ready, place the panel, adjust it, and press it in its position. Generally, it is possible to walk on the panels while the glue is drying, but with extreme caution and always in compliance with the prescriptions of the manufacturer of the adhesive.

If the panels "slide" on the adhesive once positioned, this means that they have been placed too early. If the adhesive was left to dry for too long, it is generally recommended to apply another layer over the first to avoid inadequate gluing.

When using cementitious adhesive for tiles: Lay the panels before it dries. Remember to near the panels together and carefully remove the excess glue that comes out from the joints between the panels, before it dries. Generally, it is recommended not to walk on the panels while the glue is drying.

3d



IMPORTANT:

- Make sure to near the panels together properly, making sure that the pipe guide traces fit into each other **(3d)**.
- Always make sure that, once glued, the panels do not have any "empty" areas under them or circumstances that could cause them to bend over time, which could cause issues once the floor is finished: the panel layer must be uniform, stable and flat.

(*) Please refer to the manufacturer's manual for more details.

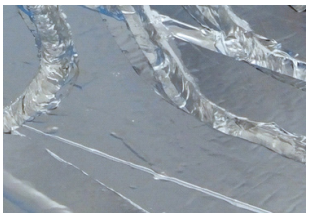
4 CUTTING A NEW TRACE/GUIDE FOR THE PIPE

4a

4b

4c

4d



Despite the fact that **KILMA FUTURA** panels are already equipped with preformed grooves and bends to accommodate the pipes, it may be necessary to cut a new trace on-site and create a complete circuit, especially where the pipes are joined to connect to the manifold, or to make particular bends or routes not pre-traced on the panel.

The trace can be made by cutting the panel with a common box cutter or with an electric device (cutter), taking care to create traces that are compatible with the diameter of the pipe they must house (neither too tight nor too loose - recommended bit / cutter of 16mm).

First trace the channel with a pen or a marker on the surface of the panel. The curves of the pipes must not be too tight (the minimum bending radius for a 16 mm pipe is 80 mm) **(4a)**.

Use a common or electric cutter to cut a 16 mm wide and 17 mm deep channel **(4b) taking care to first lubricate the tool blade with silicone spray in order to facilitate milling operations** and completely remove all residues, leaving the surface clean.

Bends (4c): At the bends, the trace is already prepared. With the aid of a suitable tool remove the surface layer of aluminium by removing the pre-defined trace.

It is advisable to notch the surface layer of aluminium covering the pre-milled bend at one of the two sides of the bend and not in the middle. This will allow the resulting aluminium layer to be easily folded into the pipe's groove without creating excessive thicknesses that could impede the correct insertion of the pipe into its seat.

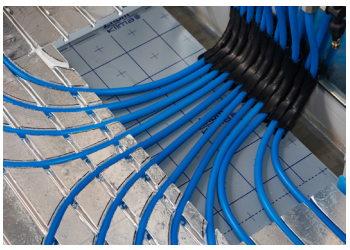
Insert the aluminised adhesive tape code 2018.00.02 in the trace made, in order to restore the aluminised surface layer **(4d)**. Pay attention to properly adhere the aluminised tape to the bottom of the trace in a way that does not prevent the correct insertion of the pipe. The pipe connected must not come out from its seat and must remain covered under the level of the surface of the panel. Insertion of tape might be avoided on the traces made starting from the manifold if these are particularly large and close, since, considering the proximity of the pipes in that zone, this would help avoid excessive heat emission in this point.

It is not necessary to insert the tape into the grooves of the pre-formed bends with which the **KILMA FUTURA** panel is equipped. To ensure proper heat diffusion at these bends, it will be sufficient to apply a layer of 'flat' aluminised tape to cover the pipe once it has been laid.

5 LAYING THE PIPE

5a

5b



5c

Vacuum the traces and the panels, to eliminate any processing residues that might cause interference in the installation.

Laying the pipe (5a): Proceed by placing the pipe starting from the distribution manifold. Check that the length of the circuit is correct.

Because of the many traces that may need to be made at this point, it may be more practical to lay the panel in the immediate vicinity of the manifold with the grooves parallel to the wall and make the starting traces perpendicular to the grooves.

In the vicinity of the outlets from the manifold, care should be taken to ensure that the pipes are not raised above the level of the panel as the flooring would not be able to be bonded in these areas. If necessary, avoid the use of the supplied bend formers, taking care, of course, not to exceed the minimum bending radius of the pipe, and ensuring that the pipes are secured so that they lie within the compartment delimited by the manifold's housing box.

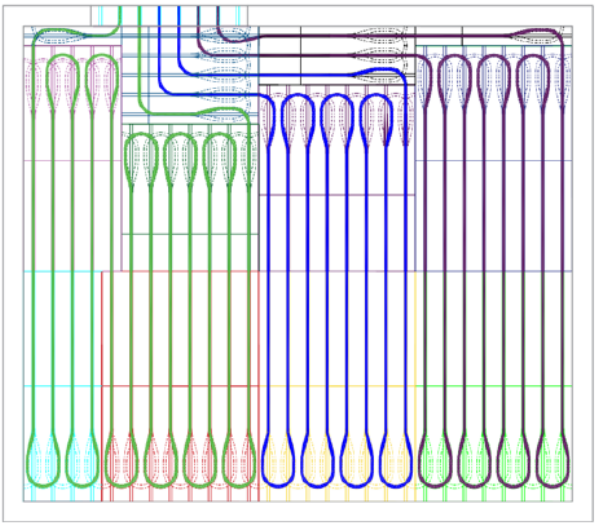
Installation of the pipes through the walls (5b): Before laying the pipes for heating through the wall or in the floor, insert the relative corrugated protective conduit. The operation must be carried out by two people: one lays the pipe and the other stretches it with caution, pulling it from the other side. If the pipe is blocked, it can create folds: avoid.

Laying of aluminised adhesive tape code 2018.00.02 (5c): Apply adhesive tape on the pipe bends and to keep it in place inside the traces (just as you would use hook clips in the "classic" radiant floor system with moulded EPS panels). Fasten the pipe with the tape where it tends to come out from its seat.

In any case, it is absolutely necessary to ensure that the pipe laid within its guides (whether preformed or made on site) does not protrude from the upper surface plane of the panel, in order to avoid possible problems with the subsequent stability of the room floor.

6 PIPE LAYING: USEFUL TIPS

6a



At certain points of the system, such as near the outlets from the distribution manifold, depending on the position of the latter and the number of outlets from it, or at the room entrances, where it is necessary to “widen” to allow more circuits to be distributed, in order to facilitate the installation of the system by reducing the amount of cuts and not having to excessively erode the polystyrene support, it could be advantageous to use the different panels by cutting them out and positioning them appropriately, even with the grooves placed orthogonally between them (e.g. directed parallel to the manifold) and subsequently mill them only in the passages, thus making the best use of the preformed grooves **(see Fig. 6a).**

In this way, in addition to reducing processes, the panel will provide better support for the subsequent installation of the flooring.

6 LAYING THE PIPE

6b

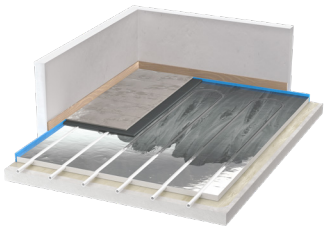
This does not detract from the fact that, both in the vicinity of the distribution manifold outlets, and in all those particular points of the system, where it is necessary to make an excessively large number of cuts on site, becoming practically unable to guarantee an adequate panel surface to provide sufficient support for the subsequent laying of the flooring (e.g. numerous outlets from the manifold or points of "passage" of the system, with a pipe installation pitch of less than 50 mm), it is recommended to make a suitable layer of screed over the pipes, until a sufficiently flat and stable support layer is created.

In some borderline cases, it may even be necessary to avoid using the KILMA FUTURA panel altogether, replacing the entire panel with the levelling screed layer **(6b)**.

It is up to the installer to assess and indicate where it is necessary to carry out this operation (this operation is in any case the responsibility of the construction company).

7 INSTALLATION OF COVERINGS

Ceramic covering



Ceramic covering installation

7a

The ceramic floor will be bonded by means of common floor glues (e.g. class C2E cement glues or above) directly to the **KILMA FUTURA** panel.

Once the underfloor heating system is installed and press tested, install the floor (for the pressurising and inspection conditions, refer also to the usual test conditions of radiant systems, as indicated by Standard EN-1264).

The heating system must be switched off, especially during the laying of the tiles, as the heat could lengthen the drying time of the glue and of the mortar, altering the characteristics of durability.

Apply an epoxy primer to protect the aluminium on the entire surface of the panels. RBM S.p.A recommends:

PRIMER MF by MAPEI® (*) code 3055.00.02 for application with a roller or similar products (7a). Average use 0.2 Kg/m2.

PRIMER MF does not alter and does not damage the PEX pipes.

• If using **PRIMER MF by MAPEI®** (*), after 12 hours and not later than 36 hours from the application of the same, apply to the entire surface an acrylic primer that assists the subsequent sealing of the glue used for tiles. RBM S.p.A. recommends the following ACRYLIC PRIMERS:

- **ACTIVE PRIME FIX by KERAKOLL** (*) - Average use of 0.1 - 0.15 Kg/m2

- **ECOPRIM T PLUS by MAPEI®** (*) - Average use of 0.1 - 0.15 Kg/m2

with roller laying

or similar.

• Four to five hours after application of the acrylic primer, it will be possible to proceed with the bonding of ceramic or natural stone tiles.

Although acrylic primers allow tiles to be bonded even after several days, in order to avoid damage to the system, improper exposure of the pipes to sunlight or soiling of the surface, it is advisable to proceed with bonding operations immediately (do not wait longer than 48-72 hours).

For bonding with the double primer cycle, the following adhesives can be used:

- **H40 NO LIMITS by KERAKOLL** (*) mixed with **TOP LATEX by KERAKOLL** (*)

- **ULTRALITE S1 FLEX or ULTRALITE S1 FLEX QUICK by MAPEI** (*) for tiles up to 60cmx60cm

- **ULTRALITE S2 FLEX or ULTRALITE S2 FLEX QUICK by MAPEI** (*) for tiles over 60cmx60cm(**)

- **ELASTORAPID by MAPEI®** (*)

- **KERABOND by MAPEI®** (*) mixed with **ISOLASTIC by MAPEI®** (*)

or similar.

As an alternative to the cycle just described, it is also possible to glue the tile to the **KILMA FUTURA** panel using glues such as:

- **H40 EXTREME by KERAKOLL**(*)

- **ULTRABOND PU 2K by MAPEI** (*)

or similar, avoiding, only in this case, the use of both primers (epoxy and acrylic) previously prescribed.

(*) Please refer to the manufacturer's manual for more details.

7b

7c

ATTENTION: The tiles must not be smaller than 25x25 cm(**) (alternatively you can also use strips with a minimum size of 15x30 cm) and the joints must be filled with products such as:

- **Fugabella Color by KERAKOLL(*)**
- **ULTRACOLOR PLUS by MAPEI ®**

or similar, in the chosen colour.

The floor expansion joints can be sealed with:

- **SILICONE COLOR or NEUTRAL COLOR by KERAKOLL** (*)
- **MAPESIL LM by MAPEI** ®

or similar (*)

The width of the joints must comply with the requirements of the reference standard for the installation of ceramic tiles (UNI EN 11493-1), assessed in relation to different aspects, including: type and size of the tiles, intended use, characteristics of the substrate, environmental conditions during use and under operating conditions.

The same standard specifies that jointing (joint = 0 mm) is not permitted and that under no circumstances may a joint width of less than 2 mm be prescribed or adopted.

In such cases it is a good idea to contact **RBM S.p.A.** technical department and the tile manufacturer before laying the tiles. **In the case of areas on the floor where the size of the tiles needs to fall below these values (e.g. cuts near the walls or recesses, etc.), make sure that any concentrated loads due to furniture etc. do not affect precisely these tiles. If it is not possible to do otherwise, provide for either a suitable distribution layer of surface load to be placed under the concentrated load or avoid placing the KILMA FUTURA panel right near these zones, if necessary by keeping a small clearance from the wall that will be filled with a suitable self-levelling screed or with a fibre cement panel or a similar one with the same thickness value. This is done to avoid any cracks of the tiles. INFORM THE LANDLORD by also inserting this sheet in the declaration of conformity of the system.**

PLEASE NOTE:

(**) Laying large format tiles (e.g. 120x120x0.6 or 100x200x0.6 etc.) is permitted, but the size of these tiles makes them much more sensitive to imperfections and unevenness of the substrate that they are installed on. This may require different procedures from those prescribed in this manual. In such cases it is a good idea to contact **RBM S.p.A.** technical department and the tile manufacturer before laying the tiles.

• Apply the adhesive for tiles on the system using a toothed spatula (7b) according to the manufacturer's instructions.

IMPORTANT: The adhesive for the tiles must be applied in a perfectly uniform manner and cover the entire surface of the panel (7c) (and in any case always in line with the manufacturer's requirements) to avoid possible cracking of the tiles in case of application of concentrate loads on them or near the relative joints.

PLEASE NOTE:

The drying times of tile adhesives may be longer than indicated in the technical documentation of the tile adhesives, as the **KILMA-FUTURA** system constitutes a waterproof, non-draining substrate. Therefore, ensure that the adhesive is perfectly dry before proceeding with the sealing of the gaps between the tiles, using suitable "jointing" materials.

Note: the above constitutes only a series of general recommendations to install the flooring. In case of doubt relating to the various indications given, follow the instructions of the manufacturer of the flooring and / or of the relative accessories. Always make sure that the panels are well glued to the substrate. If a panel or part of a panel is not firmly stable and stationary, it is imperative to investigate the reason and carry out any necessary steps to remedy the problem. The radiant system must be absolutely stable and level before laying floor coverings.

(*) Please refer to the manufacturer's manual for more details.

8 INSTRUCTIONS FOR LAYING PARQUET

VERIFICATION OF THE SPECIFIC ENVIRONMENTAL CONDITIONS FOR LAYING WOODEN FLOORS:

Before starting the installation, make sure that any other work to be carried out on site (masonry, sanitary fitting, etc.) has been completed.

Ensure that the relative humidity in the room is between **45% and 65%** and that the room temperature is between **16°C and 25°C**. Compliance with these conditions is important both to avoid deformation of the strips and to ensure the proper functioning of the adhesives and other products used for laying.

CONDITIONS OF USE

Wood is naturally subject to dimensional variations depending on humidity and ambient temperature.

Consequently, the following requirements must be observed if the floor is to be constantly in perfect shape.

A. Air temperature and humidity

Constantly maintain an air temperature between **15°C and 30°C** and, more importantly, a relative air humidity between **45% and 65%**.

This range corresponds to the optimal environmental conditions not only for the floor, but also for people's wellbeing.

If difficulties are encountered in keeping the air humidity above the minimum limit in the winter period, the use of appropriate humidification systems is recommended.

B. Floor surface temperature

The control system must be set so that the temperature measured at the floor surface does not exceed **27°C** (consider that modern low-temperature systems already offer excellent room comfort with floor surface temperatures of around **24-25°C**).

UNDERFLOOR COOLING

For systems in which cooling is also to be used, it is absolutely necessary to set up all suitable

systems to categorically prevent the formation of condensation at every level of stratification of the floor system, i.e. both

surface and in the gaps.

The lack of such predispositions could lead to the wood absorbing moisture and consequently showing dimensional deformations and changes in its surface appearance.

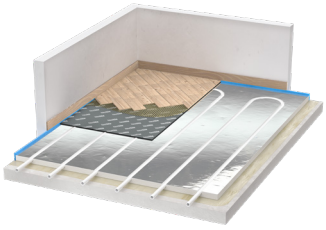
RBM S.p.A offers complete and integrated solutions for the correct control of all these parameters.

PLEASE NOTE:

These prescriptions, borrowed from leading wood flooring experts, are valid in every case of parquet installation on radiant systems and not only on the KILMA FUTURA system.

Parquet covering

Laying floating parquet



Glued parquet installation

LAYING FLOATING PARQUET (3-LAYER PRE-FINISHED PARQUET):

• If a wooden, floating type floor is required, this will be laid on a support mat compatible with heating systems such as **ISOLAMANT TOP by ISOLMANT®** or similar.

• Before proceeding with installation of the mat and parquet, make sure to lay a suitable protective layer with a vapour barrier function made of PE foil, **code no. 778.20.02**, taking care to cover the whole system and to overlap different layers of at least 5-10 cm between them along the sides. With the floating parquet laying solution, no surface treatment of the panel (primer or other) is required.

• The floor layer must always ensure that the substrate is suitable for the installation of his product before proceeding with the installation.

LAYING GLUED PARQUET (PRE-FINISHED PARQUET):

• If a glued parquet is required, the solution is to place between the **KILMA FUTURA** panel and the floor an adequate support layer to allow for the bonding of the wood essence and suitable to withstand the relative tensile stress caused by normal shrinkage and the usual thermal expansion of floors placed on radiant systems, such as **PHONOFIX by RBM**, for floating laying on the **KILMA FUTURA** panel and subsequent bonding of the parquet on this support layer.

The parquet will be bonded to the substrate using common glues specific for gluing wooden floors.

Prefinished 2-layer or 3-layer parquet flooring with thermal resistance <=0.10m² K/W are compatible with this type of solution. However, always refer to the mat's technical data sheet for its compatibility with the chosen flooring.

Alternatively, the **TOP INCOLLAPAVIMENTO by ISOLMANT®** support layer can be used for floating laying on the **KILMA FUTURA** panel and subsequent bonding of the parquet on the substrate thanks to the adhesive layer which **TOP INCOLLAPAVIMENTO by ISOLMANT®** is provided with.

In any case, it is always important that the support layer adheres to the **KILMA FUTURA** panel and that it is a good heat conductor and that it has sufficient consistency to withstand the stress to which it will be subjected. Generally, the manufacturer of the substrate will provide suitable specifications on the relative technical sheet, so that its own product can withstand, for example, the tensile stress of the wooden parquet according to the wood essence and thickness. Even with the glued parquet laying solution, no surface treatment of the panel (primer or other) is required.

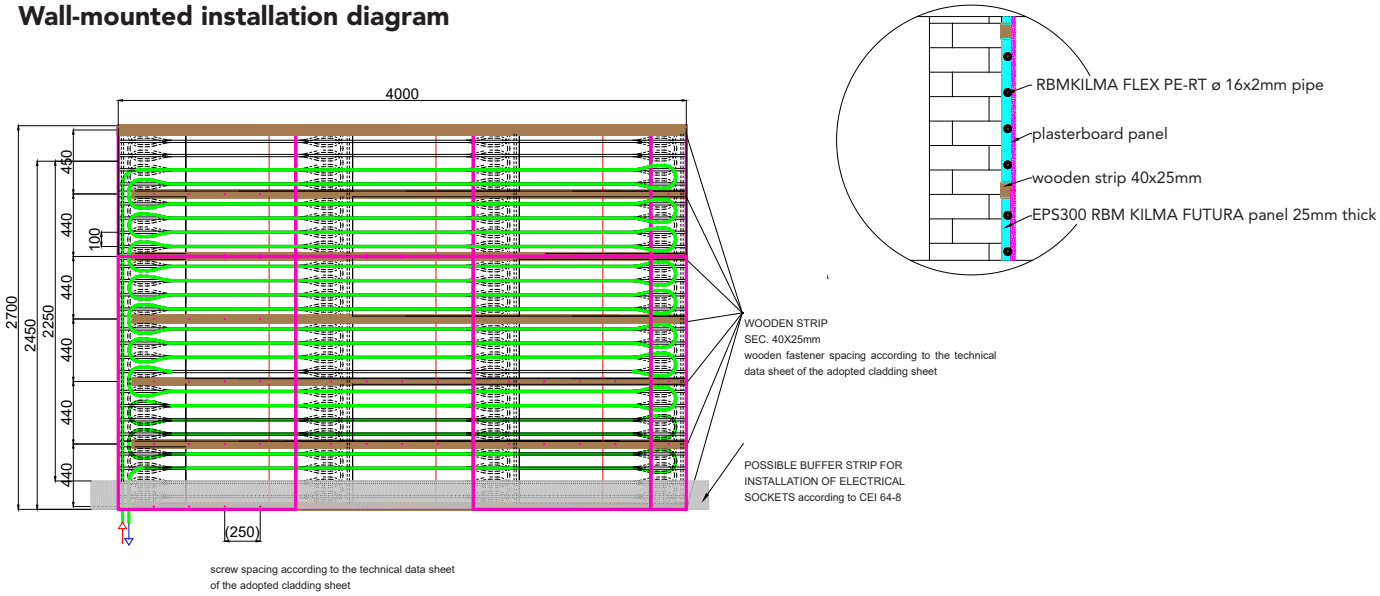
• The floor layer must always ensure that the substrate is suitable for the installation of his product before proceeding with the installation.

ATTENTION:

Solid wood parquet flooring is not permitted (*).

(*) In some particular cases, "ad hoc" protocols have been sporadically studied and refined for compulsory use of this type of finish. However, these have always been defined, agreed and tested in close cooperation with the manufacturers and installers of the various woods, and always first agreed with the DL and client. For any use of solid wood on the system as an exception, always contact RBM's technical department for advice.

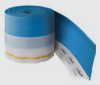
Wall-mounted installation diagram



(*) For the characteristics and methods of use of the above mentioned products, please always refer to the relative technical data sheets available on the manufacturer's website (e.g. http://www.mapei.com).

ATTENTION: In the specifications indicated above we deliberately avoided reporting the intermediate normal hydraulic operations of all the radiant floor systems, or they were simply mentioned (e.g. testing of piping with water at 6 bars before covering the pipes, before thermal expansion of the system before installing the floor, etc.), as required by the specific technical standard and the state-of-the-art rule which, obviously, must always be followed. The spirit of these specifications is focused rather on highlighting the peculiarities that characterise the system and that differentiate it from the "traditional" radiant floor systems with a cement screed.

MAIN COMPONENTS THAT CAN BE USED TOGETHER WITH THE KILMA-FUTURA SYSTEM

	Code	Description
	**1484.16.X2**	**KILMA-FLEX PE-RT pipe** in polyethylene of improved thermal resistance and with an anti-oxygen barrier made of EVOH, in compliance with Standard EN ISO 22391-2 (PE-RT), UNI 9338, DIN 4726 and Ministerial Decree no. 174 / 04 of the Health Ministry. Used in size (external Φ x pipe thickness): 16x2 mm (roll length 120, 240 or 600 m).
	**472.08.12**	**Base edging joint**: expansion joint made of expanded polyethylene, coupled with LDPE sheet for mortar containment, 80 mm high, 5 mm thick and supplied in 25 m rolls.
	**483.25.02** **483.32.02**	**Corrugated conduit**: (diameter 25 mm per pipe d. 17 – diameter 32 mm per pipe d. 20-25 used as pipe protection. It provides indispensable protection when the pipes cross the expansion joints. Supplied in 50 or 25 m rolls.
	**603.18.12**	**Bend former** for curves at 90°, made of polyamide with fibreglass. Used as a bend former and to provide tube protection near manifold connection.
	**778.20.02**	**Moisture barrier** made with a PE sheet, 0.2 mm thick. Roll supply, 200 m^2
	**2018.00.02**	**Anodised aluminium adhesive tape**. Used to avoid the formation of heat bridges between two adjacent panels and to create a single insulating layer.
	**3702.00.02**	**Kilma Futura Adhesive AD**. Used to stick Kilma Futura panels on the existing substrate (smoothed cement screed, cement smoothing, ceramic or natural stone floors). Supplied in 1 kg can. Average use 0.10 ÷ 0.15 Kg/m^2.
	**3055.00.12**	**Epoxy PRIMER MF by MAPEI®**. Waterproofing and protection of the aluminised surface of the panel and piping in case of subsequent laying of flooring with cement-based glues or self-levelling screeds. Supplied in a kit consisting of 1 x 3 kg drum of Primer + 1 x 1 kg drum of Reagent. Average use 0.2 kg/m^2.

SPECIFICATIONS

SERIES 2926

RBM Kilma-Futura insulating panel, high mechanical strength, made of EPS 300 type expanded synthetic polystyrene, closed cell stamped, overlaid with aluminium sheet, suitable for installing radiant heating systems with reduced thickness, without screed or allocator elements, with direct floor laying on the panel and characterised by very low thermal inertia.

Equipped with parallel straight seats for pipes Ø16x2mm with pre-set pitch and head curves pre-shaped in the panel. Any other seat and supplies can be easily made at the building site by the installer with an ordinary milling machine.

Declared thermal conductivity: 0.033 m^2K/W

Thermal resistance according to UNI-EN 1264.

Denomination and classification in compliance with Directive 89/106 EC CS(10)300 Euroclass F.

Panel pitch dimensions 150mm: 1175x750 mm (0.88 m^2 usable surf.)

Panel pitch dimensions 100mm: 1175x800 mm (0.94 m^2 usable surf.)

Available in the following versions:

17 mm thickness (150 mm pitch) - Minimum guaranteed thermal resistance = 0.265 m^2K/W

25 mm thickness (150 mm pitch) - Minimum guaranteed thermal resistance = 0.587 m^2K/W

25 mm thickness (100 mm pitch) - Minimum guaranteed thermal resistance = 0.533 m^2K/W

33 mm thickness (100 mm pitch) - Minimum guaranteed thermal resistance = 0.780 m^2K/W

48 mm thickness (100 mm pitch) - Minimum guaranteed thermal resistance = 1.250 m^2K/W

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