

# PRODUCT-CATEGORY RULES (PCR)

For preparing an environmental declaration  
(EPD) for Product Group

***Asphalt and crushed stone***

NPCR 18  
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## 1. General information

These product category rules (PCR) are intended for companies preparing an Environmental Product Declaration (EPD) for asphalt and/or crushed stone (see chapter 6.1 for definition of product group).

The PCR is based on and represent a supplement to ISO 14025 [1] and the coming European standard prEN 15804 - *Sustainability of construction works – Environmental Product Declarations – core rules for the product category of construction products* [2] (Draft 2010-10-12).

The PCR covers cradle to gate for crushed stone and cradle to gate (mandatory) and construction stage (optional) for asphalt.

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## 2 Excecutive summary

Table 1 sums up the most important aspects defined distinctively for this particular product category. More details are given in the following sections.

Table 1: PCR for asphalt – executive summary

Section	Topic	PCR – asphalt	Reference in ISO 14044	Reference in ISO 14025	Reference in prEN 15804
4	Terms and definitions	Asphalt, crushed stone, recycled asphalt, reuse in production	3	3	3
6.1	Product category	Asphalt and crushed stone		6.7.1 6.7.2	6.1
6.3.2	Declared unit	1 tonne of manufactured crushed stone /asphalt	4.2.3.2 4.3.3.3		6.3.2
6.3.3	Reference service life	Not relevant, but should be stated by manufacturer in the EPD for different applications.			6.3.3
6.3.4	System Boundaries	Cradle to gate	4.2.3.3 4.3.3.4		6.3.4
	<u>Scenarios</u>				
6.3.7	Developing product level scenarios	Laying/installation of 4 cm asphalt			6.3.8
6.4.1	Allocation rules	Allocation according to mass [kg]	4.3.4		6.4.3
7	Additional information	The content of harmful substances/ chemicals should be declared in EPD.		7.2.3 7.2.4	7.48.2

## 3 Scope

The intended application of these Product Category Rules (PCR) is to give guidelines for development of Environmental Product Declarations (EPD) for cradle to gate for crushed stone and asphalt, and in additional optional construction stage for asphalt, and to further specify the

underlying requirements of the limited Life Cycle Assessment (LCA). The core rules valid for all construction products are given in standard prEN 15804, and are expected known by those preparing the EPD.

## 4 Terms and definitions

General definitions are given in the standard prEN 15804, chapter 3.

### 4.1

#### **Asphalt**

Product mainly consisting of crushed stone and bitumen used as road surface with other applications such as surfaces on airport runways, outdoor car parks and schoolyards.

### 4.2

#### **CML**

The CML 2001 [3] is an impact assessment method collection, which restricts quantitative modelling to relatively early stages in the cause-effect chain to limit uncertainties and group LCI results in so-called midpoint categories, according to themes. These themes are common mechanisms (e.g. climate change) or commonly accepted grouping (e.g. ecotoxicity). (May be replaced by ELCD handbook requirements.)

### 4.3

#### **Crushed stone**

Stone material with specified quality produced in stamp mills/crushing plants. Commonly used as filling material in many construction applications.

### 4.4

#### **Recycled asphalt**

Asphalt that has been in use and has reached its end of life and hence been removed from road or other application, transported back to factory and used as input to production of new asphalt.

### 4.5

#### **Reuse in production**

E.g. asphalt waste from asphalt production used as input to asphalt production (closed loop recycling).

## 5 Comparability of EPD of construction products

General rules for comparability are given in the standard prEN 15804, chapter 5.3. Contents of project report and EPD shall be as specified in prEN 15804, chapters 7 and 9.

All EPDs shall display separate results from cradle to gate-analysis to allow aggregation to provide complete information for construction works.

## 6 Product Category Rules for LCA

### 6.1 Product Category

The product groups are:

- crushed stone from cradle to gate
- asphalt from cradle to gate (mandatory), and construction phase (optional)

## 6.2 Life Cycle stages to be included

See chapter 6.3.4. Figure 1 and 2.

## 6.3 Calculation rules for the LCA

### 6.3.1 Functional unit

Not relevant.

### 6.3.2 Declared unit

The declared unit is used when an EPD is based on one or more information modules rather than on LCA.

The declared unit (cradle to gate) is:

**1 tonne of crushed stone**

**1 tonne of manufactured asphalt**

**1 tonne layed asphalt with thickness 4 cm**

### 6.3.3 Reference service life

Not relevant.

### 6.3.4 System boundaries

The life cycle stages for crushed stone (cradle to gate) are shown in Figure 1.

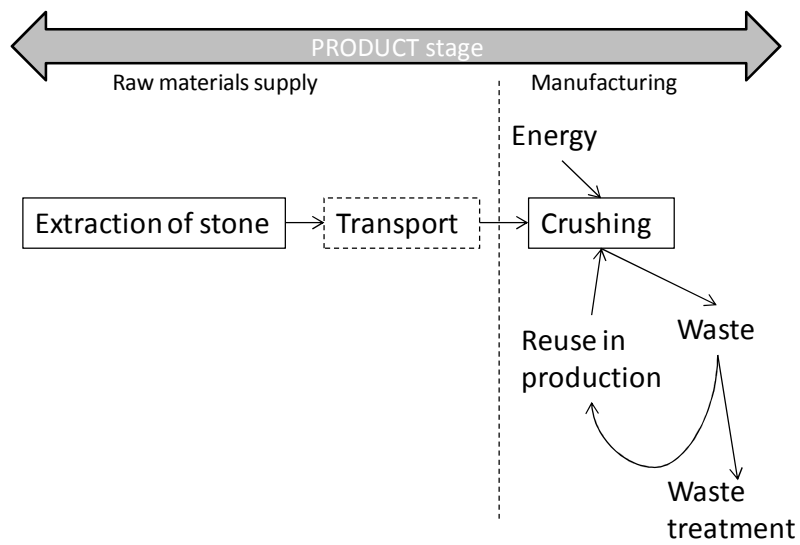


Figure 1: System boundaries and life cycle stages of crushed stone

Crushed stone may be an independent product or a material input to asphalt production or other products.

The life cycle stages for installed asphalt are shown in

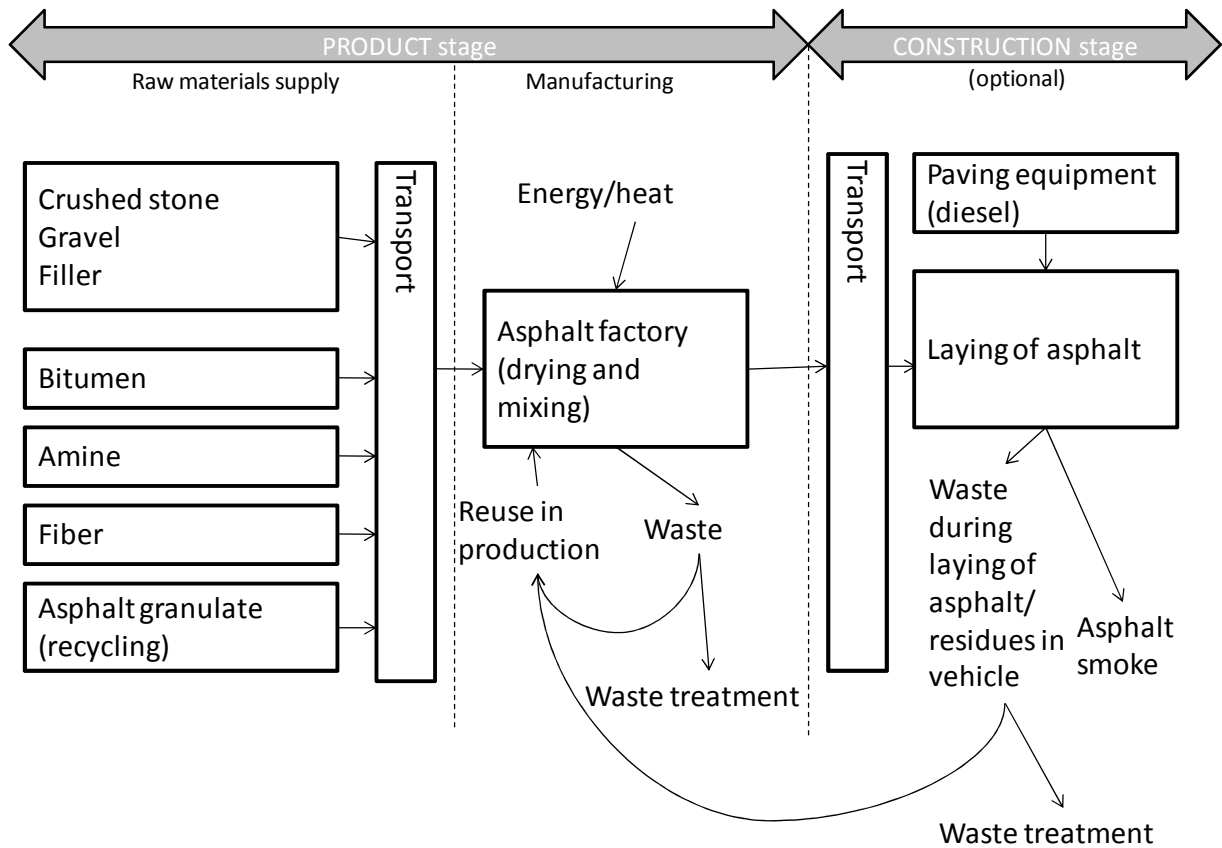


Figure 2. See also Fig. 1 in prEN 15804.



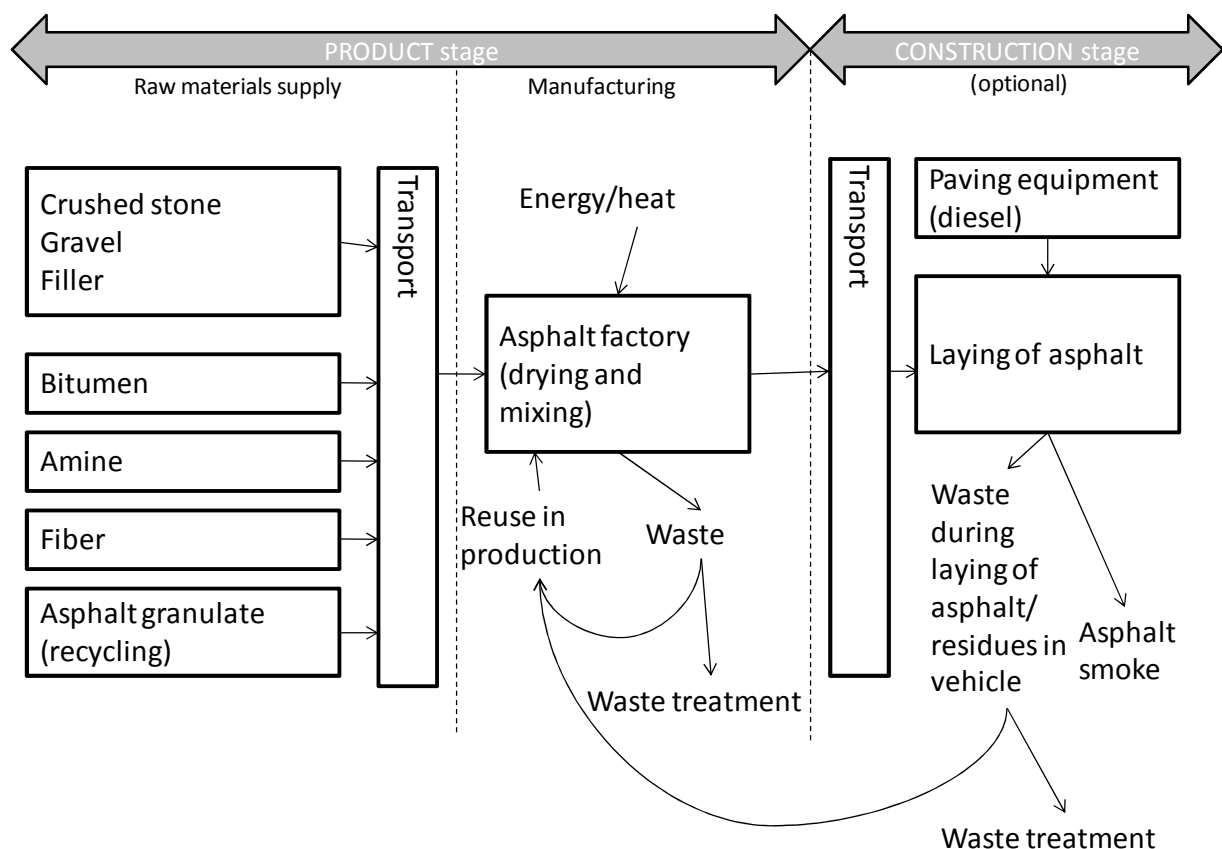


Figure 2: System boundaries and life cycle stages of asphalt

Bitumen produced according to the standards NS-EN 12591 *Bitumen and bituminous binders - Specifications for paving grade bitumens* [8] and NS-EN 14032 *Bitumen and bituminous binders. Framework specification for polymer modified bitumens* [9].

Use of bitumen emulsion as adhesive (bond coat) in construction phase according to standard NS-EN 13808 *Bitumen and bituminous binders - Framework for specifying cationic bituminous emulsions* [10].

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

General cut-off criteria are given in standard prEN 15804, section 6.3.5.

Excluded from the calculations:

- Production of machinery for production of crushed stone and asphalt due to assumption of low impact relative to other impacts

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

### 6.3.6 Data quality requirements

General requirements and guidelines concerning use of generic and specific data and the quality of those are described in the standard prEN 15804, sections 6.3.6 and 6.3.7.

In addition the following rules should be applied:

- For manufacturing of product (crushed stone or asphalt), specific annual data shall be applied
- Actual data age (when data was collected) shall be stated.
- If site-specific data with certificate of origin cannot be obtained, the mix of electricity used should be the grid mix in the country where main energy consuming processes take place. (e.g. NordEl mix for production sites located in Norway). The mix of electricity (calculation procedure) shall be documented by citing sources for environmental impact from production and for electricity mix.
- For directly consumed heat and electricity, production and infrastructure of consumed heat and electricity should be included in accordance with PCR for Electricity, Steam, and Hot and Cold Water Generation and Distribution, PCR CPC 17 [11]. As a result, infrastructure must be included for energy production.
- Hazardous waste shall be specified according to EU Directives 91/689/EEC and 75/442/EEC (specific and/or average background) or updates/directive in force in the relevant country.

Specific data shall always be applied when possible. If an EPD exists for a purchased sub-product, the EPD should be used as data source/input to the LCA.

All transport must be included and allocated based on the weight [tonne km] of transported product. Specific transport distances are to be used when available. If no such information is available, the following transport scenario and distances shall be used:

Transport of asphalt from production site to laying location: estimated to 35 km. If other distance is applied, this must be clearly stated and justified in the EPD. This transportation distance is defined as a part of construction stage, which is optional. It is however recommended to include this transport distance in a cradle to gate EPD.

### 6.3.7 Scenarios on product level

The optional construction stage for cradle to gate EPD is defined by the scenario described below.

Construction process stage (optional) – only relevant for EPD of asphalt

The construction process stage is based on laying of 1 tonne of asphalt with a layer thickness of 4 centimetres. All machinery fuel and materials consumed during laying of the asphalt must be included, such as use of paving equipment. Both production of fuel and emissions from combustion of the fuel shall be included.

If other thickness than 4 cm is used in the calculation, this must be explained in the EPD.

Waste handling of residue if not reused in production (residues in car and related to laying) shall be included. Emissions such as asphalt smoke must be included in the LCA.

Secondary materials leaving the system boundary shall be declared in module D, “supplementary information beyond the building life cycle”

### 6.3.8 Units

SI units shall be used

## 6.4 Inventory analysis

### 6.4.1 Allocation of input flows and output emissions

General allocation rules including closed-loop and open-loop allocation procedures are given in the standard prEN 15804.

Allocation should be performed in the following order

- 1 Physical properties (e.g. mass)
- 2 Economic value

Allocation related to transport shall be based on the weight [tonne km] of transported product.

The environmental impacts from recycling are allocated to the next life cycle. The recycling processes shall be treated as closed loop recycling, as long as no changes occur in the inherent properties of the recycled material. In such cases, the need for allocation is avoided since the use of secondary material displaces the use of virgin (primary) materials. Recycled materials that are used in the fabrication of the product shall have no environmental impact on the new product.

## 6.5 Impact assessment

Parameters shall be declared and reported according to standard prEN 15804, sections 6.5, 7.2.2 and 7.3. Characterisation method is specified for each environmental impact category.

Environmental impact should be declared as stated in prEN 15804, chapter 6.5:

- Global warming potential, GWP, in kg CO<sub>2</sub> - equivalents, 100 years (latest version of IPCC)
- Depletion potential of the stratospheric ozone layer, ODP (ozone depletion potential), in kg CFC 11-equivalents, 20 years (CML 2001 or updates)
- Acidification potential of land and water sources, AP, in kg SO<sub>2</sub> – equivalents (CML 2001 or updates)
- Eutrophication potential, EP in kg PO<sub>4</sub> –equivalents (CML 2001 or updates)
- Formation potential of tropospheric ozone photochemical oxidants, POCP (photochemical oxidants creation potential), in kg C<sub>2</sub>H<sub>4</sub>-equivalents). (CML 2001 or updates)

CML may be replaced by ELCD handbook requirements.

## Resources

Parameter	Parameter unit expressed per functional/declared unit
input of renewable primary energy not including feedstock (renewable energy resources)	MJ, net calorific value
Input of renewable feedstock	MJ
Total input of renewable primary energy	MJ
input of non renewable primary energy not including feedstock (non renewable energy resources),	MJ, net calorific value
Input of non renewable feedstock	MJ
Total input of non renewable primary energy	MJ
Input of secondary material	kg
Input of renewable secondary fuels	MJ
Input of non renewable secondary fuels	MJ
Input of net fresh water	m <sup>3</sup>

Waste to disposal should be declared as:

- Hazardous waste (kg) according to EU directive 91/689/EEC and 75/442/EE and updates. (Current regulations that apply in Norway: Regulation for recycling and treatment of waste, FOR-2004-06-01-930, with amendment FOR-2010-06-25-979, Ministry of Environment (Norwegian: Avfallsforskriften)).
- Non hazardous waste (kg)
- Radioactive waste

## 7 Additional environmental information

An EPD for asphalt and crushed stone shall include the following information related to environmental issues, in addition to the environmental information derived from LCA.

### 7.1 Chemicals

Specification of materials and substances that can adversely affect human health and environment shall be reported.

A detailed list of the product's substances (chemicals used in manufacture), including CAS number and health class (Risk phrases or CLP regulations (Regulation (EC) No 1272/2008) when these are in force), shall be included in the product content declaration. The content of substances shall be declared in weight %. In cases where information about contents could affect patent or company secrets, a qualitative list of chemicals and their expected functions is sufficient, including the Risk phrases.

## 7.2 Recyclability

Under end of life description the manufacturer should describe the recommended waste handling and state the recyclability of product (weight percentage of materials in product that are recyclable).

## 8 Content of the EPD

The content of EPDs (cradle to gate) for crushed stone and asphalt is described below:

1. Information about product: product name, reference to this PCR, description of applications and density.
2. Information about manufacturer
3. The following information must be presented in a red box on the front page:
  - LCA results for GWP (Global warming potential)
  - LCA results for energy use (fossil and non fossil)
  - The amount of recycled material used (weight percentage according to definition of recycled asphalt in chapter 4 Terms and definitions) (only for asphalt)
  - Production temperature (only for asphalt)
4. Product specification (material content of product in % and data sources for each material).
5. LCA results for cradle to gate (and optional construction stage for asphalt): material use, energy use, environmental impact categories and waste, for raw materials extraction, transport, production, construction stage (optional and only for asphalt) and in total.
6. Information about use phase: what are the factors that influence the service life?
7. Information about end of life: Description of recommended waste handling of product. The recyclability of product should be stated in % of product weight.
8. Methodological decisions, description of some life cycle stages are not included
9. Period of validity and statement that environmental declarations from different programmes may not be comparable
10. References

## 9 Period of validity of the document

This document is valid until 10.11.2015.

## 10 References

1. ISO 14025: 2006 Environmental labels and declarations –Type III environmental declarations – Principles and procedures
2. prEN 15804: 2010 Sustainability of construction works – Environmental Product Declarations – core rules for the product category of construction products.
3. CML 2010: Universiteit Leiden, Website of Institute of Environmental Sciences (CML), Faculty of Science. CML-IA Characterisation Factors found at:  
<http://cml.leiden.edu/software/data-cmlia.html>
4. ISO 21930: 2007 Sustainability in building construction - Environmental declaration of building products
5. ISO 14044: 2006 Environmental management - life cycle assessment - requirements and guidelines

6. ISO 14001: 2004 Environmental management – Specification of the requirements of an environmental management system (EMS)
7. EMAS – The Eco-Management and Audit System – Specification of the requirements of an environmental management system (EMS)
8. NS-EN 12591: 2009 Bitumen and bituminous binders - Specifications for paving grade bitumens.
9. NS-EN 14023: 2010 Bitumen and bituminous binders. Framework specification for polymer modified bitumens.
10. NS-EN 13808: 2005 Bitumen and bituminous binders. Framework for specifying cationic bituminous emulsions.
11. PCR 2007: Product category rules for preparing an environmental declaration for Electricity, Steam, Hot and cold water, generation and distribution, PCR CPC 17, Version 1.1.

The document may be updated during this period in accordance with changes in standards in force and guidelines for EPD Norway.

**Approved 10.11.2010, valid until 10.11.2015**  
**Norwegian EPD Foundation, PCR Review Panel**



- **Panel chairman**