

## Clay climate - dry construction system

The **water-guided system** from ArgillaTherm combines the advantages of innovative heating technology with the positive properties of clay as a building material and relies on a newly developed, worldwide unique and patented panel system for a particularly simple and inexpensive installation.

**Product manufacturing almost CO<sup>2</sup> neutral. 100% return to nature possible, cradle to cradle.**

### Sandwich construction



### Components

- 1 OSB 3 / ESB-Plus P5 boards or in buildings with increased fire protection requirements cement-bonded chipboard with tongue and groove as substructure
- 2 High-performance clay modules according to DIN 18948 and clay-compensation panels according to DIN 18948
- 3 Polybutene pipe "Hot & Cool" according to DIN 16968, PB 12 x 1.3mm, oxygen tight according to DIN 4726
- 4 Clay plaster "Thermo" according to DIN 18947 for surface heating and cooling systems with integrated mesh
- 5 Clayfix clay paint according to DVL TM 06 as sprayable and spreadable ready-mix or Clay high-grade plaster according to DVL TM 06

1

### Core of the system



#### High Performance Clay Modules

for easy & coupling-free installation of heating/cooling pipes. Highly absorbent, dimensionally stable, crack-free, without the use of grid fabrics.

Absorption according to standard = 107g/m<sup>2</sup> in 12 hours

Absorption after 7 days > 500g/m<sup>2</sup>

Tested and certified.

composition:

Clays (≥ 35%), sands, Miscanthus fibres

1m<sup>2</sup> = 7,23 Units High-Performance Clay Modules



**Technical data of the high performance clay modules**

<b>Dimensions</b>	<b>372 x 372 x 25 mm</b>
<b>Weight per module</b>	<b>5,05 kg</b>
<b>Weight per m<sup>2</sup> (7.23 pieces)</b>	<b>36,5 kg</b>
<b>max. pipe consumption per m<sup>2</sup></b>	<b>11 m</b>
<b>Building material class</b>	<b>A 1</b>
<b>Thermal conductivity</b>	<b>High (1,05 W/mK)</b>
<b>Moisture absorption and release in 12 hours</b>	<b>&gt; 100 Grammes per m<sup>2</sup></b>

**Systempartner**

In order to be able to offer complete systems on the market, various cooperation agreements have been concluded with leading German manufacturers.

ArgillaTherm only uses system components that are subject to current standards and have been tested accordingly.

<b>Firma Claytec</b>	clay plasters & paints	Special design
<b>Firma Viega</b>	Heating/cooling pipe	Special design
<b>Firma Eberle</b>	Control engineering	Standard products with specially stored control programs
<b>Firma Spax</b>	Fixings	Standard products
<b>Firma Liaver</b>	Acoustic system	Standard products

2

**System tests carried out**

<b>DIN EN 1264</b>	Test for room area integrated heating & cooling systems with water flow to determine the heating / cooling capacity	MFPA Weimar
<b>DIN 4102</b>	Test for the classification of building materials according to their reaction to fire performance in fire resistance classes	MFPA Leipzig
<b>DIN 18948</b>	Requirements, performance characteristics and test methods for factory-made clay building boards	MFPA Weimar
<b>DIN 18947</b>	Requirements for clay plaster mortar for plastering walls and ceilings	BAM Berlin
<b>DIN 4726</b>	Testing the oxygen tightness of plastic pipes	MPA Dortmund



Heating, automatic humidity control, permanent room air cleaning and optionally via additional modules a pleasant acoustics with only one surface.

### System flow temperatures

Depending on the heating power requirement, occupancy density and spread at

Heating: 27 – 55°C

### Reaction time / thermal inertia

Depending on the heating system, the response time is about 5-10 minutes, the clay wall material with its total layer thickness of about 30mm is completely heated through after about 60 minutes. If the heat supply is interrupted, the system keeps the surface temperature relatively constant, depending on the environment, for about 60 minutes without significant drop. When heat pumps are used, interruptible heating current tariffs (heat pump tariffs) can therefore be used without buffer storage without any problems.

### Mounting variants / system structure

The high-performance clay modules are mounted on a smooth substructure with the help of stainless steel screws and washers. The substructure can be

- OSB boards or ESB boards (tongue & groove)
- Wood fibre insulation boards (tongue & groove)
- Cement- or gypsum-based fibreboards
- Solid wood walls
- Battens made of wood

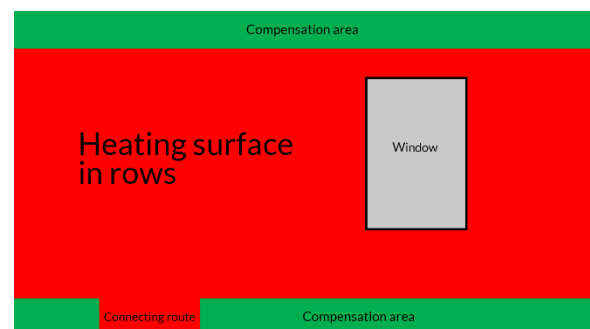
When installing heating systems on external walls, the substructure of the panels must be sufficiently permeable to water vapour. ESB-Plus P5 boards are recommended here, as the water vapour diffusion resistance factor ( $\mu$  value) is only 40. The SD value is therefore 0.88m. The ESB-Plus P5 boards, size 129x62.5cm, are part of the delivery program of the company ArgillaTherm GmbH.

For safety reasons, a dew point calculation should be carried out!

### Variants wall heating

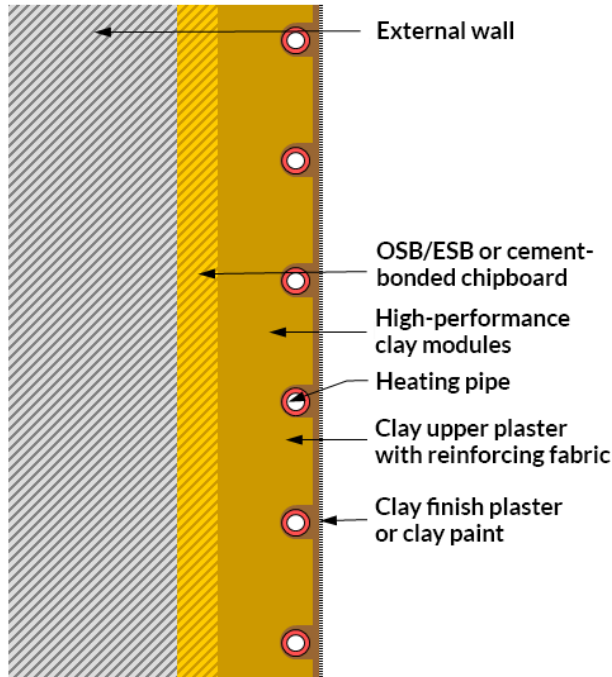


Maximum heating power

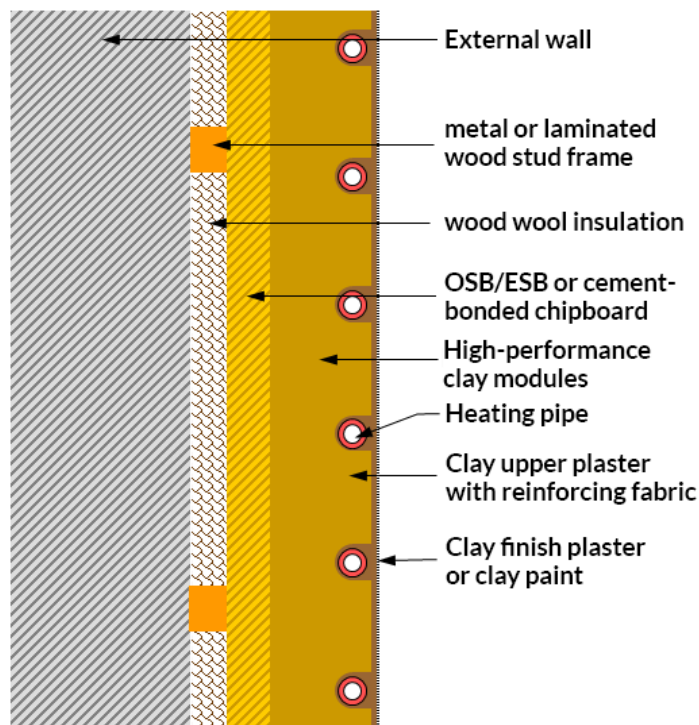


Maximum heating power with sound absorber

**Example 1:** direct fixing to the wall with OSB/ESB or cement-bonded chipboard / construction depth 52mm



**Example 2:** Fixing with substructure formwork, cavity insulation and OSB/ESB or cement-bonded chipboard / construction depth 52mm plus depth of the substructure formwork



### Technical planning and basics

When planning and designing the ArgillaTherm wall heating system, the relevant regulations and standards must be observed.

DIN EN 12831	Method for calculating the standard heating load
DIN EN 1264	Room area integrated heating and cooling systems with water flow
DIN EN ISO 11855	Environmentally compatible building planning - planning, design, installation and control of surface-integrated radiant heating and cooling systems
DIN 16968	Polybutene (PB) pipes, general quality requirements
DIN 4726	Plastic pipelines, limit value for diffusion tightness
VDI 2035	Avoidance of damage in hot water heating systems
DIN EN 60730	Automatic electrical regulation and control devices
DIN 18947	Requirements for clay plaster mortar for plastering walls and ceilings
DIN 18948	Requirements, applications, performance characteristics and test methods for factory-made clay building boards
DVL TM 06	Technical data sheet for clay thin-layer coatings of walls and ceilings

The work of the trades involved in the construction process must be coordinated accordingly.

Planning: Energy Consultant/Architect / Planner

Performing trades: Heating installer/drywall installer/construction company

### Wall heating design

Wall heating systems differ from ceiling heating systems mainly in two points. Firstly, the surface temperatures can be higher and secondly, wall heating systems have an additional convective component (resulting warm air roll).

The wSYSTEM wall heating system is designed with a standard flow temperature of 35°C (corresponds to a power output of 72 Watt/m<sup>2</sup>). Lower heating outputs are achieved either by reducing the system temperatures or by reducing the surface area of high-performance clay modules while maintaining the same system temperatures (surfaces are covered with clay compensation panels).

**Heat output  $\triangleq$  Flow<sub>Temp.</sub> – Room<sub>Temp.</sub> x Factor 4,8** (tested according to DIN EN 1264)

Features	Interpretation Variant I	Interpretation Variant II
Pipe dimensions	12 x 1,3 mm	12 x 1,3 mm
max. length per heating circuit	80 m	100 m
max. flow rate per heating circuit	72 l/h $\triangleq$ 0,9l per linear metre	90 l/h $\triangleq$ 0,9l per linear metre
Pressure difference	150 mbar	250 mbar

Standard design wall heating at 72 W/m<sup>2</sup>, room target temperature 20°C

Example: Design variant I with 72W/m<sup>2</sup>:  
 The heating circuit has a pipe length of 48m.  
 ==> The required flow rate is: 48 x 0.9l = 43 l/h

At a flow temperature of 35°C, the average wall temperature is 3 K below the average value of the heating water. When the flow temperature increases, this value rises proportionally. The values that are important for heating output are listed in the following table.

**With regard to power output, the system was tested according to DIN EN 1264.**

Flow Temperature in °C	Return Temperature in °C	Wall Temperature in °C	Room Temperature in °C	Heating capacities Watt/m <sup>2</sup>
55,0	41,0	41,0	20	168
52,5	39,5	39,5	20	156
50,0	38,0	38,0	20	144
47,5	36,5	36,5	20	132
45,0	35,0	35,0	20	120
42,5	33,5	33,5	20	108
40,0	32,0	32,0	20	96
37,5	30,5	30,5	20	84
<b>35,0</b>	<b>29,0</b>	<b>29,0</b>	<b>20</b>	<b>72</b>
32,5	27,5	27,5	20	60
30,0	26,0	26,0	20	48
27,5	24,5	24,5	20	36

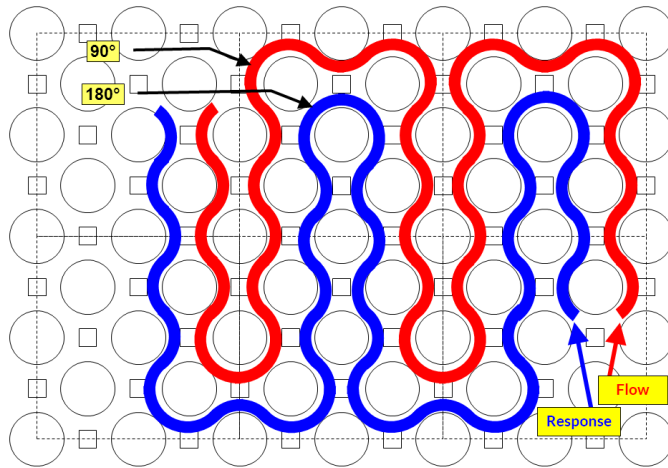
Flow temperatures and heating capacities for wall mounting

### Connection to existing heating systems

The following variants are recommended for connection to existing heating systems:

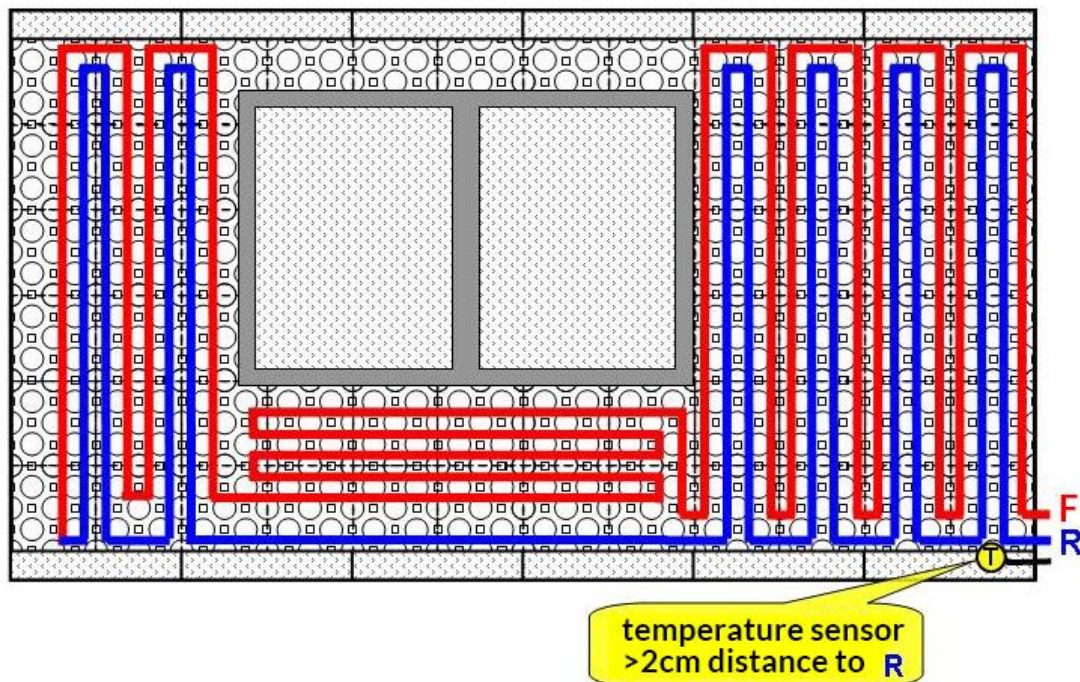
- 1. RTL control box with flow regulation in connection with the ArgillaTherm room thermostat**  
 The remote sensor measures the wall temperature and transmits these values to the room thermostat. The room thermostat controls the actuator in the RTL box (product recommendation is the RTL-TH Basic combination box from Simplex, art. no. F11836), which is to be installed in the return pipe. Since no additional pump is used here to transport the heating water, hydraulic balancing with the existing heating system must be carried out by adjusting the pressure differences. Heating systems are usually adjusted with pressure differences of less than 100mbar. For this reason, the following basic parameters must be applied.  
 Maximum heating circuit length = 60m, volume flow per hour = 60l, pressure loss in the heating circuit = 80mbar
- 2. control station with 3- or 4-way mixer and pump.**  
 The flow temperature of the existing heating system is reduced to the desired flow temperature of the ArgillaTherm wall heating system by means of a control station. The pump provides the necessary pressure and volume flow, which is controlled by the room thermostat via the wall sensor. The heating circuit lengths and volume flows are identical to connections to heating circuit distributors.

The wSYSTEM is to be executed with a special PB 12x1,3mm water pipe from ArgillaTherm.

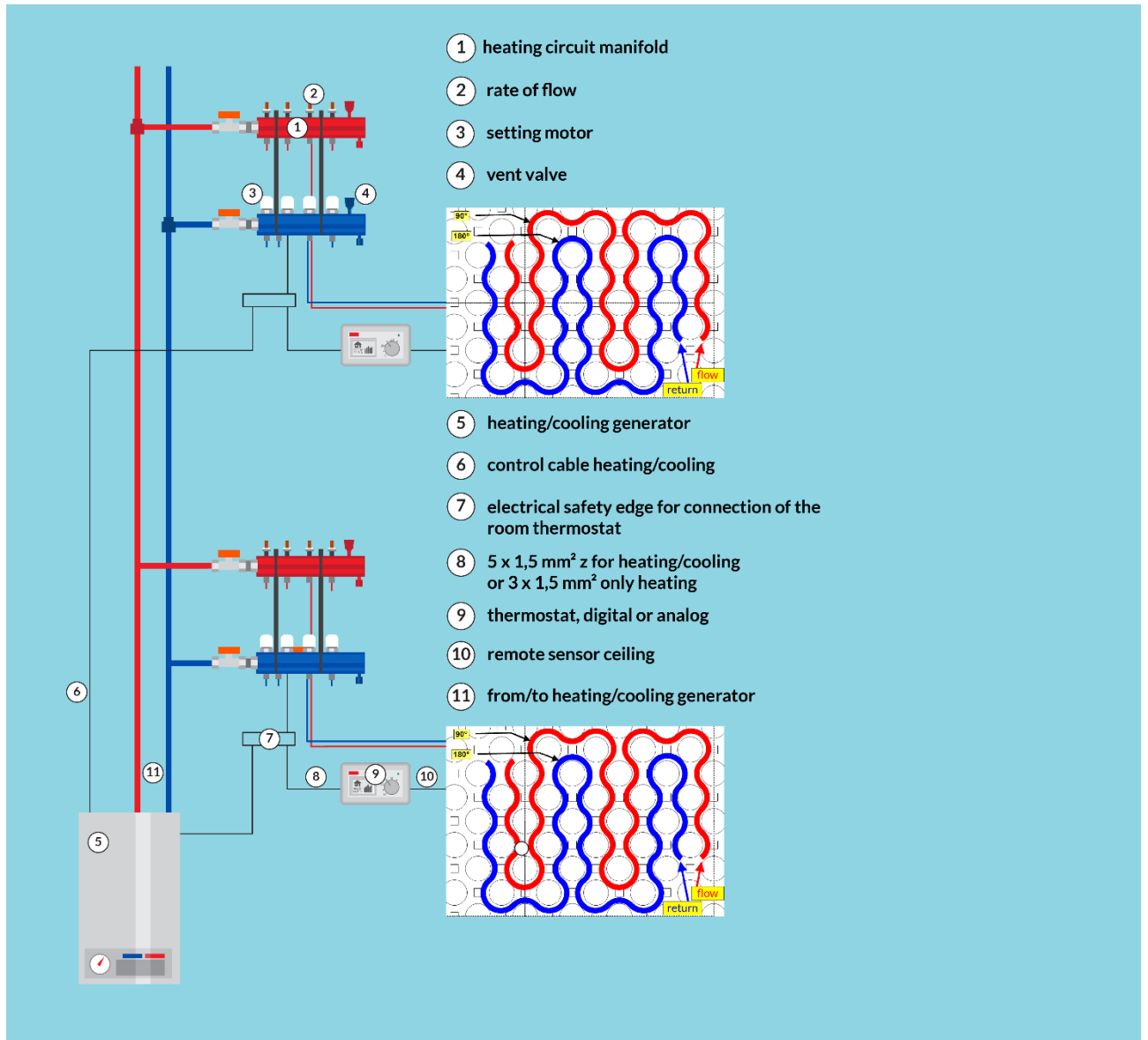


**Examples of vertical pipe installation with one heating circuit**

Wall installation window side without consideration of German regulations for electrical installation areas above and below



**Circuit diagram**



**Required materials per m<sup>2</sup> heating surface**

OSB/ESB or cement-bonded chipboard with tongue and groove as substructure	1 m <sup>2</sup>
High-performance clay modules according to DIN 18948	7,23 piece
Stainless steel - screw load distribution disc 5 x 50 mm & stainless steel - clamping screw 5 x 45mm	18 piece
Polybutene pipe "Hot & Cool" according to DIN 16968, PB 12 x 1.3mm	11 m
Clay Plaster „Thermo“ according to DIN 18947	20 kg
Glass silk mesh fabric, MW 7 x 7mm, 105g/m <sup>2</sup> , 100cm wide	1 m <sup>2</sup>
Clayfix clay paint according to DVL TM 06 as sprayable and brushable ready-mix	0,5 Litres
<i>High-grade clay plaster according to DVL TM 06 with 2mm application thickness (optional)</i>	<i>3,5 kg</i>