

ENVIRONMENTAL PRODUCT DECLARATION

HEAVY DENSITY BOARD INSULATION

QUIETR® DUCT BOARD
700 SERIES FIBERGLAS™ INSULATION



Owens Corning® QuietR® Duct Board and 700 Series FIBERGLAS™ Insulation Face with ASJ Max Facing



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



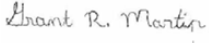

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According to ISO 14025,
EN 15804, and ISO 21930:2017

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	4788986648.101.1	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Heavy Density Board Insulation Quiet Duct Board & 700 Series Fiberglas, 1 m ² insulation at RSI=1	
REFERENCE PCR AND VERSION NUMBER	Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements, UL 10010-03	
DESCRIPTION OF PRODUCT APPLICATION/USE	Heavy Density Board Insulation for use in thermal and acoustic applications for residential and commercial installations.	
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
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

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

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

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

Newark Plant
Newark, OH 43058
Waxahachie Plant
Waxahachie, TX 75165

All varieties of product described are not produced at all locations listed.

1.2. Product Description

Product Identification

Heavy Density Insulation Boards are flexible, semi-rigid or rigid, resin bonded glass boards available in a variety of thicknesses, densities and facing options. They provide excellent thermal and acoustic insulating properties.

Product Availability

Table 1. Availability¹ of Type 703 and 705 Fiberglass Insulation

PROPERTY	DIMENSION
Width	45" – 49" (1,143.0mm – 1,244.6mm)
Length	24" – 121" (609.6mm – 3,073.4mm)
Thickness	703: ¾" – 4" (19.05mm – 101.6 mm) 705: ½" – 2½" (12.7mm – 63.5mm)

¹Minimum order requirements and lead-time contingent upon size.

Table 2. Availability of Owens Corning® QuietR® Duct Board

TYPE	THICKNESS	DENSITY, PCF (KG/M ³)
Type 475	1" (25mm)	4.4 (70)
Type 800	1½" (38mm)	3.8 (61)
Type 1400	2" (51mm)	3.8 (61)

Type designates board stiffness defined by flexural rigidity. Type selection depends on duct size, pressure and reinforcement schedule. The 1½" (38mm) and 2" (51mm) thickness provide superior thermal performance.



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Product Specification

Table 3. Physical Properties of Type 703 and 705 Fiberglass Insulation

PROPERTY	TEST METHOD	VALUE
Density	ASTM C303	Type: 703: 3.0 pcf (48 kg/m ³) Type: 705: 6.0 pcf (96 kg/m ³)
Equipment Operating Temperature Limitation ²	ASTM C411	0 to 450°F (-18 to 232°C)
Insulation Jacket Temperature Limitation	ASTM C1136	-20 to 150°F (-29 to 66°C)
Jacket Permeance	ASTM E96, Proc. A	0.02 perm
Jacket Burst Strength	ASTM D774	ASJ Max: 100 psi
Compressive Strength (minimum) at 10% deformation at 25% deformation	ASTM C165	703 Board 25 lb/ft ² (1197 Pa) 90 lb/ft ² (4309 Pa)
Water Vapor Sorption	ASTM C1104	<2% by weight at 120°F (49°C), 95% R.H.
Surface burning characteristics ³	UL 723, ASTM E84 or CAN/ULC S102	FACED: Flame Spread Index 25 Smoke Developed Index 50 UNFACED: Flame Spread Index 5 Smoke Developed Index 5

²Maximum thickness at 450°F (232°C) – 703 and 705: 4" (102 mm)

³The surface burning characteristics of this product have been determined in accordance with UL 723, ASTM E84 or CAN/ULC S102. Values are reported to the nearest 5 rating.

Table 4. Physical Properties of Owens Corning® QuietR® Duct Board

PROPERTY	TEST METHOD	VALUE
Maximum operating temperature limits	UL 181/ULC S110	Internal: 250°F (121°C) External: 150°F (66°C)
Maximum air velocity	UL 181/ULC S110 Erosion test	6,000 fpm (30.5 m/s)
Static pressure limit	UL 181/ULC S110	±2 in. w.g. (500 Pa)
Water vapor sorption	ASTM C 1104	<3% by weight at 120°F (49°C), 95% R.H.
Mold growth	UL 181/ULC S110	Meets requirements
Fungi resistance	ASTM G21	Meets requirements
Bacteria resistance	ASTM G22	Meets requirements
Surface burning characteristics ¹ Flame spread Smoke developed	UL 723/ULC S102	<25 ¹ <50
Fire retardancy	UL 181/ULC S110	Flame penetration 30 min.

¹The surface burning characteristics of this product have been determined in accordance with UL 723/ULC S102. The standard should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest 5 rating.

Additional product information available on www.owenscorning.com



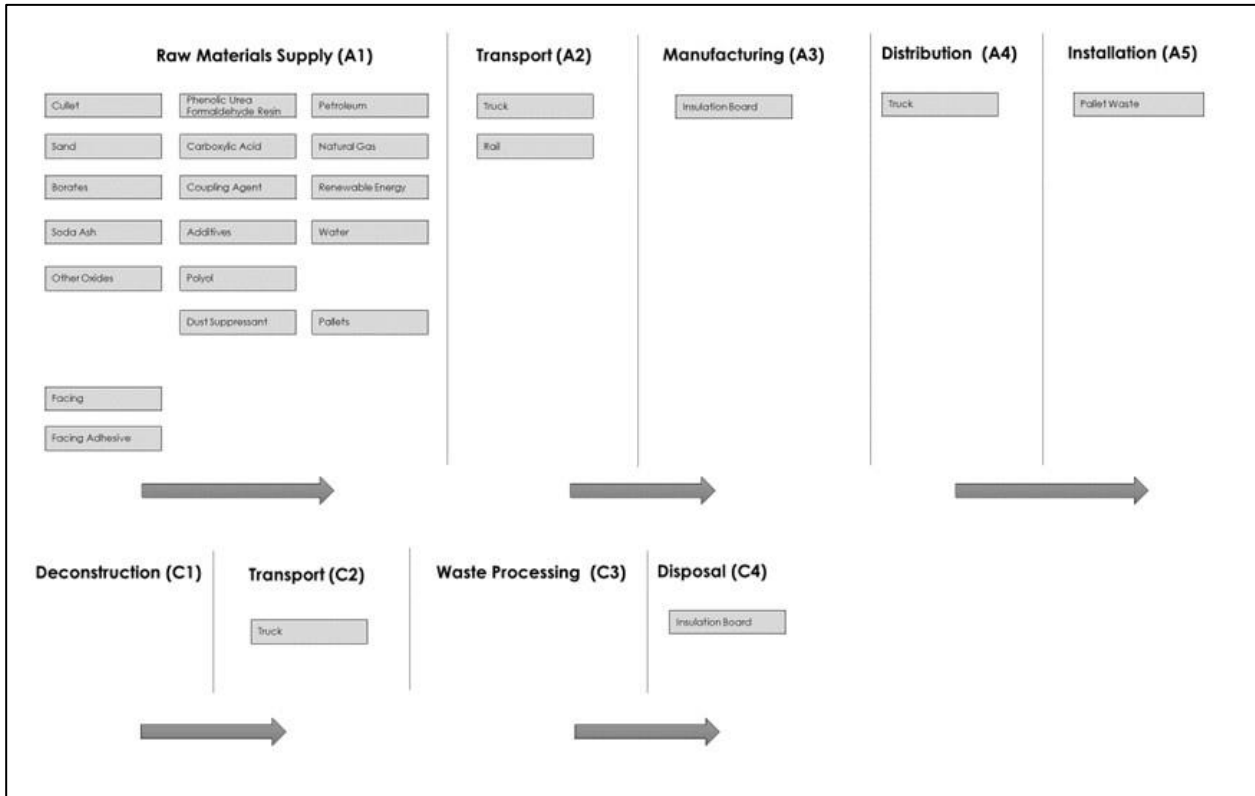
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Flow Diagram



Product Average

The results of this declaration represent an average performance for the listed products and manufacturing locations. 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.



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1.3. Application

Fiberglas™ 700 Series Board

Type 701 – Lightweight, resilient, flexible insulation in batt or blanket form, used on mechanical equipment with irregular surfaces where compressive strength is not a performance issue and where an exterior finish will be supported mechanically.

Type 703 – Semi-rigid boards for use on mechanical equipment, storage tanks and air conditioning ductwork.

Type 705 – A high-strength, rigid board for use on chillers, hot and cold equipment, and heating and air conditioning ductwork where high abuse resistance and good appearance are required.

Type 706 & 707 – Insulation for use in acoustical wall panels and specialized ceiling applications.

Types 703 and 705 are available with factory-applied FRK (foil reinforced kraft) or ASJ Max facings. Both facings are vapor retarders and provide finished appearance in mechanical applications.

QuietR® Duct Board

QuietR® Duct Board features a durable mat airstream surface that isolates the glass fiber substrate from the airstream and inhibits penetration of the insulation by dirt, dust and other pollutants. The thermal/acoustic insulation board plus jacket forms a single component duct system, reducing inspection time. When properly installed, it virtually eliminates air leaks, saving energy and removing the need for system overdesign. Lightweight boards are easy to transport and handle, and feature an EPA registered biocide that protects the air stream surface from microbial growth.

QuietR® Duct Board is used to fabricate components for indoor commercial and residential heating, ventilating and air conditioning duct systems operating at static pressures to ± 2 in. w.g. (500 Pa), internal air temperatures 40°F (4°C) to 250°F (121°C), and air velocity rating of 6,000 fpm (30.5 m/s). Straight duct sections, elbows, tees, offsets and other system elements can quickly and easily be fabricated at the shop or on the job and assembled into a complete air transmission system.



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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

Fiberglas™ 700 Series Board

- ASTM C612, Mineral Fiber Block & Board Thermal Insulation, Types IA, IB – Types 703 and 705
- ASTM C795, Thermal Insulation For Use Over Austenitic Stainless Steel⁴
- ASTM C1136, Flexible Low Permeance Vapor Retarders for Thermal Insulation, Type I: ASJ Max; Type II: FRK
- Nuclear Regulatory Commission Guide 1.36, Non-Metallic Thermal Insulation⁴
- Doesn't contain the fire retardant decabrominated diphenyl ether (decaBDE)
- CAN/CGSB-51.10 – Type I, Class I – Type 703
- NFPA 90A and 90B
- California Insulation Quality Standards CA-T052

⁴Preproduction qualification testing complete and on file. Chemical analysis of each production lot required for total conformance. Certification needs to be specified at the time of order.

QuietR® Duct Board

- Meets UL 181 Class 1 Air Ducts
- Meets NFPA 90A/90B
- Meets ICC International Mechanical Code, Corps of Engineers Guide Spec.
- Supported by NAIMA and SMACNA industry standards

1.6. Properties of Declared Product as Delivered

When installed in typical building and construction assemblies according to all applicable Owens Corning specifications, recommendation and guidelines, Heavy Density Board Insulation delivers its advertised R-value.



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1.7. Material Composition

700 Series FIBERGLAS™ Insulation consists of two major components, the glass fiber, and the binder system. The glass fiber is made from various inorganic minerals, which are referred to as batch chemicals. The binder system consists of non-renewable organic materials.

MATERIALS	FUNCTION	QUANTITY (% BY MASS)
Cullet	Glass Batch	45-48%
Sand	Glass Batch	14-17%
Borates	Glass Batch	10-13%
Soda Ash	Glass Batch	3-6%
Silicates	Glass Batch	0-3%
Other Oxides	Glass Batch	<1%
Phenol Urea Formaldehyde Resin	Binder	5-12%
Dust Suppressant	Binder	<1%
Coupling Agent	Binder	<1%
Carboxylic Acid Additive	Binder	<1%

700 Series FIBERGLAS™ Insulation is available with two factory-applied facing options: FRK (foil reinforced kraft) and ASJ Max (All-Service Jacket Max).

MATERIAL	FUNCTION	QUANTITY (% BY MASS)
FRK Facing		
Aluminum Foil	Exterior layer	15-18%
Elastomeric Polymer	Barrier Coating	11-14%
Fiberglass Mat	Reinforcement	17-20%
Emulsion	Adhesive	11-14%
Natural Kraft	Interior layer	46-49%
ASJ Max Facing		
Polymer Film	Exterior layer	25-28%
Proprietary	Core	37-40%
Fiberglass Mat	Reinforcement	22-25%
Aluminum Foil	Interior layer	10-13%



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QuietR® Duct Board insulation consists of the glass fiber, binder system, an FRK (Foil Reinforced Kraft) facing, and nonwoven airstream mat. The glass fiber is made from various inorganic materials, which are referred to as batch chemicals, and are adhered with the non-renewable binder materials.

MATERIALS	FUNCTION	QUANTITY (% BY MASS)
Cullet	Glass Batch	25-75%
Sand	Glass Batch	5-50%
Borates	Glass Batch	<5%
Other Oxides	Glass Batch	<5%
Phenol Urea Formaldehyde Resin	Binder	10-30%
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%
Fiberglass Mat	Airstream surface	<1%

1.8. Manufacturing

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

Newark Plant Newark, OH 43058
Waxahachie Plant Waxahachie, TX 75165

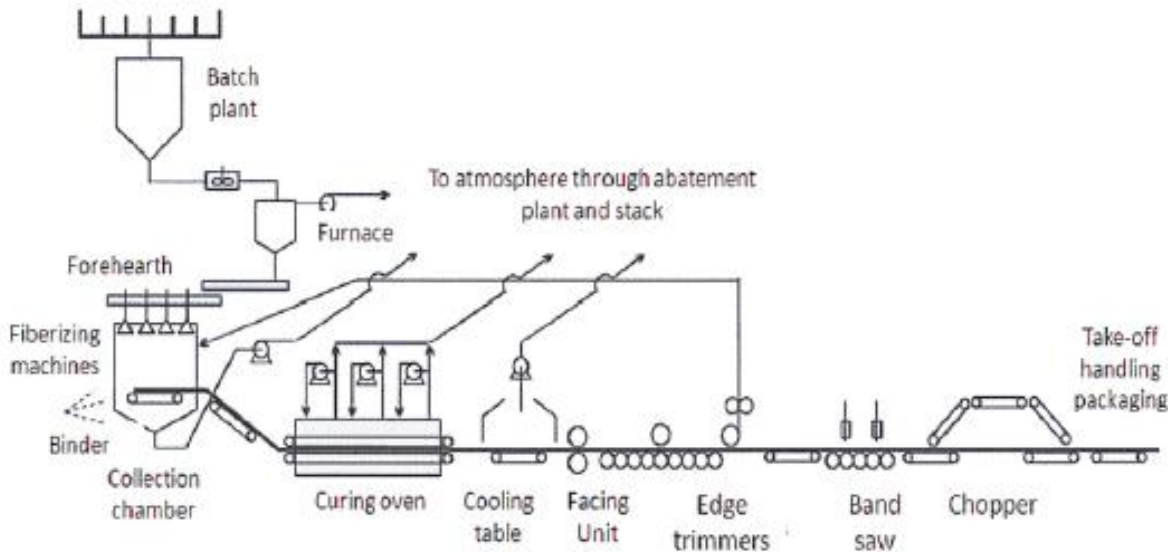


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The diagram above is representative for the manufacturing of bonded fiberglass insulation product. There are no significant process differences between locations.

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 customers by a combination of diesel semi-truck and rail. The weighted average distance from the manufacturing site to the customer is for Fiberglas™ 700 Series Insulation is 1151 km by truck; for QuietR® Duct Board is a combination of 1207 km by truck and 2076 km by rail.

1.11. Product Installation

Fiberglas™ 700 Series Board

700 Series FIBERGLAS™ Insulation is made for easy handling and installation. As a semi-rigid product that is easy to cut and install, its flexibility allows it to conform to building shapes and construction irregularities.

Types 703 and 705 are board insulations usually impaled over weld pins on flat surfaces. They are cut in segments and banded in place on irregular surfaces.

Find detailed installation instructions at www.owenscorning.com/insulation/commercial



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QuietR® Duct Board

Fabrication and installation of fiberglass Duct Systems shall be in accordance with the UL listing and shall conform to Owens Corning's published methods and/or latest editions of NAIMA (North American Insulation Manufacturers Association) Fibrous Glass Duct Construction Standards or SMACNA (Sheet Metal and Air Conditioning Contractors National Association) Fibrous Glass Duct Construction Standards. One of the following closure methods must be employed to meet the requirements of UL 181/ULC S110.

- Pressure-Sensitive Tape
- Heat-Activated Tape
- Mastic and Glass Fabric

For additional technical information, please visit www.owenscorning.com/insulation/commercial/air-distribution Use Insulation is a passive device that requires no extra utilities or maintenance to operate over its useful life.

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

Heavy Density Board Insulation 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 5. Functional Unit for Heavy Density Board Insulation

NAME	700 SERIES INSULATION	QUIETR® DUCT BOARD	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	2.53E+00	2.09E+00	kg
Thickness to achieve Functional Unit	3.49E-02	3.36E-02	m



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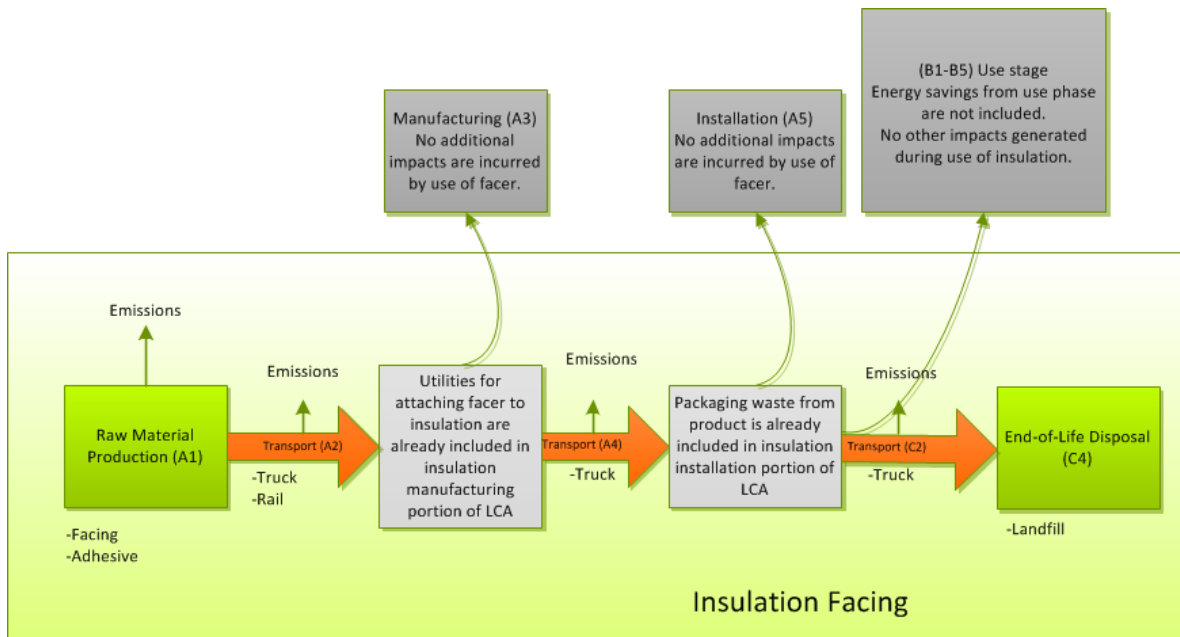
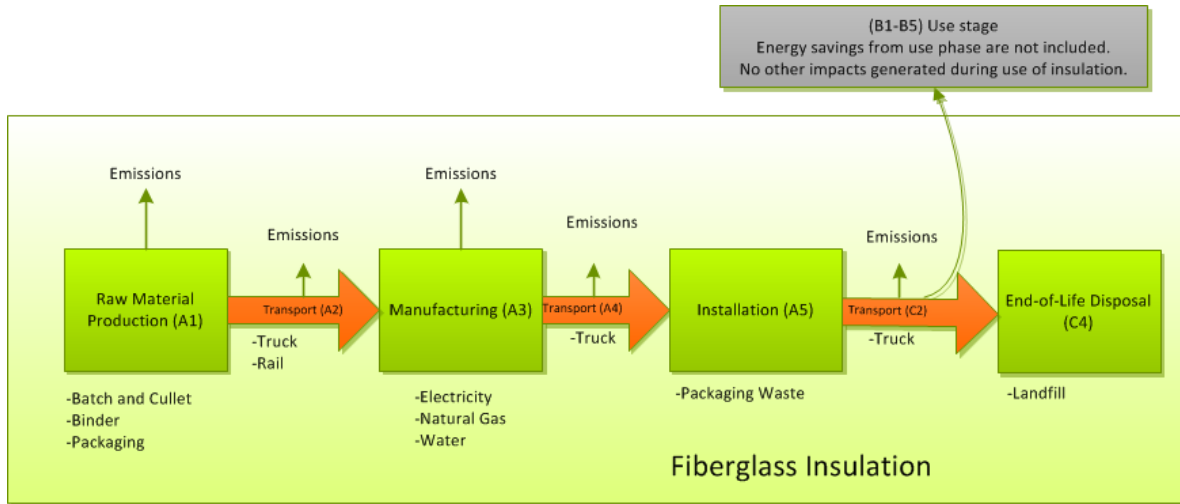


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2.2. System Boundary

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



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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 North American Owens Corning plants 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

Table 6. Transport to the building site (A4) for Heavy Density Board Insulation

NAME	700 SERIES INSULATION	QUIETR® DUCT BOARD	UNIT
Fuel type	Low-sulfur diesel	Low-sulfur diesel	
Liters of fuel	1.13E-02	9.33E-03 [2.64E-03] ^R	l/100km
Vehicle type	EURO3, 16-32 metric ton lorry	EURO3, 16-32 metric ton lorry [US diesel freight train] ^R	
Transport distance	1.13E+03	1.21E+03 [2.08E+03] ^R	km
Capacity utilization (including empty runs, mass based)	50	50	%
Gross density of products transported	7.25E+01	6.22E+01	kg/m ³
Weight of products transported (if gross density not reported)	2.53E+00	2.09E+00	kg
Volume of products transported (if gross density not reported)	3.49E-02	3.36E-02	m ³
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	1	1	-

^R[Rail component of transport]

Table 7. Transport to the building site (A4) for Facings

NAME	FOIL REINFORCED KRAFT FACING	ASJ-MAX FACING	FIBERGLASS AIR STREAM MAT	UNIT
Fuel type	Low-sulfur diesel	Low-sulfur diesel	Low-sulfur diesel	
Liters of fuel	4.58E-04	7.20E-04	2.77E-04	l/100km
Vehicle type	EURO3, 16-32 metric ton lorry	EURO3, 16-32 metric ton lorry	EURO3, 16-32 metric ton lorry	
Transport distance	1.15E+03	1.15E+03	1.95E+03	km
Capacity utilization (including empty runs, mass based)	50	50	50	%
Gross density of products transported	5.05E+02	7.03E+02	1.03E+02	kg/m ³
Weight of products transported (if gross density not reported)	1.03E-01	1.61E-01	6.20E-02	kg
Volume of products transported (if gross density not reported)	2.03E-04	2.29E-04	6.00E-04	m ³
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	1	1	1	-



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Table 8. Installation into the building (A5) for Heavy Density Board Insulation

NAME	700 SERIES INSULATION	QUIETR® DUCT BOARD	UNIT
Ancillary materials	0.00E+00	0.00E+00	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0.00E+00	0.00E+00	m ³
Other resources	0.00E+00	0.00E+00	kg
Electricity consumption	0.00E+00	0.00E+00	kWh
Other energy carriers	0.00E+00	0.00E+00	MJ
Product loss per functional unit	0.00E+00	0.00E+00	kg
Waste materials at the construction site before waste processing, generated by product installation	1.85E-06	7.47E-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	0.00E+00	kg
Biogenic carbon contained in packaging	0.00E+00	0.00E+00	kg CO ₂
Direct emissions to ambient air, soil and water	0.00E+00	0.00E+00	kg
VOC content	<0.001 ¹	<0.001 ¹	g/l

¹VOC content determined in accordance to "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers- version1.2". CA Specification 01350.

Since facing is attached to Heavy Density Insulation Board 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.

Table 9. Reference Service Life

NAME	700 SERIES INSULATION	QUIETR® DUCT BOARD	UNIT
RSL	75	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 Heavy Density Insulation Board it is part of the Reference Service Life reported above and has not been reported separately.



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Table 10. End of life (C2) for Heavy Density Board Insulation

NAME		700 SERIES INSULATION	QUIETR® DUCT BOARD	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	0.00E+00	kg
	Collected with mixed construction waste	2.53E+00	2.09E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	0.00E+00	kg
	Recycling	0.00E+00	0.00E+00	kg
	Landfill	0.00E+00	0.00E+00	kg
	Incineration	0.00E+00	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	0.00E+00	0.00E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	0.00E+00	kg CO ₂

Table 11. End of life (C4) for Heavy Density Board Insulation

NAME		700 SERIES INSULATION	QUIETR® DUCT BOARD	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	0.00E+00	kg
	Collected with mixed construction waste	0.00E+00	0.00E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	0.00E+00	kg
	Recycling	0.00E+00	0.00E+00	kg
	Landfill	0.00E+00	0.00E+00	kg
	Incineration	0.00E+00	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	2.53E+00	2.09E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	0.00E+00	kg CO ₂



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

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

Table 12. End of life (C2) for Facings

NAME		FOIL REINFORCED KRAFT FACING	ASJ-MAX FACING	FIBERGLASS AIR STREAM MAT	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	0.00E+00	0.00E+00	kg
	Collected with mixed construction waste	1.03E-01	1.61E-01	6.20E-02	kg
Recovery (specified by type)	Reuse	0.00E+00	0.00E+00	0.00E+00	kg
	Recycling	0.00E+00	0.00E+00	0.00E+00	kg
	Landfill	0.00E+00	0.00E+00	0.00E+00	kg
	Incineration	0.00E+00	0.00E+00	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	0.00E+00	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	0.00E+00	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	0.00E+00	0.00E+00	0.00E+00	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	0.00E+00	0.00E+00	kg CO ₂

Table 13. End of life (C4) for Facings

NAME		FOIL REINFORCED KRAFT FACING	ASJ-MAX FACING	FIBERGLASS AIR STREAM MAT	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	0.00E+00	0.00E+00	kg
	Collected with mixed construction waste	0.00E+00	0.00E+00	0.00E+00	kg
Recovery (specified by type)	Reuse	0.00E+00	0.00E+00	0.00E+00	kg
	Recycling	0.00E+00	0.00E+00	0.00E+00	kg
	Landfill	0.00E+00	0.00E+00	0.00E+00	kg
	Incineration	0.00E+00	0.00E+00	0.00E+00	kg
	Incineration with energy recovery	0.00E+00	0.00E+00	0.00E+00	kg
	Energy conversion efficiency rate	0.00E+00	0.00E+00	0.00E+00	
Disposal (specified by type)	Product or material for final deposition	1.03E-01	1.61E-01	6.20E-02	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	0.00E+00	0.00E+00	kg CO ₂



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

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

4. Life Cycle Assessment Results

Table 14. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X 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 15. North American Impact Assessment Results for 1m² of 700 Series FIBERGLAS™ Insulation at R_{SI}=1

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	5.44E+00	4.80E-01	8.61E-06	MND	MND	6.72E-02	MND	1.33E-02
ODP [kg CFC-11 eq]	5.27E-07	1.19E-07	8.07E-13	MND	MND	1.66E-08	MND	6.41E-09
AP [kg SO ₂ eq]	2.53E-02	2.99E-03	8.89E-08	MND	MND	4.18E-04	MND	1.16E-04
EP [kg N eq]	2.80E-02	5.97E-04	1.85E-07	MND	MND	8.35E-05	MND	2.48E-05
POCP [kg O ₃ eq]	2.55E-01	8.11E-02	2.76E-06	MND	MND	1.13E-02	MND	2.76E-03
ADP _{fossil} [MJ, LHV]	8.94E+00	1.07E+00	1.08E-05	MND	MND	1.49E-01	MND	5.96E-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]



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
 QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

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

Table 16. EU Impact Assessment Results for 1m² of 700 Series FIBERGLAS™ Insulation at R_{SI}=1

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	5.53E+00	4.82E-01	8.39E-06	MND	MND	6.74E-02	MND	1.34E-02
ODP [kg CFC-11 eq]	4.19E-07	8.92E-08	6.50E-13	MND	MND	1.25E-08	MND	4.82E-09
AP [kg SO ₂ eq]	2.37E-02	2.46E-03	6.79E-08	MND	MND	3.44E-04	MND	1.01E-04
EP [kg PO ₄ ⁻³ eq]	1.38E-02	5.89E-04	7.72E-08	MND	MND	8.23E-05	MND	2.15E-05
POCP [kg ethene eq]	1.36E-03	8.94E-05	2.38E-09	MND	MND	1.25E-05	MND	4.96E-06
ADP _{element} [kg Sb-eq]	5.88E-06	1.44E-06	1.10E-11	MND	MND	2.01E-07	MND	1.51E-08
ADP _{fossil} [MJ, LHV]	7.60E+01	7.35E+00	7.83E-05	MND	MND	1.03E+00	MND	4.05E-01

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

Table 17. North American Impact Assessment Results for 1 m² of Owens Corning® QuietR® Duct Board at R_{SI}=1

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	6.22E+00	6.63E-01	3.48E-04	MND	MND	5.55E-02	MND	1.10E-02
ODP [kg CFC-11 eq]	5.40E-07	1.52E-07	3.26E-11	MND	MND	1.37E-08	MND	5.30E-09
AP [kg SO ₂ eq]	2.42E-02	5.04E-03	3.59E-06	MND	MND	3.46E-04	MND	9.60E-05
EP [kg N eq]	2.26E-02	1.02E-03	7.49E-06	MND	MND	6.90E-05	MND	2.05E-05
POCP [kg O ₃ eq]	3.58E-01	1.41E-01	1.11E-04	MND	MND	9.37E-03	MND	2.28E-03
ADP _{fossil} [MJ, LHV]	1.13E+01	1.37E+00	4.34E-04	MND	MND	1.23E-01	MND	4.92E-02

Table 18. EU Impact Assessment Results for 1 m² of Owens Corning® QuietR® Duct Board at R_{SI}=1

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	6.33E+00	6.65E-01	3.39E-04	MND	MND	5.57E-02	MND	1.10E-02
ODP [kg CFC-11 eq]	4.22E-07	1.14E-07	2.63E-11	MND	MND	1.03E-08	MND	3.98E-09
AP [kg SO ₂ eq]	2.17E-02	4.08E-03	2.74E-06	MND	MND	2.84E-04	MND	8.32E-05
EP [kg PO ₄ ⁻³ eq]	1.15E-02	1.03E-03	3.12E-06	MND	MND	6.80E-05	MND	1.77E-05
POCP [kg ethene eq]	2.12E-03	1.41E-04	9.60E-08	MND	MND	1.03E-05	MND	4.10E-06
ADP _{element} [kg Sb-eq]	7.60E-06	1.58E-06	4.43E-10	MND	MND	1.66E-07	MND	1.24E-08
ADP _{fossil} [MJ, LHV]	8.61E+01	9.66E+00	3.16E-03	MND	MND	8.49E-01	MND	3.35E-01



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
 QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

According to ISO 14025,
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Table 19. 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 20. 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

Table 21. North American Impact Assessment Results for 1 m² of ASJ-Max Facing

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	6.21E-01	3.06E-02	MND	MND	MND	4.28E-03	MND	8.45E-04
ODP [kg CFC-11 eq]	3.27E-08	7.55E-09	MND	MND	MND	1.06E-09	MND	4.08E-10
AP [kg SO ₂ eq]	3.37E-03	1.90E-04	MND	MND	MND	2.66E-05	MND	7.40E-06
EP [kg N eq]	1.66E-03	3.80E-05	MND	MND	MND	5.31E-06	MND	1.58E-06
POCP [kg O ₃ eq]	4.43E-02	5.16E-03	MND	MND	MND	7.22E-04	MND	1.76E-04
ADP _{fossil} [MJ, LHV]	8.66E-01	6.79E-02	MND	MND	MND	9.50E-03	MND	3.79E-03



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 QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

According to ISO 14025,
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Table 22. EU Impact Assessment Results for 1 m² of ASJ-Max Facing

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	6.30E-01	3.07E-02	MND	MND	MND	4.29E-03	MND	8.51E-04
ODP [kg CFC-11 eq]	2.46E-08	5.68E-09	MND	MND	MND	7.94E-10	MND	3.07E-10
AP [kg SO ₂ eq]	3.28E-03	1.57E-04	MND	MND	MND	2.19E-05	MND	6.42E-06
EP [kg PO ₄ ⁻³ eq]	9.21E-04	3.75E-05	MND	MND	MND	5.24E-06	MND	1.37E-06
POCP [kg ethene eq]	1.84E-04	5.70E-06	MND	MND	MND	7.97E-07	MND	3.16E-07
ADP _{element} [kg Sb-eq]	1.58E-06	9.15E-08	MND	MND	MND	1.28E-08	MND	9.59E-10
ADP _{fossil} [MJ, LHV]	8.40E+00	4.68E-01	MND	MND	MND	6.54E-02	MND	2.58E-02

Table 23. North American Impact Assessment Results for 1 m² of Owens Corning Fiberglass Air Stream Surface Facing

TRACI v2.1	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	2.89E-01	1.99E-02	MND	MND	MND	1.65E-03	MND	7.43E-04
ODP [kg CFC-11 eq]	4.02E-08	4.92E-09	MND	MND	MND	4.06E-10	MND	3.59E-10
AP [kg SO ₂ eq]	7.72E-04	1.24E-04	MND	MND	MND	1.03E-05	MND	6.51E-06
EP [kg N eq]	6.85E-04	2.47E-05	MND	MND	MND	2.05E-06	MND	1.39E-06
POCP [kg O ₃ eq]	1.38E-02	3.36E-03	MND	MND	MND	2.78E-04	MND	1.55E-04
ADP _{fossil} [MJ, LHV]	5.25E-01	4.43E-02	MND	MND	MND	3.66E-03	MND	3.33E-03

Table 24. EU Impact Assessment Results for 1 m² of Owens Corning Fiberglass Air Stream Surface Facing

CML v4.7	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	2.92E-01	2.00E-02	MND	MND	MND	1.65E-03	MND	7.48E-04
ODP [kg CFC-11 eq]	3.28E-08	3.70E-09	MND	MND	MND	3.06E-10	MND	2.70E-10
AP [kg SO ₂ eq]	6.63E-04	1.02E-04	MND	MND	MND	8.43E-06	MND	5.64E-06
EP [kg PO ₄ ⁻³ eq]	3.52E-04	2.44E-05	MND	MND	MND	2.02E-06	MND	1.20E-06
POCP [kg ethene eq]	3.74E-05	3.71E-06	MND	MND	MND	3.07E-07	MND	2.78E-07
ADP _{element} [kg Sb-eq]	1.77E-07	5.96E-08	MND	MND	MND	4.92E-09	MND	8.43E-10
ADP _{fossil} [MJ, LHV]	3.79E+00	3.05E-01	MND	MND	MND	2.52E-02	MND	2.27E-02



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

According to ISO 14025,
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4.2. Life Cycle Inventory Results

Table 25. Resource Use for 1m² of 700 Series FIBERGLAS™ Insulation at R_{SI}=1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	1.54E+00	7.30E-02	1.65E-06	MND	MND	1.02E-02	MND	3.36E-03
RPR _M [MJ, LHV]	3.29E-02	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	7.10E+01	7.44E+00	7.99E-05	MND	MND	1.04E+00	MND	4.11E-01
NRPR _M [MJ, LHV]	1.94E+01	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
SM [kg]	1.71E+00	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]	3.71E-02	1.33E-03	-1.22E-07	MND	MND	1.85E-04	MND	4.28E-04

[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 26. Output Flows and Waste Categories for 1m² of 700 Series FIBERGLAS™ Insulation at R_{SI}=1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD [kg]	1.12E-04	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NHWD [kg]	2.39E-01	0.00E+00	1.85E-06	MND	MND	0.00E+00	MND	2.53E+00
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]



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

According to ISO 14025,
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Table 27. Carbon Emissions and Removals for 1m² of 700 Series FIBERGLAS™ Insulation 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]	6.84E-05	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 28. Resource Use for 1 m² of Owens Corning® QuietR® Duct Board at R_{SI}=1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	4.03E+00	1.48E-01	6.67E-05	MND	MND	8.44E-03	MND	2.78E-03
RPR _M [MJ, LHV]	7.48E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	7.38E+01	9.84E+00	3.23E-03	MND	MND	8.60E-01	MND	3.39E-01
NRPR _M [MJ, LHV]	1.89E+01	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
SM [kg]	1.61E+00	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]	8.18E-02	2.04E-03	-4.92E-06	MND	MND	1.53E-04	MND	3.54E-04

Table 29. Output Flows and Waste Categories for 1 m² of Owens Corning® QuietR® Duct Board at R_{SI}=1

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HWD [kg]	7.24E-05	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00
NHWD [kg]	3.71E-01	0.00E+00	7.47E-05	MND	MND	0.00E+00	MND	2.09E+00
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



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Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

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

Table 30. Carbon Emissions and Removals for 1 m² of Owens Corning® QuietR® Duct Board 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]	0.00E+00	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

Table 31. 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 32. 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 33. 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

Table 34. Resource Use for 1 m² of ASJ-Max Facing

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	2.06E+00	4.65E-03	MND	MND	MND	6.51E-04	MND	2.14E-04
RPR _M [MJ, LHV]	9.92E-01	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	7.17E+00	4.74E-01	MND	MND	MND	6.63E-02	MND	2.62E-02
NRPR _M [MJ, LHV]	1.76E+00	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]	7.48E-03	8.44E-05	MND	MND	MND	1.18E-05	MND	2.73E-05

Table 35. Output Flows and Waste Categories for 1 m² of ASJ-Max 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	1.61E-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 36. Carbon Emissions and Removals for 1 m² of ASJ-Max 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

Table 37. Resource Use for 1 m² of Owens Corning Fiberglass Air Stream Surface Facing

PARAMETER	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	6.97E-02	3.03E-03	MND	MND	MND	2.50E-04	MND	1.88E-04
RPR _M [MJ, LHV]	0.00E+00	0.00E+00	MND	MND	MND	0.00E+00	MND	0.00E+00
NRPR _E [MJ, LHV]	4.62E+00	3.09E-01	MND	MND	MND	2.55E-02	MND	2.30E-02
NRPR _M [MJ, LHV]	8.94E-03	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]	1.13E-01	5.50E-05	MND	MND	MND	4.55E-06	MND	2.40E-05

Table 38. Output Flows and Waste Categories for 1 m² of Owens Corning Fiberglass Air Stream Surface 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	6.20E-02
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 39. Carbon Emissions and Removals for 1 m² of Owens Corning Fiberglass Air Stream Surface 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 40. Total impact category values for 1m² of 700 Series FIBERGLAS™ Insulation at various R-values

Thickness (in)	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Thickness (m)	2.54E-02	3.81E-02	5.08E-02	6.35E-02	7.62E-02	8.89E-02	1.02E-01
R _{SI} m ² K/W	0.73	1.09	1.46	1.82	2.18	2.55	2.91
GWP 100 [kg CO ₂ eq]	4.37E+00	6.55E+00	8.74E+00	1.09E+01	1.31E+01	1.53E+01	1.75E+01
ODP [kg CFC-11 eq]	4.87E-07	7.30E-07	9.73E-07	1.22E-06	1.46E-06	1.70E-06	1.95E-06
AP [kg SO ₂ eq]	2.10E-02	3.15E-02	4.20E-02	5.25E-02	6.30E-02	7.35E-02	8.40E-02
EP [kg N eq]	2.09E-02	3.13E-02	4.17E-02	5.21E-02	6.26E-02	7.30E-02	8.34E-02
POCP [kg O ₃ eq]	2.55E-01	3.82E-01	5.10E-01	6.37E-01	7.65E-01	8.92E-01	1.02E+00
ADP _{fossil} [MJ, LHV]	7.44E+00	1.12E+01	1.49E+01	1.86E+01	2.23E+01	2.60E+01	2.98E+01

Table 41. Total impact category values for 1 m² of Owens Corning® QuietR® Duct Board Insulation at various R-values

Thickness (in)	1.0	1.5	2.0
Thickness (m)	2.54E-02	3.81E-02	5.08E-02
R _{SI} m ² K/W	0.73	1.09	1.46
GWP 100 [kg CO ₂ eq]	5.06E+00	7.59E+00	1.01E+01
ODP [kg CFC-11 eq]	5.17E-07	7.76E-07	1.03E-06
AP [kg SO ₂ eq]	2.16E-02	3.24E-02	4.32E-02
EP [kg N eq]	1.72E-02	2.58E-02	3.45E-02
POCP [kg O ₃ eq]	3.72E-01	5.57E-01	7.43E-01
ADP _{fossil} [MJ, LHV]	9.34E+00	1.40E+01	1.87E+01



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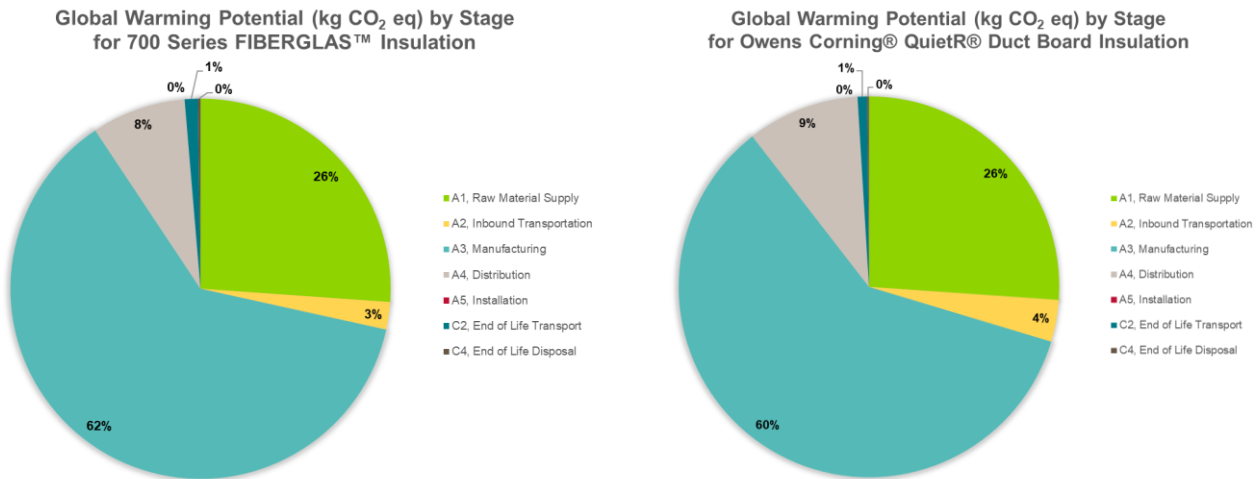


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According to ISO 14025,
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5. LCA Interpretation

The manufacturing stage drives most of the environmental impact categories. 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 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



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According to ISO 14025,
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- 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.
- Health Product Declaration



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation
QuietR® Duct Board and 700 series FIBERGLAS™ Insulation

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

Made with Wind Energy and Reduced Carbon Footprint

Heavy Density Board Insulation products are available upon request in the US with SCS Global Services certification for “Made with Wind Energy” and “Reduced Carbon Footprint”. The updated environmental impacts for the products by matching the amount of electricity used in manufacturing with wind energy produced as part of Owens Corning’s Power Purchase Agreement were calculated and can be found in the tables below. The values for life cycle stages A1-A3 below reflect calculations based on the electricity impacts per the SimaPro implementation of the ecoinvent versions of the NERC power grids. Certificates published on the SCS Global Services website are based on calculations using updated NERC and eGrid power grid data and updated manufacturing production data per the certification guideline, so variation between the values is expected.

TRACI v2.1	700 Series FIBERGLAS™ Insulation			Owens Corning® QuietR® Duct Board Insulation		
	A1-A3 Standard Product	A1-A3 Certified Product	% Change	A1-A3 Standard Product	A1-A3 Certified Product	% Change
GWP 100 [kg CO ₂ eq]	5.44E+00	3.03E+00	-44%	6.22E+00	4.72E+00	-24%
ODP [kg CFC-11 eq]	5.27E-07	3.45E-07	-34%	5.40E-07	4.25E-07	-21%
AP [kg SO ₂ eq]	2.53E-02	1.63E-02	-36%	2.42E-02	2.00E-02	-17%
EP [kg N eq]	2.80E-02	5.81E-03	-79%	2.26E-02	1.16E-02	-49%
POCP [kg O ₃ eq]	2.55E-01	1.94E-01	-24%	3.58E-01	3.26E-01	-9%
ADP _{fossil} [MJ, LHV]	8.94E+00	7.94E+00	-11%	1.13E+01	9.83E+00	-13%

6.6. Further Information

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

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



ENVIRONMENTAL PRODUCT DECLARATION



Heavy Density Board Insulation

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

ASTM C303, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation

ASTM C411, Standard Test Method for hot-Surface Performance of High-Temperature Thermal Insulation

ASTM D774, Standard Test Method for Bursting Strength of Paper

ASTM C165, Standard Test Method for Measuring Compressive Properties of Thermal Insulation

ASTM C612, Mineral Fiber Block & Board Thermal Insulation

ASTM C795, Thermal Insulation For Use Over Austenitic Stainless Steel

ASTM C1136, Flexible Low Permeance Vapor Retarders for Thermal Insulation

ASTM C1104/C1104M, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation

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

ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials

ASTM G21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

ASTM G22, Standard Practice for Determining Resistance of Plastics to Bacteria

CAN/CGSB-51.10, Mineral Fibre Board Thermal Insulation

NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems

NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

CA-T052, California Insulation Quality Standards

UL723, Standard for Test for Surface Burning Characteristics of Building Materials

UL181, Standard for Factory-Made Air Ducts and Air Connectors

ULC S110, Standard Methods of Test for Air Ducts

CAN/ULC S102, Standard Method for Test of Surface Burning Characteristics of Building Materials and Assemblies

SCS Global Services Guideline for Claims of “Made with Renewable Energy” or “Reduced Carbon Footprint” Based on Power Purchase Agreement, February 2018

