Sustainable Minds

Transparency Report (EPD)



SM Transparency Catalog ► Knauf Insulation Showroom ► Earthwool® Insulation Board



Earthwool® Insulation Board

Unfaced, ASJ+, FSK

Knauf Insulation Earthwool® Insulation Board is a versatile product for thermal and acoustical applications such as heating and air conditioning ducts, power and process equipment, boiler and stack installation, and more. It is bonded with ECOSE® Technology and is available plain or with a factory applied foil-scrim-kraft (FSK) facing or all service jacket (ASJ+) facing.



Performance dashboard





Features & functionality

Excellent thermal efficiency results in lower operating costs

FSK and ASJ+ vapor-retardant facings provide a neat finished appearance in mechanical

Low emitting and formaldehyde-free for indoor air quality considerations

Excellent acoustical properties effectively reduce noise

Visit Knauf for more product information

Earthwool® Insulation Board unfaced Earthwool® Insulation Board FSK-faced Earthwool® Insulation Board ASJ+-faced

MasterFormat® 07 21 13 Earthwool® Insulation Board Guide Spec, **Technical Data Sheet**

For spec help, contact us or call 317 421 8727

Environment & materials

Improved by:

Utilization of recycled glass

Knauf's original bio-based ECOSE® Technology binder technology

Certification & rating systems:

HPD v2.2 (Unfaced), v2.3 (ASJ+ and FSK)

UL GREENGUARD Gold certified

UL Validated recycled content

UL Validated formaldehyde-free

Audited, European Certification Board for Mineral Wool Products exoneration process

ASTM C612: Type IA (1.6, 2.25, 3.0, 4.25, 6.0 pcf), Type IB (3.0, 4.25, 6.0 pcf); ASTM C795; ASTM C1136: Type I, II, III, IV, VIII (ASJ+), Type II, IV (FSK)

See LCA, interpretation & rating systems

See materials, interpretation & rating systems











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

3rd-party verified

Transparency Report (EPD)

LCA

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

3rd-party verified

KNA - 12122023 - 008 Material

MATERIAL HEALTH evaluation

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

UL Part B: Building Envelope Thermal Insulation v2.0

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

Functional unit / ESL:

1 m² installed insulation material, packaging included, with thickness that gives average thermal resistance of R_{si} = 1m²·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 North America and Manson Insulation Products

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

Contact us

KNAUFINSULATION

LCA results & interpretation

Sustainable Minds

Transparency Report (EPD)

Earthwool® Insulation Board

2 LCA & MATERIAL RESULTS & INTERPRETATION

 HOW WE MAKE IT GREENER

Scope and summary

Unfaced

PERFORMANCE DASHBOARD

O Cradle to gate O Cradle to gate with options V Cradle to grave

Application

conditioning ducts, power and process equipment, boiler and stack

Versatile product for thermal and acoustical applications such as: heating & air

installations, metal and masonry walls, wall and roof panel systems, curtain wall assemblies, and cavity walls. **Functional unit**

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

thickness that gives an average thermal resistance of R_a = 1m²·K/W with a building service life of 75 years. Reference service life: 75 years when Installed per manufacturer's Instructions

Manufacturing data Reporting period: January 2022 - December 2022

A thickness of 0.0330m achieves the functional unit. (ASTM C518)

PART

Packaging

Packaging

5.00E-02

4.00E-02

3.00E-02

Location: Shelbyville, IN

Default installation, packaging, and disposal scenarios At the installation site, insulation products are unpackaged and installed. Staples may be used to install board products. The potential impact of the

assumed to be transported 100 miles for disposal.

Material composition greater than 1% by weight

Reference flow: 2.04 kg of unfaced product.

staples is assumed to be negligible since their use is spread out over hundreds of sheets of product; 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

Batch Cullet 30-35% **Batch** 5-8% Sand **Batch Borates** 2-5% Soda ash **Batch** 2-5% 1-2% Limestone 1-2% Batch <1% Batch Oxides 15-20% Binder Water Binder Sugars 10-15% Binder Additives 2-5%

MATERIAL

Plastic

Cardboard

2.00E-02

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

LIFE CYCLE STAGE

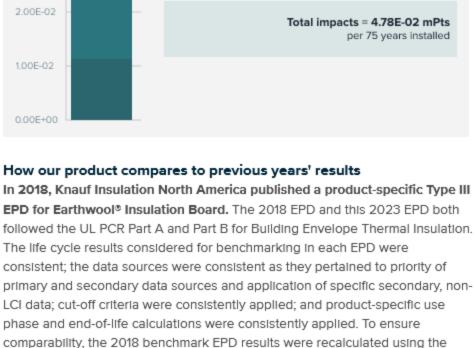
Manufacturing

Transportation

Raw material acquisition

Installation and maintenance

Disposal/reuse/recycling



most recent LCA software version and most recently updated LCI data sets, then used for benchmarking with the 2023 updated EPD. The updated unfaced

2018 total results from cradle to grave were as follows: global warming

5.09E+00 kg CO2-eq, ozone depletion potential 3.52E-10 kg CFC-11 eq, fossil

fuel depletion 6.74E+00 MJ surplus, and eutrophication 1.13E-03 kg N eq. Earthwool® Insulation Board results from 2023 show improvements across the global warming potential and ozone depletion potential impact categories. The next highest performing impact category was fossil fuel depletion, which showed only a 1% increase in impacts. The impact reductions for GWP and ODP primarily stem from A3. Differences in manufacturing activities contribute significantly when comparing the 2023 results to the 2018 results and identifying the contributors to performance improvement. The lowest performing impact category compared (higher impact results than in 2018) was eutrophication. The biggest contributors to eutrophication are the sugars in the binder and the water used in the fiberizing step during manufacturing. More water was consumed in this step as compared to previous years.

RAW MATERIAL

ACQUISITION

Transportation

(X) A1 Raw

materials

(X) A2

All life cycle stages The manufacturing stage dominates all impact categories except ozone depletion, where the raw material acquisition stage takes precedence. The

What's causing the greatest impacts

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 most impact categories, but ozone depletion potential is almost entirely

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

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

generated from this stage. The raw materials acquisition stage impact is

contribute to the respiratory effects category, they can lead to higher impact

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

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

Embodied carbon

IN is 3.41E+00 kg CO2-eq.

that this report is valued at 1.5 products.

Total impacts: 2018 to 2023 comparison

are assumed to be landfilled at the end of life rather than incinerated or

Embodied carbon can be defined as the cradle-to-gate (A1-A3) global

%WT.

<1%

15-20%

MPTS/FUNC. UNIT

1.18E-02

3.30E-02

1.11E-03

4.87E-04

1.31E-03

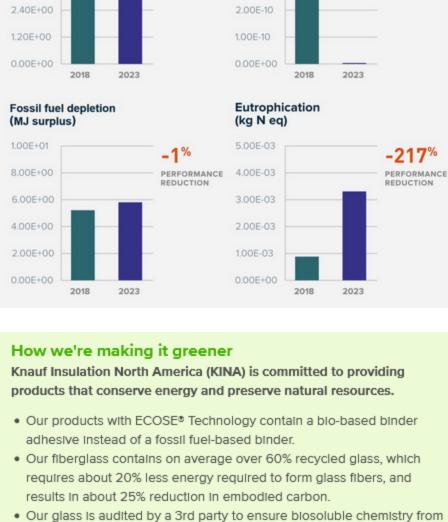
About 2018 results The 2018 Transparency Report for Earthwool® Insulation Board serves as a benchmark to which the 2023 results can be compared. One Impact category was used for comparison to satisfy the LEED LCA optimization credit: global warming potential. Its reduction alone can contribute towards

satisfying credits under LEED. The reduction in this impact category reflects

warming potential impacts. The total embodied carbon per functional unit of

unfaced Earthwool® Insulation Board Insulation manufactured in Shelbyville,

Highest and lowest performing impact categories Ozone depletion potential Global warming (kg CO₂ eq) (kg CFC-11 eq) 6.00E+00 5.00E-10 +99% +29% 4.80E+00 PERFORMANCE IMPROVEMENT 4.00E-10 PERFORMANCE IMPROVEMENT 3.60E+00 3.00E-10



AND

INSTALLATION

MAINTENANCE

(X) A5 Installation

(X) B2 Maintenance

(X) B4 Replacement

(X) B1 Use

(X) B3 Repair

Refurbishment

energy use

7.74E-02

1.27E-16

1.65E-04

2.70E-05

9.74E-04

3.88E-06

0.1%

0.3%

0.1%

The intent is to reward project teams for selecting products from

LEED RD+C: Now Construction Lv4 LEED v4

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

Third-party certified type III EPD

Materials and resources

Industry-average EPD

LCA Optimization

Criteria

manufacturers who have verified improved life-cycle environmental

Collaborative for High Performance Schools National

MW C5.1 - Environmental Product Declarations

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

6.32E-02

1.82E-15

2.65E-04

1.63E-05

5.18E-03

1.79E-05

2.2%

5.1%

0.6%

1.24E-01

1 product

1.5 product

1.5 products

2 point

.5 point

.75 points

1 point

(X) B6 Operational

(X) B7 Operational

(X) B5

DISPOSAL/ REUSE/

RECYCLING

Deconstruction

Transportation

(X) C4 Disposal

(X) C3 Waste

processing

(X) C1

(X) C2

a health and safety standpoint.

TRANSPORTATION

(X) A4 Distribution

See how we make it greener

Information modules: Included (X) | Excluded (MND)*

Global warming

Ozone depletion

Acidification

Eutrophication

Impact category

Respiratory effects

Impact category

Non-carcinogenics

Carcinogenics

References

LCA Background Report

North America (KINA) 2018.

upon request)

life cycle stages declared.

3rd-party verified

3rd-party verified

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

KNA - 12122023 - 008

MATERIAL HEALTH

Self-declared

Transparency Report (EPD)

Ecotoxicity

Human health damage

kg CO₂ eq

kg SO₂ eq

kg N eq

Unit

Additional environmental information

Unit

CTU,

CTU,

CTU

kg O₅ eq

kg PM_{2.5} eq

kg CFC-11 eq

2.11E-01

2.31E-12

2.62E-03

1.74E-03

2.76E-02

1.90E-04

7.7%

12.6%

23.7%

0

0

0

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.

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

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

2018 Transparency Report for Earthwool® Insulation Board, Knauf Insulation

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

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that

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

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

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

Download PDF SM Transparency Report / EPD

*Module D is also excluded from this

system boundary (MND).

LCA results

LIFE CYCLE STAGE

				water use	
SM Single Score Learn about SM Single	e Score results				
Impacts per 1 square meter of insulation material	1.18E-02 mPts	3.30E-02 mPts	1.11E-03 mPts	4.87E-04 mPts	1.31E-03 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 fibers.	Truck and rail transportation used to transport product to building site.	Transportation to landfill and landfilling of packaging materials.	Transportation to landfill and landfilling of product at end of life.
RACI v2.1 results per functional	unit (unfaced Ear	thwool® Insulatio	on Board - Shelby	ville, IN)	
LIFE CYCLE STAGE	RAW MATERIAL ACQUISITION	MANUFACTURING	TRANSPORTATION	INSTALLATION AND MAINTENANCE	DISPOSAL/ REUSE/ RECYCLING
Ecological damage					
Impact category Unit					

3.20E+00

4.32E-13

6.16E-03

1.77E-03

1.19E-01

3.67E-04

89.8%

81.7%

74.9%

5.98E-02

1.33E-16

3.07E-04

2.63E-05

1.05E-02

1.50E-05

0.2%

0.4%

0.7%

Rating systems

performance.

MANUFACTURING

Manufacturing

(X) A3

Fossil fuel depletion MJ surplus 1.16E+00 5.38E+00 1.12E-01 1.14E-02

ISO 14025, "Sustainability in buildings and civil engineering works Core rules for environmental product declarations of construction products and services"	Building product disclosure and optimization Environmental product declarations
ISO 21930:2017 serves as the core PCR along with UL Part A.	○ Industry-wide (generic) EPD ½product
UL Part A: Life Cycle Assessment Calculation Rules and Report	✓ Product-specific Type III EPD 1 product
Requirements v4.0	
March, 2022. PCR review conducted by Lindita Bushi, PhD, Chair (Athena	LEED BD+C: New Construction v4.1 - LEED v4.1
Sustainable Materials Institute), lindita.bushi@athenasmi.org; Hugues Imbeault-	Building product disclosure and optimization
Tétreault (Group AGECO); and Jack Geibig (Ecoform).	

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 Green Globes for New Construction and Sustainable comparable. Comparison of the environmental performance of products using EPD information Interiors 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

LCA

 Multi-product specific EPD Product-specific EPD

BREEAM New Construction 2018

Environmental Product Declarations (EPD)

Shelbyville, IN 46176

317 398 4434 Contact us

erview™	
JMMARY	Knauf Insulation, In
ference PCR	One Knauf Drive

Material evaluation (913) 780-3328

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

SM Transparency Report (EPD)™ + Material Health Ove

This environmental product

declaration (EPD) was externally

UL Part A; UL Part B for Building

Products; and ISO 14025:2006.

Envelope Thermal Insulation

Harmony Environmental, LLC

16362 W. Briarwood Ct.

verified by Harmony Environmental,

LLC, according to ISO 21930:2017;

UL Part B: Building Envelope Thermal Regions; system boundaries North America; Cradle-to-grave

packaging included, with thickness that gives average thermal resistance

Olathe, KS 66062

THARMONY Environmental, LLC d Sustainability, Striving for Harmony

of R_{si} = 1m⁴·K/W over an estimated

LCIA methodology: TRACI 2.1 LCA software; LCI database LCA for Experts v10.7; LCA for Experts 2023 reference PCR, this life cycle

SU

Ref

service life (ESL) of 75 years

Functional unit / ESL:

1 m² installed insulation material,

In accordance with ISO 14044 and the assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC. Public LCA: Knauf Insulation North America and

KNAUFINSULATION

LCA results & interpretation

Earthwool® Insulation Board

2 LCA & MATERIAL RESULTS & INTERPRETATION

 HOW WE MAKE IT GREENER

FSK faced

Sustainable Minds

Transparency Report (EPD)

Scope and summary

Application

Cradle to gate Cradle to gate with options Cradle to grave

Versatile product for thermal and acoustical applications such as: heating & air

conditioning ducts, power and process equipment, boiler and stack

installations, metal and masonry walls, wall and roof panel systems, curtain wall assemblies, and cavity walls. **Functional unit** One square meter of installed insulation material, packaging included, with a

thickness that gives an average thermal resistance of R_a = 1m²·K/W with a building service life of 75 years.

Reference service life: 75 years when Installed per manufacturer's Instructions

Manufacturing data Reporting period: January 2022 - December 2022

Reference flow: 2.19 kg of product with foil skrim kraft (FSK) facer.

A thickness of 0.0330m achieves the functional unit. (ASTM C518)

Location: Shelbyville, IN

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

Binder

Facer

3.60E-02

Packaging

Packaging

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

assumed to be transported 100 miles for disposal.

No material is assumed to be lost or wasted. Scraps are typically used to fill

Material composition greater than 1% by weight

of sheets of product; therefore, they were not included in the model.

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

PART MATERIAL %WT. **Batch** Cullet 30-35% **Batch** 5-8% Sand **Batch Borates** 2-5% Soda ash **Batch** 2-5% 1-2% Limestone 1-2% Batch <1% Batch Oxides Binder Water 15-20% Binder Sugars 10-15%

Additives

FSK facer

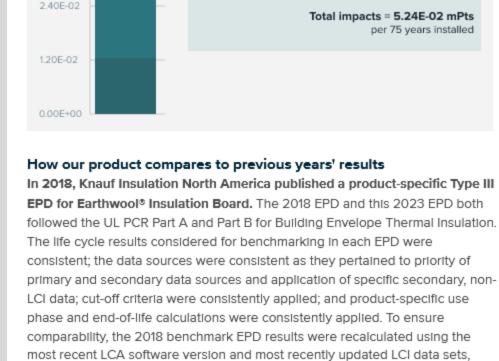
Cardboard

Plastic

Total impacts b	y life cycle stages [mPts/per func	unit]
6.00E-02	LIFE CYCLE STAGE	MPTS/FUNC. UNIT
	 Raw material acquisition 	1.22E-02
4.80E-02	Manufacturing	3.71E-02
	Transportation	1.19E-03

Installation and maintenance

Disposal/reuse/recycling



then used for benchmarking with the 2023 updated EPD. The updated FSK-

faced 2018 total results from cradle to grave were as follows: global warming

Earthwool® Insulation Board results from 2023 show improvements across

which showed only a 14% increase in impacts. The impact reductions for GWP

categories. The next highest performing impact category was acidification,

The lowest performing impact category compared (higher impact results

and ODP primarily stem from A3. Differences in manufacturing activities contribute significantly when comparing the 2023 results to the 2018 results

and identifying the contributors to performance improvement.

5.48E+00 kg CO₂-eq, ozone depletion potential 2.49E-09 kg CFC-11 eq,

acidification 9.11E-03 kg SO₂-eq, and eutrophication 1.24E-03 kg N eq.

the global warming potential and ozone depletion potential impact

than in 2018) was eutrophication. The biggest contributors to eutrophication are the sugars in the binder and the water used in the fiberizing step during manufacturing. More water was consumed in this step as compared to previous LCA results RAW MATERIAL LIFE CYCLE STAGE MANUFACTURING ACQUISITION

(X) A1 Raw

Transportation

materials

(X) A2

(X) A3

Manufacturing

All life cycle stages The manufacturing stage dominates all impact categories except ozone depletion, where the raw material acquisition stage takes precedence. The

What's causing the greatest impacts

energy required to melt the glass and produce the glass fibers is the largest

PERFORMANCE DASHBOARD

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 most impact categories, but ozone depletion potential is almost entirely

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 contribute to the respiratory effects category, they can lead to higher impact

results in the raw materials acquisition stage. However, since sand and borax

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

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

Embodied carbon

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

are assumed to be landfilled at the end of life rather than incinerated or

Embodied carbon can be defined as the cradle-to-gate (A1-A3) global

2-5%

8-10%

15-20%

5.23E-04

1.40E-03

<1%

IN is 4.60E+00 kg CO2-eq. About 2018 results The 2018 Transparency Report for Earthwool® Insulation Board serves as a benchmark to which the 2023 results can be compared. One Impact category was used for comparison to satisfy the LEED LCA optimization

credit: global warming potential. Its reduction alone can contribute towards

satisfying credits under LEED. The reduction in this impact category reflects

warming potential impacts. The total embodied carbon per functional unit of

FSK-faced Earthwool® Insulation Board Insulation manufactured in Shelbyville,

that this report is valued at 1.5 products.

Total impacts: 2018 to 2023 comparison Highest and lowest performing impact categories Ozone depletion potential Global warming (kg CO2 eq) (kg CFC-11 eq) 6.00E+00 3.00E-09 +99% +12% 4.80E+00 PERFORMANCE IMPROVEMENT 2.40E-09 PERFORMANCE



INSTALLATION

MAINTENANCE

(X) A5 Installation

(X) B2 Maintenance

(X) B4 Replacement

(X) B1 Use

(X) B3 Repair

Refurbishment

energy use

water use

8.31E-02

1.36E-16

1.77E-04

2.90E-05

1.05E-03

4.17E-06

0.1%

0.3%

0.1%

The intent is to reward project teams for selecting products from

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

Collaborative for High Performance Schools National

Green Globes for New Construction and Sustainable

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

Building product disclosure and optimization

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

manufacturers who have verified improved life-cycle environmental

1.23E-02

6.79E-02

1.96E-15

2.85E-04

1.75E-05

5.56E-03

1.92E-05

2.2%

5.2%

0.6%

1.33E-01

1 product

1.5 product

1.5 products

2 point

.5 point

.75 points

1 point

(X) B6 Operational

(X) B7 Operational

(X) B5

DISPOSAL/ REUSE/

RECYCLING

Deconstruction

Transportation (X) C3 Waste

(X) C4 Disposal

processing

(X) C1

(X) C2

a health and safety standpoint.

TRANSPORTATION

(X) A4 Distribution

See how we make it greener

Information modules: Included (X) | Excluded (MND)*

Impact category

Global warming

Ozone depletion

Acidification

Eutrophication

Impact category

Respiratory effects

Impact category

Carcinogenics

References

LCA Background Report

Requirements v4.0

North America (KINA) 2018.

upon request)

life cycle stages declared.

3rd-party verified

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

KNA - 12122023 - 008

Smog

Human health damage

Unit

kg CO₂ eq

kg SO₂ eq

kg N eq

Unit

Additional environmental information

Unit

CTU,

Knauf Insulation North America and Manson Insulation Products LCA

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

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

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

2018 Transparency Report for Earthwool® Insulation Board, Knauf Insulation

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

shall be based on the product's use and impacts at the building level, and therefore EPDs may not

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

be used for comperability 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

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

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

kg O₅ eq

kg PM_{2.5} eq

kg CFC-11 eq

*Module D is also excluded from this

system boundary (MND).

					A
SM Single Score Learn about SM Single	e Score results				
Impacts per 1 square meter of insulation material	1.22E-02 mPts	3.71E-02 mPts	1.19E-03 mPts	5.23E-04 mPts	1.40E-03 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 fibers.	Truck and rail transportation used to transport product to building site.	Transportation to landfill and landfilling of packaging materials.	Transportation to landfill and landfilling of product at end of life.
TRACI v2.1 results per functional unit (FSK-faced Earthwool® Insulation Board - Shelbyville, IN)					
LIFE CYCLE STAGE	RAW MATERIAL ACQUISITION	MANUFACTURING	TRANSPORTATION	INSTALLATION AND MAINTENANCE	DISPOSAL/ REUSE/ RECYCLING
Ecological damage					

4.38E+00

6.89E-03

1.67E-03

1.36E-01

3.66E-04

90.0%

1.05E-11

6.42E-02

1.43E-16

3.29E-04

2.82E-05

1.13E-02

1.61E-05

0.2%

Rating systems

Non-carcinogenics CTU 12.4% 81.8% 0.4% **Ecotoxicity** 22.6% 76.0% 0.7% Fossil fuel depletion MJ surplus 1.20E+00 8.87E+00 1.20E-01

2.18E-01

2.39E-12

2.71E-03

1.80E-03

2.86E-02

1.97E-04

7.5%

2023; developed using the TRACI v2.1 and CML impact assessment	performance.	
methodologies, and LCA for Experts modeling software.	LEED BD+C: New Construction v4 - LEED v4	
ISO 14025, "Sustainability in buildings and civil engineering works Core	Building product disclosure and optimization	
rules for environmental product declarations of construction products and services"	Environmental product declarations	
ISO 21930:2017 serves as the core PCR along with UL Part A.	○ Industry-wide (generic) EPD ½product	
UL Part A: Life Cycle Assessment Calculation Rules and Report	✔ Product-specific Type III EPD 1 product	

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

Download PDF SM Transparency Report / EPD

Criteria MW C5.1 - Environmental Product Declarations Third-party certified type III EPD.

Materials and resources

Interiors

LCA Optimization

Environmental Product Declarations (EPD) Industry-average EPD

BREEAM New Construction 2018

One Knauf Drive

Multi-product specific EPD Product-specific EPD

)verview™	
SUMMARY	Knauf Insulation, Inc.

UL Part B: Building Envelope Thermal Shelbyville, IN 46176 317 398 4434 Regions; system boundaries North America; Cradle-to-grave Contact us

SM Transparency Report (EPD)™ + Material Health Ove

LCA This environmental product 3rd-party verified declaration (EPD) was externally verified by Harmony Environmental, Transparency Report (EPD) LLC, according to ISO 21930:2017;

(913) 780-3328

UL Part A; UL Part B for Building

Products; and ISO 14025:2006.

Envelope Thermal Insulation

Harmony Environmental, LLC

16362 W. Briarwood Ct.

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

Functional unit / ESL:

Reference PCR

1 m² installed insulation material, packaging included, with thickness that gives average thermal resistance of R_{si} = 1m⁴·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

Harmony Environmental, LLC. Public LCA:

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

Material Olathe, KS 66062 evaluation MATERIAL HEALTH Self-declared Harmony Environmental, LLC yond Sustainability, Striving for Harmony

KNAUFINSULATION

LCA results & interpretation

Sustainable Minds

Transparency Report (EPD)

Earthwool® Insulation Board

2 LCA & MATERIAL RESULTS & INTERPRETATION

 HOW WE MAKE IT GREENER

ASJ+ faced

PERFORMANCE DASHBOARD

Scope and summary

Application

conditioning ducts, power and process equipment, boiler and stack

Cradle to gate Cradle to gate with options Cradle to grave

Versatile product for thermal and acoustical applications such as: heating & air

installations, metal and masonry walls, wall and roof panel systems, curtain wall assemblies, and cavity walls. **Functional unit**

One square meter of installed insulation material, packaging included, with a thickness that gives an average thermal resistance of R_s = 1m²-K/W with a building service life of 75 years.

Reference service life: 75 years when Installed per manufacturer's Instructions

Reference flow: 2.30 kg of product with all-service jacket (ASJ+) facer.

Manufacturing data Reporting period: January 2022 - December 2022

A thickness of 0.0330m achieves the functional unit. (ASTM C518)

Location: Shelbyville, IN

Default installation, packaging, and disposal scenarios

PART

Facer

6.00E-02

4.80E-02

LCA results

Information modules:

Impact category

Global warming

Ozone depletion

Acidification

Eutrophication

Impact category

Respiratory effects

Carcinogenics

Ecotoxicity

services"

Requirements v4.0

Non-carcinogenics

Fossil fuel depletion

Smog

Human health damage

Unit

kg CO₂ eq

kg SO₂ eq

kg N eq

Unit

CTU,

CTU

MJ surplus

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

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

UL Part A: Life Cycle Assessment Calculation Rules and Report

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

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

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

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

kg O₅ eq

kg PM_{2.5} eq

kg CFC-11 eq

Included (X) | Excluded (MND)*

*Module D is also excluded from this

Packaging

Packaging

At the installation site, insulation products are unpackaged and installed. Staples may be used to install board products. The potential impact of the staples is assumed to be negligible since their use is spread out over hundreds

assumed to be transported 100 miles for disposal.

Material composition greater than 1% by weight

of sheets of product; 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

Batch Cullet 25-30% **Batch** 2-5% Sand Batch **Borates** 2-5% Soda ash **Batch** 2-5% 1-2% Limestone 1-2% Batch <1% Batch Oxides Binder Water 15-20% Binder Sugars 8-10% Additives 2-5% Binder ASJ+ facer 10-15%

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

LIFE CYCLE STAGE

Manufacturing

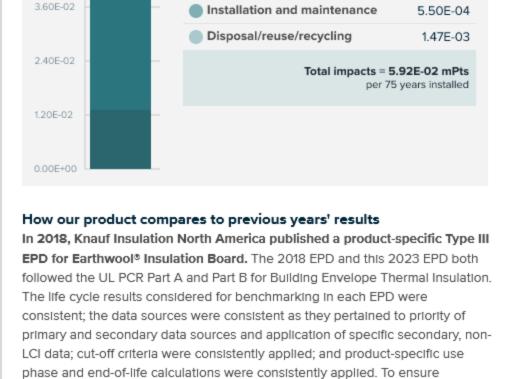
Transportation

Raw material acquisition

MATERIAL

Plastic

Cardboard



Earthwool® Insulation Board results from 2023 show improvements across the global warming potential and ozone depletion potential impact categories. The next highest performing impact category was acidification, which showed only a 22% increase in impacts. The impact reductions for GWP and ODP primarily stem from A3. Differences in manufacturing activities contribute significantly when comparing the 2023 results to the 2018 results and identifying the contributors to performance improvement. The lowest performing impact category compared (higher impact results

than in 2018) was eutrophication. The biggest contributors to eutrophication are the sugars in the binder and the water used in the fiberizing step during manufacturing. More water was consumed in this step as compared to previous

comparability, the 2018 benchmark EPD results were recalculated using the

most recent LCA software version and most recently updated LCI data sets, then used for benchmarking with the 2023 updated EPD. The updated ASJ+

faced 2018 total results from cradle to grave were as follows: global warming

5.76E+00 kg CO₂-eq, ozone depletion potential 2.88E-09 kg CFC-11 eq,

acidification 9.66E-03 kg SO₂-eq, and eutrophication 1.30E-03 kg N eq.

RAW MATERIAL LIFE CYCLE STAGE MANUFACTURING ACQUISITION (X) A1 Raw (X) A3 materials Manufacturing

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

What's causing the greatest impacts

energy required to melt the glass and produce the glass fibers is the largest

All life cycle stages

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 most impact categories, but ozone depletion potential is almost entirely

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

contribute to the respiratory effects category, they can lead to higher impact

results in the raw materials acquisition stage. However, since sand and borax

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

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

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

%WT.

<1%

15-20%

MPTS/FUNC. UNIT

1.32E-02

4.28E-02

1.25E-03

reuse/recycling.

are assumed to be landfilled at the end of life rather than incinerated or

Embodied carbon Embodied carbon can be defined as the cradle-to-gate (A1-A3) global

ASJ+ faced Earthwool® Insulation Board Insulation manufactured in Shelbyville, IN is 5.08E+00 kg CO₂-eg. About 2018 results The 2018 Transparency Report for Earthwool® Insulation Board serves as a benchmark to which the 2023 results can be compared. One Impact

category was used for comparison to satisfy the LEED LCA optimization credit: global warming potential. Its reduction alone can contribute towards

satisfying credits under LEED. The reduction in this impact category reflects

warming potential impacts. The total embodied carbon per functional unit of

that this report is valued at 1 product.

Total impacts: 2018 to 2023 comparison Highest and lowest performing impact categories Ozone depletion potential Global warming (kg CO2 eq) (kg CFC-11 eq) 7.50E+00 5.00E-09 +8% +53% 6.00E+00 PERFORMANCE 4.00E-09 PERFORMANCE IMPROVEMENT IMPROVEMENT



INSTALLATION

MAINTENANCE

(X) A5 Installation

(X) B2 Maintenance

(X) B4 Replacement

(X) B1 Use

(X) B3 Repair

Refurbishment

(X) B5

8.74E-02

1.43E-16

1.86E-04

3.05E-05

1.10E-03

4.38E-06

0.1%

0.3%

0.1%

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

Green Globes for New Construction and Sustainable

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

Building product disclosure and optimization

Building product disclosure and optimization

Environmental product declarations

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

Industry-wide (generic) EPD

Product-specific Type III EPD

1.29E-02

7.14E-02

2.06E-15

2.99E-04

1.84E-05

5.85E-03

2.02E-05

2.1%

5.0%

0.6%

1.40E-01

½product

1 product

1 product

1.5 product

1 product

2 point

.5 point

.75 points

1 point

DISPOSAL/ REUSE/

RECYCLING

Deconstruction

Transportation (X) C3 Waste

(X) C4 Disposal

processing

(X) C1

(X) C2

a health and safety standpoint.

TRANSPORTATION

(X) A4 Distribution

See how we make it greener

(X) A2 Transportation

system boundary (MND).				(X) B6 Operational energy use	
				(X) B7 Operational water use	
iM Single Score Learn about SM Single	e Score results				
Impacts per 1 square meter of insulation material	1.32E-02 mPts	4.28E-02 mPts	1.25E-03 mPts	5.50E-04 mPts	1.47E-03 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 landfilling of	Transportation to landfill and landfilling of produc
to total impacts in each life cycle stage	production.	fibers.	to building site.	packaging materials.	at end of life.
			_		
RACI v2.1 results per functional			_		

4.85E+00

1.35E-09

8.01E-03

1.84E-03

1.53E-01

4.37E-04

90.1%

82.3%

76.3%

9.79E+00

6.75E-02

1.51E-16

3.46E-04

2.97E-05

1.19E-02

1.69E-05

0.2%

0.4%

0.7%

1.27E-01

Additional environmental information Impact category Unit

2.34E-01

2.57E-12

2.91E-03

1.94E-03

3.07E-02

2.12E-04

7.4%

12.1%

22.4%

1.29E+00

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

2018 Transparency Report for Earthwool® Insulation Board, Knauf Insulation North America (KINA) 2018. UL Environment General Program Instructions v2.4, July 2018 (available

upon request)

3rd-party verified

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

KNA - 12122023 - 008

MATERIAL HEALTH

Self-declared

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 comperability 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

Collaborative for High Performance Schools National Criteria MW C5.1 - Environmental Product Declarations

LCA Optimization

BREEAM New Construction 2018 Mat 02 - Environmental impacts from construction products

Product-specific EPD

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

17 398 4434	
Contact us	

Shelbyville, IN 46176

Download PDF SM Transparency Report / EPD Third-party certified type III 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

Interiors Materials and resources

Industry-average EPD

Multi-product specific EPD

Environmental Product Declarations (EPD)

SUMMARY Knauf Insulation, Inc. Reference PCR One Knauf Drive

Functional unit / ESL: 1 m² installed insulation material, packaging included, with thickness

that gives average thermal resistance of R_{si} = 1m^{*}·K/W over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1

UL Part B: Building Envelope Thermal

Regions; system boundaries

North America; Cradle-to-grave

LCA This environmental product 3rd-party verified declaration (EPD) was externally verified by Harmony Environmental, Transparency Report (EPD) LLC, according to ISO 21930:2017;

Material

evaluation

Harmony Environmental, LLC 16362 W. Briarwood Ct. Olathe, KS 66062 (913) 780-3328 Harmony Environmental, LLC

UL Part A; UL Part B for Building

Products; and ISO 14025:2006.

Envelope Thermal Insulation

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

yond Sustainability, Striving for Harmony

reference PCR, this life cycle assessment was conducted by Sustainable Minds and verified by

2023

LCA software; LCI database LCA for Experts v10.7; LCA for Experts In accordance with ISO 14044 and the

Harmony Environmental, LLC. Public LCA:

EPD additional content

EPD additional content

Scenarios and additional technical information VALUE PARAMETER

Average distance from

manufacturing to installation

Assumptions for scenario

development

site

ASTM or ANSI product

specification

Data

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

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

collecting production data from the Shelbyville, IN production location.

Secondary data sources include those available in LCA for Experts 2023

KNAUFINSULATION

SM Transparency Catalog ► Knauf Insulation Showroom ► Earthwool® Insulation Board

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

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

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

environmental declarations. Other categories are being developed and defined

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

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

scrap

Fiber

forming

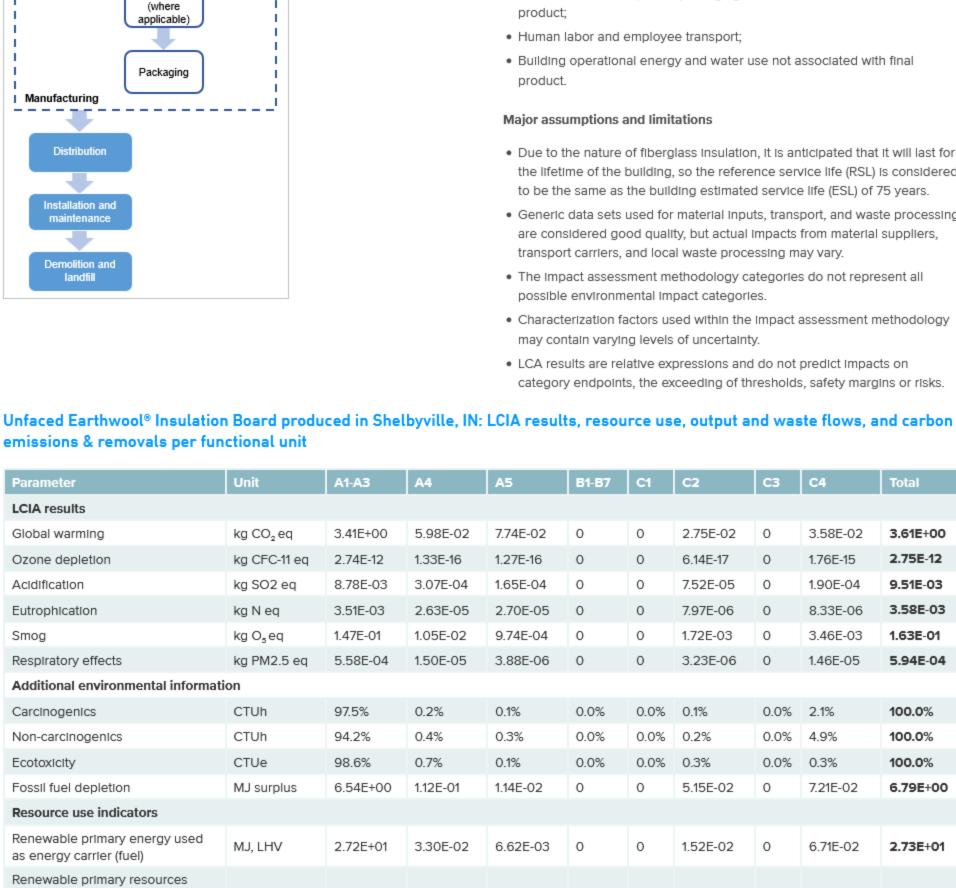
Curing

Cooling & trimming

Facing

Binder

results.



with energy content used as

resources used as an energy

resources with energy content

Renewable secondary fuels

Non-renewable secondary fuels

Non-renewable primary

Non-renewable primary

carrier (fuel)

used as material

Secondary materials

Recovered energy

Use of net fresh water

Hazardous waste disposed

High-level radioactive waste

renewable sources used in production processes

Parameter

LCIA results

Acidification

Smog

Eutrophication

Carcinogenics

Ecotoxicity

material

Respiratory effects

Non-carcinogenics

Fossil fuel depletion

Resource use indicators

as energy carrier (fuel)

Non-renewable primary

Non-carcinogenics

Fossil fuel depletion

Resource use indicators

as energy carrier (fuel)

Non-renewable primary

Renewable primary energy used

Renewable primary resources with energy content used as

resources used as an energy

Ecotoxicity

material

carrier (fuel)

Renewable primary energy used

Renewable primary resources

with energy content used as

Additional environmental information

Global warming

Ozone depletion

carbon emissions & removals per functional unit

Unit

kg CO₂ eq

kg CFC-11 eq

kg SO2 eq

kg N eq

kg O₅eq

CTUh

CTUh

CTUe

MJ surplus

MJ, LHV

MJ, LHV

kg PM2.5 eq

A1-A3

4.60E+00

1.29E-11

9.59E-03

3.47E-03

1.64E-01

5.63E-04

97.4%

94.1%

98.6%

1.01E+01

2.13E+01

1.90E-07

Non-hazardous waste disposed

A1-A3

3.41E+00

2.74E-12

8.78E-03

3.51E-03

1.47E-01

5.58E-04

97.5%

94.2%

98.6%

6.54E+00

2.72E+01

1.11E-07

7.38E+01

7.22E-07

5.87E-01

0.00E+00

0.00E+00

0.00E+00

1.41E+00

0.00E+00

2.69E-01

5.24E-06

MJ, LHV

MJ, LHV

MJ, LHV

MJ, LHV

MJ, LHV

MJ, LHV

m³

kg

kg

kg

kg

5.98E-02

1.33E-16

3.07E-04

2.63E-05

1.05E-02

1.50E-05

0.2%

0.4%

0.7%

1.12E-01

3.30E-02

-2.73E-12

8.47E-01

3.37E-09

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.15E-04

0.00E+00

0.00E+00

2.47E-09

7.74E-02

1.27E-16

1.65E-04

2.70E-05

9.74E-04

3.88E-06

1.14E-02

6.62E-03

8.39E-13

9.13E-02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

6.95E-05

0.00E+00

6.77E-02

1.26E-09

Transport to the building site [A4] Vehicle type Truck and trailer Fuel type Diesel

161

site					
Capacity utilization	27	%			
Gross density	48.1	kg/m ⁸			
Capacity utilization volume factor	1	-			
Installation into the building [[A5]				
Mass of plastic packaging waste	0.00543	kg			
Biogenic carbon content of packaging	0.451	kg CO ₂			
End of life [C1-C4]					
Assumptions for scanario	Following manual removal of the insulation, it was assumed to be transported 100 miles				

Earthwool® Insulation Board

UNIT

km

to disposal. The PCR prescribes that 100%

of the insulation is sent to landfill, where no

for each roll of the product are 1.5" - 2"

 ASTM C612: Type IA (1.6, 2.25, 3.0, 4.25, 6.0 pcf), Type IB (3.0, 4.25, 6.0 pcf)

· ASTM C1136: Type I, II, III, IV, VIII (ASJ+),

thick, 24" in width, and 48" in length.

	prior waste processing is required.				
Collection process	Collected with mixed construction waste	Unfaced: 1.75 kg FSK: 1.90 kg ASJ+: 2.01 kg			
Disposal	Product for final deposition in landfill	Unfaced: 1.75 kg FSK: 1.90 kg ASJ+: 2.01 kg			
Technical properties					

		_				
Disposal	Product for final deposition in landfill	Unfaced: 1.75 kg FSK: 1.90 kg ASJ+: 2.01 kg				
Technical properties						
Dimensions/quantities delivered to installation	Earthwool® Insulation Board is sold in sheets. One carton contains eight piece wrapped in stretch wrap. The dimension					

ASTM C795

Type II, IV (FSK)

Corrosion	ASTM C1617; Pass						
Puncture Resistance	TAPPI Test T803, Beach Units FSK facing: 25, ASJ+ facing: 120						
Water vapor sorption (by weight)	ASTM C1104; Less than 5%						
Shrinkage ASTM C356; Less than 0.3%							
Mold growth	ASTM C1338; Pass						
Surface burning characteristics (flame spread/smoke developed)	ASTM E84, UL 723, CAN/ULC S102, NFPA 90A and 90B; UL/ULC Classified FHC 25/50						
Major system boundary exclusions Capital goods and Infrastructure; maintenance of operation and support equipment;							
 Manufacture & transport of packaging materials not associated with final product; 							
 Human labor and employee 	transport;						
 Building operational energy and water use not associated with final product. 							
Major assumptions and limitations							
 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

LCA results are relative expressions and do not predict impacts on

2.75E-02

6.14E-17

7.52E-05

7.97E-06

1.72E-03

3.23E-06

5.15E-02

1.52E-02

-1.25E-12

3.89E-01

0.00E+00

0.00E+00

0.00E+00

5.27E-05

0.00E+00

0.00E+00

1.13E-09

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

3.58E-02

1.76E-15

1.90E-04

8.33E-06

3.46E-03

1.46E-05

7.21E-02

6.71E-02

1.34E-11

5.73E-01

0.00E+00

0.00E+00

0.00E+00

0.00E+00

7.10E-05

0.00E+00

1.71E+00

7.09E-09

3.61E+00

2.75E-12

9.51E-03

3.58E-03

1.63E-01

5.94E-04

6.79E+00

2.73E+01

1.11E-07

7.57E+01

0.00E+00

0.00E+00

0.00E+00

1.41E+00

0.00E+00

2.05E+00

5.25E-06

Total

4.82E+00

1.29E-11

1.04E-02

3.55E-03

1.82E-01

6.03E-04

100.0%

100.0%

100.0%

1.03E+01

2.14E+01

1.90E-07

Characterization factors used within the impact assessment methodology

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

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

0

0

0

0

0

0

- 0.1% 0.0% 0.0% 0.1% 0.0% 2.1% 100.0% 0.3% 0.0% 0.0% 0.2% 0.0% 4.9% 100.0% 0.1% 0.0% 0.0% 0.3% 0.0% 0.3% 100.0%
- 3.09E-10 0 0 1.55E-09 0 1.43E-09 7.29E-07 5.87E-01 0 0.00E+00

resources Abiotic depletion potential, 3.87E-01 5.55E-01 MJ, LHV 5.93E+01 8.41E-01 8.83E-02 0 0 0 6.11E+01 fossil Output flows and waste category indicators

Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	5.07E-03	2.08E-06	1.07E-06	0	0	9.55E-07	0	6.34E-06	5.08E-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	2.39E-01	0	0	0.00E+00	0	0.00E+00	2.39E-01
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 ₂	8.51E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	8.51E-01
Biogenic carbon emission from product	kg CO ₂	3.54E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	2.94E-03	3.57E-01
Biogenic carbon removal from packaging	kg CO ₂	6.06E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	6.06E-01
Biogenic carbon emission from packaging	kg CO ₂	0.00E+00	0.00E+00	1.37E-02	0	0	0.00E+00	0	0.00E+00	1.37E-02
Biogenic carbon emission from combustion of waste	kg CO ₂	0.00E+00	0.00E+00	2.18E-02	0	0	0.00E+00	0	0.00E+00	2.18E-02
Calcination carbon emissions	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbonation carbon removals	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbon emissions from combustion of waste from non renewable sources used in production processes + Carbon emissions from combustion of waste from	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00

FSK-faced Earthwool® Insulation Board produced in Shelbyville, IN: LCIA results, resource use, output and waste flows, and

6.42E-02

1.43E-16

3.29E-04

2.82E-05

1.13E-02

1.61E-05

0.2%

0.4%

0.7%

1.20E-01

3.54E-02

-2.93E-12

8.31E-02

1.36E-16

1.77E-04

2.90E-05

1.05E-03

4.17E-06

0.1%

0.3%

0.1%

1.23E-02

7.11E-03

9.01E-13

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

0

0

2.95E-02

6.59E-17

8.07E-05

8.55E-06

1.84E-03

3.46E-06

0.1%

0.2%

0.3%

5.53E-02

1.63E-02

-1.35E-12

0

0

0

0

0

0

0.0%

0.0%

0.0%

0

0

0

3.84E-02

1.89E-15

2.04E-04

8.94E-06

3.72E-03

1.57E-05

2.1%

5.0%

0.3%

7.74E-02

7.20E-02

1.43E-11

resources used as an energy carrier (fuel)	MJ, LHV	1.01E+02	9.09E-01	9.81E-02	0	0	4.18E-01	0	6.15E-01	1.03E+02
Non-renewable primary resources with energy content used as material	MJ, LHV	5.84E-07	3.62E-09	3.32E-10	0	0	1.66E-09	0	1.53E-09	5.91E-07
Secondary materials	kg	6.30E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	6.30E-01
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	m ³	1.46E+00	1.23E-04	7.47E-05	0	0	5.65E-05	0	7.62E-05	1.46E+00
Abiotic depletion potential, fossil	MJ, LHV	8.50E+01	9.03E-01	9.48E-02	0	0	4.15E-01	0	5.96E-01	8.70E+01
Output flows and waste category i	ndicators									
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	2.89E-01	0.00E+00	7.27E-02	0	0	0.00E+00	0	1.84E+00	2.20E+00
High-level radioactive waste	kg	5.79E-06	2.65E-09	1.35E-09	0	0	1.22E-09	0	7.61E-09	5.80E-06
Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	5.51E-03	2.23E-06	1.15E-06	0	0	1.03E-06	0	6.81E-06	5.52E-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	2.57E-01	0	0	0.00E+00	0	0.00E+00	2.57E-01
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 ₂	8.80E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	8.80E-01
Biogenic carbon emission from product	kg CO ₂	3.66E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	3.16E-03	3.69E-01
Biogenic carbon removal from packaging	kg CO ₂	1.25E-02	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	1.25E-02
Biogenic carbon emission from packaging	kg CO ₂	0.00E+00	0.00E+00	1.47E-02	0	0	0.00E+00	0	0.00E+00	1.47E-02
Biogenic carbon emission from combustion of waste	kg CO ₂	0.00E+00	0.00E+00	2.34E-02	0	0	0.00E+00	0	0.00E+00	2.34E-02
Calcination carbon emissions	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbonation carbon removals	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbon emissions from combustion of waste from non renewable sources used in production processes + Carbon emissions from combustion of waste from renewable sources used in production processes	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
ASJ+ faced Earthwool® Insula arbon emissions & removals			helbyville,	IN: LCIA re	sults, re	source	use, outpu	it and i	waste flows	s, and
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	Total
LCIA results										
Global warming	kg CO₂ eq	5.08E+00	6.75E-02	8.74E-02	0	0	3.10E-02	0	4.04E-02	5.31E+00
Ozone depletion	kg CFC-11 eq	1.36E-09	1.51E-16	1.43E-16	0	0	6.93E-17	0	1.99E-15	1.36E-09
Acidification	kg SO2 eq	1.09E-02	3.46E-04	1.86E-04	0	0	8.49E-05	0	2.14E-04	1.18E-02
Eutrophication	kg N eq	3.78E-03	2.97E-05	3.05E-05	0	0	8.99E-06	0	9.40E-06	3.86E-03
Smog	kg O₅eq	1.84E-01	1.19E-02	1.10E-03	0	0	1.94E-03	0	3.91E-03	2.03E-01
Respiratory effects	kg PM2.5 eq	6.48E-04	1.69E-05	4.38E-06	0	0	3.64E-06	0	1.65E-05	6.90E-04
Additional environmental informat										
Carcinogenics	CTUh	97.5%	0.2%	0.1%	0.0%	0.0%	0.1%	0.0%	2.0%	100.0%

94.4%

98.7%

1.11E+01

2.40E+01

1.03E-05

1.11E+02

0.4%

0.7%

1.27E-01

3.72E-02

-3.08E-12

9.56E-01

0.3%

0.1%

1.29E-02

7.48E-03

9.47E-13

1.03E-01

0.0%

0.0%

0

0

0

0

0.0%

0.0%

0

0

0

0

0.2%

0.3%

5.82E-02

1.71E-02

-1.42E-12

4.39E-01

0.0%

0.0%

0

0

0

0

4.8%

0.3%

8.14E-02

7.58E-02

1.51E-11

6.47E-01

100.0%

100.0%

1.14E+01

2.41E+01

1.03E-05

1.13E+02

CTUh

CTUe

MJ surplus

MJ, LHV

MJ, LHV

MJ, LHV

. ,										
Non-renewable primary resources with energy content used as material	MJ, LHV	6.31E-07	3.81E-09	3.49E-10	0	0	1.75E-09	0	1.61E-09	6.39E-07
Secondary materials	kg	6.62E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	6.62E-01
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	m ³	1.57E+00	1.29E-04	7.85E-05	0	0	5.95E-05	0	8.02E-05	1.57E+00
Ablotic depletion potential, fossil	MJ, LHV	9.36E+01	9.49E-01	9.97E-02	0	0	4.36E-01	0	6.27E-01	9.57E+01
Output flows and waste category i	ndicators									
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	3.04E-01	0.00E+00	7.64E-02	0	0	0.00E+00	0	1.93E+00	2.31E+00
High-level radioactive waste	kg	6.34E-06	2.78E-09	1.42E-09	0	0	1.28E-09	0	8.00E-09	6.35E-06
Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	6.05E-03	2.35E-06	1.21E-06	0	0	1.08E-06	0	7.16E-06	6.06E-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	2.70E-01	0	0	0.00E+00	0	0.00E+00	2.70E-01
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 ₂	9.46E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	9.46E-01
Biogenic carbon emission from product	kg CO ₂	3.93E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	3.32E-03	3.97E-01
Biogenic carbon removal from packaging	kg CO ₂	1.32E-02	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	1.32E-02
Biogenic carbon emission from packaging	kg CO ₂	0.00E+00	0.00E+00	1.54E-02	0	0	0.00E+00	0	0.00E+00	1.54E-02
Biogenic carbon emission from combustion of waste	kg CO ₂	0.00E+00	0.00E+00	2.46E-02	0	0	0.00E+00	0	0.00E+00	2.46E-02
Calcination carbon emissions	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
Carbonation carbon removals	kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00

3rd-party verified Validity: 12/12/23 - 12/12/28 KNA - 12122023 - 008

EPD

3rd-party verified

MATERIAL HEALTH

Self-declared

Transparency Report (EPD)

Carbon emissions from

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

combustion of waste from non renewable sources used in production processes

> Envelope Thermal Insulation Products; and ISO 14025:2006. Harmony Environmental, LLC 16362 W. Briarwood Ct. Olathe, KS 66062

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

This environmental product

(913) 780-3328

declaration (EPD) was externally

UL Part A; UL Part B for Building

verified by Harmony Environmental,

LLC, according to ISO 21930:2017;

0.00E+00

0.00E+00

0.00E+00 0

SUMMARY

Reference PCR

kg CO₂

LCA

Material

evaluation

packaging included, with thickness that gives average thermal resistance of R_{si} = 1m²·K/W over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1 LCA software; LCI database

UL Part B: Building Envelope Thermal Insulation v2.0

Regions; system boundaries

Functional unit / ESL:

North America; Cradle-to-grave

1 m² installed insulation material,

Knauf Insulation, Inc.

Shelbyville, IN 46176

Contact us

One Knauf Drive

317 398 4434

0.00E+00

0.00E+00

d Sustainability, Striving for Harmony

Harmony Environmental, LLC 2023 assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC. Public LCA:

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

0.00E+00

0

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

LCA & material health results & interpretation

Sustainable Minds

Earthwool® Insulation Board

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:

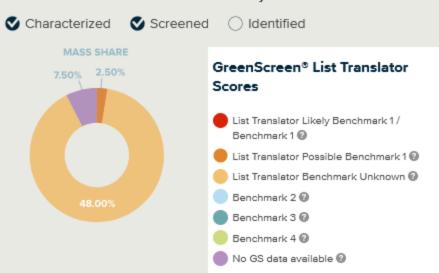
- Authoritative lists maintained or recognized by government bodies
- · Screening lists, which include chemicals that government bodies determined need further scrutiny, as well as chemical lists not recognized by any government body.

Assessment scope and results

Health Product Declaration® Earthwool® Insulation Board Unfaced

Full disclosure known hazards: Yes

Based on the selected content inventory threshold:



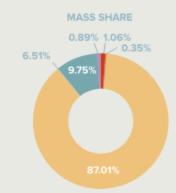
Learn about the GreenScreen® List Translator

Total VOC Content®

VOC Content data is not applicable for this product category.

Earthwool® Insulation Board ASJ+ Full disclosure known hazards: Yes

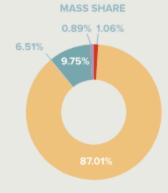
Based on the selected content inventory threshold:



Total VOC Content® VOC Content data is not applicable for this product category.

Earthwool® Insulation Board FSK Full disclosure known hazards: Yes

Based on the selected content inventory threshold:



Total VOC Content® VOC Content data is not applicable for this product category.

What's in this product and why

Earthwool® Insulation Board products without a facer do not contain any chemicals that are on the Red List. The Red List is a list of chemicals that are not allowed in Living Building Challenge buildings. Being Red List free is our design benchmark at Knauf.

Earthwool® utilizes a bio-based binder chemistry derived from corn that is formaldehyde-free (FF) and more interior friendly than phenol-formaldehyde (P/F) systems.

The ingredients of the unfaced variant avoids the 800+ chemicals of the Living Building Challenge Red List. This is primarily because of its bio-based binder adhesive chemistry known as ECOSE® Technology, ECOSE is based on dextrose or high fructose corn syrup instead of phenol and formaldehyde. Dextrose and fructose can be used interchangeably. The ECOSE binder allows the product to be validated by the UL Environment as formaldehydefree. Formaldehyde is a Red List chemical.

The Earthwool® Board ASJ+ and FSK facers do not meet Red List free because the facer contains a halogenated fire retardant (HFR). This is why we disclose the ingredients as an HPD rather than Declare used for all other product variants.

Red List Free is our development benchmark and we constantly challenge

ourselves on elimination of Red List chemicals. An HFR is used on the faced variants because the products are for exposed applications and must meet stringent fire performance requirements. We are very aware of the concerns associated with HFRs and continually work with vendors on this issue. At the same time, fire performance is critical and current events relating to fire performance of building materials only support the importance of fire-safe products.

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® Earthwool® Insulation Board - Unfaced Earthwool® Insulation Board ASJ+

Earthwool® Insulation Board FSK

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

Health Product Declaration Open Standard - all versions

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

Rating systems

Building product disclosure and optimization

Material Ingredients Credit value options

1. Reporting 3. Supply Chain Optimization 2. Optimization

1 product each

1 product each

2 points

3. Supply Chain Optimization

Materials and resources **Material Ingredients**

2. Optimization

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

Credit value options

1. Reporting

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

Prescriptive Approach 2 points

EPD

Self-declared

LCA SUMMARY This environmental product

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



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.

declaration (EPD) was externally

Olathe, KS 66062

Harmony Environmental, LLC

© 2023 I The SM Trensparency Report [EPD]" Program is operated by Sustainable Minds* (www.sustainableminds.com) I Privacy policy

(913) 780-3328

Reference PCR UL Part B: Building Envelope Thermal Insulation v2.0

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

Functional unit / ESL:

1 m² installed insulation material,

packaging included, with thickness that gives average thermal resistance of R_{si} = 1m⁴·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 North America and

Shelbyville, IN 46176 317 398 4434 Contact us

Knauf Insulation, Inc.

One Knauf Drive

SM Transparency Catalog ► Knauf Insulation Showroom ► Earthwool® Insulation Board

Earthwool® Insulation Board

How we make it greener

Expand 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.





MANUFACTURING

Following the launch of our ECOSE® Technology in 2008, we had

Lead green chemistry efforts

transformed most of our products and processes to this new 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.



the entire Knauf team in our manufacturing excellence and sustainability Journey. Knauf Insulation, comprised of Knauf Insulation North America

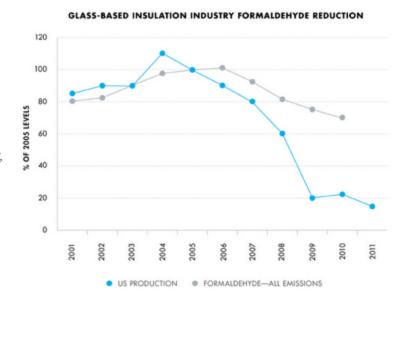
(KINA) and Knauf Insulation Europe, Middle East, Asia, Asia Pacific (KI EMEA & APAC), share an overall global certification for ISO

Continuous improvement is the methodology we utilize to engage

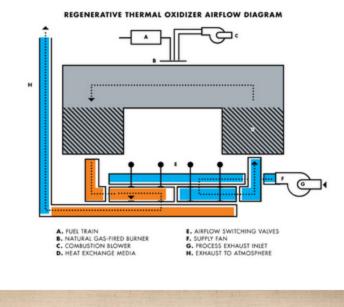
Reduce scrap generation and energy consumption

45001 Health & Safety, ISO 14001 Environmental, ISO 50001 Energy, 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



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





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

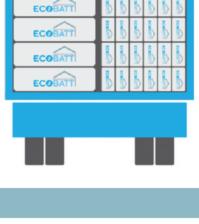
from transportation.

Glass is a high modulus material, which helps to facilitate



WE COMPRESS OUR

INSULATION



ECOBATT

ECOBATT

Be confident in glass fiber's safety 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,

by UL Environment.

meaning that the fibers dissolve in the body in a short period of 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

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

Green Construction Code, Green Guide for Heath Care, NAHB

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

exoneration process. This guarantees the formulations are

Certification Board for Mineral Wool Products (EUCEB)

Visit the green building rating systems page to see all the credits you can earn using Manson and Knauf Insulation products

Green Building Standard, and more.

Green building rating systems

and 41% pre-consumer recycled glass.

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



Green building rating system credits

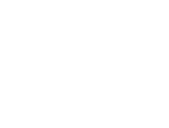
Find out all the credits you can

earn with Knauf products.

EPD

3rd-party verified

DISPOSAL



glass.



COALITION



SM Transparency Report (EPD)™ + Material Health Overview™ LCA SUMMARY This environmental product declaration (EPD) was externally Reference PCR

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.

> (913) 780-3328 Harmony Environmental, LLC

Olathe, KS 66062

nd Sustainability, Striving for Harmony

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

1 m2 installed insulation material, packaging included, with thickness that gives average thermal resistance

Functional unit / ESL:

of R_{si} = 1m²·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

UL Part B: Building Envelope Thermal

Regions; system boundaries

North America; Cradle-to-grave

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

Knauf Insulation North America and Manson Insulation Products

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