Sustainable Minds®

Transparency Report (EPD)



Download PDF



### 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) 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 rooms

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™

**EPD** LCA 3rd-party verified Transparency Report (EPD) 3rd-party verified Validity: 12/12/23 - 12/12/28

KNA - 12122023 - 008 Material **MATERIAL HEALTH** evaluation

Self-declared

Ø

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

| Harmony Environmental, LLC eyond 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

KNAUFINSULATION

Earthwool® Insulation Board

# LCA results & interpretation

Sustainable Minds

Transparency Report (EPD)

Scope and summary

What's causing the greatest impacts

# Cradle to gate Cradle to gate with options Cradle to grave

**Unfaced** 

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

## conditioning ducts, power and process equipment, boiler and stack

assemblies, and cavity walls. **Functional unit** 

installations, metal and masonry walls, wall and roof panel systems, curtain wall

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

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

Reference flow: 2.04 kg of unfaced product.

Reporting period: January 2022 – December 2022 Location: Shelbyville, IN

## Default installation, packaging, and disposal scenarios

**Binder** 

**Binder** 

5.00E-02

4.00E-02

3.00E-02

**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

### 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

Material composition greater than 1% by weight

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 assumed to be transported 100 miles for disposal.

corners or crevices. Plastic packaging waste is disposed (9% to recycling, 68%

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

Sugars

**Plastic** 

**Additives** 

Cardboard



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

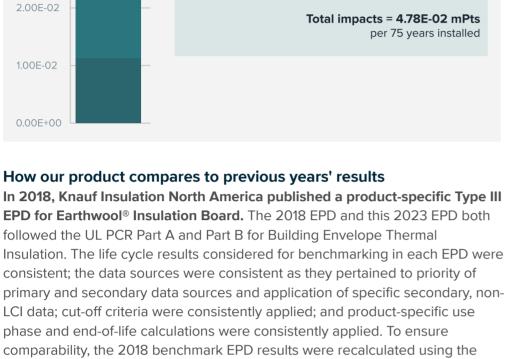
LIFE CYCLE STAGE

Manufacturing

Transportation

Raw material acquisition

Installation and maintenance



most recent LCA software version and most recently updated LCI data sets,

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

the global warming potential and ozone depletion potential impact

categories. The next highest performing impact category was fossil fuel

for GWP and ODP primarily stem from A3. Differences in manufacturing

results and identifying the contributors to performance improvement.

then used for benchmarking with the 2023 updated EPD. The updated unfaced

5.09E+00 kg CO<sub>2</sub>-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

depletion, which showed only a 1% increase in impacts. The impact reductions

activities contribute significantly when comparing the 2023 results to the 2018

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. LCA results RAW MATERIAL **MANUFACTURING** LIFE CYCLE STAGE **ACQUISITION** (X) A3 (X) A1 Raw materials Manufacturing

(X) A2

**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

All life cycle stages

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.

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

**Embodied carbon** 

IN is  $3.41E+00 \text{ kg CO}_2-\text{eq}$ .

reuse/recycling.

#### Embodied carbon can be defined as the cradle-to-gate (A1-A3) global warming potential impacts. The total embodied carbon per functional unit of

10-15%

2-5%

<1%

15-20%

1.18E-02

3.30E-02

1.11E-03

4.87E-04

1.31E-03

MPTS/FUNC. UNIT

**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

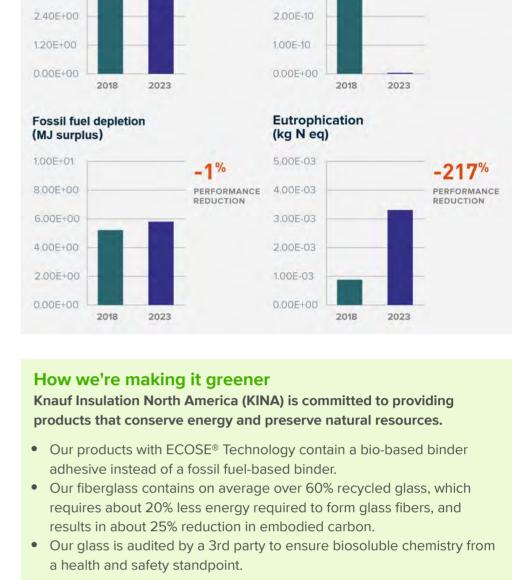
unfaced Earthwool® Insulation Board Insulation manufactured in Shelbyville,

# Highest and lowest performing impact categories

that this report is valued at 1.5 products.

Total impacts: 2018 to 2023 comparison

**Global warming** Ozone depletion potential (kg CO2 eq) (kg CFC-11 eq) 6.00E+00 5.00E-10 +99% 4.80E+00 4.00E-10 PERFORMANCE PERFORMANCE IMPROVEMENT 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

water use

1.27E-16

1.65E-04

2.70E-05

9.74E-04

3.88E-06

0.1%

0.3%

0.1%

1.14E-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

½product

1 product

1 product

1.5 product

1.5 products

2 points

.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

See how we make it greener

**TRANSPORTATION** 

(X) A4 Distribution

### \*Module D is also excluded from this system boundary (MND).

Information modules:

Included (X) | Excluded (MND)\*

SM Single Score Le	earn about SM Sir	ngle Score results				
	square meter of sulation material		3.30E-02 mPts	1.11E-03 mPts	4.87E-04 mPts	1.31E-03 mPts
Materials or processes of to total impacts in each I	_	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 ր	per function	al unit (unfaced Ea	rthwool® Insulation	on Board - Shelby	ville, IN)	
LIFE CYCLE STAGE		RAW MATERIAL ACQUISITION	MANUFACTURING	TRANSPORTATION	INSTALLATION AND MAINTENANCE	DISPOSAL/ REUSE/ RECYCLING
Ecological damage	•					
Impact category U	Init					
Global warming k	g CO₂ eq	2.11E-01	3.20E+00	5.98E-02	7.74E-02	6.32E-02

4.32E-13

6.16E-03

1.77E-03

1.19E-01

3.67E-04

89.8%

81.7%

74.9%

5.38E+00

1.33E-16

3.07E-04

2.63E-05

1.05E-02

1.50E-05

0.2%

0.4%

0.7%

1.12E-01

**Rating systems** 

Industry-wide (generic) EPD

**♥** Product-specific Type III EPD

✓ Product-specific Type III EPD

**Option 2: Multi-attribute optimization** 

Building product disclosure and optimization

**Environmental product declarations** 

Option 1: Industry-wide (generic) EPD

Option 1: Product-specific Type III EPD

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

Green Globes for New Construction and Sustainable

# Fossil fuel depletion **MJ** surplus

ICA Background Penort

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

**MATERIAL HEALTH** 

Self-declared

Ozone depletion

**Acidification** 

Eutrophication

Impact category

**Respiratory effects** 

**Impact category** 

**Non-carcinogenics** 

**Carcinogenics** 

References

**Ecotoxicity** 

**Smog** 

Human health damage

kg CFC-11 eq

kg SO<sub>2</sub> eq

kg N eq

Unit

Additional environmental information

Unit CTU<sub>h</sub>

CTU<sub>h</sub>

CTU<sub>e</sub>

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

**2018 Transparency Report** for Earthwool® Insulation Board, Knauf Insulation

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

comparable. Comparison of the environmental performance of products using EPD information

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

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

kg O₃ eq

kg PM<sub>2.5</sub> eq

2.31E-12

2.62E-03

1.74E-03

2.76E-02

1.90E-04

7.7%

12.6%

23.7%

1.16E+00

0

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 rules for environmental product declarations of construction products and services"	LEED BD+C: New Construction   v4 - LEED v4 Building product disclosure and optimization Environmental product declarations

### 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

**Download PDF** SM Transparency Report / EPD

# Option 2: Embodied carbon / LCA optimization

**Interiors** Materials and resources NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

Industry-average EPD Multi-product specific EPD

**SUMMARY** Reference PCR Functional unit / ESL:

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

Third-party certified type III EPD

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

**Environmental Product Declarations (EPD)** 

Mat 02 - Environmental impacts from construction products

✓ Product-specific EPD

Knauf Insulation, Inc. One Knauf Drive

Contact us

#### Shelbyville, IN 46176 317 398 4434 Regions; system boundaries North America; Cradle-to-grave

packaging included, with thickness that gives average thermal resistance

**LCA** This environmental product 3rd-party verified 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

**V** 

Olathe, KS 66062 Material evaluation (913) 780-3328 Harmony Environmental, LLC Management • Analysis • Communication

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16362 W. Briarwood Ct.

**Envelope Thermal Insulation** 

Harmony Environmental, LLC

Products; and ISO 14025:2006.

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

1 m<sup>2</sup> installed insulation material,

2023

**Public LCA:** 

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 assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC.

Beyond Sustainability, Striving for Harmony

Earthwool® Insulation Board

# LCA results & interpretation

Sustainable Minds®

Transparency Report (EPD)

Scope and summary

**FSK** faced

What's causing the greatest impacts

# ○ Cradle to gate ○ Cradle to gate with options **②** Cradle to grave

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

# conditioning ducts, power and process equipment, boiler and stack

assemblies, and cavity walls. **Functional unit** One square meter of installed insulation material, packaging included, with a

installations, metal and masonry walls, wall and roof panel systems, curtain wall

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

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.

# Staples may be used to install board products. The potential impact of the

**Binder** 

**Binder** 

**Binder** 

Facer

6.00E-02

4.80E-02

3.60E-02

**Packaging** 

**Packaging** 

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%

Material composition greater than 1% by weight

(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 assumed to be transported 100 miles for disposal.

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

MATERIAL **PART** %WT. **Batch** Cullet 30-35% 5-8% **Batch** Sand Batch 2-5% **Batch** Soda ash 2-5% **Feldspar** 1-2% Batch **Batch** Limestone 1-2% **Batch Oxides** <1%

Water

**Sugars** 

**Additives** 

**FSK** facer

Cardboard

**Plastic** 



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

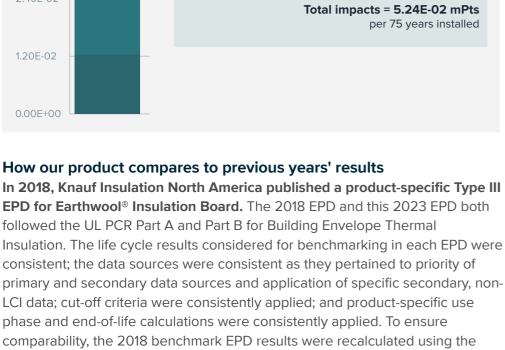
LIFE CYCLE STAGE

Manufacturing

Transportation

Raw material acquisition

Installation and maintenance



most recent LCA software version and most recently updated LCI data sets,

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

contribute significantly when comparing the 2023 results to the 2018 results

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

categories. The next highest performing impact category was acidification,

and ODP primarily stem from A3. Differences in manufacturing activities

and identifying the contributors to performance improvement.

 $5.48E+00 \text{ kg CO}_2$ -eq, ozone depletion potential 2.49E-09 kg CFC-11 eq,

acidification 9.11E-03 kg  $SO_2$ -eq, and eutrophication 1.24E-03 kg N eq.

the global warming potential and ozone depletion potential impact

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

(X) A2

2.71E-03

1.80E-03

2.86E-02

1.97E-04

7.5%

12.4%

22.6%

1.20E+00

0

kg SO<sub>2</sub> eq

kg N eq

Unit

Additional environmental information

Unit CTU<sub>h</sub>

CTU<sub>h</sub>

**CTU**<sub>e</sub>

**MJ** surplus

Knauf Insulation North America and Manson Insulation Products LCA

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

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).

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March, 2022. PCR review conducted by Lindita Bushi, PhD, Chair (Athena

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

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

methodologies, and LCA for Experts modeling software.

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

kg O₃ eq

kg PM<sub>2.5</sub> eq

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

All life cycle stages

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

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

sugars in the binder. Third-party verified ISO 14040/44 secondary LCI data

# 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

# reuse/recycling

**Embodied carbon** 

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

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

#### Embodied carbon can be defined as the cradle-to-gate (A1-A3) global warming potential impacts. The total embodied carbon per functional unit of FSK-faced Earthwool® Insulation Board Insulation manufactured in Shelbyville,

15-20%

10-15%

2-5%

8-10%

15-20%

MPTS/FUNC. UNIT

1.22E-02

3.71E-02

1.19E-03

5.23E-04

1.40E-03

<1%

IN is 4.60E+00 kg CO<sub>2</sub>-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

# Total impacts: 2018 to 2023 comparison

that this report is valued at 1.5 products.

Highest and lowest performing impact categories Global warming Ozone depletion potential (kg CFC-11 eq) (kg CO<sub>2</sub> eq) 6.00E+00 3.00E-09 +99% PERFORMANCE IMPROVEMENT 4.80E+00 2.40E-09 PERFORMANCE IMPROVEMENT 3.60E+00 1.80E-09

#### 2.40E+00 1.20E-09 1.20E+00 6.00E-10 0.00E+00 0.00E+00 2023 2018 2023 Acidification Eutrophication (kg SO<sub>2</sub> eq) (kg N eq) 1.50E-02 5.00E-03 -14% -185% 1.20E-02 PERFORMANCE REDUCTION 4.00E-03 PERFORMANCE REDUCTION 9.00E-03 3.00E-03 6.00E-03 2.00E-03 3.00E-03 1.00E-03 0.00E+00 0.00E+00 2018 2023 How we're making it greener Knauf Insulation North America (KINA) is committed to providing products that conserve energy and preserve natural resources. Our products with ECOSE® Technology contain a bio-based binder adhesive instead of a fossil fuel-based binder. • Our fiberglass contains on average over 60% recycled glass, which 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 a health and safety standpoint.

INSTALLATION

**MAINTENANCE** 

(X) A5 Installation

(X) B2 Maintenance

(X) B4 Replacement

(X) B6 Operational

(X) B7 Operational

(X) B1 Use

(X) B3 Repair

Refurbishment

energy use

water use

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 - LEED v4

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

Building product disclosure and optimization

**Environmental product declarations** 

**Option 2: Multi-attribute optimization** 

Building product disclosure and optimization

**Environmental product declarations** 

Option 1: Industry-wide (generic) EPD

Option 1: Product-specific Type III EPD

Option 2: Embodied carbon / LCA optimization

( ) Industry-wide (generic) EPD

✓ Product-specific Type III EPD

Product-specific Type III EPD

manufacturers who have verified improved life-cycle environmental

1.23E-02

2.85E-04

1.75E-05

5.56E-03

1.92E-05

2.2%

5.2%

0.6%

1.33E-01

½product

1 product

1 product

1.5 product

1.5 products

2 point

.5 point

.75 points

1 point

(X) B5

DISPOSAL/ REUSE/

RECYCLING

**Deconstruction** 

**Transportation** (X) C3 Waste

(X) C4 Disposal

processing

(X) C1

(X) C2

See how we make it greener

**TRANSPORTATION** 

(X) A4 Distribution

### Included (X) | Excluded (MND)\* \*Module D is also excluded from this system boundary (MND).

**Acidification** 

Eutrophication

Impact category

Respiratory effects

Impact category

**Non-carcinogenics** 

Fossil fuel depletion

References

Carcinogenics

**Ecotoxicity** 

Smog

Human health damage

Information modules:

years.

SM Single Score	Learn about SM	Singl	e Score results				
Impacts	per 1 square mete insulation mate		1.22E-02 mPts	3.71E-02 mPts	1.19E-03 mPts	5.23E-04 mPts	1.40E-03 mPts
Materials or process to total impacts in e			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 resu	lts per functio	nal	unit (FSK-faced E	arthwool® Insula	tion Board - Shell	byville, IN)	
LIFE CYCLE STAGE			RAW MATERIAL ACQUISITION	MANUFACTURING	TRANSPORTATION	INSTALLATION AND MAINTENANCE	DISPOSAL/ REUSE/ RECYCLING
Ecological dam	nage						
Impact category	Unit						
Global warming	kg CO₂ eq	?	2.18E-01	4.38E+00	6.42E-02	8.31E-02	6.79E-02
Ozone depletion	kg CFC-11 eq	8	2.39E-12	1.05E-11	1.43E-16	1.36E-16	1.96E-15
		0					

6.89E-03

1.67E-03

1.36E-01

3.66E-04

90.0%

81.8%

76.0%

8.87E+00

3.29E-04

2.82E-05

1.13E-02

1.61E-05

0.2%

0.4%

0.7%

Rating systems

performance.

1.20E-01

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

Requirements v4.0

upon request)

**EPD** 

3rd-party verified

3rd-party verified

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

KNA - 12122023 - 008

**MATERIAL HEALTH** 

Self-declared

Transparency Report (EPD)

**LCA Background Report** 

(thinkstep); Andre Desjarlais (Oak Ridge National Laboratory). 2018 Transparency Report for Earthwool® Insulation Board, Knauf Insulation North America (KINA) 2018. UL Environment General Program Instructions v2.4, July 2018 (available

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

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

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

LCA

Material

evaluation

Ø

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 life cycle stages declared.

# **Collaborative for High Performance Schools National** C

**Interiors** 

**SUMMARY** 

**Public LCA:** 

**Materials and resources** 

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

**BREEAM New Construction 2018** 

 Multi-product specific EPD ✓ Product-specific EPD

SM Transparency Report (EPD)™ + Material Health Overvi

Criteria MW C5.1 – Environmental Product Declarations			
Third-party certified type III EPD	2 point		
Green Globes for New Construction and S	Sustainable		

# ons (EPD)

Mat 02 - Environmental impacts from construction products

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

Contact us

Environmental Product Declaration
Industry-average EPD

iew™		

Regions; system boundaries North America; Cradle-to-grave		317 398 4434	
Functional unit / ESL:		Contact (	
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 ond Sustainability, Striving for Harmony In accordance with ISO 14044 and the reference PCR, this life cycle assessment was conducted by Sustainable Minds and verified by Harmony Environmental, LLC.

(913) 780-3328

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** 

Products; and ISO 14025:2006.

Harmony Environmental, LLC

16362 W. Briarwood Ct.

© 2024 | The SM Transparency Report [EPD]\*\* Program is operated by Sustainable Minds\* (www.sustainableminds.com) | Privacy policy

Olathe, KS 66062

**Envelope Thermal Insulation** 

**Harmony Environmental, LLC** 

Earthwool® Insulation Board

KNAUFINSULATION

# LCA results & interpretation

Sustainable Minds<sup>,</sup>

Transparency Report (EPD)

ASJ+ faced

Scope and summary

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

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

conditioning ducts, power and process equipment, boiler and stack

assemblies, and cavity walls. Functional unit

installations, metal and masonry walls, wall and roof panel systems, curtain wall

One square meter of installed insulation material, packaging included, with a thickness that gives an average thermal resistance of R<sub>SI</sub> = 1m<sup>2</sup>·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

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

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

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

Location: Shelbyville, IN

# Default installation, packaging, and disposal scenarios

**PART** 

**Facer** 

1.20E-02

0.00E+00

**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

### 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%

Material composition greater than 1% by weight

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 assumed to be transported 100 miles for disposal.

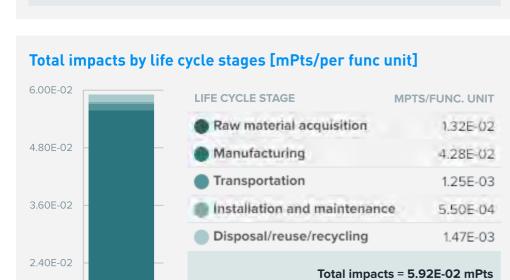
**MATERIAL** 

**ASJ+** facer

Cardboard

**Plastic** 

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



#### followed the UL PCR Part A and Part B for Building Envelope Thermal Insulation. The life cycle results considered for benchmarking in each EPD were

How our product compares to previous years' results

In 2018, Knauf Insulation North America published a product-specific Type III EPD for Earthwool® Insulation Board. The 2018 EPD and this 2023 EPD both

consistent; the data sources were consistent as they pertained to priority of

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 CO<sub>2</sub>-eq, ozone depletion potential 2.88E-09 kg CFC-11 eq,

acidification 9.66E-03 kg  $SO_2$ -eq, and eutrophication 1.30E-03 kg N eq.

primary and secondary data sources and application of specific secondary, non-LCI data; cut-off criteria were consistently applied; and product-specific use phase and end-of-life calculations were consistently applied. To ensure comparability, the 2018 benchmark EPD results were recalculated using the

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 years. **LCA** results

**RAW MATERIAL** 

**ACQUISITION** 

**Transportation** 

(X) A1 Raw

materials

(X) A2

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

**SM Single Score** Learn about SM Single Score results

Impacts per 1 square meter of

Unit

kg CO<sub>2</sub> eq

kg SO<sub>2</sub> eq

kg N eq

Unit

Additional environmental information

Unit CTU<sub>h</sub>

CTU<sub>h</sub>

**CTU**<sub>e</sub>

Knauf Insulation North America and Manson Insulation Products LCA

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

kg O₃ eq

kg PM<sub>2.5</sub> eq

kg CFC-11 eq

Materials or processes contributing >20%

to total impacts in each life cycle stage

LIFE CYCLE STAGE

Impact category

Global warming

Ozone depletion

**Acidification** 

Eutrophication

Impact category

**Respiratory effects** 

Impact category

**Non-carcinogenics** 

Carcinogenics

References

**Ecotoxicity** 

Smog

**Ecological damage** 

Human health damage

insulation material

**LIFE CYCLE STAGE** 

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

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

largely due to the borax, manganese oxide, and soda ash in the batch and the

# 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

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

**Embodied carbon** 

Shelbyville, IN is 5.08E+00 kg CO<sub>2</sub>-eq.

that this report is valued at 1 product.

Total impacts: 2018 to 2023 comparison

Highest and lowest performing impact categories

%WT.

10-15%

15-20%

per 75 years installed

<1%

reuse/recycling

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

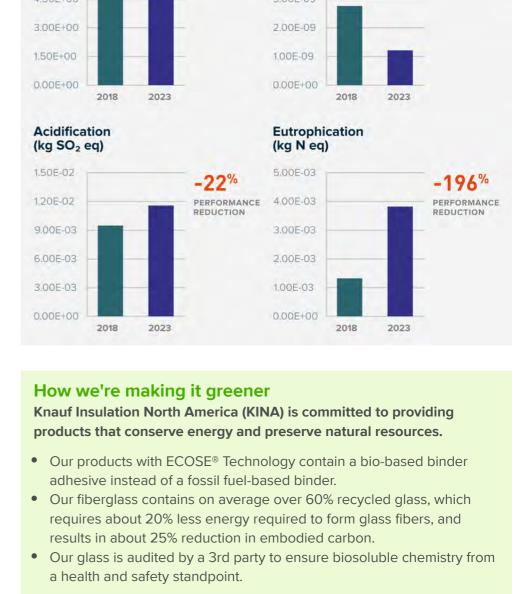
been removed from the building and transported to a landfill. Since materials are assumed to be landfilled at the end of life rather than incinerated or

#### warming potential impacts. The total embodied carbon per functional unit of ASJ+ faced Earthwool® Insulation Board Insulation manufactured in

**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

# **Global warming**

Ozone depletion potential (kg CFC-11 eq) (kg CO<sub>2</sub> eq) 7.50E+00 5.00E-09 +53% +8% 6.00E+00 4.00E-09 PERFORMANCE IMPROVEMENT PERFORMANCE 4.50E+00 3.00E-09



**TRANSPORTATION** 

See how we make it greener

**AND** 

(X) C1 (X) A4 Distribution (X) A5 Installation **Deconstruction** (X) C2 (X) B1 Use

(X) B3 Repair

water use

5.50E-04 mPts

Transportation to

**INSTALLATION** 

**MAINTENANCE** 

1.10E-03

4.38E-06

0.1%

0.3%

0.1%

The intent is to reward project teams for selecting products from

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

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

manufacturers who have verified improved life-cycle environmental

1.29E-02

packaging materials.

landfill and

landfilling of

**INSTALLATION** 

**MAINTENANCE** 

(X) B2 Maintenance

(X) B4 Replacement

**DISPOSAL/ REUSE/** 

RECYCLING

**Transportation** (X) C3 Waste

(X) C4 Disposal

1.47E-03 mPts

Transportation to

landfilling of product

DISPOSAL/ REUSE/

landfill and

at end of life.

RECYCLING

processing

(X) B5 Refurbishment \*Module D is also excluded from this system boundary (MND). (X) B6 Operational energy use (X) B7 Operational

**MANUFACTURING** 

Manufacturing

(X) A3

1.32E-02 mPts 4.28E-02 mPts 1.25E-03 mPts Energy required to Truck and rail Batch material and melt the glass and transportation used binder material produce the glass to transport product production. fibers. to building site.

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

TRACI v2.1 results per functional unit (ASJ+ faced Earthwool® Insulation Board - Shelbyville, IN)

**RAW MATERIAL** 

**ACQUISITION** 

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

0

0

**MANUFACTURING TRANSPORTATION** 

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

**Rating systems** 

performance.

7.14E-02 8.74E-02 1.43E-16 2.06E-15 1.86E-04 2.99E-04 3.05E-05 1.84E-05

2.02E-05

1 product

1.5 product

1 product

2 point

.5 point

.75 points

1 point

5.85E-03

2.1%

5.0%

0.6%

1.40E-01

### Background Report (public version), Knauf Insulation North America (KINA) 2023; developed using the TRACI v2.1 and CML impact assessment methodologies, and LCA for Experts modeling software.

**LCA Background Report** 

Fossil fuel depletion MJ surplus

# Tétreault (Group AGECO); and Jack Geibig (Ecoform). UL Part B: Building Envelope Thermal Insulation EPD Requirements, v2.0

North America (KINA) 2018.

upon request) **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

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

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

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

# See the additional content required by the NSF PCR for architectural coatings on page 4 of the Transparency Report PDF.

Building product disclosure and optimization

Building product disclosure and optimization

**Environmental product declarations** 

**Environmental product declarations** 

✓ Product-specific Type III EPD

services" Industry-wide (generic) EPD ½product ISO 21930:2017 serves as the core PCR along with UL Part A. ✓ Product-specific Type III EPD 1 product **UL Part A: Life Cycle Assessment Calculation Rules and Report** Requirements v4.0 March, 2022. PCR review conducted by Lindita Bushi, PhD, Chair (Athena **Option 2: Multi-attribute optimization** Sustainable Materials Institute), lindita.bushi@athenasmi.org; Hugues Imbeault-

> Collaborative for High Performance Schools National Criteria **MW C5.1 – Environmental Product Declarations**

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

**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

✓ Product-specific EPD

317 398 4434

### 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

life cycle stages declared.

# Third-party certified type III EPD

Interiors

**BREEAM New Construction 2018** 

**Environmental Product Declarations (EPD)** 

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

Contact us

# SM Transparency Report (EPD)™ + Material Health Overview™ **LCA** This environmental product declaration (EPD) was externally

(913) 780-3328 Harmony Environmental, LLC

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

1 m<sup>2</sup> installed insulation material, packaging included, with thickness

service life (ESL) of 75 years LCIA methodology: TRACI 2.1 LCA software; LCI database LCA for Experts v10.7; LCA for Experts 2023

Management • Analysis • Communication yond Sustainability, Striving for Harmony

Functional unit / ESL:

that gives average thermal resistance of  $R_{si} = 1m^2 \cdot K/W$  over an estimated

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:** 

**EPD** 3rd-party verified

Material

evaluation

V

Transparency Report (EPD)

3rd-party verified

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

KNA - 12122023 - 008

**MATERIAL HEALTH** 

Self-declared

Option 1: Industry-wide (generic) EPD Option 1: Product-specific Type III EPD Option 2: Embodied carbon / LCA optimization

Mat 02 - Environmental impacts from construction products

**Materials and resources** 

Industry-average EPD

( ) Multi-product specific EPD

**SUMMARY 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. Olathe, KS 66062

**EPD** additional content

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



UNIT

**Earthwool® Insulation Board** 

**Data** 

results.

**EPD** additional content

databases. Allocation The PCR prescribes where and how allocation occurs. Since only

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

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

per package of product. Allocation of transportation was based on either

allocated based on product area, and packaging was allocated based on mass

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."

Raw material acquisition and Batch Melting materials cullet Fiber

ecrap

A1-A3

3.41E+00

2.74E-12

8.78E-03

3.51E-03

1.47E-01

5.58E-04

97.5%

5.98E-02

1.33E-16

3.07E-04

2.63E-05

1.05E-02

1.50E-05

0.2%

1.27E-16

1.65E-04

2.70E-05

9.74E-04

3.88E-06

forming

Curing

Output flows and waste category indicators

Hazardous waste disposed

Non-renewable secondary fuels

Recovered energy

resources

Use of net fresh water

Abiotic depletion potential,

Hazardous waste disposed

Biogenic carbon emission from

Biogenic carbon emission from

Calcination carbon emissions

Carbonation carbon removals

combustion of waste from non renewable sources used in production processes

combustion of waste

Carbon emissions from

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

**EPD** 

**3rd-party verified** 

3rd-party verified

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

KNA - 12122023 - 008

**MATERIAL HEALTH** 

**Self-declared** 

packaging

Output flows and waste category indicators

0.00E+00

0.00E+00

0.00E+00

0

0

0.00E+00

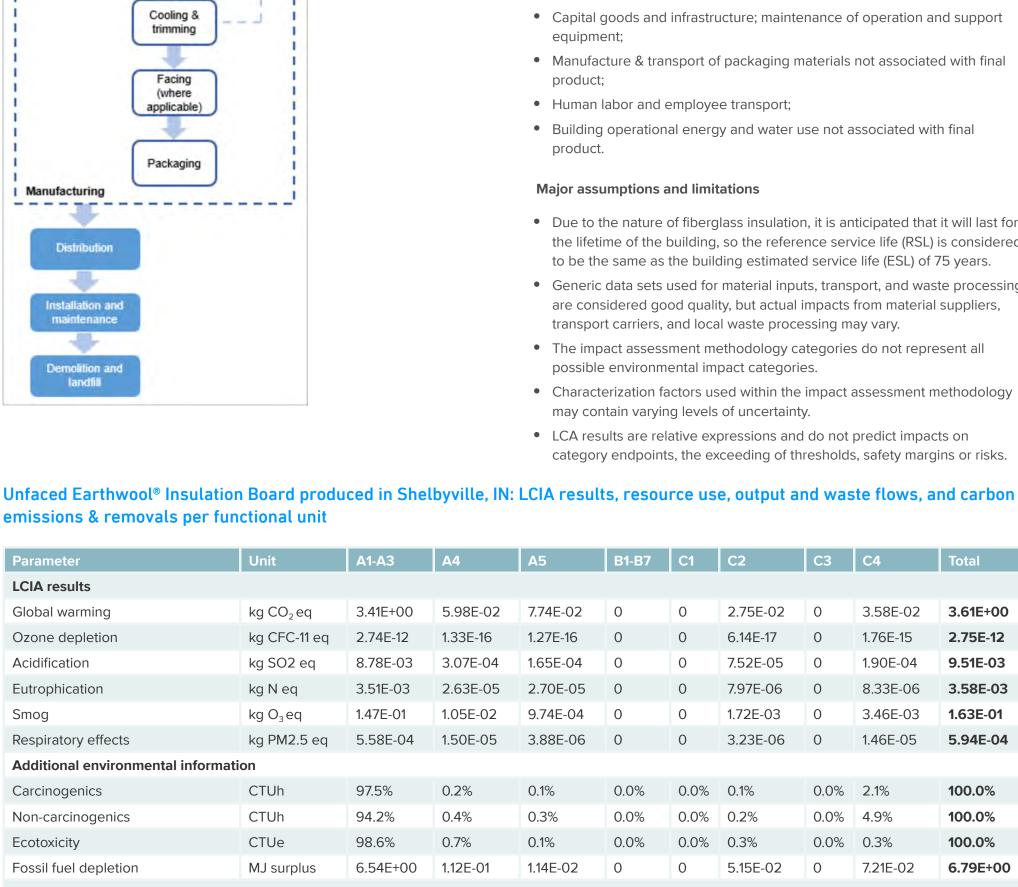
0

0.00E+00

0.00E+00

Binder

Flow diagram



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

**PARAMETER** 

Assumptions for scenario

**Dimensions/quantities** 

delivered to installation

**ASTM** or **ANSI** product

specification

site

development

Scenarios and additional technical information

**VALUE** 

Average distance from manufacturing to installation site	161	km		
Capacity utilization	27	%		
Gross density	48.1	kg/m³		
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 <sub>2</sub>		
End of life [C1-C4]				

Oloss delisity	40.1	kg/III				
Capacity utilization volume factor	1	-				
Installation into the building	Installation into the building [A5]					
Mass of plastic packaging waste	0.00543	kg				
Biogenic carbon content of packaging	0.451	kg CO <sub>2</sub>				
End of life [C1-C4]						
Following manual removal of the insulation it was assumed to be transported 100 mile						

	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

to disposal. The PCR prescribes that 100%

of the insulation is sent to landfill, where no

sheets. One carton contains eight pieces

wrapped in stretch wrap. The dimensions

• 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+),

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

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

	deposition in landilli	ASJ+: 2.01 kg
echnical properties		
	Earthwool® Insulation	Board is sold in

• 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								
	ture; maintenance of operation and support								
·	ackaging materials not associated with final								
product;	La constant								
<ul> <li>Human labor and employee transport;</li> </ul>									
Building operational energy and water use not associated with final product.									
Major assumptions and limitat	ions								
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

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

Total B1-B7 7.74E-02 0 0 2.75E-02 0 3.58E-02 3.61E+00

0

0

0

0

0

0.0%

1.76E-15

1.90E-04

8.33E-06

3.46E-03

1.46E-05

2.75E-12

9.51E-03

3.58E-03

1.63E-01

5.94E-04

100.0%

6.14E-17

7.52E-05

7.97E-06

1.72E-03

3.23E-06

0.1% 0.0% 0.1% 2.1% 0.3% 0.0% 0.0% 100.0% 0.2% 0.0% 4.9%

Non-carcinogenics	CTUh	94.2%	0.4%	0.3%	0.0%	0.0%	0.2%	0.0%	4.9%	100.0%
Ecotoxicity	CTUe	98.6%	0.7%	0.1%	0.0%	0.0%	0.3%	0.0%	0.3%	100.0%
Fossil fuel depletion	MJ surplus	6.54E+00	1.12E-01	1.14E-02	0	0	5.15E-02	0	7.21E-02	6.79E+00
Resource use indicators	The Confession									
Renewable primary energy used as energy carrier (fuel)	MJ, LHV	2.72E+01	3.30E-02	6.62E-03	0	0	1.52E-02	0	6.71E-02	2.73E+01
Renewable primary resources										
with energy content used as material	MJ, LHV	1.11E-07	-2.73E-12	8.39E-13	0	0	-1.25E-12	0	1.34E-11	1.11E-07
Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	7.38E+01	8.47E-01	9.13E-02	0	0	3.89E-01	0	5.73E-01	7.57E+01
Non-renewable primary resources with energy content	MJ, LHV	7.22E-07	3.37E-09	3.09E-10	0	0	1.55E-09	0	1.43E-09	7.29E-07
used as material		E 07E 04	0.005+00	0.005+00	0	0	0.005+00	0	0.005+00	E 07E 04
Secondary materials	kg	5.87E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	5.87E-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 <sup>3</sup>	1.41E+00	1.15E-04	6.95E-05	0	0	5.27E-05	0	7.10E-05	1.41E+00
Abiotic depletion potential,	MJ, LHV	5.93E+01	8.41E-01	8.83E-02	0	0	3.87E-01	0	5.55E-01	6.11E+01
Output flows and waste category i	ndicators									
Hazardous waste disposed		0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
·	kg									
Non-hazardous waste disposed	kg	2.69E-01	0.00E+00	6.77E-02	0	0	0.00E+00	0	1.71E+00	2.05E+00
High-level radioactive waste	kg	5.24E-06	2.47E-09	1.26E-09	0	0	1.13E-09	0	7.09E-09	5.25E-06
Intermediate- and low-level radioactive waste, conditioned, to	kg	5.07E-03	2.08E-06	1.07E-06	0	0	9.55E-07	0	6.34E-06	5.08E-03
final repository  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 <sub>2</sub>	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	kg CO <sub>2</sub>	3.54E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	2.94E-03	3.57E-01
product Biogenic carbon removal from	kg CO <sub>2</sub>	6.06E-01	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	6.06E-01
packaging Biogenic carbon emission from										
packaging Biogenic carbon emission from	kg CO <sub>2</sub>	0.00E+00	0.00E+00	1.37E-02	0	0	0.00E+00	0	0.00E+00	1.37E-02
combustion of waste	kg CO <sub>2</sub>	0.00E+00	0.00E+00	2.18E-02	0	0	0.00E+00	0	0.00E+00	2.18E-02
										0.00E+00
Calcination carbon emissions  Carbonation carbon removals	kg CO <sub>2</sub>	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0	0	0.00E+00 0.00E+00	0	0.00E+00 0.00E+00	0.00E+00
Calcination carbon emissions Carbonation carbon removals 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 <sub>2</sub>	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0	0	0.00E+00 0.00E+00	0	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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	kg CO <sub>2</sub> kg CO <sub>2</sub>	0.00E+00  0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0	0	0.00E+00 0.00E+00	0	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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  **SK-faced Earthwool® Insulated	kg CO <sub>2</sub> kg CO <sub>2</sub>	0.00E+00  0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0	0	0.00E+00 0.00E+00	0	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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  * SK-faced Earthwool® Insulat arbon emissions & removals	kg CO <sub>2</sub> kg CO <sub>2</sub>	0.00E+00  0.00E+00  duced in Shall unit	0.00E+00  0.00E+00	0.00E+00  0.00E+00	o o ults, reso	o o	0.00E+00 0.00E+00	o o	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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  * SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results	kg CO <sub>2</sub> kg CO <sub>2</sub>	0.00E+00  0.00E+00  duced in Shall unit	0.00E+00  0.00E+00	0.00E+00  0.00E+00	o o ults, reso	o o	0.00E+00 0.00E+00	o o	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming	kg CO <sub>2</sub> kg CO <sub>2</sub> ion Board proper functional Unit	0.00E+00  0.00E+00  duced in Shal unit	0.00E+00  0.00E+00	0.00E+00  0.00E+00	0 0 ults, reso	O O C1	0.00E+00  0.00E+00  use, output	o o and w	0.00E+00  0.00E+00  aste flows,	0.00E+00  0.00E+00  and
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq	0.00E+00  0.00E+00  duced in Shal unit  A1-A3  4.60E+00 1.29E-11	0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02  1.43E-16	0.00E+00  0.00E+00  N: LCIA resident   A5  8.31E-02 1.36E-16	0 0 <b>ults, reso</b> 0 0	0 0 C1 0	0.00E+00  0.00E+00  use, output  2.95E-02 6.59E-17	0 and w	0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> ion Board pro per functiona  Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq	0.00E+00  0.00E+00  duced in Shal unit  A1-A3  4.60E+00 1.29E-11 9.59E-03	0.00E+00  0.00E+00  0.00E+00  0.44  6.42E-02 1.43E-16 3.29E-04	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04	0 0 <b>B1-B7</b> 0 0	0 0 0 C1 0 0	0.00E+00  0.00E+00  0.00E+00  c2  2.95E-02 6.59E-17 8.07E-05	0 and w	0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> ion Board pro per functiona  Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03	0.00E+00  0.00E+00  0.00E+00  0.44  6.42E-02 1.43E-16 3.29E-04 2.82E-05	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04  2.90E-05	0 0 <b>B1-B7</b> 0 0 0	0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06	0 0 0 0 0 0 0	0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> ion Board proper functional  Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04  2.90E-05  1.05E-03	0 0 <b>B1-B7</b> 0 0 0 0	0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03	0 0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> ion Board pro per functiona  Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03	0.00E+00  0.00E+00  0.00E+00  0.44  6.42E-02 1.43E-16 3.29E-04 2.82E-05	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04  2.90E-05	0 0 <b>B1-B7</b> 0 0 0	0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06	0 0 0 0 0 0 0	0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulat arbon emissions & removals	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04  2.90E-05  1.05E-03	0 0 <b>B1-B7</b> 0 0 0 0	0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03	0 0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental informate	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02	0.00E+00  0.00E+00  0.00E+00  N: LCIA rest  8.31E-02  1.36E-16  1.77E-04  2.90E-05  1.05E-03	0 0 <b>B1-B7</b> 0 0 0 0	0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03	0 0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01
Calcination carbon emissions Carbonation carbon removals 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  * SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq  ion	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01 5.63E-04	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.13E-02 1.61E-05	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second in the seco	0 0 <b>B1-B7</b> 0 0 0 0	0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03 3.46E-06	0 and w C3 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04
Carbonation carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq  ion  CTUh	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01 5.63E-04	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02 1.43E-16 3.29E-04 2.82E-05 1.13E-02 1.61E-05	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 <b>B1-B7</b> 0 0 0 0 0 0 0 0 0 0	0  Ource ( 0  0  0  0  0  0  0  0  0  0  0 0	0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03 3.46E-06  0.1%	0  and w  c3  0  0  0  0  0  0  0  0  0  0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05  2.1% 5.0%	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics Ecotoxicity	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq  ion  CTUh  CTUh  CTUh	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  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%	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02  1.61E-05  0.2%  0.4%  0.7%	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 ults, reso B1-B7 0 0 0 0 0 0 0 0 0 0 0.0% 0.0%	0  Ource I  0  0  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  0.10E+00  0.10E+	0 and w  C3  0 0 0 0 0 0 0 0 0 0.0% 0.0%	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05  2.1% 5.0% 0.3%	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04  100.0% 100.0%
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg PM2.5 eq  ion  CTUh  CTUh	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  A1-A3  4.60E+00 1.29E-11 9.59E-03 3.47E-03 1.64E-01 5.63E-04  97.4% 94.1%	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02  1.61E-05  0.2%  0.4%	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 <b>B1-B7</b> 0 0 0 0 0 0 0 0 0.0%	0  Ource I  O  O  O  O  O  O  O  O  O  O  O O  O	0.00E+00  0.00E+00  0.00E+00  0.00E+00  2.95E-02 6.59E-17 8.07E-05 8.55E-06 1.84E-03 3.46E-06  0.1% 0.2%	0  and w  C3  0  0  0  0  0  0  0  0  0  0  0 0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05  2.1% 5.0%	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04  100.0%
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq  ion  CTUh  CTUh  CTUh	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  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%	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02  1.61E-05  0.2%  0.4%  0.7%	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 ults, reso B1-B7 0 0 0 0 0 0 0 0 0 0 0.0% 0.0%	0  Ource I  0  0  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  0.10E+00  0.10E+	0 and w  C3  0 0 0 0 0 0 0 0 0 0.0% 0.0%	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05  2.1% 5.0% 0.3%	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04  100.0% 100.0%
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion  Resource use indicators Renewable primary energy used	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg O <sub>3</sub> eq  kg PM2.5 eq  ion  CTUh  CTUh  CTUh	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  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%	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.43E-02  1.43E-16  3.29E-04  2.82E-05  1.13E-02  1.61E-05  0.2%  0.4%  0.7%	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 ults, reso B1-B7 0 0 0 0 0 0 0 0 0 0 0.0% 0.0%	0  Ource I  0  0  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  0.10E+00  0.10E+	0 and w  C3  0 0 0 0 0 0 0 0 0 0.0% 0.0%	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  3.84E-02 1.89E-15 2.04E-04 8.94E-06 3.72E-03 1.57E-05  2.1% 5.0% 0.3%	0.00E+00  0.00E+00  and  Total  4.82E+00 1.29E-11 1.04E-02 3.55E-03 1.82E-01 6.03E-04  100.0% 100.0%
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq  kg CFC-11 eq  kg SO2 eq  kg N eq  kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus	0.00E+00  0.00E+00  0.00E+00  duced in Shal unit  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	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.44  0.42E-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	0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the second seco	0 <b>B1-B7</b> 0  0  0  0  0  0  0  0  0  0  0  0  0	0  Ource I  0  0  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  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	0  and w  c3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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	0.00E+00  0.00E+00  and  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
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informate Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as material Non-renewable primary resources used as an energy	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> lion Board proper functional  Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus	0.00E+00  0.00E+00  0.00E+00  0.00E+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	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-02  1.43E-04  2.82E-05  1.13E-02  1.61E-05  0.2%  0.4%  0.7%  1.20E-01  3.54E-02	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.23E-02  0.00E+00  0.1%  0.3%  0.1%  1.23E-02  7.11E-03	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0  Ource I  0  0  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  0.10E-02  0.10E-03  1.63E-02	0  and w  C3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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	0.00E+00  0.00E+00  and  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
Calcination carbon emissions Carbonation carbon removals 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  * SK-faced Earthwool® Insulat arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informat	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq  ion CTUh CTUh CTUe MJ surplus  MJ, LHV  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  0.00E+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  1.90E-07	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-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	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  N: LCIA resident in the content of the content	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0  Ource I  0  0  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  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  and w  c3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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	0.00E+00  0.00E+00  and  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
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informate Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as material Non-renewable primary resources used as an energy carrier (fuel) Non-renewable primary resources with energy content used as material	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  duced in Shall unit  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  1.90E-07  1.01E+02	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.44  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  9.09E-01	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.10E-13  0.10E-03  1.05E-03  4.17E-06  0.1%  0.3%  0.1%  1.23E-02  7.11E-03  9.01E-13	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0  Ource I  0  0  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  0.18e, output  0.59E-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  4.18E-01	0  and w  c3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01	0.00E+00  0.00E+00  and  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
Calcination carbon emissions Carbonation carbon removals 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  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter  LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental informate Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as material Non-renewable primary resources used as an energy carrier (fuel) Non-renewable primary resources with energy content used as material Secondary materials	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.01E+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  1.90E-07  1.01E+02  5.84E-07	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.43E-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  9.09E-01  3.62E-09	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.10E-13  0.1%  0.3%  0.1%  1.23E-02  7.11E-03  9.01E-13  9.81E-02  3.32E-10	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0 Ource I  0 0 0 0 0 0 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  0.1Se, output  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  1.63E-02  4.18E-01  1.66E-09	0  and w  c3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01  1.53E-09	0.00E+00  0.00E+00  and  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  1.03E+02
Calcination carbon emissions Carbonation carbon removals 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  * Carbon emissions from combustion of waste from renewable sources used in production processes  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter  LCIA results  Global warming Ozone depletion  Acidification Eutrophication  Smog  Respiratory effects  Additional environmental informat  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as material  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources with energy content used as material  Secondary materials  Renewable secondary fuels	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV  kg	0.00E+00  0.00E+00  0.00E+00  0.00E+00  1.01E+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  1.90E-07  1.01E+02  5.84E-07  6.30E-01	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00	0.00E+00	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	O O O O O O O O O O O O O O O O O O O	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00	0  and w  c3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01  1.53E-09 0.00E+00	0.00E+00  0.00E+00  and  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  1.03E+02  5.91E-07  6.30E-01
Calcination carbon emissions Carbonation carbon removals 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  K-Garbon emissions from combustion of waste from renewable sources used in production processes  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter  LCIA results  Global warming Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental informate Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as material  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources with energy content used as material  Secondary materials  Renewable secondary fuels  Non-renewable secondary fuels	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV  kg  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+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  1.90E-07  1.01E+02  5.84E-07  6.30E-01  0.00E+00  0.00E+00	0.00E+00	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  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  9.81E-02  3.32E-10  0.00E+00 0.00E+00 0.00E+00	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0 Ource I O O O O O O O O O O O O O O O O O O O	0.00E+00  0.00E+00  0.00E+00  0.00E+00  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  1.63E-02  1.66E-09 0.00E+00 0.00E+00 0.00E+00	0  and w  C3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01  1.53E-09 0.00E+00 0.00E+00 0.00E+00	0.00E+00  0.00E+00  and  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  1.03E+02  5.91E-07  6.30E-01 0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals 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  * Carbon emissions from combustion of waste from renewable sources used in production processes  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental informate Carcinogenics  Kon-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as material  Non-renewable primary resources with energy content production of waste from non removable primary resources used as an energy carrier (fuel)  Non-renewable primary resources with energy content	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV  kg  MJ, LHV  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  0.00E+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  1.90E-07  1.01E+02  5.84E-07  6.30E-01  0.00E+00  0.00E+00  0.00E+00	0.00E+00	0.00E+00	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	O O O O O O O O O O O O O O O O O O O	0.00E+00  0.00E+00  0.00E+00  0.00E+00  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  1.63E-02  1.66E-09  0.00E+00  0.00E+00  0.00E+00  0.00E+00	0  and w  c3  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01  1.53E-09 0.00E+00 0.00E+00 0.00E+00	0.00E+00  0.00E+00  and  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  1.03E+02  5.91E-07  6.30E-01 0.00E+00 0.00E+00 0.00E+00
Calcination carbon emissions Carbonation carbon removals Carbon emissions from combustion of waste from non renewable sources used in production processes  H Carbon emissions from combustion of waste from combustion of waste from renewable sources used in production processes  SK-faced Earthwool® Insulate arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Entrophication Entrophication Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as material Non-renewable primary resources used as an energy carrier (fuel) Non-renewable primary resources with energy content used as material Secondary materials Renewable secondary fuels Renewable secondary fuels Recovered energy	kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> kg CO <sub>2</sub> Unit  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq  ion  CTUh  CTUh  CTUe  MJ surplus  MJ, LHV  MJ, LHV  kg  MJ, LHV	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+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  1.90E-07  1.01E+02  5.84E-07  6.30E-01  0.00E+00  0.00E+00	0.00E+00	0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  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  9.81E-02  3.32E-10  0.00E+00 0.00E+00 0.00E+00	0  ults, reso  0  0  0  0  0  0  0  0  0  0  0  0  0	0 Ource I O O O O O O O O O O O O O O O O O O O	0.00E+00  0.00E+00  0.00E+00  0.00E+00  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  1.63E-02  1.66E-09 0.00E+00 0.00E+00 0.00E+00	0  and w  C3  0  0  0  0  0  0  0  0  0  0  0  0  0	0.00E+00  0.00E+00  0.00E+00  aste flows,  C4  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  6.15E-01  1.53E-09 0.00E+00 0.00E+00 0.00E+00	0.00E+00  0.00E+00  and  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  1.03E+02  5.91E-07  6.30E-01 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
ligh-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
ntermediate- 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 <sub>2</sub>	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 <sub>2</sub>	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 backaging	kg CO <sub>2</sub>	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 <sub>2</sub>	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 <sub>2</sub>	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 <sub>2</sub>	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 <sub>2</sub>	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	kg CO <sub>2</sub>	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	0.00E+00
combustion of waste from renewable sources used in production processes  SJ+ faced Earthwool® Insula			helbyville,	IN: LCIA res	sults, res	source	use, outpu	t and v	waste flows	s, and
renewable sources used in production processes			helbyville,	IN: LCIA re:	sults, res	source C1	use, outpu	t and v	waste flows	s, and
renewable sources used in production processes  SJ+ faced Earthwool® Insulations & removals	s per functiona	al unit								
renewable sources used in production processes  SJ+ faced Earthwool® Insula arbon emissions & removals  Parameter	Unit	al unit								
renewable sources used in production processes  SJ+ faced Earthwool® Insulation emissions & removals  Parameter  LCIA results	s per functiona	A1-A3	Α4	A5	B1-B7	C1	C2	C3	C4	Total
renewable sources used in production processes  SJ+ faced Earthwool® Insulation emissions & removals  Parameter  LCIA results  Global warming	Unit  kg CO <sub>2</sub> eq	A1-A3 5.08E+00	A4 6.75E-02	A5 8.74E-02	B1-B7 0	C1 0	C2 3.10E-02	C3	C4 4.04E-02	Total 5.31E+00
renewable sources used in production processes  SJ+ faced Earthwool® Insulations & removals  Parameter  LCIA results  Global warming  Ozone depletion	Unit  kg CO <sub>2</sub> eq kg CFC-11 eq	A1-A3  5.08E+00 1.36E-09	6.75E-02 1.51E-16	8.74E-02 1.43E-16	<b>B1-B7</b> 0 0	C1 0 0	3.10E-02 6.93E-17	C3 0 0	C4 4.04E-02 1.99E-15	Total 5.31E+00 1.36E-09
renewable sources used in production processes  SJ+ faced Earthwool® Insular bon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification	Init  kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq	5.08E+00 1.36E-09 1.09E-02	6.75E-02 1.51E-16 3.46E-04	8.74E-02 1.43E-16 1.86E-04	0 0 0	0 0 0	3.10E-02 6.93E-17 8.49E-05	0 0 0	4.04E-02 1.99E-15 2.14E-04	Total  5.31E+00 1.36E-09 1.18E-02
renewable sources used in production processes  SJ+ faced Earthwool® Insulation emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq	5.08E+00 1.36E-09 1.09E-02 3.78E-03	6.75E-02 1.51E-16 3.46E-04 2.97E-05	8.74E-02 1.43E-16 1.86E-04 3.05E-05	B1-B7  0 0 0 0	0 0 0 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06	0 0 0 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03
renewable sources used in production processes  SJ+ faced Earthwool® Insulation emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03	0 0 0 0 0	0 0 0 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03	C3  0  0  0  0  0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01
renewable sources used in production processes  SJ+ faced Earthwool® Insular arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03	0 0 0 0 0	0 0 0 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03	C3  0  0  0  0  0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01
renewable sources used in production processes  SJ+ faced Earthwool® Insula arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02 1.69E-05	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06	B1-B7  0 0 0 0 0 0 0	0 0 0 0 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06	C3  0 0 0 0 0 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04
renewable sources used in production processes  SJ+ faced Earthwool® Insular arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02 1.69E-05	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06	B1-B7  0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06	C3  0 0 0 0 0 0 0 0 0 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04
renewable sources used in production processes  SJ+ faced Earthwool® Insular bon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg O <sub>3</sub> eq kg PM2.5 eq tion CTUh	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4%	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02 1.69E-05	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06	B1-B7  0 0 0 0 0 0 0 0 0 0 0 0.0%	C1  0 0 0 0 0 0 0 0 0 0 0.0%	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06	C3  0 0 0 0 0 0 0 0 0 0.0%	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04 100.0%
renewable sources used in production processes  SJ+ faced Earthwool® Insular arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4% 98.7%	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02 1.69E-05 0.2% 0.4% 0.7%	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1%	0 0 0 0 0 0 0 0 0 0 0.0%	C1  0 0 0 0 0 0 0 0 0 0.0% 0.0%	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3%	C3  0 0 0 0 0 0 0 0 0 0.0% 0.0%	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3%	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0%
renewable sources used in production processes  SJ+ faced Earthwool® Insular bon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4% 98.7%	6.75E-02 1.51E-16 3.46E-04 2.97E-05 1.19E-02 1.69E-05 0.2% 0.4% 0.7%	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1%	0 0 0 0 0 0 0 0 0 0 0.0%	C1  0 0 0 0 0 0 0 0 0 0.0% 0.0%	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3%	C3  0 0 0 0 0 0 0 0 0 0.0% 0.0%	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3%	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0%
renewable sources used in production processes  SJ+ faced Earthwool® Insular bon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh CTUe MJ surplus	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4% 98.7% 1.11E+01	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	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1% 1.29E-02	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%	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3% 5.82E-02	0 0 0 0 0 0 0 0 0.0% 0.0%	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3% 8.14E-02	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0% 1.14E+01
SJ+ faced Earthwool® Insular arbon emissions & removals  Parameter LCIA results Global warming Ozone depletion Acidification Eutrophication Smog Respiratory effects Additional environmental information Carcinogenics Non-carcinogenics Ecotoxicity Fossil fuel depletion Resource use indicators Renewable primary energy used as energy carrier (fuel) Renewable primary resources with energy content used as material Non-renewable primary resources with energy used as an energy	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh CTUe MJ surplus	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4% 98.7% 1.11E+01	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	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1% 1.29E-02	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%	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3% 5.82E-02	0 0 0 0 0 0 0 0.0% 0.0% 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3% 8.14E-02	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0% 100.0% 1.14E+01
renewable sources used in production processes  SJ+ faced Earthwool® Insular arbon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh CTUe MJ surplus	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04 97.5% 94.4% 98.7% 1.11E+01 2.40E+01 1.03E-05	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 3.72E-02	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1% 1.29E-02 7.48E-03	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	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3% 5.82E-02	0 0 0 0 0 0 0 0.0% 0.0% 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3% 8.14E-02 7.58E-02	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0% 100.0% 1.14E+01  2.41E+01
SJ+ faced Earthwool® Insular broduction processes  SJ+ faced Earthwool® Insular broon emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as material  Non-renewable primary resources with energy content used as material  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources used as an energy carrier (fuel)	kg CO <sub>2</sub> eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh CTUe MJ surplus  MJ, LHV  MJ, LHV	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04  97.5% 94.4% 98.7% 1.11E+01  2.40E+01  1.03E-05	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 3.72E-02 -3.08E-12	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 0.3% 0.1% 1.29E-02 7.48E-03 9.47E-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	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3% 5.82E-02 1.71E-02 -1.42E-12	0 0 0 0 0 0 0 0 0.0% 0.0% 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3% 8.14E-02 7.58E-02 1.51E-11	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0% 100.0% 1.14E+01  2.41E+01  1.03E-05
SJ+ faced Earthwool® Insular born emissions & removals  Parameter  LCIA results  Global warming  Ozone depletion  Acidification  Eutrophication  Smog  Respiratory effects  Additional environmental information  Carcinogenics  Non-carcinogenics  Ecotoxicity  Fossil fuel depletion  Resource use indicators  Renewable primary energy used as energy carrier (fuel)  Renewable primary resources with energy content used as material  Non-renewable primary resources with energy content used as material  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources used as an energy carrier (fuel)  Non-renewable primary resources used as an energy carrier (fuel)	kg CO₂ eq kg CFC-11 eq kg SO2 eq kg N eq kg PM2.5 eq tion CTUh CTUh CTUe MJ surplus  MJ, LHV  MJ, LHV  MJ, LHV	5.08E+00 1.36E-09 1.09E-02 3.78E-03 1.84E-01 6.48E-04  97.5% 94.4% 98.7% 1.11E+01  1.03E-05  1.11E+02	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 3.72E-02 -3.08E-12 9.56E-01	8.74E-02 1.43E-16 1.86E-04 3.05E-05 1.10E-03 4.38E-06 0.1% 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 0 0 0 0 0 0.0% 0.0% 0	3.10E-02 6.93E-17 8.49E-05 8.99E-06 1.94E-03 3.64E-06 0.1% 0.2% 0.3% 5.82E-02 1.71E-02 -1.42E-12 4.39E-01	0 0 0 0 0 0 0 0 0.0% 0.0% 0	4.04E-02 1.99E-15 2.14E-04 9.40E-06 3.91E-03 1.65E-05 2.0% 4.8% 0.3% 8.14E-02 7.58E-02 1.51E-11 6.47E-01	Total  5.31E+00 1.36E-09 1.18E-02 3.86E-03 2.03E-01 6.90E-04  100.0% 100.0% 100.0% 1.14E+01  1.03E-05  1.13E+02  6.39E-07

#### Non-hazardous waste disposed 0 0 kg 3.04E-01 0.00E+00 7.64E-02 0.00E+00 0 1.93E+00 2.31E+00 0 0 1.28E-09 kg 6.34E-06 2.78E-09 1.42E-09 0 8.00E-09 6.35E-06 High-level radioactive waste

0.00E+00

0.00E+00

1.29E-04

9.49E-01

0.00E+00

0.00E+00

0.00E+00

1.57E+00

9.36E+01

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

MJ, LHV

MJ, LHV

MJ, LHV

kg CO<sub>2</sub>

kg CO<sub>2</sub>

kg CO<sub>2</sub>

kg CO<sub>2</sub>

kg CO<sub>2</sub>

Material

evaluation

V

0

0

0

0

0

0

0

0

0

0.00E+00

0.00E+00

5.95E-05

4.36E-01

0.00E+00

0

0

0

0

0

0.00E+00

0.00E+00

7.85E-05

9.97E-02

0.00E+00

riigii-ieverradioactive waste	kg	0.54L-00	2.70L-03	1. <del>1</del> 2L-03	O	O	1.20L-0 <i>3</i>	U	0.00L-03	0.55L-00
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 <sub>2</sub>	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 <sub>2</sub>	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 <sub>2</sub>	1.32E-02	0.00E+00	0.00E+00	0	0	0.00E+00	0	0.00E+00	1.32E-02

1.54E-02

2.46E-02

0.00E+00

0.00E+00

0.00E+00

0

0

0

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0.00E+00

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0

0

0.00E+00

SM Transpar	ency l	Report (EPD)™ + Material Healt	h Overview™
	LCA		SUMMARY
ty verified	•	This environmental product declaration (EPD) was externally	Reference PCR UL Part B: Buildi
Transparency Repo	rt (EPD)	verified by Harmony Environmental, LLC, according to ISO 21930:2017;	Insulation v2.0  Regions; system
ty verified	•	UL Part A; UL Part B for Building Envelope Thermal Insulation	North America;

Products; and ISO 14025:2006.

Harmony Environmental, LLC

16362 W. Briarwood Ct.

Olathe, KS 66062

(913) 780-3328

Harmony Environmental, LLC Management • Analysis • Communication

**SUMMARY Reference PCR** 

Regions; system boundaries North America; Cradle-to-grave packaging included, with thickness that gives average thermal resistance LCA software; LCI database LCA for Experts v10.7; LCA for Experts 2023 In accordance with ISO 14044 and the One Knauf Drive Shelbyville, IN 46176 317 398 4434 Contact us

Knauf Insulation, Inc.

0.00E+00

0.00E+00

8.02E-05

6.27E-01

0.00E+00

0.00E+00

0.00E+00

1.57E+00

9.57E+01

0.00E+00

1.54E-02

2.46E-02

0.00E+00

0.00E+00

0.00E+00

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Functional unit / ESL: 1 m<sup>2</sup> installed insulation material, of  $R_{SI} = 1m^2 \cdot K/W$  over an estimated service life (ESL) of 75 years LCIA methodology: TRACI 2.1

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

**Public LCA:** 

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# LCA & material health results & interpretation

Earthwool® Insulation Board

### **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.

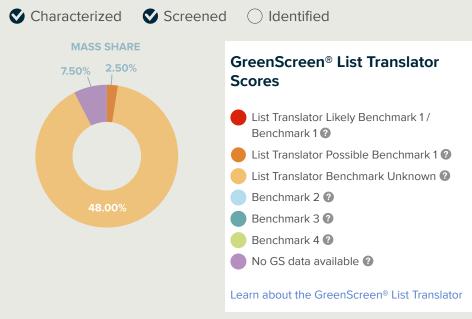
# Assessment scope and results

## Health Product Declaration®

# Earthwool® Insulation Board Unfaced

Full disclosure known hazards: Yes

Based on the selected content inventory threshold:



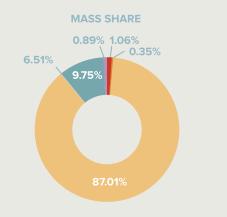
### Total VOC Content® VOC Content data is not applicable for this product category.

## Full disclosure known hazards: Yes

Earthwool® Insulation Board ASJ+

Based on the selected content inventory threshold:

**♦** Characterized **♦** Screened ☐ Identified



# VOC Content data is not applicable for this product category.

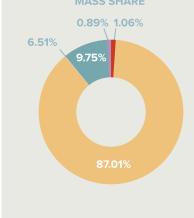
Total VOC Content®

# Full disclosure known hazards: Yes

Earthwool® Insulation Board FSK

Based on the selected content inventory threshold:

**MASS SHARE** 



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

# What's in this product and why

Material health

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.

### Knauf engages very closely with its vendors to eliminate and avoid

How we're making it healthier

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

# **Health Product Declaration®**

References

#### 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**

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

Credit value options

1. Reporting 2. Optimization

3. Supply Chain Optimization

1 product each

1 product each

3. Supply Chain Optimization

Materials and resources **Material Ingredients** 

Credit value options

1. Reporting 2. Optimization

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

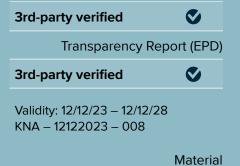
**Collaborative for High Performance Schools National** Criteria **EQ C7.1 Material Health Disclosures** 

# **✓** Performance Approach

2 points Prescriptive Approach 2 points

#### **SUMMARY LCA** This environmental product

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



**MATERIAL HEALTH** 

Self-declared

evaluation

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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

declaration (EPD) was externally

verified by Harmony Environmental,

(913) 780-3328

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

# 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

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.

LCA for Experts v10.7; LCA for Experts

**Public LCA:** 

317 398 4434 Contact us

Knauf Insulation, Inc.

Shelbyville, IN 46176

One Knauf Drive

Download PDF

KNAUFINSULATION

Earthwool® Insulation Board

# How we make it greener

Sustainable Minds®

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.



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

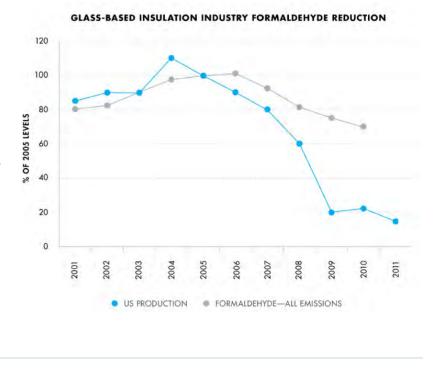
(KI EMEA & APAC), share an overall global certification for ISO

Continuous improvement is the methodology we utilize to engage

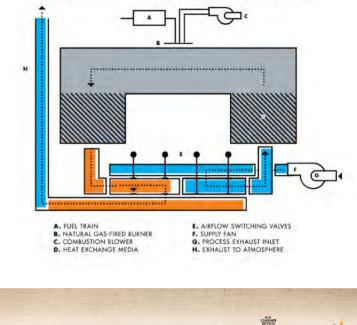
45001 Health & Safety, ISO 14001 Environmental, ISO 50001 Energy, and ISO 9001 Quality through a third-party Certification Body. Our Continuous Improvement Program, with all its tools and systems associated with it, provide a formal process where we are constantly monitoring our manufacturing and sustainability 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.



REGENERATIVE THERMAL OXIDIZER AIRFLOW DIAGRAM



ECOBATT

ECOBATT

**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

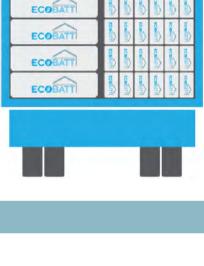
Leverage compression packaging

Glass is a high modulus material, which helps to facilitate

from transportation.



WE COMPRESS OUR



#### 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,

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

our formaldehyde-free products could have on the indoor

# by UL Environment.

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 and 41% pre-consumer recycled glass.

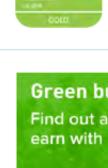
exoneration process. This guarantees the formulations are biosoluble and pose no health concerns. Having over 35 years of research behind its safety, fiberglass products have been thoroughly evaluated and therefore we believe it is one of the safest building materials available today.

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

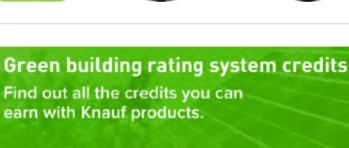
All of our processes and formulations are voluntarily third-party

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)



Learn more





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

**Green building rating systems** 

Green Building Standard, and more.



**3rd-party verified** 

3rd-party verified

**MATERIAL HEALTH** 

Self-declared

Validity: 12/12/23 - 12/12/28 KNA - 12122023 - 008

**DISPOSAL** 

**Promote Recycling** By taking a comprehensive approach of the benefits of recycling,

Knauf Insulation North America advocates and promotes local

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

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.

glassrecycles.org

LCA

Material

evaluation

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

verified by Harmony Environmental, Transparency Report (EPD) LLC, according to ISO 21930:2017; **UL Part A; UL Part B for Building** Regions; system boundaries **Envelope Thermal Insulation** North America; Cradle-to-grave Products; and ISO 14025:2006.

(913) 780-3328

Harmony Environmental, LLC

16362 W. Briarwood Ct.

Olathe, KS 66062

This environmental product

declaration (EPD) was externally

The Harmony Environmental, LLC

317 398 4434

Contact us

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

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

2023

**Public LCA:** 

**SUMMARY** 

**Reference PCR** 

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

LCIA methodology: TRACI 2.1

LCA software; LCI database

that gives average thermal resistance

LCA for Experts v10.7; LCA for Experts

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