

Draft PCR for Piping systems for use in sewage and storm water systems (under gravity) 2.0

PRODUCT CATEGORY RULES

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PCR – Part B for Piping systems for use in sewage and storm water systems (under gravity)



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 (20xx-xx-xx)	Type	Description of change
Version 1.0		
Original version, issued 20xx-xx-xx.		

DRAFT

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Introduction

These product category rules (PCR) are intended for companies preparing an environmental product declaration (EPD) for piping systems for use in sewage and storm water systems (under gravity) (see chapter 6.1 for a definition of the product group).

The PCR for piping systems for use in sewage and storm water systems (under gravity) consists of two parts. This document contains PCR part B for piping systems for use in sewage and storm water systems (under gravity), which is the part of the PCR that is specific for piping systems for use in sewage and storm water systems. Part A contains the requirements that are common for all construction products. When preparing an EPD for piping systems for use in sewage and storm water systems, 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 September 2017 to January 2018, by a Norwegian PCR work group, with representatives from the pipe production industry, and with aid from Ostfold Research (Østfoldforskning), SINTEF Building and Infrastructure and the Norwegian 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 15804:2012+A1:2013 and NPCR part A, and is intended to be used in conjunction with those standards.

In addition, the intended application of this product category rule (PCR) is to give guidelines for the development of environmental product declarations (EPD) for piping systems for use in sewage and storm water systems (under gravity); either cradle to gate with options or cradle to grave; and to further specify the underlying requirements of the life cycle assessment (LCA). The core rules valid for all construction products are given in standard EN 15804 and NPCR Part A, and are expected to be known by those preparing the EPD.

More specifically, this document outlines the following:

- defines the system boundaries;
- defines the modelling and assessment of material-specific characteristics;
- defines allocation procedures for multi-output processes along the production chain;
- defines allocation procedures for reuse and recycling;
- includes the rules for calculating the life cycle inventory (LCI) and the life cycle impact assessment (LCIA) underlying the EPD;
- provides guidance/specific rules for the determination of the reference service life (RSL);
- gives guidance on the establishment of default scenarios;
- gives guidance on default functional units for piping systems for use in sewage and storm water systems (under gravity)

This document is intended to be used either for cradle to gate with options or cradle to grave assessment, provided the intentions are properly stated in the system boundary description.

Within the construction works context, a cradle to grave declaration delivers a more comprehensive understanding of the environmental impacts associated with concrete and concrete elements.

2 Normative references

ISO14025: 2006, Environmental management – Type III environmental declarations – Principles and procedure.

ISO 21930: 2007, Sustainability in building and construction – Environmental declaration of building products.

ISO14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO15686-1: 2000, Buildings and constructed assets – Service life planning – Part 1: General principles

ISO15686-8: 2008, Buildings and constructed assets – Service life planning – Part 8: Reference

service life

EN15804: 2012, Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

EN15942: 2011, Sustainability of construction works – Environmental product declarations – Communication formats: business to business

NPCR Part A: Construction products and services. Ver. 1.0. April 2017. Oslo: EPD-Norge.

EN 1610: 1998. Construction and testing of drains and sewers

Part F: NS 3420-F:2008: Specification texts for building, construction and installations - Part F: Earthworks - Part 1

Part G: NS 3420-U:2008: Specification texts for building, construction and installations - Part G: Earthworks - Part 2

Part U: NS 3420-U:2016: Specification texts for building, construction and installations - Part U: Piping systems and installations

VA/Miljø-blad 5 and 6, 2016

3 Terms and Definitions

As in PCR part A.

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

3.1 Piping system for storm water

This includes the piping system as well as fittings and inspection chambers/manholes for leading rain, drain and surface water from collections of water (basins/manholes) to outflow/collectors.

3.2 Piping system for sewage

This includes the piping system as well as fittings and inspection chambers/manholes for transport of sewage.

3.3 Piping system function

The function of the sewage piping system for sewer applications is to transport (via gravity discharge) a certain amount of sewage from the entrance of a public sewer system to the entrance of the wastewater treatment plant.

4 Abbreviations

As in PCR part A.

5 General Aspects

5.1 Objective of PCR of this PCR

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:

According to this PCR, cradle-to-gate with options also includes life cycle modules A1-A3, A4, A5, C1-C4 and D as a minimum requirement (cradle to handover).

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.

5.6 Communication format

As in PCR part A.

6 Product Category Rules for LCA

As in PCR part A.

6.1 Product Category

As in PCR part A, including the following additions:

The product group piping systems for use in sewage and storm water systems (under gravity) includes pipes, fittings, and inspection chambers/manholes produced from all types of materials (EN 476).

6.2 Life cycle stages and their information modules to be included

6.2.1 General

As in PCR part A

6.2.2 A1-A3, Product stage, information modules

In addition to the text in PCR:

It is important to clarify whether the substance entering the production process under study is classified as “waste” or as “secondary product”, i.e. secondary material or secondary fuel. See ISO 21930:2017 for further specification.

6.2.3 A4-A5, Construction process stage, information modules

As in PCR part A including the following further clarification:

The installation phase includes all materials and activities connected to the installation of the piping system at the construction site; such as, excavating a trench, placing the components according to requirements and backfilling the trench. This also includes use of construction machinery, transportation, lifting equipment and energy and fuel consumption of construction machinery.

6.2.4 B1-B5, Use stage, information modules

As in PCR part A.

6.2.5 B6, use of energy and B7, use of water

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

As in PCR part A.

6.3 Calculation rules for the LCA

6.3.1 Functional unit

This PCR is valid for all piping systems for use in sewage and storm water systems (under gravity) that are in correspondence with EN 476.

The functional unit (cradle to grave) is:

A typical installed and backfilled piping system over a specified distance in metres, with a specified inner diameter, that fulfils specified quality criteria given in regional standards during the life span of the construction works

Results should be displayed per functional unit based on scenarios for the construction process stage, use stage and end of life stage, see clause 6.2.

6.3.2 Declared unit

The declared unit (cradle to gate with option: A1-A3, A4, A5, C1-C4 and D) is defined as:

A specified length of a piping system, in metres, with a specified inner diameter, that fulfils specified quality criteria given in regional standards during the life span of the construction work

6.3.3 Reference service life (RSL)

As in PCR part A, including the following clarification:

The reference service life is depending on the pipe construction and materials used, and shall be declared by the producer with reference to “test results”

6.3.4 System boundaries

As in PCR part A, including the following clarification:

As a minimum, cradle-to-gate with options (cradle to handover) that also includes module life cycle modules A1-A3, A4, A5, C1-C4 and D.

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

As in PCR part A, including the following exceptions:

Excluded from the calculations:

- The production of machinery for production of the piping system, due to the assumption that the machinery has relatively low impacts relative to other impacts.
- The production of machinery to produce raw materials, due to the assumption that the production machinery has relatively low impacts relative to other impacts.
- Packaging.
- Laboratory.
- Office.
- Business travel.
- Travel to workplace.
- Inspections by authorities or commissioning body.

- Effect on vehicle emissions during laying of piping systems e.g. due to traffic congestion.

A list of hazardous and toxic materials and substances shall be included in the inventory. The general cut-off rules do not apply to such substances. However, substances included in amounts below the limits for chemical products health and environment hazard classification do not have to be declared.

Exceptions apply for substances on the REACH candidate list and Norwegian priority list, whereby a cut-off of 0.1 % applies. All REACH candidate list substances occurring in amounts exceeding 0.1 % must be declared. The same limits apply to all substances on the Norwegian priority list.

6.3.6 Selection of data

As in PCR part A.

6.3.7 Data quality requirements

As in PCR part A.

6.3.8 Scenarios at the product level

As in PCR part A with the following additions:

The scenarios described below define the life cycle modules after A1-A3, for a cradle to gate EPD with options, or a cradle to grave EPD.

6.3.8.1 A5, Installation

As in PCR part A, with the following additions:

The installation phase includes all materials and activities connected to installation of the piping systems at the construction site, such as; excavating the trench, placing the components according to requirements, and backfilling the trench. This includes use of construction machinery, transportation, lifting equipment and energy and fuel consumption of construction machinery.

The installation phase for the piping systems, shall be in accordance with existing standards such as:

- Excavated trench according to relevant national or international standard (for Norway, VA/Miljø-blad 5 and 6, 2016)
- EN 1610: 1998. Construction and testing of drains and sewers
- Piping system manufacturers guidance for installation:
 - NS 3420-F (:2008) - Specification texts for building, construction and installations - Part F: Earthworks - Part 1
 - NS 3420-G (:2008) - Specification texts for building, construction and installations - Part G: Earthworks - Part 2

- NS 3420-U (:2016) - Specification texts for building, construction and installations - Part U: Piping systems and installations

The requirements for the installation scenario are dependent on the application area of the piping system, the pipeline diameter, the numbers of pipes in one trench, the location of the trench and the materials used in the piping system. To avoid allocation problems in the installation scenario, and to obtain comparability between EPDs, the installation scenario shall be defined as one pipe installed in a trench, whereby the volume of the trench and refilling of mass shall follow the requirements demanded by the strength of the pipe, according to the relevant national requirements. The volume of the trench and the amount of local excavated mass and gravel used shall be documented. If the EPD deviates from the predefined scenario, this shall be clearly stated and justified. When local mass cannot be used, production and transport of gravel shall be included, in addition to the transport of local mass to landfill.

If the EPD deviates from the predefined scenarios, this shall be clearly stated and justified.

Calculating the volume of the trench and trench layers

This clause shall be in accordance with national rules and regulations (for Norway: VA/Miljø-blad 5 and 6, 2016)

Activities to be included in the installation scenario:

- Excavation of the volume of the trench (the intersection area of trench multiplied by, for example, 100 m). The fuel consumption of the excavated volume shall be defined.
- Transport of excavated mass (that is not reused) from the construction site. A transport distance shall be defined. When the density of excavated mass is unknown, a density of 2000 kg/m³ may be used in the calculation. If another density is assumed, this shall be stated and justified in the LCA report.
- For the production of gravel, generic data may be used. When the density of gravel is unknown, a density of 1800 kg/m³ shall be used as basis for calculations. If another density is assumed, this shall be stated justified in the LCA report.
- Transport of gravel to the construction site. A transport distance shall be defined.
- Refilling of mass (volume of the trench minus the volume of the pipe). The fuel consumption of the excavated mass shall be defined.
- Compaction of mass shall be included.
- Use of explosives is excluded.

Generic data may be used for the excavation and production of gravel, if the supplier is unknown, or an EPD for gravel does not exist.

6.3.8.2 Use stage

The use stage includes maintenance of the piping system during its reference service life. Energy required to transport water in the piping system (e.g. pumps etc.) is excluded from the LCA because the piping system is based on gravity.

Flushing or cleaning activities during the operation stage may be excluded from the analysis, as the activity is assumed to have a minor impact on total results. However, if hazardous or toxic materials are used during flushing or cleaning activities, then this activity shall be included in the analysis.

It is assumed that replacement or repair of pipes will not be necessary during the reference service life of the piping system. If a replacement or repair scenario is included in the LCA report, it must be well documented, justified and explained.

It is assumed that the activities that influence the reference service life of the product system have a relatively low impact on life cycle emission results.

6.3.8.3 C1-C4 End-of-life

There are a number of end of life scenarios available for piping systems. These include:

- The excavation and replacement of the existing piping system with new pipes (whereby the excavation process is allocated to the new pipe's life cycle).
- The renovation of pipelines and extension of the reference service life.
- The pipes are left untreated in the ground.
- The piping system components are recycled in an identified recycling industry (e.g. metal scrap, plastic etc.)

It is assumed that the most likely end of life scenario will be that the pipes are left in the ground after use. Environmental impacts due to this shall be documented. If other "end of life scenarios" are more probable, then this may be included in the life cycle assessment. Alternative scenarios must be documented, justified and explained. All transportation distances shall be included.

6.3.9 Units

As in PCR part A.

6.4 Inventory analysis

As in PCR part A

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, with the following additions:

The following shall be described in the EPD:



- Assumed reference service life (RSL) for the product
- Length of the declared product system
- Inner pipe dimensions
- The end of life scenario assumed

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

As in PCR part A.

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:

If no specifications are given in PCR part A, biogenic carbon shall be declared according to ISO 21930:2017.

7.2.7 Greenhouse gas emissions from land use change

As in PCR part A and EN 16757 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 21930:2017.

7.2.8 Carbonation

As in PCR part A, including the following additions:

If no specifications are given in PCR part A, carbonisation shall be declared according to ISO 21930, EN 16757:2017 or NPCR 020 Concrete Products.

7.3 Scenarios and additional technical information

7.3.1 General

As in NPCR 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 and EN 16757 including the following additions:

Capacity utilization is calculated as % of the mass carried of the total load capacity of the vehicle. The number given shall be the average of the capacity utilisation on the trip to the construction site and the capacity utilisation on the return trip.

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:

	Unit	Value
Energy consumption of the excavated volume.	kWh or l/tonne excavated	
Excavated mass, total	Kg	
Excavated mass transported to deposite	Kg	
Transport distance from construction site	Km	
Refilling mass	Kg	
Transport distance for refilling mass to construction site	Km	
Energy used for compaction	kWh or l/tonne compacted	

7.3.3 As in PCR part A. Use stage

As in PCR part A, including the following additions:

The number of maintenance and replacement cycles during the service life of the construction shall be given.

7.3.4 End of life

As in PCR part A, including the following additions:

If the pipes are left in the ground after use, environmental impacts due to this shall be documented.

If other “end of life scenarios” are more probable, then this may be included in the life cycle assessment. Alternative scenarios must be documented, justified and explained.

All transportation distances shall be included.

7.4 Additional information

As in PCR part A.

This clause includes all significant environmental and health impacts not included in the impact categories of this PCR. See section 7.2.3.

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

7.4.1.1 Indoor air

As in PCR part A.

No indoor emissions are expected from piping systems.

7.4.1.2 Soil, ambient air and water

As in PCR part A, including the following additions: Until horizontal standards for the measurement of leaching characteristics are available, the following report can be used:

- CEN/TR 17105:2017 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.

7.4.2.1 Greenhouse gas emissions from electricity use in A3 Manufacturing

As in PCR part A.

7.4.2.2 Dangerous substances and content declaration

As in PCR part A including the following additions:

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 included in the final roof waterproofing product), 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 terms of weight percentages. Only substances that are mentioned in the raw material safety declaration sheets (SDS) shall be included. The EPD owner has no obligation to investigate the content of ingredients used in raw material production, with the exception of products on the REACH candidate list and the Norwegian Priority List.

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. This does not apply to substances registered under the REACH Directive

7.4.2.3 Emission classification of building materials

As in PCR part A.

7.5 Aggregation of information modules

As in PCR part A.

8 Project Report

As in PCR part A.

9 Verification and Validity of an EPD

As in PCR part A.

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

CEN/TR 17105:2 017 Construction products. Assessment of release of dangerous substances.

EN 1610: 998. Construction and testing of drains and sewers

EN 476:2011: Generelle krav til komponenter brukt i avløpsledninger

NS 3420-F:2008: Specification texts for building, construction and installations - Part F: Earthworks
- Part 1

NS 3420-G:2008: Specification texts for building, construction and installations - Part G: Earthworks
- Part 2

NS 3420-U:2016: - Specification texts for building, construction and installations - Part U: Piping
systems and installations

PCR Part A: Construction products and services. Ver. 1.0. April 2017. Oslo: EPD-Norge.

VA/Miljø-blad 5 and 6, 2016