ENVIRONMENTAL PRODUCT DECLARATION

AXIOM®

TRIMS & TRANSITIONS

4" Axiom® Classic-Curved

Armstrong® CEILING SOLUTIONS

Committed to Sustainability.

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

The products included in this declaration participate in the Living Building Challenge™ Declare program and are part of the Sustain™ family by Armstrong Ceilings, which is one of the highest performing environmental systems available today.

Inside the Armstrong Product Declaration you will find

- Material ingredient reporting
- Ingredient screening
- VOC Emissions information
- Environmental certification
- Performance attributes

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

Armstrong CEILING SOLUTIONS

AXIOM®
TRIMS & TRANSITIONS

According to ISO 14025

1. General Information

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor re 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, envi onmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Armstrong
DECLARATION NUMBER	4787532757.106.1
DECLARED PRODUCT	AxiomÈ Trims & Transitions
REFERENCE PCR	IBU PCR Part A and Part B for products of aluminum and aluminum alloys with UL PCR addendum to part A and part B.
DATE OF ISSUE	April 7, 2017
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physic Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Life cycle assessment results Testing results and verification
The PCR review was conducted by:	IBU PCR Review Panel
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTErNAL ☒ EXTErNAL	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas gloria, Industrial Ecology Consultants

2. Product Information

2.1 Product Description

Armstrong® Axiom® Trims & Transitions are crisp edge details and smooth connections that add the finishing touch to just abou any job. Axiom is manufactured by Armstrong World Industries in Alpharetta, Georgia and Santa Fe Springs, California.

2.2 Application

Commercial Interior Finish. Trims and Transitions. The ceiling systems components must be installed in accordance with Armstrong installation guidelines. You can reference this document at www.armstrongceilings.com.

2.3 Technical Data

There are different levels of performance associated with Axiom® Trims & Transitions. Performance information is included in this EPD to provide a total understanding of this product and its performance attributes.

Performance of Axiom® Trims & Transitions

Product Line	• **Axiom**® Classic • **Axiom** Glazing Channel • **Axiom** Direct Light Coves • **Axiom** Profiled • **Axiom** Vector®	• **Axiom** Building Perimeter • **Axiom** for Interlude® • **Axiom** Indirect Light Coves • **Axiom** Soft Edge • **Axiom** Moldings and Column Rings	• **Axiom** Building Perimeter for Lutron® Shades • **Axiom** Knife Edge® • **Axiom** Paired • **Axiom** Transitions

2.4 Placing On the Market/Application Rules

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

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

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

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

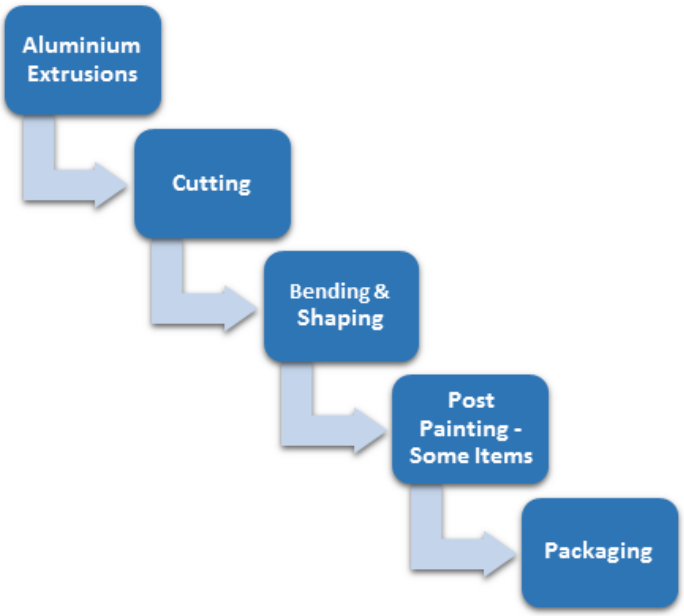
2.5 Material Content of Axiom® Trims & Transitions

Components	FUNCTION	QUANTITY (PERCENT BY WEIGHT)	RECYCLED MINERAL RESOURCE	MINERAL RESOURCE	NON-RENEW-ABLE	RENEW-ABLE	ABUNDANT	RECYCLED MATERIAL	ORIGIN	TRANS-PORTATION MODE	TRANS-PORTATION MILES
Aluminum	Core Material	>93%	■	■	■		■	■	Global	Truck	500-600
Paint	Finish	<7%		■	■				U.S.	Truck/Rail	200-500

2. Product Information (continued)

2.6 Manufacture

Process for Manufacturing Axiom® Trims & Transitions



2.7 Health, Safety, and Environmental Aspects During Manufacturing

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

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

2.8 Installation of Axiom® Trims & Transitions

Axiom® Trims & Transitions must be installed in accordance with Armstrong Ceilings installation guidelines. You can reference this document at www.armstrongceilings.com.

2.9 Packaging

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

2. Product Information (continued)

2.10 Health, Safety, and Environmental Aspects During Installation

There are no recognized systemic hazards associated with installing Axiom® Trims & Transitions. Armstrong World Industries recommends that installers handle materials in a manner to avoid injury from cut edges of metal parts. Installers should wear appropriate personal protective equipment, such as gloves and safety glasses to avoid injury when working with metal parts.

2.11 Reference Service of Life

Per the PCR the reference service life for this product is not specified

2.12 Extraordinary Effects

- **Seismic Performance**

  Seismic Categories C, D, E, and F

  ICC-ES ESR 1308 – see armstrongceilings.com/seismicRX

3. Life Cycle Assessment

This study provides life cycle inventory and environmental impacts relevant to Armstrong® Axiom® Trims & Transitions. This LCA was conducted to better understand the environmental impacts of the Trims & Transitions and learn how the impacts of raw material selection, product formulation, and manufacturing processes influence the life cycle impacts

The methods for conducting the life cycle assessments used for this project were consistent with ISO 14040 and 14044. This report is intended to ful ll the reporting requirements in Section 5 of ISO 14044 and the requirements outlined in the North American Product Category Rule for Designated Steel Construction Products.

3.1 Declared Unit

The declared unit for this EPD is 1 metric ton of Axiom®. The reference service life is not specified per the PCR.

Axiom® Trims & Transitions	
Declared Unit	1 metric ton
Declared Density (kg/m^3)	2699 kg/m^3

3. Life Cycle Assessment (continued)

3.2 System Boundaries:

The system boundary for this PCR is the Product Stage. The system boundaries studied as part of this life cycle assessment include extraction of primary materials, raw materials manufacture, trims and transitions production, and packaging.

The Assessment Includes:

– Raw materials production including aluminum extrusion, cutting, shaping, postpainting and packaging materials for Axiom® Trims & Transitions

– Inbound transportation of materials to Armstrong facility

– Fabrication of Axiom® Trims & Transitions at an Armstrong facility

– Packaging of finished products including energy to operate packaging equipment

– **The Assessment Excludes:**

– Overhead energy usage (heating, lighting) of manufacturing facilities

– Maintenance and operation of support equipment

3.3 Assumptions:

No particular assumptions were taken into consideration within the model.

3.4 Cut-off Criteria:

Mass – If a flow is less than 1% of the cumulative mass of the model, it is excluded, providing its environmental relevance is not a concern.

Energy – If a flow is less than 1% of the cumulative energy of the model, it is excluded, providing its environmental relevance is not a concern.

Environmental relevance – If a flow meets the above criteria for exclusion, yet is believed to potentially have a significant environmental impact, it is included.

3.Life Cycle Assessment (continued)

3.5 Background Data:

All data is reported as a North American weighted average across our aluminum system manufacturing locations. The map shows the location of each of our manufacturing facilities. We have plants located in Alphareta, GA and Santa Fe Springs, CA. Aluminum is purchased at multiple locations including Georgia and Texas. Secondary gaBi datasets were utilized for all raw materials. All transportation associated with raw materials reflects the actual modes of transportation and mileage.

3.6 Data Quality:

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

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

3.7 Period Under Review

Calendar year 2014 manufacturing data was used to create the LCA model.

3.8 Allocation:

Since this EPD does not cover the end-of-life of the products. End-of-life allocation is outside the scope of the study.

4. LCA: Results

Disclaimer: This Environmental Product Declaration (EPD conforms to ISO 14025, ISO 14040, ISO 14044, and ISO 21930.

Scope of Results Reported: The PCR requires reporting of a limited set of LCA metrics; therefore, there may be relevant environmental impacts beyond those disclosed by this EPD. This EPD does not indicate that any environmental or social performance benchmarks are met nor thresholds exceeded.

Accuracy of Results: This EPD has been developed in accordance with the PCR applicable for the identified products following the principles, requirements and guidelines of the ISO 14040, ISO 14044, ISO 14025, and ISO 21930 standards. The results in this EPD are estimations of potential impacts. The accuracy of the results in different EPDs may vary as a result of value choices, background data assumptions and quality of data collected.

Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. Such comparisons can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories. Any comparison of EPDs shall be subject to the requirements of ISO 21930. For comparison of EPDs which report different module scopes, such that one EPD includes Module D and the other does not, the comparison shall only be made on the basis of Modules A1, A2, and A3. Additionally when Module D is included in the EPDs being compared, all EPDs must use the same methodology for calculation of Module D values.

The Life Cycle Assessment (LCA) was performed according to ISO 14040 and follows the PCR instructions. The cradle-to-grave LCA encompasses raw material production; transport of raw materials to production facility; manufacturing of Axiom® Trims & Transitions.

Table 1. Description of the system boundary (X = Included in LCA; NS = Not in Scope)

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	Raw Material supply	Transport	Manufacturing	Transport from gate site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling potential
EPD type	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Gate to Gate for 1 tonne	X	X	X	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

4. LCA: Results (continued)

Life Cycle Environmental Impact Results: 1 Metric Ton – Consistent Declared Unit

Declared Unit: 1 Metric Ton of Axiom for use over 75 years, impacts based on U.S. EPA TRACI 2.1 Impact Factors Table

2. North American LCA Environmental Impact Results

TRACI 2.1 Impact Assessment, October 2013						
Impact Category	**Parameter**	**Unit**	**A1. Raw materials**	**A2. Transport**	**A3. Production**	**A1-A3**
Global Warming	Global warming potential (GWP)	metric ton CO2- Eq.	6.90E+00	8.55E-02	1.58E-01	7.14E+00
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP)	metric ton CFC-11 Eq.	4.91E-10	6.88E-13	3.02E-13	4.91E-10
Acidification of Land and Water	Acidification potential of soil and water (AP)	metric ton SO2- Eq.	3.91E-02	1.14E-03	5.01E-04	4.07E-02
Eutrophication	Eutrophication potential (EP)	metric ton N- Eq.	7.38E-04	5.45E-05	1.73E-04	9.66E-04
Photochemical Ozone Creation	Formation potential of tropospheric ozone (POCP)	metric ton O3- Eq.	3.42E-01	2.48E-02	7.82E-03	3.74E-01
Depletion of Abiotic Resources (Elements)*	Abiotic depletion potential (ADP-elements) for non-fossil resources	metric ton Antimony Eq.	4.18E-06	1.20E-08	4.64E-09	4.20E-06
Depletion of Abiotic Resources (Fossil)	Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ, net calorific value	7.43E+04	1.14E+03	1.68E+02	7.56E+04

* This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which the indicator is best for assessing the depletion of abiotic resources.

Table 3. LCA Results: Resource Use

LCA RESULTS - RESOURCE USE 1 Metric Ton AXIOM					
Parameter	**Unit**	**A1. Raw materials**	**A2. Transport**	**A3. Production**	**A1-A3**
Non-renewable primary energy excluding resources used as raw materials	MJ	7.72E+04	1.15E+03	1.71E+02	7.85E+04
Non-renewable primary energy resources used as raw materials	MJ	0.00E+00	0.00E+00	1.13E+00	1.13E+00
Non-renewable primary energy demand, total	MJ	7.72E+04	1.15E+03	1.72E+02	7.85E+04
Renewable primary energy excluding resources used as raw materials	MJ	3.23E+04	1.44E+01	1.21E+02	3.24E+04
Renewable primary energy resources used as raw materials	MJ	0.00E+00	0.00E+00	5.19E+00	5.19E+00
Renewable primary energy, total	MJ	3.23E+04	1.44E+01	1.26E+02	3.24E+04
Non-renewable and renewable primary energy demand, total	MJ	1.09E+05	1.16E+03	2.98E+02	110949.9391
Use of secondary material	metric ton	0.182	0	0.00506	0.188
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of net fresh water	m^3	1.60E+02	1.74E-01	7.63E-02	1.61E+02

* Net calorific value is applicable to combustible fuels and is not applicable to other forms of renewable energy (e.g. solar, wind)

4. LCA: Results (continued)

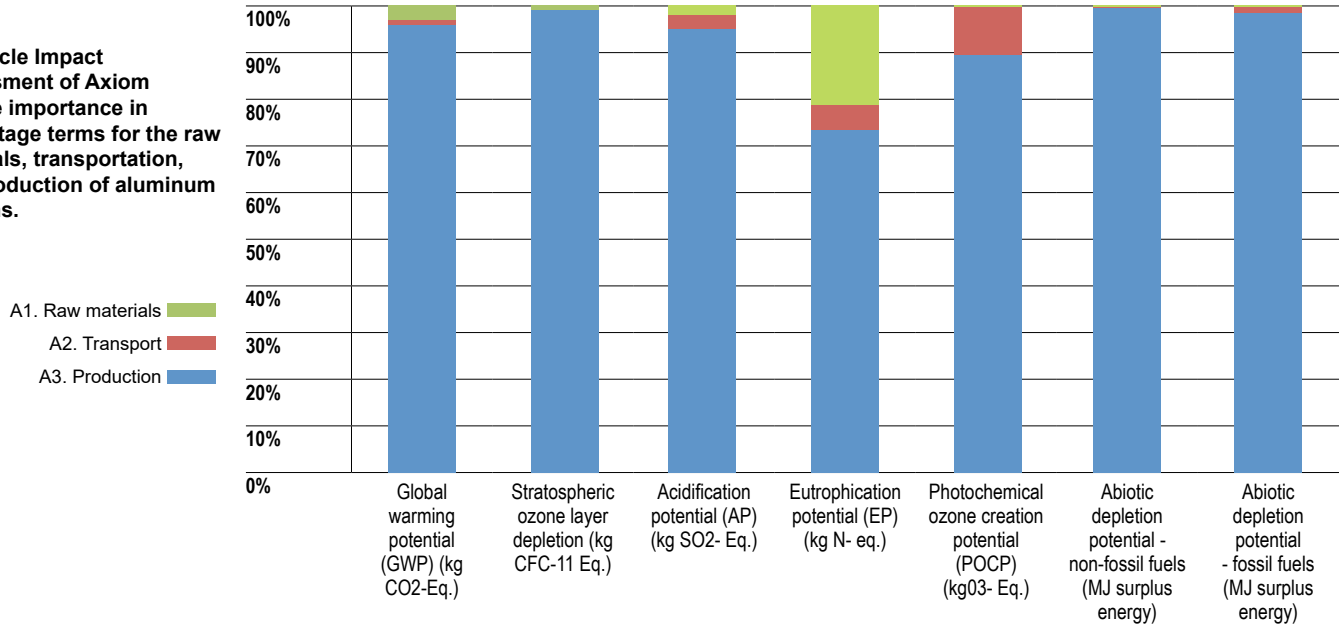
Table 4. LCA Results: Output Flows and Waste Categories

LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES 1 M[metric Ton] AXIOM					
Waste:					
Parameter	**Reporting Unit**	**A1. Raw materials**	**A2. Transport**	**A3. Production**	**A1-A3**
Hazardous waste disposed	metric ton	NA	NA	NA	NA
Non-hazardous waste disposed	metric ton	NA	NA	NA	NA
Radioactive waste disposed	metric ton	NA	NA	NA	NA
Output Flow:					
Parameter	**Reporting Unit**	**A1. Raw materials**	**A2. Transport**	**A3. Production**	**A1-A3**
Components for re-use	metric ton	0	0	0	
Materials for recycling	metric ton	0	0	9.70E-06	9.70E-06
Materials for energy recovery	metric ton	0	0	0	0
Exported energy	MJ per energy carrier	0	0	0.026	0.026

5. LCA: Interpretation

From the 2015 LCA study of Axiom® Trims & Transitions, it was concluded that the raw materials had the highest impact in all impact categories. Aluminum is the primary raw material and may account for 80-99% of the overall impact category.

Life Cycle Impact Assessment of Axiom relative importance in percentage terms for the raw materials, transportation, and production of aluminum systems.



6. Supporting Documentation

Quality Assurance

Armstrong World Industries has a robust internal Quality Assurance process that is based on industry-accepted best practices. The process involves several hundred different measures made throughout the manufacturing processes. In addition, our products are UL labeled for fire, humidit , corrosion, and seismic performance, a process which involves strict oversight by Underwriters Laboratories.

7. References

Reporting Standards, PCR

UL Environment

UL Environment General Program Instructions April 2015, version 2

Sustainability Reporting Standards

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

ISO 14025: 2006 – Environmental labels and declarations — Type III environmental declarations — Principles and procedures ISO 14040: 2006 – Environmental management – Life cycle assessment – Principles and framework

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

ISO 14046:2013 – Environmental management- Water footprint- Principles, requirements and guidelines

ISO 15392:2008 – Sustainability in building construction- General principles

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

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

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

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

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

Relevant Federal Standards and SOPS

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

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

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

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

Relevant PCRs

IBU's Product Category Rule for Products of Aluminum and Aluminum Alloys

BPCS-5383-317