zintra®

Zintra Acoustic Solutions

MDC

INTERIOR SOLUTIONS

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and ISO 21930:2017

ASTM INTERNATIONAL

MDC Interior Solutions is pleased to present this Environmental Product Declarati on (EPD) for their Zintra Acoustic Soluti ons. This EPD was developed in compliance with ISO 14025 and ISO 21930 and has been verifi ed by Lindita Bushi, Athena Sustainable Materials Institute.

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

For more information about Baresque, visit mdc.is/zintra

1. GENERAL INFORMATION

PCR GENERAL INFORMATION			
Reference PCR	UL Environment PCR for Building Related Products and Services - Part A: LCA Calculation Rules and Report Requirements, UL 10010 v.3.2, December 2018. Part B: Non-Metal Ceiling and Interior Wall Panel EPD Requirements. April 2021 to April 2026.		
The PCR review was conducted by:	*Lindita Bushi, PhD* *lindita.bushi@athenasmi.org* *Athena Sustainable Materials Institute*	*Tom Gloria, PhD* *t.gloria@industrial-ecology.com* *Industrial Ecology Consultants*	*Olivia Palmer* *ohpalmer@sgh.com* *Simpson Gumpertz & Heger*

EPD GENERAL INFORMATION		
Program Operator	ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs), General Program Instructions, Version: 8.0, Revised 04/29/20. 100 Barr Harbor Drive, West Conshohocken, (PA) 19428-2959 USA www.astm.org	
Declared Product	Zintra Acoustic Solutions	
EPD Registration Number	**EPD Date of Issue** February 2023	**EPD Period of Validity** February 2023 - February 2028
EPD Recipient Organization	Baresque 21925 Field Parkway Deer Park, IL 60010 USA	zintra®

EPD Type/Scope and Functional Unit	**Year of Reported Manufacturer Primary Data**
Product-specific type III, Cradle-to-Grave EPD with functional unit of 0.093 m² (1 ft²) of wall covering, with a reference service life (RSL) of 30 years, during a building's estimated service life (ESL) of 75 years.	2021

Geographical Scope	**LCA Software**	**LCI Databases**	**LCIA Methodology**
North America	OpenLCA v.1.10.3	Ecoinvent 3.7 and US LCI	TRACI 2.1

This LCA and EPD were prepared by:	Gatien Geraud Essoua Essoua, Ph. D, Ing. f. Vertima Inc. www.vertima.ca
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2006 and ISO 14044:2006, as well as the PCR ULE "for Building Related Products and Services in: Part B: Non-Metal Ceiling and Interior Wall Panel EPD requirements which is based on ISO 21930:2017. ☐ Internal ☒ External	Lindita Bushi _____ Lindita Bushi, PhD. Athena Sustainable Materials Institute

LIMITATIONS

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of Non-Metal Ceiling and Wall System Products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with this 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.

2 PRODUCT DEFINITION AND INFORMATION

2.1 DESCRIPTION OF THE COMPANY

Zintra is renowned for its leadership in offering a variety of quality materials, finishes and designs for acoustic solutions. Founded in Australia with a global footprint, Zintra is the 'go to' destination for architects and designers seeking inspiration, quality, outstanding service and insightful solution-oriented expertise.

Baresque Zintra Acoustic Panels are produced using pre-consumer and post-consumer polyester fiber. Zintra is the ideal material for absorbing internal and external sounds and reducing the noise level in a space. Available in a wide range of colors and designs, used for a variety of applications at an affordable price, our standard product line offers countless combinations of acoustic solutions sure to deliver style and function.

2.2 PRODUCT DESCRIPTION

2.2.1 Product Identification

Baresque Zintra Acoustic Panel are polyester acoustic panel with two different thicknesses (12 mm and 24 mm). Average for the Zintra Acoustic Panel were calculated as the weighted average product based on annual production in square meters.

The standard size of panels produce are 2800 mm in length x 1225 mm in width.

The Zintra's panel construction is durable and beautiful, and provide 30-year reference service life (RSL). Figure 1 shows a room scene of Zintra panels. The primary United Nations Standard Products and Services Code (UNSPSC) code for acoustic insulation panels 30161702 and the Construction Specifications Institute (CSI) code is 09 81 00.

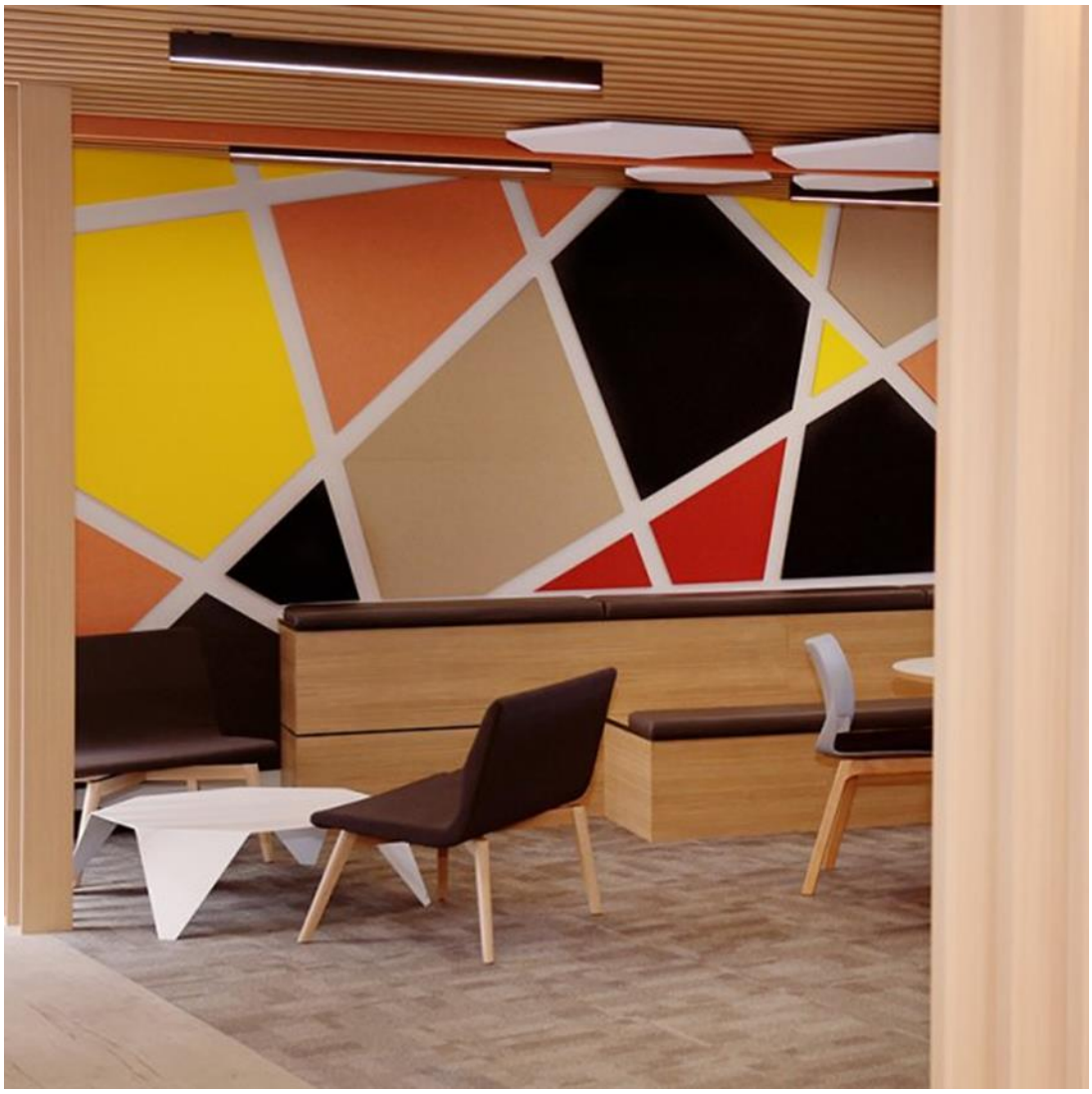

Figure 1: Representation of Zintra Acoustic Solutions.

2.2.2 Product Average

The weighted average profile of each product is calculated based on 2021 annual production data (on mass) of the two (2) different thicknesses of Zintra Acoustic Panels such as 12 mm and 24 mm.

2.2.2.1 *Product-Specific EPD*

In the context of the growing popularity of sustainable building and LEED v4 and v4.1 Rating Systems, developing Type III Environmental Product Declarations (EPDs) would allow Baresque to increase visibility for its products: Zintra acoustic panels have been developed according to UL Environment PCR part B for non-metal ceiling and interior wall panel EPD requirements developed in accordance with ISO 21930 - 2017 and ISO 14025 [1, 2, 3].

2.3 APPLICATION

Zintra's ease of use make it the ideal material for residential, commercial and institutional applications. Zintra panels are installed on walls and ceilings.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

This LCA is a cradle-to-grave study. For this analysis, the attributional approach was followed and impacts of infrastructure have been excluded.

Life cycle stages included in the analysis are production, construction, use and end of live. Based on the PCR Part B [1], the RSL of the product is 30 years. The ESL of the building is 75 years. According to the ULE PCR part B, if a mass flow or energy flow represents less than 1% of the cumulative mass or energy flow of the system, it may be excluded from system boundaries. No known flows are deliberately excluded from this EPD. According to the PCR part B section 3.8 allocation procedure, mass should be used as the primary basis co-product allocation. OpenLCA software v1.10.2 [4], an open-source software, was used to calculate the inventory and to assess potential environmental impacts associated with the inventoried emissions.

2.5 TECHNICAL DATA

For specific properties and performance data for Baresque's Zintra Acoustic Panels, please consult the following link: https://baresque.com.au/products/acoustic-solutions/zintra-acoustic-panel/. Table 1 presents the technical data for the products under study.

Table 1:Technical Details

Parameters	Zintra Acoustic Panels		Unit
	12 mm thick	24 mm thick	
Width	1225		mm
Length	2880		mm
Density	2.4	3.3	kg/m^2
FU Density	2.23E-01	3.07E-01	kg/0.093 m^2

2.6 MATERIAL COMPOSITION

A summary of the values compiled are presented in Table 2.

Table 2: Material Composition

Materials	Zintra Acoustic Panels
Polyester Fiber Post-consumer	60%
Low melting Fiber Pre-consumer	35%
Polylactic Acid	5%

2.7 MANUFACTURING

The manufacture of Baresque's acoustic insulation panels is a multistep process: mixing of fibres & low melting fibres – addition of polylactic acid - layering out - needle punching – heating in oven - pressing - rolling out - cutting – cooling. Figure 2 shows the flow diagram for the manufacturing stage.

The products are packaged in cardboard boxes and placed on wood pallets, then tied down with polyethylene strapping. Packaging materials used are presented in section 2.8 below.

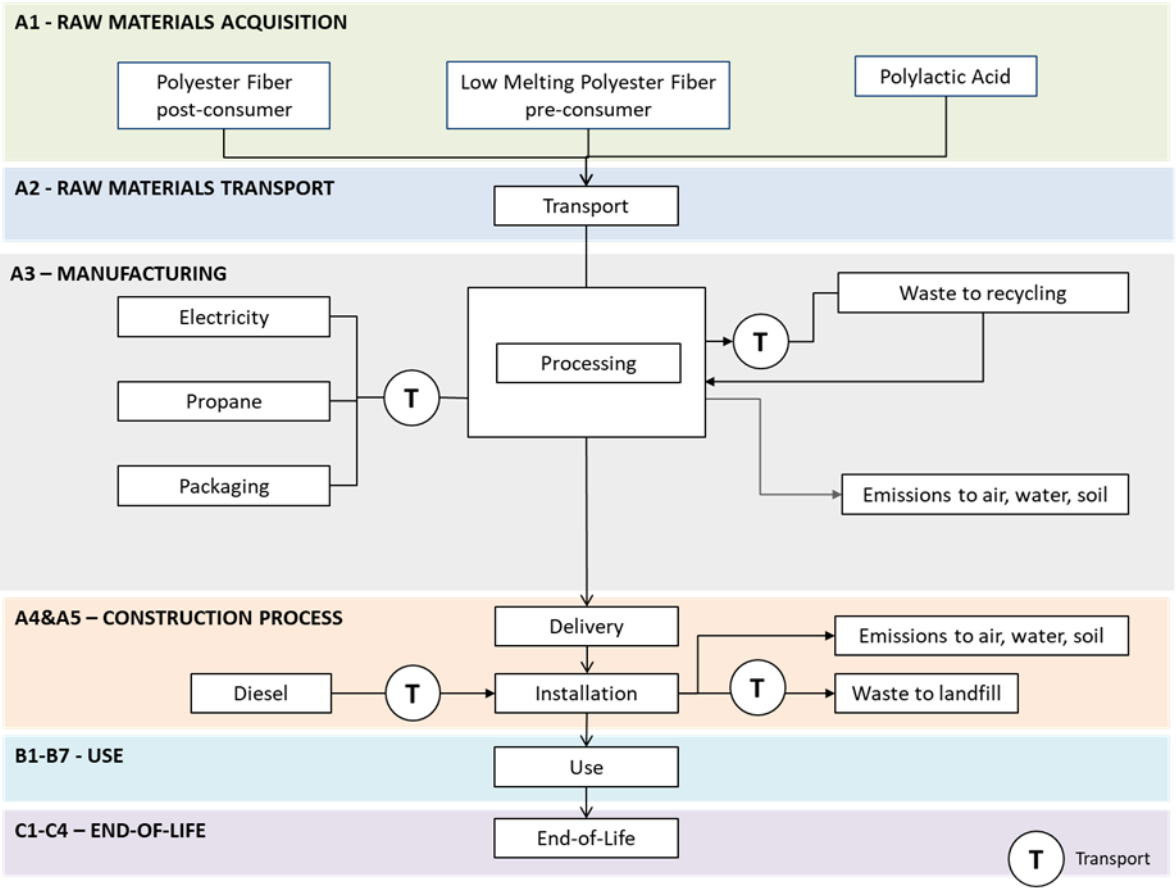

Figure 2: Flow Diagram for Zintra Acoustic Panels.

2.8 PACKAGING

All Zintra Acoustic Panels are packaged using the materials presented in Table 3.

Table 3: Amount of packaging materials per 0.093 m² (1 ft²) of Zintra Acoustic Panels

Materials	Zintra Acoustic Panels		Unit
	12 mm thick	24 mm thick	
Wood pallet	3.42E-03	4.70E-03	Kg
Cardboard box	8.55E-04	1.18E-03	Kg
Polyester tie strapping	1.34E-04	1.84E-04	Kg

All Zintra Acoustic Panels is packaged in cardboard boxes with polyester strapping on the wood pallet that make easy to carry.

2.9 TRANSPORTATION

Zintra's products are transported by truck and boat from the Chinese factory to the warehouse in Illinois (USA). Distribution to Baresque's customers is provided primarily via trucking to North America locations.

2.10 PRODUCT INSTALLATION

The manufacturer's installation instructions should be followed [5]. During installation, personal protective equipment (ear plugs and safety glasses) should be worn to protect the installer's safety. In addition, the use of knee pads and rubber gloves is recommended. No energy is used during the installation module (A5).

Table 4: Installation inputs per FU

Silicone Adhesive Ingredients	Zintra Acoustic Panels		Unit
	12 mm thick	24 mm thick	
Limestone	4.85E-03	6.67E-03	Kg
Silica, Amorphous	4.16E-04	5.72E-04	Kg
Distillates (petroleum), hydrotreated light	8.32E-05	1.14E-04	Kg
Quartz	8.32E-05	1.14E-04	Kg
Water	8.43E-03	1.16E-02	Kg

2.11 USE CONDITIONS

After installation, apart from ordinary cleaning to remove any dust that may settle on any surface, the manufacturer does not have specific recommendation about use conditions.

2.12 REFERENCE SERVICE LIFE AND ESTIMATED BUILDING SERVICE LIFE

As required in the PCR [1] the estimated service life (ESL) of the building is 75 years. The reference service life (RSL) is assumed to be 30 years. Replacement is performed 2.5 times during the building's service life.

2.13 REUSE, RECYCLING, AND ENERGY RECOVERY

During the life cycle stages of Zintra panels, there is no re-use, recycling, or energy recovery.

2.14 DISPOSAL

This LCA study assumes that Zintra Acoustic Panels are disposed at the end of their service life according to construction, renovation and demolition (CRD) waste disposal practice commonly occurring in North America. Inspired by UL Environment PCR, part A, Tables 2 and 3, it was assumed that Zintra Acoustic Panels and packaging materials are 100% landfilled [6] In landfills, based on conservative 100-year timeline and the ecoinvent dataset '' treatment of waste polyethylene, sanitary landfill | waste polyethylene | Cutoff, U ''. Polyethylene degradation represents less than 1% (negligible). In this LCA, the degradation rate at landfill sites was considered nill. There is no biogenic carbon in Zintra Acoustic Panels.

2.15 FURTHER INFORMATION

Further information about Zintra Acoustic Panels is available at https://baresque.com/

For this EPD, the system boundaries encompass a cradle-to-grave scope. Environmental impacts of products during the use stage are included in accordance with the ULE PCR part B [1].

Baresque is committed to making products that contribute to a healthy living environment. This is evidenced by the fact that all Zintra Acoustic Panels (12 mm and 24 mm) are tested for VOC and formaldehyde emissions by a third-party laboratory. Zintra panels also have the Health Product Declarations (HPD), certified by a third-party (Vertima inc.).

3 LIFE CYCLE ASSESSMENT CALCULATION RULES

3.1 FUNCTIONAL UNIT

The functional unit (FU) analyzed is 0.093 m^2 (1 ft^2) of wall covering, with reference service life (RSL) of 30 years, during a building's estimated service life (ESL) of 75 years. As the Zintra acoustic panel is used in numerous combinations of layers to achieve the expected performance, this report, based solely on an analyze of the raw product manufactured without colour and installed without additional layers. Table 5 presents all products covered by this report and their respective functional unit (FU).

Table 5: Functional Unit of assessed products.

Items	Zintra Acoustic Panels		Unit
	12 mm thick	24 mm thick	
Functional Unit	0.093	0.093	m^2
Average Weight	2.23E-01	3.07E-01	Kg

3.2 SYSTEM BOUNDARIES

According to PCR [1] the LCA is cradle-to-grave. All life cycle stages are included in the analysis; Production, Construction, Use and End-of-life. The production stage includes the following modules: A1) Extraction and upstream production, A2) Raw materials transportation to the manufacturing site, and A3) Manufacturing. The Construction stage includes the following modules: A4) Transportation of Zintra panels from manufacturing sites to the building site and A5) Installation of the product. The Use stage includes the B1 to B7 modules. The End-of-Life (EoL) stage includes the C1 to C4 modules. Module D is excluded from the system boundaries.

Figure 3 presents the life cycle stages, and their modules, included in the system boundaries.

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END-OF-LIFE STAGE				BENEFITS BEYOND THE SYSTEM
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Extraction and upstream production	Transport	Manufacturing	Transport from gate to site	Assembly/Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse – Recycling
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Legend: X = Included; MND = Module not declared (Excluded)

Figure 3: System boundaries for the cradle-to-grave LCA of Zintra Acoustic Panels

Extraction and upstream production (module A1): This stage includes the extraction and transformation of raw materials needed to produce Zintra Acoustic Panels (12 mm and 24 mm thicknesses). All chemicals used in the process have been taken into account in the inventory.

Raw materials transportation to flooring factory (module A2): This stage includes the transportation of raw materials from suppliers to Baresque's manufacturing site at Zhangjiagang (Suzhou) city, Jiangsu province, China.

Manufacturing of flooring (module A3): This stage includes water and energy (electricity, diesel and propane) consumption for the manufacturing processes. It also takes in to account chemicals used in the process as well as their transport to the site. Hazardous waste treatment has been counted as well.

Manufacturing processes of Zintra Acoustic Panels generate losses. These losses have been reintroduced to the process. Finally, packaging materials to make products ready for shipment are covered by this stage.

Transport to installation site (module A4): Products are transported by truck and boat from the manufacturing site to the warehouse in Illinois (USA) and from the warehouse to installation sites in North American locations.

Product installation (module A5): To Install the Zintra Acoustic Panels to the wall, the manufacturer recommends using silicone adhesive. The waste generated in this module represents 7% of the product and packaging. The burden of wastage purchased for module A5 represents 7% of production and distribution burden of the product.

Use phase (module B1 to B7): No impacts are associated with the use of the product over the reference Service Lifetime (ESL) except for the replacement modules (B4). The panel product can be cleaned and maintained by removing dust and dirt with a stiff plastic bristle brush, with no associated impacts (B2). Product repair (B3), and refurbishment (B5) are not relevant during the lifetime of the product. As mentioned in the section 3.7 of the PCR part B [1] it was assumed that the RSL of the product is 30 years. During the building's ESL (75 years), the Zintra Acoustic Panels were replaced 2.5 times. The material and energy flows, including transportations and emissions represents 2.5 time the data of module A1 to A5. All waste materials generated at each replacement are transported to the landfill site. For the end of the life stage, modules C2 and C4 are accounted for in module B4. During the ESL of building, C2 and C4 are 2.5 time included in B4 modules. There is no operational energy or water use associated with the use of the product and the results for these stages are zero.

Transport to waste processing and/or disposal (module C2): Transport distance from the installation site to a landfill site is considered in this module.

Disposal of waste (module C4): At the end of the life, 100% of Zintra Acoustic Panels are landfilled.

3.3 ESTIMATION AND ASSUMPTIONS

The average transportation distance for delivery of Zintra's products from Illinois warehouse (USA) to the North America installation site was assumed to be 800 km according to the PCR. During the use stage, the resources used on rare occasions, if necessary, are negligible for modules B1, B2, B3 and B5. During the service life of the building, the product doesn't require operational energy (B6) and water use (B7). In this analysis, the environmental impacts of these modules (B1, B2, B3, B5, B6 and B7) are therefore considered as nil. For cleaning purposes, the panel product can be cleaned and maintained by removing dust and dirt with a stiff plastic bristle brush, with no associated environmental impacts.

For the EoL stage, there is no energy consumption for the deconstruction module (C1) because it is generally a manual operation. For modules C3, the waste goes directly from the building site to the landfill site without any energy consumption at a sorting plant. The EoL modules included in this analysis are the C2 and C4 modules for transportation from building sites to the landfill site (35 km) [1]

3.4 CUT-OFF CRITERIA

According to the UL PCR Part A [6] which follows ISO 21930:2017 [2] directives, cut-off rules shall not be applied in order to hide data. Any application of the criteria for the exclusion of inputs and outputs shall be documented.

In this EPD, any material input less than 1% of the total mass of the final product, with no significant environmental impact, is not included in the scope of the study. However, material inputs greater than 1% of the total mass of the final product are included. The cumulative material inputs and environmental impacts less than 5% of the total weight of the FU are excluded. No known flows are deliberately excluded from this EPD.

3.5 DATA SOURCES

Inventory data was collected from Baresque's manufacturing plant located in Zhangjiagang (Suzhou) city, Jiangsu province (China), using a life cycle inventory (LCI) questionnaire. All data collected from Baresque (primary data) was used in the analysis.

When primary data was not available, unit processes were selected from the ecoinvent database v3.7 or from the US LCI database, the most comprehensive LCI databases currently available [7, 8].

When ecoinvent unit processes were not available specifically for China, they were adapted by replacing their electricity grid by the ecoinvent process "Market for Electricity, medium or high voltage – CN-CSG,".

3.6 DATA QUALITY

Data Quality Parameter	Data Quality Discussion
Source of manufacturing data: Description sources of data	Manufacturing data was collected from Baresque manufacturing site located at Zhangjiagang (Suzhou) city, Jiangsu province (China), for the 2021 production year.

Data Quality Parameter	Data Quality Discussion
	Data included total production mass of products produced at the manufacturing plant, as well as the total annual units in m^2 and total production mass of products under study; raw materials entering the production of the products under study, losses of materials, transport modes and distance of materials, energy consumption, water consumption, emissions to the environment at the manufacturing plant, waste treatment, packaging material, flooring products distribution.
Source of secondary data: Description sources of raw material, energy source, transport, waste and packaging data	When appropriate, the grid mix was changed for the grid mix of the province or country where the process takes place. Otherwise, ecoinvent datasets representative of the global market or "rest-of-the-world" were mainly selected as proxies.
Geographical representativeness	Manufacturing site is located at Zhangjiagang (Suzhou) city, Jiangsu province (China), hence electricity consumption is based on the Chinese grid mix. Geographical correlation of the material supply and the selected datasets are representative of each specific area or a larger area.
Temporal representativeness	Primary data were collected to be representative of the full year 2021, while this was not always the case for ecoinvent and US LCI datasets. Nevertheless, ecoinvent and US LCI remain reference LCI databases used in this study.
Technological representativeness	Primary data, obtained from the manufacturer, are representative of the current technologies and materials used by the company.
Completeness	All relevant process steps were considered and modelled to satisfy the goal and scope. Cut-off criteria were respected.

3.7 PERIOD UNDER REVIEW

The period under review is the year 2021.

3.8 ALLOCATION

The ISO 14040/44 allocation procedure states that whenever possible, allocation should be avoided by collecting data related to the process under study or by expanding the product system [9, 10].

According to PCR section 3.3 allocation rules, mass should be used as the primary basis co-product allocation [6]. In this study, mass allocation was used for input and output flows. Allocation was performed on the basis of the yearly production mass of each product under study. Baresque provided all data relative to energy consumption (electricity) for all products.

Material flows undergoing recycling/reuse processes are excluded from the system boundary. A cut-off approach was used because recycled/reused material is part of raw material preparation of another product system.

3.9 COMPARABILITY AND BENCHMARKING

ISO 21930-2017 and UL PCR part A allow EPD comparability only when all life cycle stages are considered [6, 2]. However, the comparison of specific EPDs from different manufacturers should be undertaken with caution, because assumptions, considerations, data sources, databases used, non-life cycle inventory data such as transportation distance and mode, and assessment tools and methods used, impact the final results. In the absence of knowledge of these specific variabilities, comparison of EPDs is not encouraged.

4 LIFE CYCLE ASSESSMENT SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Table 6: Transport from gate to site (A4)

Name	Truck	Ship	Unit
Fuel type	Diesel	Heavy Fuel Oil	
Litres of fuel	-	-	l/100 km
Vehicle type	Transport truck,	Transoceanic container ship, 50,000 dwt	-
Transport distance from China to USA	710	15 000	Km
Distribution in North America	800	-	Km
Capacity utilization (including empty runs, mass-based)	-	-	%
Weight of products transported (if gross density not reported)	-	-	kg
Capacity utilization volume factor (factor=1 or <1 or ≥1 for compressed or nested packaging products)	1	1	-

Table 7: Installation (A5)

Name	12 mm thick	24 mm thick	Unit
Ancillary materials – Adhesive	1.39E-02	1.91E-02	Kg/ft^2
Net freshwater consumption	0	0	Kg/ft^2
Product loss per functional unit	0	0	%
Waste materials at the construction site before waste processing, generated by product installation	7	7	%
Packaging waste	3.08E-04	4.24E-04	Kg/ft^2
Biogenic carbon contained in packaging	1.78E-03	2.44E-03	Kg C
VOC emissions	≤ 0.5	≤ 0.5	mg/m^3

Table 8: Reference Service Life (RSL)

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	Installation as per manufacturer's recommendations	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Accepted industry standard	-
Indoor environment, (if relevant for indoor applications), e.g temperature, moisture, chemical exposure	Normal building operating conditions	-
Use conditions, e.g. frequency of use, mechanical exposure	Normal building operating conditions	-
Maintenance, e.g. required frequency, type and quality of replacement components	Maintenance based on manufacturer's recommendations	-

Maintenance stage (B2)

The panel product can be cleaned and maintained by removing dust and dirt with a soft bristle brush, with no associated environmental impacts.

Repair/Replacement/Refurbishment stage (B3 to B5)

Product repair (B3) and refurbishment (B5) are not relevant during the lifetime of the product. Replacements (B4) are required 2.5 times over the 75-year building lifetime. Material and energy flows including transportations and emissions represents 2.5 time the data of module A1 to A5. All waste materials generated at each replacement are transported to the landfill site. For the end of the life stage, modules C2 and C4 are accounted for 2.5 time in module B4 during the ESL of building.

Building operation stage (B6 – B7)

There is no operational energy or water use associated with the use of the product and the results for these stages are nil.

Table 9: End of Life (C1-C4)

Name		12 mm thick	24 mm thick	Unit
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method and transportation)		Zintra's product is manually removed		
Collection process (specified by type)	Collected separately	0	0	kg
	Collected with mixed construction waste	2.23E-01	3.07E-01	kg
Recovery (specified by type)	Reuse	0	0	kg
	Recycling	0	0	kg
	Landfill	0	0	kg
	Incineration	0	0	kg
	Incineration with energy recovery	0	0	kg
	Energy conversion (specify efficiency rate)	0	0	%
Disposal (specified by type)	Product or material for final deposition	2.23E-01	3.07E-01	kg
Biogenic carbon removals (excluding packaging)		0	0	Kg CO_2eq.

5 LIFE CYCLE ASSESSMENT RESULTS

5.1 RESULTS TABLES

According to the ULE PCR part B [1] life cycle assessment results must be presented per FU. It should be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds safety margins, or risks. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, EPD users shall not use additional measures for comparative purposes.

Table 10: Life Cycle Impact Assessment Results for Zintra Acoustic Panel 12 mm Thickness

Impact Categories	Indicators	Units	Production Phase	Construction Phase		Use Phase			End of Life Phase				Total
			A1-A3	A4	A5	B1-B3	B4	B5-B7	C1	C2	C3	C4	
Global Warming Potential	GWP 100 y	kg CO2 eq	2.71E-01	7.49E-02	4.97E-02	0.00E+00	1.05E+00	0.00E+00	0.00E+00	8.53E-04	0.00E+00	2.48E-02	1.47E+00
Biogenic Carbon Removal from Packaging	BCRK	kg CO2 eq	-6.46E-03	0.00E+00	-6.46E-05	0.00E+00	-1.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.28E-02
Biogenic Carbon Emission from Packaging	BCEK	kg CO2 eq	0.00E+00	0.00E+00	9.62E-04	0.00E+00	2.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.37E-03
Ozone Depletion Potential	ODP	kg CFC-11 eq	7.67E-09	9.29E-09	4.07E-09	0.00E+00	5.46E-08	0.00E+00	0.00E+00	3.04E-11	0.00E+00	7.95E-10	7.65E-08
Acidification Potential	AP	kg SO2 eq	1.47E-03	1.00E-03	2.88E-04	0.00E+00	6.99E-03	0.00E+00	0.00E+00	4.60E-06	0.00E+00	3.19E-05	9.79E-03
Eutrophication Potential	EP	kg N eq	4.18E-04	8.39E-05	3.54E-04	0.00E+00	1.03E-02	0.00E+00	0.00E+00	3.51E-07	0.00E+00	3.25E-03	1.44E-02
Smog Formation Potential	SFP	kg O3 eq	1.71E-02	1.82E-02	3.77E-03	0.00E+00	9.92E-02	0.00E+00	0.00E+00	1.44E-04	0.00E+00	4.41E-04	1.39E-01
Fossil Fuel Deplation Potential	FFDP	MJ Surplus, LHV	9.72E-02	1.42E-01	7.67E-02	0.00E+00	8.14E-01	0.00E+00	0.00E+00	1.74E-03	0.00E+00	7.39E-03	1.14E+00

Notes: B2, B3, B5, B6 and B7 are nil.

Table 11: Life Cycle Impact Assessment Results for Zintra Acoustic Panel 24 mm Thickness

Impact Categories	Indicators	Units	Production Phase	Construction Phase		Use Phase			End of Life Phase				Total
			A1-A3	A4	A5	B1-B3	B4	B5-B7	C1	C2	C3	C4	
Global Warming Potential	GWP 100 y	kg CO2 eq	3.72E-01	1.03E-01	6.84E-02	0.00E+00	1.45E+00	0.00E+00	0.00E+00	1.17E-03	0.00E+00	3.41E-02	2.03E+00
Biogenic Carbon Removal from Packaging	BCRK	kg CO2 eq	-8.88E-03	0.00E+00	-8.88E-05	0.00E+00	-2.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.14E-02
Biogenic Carbon Emission from Packaging	BCEK	kg CO2 eq	0.00E+00	0.00E+00	1.32E-03	0.00E+00	3.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-03
Ozone Depletion Potential	ODP	kg CFC-11 eq	1.05E-08	1.28E-08	5.60E-09	0.00E+00	7.51E-08	0.00E+00	0.00E+00	4.18E-11	0.00E+00	1.09E-09	1.05E-07
Acidification Potential	AP	kg SO2 eq	2.02E-03	1.38E-03	3.96E-04	0.00E+00	9.61E-03	0.00E+00	0.00E+00	6.32E-06	0.00E+00	4.38E-05	1.35E-02
Eutrophication Potential	EP	kg N eq	5.74E-04	1.15E-04	4.87E-04	0.00E+00	1.41E-02	0.00E+00	0.00E+00	4.82E-07	0.00E+00	4.47E-03	1.98E-02
Smog Formation Potential	SFP	kg O3 eq	2.35E-02	2.51E-02	5.19E-03	0.00E+00	1.36E-01	0.00E+00	0.00E+00	1.98E-04	0.00E+00	6.06E-04	1.91E-01
Fossil Fuel Deplation Potential	FFDP	MJ Surplus, LHV	1.34E-01	1.96E-01	1.06E-01	0.00E+00	1.12E+00	0.00E+00	0.00E+00	2.40E-03	0.00E+00	1.02E-02	1.57E+00

Notes: B2, B3, B5, B6 and B7 are nil.

(1): Calculated as per U.S EPA TRACI 2.1 [12], OpenLCA v 1.10.2 [4]

(2): GWP 100y, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(3): A negative represents a biogenic carbon removal to the atmosphere.

*In the calculation of RPR_M and $NRPR_M$, packaging materials were included

Table 12: Life Cycle Inventory Results for Zintra Acoustic Panel 12 mm Thickness

Resource use												
Parameter	Unit	Production stage	Construction stage		Use stage			End-of-life stage				Total
		A1-A3	A4	A5	B1-B3	B4	B5-B7	C1	C2	C3	C4	
RPR_E (4)	MJ, LHV	8.60E-01	1.30E-02	8.09E-02	0.00E+00	2.39E+00	0.00E+00	0.00E+00	5.90E-06	0.00E+00	1.77E-03	3.34E+00
RPR_M (5)*	MJ, LHV	6.14E-02	0.00E+00	4.30E-03	0.00E+00	1.64E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-01
$NRPR_E$ (6)	MJ, LHV	2.70E+00	1.08E+00	7.89E-01	0.00E+00	1.16E+01	0.00E+00	0.00E+00	1.25E-02	0.00E+00	5.77E-02	1.62E+01
$NRPR_M$ (7)*	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM (8)	kg	2.12E-01	0.00E+00	1.48E-02	0.00E+00	5.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.94E-01
RSF (9)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF (10)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE (11)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW (12)	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Output Flows and Waste												
HWD (13)	kg	2.21E-05	9.38E-05	2.51E-05	0.00E+00	2.04E-04	0.00E+00	0.00E+00	3.27E-06	0.00E+00	3.47E-06	3.52E-04
NHWD (14)	kg	2.15E-01	2.37E-02	6.26E-02	0.00E+00	1.32E+00	0.00E+00	0.00E+00	1.08E-05	0.00E+00	2.25E-01	1.84E+00
HLRW (15)	m^3	4.37E-12	6.52E-12	6.77E-12	0.00E+00	4.51E-11	0.00E+00	0.00E+00	1.01E-16	0.00E+00	3.81E-13	6.31E-11
ILLRW (16)	m^3	7.45E-12	1.32E-10	4.35E-11	0.00E+00	4.92E-10	0.00E+00	0.00E+00	1.47E-15	0.00E+00	1.32E-11	6.88E-10
CRU (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (17)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*In the calculation of RPR_M and $NRPR_M$, packaging materials were included.

Table 13: Life Cycle Inventory Results for Zintra Acoustic Panel 24 mm Thickness

Resource use												
Parameter	Unit	Production stage	Construction stage		Use stage			End-of-life stage				Total
		A1-A3	A4	A5	B1-B3	B4	B5-B7	C1	C2	C3	C4	
RPR_E (4)	MJ, LHV	1.18E+00	1.78E-02	1.11E-01	0.00E+00	3.28E+00	0.00E+00	0.00E+00	8.11E-06	0.00E+00	2.44E-03	4.60E+00
RPR_M (5)*	MJ, LHV	8.45E-02	0.00E+00	5.91E-03	0.00E+00	2.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-01
$NRPR_E$ (6)	MJ, LHV	3.71E+00	1.49E+00	1.09E+00	0.00E+00	1.59E+01	0.00E+00	0.00E+00	1.72E-02	0.00E+00	7.93E-02	2.23E+01
$NRPR_M$ (7)*	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM (8)	kg	2.92E-01	0.00E+00	2.04E-02	0.00E+00	7.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+00
RSF (9)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF (10)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE (11)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW (12)	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Output Flows and Waste												
HWD (13)	kg	3.04E-05	1.29E-04	3.46E-05	0.00E+00	2.81E-04	0.00E+00	0.00E+00	4.49E-06	0.00E+00	4.77E-06	4.84E-04
NHWD (14)	kg	2.96E-01	3.26E-02	8.61E-02	0.00E+00	1.81E+00	0.00E+00	0.00E+00	1.48E-05	0.00E+00	3.09E-01	2.53E+00
HLRW (15)	m^3	6.00E-12	8.96E-12	9.31E-12	0.00E+00	6.20E-11	0.00E+00	0.00E+00	1.39E-16	0.00E+00	5.24E-13	8.68E-11
ILLRW (16)	m^3	1.02E-11	1.82E-10	5.98E-11	0.00E+00	6.76E-10	0.00E+00	0.00E+00	2.02E-15	0.00E+00	1.81E-11	9.46E-10
CRU (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER (17)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (17)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*In the calculation of RPR_M and $NRPR_M$, packaging materials were included

(4): RPR_E = RPRT - RPR_M, where RPRT is equal to the value for renewable energy obtained using the CED LHV

(5): RPR_M, is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input as per ACLCA ISO 21930 Guidance [12]. In the calculation of RPR_M, packaging materials were included.

(6): $NRPR_E$ = NRPRT - $NRPR_M$, where NRPRT is equal to the value for non- renewable energy obtained using the CED LHV methodology (both non- renewable energy fossil fuel and nuclear).

(7): $NRPR_M$, is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input as per ACLCA ISO 21930 Guidance [12]. In the calculation of $NRPR_M$, packaging materials were included.

(8): Calculated as per ACLCA ISO 21930 Guidance [12], 6.5 Secondary material, SM: There is SM involved in Zintra Acoustic Panels.

(9): Calculated as per ACLCA ISO 21930 Guidance [12], 6.6 Renewable secondary fuels, RSF: There is no RSF involved in Zintra Acoustic Panels manufacturing process.

(10): Calculated as per ACLCA ISO 21930 Guidance [12], 6.7 Non-renewable secondary fuels, NRSF: There is no NRSF involved in Zintra Acoustic Panels manufacturing process.

(11): Calculated as per ACLCA ISO 21930 Guidance [12], 6.8.1 Recovery Energy, RE: There is no RE involved in the Zintra Acoustic Panels manufacturing process

(12): There is no water used in the Zintra Acoustic Panels manufacturing process.

(13): Calculated from life cycle inventory results, based on datasets marked as "hazardous".

(14): Calculated from life cycle inventory results, based on waste "non-hazardous"

(15): Calculated as per ACLCA ISO 21930 Guidance [12], 10.3 High-level radioactive waste, conditioned, to final repository. It should be noted that Zintra Acoustic Panels manufacturing process does not generate any HLRW. High-level radioactive waste, e.g., when generated by electricity production, consists mostly of spent fuel from reactors." (ISO 21930:2017, clause 7.2.14).

(16): Calculated as per ACLCA ISO 21930 Guidance [12], 10.4 Intermediate- and low-level radioactive waste, conditioned, to final repository. It should be noted that Zintra Acoustic Panels manufacturing process does not generate any ILLRW. Low- and intermediate-level radioactive wastes, e.g., when generated by electricity production, arise mainly from routine facility maintenance and operations (ISO 21930:2017, clause 7.2.14).

(17): Reused components (CRU), materials for recycling (MR), materials for energy recovery (MER) and exported energy (EE) are nil in this analysis.

Table 14: Biogenic Carbon Removal and Emission from Packaging

Product	Category	Thicknesses	Total BCR + BCE (kg CO2 Eq.)
Zintra Panels	Packaging	12 mm	-1.95E-02
		24 mm	-2.67E-02

6 LCA: INTERPRETATION

The aim of this section is to present more details on the contribution to the impacts and resource use of the different life cycle modules of each Zintra Acoustic Panel product studied.

The relative impacts are similar for both thicknesses of zintra acoustic panels. The analysis of the 12 mm Zintra Acoustic Panel results shows that the replacement module (B4) is the major contributors for all impact categories of the life cycle environmental impacts. Impacts of the module B4 constitute 71% of the total, for each impacts category. Module B4 is the major contributor because it represents 2.5 times the impacts of modules A1 to A5 including modules C2 and C4. In the EP impact category, the landfill as waste management module (C4) represents 79% of the total impact. The distribution module (A4) and production stage are relevant contributors. Regarding module A4, impacts are between 1% and 13% of the total impact for all impact categories with the major effect on Smog Formation Potential impact category. The major impact of module A4 is due to the long distances that the product travels before being installed. For the production stage, the impacts are between 3% and 18% for all impacts categories, with the major effect on Global Warming Potential impact category. Breaking down the production stage, the manufacturing module (A3) has major impact due to the Chinese electricity grid mix used. The impacts of module A3 modules are between 50% and 86% of the total impact for all impacts categories. The grid mix of electricity used in the manufacturing process is a largest contributor in the production stage, constituting between 33% and 84%.

When including biogenic carbon of packaging materials in the calculation, the environmental impacts of Zintra's products for the Global Warming Potential impact category decreases for 1.3% in total.

Limitation to this study is:

- Comparability limitation: Environmental declarations from different programs based upon differing PCRs may not be comparable. Furthermore, Cradle-to-Grave EPDs based on the same PCR and reference standards may be comparable; however, care should be taken when doing so.

7 ADDITIONAL ENVIRONMENTAL INFORMATION

7.1 ENVIRONMENTAL ACTIVITIES AND CERTIFICATION

In addition, Baresque is engaged in a third-party verification process with Vertima Inc. where their Zintra Acoustic Panel products and environmental documents are assessed. At the end of the process, it will receive a Validated Eco-Declaration® (EDS-Environmental Data Sheet) summarizing verified environmental claims.

Baresque has a Health Product Declaration (HPD) for Zintra Acoustic Panels based on a process performed by the third-party preparer Vertima Inc.

7.2 EXTRAORDINARY EFFECTS

There are no extraordinary effects for Zintra 's product.

8 REFERENCES

[1] UL Environment, "Product Category Rule (PCR) Guidance for Building-Related Products and Services. Part B: Non-Metal Ceiling and Interior Wall Panel EPD Requirements.," UL Environment, 2021.

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[9] ISO 14040:2006/Amd1:2020, "Environmental management - Life cycle assessment - Principles and framework. International Organization for Standardization," 2006.

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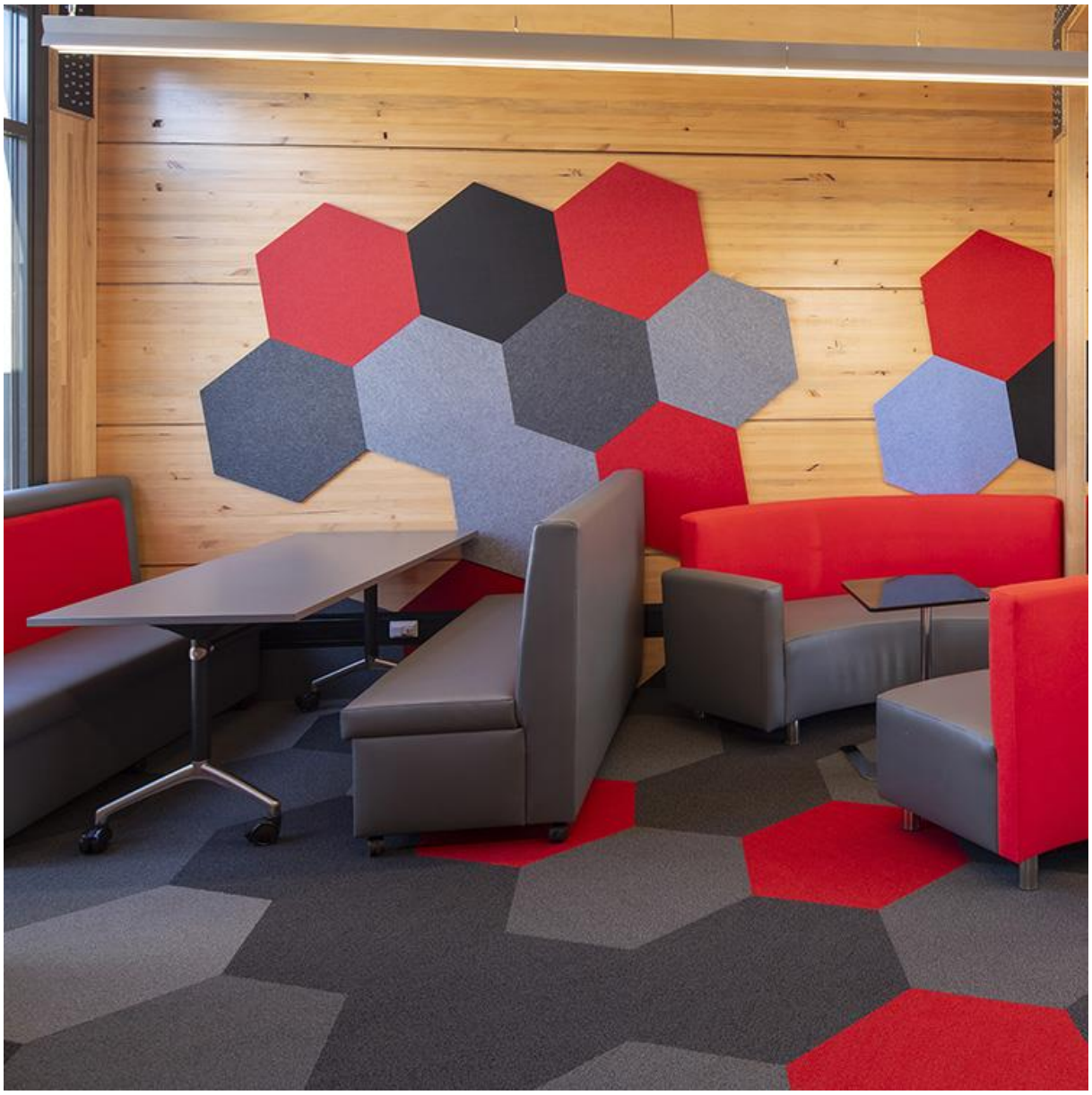
[11] ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20.



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