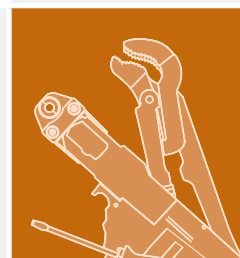
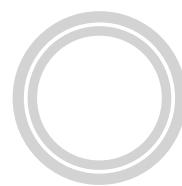
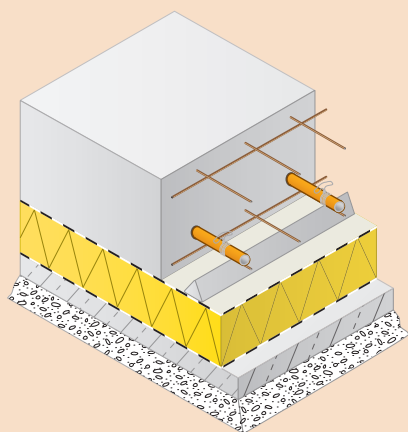


FBHS

FLOOR HEATING. INDUSTRIAL. SYSTEM.
INSTALLATION.

VarioSolid.



PDF

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1.1 General

These installation instructions are intended for authorised specialist personnel.

Observe the applicable local regulations and standards for electrical and heating installations.

1.2 Guarantee conditions

If the heating system is installed or commissioned incorrectly, all claims on the basis of the manufacturer's warranty and guarantee become void. Our currently applicable installation instructions are an integral part of our guarantee!

1.3 Storage of Variomodular pipe 20x2 Laser

The Variomodular pipe is an aluminium multi-layer composite pipe (100% oxygen diffusion-tight) which includes insulation.

Damage (e.g. denting and scratching) is to be avoided during storage, transport, unloading, unwinding and laying. This type of damage has a detrimental effect on the creep behaviour.

In order to prevent damage to the Variomodular pipe during the construction phase, high-visibility warning signs should be placed at appropriate locations. The Variomodular pipe is only weather-resistant to a limited extent, must be shielded from direct sunlight and must not be stored outdoors.

The interaction of the air's oxygen with UV rays damages the pipes. Normal temporary storage on the construction site for a few days is permissible.

1.4 Coordination of floor construction

The following items must be coordinated between the architect, construction manager, installation technician, screed layer and floor layer:

- Horizontal marking
- Floor structure with the required vapour retarders/barriers
- Floor heating system
- Positions of the distribution manifolds
- Positions of the load-bearing and non-load-bearing intermediate walls
- Type and thickness of the concrete
- Expansion joints/dummy joints in the concrete
- Measurement points for moisture measurement
- Floor covering, with heat sensors if necessary

The installation technician must coordinate or notify others of these discussions as per ÖNORM B2242-1.

1.5 Standards

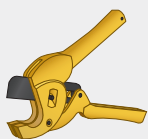
The validity of the standards specified in these installation instructions was last verified on 8 March 2017!

If necessary, amendments to standards must be checked!



2.1 Tools

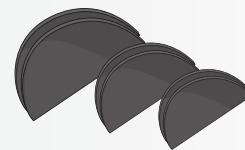
The following Variotherm tools are required/recommended for installation work:



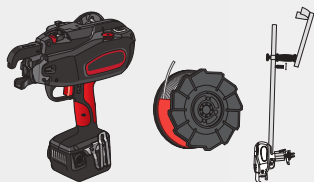
Pipe cutting pliers



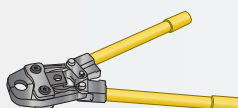
Calibration and chamfering tool



Bending models 20/200, 20/250 & 20/300



Cordless binding tool, wire reel & extension arm



EcoPress or AkkuPress Mini pressing tool, incl. press-fitting jaws (e.g. for residual pipe lengths)



2.2 Rooms/laying areas

- The laying areas must be cleared, free of building rubble and dry.
- No other tradesmen are permitted to work in the laying area during laying work.

2.3 Vapour barrier/vapour retarder

A full-surface vapour barrier as per ÖN B 3691 is to be laid in order to prevent rising damp. This cannot be replaced with concrete of a corresponding quality (WU concrete etc.). Protection against rising damp must therefore always be provided in the form of a sealing layer underneath the floor slab. The details are to be defined by the planner.

2.4 Insulation

According to OIB Guideline 6, Issue 2015, Point 4.6.1 insulation layers are necessary between the heating surface and the soil, with a thickness of 140 – 180 mm based on experience. According to ÖN B 6000, only sheets of type XPS-G SF (smooth surface with foam skin and stepped seams) may be used. Care must be taken to ensure that no concrete or cement solution can penetrate closed joints and abutting joints.

2.5 Foundation slab/floor slab

The foundation slab/floor slab is to be dimensioned by a structural engineer according to the traffic loads that will be present. The reinforcing measures required (fibrous concrete, rebar grid) must also be defined by a structural engineer.

2.6 Separating layer

After the insulation and granular sub-base layers have been laid, the entire surface is covered crease-free using a suitable separating layer.

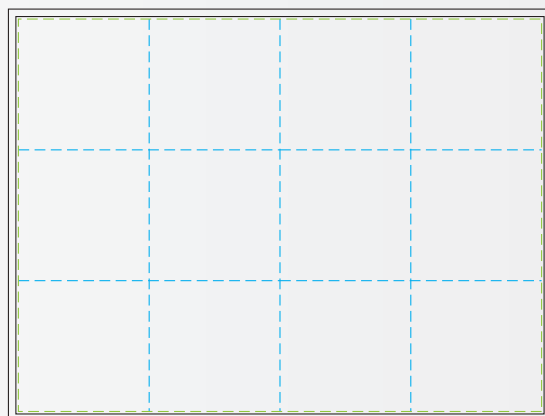
Ensure a sufficiently large overlap of approx. 50 mm at the foil joints, sealed with adhesive tape.

2.7 Joints

To ensure tension-free accommodation of changes in length, it is necessary to provide movement joints in the floor structure as defined by the architect or planner. Also arrange the joints along the surrounding walls and at pillars, steps, door frames, columns, shafts etc. before laying the concrete. The floor structure should be able to accommodate concrete movements of up to 10 mm.

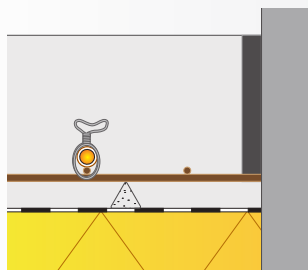
Requirements for movement joints:

- The number of joints and size of the concreted area depend on the concrete type and the floor covering
- The heating installer must be provided with a plan specifying the positions of the joints as part of the specification (according to ÖNORM EN 1264-4).
- Heating pipe feed-throughs are to be fitted with flexible sleeve tubes (approx. 500 mm), with the number of these feed-throughs being kept to the minimum possible.
- The joint dimensions for large surfaces must be suitably large to accommodate expansion of the concrete.

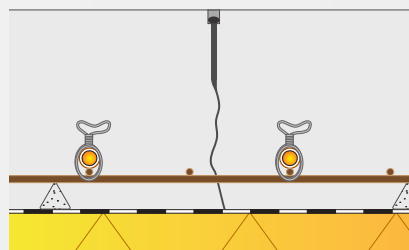


Examples of the layout of the dummy joints --- and/or edge connections ---

Example of edge connection with rubber separators

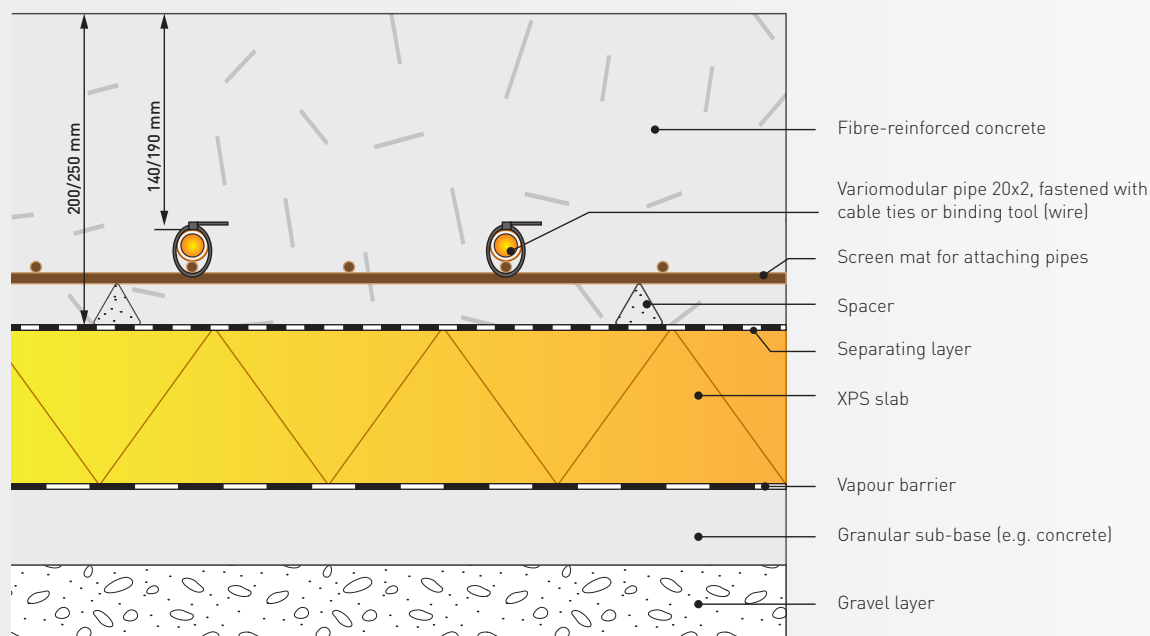
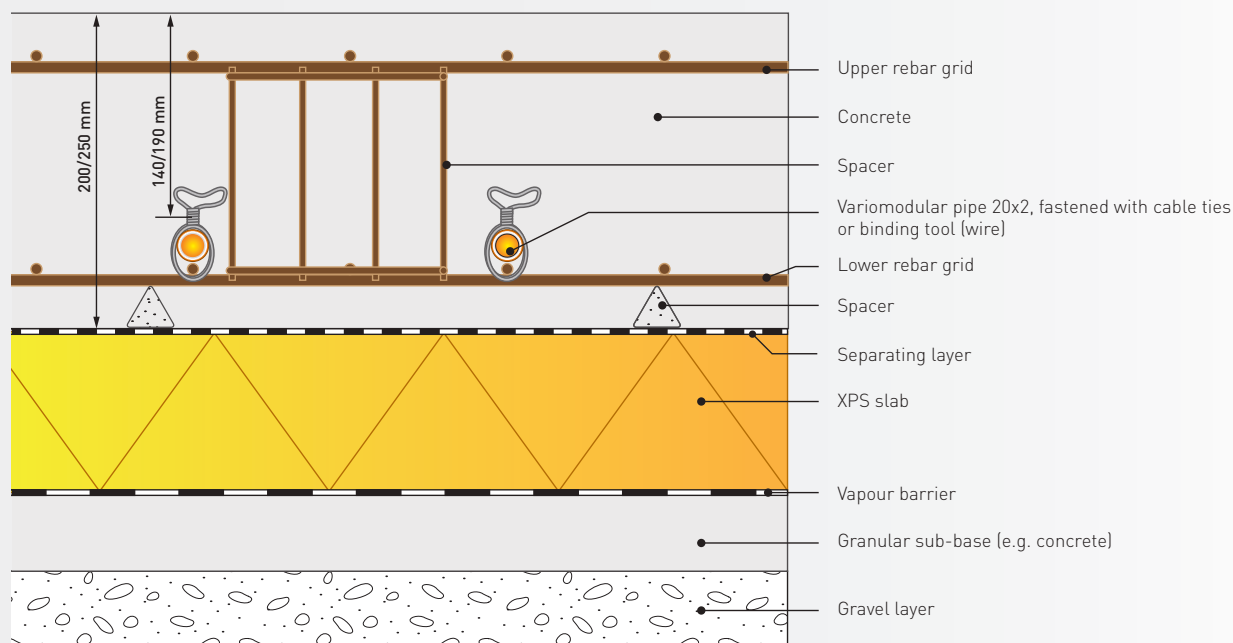


Example of a dummy joint



>> For details on pipe laying with seams, see chapter 4.

2.8 Construction examples



3.1 General

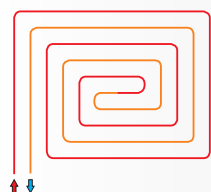
With the Variotherm Industrial floor heating system, the Variomodular 20x2 Laser pipe is always laid directly in the concrete. The Variomodular pipe is routed with no twisting from the heating distribution manifold to the room in question.

Maximum pipe length per heating circuit: 150 m

Required pipe lengths per m²:

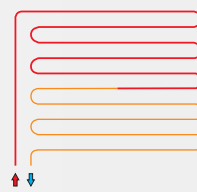
Pipe spacing:	200 mm	250 mm	300 mm	350 mm	400 mm
Pipe requirements:	5.0 m/m ²	4.0 m/m ²	3.3 m/m ²	2.9 m/m ²	2.5 m/m ²

3.2 Laying pattern



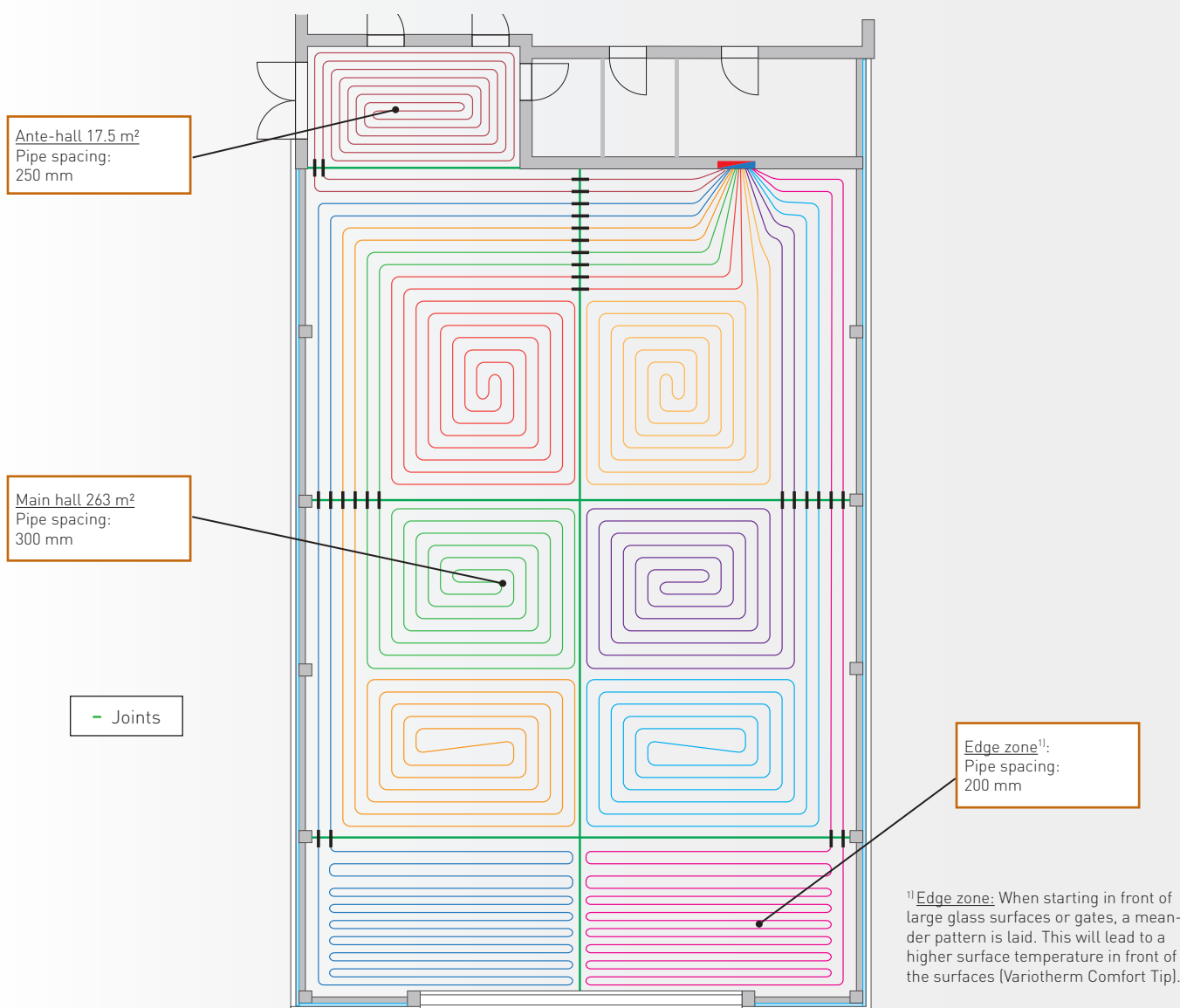
Bifilar

Uniform distribution of surface temperature as the supply is located next to the return.



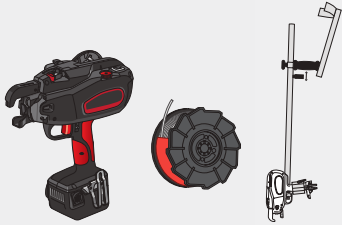
Meander

Less uniform distribution of surface temperature, for small, ancillary rooms and peripheral zones.

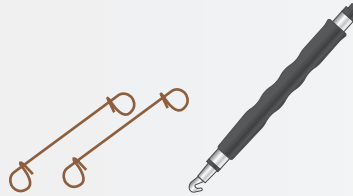


Laying example for an industrial hall

3.3 Pipe fastening



Variotherm binding tool with extension arm



Tie wire



Cable ties

3.4 Pipe clearances to other components

- Between the Variomodular pipe and vertical building components: ≥ 100 mm
- Between Variomodular pipes and chimneys, open or walled-in shafts and lift shafts: ≥ 200 mm

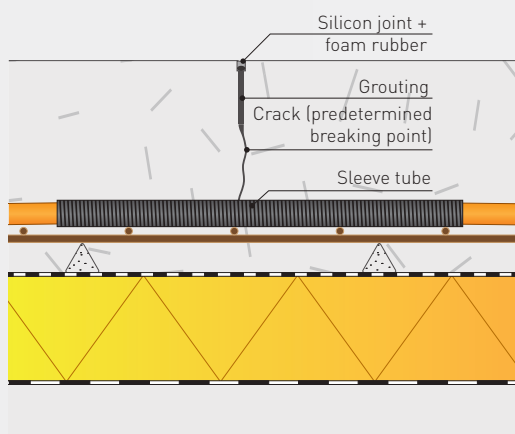
3.5 Laying of pipes at joints

Sleeve tubes are used for laying pipes through future expansion joints and dummy joints. Keep the number of pipe feed-throughs as small as possible.

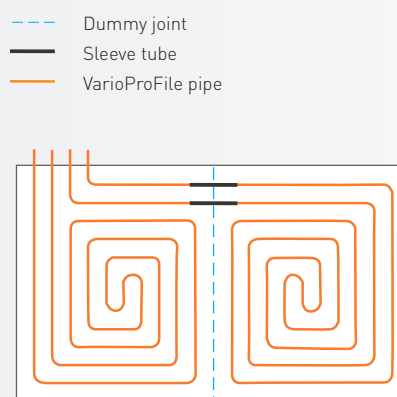
>> See also chapter 2 for preparation of the joints.



Sleeve tube



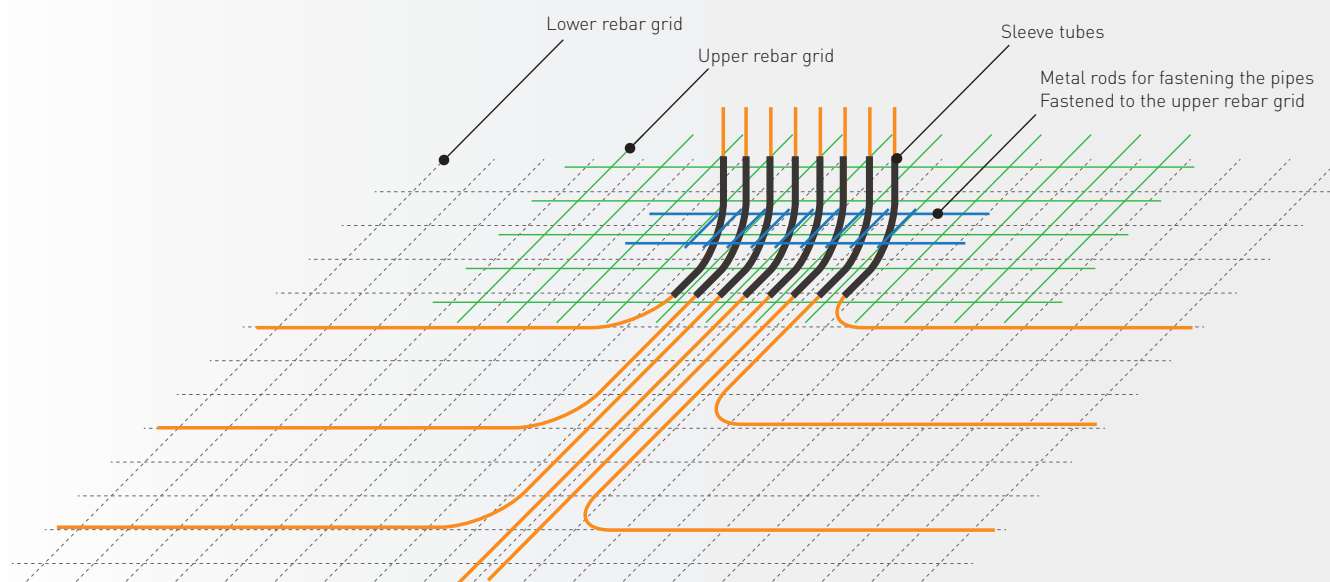
Laying pipes through joints



Correct heating circuit distribution at joints

3.6 Pipe fastening for later wall attachments

Positioning of the Variomodular pipes at the distribution manifold when walls are erected after construction of the floor slab is finished.



3.7 Bends

Bending models 20/200, 20/250 or 20/300, depending on the radius, are used for bending small radii (200/250/300 mm). During bending, the pipe must be securely positioned in the groove of the bending model. The VarioProFile pipe must be pre-heated (stored in a warm room) at material temperatures $< 5^{\circ}\text{C}$.

Caution: During bending, the technician's hands must be as close as possible to the pipe bending tool in order to prevent kinks from forming.



3.8 Press-fit connections

Variomodular pipes can be joined in a permanent, non-detachable manner using a press-fit coupling connection in order to use residual lengths of pipe or for repairs.

Caution: A permanent, tight connection is only guaranteed if original Variotherm system components are used:

- Variomodular pipe 20x2 Laser
- Variotherm calibration and chamfering tool
- Variotherm press-fit couplings and Variotherm pressing tool

Maintenance

The press-fitting jaws and pressing tool must be checked at least once a year for correct operation by REMS or an authorised REMS customer service workshop.

Preparing the pipe:

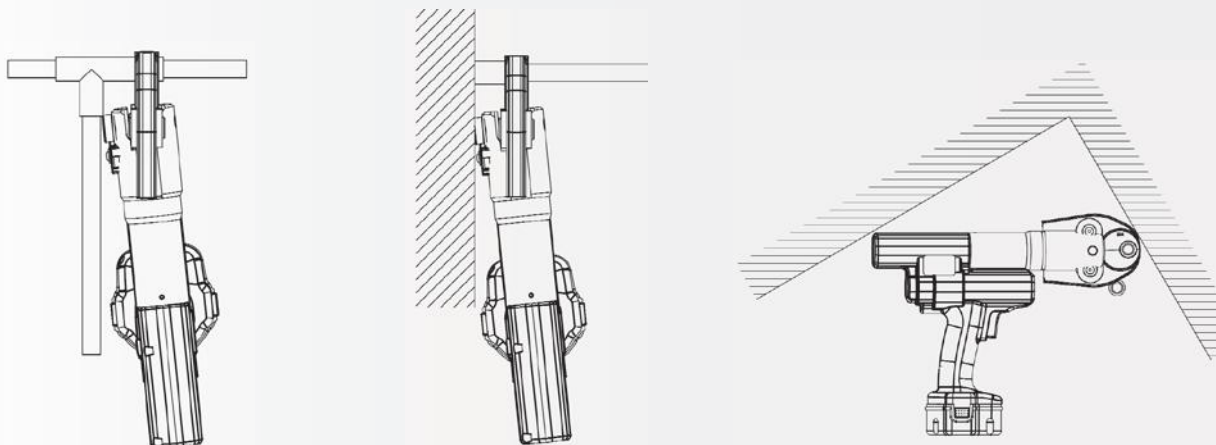


Pressing procedure for AkkuPress:

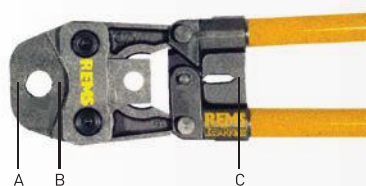


- Push the press-fitting jaws (Z) together by hand (causing the press-fitting jaws to open) far enough so that the press-fitting jaws can be placed over the press-fit coupling **2**. Place the pressing tool with press-fitting jaws on the press-fit coupling at a right angle to the pipe axis.
- Release the press-fitting jaws so that they close around the press-fit coupling **3**.
- Hold the pressing tool at the housing grip (G) and at the motor grip (M). When using a REMS AkkuPress, hold the switch (S) pressed until the press-fitting jaws are fully closed. This is indicated by an audible click.
- Press the reset lever (R) until the pressing rollers (P) have retracted completely. Press the press-fitting jaws (Z) together by hand so that the jaws can be removed from the press-fit coupling (see also the REMS AkkuPress operating manual).

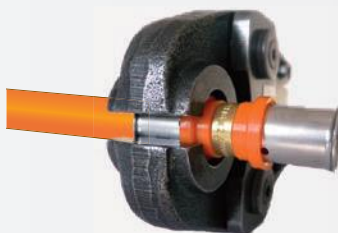
The following situations must be avoided (danger of gearbox breakage!):



Pressing procedure for Eco-Press:

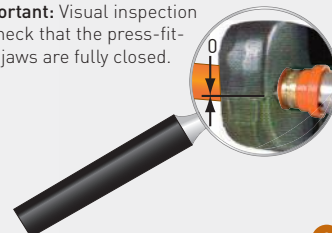


1



2

Important: Visual inspection to check that the press-fitting jaws are fully closed.



3

- The pressing tool's lever length can be adjusted to suit the pressing force and the available space on site. Use the provided pipe arms with sleeve sockets for extension. Always screw pipe arms tight before use (danger of accidents!). Secure the selected press-fitting jaws with plug-in bolts.
- Pull the pipe arms far enough apart (press-fitting jaws open) so that the press-fitting jaws can be slid over the press-fit coupling ②. Place the press-fitting jaws on the press-fit coupling at a right angle to the pipe axis.
- Push pipe arms together until they reach the stop position (C) (a click is heard when they reach the stop). Only if the press-fitting jaws are fully closed at (A) and at (B) has a correct press connection been carried out. > Visual check ③.
- Re-open the pipe arms so that the jaws can be removed from the press-fit coupling (see also the REMS Eco-Press operating manual).

Corrosion prevention notice

The connecting elements are to be protected (after the pressure test) in accordance with ÖN H5155. For example, using cold shrink tape or corrosion protection tape.



4.1 Preparation

The floor heating system is checked for leaks, filled and bled free of air before pouring the concrete.

The pipes should be pressurised to 2 – 3 bar before pouring the concrete. The laid Variomodular pipes must be protected against damage (possibly by laying boards).

Caution: Concrete heats up during the binding process, increasing the pressure in the heating system. Always use an expansion tank and a safety valve!

4.2 Concrete type and thickness

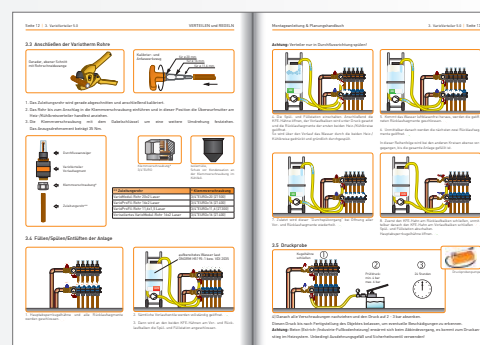
The thickness and quality of the concrete depend on the building requirements and traffic loads. This is defined by the architect, structural engineer or construction manager.

4.3 Commissioning and control

Details regarding the system and heating circuit pipes and the room temperature control are provided in the **DISTRIBUTION and CONTROL** design and installation manual. >>

The VarioSolid floor heating system heats the concrete slab, which then radiates cosy heat into the room. Switching the floor heating system on and off leads to the floor cooling down and a lengthy heating process for the heavy mass. This results in a higher energy requirement. A permanent supply of heat must therefore be ensured during the heating period.

After commissioning, the Variotherm screed floor heating system can be considered maintenance-free. (Subject to technical modifications without notice).



5.1 Leak-tightness test in accordance with DIN ÖNORM EN 1264-4

Construction project: _____

Building owner/Occupant: _____

Client: _____

Heating installation technician: _____

Architect: _____

Other: _____

The leak-tightness test can be carried out using water or compressed air. Before the concrete is poured, the heating circuits are to be tested for leak-tightness by means of a pressure test. The test pressure must be no less than 4 bar and no greater than 6 bar. Leak-tightness and test pressure must each be listed separately in a test report (see log below). If there is a risk of frost, appropriate measures must be taken, such as the use of antifreeze and controlling the building's temperature.

At the start of normal operation, all antifreezes can be bled off and disposed of in accordance with national occupational safety regulations; the system must then be flushed three times with clean water.

- Floor heating system incl. connection and piping completed on: ____ . ____ . ____
- Pressure test started on: ____ . ____ . ____ with test pressure of ____ bar
- Pressure test completed on: ____ . ____ . ____ with test pressure of ____ bar
- Concrete pouring, started on: ____ Completed on: ____ . ____ . ____
- The system water was purified (e.g. per ÖNORM H5195-1) ☐ Yes ☐ No
- Antifreeze was added to the system water ☐ Yes ☐ No
- System pressure during the completion work was ____ bar
- The system was checked for leak-tightness on ____ . ____ . ____ and approved

Approval:

Building owner/Occupant/Client

Construction management/Architect

Heating installation technician

5.2 Functional heating in accordance with DIN ÖNORM EN 1264-4

Construction project: _____

Building owner/Occupant: _____

Client: _____

Heating installation technician: _____

Architect: _____

Other: _____

The functional heating of concrete slabs is performed no earlier than 28 days after laying the concrete. Approval to start heating must always first be obtained from the construction company/architect.

Functional heating begins with a supply temperature of between 20 °C and 25 °C, which is to be maintained for at least 3 days. After this, the temperature is set to the maximum design temperature and maintained at this value for at least 4 days. The functional heating procedure must be documented (see log below).

- Concrete quality used: _____
- Concreting finished on: ____ . ____ . ____
- Average concrete thickness: _____ mm
- Functional heating started on: ____ . ____ . ____
- Set supply temperature to 25 °C and maintain this value for 3 days ☐ Completed
- Set to max. design temperature and maintain for 4 days ☐ Completed
- Functional heating finished on: ____ . ____ . ____

Approval:

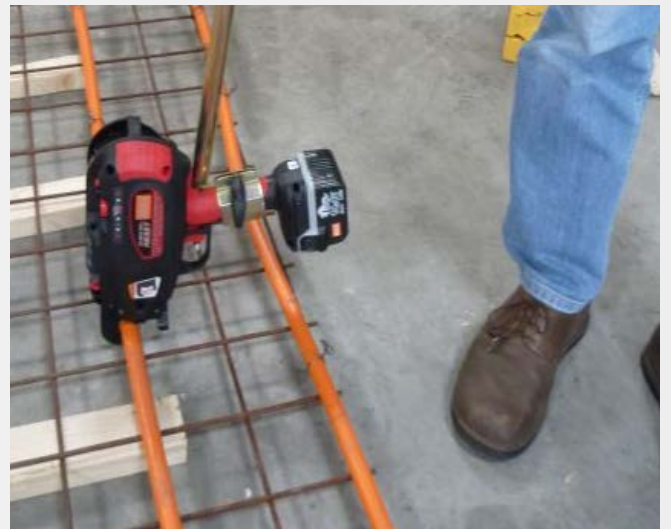
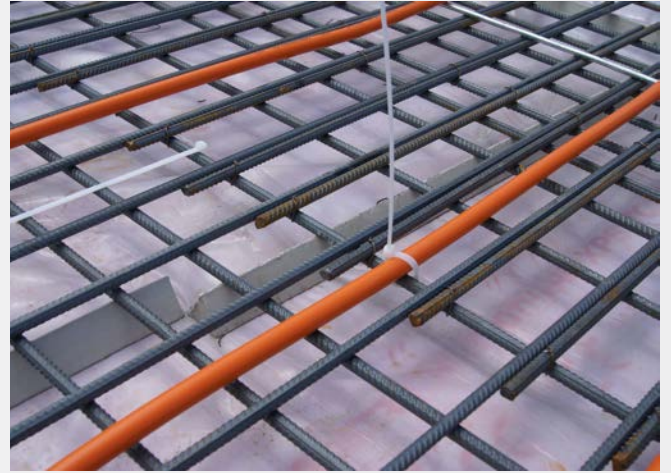
Building owner/Occupant/Client

Construction management/Architect

Heating installation technician

5.3 Dry heating note

If the concrete slab is to be covered with additional floor coverings (tiles, industrial floor ...), then the residual moisture content of the concrete must be measured via CM measurements before laying the covering. It may be necessary to provide covering preparation heating of the concrete slab.



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