



Product Category Rule for Environmental Product Declarations

PCR for Slag Cement v2.0 (UN CPC 3744 – Slag Cement)



Program Operator

NSF International

National Center for Sustainability Standards

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PRODUCT CATEGORY RULES REVIEW PANEL

Program Operator

NSF International

Recommended for adoption by

The PCR Committee for Slag Cement

No participation fees were charged by NSF to interested parties. NSF International ensured that reasonable balance among the members of the PCR committee were achieved and potential conflicts of interest were resolved prior to commencing this PCR development.

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NSF International shall ensure that reasonable balance among the members of a PCR committee is achieved and potential conflicts of interest are identified. No participation fees will be charged by NSF International to interested parties for participation on PCR Development Committees, for attendance at PCR Development Committee meetings, or for commenting on a draft PCR document.

PCR REVISION HISTORY

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ABOUT NSF'S NATIONAL CENTER FOR SUSTAINABILITY STANDARDS (NCSS)

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The National Center for Sustainability Standards will continue to add to its growing portfolio while providing education, outreach, and innovative support to private industry, trade associations, government and academia to foster a consensus-based approach toward conformity assessment in the sustainability field. Visit <www.nsfustainability.org> or contact ncss@nsf.org.

To initiate your LCA, receive your EPD verification, or have questions on where to start, contact NSF Sustainability at sustainability@nsf.org or 734-476-2543.

ABOUT THE SLAG CEMENT ASSOCIATION

The Slag Cement Association (SCA) is a nonprofit trade association representing producers and shippers of slag cement in the United States. The SCA with assistance from its various volunteer based committees operate several annual activities and programs in support of slag cement use in concrete mix design.

PCR DEVELOPMENT AND STAKEHOLDER CONSULTATION

This sub-product category rule for “slag cement” is Version 2.0 of the Product Category Rules (PCR) for ISO 14025:2006 Type III Environmental Product Declarations (EPDs) of slag cement updating Version 1.0 dated August 2014, published by ASTM. The following changes have been included in this document:

- compliance with ISO 21930:2017.

A stakeholder committee provided review and input to the revisions. After consideration of existing North American PCRs for slag cement (hosted at ASTM), the USGBC PCR Guidance Document, and ISO 21930:2017 (see references) the technical committee decided to use ISO 21930:2017 as the ‘core PCR’ and adapt the ASTM slag cement PCR to be a ‘sub-category PCR.’

ISO 21930:2017 provides the “core rules” for construction products and services and must be read in tandem with this document.

The development of this PCR was supported by the Slag Cement Association (www.slagcement.org) and its members.

 1 SCOPE

Per ISO 21930:2017 Section 1, with the following additions:

This sub-product category rule (PCR) addresses UN CPC 3744 – *Slag Cement* and enables the development of EPDs associated with the production of slag cement (ground granulated blast-furnace slag) from cradle-to-gate for life cycle stage Modules A1-A3. This PCR was developed specifically for use where applicants produce slag cement in accordance with standards listed in Table 1.

Table 1

Standard / Specification
ASTM C989/C989M, <i>Standard Specification for Slag Cement for Use in Concrete and Mortars</i>
AASHTO M 302, <i>Standard Specification for Slag Cement for Use in Concrete and Mortars</i>
CSA A3001, <i>Cementitious Materials for Use in Concrete</i>

Since slag cement is an intermediate product that is used in downstream products, such as concrete, other PCRs will govern downstream life cycle stages.

 2 NORMATIVE REFERENCES

The following documents are referred to in the text. For undated reference, the latest edition of the referenced document (including any amendments) applies:

ISO 21930:2017, *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.*

ISO 14025:2006, *Environmental Labels and Declarations – Type III Environmental Declarations Principles and Procedures*

ASTM C219, *Standard Terminology Relating to Hydraulic Cement*

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

3 TERMS AND DEFINITIONS

While this PCR will likely be used primarily in North America, it may be used in other regions where program operators deem it appropriate. Per ISO 21930:2017 Section 3, with the following definitions:


cement, blended hydraulic: 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: 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: 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: Product obtained by grinding granulated iron 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)

hazardous waste: Waste identified as hazardous according to regulations applicable in the market for which the EPD is valid. For the US market, wastes are hazardous if they are regulated under the Resource Conservation and Recovery Act <www.epa.gov/rcra>, see also 40 CFR 261.33 <www.govinfo.gov/content/pkg/CFR-2011-title40-vol26/pdf/CFR-2011-title40-vol26-sec261-33.pdf>. For the Canadian market wastes



are hazardous if they are regulated under the Canadian Environmental Protection Act, 1999 Regulations (<www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/permit-hazardous-wastes-recyclables/management.html>).

NOTE — Hazardous waste does not include radioactive waste; see ISO 21930:2017 Section 7.2.14.

industry-wide (average) EPD: EPD results for a specific product or group of slag cements categorized by performance for a specified region and or group of manufacturers.

metric tonne: 1,000 kilograms.

net consumables: Items used during manufacturing, such as lubricants, greases and oils.

non-hazardous waste: Commercial / industrial waste that is not hazardous: dust, spoil, or other waste from raw material extraction; waste in municipal disposal scheme, and leftover or waste slag.

product specific EPD: EPD results for a specific product or group of slag cements, categorized by performance and developed by a manufacturer for a specific manufacturing facility location(s).

recovered material: 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)

short ton: 2,000 pounds.

Type III EPD: Product with third party certification, including external verification in which manufacturer is explicitly recognized at the participant by the program operator.



4 ABBREVIATED TERMS

Per ISO 21930:2017 Section 4, with the following additions:

CAGBC: Canadian Green Building Council

LEED: Leadership in Energy and Environmental Design

USGBC: US Green Building Council



5 GENERAL ASPECTS


5.1 Objectives of this PCR

Per ISO 21930:2017 Section 5.1, with the following additions:

- the primary objective of this sub-category PCR is to provide common rules specific to slag cement for the application of ISO 21930:2017 for building and civil engineering works.

Additional objectives include to:

- describe which stages of a product's life cycle are considered in the EPD and which processes are to be included in the life cycle stages;
- encourage slag cement producers to quantify, report, better understand and reduce the environmental impacts of slag cement;
- promote transparency and incentivize manufacturer specific upstream data;
- represent slag cement appropriately following international standards for building materials and products;

- 
- specify the data quality to be attained in slag cement EPDs;
 - support the use and guidance of EPDs in sustainable design construction programs and rating systems;
 - address requirements for creating an industry-wide EPD to enable a pathway towards comparative assessment against company specific EPDs (for example, per LEED v4.x MR Credit: Building product disclosure and optimization – Environmental declarations); and
 - enable consistent and comparable reporting of LCA results related to slag cement production.

5.2 Life cycle stages


Per ISO 21930:2017 Section 5.2, with the following clarifications:

- this PCR enables reporting of a **cradle-to-gate** EPD as outlined in ISO 21930 Section 5.2.2.

5.3 Average EPDs for groups of similar products

Per ISO 21930:2017 Section 5.3, with the following clarifications and additions:

- groups of similar products are limited to those that comply with the relevant standards listed in Table 1;
- as a minimum, an industry-average EPD shall be comprised of at least three companies operating three different manufacturing locations each of which shall provide primary manufacturing data to calculate the industry average EPD. The commissioner of the industry-average EPD shall be responsible for ensuring that the population used to calculate the EPD is representative of the industry. The industry-average EPD shall report the percentage of market participation;

- 
- manufacturers who participated in the industry average may benchmark new product individual Type III EPDs against an industry average EPD, if at a minimum, the product meets the ASTM specification as represented in the industry average EPD. For manufacturers who did not participate in the industry average, product specific EPDs may be developed, but shall not be compared to the industry average Type III EPD;
 - for full transparency, product specific EPDs are encouraged.

5.4 Use of EPDs for construction products

Per ISO 21930:2017 Section 5.4, with the following clarifications and additions:

- this PCR is intended to be used to create cradle-to-gate EPDs for use in business-to-business (B2B) communication.

5.5 Comparability of EPDs for construction products

Per ISO 21930:2017 Section 5.5, with the following clarifications:

- EPDs based on cradle-to-gate and cradle-to-gate with options information modules shall not be compared. Further, EPDs based on a declared unit shall not be used for comparisons.

5.6 Documentation

Per ISO 21930:2017 Section 5.6.



6 PCR DEVELOPMENT AND USE

Per ISO 21930:2017 Section 6, with the following additions:

- this PCR document is effective for five (5) years from the latest date of publication. If after five years, the Program Operator deems relevant changes in the product category or other relevant factors have occurred (for example, evolution of LCA methodology in ISO 21930:2017), the document will be revised. See Section 5.5 regarding comparability.

7 PCR FOR LCA

7.1 Methodological framework

7.1.1 LCA modeling and calculation

Per ISO 21930:2017 Sections 7.1.1, and 7.2.3 through 7.2.6.

7.1.2 Functional unit

Per ISO 21930:2017 Section 7.1.2, with the following clarifications and additions:

- no functional unit is defined in this PCR. However, performance characteristics of slag cement shall be reported including:
 - UNSPC Product code; and
 - ASTM, AASHTO, or CSA specification, as per ASTM C989/C989M, AASHTO M 302 or CSA A3001.

Alternatively, the EPD may provide the minimum specification product descriptions, or a range of additional characteristics for EPDs that represent various slag cement performance groups or material groups.

7.1.3 Declared unit

Per ISO 21930:2017 Section 7.1.3, with the following clarifications:

- since this PCR only covers Module A (manufacturing), a declared unit shall be used. The declared unit shall be one metric tonne (1,000 kg) of slag cement. Data may additionally be presented per short ton (2,000 pounds).

7.1.4 Reference service life

Per ISO 21930:2017 Section 7.1.3, with the following clarifications:

- as this PCR does not address module B (Use), the reference service life (RSL) of slag cement is not addressed.

7.1.5 System boundary with nature

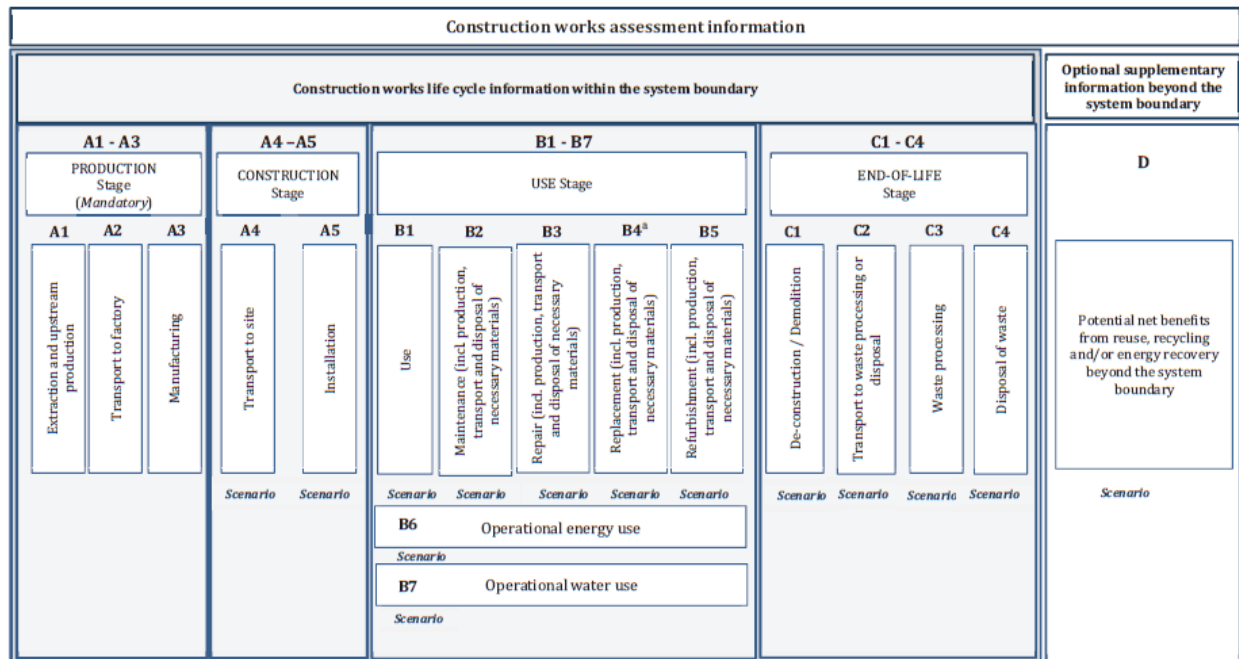
Per ISO 21930:2017 Section 7.1.5.

7.1.6 System boundary between products systems

Per ISO 21930:2017 Section 7.1.6.

7.1.7 System boundaries and technical information for scenarios

Figure 1 shows the life-cycle stages. This sub-category PCR is limited to the production of slag cement from cradle-to-gate. **Information modules A1-A3 are mandatory for compliance with this sub-category PCR.**



^a Replacement information module (B4) not applicable at the product level.

Figure 1

Common four life cycle stages and their information modules [Source: 21930:2017]

Items that may be excluded from the system boundary 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.

7.1.7.1 General

Per ISO 21930:2017 Section 7.1.7.1.

7.1.7.2 A1 to A3, production stage

Per ISO 21930:2017 Section 7.1.7.2.

This shall include:

- recovering the iron blast furnace slag and subjecting it to the granulation process including transport if relevant;
- drying of the granulated blast furnace slag granules;
- grinding the slag granules to a suitable fineness to result in slag cement;
- extraction and processing of raw materials, including fuels used in extraction and transport within the process;
- average or specific transportation of raw materials from extraction site or source to manufacturing site (including any recovered materials from source to be recycled in the process), including empty backhauls and transportation to interim distribution centers or terminals;
- manufacturing including all energy and materials required, and all emissions and wastes produced;
- packaging, including transportation and waste disposal, to make 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;



- recycling / recovery / reuse / energy recovery of pre-consumer wastes and by-products from production;
- transportation activities at the manufacturing site; and
- end of life treatment of manufacturing waste.

7.1.7.3 A4 to A5, construction stage

Per ISO 21930:2017 Section 7.1.7.3, with the following additions:

- as this PCR does not address modules A4 to A5, this section of ISO 21930:2017 does not apply.

7.1.7.4 Use stage

Per ISO 21930:2017 Section 7.1.7.4, with the following additions:

- this section of ISO 21930:2017 does not apply.

7.1.7.5 End-of-life stage

Per ISO 21930:2017 Section 7.1.7.5, with the following additions:

- this section of ISO 21930:2017 does not apply.

7.1.7.6 Benefits and loads beyond the system boundary

Per ISO 21930:2017 Section 7.1.7.6:

- this section of ISO 21930:2017 does not apply.

7.1.8 Criteria for the inclusion and exclusion of inputs and outputs

- per ISO 21930:2017 Section 7.1.8.

7.1.9 Selection of data and data quality requirements

Per ISO 21930:2017 Section 7.1.9, with the following additions:

- electrical energy data shall use NERC, or sub regions or similar data to represent electrical energy production for the US and Canada. Preference shall be given to datasets that include transmission and distribution losses as well power trade between regions. For regions other than the United States and Canada, country or region-specific processes shall be used for the manufacturing stage provided they are representative. The sources for electricity and the calculation procedure shall be documented; and
- credit may not be applied to LCA baseline when “green” power certificates are used, but certificates may be reported in the Additional Environmental Information section. Green power certificates must be available and provided to the program operator for the entire period of EPD validity.

7.1.10 Units

Per ISO 21930:2017 Section 7.1.10, with the following additions:

- as noted in ISO 21930:2017, SI units shall be used. Optionally, EPDs may provide both US imperial and metric units using the following conversion factors.

Table 2
Conversion factors

Convert from:	Convert to:	Multiply by:
cubic yard (yd ³)	cubic meter (m ³)	7.654 549 E-01
square foot (ft ²)	square meter (m ²)	9.290 304 E-02
foot (ft)	meter (m)	3.048 E-01
British thermal unit (BTU)	megajoule (MJ)	1.055 056 E-03
pound (lb)	kilogram (kg)	4.535 924 E-01
short ton	metric tonne	9.071 848 E-01
Source: NIST: http://physics.nist.gov/Pubs/SP811/appenB9.html		

7.2 Inventory analysis

Per ISO 21930:2017 Section 7.2, with additional guidance as follows:

- iron blast-furnace slag shall be considered a recovered material and not a co-product as is consistent with version 1 of the ASTM Slag Cement PCR and the version 2 of the NSF PCR for Concrete. Granulation is the first step in the process of making the recovered material as an input in slag cement manufacture;
- 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 slag cement plant need to be considered for recycled or recovered materials;

— recycled and recovered materials with fuel content and used as fuels, such as scrap tires, spent solvents and waste oils, shall be considered alternative or secondary energy sources. 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. All emissions from combustion at the point of use shall be taken into account;

— 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 the EPD; and

— the impacts of water desalination, if applicable, shall be included.

7.3 Impact assessment indicators describing main environmental impacts derived from LCA

Per ISO 21930:2017 Section 7.3.

Of note, ISO 21930:2017 greatly expands the indicators required to be reported. Often the best currently available data such as industry average EPDs for upstream processes do not yet align with ISO 21930:2017.



8 ADDITIONAL ENVIRONMENTAL INFORMATION

Per ISO 21930:2017 Section 8.



9 CONTENT OF AN EPD

9.1 General

Per ISO 21930:2017 Section 9.1.

9.2 Declaration of general information

Per ISO 21930:2017 Section 9.2 with the following clarifications:

- a simple visual representation of granulated blast furnace and the final slag cement product while recommended is not required;
- as the percentage of material components can be considered proprietary information, the list of materials should be reported in order of greatest mass and or aggregated by type to protect confidential information.
- include the following table in lieu of ISO 21930:2017, Figure 3:

<p>ISO 21930:2017 Sustainability in Building Construction – Environmental Declaration of Building Products: serves as the core PCR</p> <p>NSF PCR for SLAG CEMENT V2.0 serves as the sub-category PCR</p> <p>Sub-category PCR review was conducted by:</p> <p><Insert name and organization of the panel chair and their contact information></p> <p>Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025: <insert year of publication></p> <p><input type="checkbox"/> internal <input type="checkbox"/> external</p> <p>Third-party verifier:</p> <p><name and contact information of third-party verifier></p> <p>For additional explanatory material:</p> <p><name and email of manufacturer's representative></p> <p><name and version of EPD software tool (if applicable)></p>
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Figure 2
Attestation table

9.3 Declaration of the methodological framework

Per ISO 21930:2017 Section 9.3, with the following additions and clarifications:

- for cradle-to-gate EPDs, scenarios are not required to be reported.

The EPD shall include the following:

- the note:

“This sub-category PCR recognizes iron blast-furnace slag as a recovered material and thus the environmental impacts allocated to this material are limited to the treatment and transportation required to use as a slag cement material input”.

- a table summarizing the life cycle stages included in the EPD:

Product stage			Construction process stage		Use stage							End-of-life stage			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4

Figure 3

Life cycle stage modules to be included in the EPD (Source: 21930:2017)

- a table outlining the primary sources of data used to complete the upstream material LCI background data including the date or version number; and

- for industry average EPDs, include the date and source of industry data survey including a list of all companies who participated in the EPD data. The type of “average” shall also be defined (e.g., a production weighted average across various facilities).

9.4 Declaration of technical information and scenarios

ISO 21930:2017 Section 9.4 does not apply for cradle-to-gate EPDs.

9.5 Declaration of environmental indicators derived from LCA

Per ISO 21930:2017 Section 9.5, with the following additions:

- the following clarifications shall be applied, and notes added:
 - many of the impacts and inventory items included in ISO 21930:2017 are emerging and have high levels of uncertainty. This shall be recognized within the EPD with the following note:

“Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.” (Can be listed as shown below or identified by note.)

- renewable primary energy resources as energy (fuel), (RPR_E);
- renewable primary resources as material, (RPR_M);
- non-renewable primary resources as energy (fuel) ,(NRPR_E);
- non-renewable primary resources as material (NRPR_M);
- secondary materials (SM);
- renewable secondary fuels (RSF);
- non-renewable secondary fuels (NRSF);
- recovered energy (RE);
- abiotic depletion potential for non-fossil mineral resources (ADPelements);
- land use related impacts, for example on biodiversity and/or soil fertility;
- toxicological aspects;



- emissions from land use change [GWP 100 (land-use change)];
 - hazardous waste¹ disposed;
 - non-hazardous waste disposed;
 - high-level radioactive waste;
 - intermediate and low-level radioactive waste;
 - components for reuse;
 - materials for recycling;
 - materials for energy recovery; and
 - recovered energy exported from the product system.
- when upstream data specified in the PCR and/or used in calculating the EPD do not have data for select impact categories or inventory items, they shall be reported as an 'x' or '-' and not zero and qualified with the note:

“Not all LCA datasets for upstream materials include these impact categories and thus results may be incomplete. Use caution when interpreting data in these categories.”

- for more information on guidance and methods for calculating these more uncertain impact indicators and inventory metrics please refer to ACLCA's Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017 (see <https://aclca.org/wp-content/uploads/ISO-21930-Final.pdf>).

9.6 Declaration of additional environmental information

Per ISO 21930:2017 Section 9.6, with the following additions:

- the following references shall be provided at a minimum in the EPD:
 - ISO 21930:2017, *Sustainability in Building Construction — Environmental Declaration of Building Products*.

¹ As defined by RCRA under 40 CFR 261.33. <www.govinfo.gov/content/pkg/CFR-2011-title40-vol26/pdf/CFR-2011-title40-vol26-sec261-33.pdf>



10 PROJECT REPORT

Per ISO 21930:2017 Section 10.

11 VERIFICATION AND VALIDITY OF AN EPD

Per ISO 21930:2017 Section 11, with the following additions:

- EPD calculations completed by software systems are permitted provided the software has been verified per similar procedures as verifying an EPD. The process used to verify the software calculations should be publicly accessible and referenced from the EPD; and
- when a product specific EPD is aligned with an industry-wide (average) EPD the following additional items are required:
 - in order to evaluate the consistency of results between product specific EPDs and industry-wide EPDs the same LCA modeling software and version and background data shall be used to create the EPD.

12 REFERENCES

AASHTO Standards²

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

² Available from American Association of State and Highway Transportation Officials. 555 12th Street NW, Suite 1000, Washington, DC 20004. <www.transportation.org>



ASTM Standards³

ASTM C989/C989M, *Standard Specification for Slag Cement for Use in Concrete and Mortars*

CSA Standards⁴

CSA A3001, *Cementitious Materials for Use in Concrete*

ISO Standards⁵

ISO 6707-1:2014, *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*

ISO 14067:2018, *Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification*

ISO 21930:2017, *Sustainability in Building Construction – Environmental Declaration of Building Products*

³ ASTM International. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. <www.astm.org>

⁴ CSA Group. 178 Rexdale Boulevard, Toronto, ON M9W 1R3, Canada. <www.csa.ca>

⁵ International Organization for Standardization. Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland. <www.iso.org>

EN Standards⁶

EN 15804, *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*, January 2012

Other references

UN CPC 3744, *Slag Cement*, 2010:09 Version 2.0, Centre for the Development of Product Sustainability⁷

USGBC LEED v4 for Building Design and Construction. <www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version>⁸

USGBC PCR Committee Process & Resources: Part B, USGBC, 7 July 2017. <www.usgbc.org/resources/pcr-committee-process-resources-part-b>⁸

NSF International, *PCR for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements – 2020e*

NSF International, *PCR for Concrete – 2019*

NERC <www.nerc.com/AboutNERC/keyplayers/Pages/default.aspx>⁹

⁶ European Committee for Standardization. Rue de la Science 23, B-1040 Brussels, Belgium. <www.cen.eu.com>

⁷ United Nations. United Nations Headquarters, New York, NY 10017. <www.un.org>

⁸ US Green Building Council. 2101 L Street NW, Washington, DC 20037. <www.usgbc.org>

⁹ North American Electric Reliability Corporation. 3353 Peachtree Road NE, Suite 600 North Tower, Atlanta, GA 30326 <www.nerc.com>

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THE HOPE OF MANKIND rests in the ability of man to define and seek out the environment which will permit him to live with fellow creatures of the earth, in health, in peace, and in mutual respect.