EPD
INTERNATIONAL EPD SYSTEM

GUARDRAILS AND BRIDGE PARAPETS

PRODUCT GROUP CLASSIFICATION: UN CPC 532

C-PCR-010 (TO PCR 2019:14)
VERSION 1.0.0

TABLE OF CONTENTS

1 INTRODUCTION

1.1 GENERAL

This document constitutes complementary Product Category Rules (c-PCR) for developing Environmental Product Declarations (EPD) in the framework of the International EPD System: a programme for EPDs[1] according to ISO 14025, ISO 14040, ISO 14044, and product-specific standards, such as EN 15804, EN 15941 and ISO 21930 for construction products.[2] developed in the framework of the International EPD System: a programme for type III environmental declarations[3] according to ISO 14025:2006. EPDs are voluntary documents for a company or an industry association to present transparent, consistent, and verifiable information about the environmental performance of their products (goods or services).

The General Programme Instructions (GPI), publicly available on www.environdec.com, includes the rules for the overall administration and operation of the programme and the basic rules for developing EPDs registered in the programme. A PCR complements the GPI and the normative standards by providing specific rules and guidelines for developing an EPD for one or more specific product categories (see Figure 1), thereby enabling the generation of consistent EPDs within a product category.

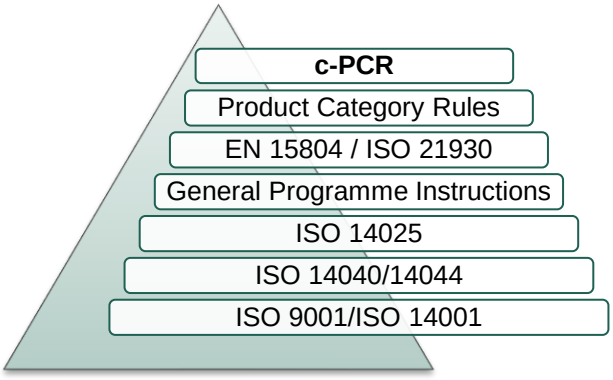

Figure 1 This c-PCR in relation to the hierarchy of standards and other documents.

The present c-PCR uses the following terminology:

- The term “shall” is used to indicate what is obligatory, i.e., a requirement.
- The term “should” is used to indicate a recommendation. Any deviation from a recommendation shall be justified in the EPD development process.
- The terms “may” or “can” are used to indicate an option that is permissible.

For definitions of other terms used in the document, see the GPI, normative standards, and PCR 2019:14 Construction products.

The latest version of the PCR is available on www.environdec.com.

Any references to this PCR shall include the PCR registration number, name, and version number.

Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR document may be sent directly to the PCR Moderator during its development or during the period of validity.

The programme operator maintains the copyright of the document to ensure that it is possible to publish, update when necessary, and available to all organisations to develop and register EPDs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

1 Termed type III environmental declarations in ISO 14025.

2 When standards are referred to in this document, the version listed in Section 7 is intended unless otherwise stated.

3 Type III environmental declarations in the International EPD System are referred to as EPD, Environmental Product Declarations.

1.2 ROLE OF THIS DOCUMENT

This document provides complementary product category rules (c-PCR) to PCR 2019:14 Construction products, available on www.environdec.com. This document cannot be used by itself but shall be used together with PCR 2019:14 and EN 15804. The document can be used together with any valid version of PCR 2019:14, regardless of the version of PCR 2019:14 referred to in this document.

See Figure 2 for an illustration on how PCR 2019:14 and this c-PCR relates to each other and the EPDs that may be based on them.

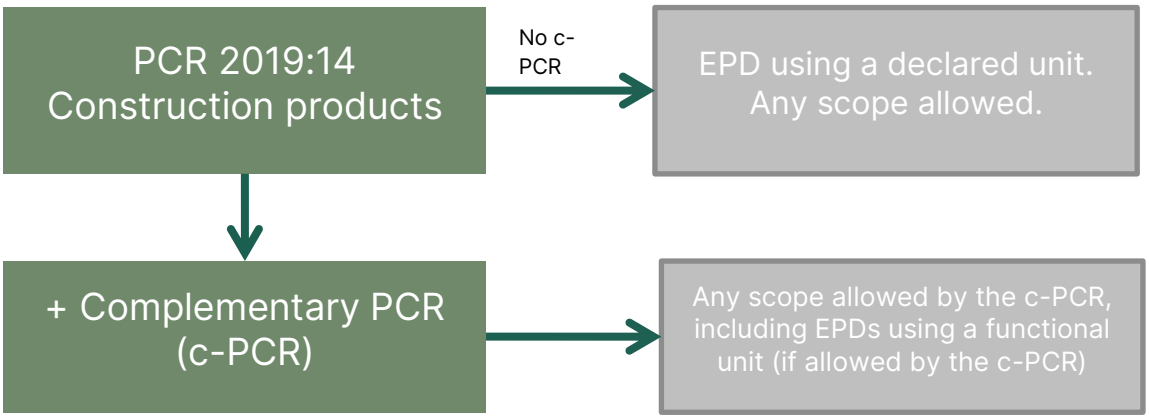

Figure 2 Overview of using PCR 2019:14 directly to develop an EPD or how to use it together with a c-PCR.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Guardrails and bridge parapets
Registration number and version:	c-PCR-010, version 1.0.0
Programme:	The International EPD System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden Website: www.environdec.com E-mail: info@environdec.com
PCR Moderator:	No currently appointed PCR Moderator
PCR Committee:	Blue Systems (Daniel Maglica) NRS (Åke Larsson) Gunnar Prefab (Anna Mårten)
Date of publication and last revision:	2025-04-09 (version 1.0.0) A version history is available in Section 8.
Valid until:	2026-02-11
Schedule for renewal:	This document will be revised upon its expiration. In case a c-PCR is developed by a CEN Product TC, the standard will replace this c-PCR.
Standards conformance:	For compliance to standards and other documents, see PCR 2019:14.
PCR language(s):	This PCR was developed and is available in English. In case of translated versions, the English version takes precedence in case of any discrepancies.

2.2 SCOPE

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This c-PCR provides category rules for the assessment and declaration of the environmental performance of all guard-rails and bridge parapets comprised within the scope of the following standards:

EN 1317-2:2010 (called EN 1317 for short) Road restraint systems - Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets. Valid for Europe.

NCHRP 350 - Recommended Procedures for the Safety Performance Evaluation of Highway Features. Valid for the United States.

MASH Manual for Assessing Safety Hardware Valid for the United States.

2.2.2 SPECIFICATION OF THE COMPANY

Information about the company issuing the EPD shall be specified in the EPD, including a description of the company and a description of its overall environmental work, as follows:

Mandatory information:

- Name and address of the company
- Voluntary information:
- Short description of the company
- Geographical location of suppliers/manufacturing sites/customers
- Information about ISO 14001 and/or EMAS certificates of manufacturing sites considered in the core processes
- Specific aspects regarding the production
- Company logotype

2.2.3 SPECIFICATION OF THE PRODUCT

The product specification shall include the following mandatory information (Table 1): Constituent materials (95% of the total composition), containment level, impact severity level, normalized working width class, normalized vehicle intrusion class, normalized dynamic deflection, recommended ground surfaceand description of the installation method.

Table 1 Mandatory information required for the specification of the product. Some of the technical parameters shall be declared based on three technical standards that are valid in different regions, as described in sections 2.2.1.

Parameter (in EN 1317)	Parameter (in NCHRP 350)	Parameter (in MASH 2016)	Description
Material composition (%) (not covered by standards)	*Same*	*Same*	*Percentage composition of materials in the product (in weight)*
Containment Level (Class T1, N1, H1 etc)	*Test Level*	*Test Level (TL1, TL2… TL6)*	*T1, N1, H1 etc. (*
Impact Severity Level (Class A, B, C)	Acceleration Severity Index (g) Theoretical Head Impact Value (m/s or km/h)	Acceleration Severity Index (g) Theoretical Head Impact Value (ms/s or km/h)	A, B or C
Working Width Level (Class W1, W2, W3…W8), Normalized	*Dynamic Deflection (m)*	*Dynamic Deflection (m) Working Width (m)*	*W1, W4, W8 etc. (Described in EN 1317)*
Normalized vehicle intrusion class	*Dynamic Deflection (m)*	*Dynamic Deflection (m) Working Width (m)*	*VI1, VI4, VI8 etc. (Described in EN 1317)*
Normalized dynamic deflection (m)	*Dynamic Deflection (m)*	*Dynamic Deflection (m) Working Width (m)*	*(Described in EN 1317)*

Ground surface at installation site (not covered by standards)	*NA*	*NA*	*Asphalt, concrete, gravel etc.*
Description of the installation method (not covered by standards)	*NA*	*NA*	*Including connection alternative*
Expected service life (not covered by standards)	*NA*	*NA*	*The expected service life of the guard rail*

2.2.4 TYPE OF EPD AND INFORMATION MODULES INCLUDED

Following the requirements in PCR 2019:14, an EPDs based on this c-PCR is a type b EPD, including modules A1-A3, A4-A5, C1-C4 and D. Section 4.2 below provide more information on each life cycle stage concerning the product category in scope.

2.2.5 GEOGRAPHICAL REGION

This PCR is applicable for EPDs in Europe, the United States and Australia, and elsewhere where the standards described in Section 2.2.1 are applicable.

2.2.6 EPD VALIDITY

To be carried out as in PCR 2019:14.

3 PCR REVIEW AND BACKGROUND INFORMATION

This PCR was developed as a c-PCR to PCR 2019:14 in the International EPD System.

Open consultation was held 2020-08-17 until 2020-10-16. The following stakeholders provided comments during the open consultation, and agreed to be listed as contributors to the PCR and at www.environdec.com:

- Marcus Wendin, Miljögiraff AB
- Rob Rouwette. start2see

The updated draft was subsequently reviewed by the PCR review panel (the Technical Committee of the International EPD® System) from 2021-02-03 to 2021-02-05, with Gorka Benito as review chair.

The main purpose of this c-PCR is to serve for the implementation of additional LCA rules for guardrails and bridge parapets that go beyond the scope of PCR 2019:14 and EN 15804.

4 GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

The goal of this section is to provide specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1.

4.1 DECLARED UNIT

EPDs based on this c-PCR shall be based on a declared unit (DU), which is used to quantify the environmental performance of the investigated product. All subsequent analyses shall refer to that DU, as all inputs and outputs in the life cycle inventory (LCI) and consequently the life cycle impact assessment (LCIA) profile are related to the DU.

The use of the DU is necessary to ensure comparability of the LCA results. This is particularly critical when guardrails and bridge parapets of different materials are being assessed. Furthermore, comparability is only achievable if the comparison is made on a common basis. Hence, EPDs based on this c-PCR are only comparable if the performance characteristics described in Table 1 are equivalent.

Based on this, the DU is defined as 1 m of guardrail/bridge parapet that meets the requirements in the applicable standard (EN 1317, NHRCP 350 or MASH) In this regard, LCA results shall be presented per 1 m of guardrail/bridge parapet.

4.2 GENERAL SYSTEM BOUNDARIES

EPDs that are developed based on this c-PCR shall cover product stage (A1-A3), construction process stage (A4-A5), end of life stage (C1-C4) as well as benefits and loads beyond the system boundary (D). In the following Table 2, the life cycle stages, and information modules are described in relation to the specifics of guardrails and bridge parapets.

Table 2 Life cycle stages and information modules relevant for guardrails and bridge parapets.

Life cycle stage	Information module		Comment
A1-A3 Product stage	A1	Raw material supply	Included
	A2	Transport	Included
	A3	Manufacturing	Included
A4-A5 Construction process stage	A4	Transport	Included
	A5	Installation	Included
B1-B7 Use stage	B1	Use	Excluded; not applicable for guard-rails and bridge parapets
	B2	Maintenance	Excluded; Maintenance applications for guardrails and bridge parapets are considered rare and are therefore excluded from the life cycle
	B3	Repair	Excluded; is dependent on traffic intensity number of accidents etc. and is, therefore, not exclusively considered product dependent
	B4	Replacement	Excluded; is dependent on traffic intensity number of accidents etc. and is, therefore, not exclusively considered product dependent
	B5	Refurbishment	Excluded; is dependent on traffic intensity number of accidents etc. and is, therefore, not exclusively considered product dependent
	B6	Operational energy use	Excluded; not applicable for guardrails and bridge parapets
	B7	Operational water use	Excluded; not applicable for guardrails and bridge parapets
C1-C4 End-of-life stage	C1	Deconstruction	Included

	C2	Transport	Included
	C3	Waste processing	Included
	C4	Waste disposal	Included
D Benefits and loads beyond the system boundary	D	Reuse, recovery, recycling, potential	Included

In Section 4.3, more detailed information and description of each life cycle stage and information module are provided.

4.3 DESCRIPTION OF PROCESSES AND INFORMATION MODULES

In the following section, the covered information modules and the respective processes are described. For detailed information on each module, see EN 15804 (Section 6.3.5). Here only specific descriptions related to this c-PCR are provided.

4.3.1 PRODUCT STAGE: MODULES A1-A3

To be carried out as in PCR 2019:14 and Section 6.3.5.2 of EN 15804.

A1 Raw material supply: Extraction and production of raw material for parts needed to produce the product, including:

- Extraction and processing of raw materials (e.g. mining processes) and biomass production and processing (e.g. agricultural or forestry operations).
- Production of energy wares used during manufacturing.
- Processing of secondary materials used as input for manufacturing the product, but not including the processes that are part of the waste treatment in the previous product system.
- Energy recovery and other recovery processes from secondary fuels, but not including the parts of waste processing in the previous product system.
- Processes that can be excluded:
- Production, maintenance and disposal of manufacturing infrastructure (buildings, machinery and capital goods).

A2 Transport: transportation from material extraction, virgin or secondary material, to material processing and on to product manufacturing site.

A3 Manufacturing: Manufacturing of the product.

- Production of main product including connection components.
- Production and use of operating and auxiliary materials consumed.
- Treatment of waste generated from manufacturing.
- Transport of generated waste from manufacturing (from manufacturing site to waste treatment site).
- Processes that can be excluded:
- Business travel of personnel and travel to and from work by personnel
- Indirect activities (such as administration, sales, research and development activities, etc.)

4.3.2 CONSTRUCTION PROCESS STAGE: MODULES A4-A5

To be carried out as in PCR 2019:14 and Section 6.3.5.3 of EN 15804.

A4 Transport: The transport from the manufacture site to the construction site shall be assessed using the following default values:

- For domestic production: If the distance from the manufacturer to the construction site is known, this distance shall be applied. If the EPD is generic and construction site is unknown, then a transport distance of 300 km shall be used.

- For import: transport distance is measured from the manufacturing site to a specific domestic storage location, plus a transport distance from the storage location to the construction site. The latter distance shall be estimated as 300 km. If no specific domestic storage location is given, the largest port city in the country where the product is imported to may be used as an approximate storage location, from which the distance to the construction site shall be estimated as 300 km..

The chosen transport scenario shall be clearly documented in the EPD. This declaration shall include:

- Load capacity utilization (included return).
- Type of vehicle.
- Distance (in total and distributed between the different modes of transportation).
- Fuel/Energy consumption.

A5 Installation: Installation of the product:

- Energy used for installing the product
- Production, transportation and installation of auxiliary products required for site-specific conditions.
- Treatment of waste generated from installation, packaging material and excess product material.
- Transport of waste generated from installation (from construction site to waste treatment site)
- Type of installation method shall be described in the EPD.

4.3.3 END-OF-LIFE (EOL) STAGE: MODULES C1-C4

To be carried out as in PCR 2019:14 and Section 6.3.5.5 of EN 15804. In addition, the end-of-life (EOL) stage shall be based on current waste handling system at the geographic region where the product is installed. The used EOL scenario shall be clearly documented and justified in the EPD, describing the adopted method for waste handling, i.e. recycling, incineration and/or landfill.

C1 Deconstruction: This module can be calculated using generic data and literature values. The energy and transport inputs estimated in A5 can be used as proxies if no better data is available.

- Energy used for dismantling and/or demolition of the product at the construction site.
- Auxiliary materials and energy used during deconstruction of the product.
- Transport for decommissioning and disassembly (e.g. machinery and equipment needed for decommissioning services)

C2 Transport: transport of the deconstructed product from the site of construction to waste treatment site.

C3 Waste Processing: processing of waste for re-use, recovery and/or recycling.

C4 Waste disposal

4.3.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY: MODULE D

To be carried out as in PCR 2019:14 and Section 6.4.3.3 of EN 15804.

Module D includes reuse, recovery and/or recycling potentials, expressed as net impacts (loads) and benefits. Any net flow leaving the product system that has passed the end-of-waste state shall be included in module D, except those which have been allocated as co-products. Declared scenario in module D shall conform to specified scenarios in module A and C. The used scenario for module D shall be clearly documented and justified in the EPD.

Please refer to Annex D (Section D.3.4) of EN 15804 for an approach to calculate the net impacts in Module D.

4.4 SYSTEM DIAGRAM

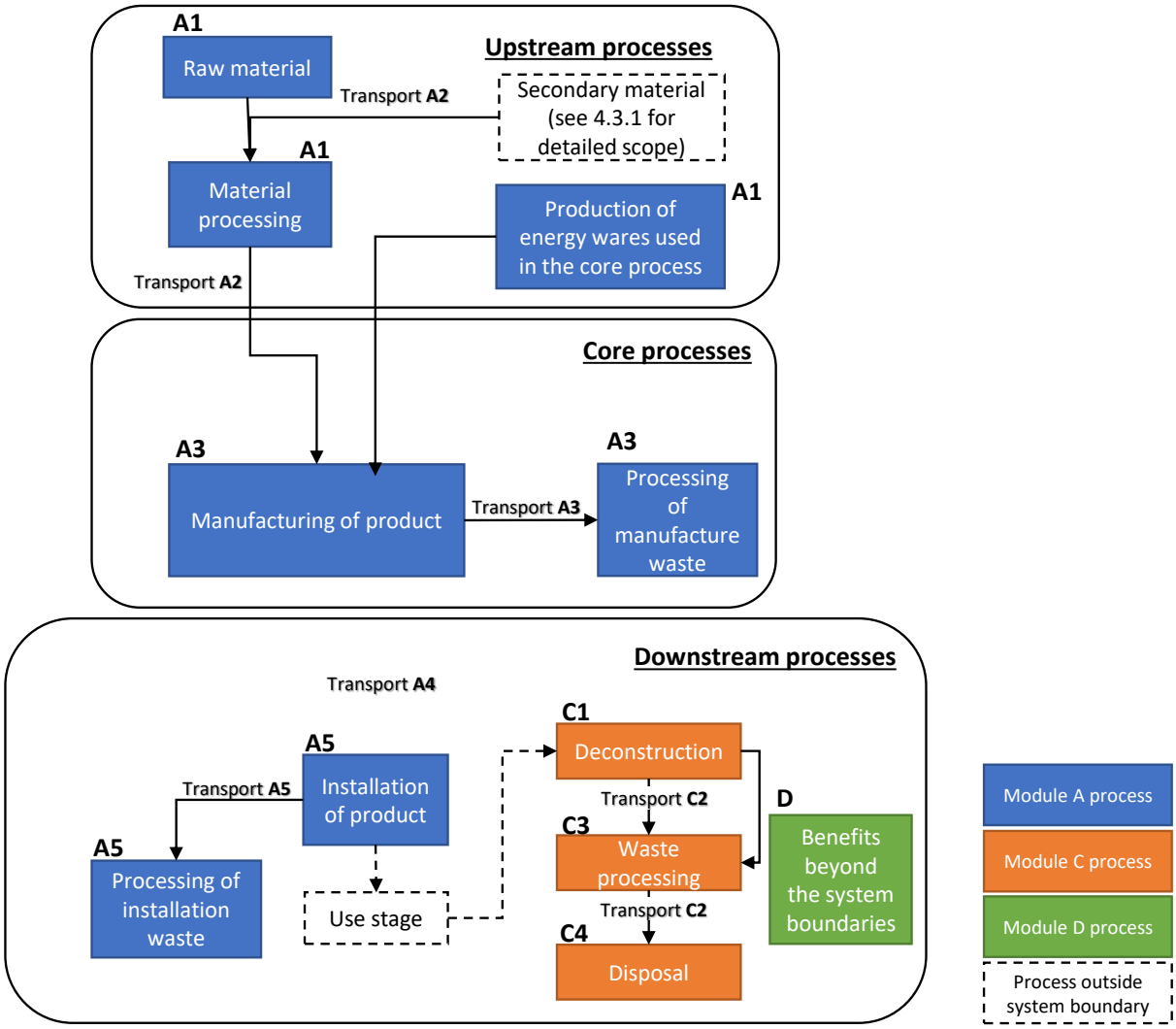

Figure 3 System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes. The system diagram also displays the partitioning of the product processes into module A, C and D.

4.5 GENERAL CUT-OFF RULES

To be carried out as in PCR 2019:14.

4.6 ALLOCATION RULES

To be carried out as in PCR 2019:14.

The methodological choices in the allocation process shall be documented and motivated in the EPD. In case of economic allocation, the reference values shall also be documented and explained in the EPD.

4.7 DATA QUALITY REQUIREMENTS

To be carried out as in PCR 2019:14.

Generic/secondary and specific/primary data shall be applied as defined by EN 15804 and PCR 2019:14.

4.8 IMPACT CATEGORIES AND IMPACT ASSESSMENT

To be carried out as in PCR 2019:14.

4.9 OTHER CALCULATION RULES AND SCENARIOS

To be carried out as in PCR 2019:14.

5 CONTENT AND FORMAT OF EPD

To be carried out as in PCR 2019:14.

5.1 EPD LANGUAGE

To be carried out as in PCR 2019:14-

5.2 UNIT AND QUANTITIES

To be carried out as in PCR 2019:14.

5.3 EPD REPORTING FORMAT

To be carried out as in PCR 2019:14.

In addition, the EPD shall contain the following statement:

“Comparability between EPDs is only achievable if the following performance characteristics are equivalent: declared unit, containment level, level of working width, assumed service life, geographic region, and fulfilment of the same requirements of the applicable standard (EN 1317, NCHRP 350 or MASH).

6 GLOSSARY

As in PCR 2019:14, and in addition:

CPC	Central Product Classification
EOL	End-of-Life
DU	Declared unit
MASH	Manual for Assessing Safety Hardware
NCHRP	National Council Highway Research Program
c-PCR	Complementary product category rules
LCA	Life cycle assessment
ISO	International organization for standardization
EPD	Environmental product declaration
EN	European Standards
LCIA	Life cycle impact assessment

7 REFERENCES

CEN (2021) EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EPD International (2025) PCR 2019:14 Construction products, version 2.0.0.

ISO (2006a) ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO (2006b) ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework.

ISO (2006c) ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines.

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

Other references relevant for guardrails and bridge parapets:

CEN (2010) EN 1317-2:2010, Road restraint systems – Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets.

AASHTO (2016) MASH Manual for Assessing Safety Hardware. ISBN: 978-1-56051-665-1.

NCHRP (1993) Recommended Procedures for the Safety Performance Evaluation of Highway Features - NCHRP 350.

8 VERSION HISTORY

VERSION 2021-02-11

Original version.

VERSION 2021-04-23

Changes in Sections 4.3 and 4.4: production of energy wares used during manufacturing moved from A3 to A1 to align with PCR 2019:14 and EN 15804:A2.

VERSION 2024-04-30

- Updated validity period to align with validity of PCR 2019:14 as of version 1.3.4
- Updates in references

Version 1.0.0, 2025-04-09

- Updated with prolonged validity, until five years from the original publication of the PCR.
- Changed from version date to version number.
- Other editorial changes and clarifications, e.g., related to the use of the c-PCR (see Section 1.21.2).
- Removed references to specific sections of PCR 2019:14, as the sections of PCR 2019:14 changed as of the publication of version 2.0.0 in 2025-04-08 and as this c-PCR is applicable together with any version of PCR 2019:14.

GUARD-RAILS AND BRIDGE PARAPETS
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