Sustainable Minds®

Transparency Report (EPD)



SM Transparency Catalog ► Knauf Insulation Showroom ► Wall and Ceiling Liner & Atmosphere™ Duct Liner



## **Atmosphere™ Duct Liner** Wall and Ceiling Liner

Atmosphere Duct Liner is a flexible, matfaced insulation with a tightly bonded mat to provide a smooth, tough surface that resists

Wall and Ceiling Liner M with ECOSE® Technology is a brown flexible fiberglass blanket with a black mat facing adhered to one surface. It provides thermal & acoustical insulation while its surface resists damage during installation. It is intended to be mechanically fastened to walls and can be left exposed, covered with fabric or suspended above linear metal & metal pan ceiling systems to serve as a visual & acoustical treatment.







## Performance dashboard

### Features & functionality

Greatly reduces noise

black surface is required

Low VOC emission and formaldehyde-free

Acoustical and visual barrier for walls and ceilings where a

For theaters, sound studios, public concourses and other areas

where acoustical treatment is needed

## Visit Knauf for more product information

Wall and Ceiling Liner Atmosphere<sup>™</sup> Duct Liner

#### **Environment & materials**

#### Improved by:

Utilization of recycled glass

Knauf's original bio-based ECOSE® binder technology

Optimized compression packaging

#### Certification & rating systems:

Declare, Red List Free

UL GREENGUARD Gold certified

UL Validated recycled content

UL Validated formaldehyde-free

Audited, European Certification Board for Mineral Wool Products exoneration process

MasterFormat® 23 07 13 Wall and Ceiling Liner Guide Spec, **Technical Data Sheet Atmosphere™ Duct Liner Technical Data Sheet** 

For spec help, contact us or call 317 421 8727

See LCA, interpretation & rating systems

See materials, interpretation & rating systems











## SM Transparency Report (EPD)™ + Material Health Overview™

**EPD LCA** 3rd-party verified Transparency Report (EPD) Ø 3rd-party verified Validity: 12/12/23 - 12/12/28 KNA - 12122023 - 004 Material evaluation **MATERIAL HEALTH** 

Self-declared"

This environmental product declaration (EPD) was externally verified by Harmony Environmental. LLC, according to ISO 21930:2017: UL Part A; UL Part B for Building **Envelope Thermal Insulation** Products; and ISO 14025:2006.

**Harmony Environmental, LLC** 16362 W. Briarwood Ct. Olathe, KS 66062

(913) 780-3328



## **SUMMARY**

**Reference PCR** 

Regions; system boundaries

North America; Cradle-to-grave

Functional unit / ESL:

1 m<sup>2</sup> installed insulation material. packaging included, with thickness that gives average thermal resistance of  $R_{si} = 1 \text{m}^2 \cdot \text{K/W}$  over an estimated service life (ESL) of 75 years

LCIA methodology: TRACI 2.1

LCA software; LCI database LCA for Experts v10.7; LCA for Experts 2023

In accordance with ISO 14044 and the reference PCR, this life cycle assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC.

### **Public LCA:**

Knauf Insulation, Inc. One Knauf Drive Shelbyville, IN 46176

Contact us

317 398 4434

SM Transparency Catalog ▶ Knauf Insulation Showroom ▶ Wall and Ceiling Liner & Atmosphere™ Duct Liner

## LCA results & interpretation

## Wall and Ceiling Liner & Atmosphere™ Duct Liner

Wall and Ceiling Liner

Sustainable Minds®

## Scope and summary

○ Cradle to gate ○ Cradle to gate with options **♡** Cradle to grave

walls and ceilings where a black surface is required. It is primarily used in

#### **Application** Wall and Ceiling Liner is designed for use as an acoustical and visual barrier for

theaters, sound studios, public concourses, and other areas where acoustical treatment is needed. **Functional unit** 

## One square meter of installed insulation material, packaging included, with a

thickness that gives an average thermal resistance of  $R_{SI} = 1 \text{m}^2 \cdot \text{K/W}$  with a building service life of 75 years. Reference service life: 75 years when installed per manufacturer's instructions Reference flow: 0.992 kg of product, at a thickness of 0.0356 m to achieve the

functional unit. (ASTM C518) Manufacturing data Reporting period: January 2022 – December 2022

## Location: Shelbyville, IN

**Batch** 

**Batch** 

**Batch** 

**Batch** 

**Binder** 

**Binder** 

**Binder** 

**Facer** 

5.00E-02

**Packaging** 

**Packaging** 

Default installation, packaging, and disposal scenarios

### Staples may be used to install liner products. The potential impact of the staples is assumed to be negligible since their use is spread out over hundreds

of pieces; therefore, they were not included in the model. No material is assumed to be lost or wasted. Scraps are typically used to fill corners or crevices. Plastic packaging waste is disposed (9% to recycling, 68%

to landfill, and 17% to incineration), paper-based packaging waste is disposed

(68% to recycling, 20% to landfill, and 5% to incineration), and no maintenance

or replacement is required over the life of the building. After removal, the

insulation is assumed to be landfilled. Insulation and packaging waste are

At the installation site, insulation products are unpackaged and installed.

assumed to be transported 100 miles for disposal. Material composition greater than 1% by weight **PART MATERIAL** %WT. **Batch** Cullet 25-30% **Batch** Sand 2-5% **Batch Borates** 2-5%

> Soda ash **Feldspar**

Limestone

**Oxides** 

Water

Sugars

**Plastic** 

(X) A1 Raw

production.

**ACQUISITION** 

27.3%

1.08E+00

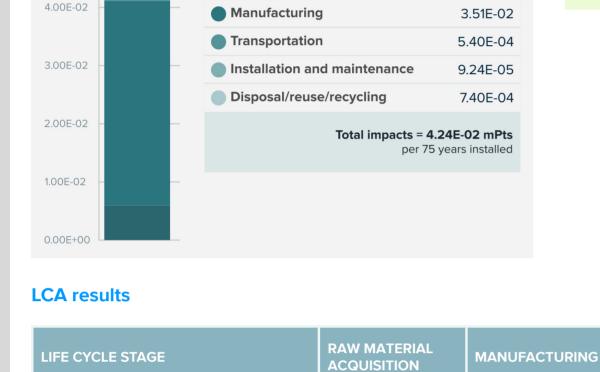
Cardboard

**Additives** 

**Black mat facer** 

#### LIFE CYCLE STAGE MPTS/FUNC. UNIT Raw material acquisition

Total impacts by life cycle stages [mPts/per func unit]



## All life cycle stages

What's causing the greatest impacts

#### The manufacturing stage dominates all impact categories except ozone depletion, where the raw material acquisition stage takes precedence. The

energy required to melt the glass and produce the glass fibers is the largest contributor to the manufacturing stage. The impact of the raw material acquisition stage is mostly due to the batch and binder materials. The contributions to outbound transportation are caused by the use of trucks and rail transport. The only impacts associated with installation and maintenance are due to the disposal of packaging waste, which is the smallest contributor of all the stages. At the end of life, insulation is manually removed from the building and landfilled. For all products, waste is dominated by the final disposal of the product. Non-hazardous waste accounts for waste generated during manufacturing and installation. Raw materials acquisition and transportation The raw material acquisition stage is the second highest contributor for

generated from this stage. The raw materials acquisition stage impact is largely due to the borax, manganese oxide, and soda ash in the batch and the sugars in the binder. Third-party verified ISO 14040/44 secondary LCI data sets contribute more than 80% of the total impacts to ozone depletion. Manufacturing stage The manufacturing stage has the most significant contribution to all impact

categories, primarily due to the energy required to melt the glass and

produce the glass fibers. Since some batch ingredients significantly

most impact categories, but ozone depletion potential is almost entirely

contribute to the respiratory effects category, they can lead to higher impact results in the raw materials acquisition stage. However, since sand and borax are melted in the oven with the other batch materials, they are not released into the air as fine particulates. Therefore, the calculated potential impacts as shown in the results tables are likely much larger than the actual impacts in the raw material acquisition stage. This implies that the manufacturing stage may have a greater share of the impact than what is displayed in the total impacts by life cycle stage. Outbound transportation is the third highest contributor to smog impacts.

## End of life

The end-of-life impacts are largely due to landfilling of the product after it has been removed from the building and transported to a landfill. Since materials are assumed to be landfilled at the end of life rather than incinerated or

reused/recycled, no materials are available for energy recovery or

### reuse/recycling.

**Embodied carbon** 

2-5%

1-2%

1-2%

<1%

20-25%

10-15%

8-10%

10-15%

<1%

1-2%

5.99E-03

(X) A3

Embodied carbon can be defined as the cradle-to-gate (A1-A3) global warming potential impacts. The total embodied carbon per functional unit of Wall and Ceiling Liner manufactured in Shelbyville, IN is 2.80E-01 kg CO<sub>2</sub>-eq per functional unit.

#### adhesive instead of a fossil fuel-based binder. Our fiberglass contains on average over 60% recycled glass, which

How we're making it greener

requires about 20% less energy required to form glass fibers, and results in about 25% reduction in embodied carbon.

• Our products with ECOSE® Technology contain a bio-based binder

Knauf Insulation North America (KINA) is committed to providing

products that conserve energy and preserve natural resources.

a health and safety standpoint. See how we make it greener

• Our glass is audited by a 3rd party to ensure biosoluble chemistry from

**INSTALLATION** 

**MAINTENANCE** 

(X) A5 Installation

**DISPOSAL/ REUSE/** 

landfilling of product

**DISPOSAL/ REUSE/** 

at end of life.

RECYCLING

0.9%

7.01E-02

½product

1 product

1 product

1.5 product

2 point

.5 point

.75 points

1 point

RECYCLING

(X) C1

TRANSPORTATION

(X) A4 Distribution

to transport product

TRANSPORTATION

to building site.

landfilling of

packaging materials.

INSTALLATION

**MAINTENANCE** 

AND

0.0%

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

Building product disclosure and optimization

**Environmental product declarations** 

Industry-wide (generic) EPD

✓ Product-specific Type III EPD

Industry-wide (generic) EPD

✓ Product-specific Type III EPD

manufacturers who have verified improved life-cycle environmental

1.87E-03

	materials	Manufacturing	(X) A4 Distribution	(X) A5 Installation	Deconstruction
	(X) A2 Transportation			(X) B1 Use	(X) C2 Transportation
				(X) B2 Maintenance	(X) C3 Waste processing
				(X) B3 Repair	(X) C4 Disposal
Information modules:				(X) B4 Replacement	
Included (X)   Excluded (MND)*  *Module D is also excluded from this				(X) B5 Refurbishment	
system boundary (MND).				(X) B6 Operational energy use	
				(X) B7 Operational water use	
SM Single Score Learn about SM Single	e Score results				
Impacts per 1 square meter of insulation material	5.99E-03 mPts	3.51E-02 mPts	5.40E-04 mPts	9.24E-05 mPts	7.40E-04 mPts
Materials or processes contributing >20% to total impacts in each life cycle stage	Batch material and binder material	Energy required to melt the glass and produce the glass	Truck and rail transportation used to transport product	Transportation to landfill and	Transportation to landfill and

produce the glass

MANUFACTURING

## TRACI v2.1 results per functional unit (Wall and Ceiling Liner - Shelbyville, IN) RAW MATERIAL

**CTU** 

**MJ** surplus

Knauf Insulation North America and Manson Insulation Products LCA

2023; developed using the TRACI v2.1 and CML impact assessment

methodologies, and LCA for Experts modeling software.

Tétreault (Group AGECO); and Jack Geibig (Ecoform).

Background Report (public version), Knauf Insulation North America (KINA)

ISO 14025, "Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and

to total impacts in each life cycle stage

LIFE CYCLE STAGE

**Ecological damage** 

Impact category	Unit						
Global warming	kg CO₂ eq	•	4.18E-01	2.38E+00	2.91E-02	1.44E-02	3.59E-02
Ozone depletion	kg CFC-11 eq	•	5.65E-12	2.00E-13	6.50E-17	5.73E-17	1.03E-15
Acidification	kg SO₂ eq	?	1.04E-03	8.05E-03	1.49E-04	3.06E-05	1.50E-04
Eutrophication	kg N eq	8	5.51E-04	7.17E-04	1.28E-05	5.89E-06	9.24E-06
Human health c							
Impact category	Unit						
Smog	kg O <sub>3</sub> eq	•	1.68E-02	8.45E-02	5.13E-03	1.52E-04	2.94E-03
Respiratory effects	kg PM <sub>2.5</sub> eq	3	5.98E-05	4.62E-04	7.31E-06	7.49E-07	1.01E-05
Additional envir	onmental info	rmati	on				
Impact category	Unit						
Carcinogenics	CTU <sub>h</sub>	•	59.5%	38.8%	0.1%	0.0%	1.5%
Non-carcinogenics	CTU <sub>h</sub>	•	75.4%	22.5%	0.1%	0.1%	1.9%

71.0%

4.89E+00

## ISO 21930:2017 serves as the core PCR along with UL Part A. **UL Part A: Life Cycle Assessment Calculation Rules and Report**

services"

**Ecotoxicity** 

Fossil fuel depletion

References

**LCA Background Report** 

### Requirements v4.0 March, 2022. PCR review conducted by Lindita Bushi, PhD, Chair (Athena Sustainable Materials Institute), lindita.bushi@athenasmi.org; Hugues Imbeault-

(thinkstep); Andre Desjarlais (Oak Ridge National Laboratory). upon request)

UL Part B: Building Envelope Thermal Insulation EPD Requirements, v2.0 April, 2018. PCR review conducted by Thomas Gloria, PhD, Chair (Industrial

Ecology Consultants) t.gloria@industrial-ecology.com; Christoph Koffler, PhD

Insulation allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not

be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with the PCR for Building Envelope Thermal

## UL Environment General Program Instructions v2.4, July 2018 (available **Download PDF** SM Transparency Report / EPD SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. Environmental declarations from different programs (ISO 14025) may not be

# LEED BD+C: New Construction | v4.1 - LEED v4.1

Criteria

**Interiors** 

**Materials and resources** 

0.8%

Rating systems

performance.

5.46E-02

Building product disclosure and optimization **Environmental product declarations** 

Collaborative for High Performance Schools National

**MW C5.1 – Environmental Product Declarations** 

Third-party certified type III EPD

Green Globes for New Construction and Sustainable

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs **BREEAM New Construction 2018** 

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

**Environmental Product Declarations (EPD)** Industry-average EPD

Mat 02 - Environmental impacts from construction products

Knauf Insulation, Inc. Reference PCR One Knauf Drive Shelbyville, IN 46176

Contact us

317 398 4434

Multi product specific EDD
Multi-product specific EPD

✓ Product-specific EPD

Regions; system boundaries North America; Cradle-to-grave Functional unit / ESL: 1 m<sup>2</sup> installed insulation material, packaging included, with thickness

of  $R_{SI} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years

reference PCR, this life cycle assessment was conducted by

Sustainable Minds and verified by Harmony Environmental, LLC.

Validity: 12/12/23 - 12/12/28 KNA - 12122023 - 004 **MATERIAL HEALTH** Self-declared"

3rd-party verified

SM Transparency Report (EPD)™ + Material Health Overview™ LCA

**EPD** This environmental product 3rd-party verified declaration (EPD) was externally verified by Harmony Environmental,

Material

evaluation

Transparency Report (EPD)

Beyond Sustainability, Striving for Harmony

© 2023 | The SM Transparency Report [EPD]™ Program is operated by Sustainable Minds® (www.sustainableminds.com) | Privacy policy

16362 W. Briarwood Ct.

Olathe, KS 66062

(913) 780-3328 **Harmony Environmental, LLC** Management • Analysis • Communication

LLC, according to ISO 21930:2017;

UL Part A; UL Part B for Building

Products; and ISO 14025:2006.

**Envelope Thermal Insulation** 

Harmony Environmental, LLC

**SUMMARY** 

that gives average thermal resistance

LCIA methodology: TRACI 2.1 LCA software; LCI database LCA for Experts v10.7; LCA for Experts In accordance with ISO 14044 and the

Public LCA:

SM Transparency Catalog ► Knauf Insulation Showroom ► Wall and Ceiling Liner & Atmosphere™ Duct Liner

## LCA results & interpretation

Wall and Ceiling Liner & Atmosphere™ Duct Liner

Atmosphere™ Duct Liner

## Scope and summary

○ Cradle to gate ○ Cradle to gate with options **♡** Cradle to grave

#### **Application** Specifically designed for sheet metal ducts used in heating, ventilating, and air

efficient sound absorption, low thermal conductivity, and minimal airstream surface friction. **Functional unit** One square meter of installed insulation material, packaging included, with a

conditioning, Atmosphere™ Duct Liner provides an optimum combination of

thickness that gives an average thermal resistance of  $R_{SI} = 1 \text{m}^2 \cdot \text{K/W}$  with a building service life of 75 years. Reference service life: 75 years when installed per manufacturer's instructions Reference flow: 1.072 kg of product, at a thickness of 0.0353 m to achieve the

functional unit. (ASTM C518) Manufacturing data Reporting period: January 2022 – December 2022

## Location: Shelbyville, IN

**Binder** 

**Binder** 

**Binder** 

4.00E-02

Default installation, packaging, and disposal scenarios At the installation site, insulation products are unpackaged and installed.

assumed to be transported 100 miles for disposal.

### Staples may be used to install liner products. The potential impact of the staples is assumed to be negligible since their use is spread out over hundreds

of pieces; therefore, they were not included in the model. No material is assumed to be lost or wasted. Scraps are typically used to fill corners or crevices. Plastic packaging waste is disposed (9% to recycling, 68% to landfill, and 17% to incineration), paper-based packaging waste is disposed

(68% to recycling, 20% to landfill, and 5% to incineration), and no maintenance

or replacement is required over the life of the building. After removal, the

insulation is assumed to be landfilled. Insulation and packaging waste are

Material composition greater than 1% by weight **PART MATERIAL** %WT. **Batch** Cullet 25-30% **Batch** Sand 2-5% **Batch Borates** 2-5% **Batch** Soda ash 2-5% **Batch** 1-2% **Feldspar Batch** Limestone 1-2% **Oxides Batch** <1%

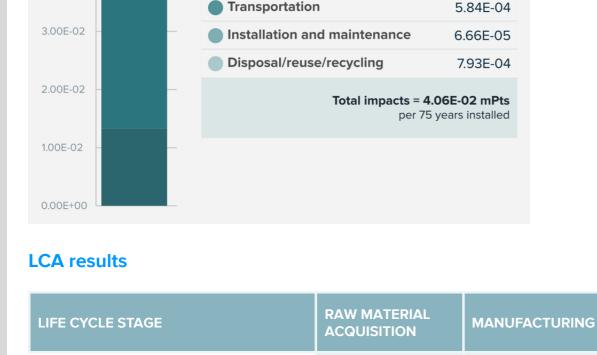
Water

**Sugars Additives** 

#### **Facer Black mat facer** 8-10% **Packaging Plastic** 1-2% Cardboard **Packaging** 1-2% Total impacts by life cycle stages [mPts/per func unit] 5.00E-02 LIFE CYCLE STAGE MPTS/FUNC. UNIT

Manufacturing

Raw material acquisition



(X) A1 Raw

production.

**ACQUISITION** 

66.3%

83.5%

35.8%

2.43E+00

0

materials

(X) A2

## All life cycle stages

What's causing the greatest impacts

Raw materials acquisition and transportation

#### The manufacturing stage dominates all impact categories except ozone depletion, where the raw material acquisition stage takes precedence. The

energy required to melt the glass and produce the glass fibers is the largest contributor to the manufacturing stage. The impact of the raw material acquisition stage is mostly due to the batch and binder materials. The contributions to outbound transportation are caused by the use of trucks and rail transport. The only impacts associated with installation and maintenance are due to the disposal of packaging waste, which is the smallest contributor of all the stages. At the end of life, insulation is manually removed from the building and landfilled. For all products, waste is dominated by the final disposal of the product. Non-hazardous waste accounts for waste generated during manufacturing and installation.

**generated from this stage.** The raw materials acquisition stage impact is largely due to the borax, manganese oxide, and soda ash in the batch and the sugars in the binder. Third-party verified ISO 14040/44 secondary LCI data sets contribute more than 80% of the total impacts to ozone depletion. Manufacturing stage The manufacturing stage has the most significant contribution to all impact

The raw material acquisition stage is the second highest contributor for

most impact categories, but ozone depletion potential is almost entirely

## categories, primarily due to the energy required to melt the glass and produce the glass fibers. Since some batch ingredients significantly

contribute to the respiratory effects category, they can lead to higher impact results in the raw materials acquisition stage. However, since sand and borax are melted in the oven with the other batch materials, they are not released into the air as fine particulates. Therefore, the calculated potential impacts as shown in the results tables are likely much larger than the actual impacts in the raw material acquisition stage. This implies that the manufacturing stage may have a greater share of the impact than what is displayed in the total impacts by life cycle stage. **Distribution** Outbound transportation is the third highest contributor to smog impacts.

End of life

The end-of-life impacts are largely due to landfilling of the product after it has been removed from the building and transported to a landfill. Since materials are assumed to be landfilled at the end of life rather than incinerated or

reused/recycled, no materials are available for energy recovery or

## reuse/recycling

20-25%

10-15%

8-10%

1.35E-02

2.56E-02

(X) A3

Manufacturing

**Embodied carbon** 

Embodied carbon can be defined as the cradle-to-gate (A1-A3) global warming potential impacts. The total embodied carbon per functional unit of Atmosphere™ Duct Liner manufactured in Shelbyville, IN is 3.34E+00 kg CO<sub>2</sub>-eg per functional unit.

### • Our products with ECOSE® Technology contain a bio-based binder adhesive instead of a fossil fuel-based binder.

How we're making it greener

requires about 20% less energy required to form glass fibers, and results in about 25% reduction in embodied carbon. • Our glass is audited by a 3rd party to ensure biosoluble chemistry from

• Our fiberglass contains on average over 60% recycled glass, which

Knauf Insulation North America (KINA) is committed to providing

products that conserve energy and preserve natural resources.

- a health and safety standpoint. See how we make it greener

**INSTALLATION** 

**MAINTENANCE** 

(X) A5 Installation

packaging materials.

INSTALLATION

**MAINTENANCE** 

AND

0.0%

0.0%

0.0%

2.62E-03

**DISPOSAL/ REUSE/** 

RECYCLING

**Deconstruction** 

at end of life.

RECYCLING

0.8%

1.0%

0.5%

7.51E-02

½product

1 product

1.5 product

2 point

.5 point

.75 points

1 point

DISPOSAL/ REUSE/

(X) C1

(X) C2

**TRANSPORTATION** 

(X) A4 Distribution

to building site.

**TRANSPORTATION** 

	Transportation			(X) B1 Use	Transportation
				(X) B2 Maintenance	(X) C3 Waste processing
				(X) B3 Repair	(X) C4 Disposal
Information modules:				(X) B4 Replacement	
Included (X)   Excluded (MND)*  *Module D is also excluded from this				(X) B5 Refurbishment	
system boundary (MND).				(X) B6 Operational energy use	
				(X) B7 Operational water use	
SM Single Score Learn about SM Single	e Score results				
Impacts per 1 square meter of insulation material	1.35E-02 mPts	2.56E-02 mPts	5.84E-04 mPts	6.66E-05 mPts	7.93E-04 mPts
Materials or processes contributing >20% to total impacts in each life cycle stage	Batch material and binder material production.	Energy required to melt the glass and produce the glass	Truck and rail transportation used to transport product	Transportation to landfill and landfilling of	Transportation to landfill and landfilling of product

fibers.

## TRACI v2.1 results per functional unit (Atmosphere™ Duct Liner - Shelbyville, IN) **RAW MATERIAL**

LIFE CYCLE STAGE

Ecological dama	age						
Impact category	Unit						
Global warming	kg CO <sub>2</sub> eq	9	9.40E-01	2.40E+00	3.15E-02	1.22E-02	3.84E-02
Ozone depletion	kg CFC-11 eq	•	1.27E-11	2.58E-13	7.03E-17	9.29E-17	1.11E-15
Acidification	kg SO₂ eq	•	2.34E-03	5.34E-03	1.62E-04	1.27E-05	1.61E-04
Eutrophication	kg N eq	0	1.24E-03	1.19E-03	1.38E-05	3.61E-06	9.90E-06
Human health d	lamage						
Impact category	Unit						
Smog	kg O₃ eq	?	3.78E-02	7.15E-02	5.54E-03	1.11E-04	3.15E-03
Respiratory effects	kg PM <sub>2.5</sub> eq	?	1.35E-04	2.94E-04	7.90E-06	4.32E-07	1.09E-05

32.8%

15.4%

63.0%

4.02E+00

**MANUFACTURING** 

#### **CTU**<sub>e</sub> **Ecotoxicity** Fossil fuel depletion **MJ** surplus

Impact category

**Non-carcinogenics** 

Carcinogenics

References

Additional environmental information

Unit CTU<sub>h</sub>

CTU<sub>h</sub>

References	Rating systems
LCA Background Report Knauf Insulation North America and Manson Insulation Products LCA Background Report (public version), Knauf Insulation North America (KINA) 2023; developed using the TRACI v2.1 and CML impact assessment	The intent is to reward project teams for selecting products from manufacturers who have verified improved life-cycle environmental performance.
methodologies, and LCA for Experts modeling software.  ISO 14025, "Sustainability in buildings and civil engineering works Core	<b>LEED BD+C: New Construction   v4 - LEED v4</b> Building product disclosure and optimization
rules for environmental product declarations of construction products and	Furtire was autal was durat de alevations

### **UL Part A: Life Cycle Assessment Calculation Rules and Report** Requirements v4.0 March, 2022. PCR review conducted by Lindita Bushi, PhD, Chair (Athena

upon request)

services"

April, 2018. PCR review conducted by Thomas Gloria, PhD, Chair (Industrial Ecology Consultants) t.gloria@industrial-ecology.com; Christoph Koffler, PhD (thinkstep); Andre Desjarlais (Oak Ridge National Laboratory).

UL Environment General Program Instructions v2.4, July 2018 (available

UL Part B: Building Envelope Thermal Insulation EPD Requirements, v2.0

Sustainable Materials Institute), lindita.bushi@athenasmi.org; Hugues Imbeault-

ISO 21930:2017 serves as the core PCR along with UL Part A.

Tétreault (Group AGECO); and Jack Geibig (Ecoform).

**Download PDF** SM Transparency Report / EPD

shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with the PCR for Building Envelope Thermal Insulation allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products

on a life cycle basis. Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information

life cycle stages declared.

and background LCI datasets may lead to differences results for upstream or downstream of the

## LEED BD+C: New Construction | v4.1 - LEED v4.1 Building product disclosure and optimization

Criteria

**Interiors** 

**Materials and resources** 

Multi-product specific EPD

**✓** Product-specific EPD

**Environmental product declarations** 

Industry-wide (generic) EPD

✓ Product-specific Type III EPD

✓ Product-specific Type III EPD

0.1%

0.1%

0.5%

5.91E-02

**Environmental product declarations** ( ) Industry-wide (generic) EPD 1 product

Collaborative for High Performance Schools National

## ▼ Third-party certified type III EPD **Green Globes for New Construction and Sustainable**

**MW C5.1 – Environmental Product Declarations** 

**BREEAM New Construction 2018** 

**Environmental Product Declarations (EPD)** 

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Mat 02 - Environmental impacts from construction products

( ) Industry-average EPD

Knauf Insulation, Inc. One Knauf Drive Shelbyville, IN 46176

317 398 4434 North America; Cradle-to-grave Contact us 1 m<sup>2</sup> installed insulation material, packaging included, with thickness

KNA - 12122023 - 004 **MATERIAL** 

Self-declar

**EPD** 

3rd-party verified

3rd-party verified

Validity: 12/12/23 - 12/12/28

#### UL Part A; UL Part B for Building **Envelope Thermal Insulation** Functional unit / ESL: Products; and ISO 14025:2006. Harmony Environmental, LLC

inability, Striving for Harmony

16362 W. Briarwood Ct. **Environmental. LLC** Analysis • Communication

© 2023 | The SM Transparency Report [EPD]™ Program is operated by Sustainable Minds® (www.sustainableminds.com) | Privacy policy

SM Transparency Report (EPD)™ + Material Health Overview™

This environmental product

declaration (EPD) was externally

verified by Harmony Environmental,

LLC, according to ISO 21930:2017;

that gives average thermal resistance

assessment was conducted by Sustainable Minds and verified by

HEALTH	evaluation	<b> </b>
red"	•	(913) 780-3328
		Harmony Management Beyond Susta

LCA

Transparency Report (EPD)

Reference PCR Regions; system boundaries

**SUMMARY** 

of  $R_{si} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1

LCA software; LCI database LCA for Experts v10.7; LCA for Experts In accordance with ISO 14044 and the reference PCR, this life cycle

Harmony Environmental, LLC. Public LCA:

SM Transparency Catalog ▶ Knauf Insulation Showroom ▶ Wall and Ceiling Liner & Atmosphere™ Duct Liner

UNIT

# EPD additional content

Wall and Ceiling Liner

**Data** 

collecting production data from the Shelbyville, IN production locations.

Secondary data sources include those available in LCA for Experts 2023

**EPD** additional content

**Atmosphere**<sup>™</sup> **Duct Liner** 

Collection process

**Technical properties** 

Wall and Ceiling Liner

Disposal

**PARAMETER** 

Wall and Ceiling Liner & Atmosphere™ Duct Liner

## Background This product-specific plant-specific declaration was created by

databases. **Allocation** The PCR prescribes where and how allocation occurs. Since only facility-level data were available, allocation among the facilities' other coproducts was necessary to determine the input and output flows associated

with the product. Allocation of batch materials and energy was done on a product output mass basis, binder materials were allocated based on the mass

calculated from the bill of materials and binder formulations, facers were allocated based on product area, and packaging was allocated based on mass per package of product. Allocation of transportation was based on either weight or volume, depending on which was found to restrict the amount of cargo; the limiting factor was used in allocating transportation. Cut-off criteria for the inclusion of mass and energy flows are 1% of renewable primary resource (energy) usage, 1% nonrenewable primary resource (energy) usage, 1% of the total mass input of that unit process, and 1% of environmental impacts. The total of neglected input flows per module does not exceed 5% of energy usage, mass, and environmental impacts. The only exceptions to these

criteria are substances with hazardous and toxic properties, which must be listed even when the given process unit is under the cut-off criterion of 1% of

the total mass. No known flows are deliberately excluded from this declaration; therefore, these criteria have been met. Biogenic carbon is included in reported

results. Quality Temporal and technological representativeness are considered to be high. Geographical representativeness is considered to be high. All relevant process steps for the product system were considered and modeled. The process chain is considered sufficiently complete with regards to the goal and scope of this study. The product system was checked for mass balance and completeness of the inventory. Capital goods were excluded since they are assumed not to significantly affect the conclusions of the LCA. Otherwise, no data were knowingly omitted. For more information on data quality, see the LCA background report.

LCIA impact factors required by the PCR are global warming, ozone depletion, acidification, eutrophication, smog, and fossil fuel depletion; "These six impact

environmental declarations. Other categories are being developed and defined

and LCA should continue making advances in their development. However, the

categories are globally deemed mature enough to be included in Type III

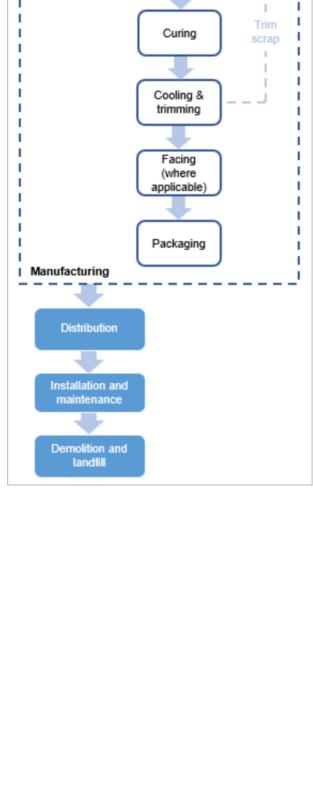
EPD users shall not use additional measures for comparative purposes." Flow diagram Raw material acquisition and Melting

Fiber

forming

materials

Binder



removals per functional unit

**Parameter** 

**LCIA** results

Acidification

Smog

Eutrophication

Carcinogenics

**Ecotoxicity** 

Respiratory effects

Non-carcinogenics

Fossil fuel depletion

Resource use indicators

as energy carrier (fuel)

Ozone depletion

Acidification

Smog

Eutrophication

Carcinogenics

**Ecotoxicity** 

material

packaging

packaging

Biogenic carbon emission from

Biogenic carbon emission from

Calcination carbon emissions

Carbonation carbon removals

combustion of waste

Carbon emissions from combustion of waste from renewable sources used in production processes

Carbon emissions from

combustion of waste from non renewable sources used in production processes

Respiratory effects

Non-carcinogenics

Fossil fuel depletion

Resource use indicators

as energy carrier (fuel)

Renewable primary energy used

Renewable primary resources with

Non-renewable primary resources

Non-renewable primary resources

energy content used as material

used as an energy carrier (fuel)

with energy content used as

Secondary materials

**Additional environmental information** 

kg CFC-11 eq

kg SO, eq

kg N eq

kg O<sub>3</sub> eq

CTUh

CTUh

**CTUe** 

MJ surplus

MJ, LHV

MJ, LHV

MJ, LHV

MJ, LHV

kg

kg CO<sub>2</sub>

kg CO

kg CO<sub>2</sub>

kg CO

kg CO<sub>2</sub>

kg CO,

kg PM<sub>2.5</sub> eq

1.30E-11

7.68E-03

2.43E-03

1.09E-01

4.29E-04

99.1%

98.9%

98.9%

6.45E+00

1.27E+01

1.99E-05

6.19E+01

3.32E-07

2.50E-01

7.03E-17

1.62E-04

1.38E-05

5.54E-03

7.90E-06

0.1%

0.1%

0.5%

5.91E-02

1.74E-02

-1.44E-12

4.46E-01

1.78E-09

0.00E+00

9.29E-17

1.27E-05

3.61E-06

1.11E-04

4.32E-07

0.0%

0.0%

0.0%

2.62E-03

3.80E-03

8.59E-13

2.70E-02

7.00E-11

0.00E+00

0

0

0

0

0

0.0%

0.0%

0.0%

0

0

0

0

0

0

Renewable primary energy used

Renewable primary resources with

Non-renewable primary resources

energy content used as material

used as an energy carrier (fuel)

**Additional environmental information** 

Global warming

Ozone depletion

#### Vehicle type Truck and trailer

Transport to the building site [A4]

Scenarios and additional technical information

**VALUE** 

Fuel type	Diesel		-		
Average distance from manufacturing to installation site	161		km		
Capacity utilization	27		%		
Gross density	24.0		kg/m³		
Capacity utilization volume factor	1		-		
Installation into the building [A5]					
Wall and Ceiling Liner					
Mass of plastic packaging waste		0.00887	kg		
Biogenic carbon content of packaging		0.0198	kg CO <sub>2</sub>		
Atom a sub-a sua IM Decemble in a su					

Atmosphere Duct Liner						
Mass of plastic packaging was	0.0168					
Biogenic carbon content of packaging	0.0234	kg	kg CO <sub>2</sub>			
End of life [C1-C4]						
Assumptions for scenario development	Assumptions for scenario development it was a to disp of the		ving manual removal of the insulation, assumed to be transported 100 miles cosal. The PCR prescribes that 100% insulation is sent to landfill, where no waste processing is required.			
Wall and Ceiling Liner						
Collection process		ted with mixed uction waste		0.971 kg		
Disposal Production in land		ct for final deposition 0.971 kg		0.971 kg		

Collected with mixed

Product for final deposition

Wall and Ceiling Liner is sold in rolls. One master

construction waste

in landfill

1.04 kg

1.04 kg

Dimensions/quantities delivered to installation site	ag contains 4 plastic bags, and each bag contains roll of the product. The dimensions for the product re 1" – 2" thick, 48" in width, and 50' – 100' in ngth.					
ASTM or ANSI product specification	ASTM C1071; Type I ASTM C 665					
Corrosiveness	ASTM C665; Does not accelerate corrosion on steel					
Corrosion	ASTM C1617; Pass					
Surface burning characteristics (flame spread/smoke developed)	ASTM E84, UL 723, NFPA 90A and 90B (IB), CAN/ULC S102 (IB); 25/50					
Atmosphere <sup>™</sup> Duct Liner						
Dimensions/quantities delivered to installation site	Atmosphere <sup><math>^{\text{M}}</math></sup> Duct Liner is sold in rolls. One master bag contains 4 plastic bags, and each bag contains 1 roll of the product. The dimensions for the product are 1" $-$ 2" thick, 48" $-$ 59" in width, and 50' $-$ 100' in length.					
ASTM or ANSI product specification	ASTM C1071; Type I ASTM C 665					
Corrosiveness	ASTM C665; Does not accelerate corrosion on steel					
Corrosion	ASTM C1617; Pass					
Water Vapor Sorption (by weight)	ASTM C1104; Less than 3%					
Mold Growth	ASTM C1338, UL 2824, ASTM G21, ASTM G22; Pass					
Surface burning characteristics (flame spread/smoke developed)	ASTM E84, UL 723, NFPA 90A and 90B (IB), CAN/ULC S102 (IB); 25/50					
Major system boundary e	xclusions					
<ul> <li>Capital goods and infrasequipment;</li> </ul>	structure; maintenance of operation and support					
<ul> <li>Manufacture &amp; transport product;</li> </ul>	t of packaging materials not associated with final					
Human labor and employee transport;						
<ul> <li>Building operational energy product.</li> </ul>	ergy and water use not associated with final					
Major assumptions and li	mitations					

B1-B7

0

0

0

0.0%

0.0%

0.0%

0

0

5.89E-06

1.52E-04

7.49E-07

0.0%

0.1%

0.0%

1.87E-03

2.34E-03

1.79E-02

Wall and Ceiling Liner produced in Shelbyville, IN: LCIA results, resource use, output and waste flows, and carbon emissions &

Α4

2.91E-02

6.50E-17

1.49E-04

1.28E-05

5.13E-03

7.31E-06

0.1%

0.1%

0.8%

5.46E-02

1.61E-02

-1.33E-12

4.13E-01

A1-A3

2.80E+00

5.85E-12

9.09E-03

1.27E-03

1.01E-01

5.22E-04

98.3%

97.9%

98.3%

5.97E+00

9.12E+00

8.84E-06

5.50E+01

kg CO, eq

kg SO<sub>g</sub> eq

kg N eq

kg O<sub>3</sub> eq

CTUh

**CTUh CTUe** 

MJ surplus

MJ, LHV

MJ, LHV

MJ, LHV

kg PM<sub>2.5</sub> eq

kg CFC-11 eq

1.44E-02 0 0 1.56E-02 0 2.03E-02 2.88E+00 5.73E-17 0 3.48E-17 0 0 9.98E-16 5.85E-12 0 0 3.06E-05 4.26E-05 0 1.08E-04 9.42E-03

4.52E-06

9.73E-04

1.83E-06

0.1%

0.1%

0.4%

2.92E-02

• Due to the nature of fiberglass insulation, it is anticipated that it will last for the lifetime of the building, so the reference service life (RSL) is considered to be the same as the building estimated service life (ESL) of 75 years.

Generic data sets used for material inputs, transport, and waste processing are considered good quality, but actual impacts from material suppliers,

The impact assessment methodology categories do not represent all

Characterization factors used within the impact assessment methodology

category endpoints, the exceeding of thresholds, safety margins or risks.

C4

4.72E-06

1.96E-03

8.31E-06

1.5%

1.8%

0.4%

4.09E-02

3.25E-01

1.30E-03

1.10E-01

5.40E-04

100%

100%

100%

6.09E+00

9.18E+00

5.60E+01

2.26E-07

2.32E-01

0.00E+00

0.00E+00

0.00E+00

3.78E-01

4.92E+01

0.00E+00

1.05E+00

2.53E-06

2.37E-03

0.00E+00

6.27E-02

0.00E+00

0.00E+00

2.82E-01

1.46E-01

2.49E-02

2.58E-03

8.67E-04

0.00E+00

0.00E+00

0.00E+00

Total

3.43E+00

1.30E-11

8.02E-03

2.45E-03

1.18E-01

4.48E-04

100%

100%

100%

6.58E+00

1.27E+01

1.99E-05

6.29E+01

3.36E-07

2.50E-01

**C3** 

0

0

0

0.0%

0.0%

0.0%

0

0

0

LCA results are relative expressions and do not predict impacts on

transport carriers, and local waste processing may vary.

possible environmental impact categories.

may contain varying levels of uncertainty.

0

0

0

0.0%

0.0%

0.0%

0

0

0

0

0

0

0

0.0%

0.0%

0.0%

0

0

0

0

0

0

3.73E-17

4.57E-05

4.84E-06

1.04E-03

1.96E-06

0.0%

0.0%

0.3%

3.13E-02

9.21E-03

-7.62E-13

2.36E-01

9.42E-10

0.00E+00

0

0

0

0

0

0.0%

0.0%

0.0%

0

0

0

0

0

0

1.07E-15

1.15E-04

5.06E-06

2.10E-03

8.90E-06

0.8%

1.0%

0.3%

4.38E-02

4.08E-02

8.12E-12

3.48E-01

8.68E-10

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

2.97E-02

6.46E-04

1.00E-03

0.00E+00

0.00E+00

0.00E+00

0 0 8.59E-03 3.80E-02 0 0 0 5.08E-13 -7.11E-13 7.58E-12 8.84E-06

2.21E-01

Non-renewable primary resources 0 0 0 MJ, LHV 2.22E-07 1.64E-09 8.79E-10 8.10E-10 with energy content used as 4.74E-11 material 2.32E-01 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 Secondary materials kg 0 Renewable secondary fuels MJ, LHV 0.00E+00 0.00E+00 0.00E+00 0 0.00E+00 0 0.00E+00 0.00E+00 0 Non-renewable secondary fuels MJ, LHV 0.00E+00 0.00E+00 0 0.00E+00 0 0.00E+00 0.00E+00 0 0.00E+00 0.00E+00 0 0.00E+00 0 0.00E+00 Recovered energy MJ, LHV  $m^3$ 0 0 0 Use of net fresh water resources 3.78E-01 5.58E-05 1.33E-05 2.99E-05 4.03E-05 Abiotic depletion potential, fossil MJ, LHV 4.83E+01 4.10E-01 1.60E-02 0 0 2.19E-01 0 3.15E-01 Output flows and waste category indicators 0 0 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0 0.00E+00 Hazardous waste disposed kg Non-hazardous waste disposed 1.37E-01 0.00E+00 4.82E-02 0 0 0.00E+00 0 8.69E-01 kg 0 1.20E-09 8.00E-10 6.42E-10 0 4.02E-09 High-level radioactive waste kg 2.52E-06 0 Intermediate- and low-level 0 radioactive waste, conditioned, to 2.37E-03 1.01E-06 6.73E-07 0 5.42E-07 0 3.59E-06 kg final repository 0 0 Components for re-use kg 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0 0.00E+00 Materials for recycling kg 0.00E+00 0.00E+00 6.27E-02 0 0 0.00E+00 0 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 Materials for energy recovery kg Exported energy MJ, LHV 0.00E+00 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 Carbon emissions and removals Biogenic carbon removal from kg CO 2.82E-01 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 product Biogenic carbon emission from 0.00E+00 0.00E+00 0 0 0.00E+00 0 1.44E-01 1.67E-03 kg CO product Biogenic carbon removal from 0.00E+00 kg CO 2.49E-02 0.00E+00 0.00E+00 0 0 0 0.00E+00 packaging Biogenic carbon emission from 0 0 0 kg CO, 0.00E+00 0.00E+00 2.58E-03 0.00E+00 0.00E+00 packaging Biogenic carbon emission from 0.00E+00 0 0 0.00E+00 0 0.00E+00 kg CO 0.00E+00 8.67E-04 combustion of waste Calcination carbon emissions kg CO 0.00E+00 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 Carbonation carbon removals kg CO<sub>2</sub> Carbon emissions from combustion of waste from renewable sources used in production processes 0.00E+00 0.00E+00 0.00E+00 0 0 0.00E+00 0 0.00E+00 kg CO, Carbon emissions from combustion of waste from non renewable sources used in production processes Atmosphere™ Duct Liner produced in Shelbyville, IN: LCIA results, resource use, output and waste flows, and carbon emissions & removals per functional unit A1-A3 Α4 Unit C4 **Parameter** B1-B7 **LCIA** results 0 1.67E-02 Global warming kg CO, eq 3.34E+00 3.15E-02 1.22E-02 0 0 2.17E-02

Renewable secondary fuels	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Non-renewable secondary fuels	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Recovered energy	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Use of net fresh water resources	m³	8.32E-01	6.03E-05	2.23E-05	0	0	3.20E-05	0	4.32E-05	8.32E-01
Abiotic depletion potential, fossil	MJ, LHV	5.32E+01	4.43E-01	2.34E-02	0	0	2.35E-01	0	3.37E-01	5.42E+01
Output flows and waste category inc	dicators									
Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1.48E-01	0.00E+00	6.11E-02	0	0	0.00E+00	0	9.39E-01	1.15E+00
High-level radioactive waste	kg	3.13E-06	1.30E-09	1.51E-09	0	0	6.89E-10	0	4.31E-09	3.14E-06
Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	3.01E-03	1.09E-06	1.27E-06	0	0	5.80E-07	0	3.85E-06	3.01E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	5.67E-02	0	0	0.00E+00	0	0.00E+00	5.67E-02
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Exported energy	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbon emissions and removals										
Biogenic carbon removal from product	kg CO <sub>2</sub>	5.28E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	5.28E-01
Biogenic carbon emission from product	kg CO <sub>2</sub>	2.17E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	1.79E-03	2.19E-01
Biogenic carbon removal from	ka CO	2.97F-02	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00F+00	2.97E-02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

2.97E-02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

6.46E-04

1.00E-03

0.00E+00

0.00E+00

0.00E+00

0

0

0

0

0

0

0

0

0

0

0

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0

0

0

0

0

0



**MATERIAL HEALTH** 

Self-declared"

Material

evaluation

This environmental product declaration (EPD) was externally verified by Harmony Environmental, LLC, according to ISO 21930:2017; **UL Part A; UL Part B for Building Envelope Thermal Insulation** Products; and ISO 14025:2006. **Harmony Environmental, LLC** 16362 W. Briarwood Ct. Olathe, KS 66062 (913) 780-3328

SM Transparency Report (EPD)™ + Material Health Overview™

**Reference PCR** 

**SUMMARY** 

2023

**Public LCA:** 

Regions; system boundaries North America; Cradle-to-grave Functional unit / ESL:

1 m<sup>2</sup> installed insulation material, packaging included, with thickness LCA for Experts v10.7; LCA for Experts Contact us

Knauf Insulation, Inc.

Shelbyville, IN 46176

One Knauf Drive

317 398 4434

Harmony Environmental, LLC Management • Analysis • Communication
Beyond Sustainability, Striving for Harmony

© 2023 | The SM Transparency Report [EPD]™ Program is operated by Sustainable Minds® (www.sustainableminds.com) | Privacy policy

that gives average thermal resistance of  $R_{si} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1 LCA software; LCI database

In accordance with ISO 14044 and the

reference PCR, this life cycle assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC.

SM Transparency Catalog ► Knauf Insulation Showroom ► Wall and Ceiling Liner & Atmosphere™ Duct Liner

## LCA & material health results & interpretation

Wall and Ceiling Liner & Atmosphere™ Duct Liner

Wall and Ceiling Liner

Material health

### **Evaluation programs**

#### The Health Product Declaration®

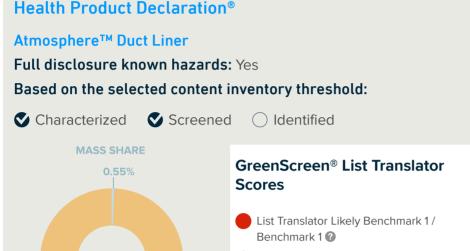
The HPD Open Standard provides a consistent, and transparent format to accurately disclose the material contents and associated hazard classifications for a building product.

### How it works

Material ingredients are screened and categorized according to the hazards that international governmental bodies and toxicology experts have associated with them, based on two listings:

- Authoritative lists maintained or recognized by government bodies
- Screening lists, which include chemicals that government bodies determined need further scrutiny, as well as chemical lists not recognized by any government body.

## Assessment scope and results



List Translator Possible Benchmark 1 ?? 📗 List Translator Benchmark Unknown 🕜 Benchmark 2 🕜 Benchmark 3 🕜 Benchmark 4 🕜 🌑 No GS data available 🕜

Total VOC Content®

VOC Content data is not applicable for this product category.

## What's in this product and why

Atmosphere™ Duct Liner utilize a bio-based binder chemistry derived from corn that is formaldehyde-free and more interior friendly than phenolformaldehyde (P/F) systems. This product transformed the industry, moving away from P/F systems and toward bio-based binder adhesive systems for these types of products. Atmosphere Duct Liner was the first of its type to be designated as bio-based and formaldehyde-free. Today, our competitors have followed this benchmark.

Knauf led the industry in bio-based development to avoid phenol and formaldehyde in our processes beginning in 2008. This development was likely the largest green chemistry disruption of our era. Today, our competitors have followed or are striving to meet this benchmark.

The primary ingredient in this product is recycled glass. While recycled content may vary from year to year, the recycled content is currently greater than 60% by weight. The second largest content is silica sand which is sourced as locally as possible. The third largest ingredient is corn-based syrup (dextrose or fructose). As a result of using plant-based binders, the VOC profile of this product is very interior friendly.

The emission from our factories is also much better for our communities. We ensure our glass formulations have no serious health concerns by allowing our processes to be audited to meet European Certification Board for Mineral Wool Products (EUCEB) biosolubility requirements.

At this time, the product is landfilled at end of life. We take extended producer responsibility very seriously and have active programs to address end of life. There is no option other than landfills at this time.

## How we're making it healthier

Knauf engages very closely with its vendors to eliminate and avoid chemicals of concern. No competitor has as many Red List free products as Knauf Insulation. We continually reduce our environmental impacts through recycled content and optimize our products by designing them to be transformative.

See how we make it greener

## References

**Health Product Declaration®** 

**Atmosphere Duct Liner** 

## **Health Product Declaration Open Standard v2.2**

The standard provides guidance to accurately disclose the material contents of a building product using a standard, consistent, and transparent format.

Learn about the GreenScreen® List Translator

## Rating systems

### LEED BD+C: New Construction | v4 - LEED v4 Building product disclosure and optimization Material Ingredients

Material ingredients					
Credit value options		1 product each			
1. Reporting	2. Optimization	3. Supply Chain Optimization			

## LEED BD+C: New Construction | v4.1 - LEED v4.1

Materials and resources

**Material Ingredients** 

Livina Buildin	a Challanga			
<b>✓</b> 1. Reporting	2. Optimization	3. Supply Chain Optimization		
Credit value options		1 product each		

### Living Building Challenge Materials petals imperatives

10. Red List Free 12. Responsible Industry 13. Living Economy Sourcing

### WELL Building Standard® Air and Mind Features

**X07** Materials Transparency

**X08** Materials Optimization

## Collaborative for High Performance Schools National

Criteria **EQ C7.1 Material Health Disclosures** 

Performance Approach 2 points

✓ Prescriptive Approach

2 points

## SM Transparency Report (EPD)™ + Material Health Overview™



Self-declared"

This environmental product declaration (EPD) was externally verified by Harmony Environmental, LLC, according to ISO 21930:2017: **UL Part A; UL Part B for Building Envelope Thermal Insulation** Products; and ISO 14025:2006.

**Harmony Environmental, LLC** 16362 W. Briarwood Ct. Olathe, KS 66062

(913) 780-3328

© 2023 | The SM Transparency Report [EPD]™ Program is operated by Sustainable Minds® (www.sustainableminds.com) | Privacy policy

Harmony Environmental, LLC Beyond Sustainability, Striving for Harmony

## **SUMMARY**

Reference PCR

Regions; system boundaries North America; Cradle-to-grave

Functional unit / ESL:

1 m<sup>2</sup> installed insulation material, packaging included, with thickness that gives average thermal resistance of  $R_{si} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years

LCIA methodology: TRACI 2.1

LCA software; LCI database LCA for Experts v10.7; LCA for Experts 2023

In accordance with ISO 14044 and the reference PCR, this life cycle assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC.

Public LCA:

Knauf Insulation, Inc. One Knauf Drive Shelbyville, IN 46176 317 398 4434

Contact us

## How we make it greener

Collapse all

RAW MATERIALS ACQUISITION



## **Utilize recycled content**

By leveraging recycled content, we reduce the energy required to form glass fibers.

We use about 10 railcars of recycled glass per day.

SM Transparency Catalog ▶ Knauf Insulation Showroom ▶ Wall and Ceiling Liner & Atmosphere™ Duct Liner





**3** HOW WE MAKE IT GREENER

MANUFACTURING.

#### Following the launch of our ECOSE® Technology in 2008, we had transformed most of our products and processes to this new

**Lead green chemistry efforts** 

technology. Using our bio-based ECOSE® Technology has removed phenol and formaldehyde from our stack emissions. This initiative not only established Knauf Insulation North America in a leadership position, but it had a transformative impact on our industry in general.



Reduce scrap generation and energy consumption

the entire Knauf team in our manufacturing excellence and

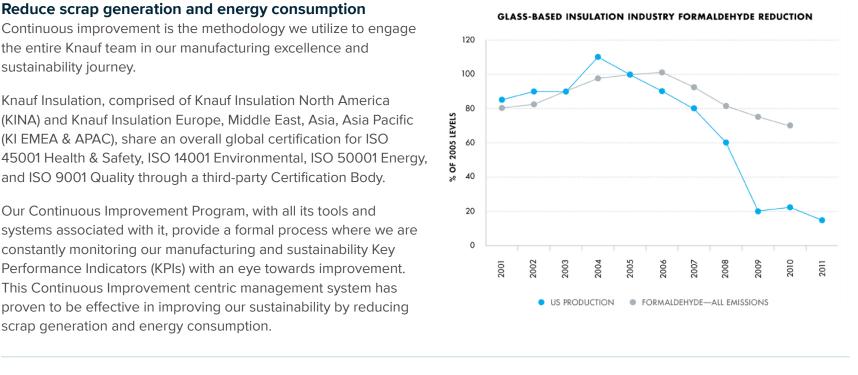
sustainability journey. Knauf Insulation, comprised of Knauf Insulation North America (KINA) and Knauf Insulation Europe, Middle East, Asia, Asia Pacific

(KI EMEA & APAC), share an overall global certification for ISO

Continuous improvement is the methodology we utilize to engage

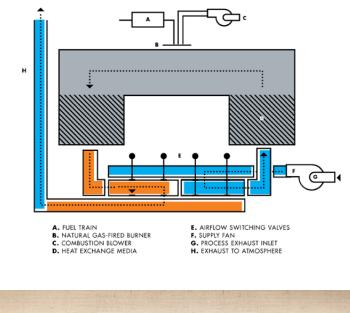
and ISO 9001 Quality through a third-party Certification Body. Our Continuous Improvement Program, with all its tools and systems associated with it, provide a formal process where we are constantly monitoring our manufacturing and sustainability Key Performance Indicators (KPIs) with an eye towards improvement.

This Continuous Improvement centric management system has proven to be effective in improving our sustainability by reducing scrap generation and energy consumption. **Green manufacturing Processes** Regenerative thermal oxidizers We use regenerative thermal

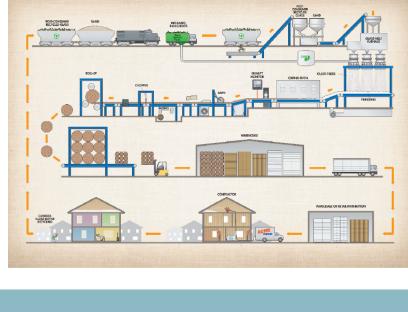


to cure our products. RTO is equipment used for the treatment of exhaust air. Our ovens exhaust into a ceramic heat exchange media to capture and reuse the heat in the exhausted air. Therefore, the amount of energy required to cure our product is reduced substantially.

oxidizers (RTO) to capture and recycle much of the energy we use



REGENERATIVE THERMAL OXIDIZER AIRFLOW DIAGRAM



**TRANSPORTATION** 



### compression packaging. We compress our insulation to fit up to five times more product on every truck, thereby reducing the amount of deliveries that need to be made, which saves time and emissions

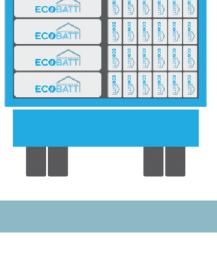
Leverage compression packaging

from transportation.

Glass is a high modulus material, which helps to facilitate



WE COMPRESS OUR



ECOBATT

ECOBATT

## In the past, a label regarding the carcinogenic potential of insulation made from glass fibers was required on all packaging.

INSTALLATION AND MAINTENANCE



### Following forty years of research, fiberglass has been exonerated entirely. Our fiberglass is comprised of fibers that are biosoluble, meaning that the fibers dissolve in the body in a short period of

and 41% pre-consumer recycled glass.

**Green building rating systems** 

Green Building Standard, and more.

by UL Environment.

Be confident in glass fiber's safety

time and exit the body with normal bodily functions. The scrutiny fiberglass has undergone is now seen as proof of its safety. Meet and exceed green standards **GREENGUARD certified** On the forefront of indoor air quality, Knauf Insulation North America had the first GREENGUARD certified

product in 2002. This achievement led us to understand the impact

environment. The formaldehyde-free claim is third party validated

3rd Party UL Environmental Claim Validation states that Knauf

Insulation products manufactured in North America contain an average of 61% recycled content, consisting of 20% post-consumer

our formaldehyde-free products could have on the indoor

Our products offer a vast array of potential credits for major green

Visit the green building rating systems page to see all the credits

building rating systems, including: WELL, LEED v4, International

Green Construction Code, Green Guide for Heath Care, NAHB

you can earn using Manson and Knauf Insulation products

biosoluble and pose no health concerns. Having over 35 years of research behind its safety, fiberglass products have been thoroughly evaluated and therefore we believe it is one of the safest building materials available today.

**EUCEB tested** Glass fiber is a widely studied building material.

All of our processes and formulations are voluntarily third-party

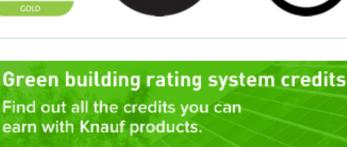
audited for compliance with the health and safety exoneration

criteria for glass and rock based fiber through the European Certification Board for Mineral Wool Products (EUCEB)

exoneration process. This guarantees the formulations are



Learn more







**DISPOSAL** 

**Promote Recycling** By taking a comprehensive approach of the benefits of recycling, Knauf Insulation North America advocates and promotes local recycling initiatives as well as actively participates in state and local government policy development. In addition, as a member of the North American Insulation Manufacturers Association (NAIMA) and

Glass Recycling Coalition (GRC), we encourage regulatory and legislative initiatives that focus on glass recycling infrastructure deployment to increase the availability of post-consumer recycled

glass.



# SM Transparency Report (EPD)™ + Material Health Overview™

**LCA** 

**EPD** 

3rd-party verified

3rd-party verified

**MATERIAL HEALTH** 

Validity: 12/12/23 - 12/12/28 KNA - 12122023 - 004

Self-declared"

declaration (EPD) was externally verified by Harmony Environmental, Transparency Report (EPD) LLC, according to ISO 21930:2017; UL Part A; UL Part B for Building **Envelope Thermal Insulation** Products; and ISO 14025:2006.

Harmony Environmental, LLC 16362 W. Briarwood Ct. Material Olathe, KS 66062 evaluation

(913) 780-3328

This environmental product

- Harmony Environmental, LLC Management • Analysis • Communication ond Sustainability, Striving for Harmony

Knauf Insulation, Inc.

Shelbyville, IN 46176 317 398 4434

Contact us

One Knauf Drive

## Regions; system boundaries North America; Cradle-to-grave

Functional unit / ESL: 1 m<sup>2</sup> installed insulation material, packaging included, with thickness

**SUMMARY** 

**Reference PCR** 

that gives average thermal resistance of  $R_{SI} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1

LCA software; LCI database LCA for Experts v10.7; LCA for Experts

2023 In accordance with ISO 14044 and the reference PCR, this life cycle assessment was conducted by

Sustainable Minds and verified by Harmony Environmental, LLC.

**Public LCA:** 

© 2023 | The SM Transparency Report [EPD]™ Program is operated by Sustainable Minds® (www.sustainableminds.com) | Privacy policy