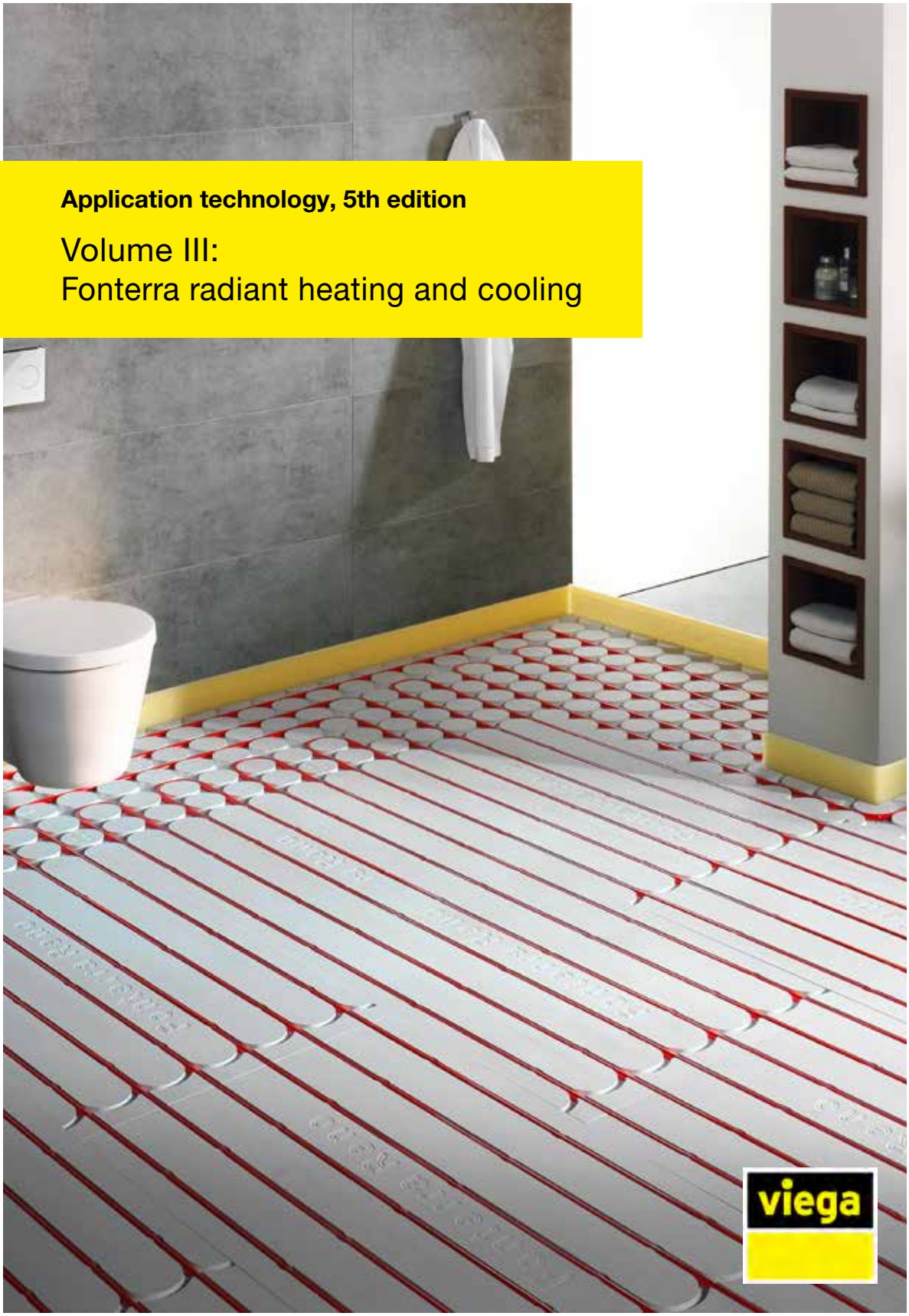
Application technology, 5th edition

Volume III:
Fonterra radiant heating and cooling



Fonterra Reno

Planning

System description

General

Underfloor heating system with 18 mm thick system panels made of plaster fibre material with milled-in pipe guiding grooves for reception of the 12 x 1.3 mm polybutene pipes.
Thanks to its low total height, it is particularly well suited for old buildings and refurbishment projects. Combined with top panels, the basic panels allow for optimum adjustment to the room geometry.

There are three different ways of installing the Fonterra Reno system:
- construction panel,
- direct tiling, and
- casting compound.

When a **construction panel** is installed over the Reno system panel, all types of floor covering can be laid on the construction panel.
Direct tiling of the Reno panel is the method of choice particularly for small total heights with tile surface and short installation times.
The application of **casting compound** on the Fonterra Reno ensures that the system is quickly ready for walking on and for laying of all types of floor covering while providing a high levelness tolerance and small total heights.

Dimensioning example

Fig. 110: Installation example

System features

General

- Low surface weight
- Dry construction system, no humidity demands on the building structure
- Easy and quick installation of the system panels
- Meandering pipe installation at a clearance of 100 mm
- Tested system safety

Construction panel

- Total heights of 28 mm and up possible
- Suitable for all types of floor coverings
- No waiting times

Direct tiling

- Total heights of 21 mm and up possible
- Suitable for tile surface
- No waiting times

Casting compound

- Total heights of 21 mm and up possible
- Suitable for all types of floor coverings
- Application of primer and casting compound
- Can be walked on 2 to 4 hours after application of the casting compound
- After 24 hours, ready for laying tiles, PVC or carpet; after three days for laying laminate or parquet

System components

Panels/pipe		
 Fonterra Reno basic panel 62 x 100 cm	 Fonterra Reno top panel 31 x 62 cm	 Fonterra Reno Manifold panel 3-pc.
 Plaster board for residual surfaces 62 x 100 cm	 PB pipe 12 x 1.3 mm	
Accessories		
 Fonterra Reno screed adhesive	 Fonterra Reno primer	 Fonterra Reno casting compound
 Joint protection 12 for connection lines	 Edge insulation strip	 Drywall screws
Tool		
 Rubber squeegee	 Pin squeegee	 Pipe reel
 Pipe shear		

System components

Name	Article number
PB pipe 12, 120 m	707712
PB pipe 12, 240 m	615680
PB pipe 12, 650 m	616502
Fonterra Reno basic panel 1000 x 620 x 18 mm	657437
Fonterra Reno top panel 310 x 620 x 8 mm	657420
Fonterra Reno manifold panel 3-piece	673154
Plaster board 1000 x 620 x 18 mm	615567
Edge insulation strip 150/8 mm	609474
Edge insulation strip 150/10 mm	609481
Edge insulation strip 90/10 mm	706906
Expansion joint profile	609542
Joint protection 12	609511
Pipe guide 12	609498
Drywall screws 25 mm	615574
Clamp connection 12 x 3/4	614584
Press connector 12 x 1.3	614676
Screw fitting 12 x 3/4	614508
Fonterra Reno screed adhesive	624903
Fonterra Reno casting compound	664428
Fonterra Reno primer	668914

Tab. 59: System components

Tools

Name	Article number
Pipe reel	562359/706906
Pipe shears for plastic pipes	652005
Press machine, e.g. Rechargeable battery Picco	556208
Hand press tool 12	401436
Press jaw 12	616915
Rubber squeegee	668938
Pin squeegee	668921

Tab. 60: Tools

System requirement

Heating circuit lengths and mounting times

	Installation clearance [cm]
	10
Max. heating circuit length Reno	80 m / 8 m²
Mounting times*	
Direct tiling	25
with construction panel	25 to 30
with casting compound	30 to 35

Tab. 61: Mounting times and heating circuit lengths Fonterra Reno
* in group minutes/m²

Material requirement Fonterra Reno

Article designation	Pro-rata requirement	Article number	Quantities/ packing units
Reno basic panel 1000 x 620 mm	1.60 pc./m² *	657437	30 pc.
Reno top panel 310 x 620 mm	5.20 pc./m² *	657420	30 pc.
Manifold panel 3 x 310 x 620 mm	1.0 pc./manifold ****	673154	1 pc.
PB pipe 12 x 1.3 mm	10.0 m/m²	615680	240/650m
Edge insulation strip 90/10	1.0 m/m²	706906	200 m
Drywall screws 25 mm	20 pc./m² ***	615574	1000 pc.
Screed adhesive	100 g/m² ***	624903	1000 g
Casting compound	10 kg/m² ****	664428	25 kg
Primer	75 g/m² ****	668914	1.0 kg

Tab. 62: Material requirement Fonterra Reno

* approx. 80 % share in the system area
** approx. 20 % share in the system area
*** for version with dry construction element
**** for version with casting compound and 3 mm layer thickness
***** for 4 or more heating circuits

Technical data

Technical data system panels

Reno panel	
Dimensions of top panel	620 x 310 x 18 mm
Dimensions of basic panel	1000 x 620 x 18 mm
Dimensions of manifold panel 3-piece	620 x 310 mm per panel
Material	Gypsum board
Fire rating class	A1 acc. to EN 13501-1 A2 acc. to DIN 4102-1
Weight of top panel	approx. 15 kg/m²
Weight of basic panel	approx. 19 kg/m²
Weight incl. casting compound	approx. 35 kg/m²
Pipe clearance	100 mm
Max. permissible supply temperature	50 °C
Max. heating circuit length	80 m/8 m²
Damp rooms	suitable for residential areas*

Tab. 63: Technical data system panel

* Note the brochure of the Zentralverband des deutschen Baugewerbes ZDB (Association of the German Building Trade).

Technical data system pipe

System pipe		Fonterra Reno
Dimensions	[mm]	12 x 1.3
Minimum bending radius		5 x d_a
Operating condition acc. to ISO 10508 Class 4 Class 5	[MPa/bar]	 1/10 0.8/8
Max. operating temperature	[°C]	95
Mounting temperature	[°C]	> -5
Water volume	[l/m]	0,069
Heat conductivity λ	[W/(m·K)]	0,22
Linear coefficient of length expansion	[K^{-1}]	1.3×10^{-4}
Weight	[g/m]	50

Tab. 64: Technical data system pipe

Vertical payloads

Vertical payloads acc. to DIN EN 1991-1-1

Max. point load range [kN]	Category [acc. to DIN 1055-3]	Payload [kN/m²]	Examples of use
1,0	A2	1,5	Living rooms/lounges and halls in residential buildings incl. kitchens and bathrooms, bedrooms in hospitals, hotel rooms
	A3	2,0	
2,0	B1	2,0	Office areas, medical practices, ward rooms, and respective halls
	D1	2,0	Surfaces of salesrooms with up to 50 m² floor space in residential, office, and similar buildings
3,0	B2	3,0	Halls in hospitals, hotels, retirement homes, boarding schools, children's daycare centres etc.: kitchens and treatment rooms incl. operating theatres without heavy equipment
4,0	B3	5,0	Halls in hospitals, hotels, retirement homes, boarding schools, children's daycare centres etc.: kitchens and treatment rooms incl. operating theatres with heavy equipment
	C1	3,0	Areas with tables; e.g. school rooms, cafeterias, restaurants, dining halls, reading rooms, reception rooms
	C2	4,0	Areas with permanently installed seat; e.g. areas in churches, theatres or cinemas, congress halls, lecture halls, meeting rooms, waiting rooms
	C3	5,0	Freely accessible areas; e.g. museum areas, exhibition areas etc., and entrance areas in public buildings and hotels
	C5	5,0	Areas for large gatherings of people, e.g. concert halls, entrance areas, grandstands with permanently installed seats
	D2	5,0	Sales rooms in shops and department stores

Tab. 65: Vertical payloads acc. to DIN EN 1991-1-1

Floor sub-constructions with insulation acc. to DIN EN 1264-4

To minimise heat losses to adjacent areas or to avoid noise annoyance, floor structures must be designed according to the requirements of DIN EN 1264.

Installation situation acc. to DIN EN 1264-4

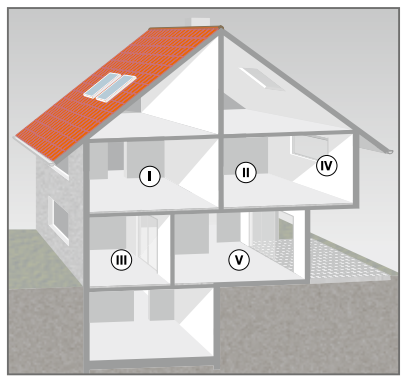


Fig. 111: Installation situations according to DIN EN 1264-4

	Position	Thermal resistivity Rλ insulation [m² K/W]
I	over a heated room	0,75
II	over an unevenly heated room	1,25
III	over an unheated room	1,25
IV	against outside air *	2,0
V	against the soil **	1,25

Tab. 66: Minimum thermal resistivities of the insulation layer under the pipes of the underfloor heating or cooling system according to DIN EN 1264-4 **

* - 5 °C > T_a ≥ -15 °C
** In case of a groundwater table ≤ 5 m, this value should be increased.
*** These requirements are valid for heating and cooling systems. For systems exclusively used for cooling, however, these are recommended values only.

The thermal resistivity of the ceiling is considered when determining the downward losses.

Installation situation I

over a heated room

$R\lambda$ Dä = 0.75 m²K/W

Fonterra Reno on Fermacell panels 10 mm

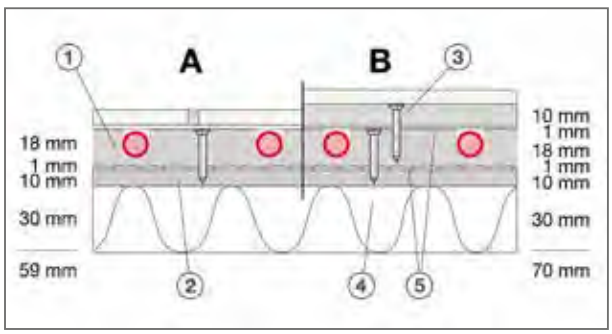


Fig. 112: Fonterra Reno on Fermacell panels 10 mm

Key
A - tiles (variable thickness)
B - other top soils (variable thickness)
① Fonterra Reno system element
② Fermacell construction panel
③ Fermacell construction panel min. 10 mm
④ Polystyrene EPS 040 DEO max. 30 mm
⑤ screed adhesive

Installation situation II+III+V

over an unevenly heated room, over an unheated room, and against soil

$R_{\lambda,Dä}$ = 1.25 m²K/W

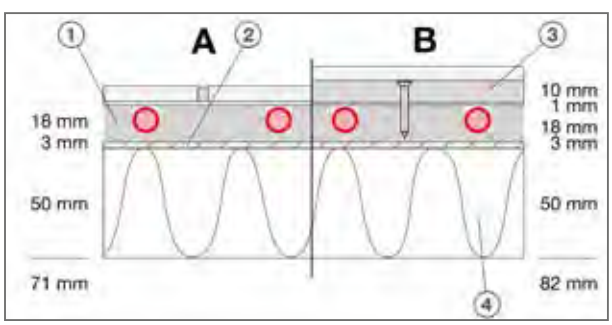


Fig. 113: Fonterra Reno on Fermacell panels 10 mm

Key
A - tiles (variable thickness)
B - other top soils (variable thickness)
① Fonterra Reno system element
② flexible adhesive (e.g. PCI-Nanolight)
③ Fermacell construction panel min. 10 mm
④ rigid foam supporting panel 50 mm

Installation situation IV

against outside air, $R_{\lambda D\ddot{a}} = 2.00\,m^2K/W$

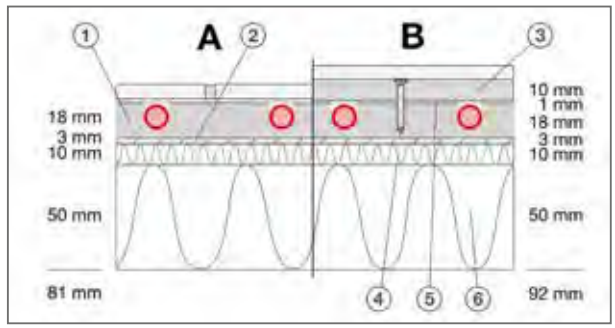


Fig. 114: Fonterra Reno on Fermacell panels 10 mm

Key
A - tiles (variable thickness)
B - other top floors (variable thickness)
① Fonterra Reno system element
② flexible adhesive (e.g. PCI-Nanolight)
③ Fermacell construction panel min. 10 mm
④ rigid foam supporting panel 10 mm
⑤ screed adhesive
⑥ insulation; e.g. PUR 53 mm

Special structures with reduced insulation layers

The Fonterra Reno offers a wide range of options for combinations of insulation and carrier layers. Below, please find an excerpt of a list of thin-layer sub-constructions. These and the subsequent floor sub-constructions do not comply with the minimum heat insulation requirements according to the EnEV and DIN EN 1264-4, and must be coordinated or agreed individually.
Other possible combinations can be coordinated with the Viega Service Center. A level, firm, non-swinging sub-construction is the precondition for all floor sub-constructions shown.

Floor sub-construction on rigid foam supporting panel

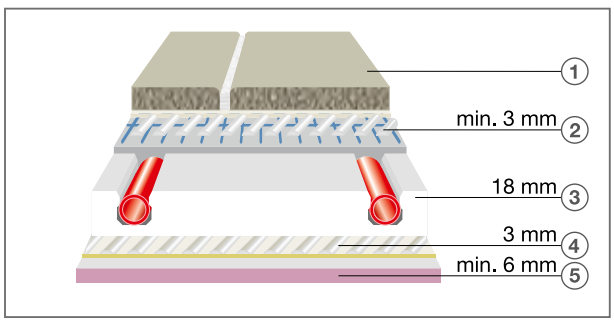


Fig. 115: Floor sub-construction on rigid foam supporting panel

Key
① Tile surface
② Flexible adhesive and reinforcement fabric
③ Fonterra Reno system panel
④ Flexible adhesive
⑤ Rigid foam supporting panel

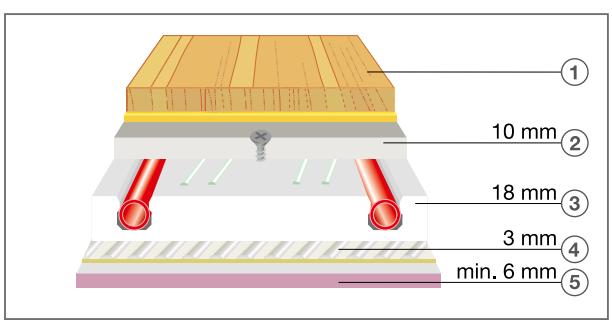


Fig. 116: Floor sub-construction on rigid foam supporting panel

Key
① Variable floor covering and adhesive layer
② Plasterboard construction panel
③ Fonterra Reno system panel
④ Flexible adhesive
⑤ Rigid foam supporting panel

Floor sub-construction on plasterboard construction panel

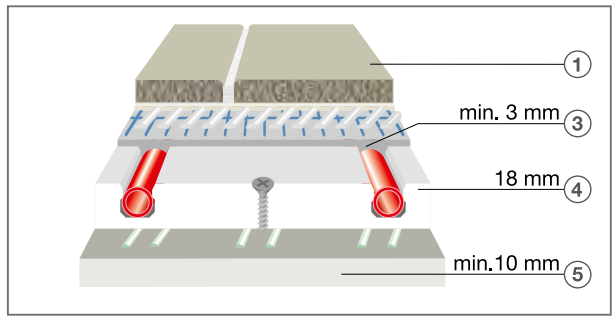


Fig. 117: Floor sub-construction on plasterboard construction panel

Key
① Tile surface
③ Flexible adhesive and reinforcement fabric
④ Fonterra Reno system panel
⑤ Plasterboard construction panel

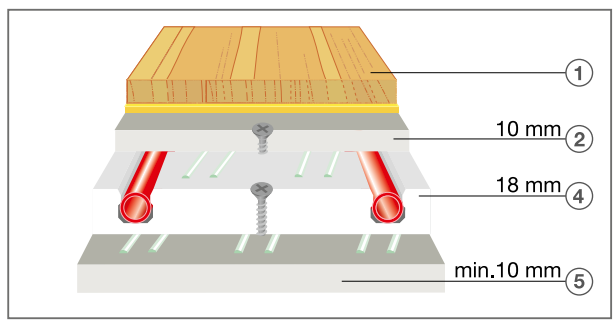


Fig. 118: Floor sub-construction on plasterboard construction panel

Key
① Variable floor covering and adhesive layer
② Plasterboard construction panel
④ Fonterra Reno system panel
⑤ Plasterboard construction panel

Floor sub-construction with casting compound

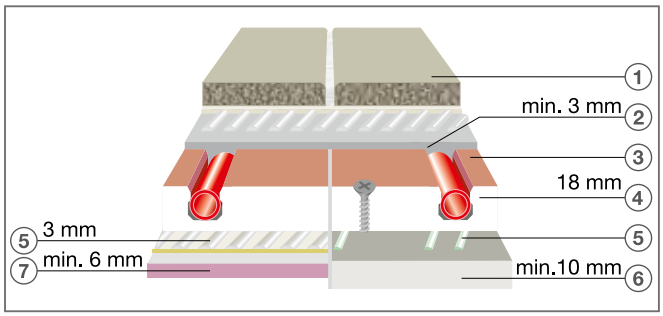


Fig. 119: Floor sub-construction with casting compound

Key
① Variable floor covering and adhesive layer
② Casting compound
③ Primer
④ Fonterra Reno system panel
⑤ Adhesive layer
⑥ Plasterboard construction panel
⑥ Rigid foam supporting panel

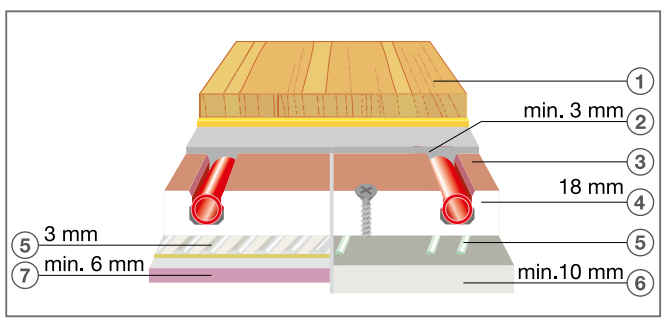


Fig. 120: Floor sub-construction with casting compound

Key
① Variable floor covering and adhesive layer
② Casting compound
③ Primer
④ Fonterra Reno system panel
⑤ Adhesive layer
⑥ Plasterboard construction panel
⑦ Rigid foam supporting panel

Floor constructions on boarding

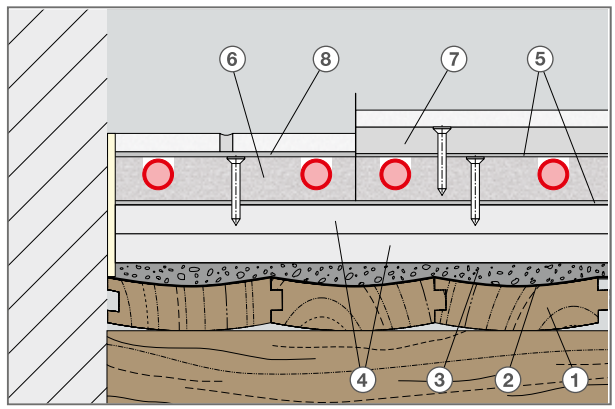


Fig. 121: Floor constructions on hardwood floors

Key
① Boarding
② Trickling protection
③ Bulk product
④ Plasterboard screed element
⑤ Adhesive layer
⑥ Fonterra Reno system panel
② Plasterboard construction panel minimum 10 mm
⑧ Flexible adhesive and fabric

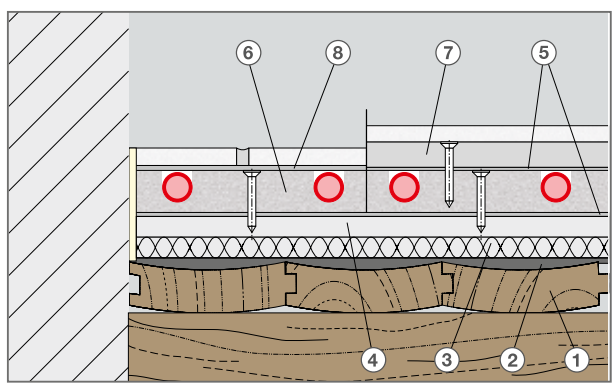


Fig. 122: Floor constructions on hardwood floors

Key
① Boarding
② Levelling mass
③ Insulation EPS DEO max. 30 mm
④ Plasterboard construction panel minimum 10 mm
⑤ Adhesive layer
⑥ Fonterra Reno system panel
② Plasterboard construction panel minimum 10 mm
⑧ Flexible adhesive and fabric

Performance data

After determination of the heat flow density, which follows from the determined standard heating load of a room, the heating fluid overtemperature in dependence on the selected floor covering can be read from the output diagrams.

Determination of the heating fluid overtemperature with different floor coverings, on 10 mm Fermacell construction panel.

Heating fluid overtemperature with different floor coverings, with construction panel

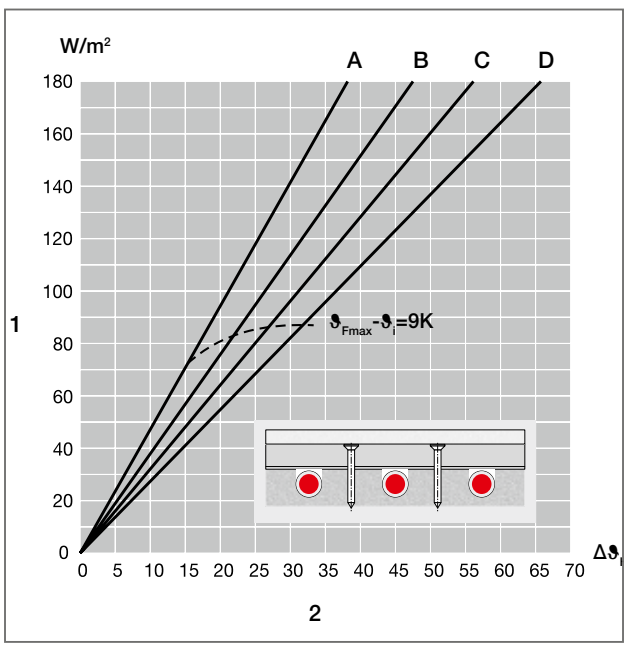


Fig. 123: Heating fluid overtemperature with different floor coverings, with construction panel

Key

① Heat flow density q [W/m2]
② Heating fluid overtemperature $\Delta\vartheta_H$
A - tiles ($R_{\lambda B}=0$)
B - parquet/laminate ($R_{\lambda B}=0.05$)
C - carpet, medium ($R_{\lambda B}=0.1$)
D - carpet, thick ($R_{\lambda B}=0.15$)

Reading example

1. Calculate the required heat output per m²
   q = e.g. 55 W/m²
2. Read the heating fluid overtemperature with the respective floor covering from the diagram
   e.g. with direct tiling = 12 K
3. Room temperature + overtemperature of the fluid = heating fluid temperature
   e.g. 20 °C + 12 K = 32 °C
   (mean heating water temperature)

Any losses to adjacent areas not considered in the heating load calculation must be adjusted in the form usually applied with underfloor heating, i.e. "adjusted heat requirement plus actual losses".

Determination of the overtemperature of the heating fluid with direct tiling (minimal system structure).

Heating fluid overtemperature with direct tiling

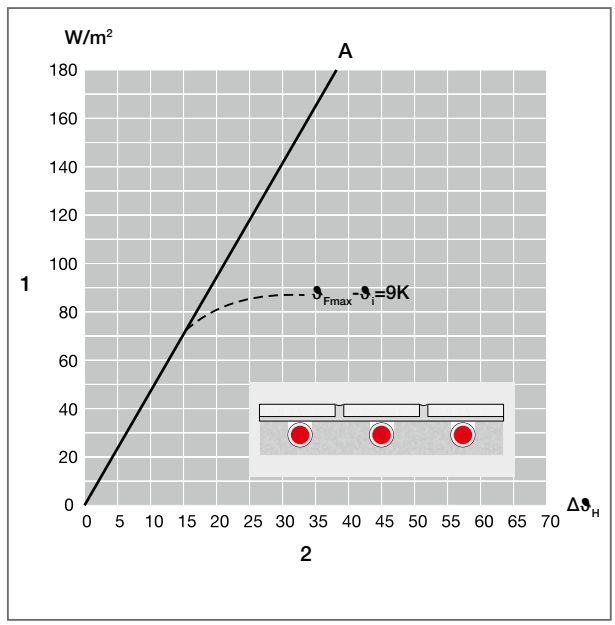


Fig. 124: Overtemperature of the heating fluid with direct tiling

Key
① Heat flow density q [W/m2]
② Heating fluid overtemperature $\Delta\vartheta_H$
A - tiles ($R_{\lambda B}=0$)

Determination of the heating fluid overtemperature with application of 3 mm casting compound (sub-construction: 10 mm construction panel and heat insulation EPS 040 DEO 30 mm).

Heating fluid overtemperature with casting compound and different floor coverings

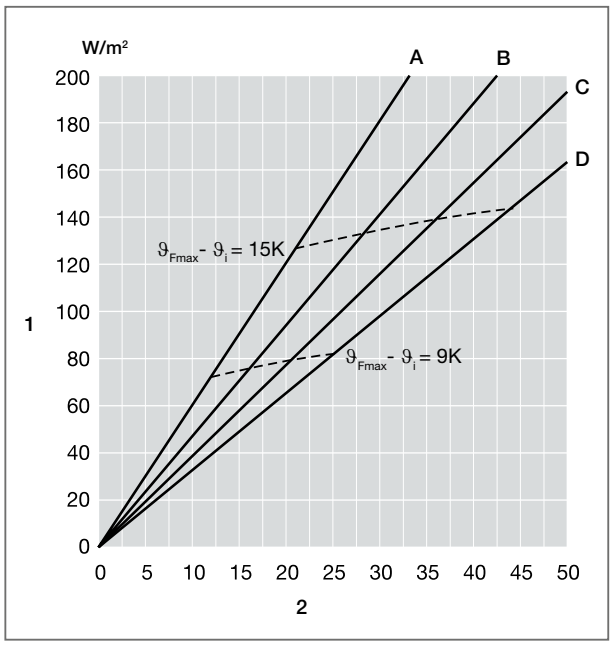


Fig. 125: Heating fluid overtemperature with casting compound and different floor coverings

Key

① Heat flow density q [W/m2]
② Heating fluid overtemperature $\Delta\vartheta_H$
A - tiles ($R_{\lambda B} = 0$)
B - parquet/laminate ($R_{\lambda B} = 0.05$)
C - carpet, medium ($R_{\lambda B} = 0.1$)
D - carpet, thick ($R_{\lambda B} = 0.15$)

Comparison of the output values with different versions

	$R_{\lambda B}$	Reno with construction panel	Reno grouted
Tile	0,00	50 W/m²	60 W/m²
Parquet/laminate	0,05	38 W/m²	48 W/m²
Timber	0,10	32 W/m²	39 W/m²
Carpet/rug	0,15	28 W/m²	33 W/m²

Tab. 67: Comparison of the output values with different versions and identical supply temperature*

* supply temperature: 33 °C, difference: 6 K, room temperature: 20 °C, heating fluid overtemperature: 10 K

With an unchanged supply temperature, an approx. 20% increase of the heating output can be achieved if Reno is used with a casting compound.

Pressure loss diagram for PB pipes 12 x 1.3

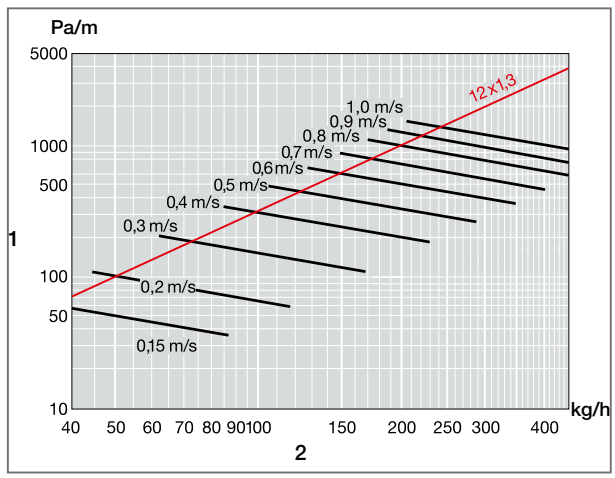


Fig. 126: Pressure loss diagram for PB pipes 12 x 1.3

Key

① Pressure gradient R [Pa/m]
② Mass flow m [kg/h] (fluid: water)

	Mean heating water temperature in °C with different top floors and room temperatures									
Required heat output	Direct tiling		Tile surface on 10 mm Fermacell panel		Parquet/laminate on 10 mm Fermacell panel		Carpet medium thickness on 10 mm Fermacell panel		Carpet, thick on 10 mm Fermacell panel	
Room temperature	20 °C	24 °C	20 °C	24 °C	20 °C	24 °C	20 °C	24 °C	20 °C	24 °C
20 W/m²	24,0	28,0	24,0	28,0	25,5	29,5	26,5	30,5	27,5	32,0
25 W/m²	25,5	29,5	25,5	29,5	26,5	30,5	27,5	31,5	28,5	32,5
30 W/m²	26,5	30,5	26,5	30,5	27,5	31,5	29,0	33,0	31,0	35,0
35 W/m²	27,5	31,5	27,5	31,5	29,0	33,0	31,5	35,5	33,0	37,0
40 W/m²	28,5	32,5	28,5	32,5	31,0	35,0	32,5	36,5	34,5	38,5
45 W/m²	29,5	33,5	29,5	33,5	32,0	36,0	34,0	37,0	36,5	40,5
50 W/m²	31,0	35,0	31,0	35,0	33,5	37,5	36,0	40,0	38,5	42,5
55 W/m²	32,0	36,0	32,0	36,0	34,5	38,5	37,0	41,0	40,0	44,0
60 W/m²	32,5	36,5	32,5	36,5	36,5	4,05	38,5	42,5	42,0	46,0
65 W/m²	34,0	38,0	34,0	38,0	37,5	41,5	41,0	45,0	43,5	47,5
70 W/m²	35,0	39,0	35,0	39,0	38,5	42,5	42,0	46,0	46,5	50,5
75 W/m²	36,5	40,5	36,5	40,5	40,0	44,0	43,5	47,5	48,0	52,0
80 W/m²	37,5	41,5	37,5	41,5	41,5	45,5	45,0	51,0	49,0	53,0
85 W/m²	38,0	42,0	38,0	42,0	42,5	46,5	46,5	50,5	51,0	55,0
90 W/m²	39,0	43,0	39,0	43,0	43,5	47,5	48,0	52,0	52,5	56,5
95 W/m²	40,0	44,0	40,0	44,0	45,0	49,0	49,5	53,5	54,5	57,5
100 W/m²	41,5	45,5	41,5	45,5	46,5	50,5	51,5	55,5	56,5	60,5
105 W/m²	42,5	46,5	42,5	46,5	48,0	52,0	52,5	56,5	58,5	62,5
110 W/m²	43,5	47,5	43,5	47,5	49,0	53,0	54,0	60,0	60,5	64,5
115 W/m²	44,5	48,5	44,5	48,5	51,0	55,0	56,5	60,5	62,5	64,5
120 W/m²	46,0	50,0	46,0	50,0	52,0	56,0	57,5	61,5	63,5	67,5

Tab. 68 Table for determination of the mean heating water temperature

In the orange-coloured range, the surface temperature is over 29 °C or 33 °C for bathrooms, shower rooms, etc.

Required heat output	Mean heating water temperature in °C with different top floors and room temperatures							
	Tile surface on 3 mm casting compound		Parquet/laminate on 3 mm casting compound		Carpet, medium thickness on 3 mm casting compound		Carpet, thick on 3 mm casting compound	
Room temperature	20 °C	24 °C	20 °C	24 °C	20 °C	24 °C	20 °C	24 °C
20 W/m²	23,5	27,5	24,0	28,0	25,0	29,0	26,5	30,5
25 W/m²	24,0	28,0	25,5	29,5	26,5	30,5	27,5	31,5
30 W/m²	25,0	29,0	26,5	30,5	27,5	31,5	28,5	32,5
35 W/m²	25,5	29,5	27,5	31,5	28,5	32,5	30,0	34,0
40 W/m²	26,5	30,5	28,5	32,5	30,5	34,5	32,0	36,0
45 W/m²	27,5	31,5	29,0	33,0	31,5	35,5	33,0	37,0
50 W/m²	28,5	32,5	31,0	35,0	33,0	37,0	35,5	39,5
55 W/m²	29,0	33,0	32,0	35,0	34,0	38,0	37,0	41,0
60 W/m²	30,0	34,0	32,5	36,5	35,5	39,5	38,5	42,5
65 W/m²	31,0	35,0	33,0	37,0	37,0	41,0	40,0	44,0
70 W/m²	31,5	35,5	35,0	39,0	38,5	42,5	41,5	45,5
75 W/m²	32,5	36,5	36,0	40,0	40,0	44,0	43,0	47,0
80 W/m²	33,5	37,5	37,0	41,0	41,0	45,0	44,5	48,5
85 W/m²	34,5	38,5	38,0	42,0	42,0	46,0	46,0	50,0
90 W/m²	35,0	39,0	39,0	43,0	43,5	47,5	48,0	52,0
95 W/m²	36,0	40,0	40,5	44,5	45,0	49,0	49,5	53,5
100 W/m²	36,5	40,5	41,5	45,5	46,5	50,5	51,0	55,0
105 W/m²	37,5	41,5	42,5	46,5	47,5	51,5	52,5	56,5
110 W/m²	38,5	42,5	43,5	47,5	48,5	52,5	54,0	58,0
115 W/m²	39,0	43,0	45,0	49,0	50,0	54,0	55,0	59,0
120 W/m²	40,0	44,0	46,0	50,0	51,5	55,5	56,5	60,5

Tab. 69: Table for determination of the mean heating water temperature for Fonterra Reno with casting compound

In the orange-coloured range, the surface temperature is above the specified value of 29 °C or 33 °C (for bathrooms).

Mounting

Structural requirements

Structural requirements for the installation of a Reno surface heating system

For installing the floor heating panels, the following work step sequence of the various trade lots must be observed:

- Windows and doors installed
- Electrical installations (wall breaking, empty pipe installation etc.), sanitary and other pipeline installations acc. to DIN EN 1264-4 completed
- Plastering work completed

Underground

- The underground must be firm, dry, and non-resilient.
- The underground must be clean (swept clean).
- The underground must be level and have no raised points.
- Any irregularities in height must be compensated for with levelling compound or a suitable filling material (note levelness tolerances).

> **!** The levelness of the underground is particularly important for the installation. The levelness tolerances according to DIN 18202 line 3 must be met.

Levelness tolerances

Checking the depth gauges

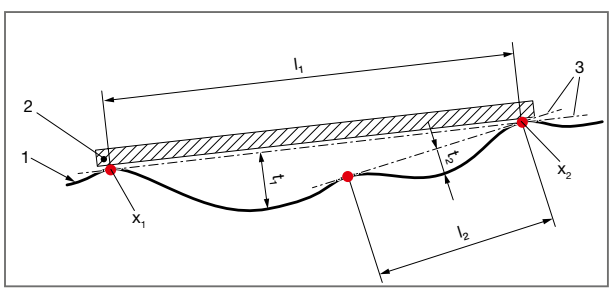


Fig. 127: Checking the depth gauges, e.g. by means of levelling staff and V-head

Key
① Actual surface
② Levelling staff
③ Vanishing line of the levelling staff
x_1, x_2 High points
t_1, t_2 Clearance to the low point (depth gauge)
l_1, l_2 Measuring point interval

Determining the levelness deviations

- Use a levelling staff (2 to 4 m, depending on room size) to check the surface for high points.
- Determine the measuring point interval (l1, l2) between two high points (x1 and x2).
- Use a V-head to determine the interval between levelling staff and low point (depth gauge t1, t2).
- Compare the resulting values to the values in the table below.

Permissible levelness deviations

Measuring point interval l1, l2	Limit value depth gauge t1, t2
0.5 m	< 3 mm
1.0 m	< 4 mm
1.5 m	< 5 mm
2.0 m	< 6 mm
3.0 m	< 8 mm
4.0 m	< 10 mm

Tab. 70 Permissible levelness deviations acc. to Figure 5, DIN 18202 (Table 3, line 3)

Repeat this process to check all the high points in the room. Deviations beyond the tolerances must be compensated before laying the system panels.

Levelness tolerances acc. to DIN 18202

Line	Reference	Depth gauges as limit values in mm with measuring point distances in m				
		0.1 m	1 m	4 m	10 m	15 m
3	Finished floor surfaces, e.g. screeds as fit-for-use screeds, screeds for reception of floor coverings, floor coverings, tile surfaces, levelled-out and glued coverings	2 mm	4 mm	10 mm	12 mm	15 mm
4	Same as line 3 but with stricter requirements	1 mm	3 mm	9 mm	12 mm	15 mm

Tab. 71 Levelness tolerances acc. to DIN 18202 for various floor coverings with installation of Fonterra Reno

Mounting conditions

The relative humidity should be less than 70%, and the room temperature should be between 10 and 30 °C.

Transport/storage/mounting

Before installation, allow the Fonterra Reno system panels to adjust to the room climate environment.
To this end, store the system panels frost-free in a flat position in a dry and clean place in the building. Do not install them at a relative humidity of > 70% and a room temperature of < 5°C. For application, the adhesive must have a temperature of > 10 °C. Wait until immediately before mounting the panels before you remove the packaging material to prevent the panel material from absorbing moisture. Transport the panels individually in a vertical position.

Floor waterproofing

Building waterproofing for surfaces bordering the soil
In accordance with DIN 18560 part 2, "Waterproofing against soil moisture" and "non-pressing water" must be specified by the building planner and provided before installing the system (see DIN 18195-4 and DIN 18195-5). The work should be done by a qualified installation company.
It is imperative that polystyrene heat and footfall sound insulation is protected with a PE foil against building waterproofing containing bitumen.

Preparation

Edge insulation strip

With heating screeds, the edge insulation strips must allow for at least 5 mm of movement. Corresponding edge insulation strips must be installed at the walls and other upright building elements, such as door frames or columns. Because the Fonterra Reno surface heating is poured subsequently, an edge insulation strip of 10 mm thickness must be provided, in the same way as with flow screeds.

Attaching the edge insulation strip

- Attach the edge insulation strip from the insulation of the upper edge of the covering.

The adhesive layer and the trailing sheet of the edge insulation strip must not be above the height of the finished floor covering.

- Lay the trailing sheet free of tension over the entire surface in the room.
- Use adhesive tape to seal the foil and the edge insulation strip tightly at the ends.
- Let the foil overlap at the edges.
- Attach additional sealing foil at the external edges.
- Arrange the film flaps of the edge insulation strip under the base layer.

If you intend to process the Reno system panel with casting compound, then pay special attention to the leak tightness of edges and corners to prevent casting compound from flowing behind the panels.

Heat insulation

Heat insulation to be installed is defined in the EnEV, DIN 4108 and DIN EN 1264. It must be coordinated with the Viega Service Center in keeping with the installation height, the available total height, and the desired floor coverings.
If additional insulation layers are required, they must be laid staggered and closely abutting under the on-site base layer. They must comply with the general considerations of DIN 13162 - 13171, must be tested and marked.
When installing heat insulation, attach the film flaps of the edge insulation strip under the base layer.

Installation example

Planning documents required

- Installation plan scale 1:50 or 1:100, as an alternative
- Plan as dwg or dxf file
- Standard heating load acc. to DIN EN 2831 per room
- Value of the heat flow density for the most unfavourable room
- Type of surface heating system
- Placement of the manifold
- Heat generator - calorific value or low temperature boiler, heat pump, solar energy, etc.
- Floor covering for the individual rooms
- Maximum traffic loads
- Selection of the suitable floor installation construction
- Control - Type of single room regulation and possibly controlled by atmospheric conditions
- Agreed room temperatures

Planning example for a room

Reconstruction of an old building with tiles as top floor

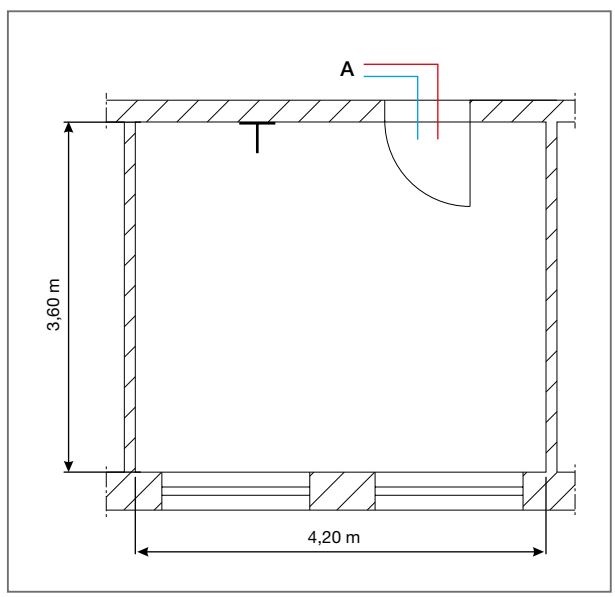


Fig. 128: Refurbishment of an old building with tiles as top floor (floor sub-construction variant 1)

Rectangular room, connection line (A = 2x5 m) through the door, level underground, floor covering freely selectable.

Determination of the supply lines

Determine the position of the supply lines and the installation limits (e.g. joint at the door) and mark them on the underground if required.

Determination of the number of heating circuits

- Calculate the surface (A) which can be covered
- Determine the length of the total connection line (AB)
- Calculate the pipe requirement (PR) for the room (A * 10 m/m²)
- Calculate the number of heating circuits (HC)

Determination of the pipe laying direction

If possible, the pipes are laid vertically to the wall at which the supply lines enter the room. With rooms of a length/width ratio > 2 or a width under 1.2 m, the pipes should always be laid in longitudinal direction.

Determining the laying direction

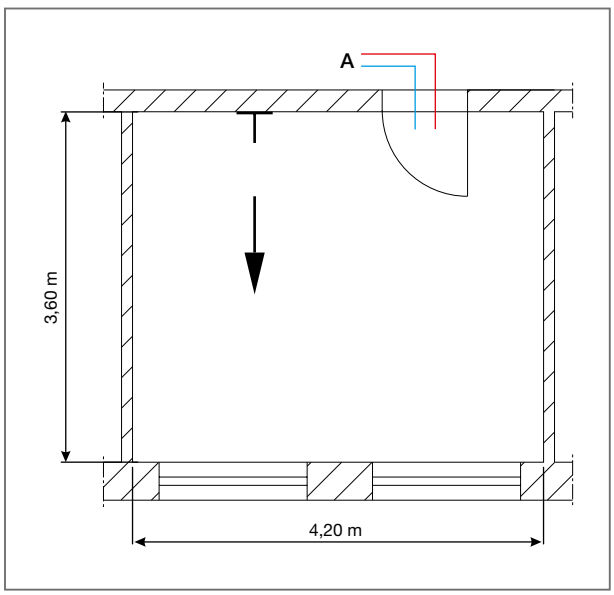


Fig. 129: Determining the laying direction

Calculate the heating circuit length or determine the number of heating circuits

- Permissible heating circuit length
  Maximum pipeline length = 80 m
  80 m – (single connection line x 2) = permissible heating circuit length
  Permissible heating circuit length = 80 m – 10 m = **70 m**
- Number of heating circuits
  Number of heating circuits = pipe length in the room / heating circuit length
  Number of heating circuits = 151.2 m / 70 m = **2.16**
- Round the number of heating circuits up to the next integer
  Number of heating circuits > 2.16 accordingly: **3 heating circuits**

Check the result

- Checking the pressure loss per heating circuit
  Check the pressure loss per heating circuit, particularly if a smaller inclination δ was selected.

Mass determination of the top and basic panels (see Tab. 72):

- Given from the previous calculation process:
  Number of heating circuits = 3 pc.
  Room length RL = 4.20 m
  Room depth RD = 3.60 m
- Top panels
  Calculated value from the table:
  Number of top panels = 14 pc.

- Basic panels
  Calculated value from the table:
  Top panel depth TD = 0.62
  Residual room depth RRD
  RRD = RD - TD
  3.60 – 0.62 = **2.98 m**

  Calculated value from the table:
  Number of basic panels = 21 pc.

Calculation process

Determination of the required heat output
Actual standard heating load/usable floor surface = heat flow density (q)
(Actual standard heating load = adjusted standard heating load + actual downward losses)
Heat flow density = 830 W / 15.12 m² = 55 W / m² (in the most unfavourable room)

Determination of the heating fluid temperature dependent on the calculated heat flow density

- The heat flow density **(q)** (W / m²) and the specified floor covering determine the required heating fluid overtemperature in °C

- The maximum supply temperature **(Q_V)** is 50 °C
- The recommended temperature incline **(δ)** between supply temperature and return temperature is 5 K to 6 K

With a heat flow density of 55 W/m² and tiles as floor covering, the following result follows from the output diagram (see above) with a minimum floor sub-construction (direct tiling) of the Fonterra Reno system:

- Heating fluid overtemperature = 12 °C (read from the diagram)
- Calculation of the supply temperature
  Heating fluid temperature = overtemperature of the heating fluid + room temperature
  Qm = 12 °C + 20 °C = 32 °C
  Supply temperature QV = approx. 35 °C/return temperature QR " approx. 29 °C
- The specification of a supply temperature of max. 50 °C is met.

Installation data / mass calculation

Determination of the **pipe laying direction**
If possible, plan it vertical to the wall at which the supply line enters the room.
In this example, the laying direction is from top to bottom.
Determination of the **coverable surface**

- Length x width – non-coverable surface = coverable surface
  4.20 m x 3.60 m – 0.00 m² = **15.12 m²**
- General calculation of the **total connection line;** as an alternative, measure length in the plan
  2.0 x 5.0 m = **10.0 m**
- Calculation of the **pipeline length in the room**
  coverable area in m² x 10 m/m² = pipe length in the room
  15.12 m² x 10 m/m² = **151.2 m**

Mass calculation
(see the table on the next page)

Key

HC Number of heating circuits
RW Room width
RD Room depth
TD Top panel depth
RRD Residual room depth, follows from RD - TD

Selection table for calculation of the quantity of top and basic panels required

Number of top panels for Fonterra Reno													
	Room width (RW) up to ... m												
HC	0,3	0,6	0,9	1,2	1,6	1,9	2,2	2,5	2,8	3,1	3,4	3,7	4,0
1	1	1	2	2	3	3	4	4	5	5	6	6	7
2	1	1	2	2	3	3	4	4	5	5	6	6	7
3	1	2	3	4	5	6	7	8	9	10	11	12	13
4	2	3	5	6	8	9	11	12	14	16	17	18	20
5	2	4	6	8	10	12	14	16	18	20	22	24	26
6	2	4	6	8	10	12	14	16	18	20	22	24	26
7	3	5	8	10	13	15	18	20	23	25	28	30	33
8	3	5	8	10	13	15	18	20	23	25	28	30	33
9	3	6	9	12	15	18	21	24	27	30	33	36	39
RRD	**Number of basic panels for Fonterra Reno**												
up to 1.0 m	1	1	2	2	3	3	4	4	5	5	6	6	7
up to 1.5 m	1	2	3	3	4	5	6	6	7	8	9	9	10
up to 2.0 m	1	2	3	4	5	6	7	8	9	10	11	12	13
up to 2.5 m	2	3	4	5	7	8	9	10	12	13	14	15	17
up to 3.0 m	2	3	5	6	8	9	11	12	14	16	17	18	20
up to 3.5 m	2	4	6	7	9	11	13	14	16	18	20	21	23
up to 4.0 m	2	4	6	8	10	12	14	16	18	20	22	24	26
up to 4.5 m	3	5	7	9	12	14	16	18	21	23	25	27	30
up to 5.0 m	3	5	8	10	13	15	18	20	23	25	28	30	33
up to 5.5 m	3	6	9	11	14	17	20	22	25	28	31	33	36
up to 6.0 m	3	6	9	12	15	18	21	24	27	30	33	36	39
up to 6.5 m	4	7	10	13	17	20	23	26	30	33	36	39	43
up to 7.0 m	4	7	11	14	18	21	25	28	32	35	39	42	46
up to 7.5 m	4	8	12	15	19	23	27	30	34	38	42	45	49

Tab. 72: Calculating the required quantity of top and basic panels

Number of top panels for Fonterra Reno													
	Room width (RW) up to ... m												
HC	4,3	4,6	5,0	5,3	5,6	5,9	6,2	6,5	6,8	7,1	7,4	Rows	TD
1	7	8	8	9	9	10	10	11	11	12	12	1	0,31
2	7	8	8	9	9	10	10	11	11	12	12	1	0,31
3	14	15	16	17	18	19	20	21	22	23	24	2	0,62
4	21	23	24	26	27	29	30	32	33	35	36	3	0,93
5	28	30	32	34	36	38	40	42	44	46	48	4	1,24
6	28	30	32	34	36	38	40	42	44	46	48	4	1,24
7	35	38	40	43	45	48	50	53	55	58	60	5	1,55
8	35	38	40	43	45	48	50	53	55	58	60	5	1,55
9	42	45	48	51	54	57	60	63	66	69	72	6	1,86
RRD	**Number of basic panels for Fonterra Reno**												
up to 1.0 m	7	8	8	9	9	10	10	11	11	12	12		
up to 1.5 m	11	12	12	13	14	15	15	16	17	18	18		
up to 2.0 m	14	15	16	17	18	19	20	21	22	23	24		
up to 2.5 m	18	19	20	22	23	24	25	27	28	29	30		
up to 3.0 m	21	23	24	26	27	29	30	32	33	35	36		
up to 3.5 m	25	27	28	30	32	34	35	37	39	41	42		
up to 4.0 m	28	30	32	34	36	38	40	42	44	46	48		
up to 4.5 m	32	34	36	39	41	43	45	48	50	52	54		
up to 5.0 m	35	38	40	43	45	48	50	53	55	58	60		
up to 5.5 m	39	42	44	47	50	53	55	58	61	64	66		
up to 6.0 m	42	45	48	51	54	57	60	63	66	69	72		
up to 6.5 m	46	49	52	56	59	62	65	69	72	75	78		
up to 7.0 m	49	53	56	60	63	67	70	74	77	81	84		
up to 7.5 m	53	57	60	64	68	72	75	79	83	87	90		

Notes on panel laying

Determine the number and position of the top panel rows for the start of laying

Heating circuits	Row top panels	Area top panels/ meter room length	Start laying with	Rigid foam supporting panel start with
1	1	0.31 m²/m	½ T panel	entire panel
2	1	0.31 m²/m	½ T panel	entire panel
3	2	0.62 m²/m	entire K panel	Panel 45 cm wide
4	3	0.93 m²/m	½ T panel	Panel 45 cm wide
5	4	1.24 m²/m	entire K panel	Panel 45 cm wide
6	4	1.24 m²/m	entire K panel	Panel 45 cm wide

Tab. 73: Determine the number and position of the top panel rows for the start of laying

If rigid foam supporting panels are to be used as sub-construction, ensure that joint offset to the system panels is provided. To this end, use the rigid foam supporting panels specified in the table above and lay them down in staggered bond formation with an offset of at least 20 cm diagonal to the laying direction of the system panels. Allow any applied adhesive layers to dry out before further processing.

- Start laying down the system panels on the left side in the room and work your way to the right side.
- In narrow rooms such as halls, Viega recommends to arrange the panels lengthwise, or to use top panels only.
- The system panels are laid down in staggered bond formation.
- Residual panels of one row can be arranged as the first element of the new row.
- Provide joints and passages as specified in the construction details.
- Straight cuts can be made with a circular hand saw with edge guide and dust extraction.
- Use a pad saw to make bends and small cutouts.
- Remove any sawing residues before proceeding.

Define a rectangular corner to start laying. In the example shown above, laying starts in the top left corner with 2 rows of top panels.

Determining the start of laying

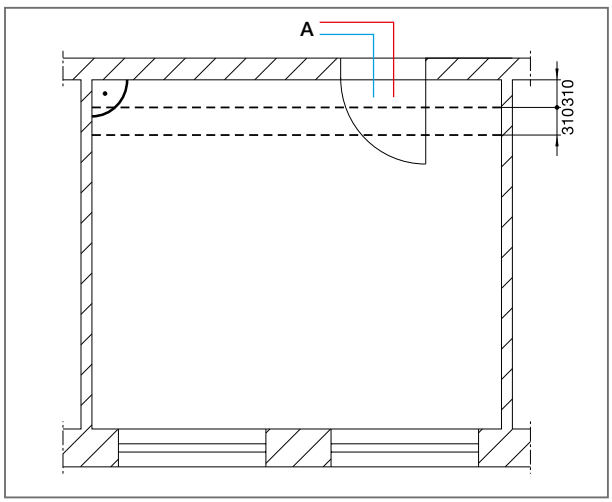


Fig. 130: Determining the start of laying

With 2 rows of top panels: Start with an entire top panel

Laying top panels

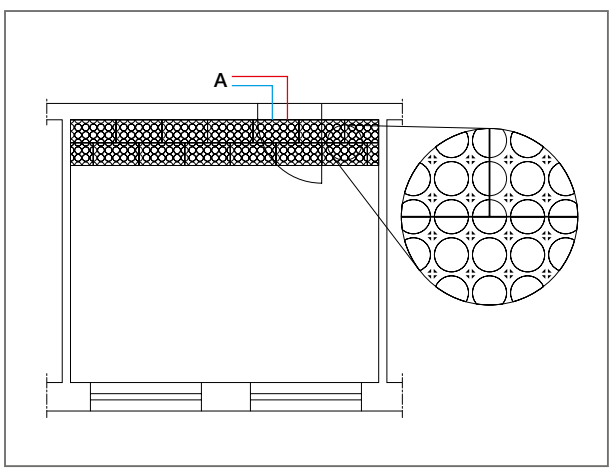


Fig. 131: Laying top panels

Make sure the pipe guiding grooves fall in line.

Avoid cross grooves; a joint offset of ≥ 200 mm must be observed.

Start laying the top panels to the opposite wall, proceeding from left to right (rows). Accurately cut the last basic panel of a row to size (see B). Avoid cross grooves; a joint offset of ≥200 mm must be observed.

Laying basic panels

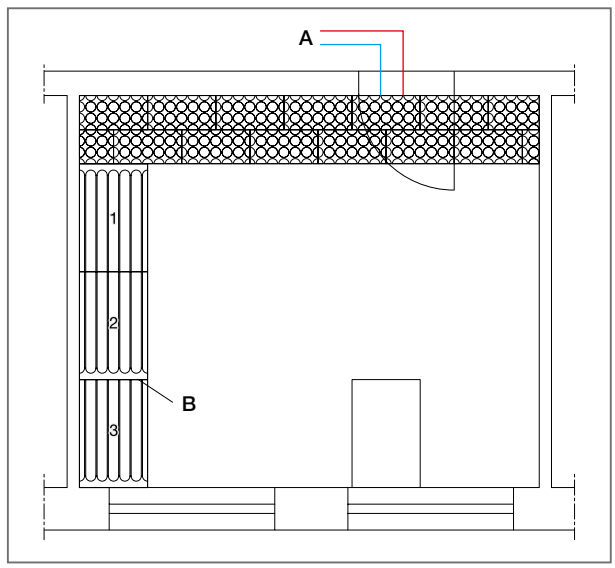


Fig. 132: Laying basic panels

Residual pieces with a minimum edge length ≥200 mm can be reserved for further use. Pieces with an edge length >200 mm can be used later for fitting in between (see panels 4b and 7b).

Using residual pieces

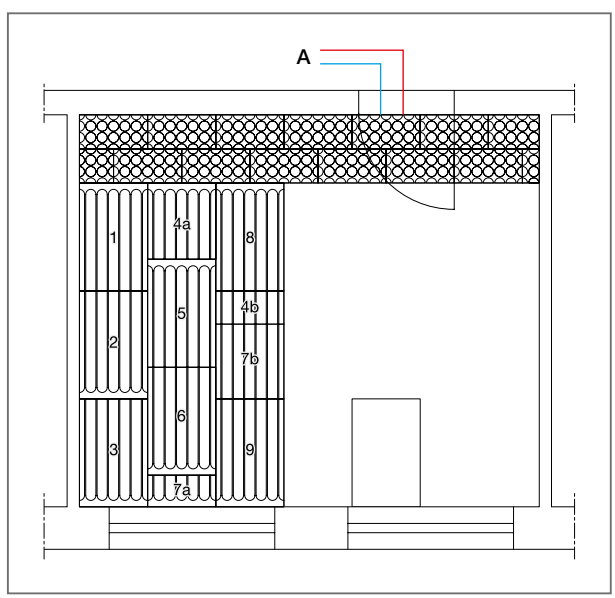


Fig. 133: Using residual pieces

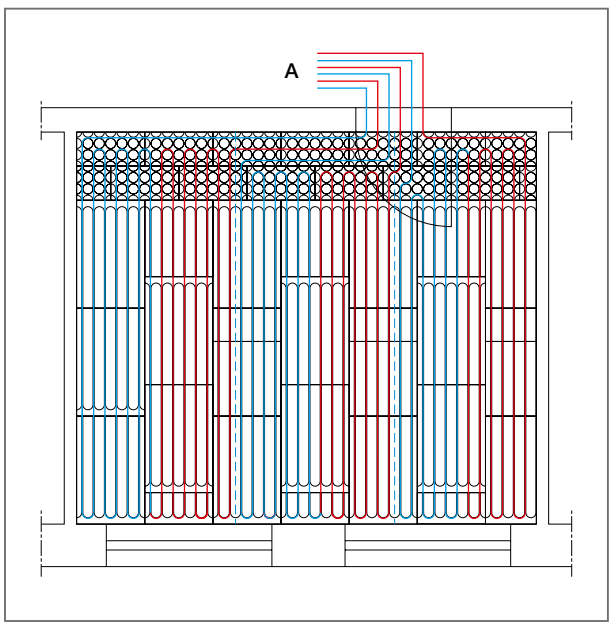
Pipe installation

Mark the specified heating circuit sizes on the floor.

When using Fonterra Reno casting compound for the floor sub-construction, you need to prime the system panels first.

Before installing the pipelines, clean the pipe guiding grooves (preferably with a vacuum cleaner).

Start with the heating circuit farthest away from the supply lines or the door > Start laying the pipes from left to right.



Pipe installation in meandering formation

Fig. 134: Pipe installation

Special situation with supply line lateral to the pipe installation direction (e.g. in narrow rooms)

Special situation: narrow rooms

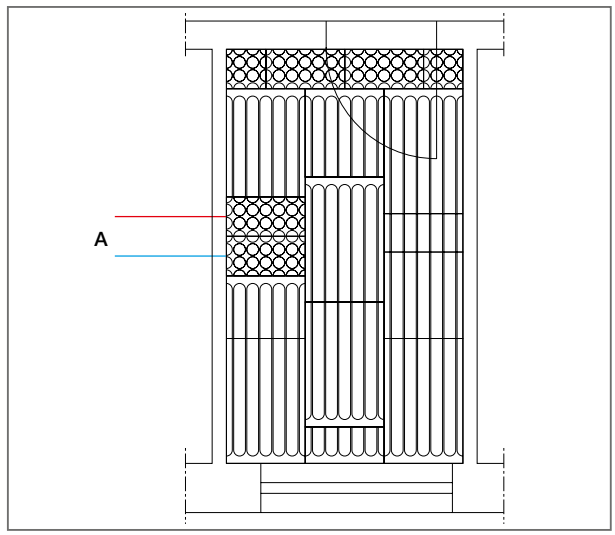


Fig. 135: Special situation: narrow rooms

Additional top panels must be installed in the area of the lateral supply lines. The number of additional top panels is likewise defined by the number of heating circuits.

Installation of additional top panels

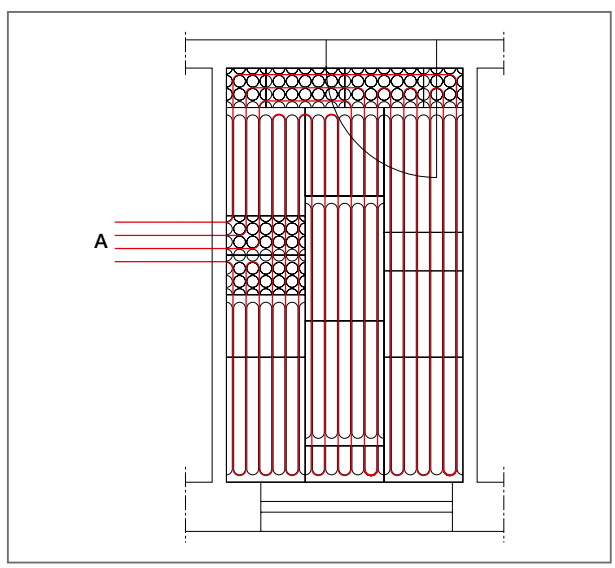
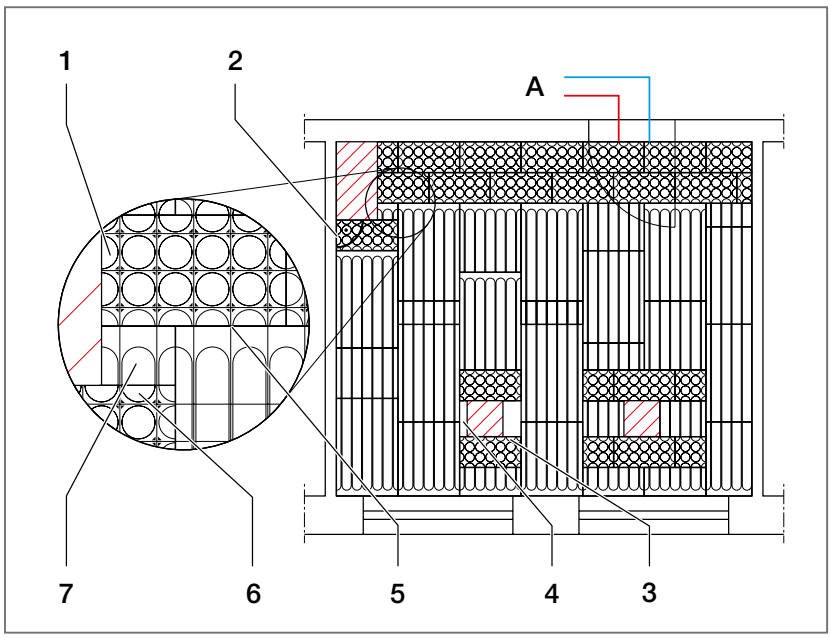


Fig. 136: Installation of additional top panels

Special situation with wall projections and columns in the room



Special situation: wall projections and columns

Fig. 137: Special situation: wall projections and columns

Key
A - Connection line
① Cut piece
② Corner for the start of laying
③ At least two free pipe grooves
④ Basic panel
⑤ Make sure pipe grooves are in line
⑥ At least two free pipe grooves
⑦ Basic panel

Determine a corner to start laying (e.g. left).
For wall projections in the area of the top panel rows, arrange additional top panels below the wall projection.
With wall projections in the area of the basic panels, you can use the deflection bends of these basic panels.

Corner for the start of laying

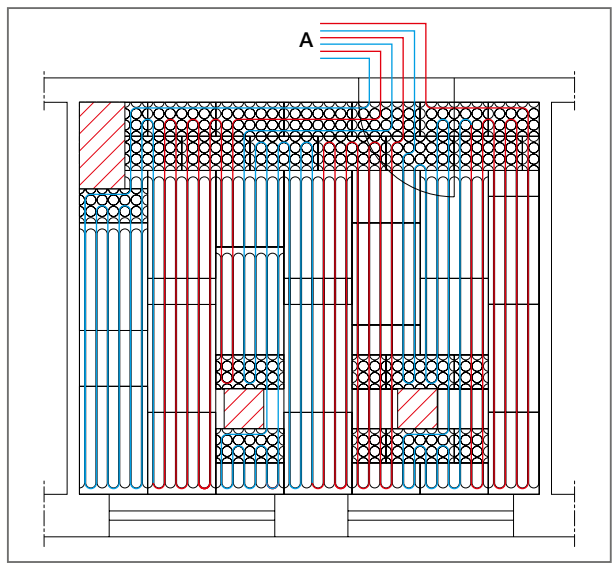


Fig. 138: Corner for the start of laying

For columns, arrange a row of top panels in front of and behind the column. Here, at least two free pipe grooves are required. Usually, entire top panels are laid down in the width of the rows of basic panels.

Special situation with wall projections in the room

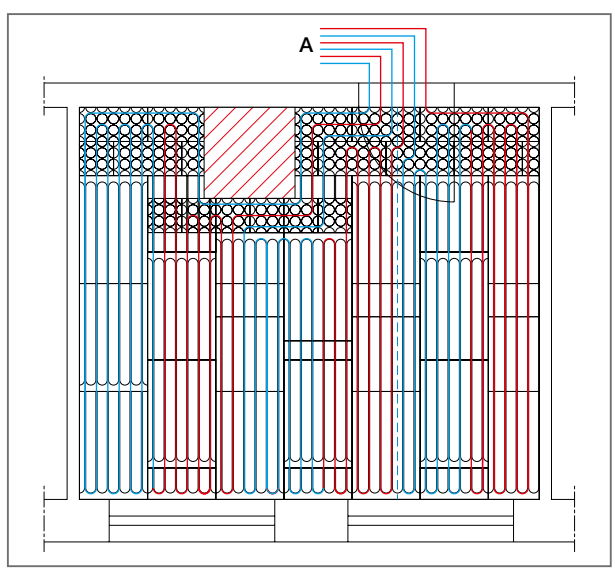


Fig. 139: Special situation with wall projections in the room

Special situation with sloped walls

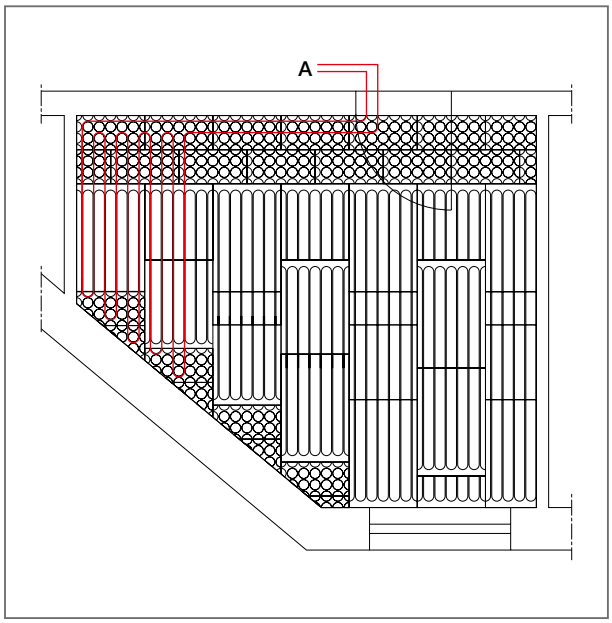


Fig. 140: : Special situation with sloped walls

Special situation with sloped walls

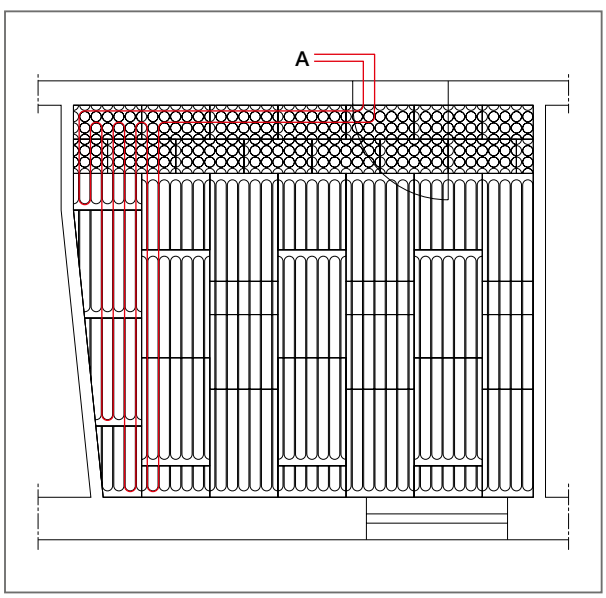


Fig. 141: Special situation with sloped walls

After completion of installation, a leakage test must be carried out according to the pressure test log.

Assignment of the manifold panel

The Fonterra Reno manifold panel comes as a 3-piece mounting set. Combine the parts in accordance with the number of heating circuits:

- 1 to 3 heating circuits: No manifold panel is required (use top panel).
- 4 to 6 heating circuits: Use the two outer parts only.
- 7 to 10 heating circuits: Use all three parts.

- In the area of the manifold, arrange at least one row of top panels before the manifold panel.
- Use pipe guides to make the weave-out from the concealed manifold cabinet.
- In the area of the manifold, pay special attention to proper sealing of corners, edges, and joints to make sure no casting compound can flow behind the system panels.

Mounting situation: 4 to 6 heating circuits

Use the two side elements of the manifold panel only. Next, guide the connection line to the manifold.

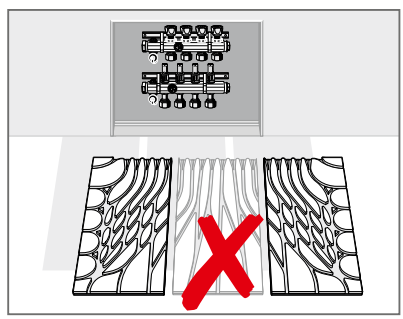


Fig. 142: With 4 to 6 heating circuits: using the two side elements

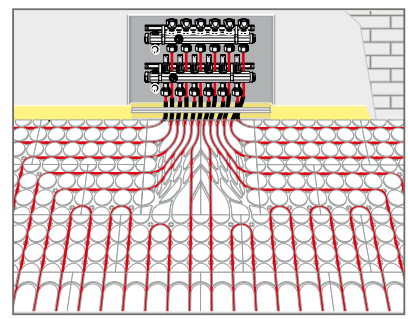


Fig. 143: 6 heating circuits with completed pipe installation.

With a manifold located in a corner, you need to use all three panel elements also for six heating circuits. If there is not enough space, you can also use the centre and one side element.

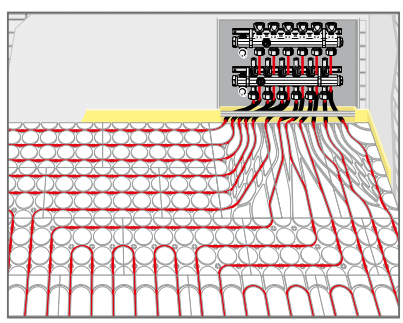


Fig. 144: Mounting situation in a corner

Mounting situation: 7 to 10 heating circuits

Use all three elements of the manifold panel. Next, guide the connection lines to the manifold.

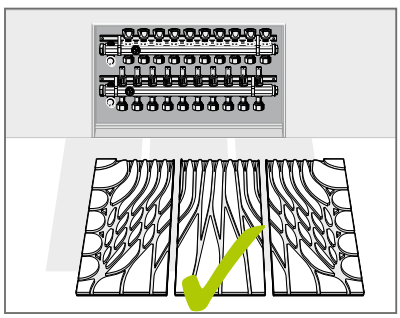


Fig. 145: With 7 to 10 heating circuits: using all panel elements

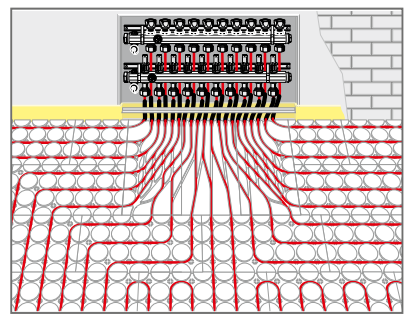


Fig. 146: 10 heating circuits with completed pipe installation.

Pipe covering with gypsum fibre construction panels
Gypsum fibre construction panels can be arranged on the Fonterra Reno system panels as additional underground for the floor covering. This floor construction has a high carrying capacity and is suitable for all types of floor covering.

Pressure test
Check the installation for leak tightness before covering the pipes. Add the pressure test log to the construction documentation.

The floor has been prepared as follows:
- Fonterra Reno system panels have been properly laid.
- Edges and joints have been sealed.
- The Fonterra Reno system panels have been cleaned and are free of dust.
- The pipelines have been installed and connected to the manifold.
- The pressure test has been successfully completed.

Apply Fonterra Reno screed adhesive (model 1237.4) at a distance of 10 cm diagonal to the pipe guiding grooves on the Fonterra Reno system panels. Apply the first line of adhesive in approx. 3 cm distance from the panel edge. Turn the gypsum fibre construction panels by 90° to the Fonterra Reno basic panels and lay them down.

Ensure that the edges of the gypsum fibre construction panels do not end on a pipe groove.

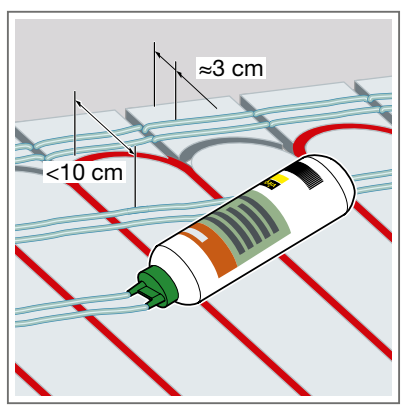


Fig. 147: Apply Fonterra Reno screed adhesive

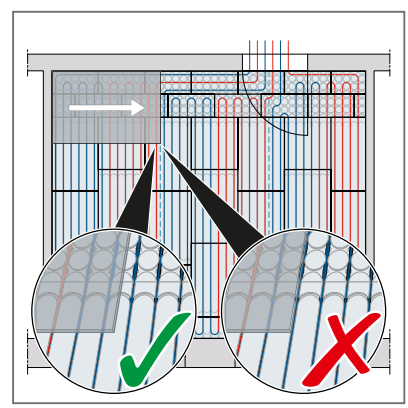


Fig. 148: Laying gypsum fibre construction panels

Apply Fonterra Reno screed adhesive in a distance of max. 1 cm along the connecting ends of the gypsum fibre construction panels.
Lay down the gypsum fibre construction panels with a joint offset of ≥20 cm.

Make sure to provide a panel offset to the Fonterra Reno system panels below of ≥20 cm.
With top panels, a 15 cm offset is sufficient.

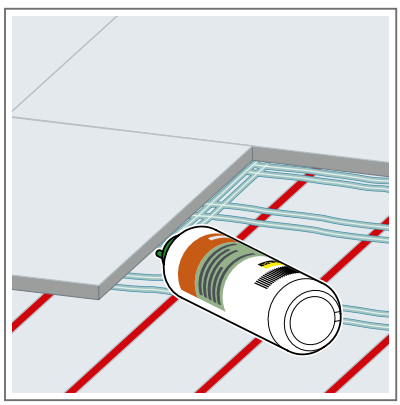


Fig. 149: Apply Fonterra Reno screed adhesive along the contact ends

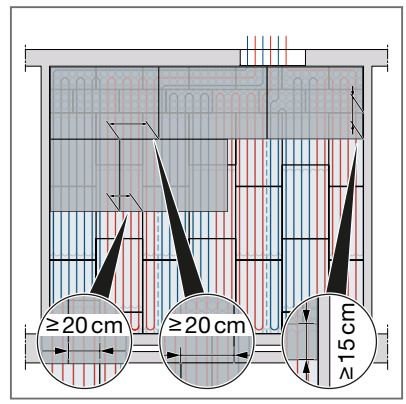


Fig. 150: Lay the gypsum fibre construction panels down over the entire surface

There are two different ways to fasten the gypsum fibre construction panels:
(1) Use drywall screws (model: 1259) spaced at ≤30 cm to fasten the gypsum fibre construction panels.
(2) Use expanding clamps spaced at ≤20 cm to fix the gypsum fibre construction panels.

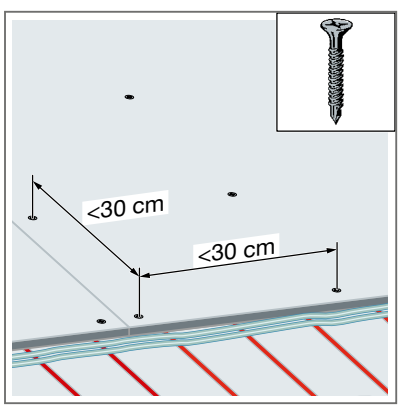


Fig. 151: Use drywall screws to fasten the gypsum fibre construction panels

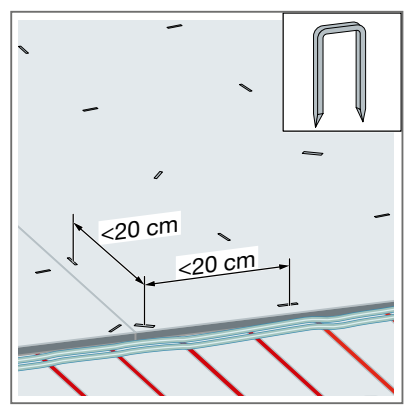


Fig. 152: Use expanding clamps to fix the gypsum fibre construction panels

Direct tiling

Manifold connection and floor construction, tiled directly

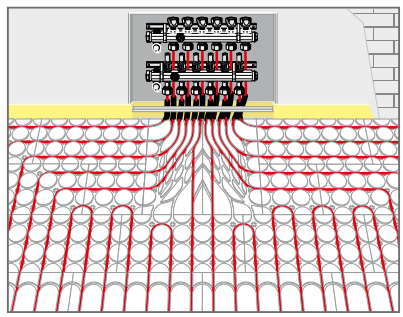


Fig. 153: Example for line installation with 6 heating circuits and two-piece manifold panel

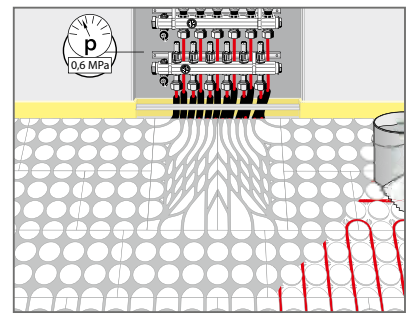


Fig. 154: Pressure test, following by coating of the system area with flexible adhesive

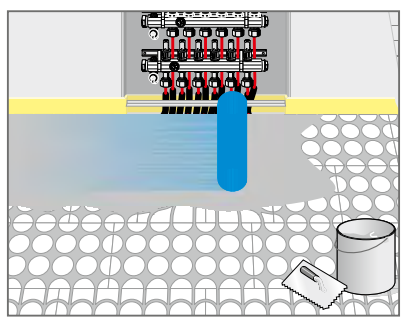


Fig. 155: Incorporation of the fabric with flexible adhesive

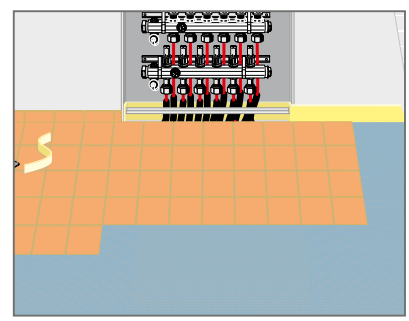


Fig. 156: Laying down the floor tiles according to the manufacturer's instructions

Casting compound

Pipe installation and priming

Before priming the surface, clean it with a vacuum cleaner and remove loose particles. Mixing the Fonterra casting compound with other manufacturers' casting compounds is not permitted.

Before installing the pipes, carefully prime the entire surface including the pipe guiding groove. To this end, use a pressure sprayer (with fine conical spray jet) to apply the properly mixed primer evenly to the dry and dust-free system panels. Spray the primer on crosswise from several directions to fully reach the flanks of the cutouts. The air temperature should be 5 to 30 °C, the underground temperature 10 to 25 °C. Use the enclosed colour chart to check that the correct quantity has been applied, also in the pipe guiding grooves.
When the primer is dry to the touch, you can install the PB heating pipe according to the design specifications. Make sure that the pipe snaps properly into the pipe guiding grooves. Use the consecutive mark on the pipe to check the max. heating circuit length of 80 meters.

After completion of the pipe installation over the entire floor surface, connect the pipe ends to the manifold. Next, carry out a pressure test according to DIN EN 1264-4 for underfloor heating systems. Maintain the test pressure for at least 25 hours until the casting compound has fully cured.

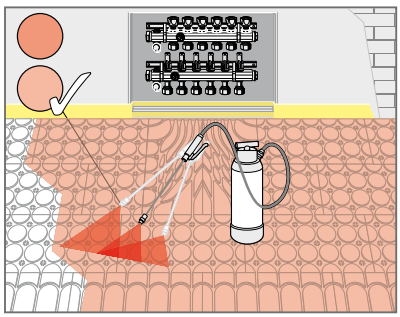


Fig. 157: Priming of the cleaned surface by means of pressure sprayer, and checking the colour depth by means of the enclosed colour chart.

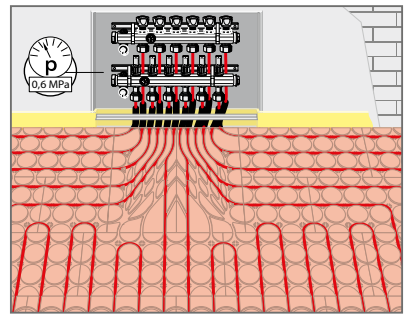


Fig. 158: Installing the heating circuits, connection to the manifold, and pressure test.

Applying the casting compound

To grout the surface, the casting compound is mixed according to the instructions and spread on the surface. A quantity of approx. 10 kg/m² is required. The air temperature should be 10 to 30 °C, the underground temperature 10 to 25 °C. Do not heat the heating pipe during grouting.
To meet the required minimum coverage of 3 mm on the system panels, the casting compound can be applied in two layers. The first layer is applied with the rubber squeegee until the panel is lightly covered, and levelled flush. The second layer is applied with the pin squeegee without additional primer until a coverage of min. 3 mm is reached after the material in the milling groove is dry to the touch (max. 4 hours).
The casting compound must be processed quickly as the open holding time after mixing is 15 to 20 minutes.
During drying, avoid direct sunlight and air draughts. If another layer of casting compound is required, you can apply it within 4 hours after application of the first layer without priming once more. If more time has passed, the surface must be primed once more.

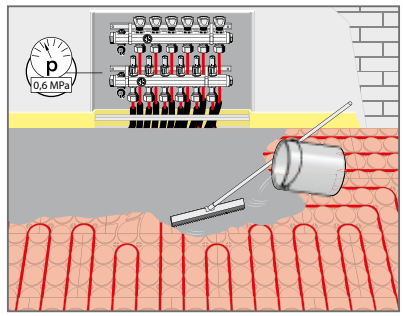


Fig. 159: Application of the casting compound and flush levelling by means of rubber squeegee. The second layer can be applied after approx. 1 hour. To do so, set the layer height at the pin squeegee to 3 mm and level the surface in one go.

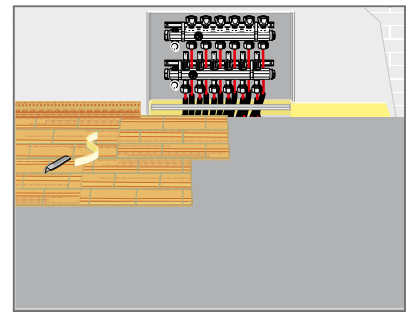


Fig. 160: Application of the floor covering according to manufacturer's instructions.

By applying one layer of casting compound, the levelness tolerances according to DIN 18202 Tab. 3 line 3 are reached.
By applying two layers of the casting compound, the stricter requirements according to line 4 are met.
In both cases, the floor layer may need re-work pursuant to VOB Part C.
The respective manufacturer's installation guidelines as well as the requirements of DIN 18365 floor covering work must be complied with.

Joints

Due to the occurring length expansions, heated floor constructions need (movement) joints and must be executed according to DIN 18560-2.
At all enclosing surfaces and the building parts located in the room (e.g. columns, stairs, etc.), this length expansion is received by the Fonterra edge insulation strip.
Building joints separate building parts over their entire cross section, i.e. from the raw ceiling down to the floor covering; they must be constructed along the same lines in the covering and protected from height offset.
Movement joints are required with room lengths of 15 m and up, or a side ratio > 2:1. Expansion joints are also required with marked projections (door passages, wall projections, constrictions).
These joints separate the system surface down to the insulation below; they are generated by means of a suitable joint profile.
Movement joints must only be crossed by connection lines.
These must be sheathed by Fonterra joint protection of 300 mm length.
The maximum jointless area is 150 m².

Movement joints of building parts

Movement joints of building parts must be constructed along the same lines in the entire structure. Also, a movement joint is required in case of change of material in the sub-constructions or the floor coverings. Before the start of the work, the final position of the expansion/movement joints must be determined on site by the planner in coordination with all stakeholders.

Movement joints for door passages

The movement joints must be provided with a shimming panel fastened on one side, as shown in the illustration below.
If possible, the connection pipelines can also be guided directly through the brick wall in a protective pipe.

Door passage with insulation and plasterboard construction panel

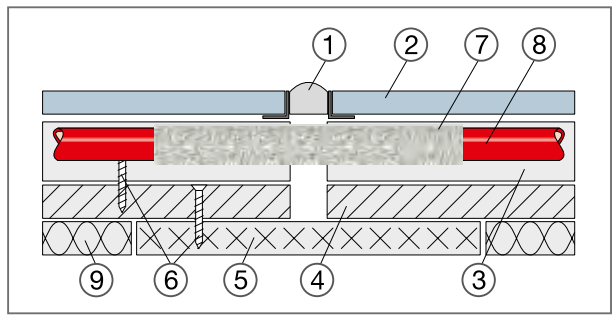


Fig. 161: Section: Floor sub-construction on insulation and plasterboard construction panel

Key
① Silicone joint
② Tile surface
③ Fonterra Reno system panel
④ Plasterboard construction panel
⑤ Shimming panel (e.g. plywood board, width 100 mm)
⑥ Drywall screw 25 mm
⑦ Joint protection
⑧ System pipe 12 x 1.3 mm
⑨ Rigid foam insulation EPS DEO 040 max. 30 mm

Floor passage with rigid foam supporting panel

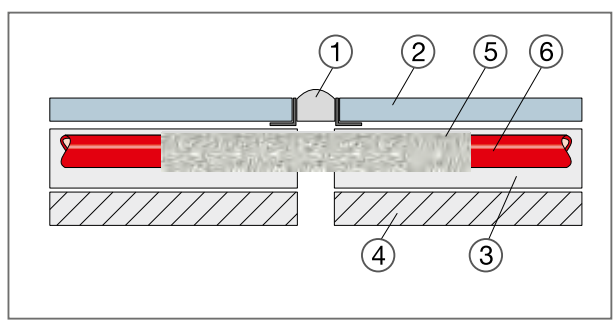


Fig. 162: Section: Floor sub-construction with rigid foam supporting panel on level, solid underground

Key
① Silicone joint
② Tile surface
③ Fonterra Reno system panel
④ Rigid foam supporting panel min. 6 mm
⑤ Joint protection
⑥ System pipe 12 x 1.3 mm

Door passage top view

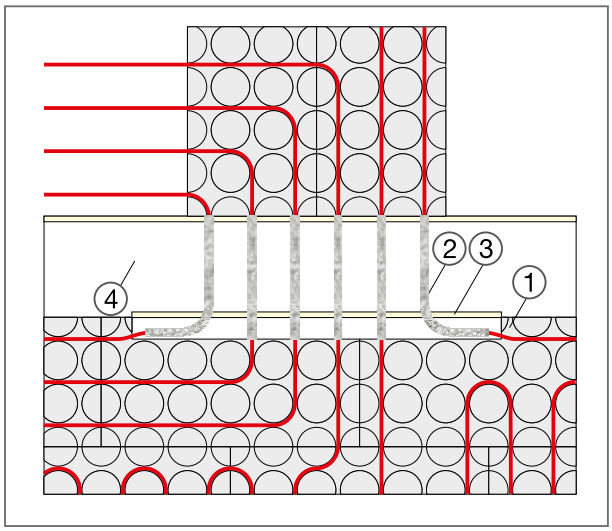


Fig. 163: Door passage with pipeline routing (top view)

Key
① Fonterra Reno system panel (if required, cut to length for pipeline routing)
② Pipe in joint protection
③ Fonterra edge insulation strip
④ Gypsum fibre compensation panels

Floor coverings

General

Already approx. 24 hours after application of the casting compound, the surface is ready for covering with tiles, PVC or carpeting. Wait for three days before covering the surface with parquet or laminate. With a room temperature of under 10 °C, these waiting times will double.
Floor coverings installed in connection with underfloor heating must be approved for this use and have a thermal resistivity of max. 0.15 m² K/W.
For gluing, use an adhesive approved for this application.
According to DIN EN 14259, adhesives must be suitable for creating a solid and permanent connection. They must have no negative effects on the floor covering or the underground and must not emit any disagreeable smell after application. The relevant processing guidelines for the individual product groups must be observed.
The floor temperature should be between 18 °C and 22 °C, the relative humidity between 40 and 65%.
For edge and expansion joints, only permanently elastic filling is permitted, or they must be covered with a joint profile.

Moisture load

Excerpt from the building regulations of the German Federal States:
Building parts must be arranged so that "water and moisture or other chemical, physical, or biological influences will not cause hazards or unreasonable nuisance".
For this reason, floor surfaces in bathrooms, moist and wet areas are subdivided in zones with low, moderate, and high moisture loads.
Low and moderate moisture loads are not subject to site supervision regulations; they are subdivided in load classes 0 and A0.
If combined with e.g. ceramic tiles or natural stone coverings, dry construction systems are considered moisture-resistant and water-repellent; however, sealing is required because the covering as a whole cannot be regarded as water impermeable due to joining and execution.
Dry construction systems combined with sealing systems have proven their worth also in bathrooms and moist rooms, and are considered to be in compliance with the general rules of engineering.
Generally, Reno system panels are suitable for use in load classes 0 and A0 (range not subject to site supervision regulation).

Moisture load classes for plaster boards

Moisture load classes for plaster boards	
0 low	**A0** moderate
Range where no sealing is required by law. (Sealing is to be provided if thought necessary or commissioned by customer or planner.)	Sealing required. Not permitted in the area of floor drains used according to plan (e.g. barrier-free shower area).

Tab. 74: Moisture load classes for plaster boards

Moisture load not subject to site supervision regulations

Load class	Load	Examples for use
0	Wall and floor areas subject to low intermittent and brief spray water loads only	– Guest half-baths (without shower and bathtub) – Utility rooms – Household kitchens used for regular purposes – At walls in the vicinity of sanitary objects, e.g. hand sinks and wall-mounted WCs
A0	Wall and floor areas subject to moderate intermittent and brief spray water loads only	– In household bathrooms used for regular purposes with or without floor drain used according to plan, e.g. barrier-free showers

Tab. 75: Moisture load classes not subject to site supervision regulations

According to "Brochure 5: Bäder und Feuchträume im Holz- und Trockenbau (Bathrooms and damp rooms in timber and dry construction) by the Bundesverband der deutschen Gipsindustrie e. V. (Association of the German Gypsum Industry)", Fonterra Reno system panels must be treated with suitable sealing coats (e.g. Fermacell).
Sealing coats by other manufacturers must be approved for use on plaster boards for flooring. Floor drains or shower channels on floor level cannot be used.

* Note data sheet 5 by the Bundesverband der deutschen Gipsindustrie e. V. (Association of the German Gypsum Industry) "Bäder und Feuchträume im Holz- und Trockenbau" (Bathrooms and damp rooms in timber and dry construction), as amended.

Natural or artificial stone coverings

Natural or artificial stone coverings are very popular thanks to their small thermal resistivity of 0.012 m²K/W for ceramic tiles and 0.010 m²K/W for natural stone coverings, they are particularly well suited for surface heating systems. Tiles and panels must have been approved by the manufacturer for thin bed laying, they must have a max. edge length of 35 x 35 cm for natural stone and 40 x 40 cm for terracotta.
Get technical advice if you wish to use tiles of greater edge lengths.

Natural or artificial stone coverings

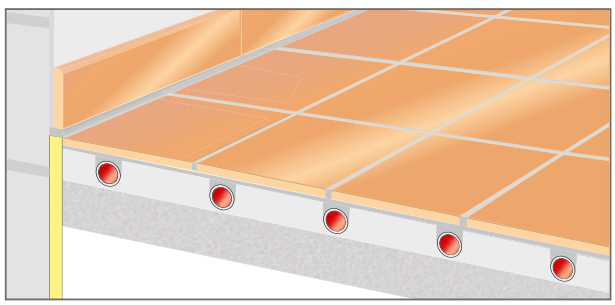


Fig. 164: Natural or artificial stone coverings

Textile / elastic floor coverings

Textile / elastic floor coverings are suitable for use with underfloor heating systems if marked accordingly.
Due to their higher thermal resistivity, they need a higher supply temperature than ceramic coverings, but they show better results than stone floor coverings in terms of compensation for the ripple of the floor temperature profile.
Elastic or textile floor coverings must be glued over the entire surface.
The installation work must be done according to the regulations of DIN 18365 and the manufacturers' instructions.

Textile / elastic floor coverings

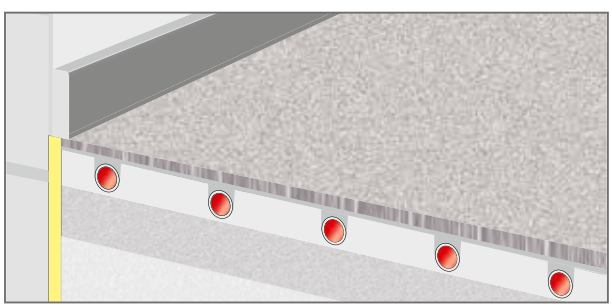


Fig. 165: Textile/elastic floor coverings

Grinding, priming and possibly smoothing of the underground can be required if the floor covering manufacturer calls for pre-treatment of the underground.

Parquet, laminate

Parquet coverings must be laid in compliance with the manufacturers' installation instructions.
The moisture content for multi-layer parquet must be noted; it can be found in the respective standards.
Three-layer parquet can be laid without ("floating") or with adhesive (note manufacturer's information). Use adhesive which is shear-resistant and described by the manufacturer as "suitable for underfloor heating" and "heat ageing resistant".
Due to their marked swelling and shrinking behaviour, solid one-layer parquets are not suitable for laying on Reno system panels.

Parquet, laminate

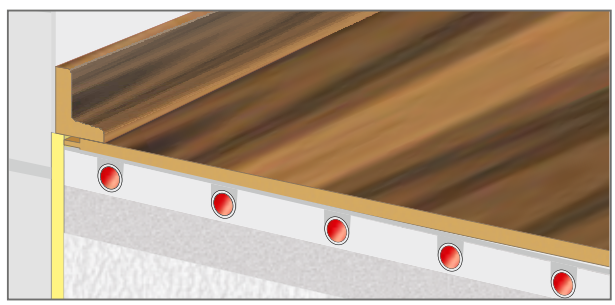


Fig. 166: Parquet, laminate

Timber floors on underfloor heating systems tend to show increased swelling and shrinking movements. Thus, widening of the joints must be expected during the heating season. This is not a quality defect. Keeping a constant climate of approx. 20 °C and 50% relative humidity helps to reduce this joint formation. Furthermore, observe the recommendations of the covering manufacturer (e.g. compliance with a max. surface temperature of 26 °C).

Pressure test

After completion of the installation work and execution of the pressure test, this document must be handed over to the planner/building owner.

We recommend to retain the document.

Building project		**Date**	
Building owner's address			
Address of the qualified installation company			

Before applying the casting compound or sealing the system surface, do a leakage test of the heating circuits using water; as an alternative, compressed air with a test pressure of 3 bar can be used according to DIN EN 1264-4. The leakage test is carried out at the finished but not yet covered pipelines.

Notes on the test procedure

- Fill the system with filtered water and vent it completely.
- In case of major differences (~10 K) between the ambient temperature and the filling water temperature, wait for 30 minutes after filling the system for the temperatures to adjust.
- Carry out the leakage test at a pressure of min. 0.4 MPa (4 bar), max. 0.6 MPa (6 bar).
- System units not designed for these pressure levels (e.g. safety valves, expansion vessels etc.) must be exempted from the test.
- Visual inspection of the piping system/check per manometer*.
- The pressure must be kept constant during the application of the casting compound.
- Take suitable measures to exclude freezing, for example room heating or addition of anti-freeze to the heating water.
- If the anti-freeze is not required for normal operation, the system must be cleaned by emptying and flushing with at least three water exchanges.
- The water temperature must be kept constant during the test.

* Pressure gauges must be used which clearly indicate pressure changes of 0.1 MPa.

Materials used	Pipes	☐ 12 x1.3 mm	
	Pipe connectors	☐ Pressing	☐ Clamping

Log of the pressure test		
Start of the pressure test:	Start pressure:	Water temperature [°C]:
End of the pressure test:	Final pressure:	Water temperature [°C]:

Visual inspection of pipe connectors carried out?	☐ yes	☐ no
Position of couplings marked in the installation plan?	☐ yes	☐ no
Leak tightness was established, no permanent form changes identified in any component?	☐ yes	☐ no
Has the operating pressure been set on system handover?	☐ yes	☐ no

Comments

Building owner	**Site management**	**Qualified installation company**
Date/signature/stamp		

Viega Technology GmbH & Co. KG
Viega Platz 1
57439 Attendorn
Germany

Phone +49 (0) 2722 61-0

viega.com

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