

PRODUCT CATEGORY RULES

EN 15804

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PCR-Part B for natural stone products, aggregates and fillers



REVISION LOG

This is an overview of the changes made to this PCR. Typology of changes:

- Editorial (ed): Text or layout edited, with no change in content.
- Technical (te): Existing content has been changed.
- Addendum (ad): New content has been added.

Naming convention: Version x.y, where x is a major revision and y is a minor revision.

Date		
(2020-05-20)	Type	Description of change
Version 1.0		
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Introduction

These product category rules (PCR) are intended for companies preparing an environmental product declaration (EPD) for aggregate or natural stone products. The PCR for aggregate or stone products consists of two parts. This document contains PCR part B specific for aggregates or natural stone products, which is the part of the PCR that is specific for aggregate or natural stone products. Part A contains the requirements that are common for all construction products. When preparing an EPD for aggregate or natural stone products, all requirements outlined in part A and part B must be followed. In PCR part B, the requirements for PCR part A are referred to in each section where they occur. The purpose of this document is to define clear guidelines for performing the underlying life cycle assessment (LCA) to ensure comparability between EPDs.

This PCR was developed from October 2019 to 2020, by a Norwegian PCR work group with representatives from the aggregate or stone products industry and with aid from Ostfold Research (Østfoldforskning) and the EPD program operator The Norwegian EPD Foundation.

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1. Scope

This document complements the core rules for the product category of construction products as defined in EN 15804 and NPCR part A and is intended to be used in conjunction with those standards.

In addition, this PCR gives further specification for creating EPDs for aggregate or natural stone products on the national market. The core rules valid for all construction products are given in EN 15804 and NPCR part A are expected to be known by those preparing the EPD.

2. Normative references

EN 15804 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.

NPCR Part A: Construction products and services. Oslo: EPD-Norge.

NOTE: CEN is developing core product category rules (cPCR) for aggregates. When this is published, the standard shall be reviewed during development of an EPD and requirements should be followed. Reasons for not following cPCR requirements when developing an EPD should be justified in the LCA report.

3. Terms and Definitions

As in PCR part A and EN 15804

In addition, the following product-specific terms and definitions are given:

Natural stone

Rock used in construction and for monuments

[ISO 6707]

Aggregate

Granular material used in construction. Aggregate may be natural, manufactured or recycled.

[EN 12620]



Filler

Aggregate with a grain size less than 0.074 mm

[NS 427]

Filler sand

Aggregate with a grain size less than 0.149 mm

[NS 427]

4. Abbreviations

EPD Environmental product declarations

DU Declared unit

FU Functional unit

PCR Product category rules

LCA Life cycle assessment

LCI Life cycle inventory

LCIA Life cycle impact assessment

RSL Reference service life

ESL Estimated service life

N/A Not applicable

5. General Aspects

5.1 Objective of PCR Part A and B

As in PCR part A.

5.2 Types of EPD in respect to life cycle stages covered

As in PCR part A, including the following additions:

This document allows three types of EPD:

Bound aggregates and fillers: Cradle-to-gate with options A1-A3+A4. These stages are the minimum and maximum to be declared for the default type of EPD for bound aggregates and fillers. For B1-B7, C1-C4 and D the specific PCR part B for the final product using the bound aggregates and/or fillers shall be used.

Natural stones and unbound aggregates (minimum): Cradle to gate with A1-A3 modules (A4+A5) + C1-C4 and module D. These stages are the minimum to be declared for the default type of EPD for unbound aggregates and stone products.

Natural stones and unbound aggregates (maximum): Cradle to grave EPD A1-C4 and module D for unbound aggregates and natural stone products. These stages are the maximum to be declared for the default type of EPD for unbound aggregates, fillers and stone products.

EPD's describing both bound and unbound applications are allowed but must follow the system boundaries described above. Clear presentation of the scenarios is required in the EPD.

5.3 Comparability of EPD of construction products

As in PCR part A.

5.4 Additional information

As in PCR part A.

5.5. Ownership, responsibility and liability for the EPD

As in PCR part A, with the following addition:

EPD owner can be the company that have documented final product responsibility according to trading regulations for the declared unit in the specific market (e.g. sale providers).

Verification document of product responsibility shall be documented in an appendix of the background LCA-document when the EPD owner is not the producer of the declared product.

5.6 Communication format

As in PCR part A.

6 Product Category Rules for LCA

As in PCR part A.

6.1 Product Category

The product group natural stones, aggregates and natural sand. The product that shall follow this PCR, and their related standards. The product group are listed here:

NS-EN 1341:2012 Slabs of natural stone for external paving

NS-EN 1342:2012 Setts of natural stone for external paving

NS-EN 1343:2012 Kerbs of natural stone for external paving

NS-EN12620 Aggregates for concrete

NS-EN13043 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

NS-EN13139 Aggregates for mortar

NS-EN 13242 Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction

NS-EN 13383-1 Armour stone Part 1 Specification

NS-EN 13450 Aggregates for railway ballast

NS-EN 13055:2016 Lightweight aggregates

NS-EN 15285:2008 Agglomerated stone - Modular tiles for flooring and stairs (internal and external)

NS 3468:2019 Coarse materials of stone for use in civil engineering works

NS-EN 13385 Geometrical product specifications (GPS)

6.1.1 Quantified general properties of the product

As in Part A.

6.2 Life cycle stages and their information modules to be declared

6.2.1 General

As in PCR part A, with following specifications:

Transport in all life cycle modules shall include the following:

- direct emissions during transport (exhaust, tyres, breaks, etc.);
- upstream emissions from fuel extraction, processing and distribution;
- life cycle emissions of vehicles (raw materials, manufacturing, maintenance and disposal);
- life cycle emissions of infrastructure e.g. roads (raw materials, manufacturing, maintenance and disposal);
- specific load capacity factor (capacity utilisation). If specific data is not available, generic load capacity can be used.

6.2.2 A1-A3, Product stage, information modules

As in PCR part A, including the following clarifications:

TABLE 1: COMPLETENESS AND ALLOCATION PROCEDURES

	Activities included (Completeness check)	Allocation
Raw material extraction A1 (quarry) requires:	<ul style="list-style-type: none"> • specific inventory for the extraction process (dynamite, dynamite exhaust, machinery, leakage of heavy metals to waterbodies, explosion mats etc.)¹. • Additional activities to achieve transportable A2 and/or processable rocks in A3 must be included (e.g. pigging of rocks). 	As in Part A, including the following clarifications in table 2 for forest clearance and land use restorations.
A2 Transport to manufacturing	<ul style="list-style-type: none"> • specific inventories developed for machinery including direct emission, production of fuel and infrastructure including consumables (tires etc.), and end of life treatment of machinery. 	As in Part A.

	Simplifications can allow but must be justified in LCA report.	
A3 Manufacturing	<ul style="list-style-type: none"> Specific inventories developed for infrastructure and machinery including direct emission, production of consumables (e.g.; diamond blades etc.), and end of life treatment of machinery. 	As in Part A.

1) NOTE: See NPCR 024 Explosives and Initiation Systems for further guidance on explosives.

The activities and allocation applied for forestry and industry are listed in the table below.

Table 2: Allocation and completeness

Module	Activities included (Completeness check)	Allocation
A1	Forest clearance, with economic value	Excluded by partitioning
A1	Forest clearance, without economic value	As in Part A
A1	Land use restorations after quarry operation expires	As in Part A.

6.2.3 A4-A5, Construction process stage, information modules

As in PCR part A.

6.2.4 B1-B5, Use stage, information modules related to construction works

As in PCR part A.

6.2.5 B6-B7, Use stage, information modules related to the operation of the building

As in PCR part A.

6.2.6 C1-C4 End-of-life stage, information modules

As in PCR part A.

6.2.7 Benefits and loads beyond the system boundary, information module D

As in PCR part A.

6.3 Calculation rules for the LCA

For declaring aggregates, natural stones or stone products, a functional unit should be used when the specific use is known and shall be used for those products where this is specified as a requirement in 6.3.1. A declared unit shall be used when functional unit is not applicable and should be used for those products specified in 6.3.2.

The scope and variations of products must be declared according to EPD-Norway guidelines. As of 2014, similar products in the same EPD can only be included if the variations of the results for each LCIA category does not exceed +/- 10 %.

6.3.1 Functional unit

As in PCR part A, with the following additions:

Functional unit should be used when there is sufficient information about the application, but the products listed in Table 2 shall be declared with the following functional units.

Table 2: Functional units for aggregate or stone products.

Product standard	Functional unit	Reference dimension
EN 13450, EN 13242, EN 13055	1 tonne used for purpose	
EN 1341, EN 1342, EN 1343, EN 13383-1, EN 15285	1 tonne used for purpose	Conversion factor to volume (m ²) and/or length (m) should be specified.

The functional unit shall also specify:

- Quantified key properties of the product, when integrated into the construction works, facilitating a functional equivalent comparison with similar products.
- The defined in-use conditions and time period for these performance characteristics.
- Reference service life must be specified as in Part A, with the following addition of chapter 6.3.3.

6.3.2 Declared unit

As in PCR part A, with the following addition:

Declared unit shall be used when functional unit is not applicable, but the products listed in Table 2 should be declared with the listed declared units.

Table 3: Declared units for crushed stones or stone products

Product standard	Declared unit	Reference dimension	Required modules
EN 12620, EN 13139 EN 13242	1 tonne		A1-A3, A4

6.3.3 Reference service life (RSL)

As in PCR part A, with the following addition:

6.3.4 System boundaries

As in PCR part A, with the following additions.

Electricity (raw material, provision, production, distribution and use) used in manufacturing (A3) are accounted for as part of A3.

6.3.5 Criteria for the exclusion of inputs and outputs (cut-off)

As in PCR part A, including the following further clarification:

The cut-off criteria in EPD-Norway's general program of instructions (GPI) shall also be followed. As of 2018, the key requirements are:

- that processes and activities that do not contribute more than 1 % of any environmental impact within any module can be left out
- production of capital, buildings and equipment that are not included shall also be justified according to the GPI. This justification shall be based on quantitative assessments to the cut-off criteria. Conservative assumption can be used when data is missing and is always better than leaving out activities in the inventory.

6.3.6 Selection of data

As in PCR part A, including the following additions:

All inputs (energy, waste, e.g.) directly associated to the extraction of aggregate or stone products and intermediate transport within a life cycle module are associated to the declared unit according to the mass balance principles described in equation 1 to 4.

All inputs (energy, waste, e.g.) not associated by any specific product are to be included based on the products sold mass share compared to the total sold mass within the appropriate period.

For transport data in life cycle modules A2, A4 and C2, the data representativeness of the vehicle type, fuel use and load factor must be shown to be realistic and conservative for the actual use and scenario. Transport inventory should use case relevant freight cohorts, fuel types and fuel consumption ranges for each life cycle module scenario. Fuel composition should reflect national blends if no specific fuel type blend is given.

6.3.7 Data quality requirements

As in PCR part A, including the following additions:

If data for stone as raw materials are not available from an EPD according to EN 15804 and/or verified according to ECO Platform, the compliance of the data to EN 15804 and specifications in this PCR must be shown in the LCA report and the LCI must be checked during verification. This includes the whole value chain from quarry and industrial processes.

6.3.8 Scenarios at the product level

As in PCR part A.

6.3.8.1 A4 Transport to the building site

As in PCR part A with the following clarifications;

Imported declared units shall declare the freight to national intermediate storage.

For imported and domestic declared units the following default travel distances from the manufacturing or intermediate storage site may be used:

- Aggregates: 50km
- Fillers: 100km
- Natural stone products: 100km.
- Case specific EPD's shall use actual freight distances within the given project.

Specific life cycle inventory is to be prioritized for the product group representing the declared unit. Use of generic life cycle inventory must be thoroughly justified.

6.3.8.2 A5 Installation

As in PCR part A.

6.3.8.3 B1-B7 Use phase

As in PCR part A.

6.3.8.4 C1-C4 End-of-life

As in PCR part A, including the following additions:

C2: Transport from the building/demolition site to the waste treatment/recycling facility shall be estimated based on information from the EPD owner and shall be relevant for the intended market. Default scenarios should be based on national statistics if specific scenarios are unavailable.

More than one scenario for waste treatment and disposal can be included if there are several relevant common practices, but the most conservative scenario shall always be included.

End of life scenario must be described in EPD.

6.3.8.5 Units

As in PCR part A.

6.4 Inventory analysis

As in PCR part A, with the following clarifications:

Calculation procedures for material flows carrying specific inherent properties:

In accordance to EN 15804 all material flows carrying specific inherent properties (e.g. elementary composition) shall be mass balanced within the system boundary. For securing this material flow assessment are to be presented for each product stage. All product flows in the foreground system must be illustrated and presented, including the declared unit, co-products and waste flows.

- The output driven approach shall be used for all upstream material flows relative to the declared or functional unit.
- The input driven approach shall be used for all downstream material flows relative to the declared or functional unit.
- The point of the declared unit or functional unit is to be set as base location of estimating process flows (e.g. A4 for declared unit and B7 for functional unit).

EQUATION 1: OUTPUT DRIVEN CALCULATIONS (UPSTREAM MASS FLOW ESTIMATION)

$$input_z = \sum_{year=1} Output_y$$

Total output of all mass flows (y) shall be the same as total input (z) for a given year each process stage upstream of where the functional unit is defined.

EQUATION 2: INPUT DRIVEN CALCULATIONS (DOWNSTREAM MASS FLOW ESTIMATION)

$$output_y = \sum_{year=1} input_x$$

Total output of all mass flows (y) shall be the same as total input (x) for a given year for each process stage downstream from where the functional unit is described.

EQUATION 3: ESTIMATION OF COEFFICIENTS, OUTPUT CALCULATIONS

$$Coefficient_{i\%,z} = \frac{\sum_{year=1} Output_{i,z}}{\sum_{year=1} Output_{total,z}}$$

Relative product flow (i%), out of process (z) is the output of (i) in mass relative to the total output in mass of process (z).

EQUATION 4: ESTIMATION OF INPUT FLOW BASED ON OUTPUT COEFFICIENTS

$$input_{i\%,z} = \frac{\sum_{year=1} Output_{i,z}}{Coefficient_{i\%,z}}$$

Input flow (in mass) to process (z) is estimated based on output flow (in mass) of product (i) divided on the relative output share of product (i).

- To secure mass balanced input and output flows and validate manufacturing data input flows (in mass) should be estimated based on one product outflows. Deviances between output flow (in mass) and given manufacturing data should be thoroughly examined.
- Relevant physical product flows shall be illustrated in detail for declared unit, aggregated co-products and waste flows unused flows.

Inventory data shall be representative for a clearly specified location or group of raw material extraction, manufacturing and installation locations.

6.5 Impact assessment

As in PCR part A.

7 Content of the EPD

7.1 Declaration of general information

As in PCR part A, including the following aspects:

The material composition of the product shall be listed in EPD with relative weights of the main constituents (petrographic assessment) as it is installed. This information shall be included in the LCA report. Usage areas and conditions must be specified in the EPD. The harmonised standard for which the product is produced according to must be specified in the EPD.

The scope of products declared in an EPD must be specified.

- Product properties shall be presented based on relevant declaration of performance (DoP) and underlying documentation must be provided.
- An EPD shall present the declared/functional unit product/service description, general or specific product purpose and technical properties according to product standard for

appropriate product group including, but not exclusively (e.g.: apparent density, water absorption abrasion resistance, flexural strength).

- Inputs of recycled materials and virgin materials shall be illustrated and described as separate flows.

7.2 Declaration of environmental parameters derived from LCA

7.2.1 General

As in PCR part A.

7.2.2 Rules for declaring LCA information per module

As in PCR part A.

7.2.3 Parameters describing environmental impacts

As in PCR part A.

7.2.4 Parameters describing resource use

As in PCR part A.

7.2.4.1 Water use

As in PCR part A.

7.2.4.2 Electricity used in A3 Manufacturing

Not as in PCR part A, edited to:

Production of electricity and provision including transmission and grid losses are to be accounted for as part of A3.

7.2.5 Other environmental information describing waste categories and output flows

As in PCR part A.

7.2.6 Accounting of biogenic carbon during the life cycle

As in PCR part A, including the following additions:

Not relevant.

7.2.7 Greenhouse gas emissions from land use change

As in PCR part A, including the following additions:

If no specifications are given in PCR part A, greenhouse gas emissions from land use change shall be declared according to ISO 21930.

7.3 Scenarios and additional technical information

7.3.1 General

As in PCR part A.

7.3.2 Construction process stage

7.3.2.1 A4, Transport from the production site to the construction site.

As in PCR part A, including the following additions:

Transport from the production gate to the construction site is typically carried out using trucks. The distance, type of vehicle, fuel consumption and degree to which the transport capacity is utilised may have a large impact on transport emissions, thus these factors must be stated. Capacity utilisation is calculated as a percentage (%) of the mass of the total load capacity of the vehicle. The percentage given shall be the average of the capacity utilisation including the return trip. Table 7 shows which information shall be provided in the EPD when module A4 is included.

TABLE 7. INFORMATION ON THE TRANSPORT TO THE CONSTRUCTION SITE (A4) REQUIRED IN THE EPD.

Type	Capacity utilization (incl. return)	Type of vehicle, fuel type, incl	Distance in km	Fuel / energy consumption per tkm	Fuel energy consumption per km



	% relative to mass capacity	emission class			
Truck					
Railway					
Ship					
Other transport means					

7.3.2.2 A5, Installation

As in PCR part A, including the following additions:

The EPD shall specify the following information about the installation scenario:

- The consumption of fasteners, adhesives and necessary accessories
- The amount of energy per energy carrier
- Guidance for installation, international standards/regulations or national standards/regulations in which the scenario is based on
- If the EPD deviates from the predefined scenarios, this shall be clearly stated and justified.
- Usage areas and conditions must be specified in the EPD.

7.3.3 Use stage

As in PCR part A, with the following additions:

Bound aggregates follow the guidelines specified for the product category in which it is bound.

7.3.4 End of life

As in PCR part A, including the following additions:



Transport from the building to end of life is typically carried out using trucks. The distance, type of vehicle, fuel consumption and degree to which the transport capacity is utilised may have a large impact on transport emissions, thus these factors must be stated. Capacity utilisation is calculated as a percentage (%) of the mass of the total load capacity of the vehicle. The percentage given shall be the average of the capacity utilisation including the return trip. Table 7 shows which information shall be provided in the EPD when module C2 is included.

TABLE 7. INFORMATION ON THE TRANSPORT FROM THE BUILDING TO END OF LIFE (C2) REQUIRED IN THE EPD.

Type	Capacity utilization (incl. return) % relative to mass capacity	Type of vehicle, fuel type, incl emission class	Distance in km	Fuel / energy consumption per tkm	Fuel energy consumption per km
Truck					
Railway					
Ship					
Other transport means					

7.4 Additional information

As in PCR part A.

7.4.1 Additional information on release of dangerous substances to indoor air, soil and water

As in PCR part A.

7.4.1.1 Indoor air

As in PCR part A, with the following additions:

Release of substances to indoor air is relevant when the product is used on the inside of the vapour barrier. The following standard should be applied for measuring emissions to indoor air:

- EN 16516 Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air

7.4.1.2 Soil, ambient air and water

As in PCR part A, with the following additions:

Release of substances to ground water or soil is relevant for products when they are used in direct contact with the ground or rainwater. Until horizontal standards for the measurement of leaching characteristics are available, the following reports should be used:

- CEN/TS 16637-1 Construction products: Assessment of release of dangerous substances – Guidance for the determination of leaching tests and additional testing steps
- CEN/TS 16637-2 Construction products – Assessment of release of dangerous substances – Horizontal dynamic surface leaching test
- CEN/TS 16637-3 Construction products. Assessment of release of dangerous substances. Horizontal up-flow percolation test.
- CEN/TR 17105 Construction products. Assessment of release of dangerous substances. Guidance on the use of ecotoxicity tests applied to construction products.

7.4.2 Additional Norwegian requirements

As in PCR part A.

7.5 Aggregation of information modules

As in PCR part A.

8 Project Report

As in PCR part A, with the following addition.

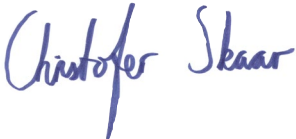
9 Verification and Validity of an EPD

As in PCR part A.

During verification, the verifier must check that the EPD and accompanying LCA report are carried out according to the normative standards listed in this PCR.

Approved 20.05.2020, valid until 20.05.2025.

Norwegian EPD Foundation, Technical committee



Christofer Skaar

Leader of the Technical committee

10 Bibliography

As in PCR part A, including the following additions:

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