



GRAMITHERM : Insulation material made from grass

(N°ETA-21/0260 [DIBt - Deutsche Institut für Bautechnik](#))

Technical Data	
Product composition	72% grass fibers 20% recycled jute fibers 8% synthetic binder fibers
Density	40(+/-5) kg/m3
Thickness	45 à 240mm
Batts dimension	1200 mm x 600mm
European Technical Agreement	ETA-21/0260
EC Labelling	CE 
Thermal conductivity λ	0,041 W/m.K
Heat transfer coefficient U	0,27 W/m.K (150 mm thickness)
Specific heat capacity	1500 J/kg.K
Vapor diffusion resistance μ	1
Moisture behaviour	Absorbs and desorbs moisture 4,6kg/m2 for 100mm thickness batt
Tensile strength parallel to faces	>20kPa
Dimensional stability	Lenght change +/-2% and maximum T2 class for the thickness. Gramitherm® self-check on the width: minimum 600mm and maximum 625mm
Resistance against fungal attack	Level 1
Fire behaviour	EuroClasse E

General data

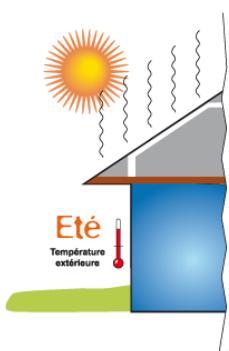
Thermal Insulation

Thickness mm	45	60	80	100	120	140	150	160	180	200	220	240
R (thermal resistance) $\text{m}^2 \cdot \text{K/W}$	1,11	1,48	1,98	2,47	2,96	3,46	3,70	3,95	4,44	4,94	5,43	5,93
U (heat transmission) $\text{W} / \text{m}^2 \cdot \text{K}$	0,90	0,67	0,50	0,40	0,34	0,29	0,27	0,25	0,22	0,20	0,18	0,17

The R value of an insulation reflects the extent to which the insulation succeeds in preventing the transport of heat. The higher is the R-value the better is the insulation system.

The U value expresses the heat flow passing through a 1m^2 building element for 1 hour, considering a temperature difference on either side of the element of 1°K . The smaller is the U, the more insulating is the product.

Insulation against summer heat



The heat-shielding properties of insulating materials are becoming increasingly important against increasing air conditioning energy consumption requiring expensive electricity.

These properties are expressed by the specific heat capacity « c » of a material. The « c » value is the amount of heat required to raise one kilogram of material by 1°K . **Gramitherm®** value = 1500J/kg.K .

The insulating properties of a material result from a very slow transfer of heat through material. The combination of thermal conductivity and specific heat capacity reduces the difference in day-night temperature under the roof and diffuses heat at night (phase shift).

Gramitherm® offers a heat diffusion (phase shift) of approximately 9 hours after heat absorption, for a thickness of 240mm.

Vapor diffusion resistance

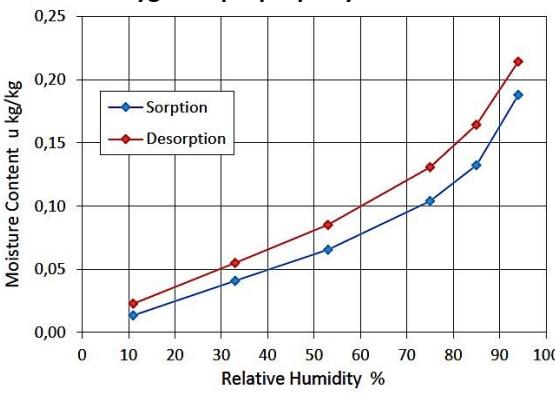


The vapor diffusion coefficient μ expresses the resistance of a material to vapor diffusion. μ is a comparative value, it expresses how many times the resistance of materials is compared to that of a layer of air of the same thickness. Air has a vapor diffusion coefficient of 1.

Gramitherm® is open to vapor diffusion ($R=1$). This is an advantage, since it avoids condensation on warmer side of the panel.

<p>Humidity absorption and diffusion</p> 	<p>Cellulose has the ability to absorb moisture from the ambient air and release it when the ambient air becomes drier. This characteristic has a regulating effect on the climate of the room, which is generally regarded as one of the advantages of renewable insulating materials, such as Gramitherm®.</p> <p>They have a moisture content varying between 5-11% of their weight. The stability of the panels and their lifespan are not affected.</p> <p>Gramitherm® absorption : 4,6kg of water/m² for a 100mm thickness panel.</p>
<p>The dimensional stability</p> 	<p>The dimensional stability of Gramitherm® has been tested according to EU-822 :2013. The changes in the duration of the product in length and width are around +/-2%.</p> <p>Gramitherm® is classified T2 for thickness (EN 823 :2013).</p> <p>Gramitherm® self-check on the width: minimum 600mm and maximum 625mm</p>
<p>Odour</p> 	<p>Gramitherm® has a slight hay odor. After application of the product in a building, the odor subsides and disappears.</p>
<p>Moisture resistance</p> 	<p>The resistance of Gramitherm® against fungal attack has been assessed by the relevant EN ISO 846 :1997 standard.</p> <p>In this test, the material is exposed to fungal spores for 4 weeks at 23°C under moisture – saturated air conditions. Then the material is examined under a microscope for the mycelia. The results are negative for Gramitherm®, no fungal attacks.</p>
<p>Fire resistance</p> 	<p>According to EN ISO 13501-1 :2018, Gramitherm® meets Euroclass E criteria for fire resistance.</p> <p>This means that in the event of a fire, the fire will not spread to other parts of a building through the insulation.</p> <p>The fumes released are non toxic, which allows fire fighters to intervene effectively in the case of fire.</p> <p>Gramitherm® fire resistance video : https://www.youtube.com/watch?v=ixWabu3yB6s</p>
<p>Allergies</p> 	<p>Gramitherm® does not contain grass pollen, because the raw material is cut before flowering.</p> <p>In addition, Gramitherm® does not contain fungal spores. Therefore, Gramitherm® can be used safely even for people with allergies.</p>

Water damage reaction	 <p>In case of water damage, Gramitherm® will be soggy. With sufficient ventilation of the material, it will dry overtime without significant change in its dimensions. It will partly regains its insulating properties.</p>
Rodents damage	 <p>Regardless of the type of insulation material, the penetration of mice and other rodents into this material can only be prevented by means of construction. National standards in the building include such means. If, despite precautions, mice enter a Gramitherm® batt, they may nest there (as they can in other insulating material), but they will not be able to feed and grow there. The digestible parts of the raw material have been separated from the fibers and the mice can not digest the cellulose.</p>
Product handling	 <p>Gramitherm® can be applied comfortably, and quickly. Batt cutting can be done at the construction site using a flat blade saw for insulation (see our cutting sheets available on our site www.gramitherm.eu).</p> <p>The product does not itch and does not cause skin irritation. Exposure to dust during product application is limited.</p> <p>Please follow our handling instructions as referenced in our safety data sheet (SDS- available on www.gramitherm.eu)</p>

Determination of the VOC emission content	EN ISO 16000-9	A+	Test report CSTC : DE-CH-0271 CH-20-191-02																					
																								
Biobased label filière Wallonne 	Material balance methodology: EN 16785-2 :2018	88% biobased mass (sourcing < 300km manufacturer)	Certificat: N°BE/14/03/20/88-BE-FW																					
Hygroscopic absorption property :	EN ISO 12571:2013 (ECOLABOR : N°ECO-P21007-20021)	<p>Hygroscopic property at 23°C</p>  <p>The graph plots Moisture Content u kg/kg on the y-axis (0,00 to 0,25) against Relative Humidity % on the x-axis (0 to 100). Two curves are shown: Sorption (blue line with diamonds) and Desorption (red line with diamonds). Both curves show a linear relationship, with the Desorption curve being steeper than the Sorption curve.</p> <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Relative Humidity %</th> <th>Moisture Content u kg/kg (Sorption)</th> <th>Moisture Content u kg/kg (Desorption)</th> </tr> </thead> <tbody> <tr><td>10</td><td>0,02</td><td>0,03</td></tr> <tr><td>30</td><td>0,04</td><td>0,05</td></tr> <tr><td>50</td><td>0,06</td><td>0,08</td></tr> <tr><td>70</td><td>0,09</td><td>0,12</td></tr> <tr><td>85</td><td>0,13</td><td>0,16</td></tr> <tr><td>95</td><td>0,18</td><td>0,22</td></tr> </tbody> </table>		Relative Humidity %	Moisture Content u kg/kg (Sorption)	Moisture Content u kg/kg (Desorption)	10	0,02	0,03	30	0,04	0,05	50	0,06	0,08	70	0,09	0,12	85	0,13	0,16	95	0,18	0,22
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Environmental balance :	<p>FDES available on INIES/AFNOR basis and on our website www.gramitherm.eu</p> 																							

European Technical Approval

Gramitherm® has obtained European Technical Approval ETA-21/0260. This approval authorizes the sale of the product in all member states of the EU. Product applications must be in accordance with national construction standards. Usually use of the product in EU does not additionally require national registration.

European Technical Approval has been obtained on the basis of numerous tests of the product. Considering the expected product life of 50 years, the type of tests that had to be conducted and passed were determined by the Deutsches Institut für Bautechnik DIBT and its technical experts. Registration is granted on the condition that Gramitherm® is protected against rain during transport, storage and application.

The Approval also sets standards for internal and external production controls that will make it possible to consistently ensure the quality of the product.

Applications for which registration exists for Gramitherm® and planned extensions.

<u>Applications*</u>	<u>Existing approvals (21/0260)</u>	<u>Planned extensions</u>
Empty space	Yes	
Frame construction in wood	Yes	
Inside external walls	Yes	
Between rafters	Yes	
Above and below rafters**	Yes	
Ventilated façades	No	Yes
Sound insulation of walls	No	Yes
Sound insulation of floors	No	Yes

* Approval for plastered external facades as well as that for applications for high fire resistance will be acquired later

** Without mechanical pressure

GRAMITHERM® is labeled *Efficient solution* by the Solar Impulse Foundation (september 2019 - <https://solarimpulse.com/efficient-solutions/gramitherm>).

