PRODUCT CATEGORY RULES FOR PREPARING AN ENVIRONMENTAL PRODUCT DECLARATION FOR SLAG CEMENT

ASTM INTERNATIONAL
Standards Worldwide

PCR	VERSION ADOPTION	VALIDITY PERIOD
	AUG. 2014	**JULY 2019**

Slag Cement (UN CPC 3744)

This PCR document specifies rules, requirements, and guidelines for developing EPDs for slag cement (ground granulated blast-furnace slag) and underlying requirements of related life-cycle assessments (LCAs). These PCR are valid for, and provide requirements, for Business-to-Business (BtoB) EPDs.

REFERENCED PCR:

UN CPC 3744 Cement, 2010:09, Version 2.0, Centre for the Development of Product Sustainability in co-operation with AITEC, 2013-05-16

Slag Cement

Scope of Validity of these PCR

The product group includes slag cement.

Program Operator

ASTM International

Interested Parties

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

The Slag Cement Association and its member companies: Argos USA, Ash Grove Cement, Essroc Italcementi Group, Holcim (US) Inc., Lafarge North America, Lehigh Hanson, and St. Marys Cement.

Additional contributors: Chryso Inc., National Ready Mixed Concrete Association, Portland Cement Association, Martha G. VanGeem, P.E., and Emily B. Lorenz, P.E.

Review Panel

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The PCR peer review report is available upon request at: *cert@astm.org*

PCR VERSION HISTORY

Version Number	Ammendments	Date Issued
1	X	08 / 22 / 14

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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 and other interested parties that use the standards referenced in Section 5.2 for preparing EPDs for slag cement, a separately provided material derived from granulated blast-furnace slag for use in concrete and mortars and other construction applications.

The referenced PCR—UN CPC 3744 Cement, 2010:09, Version 2.0, Centre for the Development of Product Sustainability in co-operation with AITEC, 2013-05-16—are inappropriate for adoption or direct adaptation as PCR for slag cement in the North American context. Slag cement (ground granulated blast-furnace slag) is commonly used at the concrete batch plants in North America as a supplementary cementitious material (SCM). ASTM C989, AASHTO M 302, and CSA A3001 are standard material specifications that provide requirements for slag cement for use in concrete and mortar. The referenced PCR do not adequately address slag cement as a separately provided SCM. In addition, the referenced PCR list, and refer to, European technical data and standards that are not applicable to North America. Slag cement in North America is specified and classified differently. Different environmental impact categories are allowed in the referenced PCR. ASTM PCR specify the use of EPA TRACI methodology as the primary reporting method.

The following related PCR documents were also reviewed during development of these PCR, but are either in a process of development or deal more broadly with concrete.

- UN CPC 375 Concrete Product Category Rules, version 1.0, dated February 2013, developed for the WBCSD Cement Sustainability Initiative—global scope, *http://www.wbcsdcement.org/index.php/key-issues/sustainability-with-concrete/responsible-sourcing*
- Carbon Leadership Forum (CLF), North America Product Category Rules (PCR) for ISO 14025 Type III Environmental Product Declarations (EPDs) and/or GHG Protocol Conformant Product "Carbon Footprint" of Concrete, adopted November 30, 2012, Revised Version 1.1 December 4, 2013
- Portland Cement Association, Product Category Rules for Development of ISO 14025 Type III Environmental Product Declarations for Portland, Blended Hydraulic, Masonry, Mortar, and Plastic (Stucco) Cements

1.1 | GOAL AND SCOPE

This PCR document specifies rules, requirements, and guidelines for developing EPDs for slag cement (ground granulated blast-furnace slag) and underlying requirements of related life-cycle assessments (LCAs). These PCR are valid for, and provide requirements for, Business-to-Business (BtoB) EPDs.

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

- materials acquisition;
- transportation; and
- processing.

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

- International Organization for Standardization (ISO) 21930: 2007 S*ustainability 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, LCA methodology), the document will be revised.

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 21930, and the following apply.

cement, blended hydraulic, n | a hydraulic cement consisting of two or more inorganic constituents (at least one of which is not portland cement or portland cement clinker) which separately or in combination contribute to the strength-gaining properties of the cement, (made with or without other constituents, processing additions and functional additions, by intergrinding or other blending). (ASTM C219)

cement, portland, n | a hydraulic cement produced by pulverizing clinker, consisting essentially of crystalline hydraulic calcium silicates, and usually containing one or more of the following: water, calcium sulfate, up to 5% limestone, and processing additions. (ASTM C219)

cement, slag, n | granulated blast-furnace slag that has been ground to cement fineness, with or without additions, and that is a hydraulic cement. (ASTM C125)

ground granulated blast-furnace slag, n | product obtained by grinding granulated blast-furnace slag, to which the various forms of calcium sulphate, water, and processing additions may be added at the option of the manufacturer. (CSA A3001)

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 this PCR that only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, reference service life, and quantified by the same functional unit, can be used to assist purchasers and users in making informed comparisons between products.

Since EPDs developed under these PCR only cover the cradle-to-gate impacts of slag cement, using a declared unit, the results cannot be used to compare products used in different mixtures and construction products. The results from a slag cement EPD must be integrated into a comprehensive cradle-to-grave, ISO 14044-compliant LCA in order to compare between different products. The basis of a comparison, where applicable, shall include the product application in accordance with ISO 21930 and the requirements for comparative assertions in ISO 14044.

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 system in place.

5.2 | DEFINITION OF PRODUCT CATEGORY

These PCR address UN CPC 3744, slag cement (ground granulated blast-furnace slag), produced in accordance with ASTM C989/C989M, *Standard Specification for Slag Cement for Use in Concrete and Mortars*, AASHTO M 302, *Standard Specification for Slag Cement for Use in Concrete and Mortars*, and/or CSA A3001 *Cementitious Materials for Use in Concrete*.

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. Slag cement shall be described in accordance with ASTM Specification C989/C989M, AASHTO Specification M 302, and/or CSA A3001 Cementitious Materials for Use in Concrete under which it is purchased.

Where relevant, the EPD shall provide the following information:

- Product identification by brand name, by material type, by production code, and by simple visual representation, which may be by photograph or graphic illustration;
- List of the standards and other product specifications adhered to; and
- Materials and substances to be declared.

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 life-cycle assessment (LCA) shall be conducted in accordance with the ISO 14040 and ISO 14044 standards.

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 slag cement, which deals only with the cradle-to-gate phase of the life cycle, the declared unit shall be per metric tonne. Data may additionally be presented per ton (IP units).

6.2 | SYSTEM BOUNDARIES

Table 1 shows the life-cycle stages and individual modules that shall be included within an LCA system boundary, depending on whether the EPD is BtoB or Business-to-Consumer (BtoC).

TABLE 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" (BtoB EPDs) | 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 (mandatory for BtoC EPDs) | 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.

The system boundaries for both cradle-to-gate and cradle-to-grave LCA include the average transportation of major inputs to (and within) each life-cycle stage. The cradle-to-grave LCA also includes shipment of products to building site locations by common modes as well as average transportation to a landfill or other disposition at the end of the service life for each application.

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. 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 slag cement, modules A1 to A3 (highlighted in Table 1) apply. The production stage includes all steps required to transform molten slag recovered from a blast furnace to slag cement. The following are factors to be taken into account for the relevant modules.

Modules A1-A3, the Product Stage:

- Recovering the slag and subjecting it to the granulation process including transport if relevant;
- Drying of the granules;
- Grinding the granules to a suitable fineness to result in slag cement;
- Other processes specific to the manufacturer;
- Average or specific transportation of recovered materials from recovery site or source to manufacturing site and including empty backhauls;
- Transportation between production sites is required to be included if different production steps take place at different sites;
- If multiple suppliers are used for one material, then a weighted average based on volume or mass shall be used to assign transport distance and mode;
- Packaging, if used, with product ready for shipment;
- 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/recovery/reuse/energy recovery of pre-consumer wastes and by-products from production.

Transportation does not need to be included for production steps if they occur at the site of blast furnace production. If no transportation information exists and assumptions are made, this should be noted.

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 point of 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.

As noted in Section 7.5, Allocation Rules, blast furnace slag is considered a waste product (and therefore a recovered material) and not a co-product. This is consistent with the CLF PCR for concrete v1.1 and allowed under the referenced PCR UN CPC 3744 (see Section 7.5).

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 should be annual values, preferably from the previous twelve-month period or calendar year. 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 use of specific or generic background data shall be documented. As a rule, the following distribution will be applied:

- Extraction and/or production of raw materials (specific or average background);
- Manufacturing of the product (specific);
- Data sources and any calculation procedures for the fuel mix for electricity generation shall be documented;
- Any hazardous waste generated shall be reported according to applicable regulations such as U.S. federal hazardous waste regulations or the Canadian federal hazardous waste regulations, or both as appropriate (or appropriate regulations if used outside North America);
- If EPDs for upstream products are not available, data from the best available published literature shall be permitted to be used; and
- If multiple suppliers are used for one material, then a weighted average, based on volume or mass, shall be used to assign transport distance and mode.

For generic data, national databases shall be used to the extent that they are applicable (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.

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 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 manufactured at multiple facilities, the LCI data for each site shall be weighted by slag cement production to determine the average. Weighting shall be by annual product production. Data reported in the declarations shall be as weighted averages of multiple facilities.

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.

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. 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 generic data. Any assumptions for such choices shall be documented.

The cutoff criteria for flows to be considered within each system boundary are as follows in case of insufficient input data or data gaps for a unit process:

Mass | If a flow is less than 1% of the cumulative mass of the model flows, 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 to have the potential to cause significant emissions into air, water, or soil related to the environmental indicators of these PCR shall be included even if such flows meet the above criteria for mass and energy.

At least 95% of the energy usage and mass 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.

A list of hazardous and toxic materials and substances shall be included in the inventory and the cutoff rules do not apply to such substances.

7.3 | 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 shown in Table 2 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^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^2K/W	ft^2Fhr/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 shall be considered raw materials. Only the materials, water, energy, emissions, and other elemental flows associated with reprocessing, handling, sorting, and transportation from the point of 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. Blast furnace slag is considered a waste product and not a co-product as per Section 6.2. The referenced PCR UN CPC 3744 notes that in countries where slag is not considered a waste (and therefore a recovered material), economic allocation should be applied. However, the referenced PCR UN CPC 3744 states that in Europe it has been shown that the contribution of slag to the overall revenue of the producing system is in the order of 1% or less and that allocation burdens can therefore be neglected.

Energy used as feedstock to produce materials (for example, plastic) shall be allocated to material resources (kg), while process energy shall be allocated to energy resources (MJ).

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

When a product's original function is no longer needed or possible, a product can be processed further in a waste management system. For example, it can be recycled, reused, or energy recovered. For example, emissions from downstream combustion will be allocated to the new downstream products, that is, heat and electricity, according to the allocation procedure for open loop recycling. 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. The recycling of slag cement is not included in these PCR.

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.

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_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	MJ (HHV)
Renewable	MJ (HHV)
Material resources consumption	
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. 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.
3. 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, biomass, etc.
4. Examples from secondary fuels recovered from previous use or a as waste are solvents, wood, tires, oil, and animal fat. Emissions

from secondary fuels shall be included in the calculation of the relevant environmental impacts.

5. 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

A Type III environmental declaration shall include, where relevant, additional information 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 14025, Section 7.2.2. 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 product performance, if environmentally significant;
- The organization's adherence to any environmental management system, with a statement on where an interested party may find details of the system;
- Any other environmental certification program applied to the product and a statement on where an interested party may 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, and;
- Potential for incidents that can have impact(s) on the environment, such as 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; shall be made available to the verifier in order to demonstrate that the requirements of this PCR and ISO 21930 have been met; and shall include, where relevant:

- The commissioner of 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 generic 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 third-party verification is optional for BtoB EPDs, but mandatory for 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[1]) 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;
- 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;
- Additional environmental information;
- 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 and/or a number of production sites;
- Information on where explanatory material may be obtained;
- Description of the life-cycle stages included in the LCA subdivided into production, construction, use, and end-of-life stages, and system boundaries;
- 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;

1 Optional for business to business communication, mandatory for business to consumer communication.

- 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); and
- Name, address, phone number, fax number, and e-mail of the third-party verifier and logo of the verification body, if applicable.

12.0 References

AASHTO Standards:[2]

AASHTO M 302: *Standard Specification for Slag Cement for Use in Concrete and Mortars*

ASTM Standards:[3]

ASTM C125 *Standard Terminology Relating to Concrete and Concrete Aggregates*

ASTM C219 *Standard Terminology Relating to Hydraulic Cement*

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