

ENVIRONMENTAL PRODUCT DECLARATION

SOFTR[®] DUCT WRAP



SOFTR[®] Duct Wrap



Owens Corning, and its family of companies, are a leading global producer of residential and commercial building materials, glass fiber reinforcements, and engineered materials for composite systems. It uses a decision framework for managing the company as a sustainable enterprise. It is the foundation of the company's strategy of building market-leading businesses, global in scope—human in scale, and reflects the company's purpose: our people and products make the world a better place.

Owens Corning is committed to balancing economic growth with social progress and sustainable solutions to its building materials and composite customers around the world.

This Environmental Product Declaration is a component of our stated goal to provide life cycle information on all core products.

sustainability.owenscorning.com





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SOFT® Duct Wrap

According to ISO 14025,
EN 15804, and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611 https://www.ul.com/ https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.4 July 2018
MANUFACTURER NAME AND ADDRESS	Owens Corning, One Owens Corning Parkway, Toledo, OH, USA
DECLARATION NUMBER	4788986648.104.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Softr® Duct Wrap; 1 m ² insulation at R _{SI} =1
REFERENCE PCR AND VERSION NUMBER	Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements, UL 10010-03, version 1.0
DESCRIPTION OF PRODUCT APPLICATION/USE	SOFT® Duct Wrap is insulation material designed for use as external insulation of commercial and residential HVAC ducts.
PRODUCT RSL DESCRIPTION (IF APPL.)	75 years
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	January 1, 2020
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-Specific
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle to gate with options (A4, A5, C2, C4)
YEAR(S) OF REPORTED PRIMARY DATA	2014
LCA SOFTWARE & VERSION NUMBER	SimaPro 9.0.0.30
LCI DATABASE(S) & VERSION NUMBER	ecoinvent 3.5
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1 v1.05; CML I-A baseline v4.7; Cumulative Energy Demand (LHV) v1.00

This PCR review was conducted by:	UL Environment
	PCR Review Panel
	epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	 Grant R. Martin, UL Environment
	 Thomas P. Gloria, Industrial Ecology Consultants
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	

LIMITATIONS

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

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

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

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1. Product Definition and Information

1.1. Description of Company/Organization

Founded in 1938, Owens Corning is a leader in insulation, roofing and fiberglass composites. It has a global presence with 20,000 people in 33 countries. Product covered by this Environmental Product Declaration was produced in the following locations:

Waxahachie Plant
Waxahachie, TX 75165

1.2. Product Description

Product Identification

SOFTR® Duct Wrap is a blanket of glass fiber insulation that is factory-laminated to FRK vapor retarder facing. This product is designed to meet existing performance standards and mechanical and energy codes.

Product Specification

Table 1. Physical Properties of SOFTR® Duct Wrap

PROPERTY	TEST METHOD	VALUE		
Operating Temperature	ASTM C411	up to 250°F (121°C)		
Insulation Jacket Temperature Limit	ASTM C1136	up to 150°F (66°C)		
Jacket Puncture Resistance	ASTM C1136	25 units (0.7 joules)		
Water Vapor Permeance	ASTM E96	0.02 perms		
Water Vapor Sorption	ASTM C1104	<3% by weight at 120°F (49°C), 95% R.H.		
Fungi Resistance	ASTM C1338	Meets requirements		
Thermal conductivity <u>Out-of-package k-Value</u> k Btu•in/hr•ft²•°F (λ at 24°C Mean, W/m•°C)	ASTM C518	Type 75 0.30 (0.043)	Type 100 0.27 (0.039)	Type 150 0.25 (0.036)
<u>Installed (Compressed) k-Value</u> k Btu•in/hr•ft²•°F (λ at 24°C Mean, W/m•°C)		Type 75 0.27 (0.039)	Type 100 0.25 (0.036)	Type 150 0.23 (0.033)
Surface Burning Characteristics ¹	ASTM E 84	Flame spread index 25 Smoke developed index 50		

¹The surface burning characteristics of these products have been determined in accordance with ASTM E84. Values are reported to the nearest 5 rating.



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Availability

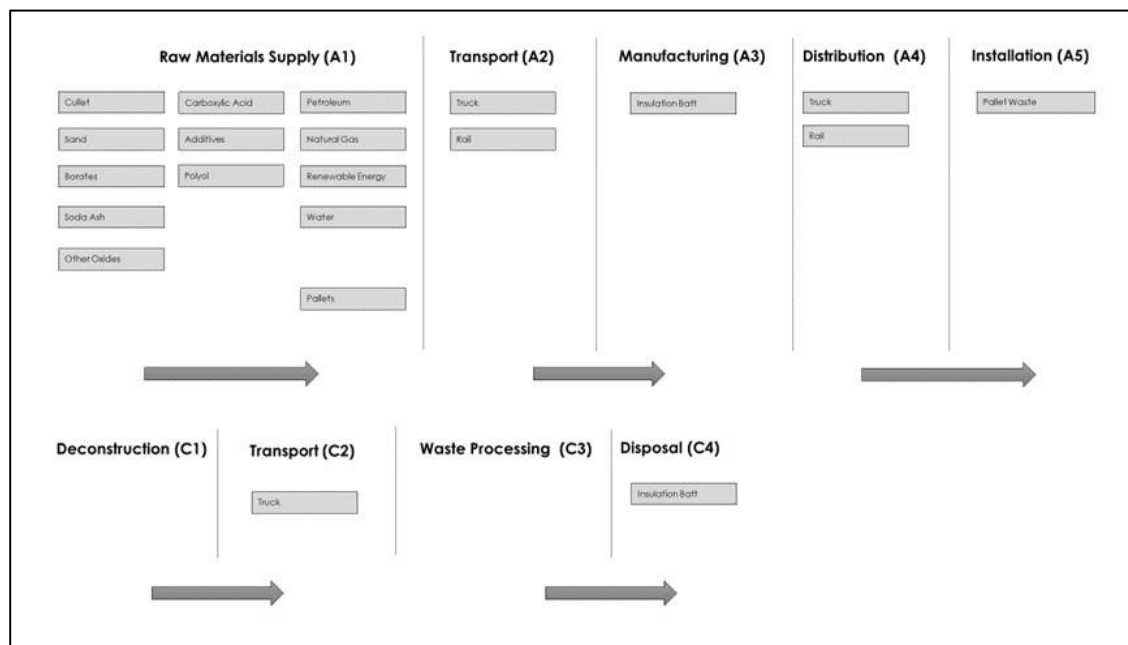
Table 2. Availability of SOFTR® Duct Wrap

NOMINAL THICKNESS		OUT OF PACKAGE R (RSI) VALUE ²		INSTALLED THICKNESS ³		INSTALLED R (RSI) VALUE ^{2,3}	
IN.	MM			IN.	MM		
Type 75 – 0.75 pcf (12 kg/m³)							
1 1/2	(38)	5.1	(0.90)	1 1/8	(29)	4.2	(0.74)
2.0	(50)	6.8	(1.17)	1 1/2	(38)	5.6	(0.98)
2.2	(56)	7.4	(1.30)	1 5/8	(42)	6.0	(1.06)
3	(76)	10.0	(1.76)	2 1/4	(57)	8.3	(1.46)
Type 100 – 1.00 pcf (16 kg/m³)							
1 1/2	(38)	5.6	(0.99)	1 1/8	(29)	4.5	(0.79)
2.0	(51)	7.4	(1.30)	1 1/2	(38)	6.0	(1.06)
Type 150 – 1.50 pcf (24 kg/m³)							
1 1/2	(38)	6.0	(1.06)	1 1/8	(29)	4.8	(0.85)
2.0	(51)	8.0	(1.41)	1 1/2	(38)	6.4	(1.13)

²hr·ft²·°F/Btu(m²·°C/W) at 75°F (24°C) mean temperature

³Assume 25% compression of insulation.

Flow Diagram



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Product Average

The results of this declaration represent an average performance for the listed products and manufacturing location. Reported area weights for included products and production locations were taken from quality control data to create a weighted average which was used to determine the functional unit mass for the LCA.

1.3. Application

SOFTR® Duct Wrap is used for the external insulation of commercial and residential heating, air conditioning and dual-temperature ducts operating at temperatures from 40°F (4°C) to 250°F (121°C). This insulation, when applied in accordance with installation instructions, will provide the “installed R-value” as published for the product and printed on the facing, assuring specified in-place thermal performance and condensation control.

It should not be used in conditions exposed to weathering or mechanical abuse without proper protection. It should not be used on the inside of ducts.

1.4. Declaration of Methodological Framework

This declaration is a product-specific EPD. It is cradle-to-gate with modules A1-A5 and end-of-life included. The LCA study included the following:

- Raw materials including extraction, production, pallets and recycle cullet
- Transportation of raw materials to the manufacturing facility
- Fiberglass manufacturing
- Finished goods transportation
- Installation in the building
- End-of-life, including transport to landfill and landfill disposal

No known flows are deliberately excluded from this EPD.

The product is expected to last for at least the 75 years reference service life if it remains clean and dry in its installed state.

1.5. Technical Requirements

Compliance

- ASTM C1290, Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts, Type III
- ASTM C1136, Flexible Low Permeance Vapor Retarders for Thermal insulation, Type II (facing only)
- ASTM C553 Mineral Fiber Thermal Insulation: Type I – Fiberglas™ Duct Wrap Type 75; Type II – SOFTR® Duct Wrap FRK Types 100 and 150. (Operating temperatures to 250°F (121°C) and thermal values to 150°F (66°C) mean.)

1.6. Properties of Declared Product as Delivered

This insulation, when applied in accordance with installation instructions, will provide the “installed R-value” as published for the product and printed on the facing, assuring specified in-place thermal performance and condensation control. Material Composition



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1.7. Material Composition

Table 3. Material Content for SOFTR® Duct Wrap

MATERIALS	FUNCTION	QUANTITY (% BY MASS)
Cullet	Glass Batch	25-75%
Sand	Glass Batch	5-50%
Borates	Glass Batch	<10%
Soda Ash	Glass Batch	<15%
Silicates	Glass Batch	<5%
Oxides	Glass Batch	<5%
Phenol Urea Formaldehyde Resin	Binder	<10%
Carboxylic Acid	Binder	<5%
Polyol	Binder	<10%
Additives	Binder	<5%
Aluminum Foil	FRK Facing (Exterior layer)	<1%
Elastomeric Polymer	FRK Facing (Barrier Coating)	<1%
Fiberglass	FRK Facing (Reinforcement)	<1%
Emulsion	FRK Facing (Adhesive)	<1%
Natural Kraft	FRK Facing (Interior layer)	<1%

1.8. Manufacturing

Owens Corning North American Insulation manufacturing locations can be found across the United States.

Waxahachie Plant
Waxahachie, TX 75165



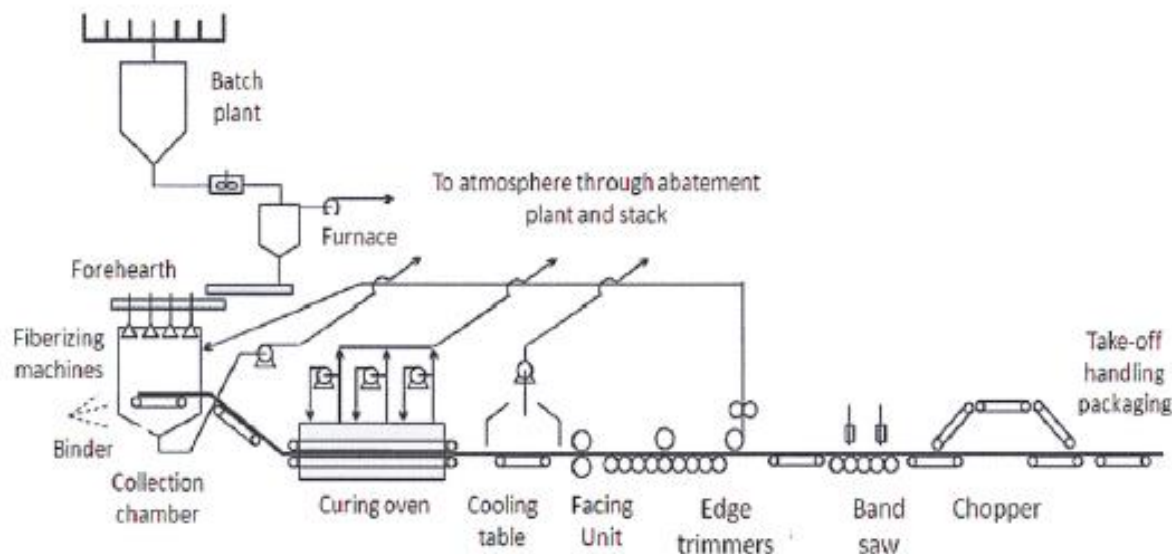
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The diagram above is representative for the manufacturing of bonded fiberglass insulation product. There are no significant process differences between locations.

1.9. Packaging

Packaging in the form of pallets was included in the analysis as a part of the overhead calculation. The weight of the other packaging materials is non-significant compared to the weight of the final product. As such, it has been excluded to reduce data collection efforts.

1.10. Transportation

The outbound transportation or distribution includes the transportation of the final product to fabrication customers by a combination of diesel semi-truck and rail. The weighted average distance from the manufacturing site to the customer is 1225 km by truck and 2210 km by rail.

1.11. Product Installation



Before applying SOFTR® Duct Wrap, ducts shall be clean, dry and tightly sealed at all joints and seams. Install in accordance with instructions so that compression is controlled.

SOFTR® Duct Wrap shall be cut to “stretch-out” dimensions and 2” (50mm) piece of duct wrap removed from the facing at the end of the piece of duct wrap to form an overlapping staple and tape flap.

Install duct wrap tightly butted with facing outside. Seams shall be stapled approximately 6” (150mm) on center with outward clinching staples. Adjacent sections of duct wrap shall be tightly butted with the 2” (50mm) tape flap overlapping.

Seal all seams and joints with a pressure-sensitive tape that matches



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the facing (either plain foil or FRK backing stock) or with glass fabric and mastic. Cloth duct tape of any color and finish using reclaimed rubber adhesives is not recommended for use on SOFTR® Duct Wrap.

The installed R-value is based on installation of product over sealed sheet metal ductwork with the average installed thickness at 75% of nominal thickness and thermal conductivity (k) at the installed compressed density as shown in Thermal Conductivity table in the product data sheet.

For additional technical information please refer to <https://www.owenscorning.com/insulation/commercial/air-distribution>

1.12. Use

Insulation is a passive device that requires no extra utilities or maintenance to operate over its useful life.

1.13. Reference Service Life and Estimated Building Service Life

The product is assumed to remain in service for the life of the building, 75 years.

1.14. Reuse, Recycling, and Energy Recovery

SOFTR® Duct Wrap can be reused if remains clean and dry. Recycling programs do not currently exist for fiberglass insulation. Small amounts of organic material are available from the binder chemicals and could be recovered for energy.

1.15. Disposal

It was assumed that all materials removed from the decommissioning of a building were taken to a local construction waste landfill, using 100 miles as the average distance to landfill.

2. Life Cycle Assessment Background Information

2.1. Functional Unit

Table 4. Functional Unit

NAME	VALUE	UNIT
Functional Unit	1 m ² of insulation material with a thickness that gives an average thermal resistance R _{SI} =1 m ² K/W	
Mass	4.33E-01	kg
Thickness to achieve Functional Unit	4.01E-02	m



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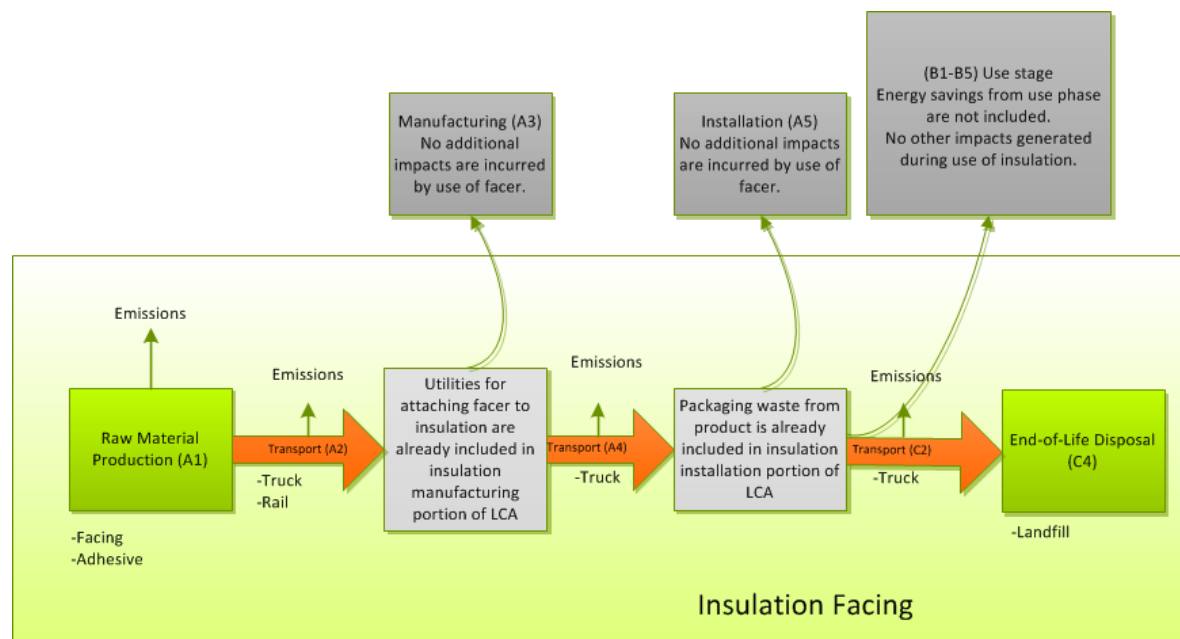
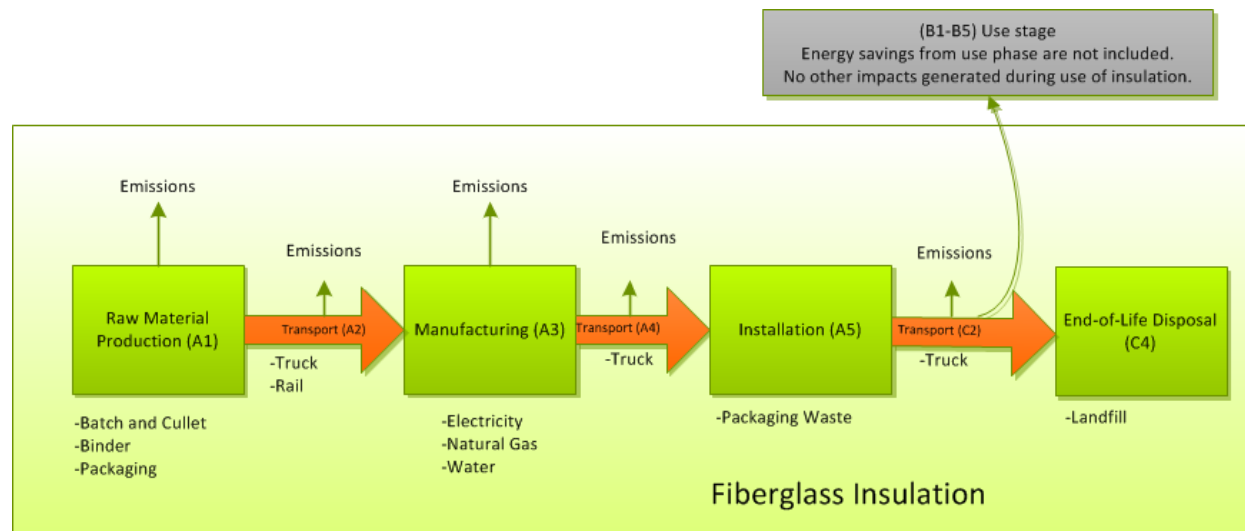
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2.2. System Boundary

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





2.3. Estimates and Assumptions

Since insulation is a passive device, it is assumed that no utility source or maintenance is needed during the use stage.

2.4. Cut-off Criteria

This LCA is in compliance with the cutoff criteria specified in the PCR. Due to the long lifetime of equipment, capital goods and infrastructure flows were excluded as having a negligible impact on the conclusions of the LCA.

Packaging in the form of pallets was included in the analysis as a part of the overhead calculation. The weight of the packaging materials is not significant compared to the weight of the final product, and previous studies of insulation products have shown the impact from the plastic packaging is not significant to the overall result. As such, it has been excluded to reduce data collection efforts.

2.5. Data Sources

Primary manufacturing data was collected from the included manufacturing locations listed in the Manufacturing section. Secondary data primarily references the ecoinvent 3.5 database and the US-LCI database.

2.6. Data Quality

Primary data was based on measured and calculated data from the Owens Corning Waxahachie plant which produced all of the product in calendar year 2014. It meets requirements for completeness along with temporal, geographical and technological representativeness. Background data was taken from the ecoinvent and US-LCI databases which are on the approved database list in the PCR.

2.7. Period under Review

Owens Corning manufacturing data is for calendar year 2014. Ecoinvent datasets were valid through 2018.

2.8. Allocation

Where it was not possible to avoid allocation, allocation was made based on production machine hours. Due to the variety of products produced at these plants, this method of allocation was deemed more appropriate by the plant engineers than allocation by product mass which is suggested by the PCR.

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3. Life Cycle Assessment Scenarios

For part of the transport to the building site, some products included truck and rail components as noted in Table 5.

Table 5. Transport to the building site (A4) for SOFTR® Duct Wrap

NAME	VALUE	UNIT
Fuel type	Low-sulfur diesel	
Liters of fuel	1.93E-03 [5.47E-04] ^R	l/100km
Vehicle type	EURO3, 16-32 metric ton lorry [US diesel freight train] ^R	
Transport distance	1.22E+03 [2.21E+03] ^R	km
Capacity utilization (including empty runs, mass based)	50	%
Gross density of products transported	1.08E+01	kg/m ³
Weight of products transported (if gross density not reported)	4.33E-01	kg
Volume of products transported (if gross density not reported)	4.01E-02	m ³
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	1	-

^R[Rail component of transport]

Table 6. Transport to the building site (A4) for Foil Reinforced Kraft Facing

NAME	VALUE	UNIT
Fuel type	Low-sulfur diesel	
Liters of fuel	4.58E-04	l/100km
Vehicle type	EURO3, 16-32 metric ton lorry	
Transport distance	1.15E+03	km
Capacity utilization (including empty runs, mass based)	50	%
Gross density of products transported	5.05E+02	kg/m ³
Weight of products transported (if gross density not reported)	1.03E-01	kg
Volume of products transported (if gross density not reported)	2.03E-04	m ³
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	1	-

Since facing is attached to SOFTR® Duct Wrap and the only impact in A5 is from pallet waste which is already reported for the insulation portion, no additional impact has been included here for the facing material.



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Table 7. Installation into the building (A5) for SOFTR® Duct Wrap

NAME	VALUE	UNIT
Ancillary materials	0.00E+00	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0.00E+00	m ³
Other resources	0.00E+00	kg
Electricity consumption	0.00E+00	kWh
Other energy carriers	0.00E+00	MJ
Product loss per functional unit	0.00E+00	kg
Waste materials at the construction site before waste processing, generated by product installation	1.75E-05	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	0.00E+00	kg
Biogenic carbon contained in packaging	0.00E+00	kg CO ₂
Direct emissions to ambient air, soil and water	0.00E+00	kg
VOC content	None detected	µg/m ³

Table 8. Reference Service Life

NAME	VALUE	UNIT
RSL	75	years
Declared product properties (at the gate) and finishes, etc.	Insulation properties require installation into a building	
Design application parameters (if instructed by the manufacturer), including references to the appropriate practices and application codes)	Install per product instructions	
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Will meet R-value. Installer should install per manufacturer instructions	
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	Not applicable – indoor application	
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure)	Product should be kept dry	
Use conditions, e.g. frequency of use, mechanical exposure.	Insulation is a passive product which is not used directly	
Maintenance, e.g. required frequency, type and quality of replacement components	None needed	

Since facing is attached to SOFTR® Duct Wrap it is part of the Reference Service Life reported above and has not been reported separately.



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Table 9. End of life (C2) for SOFTR® Duct Wrap

NAME		VALUE	UNIT
Although reuse and recycling of fiberglass insulation at its end of life are possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.			
Collection process (specified by type)	Collected separately	0.00E+00	kg
	Collected with mixed construction waste	4.33E-01	kg
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	0.00E+00	kg
	Landfill	0.00E+00	kg
	Incineration	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	0.00E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO ₂

Table 10. End of life (C4) for SOFTR® Duct Wrap

NAME		VALUE	UNIT
Although reuse and recycling of fiberglass insulation at its end of life are possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.			
Collection process (specified by type)	Collected separately	0.00E+00	kg
	Collected with mixed construction waste	0.00E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	0.00E+00	kg
	Landfill	0.00E+00	kg
	Incineration	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	4.33E-01	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO ₂



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Table 11. End of life (C2) for Foil Reinforced Kraft Facing

NAME		VALUE	UNIT
Although reuse and recycling of fiberglass insulation at its end of life are possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.			
Collection process (specified by type)	Collected separately	0.00E+00	kg
	Collected with mixed construction waste	1.03E-01	kg
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	0.00E+00	kg
	Landfill	0.00E+00	kg
	Incineration	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	0.00E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO ₂

Table 12. End of life (C4) for Foil Reinforced Kraft Facing

NAME		VALUE	UNIT
Although reuse and recycling of fiberglass insulation at its end of life are possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.			
Collection process (specified by type)	Collected separately	0.00E+00	kg
	Collected with mixed construction waste	0.00E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	0.00E+00	kg
	Landfill	0.00E+00	kg
	Incineration	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	1.03E-01	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO ₂





4. Life Cycle Assessment Results

Table 13. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT- ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X ¹	X	X ¹	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	MND

MND – Module Not Declared

¹For facing materials, for A3, since the application process is closely integrated with the insulation manufacturing process, it was not possible to separate these impacts and it is included in the insulation values. Since A5 only includes pallet waste, these impacts are already accounted for in the insulation values.

4.1. Life Cycle Impact Assessment Results

Table 14. North American Impact Assessment Results for 1 m² SOFTR® Duct Wrap at R_{SI} = 1

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	1.17E+00	1.42E-01	7.77E-05	MND	MND	1.15E-02	MND	3.25E-03
ODP [kg CFC-11 eq]	6.98E-08	3.24E-08	7.28E-12	MND	MND	2.84E-09	MND	1.22E-09
AP [kg SO ₂ eq]	4.32E-03	1.08E-03	8.03E-07	MND	MND	7.15E-05	MND	2.35E-05
EP [kg N eq]	4.19E-03	2.20E-04	1.67E-06	MND	MND	1.43E-05	MND	3.59E-06
POCP [kg O ₃ eq]	6.62E-02	3.03E-02	2.49E-05	MND	MND	1.94E-03	MND	6.65E-04
ADP _{fossil} [MJ, LHV]	1.81E+00	2.92E-01	9.71E-05	MND	MND	2.55E-02	MND	1.18E-02

[GWP – Global Warming Potential, ODP – Ozone Depletion Potential, AP – Acidification Potential, EP – Eutrophication Potential, POCP – Smog Formation Potential, ADP_{fossil} – Abiotic Depletion Potential of Non-renewable (fossil) energy resources]



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Table 15. EU Impact Assessment Results for 1 m² SOFTR® Duct Wrap at R_{SI} = 1

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	1.19E+00	1.42E-01	7.57E-05	MND	MND	1.15E-02	MND	3.29E-03
ODP [kg CFC-11 eq]	5.37E-08	2.44E-08	5.87E-12	MND	MND	2.13E-09	MND	9.14E-10
AP [kg SO ₂ eq]	3.85E-03	8.76E-04	6.13E-07	MND	MND	5.88E-05	MND	1.90E-05
EP [kg PO ₄ ⁻³ eq]	2.11E-03	2.22E-04	6.97E-07	MND	MND	1.41E-05	MND	4.33E-06
POCP [kg ethene eq]	4.01E-04	3.03E-05	2.15E-08	MND	MND	2.14E-06	MND	7.13E-07
ADP _{element} [kg Sb-eq]	7.41E-07	3.36E-07	9.92E-11	MND	MND	3.43E-08	MND	3.33E-09
ADP _{fossil} [MJ, LHV]	1.47E+01	2.06E+00	7.07E-04	MND	MND	1.76E-01	MND	7.92E-02

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

Table 16. North American Impact Assessment Results for 1 m² of Foil Reinforced Kraft Facing

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	5.09E-01	1.95E-02	MND	MND	MND	2.72E-03	MND	5.38E-04
ODP [kg CFC-11 eq]	2.73E-08	4.80E-09	MND	MND	MND	6.72E-10	MND	2.60E-10
AP [kg SO ₂ eq]	2.84E-03	1.21E-04	MND	MND	MND	1.69E-05	MND	4.71E-06
EP [kg N eq]	1.38E-03	2.42E-05	MND	MND	MND	3.38E-06	MND	1.00E-06
POCP [kg O ₃ eq]	3.60E-02	3.29E-03	MND	MND	MND	4.60E-04	MND	1.12E-04
ADP _{fossil} [MJ, LHV]	5.16E-01	4.32E-02	MND	MND	MND	6.05E-03	MND	2.41E-03

Table 17. EU Impact Assessment Results for 1 m² of Foil Reinforced Kraft Facing

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	5.16E-01	1.95E-02	MND	MND	MND	2.73E-03	MND	5.41E-04
ODP [kg CFC-11 eq]	2.08E-08	3.61E-09	MND	MND	MND	5.05E-10	MND	1.95E-10
AP [kg SO ₂ eq]	2.79E-03	9.97E-05	MND	MND	MND	1.39E-05	MND	4.08E-06
EP [kg PO ₄ ⁻³ eq]	7.56E-04	2.38E-05	MND	MND	MND	3.34E-06	MND	8.70E-07
POCP [kg ethene eq]	2.62E-04	3.62E-06	MND	MND	MND	5.07E-07	MND	2.01E-07
ADP _{element} [kg Sb-eq]	1.31E-06	5.82E-08	MND	MND	MND	8.14E-09	MND	6.10E-10
ADP _{fossil} [MJ, LHV]	5.83E+00	2.98E-01	MND	MND	MND	4.16E-02	MND	1.64E-02



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According to ISO 14025,
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4.2. Life Cycle Inventory Results

Table 18. Resource Use for 1 m² SOFTR® Duct Wrap at R_{SI} = 1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	6.90E-01	3.20E-02	1.49E-05	MND	MND	1.75E-03	MND	3.64E-04
RPR _M [MJ, LHV]	5.01E-01	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	1.59E+01	2.10E+00	7.22E-04	MND	MND	1.78E-01	MND	8.11E-02
NRPR _M [MJ, LHV]	1.21E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
SM [kg]	3.25E-01	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
FW [m ³]	1.03E-02	4.37E-04	-1.10E-06	MND	MND	3.17E-05	MND	8.97E-05

[RPR_E – Renewable primary energy used as energy carrier (fuel), RPR_M – Renewable primary resources with energy content used as material, NRPR_E – Non-renewable primary energy used as energy carrier (fuel), NRPR_M – Non-renewable primary resources with energy content used as material, SM – Secondary materials, RSF – Renewable secondary fuels, NRSF – Non-renewable secondary fuels, RE – Recovered energy, FW – Use of net fresh water resources]

Table 19. Output Flows and Waste Categories for 1 m² SOFTR® Duct Wrap at R_{SI} = 1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD [kg]	9.96E-06	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NHWD [kg]	8.69E-02	0.00E+00	1.75E-05	MND	MND	0.00E+00	MND	4.33E-01
HLRW [kg] or [m ³]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
ILLRW [kg] or [m ³]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
R [kg]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00

[HWD – Hazardous waste disposed, NHWD – Non-hazardous waste disposed, HLRW – High-level radioactive waste, conditioned, to final repository, ILLRW – Intermediate- and low-level radioactive waste, conditioned, to final repository, CRU – Components for re-use, R – Materials for recycling, MER – Materials for energy recovery, EE – Exported energy]



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According to ISO 14025,
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Table 20. Carbon Emissions and Removals for 1 m² SOFTR® Duct Wrap at R_{SI} = 1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
BCRP [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
BCEP [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
BCRK [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
BCEK [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
BCEW [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
CCE [kg CO ₂]	3.54E-07	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
CCR [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
CWNR [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00

[BCRP – Biogenic Carbon Removal from Product, BCEP – Biogenic Carbon Emission from Product, BCRK – Biogenic Carbon Removal from Packaging, BCEK – Biogenic Carbon Emission from Packaging, BCEW – Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE – Calcination Carbon Emissions, CCR – Calcination Carbon Removals, CWNR – Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes]

Table 21. Resource Use for 1 m² of Foil Reinforced Kraft Facing

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	1.65E+00	2.96E-03	MND	MND	MND	4.14E-04	MND	1.36E-04
RPR _M [MJ, LHV]	7.81E-01	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	5.70E+00	3.02E-01	MND	MND	MND	4.22E-02	MND	1.66E-02
NRPR _M [MJ, LHV]	4.29E-01	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
SM [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
FW [m ³]	5.33E-03	5.37E-05	MND	MND	MND	7.51E-06	MND	1.74E-05

Table 22. Output Flows and Waste Categories for 1 m² of Foil Reinforced Kraft Facing

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
NHWD [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	1.03E-01
HLRW [kg] or [m ³]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
ILLRW [kg] or [m ³]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
R [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
MER [kg]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00



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According to ISO 14025,
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Table 23. Carbon Emissions and Removals for 1 m² of Foil Reinforced Kraft Facing

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
BCRP [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
BCEP [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
BCRK [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
BCEK [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
BCEW [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
CCE [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
CCR [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
CWNR [kg CO ₂]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00

4.3. Environmental Impact Values for “R” Values other than the Functional Unit

Table 24. Total impact category values for 1 m² SOFTR® Duct Wrap material at various R-values

Thickness (in)	1.1	1.5	1.6	2.3
Thickness (m)	2.86E-02	3.81E-02	4.13E-02	5.72E-02
R _{SI} m ² K/W	0.74	0.98	1.06	1.46
GWP 100 [kg CO ₂ eq]	9.49E-01	1.27E+00	1.37E+00	1.90E+00
ODP [kg CFC-11 eq]	7.59E-08	1.01E-07	1.10E-07	1.52E-07
AP [kg SO ₂ eq]	3.93E-03	5.24E-03	5.68E-03	7.86E-03
EP [kg N eq]	3.17E-03	4.22E-03	4.57E-03	6.33E-03
POCP [kg O ₃ eq]	7.09E-02	9.45E-02	1.02E-01	1.42E-01
ADP _{fossil} [MJ, LHV]	1.53E+00	2.03E+00	2.20E+00	3.05E+00



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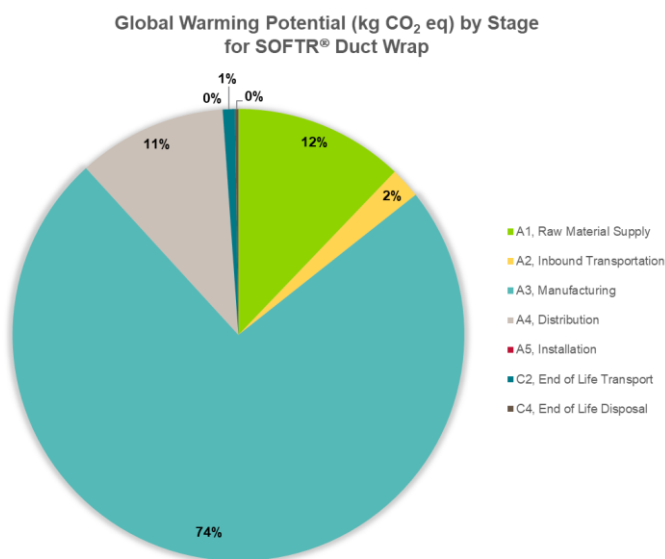
SOFTR® Duct Wrap



According to ISO 14025,
EN 15804 and ISO 21930:2017

5. LCA Interpretation

The manufacturing stage drives most of the environmental impact categories, although ozone depletion potential and smog potential are also highly influenced by the distribution stage. Manufacturing impacts are primarily driven by energy use (electricity and natural gas) for glass melting.



6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Depending on the plant facility, the following environmental equipment may be used to control emissions: electrostatic precipitator, incinerator, scrubber and/or fabric filter (baghouse).

6.2. Environment and Health During Installation

This product is considered an article. 29 CFR 1910.1200(c) definition of an article is as follows: "Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Manufactured articles which meet the definition of the Canadian Hazardous Products Act (any article that is formed to a specific shape or design during manufacture, the intended use of which when in that form is dependent in whole or in part on its shape or design, and that, when being installed, if the intended use of the article requires it to be installed, and under normal conditions of use, will not release or otherwise cause an individual to be exposed to a hazardous product) are not regulated by the Canadian Hazardous Products Regulation SOR/2015-17.

The product's Safe Use Instruction Sheet includes exposure guidelines, engineering controls and individual protection



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measures. The following individual protection measures can be considered:

- Eye/face protection – Wear safety glasses with side shields (or goggles)
- Skin and body protection – Wear protective gloves, long-sleeved shirt and long pants
- Respiratory protection – When facing airborne/dust concentration above the exposure limits, use an appropriate certified respirator. A properly fitted NIOSH approved disposable N 95 type dust respirator or better is recommended.
- General hygiene considerations – Wash hands before breaks and immediately after handling products. Remove and wash contaminated clothing before re-use.

6.3. Extraordinary Effects

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

6.4. Delayed Emissions

No delayed emissions are expected from this product.

6.5. Environmental Activities and Certifications

Certifications and Sustainable Features

- Certified by SCS Global Services to contain a minimum of 53% recycled glass content, 31% pre-consumer and 22% post-consumer.
- GREENGUARD Gold: Certified products are certified to GREENGUARD standards for low chemical emissions into indoor air during product usage.
- Health Product Declaration



6.6. Further Information

Additional information may be found at www.owenscorning.com.

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According to ISO 14025,
EN 15804 and ISO 21930:2017

7. References

- Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (December 12, 2018, version 3.2)
- Part B: Mechanical, Specialty, Thermal and Acoustic Insulation EPD Requirements, UL Environment, UL 10010-03 (September 3, 2019, version 1.0)
- ISO 14025: 2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- ISO 14040: 2006, Environmental management – Life cycle assessment – Principles and framework
- ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 14046:2013, Environmental management- Water footprint- Principles, requirements and guidelines
- ISO 15804:2012+A1:2013, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products
- ISO 21930: 2017, Sustainability in building construction -- Environmental declaration of building products
- EN 15804, Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products
- ASTM C411, Standard Test Method for hot-Surface Performance of High-Temperature Thermal Insulation
- ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- ASTM E96, Standard Test Methods for Water Vapor Transmission Materials
- ASTM C1104, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
- ASTM C1338, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
- ASTM C1290, Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts
- ASTM C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
- SCS Global Services Guideline for Claims of “Made with Renewable Energy” or “Reduced Carbon Footprint” Based on Power Purchase Agreement, February 2018

