



Dryfloor System

ecoFloor  
PLUS

Technical Data Sheet

## Low profile dry screed underfloor heating-cooling system

### Description

Ecofloor is a dry screed fiber reinforced gypsum board system for underfloor, ceiling and wall heating/cooling installations. System contains gypsum boards factory-milled channels reinforced with cellulose fibers. Gypsum boards have a thickness of 15mm and its depth of channels is 10mm. In channels emended PE-Xb MD pipe  $\Phi 10 \times 1,1$ mm through them circulate heat/cool fluid. Distance between channels is 100mm.

### Applications

- New construction, renovations and holiday houses.
- Office and shop buildings, hospitals dispensaries.
- For interior use.
- On concrete slabs, mosaic, metal and wooden floors. Any other substructures with own bearing capacity.

### Advantages

- **Low height of installation** from 3,2cm up to 5cm, including final floor.
- **High energy efficient with low temperatures** ranges 40-45°C.
- **Easy installation, short time to built.**

### Advantages

- **Highly responsive heating/cooling and reduction of thermal inertia.** Heating time is 8% faster instead of radiator systems.
- **Industrially certified efficiency of system due to stable thermal conductivity of gypsum board [EN 12667].**
- **Less floor thermal expansions.**
- **Lighter structure compared to traditional system.** Weight load of dry screed system is 21Kg/m<sup>2</sup> compared to conventional systems 90Kg/m<sup>2</sup>.
- **No need for floor drying.** Final layer of floor can be installed after 4 - 48h.
- **Smaller 30% sizing of cabinets and distributor manifolds.**

### Floor Coverings

There is no limitation in use of floor coverings if these are suitable for underfloor heating/cooling installations. Coverings such as tiles, marble, wood or laminate, linoleum, natural stone, decorative cement mortar can be used.



# Technical manual

## General information

Ecofloor gypsum boards produced in 5 different types offering high cover of any heating area and increase (where this is necessary) the mechanical resistance in useful loads according DIN 1055-3.

Gypsum boards produced under pressure, reinforced with fiber of cellulose and fully impregnated, providing high hardness and resistance in abrasion, penetration and collision. Board surfaces are smoothly and fully waterproofed with a layer of silicon, made it suitable in high humidity areas. Gypsum boards produced and tested according EU norms DIN EN 15283, EN10456 and provided with ETA certification (European Technical Approval).

## Gypsum board technical data

|  |                         |                    |
|--|-------------------------|--------------------|
| ■ Density                                    | [ Kg/m <sup>3</sup> ]   | 1250 ± 50          |
| ■ Thermal conductivity λ EN 12667            | [ W /(m*K) ]            | 0,3                |
| ■ Specific heat capacity C                   | [ kj /(Kg*K) ]          | 1,0                |
| ■ Material classification according EN 13501 |                         | A2-s1,do           |
| ■ Thermal expansion                          | [ %/ K / m ]            | 0,015              |
| ■ Max. permissible point load                | [ kN ]                  | 1,5                |
| ■ Max. distributed load                      | [ kN ]                  | 2,0                |
| ■ Hardness (Brinell)                         | [ N / mm <sup>2</sup> ] | 30                 |
| ■ Water absorption after 24h resistance      | [ % ]                   | < 2                |
| ■ Water diffusion resistance coefficient     | [ μ ]                   | 15                 |
| ■ Fire classification DIN 4102               |                         | A2 Non-combustible |

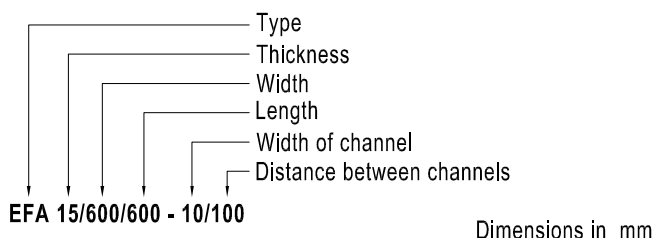
Table.1

## Weight of boards

|                                    |                          |
|------------------------------------|--------------------------|
| EFA 15/600/1200 - 10/100           | 16,0 Kg / m <sup>2</sup> |
| EFB 15/600/600 - 10/100            | 13,6 Kg / m <sup>2</sup> |
| EFC 15/600/1200 (χωρίς αυλακώσεις) | 17,7 Kg / m <sup>2</sup> |
| EFD 9/500/1000 (χωρίς αυλακώσεις)  | 15,3 Kg / m <sup>2</sup> |
| EFE 15/600/1200 - 10/100           | 19,8 Kg / m <sup>2</sup> |

Table.2

## Codification of boards



Gypsum boards must be mounted in smooth and horizontal rigid floors such as reinforced concrete pad, steel or wood constructions. Good leveling of substructures is very important before installation of gypsum boards.

## Dimensions of boards

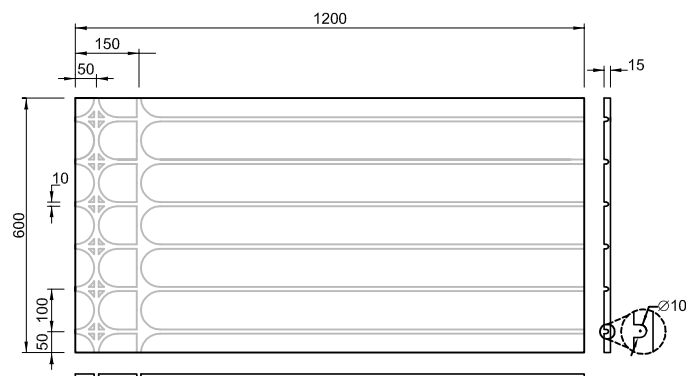


Figure.1

### EFA 15/600/1200 - 10/100

|                           |         |
|---------------------------|---------|
| Thickness                 | 15 mm   |
| Length                    | 1200 mm |
| Width                     | 600 mm  |
| Width of channels         | 10mm    |
| Distance between channels | 100 mm  |

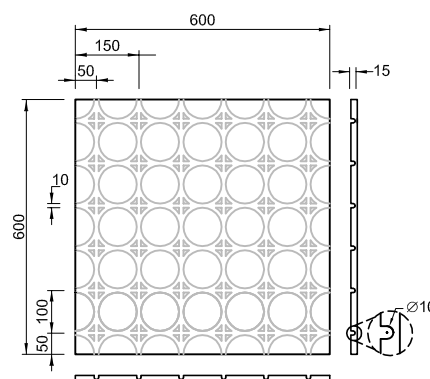


Figure.2

### EFB 15/600/600 - 10/100

|                           |         |
|---------------------------|---------|
| Thickness                 | 15 mm   |
| Length                    | 1200 mm |
| Width                     | 600 mm  |
| Width of channels         | 10mm    |
| Distance between channels | 100 mm  |



Dry screed floors should not be subjected to temperatures above 50°C.



# Technical manual

## Dimensions of boards

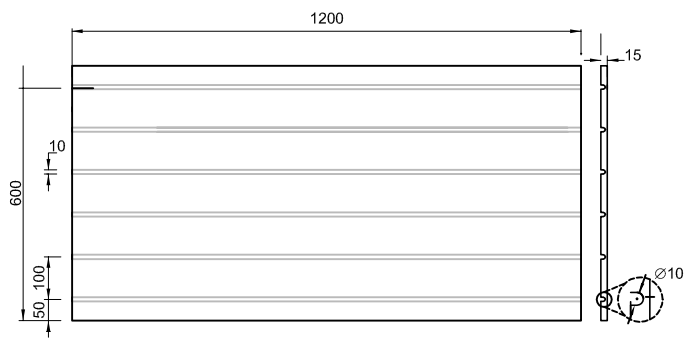


Figure.3

### EFE 15/600/1200 - 10/100

|                           |         |
|---------------------------|---------|
| Thickness                 | 15 mm   |
| Length                    | 1200 mm |
| Width                     | 600 mm  |
| Width of channels         | 10 mm   |
| Distance between channels | 100 mm  |

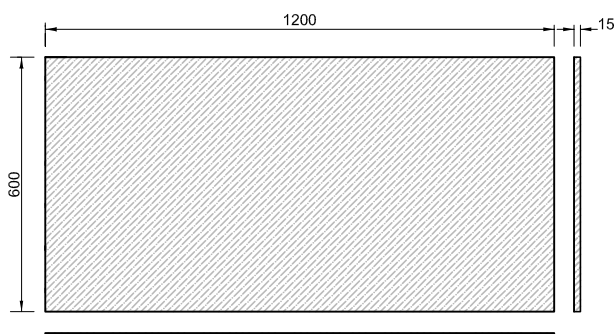


Figure.4

### EFC 15/600/1200 No channels

|           |         |
|-----------|---------|
| Thickness | 15 mm   |
| Length    | 1200 mm |
| Width     | 600 mm  |

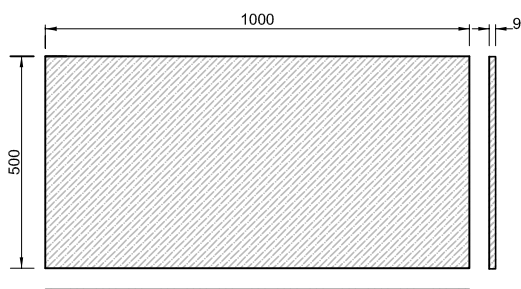


Figure.5

### EFD 9/500/1000 No channels

|           |         |
|-----------|---------|
| Thickness | 9 mm    |
| Length    | 1000 mm |
| Width     | 500 mm  |

## Areas of use

Vertical imposed loads according DIN 1055-3

| Concentrated max. load [kN] | Category accord. DIN 1055-3 | Permissible point load [kN/m <sup>2</sup> ] | Application areas  |
|-----------------------------|-----------------------------|---|--|
| 1,0                         | A2                          | 1,5   | Living rooms, bed rooms, kitchens, hallways and attics in residential buildings  |
|                             | A3                          | 2,0   | Hotel rooms including accompanying bathrooms A1  |
| 2,0                         | B1                          | 2,0   | Office rooms, hallways, attics in office buildings, physicians practices, waiting rooms and hallway in physicians practices        |
|                             | D1                          | 2,0   | Retail space with up 50m <sup>2</sup> floor space in office and residential buildings  |
| 3,0                         | B2                          | 3,0   | Hallways in schools, retirement homes, hospitals etc., treatment rooms including operating rooms without heavy equipment           |
|                             | B3                          | 5,0   | Hallways in hospitals, retired homes etc., treatment rooms including operating rooms with heavy equipment                          |
| 4,0                         | C1                          | 3,0   | Areas with tables; e.g. waiting rooms, lecture halls, classrooms, school rooms, dining halls, cafes, restaurants, receptions rooms |
|                             | C2                          | 4,0   | Areas with large congregations of people, e.g. hallways to lecture halls and classrooms, churches, theaters and cinemas            |
|                             | C3                          | 5,0   | Column-free areas, e.g. museum areas, exhibition areas etc. and entrance areas in public buildings and hotels                      |
|                             | C4                          | 5,0   | Sports and recreation areas e.g. dance halls, sports halls, gymnastics and weight rooms, stages                                    |
|                             | C5                          | 5,0   | Convention halls, congregation rooms, waiting rooms, concert halls   |
|                             | D2                          | 5,0   | Areas in warehouses, retail stores and malls   |

Picture.3 For application areas with higher requirements only after consultation with Interplast mechanical and renewable department.

## Increasing mechanical strength with gypsum boards composition

|                                  |                             |
|----------------------------------|-----------------------------|
| Category                         | Max. permissible point load |
| I EFA width 15mm                 | 1,5 kN                      |
| II EFA 15mm + EFD 9mm            | 2,5 kN                      |
| III EFA 15mm + EFC 15mm          | 3,5 kN                      |
| IV EFA 15mm + EFC 15mm + EFD 9mm | 4,0 kN                      |

↑ Type of board  
↑ Composition of boards based in category



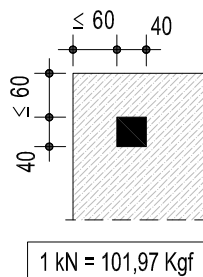
# Technical manual

## Calculation of permissible weight loads

 Permissible point load [ kN ]

Specifications to calculate the point load:

- Load area 40mm x 40mm
- Distance from edges  $\geq 60$ mm
- Deviation  $\leq 3$ mm



 Permissible distributed load [ kN/m<sup>2</sup> ]

- Load area 1000mm x 1000mm

## Requirements of structural slab

For installation of Ecofloor, structural slab must be clean, dry and capable of bearing loads. Floor leveling must be checked and any deviation measured must be compensated before beginning the installation.

## Suitable measures for correct leveling:

- Unevenness from 0 to 10mm:
  - Small areas : Coating with appropriate plaster material.
  - Big areas : Application of a self-leveling liquid spackle.
- Deep unevenness:
  - Apply bound compensating mortar with a thickness of 15 mm up to 60 mm.

## Wooden panels and parquet floors

Ecofloor can be applied over wooden floor. Structural condition of wooden strips and beams must be checked before beginning the installation. Subsurface must absolutely flat and stable. If this is not fulfilled, screw the loose wooden strips or beams.



Substructures must be checked for appropriate bearing capacity. If this requirement is not fulfilled a bearing capacity proof must be issued.

## Heating insulation

The heating needs of outside walls determine specific requirements following national rules and specifications. Additional to that, minimum requirements of thermal conductivity resistance according EN 1264-4 should be obtained (showed in Table 4).

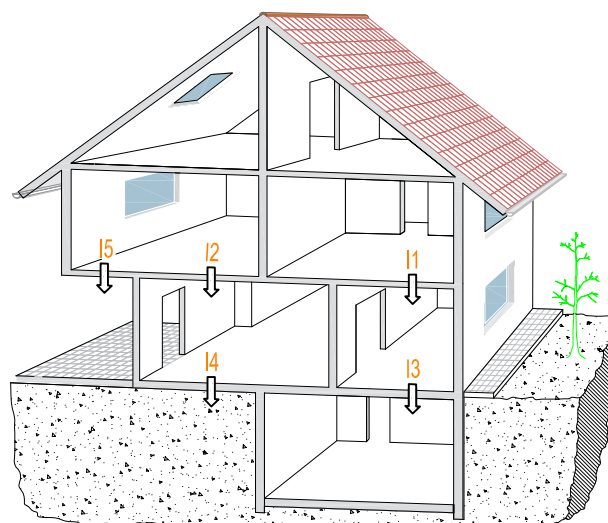


Figure.5

Minimum requirement of floor insulation according EN 1264 - 4

| Category | Field of application   | Minimum heat transmission value $R_{\lambda, \text{insulation}}$ [ m <sup>2</sup> K / W ] |
|----------|--|---|
| I1       | Heating area   | 0,75  |
| I2       | Heated area at intervals *   | 1,25  |
| I3       | Unheated area *  | 1,25  |
| I4       | Area directly on the ground *  | 1,25  |
| I5       | Outside temperature of air : $T \geq 0^\circ$                              | 1,25  |
|          | Outside temperature of air : $0^\circ\text{C} > T \geq -5^\circ\text{C}$   | 1,5   |
|          | Outside temperature of air : $-5^\circ\text{C} > T \geq -15^\circ\text{C}$ | 2,0   |

Table.4 Minimum floor insulation requirements below Ecofloor underfloor heating/cooling system according EN 1264.

\*  $R_{\lambda, \text{insulation}}$  should be increased in case of a groundwater level  $\leq 5$ m.



# Technical manual

## Calculating heat transmission resistance

To calculate heat transmission resistance value we should know thermal conductivity factor  $\lambda_{ins}$  (W/mK) and thickness  $S_{ins}$  (m). Exported from the below equation (1).

$$R\lambda_{ins.} = \frac{S_{ins}}{\lambda_{ins}} \left[ \frac{m^2 K}{W} \right] \quad \text{Equation.1}$$

Use equation (2) to calculate the insulation thickness. For this calculation thermal conductivity of insulation  $\lambda_{ins}$  [W/mK] and heat transmission resistance should be calculated  $R_{\lambda}$  [m<sup>2</sup> K / W] which exported from table 4-1.

$$S_{ins} = \lambda_{ins} * R\lambda_{ins} \quad [m] \quad \text{Equation. 2}$$

## Heating insulation substructures

Determination of insulation products made according to DIN EN 13163 and DIN EN 13164.

| Type | Description   |
|------|---|
| EPS  | Expanded polystyrene  |
| XPS  | Extruded polystyrene (Rigid foam)   |
| DEO  | Insulation panels of ceiling/ground below gypsum boards, soundproofed.              |
| DES  | Insulation panels of ceiling/ground below gypsum boards, required sound insulation. |
| sm   | Impact sound insulation increase compressibility, requirement $\leq 3mm$            |
| sg   | Impact sound insulation increase compressibility, requirement $\leq 2mm$            |

Table.5

## Properties of heating insulation panels:

- Expanded polystyrene (EPS):
  - Density : at least 30 kg/m<sup>3</sup>
  - Thickness : max. 60mm
- Extruded polystyrene (XPS):
  - Density : at least 33 kg/m<sup>3</sup>
  - Thickness : max 60mm
- Maximum two of insulation substructures, cross placed each other, may be installed with Ecofloor system. Insulation layers must be full contacted with bearing substrate and no cavities are permitted.

## Recommended insulation layers according DIN 1264-4

| Application according Table.4 | Heat transmission resistance $R\lambda$ insulation [m <sup>2</sup> K / W] | Insulation thickness [mm] | Thermal conductivity of material $\lambda$ [W/m <sup>2</sup> K] | Description of thermal insulation & soundproof insulation layer | Total value of heat resistance $R$ [m <sup>2</sup> K / W] |
|-------------------------------|---|---------------------------|---|---|---|
| I1                            | 0,75  | 30                        | 0,03  | EPS graphite expanded polystyrene                               | 1,0   |
| I2,I3,I4<br>I5 I              | 1,25  | 40                        | 0,03  | EPS graphite expanded polystyrene                               | 1,33  |
| I5 II                         | 1,5   | 50                        | 0,03  | EPS graphite expanded polystyrene                               | 1,66  |
| I5 III                        | 2,0   | 60                        | 0,03  | EPS graphite expanded polystyrene                               | 2,0   |

Table. 6

## Recommended insulation and soundproof layers comply with DIN 1264-4 & ISO 140.7 & ISO 717.2.

| Application according Table.4 | Heat transmission resistance $R\lambda$ insulation [m <sup>2</sup> K / W] | Insulation thickness [mm] | Thermal conductivity of material $\lambda$ [W/m <sup>2</sup> K] | Description of thermal insulation & soundproof insulation layer | Heat transmission resistance of each layer $R$ [m <sup>2</sup> K / W] | Total value of heat resistance $R$ [m <sup>2</sup> K / W] |
|-------------------------------|---|---------------------------|---|---|---|---|
| I1                            | 0,75  | 20                        | 0,03  | EPS graphite expanded polystyrene                               | 0,6666  | 0,76  |
|                               |   | 5                         | 0,049   | Soundproof insulation layer                                     | 0,1020  |   |
| I2,I3,I4<br>I5 I              | 1,25  | 40                        | 0,03  | EPS graphite expanded polystyrene                               | 1,3333  | 1,43  |
|                               |   | 5                         | 0,049   | Soundproof insulation layer                                     | 0,1020  |   |
| I5 II                         | 1,5   | 50                        | 0,03  | EPS graphite expanded polystyrene                               | 1,6666  | 1,76  |
|                               |   | 5                         | 0,049   | Soundproof insulation layer                                     | 0,1020  |   |
| I5 III                        | 2,0   | 60                        | 0,03  | EPS graphite expanded polystyrene                               | 2,0   | 2,01  |
|                               |   | 5                         | 0,049   | Soundproof insulation layer                                     | 0,1020  |   |

Table.7 Application with higher requirements only after consultation with Interplast mechanical and renewable department.



# Technical manual

## Sound proof insulation of floating screed.

Sound proof insulation against sound transmission due to walking is very important in floating screeds.

The improvement rate of sound proof insulation against sound transmission due to walking it depends from the dynamic stiffness of insulation, the gypsum board and the thickness of reinforced concrete slab. Necessary requirements of sound proof insulation described thoroughly in German Standards B8115 & VDI 4100 and in international standards ISO 140.7 & ISO 717.2. When weighted normalized impact sound pressure level of concrete floor is  $\leq$  of these standard limits, there is no need to apply additional sound proof insulation. Small values of  $L'_{n,w}$  provide high ability of sound proof insulation against impact sound.

To check the pre-determined construction of slab:

$$L'_{n,w,R} = L'_{n,w,eq,R} - \Delta L_{w,R} + 2 \text{ dB}$$

Terms:

$L'_{n,w,R}$  = Weighted normalized impact sound pressure level

$L'_{n,w,eq,R}$  = Equivalent rated standard impact sound of concrete slab

$\Delta L_{w,R}$  = Impact noise reduction

2dB = Safety value



Not to mount more than 2 impact sound proof insulation layers in one floor. Load bearing ability of all used layers must not be more than below values:

- 5 mm in occasions of point loads  $\leq 3 \text{ kN/m}^2$
- 3 mm in occasions of point loads  $\leq 5 \text{ kN/m}^2$

Soundproofing layer must be unified, without interference of other kind layers.

## Fuellmasse

Fuellmasse is used for filling gypsum board grooves with or without installed underfloor heating pipes. It is a factory mixed dry mortar made by special cements, synthetics and various fillers. Fuellmasse helps heating transmission from UFH pipes to gypsum board, reinforced the stability of structure and holds together the underfloor heating system elements.

## Advantages

- Quick and easy installation
- High yield
- High strenghts
- No dry process required
- Good enclosing of UFH pipes
- Excellent enclosing of pipes
- Ready for covering after 24 hours
- Can be machine applied

## Substrate

The substrate must be solid, clean, not cracked, free of vibration dry and clean. During filling heating should not be switched on and substrate should have normal room temperature.

## Mixing

For mixing use a clean mixing vessel. Mix 1 bag (each bag 25kgs) into approximately 8l of clean water with an agitator, avoiding air inclusion until a lump-free, uniform, and flowing consistency is achieved. Always check workability of mixing.

## Application

Before apply Fuellmasse, pressure test in all UFH circuits should be made. The working temperature during application should be at least  $+5^{\circ}\text{C}$ . Lower temperatures delay setting and higher temperatures speed it up. Mix 25kgs of Fuellmasse with 10l of cold water. Always check the workability of mixture. Apply it in all gypsum board surfaces (Fuellmasse is not a self-leveling material). Distribute it using a finishing trowel or dappling bar to a layer thickness of about 10mm. The prepared filler material must be applied within about 20 minutes. After application remove excess filling layers with plastering knife as soon as surface is safe to walk on. Pay attention not to damage UHF pipes. Surfaces can be walked, depending on the thickness and temperature at  $20^{\circ}\text{C}$ . / 65% relative humidity, after approximately 1.5h.



# Technical manual

## Drying

20°C, 65 % relative humidity

Layer thickness 10mm : After 1 days (24 hours)

## Data

- Layer thickness Up to 20 mm
- Streight after 28 days (references values)
- Compressive strength > 28 N/mm<sup>2</sup>
- Bending tensile strength > 6 N/mm<sup>2</sup>
- Agitator application
- Water ratio 25 kgs approx. 10 l
- Thermal expansion approx. 0.01 mm/(mK)
- Storage up to 12 months



## Primer

Primer is a ready to use, fine-particle, watery deep primer on a synthetic resin dispersion and is solvent-free and softener-free as well as alkaline resistance. It is used after Fuellmasse application to manage better adhesiveness between the gypsum boards and the above material (tile glue etc).

## Advantages

- Ready to use
- Very good penetration power
- Diffusion permeable
- Surface consolidating
- Dust binding
- Absorption regulating
- Solvent and softener free, low emission
- Can be machine applied

## Substrate

The substrate must be stable, dry, firm and sufficient dimensionally stable, dust free, free of loose components, oil, grease, concrete release agents and treatment agents, sinter layers, impurities and harmful efflorescence.

## Application

Stir the content before application. Primer can be applied with a painting brush, roller or spray gun. Remove excess material so that no glossy spots or pools occur. For highly absorbent and porous surfaces can be applied two coats "fresh-in-fresh".

## Drying

Primer drying normally after minimum 3 hours ( 20 °C and 65% relative humidity). The time after drying and commencement of subsequent work should be kept as short as possible to avoid dust depositing on the surfaces.

## Data

- Density approx. 1.0 kg/l
- Viscosity low viscosity (thing flowing)
- pH value approx. 8
- Working temperature min. +5 °C