Environmental Product Declaration

BAROQUE™ CEILING PANELS

CERTAINTEED (L'ANSE, MI)
BAROQUE, BAROQUE CUSTOMLINE, FINE FISSURED, FINE FISSURED CUSTOMLINE, DIRECTIONAL FISSURED, SAND MICRO, SAND MICRO CUSTOMLINE, SCHOOL BOARD

Ceiling panel products with enhanced fire performance as well as a range of aesthetic and performance properties.

CertainTeed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of interior building materials including gypsum, ceilings, and insulation as well as exterior building materials which include roofing, vinyl siding, trim, fence, railing and decking.

CertainTeed respects the environment through the responsible development of sustainable building products and systems. Architects, contractors and manufacturers continue to look for ways to reduce our industry's impact on the environment while meeting customer demand for products that deliver beauty, comfort, and performance. CertainTeed Ceilings' respect for the environment is reflected in our ongoing emphasis on sustainable building products and systems. Open sharing of the data we gather on these effects – as embodied in Environmental Product Declarations – is central to the process, and sets CertainTeed Ceilings apart. For more information visit: http://www.certainteed.com

UL CERTIFIED
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certainteed
SAINT-GOBAIN

Baroque, Baroque Customline, Fine Fissured, Fine Fissured Customline, Directional Fissured, Sand Micro, Sand Micro Customline, School Board

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

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL ENVIRONMENT 333 PFINGSTEN RD, NORTHBROOK, IL 60062	WWW.UL.COM WWW.SPOT.UL.COM
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v 2.7 2022	
MANUFACTURER NAME AND ADDRESS	CertainTeed Architectural Solutions 200 S Main St, L'Anse, MI 49946	
DECLARATION NUMBER	4790601028.101.1	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Baroque™ Ceiling Panels - L'Anse, MI	
REFERENCE PCR AND VERSION NUMBER	Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 4. March 2022. UL Environment. Product Category Rule Guidance for Building-Related Products and Services Part B: Non-Metal Ceiling and Interior Wall Panel EPD Requirements, Version 2.0 2021.	
DESCRIPTION OF PRODUCT APPLICATION/USE	Modular installation of suspended ceilngs in commercial buildings.	
PRODUCT RSL DESCRIPTION (IF APPL.)	This study assumes a product service life of 30 years.	
MARKETS OF APPLICABILITY	Global/North America	
DATE OF ISSUE	February 1, 2023	
PERIOD OF VALIDITY	5 Years	
EPD TYPE	Product-specific	
RANGE OF DATASET VARIABILITY	N/A	
EPD SCOPE	Cradle to gate with options	
YEAR(S) OF REPORTED PRIMARY DATA	2021-2022	
LCA SOFTWARE & VERSION NUMBER	GaBi 10.6.2.9	
LCI DATABASE(S) & VERSION NUMBER	The Sphera GaBi 2022.2, US LCI, and Ecoinvent v3.8 databases	
LCIA METHODOLOGY & VERSION NUMBER	TRACI v2.1 and CML v4.2	

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McC Cooper McCollum, UL Environment
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Saint-Gobain
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

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

1. Product Definition and Information

1.1. Description of Company/Organization

CertainTeed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of interior building materials including gypsum, ceilings, and insulation as well as exterior building materials which include roofing, vinyl siding, trim, fence, railing and decking.

1.2. Product Description

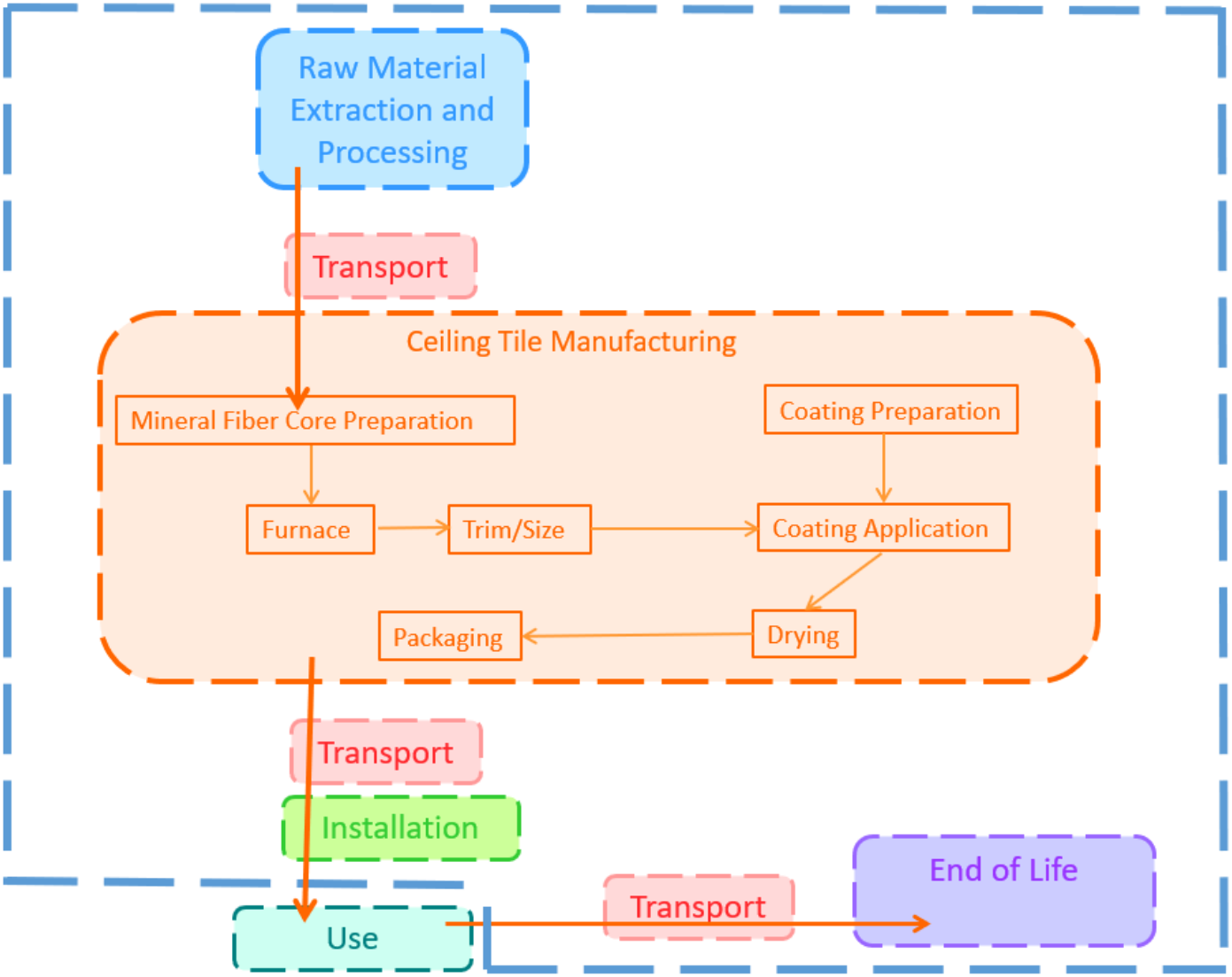
Product Identification

The Baroque™ Ceiling Panel product family is made up of the **Baroque™, Baroque™ Customline®, Fine Fissured, Fine Fissured Customline®, Directional Fissured, Sand Micro™, Sand Micro™ Customline® and School Board®** acoustic ceiling products. These products are manufactured in L'Anse, Michigan. CertainTeed Architectural's quality assurance process is based on industry-accepted best practices that involve constant measurement and evaluation throughout the manufacturing process. The Saint-Gobain Acoustical Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and has been assessed against the management and technical requirements published in the International Standard, ISO/IEC 17025:2017. This Environmental Product Declaration (EPD) is developed for these ceiling panel products only and does not include the ceiling suspension systems. Those are examined in a separate EPD.

Features

- Most have mold/mildew resistant surfaces (BioShield®)
- Many offer non-directional patterns which can reduce scrap during installation
- Some have USDA certified Bio-based content to 96%
- Certified VOC compliant to CDPH v1.2, 2017
- Cost-effective options for acoustic treatment
- Multiple sizes, edge details and finish textures to meet aesthetic requirements

Flow Diagram



Product Average

This is a product specific EPD manufactured in one facility. Two products within the product line were analyzed and a weighted average was calculated to showcase the results.

1.3. Application

Modular installation of suspended ceilngs in commercial buildings.

1.4. Declaration of Methodological Framework

The nature of life cycle assessment is to include a wide range of inputs and outputs associated with the product being analyzed. Constraining the LCA scope is an essential part of the study. The following section describes the various information included in the framework of this LCA study in order to appropriately define goal, scope, and boundaries of the study.

1.5. Technical Data

TECHNICAL DATA	VALUE	UNIT
Noise Reduction Coefficient (NRC) Test Method ASTM C423	0.55	NRC
Ceiling Attenuation Class (CAC) Test Method ASTM E1414	33 (2x2) 35 (2x4)	dB
Fire Rating Test Method ASTM E84	Class A	n/a
Light Reflection Test Method ASTM E1477	0.83	n/a

1.6. Properties of Declared Product as Delivered

All flows to and from the environment within the system boundary are normalized to a unit summarizing the function of the system. The environmental impact potentials per functional unit are the basis for comparison in an LCA. It provides a unit of analysis and comparison for all environmental impacts.

The functional unit for the study is one ceiling panel. The ceiling panel has a mass of 0.405 kilograms. The reference service life is 30 years.

1.7. Material Composition

The panel's core component consists of perlite, newspaper, mineral wool, and starch. The coating is a proprietary mixture.

The coating consists of a mixture of additional materials and is applied to the surface of the panel. The various coatings available for the product consist primarily of varying percentages of limestone, kaolin, feldspar, and titanium dioxide, along with other smaller amounts of additives. The coating modeled and used in the results for this EPD is the mixture with the highest environmental impacts.

Component	Baroque
Perlite	42-48%
Broke	15-24%
Newspaper	15%
Mineral Wool	12-14%
Starch	7-8%
Clay	0%
Total:	100%

1.8. Manufacturing

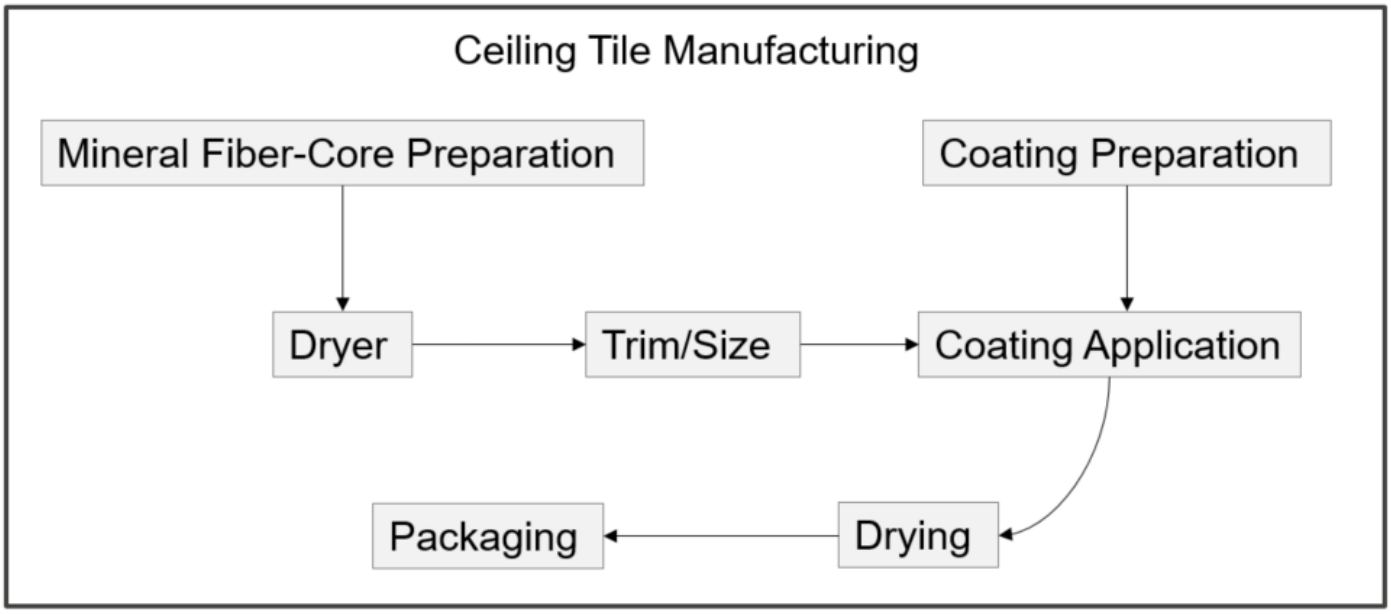
A detailed analysis of the Baroque, Cashmere, and Protectone Ceiling Panel Product families manufacturing process was completed by the Saint-Gobain North America ESG group. A process flow diagram is attached in Appendix A and illustrates all process steps, inputs, and outputs including material, energy, emissions, and wastes.

To produce ceiling panels, the core component raw materials are mixed and formed into the product. After the raw materials have been processed they are added to the mix tank where they are combined. The resulting slurry is then further filtered and processed to remove any impurities. The processed slurry is then sent to the board machine, where the wet mixture is formed into boards with the excess water being drained from below. The board sections are baked in a large oven heated with natural gas.

The panel sections of mineral fiber board are then trimmed, cut to size, and further finished with various fissuring or texturing options. Coating is then applied as necessary according to the specification of the individual product type being manufactured and the completed tile is heated a second time to cure the coating. Finally, the panels are packaged for shipping.

It is important to note that the waste from any process in the mineral wool ceiling tile manufacturing process that produces wet or dry scrap is collected and reused. The dry dust and trimmings as well as the wet scrap are mixed with water and pulped to produce “broke”, which is then added to the mix tank along with the other raw materials. In addition, the wastewater, along with the impurities from the mix tank, is transferred to a settling pond. The water from the settling pond is then used to irrigate fields on site, and the solid waste is used as land applied fertilizer and soil amendments.

The L’Anse manufacturing facility receives all of its electricity from a nearby biomass electricity plant and the waste steam from that plant is also used to pre-heat wet slabs before entering the dryer. Energy, water, and materials go into the Baroque Ceiling Panel Product family process, waste and emissions are outputs from the manufacturing process.



1.9. Packaging

Packaging of the final product after production is included in the life cycle assessment. The product is stacked in cardboard sleeves, wrapped in shrink wrap, and paper labels affixed. The packages of product in cardboard sleeves are then stacked on a pallet with other finished product, and wrapped in shrink wrap again before final shipping. The purchased amount of packaging material was provided by the L'Anse facility personnel and the weight of each material per square foot of finished product was calculated.

1.10. Transportation

Raw materials are transported to the manufacturing sites by standard freight truck, train, or ocean freighters. Unless otherwise noted, transport vehicles are fueled with diesel fuel.

Final products are transported on trucks throughout the United States. This study assumed an average of 800 km for the final shipment of product based on the assumption within the Product Category Rule (PCR).

1.11. Use

The use stage is excluded in the life cycle assessment.

The PCR requires products with indoor applications to report on the VOC emissions as determined in accordance with the "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2." All of the product families included in this study have been tested and certified in compliance with the VOC emissions standard for individual VOCs of concern and formaldehyde.

1.12. Reference Service Life and Estimated Building Service Life

This study assumes a product service life of 30 years. The selected service life used in this study reflects the expert

opinion of the product manufacturer and the building service life indicated in the PCR.

1.13. Reuse, Recycling, and Energy Recovery

The overissue newspaper is a waste material that is collected and recycled for use in the ceiling panel.

1.14. Disposal

There is no industry consensus for end of life scenarios, per the PCR guidance. For this reason, the study will assume landfill disposal at end of life.

Name		Value	Unit
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method, and transportation)			
Collection process (specified by type)	Collected separately	0	kg
	Collected with mixed construction waste	0.41	kg
Recovery (specified by type)	Reuse	0	kg
	Recycling	0	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion (specify efficiency rate)	-	
Disposal (specified by type)	Product or material for final disposal	0.41	kg
Removals of biogenic carbon (excluding packaging)		0	kg CO2

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The functional unit for the study is one ceiling panel. The ceiling panel has a mass of 0.405 kilograms. The reference service life is 30 years.

Name	Value	Unit
Functional unit	1	0.093 m^2 (1 ft^2)

Declared unit (wall, ceiling, and column panels, covers, and assemblies)	1	0.093 m^2 (1 ft^2)
Declared thickness	1.905	cm
Surface weight per declared unit	4.36	kg/m^2
Density per declared unit	229.1	kg/m^3

2.2. System Boundary

The life cycle assessment conducted for this EPD is a “cradle-to-gate with options” study. The system boundary includes raw material supply and transport, manufacturing, distribution, installation, and end of life. The figure below outlines life cycle stages included in the study.

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 & Loads Beyond System Boundaries
Raw Material Supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-construction demolition	Transport	Waste Processing	Disposal	Reuse-Recover-Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MND

2.3. Estimates and Assumptions

Estimates and assumptions are required when little or no data is available. The study’s assumptions and estimates are recorded and documented in the background report.

2.4. Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances – as defined by the U.S. Occupational Health and Safety Act the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No known flows were deliberately excluded. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration.

2.5. Data Sources

GaBi version 10.6 software system was used for modeling the life cycle of the CertainTeed Baroque Ceiling Panel. The Sphera GaBi, US LCI, and Ecoinvent v3.8 databases were used for raw materials, transportation, and energy inputs.

2.6. Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. Since the inventory flows for the utilized databases are very often accompanied by a series of data quality ratings, a general indication of precision can be inferred. Using these ratings, the data sets used generally have medium-to-high precision. The Saint-Gobain North American ESG Department collected specific data on energy and material inputs, wastes, water use, emissions, and transportation impacts for the L'Anse, MI manufacturing plant.

2.7. Period under Review

For this life cycle assessment, the Saint-Gobain North American ESG Department collected specific data on energy and material inputs, wastes, water use, emissions, and transportation impacts for the L'Anse, MI manufacturing plant. The data used spanned between April 1, 2021 and March 31, 2022.

2.8. Allocation

The L'Anse, MI facility is the only location that produces the Baroque Ceiling Panel product line in the United States for CertainTeed Corporation. However, there are additional products produced at this location that were excluded from the study. Allocation was conducted based on the production mass data provided by the facility as a percentage of the overall production mass at each facility. Recycled paper was the only secondary raw material throughout the product life cycle. The secondary raw material was modeled using a cut-off methodology, excluding the primary production burden.

3. Life Cycle Assessment Scenarios

Table 1. Transport to the building site (A4)

NAME	VALUE	UNIT
Fuel type	Diesel	
Liters of fuel	-	l/100km
Vehicle type	Standard Freight Trailer	
Transport distance	800	km
Capacity utilization (including empty runs, mass based	85	%
Gross density of products transported	229.06	kg/m^3
Weight of products transported (if gross density not reported)		kg
Volume of products transported (if gross density not reported)		m^3
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	<1	-

Table 2. Installation into the building (A5)

NAME	VALUE	UNIT
Ancillary materials	0	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0	m^3
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Product loss per functional unit	2.84E-02	kg
Waste materials at the construction site before waste processing, generated by product installation	8.55E-02	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	0	kg
Biogenic carbon contained in packaging	0	kg CO_2
Direct emissions to ambient air, soil and water	0	kg
VOC content	0	$\mu g/m^3$

Table 3. Reference Service Life

NAME	VALUE	UNIT
RSL	**30**	years
Declared product properties (at the gate) and finishes, etc.	-	Units as appropriate
Design application parameters (if instructed by the manufacturer), including references to the appropriate practices and application codes)	-	Units as appropriate
An assumed quality of work, when installed in accordance with the manufacturer's instructions	-	Units as appropriate
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation,	-	Units as appropriate

shading, temperature		
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure)	-	Units as appropriate
Use conditions, e.g. frequency of use, mechanical exposure.	-	Units as appropriate
Maintenance, e.g. required frequency, type and quality of replacement components	-	Units as appropriate

Table 4. Maintenance (B2)

NAME	VALUE	UNIT
Maintenance process information (cite source in report)	-	-
Maintenance cycle	-	Number/ RSL
Maintenance cycle	-	Number/ ESL
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Ancillary materials specified by type (e.g. cleaning agent)	-	kg
Other resources	-	kg
Energy input, specified by activity, type and amount	-	kWh
Other energy carriers specified by type	-	kWh
Power output of equipment	-	kW
Waste materials from maintenance (specify materials)	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	-

Table 5. Repair (B3)

NAME	VALUE	UNIT
Repair process information (cite source in report)	-	None required
Inspection process information (cite source in report)	-	None required
Repair cycle	-	Number/ RSL
Repair cycle	-	Number/ ESL
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Ancillary materials specified by type (e.g. cleaning agent)	-	kg
Energy input, specified by activity, type and amount	-	kWh
Waste materials from repair (specify materials)	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	N/A

Table 6. Replacement (B4)

NAME	VALUE	UNIT
Replacement cycle	-	Number/ RSL
Replacement cycle	-	Number/ ESL
Energy input, specified by activity, type and amount	-	kWh
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Ancillary materials specified by type (e.g. cleaning agent)	-	kg
Replacement of worn parts, specify parts/materials	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development, e.g. frequency and time period of use	-	As appropriate

Table 7. Refurbishment (B5)

NAME	VALUE	UNIT
Refurbishment process description (cite source in report)	-	-
Replacement cycle	-	Number/ RSL
Replacement cycle	-	Number/ ESL
Energy input, specified by activity, type and amount	-	kWh
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Material input for refurbishment, including ancillary materials specified by type (e.g. cleaning agent)	-	kg
Waste material(s), specified by material	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	-

Table 8. Operational energy use (B6) and Operational water use (B7)

NAME	VALUE	UNIT
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Ancillary materials	-	kg
Energy input, specified by activity, type and amount	-	kWh
Equipment power output	-	kW
Characteristic performance (e.g. energy efficiency, variation of performance with capacity utilization)	-	Units as appropriate

Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	As appropriate

Table 9. End of life (C1-C4)

NAME		VALUE	UNIT
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method and transportation)		-	-
Collection process (specified by type)	Collected separately	0	kg
	Collected with mixed construction waste	0.41	kg
Recovery (specified by type)	Reuse	0	kg
	Recycling	0	kg
	Landfill	0.41	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	0	
Disposal (specified by type)	Product or material for final deposition	0	kg
Removals of biogenic carbon (excluding packaging)		0	kg CO_2

Table 10. Reuse, recovery and/or recycling potentials (D), relevant scenario information

NAME	VALUE	UNIT
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	-	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	-	MJ
Net energy benefit from material flow declared in C3 for energy recovery	-	MJ
Process and conversion efficiencies	-	
Further assumptions for scenario development (e.g. further processing technologies, assumptions on correction factors);	-	

4. Life Cycle Assessment Results

Table 11. Description of the system boundary modules

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

4.1. Life Cycle Impact Assessment Results

Table 12. North American Impact Assessment Results

TRACI v2.1	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP 100 [kg CO_2 eq]	3.09E-01	2.06E-02	2.06E-02	-	-	-	-	-	-	-	0	2.06E-02	0	6.79E-03
ODP [kg CFC-11 eq]	1.81E-08	3.90E-17	1.15E-16	-	-	-	-	-	-	-	0	3.90E-17	0	3.31E-16
AP [kg SO_2 eq]	2.75E-03	6.39E-05	2.39E-05	-	-	-	-	-	-	-	0	6.39E-05	0	4.21E-05
EP [kg N eq]	9.91E-04	6.49E-06	9.69E-05	-	-	-	-	-	-	-	0	6.49E-06	0	1.80E-06
POCP [kg O_3 eq]	3.53E-02	1.46E-03	5.85E-04	-	-	-	-	-	-	-	0	1.46E-03	0	7.97E-04
$ADP_{element}$ [kg Sb-eq]				-	-	-	-	-	-	-	0		0	
ADP_{fossil} [MJ, LHV]	2.84E-01	3.84E-02	6.94E-03	-	-	-	-	-	-	-	0	3.84E-02	0	1.14E-02

Table 13. EU Impact Assessment Results

CML v4.2	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP 100 [kg CO_2 eq]	3.44E-01	2.06E-02	3.31E-02	-	-	-	-	-	-	-	0	2.06E-02	0	6.82E-03
ODP [kg CFC-11 eq]	1.14E-08	2.21E-15	6.71E-15	-	-	-	-	-	-	-	0	2.21E-15	0	1.94E-14
AP [kg SO_2 eq]	2.02E-03	4.70E-05	8.12E-05	-	-	-	-	-	-	-	0	4.70E-05	0	3.94E-05
EP [kg PO_4^{-3} eq]	8.38E-04	1.43E-05	1.07E-04	-	-	-	-	-	-	-	0	1.42E-05	0	4.41E-06
POCP [kg ethene eq]	1.38E-04	1.58E-05	2.00E-05	-	-	-	-	-	-	-	0	-1.58E-05	0	3.07E-06
$ADP_{element}$ [kg Sb-eq]	1.71E-06	6.79E-09	1.62E-09	-	-	-	-	-	-	-	0	6.79E-09	0	2.50E-09

ADP_{fossil} [MJ, LHV]	4.00E+00	2.88E-01	5.36E-02	-	-	-	-	-	-	-	0	2.88E-01	0	8.82E-02

4.2. Life Cycle Inventory Results

Table 14. Resource Use

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RPR_E [MJ, LHV]	5.11E+00	3.24E-01	5.14E-03	-	-	-	-	-	-	-	0	3.24E-01	0	1.37E-02
RPR_M [MJ, LHV]	4.76E+00	3.01E-01	5.34E-03	-	-	-	-	-	-	-	0	3.01E-01	0	1.10E-02
RPR_T [MJ, LHV]	4.19E+00	3.12E-01	5.20E-03	-	-	-	-	-	-	-	0	3.12E-01	0	1.22E-02
$NRPR_E$ [MJ, LHV]	3.89E+00	2.90E-01	5.48E-02	-	-	-	-	-	-	-	0	2.90E-01	0	9.07E-02
$NRPR_M$ [MJ, LHV]	9.23E-01	1.13E-02	5.37E-02	-	-	-	-	-	-	-	0	1.13E-02	0	8.21E-02
$NRPR_T$ [MJ, LHV]	8.66E-01	1.13E-02	5.56E-02	-	-	-	-	-	-	-	0	1.13E-02	0	7.30E-02
SM [kg]	2.42E-03	0	0	-	-	-	-	-	-	-	0	0	0	0
RSF [MJ, LHV]	0	0	0	-	-	-	-	-	-	-	0	0	0	0
NRSF [MJ, LHV]	0	0	0	-	-	-	-	-	-	-	0	0	0	0
RE [MJ, LHV]	0	0	0	-	-	-	-	-	-	-	0	0	0	0
FW [m^3]	1.21E-02	4.05E-05	1.21E-05	-	-	-	-	-	-	-	0	4.05E-05	0	2.30E-05

Table 15. Output Flows and Waste Categories

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD [kg]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
NHWD [kg]	1.51E-02	0	8.55E-02	0	-	-	-	-	-	-	0	0	0	4.05E-01
HLRW [kg] or [m^3]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
ILLRW [kg] or [m^3]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
CRU [kg]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
R [kg]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
MER [kg]	0	0	0	0	-	-	-	-	-	-	0	0	0	0
EE [MJ, LHV]	0	0	0	0	-	-	-	-	-	-	0	0	0	0

Table 16. Carbon Emissions and Removals

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
BCRP [kg CO2]														
BCEP [kg CO2]														
BCRK [kg CO2]														
BCEK [kg CO2]														

BCEW [kg CO2]														
CCE [kg CO2]														
CCR [kg CO2]														
CWNR [kg CO2]														

5. LCA Interpretation

Based on the results from the life cycle assessment, the life cycle impacts are strongly driven by the raw materials and manufacturing processes.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

CertainTeed has well-established Environmental, Health, and Safety (EHS) and product stewardship programs which help to enforce proper evaluation and monitoring of chemicals that are chosen to manufacture products. These programs ensure that all environmental and OSHA requirements are met or exceeded to ensure the health and safety of all employees and contractors. In addition, this plant is zero discharge to Publicly Owned Treatment Works (POTWs). The water system utilizes a settling pond on-site and discharges the remaining water to a spray field rather than a sewer system.

6.2. Environment and Health During Installation

Installation has minimal impacts due to the modular nature of ceiling panels and minimal energy required for installation. The assumption is that ceiling panels require no cleaning or maintenance so use phase impacts are zero.

6.3. Extraordinary Effects

Fire

ASTM E1264 – Class A

ASTM E84 – Flame spread of 25 or less, smoke developed of 50 or less

Water

This product is subject to water damage. No water or water vapor from sources including, but not limited to, condensation, leaking pipes and/or ducts, or steam must come in contact with the ceiling panels.

Mechanical Destruction

This product is intended for commercial applications. Use and Practice information can be found in “Acoustical Ceilings: Use and Practice” published by Ceilings & Interior Systems Construction Association (CISCA). The product should be installed according to CertainTeed Ceilings installation instructions.

7. Supporting Documentation

The LCA reports the life cycle inventory and environmental impacts relevant to CertainTeed ceiling tiles. The life cycle methods used for this study were consistent with ISO 14040 and 14044. This project is fulfilling the reporting requirements in Section 5 of ISO 14044 and Product Category Rules Guidance for Building-Related Products and Services UL® Environments (2021) Part B: Non-Metal Ceiling Panel EPD Requirements.

8. References

Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 4. March 2022. UL Environment.

Product Category Rule Guidance for Building-Related Products and Services Part B: Non-Metal Ceiling and Interior Wall Panel EPD Requirements, Version 2.0 2021. UL Environment.

ISO 14025: 2006 Series – Environmental Management-Life Cycle Assessment

ISO 14040: 2006 Series – Environmental Management-Life Cycle Assessment

ISO 14044: 2006 Series – Environmental Management-Life Cycle Assessment

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

GaBi Databases. https://gabi.sphera.com/america/

US LCI Database. https://www.nrel.gov/lci/

Ecoinvent v3.8 Database. http://ecoinvent.org/

CertainTeed Ceilings and Walls Website. https://www.certainteed.com/ceilings-and-walls/mineral-fiber/