
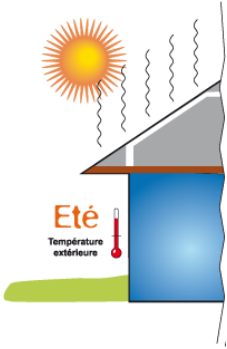















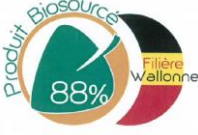
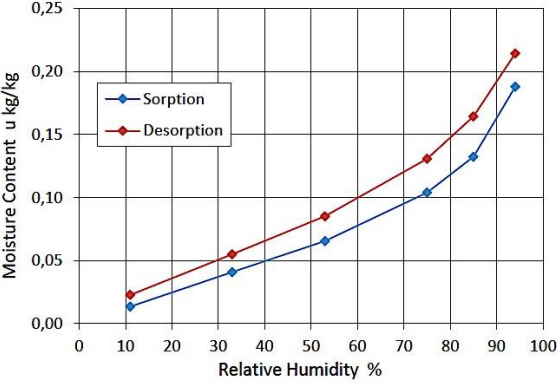
CE GRAMITHERM : Insulation material made from grass
 (N°ETA-21/0260 [DIBt - Deutsche Institut für Bautechnik](#))

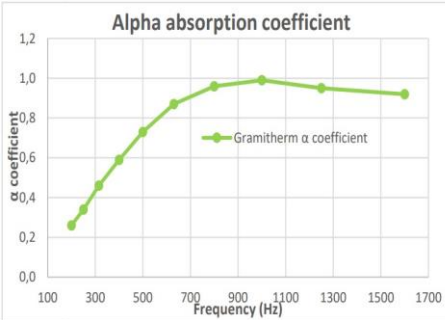


Technical Data																																														
Product composition	Grass fibre: 70% (+/- 5%) Recycled jute fibre: 20% (+/- 5%) Synthetic binder fibre: 10% (+/-2%)																																													
Density	40 kg/m ³ (+/- 5kg/m ³)																																													
Thickness	Standard: 45 to 240mm Custom: 30 mm																																													
Batts dimension	Standard: 1200mm x 600mm Custom: 1200mm x 450mm																																													
European Technical Agreement	ETA-21/0260																																													
EC Labelling																																														
Thermal conductivity λ <i>according to EN 12667 :2001 standard</i>	0,041 W/m.K																																													
Heat transfer coefficient U and R	<table border="1"> <thead> <tr> <th>Thickness in mm</th> <th>45</th> <th>60</th> <th>70</th> <th>80</th> <th>90</th> <th>100</th> <th>120</th> <th>140</th> <th>150</th> <th>160</th> <th>180</th> <th>200</th> <th>220</th> <th>240</th> </tr> </thead> <tbody> <tr> <td>R stated in m².K/W</td> <td>1.11</td> <td>1.48</td> <td>1.71</td> <td>1.98</td> <td>2.20</td> <td>2.47</td> <td>2.96</td> <td>3.46</td> <td>3.70</td> <td>3.95</td> <td>4.44</td> <td>4.94</td> <td>5.43</td> <td>5.93</td> </tr> <tr> <td>U stated in W/ m².K</td> <td>0.90</td> <td>0.67</td> <td>0.59</td> <td>0.50</td> <td>0.46</td> <td>0.40</td> <td>0.34</td> <td>0.29</td> <td>0.27</td> <td>0.25</td> <td>0.22</td> <td>0.20</td> <td>0.18</td> <td>0.17</td> </tr> </tbody> </table>	Thickness in mm	45	60	70	80	90	100	120	140	150	160	180	200	220	240	R stated in m ² .K/W	1.11	1.48	1.71	1.98	2.20	2.47	2.96	3.46	3.70	3.95	4.44	4.94	5.43	5.93	U stated in W/ m ² .K	0.90	0.67	0.59	0.50	0.46	0.40	0.34	0.29	0.27	0.25	0.22	0.20	0.18	0.17
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Specific heat capacity	2232 J/kg.K																																													
Vapour diffusion resistance μ <i>according to NF EN 12086 :2013 standard</i>	$\mu = 2$ <table border="1"> <thead> <tr> <th>Thickness in mm</th> <th>45</th> <th>80</th> <th>120</th> <th>160</th> <th>200</th> <th>220</th> <th>240</th> </tr> </thead> <tbody> <tr> <td>S_d in mm</td> <td>0.0900</td> <td>0.160</td> <td>0.240</td> <td>0.320</td> <td>0.400</td> <td>0.440</td> <td>0.480</td> </tr> </tbody> </table>	Thickness in mm	45	80	120	160	200	220	240	S _d in mm	0.0900	0.160	0.240	0.320	0.400	0.440	0.480																													
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Short-term water absorption <i>according to NF EN ISO 29767 standard</i>	3.5 kg/m ²																																													

<p>Long-term water absorption <i>according NF EN 16535 standard</i></p>	15.5%
<p>Tensile strength parallel to faces <i>according to NF EN 1608 :2013 standard</i></p>	>20kPa
<p>Dimensional stability <i>according to EN 1604 en EN 13171 standard</i></p>	Length change +/-2% and maximum T2 class for the thickness. Gramitherm [®] self-check on the width: minimum 600mm and maximum 625mm
<p>Resistance against fungal attack <i>according to CSTB specification 3713-V3 85% scenario</i></p>	Resistant to fungal contamination at 28°C and 85% RH
<p>Fire behaviour <i>NF EN 13501-1 :2018</i></p>	EuroClass E
<p>Corrosion resistance <i>According to NF EN15 101-1:2013 standard</i></p>	No perforation

General data	
<p>Insulation against summer heat</p> 	<p>Dephasing time: 9 hours after absorbing heat, for a thickness of 240mm (opaque surface)</p> <p>The heat-shielding properties of insulating materials are becoming increasingly important against increasing air conditioning energy consumption requiring expensive electricity.</p> <p>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 = 2232 J/kg.K</p> <p>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).</p>
<p>Vapor diffusion resistance</p> 	<p>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 vapour diffusion ($\mu=2$).</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). 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 after 3 to 4 weeks with normal ventilation and aeration.</p>
<p>Moisture resistance</p> 	<p>Gramitherm®'s resistance to fungal attacks has been evaluated against the CSTB 3713-V3 specification. This includes inoculating and incubating previously sterilised samples at a temperature of 28°C ± 2°C and a relative humidity of 85% ± 4% for a period of 28 days.</p> <p>In conclusion: Gramitherm® is deemed resistant to fungal contamination.</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>
<p>Water damage reaction</p> 	<p>In the case of water damage, Gramitherm® will be soaked. With sufficient aeration of the material, it will gradually dry out with a moderate change in its dimensions and alteration of the insulation properties. Exposing the insulation in such a way would invalidate the guarantee.</p> <p>Always ensure that the products are installed and protected in accordance with the installation and usage instructions (see below).</p>
<p>Rodents damage</p> 	<p>The digestible liquid components of the raw grass have been removed from the fibres (the ligno-cellulosic component); rodents are unable to digest the cellulose, so they no longer have any interest in consuming the product.</p> <p>In addition, the density and shape of the panels makes it difficult for rodents to nest.</p> <p>Regardless of the type of insulation material, ingress by mice and other rodents must be prevented by use of appropriate measures in accordance with the national standards in the building's location.</p>
<p>Product handling</p> 	<p>Gramitherm® can be applied comfortably, and quickly. Batt cutting can be done at the construction site using the tools recommended on our website (see our cutting tools available on our website www.gramitherm.eu).</p> <p>The product does not itch and does not cause skin irritation. The grass fibres may spread during cutting but do not remain in the air.</p> <p>Please follow our handling instructions as referenced in our safety data sheet (SDS- available on www.gramitherm.eu)</p>

<p>Determination of the VOC emission rate</p> 	<p>EN ISO 16000-9</p>	<p>A+</p>	<p>Test report BBRI : DE-CH-0271 CH-20-191-02</p> <table border="1" data-bbox="992 398 1433 676"> <thead> <tr> <th>Component</th> <th>Cas n°</th> <th>Emission rate after 28 days (µg/m³)</th> <th></th> </tr> </thead> <tbody> <tr> <td>TVOC</td> <td>-</td> <td>17</td> <td>< 1000</td> </tr> <tr> <td>Formaldehyde</td> <td>50-00-0</td> <td>4</td> <td>< 10</td> </tr> <tr> <td>Acetaldehyde</td> <td>75-07-0</td> <td>31</td> <td>< 200</td> </tr> <tr> <td>Toluene</td> <td>108-88-3</td> <td>4</td> <td>< 300</td> </tr> <tr> <td>Tetrachloroethylene</td> <td>127-18-4</td> <td>< 1</td> <td>< 250</td> </tr> <tr> <td>Ethylbenzene</td> <td>100-41-4</td> <td>< 1</td> <td>< 750</td> </tr> <tr> <td>Xylene (m-,p- & o-)</td> <td>1330-20-7</td> <td>< 1</td> <td>< 200</td> </tr> <tr> <td>Styrene</td> <td>100-42-5</td> <td>< 1</td> <td>< 250</td> </tr> <tr> <td>2-Butoxyethanol</td> <td>111-76-2</td> <td>< 1</td> <td>< 1000</td> </tr> <tr> <td>1,2,4-Trimethylbenzene</td> <td>95-63-5</td> <td>< 1</td> <td>< 1000</td> </tr> <tr> <td>1,4-Dichlorobenzene</td> <td>106-46-7</td> <td>< 1</td> <td>< 60</td> </tr> </tbody> </table>	Component	Cas n°	Emission rate after 28 days (µg/m³)		TVOC	-	17	< 1000	Formaldehyde	50-00-0	4	< 10	Acetaldehyde	75-07-0	31	< 200	Toluene	108-88-3	4	< 300	Tetrachloroethylene	127-18-4	< 1	< 250	Ethylbenzene	100-41-4	< 1	< 750	Xylene (m-,p- & o-)	1330-20-7	< 1	< 200	Styrene	100-42-5	< 1	< 250	2-Butoxyethanol	111-76-2	< 1	< 1000	1,2,4-Trimethylbenzene	95-63-5	< 1	< 1000	1,4-Dichlorobenzene	106-46-7	< 1	< 60
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<p>Biobased label filère Wallonne</p> 	<p>Material balance methodology: EN 16785-2 :2018</p>	<p>88% biobased mass (sourcing < 300km factory)</p>	<p>Certificate: N°BE/14/03/20/88-BE-FW</p>																																																
<p>Hygroscopic absorption property</p>	<p>EN ISO 12571:2013 (ECOLABOR : N°ECO-P21007-20021)</p> <p>NF EN ISO 29767 NF EN ISO 16535</p>	<p>Hygroscopic property at 23°C</p>  <p>Sorption is the process by which a substance is adsorbed or absorbed (by a "sorberent") on or into another substance. This results from the action of gas or liquid molecule coming into contact with a solid material, and which attach to its surface (adsorption) or are fully incorporated within it (absorption).</p> <p>Desorption is the opposite process to sorption, by which the sorbed molecules detach from the substrate.</p> <p>Applied to this insulation, these physical phenomena show the ability to "capture" the initial moisture from the building as the vapour moves, thus maintaining air moisture levels at a constant levels without causing condensation. This ability ensures faster drying and that balanced moisture levels return more quickly.</p> <p>Water absorption in the short term is 3.5kg/m². Water absorption in the long term is 15.5%.</p>																																																	

<p>Sound absorption</p>	<div style="display: flex; align-items: center;">  <table border="1" data-bbox="1050 300 1292 591" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Gramitherm</th> </tr> <tr> <th>Frequency</th> <th>α coefficient</th> </tr> </thead> <tbody> <tr><td>200</td><td>0,26</td></tr> <tr><td>250</td><td>0,34</td></tr> <tr><td>315</td><td>0,46</td></tr> <tr><td>400</td><td>0,59</td></tr> <tr><td>500</td><td>0,73</td></tr> <tr><td>630</td><td>0,87</td></tr> <tr><td>800</td><td>0,96</td></tr> <tr><td>1000</td><td>0,99</td></tr> <tr><td>1250</td><td>0,95</td></tr> <tr><td>1600</td><td>0,92</td></tr> </tbody> </table> </div> <p>Sources : Laboratoire de la Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), 2015</p>		Gramitherm		Frequency	α coefficient	200	0,26	250	0,34	315	0,46	400	0,59	500	0,73	630	0,87	800	0,96	1000	0,99	1250	0,95	1600	0,92
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<p>Environmental balance</p>	 	<p>FDES available on INIES/AFNOR basis and our website www.gramitherm.eu.</p> <p>Gramitherm® B-EPDs comply with the EN 15804+A2 standard and B-EPD-PCR version 18.10.2022. The data is available in the TOTEM database and on our website www.gramitherm.eu</p>																								
<p>Recyclability</p>	<p>The grass is recycled (waste transformation). The jute is from recycling cocoa and coffee bean sacks. Gramitherm® batts can be recycled at the factory and can be re-used in making new batts.</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.

The test and assessment methods on which this ETA is based suggest a useful life of at least 50 years for the thermal insulation batts. Indications about the lifespan of the product cannot be interpreted as a guarantee by the manufacturer, but only as a means to help select the right products for the expected economically reasonable lifespan of the building.

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	
Wood-framed buildings	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

The rules for correct application are those in force in the country concerned. Application recommendations and instructions can be consulted on the website: [INSTALLATION - Gramitherm](#)

GRAMITHERM[®] is labeled *Efficient solution* by the Solar Impulse Foundation (August 2022 - <https://solarimpulse.com/efficient-solutions/gramitherm>).

