

PRODUCT CATEGORY RULES FOR PREPARING
AN ENVIRONMENTAL PRODUCT DECLARATION
FOR SPRAY-APPLIED FIRE-RESISTIVE MATERIALS (SFRM)



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Spray-applied Fire-Resistive Materials (SFRM)

(UNCPC 54650 and/or CSI MasterFormat Division 078100 and 078116)

The product group includes SFRMs composed primarily of binding agents such as cement or gypsum and often contains other materials such as mineral wool, quartz, perlite, vermiculite, or bauxite along with various other ingredients produced in accordance with fire endurance tests such as ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials or ULC CAN S101



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Spray-applied Fire-Resistive Materials (SFRM)

Scope of Validity of these PCR

This product group is Spray-applied Fire-Resistive Material (SFRM). It is used as part of a building's passive fire resistance strategy. SFRM is typically applied to steel structural members (beams, columns, girders, trusses, angles, tubes, steel floor deck, etc.). Unlike Intumescent Fire-Resistive Materials (IFRM) or coatings, spray-applied "fireproofing" can provide thermal resistance and acoustical properties. However, its main use is in insulating steel, metal decking and other assemblies from the high temperatures found during a fire.

Spray-applied fireproofing products are used to delay (or prevent) the weakening of steel and the spalling of concrete in structures that are exposed to the high temperatures found during a fire. They do this by thermally insulating the structural members to keep them below the temperatures that cause failure.

Program Operator

NSF International

Interested Parties

Representatives of the following organizations participated in the development of the PCR:

Athena Institute, Carboline, Etex Building Performance, GPC Applied Technologies, Isolatek International, National Fireproofing Contractors Association (NFCA)

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1.0 General Information

These product category rules (PCR) have been developed under the general program instructions for ASTM International's Environmental Product Declaration (EPD) Program. The PCR are primarily intended for use by organizations and other interested parties that use the standards referenced in Section 5.2 for preparing EPDs for spray-applied fire resistive materials.

1.1 | GOAL AND SCOPE

This PCR document specifies rules, requirements, and guidelines for developing EPDs for spray-applied fire resistive materials and underlying requirements of related life-cycle assessments (LCAs). These PCR are valid for, and provide requirements for, a cradle-to-gate EPD. The rationale for limiting the PCR scope to cradle-to-gate include:

- the transportation to building site and installation is relatively minor and similar for all SFRMs;
- SFRMs are by nature passive, require little or no maintenance or periodic replacement and typically have a service life equal to the expected life of the building unless the SFRM is damaged or removed from the building element; and
- While it is acknowledged that the SFRM protected assemblies will be recovered and recycled at the end of the building's life, the final disposition of all SFRMs is an inert landfill and thus, there is little if any end-of-life differences across the product category.

An EPD prepared under these PCR shall present results over the following phases of the life cycle:

- raw materials acquisition,
- transportation,
- manufacturing.

These PCR are consistent with and comply with the mandatory requirements contained in the following standards:

- International Organization for Standardization (ISO) 21930: 2007 *Sustainability in building construction—Environmental declaration of building products*.
- 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*.

While not necessarily complying with the CEN EN 15804 standard, it is referenced in Section 12 and has been consulted with regard to selected requirements and presentation details that go beyond or expand on the above-noted ISO standards.

Note 1—Dry product SFRM requires a significant amount of water for mixing, initiating the required chemical reaction, and application, and clean-up at the project site. The environmental impacts associated with this water consumption are not required to be included in the resultant EPDs. However, a note shall be included in the EPD estimating the amount of water required to be added during the mixing and application of 1,000 kg of dry powder SFRM and the additional environmental impacts associated with that water consumption.

1.2 | EPD OWNERSHIP/RESPONSIBILITY

The producers or group of producers who develop an EPD following these PCR maintain sole ownership and have responsibility and liability for their EPD.

2.0 Period of Validity

This PCR document is effective for five (5) years from the latest date of publication. If after five years, relevant changes in the product category or other relevant factors have occurred (for example, changes in LCA methodology), the document shall be revised. If no changes are necessary, the PCR shall be updated with a new date. Revisions may also be made to these PCR during the period of validity, however such changes do not have to be reflected in existing EPDs during their validity period unless the EPD owners choose to do so.

An EPD created under these PCR shall be valid for a five (5) year period from the date of issue. After five years, the EPD shall be reviewed. If relevant changes in the product category or other relevant factors have occurred that could alter the content and accuracy of the declaration (for example, changes in technology or LCA methodology), the EPD shall be revised and verified. If no changes are necessary, the EPD shall be updated with a new date. The process for verification and establishing the validity of an EPD shall be in accordance with ISO 14025:2006 and ISO 21930:2007.

3.0 Definitions

For the purposes of this document, the definitions given in ISO 6707-1, ISO 14025, ISO 14044, ISO 14050, ISO 15686-1, ISO 21930, and the following shall apply.

SFRM is composed primarily of binding agents such as Portland cement or gypsum and often contains other materials such as mineral wool (such as slag or rockwool), quartz, perlite, vermiculite, or bauxite along with various other ingredients. The other materials are used to help lighten the solution material or to add/entrain air as an insulator and lightener. Chemical additives are sometimes used to reduce set times.

Applied fireproofing is available as a wet or dry formula. It is typically sprayed, but can also be troweled or applied. The fireproofing is generally delivered as a dry powder in bag, which is then mixed with water in the field. Modern formulas are asbestos-free and don't contain free crystalline silica.

This PCR excludes Intumescent Fire-Resistive Materials (IFRM) or coatings.

The physical characteristics of SFRM are determined according to various ASTM standards such as, but not limited to:

- E736/E736M, Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- E605/E605M, Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
- E759/E759M-92(2015)e1 Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
- E760/E760M-92(2015)e1 Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

- E761/E761M-92(2015)e1 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- E859/E859M-93(2015)e1 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
- E937/E937M-93(2015)e1 Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members

4.0 Informed Comparison

EPDs may enable comparison between products but do not themselves compare products, as stated in ISO 14025:2006, Sections 4 and 6.7.2. It shall be stated in EPDs created using these PCR that EPDs can be used to assist purchasers and users in making informed comparisons between products if they are prepared from cradle-to-grave life-cycle results, are based on the same function quantified by the same functional unit, and take account of replacement based on each product's reference service life (RSL) relative to the same assumed building service life. EPDs shall also meet all the conditions in ISO 14025:2006 Section 6.7.2 if used to assist purchasers and users in making informed comparisons between products.

EPDs based on cradle-to-gate information modules shall not be used for comparisons unless using a functional unit and complying with all of the requirements set out in ISO 14025:2006, Section 6.7.2, and ISO 21930:2007, Section 5.6, when the product is used in buildings. EPDs based on a declared unit shall not be used for comparisons.

This EPD covers only the cradle-to-gate impacts of spray-applied fire-resistive materials using a declared unit and the results cannot be used to compare between products.

5.0 Company/Organization, Product, and Product Category

5.1 | DESCRIPTION OF COMPANY/ORGANIZATION

The name of the company/organization as well as the place(s) of production shall be provided in the EPD. The EPD may also include general information about the company/organization such as quality systems, an environmental management system according to ISO 14001, or any other environmental management systems in place (see Section 9.0).

5.2 | DEFINITION OF PRODUCT CATEGORY

These PCR address spray-applied fire-resistive materials produced from the materials shown in Table 1, which also shows the standards that provide detailed descriptions and specifications for each material.

TABLE 1: SFRM Component Materials

Product or Material	Description/Specification
Portland cement	Portland cement ASTM C150 Standard Specification for Portland Cement and/or slag cement ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars
Gypsum	natural and/or Flue-Gas Desulfurization (FGD) gypsum ASTM C22 Standard Specification for Gypsum
mineral wool	mineral and/or slag based wool ASTM C726 Standard Specification for Mineral Wool Roof Insulation Board
Quartz	natural and/or recovered material
perlite	natural and/or expanded ASTM C549 Standard Specification for Perlite Loose Fill Insulation
vermiculite	natural and/or expanded ASTM C516 Standard Specification for Vermiculite Loose Fill Thermal Insulation
bauxite	natural

5.3 | DESCRIPTION OF PRODUCT

The EPD shall provide a narrative description of the product that will enable the user to clearly and unambiguously identify the product. This description shall include, where relevant:

- Product identification by brand name, material type, and simple visual representation, which may be by photograph or graphic illustration;
- List of the standards and other product specifications to which the products comply;
- Details regarding reinforcement, thicknesses and colors;
- Flow diagram illustrating main unit processes by life-cycle stage according to the scope of the declaration;
- Materials and substances to be declared; and
- Any additional information that will assist in identifying the product.

Material contents of the finished product ready for shipment, including packaging, shall be declared in terms of the main components. Intentionally added substances officially classified as hazardous according to relevant national or international regulations shall be stated. Product specific data that is confidential because of the competitive business environment, intellectual property rights, or similar legal restrictions need not be declared except where such data involves regulated hazardous substances, which must always be disclosed.

6.0 Requirements for the Underlying LCA

The underlying LCA shall be conducted in accordance with ISO 14040 and ISO 14044.

6.1 | FUNCTIONAL AND DECLARED UNIT

The functional unit of a product provides a reference to which the material flows (input and output data) of a building product are normalized mathematically (ISO 21930:2007). A functional unit is defined for EPDs covering the complete cradle-to-grave life cycle or the cradle-to-gate life cycle with a use stage scenario.

A declared unit is defined for EPDs covering only the cradle-to-gate or cradle-to-gate plus end-of-life stages (see Section 6.2). If the intended use of the EPD is for comparison purposes between different building products, the entire life cycle shall be included, including the use and end-of-life stages. In such situations the functional unit shall be used as the reference unit, not the declared unit.

Since these PCR for spray-applied fire resistive materials only cover the cradle-to-gate stages, a declared unit 1,000 kg of product shall be used. A weighted average formulation or other applicable aspects of the product shall be stated when the EPD deals with a generic or representative product group with different material components. The weights shall reflect the relative production volumes for the relevant materials.

6.2 | SYSTEM BOUNDARIES

Figure 1 shows the life-cycle stages and individual modules that shall be included within the LCA system boundary, depending on whether the EPD is Cradle-to-Gate or Cradle-to-Grave.

FIGURE 1 Life-Cycle Stages and Modules

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE			
Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4

Cradle-to-Gate or “Information Module” | The life-cycle activities and related processes shall include modules A1, A2, and A3—the product stage—as defined below, with scenarios for other life-cycle stages as appropriate.

Any site-generated energy and purchased electricity shall be included in the system boundary. The extraction, processing, and delivery of purchased primary fuels, for example natural gas and primary fuels used to generate purchased electricity, shall also be included within the boundaries of the system. Regionally specific inventory data on electricity shall be based on subnational U.S. and Canadian

consumption mixes that account for power trade between the regions. If such regional data are not available, production mixes of the three continental interconnections (East, West, Texas) as well as those of Hawaii and Alaska may be used. In the case of a Cradle-to-Grave EPD the North American average grid mix shall be used for the construction and use stages if the use location is not known. A comparable approach shall be taken for electricity consumption in the case of materials or input products imported from outside the U.S. and Canada. The sources for electricity (calculation procedure) shall be documented.

In the case of EPDs based on these PCR, modules A1 to A3 (highlighted in Figure 1) apply. The following factors are to be taken into account for each life cycle stage

Modules A1-A3, the Product Stage:

- A1 - Extraction and processing of raw materials, including fuels used in extraction and transport within the process;
- A2 - Average or specific transportation of raw materials (including recycled or recovered materials) from extraction site or source to manufacturing site and including empty backhauls and transportation to interim distribution centers or terminals;
- A3 - Manufacturing of the product, including all energy and materials required and all emissions and wastes produced. This may include:
 - Packaging, including transportation and waste disposal, to make product ready for shipment;
 - If packaging is purchased from multiple suppliers, then a weighted average of the transportation distances by mode from all suppliers shall be included in the LCA modeling;
 - Average or specific transportation from manufacturing site to recycling/reuse/landfill for pre-consumer wastes and unutilized by-products from manufacturing, including empty backhauls; and
 - Recycling/reuse/energy recovery of pre-consumer wastes and by-products from production.

Modules A1, A2, and A3 and the total A1-A3 shall be shown separately.

Excluded from System Boundary | A summary of items that may be excluded in the primary product stages include:

- Production, manufacture, and construction of manufacturing capital goods and infrastructure;
- Production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
- Personnel-related activities (travel, furniture, and office supplies); and
- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

7.0 Life-Cycle Inventory Analysis

7.1 | DATA COLLECTION AND DESCRIPTION OF DATA

The primary data shall be representative according to temporal, geographical, and technological requirements.

Temporal | The obtained information from the manufacturing process shall be annual values, preferably from the previous twelve-month period or calendar year, unless accompanied by a statement attesting to

the validity of older data. The reference year of average background or secondary data shall not be older than ten years unless accompanied by a statement attesting to the validity of older data.

Geographical | The geographic region of the relevant life-cycle stages included in the calculation of representative data shall be documented.

Technological | Data shall represent the specific technology or technology mix in use.

The following specific or proxy background data shall be documented with regard to data sources:

- Extraction and/or production of raw materials (specific or average background);
- Manufacturing of the product (specific);
- The fuel mix and calculation procedures for electricity generation;
- Hazardous waste according to applicable U.S. and/or Canadian federal or state/provincial regulations (or appropriate regulations for materials imported from outside North America);
- Data for upstream products where specific or proxy data is not available; and
- Weighted averages based on volume or mass used to assign transport distance and mode if multiple suppliers are used for one material.

National databases shall be used for upstream data to the extent that they are applicable when no other primary data is available (for example, U.S. Life Cycle Inventory Database, www.nrel.gov/lci). If appropriate national data are not available, sources for similar technology adjusted for national boundary conditions (for example, energy mix) may be used. Data from other regions are acceptable if it is determined and justified that those data are the best available.

All data sources shall be specified, including database and year of publication (reference). Sources of data for transport models (including transport mode, distances, and quantities to be transported) and thermal energy production shall be documented. Where proxy data is used in the absence of specific data for other inputs, the source and justification for selection of the proxies shall be documented in the LCA report.

When preparing an average EPD for an identical product manufactured at multiple facilities, the LCI data for each site shall be weighted to determine the average. Weighting shall be by annual product production. Data reported in the declarations shall be as production-weighted averages of multiple facilities.

The product content shall be described in the declaration. Product specific data that is confidential because of the competitive business environment, intellectual property rights, or similar legal restrictions need not be declared. In such cases, a notation that the information is confidential shall be made along with a description of the function of the component.

7.2 | CUTOFF RULES

Criteria for the exclusion of inputs and outputs (cutoff rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. They shall not be applied in order to hide data. All inputs and outputs of a unit process for which data are reasonably available shall be included in the calculation. Any application of the criteria for the exclusion of inputs and outputs shall be documented. Data gaps may be filled by conservative assumptions with average or proxy data. Any assumptions for such choices shall be documented.

If data are not reasonably available, the cutoff criteria for flows to be considered within the system boundary shall be as follows:

Mass | If a flow is less than 1% of the cumulative mass of the unit processes, it may be excluded, provided its environmental relevance is minor.

Energy | If a flow is less than 1% of the cumulative energy of the system model, it may be excluded, provided its environmental relevance is minor.

Environmental relevance | Material and energy flows known or expected to have the potential to cause environmentally relevant emissions into air, water, or soil related to the environmental indicators of these PCR shall be included unless justification for exclusion is documented.

At least 95% of the energy usage and mass flow shall be included and the life-cycle impact data shall contain at least 95% of all elementary flows that contribute to each of the declared category indicators.

All hazardous and toxic materials and substances shall be included in the inventory and the cutoff rules shall not apply to such substances.

7.3 | SECONDARY DATA QUALITY REQUIREMENTS

Any secondary data source used in the underlying life-cycle inventory analysis shall be as complete and representative as possible for the applicable region in terms of its geographic and technological coverage, and of a recent reference year, which is typically less than ten years old. Any deviations from these requirements for secondary data shall be documented, and the following apply.

- The information obtained from the manufacturing process shall be annual average values.
- Average background data shall not be older than ten years for industry average data or five years for producer specific data, unless justification is provided.
- When the EPD owner is not the owner of all upstream processes, the EPD owner shall request primary data from its suppliers within the system boundary. If the suppliers do not supply data, the EPD owner shall use the best-available data in the literature based on data quality requirements of this PCR.
- Data shall be identified as direct (for example, measurements or purchasing records), indirect (based on calculations), estimated, or other.

7.4 | UNITS

SI units shall be used with conversions as shown in the table below as necessary. Power and energy units are as follows:

- kWh or MJ for electric energy
- kW or MW for power

TABLE 2: Conversion Factors to be Used if Reporting in IP Units (Imperial)

Convert from	To	Multiply by
Square meter (m ²)	Square foot (ft ²)	1.076391E+01
Kilogram (kg)	Pound (lb)	2.204622
Mega joule (MJ)	British Thermal Unit (Btu)	9.478170E+02
Degree Celsius (°C)	Degree Fahrenheit (°F)	(°C * 9/5) +32
Cubic meter (m ³)	Cubic foot (ft ³)	3.531466E+01
Meter (m)	Foot (ft)	3.281
m ² K/W	ft ² Fhr/Btu	5.6783
Metric tonne	Ton	1.102

Source: NIST: <http://physics.nist.gov/Pubs/SP811/appenB9.html>; <http://www.nist.gov/pml/wmd/metric/temp.cfm>; and <http://www.nist.gov/pml/wmd/metric/common-conversion-b.cfm>

7.5 | ALLOCATION RULES

In a production process in which more than one type of product is generated, it is necessary to allocate the environmental flows (inputs and outputs) from the process to the different products to get product-based inventory data. Allocation, if required, shall follow the requirements and guidance of ISO 14044:2006, Section 4.3.4.

Recycled and recovered materials shall be considered raw materials. Only the materials, water, energy, emissions, and other elemental flows associated with reprocessing, handling, sorting, and transportation from the generating industrial process to their use in the production process shall be considered. Any allocations before reprocessing shall be allocated to the original product. Recycled and recovered materials with fuel content and used as fuels, such as used tires, shall be considered alternative energy.

Allocation related to transport shall be based on the mass of transported product.

When a product's original function is no longer needed or possible, the product can be processed further in a waste management system. For example, it can be recycled, reused, or energy recovered. Emissions from downstream recycling, or combustion after the end-of-waste state, will be allocated to the new downstream products. In the case of incineration of wastes for energy production at the primary production site, the combustion emissions shall be allocated to the building product unless the energy is exported.

Recycling processes shall be treated as closed loop recycling, as long as no change occurs in the inherent properties of the recycled material. In such cases, the need for allocation is avoided since the use of secondary material displaces the use of virgin (primary) materials.

If different allocation options are relevant and a deviation of greater than 20% is a foreseen outcome, a sensitivity analysis shall be initiated. These different allocation approaches and data sets shall be documented and declared.

In cases where several similar products are produced by a site or company, these PCR allow similar products to be declared as a production-weighted average product in the same EPD provided that the difference between their environmental impacts is less than 5% for each environmental impact category. In cases where the difference is greater than 5%, it shall be permitted to separately report similar products in the same EPD (for example, in separate columns in a table). If a single value is chosen for each impact category for all products, the value reported shall be the worst performance within the range of variation. It shall be permitted to show arithmetically weighted 'averaged data' in an EPD as supplementary information if found relevant.

8.0 Impact Categories and Characterization Factors

Life Cycle Impact Assessment (LCIA) and Life Cycle Inventory (LCI) measures to be declared in the EPD shall be based on Table 4 in accordance with ISO 21930:2007, Section 8.2 and ISO 14044:2006.

TABLE 3: Declaration of Environmental Category Indicator Results, Use of Resources, and Generation of Waste

Measures To Be Declared	Unit
Impact category	
Global warming potential (GWP)	kg CO ₂ equiv
Acidification potential	kg SO ₂ equiv
Eutrophication potential	kg N equiv
Smog creation potential	kg O ₃ equiv
Ozone depletion potential	kg CFC-11 equiv
Total primary energy consumption	
Nonrenewable fossil	MJ (HHV)
Nonrenewable nuclear	MJ (HHV)
Renewable (solar, wind, hydroelectric, and geothermal)	MJ (HHV)
Renewable (biomass)	MJ (HHV)
Material resources consumption	
Nonrenewable material resources	kg
Renewable material resources	kg
Net fresh water	L
Non-hazardous waste generated	kg
Hazardous waste generated	kg

Notes for Table 3:

1. Fresh water is naturally occurring water on the earth's surface and underground as groundwater in aquifers and underground streams. The term specifically excludes seawater and brackish water, but does include fresh water that has been treated to make it potable. Energy use and other impacts associated with fresh water treatment are not included.
2. Consumption of net fresh water includes fresh water entering the system being studied that is not returned to the same drainage basin that it originated from.
3. Recovered or recycled materials are neither nonrenewable nor renewable resources under ISO definitions. The use of such materials can be reported as additional environmental information as per Section 9.
4. Primary energy is an energy form found in nature that has not been subjected to any conversion or transformation process. Examples of primary fuels are coal and natural gas.
5. Recycled and recovered materials with fuel content and used as fuels shall be considered alternative energy. Examples of such secondary fuels include but are not limited to solvents, wood, tires, and animal fat. Emissions from secondary fuels shall be included in the calculation of the relevant environmental impacts.
6. Energy consumption shall be reported in Higher Heating Values (HHV) mega joules.

7. Non-renewable energy flows used as feedstock to produce materials (for example, plastic) shall be counted and reported under the non-renewable fossil energy (MJ).

The impact categories of life-cycle impact assessment (LCIA) shall be calculated using characterization factors specified in version 2.1 of TRACI (Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts). Characterization factors taken from the University of Leiden (CML) methodology are optional additions for EPDs valid in North America, but shall be reported for EPDs valid outside of North America. <https://www.epa.gov/chemical-research/tool-reduction-and-assessment-chemicals-and-other-environmental-impacts-traci>

9.0 Additional Environmental Information

An EPD shall include, where relevant, additional information, such as given in the points below, related to environmental issues, other than the environmental information derived from LCA, LCI, or information modules. This information shall be separated from the information described in ISO 21930:2007, Sections 8.2.2 and 8.2.3. Identification of the significant environmental aspects should, as a minimum, take into consideration the following as per ISO 21930:2007:

- Information on environmental issues, such as
 - Impact(s) and potential impact(s) on biodiversity,
 - Toxicity related to human health or the environment or both, and
 - Geographical aspects relating to any stages of the life cycle (for example, a discussion on the relation between the potential environmental impact(s) and the location of the product system);
- Data on building product performance if environmentally significant;
- Organization's adherence to any environmental management system, with a statement on where an interested party can find details of the system;
- Any other environmental certification program applied to the building product and a statement on where an interested party can find details of the certification program;
- Other environmental activities of the organization, such as participation in recycling or recovery programs or renewable energy credits (REC), provided details of these programs are readily available to the purchaser or user and contact information is provided;
- Information that is derived from LCA but not communicated in the typical LCI- or LCIA-based formats;
- Instructions and limits for efficient use;
- Hazard and risk assessment on human health and the environment;
- Information on absence or level of presence of a material in the product that is considered of environmental significance in certain areas (see ISO 14021:1999, Sections 5.4 and 5.7);
- Preferred waste management option for used building products; and
- Potential for incidents that can have impact(s) on the environment, such as:
 - the end-of-life stage, from deconstruction, reuse, demolition, recycling and disposal;
 - energy, water-saving etc. and other improvements, such as acoustical improvements;
 - energy content of the building product for energy recovery in the end of life;

- recycled content (see ISO 14021:1999, 7.8.1.1) or recycling rates.

Additional information shall only be related to environmental issues. Information and instructions on product safety unrelated to the environmental performance of the building product shall not be part of a Type III environmental declaration (ISO 14025:2006, 7.2.3).

NOTE 2: Section 9.0, above, extracted from ISO 21930:2007 and ISO 14025:2006 with minor wording changes.

10.0 EPD Supporting Data

A project report shall be prepared in accordance with the requirements and guidance of ISO 14044:2006, Section 5, for third-party reports. This information shall document the LCA study and additional environmental information in a systematic, comprehensive way, and shall be made available to the verifier in order to demonstrate that the requirements of this PCR document and ISO 21930:2007, Section 7.3, have been met. The project report shall include, where relevant:

- The name of the organization that commissioned the report, the contact information of the report author, and the date of the report;
- The input and output environmental data of the unit processes that are used for the LCA calculations;
- The documentation (measurements, calculations, estimates, sources, correspondence, traceable references to origin, etc.) that provides the basis from which the process data for the LCA is formulated;
- The specification used to create the manufacturer's building products;
- Energy consumption figures;
- Emission data to air, water, and soil;
- Waste production;
- Data that demonstrates that the information is complete—in specific cases, reference can be made to, for instance, standards or quality regulations;
- Referenced literature and databases from which data have been extracted;
- Data used to carry out sensitivity analyses;
- Documentation that demonstrates that the building products can fulfill the desired function(s) and performance;
- Documentation that demonstrates that the chosen processes and scenarios in the flow chart satisfy the requirements set in ISO 21930:2007;
- Documentation that substantiates the chosen life-cycle of the building products;
- Documentation and substantiation of the percentages or figures used for the calculations in the end-of-life stage;
- Documentation and substantiation of the percentages and figures (number of cycles, prices, and so forth) used for the calculations in the allocation procedure;
- Information showing how averages of different reporting locations have been calculated to obtain proxy data;
- Documentation used to substantiate any qualitative information in the additional environmental information;

- Procedures used to carry out the data collection (questionnaires, instructions, informative material, confidentiality agreements, and so forth);
- The characterization factors used;
- The criteria and substantiation used to determine the system limits and the selection of input and output flows;
- Documentation that demonstrates consistency when using information modules; and
- Documentation used to substantiate the other choices and assumptions.

NOTE 3: Section 10, above, includes material extracted from ISO 21930:2007, Section 7.3.

11.0 Content of the EPD

The following demonstration of verification shall be completed and included with the EPD. Note that while third-party verification is optional for Business-to-Business (BtoB) EPDs, ASTM will always use third-party verification. Third-party verification is mandatory for Business-to-Consumer (BtoC) EPDs.

Demonstration of Verification

PCR review, was conducted by:

< name and organization of the chair, and information on how to contact the chair through the program operator >

Independent verification of the declaration and data, according to ISO 14025:

internal external

(Where appropriate) Third party verifier:

<name of third party verifier>

As per ISO 21930:2007, Section 8, Type III environmental declarations in a product category shall follow the format and include the parameters as identified in this PCR. The following general information shall be declared in the EPD:

- Name and address of the manufacturer(s);
- Product identification by name (including, for example, production code) and a simple visual representation of the product;
- Description of the building product's use and the functional or declared unit of the product to which the data relates;
- Description of the application (installation) of the building product where relevant;
- Detailed list of the substances, by weight, that make up the building product, taking into account cutoff rules and confidentiality;
- Data from LCA or LCI or information modules, as per ISO 14025:2006, Section 7.2.2;
- Additional environmental information (see Section 9);
- Statement of whether the EPD is Cradle-to-Gate or Cradle-to-Grave;

- Statement that EPDs from different programs (using different PCR) may not be comparable;
- Statement that the EPD represents an average performance in cases where an EPD declares an average performance for a number of products, with information on the deviation of the product's performance with respect to the average stated;
- Site(s), manufacturer or group of manufacturers, or those representing them, for whom the results of the LCA are representative;
- Information on where explanatory material may be obtained;
- Description or diagram of the life-cycle stages included in the LCA subdivided into production, construction, use and end-of-life stages, and system boundaries;
- When the EPD includes the use stage, a description of the nature of the processes and ancillary materials that are required for installing the building product in the building or other type of construction works and their replacement and maintenance according to the cutoff criteria;
- Name of the program and the program operator's address and, if relevant, the logo and website URL;
- Identification of the PCR document on which the EPD is based;
- Date the EPD was issued and period of validity;
- Site(s), manufacturer, or group of manufacturers or those representing them for whom the results of the LCA are representative;
- Name of PCR review panel chair;
- Whether the independent review of the EPD and data was conducted by an internal or external verifier (third-party verification is mandatory for BtoC EPDs);
- Name, address, phone number, fax number, and e-mail of the third-party verifier and logo of the verification body, if applicable; and
- ISO 14025:2006 9.2.2 states that, "Type III environmental product declarations intended for business-to-consumer communication shall be available to the consumer at the point of purchase."

12.0 References

ASTM Standards:¹

- ASTM C22/C22M Standard Specification for Gypsum
- ASTM C150/C150M Standard Specification for Portland Cement
- ASTM C516 Standard Specification for Vermiculite Loose Fill Thermal Insulation
- ASTM C549 Standard Specification for Perlite Loose Fill Insulation
- ASTM C726 Standard Specification for Mineral Wool Roof Insulation Board
- ASTM C989/C989M Standard Specification for Slag Cement for Use in Concrete and Mortars
- ASTM E736/E736M, Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- ASTM E605/E605M, Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
- ASTM E759/E759M-92(2015)e1 Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E760/E760M-92(2015)e1 Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E761/E761M-92(2015)e1 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E859/E859M-93(2015)e1 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
- ASTM E937/E937M-93(2015)e1 Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members

ISO Standards:²

- ISO 6707-1: 014 Buildings and Civil Engineering Works—Vocabulary—Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations—Self-declared Environmental Claims (Type II Environmental Labeling)
- 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 14050:2009 Environmental Management—Vocabulary

¹ Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, <http://www.astm.org>.

² Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.



ISO 15686-1:2011 Buildings and Constructed Assets—Service life planning—Part 1: General Principles and Framework

ISO 21930:2007 Sustainability in Building Construction—Environmental Declaration of Building Products

Other References:³

EN 15804 *Sustainability of construction works—Environmental product declarations—Core rules for the product category of construction products*

³ European Committee for Standardization (CEN), Avenue Marnix 17, B-1000 Brussels, Belgium, www.cen.eu