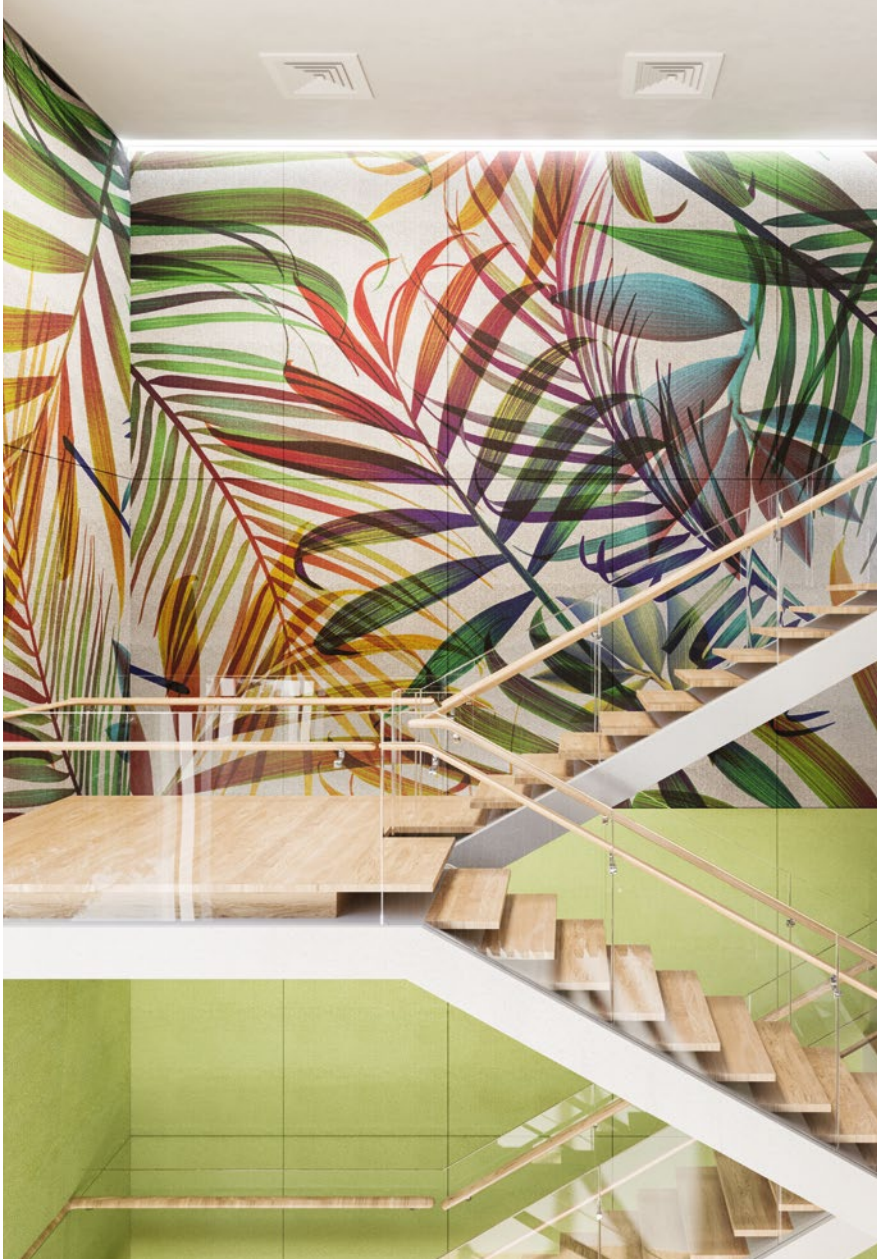


ENVIRONMENTAL PRODUCT DECLARATION

TECTUM® CEILING+WALL PANELS

CEMENTITIOUS WOOD FIBER



Tectum Direct-Attach wall panels in custom colors



CEILING & WALL SOLUTIONS

COMMITTED TO SUSTAINABILITY

Armstrong World Industries leads in delivering solutions that meet today's most stringent industry sustainability standards. We are committed to environmental responsibility in all aspects of our business, and carbon reduction is part of our 2030 Company goals and ambitions.

We were one of the first companies to create and publish the Environmental Product Declaration (EPD) in the ceiling industry. We have over a decade of experience using Life Cycle Assessment (LCA) to evaluate environmental impacts of our products starting with design, to raw materials, and through our operations. We are constantly working to optimize our operations and products to reduce their environmental impact. We believe the use of LCA and our commitment to transparency of our products' carbon footprint is critical to contributing to decarbonization of the built environment.

For more information visit armstrongceilings.com/transparency





ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS
CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

1. CONTENT OF THE EPD

| | |
|--|--|
| EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE | ASTM International – 100 Barr Harbor Drive, West Conshohocken, PA, 19428, USA www.astm.org |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER | Program Operator Provided |
| MANUFACTURER NAME AND ADDRESS | Armstrong World Industries 2500 Columbia Avenue Lancaster, PA 17603 |
| DECLARATION NUMBER (Part A and B) | EPD 354 Armstrong Tectum Ceiling and Wall Panels |
| DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT | 1 Square Foot |
| REFERENCE PCR AND VERSION NUMBER | Part A: PCR for building-related products, 2021 |
| DESCRIPTION OF PRODUCT'S INTENDED APPLICATION AND USE (AS IDENTIFIED WHEN DETERMINING PRODUCT RSL) | Tectum® Acoustical Cementitious Wood Fiber Ceiling and Walls Panels |
| PRODUCT RSL DESCRIPTION (IF APPL.) | 30 Years |
| MARKETS OF APPLICABILITY | North America Interior Furnishing |
| DATE OF ISSUE | June 15, 2022 |
| PERIOD OF VALIDITY | 5 years |
| EPD TYPE | Product-Specific |
| EPD SCOPE | Cradle to Grave |
| YEAR(S) OF REPORTED MANUFACTURER PRIMARY DATA | 2020 |
| LCA SOFTWARE & VERSION NUMBER | GaBi 10.6.1.35 |
| LCI DATABASE(S) & VERSION NUMBER | GaBi 2022.1 |
| LCIA METHODOLOGY & VERSION NUMBER | TRACI 2.1 |
| The sub-category PCR review was conducted by: | Timothy S Brooke ASTM International  |
| This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," serves as the core PCR. <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL | |
| This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by: | Thomas P. Gloria, Ph. D. Industrial Ecology Consultants |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: |  |
| LIMITATIONS | |
| <p>Environmental declarations from different programs (ISO 14025) may not be comparable.</p> <p>Comparison of the environmental performance of 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.</p> <p>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 in results for upstream or downstream of the life cycle stages declared.</p> <p>ASTM certification of this EPD is not to be construed as representing aesthetics or any other attributes not specifically addressed, nor should it be construed as an ASTM endorsement of the subject of the EPD or a recommendation for its use. There is no warranty by ASTM, express or implied, as to any finding or other matter in the EPD, or as to any product covered by the EPD. The EPD holder is liable for the information and evidence on which the EPD is based.</p> | |



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

2. GENERAL INFORMATION

2.1 DESCRIPTION OF ORGANIZATION

Armstrong World Industries, Inc. (AWI) is a leader in the design and manufacture of innovative commercial and residential ceiling, wall and suspension system solutions in the Americas. At home, at work, in healthcare facilities, classrooms, stores, or restaurants, Armstrong World Industries offers interior solutions that help to enhance comfort, save time, improve building efficiency and overall performance, and create beautiful spaces.

For more than 150 years, we have built our business on trust and integrity. It set us apart then, and it sets us apart now, along with our ability to collaborate with, and innovate for the people we're here to serve – our customers, our shareholders, our communities, and our employees.

We are committed to developing new and sustainable ceiling solutions, with design and performance possibilities that make a positive difference in spaces where we live, work, learn, heal, and play.

2.2 PRODUCT DESCRIPTION

Tectum® Ceiling and Wall Panels are manufactured from Aspen wood fibers by Armstrong World Industries in Newark, OH. 43055.

Features:

- Tectum panels have UL® Certified acoustics with acoustical testing and reporting that align with industry-wide best practices
- Panels have a proprietary factory-applied acoustical backer, adding sound absorption that is certified by UL
- CleanAssure™ family of products – includes disinfectable panels, suspension systems, and trim (standard colors only)
- Select products included in the FAST134 program – ready to ship in 4 weeks or less
- Sustainable Beyond Standard: Custom sizes in 1" thickness and all standard panels are part of the Sustain® portfolio and meet the most stringent industry sustainability compliance standards today
- Great retrofit solution for noise reduction
- Excellent sound absorption – NRC up to 0.85 (1" panel, C-40 Mounting)

2.2.1 Product Identification

Tectum® ceiling and wall panels provide durable, sustainable, acoustical options for spaces with direct-attach options for walls, and tegular and lay-in and direct attach options for ceilings.

2.2.2 Product Specification

These products generally fall under ASTM E1264 Section 5.2 designation as Type XIV—Excelsior bonded with inorganic binders.

This report covers the entire Tectum product line and focuses on highest volume product in the family. Other products within the family that differ by shape, size, and edge details of the panels are well represented within the scope of the study.



ENVIRONMENTAL PRODUCT DECLARATION



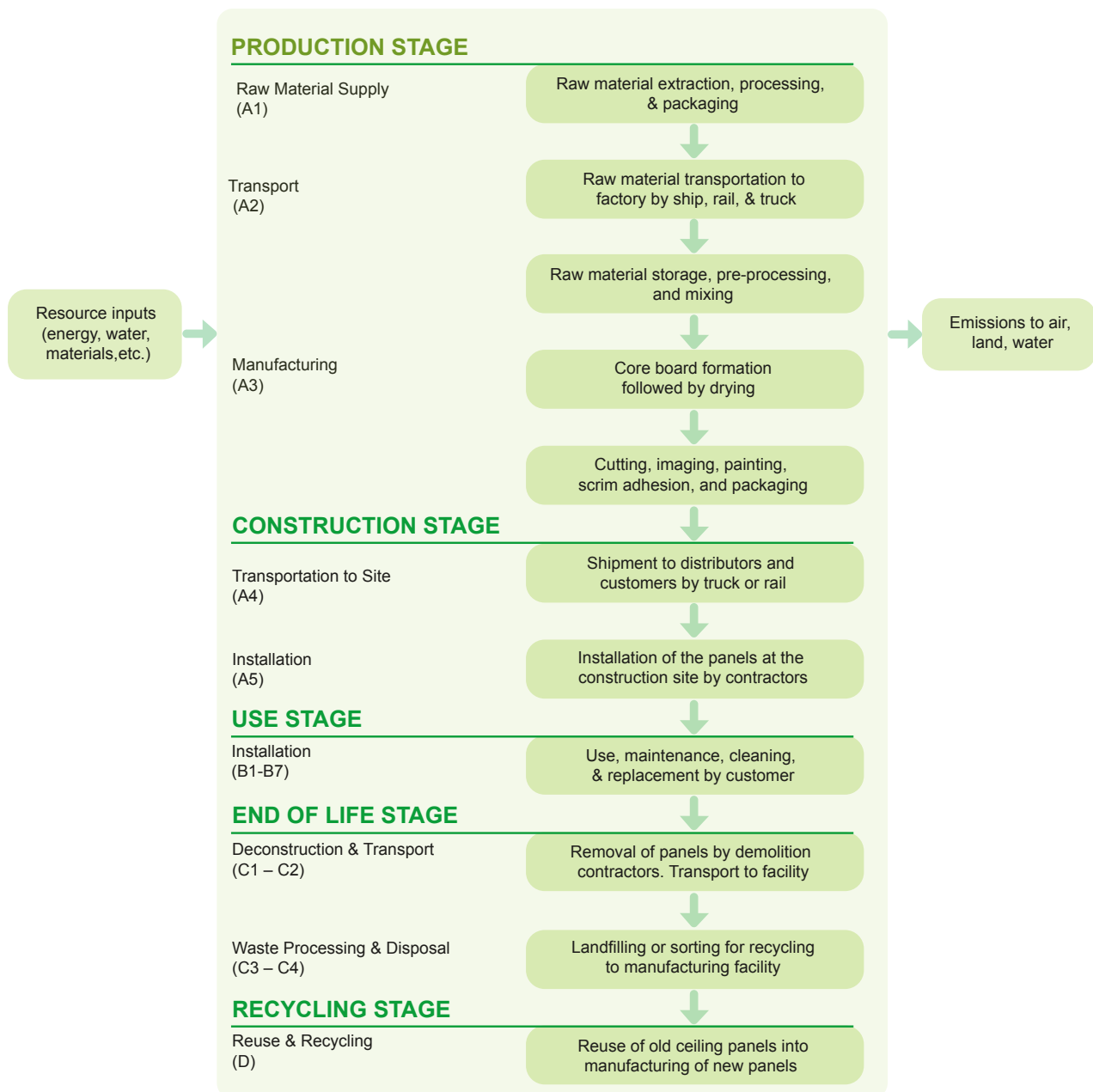
TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

2.2.3 Flow Diagram

Tectum Cementitious Wood Fiber ceiling and wall panels are manufactured using a wet-formed process. After arriving at the Armstrong manufacturing facility, the raw materials are processed and go through quality checks then mixed, water is added, and the mixture is formed into panels which are then dried. The panels are finished by application of back and prime coats, punching, lamination of scrim, final painting, cutting to size, and addition of edge detail. After packaging, the material is shipped and installed.

At the end of its useful life, the ceiling panel can then be sent to a landfill.



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

2.3 PRODUCT AVERAGE

2.3.2 Product-Specific EPD

In this specific case of Tectum Cementitious Wood Fiber product EPD, data collection for energy and other raw materials input stream was specific to the manufacturing location(s) and was supported by volume-driven mathematical modeling. For all the key raw materials, primary databases were used for LCA parameters. Other primary data were collected at the facility.

2.4 APPLICATION

The products covered by this EPD are designed to be installed in a direct-attach method or a suitable metal grid system.

2.5 MATERIAL COMPOSITION

Major raw materials used in ceiling and wall panel manufacturing are summarized in the table below.

| Material | Tectum® |
|-------------------|---------|
| Aspen Wood Fiber | 40-60% |
| Magnesium Oxide | 20-30% |
| Sodium Silicate | 10-20% |
| Magnesium Sulfate | 1-10% |
| Calcium Carbonate | 1-10% |
| Coating | 1-5% |

2.6 TECHNICAL REQUIREMENTS

TABLE 1. TECHNICAL DATA

| Name & Test Method | Value | Unit |
|--|------------|----------------------------------|
| Sound absorption coefficient (NRC) (ASTM C423) | up to 0.90 | NRC |
| Light reflectance (ASTM E1477) | 75 | n/a |
| Interzone attenuation of open office components (AC) (ASTM E1111 and ASTM E1110) | – | n/a |
| Sound Transmission Class (STC) (ASTM E413 and ASTM E90) | – | dB |
| Sound attenuation between rooms sharing a common ceiling plenum (CAC) (ASTM E1414 and Classification E413) | up to 40 | dB |
| Surface burning characteristics of building materials (ASTM E84, ASTM E1264) | Class A | Flame spread/ smoke developed |

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The final EPD is available on the Armstrong website (armstrongceilings.com/epd); and is under the Finish category in the EC3 Tool (buildingtransparency.org).



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

3. METHODOLOGICAL FRAMEWORK

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 and 14044. 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 UL® Environments (2021) Part B: Non-Metal Ceiling Panel EPD Requirements.

3.1 FUNCTIONAL UNIT

The declaration refers to the functional unit of 0.093 m² (1 ft²) of installed ceiling panel, as defined by the PCR.

3.2 DECLARED UNIT

The declaration refers to the declared unit of 0.093 m² (1 ft²) of installed ceiling panel, as defined by the PCR.

3.3 FUNCTIONAL/DECLARED UNIT PROPERTIES

TABLE 2. FUNCTIONAL OR DECLARED UNIT PROPERTIES

| Tectum Board 2 inches | |
|--------------------------------------|-------------------|
| Name | Value |
| Declared Unit | 1 ft ² |
| DeclaredThickness (inches) | 2.0 |
| Surface Weight (lb/ft ²) | 3.50 |
| Declared Unit | 1 m ² |
| DeclaredThickness (cm) | 5.08 |
| Surface Weight (kg/m ²) | 17.09 |



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

3.4 SYSTEM BOUNDARY

The LCA is “cradle-to-grave” for one square foot (0.093 m2) of ceiling tile. Details of inclusions and exclusions from the system boundary are listed below.

THE CRADLE-TO-GRAVE ASSESSMENT:

| Includes | Excludes |
|---|---|
| <ul style="list-style-type: none"> – Raw material acquisition and processing for both the product and its packaging (A1) – Inbound transport of raw materials to production facility (A2) – Manufacturing energy of ceiling panels (A3) – Energy production (A3) – Manufacturing waste disposal (A3) – Packaging of final products (A3) – Outbound transport of products to job site (A4) – Installation and installation waste (A5) – Use stage considered, but no impact (B) – End of life, including transport (C2-4) – Benefits and loads beyond the system boundary (D) | <ul style="list-style-type: none"> – Overhead facility energy (heating, lighting, etc.) of manufacturing facilities (A3) – Construction of capital equipment and other infrastructure flows – Maintenance and operation of support equipment – Human labor and employee transport – Manufacture and transport of packaging materials not associated with final product |

3.5 PRODUCT-SPECIFIC CALCULATIONS FOR USE PHASE (MODULES B1-B7)

Use (B1) of the ceiling panel does not require any activities that would contribute to potential environmental impacts of the product. The VOC emissions during the use phase are negligible and the product complies with the Office and Classroom VOC Requirements of CDPH.

The ceiling panels do not require maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) as part of regular use. Typically panels are only replaced due to damage from leaking water or if the owner chooses to change them based on design requirements rather than performance concerns. The rate of replacement due to water leaks is minimal and there is currently no published data to help define this. It is believed to be minimal, with negligible effect on the overall potential environmental impacts of the ceiling panel. There is also no operation energy (B6) or water (B7) use for the installed ceiling panels.

3.6 PRODUCT-SPECIFIC CALCULATIONS FOR END-OF-LIFE PHASE (MODULES C1-C4)

At this time, there is no industry consensus for product-specific assumption behind reported scenarios for information in modules C1-C4. For this study, panels were assumed to be landfilled at the end of life.

3.7 REFERENCE SERVICE LIFE AND ESTIMATED BUILDING SERVICE LIFE

In accordance with the PCR, the Reference Service Life (RSL) for this study was assumed to be 30 years and the Estimated Service Life was assumed to be 75 years.

3.8 ALLOCATION

No co-product or by-product allocation was necessary during manufacturing, use, or end of life. Allocation of background data (energy and materials) taken from the GaBi databases.



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

3.9 CUT-OFF RULES

No cut-off rules are defined for this study. The system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

3.10 DATA SOURCES

Primary data for this study was collected from the manufacturing facility for 2020 and datasets for materials upstream from manufacturing were obtained from the GaBi database version 10.6.1.35.

3.11 DATA QUALITY

The data quality ranges from good to very good. The temporal quality of the data is very good with both manufacturing specific data and GaBi background data from 2020.

3.12 PERIOD UNDER REVIEW

All the primary data in the scope of this analysis was collected from Armstrong manufacturing facilities during 2020.

3.13 COMPARABILITY AND BENCHMARKING

Tectum® ceiling and wall panels offer a unique set of product attributes and we do not have any data on comparable non-competitive products to report.

3.14 ESTIMATES AND ASSUMPTIONS

The datasets for materials upstream from manufacturing are from the GaBi database. When inventories were not available for materials, conservative proxy datasets were chosen based on similarity of material. Additionally and consistent with the PCR, the following assumptions in Table 3 related to transport, installation, and deconstruction procedures were made.

TABLE 3. TRANSPORT, INSTALLATION, AND DECONSTRUCTION PROCEDURES

| | |
|--|---|
| Product transport from point of manufacture to building site | Mode: Diesel-powered truck/trailer Distance: 800 km |
| Product transport from building site to waste processing | Mode: Diesel-powered truck/trailer Distance: 35 km |
| Installation & deconstruction procedures | Manual (no operational energy use) |

3.15 UNITS

Units commonly used in the North American market are included in addition to the required SI units.

4. TECHNICAL INFORMATION AND SCENARIOS

Data is reported as a weighted average for Tectum production.

4.1 MANUFACTURING

The manufacturing process has been described in a simple flow chart in Section 2.2.4.

Based on 2021 data, ~0.77 pounds of non-hazardous waste is generated per square foot of production at the Newark, OH manufacturing facility.

4.2 PACKAGING

Armstrong® ceiling panels are well packaged in a variety of wooden panels, rigid corrugate, and stretch wrap. Stacks of material are banded to wooden pallets for shipping.



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

4.3 TRANSPORTATION

The following information specifies any transport after the manufacturing gate. Details of type of transport, type of vehicle, distance, type, and amount of energy carrier are listed. These values are consistent with industry standard assumptions.

TABLE 4. TRANSPORT TO THE BUILDING SITE (A4)

| Name | Unit | Tectum |
|---|---------|----------|
| Liters of fuel | l/100km | 3.41E+03 |
| Transport distance | km | 2.50E+02 |
| Capacity utilization (including empty runs) | % | 6.70E+01 |
| Gross density of products transported | kg/m3 | 2.15E+00 |
| Capacity utilization volume factor | - | 8.00E-01 |

4.4 PRODUCT INSTALLATION

The ceiling system must be installed in accordance with Armstrong Ceilings 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 armstrongceilings.com/installationinstructions

TABLE 5. INSTALLATION INTO THE BUILDING (A5)

| Name | Unit | 1m2 | 1ft2 |
|-------------------------|------|------------|------------|
| Auxiliary | kg | 0 | 0 |
| Water Consumption | m3 | 0 | 0 |
| Other Resources | kg | 0 | 0 |
| Electricity Consumption | kWh | 0 | 0 |
| Other Energy Carriers | MJ | 0 | 0 |
| Material Loss | % | 7% | 7% |
| Dust in air | kg | negligible | negligible |
| VOC in Air | kg | negligible | negligible |

4.5 USE

As per the PCR it was assumed that no energy, material, and water inputs were needed during the use phase of the ceiling panel system under recommended normal operating conditions. Consideration of any resources used during maintenance and repairs during normal use of ceiling system were outside the scope of this study.

Maintenance (B2), Repair (B3), Replacement (B4) , Refurbishment (B5)

Per the PCR, non-metal ceiling and wall panels were assumed to not need repainting, maintenance, or repairing, and to last the entire duration of the building ESL with no replacement or refurbishment.

Reference Service Life

A product’s RSL depends on the product properties and reference in-use conditions. The default RSL assumed in this PCR is 30 years for both ceiling and wall products.



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

4.6 DISPOSAL

End of Life

The end-of-life phase for the ceiling panels was included in the study. End-of-life impacts include landfill disposal of ceiling panels, scrap, and packaging at the end of installation.

TABLE 6. 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 | 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 | 0.74 | kg |
| Removals of biogenic carbon (excluding packaging) | | 0 | kg CO ₂ |

4.7 REUSE PHASE

TABLE 7. 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) | 0 | MJ |
| Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6) | 0.00314 | MJ |
| Net energy benefit from material flow declared in C3 for energy recovery | 0 | MJ |
| Process and conversion efficiencies | - | |
| Further assumptions for scenario development | - | |



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

5. ENVIRONMENTAL INDICATORS DERIVED FROM LCA

5.1 LCA RESULTS FROM LCIA

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

TABLE 8. DESCRIPTION OF THE SYSTEM BOUNDARY MODULES

| EPD Type | Production | | | Construction | | Use | | | | | | | End Of Life | | | | Benefits And Loads Beyond 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 to site | Assembly/Install | Use | Maintenance | Repair | Replacement | Refurbishment | Operational Energy Use | Deconstruction | Deconstruction | Transport | Waste processing | Disposal | Reuse, Recovery, Recycling Potential | |
| | | | | | | B6 Operational Energy Use of Building Integrated System During Product Use | | | | | | | | | | | | |
| | | | | | | B7 Operational Water Use of Building Integrated System During Product Use | | | | | | | | | | | | |
| Cradle to Gate | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | |



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

5.2 LCA RESULTS FROM LCI

Life cycle impacts reported below are based on TRACI 2.1 methodology. Results are provided in reference to the declared unit, and for convenience of the reader we have included additional grouping across the system boundaries and provided conversion in SI unit. For the other impact categories, results are presented in the tables below using the EN15804 standard and for the declared unit. Also for readers convenience conversions are provided in each table to SI units. Because products include biobased content, they store or sequester carbon. Both total and fossil-fuel-based global warming potential in our results tables. Total GWP reflects the stored carbon.

TABLE 9. LIFE CYCLE ASSESSMENT RESULTS FOR 0.93 M2 (1 FT2) OF TECTUM

| Impact Category | Units | Source | A1 - A3 | A4 - A5 | C1 - C4 | D | Total |
|------------------------------------|---------------|-----------|----------|----------|----------|-----------|----------|
| Global Warming Potential (GWP 100) | kg CO2 eq. | TRACI 2.1 | 1.33E+00 | 1.09E-01 | 2.42E-02 | -9.94E-04 | 1.46E+00 |
| Ozone Depletion Potential (ODP) | kg CFC 11 eq. | TRACI 2.1 | 1.51E-12 | 3.48E-16 | 4.94E-16 | -5.11E-16 | 1.51E-12 |
| Acidification Potential (AP) | kg SO2 eq. | TRACI 2.1 | 3.04E-03 | 5.04E-04 | 9.14E-05 | -5.34E-06 | 3.63E-03 |
| Eutrophication Potential (EP) | kg N eq. | TRACI 2.1 | 1.65E-04 | 4.47E-05 | 6.42E-06 | -7.32E-07 | 2.16E-04 |
| Smog Formation Potential | kg O3 eq. | TRACI 2.1 | 4.79E-02 | 1.15E-02 | 1.74E-03 | -1.30E-04 | 6.10E-02 |
| Resources, Fossil fuels | MJ | TRACI 2.1 | 1.67E+00 | 2.03E-01 | 4.64E-02 | -1.75E-03 | 1.92E+00 |
| Abiotic Depletion (ADP fossil) | MJ | CML 2016 | 1.47E+02 | 1.64E+01 | 3.81E+00 | -1.49E-01 | 1.67E+02 |

5.3 LCA RESULTS FROM LCI

TABLE 10. LCA RESULTS - RESOURCE USE

| Parameter | Description | Unit | A1 - A3 | A4 - A5 | C1 - C4 | D | Total |
|-----------|--|----------------|----------|----------|----------|-----------|----------|
| RPRe | Renewable primary resources used as energy carrier (fuel) | MJ | 149.70 | 0.69 | 0.28 | -0.04 | 150.63 |
| RPRm | Renewable primary resources with energy content used as material | MJ | 5.01E-09 | 3.56E-10 | 1.40E-10 | -2.45E-11 | 5.48E-09 |
| NRPRe | Non-renewable primary resources used as an energy carrier (fuel) | MJ | 159.851 | 16.525 | 3.874 | -0.169 | 180.08 |
| NRPRM | Non-renewable primary resources with energy content used as material | MJ | 4.156 | 0.515 | 0.115 | -0.004 | 4.78 |
| SM | Secondary materials | kg | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| RSF | Renewable secondary fuels | kg | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| NRDF | Non-renewable secondary fuels | m ³ | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| RE | Recovered Energy | MJ | 0.000 | 0.000 | 0.000 | 0.017 | 0.02 |
| FW | Use of net fresh water | m ³ | 42.933 | 0.683 | 0.709 | -0.107 | 44.22 |

TABLE 11. LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES

| Parameter | Description | Unit | Total |
|-----------|---|------|----------|
| HWD | Hazardous waste disposed | kg | 3.64E-07 |
| NHWD | NHWD Non-hazardous waste disposed | kg | 8.34E+00 |
| HLRW | HLRW High-level radioactive waste, conditioned, to final repository | kg | 9.27E-07 |
| ILLRW | Intermediate- and low-level radioactive waste, conditioned, to final repository | kg | 4.41E-05 |
| CRU | Components for re-use | kg | 0 |
| MR | Materials for recycling | kg | 0 |
| MER | Materials for energy recovery | kg | 0 |
| EE | Recovered energy exported from the product system | MJ | 1.75E-02 |



ENVIRONMENTAL PRODUCT DECLARATION

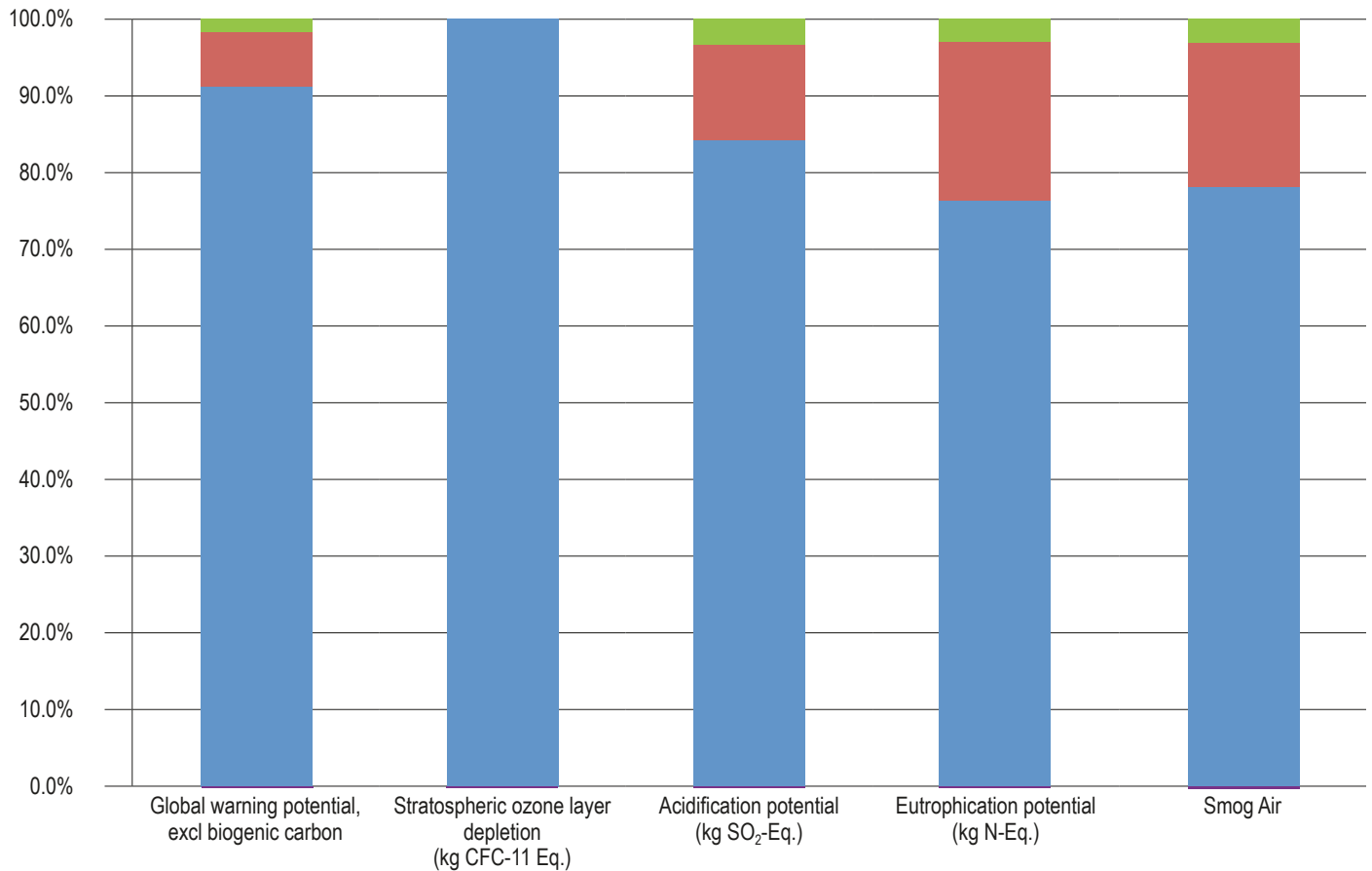


TECTUM® CEILING+WALL PANELS
CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

6. LCA: INTERPRETATION

From the 2020 LCA Model of the ceiling life cycle covered in this study, it was concluded that the ceiling panel manufacturing process and raw materials in the ceiling panel have the greatest impact on “carbon footprint” as represented by Global Warming Potential [GWP].



KEY

- Production ■
- Construction ■
- End of Life ■
- Recycle ■

Life Cycle Impact Assessment of Tectum® Ceiling and Wall Panels^{1,2} relative importance in percentage terms for the Production, Use, and End-of-Life stages for the ceiling panel.

¹ Based on U.S. EPA TRACI 2.1 Impact Factors

² Data is from Tectum 2" Tegular items.



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS
CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

7. ADDITIONAL ENVIRONMENTAL INFORMATION

7.1 ENVIRONMENT AND HEALTH 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.

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.

7.2 ENVIRONMENT AND HEALTH DURING INSTALLATION

All recommendations shall be utilized as indicated by SDS and installation guidelines. Specific product SDS and installation instructions can be downloaded at: armstrongceilings.com/pdbupimages-clg/217521.pdf

7.3 QUALITY

Armstrong World Industries has a robust internal Quality Assurance process that is based on industry-accepted best practices and is led by a team of quality professionals who have been certified by the American Society for Quality. The process involves several hundred different measures made throughout the manufacturing processes. In addition, our products are UL® labeled for fire and acoustical performance – a process which involves strict oversight by Underwriters Laboratories. The Armstrong Ceilings acoustical laboratory is ISO 17025 certified and is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

7.4 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

All environmental certifications can be found at: Armstrongceilings.com

Tectum: armstrongceilings.com/commercial/en/articles/tectum-part-of-armstrong-portfolio.html

Transparency Documents: armstrongceilings.com/commercial/en-us/performance/sustainable-building-design/transparency-documents.html

Technical Downloads & Resources: armstrongceilings.com/commercial/en-us/technical-downloads.html

7.5 FURTHER INFORMATION

Additional Information can be found at: armstrongceilings.com All recommendations shall be utilized as indicated by SDS and installation guidelines. Specific product SDS and installation instructions can be downloaded at: armstrongceilings.com/pdbupimages-clg/217521.pdf



ENVIRONMENTAL PRODUCT DECLARATION



TECTUM® CEILING+WALL PANELS
CEMENTITIOUS WOOD FIBER

According to EN 15804, ISO 14025 AND ISO 21930

8. PROJECT REPORT AND SUPPORTING DOCUMENTATION

The methods for conducting the life cycle assessment upon which the results in this EPD are based were consistent with ISO 14040 and 14044. 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 UL® Environments (2021) Part B: Non-Metal Ceiling Panel EPD Requirements.

9. REFERENCES

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 21930:2017 – Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services

Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers version 1.2, January 2017.

U.S. 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

UL PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL® Environment (2021, version 3.2)

UL PCR Part B: 2021 – Non-metal ceilings and interior wall panels

