ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**Yapı Enerji Doğal Yalıtım Malzemeleri San. ve Tic. A.Ş (Styronit)**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-YAD-20160057-CAC1-EN
Issue date	17.05.2016
Valid to	16.05.2021

Thermal Insulation Plaster

Yapı Enerji Doğal Yalıtım Malzemeleri San. ve Tic. A.Ş (STYRONIT)

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com

General Information

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Programme holder
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Declaration number
EPD-YAD-20160057-CAC1-EN

This Declaration is based on the Product Category Rules:
Mineral factory-made mortar, 07.2014
(PCR tested and approved by the SVR)

Issue date
17.05.2016

Valid to
16.05.2021

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

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(Managing Director IBU)

Thermal Insulation Plaster

Owner of the Declaration
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Declared product / Declared unit
Thermal Insulation Plaster/1kg

Scope:
This EPD is based on 2015 production data for the thermal insulation plaster produced in the manufacturing plant of Styronit located in Istanbul. It is prepared as an average EPD for the plaster product group. The system boundary covers the information modules A1-A3 (cradle-to-gate).

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally

Vito D'Incognito
(Independent verifier appointed by SVR)

Product

Product description
Thermal insulation plaster comprises of expanded perlite, pumice, puzzolanic cement, hydraulic lime and inorganic/organic materials.

The recycled material content of the average plaster product is about 21% (post-consumer).

Product specification of each product is shown below:

Styronit Kaba: Natural thermal insulation plaster, applied internally and externally instead of classic rough plaster. It has a high breathing and adhesion ability. Suitable for interior and exterior wall surfaces, bricks, aerated concrete, pumice walls and ceiling.

Styronit Biomantolama: Natural thermal insulation material, applied to the exterior walls of painted buildings. High thermal comfort and breathability raises high the living comfort in buildings. It also has high adhesion and water repellent abilities.

Styronit Bioklima: Natural thermal insulation material, applied to the interior walls of painted buildings. High thermal comfort and breathability raises the living comfort in buildings and creates a bioclimatic natural environment. The ability to reflect heat, helps to protect the thermal energy saving even on 1 cm thickness.

Styronit Horasan: Horasan is a natural plaster for renovation, restoration of historical buildings, domed mosque and also grouting plaster to fill gaps and used for acoustic and thermal insulation.

Styronit Acoustic: Acoustic, is a natural plaster, applied to prevent noise problems to neighbouring walls, elevators, generator rooms, offices, schools, conference rooms hotels, etc.

Styronit Şap (screed): ŞAP is a lightweight screed for thermal and acoustic insulation.

Application
Thermal insulating plasters are used for exterior and interior works. Areas of application of each product are explained separately as below:

Styronit Kaba: It is applied on interior and exterior wall surfaces, bricks, aerated concrete, pumice walls and ceilings.

Styronit Biomantolama: It is used for exterior painted surfaces.

Styronit Bioklima: It is suitable for interior painted walls, cold storages, schools, conference rooms, etc.

Styronit Acoustic: It is suitable for interior wall surfaces, bricks, aerated concrete, pumice walls and ceilings.

Styronit Şap (screed): This lightweight screed is applied on ventilated roofs, flat roofs, floors, balconies and terraces before marble, ceramic, parquets, laminate and PVC.

Styronit Horasan: It is used on the domed mosque interior and exterior walls of historical buildings, wood and stone surfaces.

Technical Data
The following table shows the technical construction data:

Constructional data

Name	Value	Unit
Thermal conductivity (EN 1745:2004)	T1	W/(mK)
Compressive strength (EN 1015-11:2000)	CS1-C10	N/mm2
Water absorption coefficient (EN 1015-18:2004)	W1	kg/m2.min 0,5
water vapor permeability factor μ (EN 1015-19:2000)	<4 - <15	
Adhesive strength (N/mm2 and fracture pattern (FP) (A,B or C)	FP:B, F4	N/mm2
(EN 1015-12:2000)		
Reaction to fire classification (TS EN 13823:2010:2011-01)	A2-s1, d0	

Base materials / Ancillary materials
Thermal insulation plasters are made of expanded perlite, pumice, puzzolanic cement, hydraulic lime and organic/inorganic fiber.

- Expanded perlite 50-55%
- Pumice 15-25%
- Puzzolanic cement ≤2%
- Hydraulic lime <2%
- Organic and inorganic materials ≤21% (Post-consumer recycled content) *

*They are taken from external (not closed-loop).

In addition, before the packaging application, very little amount of raw materials mixed (perlite and pumice) remains at the mixing stage. They are recycled into the plaster formulation (closed-loop).

Packaging
Craft Bag, wooden pallet, LDPE stretch film and etiquette are used as packaging materials.

Reference service life
In this study, Reference Life Value is not taken into consideration during the calculations, since the system boundary of this EPD is cradle-to-gate.

LCA: Calculation rules

Declared Unit
The functional unit for this product category is defined as 1kg plaster products.

Declared unit

Name	Value	Unit
Declared unit	1	kg
Gross density +- 25	280 - 550	kg/m^3
Conversion factor to 1 kg	0.001818 - 0.00357	-

System boundary
Type of the EPD: cradle-to-gate
The system boundary contains A1 (extraction, processing, production of raw materials), A2 (Transport to the manufacturer and internal transport) and A3 (Manufacturing operations) modules. These are declared separately.

The raw materials are delivered from suppliers/producers and then stored in the production factory in silos. After that, all raw materials are mixed according to the applicable formulation of plaster. Next, the products are filled into craft bags. After quality control, they are piled onto wooden pallets and polyethylene shrink-wrapped.

The production process of plaster is shown below:

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

As mentioned in the system boundary chapter above, only A1, A2 and A3 modules are declared within the scope of this study. Hence, there are no scenarios provided below regarding the other modules A4, A5, B1-B7, C1-C4 and D.

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: Thermal insulation plaster/1kg

Parameter	Unit	A1	A2	A3
Global warming potential	[kg CO_2-Eq.]	3.90E-1	2.26E-2	1.26E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.39E-7	1.60E-9	1.47E-10
Acidification potential of land and water	[kg SO_2-Eq.]	2.11E-3	9.33E-5	8.03E-5
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	6.32E-4	2.39E-5	4.57E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.13E-4	3.25E-6	3.18E-6
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.51E-6	6.62E-8	2.70E-9
Abiotic depletion potential for fossil resources	[MJ]	5.63E+0	3.44E-1	1.85E-1

RESULTS OF THE LCA - RESOURCE USE: Thermal insulation plaster/1kg

Parameter	Unit	A1	A2	A3
Renewable primary energy as energy carrier	[MJ]	0.00E+0	0.00E+0	0.00E+0
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	0.00E+0	0.00E+0	0.00E+0
Non-renewable primary energy as energy carrier	[MJ]	7.76E+0	3.73E-1	1.65E-1
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	7.76E+0	3.73E-1	1.65E-1
Use of secondary material	[kg]	-	-	-
Use of renewable secondary fuels	[MJ]	-	-	-
Use of non-renewable secondary fuels	[MJ]	-	-	-
Use of net fresh water	[m^3]	1.15E-4	7.85E-6	7.18E-7

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: Thermal insulation plaster/1kg

Parameter	Unit	A1	A2	A3
Hazardous waste disposed	[kg]	1.73E-4	4.15E-7	9.92E-8
Non-hazardous waste disposed	[kg]	4.92E-2	2.50E-2	1.20E-2
Radioactive waste disposed	[kg]	3.58E-5	1.96E-6	1.49E-7
Components for re-use	[kg]	-	-	-
Materials for recycling	[kg]	-	-	-
Materials for energy recovery	[kg]	-	-	-
Exported electrical energy	[MJ]	-	-	-
Exported thermal energy	[MJ]	-	-	-

LCA: Interpretation:

When considering LCA results, the raw materials supply stage (A1) has the highest impact for all environmental impact categories. Among raw materials, the most important contributor is expanded perlite. Concerning the lowest environmental impact, transport stage (A2) and manufacturing stage (A3) have minor values in all categories.

Regarding the total energy requirement, the raw materials supply stage has the biggest energy demand, followed by transport and manufacturing stages with minor effects.

Regarding water consumption, the raw materials stage has the biggest impact. Transport and manufacturing stages have only a small impact on this category. During the plaster production, water is not consumed. In the manufacturing stage, the water consumption is totally linked to the background process of electricity production; whilst in the raw material supply stage, the water use is mainly caused by upstream processes of expanded perlite.

Concerning the waste generation, the hazardous waste is mainly generated by the raw material supply stage (mostly caused by upstream processes of expanded perlite).

The non-hazardous waste is mainly linked to upstream processes of raw materials supply, transport, followed by the manufacturing stage. Within the raw materials supply stage, it is due to upstream processes of expanded perlite, while in the manufacturing stage, it is caused mainly by the upstream processes of electricity.

Similarly, radioactive waste is mainly coming from the raw material supply stage. It is mostly linked to upstream processes of expanded perlite. During the manufacturing processes of plaster, there is no direct radioactive waste. But, the value acquired for radioactive waste generation is in relation with the upstream processes of electricity.

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