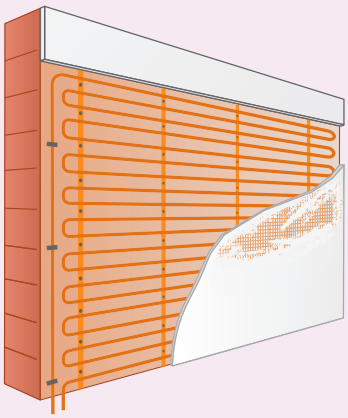
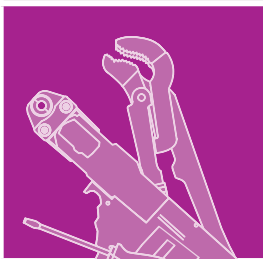
SWHC INSTALLATION

PLASTER WALL. HEATING AND COOLING.

SystemWall.





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VARIOTHERM

VMONT1 | e11817

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 relevant current applicable installation instructions are an integral part of our guarantee.

1.3 Variotherm pipes storage

The VarioProFile pipe 16x2 Laser and the pre-insulated Variomodular pipe 16x2 Laser as a supply pipe to the SystemWall are multi-layer aluminium composite pipes (100 % oxygen diffusion-tight). They are only weather-resistant to a limited extent, must be shielded from direct sunlight and must not be stored outdoors.

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 pipe during the construction phase, high-visibility warning signs should be placed at appropriate locations.

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 EcoHeatingPlaster storage

EcoHeatingPlaster is supplied on pallets in sacks weighing 25 kg. Ensure dry storage until processing. Max. storage time is 12 months.

1.5 Standards

The validity of the standards listed in these installation instructions was last checked on 28/04/2017!

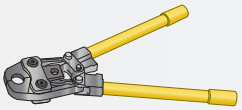
If applicable, changes in standards must be reviewed!

2.1 Tools

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

Pipe cutting pliers

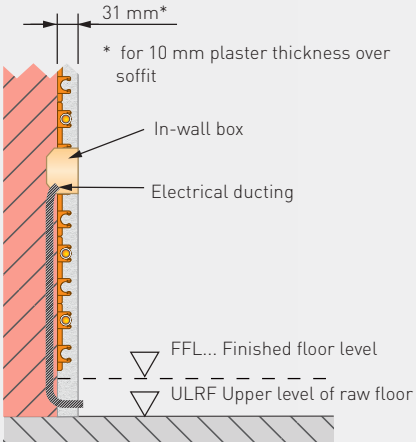
Calibration and chamfering tool



EcoPress or AkkuPress Mini pressing tool, incl. press-fitting jaws

Bending model 16/100

2.2 Domestic electrical installation



Before installing the system wall heating, electrical ducting must be carried out. When installing the in-wall boxes, pay attention to the respective height level of the plaster.

<< Image: Cross-section through System-Wall with ducting for electrical installation

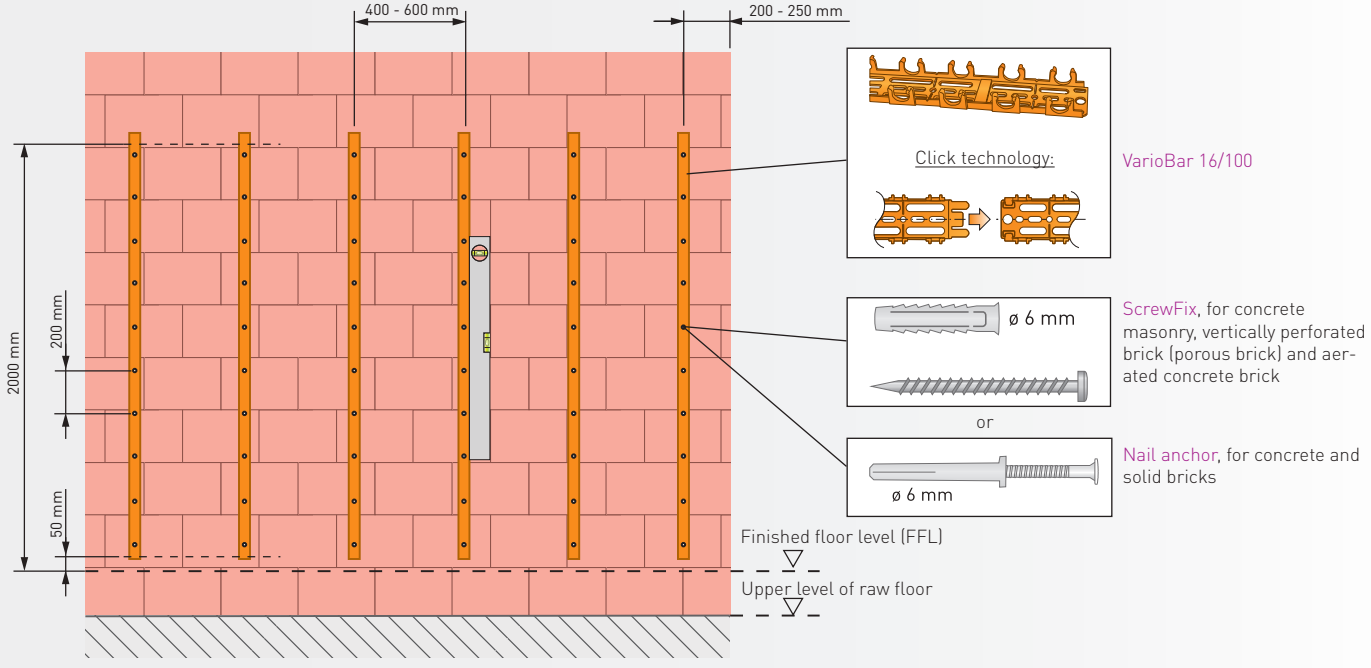
2.3 Specific requirements for the brickwork

Areas in which the system wall heating/cooling systems are to be installed must be even and dry. Their evenness must lie within the permissible range. Any uneven areas must be chipped off or evened out with an undercoat.

As a standard, the SystemWall is installed up to a height of 2 m above the finished floor level (FFL).

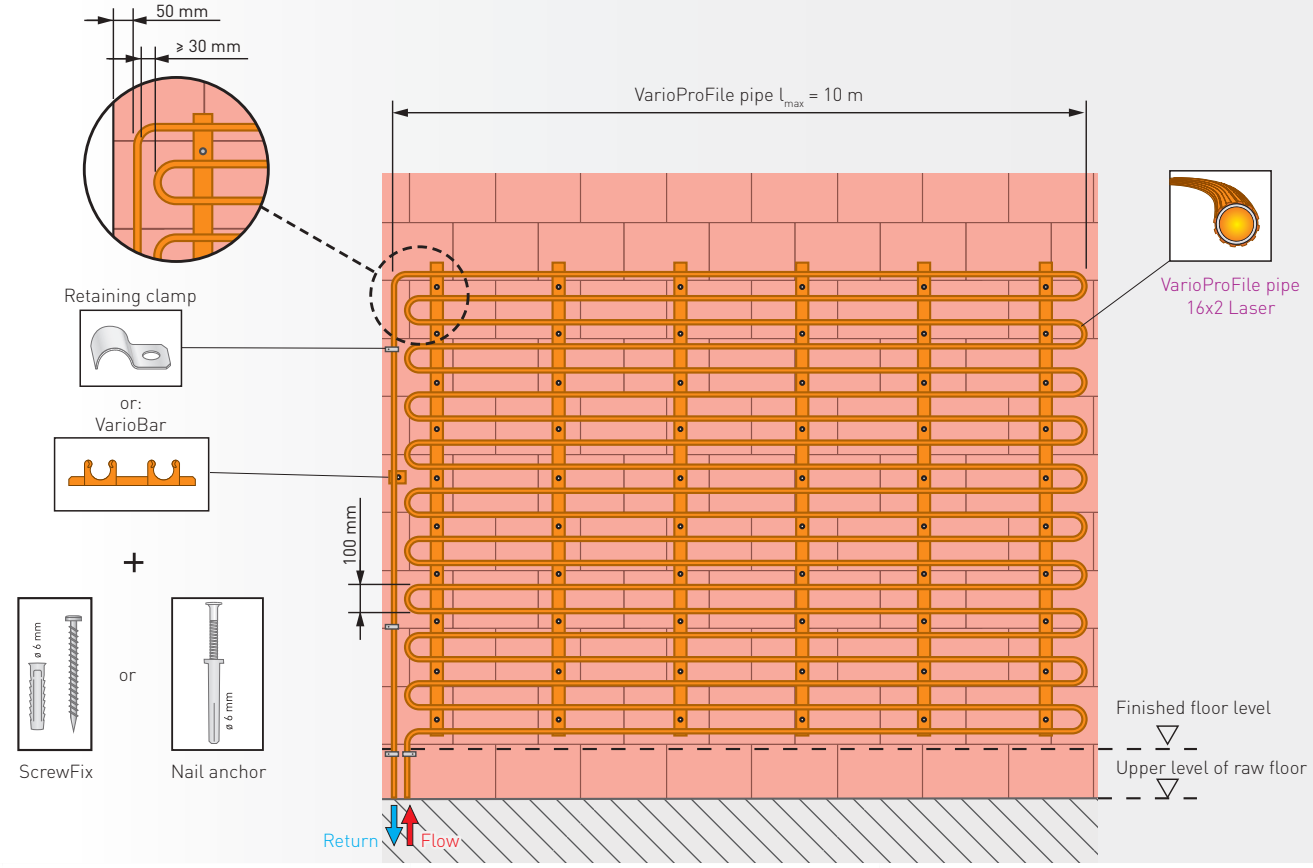
Further information on the plaster base inspection can be found in Section 4.2.

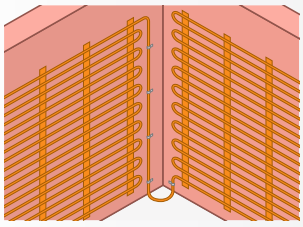
2.4 Installation of VarioBar 16/100



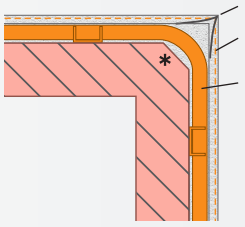
3.1 Pipe installation

- 1 m² SWHK2/3 ≙ 10 m VarioProFile pipe
- **Maximum pipe length per heating circuit: 120 m**
  (e.g. 10 m² heating/cooling surface area + 20 m supply pipe)
- Starting below, insert VarioProFile pipe into VarioBar
- Distance between pipes: 100 mm
  (exceptions: windows, ... – see Section 3.4)
- Leave approx. 50 mm distance to adjacent walls

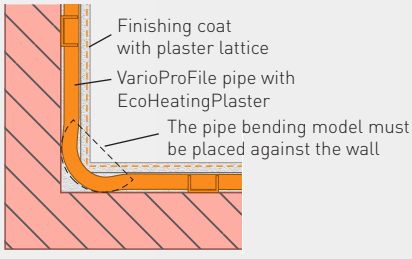




Example inner corner



Special case outside corner

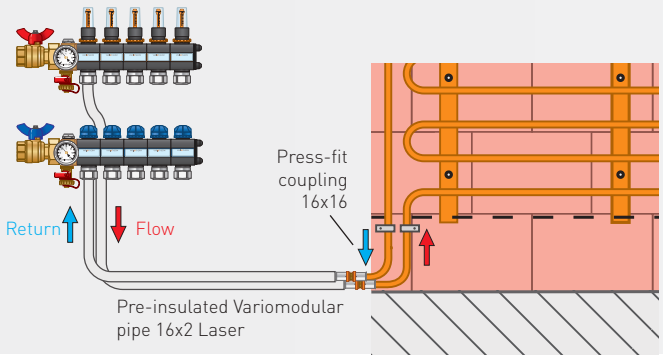


Special case inner corner

3.2 Supply pipe

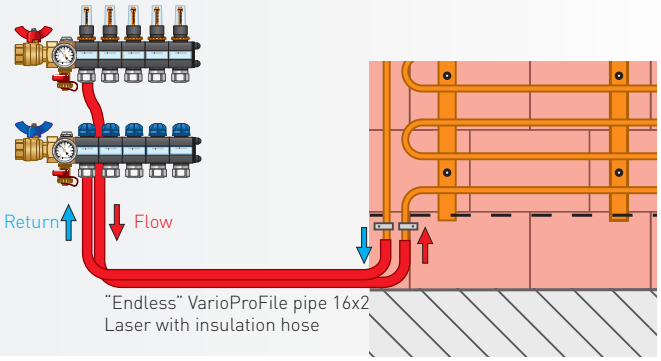
Variant: Pre-insulated Variomodular pipe 16x2 Laser

Press-fit coupling connection 16x16



Variant: Insulation hose 4 mm

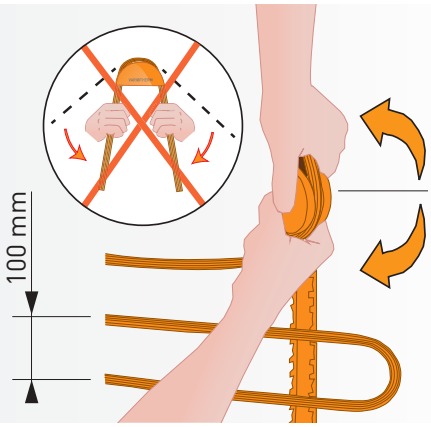
"Endless" VarioProFile pipe with insulation hose



3.3 Bending small radii

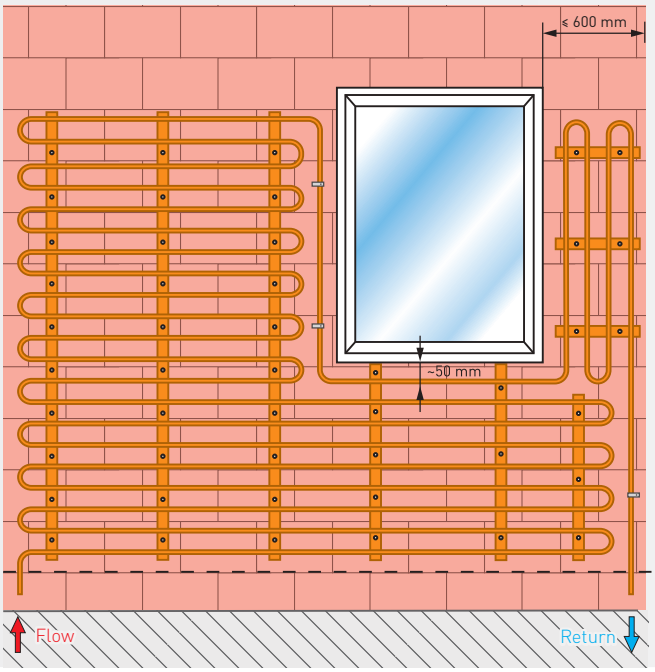
Use the bending model 16/100 for the 180° return loops and 90° corners. During bending, the pipe must be securely positioned in the groove of the bending model. Manual bending without heating is possible at room temperatures above +5°C. For lower temperatures, the VarioProFile pipe 16x2 Laser is pre-heated (store in a warm place).

Caution! During bending, the technician's hands must be as close as possible to the bending model in order to prevent kinks from forming (visual inspection)! >>

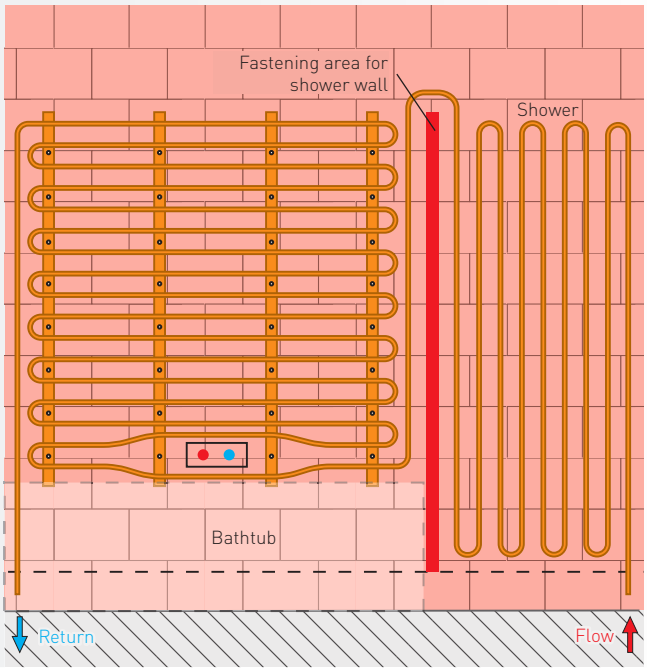


3.4 Pipe installation with assemblies (sockets, windows, etc.)

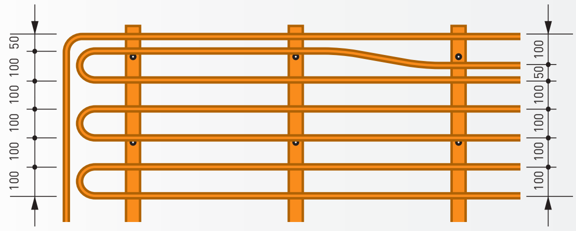
Example for window area:

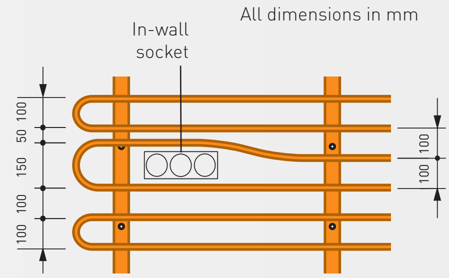


Example for bathroom:



A section-wise spacing of 50 or 150 mm is permissible for assemblies (sockets, windows, etc.).





3.5 Trimming and connecting the Variotherm pipes (press-connection)

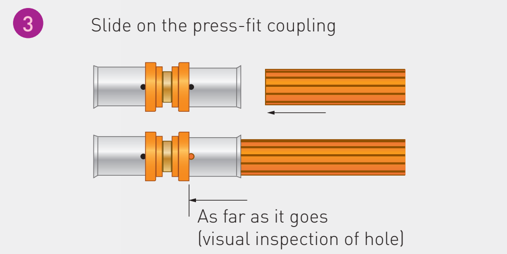
Caution! A permanent, tight connection is only guaranteed if original Variotherm system components are used:

- VarioProFile pipe 16x2 Laser
- Variotherm calibration and chamfering tool
- Variotherm press-fit couplings and Variotherm pressing tool

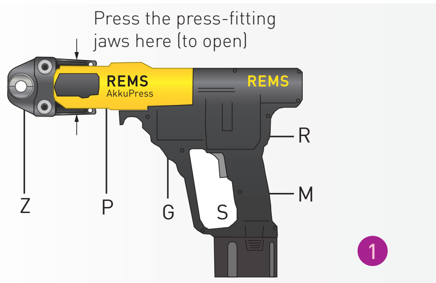
Maintenance

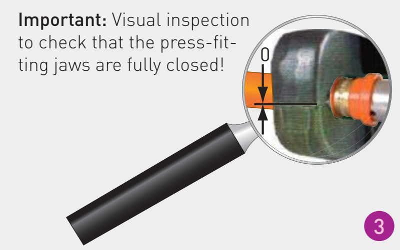
The press-fitting jaws and pressing tool must be checked at least once a year for correct operation by REMS or an authorised REMS customer service workshop.

Preparing the pipe:



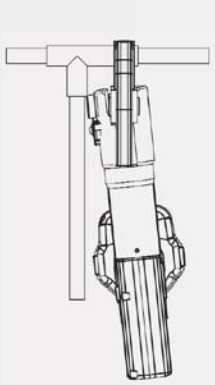
Pressing procedure for AkkuPress:

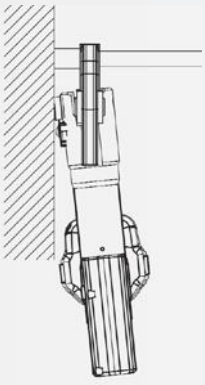


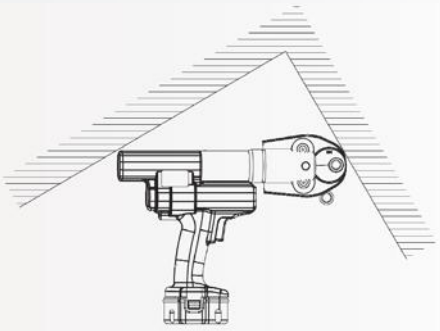


- Push the press-fitting jaws (Z) together by hand (causing the press-fitting jaws to open) far enough so that the press-fitting jaws can be placed over the press-fit coupling ❷. Place the pressing tool with press-fitting jaws on the press-fit coupling at a right angle to the pipe axis.
- Release the press-fitting jaws so that they close around the press-fit coupling ❸.
- Hold the pressing tool at the housing grip (G) and at the motor grip (M). When using an REMS AkkuPress, hold the switch (S) pressed until the press-fitting jaws are fully closed. This is made apparent 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).

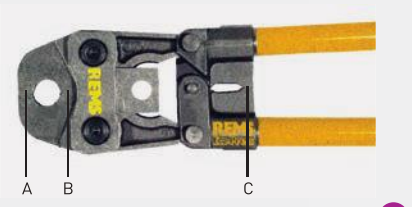
The following situations must be avoided (danger of gearbox breakage!):







Pressing procedure for Eco-Press:



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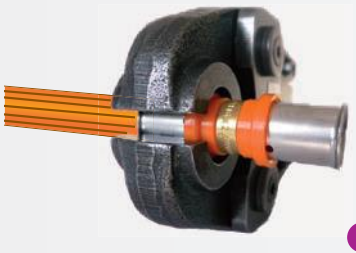
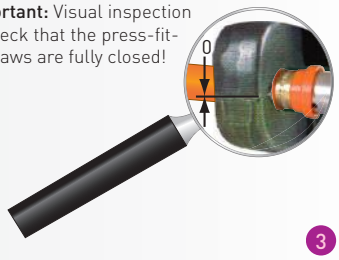


2

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



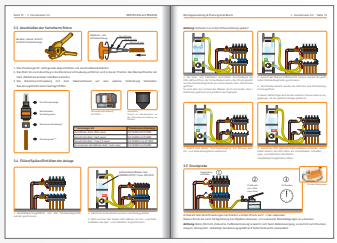
3

- 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 inspection 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).

3.7 Control and pressure test

Once all circuits have been connected to the heating/cooling distribution manifold, the system can be filled downstream of the manifold and pressurised. The pipes are to be kept under water pressure prior to or during plastering so that any damage becomes immediately visible.

Details regarding the system and heating circuit pipes and the room temperature control are provided in the DISTRIBUTION and CONTROL planning and installation instructions >>



4.1 General information

Plaster work is carried out as a multi-layer plaster (base coat and finishing coat) or a single-layer plaster. Observe the following standards:

- **ÖNORM B 2210** Work contract standard for plaster work
- **ÖNORM B 2206** Work contract standard for brickwork and fixing work
- **EN 13914-2** Design, preparation and application of external rendering and internal plastering - Part 2: Design considerations and essential principles for internal plastering
- **ÖNORM B 3346** Rendering and plastering mortar - Rules for use and processing - Complementary provisions to ÖNORM EN 13914-1 and -2
- **EN 998-1** Specification for mortar for masonry - Part 1: Rendering and plastering mortar
- **EN 1996-1** Eurocode 6: Design and construction of masonry structures - Part 1-1: General rules for reinforced and unreinforced masonry structures - National regulations for ÖNORM EN 1996-1-1
- **ÖAP guidelines WHS 06/2004**

4.2 Plaster base inspection

The plaster base inspection has to comply with the ÖNORM B 3346, EN 13914-2 guidelines. The plaster base must be free of dust, frost and efflorescences, it may not be water-repellent, and must be free of loose parts.

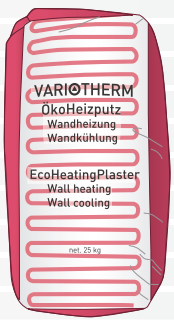
4.3 Plastering with EcoHeatingPlaster - SWHK2

The following notes apply to standard-compliant brickwork and **solely** for the purpose of using Variotherm EcoHeatingPlaster as a base coat (SystemWall SWHK2)!

After applying the EcoHeatingPlaster, the finishing coat is applied on-site.

4.3.1 Description of EcoHeatingPlaster

Variotherm EcoHeatingPlaster was designed as a base coat for plastering the SystemWall with a plaster thickness (incl. heating pipe) **of up to 25 mm**. It is a premixed hydraulic dry mortar for machine and manual processing (classification: GP - CS II per ÖNORM EN 998-1).



	Technical data
Maximum grain size:	2 mm
Compressive strength (28d):	> 3 N/mm²
Flexural strength (28d):	> 1 N/mm²
Thermal conductivity λ:	0.82 W/mK
μ value:	12.4
Oven-dry density (28d):	approx. 1,500 kg/m³
Fresh mortar apparent density:	approx. 1,700 kg/m³
Water requirement:	5 – 6 litres/25 kg
Material consumption:	approx. 45 kg/m²
Minimum plaster thickness:	10 mm
Maximum plaster thickness:	25 mm
Packaging:	25 kg per bag/42 bags per euro-pallet
Storage (dry, foil-wrapped):	12 months

4.3.2 Plaster base preparation

GENERAL INFORMATION

Prerequisites for the proper execution of plaster work are:

(1) Building shell work: planning and implementation in accordance with the materials (for example arrangement of expansion joints)

(2) Protection against moisture penetration

- Weatherproof storage of plaster materials on the construction site
- Cover the respective upper connecting walls – and pay attention to parapets, even with longer breaks, over weekends and in rainy weather (for example ÖNORM B 2206)

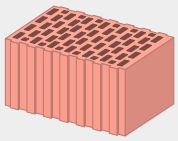
(3) Waiting time for building shell or brickwork: observe building-specific setting/curing times (waiting time)

(4) Timely finishing with lime/cement mortar or with cement filling mass prior to plaster work

(5) Measure for assemblies: before starting the plaster work, all corrosive metal parts must be protected

(6) Preparation:

- Even out defects and uneven areas
- Dry brush any efflorescences on the naked brickwork (before laying out the VarioProFile pipes)
- Seal seams
- Finish any damaged areas

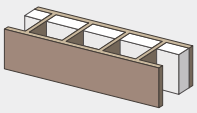


Burnt bricks (vertically perforated bricks, NF bricks)

After laying the VarioProFile pipes, apply spatterdash coat to the whole surface to compensate for excessive porosity/absorbency. Waiting time: 3 days

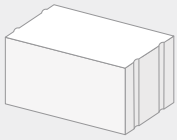
Mineral-bonded wood-wool and lightweight chipboard panels single- and multi-layered

Glue panel system on the front side > After laying the VarioProFile pipes, apply spatterdash coat to the whole surface. Waiting time: 3 days



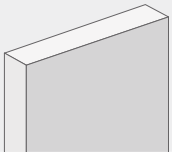
Cement-bonded wood chip flue bricks with and without integrated thermal insulation

After laying the VarioProFile pipes, apply spatterdash coat to the whole surface. Waiting time: 14 days



Cellular concrete blocks

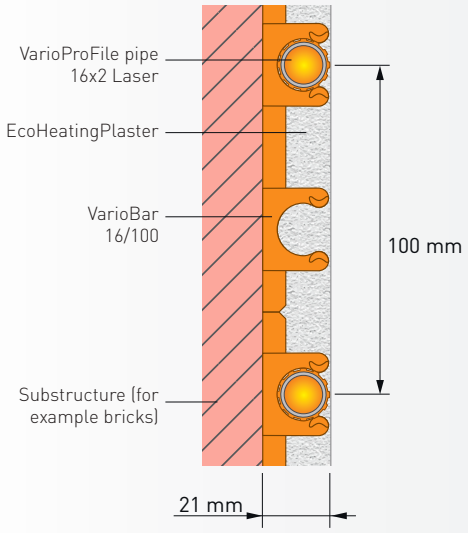
After laying the VarioProFile pipes, remove dust and wet surface, apply spatterdash coat to the whole surface. Waiting time: 3 days



Concrete

After laying the VarioProFile pipes, apply spatterdash coat to the whole surface. Waiting time: 3 days

4.3.3 Applying the EcoHeatingPlaster (base coat)



Notes

- Only carry out plaster work if air, plaster base and material temperatures are higher than +5°C.
- After carrying out the plaster work, the temperature must be higher than +5°C for at least 2 days.
- The SystemWall may not be heated during the plaster work.
- Proper curing requires sufficient air exchange but dehumidification should not be too rapid.
- Rapid heating of the Variotherm EcoHeatingPlaster or using dehumidification systems is not permissible.
- If there is any risk of too rapid drying, keep the EcoHeatingPlaster surface moist for 2 days after application.

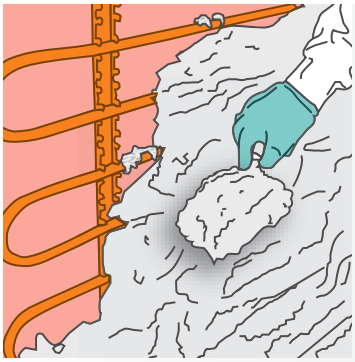
Tempering water

Water from the municipal water supply can be used for tempering. Water from other sources needs to be checked. The temperature of the tempering water may not exceed 25 °C. Mix 25 kg EcoHeatingPlaster with 5 – 6 litres of water.

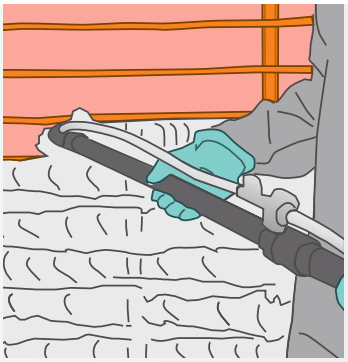
Processing the Variotherm EcoHeatingPlaster

EcoHeatingPlaster is applied manually or with a suitable machine and then skimmed down to the level of the VarioBar. The VarioProFile pipes are fully surrounded by the EcoHeatingPlaster.

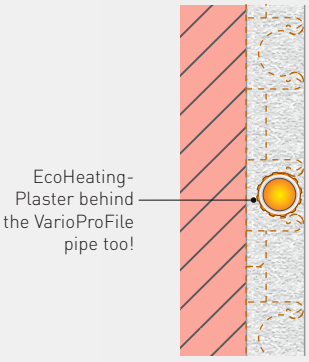
Example for plaster machine for EcoHeatingPlaster	
Plaster machine:	G4
Worm drive:	D6-3
Nozzle:	for interior plaster
Tube:	inner diameter 25 mm

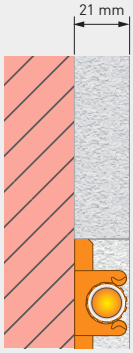


Manual application



Machine application





Finishing options for upper SystemWall, e.g. with lime plaster or lime cement plaster as a base coat

For an improved adhesion of the finishing coat, the EcoHeatingPlaster, which has hardened somewhat after 6 to 9 hours, is scarified horizontally (can be done up to 24 hours after application).

Caution! Avoid any damage to the VarioProFile pipe.

4.3.5 Applying the finishing coat

- Maintain plaster thickness of 10 mm to max. 20 mm over soffit of VarioProFile pipe.
  (Exception: special decorative plaster applied with a trowel – see manufacturer's specifications)
- Variotherm recommends finishing coat using lime plaster, lime cement plaster, clay plaster or lime gypsum plaster with:
  - Oven-dry density (28d): ⩾ 1,200 kg/m³
  - Maximum grain size: 1.2 mm
  - Compressive strength: < 3 N/mm² (less than EcoHeatingPlaster).

  They have good heat-conducting properties, are temperature-resistant and have a favourable influence on moisture regulation (important for cooling function).

Examples for finishing coat on Variotherm EcoHeatingPlaster

	Oven-dry density (28d)	Compressive strength	Product examples	Maximum grain size	Min. drying time EcoHeatingPlaster	Inserted Variotherm plaster lattice	Max. flow temperature
Lime plaster, lime cement plaster	⩾ 1,200 kg/m³	< 3 N/mm²	Maxit IP 20, Baumit MPI30	depending on products	6 - 9 hours (hardening)	Yes	55°C
Lime gypsum plaster	⩾ 1,200 kg/m³	< 3 N/mm²	Maxit IP 23F, Maxit IP 24F, Baumit MPI26	1.0 mm	7 days	Yes	45°C
Clay plaster	1,580 kg/m³	< 3 N/mm²	Natur und Lehm BF02	-	5 - 6 days	Yes	55°C

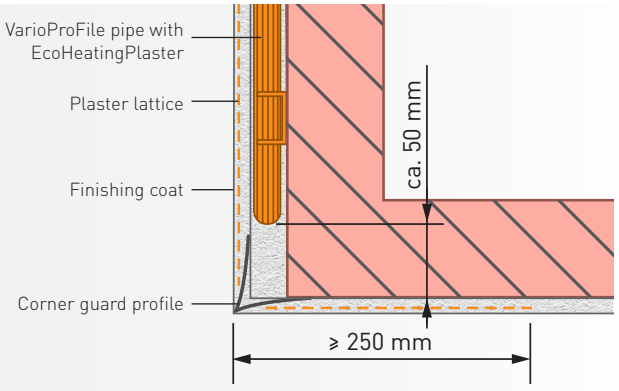
The values above are based on an air temperature of approx. 20°C and a relative humidity of 45 - 70%. Processes such as hardening and the required drying of the EcoHeatingPlaster prior to application of the finishing coat must be observed and possibly adjusted by the plasterer as per the table. Please also note that according to manufacturers' specifications, some finishing coats (especially lime cement plaster) must be kept moist for a period of 2 days after finishing the surface to avoid cracking.

Corner guard

Protruding corners can be protected with corner guards. These are installed after the EcoHeatingPlaster.

The corner guards are applied to the outer plaster layer using a suitable adhesive (adhesive mortar). They are covered by the finishing coat, whereby the mesh of the corner guard serves as a reinforcement of the immediate vicinity.

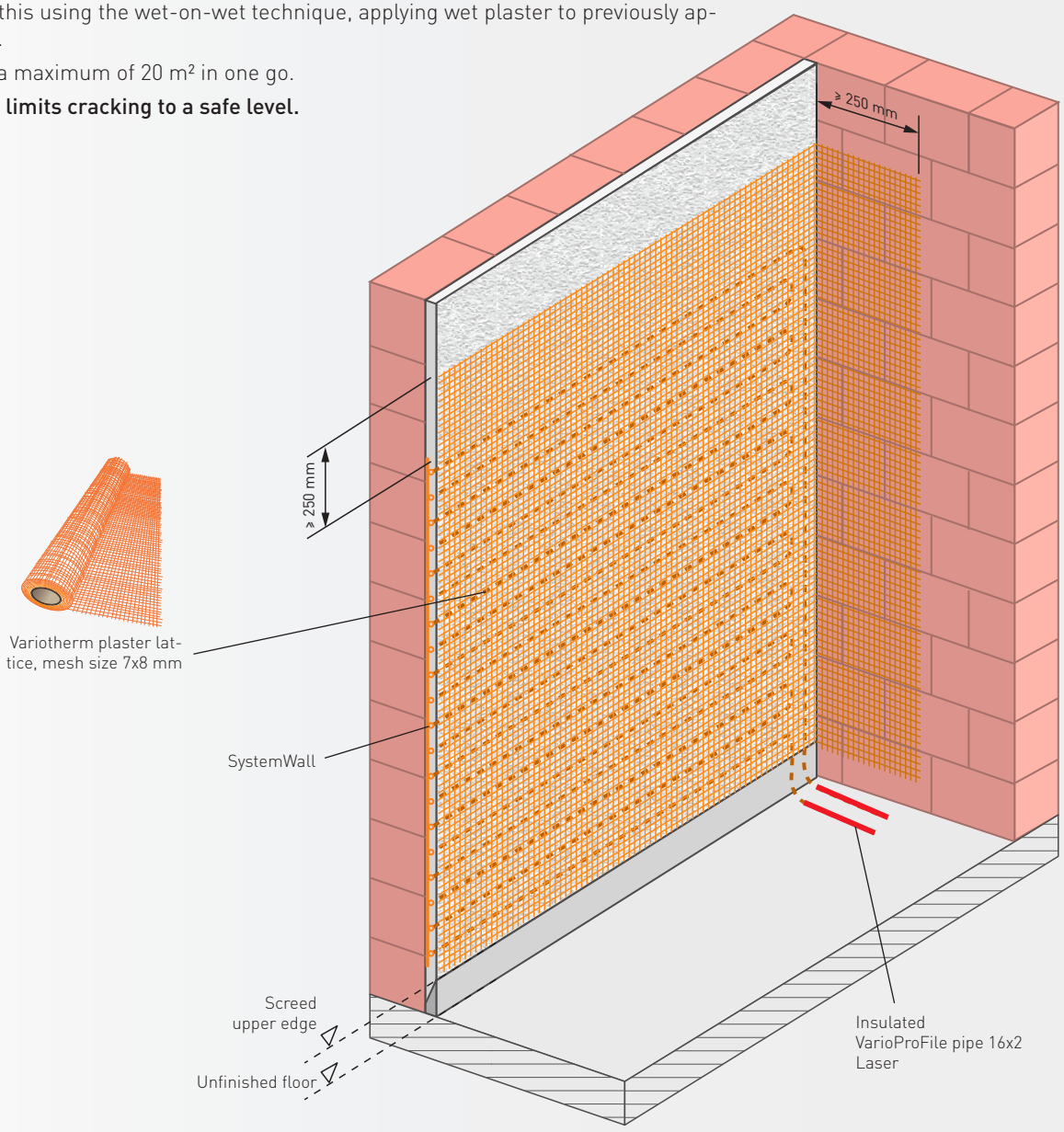
The plaster lattice (inserted into the finishing coat) is applied from both sides up to the edge.



Applying the Variotherm plaster lattice

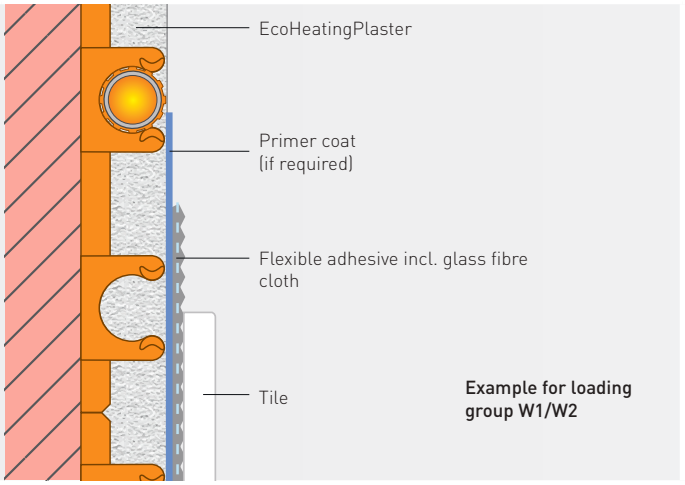
- Apply the finishing coat to about two thirds of the required plaster thickness.
- Apply Variotherm plaster lattice (at least 250 mm in excess of the SystemWall heating area [especially for embrasures, corners, at the edges] and make sure it overlaps by at least 100 mm).
- Make sure the plaster lattice is tight and even.
- See page 12 if using a corner guard.
- Apply the remaining plaster up to the required thickness of the finishing coat. Make sure to do this using the wet-on-wet technique, applying wet plaster to previously applied wet plaster.
- Apply and finish a maximum of 20 m² in one go.

The plaster lattice limits cracking to a safe level.

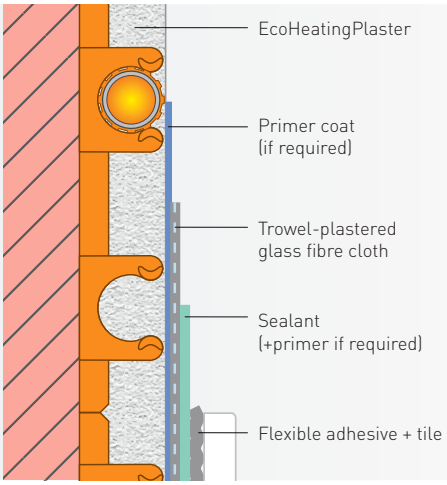


4.3.6 Fitting tiles (instead of finishing coat)

The tiles can be applied directly to the EcoHeatingPlaster (skimmed down to VarioBar level). The EcoHeatingPlaster must be fully dried before you fit the tiles. Preheating is to be carried out according to the preheating protocol (see Section 5) and prior to laying the tiles.



Example for loading group W1/W2



Example for loading group W3/W4

Sealant in wet areas:

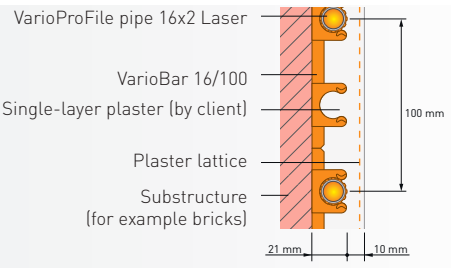
Loading group		Which room?	Primer	Sealing system
ÖN B 3407	ZDB Composite sealing (Germany)			
W1	-	Residential sector: Toilets, hallways, staircases	Not required (cement flexible adhesive mortar)	Not required
W2	-	Residential sector: Kitchen Commercial sector: Toilet systems	Not required (cement flexible adhesive mortar)	Not required
W3	A0	Wall/floor surfaces without drains (e.g. bathrooms with shower trays)	In addition to sealing system if recommended by the manufacturer	Required
W4	B0, A, B, C	Wall/floor surfaces with drains (e.g. showers with floor-level fittings)	In addition to sealing system if recommended by the manufacturer	Required
W5		Commercial sector: Canteen kitchens, shower facilities	In addition to sealing system if recommended by the manufacturer	Required
W6		Exterior surfaces	SystemWall cannot be used	

Product examples for primer or sealing system:

Manufacturer	Primer	Sealing system W3	Sealing system W4 (confirm W5 with manufacturer)
Cimsec	Primer	Dichtflex	2K sealing, CL69
Ceresit	CT17	CL51	CL50, CL69 Ultra Tight
Schönox	Not required	HA	1K DS-Premium
Murexin	Deep primer LF1	Liquid foil 1KS, object liquid foil rapid 1K	Professional sealing foil PD 1K, sealing foil DF 2K, liquid foil 2KS
Ardex	Not required	S1-K	8+9
Kema	Primer S	Hidrostop DB	Hidrostop Vario

4.4 Plastering with EcoHeatingPlaster - SWHK3

- **Single-layer plasters require the manufacturer's approval for use with wall heating systems**
- Observe the manufacturer's guidelines for plastering
- Oven-dry density (28d): ⩾ 1,200 kg/m³
- Pipe covering: ⩾ 10 mm



Construction project: _____

Building owner/Occupant: _____

Client: _____

Heating installation technician: _____

Architect: _____

Other: _____

5.1 Leak-tightness test

The Variotherm SystemWall circuits are to be tested for leak-tightness using a water pressure test after they have been laid and before plaster work is carried out. The test pressure should be min. 4 bar and max. 6 bar. If there is a risk of freezing, appropriate measures should be taken, e.g. use of antifreeze and controlling the building's temperature.

- Installation of pipe connections finished on: _____
- Pressure test started on: _____ with test pressure of ____ bar
- Pressure test completed on: _____ with test pressure of ____ bar
- Plaster work started on: _____
- System pressure during the completion work was _____ bar
- The system water was treated (e.g. per ÖNORM H 5195-1) ☐ Yes ☐ No
- Antifreeze was added to the system water ☐ Yes ☐ No
- The system was checked for leak-tightness on: _____ and approved

Approval:

Building owner/Occupant/Client	Construction management/Architect	Heating installation technician

5.2 Preheating protocol

The system wall heating system and the plaster may not be baked out! Prior to the first heating, a drying period of at least 14 days must be observed after completion of the finishing coat.

Prior to painting, the wall must be heated to the max. calculated flow temperature.

Plaster base: ☐ Heraklit panels ☐ Vertically perforated bricks, bricks ☐ Other: _____

Base coat or undercoat: ☐ Variotherm EcoHeatingPlaster ☐ Other: _____

Finishing coat: ☐ Lime plaster ☐ Lime cement plaster ☐ Lime gypsum plaster ☐ Other: _____

Preheating the Variotherm SystemWall (also in the summer):

- Completion of plaster work (EcoHeatingPlaster or base coat) on: _____
- Completion of plaster work (finishing coat) on: _____
- Preheating started on: _____
- Set flow temperature to 25°C and maintain this value for 3 days Completed ☐
- Set to max. permissible flow temperature and maintain for 4 days Completed ☐
- Maximum flow temperature reached: _____ °C
- Preheating finished on: _____

Approval:

Building owner/Occupant/Client	Construction management/Architect	Heating installation technician

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