



# SUSTAINABILITY SHEET

Turning trash into a resource

FSorb® Acoustic wall and ceiling panels are thermally bonded and 100% polyester fiber products. There are NO adhesives, paints, coatings, VOC's, formaldehyde, fiberglass insulation, wood, agriculture, or paper products.

## PUBLICLY DISCLOSED HEALTH PRODUCT DECLARATION:

FSorb® has declare labels for each location of manufacture and are located on the website and provided upon request. <https://www.fsorb.com/our-products>



**CONTACT:**  
Tel: 844-313-7672 or 425-881-0888  
Fax: 425-881-1114

## PAINTS, COATINGS, ADHESIVES, AND SEALANTS

NO paints, coatings, adhesives or sealants are used to manufacture this product. It is thermally bonded.

MATERIAL NAME: Polyester

CAS NUMBER #: 68604-67-1

PROPORTION: 100%

Contains 0.0 VOC's

## RECYCLED CONTENT

The recycled content varies depending on availability of recycled PET pellets. The post-consumer recycled content ranges between 65% - 81% depending on color and location.

## SOURCING OF RAW MATERIALS

The recycled polyester comes from PET plastic pellets which are sourced from a variety of locations near the manufacturer and varies depending on availability. The raw material polyester pellets are sourced based on commodity pricing and availability.

## MANUFACTURING LOCATION

Products are manufactured in one of the following locations:

- 1.) Los Angeles
- 2.) Gyeonggi, Korea

Final assembly for specialty products:

- 1.) Redmond, Washington

## OTHER ECOLOGICAL INFORMATION

FSorb® does not contain any Ozone depleting chemicals, and is not classified as a hazardous air pollutant.

## END OF LIFE CONSIDERATIONS

FSorb® products are recyclable and only made of recycled PET and regular polyester. It can be recycled at any polyester recycling facility. FSorb® is working on a product take-back program to create closed-loop recycling for a future product line.

# Declare.



## FSorb

### Nut Shell, LLC. dba F-Sorb

**Final Assembly:** Woodinville, Washington, USA

**Life Expectancy:** Lifetime Year(s)

**End of Life Options:** Salvageable/Reusable in its Entirety, Recyclable (100%)

#### Ingredients:

**Polyethylene terephthalate, PET:** Polyethylene Terephthalate;  
**Flame Retardants:** Phosphonic acid, methyl-, bis[(5-ethyl-2-methyl-2,2-dioxido-1,3,2-dioxaphosphorinan-5-yl)methyl] ester, mixt. with (5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphorinan-5-yl)methyl methyl methylphosphonate; **Tints & Etc:** 1-Octadecanol; 1,3-Benzenedicarboxylic acid; 2-Naphthalenecarboxamide, N,N'-(2,5-dichloro-1,4-phenylene) bis[4-[(2,5-dichlorophenyl)azo]-3-hydroxy -; 2-Naphthalenol, 1-[[4-[(dimethylphenyl)azo]dimethylphenyl]azo]-; Benzoxazole, 2,2'-(1,2-ethenediyl-di-4,1-phenylene)bis-; Blue; Butanamide, 2,2'-[(3,3'-dichloro[1,1'- biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2-methylphenyl )-3-oxo-; C. I. Pigment Blue 15; C.I. Pigment Green 7; Carbon black; Copper, [29H,31H-phthalocyaninato( 2-)-N29,N30,N31,N32]-, (1,3-dihydro-1,3-dioxo-2H-isoindol-2-yl)methyl derivs.; Diindolo[3,2-b:3',2'-m]triphenodioxazine, 8,18-dichloro-5,15-diethyl-5,15-dihydro-; Fe2O3; Hexadecanoic acid, 2-ethylhexyl ester; Scarlet Red; Titanium dioxide; Water; Yellow

**Living Building Challenge Criteria:** Compliant

#### I-13 Red List:

- LBC Red List Free                      % Disclosed: 100% at 100ppm
- LBC Red List Approved                VOC Content: Not Applicable
- Declared

**I-10 Interior Performance:** Not Applicable

**I-14 Responsible Sourcing:** Not Applicable

FSB-0002

EXP. 01 FEB 2025

Original Issue Date: 2021

# FSorb® Acoustical Systems



FSorb has committed to focusing on saving energy and a clean environment since 2007. They are ISO 9001, ISO 14001, LBC Red List Free and Greengard Gold certified with continual improvement programs in place to reduce the environmental impact.

FSorb is UL Certified as VOC Free per CDPH-CA Section 01350 and compliant with California OEHHA Proposition 65 List and the California-EPA Air Resource Board list of Toxic Air Contaminants (TACs)

FSorb is motivated by improving human health and do so by creating eco-friendly acoustic products. FSorb's mission is to help designers build beautiful spaces that reduce excess ambient noise while calming the human nervous system.

FSorb is made from 100% recyclable polyesters which are designed to reduce noise and reverberated sound. The primary material is 65% minimum recycled polyester fibers, primarily from clear plastic beverage containers.



FSorb Silentline® Linear Baffles and Clouds



FSorb Quietgrid® Cellular Clouds



EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611	<a href="https://www.ul.com/">https://www.ul.com/</a> <a href="https://spot.ul.com/">https://spot.ul.com/</a>
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.5 March 2020	
MANUFACTURER NAME AND ADDRESS	Nut Shell LLC, DBA FSorb, 21415 87th Ave. SE, Woodinville, WA 98072 USA and 25-3, Hyundaikia-ro, Paltan-myeon, Hwaseong-si, Gyeonggi-do, Republic of Korea	
DECLARATION NUMBER	4789406799.101.1	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	FSorb Acoustical Systems 1m <sup>2</sup>	
REFERENCE PCR AND VERSION NUMBER	Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements, UL 10010-03, version 1.0	
DESCRIPTION OF PRODUCT APPLICATION/USE	FSorb is a type of Acoustical Finishes used in a variety of building applications, both residential and commercial.	
PRODUCT RSL DESCRIPTION (IF APPL.)	75 years	
MARKETS OF APPLICABILITY	North America	
DATE OF ISSUE	January 15, 2021	
PERIOD OF VALIDITY	5 years	
EPD TYPE	Product-specific	
RANGE OF DATASET VARIABILITY	N/A	
EPD SCOPE	Cradle to grave with options (A1-3, A4 A5, C1, C2, C3, C4)	
YEAR(S) OF REPORTED PRIMARY DATA	2019	
LCA SOFTWARE & VERSION NUMBER	GaBi 8.5.0.79	
LCI DATABASE(S) & VERSION NUMBER	GaBi Database 8007	
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1 v1.05; CML-IA version 4.2	
The PCR review was conducted by:	PCR Review Panel	
This declaration was independently verified in accordance with ISO 14025: 2006. INTERNAL <input type="checkbox"/> EXTERNAL <input checked="" type="checkbox"/>	Jessica Kwon, UL Environment	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomal Gloria, Industrial Ecology Consultants	

### LIMITATIONS

**Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

**Accuracy of Results:** EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

**Comparability:** EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have





# 1. PRODUCT DEFINITION AND INFORMATION

## 1.1 Description of Company / Organization

Founded in 2007, Nut Shell LLC, DBA FSorb is an environmentally responsible company which produces 100% pure polyester acoustical sound panels and systems. By manufacturing high quality polyester (or PET) acoustic sound absorption panels and insulation, FSorb has grown the business to cover North America. FSorb is sold through distributors and dealers across the United States and Canada. The products covered by this Environmental Product Declaration (EPD) are produced in the following locations:

- Raw Materials: 25-3, Hyundaijikia-ro, Pultan-myeon, Hwaseong-si, Gyeonggi-do, Republic of Korea
- Finished Goods: 21415 87th Avenue SE, Woodinville, WA 98072, USA

## 1.2 Product Description

### Product Identification

FSorb products are made from 100% polyester fiber, bonded using heat instead of chemical binders. Polyester is naturally resistant to moisture, insects and mold. It is highly durable and easy to work with. It is light weight.

### Product Specification

For the declared product, the following technical data in the delivery status must be provided with reference to the test standards:

**Table 1. Technical Specifications**

PROPERTY	TEST METHOD	VALUE
Fire hazard classification	ASTM E84	Available in Class A
Noise reduction coefficient	ASTM C423 Mounting A	NRC 0.70 SAA 0.69
Fungi resistance of insulation materials and facings	ASTM C1338-08	Pass
Classification of reaction to fire	BS EN 13823:2010	Reaction to fire classification B-s1,d0
	BS EN ISO 11925-2:2010	



### Product Average

The results of this declaration represent an average performance for the listed products and manufacturing locations. The average product is calculated based on the weight of production.

### 1.3 Application

FSorb products are used on ceilings and walls to provide outstanding sound absorption as well as an insulating function.

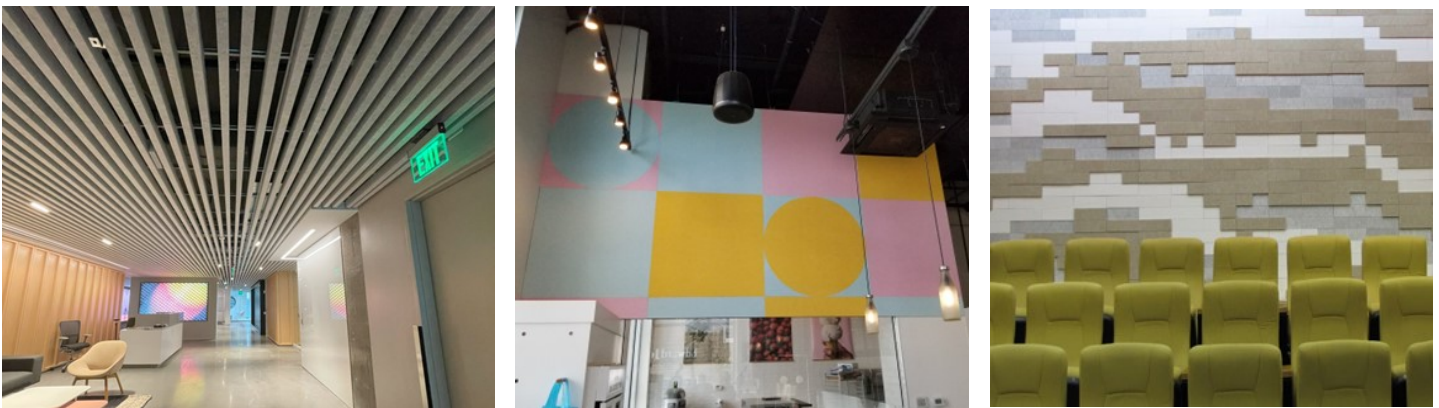


Figure 1. FSorb in its various applications

### 1.4 Declaration of Methodological Framework

This declaration is a product-specific EPD and is cradle-to-installation with end-of-life. The underlying LCA upon which this EPD is based includes the following life cycle modules: Raw Material Supply (A1); Inbound Transportation (A2); Manufacturing (A3); Distribution (A4); Installation (A5); End-of-Life, Deconstruction (C1); Transport (C2); Waste processing (C3) and Disposal (C4). No known flows have been deliberately excluded. The product is expected to perform as claimed for the 75-year reference service life if it remains clean and dry in its installed state.

### 1.5 Technical Requirements

The standards that can be applied for FSorb are:

- ASTM E84 - Surface Burning Characteristics; pursuant to the test certificate
- ASTM C423 - Sound Absorption
- ASTM C1338-08 - Fungi Resistance of Insulation Materials and Facings
- BS EN 13823:2010 / BS EN ISO 11925-2:2010 Reaction to fire classification B-s1.d0

## 1.6 Properties of Declared Product as Delivered

The declared product dimensions vary by installation. The range of products declared in the table below has a density of 80 to 120 kg/m<sup>3</sup> (5.0 to 7.5 lb/ft<sup>3</sup>), a thickness of 12mm to 50mm (1/2" to 2"). Since the ranges are declared, variations may occur for specific products.

Table 2. Declared Unit Properties of FSorb

NAME	VALUE	UNIT
Declared unit	1	m <sup>2</sup>
Density	80 - 120	kg/m <sup>3</sup>
Thickness	25 - 50	mm

## 1.7 Material Composition

The composition of FSorb (1m<sup>3</sup>) is as follows:

Table 3. Material Composition (FSorb)

MATERIAL COMPONENT	QUANTITY (% BY MASS)
polyester staple fiber	10 ~ 40
Recycled polyester fiber	60 ~ 90
other	<1

## 1.8 Manufacturing

### Manufacturing Locations

- Raw Materials: 25-3, Hyundaijkia-ro, Pultan-myeon, Hwaseong-si, Gyeonggi-do, Republic of Korea
- Finished Goods: 21415 87th Avenue SE, Woodinville, WA 98072, USA

### Manufacturing Process

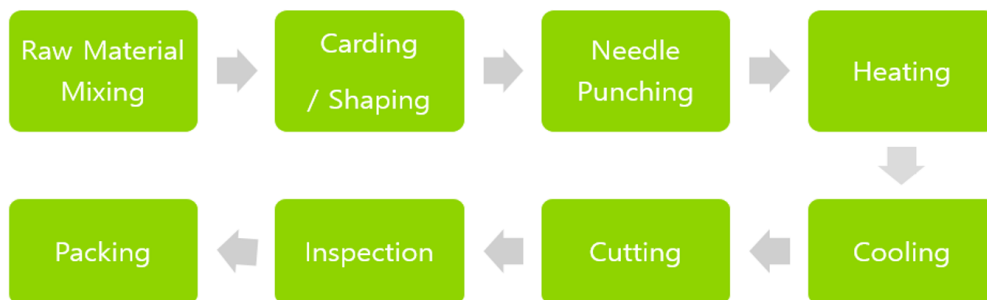


Figure 2. FSorb Manufacturing Process

## 1.9 Packaging

FSorb products are packaged using LDPE (low density polyethylene) film in the form of a bag or plastic sheet. The regional disposal scenarios for the United States is the default assumption for the packaging waste generated during the installation. The disposal rates by material type and waste treatment method are shown in the table below.

Table 4. Disposal rates used by material type and waste treatment method

COUNTRY/REGION	MATERIAL TYPE	RECYCLING RATE	LANDFILL RATE	INCINERATION RATE
United States	Plastics	15%	68%	17%
	Metals	57%	34%	9%
	Pulp(cardboard, paper)	75%	20%	5%

## 1.10 Transportation

The outbound transportation of the product from the manufacturing facility is diesel truck and ship. The

## 1.11 Product Installation

FSorb products are made for easy handling and installation. Installation of FSorb products is accomplished by manual labor using mostly hand tools. No material or energy inputs are required on the jobsite.

## 1.12 Use

There are no special features to be noted within the limits of normal and customary usage.

## 1.13 Reference Service Life and Estimated Building Service Life

FSorb products are assumed to remain in service for the life of the building, 75 years.

## 1.14 Reuse, Recycling, and Energy Recovery

At the end-of-life, the FSorb products may be recycled or disposed of in a landfill.

## 1.15 Disposal

Until a formal recycling program is in place, it is assumed that all materials removed from the decommissioning of a building were taken to a local construction waste landfill, using 100 miles as the average distance to landfill. Disposal in a municipal landfill or commercial incineration facility is permissible and should be done in accordance with the local, state, and federal regulations.



## 2. LIFE CYCLE ASSESSMENT BACKGROUND INFORMATION

### 2.1 Functional or Declare Unit

The declared unit for this EPD is 1 m<sup>3</sup> of FSorb product for use over 75 years.

Table 5. The declared unit of FSorb

NAME	VALUE	UNIT
Declared unit	1	m <sup>3</sup>
Declared thickness	25 to 50	mm
Weight per declared unit	3.09	kg/m <sup>3</sup>

### 2.2 System Boundary

This EPD is cradle-to-installation with the end-of-life. Details of the system boundaries may be found in the table below.

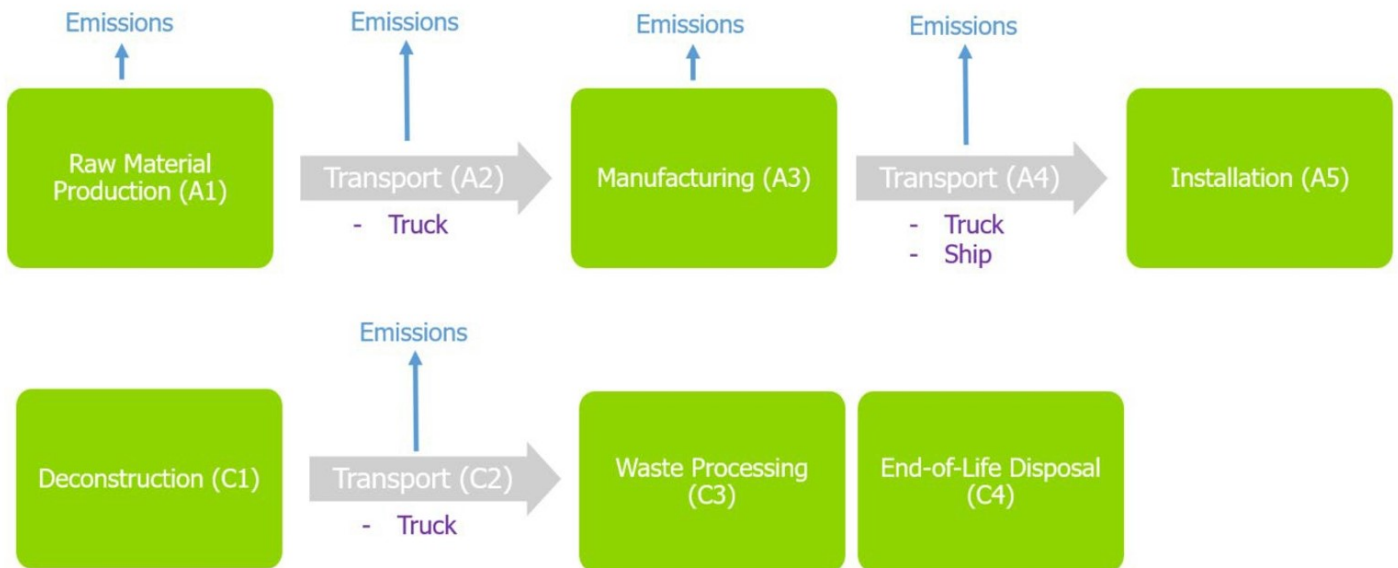


Figure 3. FSorb System boundary

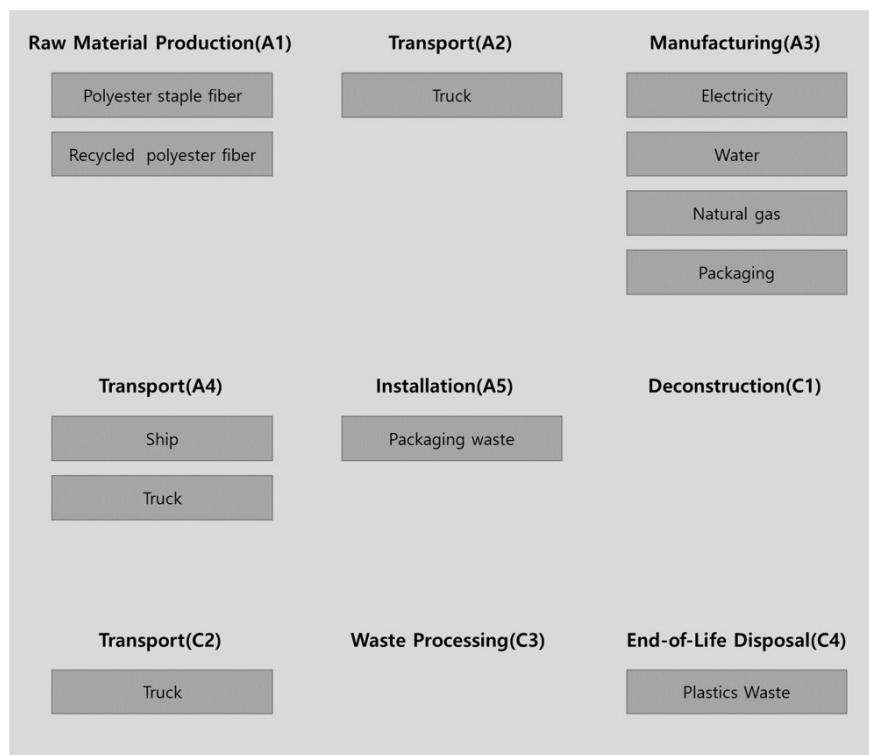


Figure 4. Flow Diagram of FSorb

## 2.3 Estimates and Assumptions

FSorb does not require any servicing or maintenance over its useful life. It is assumed that the product remains in service for the 75-year reference service.

## 2.4 Cut-off Criteria

According to section 2.9 of PCR(UL 10010 Version 3.2), the procedure detailed in ISO 21930, section 7.1.8 was followed regarding the exclusion of inputs and outputs. For energy, mass and environmental impacts, the cut-off criteria were 1% per the standard. Per the standard “the total of neglected input flows per module shall be a maximum of 5% of energy usage, mass and environmental impacts.”

Flows excluded for this study include infrastructure, capital goods and workforce burdens. Inputs and outputs associated with infrastructure (construction, maintenance and demolition of buildings/plants, road surfaces, transported equipment, etc.) are not included. This choice is based on experience from previous LCAs where the contribution from these items was negligible due to the long lifetime of the equipment compared to the high production volume of material during that lifetime. Although pallets are used in the transportation of packaged, finished FSorb products, pallets have been excluded due to their high reuse rates since they would have a negligible impact if otherwise included.

## 2.5 Data Sources

Primary manufacturing data was collected from the included manufacturing locations listed in the Manufacturing section. Secondary data primarily references the GaBi database. LCI data was taken from GaBi databases which are on the approved database list in the PCR.

## 2.6 Data Quality

Primary data was based on measured and calculated data from the FSorb plant which produced most of the product in calendar year 2019. It meets requirements for completeness along with temporal, geographical and technological representativeness.

## 2.7 Period Under Review

The LCA data were collected for the calendar year 2019.

## 2.8 Allocation

Where it was not possible to avoid allocation, allocation was made based on product mass which is suggested by the PCR. The raw material, energy and waste data were collected and allocated based on the mass of the entire plant consumption because the products produced in the factory have different specifications (weight, width, thickness, density), but are produced through the same process.

# 3. LIFE CYCLE ASSESSMENT SCENARIOS

Table 6. Transport to the building site (A4)

NAME	VALUE	UNIT
Fuel type	diesel, low-sulfur	
Liters of fuel	2.95E-03 [4.00E-01]	l/100km
Vehicle type	EURO3, 26-28 metric ton lorry [Container ship, 27500dwt]	
Transport distance	4.63E+02 [1.10E+04]	km
Capacity utilization (including empty runs, mass based)	85	%
Gross density of products transported	1.09E+02	kg/m <sup>3</sup>
Weight of products transported (if gross density not reported)	3.09E+00	kg
Volume of products transported (if gross density not reported)	2.83E-02	m <sup>3</sup>
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	1	-

Table 7. Installation into the building (A5)

NAME	VALUE	UNIT
Ancillary materials	0.00E+00	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0.00E+00	m <sup>3</sup>
Other resources	0.00E+00	kg
Electricity consumption	0.00E+00	kWh
Other energy carriers	0.00E+00	MJ
Product loss per functional unit	0.00E+00	kg
Waste materials at the construction site before waste processing, generated by product installation	0.00E+00	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	0.00E+00	kg
Biogenic carbon contained in packaging	1.73E-01	kg CO <sub>2</sub>
Direct emissions to ambient air, soil and water	0.00E+00	kg
VOC content	0.00E+00	µg/m <sup>3</sup>
	0.00E+00	

Table 8. End-of-life (C1-C4)

NAME		VALUE	UNIT
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method and transportation)			
Collection process (specified by type)	Collected separately	0.00E+00	kg
	Collected with mixed construction waste	3.09E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	0.00E+00	kg
	Landfill	0.00E+00	kg
	Incineration	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	3.09E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO <sub>2</sub>

## 4. LIFE CYCLE ASSESSMENT RESULTS

Table 9. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MND

MND: module not declared X: declared

### 4.1 Life Cycle Impact Assessment Results

The following results were obtained as a result of the life cycle impact assessment (LCIA) for FSorb. The LCIA results are shown through TRACI 2.1 and CML guideline 2001 (2016).

The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceedance of thresholds, safety margins or risks.

Table 10. North American Impact Assessment Results for 1 m<sup>3</sup> FSorb

TRACI v2.1	A1-A3	A4	A5	C1	C2	C3	C4
GWP 100 [kg CO <sub>2</sub> eq]	9.16.E+00	6.04.E-01	9.20.E-02	0.00.E+00	6.00.E-02	0.00.E+00	1.58.E-02
ODP [kg CFC-11 eq]	4.72.E-12	1.49.E-14	1.39.E-14	0.00.E+00	2.50.E-15	0.00.E+00	3.61.E-15
AP [kg SO <sub>2</sub> eq]	1.63.E-02	1.67.E-02	1.40.E-04	0.00.E+00	3.39.E-04	0.00.E+00	1.03.E-04
EP [kg N eq]	1.42.E-03	5.79.E-04	3.70.E-05	0.00.E+00	2.77.E-05	0.00.E+00	8.70.E-06
POCP [kg O <sub>3</sub> eq]	2.44.E-01	3.11.E-01	1.24.E-03	0.00.E+00	7.54.E-03	0.00.E+00	2.03.E-03
ADP <sub>fossil</sub> [MJ, LHV]	2.35.E+01	1.07.E+00	2.99.E-02	0.00.E+00	1.17.E-01	0.00.E+00	2.57.E-02

[GWP – Global Warming Potential, ODP – Ozone Depletion Potential, AP – Acidification Potential, EP – Eutrophication Potential, POCP – Smog Formation Potential, ADP<sub>fossil</sub> – Abiotic Depletion Potential of Non-renewable (fossil) energy resources]



Table 11. EU Impact Assessment Results for 1 m<sup>3</sup> FSorb

CML v4.2	A1-A3	A4	A5	C1	C2	C3	C4
GWP 100 [kg CO <sub>2</sub> eq]	9.18.E+00	6.05.E-01	9.22.E-02	0.00.E+00	5.98E-02	0.00.E+00	1.60.E+02
ODP [kg CFC-11 eq]	4.72.E-12	1.49.E-14	1.39.E-14	0.00.E+00	2.50.E-15	0.00.E+00	3.61.E-15
AP [kg SO <sub>2</sub> eq]	1.54.E-02	1.58.E-02	1.25.E-04	0.00.E+00	2.51.E-04	0.00.E+00	9.42.E-05
EP [kg PO <sub>4</sub> <sup>-3</sup> eq]	2.48.E-03	1.67.E-03	3.91.E-05	0.00.E+00	6.37.E-05	0.00.E+00	1.30.E-05
POCP [kg ethene eq]	1.89.E-03	6.90.E-04	3.65.E-05	0.00.E+00	9.32.E-05	0.00.E+00	7.32.E-06
ADP <sub>element</sub> [kg Sb-eq]	1.83.E-06	2.15.E-08	8.03.E-09	0.00.E+00	5.38.E-09	0.00.E+00	6.00.E-09
ADP <sub>fossil</sub> [MJ, LHV]	1.77.E+02	7.48.E+00	2.81.E-01	0.00.E+00	8.19.E-01	0.00.E+00	2.06.E-01

[GWP – Global Warming Potential, ODP – Depletion potential of the stratospheric ozone layer, AP – Acidification Potential of soil and water, EP – Eutrophication Potential, POCP – Photochemical Oxidant Creation Potential, ADP<sub>element</sub> – Abiotic depletion potential (ADP-Elements) for non-fossil resources, ADP<sub>fossil</sub> – Abiotic Depletion Potential (ADP-fossil fuels) for fossil resources]

## 4.2 Life Cycle Inventory Results

Table 12. Resource Use for 1 m<sup>3</sup> FSorb

PARAMETER	A1-A3	A4	A5	C1	C2	C3	C4
RPR <sub>E</sub> [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
RPR <sub>M</sub> [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
NRPR <sub>E</sub> [MJ, LHV]	7.03E-01	1.79E-01	8.37E-03	0.00.E+00	1.99E-02	0.00.E+00	5.74E-03
NRPR <sub>M</sub> [MJ, LHV]	5.40E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
FW [m <sup>3</sup> ]	5.05E+00	2.41E-02	9.34E-03	0.00.E+00	4.46E-03	0.00.E+00	1.61E-02

Table 13. Output Flows and Waste Categories for 1 m<sup>3</sup> FSorb

PARAMETER	A1-A3	A4	A5	C1	C2	C3	C4
HWD [kg]	1.27E-07	4.34E-08	6.63E-08	0.00.E+00	4.34E-08	0.00.E+00	3.67E-09
NHWD [kg]	6.48E+00	2.04E-02	1.55E-01	0.00.E+00	4.14E-03	0.00.E+00	1.04E+00
HLRW [kg] or [m <sup>3</sup> ]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
ILLRW [kg] or [m <sup>3</sup> ]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
R [kg]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00

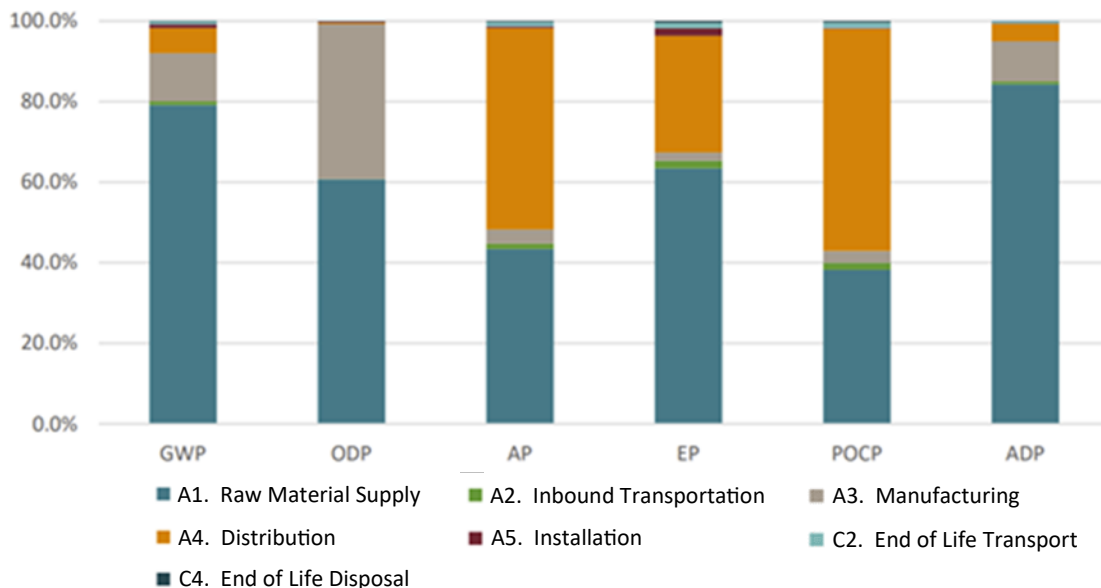
Table 14. Carbon Emissions and Removals for 1 m<sup>3</sup> FSorb

PARAMETER	A1-A3	A4	A5	C1	C2	C3	C4
BCRP [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
BCEP [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
BCRK [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
BCEK [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
BCEW [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
CCE [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
CCR [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00
CWNR [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00.E+00	0.00E+00	0.00.E+00	0.00E+00

## 5. LCA INTERPRETATION

The underlying LCA upon which this EPD is based considered the following six environmental impact categories: Global Warming Potential (GWP 100); Ozone Depletion Potential (ODP); Acidification Potential (AP); Eutrophication Potential (EP); Smog Formation Potential (POCP); and Abiotic Resource Depletion Potential or Non-renewable (fossil) energy resources (ADP fossil).

The impact assessment results indicate that among the life cycle modules declared for FSorb, the Raw material supply (A1) life cycle module accounted for the majority of the potential environmental impact of each of these six impact categories.



## 6. ADDITIONAL ENVIRONMENTAL INFORMATION

### 6.1 Environment and Health During Installation

Classified as Non-Hazardous according to OSHA29CFR1910.1200.

### 6.2 Extraordinary Effects

No extraordinary effects or environmental impacts are expected due to destruction of the product by fire, water or mechanical means.

### 6.3 Delayed Emissions

No delayed emissions are expected from this product.

### 6.4 Environmental Activity and Certifications

- GREENGARD Gold: The products are certified by GREENGUARD standards for low chemical emissions in indoor air during product usage.
- Korea Eco-label: The products are certified as eco-friendly lagging insulation materials for use of recycled materials, energy saving, sound-absorbing.
- Healthy Building Material: The products are certified as eco-friendly building materials according to released intensity of organic compounds (TVOC, HCHO). Korea Air Cleaning Association (KACA) certifies HB mark and qualifies certification grades through rigorous and thorough certification test on the ground of Green Building Assessment System.

### 6.5 Further Information

Additional information may be found at <http://fsorb.com> and <http://ecotmax.com>

## 7. REFERENCES

PCR A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (December 12, 2018, version 3.2)

PCR Part B: Mechanical, Specialty, Thermal and Acoustic Insulation EPD Requirements, UL Environment, UL 10010-03 (September 3, 2019, version 1.0)

ISO 14025: 2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14040: 2006, Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines

ISO 14046:2013, Environmental management- Water footprint- Principles, requirements and guidelines

EN 15804:2012+A1:2013, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products

ISO 21930: 2017, Sustainability in building construction -- Environmental declaration of building products

EN 15804, Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products

ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials

UL General Program Rules v. 2.5 March 2020

