



NSF Product Category Rule  
for Environmental Product Declarations

NSF 1129-26

---

**Concrete Admixtures**  
Version 1.0

Program Operator: NSF  
National Center for Sustainability Standards  
Valid through February 28, 2031  
[ncss@nsf.org](mailto:ncss@nsf.org)

**Since 1944, NSF International (NSF) has stood at the forefront of global efforts to improve human and planet health.**

As an independent, internationally recognized organization, we play a pivotal role in the development of robust public health standards. NSF engages in the rigorous testing, auditing, and certification of an array of products and services. The NSF mark serves as an emblem of assurance, signifying to consumers, retailers, and regulatory bodies that our certified products meet or exceed requisite standards.

This PCR is subject to revision.  
Contact NSF to confirm this revision is current.

Users of this PCR may request clarifications and interpretations, or propose revisions by contacting:

NSF National Center for Sustainability Standards  
789 North Dixboro Road, PO Box 130140  
Ann Arbor, Michigan 48113-0140 USA  
Phone: (734) 769-8010 Email: [ncss@nsf.org](mailto:ncss@nsf.org)  
Web: [nsf.org](http://nsf.org)

Valid through February 28, 2031

**NSF 1129-26**  
**Product Category Rule for Environmental Product Declarations**

**Concrete Admixtures**  
**Version 1.0**

Program Operator  
**NSF**

Prepared by NSF staff with assistance from the  
**NSF Product Category Rules Concrete Admixtures Committee**

## **Academia**

John Harvey, University of California Pavement Research Center

## **Industry**

Jeffrey Abbuhl, Euclid Chemical

Lisa Barnard, Chryso

David Hollingsworth, Premiere Concrete Admixtures LLC

Phil Matisak, Master Builders Solution US, LLC

Monica Morano, Sika

Brittany Storm, MAPEI

## **Public Health/Regulatory**

Bailey Vigil, Colorado Dept. of Personnel & Administration

Michelle Cooper, US Department of Transportation (through 1/01/2025)

## **User**

Anna Lasso, Smart EPD

## **LCA Expertise**

James Salazar, WAP Sustainability

## **NSF Staff**

Andrea Burr, Standards Specialist

## **Product Category Rules Independent Review Panel**

Thomas P. Gloria, PhD, Industrial Ecology Consultants

Bill Stough, Bill Stough LLC

Terrie Boguski, Harmony Environmental, LLC

PCR review panel comments may be obtained by contacting NSF's National Center for Sustainability Standards at [ncss@nsf.org](mailto:ncss@nsf.org).

No participation fees were charged by NSF to interested parties. NSF ensured that reasonable representation among the members of the PCR committee was achieved and potential conflicts of interest were resolved prior to commencing this PCR development. Each member has signed a legal document stating that they have no conflicts of interest.

## PCR revision history

| Version | Changes             | Date issued |
|---------|---------------------|-------------|
| 1.0     | Initial publication | March 2026  |

Published by  
NSF, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA

For inquiries regarding this PCR, please reference the designation: "NSF 1129-26."

Copyright 2026 NSF International

This document and any supporting materials are protected by applicable copyright laws. They may be requested at [ncss@nsf.org](mailto:ncss@nsf.org) and printed without special permission. However, the intellectual property rights, technical knowledge, and copyrighted material remain the sole property of NSF.

Printed in the United States of America.

## Unit abbreviations

The following table is provided as a reference for unit abbreviations for common forms of measurement used within NSF documents.

|                       |                    |     |
|-----------------------|--------------------|-----|
| <b>Time</b>           | second             | s   |
|                       | minute             | min |
|                       | hour               | h   |
|                       | day                | d   |
|                       | week               | wk  |
|                       | month              | mo  |
|                       | year               | yr  |
| <b>Length</b>         | inch               | in. |
|                       | foot               | ft  |
|                       | yard               | yd  |
|                       | micrometer         | µm  |
|                       | nanometer          | nm  |
|                       | millimeter         | mm  |
|                       | centimeter         | cm  |
|                       | meter              | m   |
|                       | kilometer          | km  |
| miles                 | mi                 |     |
| <b>Liquid measure</b> | milliliter         | mL  |
|                       | liter              | L   |
|                       | liters per day     | LPD |
|                       | liters per minute  | LPM |
|                       | ounce              | oz  |
|                       | pint               | pt  |
|                       | quart              | qt  |
|                       | gallon             | gal |
|                       | gallons per minute | GPM |
| gallons per day       | GPD                |     |
| <b>Weight</b>         | microgram          | µg  |
|                       | picogram           | pg  |
|                       | nanogram           | ng  |
|                       | milligram          | mg  |
|                       | centigram          | cg  |
|                       | gram               | g   |
|                       | kilogram           | kg  |
|                       | pound              | lb  |
|                       | ton                | t   |
| metric ton            | mt                 |     |

|                      |                      |     |
|----------------------|----------------------|-----|
| <b>Miscellaneous</b> | British Thermal Unit | BTU |
|                      | megajoule            | MJ  |

## Table of contents

|                |  |           |
|----------------|--|-----------|
| <b>1</b>       | <b>Scope</b>   | <b>1</b>  |
| <b>2</b>       | <b>Normative references</b>  | <b>1</b>  |
| <b>3</b>       | <b>Terms and definitions</b>   | <b>2</b>  |
| <b>4</b>       | <b>Abbreviated terms</b>   | <b>4</b>  |
| <b>5</b>       | <b>General aspects</b>   | <b>5</b>  |
| 5.1            | Objectives of this PCR   | 5         |
| 5.2            | Life cycle stages  | 6         |
| 5.3            | Average EPDs for groups of similar products  | 6         |
| 5.4            | Use of EPDs for construction products  | 6         |
| 5.5            | Comparability of EPDs for construction products  | 7         |
| 5.6            | Documentation  | 7         |
| <b>6</b>       | <b>PCR development and use</b>   | <b>7</b>  |
| <b>7</b>       | <b>PCR for LCA</b>   | <b>7</b>  |
| 7.1            | Methodological framework   | 7         |
| 7.2            | Inventory analysis   | 15        |
| 7.3            | Impact assessment indicators describing main environmental impacts derived from LCA          | 17        |
| <b>8</b>       | <b>Additional environmental information</b>  | <b>17</b> |
| 8.1            | General  | 17        |
| 8.2            | Additional LCA-related environmental information not included in the pre-set LCIA indicators | 17        |
| 8.3            | Additional environmental information not derived from or related to LCA                      | 17        |
| 8.4            | Mandatory additional environmental information   | 17        |
| <b>9</b>       | <b>Content of an EPD</b>   | <b>18</b> |
| 9.1            | General  | 18        |
| 9.2            | Declaration of general information   | 18        |
| 9.3            | Declaration of the methodological framework  | 20        |
| 9.4            | Declaration of technical information and scenarios   | 20        |
| 9.5            | Declaration of environmental indicators derived from LCA                                     | 20        |
| 9.6            | Declaration of additional environmental information  | 22        |
| <b>10</b>      | <b>Project report</b>  | <b>22</b> |
| <b>11</b>      | <b>Verification and validity of an EPD</b>   | <b>22</b> |
| <b>12</b>      | <b>References</b>  | <b>23</b> |
| 12.1           | ASTM standards   | 23        |
| 12.2           | ISO standards  | 23        |
| 12.3           | EN standards   | 23        |
| 12.4           | Other references   | 24        |
| <b>Annex A</b> | <b>Default data sources</b>  | <b>25</b> |

## Foreword

This PCR explains how to create environmental product declarations (EPDs) for concrete admixtures. It covers the environmental impacts from raw materials through manufacturing (stages A1–A3). It applies to admixtures that follow certain ASTM and AASHTO standards and the UNSPSC code 30111500 for chemical concrete admixtures. Items like water, cement materials, aggregates, and reinforcement materials are not included in this PCR.

This is the first edition of the PCR.

Suggestions for improvement of this guideline are welcome. Comments should be sent to [ncss@nsf.org](mailto:ncss@nsf.org), or c/o NSF, National Center for Sustainability Standards, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

## About the NSF National Center for Sustainability Standards

Through the NCSS, NSF develops life cycle-based, multi-attribute sustainability standards, protocols, and PCRs for various industries including building products and materials, furniture, carpet and flooring, fabrics, wallcoverings, roofing membranes, green chemicals, electronics, and water and wastewater.

The NCSS will continue to add to its growing portfolio while providing education, outreach, and innovation support to private industry, trade associations, government and academia to foster a consensus-based approach toward conformity assessment in the sustainability field. Visit [nsfsustainability.org](https://nsfsustainability.org) or contact [ncss@nsf.org](mailto:ncss@nsf.org).

## NSF Product Category Rule for Environmental Product Declarations –

# Concrete Admixtures Version 1.0

## 1 Scope

Per ISO 21930:2017<sup>1</sup> Clause 1, with the following additions.

This sub-category PCR addresses the goal and scope of LCAs for CSI MasterFormat 03 05 55, *Concrete Admixtures/Additives*,<sup>2</sup> in order to produce EPDs according to ISO 14025:2006<sup>1</sup> and ISO 21930:2017.<sup>1</sup> This PCR enables the development of EPDs associated with the production of concrete admixtures from cradle-to-gate for life cycle stages A1-A3. This PCR was developed specifically for use where applicants use the following standards for chemical concrete admixtures: ASTM C260/260M,<sup>3</sup> ASTM C494/C494M<sup>3</sup> (AASHTO M194<sup>4</sup>), ASTM C979/C979M,<sup>3</sup> ASTM C1582/C1582M,<sup>3</sup> ASTM G109,<sup>3</sup> ASTM G180,<sup>3</sup> standards for chemical admixtures for concrete, UNSPSC code 30111500.<sup>5</sup> Excluded from the scope of this sub-category PCR are water, cement SCM, aggregates, and fiber or steel reinforcement.

While this PCR will be used primarily in North America, it may be used in other regions where program operators deem it appropriate.

This PCR is valid through February 28, 2031.

## 2 Normative references

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

Per ISO 21930:2017<sup>1</sup> Clause 2, with the following additions.

AASHTO M194, *Standard Specification for Chemical Admixtures for Concrete*<sup>4</sup>

ACI 212, *Chemical Admixtures for Concrete*<sup>6</sup>

ACI CT-23, *Concrete Terminology*<sup>6</sup>

---

<sup>1</sup> International Organization for Standardization. Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland. <[iso.org](http://iso.org)>

<sup>2</sup> Construction Specifications Institute. 5034A Thoroughbred Lane, Brentwood, TN 37027. <[csiresources.org](http://csiresources.org)>

<sup>3</sup> ASTM International. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428. <[astm.org](http://astm.org)>

<sup>4</sup> American Association of State Highway and Transportation Officials. 555 12<sup>th</sup> Street NW, Suite 1000, Washington, DC 20004. <[transportation.org](http://transportation.org)>

<sup>5</sup> United Nations Standard Products and Services Code®. United Nations Development Programme (UNDP). One United Nations Plaza, New York, NY 10017. <[undp.org/unspsc](http://undp.org/unspsc)>

<sup>6</sup> American Concrete Institute. 38800 Country Club Drive, Farmington Hills, MI 48331. <[concrete.org](http://concrete.org)>

ASTM C260/C260M, *Standard Specification for Air-Entraining Admixtures for Concrete*<sup>3</sup>

ASTM C494/C494M *Specification for Chemical Admixtures for Concrete*<sup>3</sup>

ASTM C979/C979M, *Standard Specification for Pigments for Integrally Colored Concrete*<sup>3</sup>

ASTM C1582/C1582M, *Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete*<sup>3</sup>

ASTM G109, *Standard Test Methods for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments*<sup>3</sup>

ASTM G180, *Standard Test Method for Corrosion Inhibiting Admixtures for Steel in Concrete by Polarization Resistance in Cementitious Slurries*<sup>3</sup>

Greenhouse Gas Protocol, *Product Life Cycle Accounting and Reporting Standard*<sup>7</sup>

ISO 14025:2006 *Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures*<sup>1</sup>

ISO 14040:2006/AMD 1:2020 *Environmental Management – Life Cycle Assessment – Principles and Framework*<sup>1</sup>

ISO 14044:2006/AMD 1:2007/AMD 2:2020 *Environmental Management – Life Cycle Assessment – Requirements and Guidelines*<sup>1</sup>

ISO 21930:2017, *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*<sup>1</sup>

UNSPSC Code 30111500<sup>5</sup>

US EPA/600/R-16/096, *Guidance on Data Quality Assessment for Life Cycle Inventory Data, June 2016*<sup>8</sup>

US EPA Data Quality Assessment Method to Support the Label Program for Low Embodied Carbon Construction Materials (Version 1), August 2024<sup>8</sup>

US EPA, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI 2.2)<sup>9</sup>

USLCI Database Project Development Guidelines<sup>10</sup>

### 3 Terms and definitions

Per ISO 21930:2017<sup>1</sup> Clause 3, with the following additions.

**chemical admixture:** Liquid, or dispersible powder, used as an ingredient in a cementitious mixture to improve its economy and/or properties in the plastic and/or hardened state. (ACI CT-23<sup>6</sup>)

---

<sup>7</sup> World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). <[ghgprotocol.org](https://www.ghgprotocol.org)>

<sup>8</sup> US Environmental Protection Agency. 1200 Pennsylvania Avenue NW, Washington, DC 20004. <[epa.gov](https://www.epa.gov)>

<sup>9</sup> Tool for Reduction and Assessment of Chemicals and Other Environmental Impacts (TRACI), US Environmental Protection Agency. 1200 Pennsylvania Avenue NW, Washington, DC 20004. <[epa.gov](https://www.epa.gov)>

<sup>10</sup> Life Cycle Indicators Database. US Department of Energy and Renewable Energy, <https://www.nrel.gov>

**concrete admixture:** A concrete admixture is a substance added to concrete mixtures, other than water, aggregates, cement, and fiber/steel reinforcement, to modify its fresh, setting, or hardened.

**consumptive water use:** Water removed from available supplies without return to a water resource system (e.g. water used in extraction, manufacturing, or batching that is not returned to a stream, river, or water treatment plant).

**co-product:** any two or more products coming from the same unit process or product system (ISO 14044, 3.10<sup>1</sup>).

**cutoff criteria:** Specification of the amount of material or energy flow or the level of environmental significance associated with unit processes of a product system to be excluded from a LCA study (adapted from ISO 14044<sup>1</sup>).

**data:**

**background data/secondary data:** *noun* – Indirectly measured, calculated, or obtained quantified value of a unit process or activity and related information within a product system (ISO 14040:2006,<sup>1</sup> Clause 3.28) or organization, not based on specific original source measurements. (ISO 21930:2017<sup>1</sup>)

**foreground data/primary data:** *noun* – Quantified value of a unit process or an activity obtained from a direct measurement, or a calculation based on indirect measurements at its original source. (ISO 21930:2017<sup>1</sup>)

**EPD:**

**product-specific EPD:** An EPD that covers a single product. Given that the distinguishing benefit of a product-specific EPD is its accuracy of environmental impact results (by avoiding product-to-product variability), an EPD *may also* be considered product-specific if it covers a group of similar products that share equivalent material and performance characteristics such that their environmental impacts per declared unit are sufficiently equivalent. (ACLCA<sup>11</sup>)

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

**secondary material (SM):** Material [recovered](#) from previous use or recovered from waste derived from another product system and used as an input in another product system. (ISO 21930, Clause 3.6.4<sup>1</sup>)

**supplementary cementitious material (SCM):** An inorganic material that contributes to the properties of a cementitious mixture through hydraulic or pozzolanic activity, or both. (ASTM C125<sup>3</sup>)

**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, instead of a new primary material, for a recycling or a manufacturing process. (ISO 14021<sup>1</sup>)

**waste:**

**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 RCRA;<sup>12</sup>

<sup>11</sup> American Center for Life Cycle Assessment. 6900 Wisconsin Avenue, Unit 30953, Bethesda, MD 20824. <[aclca.org](http://aclca.org)>

<sup>12</sup> Resource and Recovery Act, US Environmental Protection Agency. <[epa.gov/rcra](http://epa.gov/rcra)>

see also 40 CFR 261.33.<sup>13</sup> For the Canadian market wastes are hazardous if they are regulated under the CEPA 1999 Regulations.<sup>14</sup>

*Note.* Hazardous waste does not include radioactive waste; see ISO 21930:2017 Clause 7.2.14.

**non-hazardous waste:** Commercial/industrial waste that is not known to be hazardous: dust, spoil and other waste from raw materials extraction; waste treated in municipal disposal scheme; and leftover or waste concrete and neutral pH yard scrapings.

## 4 Abbreviated terms

Per ISO 21930:2017<sup>1</sup> Clause 4, with the following additions.

|               |  |
|---------------|--|
| <b>AASHTO</b> | American Association of State Highway and Transportation Officials |
| <b>ACI</b>    | American Concrete Institute  |
| <b>ACLCA</b>  | American Center for Life Cycle Assessment                          |
| <b>ADP</b>    | abiotic depletion potential  |
| <b>AP</b>     | acidification potential  |
| <b>ASTM</b>   | American Society for Testing and Materials                         |
| <b>B2B</b>    | business-to-business   |
| <b>B2C</b>    | business-to-consumer   |
| <b>CEN</b>    | European Committee for Standardization                             |
| <b>CEPA</b>   | Canadian Environmental Protection Act                              |
| <b>CLF</b>    | Carbon Leadership Forum  |
| <b>CSI</b>    | Construction Specifications Institute                              |
| <b>DQA</b>    | data quality assessment  |
| <b>EP</b>     | eutrophication potential   |
| <b>EPA</b>    | Environmental Protection Agency                                    |
| <b>EPD</b>    | environmental product declaration                                  |
| <b>EU</b>     | European Union   |
| <b>FERC</b>   | Federal Energy Regulatory Commission                               |
| <b>FLCAC</b>  | Federal Life Cycle Assessment Commons (aka "The Commons")          |
| <b>GWP</b>    | global warming potential   |
| <b>ILCD</b>   | International Reference Life Cycle Data System                     |
| <b>IPCC</b>   | Intergovernmental Panel on Climate Change                          |
| <b>IRC</b>    | International Residential Code                                     |
| <b>ISO</b>    | International Organization for Standardization                     |
| <b>LCA</b>    | life cycle assessment  |
| <b>LCI</b>    | life cycle inventory   |
| <b>LCIA</b>   | life cycle impact assessment                                       |

<sup>13</sup> Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration. 7 G Street NW, Suite A-734, Washington, DC 20401. <[ecfr.gov](http://ecfr.gov)>

<sup>14</sup> Canadian Environmental Protection Act, Environment and Climate Change Canada (ECCC), Government of Canada. <[www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry.html](http://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry.html)>

|               |  |
|---------------|--|
| <b>LEED</b>   | Leadership in Energy and Environmental Design  |
| <b>NERC</b>   | North American Electric Reliability Corporation                                      |
| <b>NETL</b>   | National Energy Technology Laboratory – A division of the Department of Energy (DOE) |
| <b>NREL</b>   | National Renewable Energy Laboratory   |
| <b>NRSF</b>   | non-renewable secondary fuel   |
| <b>OEM</b>    | operations equipment maintenance   |
| <b>PCR</b>    | product category rule  |
| <b>POCP</b>   | photochemical ozone creation potential   |
| <b>RCRA</b>   | Resource Conservation and Recovery Act   |
| <b>RE</b>     | recovered energy   |
| <b>RSF</b>    | renewable secondary fuel   |
| <b>RSL</b>    | reference service life   |
| <b>SCM</b>    | supplementary cementitious material  |
| <b>SDS</b>    | Safety Data Sheet  |
| <b>SI</b>     | Système International d'Unités (International System of Units)                       |
| <b>SM</b>     | secondary material   |
| <b>TRACI</b>  | Tool for Reduction and Assessment of Chemicals and Other Environmental Impacts       |
| <b>UN</b>     | United Nations   |
| <b>UNSPSC</b> | United Nations Standard Products and Services Code                                   |
| <b>US</b>     | United States  |
| <b>USGBC</b>  | US Green Building Council  |
| <b>USLCI</b>  | United States Life Cycle Inventory   |

## 5 General aspects

### 5.1 Objectives of this PCR

Per ISO 21930:2017<sup>1</sup> Clause 5.1, with the following clarifications.

The primary objective of this sub-category PCR is to provide rules for the application of ISO 21930:2017 to create Type III EPDs for concrete admixtures for inclusion in concrete EPD analysis.

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 admixture producers to quantify, report, better understand and reduce the environmental impacts of their products
- promote transparency and incentivize manufacturer-specific upstream data
- represent concrete admixtures appropriately following international standards for building materials and products
- specify the data quality and default data to be used in concrete admixture EPDs
- support the use and guidance of EPDs in sustainable design construction programs and ratings

- address requirements for creating an industry average EPD to enable a pathway towards comparative assessment against company specific EPDs supporting green building programs to the degree possible
- enable consistent and comparable reporting of LCA results related to concrete admixture production.

## 5.2 Life cycle stages

Per ISO 21930:2017<sup>1</sup> Clause 5.2, with the following clarifications:

This PCR enables reporting of a cradle-to-gate (A1-A3) EPD as outlined in ISO 21930:2017 Clause 5.2.2.

The scope of the underlying LCA of concrete admixtures is cradle-to-gate, with the gate being defined as the point at which the concrete admixture is transferred to a vehicle for transport to the customer. Cradle-to-gate results shall be reported in the EPD based on a declared unit. Additional life cycle stages or information modules shall not be included in EPDs developed under this sub-category PCR.

As stipulated by ISO 21930:2017, the system boundary shall follow both the modularity and polluter pays principle. These are discussed in greater detail in Clause 7.1.1 and Table 1 of ISO 21930.

## 5.3 Average EPDs for groups of similar products

Per ISO 21930:2017<sup>1</sup> Clause 5.3, with the following clarifications and additions.

- Average EPDs developed for a group of similar products shall represent products with the same function for a concrete mixture. An average EPD can be developed for the following groups of similar products: chloride accelerators, non-chloride accelerators, hydration enhancers, low range water reducers, mid-range water reducers, high range water reducers, retarders, air entrainer.
- Average EPDs shall include the number of manufacturing plants included, and the average, median, and standard deviation for each of the reported environmental impacts.
- If any environmental indicators for products included in the average differ by more than  $\pm 10\%$ , the minimum and maximum of the population or dataset shall be reported. Alternatively, if a single value is chosen for each impact category for all products, the value reported shall be the highest impact within the range of variation; therefore, the EPD would report the highest single value for each impact category amongst all of the products or plants included in the average EPD analysis.
- Manufacturers seeking to benchmark their individual type III EPDs against the industry average EPD for the same category of concrete admixture, shall have participated in the industry average EPD.
- For full transparency, product-specific EPDs are encouraged.

## 5.4 Use of EPDs for construction products

Per ISO 21930:2017<sup>1</sup> Clause 5.4, with the following clarifications.

This PCR is to create EPDs for use in B2B communication. If the EPD is intended for use in the B2C marketplace, the provisions of ISO 14025:2006<sup>1</sup> Clause 9 apply.

The manufacturer, or group of manufacturers, of the construction product is the sole owner of the EPD and is responsible for developing the EPD of the construction product according to this PCR. Only the manufacturer or group of manufacturers is authorized to declare the environmental performance of the construction product using an EPD.

## 5.5 Comparability of EPDs for construction products

Per ISO 21930:2017<sup>1</sup> Clause 5.5, with the following clarifications and additions.

Comparison of construction products using an EPD shall be carried out in the context of the construction works. Consequently, a comparison of the environmental performance of the construction products using the EPD shall consider all the relevant information modules over the full life cycle of the product within the construction works. Requirements for comparability of EPDs given in Per ISO 21930:2017 Clause 5.5, shall apply:

- Comparison based on LCA A1-A3 data, shall be made only if the same secondary data sets are equivalent for both EPDs.
- If concrete admixture EPDs are used to compare two different products, the declared units must be the same. Additionally, the following conditions must be met:
  - The concrete admixtures have the same functional effects on concrete mixture performance.
  - For product-specific EPD comparisons, results for A2 transportation shall reflect actual transportation distances.

*Note.* Required comparability disclosure in EPD, see Section 9.5 of this sub-category PCR.

All documentation requirements outlined in ISO 21930:2017 Clause 5.6 shall be met, including those of the project report (also discussed in Section [10](#) of this sub-category PCR).

## 5.6 Documentation

Per ISO 21930:2017<sup>1</sup> Clause 5.6.

See Sections [8](#) through [10](#) for guidance on additional environmental information, EPD content, and the project report.

## 6 PCR development and use

Per ISO 21930:2017<sup>1</sup> Clause 6, with the following additions.

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 (e.g. evolution of LCA methodology in ISO 21930:2017), the document will be revised. See Section [5.5](#) for comparability.

## 7 PCR for LCA

### 7.1 Methodological framework

#### 7.1.1 LCA modeling and calculation

Per ISO 21930:2017<sup>1</sup> Clause 7.1.1.

### **7.1.2 Functional unit**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.2, with the following clarification.

This PCR does not define a functional unit. However, the performance characteristics of concrete admixtures, including the UNSPSC product code and CSI specification number, shall be reported.

### **7.1.3 Declared unit**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.3, with the following clarifications.

A declared unit provides a reference by which a product is normalized to produce data expressed on a common basis and is appropriate when the precise function of the product at the construction works is not stated or within scope.

An EPD prepared to this sub-category PCR covers only the cradle-to-gate life-cycle stages (A1-A3). Since the use phase is explicitly excluded from this scope, a declared unit shall be used. The declared unit shall be 1 kg of concrete admixtures. Data may additionally be presented per US pounds or volume (i.e. liters).

### **7.1.4 Reference service life**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.4, with the following clarifications.

The RSL of a product defines the expected service life of a product under a specific set of use conditions. As this PCR does not address Module B (Use), the RSL of concrete admixtures is not applicable.

### **7.1.5 System boundary with nature**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.5.

### **7.1.6 System boundary between product systems**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.6.

### **7.1.7 System boundaries and technical information for scenarios**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.7.

**Table 1**  
System boundary example

| Raw material supply (A1) | Transport (A2)                | Manufacturing (A3)   |
|--------------------------|-------------------------------|--|
| cements and SCMs         | truck, rail, freighter, barge | energy carriers (electricity and fuels)  |
| aggregates               | energy carriers (fuel)        | ancillary materials (lubricants, motor oil, cleaning chemicals, other consumables)               |
| admixtures               | —                             | water (manufacturing water, including wash water for concrete trucks, but excluding batch water) |
| batch water              | —                             | waste (end-of-life treatment of ancillary materials and any packaging)                           |
| fibers and pigments      | —                             | 30% total fleet energy for transit and shrink mix plants only                                    |

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)
- 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<sup>1</sup> Clause 7.1.7.1, with the following modification.

Since the scope of an EPD developed to this PCR is limited to cradle-to-gate, scenario data for modules other than A1- A3 are not applicable and thus shall not be reported.

**7.1.7.2 A1- A3, production stage**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.7.2, with the following additions:

- Module A1 – Extraction and upstream production:
  - A1 shall rely on background data/upstream data specified in Annex [A](#).
  - The module shall include impacts associated with the following processes:
    - production and transmission of electricity
    - production of fuels
    - production and transmission of natural gas
    - production and transmission of water.

- Module A2 – Transport to factory:
  - A2 shall assume all long haul transport by bulk carriers (greater than 322 km (200 mi)) do not typically return empty and thus can use the USLCI dataset,<sup>10</sup> which includes 35% additional distance to account for this.
  - A2 shall assume that all short-haul transport (local trucks and dump trucks) return empty. Thus, one-way transport distance shall be multiplied by (2/1.35) to reflect two-way transport and eliminate the 35% additional distance included in the USLCI.
- Module A3 – Manufacturing:
  - A3 shall include transportation activities at the concrete admixtures manufacturing site.
  - A3 shall include ancillary materials, which include, but are not limited to, lubricating oils, engine oils, and other consumable OEM products.
  - A3 shall include final end-of-life treatment for any manufacturing waste. For example, precursor chemical and ancillary material packaging.

Modules A1, A2, and A3 shall be reported separately as well as in total A1-A3.

#### **7.1.7.3 A4-A5, construction stage**

This clause of 21930:2017 does not apply.

#### **7.1.7.4 B1- B5, use stage**

This clause of ISO 21930:2017<sup>1</sup> does not apply.

#### **7.1.7.5 C1-C4, end-of-life-stage**

This clause of ISO 21930:2017<sup>1</sup> does not apply.

#### **7.1.7.6 Benefits and loads beyond the system boundary in optional supplementary Module D**

This clause of ISO 21930:2017<sup>1</sup> does not apply.

#### **7.1.8 Criteria for the inclusion and exclusion of inputs and outputs**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.8.

#### **7.1.9 Selection of data and data quality requirements**

Per ISO 21930:2017<sup>1</sup> Clause 7.1.9, with the following additions.

**Table 2**  
**Selection of data and data quality requirements**

| Indicator                        | Definition  | ← Highest data quality (lowest score)                         |   |   | Lowest data quality (highest score) →                        |  |
|----------------------------------|---|---|---|---|--|--|
|                                  |   | 1   | 2   | 3   | 4  | 5 (default)                                      |
| temporal representativeness      | Indicates the temporal difference between the date of data generation and the date the data are supposed to represent based on the PCR.                           | Less than 3 yr of difference                                  | Less than 6 yr of difference  | Less than 10 yr of difference                               | Less than 15 yr of difference                                | Age of data unknown or more than 15 yr           |
| geographical representativeness  | Indicates how well the geographical area from which data for a unit process are collected satisfies the goal of the study. (ISO 14044:2006/AMD 1:2017/AMD 2:2022) | Data from same resolution <sup>a</sup> and same area of study | Within one level of resolution and a related area of study <sup>b</sup> | Within two levels of resolution and a related area of study | Outside two levels of resolution but a related area of study | From a different or unknown area of study        |
| technological representativeness | Indicates technical representativeness based on four categories: process design, operating conditions, material quality/type and process scale.                   | All technology categories <sup>c</sup> are equivalent         | Three of the technology categories are equivalent                       | Two of the technology categories are equivalent             | One of the technology categories is equivalent               | None of the technology categories are equivalent |

**Table 2**  
**Selection of data and data quality requirements**

| Indicator               | Definition   | ← Highest data quality (lowest score)   |  |  | Lowest data quality (highest score) →  |  |
|-------------------------|--|---|--|--|--|--|
|                         |  | 1   | 2  | 3  | 4  | 5 (default)  |
| data collection methods | Assessment of the robustness of the sampling methods and data collection period.         | Representative data from greater than 80% of the relevant market, <sup>d</sup> over an adequate period <sup>e</sup> | Representative data from 60% to 79% of the relevant market, over an adequate period, or representative data from > 80% of the relevant market, over a shorter period | Representative data from 40 to 59% of the relevant market, over an adequate period, or representative data from 60% to 79% of the relevant market, over a shorter period | Representative data from less than 40% of the relevant market, over an adequate period, or representative data from 40% to 59% of the relevant market, over a shorter period | Unknown data from a small number of sites and from shorter periods |
| reliability             | Indicates quality of data generation method and verification of data collection methods. | Verified <sup>f</sup> data based on measurements  | Verified data based on a calculation or non-verified data based on measurements  | Non-verified data based on a calculation   | Documented estimate  | Undocumented estimate  |

Source: <[cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?Lab=NRMRL&dirEntryId=321834](https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=321834)>

<sup>a</sup> Levels of resolution are defined as follows: global, continental, sub-region, national, state/province/region, county/city, site-specific. (The first four of these are from the UN geoscheme (UN, 2013)). The same approach applies for imports to the US.

<sup>b</sup> A related area of study is defined by the user and should be documented in the geographical metadata. By default, a related area of study is one within the same hierarchy of political boundaries (e.g. Denver is within Colorado, which is within the US, which is within North America).

<sup>c</sup> Technology categories are process design, operating conditions, material quality, and process scale.

<sup>d</sup> The relevant market should be documented in the DQA. The default relevant market is measured in production units; if the relevant market is determined using other unites, this should be documented in the DQA. The relevant market established in the metadata should be consistently applied to all flows within the unit process.

<sup>e</sup> An adequate time period can be evaluated as on long enough to even out normal fluctuations. The default period is 1 yr, except for emerging technologies (2 to 6 mo) or agricultural projects over 3 yr. Seasonality considerations shall be incorporated for construction materials where relevant.

<sup>f</sup> Verification may take place in several ways, e.g. by on-site checking, by recalculation, through mass balances or crosschecks with other sources. For values calculated from a mass balance or another verification method, an independent verification method must be used in order to qualify the value as verified.

The data quality rating method here evaluates five representativeness aspects: temporal, geographical, technological, data collection method, and reliability, a holistic approach should be used when applicable, the *ACLCA Guidance for Assessing Data Quality of Background Life Cycle Inventory (LCI) Datasets*<sup>11</sup> shall be used. Reliability assesses the quality of data generation and verification methods. Seasonality, critical for some supply chains, shall be evaluated by the "data collection methods" indicator.

A DQA shall be made for the system under study. All data shall be accurate, complete, and representative of the manufacturing process, current technology and current measurement capability. The data shall be consistent with the following requirements:

ISO 21930:2017<sup>1</sup> (Table 3, A1-A3 sections only) shall be supplemented by Table 3 with additional detail on the upstream data to use in developing the EPD.

**Table 3**  
**Application of data within Module A1**

|                                 | <b>Production of commodities, raw materials</b> |
|---------------------------------|---|
| process type                    | upstream processes                              |
| preferred data                  | use product specific EPD                        |
| if preferred data doesn't exist | per Appendix A                                  |

**Foreground data**

- **time period:** Facility-specific datasets (A3) shall include 12 consecutive months of data beginning within 5 yr of the publication date of the EPD. Deviations shall be justified.

For transparency, the time period for collection of foreground data should be reported in EPDs as specified in Section 9.2.

If the market-based method for Scope 2 accounting is used to quantify potential GHG emission reductions associated with electricity consumption documentation shall meet the Scope 2 Quality Criteria in the GHG Protocol Scope 2 Guidance.<sup>7</sup>

- **documents on file:** Foreground data shall be based on utility and energy bills, sales records, product designs, and similar records, all of which should be kept on file and easily accessible. Deviations shall be justified.
- **geography:** Foreground data for a facility-specific EPD shall be specific to the facility. Company averages are not allowed for facility-specific EPDs. Foreground data for industry average EPDs shall be specific to the participating facilities and products that meet the applicable specification(s).
- **data gaps:** Data gaps for foreground data shall be limited only to those items for which a predetermined parameter has been provided in Annex A. Deviations shall be justified.

**Background data**

- **prioritization of data for upstream processes:** Use of upstream data associated with production of commodities and raw materials shall follow this hierarchy:
  - 1) valid facility-specific and product-specific EPDs with impact categories modeled according to

TRACI 2.2<sup>9</sup> for the specific inputs associated with the EPD

- 2) either of the following:
    - a) valid industry average EPDs with impact categories modeled according to TRACI 2.2 as prescribed in Annex [A](#)
    - b) specified datasets as prescribed in Annex [A](#), including critically reviewed LCA studies that are conformant with ISO 14040/14044<sup>1</sup> that have been published to the USLCI.<sup>10</sup>
  - 3) publicly available, critically reviewed LCA studies that are conformant with ISO 14040/14044 that have not been published to the USLCI.
  - 4) either of the following:
    - a) commercial (proprietary) inventory data, when process or flow impacts are estimated to be greater than 1% total
    - b) declared data gap, when process or flow impacts are estimated to be less than 1% total, or when no data exists. Any estimations need to be justified. Proxy data shall not be used.
- **uniformity in use of life cycle inventories:** Manufacturers who develop product-specific EPDs, industry average EPDs, or public datasets that could be used as upstream data for ready mix concrete are strongly encouraged to use the public datasets prescribed in Annex [A](#) for common upstream energy and materials to improve the consistency and comparability of EPDs developed under this PCR.
  - **transparency of life cycle inventories:** Background inventory data sources at the flow and database level shall be declared on the EPD.
  - **geography and regionalization:** The upstream data specified in Annex [A](#) are specific to North America. US baseline inventories for electricity shall be regionalized at the balancing authority level (see Annex [A](#) for details). Canadian baseline inventories for electricity shall be regionalized at the Provincial level.
  - **data gaps:** Data gap identification shall be performed in accordance with the *ACLCA Guidance for Assessing Data Quality of Background Life Cycle Inventory (LCI) Datasets*<sup>11</sup> for background dataset selection. Data gaps shall be described on the EPD and the following statement should appear:
 

*"Data for [list of materials] was not available at time of EPD preparation and may have significant effects on total impacts."*
  - **updating prescribed inventory data:** The concrete admixture PCR Committee shall convene at intervals no greater than 24 months to review upstream datasets to determine whether any changes should be made to Annex [A](#). Any resulting revision of Annex [A](#) based on this review shall be summarized in the Summary of Changes section of Annex [A](#) and shall include the date of revision. The PCR's date of expiry shall not be affected.

Preference shall be given to datasets that include transmission and distribution losses. For regions other than the US (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.

Credit may not be applied to LCA baseline when "green" power certificates are used. 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<sup>1</sup> Clause 7.1.10, with the following additions.

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

**Table 4**  
SI conversions

| Convert from                   | Convert to                     | Multiply by    |
|--------------------------------|--------------------------------|----------------|
| cubic yard (yd <sup>3</sup> )  | cubic meter (m <sup>3</sup> )  | 7.654 459 E-01 |
| square foot (ft <sup>2</sup> ) | square meter (m <sup>2</sup> ) | 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 |
| gallon (gal)                   | liter (L)                      | 3.78541 E-00   |
| fluid ounce (oz)               | milliliter (mL)                | 29.5735 E-00   |

Source: NIST Special Publication 811, with additions. <[nist.gov/pml/special-publication-811](https://www.nist.gov/pml/special-publication-811)>

## 7.2 Inventory analysis

Per ISO 21930:2017<sup>1</sup> Clause 7.2, with the following additions and clarifications.

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

Where potable water from a municipal source is used, the water treatment and distribution systems shall be included as an upstream process, which will have its own resource use and discharges. The impacts of water desalination shall be included.

### 7.2.1 Data collection

Per ISO 21930:2017<sup>1</sup> Clause 7.2.1.

### 7.2.2 Calculation procedures

Per ISO 21930:2017<sup>1</sup> Clause 7.2.2.

### 7.2.3 Allocation situations

Per ISO 21930:2017<sup>1</sup> Clause 7.2.3.

### 7.2.4 Principles for allocation both allocation situations

Per ISO 21930:2017<sup>1</sup> Clause 7.2.4.

## **7.2.5 Allocation for co-products**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.5.

### **7.2.5.1 General**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.5.1.

### **7.2.5.2 Co-product allocation procedure**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.5.2, with the following clarification:

Co-product allocation shall follow the step-based process described in ISO 21930 Clause 7.2.5.2. System expansion shall not be used to avoid allocation and is not allowed under this PCR.

### **7.2.5.3 Avoiding allocation generally**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.5.3.

### **7.2.5.4 Allocation by subdivision**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.5.4.

## **7.2.6 Allocation between product systems (across the system boundary)**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.6.

## **7.2.7 Accounting of biogenic carbon update and emissions during the life cycle**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.7.

## **7.2.8 Carbonation**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.8.

## **7.2.9 Accounting of delayed emissions**

This clause is not applicable to this PCR.

## **7.2.10 Inventory Indicators describing resource use**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.10.

## **7.2.11 Greenhouse gas emissions from land use change**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.11.

## **7.2.12 Additional inventory indicators describing emissions and removal of carbon**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.12.

### **7.2.13 Inventory indicator describing consumption of freshwater**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.13.

### **7.2.14 Environmental information describing waste categories and output flows**

Per ISO 21930:2017<sup>1</sup> Clause 7.2.14.

## **7.3 Impact assessment indicators describing main environmental impacts derived from LCA**

Per ISO 21930:2017<sup>1</sup> Clause 7.3.

## **8 Additional environmental information**

Additional information shall only be related to environmental aspects. Information and instructions on product safety unrelated to the environmental performance of the building product shall not be part of a Type III environmental declaration (ISO 14025:2006<sup>1</sup>).

### **8.1 General**

Per ISO 21930:2017<sup>1</sup> Clause 8.1.

### **8.2 Additional LCA-related environmental information not included in the pre-set LCIA indicators**

Per ISO 21930:2017<sup>1</sup> Clause 8.2.

### **8.3 Additional environmental information not derived from or related to LCA**

Per ISO 21930:2017<sup>1</sup> Clause 8.3.

## **8.4 Mandatory additional environmental information**

### **8.4.1 Content of regulated hazardous substances**

Per ISO 21930:2017<sup>1</sup> Clause 8.4.1, with the following clarification:

The following resources provide guidance:

- RCRA<sup>12</sup>
- 40 CFR 261.33, discarded commercial chemical products, off-specification species, container residues, and spill residues thereof
- For the Canadian market, wastes are hazardous if they are regulated under the CEPA 1999 Regulations<sup>14</sup>

### **8.4.2 Release of dangerous substances from construction products**

Per ISO 21930:2017<sup>1</sup> Clause 8.4.2.

## **9 Content of an EPD**

### **9.1 General**

Per ISO 21930:2017<sup>1</sup> Clause 9.1.

### **9.2 Declaration of general information**

Per ISO 21930:2017<sup>1</sup> Clause 9.2, with the following clarifications:

- a simple visual representation of concrete admixtures is not relevant and thus are not required

The manufacturer is responsible for the provision of all information in the following sections. An EPD developed under this PCR shall include the following information:

#### **9.2.1 Owner and verification information**

Table [5](#) of general product and verification information shall be presented on the page after the cover page of the EPD.

**Table 5**  
**Demonstration of verification**

|   |   |
|---|---|
| Product name  |   |
| Manufacturer name and address   |   |
| Program operator  |   |
| General program instructions and version number   |   |
| Declaration number  |   |
| Reference PCR and version number  |   |
| EPD type and scope  |   |
| Defined functional or declared unit   |   |
| Product's intended application and use  |   |
| Product RSL   |   |
| Markets of applicability  |   |
| Date of issue   |   |
| Period of validity  |   |
| Year of reported manufacturer primary data  |   |
| LCA software and version number   |   |
| LCI database and version number   |   |
| LCIA methodology and version number   |   |
| Overall data quality assessment score   |   |
| The sub-category PCR review was conducted by:   |   |
| This declaration was independently verified in accordance with ISO 14025:2006. ISO 21930:2017 serves as the core PCR. Sub-category PCR: <b>NSF Concrete Admixtures</b> Product Category Rule<br><br><input type="checkbox"/> Internal <input type="checkbox"/> External | Industrial Ecology Consultants,<br>Thomas P. Gloria, PhD,<br><a href="mailto:t.gloria@industrial-ecology.com">t.gloria@industrial-ecology.com</a> |
| This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:   |   |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:  |   |
| Explanatory material can be obtained from the following:  |   |

### 9.3 Declaration of the methodological framework

Per ISO 21930:2017<sup>1</sup> Clause 9.3, with the following additions and clarifications:

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

**Table 6**  
Description of EPD system boundary

| Production stage        |           |               | Construction stage     |              | Use stage |             |        |             |               |                      |                     | End of life stage |           |                  |          | Benefits and loads beyond the system boundary |
|-------------------------|-----------|---------------|------------------------|--------------|-----------|-------------|--------|-------------|---------------|----------------------|---------------------|-------------------|-----------|------------------|----------|---|
| Raw material extraction | Transport | Manufacturing | Transportation to site | Installation | Use       | Maintenance | Repair | Replacement | Refurbishment | Operation energy use | Operation water use | De-construction   | Transport | Waste processing | Disposal | Reuse/recycle                                 |
| A1                      | A2        | A3            | A4                     | A5           | B1        | B2          | B3     | B4          | B5            | B6                   | B7                  | C1                | C2        | C3               | C4       | D   |
| X                       | X         | X             | MND                    | MND          | MND       | MND         | MND    | MND         | MND           | MND                  | MND                 | MND               | MND       | MND              | MND      | MND   |

Note. MND = module not declared, X = module declared

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

### 9.4 Declaration of technical information and scenarios

The ISO 21930:2017<sup>1</sup> clause does not apply.

### 9.5 Declaration of environmental indicators derived from LCA

Per ISO 21930:2017<sup>1</sup> Clause 9.5, with the following additions.

Modules A1-A3 shall not be declared as one aggregated module and shall be reported separately, and:

- the following additional LCA results shall be included in the EPD:

- ADP for non-fossil mineral resources (ADP elements).
- 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 (can be listed as shown below or identified by the word 'note':

*"This EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis."*

- renewable primary energy resources as energy (fuel) (RPR<sub>E</sub>)
- renewable primary resources as material (RPR<sub>M</sub>)
- non-renewable primary resources as energy (fuel) (NRPR<sub>E</sub>)
- non-renewable primary resources as material (NRPR<sub>M</sub>)
- secondary materials (SMs)
- renewable secondary fuels (RSF)
- non-renewable secondary fuels (NRSF)
- recovered energy (RE)
- ADP for non-fossil mineral resources (ADP elements):
  - 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 waste disposed <sup>15</sup>
  - non-hazardous waste disposed
  - high-level radioactive waste
  - intermediate and low-level radioactive waste
  - components for reuse
  - materials for recycling
  - materials for energy recovery
  - RE exported from the product system.

<sup>15</sup> As defined by the RCRA under 40 CFR 261.33. <[govinfo.gov/content/pkg/CFR-2011-title40-vol26/pdf/CFR-2011-title40-vol26-sec261-33.pdf](https://www.govinfo.gov/content/pkg/CFR-2011-title40-vol26/pdf/CFR-2011-title40-vol26-sec261-33.pdf)>

- when upstream data (either specified in the PCR or from other sources) are missing values for select impact categories or inventory items that are required to be reported in the EPD, the impact categories or inventory items shall be reported with an asterisk '\*' or as an 'x' or '-' and not zero and qualified with the footnote:

*"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."*

## 9.6 Declaration of additional environmental information

Per ISO 21930:2017<sup>1</sup> Clause 9.6.

## 10 Project report

Per ISO 21930:2017<sup>1</sup> Clause 10, with the following additions.

EPDs for concrete admixtures that are developed using a verified software tool do not need an individual project report for each EPD. Instead, the underlying project report for the software tool may serve as the project report for the EPD. In addition, the report shall address the steps taken to ensure the security and integrity of the tool over time and describe the specific conditions under which a re-review of the software tool would be triggered (e.g. change in scope). If a verified software tool is used to create the EPD, then the underlying project report shall be available to the tool user and to the EPD verifier. The underlying project report for the software tool shall conform to the requirements of all applicable standards, NSF's General Program Instructions and this PCR.

## 11 Verification and validity of an EPD

Per ISO 21930:2017<sup>1</sup> Clause 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
- when a product-specific EPD is aligned with an industry-average EPD the following additional items are required:
  - to evaluate the consistency of results between product-specific EPDs and industry-average EPDs, either:
    - the same LCA modeling software and version and background data shall be used to create the EPD
    - the LCA modeling software and version shall test representative samples of the regionally specific industry average benchmark data and include in the EPD a report of the maximum percent difference for environmental impact categories: GWP, AP, ozone depletion potential and smog creation potential. If a different LCA tool is selected, it shall be used to calculate environmental indicators for a sample of representative mixes taken from the published industry average LCA report. The variation of results produced by the selected LCA modeling software and version, compared to the published environmental indicators in the industry EPD shall be reported as a maximum percent variation for GWP 100, AP, EP or POCP. This is to provide transparency on the variability of results that stem from background data and models.

- an EPD shall be recalculated when changes to manufacturing practices are reasonably expected to result in a significant change to the EPD results
- an EPD shall be recalculated when its period of validity is complete or when updates to the PCR result in significant changes to the EPD results
- significant changes are an increase or decrease of GWP 100, AP, EP or POCP by more than 5% of previously reported result.

## 12 References

At the time this PCR was balloted, the editions listed below were valid. All documents are subject to revision, and parties are encouraged to investigate the possibility of applying the recent editions of the documents indicated below. The most recent published edition of the document shall be used for undated references.

### 12.1 ASTM standards

ASTM C94, *Standard Specification for Ready-Mixed Concrete*<sup>3</sup>

### 12.2 ISO standards

ISO 6707-1: 2014, *Buildings and Civil Engineering Works – Vocabulary – Part 1: General Terms*<sup>1</sup>

ISO 14021:2016/AMD1:2021, *Environmental Labels and Declarations – Self-declared Environmental Claims (Type II Environmental Labeling)*<sup>1</sup>

ISO 14025:2006, *Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures*<sup>1</sup>

ISO 14040:2006/AMD 1:2020, *Environmental Management – Life Cycle Assessment – Principles and Framework*<sup>1</sup>

ISO 14044:2006/AMD 1:2017/AMD 2:2022, *Environmental Management – Life Cycle Assessment – Requirements and Guidelines*<sup>1</sup>

ISO 14067:2018, *Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification*<sup>1</sup>

ISO 14050:2009, *Environmental Management – Vocabulary*<sup>1</sup>

ISO 21930:2017, *Sustainability in Building Construction – Environmental Declaration of Building Products*<sup>1</sup>

### 12.3 EN standards

EN 16757, *Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements*<sup>16</sup>

EN 15804, *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*<sup>16</sup>

---

<sup>16</sup> European Standards s.r.o. Krimická 134, 318 00 Pilsen, Czech Republic. <[en-standard.eu](http://en-standard.eu)>

## 12.4 Other references

ACLCA, 2022 PCR Guidance and Toolkit<sup>11</sup>

Mather, B. & Ozyildirim, C. (2002). SP-1(02): *Concrete Primer*. American Concrete Institute: SP0102.

USGBC LEED v4 for Building Design and Construction<sup>17</sup>

USGBC PCR Committee Process & Resources: Part B<sup>17</sup>

---

<sup>17</sup> United States Green Building Council. 2101 L Street NW, Suite 600, Washington, DC 20037. <[usgbc.org](https://www.usgbc.org)>

## Annex A

### Default data sources

The default LCA/LCI data noted in Table A.1 of this appendix shall be used unless manufacturer and product specific EPD results are available. Tables A.2 and A.3 shall be used for all applications unless an alternate standardized regional database is published as a clarification to the *PCR for Concrete* (most recent edition) to enable more accurate yet still standardized upstream LCA data.

**Table A.1**  
Material data

| Materials |       | Default LCA/LCI data   | Year, Region        | PCR  |
|-----------|-------|--|---------------------|------|
| Water     | water | Ecoinvent 3.10 or later: Tap water {RoW}   market for   Cut-off adjusted for the electricity grid for the region of interest.<br><br>If water source includes significant fresh water created via desalination processes, the tap water LCI shall be supplemented with regionally specific LCI of water and the LCI source specified in the EPD. | Ecoinvent 2012-2023 | None |

**Table A.2**  
Transportation data

| Transportation mode |                            | Default LCI data   | Year, Region                         | Notes  |
|---------------------|----------------------------|--|--------------------------------------|--|
| Land                | road:<br>combination truck | <ul style="list-style-type: none"> <li>Transport, combination truck, long-haul, diesel powered/tkm/RNA<sup>a</sup></li> <li>Transport, combination truck, short-haul, diesel powered/tkm/RNA<sup>b</sup></li> <li>Transport, combination truck, short-haul, gasoline powered/tkm/RNA<sup>c</sup></li> </ul>  | Data collection: 2010<br>Region: USA | Long-haul trips are greater than 200 miles (322 km), while short-haul trips are 200 mi (322 km) or less <sup>d</sup> |
|                     | road:<br>single unit truck | <ul style="list-style-type: none"> <li>Transport, single unit truck, long-haul, diesel powered/tkm/RNA<sup>e</sup></li> <li>Transport, single unit truck, long-haul, gasoline powered/tkm/RNA<sup>f</sup></li> <li>Transport, single unit truck, short-haul, diesel powered/tkm/RNA<sup>g</sup></li> <li>Transport, single unit truck, short-haul, gasoline powered/tkm/RNA<sup>h</sup></li> </ul> | Data collection: 2010<br>Region: USA | Long-haul trips are greater than 200 miles (322 km), while short-haul trips are 200 mi (322 km) or less <sup>d</sup> |
|                     | rail                       | <ul style="list-style-type: none"> <li>Transport, train, diesel powered/tkm/US<sup>i</sup></li> </ul>  | Data collection: 2012<br>Region: USA | USLCI Database (Summer 2024 Release) <sup>d, j</sup>   |

**Table A.2**  
Transportation data

| Transportation mode |           | Default LCI data  | Year, Region                              | Notes  |
|---------------------|-----------|---|---|--|
| Water               | freighter | <ul style="list-style-type: none"> <li>Transport, ocean freighter, average fuel mix/tkm/US<sup>k</sup></li> </ul> | Data collection: 2005-2013<br>Region: USA | USLCI Database (Summer 2024 Release) <sup>d, j</sup> |
|                     | barge     | <ul style="list-style-type: none"> <li>Transport, barge, average fuel mix<sup>l</sup></li> </ul>                  | Data collection: 2019<br>Region: USA      | USLCI Database (Summer 2024 Release) <sup>d, j</sup> |
|                     |           | <ul style="list-style-type: none"> <li>Transport, barge, diesel powered<sup>m</sup></li> </ul>                    | Data collection: 2005-2013<br>Region: USA |  |
|                     |           | <ul style="list-style-type: none"> <li>Transport, barge, residual fuel oil powered<sup>n</sup></li> </ul>         | Data collection: 2005-2013<br>Region: USA |  |

<sup>a</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/a685da05-1a42-3fe1-a68b-6db458be5e07](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/a685da05-1a42-3fe1-a68b-6db458be5e07)>

<sup>b</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/8d1daa68-bede-347a-86a4-aeca5383906c](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/8d1daa68-bede-347a-86a4-aeca5383906c)>

<sup>c</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/60785dad-585a-3fe9-ae8e-507f0cbc7f6f](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/60785dad-585a-3fe9-ae8e-507f0cbc7f6f)>

<sup>d</sup> All data is free-to-use and publicly accessible via the links provided to the Federal LCA Commons' USLCI Database.

<sup>e</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/c3ba0cd2-d36d-396a-8295-bd4c00979cf6](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/c3ba0cd2-d36d-396a-8295-bd4c00979cf6)>

<sup>f</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/707525a6-c6e4-31e0-a728-5685f0133b9c](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/707525a6-c6e4-31e0-a728-5685f0133b9c)>

<sup>g</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/711ab26a-94a2-33f9-89da-560c55808297](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/711ab26a-94a2-33f9-89da-560c55808297)>

<sup>h</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/ba328bfe-68dd-3d33-a95e-bdcd28252c39](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/ba328bfe-68dd-3d33-a95e-bdcd28252c39)>

<sup>i</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/7de9c230-fd0f-3478-be87-f80181132faa](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/7de9c230-fd0f-3478-be87-f80181132faa)>

<sup>j</sup> National Renewable Energy Laboratory, 2012. Accessed July 30, 2024. These specific processes have been added to USLCI from GREET 2023. <[github.com/FLCAC-admin/uslci-content/blob/dev/docs/release\\_info/press-release.md?sa=D&source=docs&ust=1722373522642937&usq=AOvVaw0mzyV1naCcmGKfRO37eKIV](https://github.com/FLCAC-admin/uslci-content/blob/dev/docs/release_info/press-release.md?sa=D&source=docs&ust=1722373522642937&usq=AOvVaw0mzyV1naCcmGKfRO37eKIV)>

<sup>k</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/1e2429d8-8d91-328f-85c3-18d39bdebfa7](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/1e2429d8-8d91-328f-85c3-18d39bdebfa7)>

<sup>l</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/099c3d09-08a3-3cac-9ffd-0558c12033b9](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/099c3d09-08a3-3cac-9ffd-0558c12033b9)>

<sup>m</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/c2300fc3-5496-3d12-9135-67dc0ef740c9](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/c2300fc3-5496-3d12-9135-67dc0ef740c9)>

<sup>n</sup> <[lcamcommons.gov/lca-collaboration/National\\_Renewable\\_Energy\\_Laboratory/USLCI\\_Database\\_Public/dataset/PROCESS/eaff3c91-b8ce-38a1-a3ba-1fe0c9d4041c](https://lcamcommons.gov/lca-collaboration/National_Renewable_Energy_Laboratory/USLCI_Database_Public/dataset/PROCESS/eaff3c91-b8ce-38a1-a3ba-1fe0c9d4041c)>

**Table A.3**  
Energy data

| Energy source          | Default LCI data   | Year, Region | Notes |
|------------------------|--|--------------|-------|
| electricity generation | Ecoinvent 3.10 or later electricity processes by NERC Region <sup>a</sup>  | 2015, USA    |       |
| site energy            | USLCI Database (NREL): <ul style="list-style-type: none"> <li>• Natural gas, combusted in industrial boiler/US <sup>b</sup></li> <li>• Residual fuel oil, combusted in industrial boiler/US <sup>c</sup></li> <li>• Diesel, combusted in industrial equipment/US <sup>d</sup></li> <li>• Gasoline, combusted in equipment/US <sup>e</sup></li> </ul> | 2007, USA    |       |

<sup>a</sup> 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.

<sup>b</sup> <[lcammons.gov/lca-collaboration/NIST/construction\\_materials/dataset/FLOW/ea8515c5-e3d4-4f42-a856-67a9b85b30a0](https://lcammons.gov/lca-collaboration/NIST/construction_materials/dataset/FLOW/ea8515c5-e3d4-4f42-a856-67a9b85b30a0)>

<sup>c</sup> <[lcammons.gov/lca-collaboration/Federal\\_Highway\\_Administration/mtu\\_pavement/dataset/FLOW/654a5cf6-185f-3d91-89ef-42442d1825e8](https://lcammons.gov/lca-collaboration/Federal_Highway_Administration/mtu_pavement/dataset/FLOW/654a5cf6-185f-3d91-89ef-42442d1825e8)>

<sup>d</sup> <[lcammons.gov/lca-collaboration/US\\_Forest\\_Service\\_Forest\\_Products\\_Lab/Woody\\_biomass/dataset/FLOW/d815ff18-015c-3afb-be18-be03bdf325da](https://lcammons.gov/lca-collaboration/US_Forest_Service_Forest_Products_Lab/Woody_biomass/dataset/FLOW/d815ff18-015c-3afb-be18-be03bdf325da)>

<sup>e</sup> <[lcammons.gov/lca-collaboration/Federal\\_Highway\\_Administration/mtu\\_pavement/dataset/FLOW/bc38e349-1ccf-3855-a615-a4f581ab875b](https://lcammons.gov/lca-collaboration/Federal_Highway_Administration/mtu_pavement/dataset/FLOW/bc38e349-1ccf-3855-a615-a4f581ab875b)>



**Improving Human and Planet Health**

---

For more information, contact:  
[ncss@nsf.org](mailto:ncss@nsf.org)

789 N. Dixboro Road Ann Arbor, MI 48105 USA  
[nsf.org](http://nsf.org)