

PRODUCT CATEGORY RULES FOR PREPARING  
AN ENVIRONMENTAL PRODUCT DECLARATION  
FOR NORTH AMERICAN GLASS MAT GYPSUM PANELS



PCR

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# North American Glass Mat Gypsum Panels

## Construction Specifications Institute Masterspec Classification 09250

The product group consists of interior and exterior gypsum panels products as defined by ASTM C1177/C1177M *Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing*, ASTM C1178/C1178M *Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel*, and ASTM C1658/C1658M *Standard Specification for Glass Mat Gypsum Panels*.



## North American Glass Mat Gypsum Panels

### Scope of Validity of these PCR

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### Program Operator

ASTM International

### Interested Parties

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

The Gypsum Association and its members:

American Gypsum Company LLC, CertainTeed Gypsum, Inc., CGC INC., Continental Building, Products Operating Company, LLC, Georgia–Pacific Gypsum LLC, National Gypsum Company, PABCO Gypsum® *a division of PABCO building products, LLC*, and United States Gypsum Company.

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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 intended for use by North American organizations for preparing EPDs for glass mat gypsum panels for use in North American or export markets.

The referenced FPInnovations PCR was reviewed but could not be adopted due to the explicit exclusion of the glass mat gypsum products in the PCR.

### 1.1 | GOAL AND SCOPE

This PCR document specifies rules, requirements, and guidelines for developing EPDs for North American produced glass mat gypsum panels and underlying requirements of related life-cycle assessments (LCAs). These PCR are valid for, and provide requirements for, cradle-to-gate, cradle-to-gate with scenarios, and cradle-to-grave EPDs.

An EPD prepared under these PCR shall present results over some or all of the following phases of the life cycle depending on whether the EPD is cradle-to-gate, cradle-to-gate with scenarios, or cradle-to-grave:

- raw materials acquisition
- manufacturing
- transportation
- installation
- use and maintenance
- disposal/reuse/recycling

A reference service life (RSL) shall be stated in a cradle-to-grave EPD to take account of the maintenance and replacement impacts over an assumed building service life. A RSL may be stated for a cradle-to-gate EPD if a use phase scenario is included in the EPD. A RSL must be based on a verifiable performance history as per the System Boundaries section.

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.

## 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 will be revised. 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 which it shall be reviewed and verified. An EPD shall be reassessed and updated after five years as necessary to reflect changes in technology or other circumstances that could alter the content and accuracy of the declaration. The process for verification and establishing the validity of an EPD shall be in accordance with ISO 14025 and ISO 21930.

## 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 apply:

- **glass mat, n** | a woven or non-woven fabric of glass fibers with or without a binder. (ASTM C11)
- **gypsum panel products, n** | the general name for a family of sheet products consisting essentially of gypsum. (ASTM C11)
- **recovered material, n** | material that would have otherwise been disposed of as waste or used for energy recovery but has instead been collected and recovered as a material input, in lieu of new primary material, for a recycling or a manufacturing process. (ISO 14021)

## 4.0 Informed Comparison

EPDs may enable comparison between products but do not themselves compare products, as stated in ISO 14025, Sections 4 and 6.7.2. It shall be stated in EPDs created using these PCR that only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, reference service life (RSL), quantified by the same functional unit, and meeting all the conditions in ISO 14025, Section 6.7.2 can be 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, Section 6.7.2, and ISO 21930, section 5.6, when the product is used in buildings. EPDs based on a declared unit shall not be used for comparisons.

These PCR cover cradle-to-gate, cradle-to-gate with scenarios, and cradle-to-grave EPDs. If an EPD is only cradle-to-gate, then the following shall be stated in the EPD: This EPD covers only the cradle-to-gate impacts of glass mat gypsum panels 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 the existence of quality systems, an environmental management system according to ISO 14001, or any other environmental management systems in place.

### 5.2 | PRODUCT CATEGORY MATERIALS

The materials for glass mat gypsum panels as produced can be found in accordance with ASTM C1658/C1658M *Standard Specification for Glass Mat Gypsum Panels*, ASTM C1177/C1177M *Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing*, and ASTM C1178/C1178M *Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel* and ASTM C11 *Standard Terminology Relating to Gypsum and Related Building Materials and Systems*.

### 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, 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 the quantitative normalization for comparing products of equivalent function (functional unit) or equivalent specification. 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.

For glass mat gypsum panels, the declared unit shall be 92.9m<sup>2</sup> (1000 ft<sup>2</sup>) with a stated thickness.

The functional unit shall be 92.9m<sup>2</sup> (1000 ft<sup>2</sup>) with a stated thickness. The conversion to one (1) kg must also be declared. Explanation of the selected functional unit shall be stated clearly, including the RSL, installation methods and all ancillary materials such as joint tape, joint treatment materials, and fasteners.

The RSL shall refer to the declared technical and functional quality of the product in the building. It shall be established in accordance with the ISO 15686-1, -2, -7, and -8 standards.

### 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.

**Cradle-to-grave** | A complete cradle-to-grave LCA shall be developed for the product, including all life-cycle stages and modules, for a specified defined function and service life, inclusive of maintenance and replacement and end-of-life effects.

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, using the latest eGrid data available. 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 cradle-to-grave EPDs based on these PCR, modules A1 to C4 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 materials) from extraction site or source to manufacturing site (including any recovered materials from source to be recycled in the process) 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. Energy inputs shall be allocated on a mass basis. 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;
  - recycling/reuse/energy recovery of pre-consumer wastes and by-products from production; and
  - treatments of flue gas desulfurization (FGD) gypsum to make it usable as a product input, as well as credit for landfill avoidance.

Module A1, A2, and A3 may be declared as one aggregated module A1-A3.

Modules A4-A5, the Construction Stage:

- average or specific transportation of product from manufacturing site to building site, including empty backhauls;

- installation on the building site including all ancillary materials (e.g., where relevant, joint tape, joint treatment materials, and fasteners); and
- the default on-site installation waste scenario for glass mat gypsum panels shall be 10% on a surface area basis (i.e., 100 sf/1,000 sf or (9.3m<sup>2</sup>/92.9m<sup>2</sup>) 0.10 m<sup>2</sup>/m<sup>2</sup>) of glass mat gypsum panel product<sup>1</sup>. Any exceptions shall be justified in the project LCA report and noted in the EPD.

Module A4 and A5 may be declared as one aggregated module A4-A5.

**Modules B1-B7, the Use Stage** | Module B1-B7 are treated as a typical scenario, which shall be described in detail:

- reference service life (RSL) of the building shall be assumed to be 60 years and the maintenance regime and number of replacements, if relevant, of the building product shall be declared accordingly (note that an assumed 60-year RSL for the building is an accepted time period for the purpose of comparative analysis);
- include any maintenance/replacement of the building product required to attain the assumed service life of the building;
- maintenance/replacements are to be modeled according to manufacturers' guidelines regarding the RSL of the product, which must be based on a verifiable product performance history;
- when the product RSL is less than the assumed building service life (60 years), the aggregated product stage, construction process stage and end-of-life stage impacts (modules A1-A5 and C1-C4) associated with the number of changeovers necessary to equal the service life of the building shall be included. When the product service life is greater than the building service life, the initial production impacts shall be fully calculated and shall not be discounted to reflect the remaining product service life; and
- when the RSL of a building product is less than the assumed building service life (60 years), the number of replacements that will be necessary to fulfill the required performance and functionality over the building service life shall be identified. The combined impacts of the original product and any replacements shall be determined by dividing the building service life by the service life of the product, and the impacts multiplied by the result. For example, if the expected service life of a component is 25 years, the impacts would be multiplied by 2.40, thus normalizing the changeovers to be equivalent to the assumed 60-year building service life.

Module B1, B2, B3, B4, B5, B6, and B7 may be declared as one aggregated module B1-B7.

**Modules C1-C4, the End-of-Life Stage** | Modules C1-C4 are treated as a typical scenario, which shall be described in detail:

- dismantling/demolition;
- average or specific transport from building site to recycling/reuse/landfill, including empty backhauls; and
- disposal.

Module C1, C2, C3 and C4 may be declared as one aggregated module C1-C4.

LCA results for production, installation, use, and end-of-life stages shall be declared separately in the EPD.

<sup>1</sup> Product Category Rules for North American Gypsum Boards; FPIInnovations – Gypsum PCR-2013:v1

All assumptions from LCA shall be described in detail. Any transportation data other than identified above shall be indicated. If transportation information is included in other stages than indicated, or if no transportation information exists and assumptions are made, this shall be noted.

Summary of EPD Types and Related Requirements

Table 1 summarizes the unit and RSL requirements by life-cycle stages and related modules.

**TABLE 1** Unit and Reference Service Life Requirements

| EPD-type                           | Life Cycle Stages and modules                                       | Declared unit (DU) or functional Unit (FU) | Reference Service Life (RSL) of Product | Primary audience  |
|------------------------------------|---|--|---|-------------------|
| Cradle to shipping gate            | Product stage; modules A1 to A3                                     | DU   | Not specified                           | BtoB*             |
| Cradle to building                 | Product and construction stages; modules A1 to A5                   | DU   | Not specified                           | BtoB              |
| Cradle to building- with EOL stage | Product, construction and EOL stages; modules A1 to A5 and C1 to C4 | DU   | Not specified                           | BtoB              |
| Cradle to building- with use stage | Product, construction and use stages; modules A1 to A5 and B1 to B5 | FU   | RSL is required                         | BtoB              |
| Cradle-to-grave                    | Product, construction, use and EOL stages; modules A1 to C4         | FU   | RSL is required                         | BtoB and/or BtoC* |

\* Note: BtoB is defined as Business-to-Business and BtoC is Business-to-Consumer

**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 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. 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 technology 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);
- 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 (e.g., glass mat); 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 and no other primary data is available (for example, U.S. Life Cycle Inventory Database, [www.nrel.gov/lci](http://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 are used in the absence of specific data for chemicals or 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 (glass mat gypsum panel) manufactured at multiple facilities, a mass-weighted average, based on total annual production of each facility, shall be used as the basis for calculating the average. Data reported in the declarations shall be as production mass-weighted averages of multiple facilities. In cases where several similar glass mat gypsum panel products are produced by a facility or company, the PCR offers the possibility for similar products to be grouped as an “average glass mat gypsum panel” in the same EPD provided that the difference between their LCA results is equal to or less than 5% for each environmental parameter derived from LCA. In the case where the results exceed 5%, the products shall be shown separately.

The product content will 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 will be made along with a description of the function of the component.

The LCI data associated with the use of a specified glass mat should be based on primary data, if available, obtained from the manufacturer of the specific glass mat product with any exemptions fully explained in both the LCA report and in the EPD.

In the case of cradle-to-grave EPDs, the amount of material used as input to enable the product to meet the functional unit requirements shall include related accessories and other materials (that is, ancillary materials) unless the reason for the omission of these is explained.

## 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 do not apply to such substances.

## 7.3 | SECONDARY DATA QUALITY REQUIREMENTS

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

- All data shall be accurate and representative of the production process, current technology, and current measurement capability.
- 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 owner of the EPD is not the owner of all upstream processes, the owner shall contact its suppliers within the system boundary. If the suppliers do not supply data, the 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. Preferred 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 <sup>2</sup> ) | Square foot (ft <sup>2</sup> ) | 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 <sup>3</sup> )  | Cubic foot (ft <sup>3</sup> )  | 3.531466E+01   |
| Meter (m)                      | Foot (ft)                      | 3.281          |
| m <sup>2</sup> K/W             | ft <sup>2</sup> 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, Section 4.3.4.

Recycled and recovered materials should 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 need to 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 offer the possibility for similar products to be grouped as an 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 is still possible to include average products in the same EPD (e.g., in separate columns in a table). If a single value is chosen for each impact category for all products, the value reported should be the worst performance within the range of variation. It is also permissible to show arithmetically weighted 'averaged data' in an EPD as supplementary information if found relevant.

## 8.0 Impact Categories and Characterization Factors

Environmental impact category indicators shall be taken from Table 3 for declaring environmental aspects in accordance with ISO 21930, Section 8.2 and ISO 14044.

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

| Category Indicator                                     | Unit                     |
|--|--------------------------|
| Global warming potential (GWP)                         | kg CO <sub>2</sub> equiv |
| Acidification potential                                | kg SO <sub>2</sub> equiv |
| Eutrophication potential                               | kg N equiv               |
| Smog creation potential                                | kg O <sub>3</sub> equiv  |
| Ozone depletion potential                              | kg CFC-11 equiv          |
| <b>Total primary energy consumption</b>                |                          |
| Nonrenewable fossil                                    | MJ (HHV)                 |
| Nonrenewable nuclear                                   | MJ (HHV)                 |
| Renewable (solar, wind, hydroelectric, and geothermal) | MJ (HHV)                 |
| Renewable (biomass)                                    | MJ (HHV)                 |
| <b>Material resources consumption</b>                  |                          |
| Nonrenewable material resources                        | kg                       |
| Renewable material resources                           | kg                       |
| Net fresh water (inputs minus outputs)                 | 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, natural gas, and biomass.
5. Recycled and recovered materials with fuel content and used as fuels shall be considered alternative energy. Examples of such secondary fuels recovered from previous use or as waste are 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.

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). <http://www.epa.gov/nrmrl/std/traci/traci.html>

## 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, Sections 7.2.2 and 7.2.3. Identification of the significant environmental aspects should, as a minimum, take into consideration the following:

- 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, 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 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.

## 10.0 EPD Supporting Data

A project report shall be prepared in accordance with the requirements and guidance of ISO 14044, Section 6, 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 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, and so forth) that provides the basis from which the process data for the LCA is formulated;
- the specification used to create the manufacturer's 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;
- 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.

## 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 programme operator >

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

internal          external

(Where appropriate<sup>2</sup>) Third party verifier:

<name of third party verifier>

All 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, 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; in addition, the range of the product's performance with respect to the stated average;
- 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,

<sup>2</sup> Optional for business to business communication, mandatory for business to consumer communication.

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 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:<sup>3</sup>

ASTM C11 Standard Terminology Relating to Gypsum and Related Building Materials and Systems

ASTM C22/C22M Standard Specification for Gypsum

ASTM C28/C28M Standard Specification for Gypsum Plasters

ASTM C1177/C1177M Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

ASTM C1178/C1178M Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

ASTM C1658/C1658M Standard Specification for Glass Mat Gypsum Panels

### ISO Standards:<sup>4</sup>

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

<sup>3</sup> Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, <http://www.astm.org>.

<sup>4</sup> Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

Framework

ISO 14044:2006 Environmental Management—Life Cycle Assessment—Requirements and Guidelines

ISO 14050:2009 Environmental Management—Vocabulary

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:

BS EN 15804 *Sustainability of construction works—Environmental product declarations—Core rules for the product category of construction products*<sup>5</sup>

<sup>5</sup> European Committee for Standardization (CEN), Avenue Marnix 17, B-1000 Brussels, Belgium, [www.cen.eu](http://www.cen.eu)