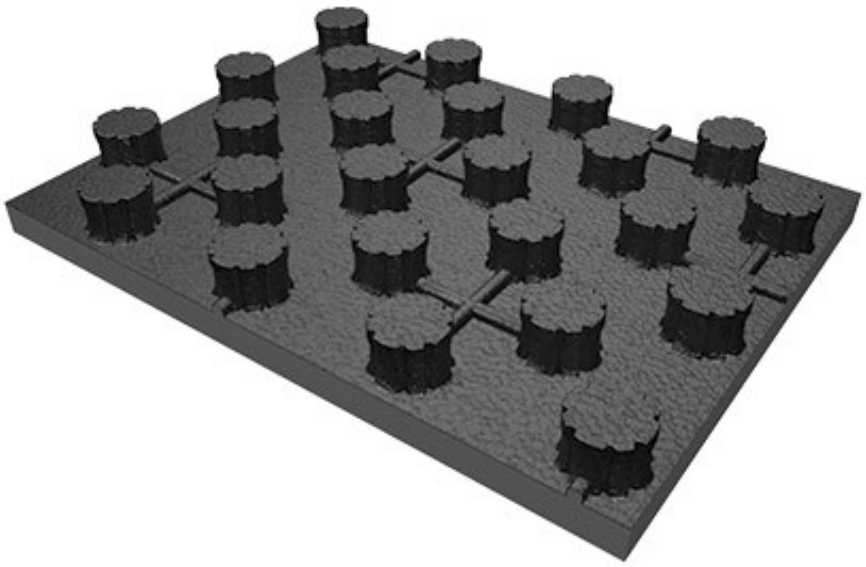
EN

# 4518GRF

## “LOW BLACK” INSULATING PANEL
## FOR LOW THERMAL INERTIA RADIANT SYSTEMS



### DESCRIPTION

LOW BLACK is the **innovative Tiemme system created to meet the demand for radiant systems with low thermal inertia and reduced thickness.**
It can be used in residential and commercial radiant floor heating and cooling systems.
Designed to meet plant engineering requirements in the event of restructuring, thanks to the reduced thickness the system can be created without having to carry out any demolition work.

The studded panel is the result of the coupling of a base in sintered expanded polystyrene - with the addition of graphite, with a **high mechanic resistance (EPS 300)**, obtained using the best moulding techniques - and a sheet of polystyrene thermo-welded HIPS with a thickness of 170 µm.

**Thanks to the high compressive resistance, that characterizes the LOW BLACK panel, it is particularly suited for coupling with special low screeds which may reach up to 10 mm above the pipe** (follow the manufacturers instructions of self-leveling compound).

Coupling between the panels is guaranteed by a special interlocking system with perimetral joints.

CAUTION: The panel must be protected from direct sunlight and stored in dry and ventilated places, away from sources of heat and open flames.

### ADVANTAGES / STRENGTHS

- Low thermal inertia (in combination with lowered screeds).
- Reduced system thickness.
- High mechanical strength (**EPS 300**).
- Panel with added graphite for a high degree of thermal insulation.
- Quick and easy installation, thanks to the preformed reliefs (ashlars) and interlocking grooves on the perimeter of the panel.
- Can be combined with Ø 16x2 mm and Ø 17x2 pipe: guaranteeing excellent flow rates with low pressure drops.

### PRODUCTION RANGE

| Art. | Code | Total panel dimension (mm) | Insulating thickness (mm) | Thermal resistance ($m^2$ K/W) | C.R. 10% (kPa) | Packing unit ($m^2$) | No. panels per package (Pcs.) |
|---|---|---|---|---|---|---|---|
| 4518GRF | 450 0567 | 1425 x 825 x 31 | 12 | 0,55 | 300 | 23,52 | 21 |
| | 450 0568 | 1425 x 825 x 38 | 19 | 0,77 | 300 | 17,92 | 16 |
| | 450 0569 | 1425 x 825 x 53 | 34 | 1,26 | 300 | 12,32 | 11 |

## DIMENSIONAL SPECIFICATIONS

| | | Panel code | | |
|---|---|---|---|---|
| | | **450 0567** | **450 0568** | **450 0569** |
| Insulating thickness | (mm) | 12 | 19 | 34 |
| Total thickness | (mm) | 31 | 38 | 53 |
| Total effective thickness (calculated according to UNI EN 1264-3) | (mm) | 17 | 24 | 39 |
| Covering film thickness | (µm) | 170 | | |
| Applicable pipe diameter | (mm) | 16 e 17 | | |
| Minimum pipe laying step | (mm) | 50 | | |
| Total panel dimensions | (mm) | 1425 x 825 | | |
| Usable panel dimensions | (mm) | 1400 x 800 | | |
| Usable panel surface | ($m^2$) | 1,12 | | |

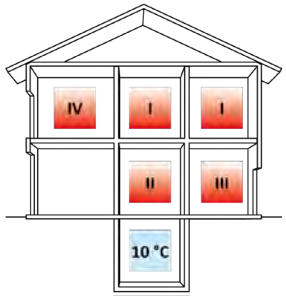
## TECHNICAL SPECIFICATIONS

| | | Panel code | | | Reference standard |
|---|---|---|---|---|---|
| | | **450 0567** | **450 0568** | **450 0569** | |
| Declared thermal conductivity **$\lambda_D$** | (W/mk) | 0,031 | | | UNI EN 12667 |
| Thermal resistance **$R_D$** | ($m^2$ K/W) | 0,55 | 0,77 | 1,26 | UNI EN 13163 |
| Compressive resistance at 10% deformation * **σ10** | (kPa) | 300 | | | UNI EN 826 |
| Water absorption **$W_{lt}$** | (%) | 5 | | | UNI EN 12087 |
| Reaction to fire classification | (Euroclass) | E | | | UNI EN 13501-1 |
| Thickness dimensional tolerance **$d_H$** | (mm) | ± 2 | | | UNI EN 823 |
| Resistance to water vapour diffusion of the EPS **µ** | | 100-160 | | | UNI EN 12086 |
| Resistance to water vapour diffusion of the HIPS **µ** | | 10.000 | | | UNI EN 12086 |

* Minimum compressive resistance at 10% crushing: σ10 ≥ 300 kPa.
Therefore, a pressure greater than, or equal to, 300 kPa (3 kg/$cm^2$ - 3000 kg/$m^2$) must be applied for the panel to be crushed by 10%.

## HOW TO CHOOSE: THICKNESSES IN ACCORDANCE WITH UNI EN 1264

The insulating layer that houses the radiant system has the function of reducing heat dispersion downwards.
The UNI EN 1264 standard shows the minimum thermal resistance values of the insulating layer, which are summarised in the table below:




| Thicknesses that comply with standard UNI EN 1264 | **CASE I** | **CASES II and III** |
|---|---|---|
| Insulation Thk (Total Thk): → | 19 (38) mm | 34 (53) mm |
| Panel code: → | **450 0568** | **450 0569** |
| **CASE IV [External T ≥ 0 °C]** | **CASE IV [-5°C ≤ T external < 0 °C]** | **CASE IV [-15°C ≤ T external < -5 °C]** |
| 34 (53) mm **450 0569** | - - | - - |

## THERMAL YIELDS

### WINTER OPERATION - CERAMIC 10 mm (ceramic, terracotta, marble, quartz, etc. with a thermal resistance of 0.01 $m^2K/W$)

| | | | |
|---|---|---|---|
| Thermal resistance of flooring (**ceramic 10 mm**) | $R_{\lambda,B}$ | 0.01 | [$m^2K/W$] |
| Screed thermal conductivity (self-leveling compound) | $\lambda_E$ | 1.4 | [W/mk] |
| Pipe thermal conductivity (Tiemme COBRAPEX pipe) | $\lambda_R$ | 0.38 | [W/mk] |
| External diameter of the pipe | $D_a$ | 17.0 | [mm] |
| Pipe wall thickness | $S_r$ | 2.0 | [mm] |
| Screed thickness (above the pipe) | $S_{\mu,0}$ | 20.0 | [mm] |
| Room temperature | $\theta_i$ | 20.0 | [°C] |

**SPECIFIC POWER AND AVERAGE FLOOR SURFACE TEMPERATURE** (Values in compliance with the operating conditions indicated above)

| Flow temperature [°C] | ΔT [°C] | Pipe distance 100 [mm] | | Pipe distance 150 [mm] | |
|---|---|---|---|---|---|
| | | Q [W/m²] | Surf. T [°C] | Q [W/m²] | Surf. T [°C] |
| 33 | 5 | 71.1 | 26.6 | 61.1 | 25.8 |
| | 6 | 66.9 | 26.2 | 57.5 | 25.4 |
| | 7 | 62.5 | 25.9 | 53.7 | 25.1 |
| | 8 | 57.8 | 25.5 | 49.7 | 24.8 |
| 35 | 5 | 85.1 | 27.8 | 73.2 | 26.8 |
| | 6 | 81.1 | 27.4 | 69.7 | 26.5 |
| | 7 | 76.9 | 27.1 | 66.1 | 26.2 |
| | 8 | 72.4 | 26.7 | 62.3 | 25.9 |
| 38 | 5 | 106.0 | 29.5 * | 91.2 | 28.3 |
| | 6 | 101.1 | 29.2 * | 87.8 | 28.0 |
| | 7 | 98.1 | 28.8 | 84.3 | 27.7 |
| | 8 | 93.9 | 28.5 | 80.8 | 27.4 |
| 40 | 5 | 119.9 | 30.6 * | 103.1 | 29.3 * |
| | 6 | 116.1 | 30.3 * | 99.8 | 29.0 |
| | 7 | 112.1 | 30.0 * | 96.4 | 28.7 |
| | 8 | 108.2 | 29.7 * | 92.9 | 28.4 |

* Value higher than the maximum floor temperature of 29°C foreseen by the UNI EN 1264 standard in living areas. In the perimeter areas the surface temperature of the floor can reach 35°C.

**Surf. T** = Average surface temperature of the floor. **Q** = Emission expressed in $W/m^2$.

### SUMMER OPERATION - CERAMIC 10 mm (ceramic, terracotta, marble, quartz, etc. with a thermal resistance of 0.01 $m^2K/W$)

| | | | |
|---|---|---|---|
| Thermal resistance of flooring (**ceramic 10 mm**) | $R_{\lambda,B}$ | 0.01 | [$m^2K/W$] |
| Screed thermal conductivity (self-leveling compound) | $\lambda_E$ | 1.4 | [W/mk] |
| Pipe thermal conductivity (Tiemme COBRAPEX pipe) | $\lambda_R$ | 0.38 | [W/mk] |
| External diameter of the pipe | $D_a$ | 17.0 | [mm] |
| Pipe wall thickness | $S_r$ | 2.0 | [mm] |
| Screed thickness (above the pipe) | $S_{\mu,0}$ | 20.0 | [mm] |
| Room temperature | $\theta_i$ | 26.0 | [°C] |

**SPECIFIC POWER AND AVERAGE FLOOR SURFACE TEMPERATURE** (Values in compliance with the operating conditions indicated above)

| Flow temperature [°C] | ΔT [°C] | Pipe distance 100 [mm] | | Pipe distance 150 [mm] | |
|---|---|---|---|---|---|
| | | Q [W/m²] | Surf. T [°C] | Q [W/m²] | Surf. T [°C] |
| 14 (51%) * | 3 | 48.5 | 19.3 | 42.5 | 20.1 |
| | 4 | 45.9 | 19.6 | 40.2 | 20.4 |
| | 5 | 43.2 | 20.0 | 37.9 | 20.7 |
| | 6 | 40.4 | 20.3 | 35.4 | 21.0 |
| 15 (56%) * | 3 | 43.9 | 19.9 | 38.5 | 20.6 |
| | 4 | 41.2 | 20.2 | 36.2 | 20.9 |
| | 5 | 38.5 | 20.6 | 33.8 | 21.2 |
| | 6 | 35.6 | 21.0 | 31.2 | 21.5 |
| 16 (60%) * | 3 | 39.2 | 20.5 | 34.4 | 21.1 |
| | 4 | 36.6 | 20.8 | 32.1 | 21.4 |
| | 5 | 33.7 | 21.2 | 29.6 | 21.7 |
| | 6 | 30.7 | 21.6 | 26.9 | 22.1 |

* According to the UNI EN 1264 standard, the flow temperature of the system in cooling mode must be no less than 1K compared to the dew point value calculated in the presence of a dehumidification system. For example, considering an environment at 26°C and relative humidity of 51%, the dew point temperature is 15°C, the flow temperature of the radiant floor system cannot be lower than 14°C.

**Surf. T** = Average surface temperature of the floor. **Q** = Emission expressed in $W/m^2$.

## THERMAL YIELDS

### WINTER OPERATION - PARQUET 15 mm (wood, linoleum, etc. with a thermal resistance of 0.06 $m^2K/W$)

| | | | |
|---|---|---|---|
| Thermal resistance of flooring (**parquet 15 mm**) | $R_{\lambda,B}$ | 0.06 | [$m^2K/W$] |
| Screed thermal conductivity (self-leveling compound) | $\lambda_E$ | 1.4 | [W/mk] |
| Pipe thermal conductivity (Tiemme COBRAPEX pipe) | $\lambda_R$ | 0.38 | [W/mk] |
| External diameter of the pipe | $D_a$ | 17.0 | [mm] |
| Pipe wall thickness | $S_r$ | 2.0 | [mm] |
| Screed thickness (above the pipe) | $S_{\mu,0}$ | 20.0 | [mm] |
| Room temperature | $\theta_i$ | 20.0 | [°C] |

**SPECIFIC POWER AND AVERAGE FLOOR SURFACE TEMPERATURE** (Values in compliance with the operating conditions indicated above)

| Flow temperature [°C] | ΔT [°C] | Pipe distance 100 [mm] | | Pipe distance 150 [mm] | |
|---|---|---|---|---|---|
| | | Q [W/m²] | Surf. T [°C] | Q [W/m²] | Surf. T [°C] |
| 33 | 5 | 48.9 | 24.7 | 43.2 | 24.2 |
| | 6 | 46.1 | 24.4 | 40.7 | 24.0 |
| | 7 | 43.0 | 24.2 | 38.0 | 23.7 |
| | 8 | 39.8 | 23.9 | 35.1 | 23.5 |
| 35 | 5 | 58.6 | 25.5 | 51.8 | 24.9 |
| | 6 | 55.8 | 25.3 | 45.3 | 24.7 |
| | 7 | 52.9 | 25.0 | 46.3 | 24.5 |
| | 8 | 49.9 | 24.8 | 44.1 | 24.3 |
| 38 | 5 | 73.0 | 26.8 | 64.5 | 26.0 |
| | 6 | 70.3 | 26.5 | 62.1 | 25.8 |
| | 7 | 67.6 | 26.3 | 59.7 | 25.6 |
| | 8 | 64.7 | 26.1 | 57.1 | 25.4 |
| 40 | 5 | 82.6 | 27.6 | 73.0 | 26.8 |
| | 6 | 79.9 | 27.3 | 70.6 | 26.6 |
| | 7 | 77.2 | 27.1 | 68.2 | 26.4 |
| | 8 | 74.4 | 26.9 | 65.7 | 26.1 |

**Surf. T** = Average surface temperature of the floor. **Q** = Emission expressed in $W/m^2$.

### SUMMER OPERATION - PARQUET 15 mm (wood, linoleum, etc. with a thermal resistance of 0.06 $m^2K/W$)

| | | | |
|---|---|---|---|
| Thermal resistance of flooring (**parquet 15 mm**) | $R_{\lambda,B}$ | 0.06 | [$m^2K/W$] |
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| Pipe thermal conductivity (Tiemme COBRAPEX pipe) | $\lambda_R$ | 0.38 | [W/mk] |
| External diameter of the pipe | $D_a$ | 17.0 | [mm] |
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| Screed thickness (above the pipe) | $S_{\mu,0}$ | 20.0 | [mm] |
| Room temperature | $\theta_i$ | 26.0 | [°C] |

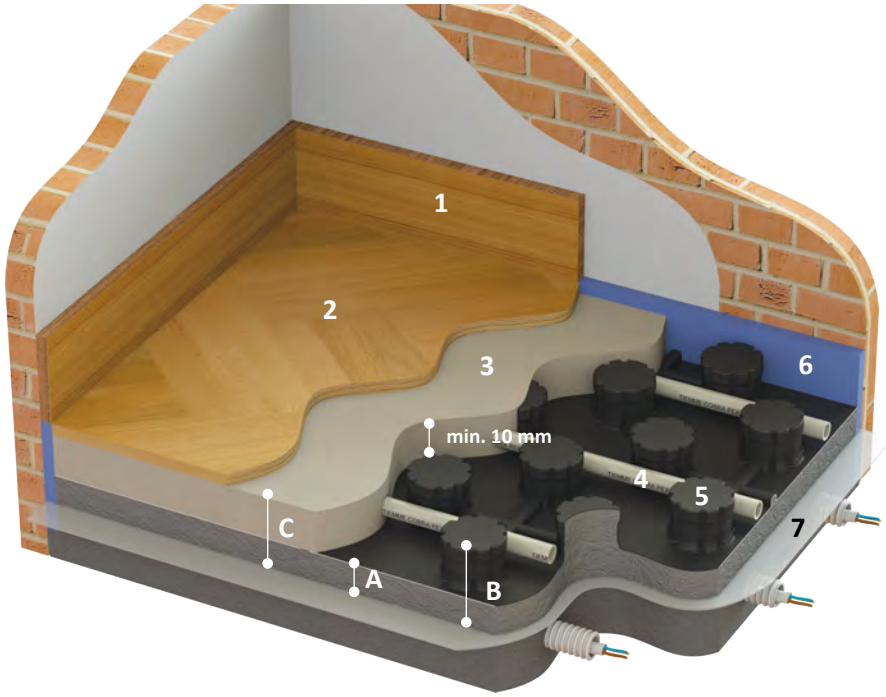
**SPECIFIC POWER AND AVERAGE FLOOR SURFACE TEMPERATURE** (Values in compliance with the operating conditions indicated above)

| Flow temperature [°C] | ΔT [°C] | Pipe distance 100 [mm] | | Pipe distance 150 [mm] | |
|---|---|---|---|---|---|
| | | Q [W/m²] | Surf. T [°C] | Q [W/m²] | Surf. T [°C] |
| 14 (51%) * | 3 | 37.1 | 20.8 | 33.2 | 21.3 |
| | 4 | 35.1 | 21.0 | 31.5 | 21.5 |
| | 5 | 33.0 | 21.3 | 29.6 | 21.7 |
| | 6 | 30.9 | 21.6 | 27.7 | 22.0 |
| 15 (56%) * | 3 | 33.5 | 21.2 | 30.1 | 21.7 |
| | 4 | 31.5 | 21.5 | 28.3 | 21.9 |
| | 5 | 29.4 | 21.8 | 26.4 | 22.2 |
| | 6 | 27.2 | 22.0 | 24.4 | 22.4 |
| 16 (60%) * | 3 | 30.0 | 21.7 | 26.9 | 22.1 |
| | 4 | 28.0 | 21.9 | 25.1 | 22.3 |
| | 5 | 25.8 | 22.2 | 23.1 | 22.6 |
| | 6 | 23.5 | 22.5 | 21.0 | 22.9 |

* According to the UNI EN 1264 standard, the flow temperature of the system in cooling mode must be no less than 1K compared to the dew point value calculated in the presence of a dehumidification system. For example, considering an environment at 26°C and relative humidity of 51%, the dew point temperature is 15°C, the flow temperature of the radiant floor system cannot be lower than 14°C.

**Surf. T** = Average surface temperature of the floor. **Q** = Emission expressed in $W/m^2$.

## LAYERING OF THE SYSTEM




| | | |
|---|---|---|
| **1)** | Skirting | - |
| **2)** | Covering | - |
| **3)** | Lowered screed | - |
| **4)** | Pipe | **Art. 0200B** |
| **5)** | Insulating panel | **Art. 4518GRF** |
| **6)** | Perimetral band | **Art. 4507** |
| **7)** | PE sheet | **Art. 4503** |

| Codes | Dimensions | | |
|---|---|---|---|
| | A (mm) | B (mm) | C (mm) |
| **450 0567** | 12 | 31 | 41÷51 |
| **450 0568** | 19 | 38 | 48÷58 |
| **450 0569** | 34 | 53 | 63÷73 |

## INFORMATION FROM TIEMME

**LOW INERTIA RADIANT FLOOR: REDUCED THICKNESS AND ENERGY EFFICIENCY!**

Low inertia radiant floors are the most innovative heating systems because they are made of a self-leveling compound that reduce thickness, lightens the screed and guarantees optimal performance in terms of energy efficiency.
For example, these are the most suitable systems to use during restructuring.
One of the main advantages of low inertia radiant floors is **the speed with which the building heats up**, offering more competitive times compared to those of traditional radiators or other heating systems.
Compared to a traditional radiant system, the low inertia system is **quick to install.** This technology also requires a lower **thickness than traditional floor** radiant systems.

## ITEM SPECIFICATIONS

### Art. 4518GRF

Insulating panel for radiant floor systems in compliance with UNI EN 1264, made of sintered expanded polystyrene (EPS) with the addition of graphite with a high mechanic resistance, coupled with a polystyrene thermo-welded protection sheet HIPS 170 µm thick.
Provided with studs for blocking pipe with external diameter 16 and 17 mm and multiple laying distance of 50 mm, and interlocking grooves on the perimeter for a solid joint between panels. Combinable with self-leveling compound which may reach up to 10 mm above the pipe.
Conform to European Standard UNI EN 13163 with CE marking, flame retardant Euroclass E reaction to fire (according to UNI EN 13501-1), compressive strength at 10% crushing 300 kPa, declared thermal conductivity 0.031 W/mk.
Total plan dimensions: 1425x825 mm. Available insulation thicknesses: 12 mm ($R_D$ = 0,55 m² K/W) - 19 mm ($R_D$ = 0,77 m² K/W) - 34 mm ($R_D$ = 1,26 m² K/W).

## CERTIFICATIONS

CE
UNI EN 13163