

# **Standards for Environmental Product Declaration**

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**Green Buildings and Sustainable Materials Project  
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Nutrition Facts	
4 servings per container	
Serving size 1 1/2 cup (208g)	
Amount per serving	
<b>Calories</b>	<b>240</b>
	% Daily Value*
<b>Total Fat</b> 4g	<b>5%</b>
Saturated Fat 1.5g	<b>8%</b>
Trans Fat 0g	
<b>Cholesterol</b> 5mg	<b>2%</b>
<b>Sodium</b> 430mg	<b>19%</b>
<b>Total Carbohydrate</b> 46g	<b>17%</b>
Dietary Fiber 7g	<b>25%</b>
Total Sugars 4g	
Includes 2g Added Sugars	<b>4%</b>
<b>Protein</b> 11g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 6mg	35%
Potassium 240mg	6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

## ENVIRONMENTAL IMPACTS

## Declared Product:

Mix 083118 • San Francisco Plant

Midsize column

Compressive strength: 8000 psi at 28 days

Declared Unit: 1 m<sup>3</sup> of concrete

Global Warming Potential (kg CO <sub>2</sub> -eq)	221
Ozone Depletion Potential (kg CFC-11-eq)	6.3E-6
Acidification Potential (kg SO <sub>2</sub> -eq)	0.75
Eutrophication Potential (kg N-eq)	0.28
Photochemical Smog Creation Potential (kg O <sub>3</sub> -eq)	15.8
<b>Total Primary Energy Consumption (MJ)</b>	<b>1,422</b>
Nonrenewable (MJ)	1,358
Renewable (MJ)	64.0
<b>Total Concrete Water Consumption (m<sup>3</sup>)</b>	<b>2.20</b>
Batching Water (m <sup>3</sup> )	0.12
Washing Water (m <sup>3</sup> )	0.02
<b>Nonrenewable Material Resource Consumption (kg)</b>	<b>1,630</b>
<b>Renewable Material Resource Consumption (kg)</b>	<b>1.50</b>
<b>Hazardous Waste Production (kg)</b>	<b>0.01</b>
<b>Nonhazardous Waste Production (kg)</b>	<b>2.31</b>

**Product Components:** crushed aggregate (ASTM C33), fly ash (ASTM C618), natural aggregate (ASTM C33), Portland cement (ASTM C150), admixture (ASTM C494), batch water (ASTM C1602)

# ***Environmental Product Declaration (EPD)***

- A globally accepted label that discloses the life cycle environmental performance of products and services
- EPD is based on an environmental life cycle assessment (LCA).
- Provide the consumer with a way to evaluate their choices
- NOT a claim of environmental superiority.
- NOT a certification or registration

# EPD and ISO Standard

## ISO 14025 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

- ISO 14025 establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations. It specifically establishes the use of the ISO 14040 series of standards in the development of Type III environmental declaration programmes and Type III environmental declarations.
- ISO 14025 establishes principles for the use of environmental information, in addition to those given in ISO 14020 Environmental labels and declarations — General principles.
- Type III environmental declarations as described in ISO 14025 are primarily intended for use in business-to-business communication, but their use in business-to-consumer communication under certain conditions is not precluded.

# Other Environmental Labels and Standards

- **ISO 14024** Environmental labels and declarations — **Type I** environmental labelling — Principles and procedures

## What is a Type I environmental labelling programme?

A Type I label is a third-party assessment of a product based on a number of criteria involved in the environmental impact of a product or material throughout its life cycle. The objective of this type of environmental labelling programme is to contribute to a reduction in the environmental impacts associated with products, through the identification of products that meet the specific criteria of a Type I programme for overall environmental preferability.



# Other Environmental Labels and Standards

- **ISO 14021** Environmental labels and declarations -- Self-declared environmental claims (**Type II** environmental labelling)
- ISO 14021 specifies requirements for self-declared environmental claims, including statements, symbols and graphics, regarding products. It further describes selected terms commonly used in environmental claims and gives qualifications for their use. This International Standard also describes a general evaluation and verification methodology for self-declared environmental claims and specific evaluation and verification methods for the selected claims in this International Standard.
- Not necessarily based on an LCA

# EPD and LCA

The data in EPD shall be generated using the principles, framework, methodologies and practices established by the ISO 14040 series of standards for Life Cycle Assessment.

A concept and methodology to evaluate the environmental effects of a product or activity holistically, by analyzing the whole life cycle of a particular product, process, or activity (U.S. EPA, 1993).



# Objectives of EPDs

**Overall: Drive the production and use of environmentally sustainable products**

Specifically

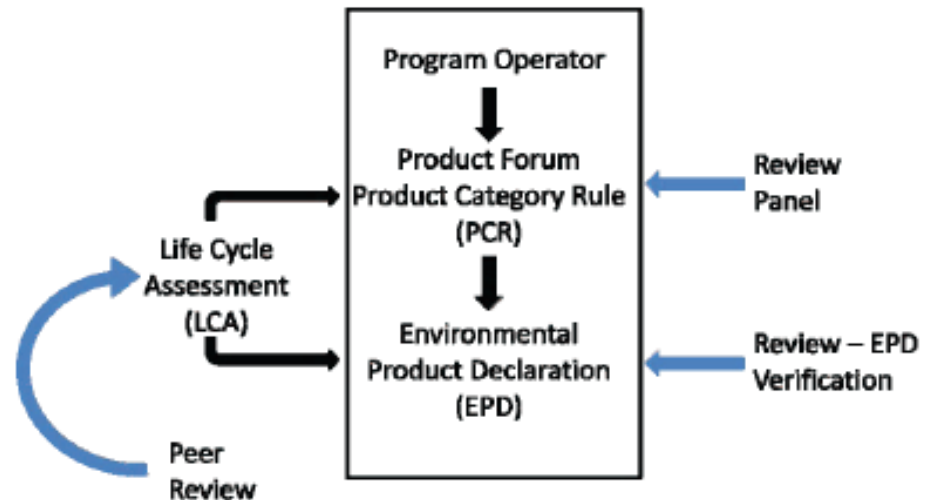
- ✓ Provide accurate and verified environmental information that is not misleading
- ✓ Provide purchasers and users with the ability to make informed decisions
- ✓ Encourage producers to make their products more environmentally friendly
- ✓ Ease data collection for life cycle environmental assessments of larger systems



# EPD Creation

Steps for EPD Creation:

1. **Program Operator** established (can be self-appointed)
2. Program operator defines **Product Category Rules**
3. Review and Comment of PCR
4. LCA performed and data used to create EPD (according to PCR and ISO methods).



# Program Operators (US list)

Program Operator Name	Website
ICC Evaluation Service	<a href="http://www.icc-es.org/ep/epd-index.shtml">http://www.icc-es.org/ep/epd-index.shtml</a>
UL Environment	<a href="http://industries.ul.com/environment/certificationvalidation-marks/environmental-product-declarations">http://industries.ul.com/environment/certificationvalidation-marks/environmental-product-declarations</a>
The Sustainability Consortium	<a href="http://www.sustainabilityconsortium.org/smr/">http://www.sustainabilityconsortium.org/smr/</a>
National Center for Sustainable Standards	<a href="http://www.nsf.org/services/by-type/standards-publications/ncss">www.nsf.org/services/by-type/standards-publications/ncss</a>
American Society of Testing and Materials (ASTM)	<a href="http://www.astm.org/CERTIFICATION/EpdAndPCRs.html">www.astm.org/CERTIFICATION/EpdAndPCRs.html</a>
SCS Global Services	<a href="http://www.scsglobalservices.com/environmental-product-declaration">http://www.scsglobalservices.com/environmental-product-declaration</a>
NSF International	<a href="http://www.nsf.org/">http://www.nsf.org/</a>
Earthsure	<a href="http://iere.org/index.php/programs/earthsure">http://iere.org/index.php/programs/earthsure</a>

Longer list available at: [www.pcrguidance.org/?page\\_id=172](http://www.pcrguidance.org/?page_id=172)

# Program Operators (International list)

Program Operator Name	Place	Website
International EPD System	Sweden	<a href="http://www.environdec.com/en/PCR/">www.environdec.com/en/PCR/</a>
Institut Bauen	Germany	<a href="http://bau-umwelt.de/hp6252/">bau-umwelt.de/hp6252/...</a>
Japanese Environmental Assoc. for Industry	Japan	<a href="http://www.ecoleaf-jemai.jp/eng/">http://www.ecoleaf-jemai.jp/eng/</a>
British Standards Institute	United Kingdom	<a href="http://www.bsigroup.com/en/Standards-and-...">www.bsigroup.com/en/Standards-and-...</a>
Korea Environmental & Technology Institute	South Korea	<a href="http://www.edp.or.kr/edp/english/process/process_list.asp">http://www.edp.or.kr/edp/english/process/process_list.asp</a>
Canadian Standards Association	Canada	<a href="http://www.csaregistries.ca/epd/about_epd_pcrs_e.cfm">http://www.csaregistries.ca/epd/about_epd_pcrs_e.cfm</a>

Longer list available at: [www.pcrguidance.org/?page\\_id=172](http://www.pcrguidance.org/?page_id=172)

# Product Category Rules

Rules on what to include and how to compute inputs and outputs to enable 'apples-to-apples' comparisons between products and enable the creation of EPDs.

## Why we need PCRs?

LCA in general leaves a lot of modelling choices up to practitioners (based on goal and scope of individual studies)

- PCRs ensure that most important modelling choices will be consistent among studies
- Allows for relatively fair comparison of products

Some key parameters covered in PCRs which often differ in LCA

**Functional unit  
determination**

**Recommended data  
sources**

**Temporal and geographic  
boundaries**

**Allocation rules**

**Impact assessment  
methods**

**Cut-off criteria**

## Product Category Rule for Environmental Product Declarations, Flooring: Carpet, Resilient, Laminate, Ceramic, Wood- NSF International

### EPD Format & Content Requirements:

1. General information
2. Product Description & Application
3. Product Characteristics
4. Product material content
5. Life Cycle Assessment Stages
6. Life Cycle Assessment Information
7. Additional Environmental Information

# Product Category Rules (PCR) for Flooring EPD

## EPD Section 1: General Information

### Goal & Scope

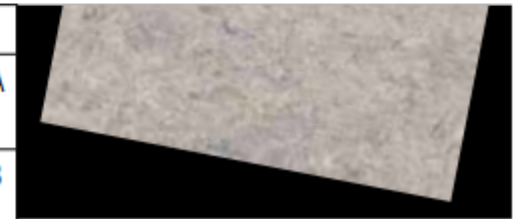
- Single/product groups/representative products
- Function unit (1 m<sup>2</sup> of floor covering for a specific time period)
- EPD shall consider all life cycle stages, and include name and address of the company responsible for the declaration
- Include the information about the program operator – address, logo, contact information, and website address
- State if document was externally reviewed

**Linoleum**

*According to ISO 14025*

This document is a Type III Environmental Product Declaration by Armstrong World Industries that is certified by ASTM as conforming to the requirements of ISO 14025. ASTM has assessed that the Life Cycle Assessment (LCA) information fulfills the requirements of ISO 14040 in accordance with the instructions listed in the Product Category Rules (PCR) cited below. The intent of this document is to further the development of environmentally compatible and sustainable construction methods by providing comprehensive environmental information related to potential impacts in accordance with international standards.

<b>Declaration Number:</b>	EPD-0002
<b>Program Operator:</b>	ASTM International - 100 Barr Harbor Drive, West Conshohocken, PA, USA www.astm.org
<b>Declaration Holder:</b>	Armstrong World Industries, Inc. - 2500 Columbia Avenue, Lancaster, PA 17603



# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 2: Product Description & Application**

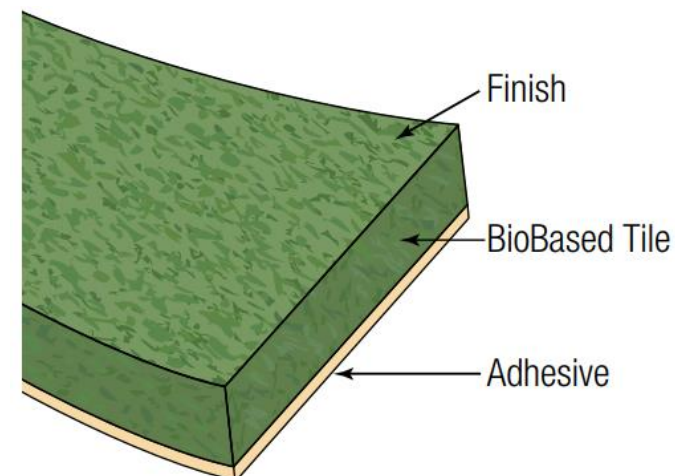
### **Product classification & description**

- Clearly identify the product (e.g., trade name, product number, pattern number)
- Clearly define product groups or average products
- Provide an illustrative picture or technical figure
- State the reference service life

### **Applicability**

- Specify the typical application and suggested use
- Provide necessary installation requirements or restrictions

### **Example: Armstrong's BioBased Tile**



# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 2: Product Description & Application**

The performance and properties of flooring products vary by the intended application. Thus the information of both applications and the performance to the specifications of the tests following relevant standards shall be included.

### **Example: Test standards for carpet performance**

AATCC Test Method 134-2011 Electrostatic Propensity of Carpets (Normative value  $\geq 3.5$  KV)

AATCC Test Method 16-2004 Colorfastness to Light (minimum grade 4 at 40 AFU)

ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

ASTM D5252 Standard Practice for the Operation of the Hexapod Tumble Drum Tester

ASTM D7330 Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings Using Standard Reference Scales

ISO 2551/ASTM D7570 Dimensional Stability (Modular Tiles Only)



# Product Category Rules (PCR) for Flooring EPD

## EPD Section 3: Product Characteristics

3) Include:

- Product dimensions
- Product weight
- Relevant testing procedures
- Relevant sustainability certifications
- Other appropriate product specifications

**Example:** Armstrong's BioBased Tile

**BioBased Tile® (BBT®)**

*According to ISO 14025 and ISO 21930*

### 4.0 Product Characteristics

**Table 3. Product Characteristics of BioBased Tile**

COMMERCIAL TILE CHARACTERISTICS					
PRODUCT	TILE DIMENSION (IN.)	THICKNESS (IN.)		AVERAGE WEIGHT (LBS/FT <sup>2</sup> )	AVERAGE WEIGHT (kg/m <sup>2</sup> )
		Overall	Wear Layer		
BioBased Tile	12 x 12	0.125	0.125	1.44	7.03
	12 x 24				

Armstrong Flooring. 2014. Environmental Product Declaration: BioBased Tile. Armstrong Flooring, Inc. 18 p.

Product Category Rule for Environmental Product Declarations, Flooring: Carpet, Resilient, Laminate, Ceramic, Wood  
NSF International, National Center for Sustainability Standards

# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 4: Material Content**

### **4.1) Material content of the product:**

Description of materials and substances used during manufacturing

- 1% cut-off criteria
- Exceptions –
  - Materials required to be disclosed by OSHA's Hazard Communication Standard or other national regulations
  - Air emissions and/or other materials subject to the U.S. EPA regulation or equivalent
  - Materials discharged to a waterway subject to local, state, and/or federal requirements or regulations.
  - Waste materials subject to a Resource Conservation and Recovery Act waste.
  - Persistent Organic Pollutant identified by the Stockholm Convention.

# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 4: Material Content**

### **4.1) Material content of the product:**

#### **Example: Laminate Floor Covering**

Component	Material	Mass %	Availability			Origin of raw materials
			Renewable	Non-renewable	Recycled	
Core: HDF	75-85% wood 25-15% resin	92%	abundant			global
Surface layer	Printed, impregnated paper (Décor)	1%	abundant			global
	Impregnated overlay	3%	abundant			global
	Corundum	1%	abundant			global
Backing	Impregnated kraft paper	3%	abundant			global

# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 4: Material Content**

### **4.2) Short description of main materials and manufacturing processes**

Example:

#### **High density fiberboard (HDF)**

High density fiberboard (HDF) or core board panel is used as a core layer in the production of laminate flooring, or other products such as furniture. The panel is composed of wood fibers, bound with a resin that is compressed under high heat and pressure to form the panels, that have a density generally greater than 800 Kg/cu m (106.8 oz/gal).

# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 5: LCA Stages and Reported EPD Information**

- Define the product's life cycle stages relevant to the LCA – extraction of raw materials, transportation, manufacturing, packaging, installation, use, and end of life.
- **Manufacturing** – provide process flow diagram/short description
- **Transportation** – vehicle and distance
- **Installation** – method, ancillary materials

### **Resilient floor coverings**

#### *Example:*

During installation, water based acrylic adhesives are recommended. Adhesives that meet the requirements of California South Coast Air Quality Management District Rule #1168 , or comply with the emissions requirements of California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CA 01350, or may be referenced as FloorScore or Green Label Plus approved).

# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 5: LCA Stages and Reported EPD Information**

- Define the product's life cycle stages relevant to the LCA – extraction of raw materials, transportation, manufacturing, packaging, installation, use, and end of life.
- **Manufacturing** – provide process flow diagram/short description
- **Transportation** – vehicle and distance
- **Installation** – method, ancillary materials
- **Waste** – collection and separation of waste generated in construction
- **Packaging** – kind and materials of packaging
- **Use** – use, cleaning, maintenance
- **End of life** – recycling, reuse, repurpose, disposal

### **Resilient floor coverings**

*Example:*

Post-installation resilient floor coverings waste may be recycled as floor covering through manufacturers' facilities.

Post installation wastes are collected and forwarded back to factories through the manufacturers.

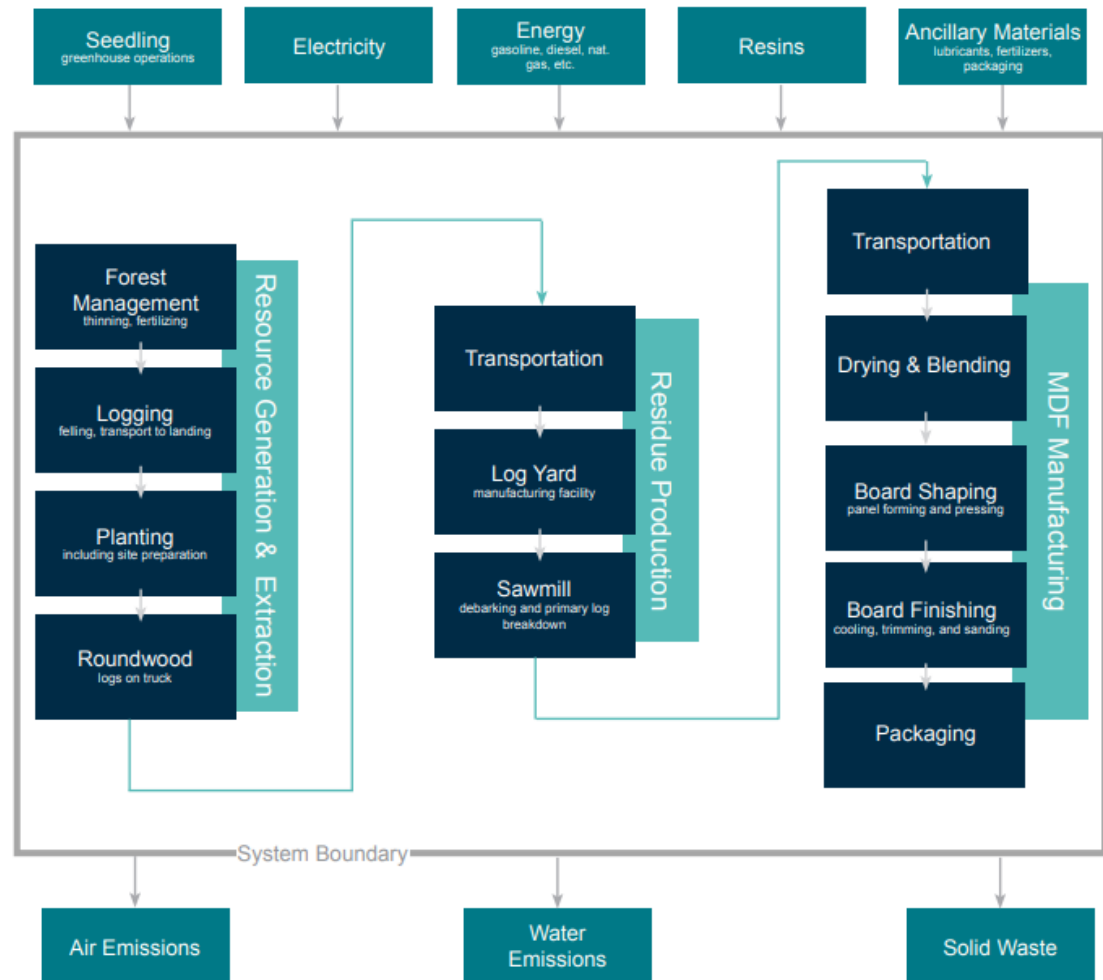
# Product Category Rules (PCR) for Flooring EPD

## EPD Section 6: Life Cycle Assessment

Define the LCA's assumptions and report results. Clearly define the:

- System boundary
- Functional unit
- Cut-off criteria
- Allocation procedures
- Data sources
- Data quality assessment
- Normalization
- Impact categories and assessment methods

### Example: Medium density fiberboard



# Product Category Rules (PCR) for Flooring EPD

## EPD Section 6: Life Cycle Assessment

Impact Category	Life Cycle Stages					
	User Defined Reference Service Life** of product = (insert user defined RSL of product here)					
	Number of Installations over 60 years = (insert # of replacements here)					
	Sourcing and Extraction	Manufacturing	Installation delivery	Use	End of life	Total
Abiotic depletion potential						
Acidification potential						
Eutrophication potential						
Global warming potential						
Ozone depletion potential						
Photochemical oxidant formation potential						
Primary energy – non renewable						
Primary energy – renewable						



# ***Product Category Rules (PCR) for Flooring EPD***

## **EPD Section 7: Additional environmental information**

- Include relevant, additional information related to environmental issues other than these derived from LCA
- Examples:
  - Environmental management systems (ISO 14001 Environmental management systems -- Requirements with guidance for use)
  - Worker safety management system
  - Use of certain production equipment

# Visit Our Project Website

<https://faculty.cnr.ncsu.edu/yuanyao/green-buildings-and-sustainable-materials/>

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