

# HempLime/HES-mix indicative technical data sheet



Type of test	Result	Source	Notes
<b>GENERAL</b>			
Apparent density (kg/m <sup>3</sup> )	<300	HES	Target density for HES-mix = 240kg/m <sup>3</sup>
Dry total Porosity	72%	BESRAC	Wall infill, hand compacted
Hazardous substances	NONE	HES	
<b>THERMAL/MOISTURE PERFORMANCE</b>			
Thermal conductivity (Lambda)(W/m.k)	0.048	VG TU	See citation *1 for relation between material density and Lambda
Thermal effusivity (j/m <sup>2</sup> .k.s <sup>2</sup> )	very low	Evrard, 2008	Similar to wood, depends on relative humidity
Thermal diffusivity (m <sup>2</sup> /s)	very low	Evrard, 2008	Similar to wood, depends on relative humidity
Specific heat capacity c (j/kg.K)	1560	BESRAC	
Thermal capacity (kj/m <sup>3</sup> .K) for 1m <sup>3</sup> INERTIA	750 to 900	Evrard, 2008	25mm wall, At=20° ,24h
Heat flow capacity (W/m <sup>2</sup> ) (t-24h)	187	Evrard, 2008	Probably lower, depending on mixing proportions
Dampening Temp, variation (h)	98.5%	Evrard, 2008	
Steam diffusion resistance	3.6 to 4.8	BESRAC	
Humidity storage capacity (%)	11	Rode et al, 2003	
Swelling and Shrinkage	NONE	HES	
<b>ACOUSTICS</b>			
Global reduction acoustic index (Ra)(dBA)	52 dBA	BESRAC	Havernhill housing test, density 550kg/m <sup>3</sup> . HES-mix probably lower
Sound absorption coefficient	0.3 to 0.9	BESRAC	Spread results
<b>ENERGY AND CO<sub>2</sub></b>			
GWP (Global warming potential) (kg CO <sub>2</sub> eq/ m <sup>3</sup> )	-108		Under study
Embodied energy (MJ/m <sup>3</sup> )	very low		Under study
Recycling (waste sent to disposal)	NONE	HES	Fully biodegradable
<b>MECHANICAL PARAMETERS</b>			
Compressive strength (N/mm <sup>2</sup> )	0.4 to 1.2		
Tensile Strength (N/mm <sup>2</sup> )	0.08 to 0.25		
Bending Strength (N/mm <sup>2</sup> )	0.3 to 0.4		
<b>FIRE PARAMETERS</b>			
Resistance to fire	105	CSTB report, 2005	300mm Chanvriblock
Reaction to fire	(B s1,d0)	MEKA	Bio-composite material receives class B, VG TU declared HES-mix as A2

\*1: Citation for Thermal Conductivity relation to Density: Florence Collet, Sylvie Pr'etot. THERMAL CONDUCTIVITY OF HEMP CONCRETES: VARIATION WITH FORMULATION, DENSITY AND WATER CONTENT. Construction and Building Materials, Elsevier, 2014, 65, pp.612-619.



## To Whom It May Concern

We are pleased to announce the introduction of the Product Characteristics Guarantee, an innovative certification method reserved for all types of NATURAL BUILDING MATERIALS.

The definition of Natural Materials: *the materials are derived from nature; they have undergone a very minimum amount of processing or modification; they contain no synthetic additives nor toxic elements; and the materials are globally beneficial to nature, human health and comfort.*

Whereas European Authorities nominate the official system of Certification, “CE approvals, EAD or ETA”, we have chosen to distinguish ourselves from this system, albeit fulfilling all prescriptions as to the testing and rating of each product. Our motivation is that the EU rating system is all in all limited to comprising only THERMAL EFFICIENCY and FIRE ratings as the essentials.

We have chosen to direct our priorities to:

THE PROTECTION OF NATURE,  
PROTECTION OF PEOPLES' HEALTH AND COMFORT,  
SAFETY,  
LONGEVITY OF BUILDINGS, and  
ENERGY CONSUMPTION

Such priorities are strongly related to *Human laws*, and we are convinced that there will be no objection to the principles of this rating. The principle, means that any product under the category of *Natural Products* that does not fulfil the priorities aforementioned, will fail approval.

We have changed the term from “Certification” to “Characteristics”. This was a suggestion made by Architect Professor, Sergio Sabbatini of the University of Polytechnics, in Milan. These are his words: “Certification refers to a system of testing. Characteristics refers to the product itself to it's nature and it's use.”

That is what is important.

We are confident that *Natural Products* in the building industry will be playing a growing role in the future. We therefore have to make sure that these products fulfil their priorities and multiple role of serving Nature and Humans as an indisputable condition.

We certify this by rendering a guarantee of performance to the benefit of any user.

Jorgen Hempel  
Founder of Hemp Eco Systems Group  
Onnens, Switzerland  
1<sup>st</sup> November 2018

# PRODUCT CHARACTERISTICS GUARANTEE



Hemp Eco Systems Group

## Principles of the Product Characteristics Guarantee:

1. To give any user an immediate answer to: the characteristics of the product, its intended use, its performance and its importance to the user.
2. To satisfy the authorities, their official test methods relevant to these natural products, have been carried out.
3. This guarantee carries supplementary product ratings not prescribed by official certifications such as: effect on nature, pollution, health, etc.

## This Guarantee constitutes the following documents:

1. A signed Declaration of Confidence
2. A Certificate of Product Characteristics
3. A Certificate of Raw Material Characteristics

## Declaration of Confidence



We declare that we are committed to promoting products which are healthy for nature and humans during their entire life cycle.


It is our obligation to promote products which:

- **Contribute to protecting nature**
- **Ensure a healthy indoor climate for all occupants**
- **Ensure the safety and comfort of all occupants**
- **Ensure longevity of buildings**
- **Ensure reduced energy consumption**

We confirm that the information provided in this Guarantee is correct, set with good intention, provided by a real person, and not intended to be misleading in any way.

Jorgen Hempel  
Founder of  
Hemp Eco Systems Group

Date: 19 November 2018

Signed:  \_\_\_\_\_

# Certificate of Product Characteristics



Product name: **HES-mix™**

Product Composition: **Hemp-hurds, hydrated lime, HES-plus** (blend of natural minerals) & water

Product intended use: **Non-load bearing wall construction, insulation and humidity regulation.**

Tests and performance ratings on product:

Type of test	Test Method	Result
Reaction to fire	EN 13501-1	Class A2, s1,d0
Water vapor diffusion resistance	EN 12086:2013	5.48
Thermal conductivity (lambda)	EN 12667:2001	0.06
Thermal Conductivity (lambda) @ density of 240kg/m3	Proportional to the density of the sample used in the above test at 319kg/m3	0.048
CO2 absorption	Indoor environmental monitoring campaign in accordance with OMS guidelines by Ing .Vincenzo Ficco (MSc Bio-architettura)	27% reduction in peak CO2 level and 34% reduction of 'background' CO2
Humidity regulation	In progress: 5 years of continuous indoor hygrometer monitoring	Average humidity between 55-65%
Rot and Pest Resistant	In progress: Product monitoring and customer feedback	No evidence of rot or pests issues ever registered
Compostability	Garden compost of left over building materials	Compost good to use for growing food
Toxicity	Compostable with garden refuse and safe for growing food	Healthy for soil and human: non-toxic

# Certificate of Raw Material Characteristics




Raw material	Characteristics	Supplier	Production process	Packaging
Hemp Hurds	Inner 'woody' core of the hemp plant, contains high silica content and lodges microscopic voids	Professional processors in various countries	Retting stalks followed by processing and de-dusting	20 kg bags plastic bags
Hydrated lime 93-98% pure	An alkaline material occurring abundantly in nature, as limestone. Used for centuries to construct cities and cathedrals around the world. Does not set in the presence of water	Local sources are preferred and most countries have deposits of this raw material	Calcium Hydroxide in powder form, made by heating limestone to around 800°C turning it into Calcium oxide then adding water which turn it into calcium hydroxide	Packed in 25kg paper and plastic bags
HES-plus minerals	A blend of natural minerals which allows hydrated lime to cure faster without losing its CO2 absorption properties	HES-Switzerland Sarl	Naturally occurring minerals which may have been crushed from stone, blended by hand.	3kg plastic sacks
Water	Clean/potable water	Nature or municipal	Nature or municipal	none

We understand the process involved in producing the raw materials required to make our products.

Jorgen Hempel  
 Founder of  
 Hemp Eco Systems Group

Date: 1st November 2018

Signed:  \_\_\_\_\_