



Product Category Rule (PCR) Guidance for Building-Related Products and Services

Part B: Expanded Shale, Clay and Slate Lightweight Aggregate EPD Requirements

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Product Category Rules (PCR) Guidance for Building Related Products and Services Part B:
Expanded Shale, Clay and Slate Lightweight Aggregate EPD Requirements, UL 10010 - 37

Second Edition, Dated January 25, 2022

Summary of Topics:

The Second Version of the Part B: Expanded Shale, Clay and Slate Lightweight Aggregate EPD Requirements, UL 10010–37 has been issued.

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Publisher:

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Tracking of versions

Version	Comments	History
1.0	Version by ASTM with input from external committee and accepted by an external review panel	April 2015
2.0	Creation of PCR Part B for Expanded Shale, Clay, and Slate Lightweight Aggregates to conform with ISO 21930:2017 and UL Part A.	January 25, 2022

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This PCR is valid for a period of five (5) years, set to expire in January, 2026.

I. Background Information and Acknowledgements

These sub-category Product Category Rules (PCR) were developed to address the product specific rules for the creation of Environmental Product Declarations (EPD) for expanded shale, clay, and slate (ESCS) lightweight aggregate in the following applications: masonry, concrete, asphalt pavement, geotechnical fills, horticulture, soil amendment, and water treatment. At the discretion of the Program Operator, this PCR may be applicable to ESCS products not specifically described herein. The products within scope are collectively referenced throughout this PCR as “ESCS lightweight aggregate”. When used to self-reference this document, “PCR” refers to “sub-category PCR.”

Other documents considered in the development of this PCR include:

- Product Category Rules for Preparing an Environmental Product Declaration for Expanded Shale, Clay, and Slate Lightweight Aggregate. ASTM. April 2015.
- Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL December 2018, version 3.2)
- EN 15804:2013+A1:2014 - Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.
- EN 15804:2013+A2:2019 - Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

This PCR assumes a minimum 75-year construction product estimated service life (ESL) to be consistent with ASHRAE 189.1 (2020, section 9.5.1.2.b) and International Green Construction Code 2021 section 901.5.1.2.

Interested Parties

This Part B has been prepared with input from the following stakeholders:

- Expanded Shale, Clay and Slate Institute (ESCSI)
- Aggregate Industries Utelite
- Arcosa Lightweight
- Buildex
- Carolina Stalite Company
- Nicholson Consulting LLC
- Norlite Corporation

Governance

There are a number of representatives of ESCS lightweight aggregate manufacturers participating in the creation of this Product Category Rule (“PCR”) for ESCS system products, including those listed in the previous section. The



very purpose and function of a trade association is to inform its members of important industry developments and to represent their interests in projects such as the update of a PCR affecting their products.

In the development of this document, Part B, participants are responsible for ensuring alignment with Part A and conformance with the scoped standards: ISO 21930, EN 15804, and ISO 14025. Compatibility issues with EN15804 and ISO 21930 are addressed in Part A.¹

Involvement of Interested Parties

UL shall be responsible for producing the PCR document by establishing an open consultation process that includes the involvement of interested parties (ISO 21930 Section 5.2 and 6.2.1). Reasonable efforts were made to achieve a consensus throughout the process (ISO 14020:2000, 4.9.1, Principle 8 and cited in both ISO 14025 and ISO 21930), demonstrated by a vote of participating interested parties.

UL posted an open call for participation in this PCR update in May 2020 via its standards website, social media outlets, and outreach to original committee stakeholders.

Update Process

The PCR is valid for a duration of five (5) years from the publication date, at which time it may be revised at the request of industry stakeholders. The PCR may be revised before the five year date if the following occurs in the industry:

- The industry desires an update
- Core governing standards ISO 14040, 14044, 14025, 21930, EN 15804 or Part A are updated with substantial material changes

Note: When the PCR is updated, the Program Operator shall communicate with the original committee, any new EPD participants, and initiate a new public call for interested parties.

Public Consultation

Public consultation was utilized during the PCR review process. The public consultation of the completed draft PCR included a minimum 30-calendar-day period for comments to be submitted to UL. After public comments were submitted, the PCR committee reviewed and developed responses for all comments. All comments from the review panel and public consultation were addressed and satisfactorily resolved by the PCR committee prior to the publication of this PCR.

Review

The review process of this Part B PCR included a review through public consultation from December 16, 2020 – January 16, 2021 and a panel review, comprised of the following individuals:

Emily Lorenz, PE, FACI (chair)
Consulting Engineer

Martha G. VanGeem, PE,
LEED AP BD+C, FACI
Consulting Engineer

Christine A. Subasic, PE, LEED AP
Consulting Architectural Engineer

II. Terms and Definitions

For the purposes of this document, the definitions given in ISO 6707-1, ISO 14025, ISO 14044, ISO 14050, ISO 15686-1, ISO 21930 and the following apply. For abbreviations not defined in Part B, see Part A. Whenever compatibility issues arise between these standards, the definitions in ISO 21930 shall take precedence. Where a definition is found in one of these standards and below, the definition below takes precedence

ALLOCATION

¹ There are several compatibility issues with ISO 21930 and EN 15804 which are specifically noted in Part A (See Section 2.8.4.1.2). Whenever compatibility issues arise, whether addressed in this Part B or not, the requirements in ISO 21930 shall take precedence over EN 15804. If it is necessary for an EPD to explicitly conform to EN 15804 and not ISO 21930, this precedence will not apply.



Partitioning the environmental flows (input and output flows) of a process or a product system between the product system under study and one or more other product systems (adapted from ISO 14044).

ANCILLARY INPUT

Material input that is used by the unit process producing the product or during the construction or use stage but does not constitute part of the product (adapted from ISO 14044).

CONSTRUCTION PRODUCT

Item used during the life cycle of a building or any other type of construction works (adapted from ISO 6707-1 and ISO 14021).

CUT-OFF 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 an LCA study (adapted from ISO 14044).

DECLARED UNIT

Quantity of a construction product for use as a reference unit, e.g. mass (kilogram), volume (cubic meter), for the expression of environmental information needed in information modules. Note: The declared unit is used in instances where the function and the reference scenario for the whole life cycle of a manufactured concrete product (MCP) cannot be stated (adapted from ISO 21930).

ENVIRONMENTAL DECLARATION/LABEL

A claim that indicates the environmental impacts of a product (adapted from ISO 14020:2000).

EXPANDED SHALE, CLAY, AND SLATE (ESCS)

A lightweight, ceramic material produced by expanding and vitrifying select shale, clay, or slate in a rotary kiln (ASTM E2788/E2788M).

FUNCTION

Purpose for which a construction product is designed, used or required to be used (adapted from ISO 15686-10).

FUNCTIONAL UNIT (FU)

Quantified performance of a product system for a construction product or construction product for use as a reference unit based on LCA that includes all stages of a life cycle (adapted from ISO 14044 and ISO 21930).

IMPACT CATEGORY

A class representing environmental impacts of concern to which life cycle inventory analysis results may be assigned (ISO 14044).

IMPACT CATEGORY INDICATOR

A quantifiable representation of an impact category (ISO 14044).

INFORMATION MODULE

Compilation of data to be used as a basis for an EPD covering a unit process or a combination of unit processes that are part of the life cycle of a product (ISO 21930).

LIFE CYCLE

Consecutive and interlinked stages related to a product, from raw material acquisition or generation from natural resources to end-of-life (adapted from ISO 14044).



LIFE CYCLE ASSESSMENT (LCA)

Assessment aimed at compiling and evaluating the inputs, outputs and the potential environmental impacts of a product system throughout the life cycle of a product (adapted from ISO 14044).

LIFE CYCLE INVENTORY ANALYSIS (LCI)

Phase of LCA involving the compilation and quantification of input and output flows for a product throughout its life cycle (ISO 14044).

NOTE In the case of 'input flows', products and materials include raw materials, intermediate products and co-products, while in the case of 'output flows' it also includes releases (emissions to air and discharges to water and soil).

LIFE CYCLE IMPACT ASSESSMENT (LCIA)

Phase of an LCA aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of a product (ISO 14044).

LIGHTWEIGHT AGGREGATE

See low-density aggregate (ASTM C125)

LOW-DENSITY AGGREGATE

Aggregate with bulk density less than 1120 kg/m³ [70 lb/ft³], such as: pumice, scoria, volcanic cinders, tuff, and diatomite; expanded or sintered clay, shale, slate, diatomaceous shale, perlite, vermiculite, or slag; and end products of coal or coke combustion (ASTM C125)

NOTE: Except for expanded shale, clay, and slate, the low-density aggregates listed above are not covered by this PCR.

PRODUCT CATEGORY

Group of construction products that can fulfill equivalent functions (adapted from ISO 14025).

PRODUCT CATEGORY RULES (PCR)

Set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories (ISO 14025).

PCR REVIEW

Verification of the PCR by a third-party panel (adapted from ISO 21930).

PRODUCT SYSTEM

Collection of unit processes with elementary product flows (i.e., smallest element considered in the life cycle inventory analysis), performing one or more defined functions, and which models the life cycle of a product (adapted from ISO 14044).

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).

TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD)

Environmental declaration that provides quantified environmental data of a product, using predetermined parameters and, where relevant, additional environmental information (adapted from ISO 14025).



III. Scope

This document contains the Product Category Rule (PCR) requirements for ESCS System Product Environmental Product Declarations (EPDs) published in coordination with the ISO 21930 and EN 15804 standards. The requirements for the background Life Cycle Assessment (LCA) project report used to inform the EPD are contained in UL's Part A: Life Cycle Assessment Calculation Rules and Report Requirements. This Part B document, coupled with the Part A, conforms to the ISO 21930, EN 15804, and ISO 14025 sustainability standards for EPD reporting in addition to the US Green Construction product Council PCR Guidance.

General Guidance

The scope of this PCR applies to the product group expanded shale, clay, and slate (ESCS) lightweight aggregate produced in a rotary kiln. Lightweight aggregate is a type of coarse and fine aggregate that is used in the production of lightweight concrete products such as concrete, masonry, backfill, pavement, soil amendments, and filter materials. For over a century, coarse and fine ESCS has been used around the world in more than 50 different types of applications in structural, geotechnical, environmental, agricultural, water resources, and transportation infrastructures. The most notable among these are concrete masonry, high-rise construction product, concrete bridge decks, precast and prestressed concrete elements, asphalt pavement and surfaces, soil conditioner, and geotechnical fills. Other uses include the internal curing of concrete, on-site water and wastewater treatment, concrete roof tile, manufactured stone veneer, and concrete wall board, to name a few.

The number of ESCS product applications is virtually unlimited, hence this PCR offers four examples as technical scenarios, including the following general categories: aggregate backfill, masonry, lightweight concrete, and concrete pavement. Although these scenarios do not cover all applications, users will be able to use the examples to build their own applications. When the application is unknown, EPDs may be cradle to gate in scope.

Applicable Products

Table 1 describes the construction product products covered within the scope of this Part B, along with their relevant Construction Specification Institute (CSI) MasterFormat numbers. This list is non-exhaustive, and the CSI numbers provided reflect common applications, which can include multiple uses; other applications may exist.

TABLE 1. ESCS LIGHTWEIGHT AGGREGATE PRODUCTS AND MASTERFORMAT (CSI) NUMBERS

Product Standards	MasterFormat (CSI) number(s) and descriptions	
STANDARD SPECIFICATION FOR INORGANIC AGGREGATES FOR USE IN GYPSUM PLASTER (ASTM C35)	03	Concrete
	03 30 00	Cast-In-Place Concrete
	03 4x xx	Precast Concrete
	03 5x xx	Cast Decks and Underlayment
STANDARD SPECIFICATION FOR AGGREGATE FOR MASONRY MORTAR (ASTM C144)	03 6x xx	Grouting
	04	Masonry
STANDARD SPECIFICATION FOR LIGHTWEIGHT AGGREGATES FOR STRUCTURAL CONCRETE* (ASTM C330/C330M or AASHTO M195)	04 05 13	Masonry Mortaring
	04 05 16	Masonry Grouting
	04 22 xx	Concrete Unit Masonry
STANDARD SPECIFICATION FOR LIGHTWEIGHT AGGREGATES FOR CONCRETE MASONRY UNITS (ASTM C331/C331M)	07	Thermal and Moisture Protection
	07 21 00	Thermal Insulation
STANDARD SPECIFICATION FOR LIGHTWEIGHT AGGREGATES FOR INSULATING CONCRETE* (ASTM C332)	31	Earthwork
	31 32 00	Soil Stabilization
	31 34 xx	Soil Reinforcement
STANDARD SPECIFICATION FOR AGGREGATES FOR MASONRY GROUT (ASTM C404)	32	Exterior Improvements
	32 1x xx	Bases, Ballasts, and Paving
	32 32 xx	Retaining Walls



STANDARD SPECIFICATION FOR AGGREGATE FOR JOB-MIXED PORTLAND CEMENT-BASED PLASTERS (ASTM C897) STANDARD SPECIFICATION FOR LIGHTWEIGHT AGGREGATE FOR INTERNAL CURING (ASTM C1761) STANDARD SPECIFICATION FOR COARSE AGGREGATE FOR ASPHALT PAVING MIXTURES (ASTM D692/D692M) STANDARD SPECIFICATION FOR FINE AGGREGATE FOR ASPHALT PAVING MIXTURES (ASTM D1073/D1073M) STANDARD SPECIFICATION FOR AGGREGATE FOR SINGLE OR MULTIPLE BITUMINOUS SURFACE TREATMENTS (ASTM D1139/D1139M) STANDARD SPECIFICATION FOR USE OF EXPANDED SHALE, CLAY AND SLATE (ESCS) AS A MINERAL COMPONENT IN THE GROWING MEDIA AND THE DRAINAGE LAYER FOR VEGETATIVE (GREEN) ROOF SYSTEMS (ASTM E2788/E2788M) STANDARD SPECIFICATION FOR LIGHTWEIGHT AGGREGATES FOR STRUCTURAL CONCRETE (AASHTO M195)	<table> <tr> <td>32 33 xx</td><td>Site Furnishings</td></tr> <tr> <td>32 91 13</td><td>Soil Preparation</td></tr> <tr> <td>33</td><td>Utilities</td></tr> <tr> <td>33 41 xx</td><td>Subdrainage</td></tr> <tr> <td>34</td><td>Transportation</td></tr> <tr> <td>34 71 xx</td><td>Roadway Construction</td></tr> </table>	32 33 xx	Site Furnishings	32 91 13	Soil Preparation	33	Utilities	33 41 xx	Subdrainage	34	Transportation	34 71 xx	Roadway Construction
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32 91 13	Soil Preparation												
33	Utilities												
33 41 xx	Subdrainage												
34	Transportation												
34 71 xx	Roadway Construction												

*Note: Although these standards apply to low-density aggregate (per ASTM C125), the scope of these PCR only includes expanded shale, clay, and slate aggregate.

The products considered in this PCR fall under UNCPC codes:

- 3799 - Non-metallic mineral products not elsewhere classified (including mineral wool, expanded mineral materials, worked mica, articles of mica, non-electrical articles of graphite, or other carbon and articles of peat)

Non-Applicable Products

Products that may provide the same function in a different application are not within the scope of this PCR. These excluded products are:

- Aggregates other than ESCS

System Boundary

The system boundary for EPDs created using this PCR is either:

- Cradle to gate (modules A1-A3) or
- Cradle to gate with options (modules A1-A3, optional modules A4, A5, B1-B7, C1-C4, and D²) or
- Cradle to grave (modules A1-A3, A4, A5, B1-B7, C1-C4, and optional module D)

See Part A, Section 2.8 for further discussion of the required and optional information modules included in each EPD type. Module D is not a life cycle stage like the information modules A1 to C4 and is outside the system boundary of the studied product system and construction works system. Supplementary environmental information may be provided in Module D that addresses potential loads and benefits beyond the product system boundary.

² Modules C1-C4 shall be reported when reporting module D.



The EPDs produced under this PCR do not cover the operational impacts of the whole construction product. It is the production of these construction products, not the impacts from the operational phase of a whole construction product, which are the subject of EPDs covered by this PCR.

The EPD requirements include:

- ISO 21930:2017 standard
- EN 15804:2012+A2:2019 standard (optional)
- ULE General Program Instructions v 2.5, March 2020 (available upon request)
- The calculation rules for the Life Cycle Assessment and Requirements on the Project Report are specified in a separate document as Part A v3.2 of the Product Category Rules, available at <https://www.ul.com/offerings/product-category-rules-pcrs>



IV. Industry-Average EPD Requirements

Industry-Average EPD Scope

The products represented within a single industry-average EPD created using this PCR are limited to the primary materials defined in the product specification standards in Section 9 of Part B that characterize the specific product in commerce.

Involvement of Interested Parties

A call for involvement of interested parties in the creation of an industry-average EPD shall be published in at least one industry trade (ESCSI) publication. At a minimum, at least three (3) different manufacturing locations from no less than three (3) companies should be involved and represented in an industry-average EPD. The method for determining representativeness shall be justified and described per the requirements listed in Section 2.2.3.

Industry-Average EPD Participation

A manufacturer qualifies for participation in an industry-average EPD created using this PCR if they provide primary manufacturing data used in calculating the initial EPD average or demonstrate willingness to provide primary manufacturing data during the LCA data collection process.

Retroactive participation

When determining a manufacturer's participation eligibility, the EPD Program Operator shall follow the rules and recommendations of the primary sponsor(s) of the industry average EPD and participating manufacturers.

If deemed eligible, a manufacturer desiring retroactive inclusion in the industry average EPD shall provide manufacturing and product data information of the same representativeness submitted in the original industry average EPD to the LCA practitioner. The LCA practitioner will then recommend to the Program Operator a determination for inclusion in the industry average based on results falling within a reasonable range for any impact category. The maximum and minimum should be reported in the LCA background report for each impact category based on the highest and lowest impact product or facility within the original industry-average LCA.

Governance

An industry organization, ESCSI, shall inform possible industry participants through association meetings, newsletters, email messages, and similar types of outreach, including public notices in the trade press publications. Confidential business information shall be collected by a third party. Data from the third party shall be provided to the facilitator as aggregated data with no trace to the original source of data.

The development of an industry-average EPD and update of an EPD should involve a series of meetings and exchanges in which all participants are invited and kept apprised of the developments. Notices of these meetings should be given to all possible participants regardless of their commitment to active involvement. Minutes of meetings, along with meeting notices, should be preserved as documentation of the process and due diligence observed in the creation or renewal of the EPD.

Data Responsibility/Ownership

The trade association ESCSI that lead the development of industry-average EPDs may need to collect confidential business information from individual members. This data can include proprietary chemical formulations and processes or other confidential information. In this case, a designated third-party entity such as an LCA practitioner shall be identified as the "industry agent". The industry agent shall be responsible for activities including collection, secure storage and analysis of such data needed for the EPD development and will preserve the privacy of individual company information while executing these duties.

Per ISO 21930 Section 5.4, 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 the PCR. Only the manufacturer or group of manufacturers is authorized to declare the environmental performance of the construction product using an EPD.



The group of manufacturers responsible for developing an industry-average EPD shall be responsible for, including but not limited to, ensuring industry-average EPD updates are made based on the most recent LCA modelling software version and impact assessment version available.

EPD Updates

EPDs created using this PCR shall expire five (5) years after publication. An update to the existing EPD, or new EPD, may need to be developed prior to the five year review if any of the following have occurred (non-exhaustive):

- 1) Significant changes in the manufacturing process;
- 2) New manufacturers wish to participate but are disqualified for retroactive participation on the basis of provided data;
- 3) Significant changes or alterations in raw materials;
- 4) Major regulatory changes that mandate or trigger changes to operational procedures; or
- 5) Major technological changes.