

## ENVIRONMENTAL PRODUCT DECLARATION

# INSULATED METAL WALL PANELS

METL-SPAN® THERMALSAFE  
ENVIRONMENTAL PRODUCT DECLARATION



Metl-Span is part of NCI Group, Inc., the single largest producer of metal building components in North America. With its groundbreaking, UL-certified, ISO-compliant products, Metl-Span leads the industry in the development of energy-efficient and cost-effective panel systems.

Since its inception, our company has been dedicated to a cleaner, safer environment. As evidence of our leadership in this role, we offer this Environmental Product Declaration, which provides a detailed analysis of our products' environmental manufacturing footprint, based on an ISO-compliant Life Cycle Assessment (LCA).

Metl-Span's LCA measures the impact of its product on the environment during all phases of its life from supply chain, through the manufacturing process, to product use and end of life. ISO LCA standards are applied to accurately report the product's impact on the environment.

Find your earth-friendly products at:  
[metlspan.com](http://metlspan.com)



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**Metl-Span**  
Insulated Metal Wall Panels  
ThermalSafe®



According to ISO 14025,  
EN 15804, and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611 <a href="https://www.ul.com/">https://www.ul.com/</a> <a href="https://spot.ul.com/">https://spot.ul.com/</a>
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.4 July 2018
MANUFACTURER NAME AND ADDRESS	Metl-Span 1720 Lakepointe Dr Suite 101, Lewisville, TX 75057
DECLARATION NUMBER	4788189841.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Insulated Metal Wall Panels, 100 m <sup>2</sup>
REFERENCE PCR AND VERSION NUMBER	Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels [UL Environment] October 2018
DESCRIPTION OF PRODUCT APPLICATION/USE	Comprised of a mineral wool core sandwiched between two pre-finished steel sheets which form a single, all-in-one insulated metal panel used as exterior wall and cladding systems and partition walls.
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	July 1, 2019
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific, single-company
EPD SCOPE	Cradle-to-gate with options
YEAR(S) OF REPORTED PRIMARY DATA	Fiscal year 2017
LCA SOFTWARE & VERSION NUMBER	GaBi ts, 8.7
LCI DATABASE(S) & VERSION NUMBER	GaBi 2018 (service pack 36)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1

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

## LIMITATIONS

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

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

**Comparability:** EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

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## 1. Product Definition and Information

### 1.1. Company Description

Metl-Span® has been the acknowledged leader in insulated metal panels for a variety of building applications since 1968. And we continue to set new standards in technological advancement, design innovation, aesthetic appeal, manufacturing quality, and service excellence. Our six strategically located, state of the art manufacturing facilities today produce a full range of insulated panels for the architectural, commercial/industrial, and cold storage industries, for new and retrofit construction. We offer panels designed specifically for use in walls, roofs and ceilings, in an ever-widening array of colors and finishes, fitments and performance specifications. Our mission is clearly defined: To deliver the highest-quality, most energy-efficient solutions to insulate and protect our world. That means producing panels which meet or exceed the U.S. Green Building Council's criteria for sustainability, reusability, recyclability and other attributes, thereby enabling our customers to qualify for credits in the Leadership in Energy and Environmental Design (LEED) Rating System, leading to Silver, Gold or Platinum certifications.

### 1.2. Product Description

Metl-Span ThermalSafe® insulated metal panel (IMP) consists of non-combustible mineral wool sandwiched between two sheets of cold rolled galvanized steel. Several configurations of IMPs exist depending on where and how they are used (e.g. building walls, roofs, cold storage, etc.) and the styling as desired by the architect.

> **ThermalSafe®:** 4-inch thick x 42-inch wide fire-resistant mineral wool metal panels

ThermalSafe® combines advanced panel design with Metl-Span's sophisticated manufacturing expertise to create a composite panel with a core made from non-combustible structural mineral wool boards that are processed in the factory to maximize compressive strength. The resulting fire rated panel has superior structural characteristics and span capability. Metl-Span has created this mineral wool panel to achieve a one-, two- or three-hour fire resistance rating under the most demanding conditions. In addition to its fire resistance characteristics, the panel provides good thermal performance and protection from the elements. The unique LockGuard® interlocking side joint further enhances the fire-resistant performance of the panel with its tongue and groove engagement of the mineral wool core.

Furthermore, the exterior face sheet of all Metl-Span insulated wall panels is treated with a base primer followed by a premium coating of full-strength 70 percent PVDF fluoropolymer finish (or a siliconized polyester finish, where economy is a primary consideration).

Information for aforementioned products was supplied by the Metl-Span facility located in Shelbyville, Indiana.

### 1.3. Applications

Thanks to their excellent insulating and weatherproofing characteristics, as well as their very competitive installed cost, Metl-Span panels are ideally suited to use in walls, ceilings and roofs for architectural, commercial, industrial and cold



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storage buildings of virtually any scale, in both new and retrofit construction. Successful applications include manufacturing facilities, warehousing and distribution centers; schools, sports complexes, museums and convention centers; corporate offices, banks and municipal buildings; retailing locations, including auto dealerships; aircraft hangars and service facilities; cold-storage and food-processing plants. Significant examples include the architecturally unique Loudoun Water Treatment facility in Loudoun, Virginia and the Atlantic Healthy Food cold storage facility in Atlanta, GA.



Figure 1: Loudoun Water Treatment Facility



Figure 2: Atlantic Healthy Food cold storage facility

## 1.4. Declaration of Methodological Framework

The EPD analysis uses a cradle-to-gate with options system boundary. The PCR considers installation, use, end-of-life, and recovery stages (Modules A4 through D) as optional. As such, this study selectively includes installation, end-of-life, and recovery stages, while excluding use stage. Since this is a “cradle-to-gate with options” study, the products are not declared as fulfilling a building reference service life. Additional details on cut-off and allocation procedures are found in sections 2.4 and 2.8, respectively.



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## 1.5. Technical Data

Technical data for IMP products can be found below. Additional product properties can be found in Section 1.6.

AS-TL1923A	ASTM D2244	ASTM F1642 FM 4471
ASTM A240	ASTM D2794	FM 4880
ASTM A653	ASTM D3359	FM 4881
ASTM A792	ASTM D4145	GSA-TS01-2003
ASTM A924	ASTM D7091	Florida Department of Business and Professional Regulation - Roof
ASTM C273	ASTM E18	Florida Department of Business and Professional Regulation - Wall
ASTM C518	ASTM E72	UL 580
ASTM C1363	ASTM E90-99	ASCE 7
ASTM D523	ASTM E283	ASTM A755
ASTM D1014	ASTM E330	ASTM D968
ASTM D1621	ASTM E413	
ASTM D1622	ASTM E1592	
ASTM D1623	ASTM E1680	
ASTM D1729	ASTM E1886	

### Fire-related standards

ASTM E84  
ASTM E119  
CAN/ULC S101  
CAN/ULC S102  
CAN/ULC S126  
CAN/ULC S134  
CAN/ULC S138

### Fire-related standards

NFPA 259  
NFPA 285  
NFPA 286  
UL 263  
UL 723

### Water-related standards

AAMA 501.1  
ASTM D2247  
ASTM E331  
ASTM E1646

### Weathering-related standards

ASTM B117  
ASTM D4214  
ASTM E1996



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## 1.6. Properties of Declared Product as Delivered

Panels are customized according to building site. Variations in panel configuration are as follows:

ThermalSafe® Insulated Metal Wall Panels	
Panel Thickness	4", 5", 6", 7", 8"
Panel Width	42"
Panel Length	8'-0" to 40'-0", variable by thickness.
Joint Configuration	Offset double tongue and groove with extended metal shelf for positive face fastening
Exterior and Interior Profile	Ultra Light Mesa nominal 1/32" deep

## 1.7. Material Composition

Steel coil represents steel that has been rolled out into 22, 24, or 26 gauge sheet and hot-dipped galvanized.

Mineral wool is fibrous insulation made from molten mineral material. Mineral wool fibers are oriented perpendicular to the panel faces for maximum structural strength.

Table 1: IMP material composition by mass

	ThermalSafe®
Steel	43%
Mineral wool	57%



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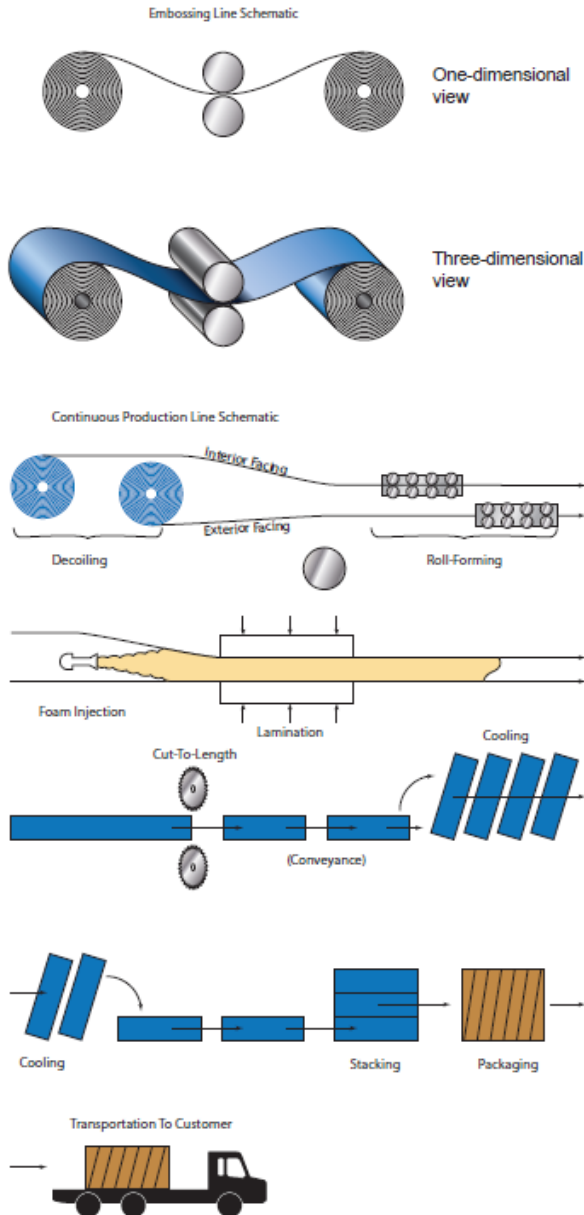
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## 1.8. Manufacturing

### Insulated Metal Panels - Continuous Production Line (CPL)



Embossing (off-line) Process	
Process step	Description
1	Decoiler
2	Embossing
3	Recoiler

Continuous Production Line (CPL) for Foam Panels	
Process step	Description
1	Decoiling of Facings
2	Slitting
3	Roll-Forming
4	Foam Injection
5	Lamination
6	Saw (Panel Cut to Length)
7	Panel Cooling
8	Bundle Packaging

CPL Unit Process Descriptions	
Metal Fabrication	Metal facings are embossed, trimmed, and roll-formed into desired shape.
Foam Injection and Curing	Chemicals are metered and dispensed between two facings into foam and allowed to cure.
Panel Fabrication and Packaging	Panels are cut to size and placed into bundles for delivery.



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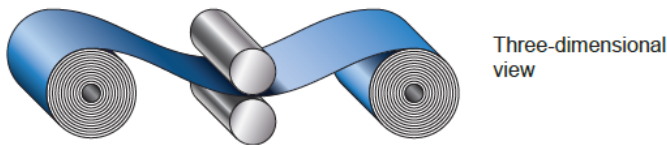
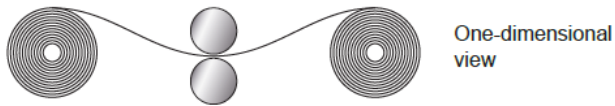
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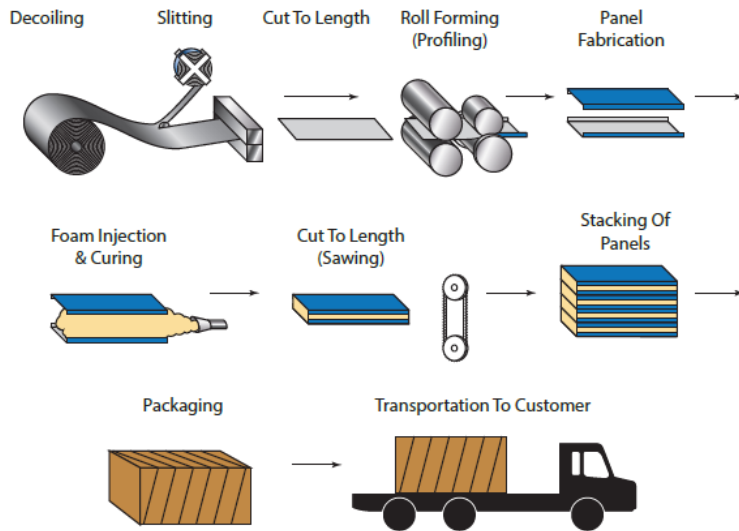
## Insulated Metal Panels - Discontinuous Production Line (DPL)

Embossing Line Schematic



Embossing (Off-line) Process	
Process Step	Description
1	Decoiler
2	Embossing
3	Recoiler

Discontinuous Production Line (DPL) for Foam Panels	
Process Step	Description
1	Decoiling of Facings
2	Slitting
3	Roll-Forming
4	Foam Injection
5	Lamination
6	Saw (Panel Cut to Length)
7	Panel Cooling
8	Bundle Packaging



DPL Unit Process Descriptions	
Metal Fabrication	Metal facings are embossed, trimmed, and roll-formed into desired shape.
Foam Injection and Curing	Chemicals are metered and dispensed between two facings into foam and allowed to cure.
Panel Fabrication and Packaging	Panels are cut to size and placed into bundles for delivery.





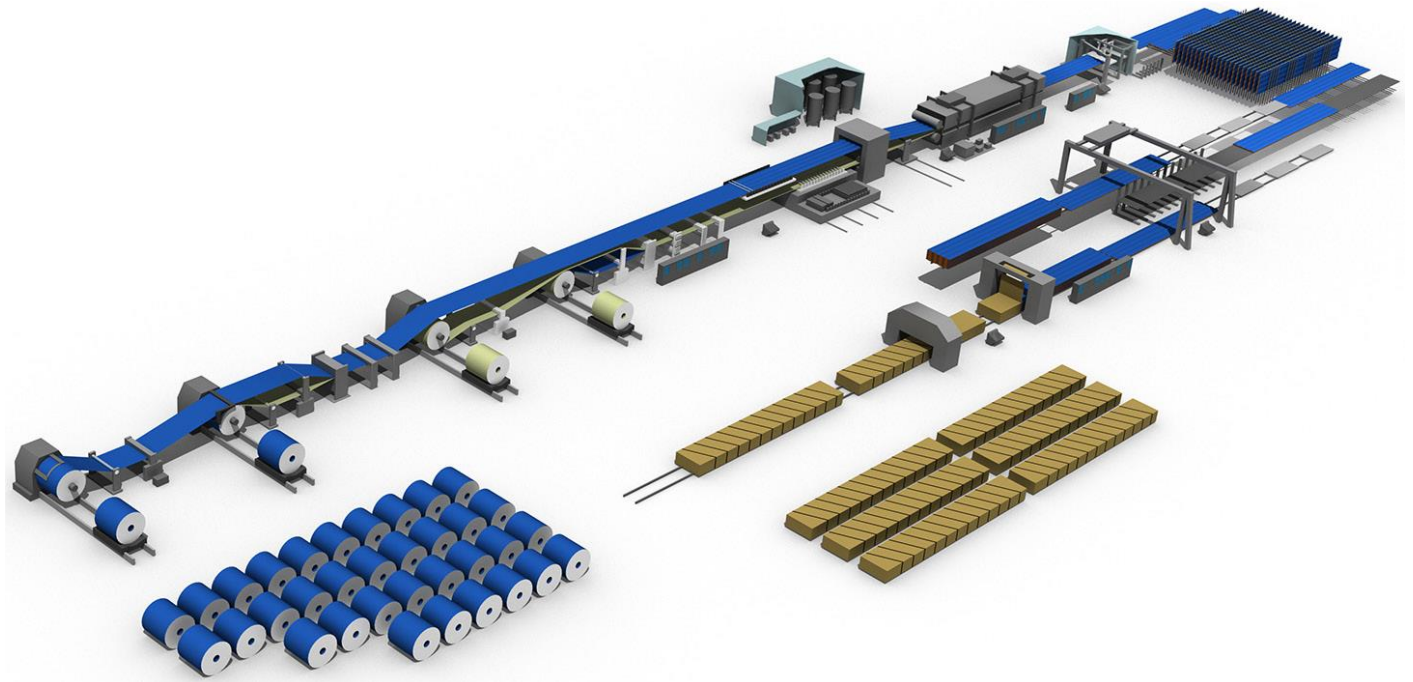
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Metl-Span ThermalSafe® insulated panels are produced by laminating mineral wool lamellas between sheets of coated metal. The result is a single, integrated unit that offers consistent thermal values, functions as the air/water/vapor barrier, and does not contribute to insect/rodent infestation. This process allows the production of insulating panels in a wide range of sizes, styles, colors and coatings to suit different applications.

Scrap panels from manufacturing are separated into metal and mineral wool. Eighty-five percent of post-consumer scrap steel is assumed to be recycled (based on Steel Recycling Institute 2010 recycling rates) and the remainder landfilled. Scrap mineral wool is sent to landfill. Packaging waste from inbound raw material transport is not considered.

The ThermalSafe® IMPs covered by this EPD are manufactured at Metl-Span's Shelbyville, IN location. Panels are then shipped via flatbed truck to the installation site.

## 1.9. Packaging

Foam sheets are layered between insulated metal panels before the panels are stacked on (OSB) oriented strand board and (EPS) expanded polystyrene underlayment and wrapped in polyethylene film. Depending on the facility, chipboard may also be used in packaging. For the purposes of this LCA, packaging reuse is not modeled.



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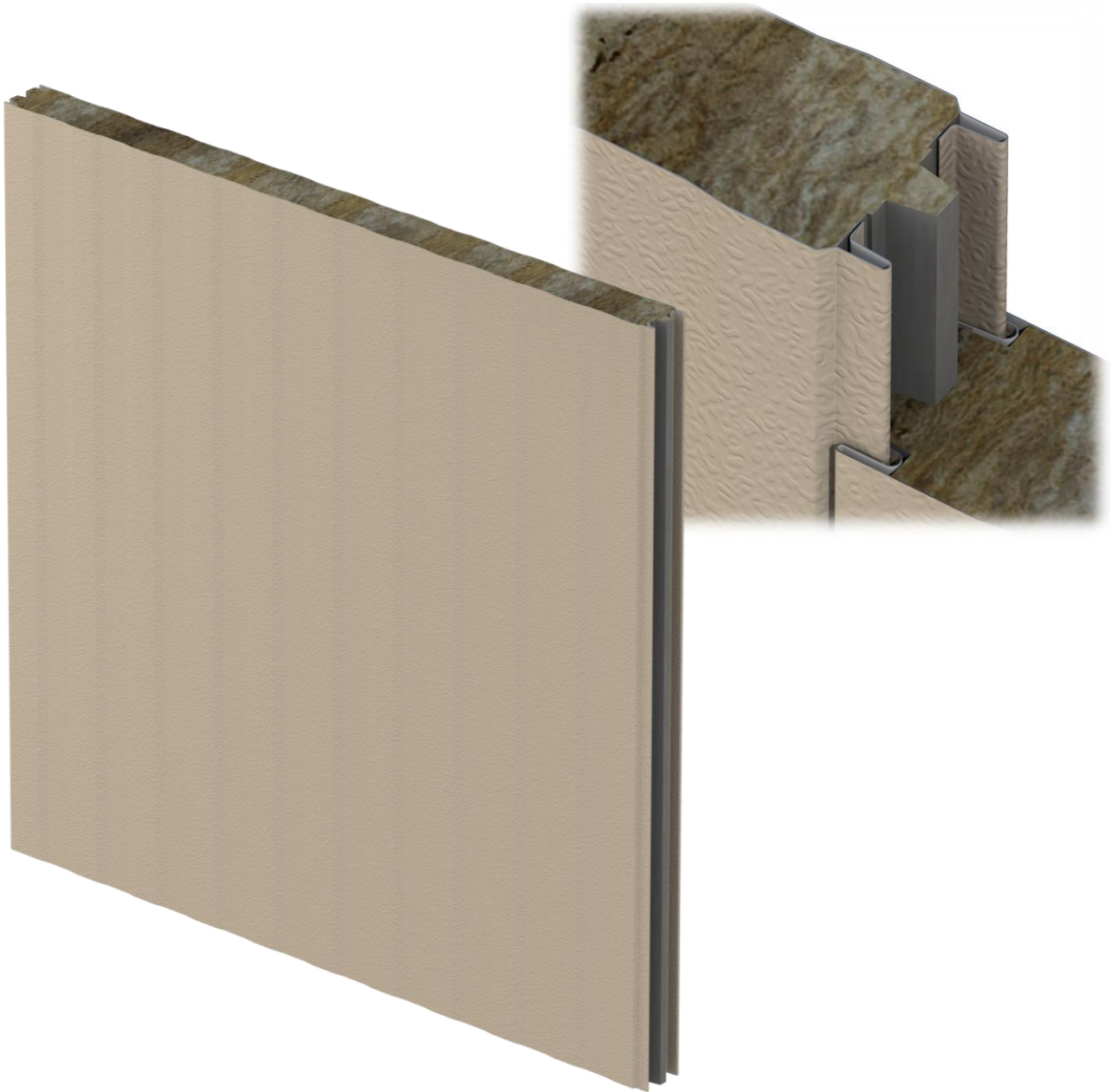
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## 1.10. Product Installation

ThermalSafe® panel



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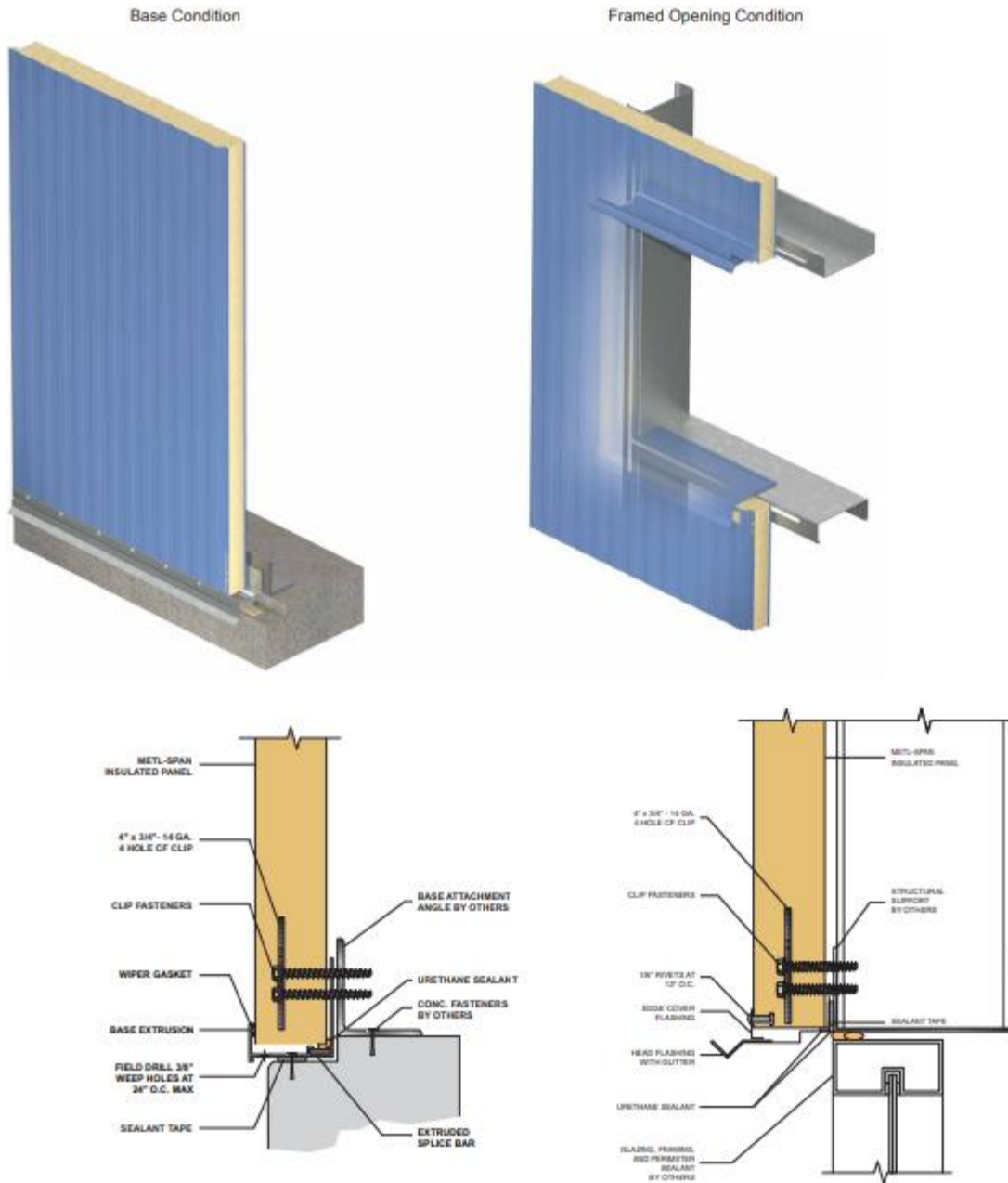


Figure 2: Example IMP Wall Installation Guidelines



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Metl-Span insulated panels are installed as a system over a new or existing structural steel support, such as wall or roof framing. Correct installation requires the use of butyl sealant and specifically designed fasteners, which are delivered with the panels. Figures 2 and 3, on the previous pages, illustrate the installation process. After the panels are in place, framed openings, flashing, trim, molding and other exterior components can be installed. (Note: Performance modeling is limited to the Metl-Span panel/sealant/fastener system and does not include framing and other wall/roof/ceiling elements or aesthetic elements such as aluminum extrusions often used with CF30A panels. Energy needed to operate any cranes or other installation equipment, however, is included.) Installation assumptions are detailed in the table below.

Scrap panel from installation is broken down by hand with 85% of scrap steel is recycled and the remainder sent to landfill along with 100% of scrap mineral wool. Panel packaging is also disposed of at this stage. Polyethylene wrap, oriented strand board, wood pallets, expanded polystyrene, and chipboard are used to package Metl-Span insulated panels. Disposal is modeled in conformance with PCR Part A (UL, 2018) requirements (see

Table 2). Landfill emissions from plastic and wood packaging are allocated to installation. Electricity generated from landfill gas (produced from the decomposition of bio-based packaging) is declared as an output from module A5 (installation).

**Table 2: Packaging end-of-life assumptions**

COMPONENT	RECYCLED	LANDFILLED	INCINERATED
Wood packaging	0%	100%	0%
Plastic packaging	15%	68%	17%

Table 3, below, shows material and energy requirements for installation requirements of Metl-Span insulated metal panels for a declared unit of 100 m<sup>2</sup>.

**Table 3: Installation requirements**

	UNITS	THERMALSAFE®
<b>Ancillary materials for installation</b>		
Butyl sealant	kg / D.U.	40.4
Polyurethane sealant	kg / D.U.	11.2
Rubber	kg / D.U.	21.6
Steel (fasteners & trim)	kg / D.U.	11.7
<b>Energy for installation</b>		
Electricity (US grid)	kWh / D.U.	4.92
Propane	L / D.U.	19.2
<b>Wastes</b>		
Scrap panel	m <sup>2</sup> / D.U.	0.502
Wood-based packaging	kg / D.U.	76.3
Plastic packaging	kg / D.U.	39.7



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## 1.11. Use

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Once installed, insulated metal panels do not directly consume energy, and require little to no maintenance. There are no parts to repair or refurbish.

The use stage is divided into five product-related modules plus two building operation modules: use or application of installed product, maintenance, repair, replacement, and refurbishment (B1 – B5). However, none of the use modules are included within the system boundaries, as is permissible given this study's system boundary of "cradle-to-gate with options".

### Building Operation

While use of the panels can affect building operational energy consumption; however, building operation is not considered in the analysis.

## 1.12. Reference Service Life and Estimated Building Service Life

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Since the use stage is not considered in the analysis, declaring a building reference service life is unnecessary.

## 1.13. Product Reuse

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Insulated metal panels are typically not reused following its removal from a building. Thus, reuse is not applicable for this product.

## 1.14. Disposal

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At the end-of-life, the panels are broken down by hand (deconstruction); since only manual labor is involved, no environmental impact is associated with this step. Wastes are then transported 20 miles to disposal. Eighty-five percent of scrap steel is assumed to be recovered per the PCR. The remaining scrap steel is landfilled, along with the entirety of mineral wool. At the landfill, it is assumed the mineral wool is inert.

## 1.15. Further Information

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No further information on insulated metal panels is provided.

## 2. Life Cycle Assessment Background Information

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A full life cycle assessment has been carried out according to ISO 14040 (ISO, 2009), 14044 (ISO, 2006), and 21930 (ISO, 2017), per the product category rules (PCR) for insulated metal panels as published by UL Environment (UL, 2018).

The main purpose of EPDs is for use in business-to-business communication. As all EPDs are publicly available via

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the program operator and therefore are accessible to the end consumer, they can also be used in business-to-consumer communication.

## 2.1. Functional or Declared Unit

The declaration refers to the declared unit of coverage of 100 m<sup>2</sup> with metal product.

Table 4: Declared unit information

NAME	UNIT	THERMALSAFE®
Declared unit	m <sup>2</sup>	100
Mass	kg / D.U.	2.26E+03

## 2.2. System Boundary

A “cradle-to-gate with options” life cycle analysis was conducted, from extraction of natural resources to final disposal. Within these boundaries the following stages were included:

- **Product Stage** (A1 – A3): Raw material supply, inbound transport of raw materials to manufacturing facility, manufacturing
- **Construction Process Stage** (A4 – A5): Outbound transport of finished product to construction site, construction installation process
- **End-of-Life Stage** (C1 – C4): Deconstruction/demolition, transport to disposal facility, waste processing, disposal

Building use phase modules (B1 through B7) were not assessed, nor were the construction and maintenance of capital equipment (e.g., production equipment). Additionally, human labor and employee commute were not included in the analysis.

## 2.3. Estimates and Assumptions

Finished panels are shipped via a flatbed truck to an installation site. Table 56 details distribution assumptions for each panel type.

Table 5: Outbound transportation distances

PARAMETER	UNIT	THERMALSAFE®
Average distance to installation site	km	372
Vehicle type	-	Flatbed truck
Fuel type	-	Diesel

At the end-of-life, it is assumed the panels are broken down by hand; since only manual labor is involved, no



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environmental impact is associated with this module (C1). Wastes are then transported 20 miles to disposal (C2). 85% of steel is recovered from the IMP (D) per the PCR. The remainder of the steel, along with all the mineral wool, is assumed to be sent to a landfill per the PCR.

## 2.4. Cut-off Criteria

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Data were included whenever possible. If it was necessary to exclude materials in order to facilitate the analysis, only flows representing less than 1% of the cumulative mass of the product system were excluded, providing their environmental relevance was judged not to be a concern.

Packaging of incoming raw materials (e.g., pallets, totes, super-sacks) are excluded as they represent less than 1% of the product mass and are not expected to contribute significantly to the results per functional unit. Capital goods and infrastructure required to produce and install IMP products (e.g., batch mixers, installation equipment) are presumed to produce millions of units to over the course of their life, so impact of a single functional unit attributed to this equipment is negligible; therefore, capital goods and infrastructure were excluded from this study.

## 2.5. Data Sources

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As a general rule, specific data derived from specific production processes or average data derived from specific production processes shall be the first choice as a basis for calculating LCA results.

For life cycle modeling of the considered products, the GaBi Software System for Life Cycle Engineering, developed by thinkstep AG, was used to model the product systems considered in this assessment. All relevant background datasets were taken from the GaBi 2018 software database (service pack 35). The datasets from the GaBi database are documented in the online documentation (thinkstep, 2018). To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

The worldsteel global average data were used for galvanized steel coil background data, with coil coating data obtained from the Metal Construction Association (MCA), of which Metl-Span is a member.

## 2.6. Data Quality

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A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of project-specific LCA models as well as the background data used.

### Temporal Coverage

All of the primary data is taken from 12 months of continuous operation in the 2017 fiscal year. All secondary data were obtained from the GaBi 2017 databases and published EPDs. Data are representative of the years 2010 to 2017.

### Geographical Coverage

All primary and secondary data were collected specific to the countries or regions under study. Where country-specific or region-specific data were unavailable, proxy data were used.

### Technological Coverage

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All primary and secondary data were modeled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used.

## 2.7. Reference Period

Primary data collected represent production during the 2016 and 2017 calendar years. This analysis is intended to represent production in 2017.

## 2.8. Allocation

Since only facility level data were available, input and output flows were allocated among each facility's co-products to determine the flows associated with the four specific products analyzed. Allocation of materials was done on a mass- or volume-basis as appropriate.

End-of-Life allocation generally follows the requirements of ISO 14044, section 4.3.4.3 and the product category rule (UL Environment, 2018). Under the PCR, the product life cycle is modeled using the cut-off approach. Scrap inputs to manufacturing are reported under the secondary materials metric. The system boundary at end-of-life is drawn after scrap collection to account for the collection rate. This generates a scrap output flow that is reported under the materials for recycling metric.

Processing and recycling of the net amount of scrap leaving the system (i.e., scrap outputs minus secondary material inputs) is reported under module D. The subsequent processing of the net scrap leaving the product system and credit associated with the recovery of this material is modeled using the worldsteel "value of scrap" model, which utilized the modeling approach described in a study of recycling methodologies (Avery & Coleman, 2009).

## 2.9. Comparability

No comparisons or benchmarking is included in this EPD. LCA results across EPDs can be calculated with different background databases, modeling assumptions, geographic scope and time periods, all of which are valid and acceptable according to the Product Category Rules (PCR) and ISO standards. Caution should be used when attempting to compare EPD results.

## 3. Life Cycle Assessment Scenarios

Table 6. Transport to the building site (A4)

Name	Unit	ThermalSafe®
Fuel type		Diesel
Liters of fuel	l/100km	41.3
Vehicle type		Flatbed truck
Transport distance	km	599





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Capacity utilization (including empty runs, mass based)	%	67%
Weight of products transported	kg	2,290
Capacity utilization volume factor	-	1

**Table 7. Installation into the building (A5)**

Name	Unit	ThermalSafe®
Ancillary materials	kg	85.0
Electricity consumption	kWh	4.92
Thermal energy	MJ	453
Product loss per functional unit	kg	11.0
Waste materials at the construction site before waste processing, generated by product installation	kg	116
Direct emissions to ambient air, soil and water	kg	0

**Table 8. End-of-life (C1-C4)**

Name	Unit	ThermalSafe®
Collected as mixed construction waste	kg	2,262
Reuse	kg	-
Recycling	kg	684
Energy recovery	kg	-
Landfilling	kg	194

**Table 9. Reuse, recovery and/or recycling potentials (D), relevant scenario information**

Name	Unit	ThermalSafe®
Net energy benefit from steam recovery from waste treatment declared as exported energy in D	MJ	2.73E-02
Net energy benefit from electricity recovery from waste treatment declared as exported energy in D	MJ	2.57E+01

## 4. Life Cycle Assessment Results

Cradle-to-grave life cycle impact assessment results are shown for both TRACI 2.0 and CML characterization factors. These results are relative expressions and do not predict impacts on category endpoints such as Human Health or Ecosystem Quality, the exceeding of thresholds, safety margins, or risks.

With respect to global warming potential, no credit was given for the sequestration of biogenic carbon during the growth of plants used in plant-derived packaging materials. Any carbon temporarily sequestered during the use of bio-



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based materials is assumed to be re-released to the atmosphere upon their decomposition. Since the lifetime of plant-derived packaging materials is shorter than the 100 year time horizon of this impact category (GWP 100), biogenic carbon was excluded from the global warming potential calculations.

**Table 10. 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
<b>EPD Type: Cradle-to-gate with options</b>	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	X

## 4.1. Life Cycle Impact Assessment Results

Impact assessment and other results are shown for a cradle-to-grave system boundary, excluding modules B1 through B7, as well as C1 and C3, for ThermalSafe® IMP product.

**Table 12. North American Impact Assessment Results, ThermalSafe®**

PARAMETER	UNIT	A1 - A3	A4	A5	C2	C4	D
<b>GWP</b>	[kg CO <sub>2</sub> eq.]	4.85E+03	1.13E+02	5.23E+02	5.24E+00	7.14E+01	-1.19E+03
<b>ODP</b>	[kg CFC-11 eq.]	7.72E-05	4.04E-12	2.44E-07	1.87E-13	1.28E-11	8.24E-06
<b>AP</b>	[kg SO <sub>2</sub> eq.]	1.84E+01	5.14E-01	1.24E+00	2.52E-02	3.62E-01	-2.32E+00
<b>EP</b>	[kg N eq.]	8.68E-01	4.24E-02	2.04E-01	2.05E-03	3.70E-02	-9.41E-02
<b>POCP</b>	[kg O <sub>3</sub> eq.]	2.20E+02	1.69E+01	1.41E+01	8.34E-01	6.50E+00	-3.26E+01
<b>ADPF</b>	Surplus MJ	3.70E+03	2.23E+02	1.13E+03	1.03E+01	1.39E+02	1.73E+02



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## 4.2. Life Cycle Inventory Results

Table 113. Resource Use, ThermalSafe®

PARAMETER	UNIT	A1 - A3	A4	A5	C2	C4	D
PERE	[MJ, LHV]	4.92E+03	4.14E+01	4.87E+02	1.91E+00	7.84E+01	7.29E+02
PERM	[MJ, LHV]	9.97E+02	0.00E+00	5.03E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	[MJ, LHV]	5.65E+04	1.67E+03	9.07E+03	7.73E+01	1.11E+03	-1.11E+04
PENRM	[MJ, LHV]	1.71E+03	0.00E+00	3.25E+03	0.00E+00	0.00E+00	0.00E+00
SM	[kg]	5.71E+01	0.00E+00	2.88E-01	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ, LHV]	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
RE	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	8.18E+00	2.01E-01	1.29E+00	9.30E-03	1.35E-01	1.50E+00

Table 14. Output Flows and Waste Categories, ThermalSafe®

PARAMETER	UNIT	A1 - A3	A4	A5	C2	C4	D
HWD	[kg]	2.54E-03	1.30E-05	5.09E-05	6.01E-07	3.83E-06	-7.61E-04
NHWD	[kg]	7.01E+02	6.28E-02	9.34E+01	2.90E-03	1.58E+03	1.25E+02
HLRW	[kg]	1.66E-03	4.43E-06	1.45E-04	2.05E-07	1.44E-05	-1.59E-05
ILLRW	[kg]	2.73E-02	1.20E-04	3.25E-03	5.54E-06	3.43E-04	-4.41E-04
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	[kg]	9.42E+01	0.00E+00	9.81E+00	0.00E+00	6.84E+02	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ, LHV]	2.72E-02	0.00E+00	2.64E+01	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ, LHV]	0.00E+00	0.00E+00	6.14E+01	0.00E+00	0.00E+00	0.00E+00



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Biogenic carbon is not reported in GWP as insulated metal panels do not typically contain bio-based materials. As such, carbon emissions and removals are not declared.

## 5. LCA Interpretation

In all impact categories, the potential impacts of insulated metal panels are primarily driven by raw materials (A1)—specifically, the production of steel and mineral wool.

Though some raw materials are transported vast distances, the inbound transportation module (A2) has a modest contribution to overall impact. Other transportation modules representing transport to site (A4) and transport to end-of-life (C2) have negligible impact to impact categories.

Overall potential impact, particularly for categories that are heavily influence by steel production, can be slightly offset by the credit for recycling steel waste in module D. Any credit received by the product system from steel scrap recovery is represented as a negative burden in the results because the recovered scrap is modeled as being made available for use by another product and therefore able to hand over the burden of virgin production to the subsequent product lifecycle.

## 6. Additional Environmental Information

### 6.1. Mandatory Environmental Information

No substances required to be reported as hazardous—as defined by the Resource Conservation and Recovery Act—are associated with the production of Metl-Span's insulated metal panels.

### 6.2. Environment and Health during Installation

Metl-Span complies with all federal, state and local health and safety requirements. Our employee safety policies, practices and systems meet or exceed OSHA standards.

## 7. References

European Standards. (2013). *EN 15804+A1 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.*

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ISO. (2009). ISO 14040: Environmental management - Life cycle assessment - principles and frameworks.

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## 8. Contact Information

### 8.1. Study Commissioner



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