

## ENVIRONMENTAL PRODUCT DECLARATION

# WoodWorks® REGULAR, VECTOR® AND CONCEALED CEILING PANELS

COMPOSITE WOOD PANELS WITH FACE-CUT VENEERS

Prelude® XL®, Suprafine® XL, Silhouette® XL, Interlude® XL Suspension Systems

Steel



WoodWorks Access Custom  
Gulf Canada Square, Calgary, Alberta  
Stantec



### Committed to Sustainability.

Armstrong World Industries is committed to delivering solutions that reduce the environmental impact of the buildings you create; from product design and raw material selection, to how our products are produced and delivered.

Now we provide Environmental Product Declarations (EPD's) to document the sustainability of our products. Inside this UL Environment certified ISO compliant EPD you will find:

- Performance features like acoustics, light reflectance, and durability
- Product application and use
- Product ingredients and their sources
- Information on how a ceiling system is produced
- Life Cycle Assessment (LCA) results including global warming potential and primary energy usage
- Total impacts over the life cycle of the product

WoodWorks® ceilings deliver a superior combination of performance attributes – excellent sound absorption, clean aesthetics, and a reduced environmental footprint – making it a great product for commercial applications.



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WOODWORKS® TEGULAR, VECTOR® AND CONCEALED CEILING PANELS  
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According to ISO 14025

## 1. General Information

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. 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, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment	
DECLARATION OPERATOR	Armstrong	
DECLARATION NUMBER	4786828541.102.1	
DECLARED PRODUCT	<b>WoodWorks® Tegular, Vector® and Concealed Ceiling Panels</b> – Composite Wood Panels with Face-cut Veneers	
REFERENCE PCR	PCR Guidance for Building Related Products and Services, From the range of Environmental Product Declarations of UL Environment: “Part B: Non-Metal Ceiling Panel EPD Requirements”, October 2015v1.	
DATE OF ISSUE	April 6, 2017	
PERIOD OF VALIDITY	5 Years	
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material’s origin Description of the product’s manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by:	Review Panel	
	epd@ul.com	
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL		
	Wade Stout, UL Environment	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		
	Thomas Gloria, Industrial Ecology Consultants	

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## 2. Product System Documentation

### 2.1 Product Description

Armstrong® WoodWorks® Ceiling and Wall Panels are real wood veneers on Forest Stewardship Council certified fire-retardant medium density particle board with face-cut veneers. WoodWorks Ceiling and Wall Panels are manufactured by Armstrong World Industries.

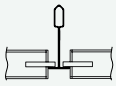



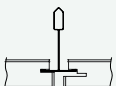
### 2.2 Application

Commercial Interior Finish. Acoustical, Suspended Ceiling System. The ceiling system must be installed in accordance with Armstrong installation guidelines. Our ceiling system installation brochure, "Installing Suspended Ceilings", is a general application overview, covering essential steps of a basic suspended ceiling installation. You can reference this document at <http://www.armstrongceilings.com/common/c2002/content/files/15994.pdf>.

### 2.3 Technical Data

There are different levels of performance associated with composite wood ceiling panels. Performance information is included in this EPD to provide a total understanding of this product and its performance attributes.

#### Performance of WoodWorks Ceiling Panels

Items Included in this EPD	Attributes		
WoodWorks Square Tegular Panels for 9/16" Suspension System 	<b>Perforations</b>	<b>NRC*</b> 	<b>CAC**</b> 
	W1	NA	38
WoodWorks Concealed Panels for 15/16" Suspension System 	W2	0.40–0.50	28
	W3	0.40–0.50	28
	W4	0.65–0.70	28
WoodWorks Vector® for 15/16" Suspension System 	W5	0.55	28
	W6	0.40–0.45	28
1" Fiberglass Infill Panel 8200100	*Values based on WoodWorks Tegular panels. For information on other WoodWorks products, visit <a href="http://www.armstrongceilings.com/woodworks">http://www.armstrongceilings.com/woodworks</a> . **Maximum NRC achieved with acoustical infill (item 8200100 or 5479). When infill is used, CAC is 28. Visit <a href="http://armstrongceilings.com/woodworks">armstrongceilings.com/woodworks</a> , or refer to the Acoustical Infill data page (CS-4172).		



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## 2. Product System Documentation (continued)

### 2.4 Placing On the Market/Application Rules

The respective standard is listed in the table in Section 2.3 above for each attribute of the declared product.

EN ISO 14025:2006, Environmental labels and declarations – Type III – environmental declarations – Principles and procedures

EN 14040 ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework

EN 14044 ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines

ASTM E1264-08e1 Standard Classification for Acoustic Ceiling Products

ASTM E84-12 Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM C518-10 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM C636 / C636M-08 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

ASTM C423-09a Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM E1414 / E1414M-11a Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

ASTM E1110-06 (2011) Standard Classification for Determination of Articulation Class

ASTM E1111 (2007) Test Method for Measuring the Interzone Attenuation of Ceiling Systems

### 2.5 Delivery Status

Armstrong® ceiling panels are well packaged in a variety of recyclable corrugated sleeves and box styles. Wooden pallets are used to protect unit loads during shipping.



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## 2. Product System Documentation (continued)

### 2.6 Material Content

- **UV Coating** – ultraviolet cured finishing coat.
- **Particleboard Core** – a composite material made of wood chips and shavings and a binder which is then pressed and extruded.
- **Veneer** – a thin layer of excellent grade wood that is adhered to the particle board.
- **Adhesive** – a substance utilized to securely adhere the wood veneer to the particle board core.
- **Edge Band** – a thin layer of PVC film adhered to the outer edges of the tile for aesthetics.

**Figure 1. Composition of a WoodWorks® Ceiling Panel**



### Material Content of WoodWorks Ceiling Panels

Mineral Fiber Core	FUNCTION	QUANTITY (PERCENT BY WEIGHT)	RECYCLED MINERAL RESOURCE	MINERAL RESOURCE	NON-RENEWABLE	RENEWABLE	ABUNDANT	RECYCLED MATERIAL	ORIGIN	TRANSPORTATION MODE	TRANSPORTATION MILES
Particleboard	Acoustics	85-95%				■	■	■	U.S.	Truck	5-250
Veneer	Aesthetics	1-5%				■	■		U.S.	Truck	5-250
Adhesive	Binder	1-5%			■	■			U.S.	Truck	100-200
UV Coating	Finish	0.05-1.5%			■				U.S.	Truck	100-200
Edge Band	Aesthetics	1-5%			■				U.S.	Truck	1200-1800





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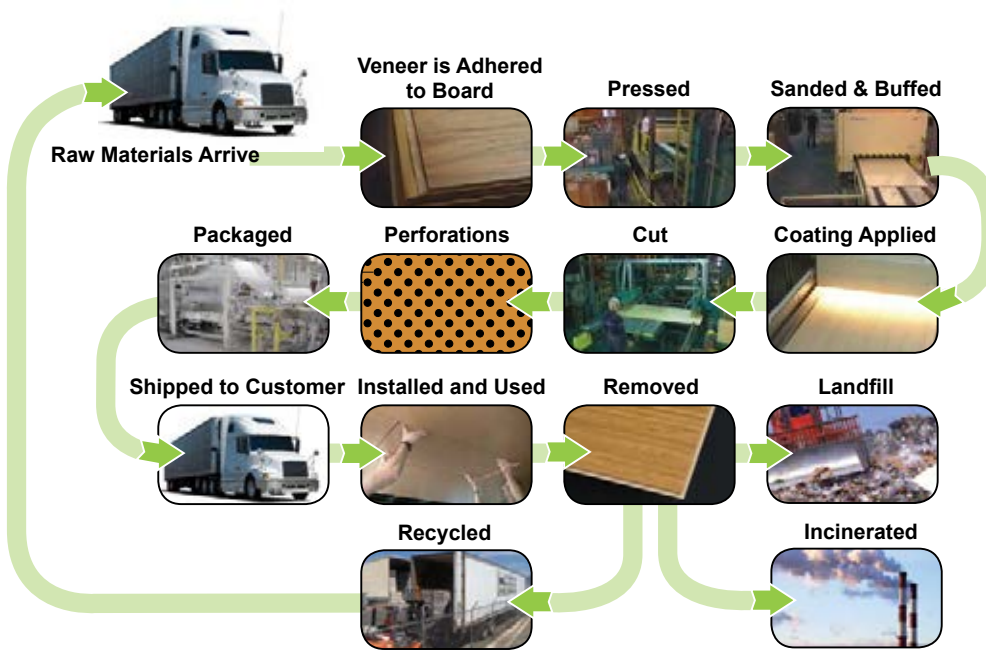
WOODWORKS® TEGULAR, VECTOR® AND CONCEALED CEILING PANELS  
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## 2. Product System Documentation (continued)

### 2.7 Manufacture

Figure 3: Process for Manufacturing WoodWorks Ceiling Panels



WoodWorks ceiling panels are manufactured using an adhesion and coating process. Particle-board and veneer sheets are delivered to the manufacturing facility. The veneer sheets are then adhered to the particle-board and pressed to ensure a good bond. The sheets are then cut to size, sanded, and buffed for an even finish. The panels are then given a final protective coating that is UV cured. Perforations are added to the finished product. After packaging, the material is shipped and installed. At the end of its useful life, the ceiling panel can then be recycled, sent to a landfill, or incinerated.

### 2.8 Health, Safety, and Environmental Aspects During Manufacturing

Armstrong World Industries has a comprehensive environmental, health, and safety management program. Risk reduction begins in the product design process. All products go through a safety, health, and environmental review prior to sale. Armstrong also has a long standing commitment to the safety and health of all our employees. The company's safety management program is considered to be World Class. Our OSHA recordable incident rate is below 1.0, meaning that there is less than one injury per 100 employees per year. All employees view safety as a key responsibility of their jobs. In 2010, Armstrong was named one of "America's Safest Companies" by EHS Today.

Armstrong World Industries is equally committed to reducing our environmental impact. As with safety goals, each manufacturing facility has environmental initiatives focused on responsible use of energy and water, and on waste reduction.

### 2.9 Installation of Ceiling Systems

The ceiling system must be installed in accordance with Armstrong installation guidelines. Our ceiling system installation brochure, "Installing Suspended Ceilings", is a general application overview, covering essential steps of a basic suspended ceiling installation.

You can reference this document at <http://www.armstrongceilings.com/common/c2002/content/files/15994.pdf>.

In addition, specific instructions are available for the different WoodWorks Ceiling Systems on each product page. These documents can be referenced at: <http://www.armstrongceilings.com>.



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## 2. Product System Documentation (continued)

### 2.10 Packaging

Armstrong® ceiling panels are well packaged in a variety of recyclable corrugated sleeves and box styles. Wooden pallets are used to protect unit loads during shipping.

### 2.11 Condition of Use

It is very important that WoodWorks ceiling materials be allowed to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. The panels should not, however, be installed in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space. Relative humidity shall not fall below 25% or exceed 55%.

### 2.12 Health, Safety, and Environmental Aspects During Installation

Sawing, sanding, and machining wood products can produce dust. Airborne wood dust can cause respiratory, eye, and skin irritation. The International Agency for Research on Cancer (IARC) has classified wood dust as a nasal carcinogen in humans.

Precautionary Measures: If power tools are used, they should be equipped with a dust collector. If high dust levels are encountered, use an appropriate NIOSH-designed dust mask. Avoid dust contact with eyes and skin.

First Aid Measure in Case of Irritation: Flush eyes or skin with water for at least 15 minutes.

Installers should wear appropriate personal protective equipment, such as gloves and safety glasses, to minimize exposure to dust and the potential for skin irritation.

### 2.13 Reference Service of Life

The system is warranted for one year; however, ceiling panels can last as long as the building's useful life if properly installed and maintained. The useful life indicated in the PCR for ceiling panels is 75 years. Warranty details can be found on each product page at <http://www.armstrongceilings.com>.

### 2.14 Extraordinary Effects

#### – Fire Performance

ASTM E84 surface burning characteristics, HPVA Certified with audit program per ASTM E84. Flame Spread Index 25 or less. Smoke Developed Index 50 or less.

CAN/ULC S102 surface burning characteristics. Flame Spread Rating 25 or less. Smoke Developed Classification 50 or less. ASTM E1264 Classification: Composite – Fire Class A.

#### – Insulation Value



ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Flow Meter Apparatus  
R Factor – 2.2 (BTU units)  
R Factor – 0.39 (Watts units)

#### – Seismic Performance

Seismic Categories C, D, E, and F  
ICC-ES ESR-1308 –

see <http://www.armstrongceilings.com/seismicRX>

Table 8: Performance of WoodWorks Ceiling Panels

Perforations	NRC* 	CAC** 
W1	N/A	38 •
W2	0.40–0.50	28
W3	0.40–0.50	28
W4	0.65–0.70	28
W5	0.55	28
W6	0.40–0.45	28

\* Values based on WoodWorks Tegular panels. For information on other WoodWorks products, visit <http://www.armstrongceilings.com/woodworks>.

\*\* Maximum NRC achieved with acoustical infill (item 8200100 or 5479). When infill is used, CAC is 28. Visit [armstrongceilings.com/woodworks](http://armstrongceilings.com/woodworks), or refer to the Acoustical Infill data page (CS-4172).



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## 2. Product System Documentation (continued)

### 2.15 Disposal

Disposal in municipal landfill or commercial incineration facilities is permissible and should be done in accordance with local, state, and federal regulations.

## 3. Life Cycle Assessment

This study provides life cycle inventory and environmental impacts relevant to Armstrong® suspended ceilings. This LCA was conducted to 1) better understand the environmental impacts of the life cycle of suspended ceiling systems; 2) learn how the impacts of raw material selection, product formulation, and manufacturing process influence the life cycle impacts of suspended ceilings, and 3) use innovation to drive reduction in the product platform.

The methods for conducting the life cycle assessments used for this project were consistent with ISO 14040, 14044 and EN15804. This report is intended to fulfill the reporting requirements in Section 5 of ISO 14044 and Product Category Rules Guidance for Building-Related Products and Services Part B: Non-Metal Ceiling Panel EPD Requirements.

### 3.1 Declared and Functional Unit

The declared unit for this EPD is 1 m<sup>2</sup> of WoodWorks ceiling panels in use over 75 years.

Armstrong World Industries has chosen to also report for 1 ft<sup>2</sup>.

Ceiling System View: In order to understand the complete view of a ceiling system, life cycle information is included for the total ceiling system based on the coverage of 1,000 square foot (ft<sup>2</sup>) area of building space and then broken down into a 1 square foot (ft<sup>2</sup>) view.

Parameter	Unit
Declared Unit	ft <sup>2</sup>
DeclaredThickness (inches)	0.75
Surface Weight (lb/ft <sup>2</sup> )	2.75
Declared Unit	m <sup>2</sup>
DeclaredThickness (cm)	1.9
Surface Weight (kg/m <sup>2</sup> )	13.42





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## 3. Life Cycle Assessment (continued)

### 3.2 System Boundaries:

The system boundaries studied as part of this life cycle assessment include extraction of primary materials, raw materials manufacture, ceiling panel production, installation, and end of life.

The phases below outline a “cradle-to-grave” life cycle assessment for ceiling panels.

#### Ceiling Panels:



#### The Cradle-to-Grave Assessment Includes:

- Raw materials production including substrate, coating, and packaging materials for ceiling panels
- Transportation of raw materials to Armstrong Ceilings manufacturing facility
- Manufacturing of the ceiling panels at an Armstrong Ceilings manufacturing facility
- Packaging of finished products including energy to operate packaging equipment
- Transportation from manufacturing facility to distribution centers, retailers, and job site (assumed to be 500 miles by truck)
- Use phase covers a useful life of 75 years as suggested in the PCR and includes the transportation and installation of the system
- End of life includes landfill disposal of ceiling panels with assumed 50 miles truck transport from job site to landfill

#### The Cradle-to-Grave Assessment Excludes:

- Overhead energy usage (heating, lighting) of manufacturing facilities
- Maintenance and operation of support equipment

### 3.3 Assumptions:

There are no specific assumptions to list that are not dealt with in the appropriate section. When an assumption is made it will be described within the specific stage of the report. As an example a 7% waste factor was utilized for the waste generated during the installation of the product. This is described in more detail within the installation section of the report.

### 3.4 Cut-off Criteria:

- Mass – If a flow is less than 1% of the cumulative mass of the model, it is excluded, providing its environmental relevance is not a concern.
- Energy – If a flow is less than 1% of the cumulative energy of the model, it is excluded, providing its environmental relevance is not a concern.
- Environmental relevance – If a flow meets the above criteria for exclusion, yet is believed to potentially have a significant environmental impact, it is included.



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## 3. Life Cycle Assessment (continued)

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### 3.5 Background Data:

All data is reported as a North American weighted average across our ceiling and suspension system plant locations. The majority of Armstrong® WoodWorks® panels are manufactured on the west coast of the United States and are shipped all across North America. Shipping data was utilized to determine that the average shipping distance from manufacturing to customer is approximately 2,240 miles. If product is not recycled, disposal transportation at end of life is assumed to be 50 miles.

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### 3.6 Data Quality:

The LCA model was created using the GaBi Software system for life cycle engineering, developed by Think Step. The GaBi database provides the life cycle inventory data for several of the raw and process materials obtained from the background system. The data quality is considered to be good to high quality. With the exception of supplier specific data, all other relevant background data was taken from the GaBi database software.

All gate-to-gate, primary foreground data was collected for the ceiling panels manufacturing process. Background data was collected from suppliers or generic data was used. When generic data was used, it was verified and triangulated against several sources.

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### 3.7 Period Under Review

Calendar year 2015 manufacturing data was used to create the LCA model.



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## 3. Life Cycle Assessment (continued)

### 3.8 Allocation:

No allocation was performed within the modeling of Armstrong World Industries unit processes for WoodWorks® ceiling panels. Allocation occurred at the end of life phase for ceiling panels as they were partitioned based on 1% overall ceiling panel recycling rate. Credits for electricity and heat gained from thermal recycling of waste and packaging in a solid waste incinerator and/or landfill were not taken in this study.

## 4. LCA: Scenarios and Additional Technical Information

### – Ceiling Panel Impacts:

The majority of the environmental impacts for this product occur during the extraction and processing of raw materials detailed in the Production Stage. For most ceiling panels, the opportunity for reduction is in the manufacturing process as well as reductions associated with raw materials.

### – Use Stage:

Although Armstrong World Industries provides a one-year ceiling system warranty, the use stage is defined in the PCR at 75 years and this is what was used in the LCA. The assumption is that the ceiling system requires no cleaning or maintenance so the impact is very small.

### – End of Life Impacts:

End of Life impacts associated with landfilling and/or incineration of WoodWorks ceiling panels range from 5% to 58% of all impact categories. For example, End of Life represented approximately 30% of the overall Global Warming Potential impacts for a WoodWorks ceiling tile.

### Transport To The Building Site (A4)

	Unit	WoodWorks
Liters of fuel	l/100km	3412.556
Transport distance	km	3605
Capacity utilization (including empty runs)	%	67
Gross density of products transported	kg/m <sup>3</sup>	1.334
Capacity utilization volume factor	–	1



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## 4. LCA: Scenarios and Additional Technical Information (continued)

### Installation Into The Building (A5)

Parameter	Unit	1 m <sup>2</sup>	1 ft <sup>2</sup>
Auxiliary	kg	0	0
Water Consumption	m <sup>3</sup>	0	0
Other Resources	kg	0	0
Electricity Consumption	kWh	0	0
Other Energy Carriers	MJ	0	0
Material Loss	kg	1.0180	0.0940
Ceiling Panel Mounting System (CPMS)	kg	1.1230	0.1040
Ceiling Panel Mounting System (CPMS)	%	7%	7%
Output substances following waste treatment on site	kg	0.0000	0.0000
Dust in air	kg	negligible	negligible
VOC in Air	kg	negligible	negligible

### Installation Into the Building

There is no energy or water use required for the ceiling system installation. For suspended ceiling systems, a 7% waste factor was assumed on site during construction. This value is based on historic internal studies which have documented the quantity of scrap that are generated at the job site due to needed cuts (to allow for the installation of sprinkler heads, for example) or mistakes. While this material can be and is recycled from some jobs, it is assumed that all of the on-site scrap material will be sent to a landfill located within 50 miles of the jobsite. The Prelude suspension was considered as part of the ceiling panel mounting system (CPMS).

The values in the table are based on a Prelude system used to install 2' x 2' square tiles at a typical depth of 4 feet from the deck. Hanger wires are every 4 feet and assumed that 6 foot long 12 gauge wire was utilized.

### End of Life

The end of life phase for the ceiling tiles was included in the study. End of life impacts include disposal of ceiling panels, scrap, and packaging at the end of installation. The study was also conservative in the fact that it did not take credit for any energy that was recovered in the incineration of landfill process.



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## 5. LCA: Results

The Life Cycle Assessment (LCA) was performed according to ISO 14040 and follows the PCR instructions. The cradle-to-grave LCA encompasses raw material production; transport of raw materials to production facility; manufacturing of ceiling panels; packaging; transportation to job site; use phase; and end of life including disposal or recycling.

**Table 1. Description of the system boundary (X = Included in LCA; MND = Module not declared)**

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES		RSL
	Raw Material supply	Transport	Manufacturing	Transport from gate site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling potential		
EPD type	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
Cradle to grave – m <sup>2</sup>	All A – C modules mandatory																75 Yrs		
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

## Life Cycle Environmental Impact Results: 1 m<sup>2</sup> WoodWorks Ceiling Panel

Declared Unit: 1 m<sup>2</sup> of ceiling panels for use over 75 years, impacts based on U.S. EPA TRACI 2.1 Impact Factors

**Table 2. North American LCA Environmental Impact Results**

TRACI 2.1 Impact Assessment, October 2013				
PARAMETER	PARAMETER	UNIT	1 m <sup>2</sup>	1 ft <sup>2</sup>
GWP	Global warming potential	kg CO <sub>2</sub> - Eq.	30.516	2.835
ODP	Stratospheric ozone layer depletion	kg CFC-11 Eq.	0.000	0.000
AP	Acidification potential	kg SO <sub>2</sub> - Eq.	0.799	0.074
EP	Eutrophication potential	kg N- Eq.	0.037	0.003
POCP	Photochemical ozone creation potential	kg O <sub>3</sub> - Eq.	1.846	0.171
ADP	Abiotic resource depletion potential – fossil fuels	Surplus energy per extracted MJ, kg or m <sup>3</sup> fossil fuel as a result of lower quality resources	26.659	2.477



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## 5. LCA: Results (continued)

**Table 3. LCA Results: Resource Use**

LCA RESULTS – RESOURCE USE 1 m <sup>2</sup> WOODWORKS®				
Parameter	Parameter	Unit	1 m <sup>2</sup>	1 ft <sup>2</sup>
PERE	Renewable primary energy as energy carrier	MJ, LHV	441.372	41.004
PERM	Renewable primary energy resources as material utilization	MJ, LHV	0.000	0.000
PERT	Total use of renewable primary energy resources	MJ, LHV	441.372	41.004
PENRE	Non-renewable primary energy as energy carrier	MJ, LHV	258.685	24.032
PENRM	Non-renewable primary energy as material utilization	MJ, LHV	0.000	0.000
PENRT	Total use of non-renewable primary energy resources	MJ, LHV	258.685	24.032
SM	Use of secondary material	MJ, LHV	0.000	0.000
RSF	Use of renewable secondary fuels	MJ, LHV	0.000	0.000
NRSF	Use of non-renewable secondary fuels	MJ, LHV	0.000	0.000
FW	Use of net fresh water	m <sup>3</sup>	0.136	0.013

**Table 4. LCA Results: Output Flows and Waste Categories**

LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES 1 m <sup>2</sup> WOODWORKS®				
Parameter	Parameter	Unit	1 m <sup>2</sup>	1 ft <sup>2</sup>
HWD	Hazardous waste disposed	kg	0.000	0.000
NHWD	Non-hazardous waste disposed	kg	0.211	0.020
RWD	Radioactive waste disposed	kg	0.000	0.000
CRU	Components for re-use	kg	0.000	0.000
MFR	Materials for recycling*	kg	0.000	0.000
MER	Materials for energy recovery	kg	0.000	0.000
EE	Exported energy	MJ, LHV	0.000	0.000

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy





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COMPOSITE WOOD PANELS WITH FACE-CUT VENEERS

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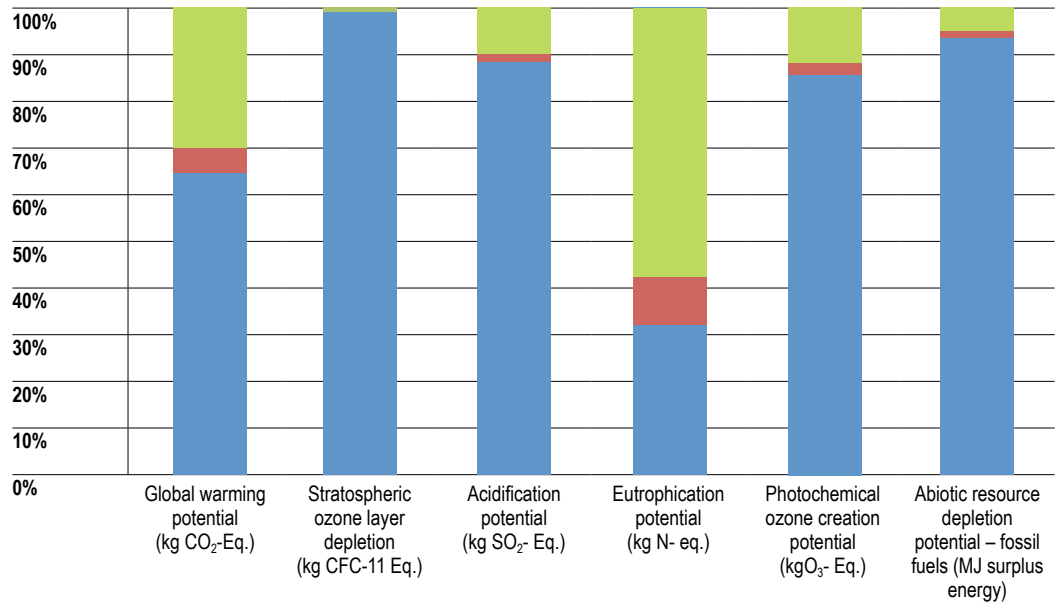
## 6. LCA: Interpretation

From the results of the suspended ceiling system life cycle covered in this study, it was concluded that the ceiling panel manufacturing process and raw materials – specifically, mineral wool in the ceiling panel and steel in the suspension systems – have the greatest impact on Primary Energy Demand (PED) and “carbon footprint” (represented by Global Warming Potential [GWP]).

**Life Cycle Impact Assessment of WoodWorks® Ceiling Panels<sup>1</sup> relative importance in percentage terms for the Production, Use, and End of Life stages for the ceiling panel.**

<sup>1</sup> Based on U.S. EPA TRACI 2.1 Impact Factors

End of Life ■  
Use ■  
Production ■



# ENVIRONMENTAL PRODUCT DECLARATION



WOODWORKS® TEGULAR, VECTOR® AND CONCEALED CEILING PANELS  
COMPOSITE WOOD PANELS WITH FACE-CUT VENEERS

According to ISO 14025

## 7. References

### PCR

#### UL Environment

UL Environment General Program Instructions April 2015, version 2

#### Sustainability Reporting Standards

EN 15804: 2012-04 – Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction product.

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 15392:2008 – Sustainability in building construction – General principles

ISO 15686-1:2011 – Buildings and constructed assets – Service life planning – Part 1: General principles

ISO 15686-2:2008 – Buildings and constructed assets – Service life planning Part 2: Service life prediction procedures

ISO 15686-7:2008 – Buildings and constructed assets – Service life planning Part 7: Performance evaluation for feedback of service life data from practice

ISO 15686-8:2008 – Buildings and constructed assets – Service life planning Part 8: Reference service life and service life estimation

ISO 21930: 2007 – Sustainability in building construction – Environmental declaration of building products

#### Testing And Classification References

ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM C636 – Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Panel and Lay-in Panels

ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials

ASTM E1110 – Standard Classification for Determination of Articulation Class

ASTM E1111 – Standard Test Method for Measuring the Interzone Attenuation of Open Office Components

ASTM E1264 – Standard Classification for Acoustical Ceiling Products

ASTM E1414 – Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

ASTM E1477 – Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers

ASTM E413 – Classification for Rating Sound Insulation

CA Specification 01350 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers – Version 1.1



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WOODWORKS® TEGULAR, VECTOR® AND CONCEALED CEILING PANELS  
COMPOSITE WOOD PANELS WITH FACE-CUT VENEERS

According to ISO 14025

## 7. References (continued)

### Relevant Federal Standards and SOPS

Environment Canada, National Pollutant Release Inventory (<http://www.ec.gc.ca/inrp-npri/>)

EPCRA 313 Toxic Release Inventory Reporting (U.S.) (<http://www2.epa.gov/toxics-release-inventory-tri-program>)

US EPA, ORD/NRMRL/Sustainable Technology Division, Systems Analysis Branch, SOP No. S-10637- OP-1-0- Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI), Software Name and Version Number: TRACI version 2.1, USER'S MANUAL, 24 July, 2012

US: Resource Conservation and Recovery Act (RCRA), Clause C (<http://www.epa.gov/region6/rcra/>)

### Relevant PCRs

PCR Guidance for Building Related Products and Services, From the range of Environmental Product Declarations of UL Environment: "Part B: Non-Metal Ceiling Panel EPD Requirements", October 2015v1.

UL Environment General Program Instructions April 2015, version 2

PCR Part A: UL Environment and Institute of Construction and Environment e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. July 2014, version 1.3

EN 15804: 2012-04 – Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction product.

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

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