NORBEC™

Norbec™'s NOROC® & NOREX® Insulated Metal Panels

NORBEC™

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and ISO 21930:2017

ASTM INTERNATIONAL

Norbec™ is pleased to present this Environmental Product Declaration (EPD) for NOROC® & NOREX® Insulated Metal Panels. This EPD was developed in compliance with ISO 14025 and ISO 21930 and has been verified by Lindita Bushi, Athena Sustainable Materials Institute.

The LCA and the EPD were prepared by Vertima Inc. The EPD includes cradle-to-gate life cycle assessment (LCA) results.

For more information about Norbec™, visit https//norbec.com/.

For any explanatory material regarding this EPD, please contact the program operator.

1. GENERAL INFORMATION

PCR GENERAL INFORMATION			
Reference PCR	PCR Part B : Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels (UL 10010-5), v2.0 and its core PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL 10010), v4.0 UL Solutions October 23, 2018 to October 31, 2026 (validity period of PCR Part B) March 28, 2022 to March 28, 2027 (validity period of PCR Part A)		
The PCR review was conducted by:	*Thomas P. Gloria, Industrial Ecology Consultants (Chairperson) t.gloria@industrial-ecology.com*	*Lindita Bushi, Athena Sustainable Materials Institute Lindita.bushi@athenasmi.org*	*Bob Zabcik, NCI Building Systems bobZ@ncigroup.com*

EPD GENERAL INFORMATION		
Program Operator	ASTM 100 Barr Harbor Drive, West Conshohocken, PA 19428 USA www.astm.org	
Declared Product	NOROC®-L, NOREX®-H, NOREX®-L and NOREX®-S Insulated Metal Panels	
EPD Registration Number EPD# 1203	**EPD Date of Issue** May 25, 2026	**EPD Period of Validity** May 25, 2026 to May 24, 2031
EPD Recipient Organization	Norbec™ 97 rue de Vaudreuil Boucherville (Quebec) J4B 1K7 CANADA https://norbec.com/	

EPD Type/Scope and Declared Unit Product-specific cradle-to-gate EPD with declared unit of 100 m^2 of insulated metal panel coverage.	**Year of Reported Manufacturer Primary Data** 2024

Geographical Scope	**LCA Software**	**LCI Databases**	**LCIA Methodology**
North America	OpenLCA v.2.03	Ecoinvent 3.9.1 and US LCI	TRACI 2.2, IPCC AR5, CML 4.8

This LCA and EPD were prepared by:	Vertima Inc. www.vertima.ca
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2006, the UL Solutions PCR "Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels EPD Requirements (UL 10010-5) v.2.0," and PCR "Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL 10010), v.4.0," which serves as the core PCR. ☐ Internal ☒ External	Lindita Bushi Lindita Bushi, Ph.D. Athena Sustainable Materials Institute

The owner of the declaration shall be liable for the underlying information and evidence; ASTM, or its affiliates, shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence.

LIMITATIONS

Environmental declarations from different programs may not be comparable.[1] Comparison of the environmental performance of metal panel and cladding products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building use phase as instructed under this PCR.[2]

Full conformance with the PCR for metal panels and cladding allows EPD comparability only when all stages of a life cycle have been considered when they comply with all referenced standards, use the same sub-category PCR, and use equivalent scenarios with respect to construction works. However, variations and deviations are possible." Example of variations: Different LCA software and background LCI datasets may lead to differences in results upstream or downstream of the life cycle stages declared.[2] Given this EPD is cradle to gate in scope, comparisons of EPD data from one product to another are not allowed.

[Photo courtesy of Norbec™]

2. PRODUCT SYSTEM DESCRIPTION

2.1. COMPANY DESCRIPTION

Norbec™ Architectural Inc. is a North American leader in manufacturing insulated metal panels for building envelopes, walk-in coolers and freezers, and doors. Founded in 1982, Norbec™ has earned an enviable reputation as a leader in many sectors, including supermarkets, restaurants, food processing plants, refrigerated warehouses, hospitals and research centres.

2.2. PRODUCT DESCRIPTION

NOROC® panels

NOROC® is a high-performance, fire-rated insulated metal architectural panel with a thermal resistance of RSI 0.28 $m^2 \cdot K/W$ per centimeter of thickness (equivalent to R-4.00 $ft^2 \cdot {}^{o}F \cdot h/BTU$ per inch in imperial units). NOROC® has a mineral core made of rigid stone-fiber insulation board composed of natural basalt rock and recycled slag. In addition to being non-combustible, it offers excellent fire resistance properties. Its corresponding MasterFormat code is 07 42 13 - Insulated Metal Wall Panels.

NOROC® panels are available in multiple thicknesses (5 in., 6 in., and 8 in.) with L-joint vertical mounting, suitable for outdoor walls, interior partitions, and interior ceilings. Its most common configuration is a 6-inch product with 26 Ga galvanized steel inner and outer face.

Figure 1 provides illustrations of Norbec™'s NOROC® panel.

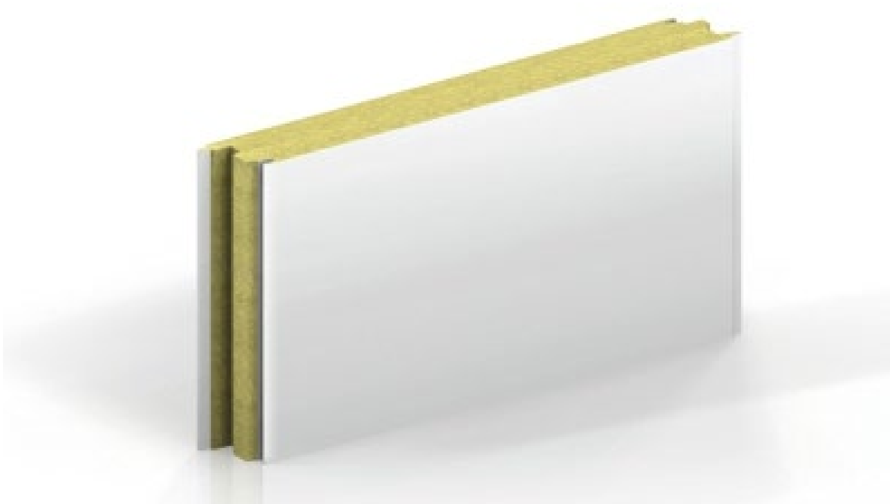

Figure 1: NOROC® – L panel [Photo courtesy of Norbec™].

NOREX® panels

NOREX® panels are insulated metal panels with a polyisocyanurate (PIR) core designed for high-efficiency buildings. They offer exceptional thermal resistance, with RSI values ranging from 0.51 to 0.55 $m^2 \cdot K/W$ per centimeter of thickness (equivalent to R-7.4 to R-8.0 $ft^2 \cdot {}^{\circ}F \cdot h/BTU$ per inch in imperial units, depending on tested temperature and thickness). These panels provide fire and rain protection barriers and are wind and tear resistant due to their exclusive anchoring system. Their joint features a pressure equalization compartment, which prevents water from being drawn inward, thus reducing the risk of penetration and moisture. Its corresponding MasterFormat code is 07 42 13 - Insulated Metal Wall Panels.

NOREX® panels are available in several joint configurations (NOREX®-L, NOREX®-H, NOREX®-S, NOREX®-M and NOREX®-In) and multiple thicknesses (2 in., 3 in., 4 in., 5 in., 6 in., and 8 in.). Its most common configuration is a NOREX®-L 4-inch product with 26 Ga galvanized steel inner and outer face. It should be noted that NOREX®-M and NOREX®-In are excluded from this EPD.

Figure 2 provides an illustration of NOREX® panels.

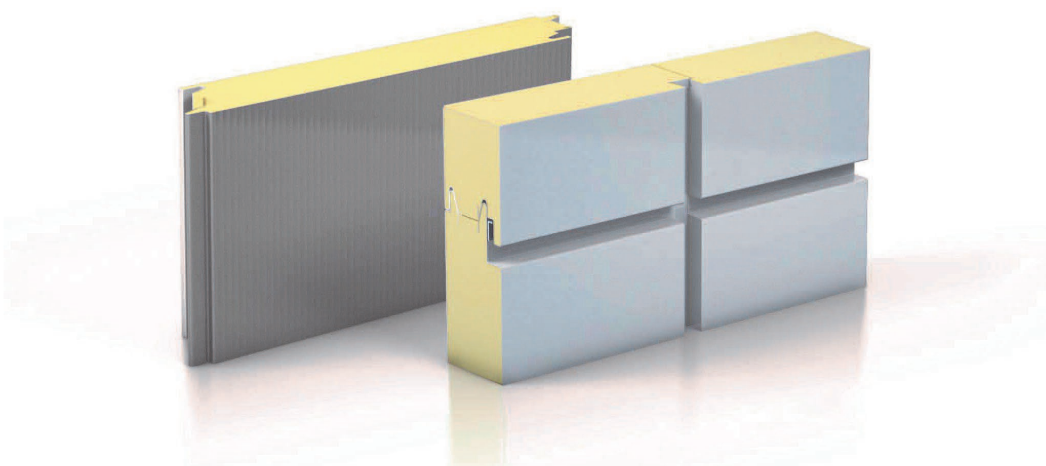

Figure 2: NOREX® – L and NOREX® – H panels [Photo courtesy of Norbec™].

2.3. PRODUCT APPLICATION

NOROC® and NOREX® panels insulate and provide and interior and exterior all-in-one construction material for industrial and commercial constructions as well as food processing plants, refrigerated and atmosphere-controlled rooms. The panels can also be used for interior partitions or as suspended ceilings.

2.4. PRODUCT SPECIFICATION

NOROC® and NOREX® panels respect the standards listed in Table 1 and Table 2 respectively.

Table 1: NOROC® panels codes, regulations, and test methods.

NOROC® panels	Procedure	Title	Results
Fire Canada	CAN/ULC-S101	Fire endurance tests of building construction and materials	12.70 cm (5 in) = 60 min 15.24 cm (6 in) = 120 min 20.32 cm (8 in) = 180 min
	CAN/ULC-S102	Surface burning characteristics of building materials and assemblies	Flame spread index < 25, Smoke developed < 45
	CAN/ULC-S126	Fire spread under roof-deck assemblies	Test requirements have been met
Fire US	ASTM E84	Surface burning characteristics of building materials	Frame spread < 25 Frame spread < 450
Structural	ASTM E72	Strength tests of panels for building construction	See load tables [9]
Air Infiltration	ASTM E283	Rate of air leakage through curtain walls at diff. pressure	Test requirements have been met
	ASTM E330	Structural performance of exterior walls by static pressure	Test requirements have been met
	CAN/ULC-S741	Standard for air barrier materials – Specification	Test requirements have been met
	CAN/ULC-S742	Standard for air barrier assemblies - Specification	Test requirements have been met
Thermal Performance	ASTM C518	Steady-state thermal transmission (heat-flow meter)	R4.0/in @ 75 °F, equivalent to RSI 0.28 $m^2 \cdot K/W/cm$
Water	ASTM E331	Water penetration by static air pressure	Test requirements have been met
	AAMA 501.1	Water penetration with dynamic pressure	Test requirements have been met

Table 2: NOREX® panels codes, regulations, and test methods.

NOREX® panels	Procedure	Title	Results
Fire Canada	CAN/ULC-S101	Fire endurance tests of building construction and materials	Meets 10-minute stay-in-place requirements (some panels)
	CAN/ULC-S102	Surface burning characteristics of building materials and assemblies	Meets National Building Code of Canada requirements
	CAN/ULC-S134	Fire test of exterior wall assemblies	Complies with fire-spread and heat-flux requirements per NBC
	CAN/ULC-S138	Fire growth of insulated building panels in full-scale room configuration	Test requirements have been met
	CAN/ULC-S126	Fire spread under roof-deck assemblies	Test requirements have been met
Fire US	ASTM E84	Surface burning characteristics of building materials	Flame spread < 25 Smoke developed < 450
	FM 4880	Class 1 fire rating for insulated wall, ceiling, roof panels	Product approved up to 6-inch thickness
Structural	ASTM E72	Strength tests of panels for building construction	See load tables in Norbec™ library
	FM 4881	Class 1 exterior wall structural performance	Refer to FM wall load chart
Air Infiltration	ASTM E283	Rate of air leakage through curtain walls	Test requirements have been met
	ASTM E330-14	Structural performance by static air pressure difference	Test requirements have been met
Thermal Performance	ASTM C518	Steady-state thermal transmission	R8.0/in @ 75 °F, equivalent to RSI 0.55 m^2·K/W/cm
	CAN/ULC-S770	Long-term thermal resistance	Test requirements have been met per CAN/ULC-S704-11
Water Infiltration	ASTM E331	Water penetration of exterior walls	Test requirements have been met
	AAMA 501.1	Water penetration using dynamic pressure	Test requirements have been met

2.5. PROPERTIES OF PRODUCT AS DELIVERED

NOROC® and NOREX® panels are available in different configuration as detailed in the two tables below.

Table 3: NOROC® panels properties as delivered

<table>
<tr><th>Specifications</th><th colspan="5">NOROC®-L Panels</th></tr>
<tr><td>Width[(1)]</td><td colspan="5">1.08 m (42 ½ in.)</td></tr>
<tr><td>Length</td><td colspan="5">2.1 to 15.8 m (7 to 52 ft.)</td></tr>
<tr><td>Insulation Thickness</td><td colspan="5">0.13, 0.15 et 0.20 m (5, 6, and 8 in.)</td></tr>
<tr><td>RSI</td><td colspan="5">0.28 m² ºK/W/cm (R-value: 4.00 ft² ºF h/BTU/in)</td></tr>
<tr><td>Steel Inner and Outer Face</td><td colspan="5">0.483 mm (0.019 in.) standard thickness – 26 Ga
0.584 mm (0.023 in.) other available thickness – 24 Ga
0.724 mm (0.0285 in.) other available thickness – 22 Ga</td></tr>
<tr><td rowspan="4">Total weight (kg/m²)</td><td colspan="2">Insulation Thickness (m)</td><td>0.13
(5 in.)</td><td>0.15
(6 in.)</td><td>0.20
(8 in.)</td></tr>
<tr><td rowspan="3">Steel inner and outer face</td><td>26/26 Ga</td><td>26.18</td><td>29.64</td><td>36.54</td></tr>
<tr><td>24/24 Ga</td><td>27.96</td><td>31.42</td><td>38.33</td></tr>
<tr><td>22/22 Ga</td><td>30.41</td><td>33.87</td><td>40.78</td></tr>
</table>

(1) The final panel width may change due to variations in fabrication and installation. Norbec™ does not recommend designing a panel arrangement in which the panel dimension plays a critical role.

Table 4: NOREX®-H panels properties as delivered

<table>
<tr><th>Specifications</th><th colspan="4">NOREX®-H</th></tr>
<tr><td>Width[(1) (2)]</td><td colspan="4">0.61, 0.76, 0.91, 1.05 m (24, 30, 36, 41 ½ in.)</td></tr>
<tr><td>Length</td><td colspan="4">2.1 to 15.8 m (7 to 52 ft.)</td></tr>
<tr><td>Insulation Thickness</td><td colspan="4">0.08 and 0.10 m (3 and 4 in.)</td></tr>
<tr><td>RSI</td><td colspan="4">0.51. m² ºK/W/cm (R-value:7.41 ft2 ºF h/BTU/in)</td></tr>
<tr><td>Steel Inner and Outer Face</td><td colspan="4">0.483 mm (0.019 in.) standard thickness – 26 Ga
0.584 mm (0.023 in.) other available thickness – 24 Ga
0.724 mm (0.0285 in.) other available thickness – 22 Ga</td></tr>
<tr><td rowspan="4">Total weight (kg/m²)
41 ½ in. wide product</td><td colspan="2">Insulation Thickness (m)</td><td>0.08
(3 in.)</td><td>0.10
(4 in.)</td></tr>
<tr><td rowspan="3">Steel inner and outer face</td><td>26/26 Ga</td><td>11.77</td><td>12.75</td></tr>
<tr><td>24/24 Ga</td><td>13.59</td><td>14.57</td></tr>
<tr><td>22/22 Ga</td><td>16.09</td><td>17.07</td></tr>
</table>

(1) The final panel width may change due to variations in fabrication and installation. Norbec™ does not recommend designing a panel arrangement in which the module width plays a critical role.
(2) 2-inch panels are not available in 24 and 30-inch widths.

Table 5: NOREX®-S panels properties as delivered

Specifications	NOREX®-S		
Width[1]	1.12 m (44 in.)		
Length	2.1 to 15.8 m (7 to 52 ft.)		
Insulation Thickness	0.10 m (4 in.)		
RSI	0.51. m^2 ºK/W/cm (R-value:7.41 ft2 ºF h/BTU/in)		
Steel Inner and Outer Face	0.483 mm (0.019 in.) standard thickness – 26 Ga 0.584 mm (0.023 in.) other available thickness – 24 Ga 0.724 mm (0.0285 in.) other available thickness – 22 Ga[6]		
Total weight (kg/m²)	Insulation Thickness (m)		0.10 (4 in.)
	Steel inner and outer face	26/26 Ga	12.39
		24/24 Ga	14.13
		22/22 Ga	16.53

(1) The final panel width may change due to variations in fabrication and installation. Norbec™ does not recommend designing a panel arrangement in which the module width plays a critical role.

Table 6: NOREX®-L panels properties as delivered

Specifications	NOREX®-L							
Width[1] [2]	0.61, 0.76, 0.91, 1.08 m (24, 30, 36 or 42 ½ in.)							
Length	2.1 to 15.8 m (7 to 52 ft.)							
Insulation Thickness	0.05, 0.08, 0.10, 0.13,0.15 and 0.20 m (2, 3, 4, 5, 6 and 8 in.)							
RSI	0.51. m^2 ºK/W/cm (R-value:7.41 ft2 ºF h/BTU/in)							
Steel Inner and Outer Face	0.483 mm (0.019 in.) standard thickness – 26 Ga 0.584 mm (0.023 in.) other available thickness – 24 Ga 0.724 mm (0.0285 in.) other available thickness – 22 Ga							
Total weight (kg/m²) 42 ½ in. wide product	Insulation Thickness (m)		0.05 (2 in.)	0.08 (3 in.)	0.10 (4 in.)	0.13 (5 in.)	0.15 (6 in.)	0.20 (8 in.)
	Steel inner and outer face	26/26 Ga	10.58	11.56	12.54	13.52	14.50	16.46
		24/24 Ga	12.36	13.34	14.32	15.30	16.28	18.23
		22/22 Ga	14.80	15.78	16.76	17.74	18.72	20.68

(1) The final panel width may change due to variations in fabrication and installation. Norbec™ does not recommend designing a panel arrangement in which the module width plays a critical role.
(2) 2-inch panels are not available in 24 and 30-inch widths.

2.6. MATERIAL COMPOSITION

The raw materials input for are detailed in Table 7. For details on material content, please refer to the health product declaration (HPD) available at http://www.hpd-collaborative.org/hpd-public-repository/

Table 7: Material composition of 100 m^2 of average NOROC® and NOREX® panels.

Components	Material	Mass in average final product (%)	
		NOROC® L 6” thick 26 / 26 Ga Steel	NOREX®-L 4” thick, 42.5” wide 26 / 26 Ga Steel
Metal panel	Galvanized steel	28.6%	67.2%
Insulation	Rock-wool	69.9%	-
	PIR	-	31.1%
Sealant		0.4%	1.1%
Side tape		-	0.8%
Adhesive		1.1%	0.5%
TOTAL		100.0%	100.0%

2.7. MANUFACTURING

The Saint-Hyacinthe (Quebec) plant, which produces NOROC® and NOREX® panels, has a continuous panel production line. The insulation is placed/injected between the metal panels prior to being cut to size. Thereafter, the panels are protected with a protective film and packaged for shipping. Panels that do not meet the product specifications are offered in a line of quality B panels, thus reducing production waste. Also, scrap steel is 100% recycled.

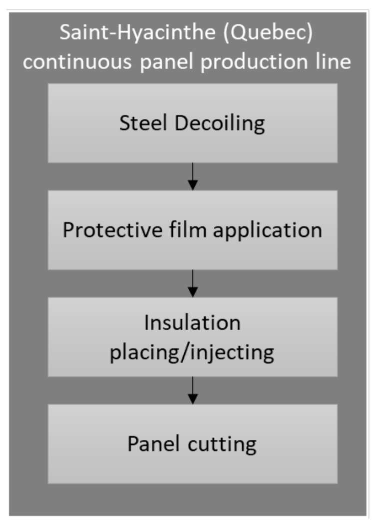

Figure 3: Norbec™ insulated metal panel manufacturing flow diagram.

2.8. PACKAGING

Norbec™'s NOROC® and NOREX® panels are packaged on home build composite dunnage (wood + EPS). Surface panels are protected with a polyethylene protective film as they are produced. On the wood of the composite dunnage, on which a polystyrene sheet has been glued, they are piled and separated with polystyrene sheets and blocks. The pile is topped with an OSB panel before being wrapped in shrink wrap.

Composite dunnage can be reused, while plastics can be recycled where services are available.

2.9. TRANSPORTATION

As the system boundaries of the Environmental Product Declaration (EPD) are cradle-to-gate, transport after the manufacturing gate is excluded from the study.

2.10. PRODUCT INSTALLATION

Please refer to specific guidelines for handling, installation and cleaning of the various panels. Documentation is available at the following link: https://norbec.com/document-library.

NOROC® and NOREX® panels may be ordered with a complete installation kit including screws, concealed fastening plate, trims and sealants based on project requirements.

2.11. USE CONDITIONS

For this EPD, the system boundaries encompass a cradle-to-gate scope. The environmental impacts of the products in the use phase are excluded from this declaration, per UL Environment PCR Guidance for Building-Related Products and Services – Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding [2].

Norbec™, as a manufacturer, assures that the product subject to this licence is free from defects and manufacturing defects, including delamination for a period of five (5) years from the date of the installation of the product or after 45 days of delivery, whichever is the earliest. Details on warranties and maintenance can be found online at https://norbec.com/document-library/.

2.12. PRODUCT REFERENCE SERVICE LIFE AND BUILDING ESTIMATED SERVICE LIFE

As the system boundaries of the Environmental Product Declaration (EPD) are cradle-to-gate, this information is excluded from the study.

2.13. RE-USE PHASE

Insulated metal panels can be re-used if not damaged.

2.14. DISPOSAL

Panel recycling is technically possible [14], but might not be available in your location. Metal facings can be recycled; the foam element of the panels can be used as a fuel source in cement kilns or incinerated (with energy recovery): please check your local regulation. As a last resort, panels and/or individual components (after either non-hazardous or hazardous panel processing has taken place) can be disposed of to landfill.

3. LCA CALCULATION RULES

3.1. DECLARED UNIT

The selected declared unit (DU) for this study is **100 m^2 of insulated metal panel coverage**. Table 8 presents all products targeted by this report and their respective DU.

Table 8: Declared unit of studied products, including mass per m² of insulated metal panel, conversion factor to 1 kg, insulation and steel thicknesses.

Item	Unit	NOROC® L 6" thick, 42.5" wide 26 / 26 Ga Steel	NOREX® L 4" thick, 42.5" wide 26 / 26 Ga Steel
Declared unit	m^2	100	100
Mass per piece	kg	2 964	1 254
Conversion factor to 1 kg	m^2/kg	0.03374	0.07973
Insulation thickness	m	0.15	0.10
Steel thickness (*Sum of inner and outer layers)*	m	0.965	0.965

3.2. PRODUCTION AVERAGE

In 2024, NOROC®-L, NOREX®-L, NOREX®-H and NOREX®-S insulated metal panels were all manufactured at the Saint-Hyacinthe (Quebec) Norbec™ facility. The results are presented for specific configurations and do not represent an average. NOREX® insulation metal panels are available in different configurations (-L, -H, -S). Potential environmental impact results of the different configurations with the same steel and insulation thickness compared to the 4-inch thick NOREX®-L with 26 Ga on the inner and outer layers are within ± 10%. Nevertheless, scaling factors are provided to calculate the potential environmental impacts of the different NOREX® configurations. **This EPD is thus facility-specific and product-specific.**

3.3. SYSTEM BOUNDARIES

The system boundaries are **cradle-to-gate**, i.e., only cover the production life cycle stage as illustrated in **Table 9**. Within this life cycle stage, three (3) modules are considered, namely A-1) Extraction and Upstream Production, A-2) Transport to Factory and A-3) Manufacturing. Construction (A-4; A-5), Use (B-1 to B-7) and End-of-life (C-1 to C-4) stages are not included in this study. Figure 4 presents the process flow diagram for NOROC® panels and NOREX® panels. Neither green power nor CO_2 credits are used in the framework of this project.

Table 9: Description of the system boundary life cycle stages and related information modules

PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Extraction and Upstream Production	Transport to Factory	Manufacturing	Transport to Site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Waste Processing or Disposal	Waste Processing	Disposal of Waste
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Key: X = included; MND = module not declared (excluded)

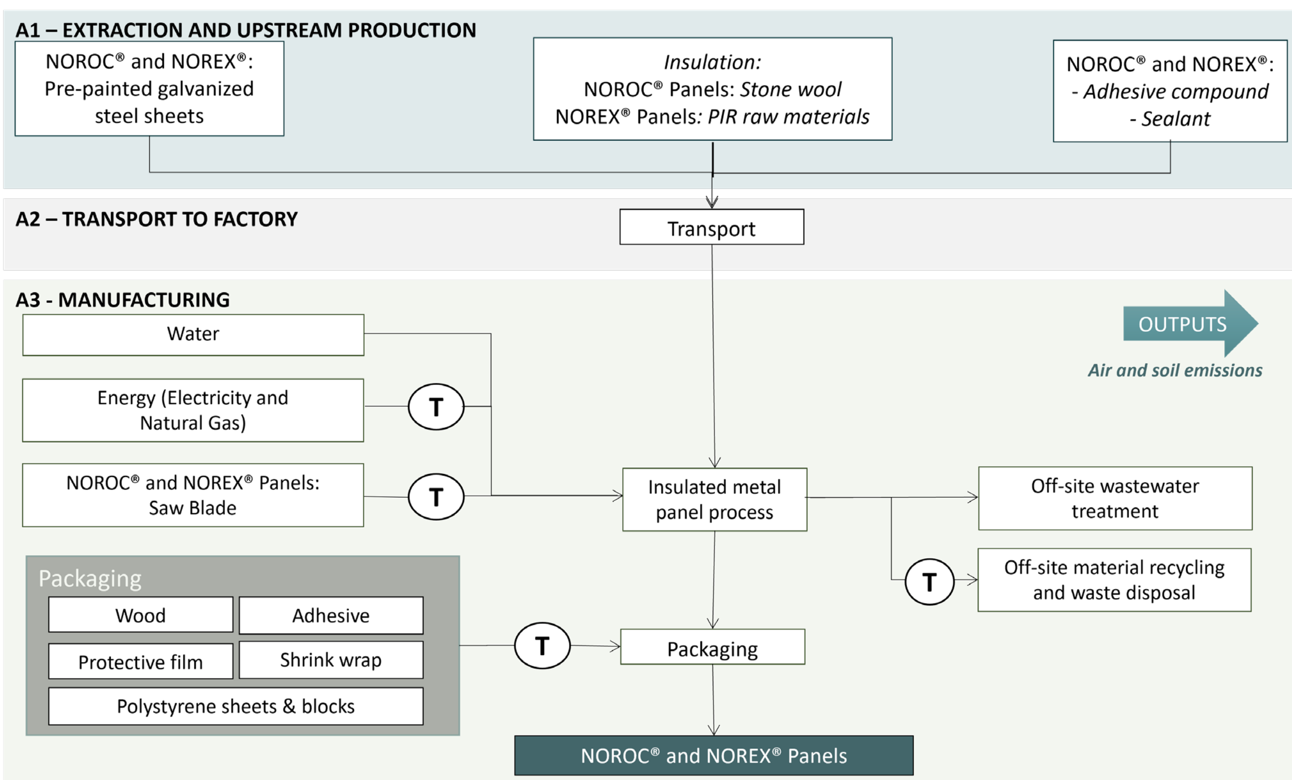

Figure 4: System boundaries of cradle-to-gate LCA of NOROC® and NOREX® panels. "T" refers to transport.

Extraction and upstream production (A1): This module includes the extraction and processing of raw materials needed to produce the panels.

Transport to factory (A2): This module includes the transportation of raw materials from Norbec™'s suppliers to Norbec™'s facilities.

Manufacturing (A3): This module includes energy consumption for the manufacturing processes and includes heating of the building. Water use is considered; however, the production process does not consume or use water. Emissions to air and soil from the NOROC® adhesive, sealant and NOREX® polyisocyanurate (PIR) production process have been considered. There are no water emissions. This module also includes process ancillary materials needed to produce the products (saw blade consumption), but excludes products needed for product installation such as screws and additional sealant.

Steel waste is sent to a recycling center while unreacted polyol or isocyanate residues are sent for hazardous waste treatment. All other wastes are considered sent to landfill.

Finally, packaging materials to make products ready for shipment, as well as their transport to Norbec™'s manufacturing plants, are covered by this module.

3.4. CUT-OFF CRITERIA

According to the UL Environment PCR – Part A,[6] no known flows are deliberately excluded from this EPD. Any application of cut-off criteria for the exclusion of inputs and outputs shall be documented.

No known flows are deliberately excluded from this EPD.

For this study, no data on the construction, maintenance, or dismantling of the capital assets, daily transport of the employees, office work, business trips, and other activities from Norbec™'s employees was included in the model. The model only takes into account the processes associated with infrastructure that are already included in the *ecoinvent* unit processes.

3.5. ALLOCATION

Data relating to energy consumption (electricity and natural gas), water use, emissions flows, process ancillary materials, waste, and packaging was provided for the whole manufacturing plant. According to the PCR part B, section 3.10, mass should be used as the primary basis co-product allocation [7]. Allocation methods deemed more appropriate than on the basis of mass may be used when justified.

In this study, **mass allocation** was used for input energy flows, water flows, process ancillary materials flows, waste flows, and packaging flows. Emissions flows were attributed only to the product responsible for their emission.

As per the PCR part A, section 3.3.1, waste processing of the material flows undergoing **recycling** processes are included up to the system boundary of the end-of-waste state. [6] In order words, a **cut-off approach** was used as further processing of the recycled material is part of raw material preparation of another product system (open-loop recycling).

3.6. DATA SOURCES AND QUALITY REQUIREMENTS

Data Source/Quality Parameter	Data Source/Quality Discussion
Source of manufacturing data	Manufacturing data was collected from the manufacturing plant located in Saint-Hyacinthe (Quebec) for the 2024 production year. This data included: total annual mass of products produced at the manufacturing plant; specific product composition; raw materials and fuels entering the product production process; transport distance of materials and fuels; electricity consumption; water use; emissions to the environment at the manufacturing plant; and packaging.
Source of secondary data:	Background data was taken from product-specific EPD, published LCA reports or ecoinvent 3.9.1 "cut-off" datasets representative of Quebec, Canada, the United States or North America. When appropriate, the grid mix was changed for the grid mix of the province or country where production takes place. Otherwise, ecoinvent data representative of the global market or the "rest-of-the-world" was selected as proxies.
Geographical representativeness	Norbec™ Architectural's manufacturing facility is based in the province of Quebec; hence electricity consumption is based on the Quebec grid mix and natural gas consumption from the Quebec supply. Geographical correlation of the material supply and the selected datasets are largely representative of the same area. When this was not possible, datasets representing a larger geographical area were used.
Temporal representativeness	Primary data was collected so as to be representative of the full 2024 year. Datasets selected were not always published within the last ten years. Nevertheless, ecoinvent remains the reference LCI database.
Technological representativeness	Primary data, obtained from the manufacturer, is representative of the current technologies and materials used by this company.
Completeness	All relevant process steps were considered and modeled to satisfy the goal and scope. No known flows were cut-off.

4. LIFE CYCLE ASSESSMENT RESULTS

4.1. DISCLAIMER

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

The reported six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

4.2. RESULTS TABLES

The table below presents the LCIA results according to the product functional unit using TRACI 2.2 methodology (GWP from IPCC AR5, ADF-ff from CML 4.8), as well as primary energy consumption, consumption of renewable and non-renewable materials, water consumption, and waste generation. EPA updated TRACI in 2021 to include spatially-specific eutrophication factors. All other indicators remain the same as version 2.1.

[Photo courtesy of Norbec™]

TRACI 2.2 potential impact indicators
GWP: Global Warming Potential; **ODP**: Ozone Layer Depletion Potential; **AP**: Acidification Potential; **EP_f**: Eutrophication Potential – Freshwater; **EP_m**: Eutrophication Potential – Marine; **SFP**: Smog Formation Potential; **ADP-ff**: Abiotic Resource Depletion Potential of Non-Renewable (Fossil) Energy Resources.
Resource use
RPR_E: Renewable Primary Resources Used as Energy Carrier (Fuel); **RPR_M**: Renewable Primary Resources with Energy Content Used as Material; **RPR_T**: Renewable Primary Resources Total; **$NRPR_E$**: Non-Renewable Primary Resources Used as Energy Carrier (Fuel); **$NRPR_M$**: Non-Renewable Primary Resources with Energy Content Used as Material; **$NRPR_T$**: Non-Renewable Primary Resources Total; **SM**: Secondary Materials; **RSF**: Renewable Secondary Fuels; **NRSF**: Non-Renewable Secondary Fuels; **RE**: Recovered Energy; **FW**: Use of Net Fresh Water Resources.
Output flows and waste categories
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; **MFR**: Materials for Recycling; **MER**: Materials for Energy Recovery; **EE**: Exported Energy.

(1) GWP 100, excludes biogenic CO_2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2) Abiotic Resource Depletion Potential of Non-renewable (fossil) energy resources (ADP-ff, in MJ, LHV) is based on CML-baseline, v4. August 2016.

(3) $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED methodology (LHV).

(4) Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.

(5) $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED methodology (LHV).

(6) Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.

(7) Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

(8) Calculated from life cycle inventory results, based on datasets classified under “treatment and disposal of hazardous waste.”

(9) Calculated from life cycle inventory results, based on waste that is neither “hazardous" nor "radioactive” and EPD values.

(10) Calculated from life cycle inventory results, based on ecoinvent waste flow “high-level radioactive waste for final repository.” The manufacturer does not generate radioactive waste.

(11) Calculated from life cycle inventory results, based on ecoinvent waste flow “low-level radioactive waste for final repository.” The manufacturer does not generate radioactive waste.

Table 10: Cradle-to-gate LCA results for 100 m² of NOROC® insulated metal panels.

Environmental indicator		Unit	NOROC® L 6" thick 26 / 26 Ga Steel			
			A1	A2	A3	A1 - A3
IPCC AR5 and TRACI 2.2	GWP(1)	kg CO_2 eq.	4.87E+03	2.30E+02	5.71E+02	5.67E+03
	ODP	kg CFC-11 eq.	1.10E-04	4.15E-06	9.15E-06	1.20E-04
	AP	kg SO_2 eq.	3.24E+02	6.73E-01	2.00E+00	3.26E+02
	EP_f	kg P eq.	5.94E-02	1.78E-02	1.04E-01	1.81E-01
	EP_m	kg N eq.	1.01E+00	5.05E-01	1.52E+00	3.04E+00
	SFP	kg O_3 eq.	1.44E+02	1.38E+01	4.56E+01	2.03E+02
	ADP-ff(2)	MJ, LHV	3.55E+04	3.41E+03	8.49E+03	4.73E+04
Resource use	RPR_E(3)	MJ, LHV	7.77E+03	4.83E+01	8.39E+03	1.62E+04
	RPR_M(4)	MJ, LHV	1.67E+03	0.00E+00	0.00E+00	1.67E+03
	RPR_T	MJ, LHV	9.44E+03	4.83E+01	8.39E+03	1.79E+04
	$NRPR_E$(5)	MJ, LHV	5.50E+04	3.44E+03	8.89E+03	6.73E+04
	$NRPR_M$(6)	MJ, LHV	6.49E+03	0.00E+00	0.00E+00	6.49E+03
	$NRPR_T$	MJ, LHV	6.14E+04	3.44E+03	8.89E+03	7.38E+04
	SM	kg	1.27E+03	0.00E+00	0.00E+00	1.27E+03
	RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW(7)	m^3	5.26E+01	4.87E-01	1.53E+01	6.83E+01
Output flows and waste categories	HWD(8)	kg	2.98E+02	9.71E+01	5.27E+02	9.22E+02
	NHWD(9)	kg	9.63E+00	2.91E+02	3.99E+02	6.99E+02
	HLRW(10)	m^3	3.80E-04	4.01E-08	5.79E-07	3.80E-04
	ILLRW(11)	m^3	4.00E-04	2.11E-07	1.32E-06	4.00E-04
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	5.13E+01	0.00E+00	1.81E+02	2.32E+02
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 11: Cradle-to-gate LCA results for 100 m² of NOREX® insulated metal panels.

Environmental indicator		Unit	NOREX® L 4” thick, 42.5” wide 26 / 26 Ga Steel			
			A1	A2	A3	A1 – A3
IPCC AR5 and TRACI 2.2	GWP(1)	kg CO_2 eq.	3.45E+03	9.39E+01	2.66E+02	3.81E+03
	ODP	kg CFC-11 eq.	4.17E-06	1.70E-06	4.30E-06	1.02E-05
	AP	kg SO_2 eq.	8.58E+00	2.56E-01	9.20E-01	9.76E+00
	EP_f	kg P eq.	9.02E-02	7.33E-03	4.99E-02	1.47E-01
	EP_m	kg N eq.	1.53E+00	1.91E-01	6.82E-01	2.40E+00
	SFP	kg O_3 eq.	1.46E+02	5.29E+00	2.05E+01	1.72E+02
	ADP-ff(2)	MJ, LHV	5.55E+04	1.40E+03	4.13E+03	6.10E+04
Resource use	RPR_E(3)	MJ, LHV	2.36E+03	1.99E+01	3.58E+03	5.96E+03
	RPR_M(4)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RPR_T	MJ, LHV	2.36E+03	1.99E+01	3.58E+03	5.96E+03
	$NRPR_E$(5)	MJ, LHV	3.60E+04	1.41E+03	4.34E+03	4.18E+04
	$NRPR_M$(6)	MJ, LHV	2.16E+04	0.00E+00	0.00E+00	2.16E+04
	$NRPR_T$	MJ, LHV	5.76E+04	1.41E+03	4.34E+03	6.34E+04
	SM	kg	8.56E+02	0.00E+00	0.00E+00	8.56E+02
	RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW(7)	m^3	3.42E+01	2.00E-01	6.63E+00	4.10E+01
Output flows and waste categories	HWD(8)	kg	1.21E+02	4.00E+01	2.52E+02	4.13E+02
	NHWD(9)	kg	3.46E+01	1.20E+02	1.18E+02	2.72E+02
	HLRW(10)	m^3	4.92E-08	1.65E-08	2.64E-07	3.29E-07
	ILLRW(11)	m^3	1.66E-07	8.66E-08	6.78E-07	9.31E-07
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	5.10E+01	0.00E+00	1.65E+02	2.16E+02
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4.3. INTERPRETATION

For NOROC® and NOREX® panels, module A1 is the greatest contributor to most impact categories and to non-renewable primary resource consumption. For NOROC® panels, module A3 is the main contributor to the two eutrophication potential (EP) indicators. As for renewable primary resource consumption (RPR_T), the contribution is split between modules A1 and module A3. For NOREX® panels, module A3 is the main contributor to ozone layer depletion potential (ODP) and renewable primary resource consumption (RPR_T).

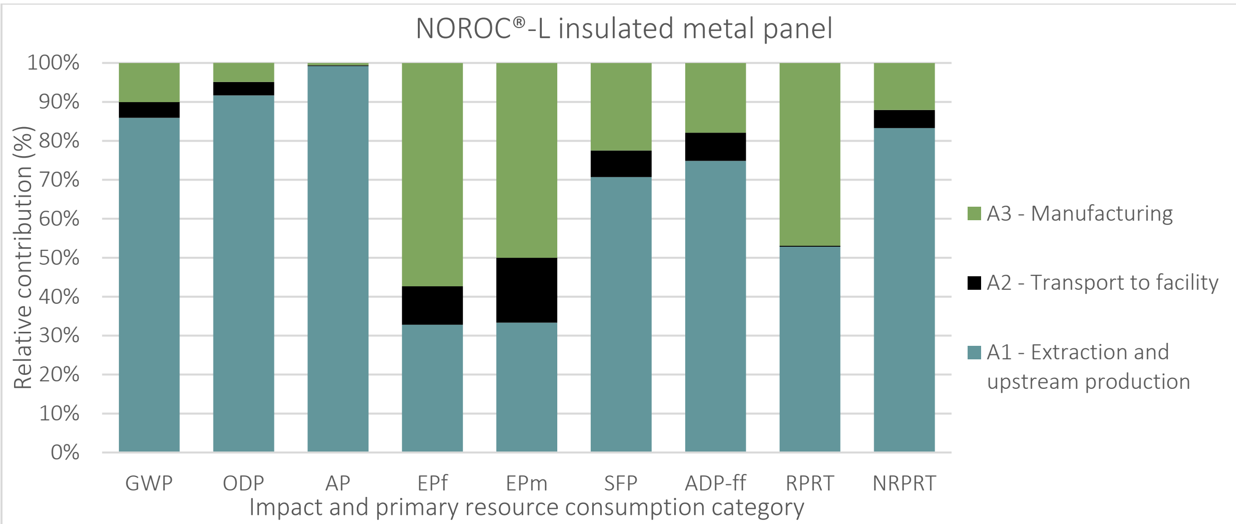

Figure 5: NOROC®-L (6" thick insulation, 42.5" wide, 26 Ga steel inner and outer facer) insulation panel module A1 to A3 contribution per potential environmental impact indicator

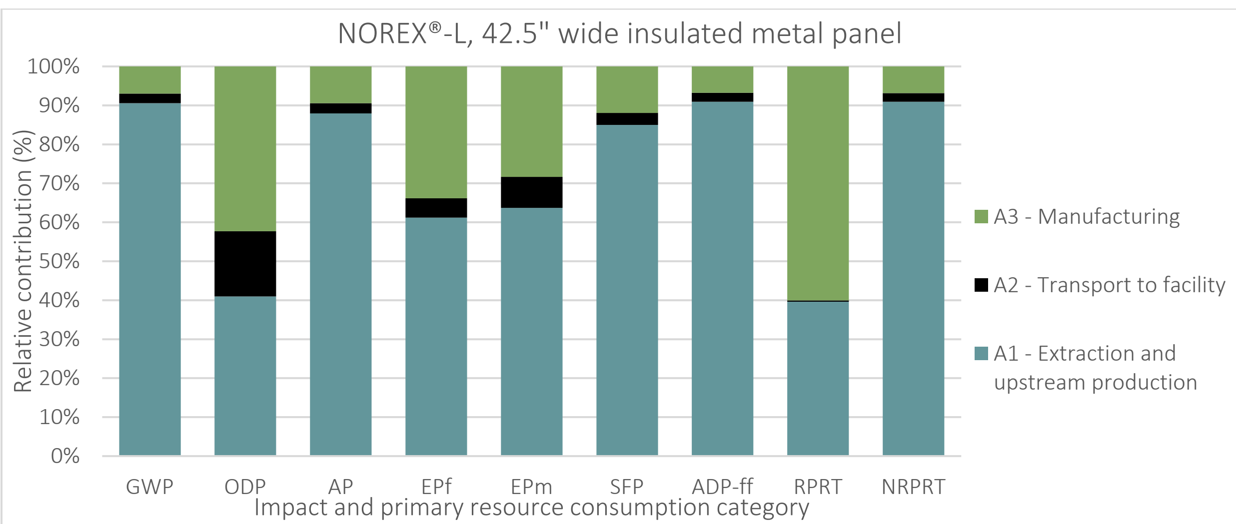

Figure 6: NOREX®-L (4" thick insulation, 42.5" wide, 26 Ga steel inner and outer facer) insulation panel module A1 to A3 contribution per potential environmental impact indicator

GWP: Global Warming Potential; **ODP**: Ozone Layer Depletion Potential; **AP**: Acidification Potential; **EP_f**: Eutrophication Potential – Freshwater; **EP_m**: Eutrophication Potential – Marine; **SFP**: Smog Formation Potential; **ADP-ff**: Abiotic Resource Depletion Potential of Non-Renewable (Fossil) Energy Resources; **RPR_T**: Renewable Primary Resources Total; **$NRPR_T$**: Non-Renewable Primary Resources Total.

The sensitivity analysis indicated that, for NOROC® panels, potential environmental impact results were sensitive to variation in the quantity of steel, insulation, and packaging input as the largest potential environmental impact result, considering all impact categories, varied by 3% to 10%. For NOREX® panels, steel and insulation input were identified as sensitive with maximum potential environmental impact results variation ranging from 3.5% to 7.9%.

Overall temporal, geographical, and technological representativeness is fair to good. Model choices, such as datasets selected to model steel and insulation material production, have great impacts on potential environmental results as they are, for various impact categories, main contributors to module A1. Potential environmental impacts related to steel vary largely depending on the steel production process and its recycled content, while it is the approach taken to model MDI itself that impacts the results. NOROC® insulation is modelled with specific data; hence, a supplier change could change the results.

Otherwise, for eutrophication potential (EP_f and EP_m), uncertainty is higher as some raw materials were modelled with EPD data and/or the LCA report which did not include these TRACI 2.2 indicator values. Approximations were made to calculate eutrophication potential – marine (EP_m), but set to zero for eutrophication potential – freshwater (EP_f). Also, as mentioned in the UL Part A PCR, ozone layer depletion potential (ODP) has higher uncertainty than the other indicators.

4.4. CALCULATING IMPACT CATEGORY RESULTS FOR PRODUCTS WITH SPECIFIC PHYSICAL PROPERTIES

Insulated metal panels are available in different configurations, insulation thicknesses, and steel inner and outer face thicknesses. To calculate impact category values for the NOROC® and NOREX® insulated metal panels in different configurations (NOREX® only) or with different insulation and/or steel thicknesses, the following equation and chart can be used:

$$I_F = I_{DU} * SF_{conf_n} + m_{i\_conf_n}(i_F - i_{DU}) + m_{s\_conf_n}(s_F - s_{DU})$$

Where

I_F: Final impact value per 100 m^2 of panel in selected configuration ($conf_n$), insulation thickness (i_F) and steel thickness (s_F)

I_{DU}: Impact value for declared unit (found in Table 10 for NOROC and Table 11 for NOREX)

i_F: Final insulation thickness (mm)

i_{DU}: Insulation thickness of the declared unit (152.4 mm (6”) for NOROC®-L, 101.6 mm (4”) for NOREX®-L)

s_F: Final steel thickness (mm)

s_{DU}: Total steel thickness of the declared unit, i.e., steel inner and outer face cumulated (0.965 mm (26 Ga for inner and outer layer) for NOROC®-L and NOREX®-L)

SF_{confn}: Scaling factor to change product configuration, i.e., product nominal width and/or joint type (for NOREX® only as NOROC® as only one configuration) (found in Table 12)

m_{i_confn}: Insulation gradient for the product configuration of interest (found in Table 13 for NOREX® and Table 15 for NOROC®)

m_{s_confn}: Steel gradient for the product configuration of interest (found in Table 14 for NOREX® Table 15 for NOROC®)

For example, to calculate the A1-A3 GWP of NOREX®-H 24-inch-wide panels with an insulation thickness of 76.2 mm (3”) and a total steel thickness of 1.448 mm (inner and outer layer of 22 Ga), the calculation is as follows:

I_F =3.81E+03*1.078 + 1.31E+01*(76.2 – 101.6) + 2.79E+03*(1.448 – 0.965) = 5.12E+3 kg CO_2 eq/100m^2.

Table 12: NOREX® scaling factor (SF_{confn}) for the different configurations per potential impact indicator

Environmental indicator		NOREX® H				NOREX® L				NOREX® S
		24" wide	30" wide	36" wide	41.5"wide	24" wide	30" wide	36" wide	42.5" wide	44" wide
Name	Unit	SF	SF	SF	SF	SF	SF	SF	SF	SF
GWP(1)	kg CO_2 eq.	1.078	1.046	1.026	1.016	1.074	1.034	1.016	1.000	0.989
ODP	kg CFC-11 eq.	1.067	1.039	1.022	1.013	1.063	1.029	1.014	1.000	0.991
AP	kg SO_2 eq.	1.044	1.024	1.013	1.006	1.042	1.019	1.009	1.000	0.995
EP_f	kg P eq.	1.042	1.023	1.013	1.007	1.040	1.018	1.008	1.000	0.995
EP_m	kg N eq.	1.072	1.040	1.020	1.009	1.070	1.032	1.013	1.000	0.991
SFP	kg O_3 eq.	1.068	1.040	1.022	1.013	1.064	1.029	1.014	1.000	0.991
ADP-ff(2)	MJ, LHV	1.064	1.037	1.021	1.012	1.061	1.028	1.013	1.000	0.992

Table 13: NOREX® Insulation gradient (m_{i_confn}) per configuration and potential impact indicator

Environmental indicator		NOREX® H				NOREX® L			
		24" wide	30" wide	36" wide	41.5" wide	24" wide	30" wide	36" wide	42.5" wide
Name	Unit	m_i	m_i	m_i	m_i	m_i	m_i	m_i	m_i
GWP(1)	kg CO_2 eq.	1.31E+01	1.31E+01	1.31E+01	1.30E+01	1.31E+01	1.32E+01	1.30E+01	1.32E+01
ODP	kg CFC-11 eq.	4.32E-02	4.32E-02	4.33E-02	4.29E-02	4.32E-02	4.35E-02	4.27E-02	4.34E-02
AP	kg SO_2 eq.	9.92E-04	9.89E-04	9.89E-04	9.84E-04	9.94E-04	9.89E-04	9.66E-04	9.94E-04
EP_f	kg P eq.	1.65E-02	1.65E-02	1.65E-02	1.64E-02	1.65E-02	1.65E-02	1.62E-02	1.66E-02
EP_m	kg N eq.	4.88E-08	4.98E-08	4.98E-08	4.95E-08	4.95E-08	4.89E-08	4.60E-08	5.10E-08
SFP	kg O_3 eq.	7.52E-01	7.53E-01	7.54E-01	7.47E-01	7.52E-01	7.57E-01	7.45E-01	7.56E-01
ADP-ff(2)	MJ, LHV	2.92E+02	2.92E+02	2.93E+02	2.90E+02	2.92E+02	2.94E+02	2.88E+02	2.94E+02

* There is no insulation gradient for NOREX®-S, since this product is only available in 4-inch-thick insulation.

Table 14: NOREX® steel gradient (m_{s_confn}) per configuration and potential impact indicator

Environmental indicator		NOREX® H				NOREX® L				NOREX® S
		24" wide	30" wide	36" wide	41.5" wide	24" wide	30" wide	36" wide	42.5" wide	44" wide
Name	Unit	m_s	m_s	m_s	m_s	m_s	m_s	m_s	m_s	m_s
GWP(1)	kg CO_2 eq.	2.79E+03	2.67E+03	2.60E+03	2.57E+03	2.78E+03	2.63E+03	2.57E+03	2.51E+03	2.46E+03
ODP	kg CFC-11 eq.	5.89E+00	5.65E+00	5.49E+00	5.44E+00	5.86E+00	5.56E+00	5.44E+00	5.30E+00	5.19E+00
AP	kg SO_2 eq.	3.67E-02	3.57E-02	3.43E-02	3.43E-02	3.66E-02	3.54E-02	3.46E-02	3.32E-02	3.26E-02
EP_f	kg P eq.	6.86E-01	6.68E-01	6.42E-01	6.40E-01	6.86E-01	6.58E-01	6.43E-01	6.22E-01	6.08E-01
EP_m	kg N eq.	4.23E-06	4.07E-06	3.92E-06	3.90E-06	4.18E-06	4.05E-06	3.94E-06	3.76E-06	3.73E-06
SFP	kg O_3 eq.	1.06E+02	1.01E+02	9.87E+01	9.76E+01	1.05E+02	9.98E+01	9.76E+01	9.52E+01	9.32E+01
ADP-ff(2)	MJ, LHV	3.45E+04	3.31E+04	3.22E+04	3.19E+04	3.44E+04	3.26E+04	3.19E+04	3.11E+04	3.04E+04

Table 15: NOROC®-L Insulation gradient (m_{i_confn}) and steel gradient (m_{s_confn}) per potential impact indicator

Environmental indicator		NOREX® L	
Name	Unit	mi	m_s
GWP(1)	kg CO_2 eq.	1.90E+01	2.51E+03
ODP	kg CFC-11 eq.	2.09E+00	5.62E+00
AP	kg SO_2 eq.	5.11E-04	3.33E-02
EP_f	kg P eq.	1.01E-02	6.23E-01
EP_m	kg N eq.	7.87E-07	0.00E+00
SFP	kg O_3 eq.	5.72E-01	9.51E+01
ADP-ff(2)	MJ, LHV	6.82E+01	3.10E+04

5. ADDITIONAL ENVIRONMENTAL INFORMATION

5.1. REGULATED HAZARDOUS SUBSTANCES

No substances required to be reported as hazardous are associated with the production of these panels.

5.2. DANGEROUS SUBSTANCES

The products are not known to release dangerous substances.

At the installation site, if silicone sealant is applied, volatile organic compounds (VOCs) may be emitted.

5.3. EXTRAORDINARY EFFECTS

The product design minimizes the risk of water and moisture infiltration, helping prevent mold and preserving indoor air quality. Designed for durability and easy maintenance, the panels feature high corrosion and weather resistance and can be safely cleaned using mild detergents, water, or controlled pressure washing, ensuring sustained hygiene and performance when maintained according to Norbec™'s approved guidelines.

5.4. ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

In addition, Norbec™ is part of a third-party verification process with Vertima Inc. where Norbec™'s products and its entire supply chain are assessed. At the end of the process, they have received a Validated Eco-Declaration® summarizing verified environmental claims.

Norbec™ has also published Health Product Declarations® for NOROC® and NOREX® insulated metal panels. More details are available on the HPDC public repository: https://www.hpd-collaborative.org/hpd-public-repository/.

5.5. FURTHER INFORMATION

For further information about NOROC® and NOREX® panels, please consult the following link: Insulated Metal Panels: High-Performance Solutions by Norbec.

6. REFERENCES

[1] International Organization for Standardization (ISO), "ISO 14025 Environmental labels and declarations - Type III environmental declarations - Principles and procedures," 2006.

[2] UL Environment, "Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels (UL 10010-5)," 2018[Online]. Available: https://www.ul.com/offerings/product-category-rules-pcrs#uledev.

[3] International Organization for Standardization (ISO), "ISO 14040:2006/AMD 1:2020 Environmental management - Life cycle assessment - Principles and framework," 2020.

[4] International Organization for Standardization (ISO), "ISO 14044:2006/AMD1:2017/AMD 2:2020 Environmental management - Life cycle assessment - Requirements and guidelines," 2006.

[5] International Organization for Standardization (ISO), "ISO 21930:2017(E) Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services," 2017.

[6] UL Environment, "Product Category Rule (PCR) Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010 (v.4.0)," 2022[Online]. Available: https://www.ul.com/services/product-category-rules-pcrs#uledev.

[7] Vertima, "Life Cycle Assessment of Norbec's NOROC® and NOREX® Insulated Metal Panels," 2026.

[8] ASTM International, "ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20," 2020[Online]. Available: www.astm.org.

97 rue Vaudreuil

Boucherville (Quebec) J4B 1K7

CANADA

www.norbec.com

EPD

This LCA and EPD were prepared by Vertima Inc.

604 Saint Viateur Street
Quebec, QC
(418) 990-2800
G2L 2K8 CANADA

vertima
Environmental certification experts
vertima.ca