PRODUCT CATEGORY RULES (PCR)
DATE 2020-11-23

CORROSION PROTECTION OF FABRICATED STEEL PRODUCTS

PRODUCT CATEGORY CLASSIFICATION: UN CPC 88731

2011:16
VERSION 2.32

VALID UNTIL: 2021-04-05

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1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations[1] according to ISO 14025:2006. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent information about the life cycle environmental impact for their goods or services.

The rules for the overall administration and operation of the programme are the General Programme Instructions, publicly available at www.environdec.com. A PCR complements the General Programme Instructions and the standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR should enable different practitioners using the PCR to generate consistent results when assessing products of the same product category.

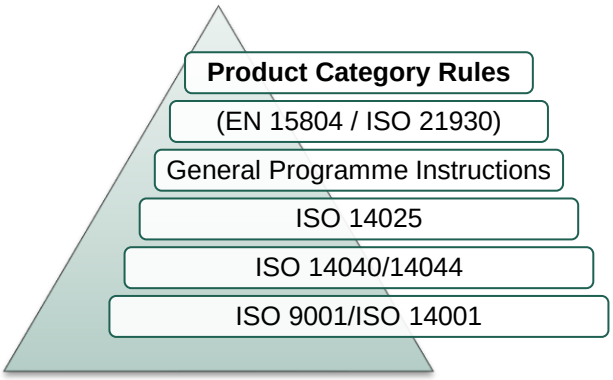

Figure 1 Illustration PCR in relation to the hierarchy of standards and other documents.

Within the present PCR, the following terminology is adopted:

- The term “shall” is used to indicate what is obligatory.
- The term “should” is used to indicate a recommendation, rather than a requirement.
- The term “may” or “can” is used to indicate an option that is permissible

For the definition of terms used in the document, see the normative standards.

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available via www.environdec.com. Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR document may be given via the PCR Forum at www.environdec.com or sent directly to the PCR moderator during its development or during the period of validity.

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

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

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Corrosion protection of fabricated steel products
Registration number and version:	2011:16, version 2.32
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:	Lello Pernice, Associazione Italiana Zincatura (Italian Galvanizing Association)
PCR Committee:	Associazione Italiana Zincatura (Italian Galvanizing Association), European General Galvanizer Association (EGGA), Life Cycle Engineering
Date of publication and last revision:	2020-11-23 (Version 2.32) Version 1.0 was published 2011-10-27. A version history is available in Section 8.
Valid until:	2021-04-05
Schedule for renewal:	A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. When the PCR is about to expire the PCR moderator shall initiate a discussion with the Secretariat how to proceed with updating the document and renewing its validity. A PCR document may be revised during its period of validity provided significant and well-justified proposals for changes or amendments are presented. See www.environdec.com for up-to-date information and the latest version.
Standards conformance:	▪ General Programme Instructions of the International EPD® System, version 3.0, based on ISO 14025 and ISO 14040/14044 ▪ PCR Basic Module, CPC Division 88 Manufacturing services on physical inputs owned by others, version 3.01, dated 2018-11-06
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 OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of Corrosion Protection of Fabricated Steel Products and the declaration of this performance by an EPD. The product category corresponds to UN CPC 88731 (Metal treatment and coating services). Since corrosion protection is also provided by non-coating technologies, and generally shaping process are considered, processes referring to UN CPC 41232 are included.

The scope of this PCR is products as defined by UN CPC subclasses 88731, class 4124 and group 421, 422, 423 and 429:

- Section 8 - Business and production services
  - Division: 88 - Manufacturing services on physical inputs owned by others
    - Group: 887 - Fabricated metal product, machinery and equipment manufacturing services
      - Class: 8873 - Other fabricated metal product manufacturing and metal treatment services
        - **Subclass: 88731 - Metal treatment and coating services**
- Section 4 - Metal products, machinery and equipment
  - Division 41 - Basic metals
    - Group 412 - Products of iron or steel
      - **Class 4124 - Bars and rods, hot-rolled, of iron or steel**
  - Division 42 – Fabricated metal products, except machinery and equipment
    - **Group 421 - Structural metal products and parts thereof**
    - **Group 422 - Tanks, reservoirs and containers of iron, steel or aluminium**
    - **Group 423 - Steam generators, (except central heating boilers) and parts thereof**
    - **Group 429 - Other fabricated metal products**

2.2.2 SPECIFICTATION OF THE PRODUCT

This PCR is intended to cover all the products/services intended for corrosion protection of **fabricated steel products**1 (subject to atmospheric exposure) by means of:

1. metallic/inorganic and organic **coatings** (covered by UN CPC 88731);
2. **alloying elements** added to steel to obtain corrosion resistant alloys (e. g. stainless steel or weathering steel - these products are partially covered by UN CPC 41232)

The **coating systems (1)** are intended to increase the corrosion resistance of steel by protecting the surface of “fabricated steel products” by means of organic/inorganic coatings (e.g., paints and varnishes) and metallic coatings. The protection is achieved through a barrier to corrosion of steel or by other mechanisms such as cathodic protection. These mechanisms vary dependent on the coating used:

- Passive mechanisms, typical of paints and varnishes (but also metallic coatings), isolate the steel to prevent the diffusion of oxygen and other reactive agents.
- Active mechanisms of corrosion protection are based on electrochemical properties of some coatings. In the case of zinc, for instance, when the metal is in contact with steel, an electrochemical cell is created in which the zinc is the anode whilst the steel behaves as the cathode. The flow of electrons is such that corrosion of the steel is prevented.

When a paint or powder coating is applied onto a hot-dip galvanized coating the corrosion protection system is termed a “duplex-system”. In that system, the passive protection is enhanced whilst retaining the active mechanism of the underlying zinc coating.

Alloyed steel (2) can be split into:

- Stainless steel, a group of ferrous alloys with a given chromium and nickel content. When exposed to oxygen, the chromium forms a conversion layer of chromium oxide (Cr_2O_3) that reduces corrosion of the steel.
- Weathering steel, a group of ferrous alloys with a certain copper, chromium, silicon and nickel content to enhance resistance to atmospheric corrosion.

The EPD shall clearly describe the considered technology according to the Table 1 and Table 4..

The technology that is the subject of the EPD shall be evaluated to establish a lifespan according to the procedure in section 4.11.

Table 1 ***Technology description***

Information	Examples/explanations
Common name (or commercial name)	
Product class to which it is applied	Information is to be given about the product ranges covered by the EPD The products range has to be specified as % during the total study period, when this information is important for the interpretation or comparison of the EPD results – e.g., for hot dip galvanized coatings (e.g. heavy or light steel fabrications, small steel products, safety fences). The method of coating application should be clearly stated (e.g., dipping; spraying; electrostatic application)
Properties	Identification of material class (e.g. coating type/specification; alloy type/designation)
	Coating Thicknesses (if applicable)
	Wear/abrasion resistance
	Other properties of relevance to corrosion protection
Plant characteristics	Reference production [t/year]
	Total production per year [t/year]
	Air Pollution Control system
	Kettle dimensions (HxWxL) (only for hot dip coatings)
	Energy efficiency measures.

2.2.2.1. Reference standards

Recognised standards should be use when referring to specific technical issues.

2.2.3 GEOGRAPHICAL REGION

This PCR is applicable to be used globally.

2.2.4 EPD VALIDITY

An EPD based on this PCR shall be valid from its registration and publication at www.environdec.com and for a five year period starting from the date of the verification report ("approval date"), or until the EPD has been de-registered from the International EPD® System.

During the validity period surveillance follow up shall be agreed with the verifier in order to evaluate if the content are still consistent with the current situation. It is not necessary to perform a full LCA, only the monitoring of main parameters is requested. The surveillance verification could be organised as documental check aimed to the evaluation of the main environmental aspects relevant for the LCA calculation.

An EPD shall be updated and re-verified during its validity if changes in technology or other circumstances have led to:

- an increase of 10% or more of any of the indicators listed in Section 5.4.7.1,
- errors in the declared information, or
- significant changes to the declared product information, content declaration, or additional environmental information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall contact the Secretariat to de-register the EPD.

3 PCR REVIEW AND BACKGROUND INFORMATION

This PCR was developed in accordance with the process described in the General Programme Instructions of the International EPD® System, including PCR review and open consultation.

3.1 PCR REVIEW

3.1.1 VERSION 2.0

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee, and were excused from the review.
Chair of the PCR review:	Hüdai Kara
Review dates:	2015-10-06 until 2016-02-08

3.2 OPEN CONSULTATION

3.2.1 VERSION 1.0

This PCR was available for open consultation from 2011-02-16 until 2011-03-30, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator.

Stakeholders were invited via e-mail or other means to take part in the open consultation, and were encouraged to forward the invitation to other relevant stakeholders.

3.2.2 VERSION 1.0

This PCR was available for open consultation from 2015-01-22 until 2015-03-22, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator..

Stakeholders were invited via e-mail or other means to take part in the open consultation, and were encouraged to forward the invitation to other relevant stakeholders.

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

To be added in the next revision of the PCR.

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed in order to enable publication of Environmental Product Declarations (EPD) for this product category based on ISO 14025, ISO 14040/14044 and other relevant standards to be used in different applications and target audiences.

3.5 UNDERLYING STUDIES

To be added in the next revision of the PCR.

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

The Declared Unit, with reference to a specific plate dimension and a specific total service life, is defined as 1 year of protection of a 1 m^2 coated steel plate.

The declared unit shall be stated in the EPD accompanied by the total life span (in years) that has been used for normalising to the functional unit for each of the plates.

The declared unit is defined to take into account product manufacturing (fabricated steel product) and operations to ensure corrosion protection throughout a product's life span using an environmental life-cycle approach. Such an approach has to consider the performances of the selected corrosion protection system on the basis of durability (defined as the duration of protection before any maintenance activity on the manufactured steel product is required).

The declared unit is defined by means of a general steel product geometry in terms of three product classes: 1 m^2 plate (double face) of 2, 5 and 8 mm thickness respectively. Results shall be presented for all the three classes (except when publishing a Sector EPD). If the product for which the declaration is made is not technically feasible and/or commercially produced in all three classes, the declaration may omit up to two classes and provide results for the others. If the company does not process any of these thicknesses, another product class can be chosen, but the choice must be justified.

General approaches are described for different technologies in the following paragraphs

4.1.1 FOR METALLIC/INORGANIC AND ORGANIC COATINGS:

4.1.1.1. Hot-dip metallic coatings

The coating performance, in terms of durability, of a fully-dense metallic coating of zinc, aluminium and other non-ferrous metallic coatings largely depends on coating thickness. For batch-applied hot dip zinc coatings, the coating thickness is heavily dependent upon the steel's section thickness. Thus, batch applied coatings require special consideration.

Batch-applied hot dip coatings

The LCA study shall be performed on the application of 1 kg of coating alloys ; the results shall be applied to the three plates taking into account the actual coating thickness (on the output product) determined over the total annual production. The average coating thickness on steel of various dimensions should be determined by direct measurements over not less than one year of production based on a range of steel thicknesses associated with the three classes, defined in Table 2. Measurement should be done in accordance with the sampling and testing procedure required by the relevant product standard (e.g., hot dip galvanizing requirements are set out in EN ISO 1461).

Table 2 ***range of steel thicknesses used to establish metallic coating thickness for the three specific plates used as basis for the functional unit geometry (for batch hot dip zinc coatings only).***

Families		
Plate thickness	**Minimum steel thickness [mm]**	**Maximum steel thickness [mm]**
2 mm	> 0	≤ 3
5 mm	> 3	≤ 6
8 mm	> 6	-

Since functional unit refers to 1 year protection, results applied to coating thickness should be divided by the life span.

Continuously-applied hot dip coatings

The relevant LCI data for the coated steel should be used – with appropriate adjustment for the plate classes required by the PCR.

4.1.1.2. Electroplating, inorganic coatings and organic coatings

The LCA study shall be performed on the application of 1 kg of coating materials (usually zinc, aluminium, nickel, chromium or paint); the results shall be applied to the three plates classes produced in accordance with ISO 12944-5 (for paint) and/or other relevant standards on minimum thickness requirements and divided by the life span.

Coating systems based on more than one technology shall be assessed in compliance with the criteria defined for all of them.

4.1.2 FOR ALLOYING ELEMENTS ADDED TO THE STEEL TO OBTAIN CORROSION RESISTANT ALLOYS.

The LCA study shall be performed on steel alloy mass associated with the three plate of 2mm, 5mm and 8mm thicknesses and divided by the life span.

4.2 REFERENCE SERVICE LIFE (RSL)

Not applicable for this product category.

4.3 SYSTEM BOUNDARY

The International EPD® System uses an approach where all attributional processes from “cradle to grave” should be included using the principle of “limited loss of information at the final product”. This is especially important in the case of business-to-consumer communication.

The scope of this PCR and EPDs based on it is cradle-to-grave (modules from A1 to C4), as defined in EN 15804.

For instance, certain modules (i.e. from A5 to C1 for hot dip galvanized products) may not be relevant in terms of environmental performance of this product category. In such case, the non-relevant modules may be neglected, but this shall be declared and justified in the EPD document.

GPI module	Asset life cycle stages	Information module
Upstream	A1) Raw material supply	A1-3) Manufacturing phase
Core	A2) Transport	
	A3) Manufacturing	
Downstream	A4) Transport	A3-4) Manufacturing phase
	A5) Construction, installation process	
	B1) Material emission from usage*	B) Usage stage
	B2) Maintenance	
	B3) Repair	
	B4) Replacement	
	B5) Refurbishment	
	C1) Deconstruction, demolition	C) End of life
	C2) Transport	
	C3) Waste processing	
	C4) Disposal	
Other environmental information	D) Reuse, recycling or recovery	D) Recyclability potentials
Inclusion of reference service life (RSL)	B)1-5	B) Usage stage

*Figure 2**. General Scheme:** The life cycle of a building product divided in three process modules according to the General Program Instructions (GPI) and four information modules according to ISO 21930 and EN 15804 and supplemented by an optional information module on potential loads and benefits beyond the building life cycle.*

Further information is available in the subsequent sections of this PCR.

4.3.1 A1 – A3, PRODUCT STAGE

The product stage includes:

- A1: raw material supply
  - Production of the steel plate
    - extraction and processing of raw materials and recycling processes of secondary materials from a previous system (not including those processes that are part of the waste processing in the previous product system)
    - recycling process of any purchased recycled material and the transport from the recycling process to where the material is used (In case that the manufacturing incorporate the process at the same site). In this case recycled materials entering the system shall be counted for and reported as secondary materials.
  - Production of metals and alloy
  - Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport.
  - - Energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system;
- A2: transportation to the manufacturer

- A3: manufacturing
  - Manufacturing of the building product and co-products, or in the case of a building service bought products and external services utilised.
  - Packing materials etc. used.
  - Transport of waste to treatment site.
  - Treatment of waste generated from the manufacturing processes.

Please note that this is a general description and that not all processes are relevant for every type of product included in this PCR.

4.3.2 A4 – A5, CONSTRUCTION PROCESS STAGE

The construction process stage includes:

- A4) Transport:
  - Transportation from the production gate to the construction site
  - Storage of products, including the provision of heating, cooling, humidity control etc.
  - Transport of waste generated from the construction site.
- A5) installation into the building, if relevant

4.3.3 B1 – B5, USE STAGE

The use stage related to the building fabric, if relevant, includes:

- B1) use or application of the installed product
- B2) maintenance
- B3) repair
- B4) replacement
- B5) refurbishment

4.3.4 C1 – C4, END OF LIFE STAGE

The end of life stage includes:

- C1) de-construction, demolition, if relevant
- C2) Transport: Transportation of the discarded product accounts for part of the waste processing, e.g. to a recycling site and transportation of waste e.g. to final sorting yard or disposal (see “polluter pays principle” in section 6.5.5).
- C3) Waste processing: Waste processing includes collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery. Materials for recycling or energy recovery processing shall be modelled as the elementary technosphere flows in the inventory, see section 6.5.5 and reported in the EPD. Materials for energy recovery are identified based on the efficiency of energy recovery with a rate higher than 60 % without prejudice to existing legislation. Materials from which energy is recovered with an efficiency rate below 60% are not considered materials for energy recovery (but incineration). This definition means that every so called waste that is used as fuel has to be accounted for the downstream user, i.e. the electricity or heat from a co-generation plant etc. This follow the pollutants pay principle.
- C4) Disposal: Waste disposal including physical pre-treatment and management of the disposal site. Emissions from waste disposal are considered part of the product system under study and therefore part of this module, according to the “polluter pays principle”. See also C3 concerning waste definition.

4.3.5 OTHER ENVIRONMENTAL INFORMATION / RECYCLABILITY POTENTIAL

As one option for other environmental information it is possible to report on recyclability potentials:

- D: potential for reuse, recovery and / or recycling, expressed as net charges and benefits.

The information in module D may contain technical information as well as LCA result from product post-consumer recycling, i.e. environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g. as secondary materials or fuels. Avoided impacts from co-products from module A to C shall not be included in Module D.

When the recyclability potential information is available, it is recommend to declare it in the EPD.

4.4 CRITERIA FOR EXCLUSION OF INPUTS AND OUTPUTS

Exclusion inputs and outputs criteria in the LCA are the following:

- all inputs and outputs of a process (unit) for which data are available should be included in the calculation, a data lack can be replaced by conservative assumptions or generic media data to be documented.
- if the input data are insufficient or single process data are missing, cutting criteria should be 1% of primary energy renewable and non-renewable use and 1% of the total mass in that process incoming unit . The total inflows not considered by module must not exceed 5% of the use of energy and mass. The data lack can be replaced by conservative assumptions and expert opinion.
- special care for materials and energy flows known to have a potential to cause emissions to air or significant ground in relation to environmental indicators. The data lack can be replaced by conservative assumptions and expert opinion.

4.5 GENERAL INVENTORY METHODOLOGY

Manufacturing processes not listed may also be included. The production of the raw materials use d for production of all product parts shall be included. A minimum of 99% of the total weight of the declared product including packaging shall be included.

For the manufacturing phase the outflow of waste materials for recycling, heat recovery, landfill and waste treatment shall be declared including the direct impact of these wastes according to the factors in international database.

For individual EPDs in specific manufacture, the data shall be representative of the site(s) involved and the surrounding conditions (i.e. energy mix…).

Emissions from the dismantling of the plant and site services are considered optional, since they are difficult to assess, and due to the vast majority of the emissions from dismantling process are associated to capital goods which are not assessed in normal operation processes. Nevertheless, if the manufacturer believes that these emissions maybe relevant, they can be included in the LCA with a specific remark of this issue.

The technical system shall not include:

- Manufacturing of production equipment, buildings and other capital goods.
- Personnel activities
- Building of site
- Machinery start up
- Business travel of personnel.
- Travel to and from work by personnel.
- Research and development activities.

4.5.1 OTHER BOUNDARY SETTING

4.5.1.1. Boundary towards nature

Boundaries to nature are defined as flows of material and energy resources from nature into the system. Emissions to air, water and soil cross the system boundary when they are emitted from or leaving the product system.

4.5.1.2. Boundaries in the life cycle

The EPD may present the information divided into additional sub-divisions.

4.5.1.3. Geographical boundaries

The data for the core module shall be representative for the actual production processes and representative for the site/region where the respective process is taking place. Special considerations should be made for geographic representativeness of a Sector EPD.

4.5.1.4. Time boundaries

Temporal data boundaries shall mirror the actual performance of the process with specific regard to the periodic maintenance (e.g. waste generation due to kettle and tank management): the basic time period for data collection is 1 year when periodic maintenance is within this period. If periodic maintenance is taking place outside the 1 year period, the basic time period shall include such activities (2 years period can be considered) in order to properly allocate the waste generation occurring periodically. The choice of a suitable approach according to plant characteristics, shall be validated by the verifier and could be related just to the waste management (for processing sludge and acid from tank maintenance).

Data suitable of two year maintenance shall than reflect input/output flows normalised over the reference period production and then averaged on the year by year production.

Validation maintenance procedure shall be applied every year, using a moving average for a time period of two or more years[2].

4.5.1.5. Boundaries towards other technical systems

See Section 4.8.2.

4.5.1.6. Boundaries towards risk assessment

Environmental impacts due to accidents and undesired events are not part of the LCA but part of the environmental risk assessment that may be reported under the clause of additional environmental information.

Environmental burdens in conjunction with mishaps occurring more often than once in three years are considered to belong to normal operation and are part of the LCA. Burdens have to be allocated to the data of the year in which the mishaps occurs.

4.6 SYSTEM DIAGRAM

To be added in the next revision of the PCR.

4.7 CUT-OFF RULES

Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary as described in Section 4.3).

The check for cut-off rules in a satisfactory way is through the combination of expert judgment based on experience of similar product systems and a sensitivity analysis in which it is possible to understand how the un-investigated input or output could affect the final results.

4.8 ALLOCATION RULES

4.8.1 CO-PRODUCT ALLOCATION

The following step-wise procedure shall be applied for multifunctional products and multiproduct processes:

[2] Years shall be shifted to make the first exit the period, and the newest to enter the period.

1. Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting the environmental data related to these sub-processes.
2. If allocation cannot be avoided, the inputs and outputs of the system shall be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.

4.8.2 REUSE, RECYCLING, AND RECOVERY

In the framework of the International EPD® System, the methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP). This means that the generator of the waste shall carry the full environmental impact until the point in the product's life cycle at which the waste is transported to a scrapyard or the gate of a waste processing plant (collection site). The subsequent user of the waste shall carry the environmental impact from the processing and refinement of the waste but not the environmental impact caused in the "earlier" life cycles. See General Programme Instruction for further information and examples.

Coating process may lead to a substantial amount of waste directly related to the process (e.g. zinc ashes and drosses, lost fraction of paint powder, sludge). They shall be considered according to the requirements of GPI Supporting annex A.7.1. Zinc ash and dross from hot dip zinc coating processes constitute a substantial part of the company revenues from those operations and should therefore be considered as by-products.: this shall be clearly mentioned in the EPD in order to make evident that ashes and dross are not environmentally free of burdens. Internal recycling (in the plant) may be considered in terms of avoided use of virgin materials. All the waste shall be declared as kg of waste and kg of hazardous waste.

4.9 DATA QUALITY REQUIREMENTS

An LCA calculation requires two different kinds of information:

- data related to the **environmental aspects** of the considered system (such materials or energy flows that enter the production system). These data usually come from the company that is performing the LCA calculation.
- data related to the **life cycle impacts** of the material or energy flows that enter the production system. These data usually come from databases.

Data on environmental aspects shall be as specific as possible and shall be representative of the studied process.

Data on the life cycle of materials or energy inputs are classified into three categories – specific data, selected generic data, and proxy data, defined as follows:

- **specific data** (also referred to as "primary data" or "site-specific data") – data gathered from the actual manufacturing plant where product-specific processes are carried out, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided by a contracted supplier that is able to provide data for the actual delivered services, transportation that takes place based on actual fuel consumption, and related emissions, etc.,
- **generic data** (sometimes referred to as "secondary data"), divided into**:**
  - **selected generic data** – data from commonly available data sources (e.g. commercial databases and free databases) that fulfil prescribed data quality characteristics for precision, completeness, and,
  - **proxy data** – data from commonly available data sources (e.g. commercial databases and free databases) that do not fulfil all of the data quality characteristics of "selected generic data".

As a general rule, specific data shall always be used, if available, after performing a data quality assessment. It is mandatory to use specific data for the core processes as defined above. For the upstream processes, downstream processes, and infrastructure, generic data may also be used if specific data are not available.

Any data used should preferably represent average values for a specific reference year. However, the way these data are generated could vary, e.g. over time, and in such cases they should have the form of a representative annual average value for a specified reference period. Such deviations should be declared.

4.9.1 RULES FOR USING GENERIC DATA

The attributional LCA approach in the International EPD® System forms the basic prerequisites for selecting generic data. To allow the classification of generic data as "selected generic data", they shall fulfil selected prescribed characteristics for precision, completeness, and representativeness (temporal, geographical, and technological), such as:

- the reference year must be as current as possible and preferably assessed to be representative for at least the validity period of the EPD,
- the cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 99% of energy, mass, and overall environmental relevance of the flows,
- completeness in which the inventory data set should, in principle, cover all elementary flows that contribute to a relevant degree of the impact categories, and
- the representativeness of the resulting inventory in the given temporal, technological, and geographical reference should, as a general principle, be better than ±5% of the environmental impact of fully representative data.
- boundaries towards nature adhere to "Data shall report all the quantitative information (resources, solid, liquid, gaseous emissions; etc.) necessary for the EPD," and

Section 4.10 provides a list of recommended databases/data sets to be used for generic data.

If selected generic data that meets the requirements of the International EPD® System are not available as the necessary input data, proxy data may be used and documented. The environmental impacts associated with proxy data shall not exceed 10% of the overall environmental impact from the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts.

Specific data shall be used for alloyed steel production while selected generic data may be used for the steel substrate for coated steel plates, e.g. data from commonly available data sources such as commercial databases (e.g. Boustead Model, Sima Pro, GaBi). Other sources as publicly available ecoprofiles from international associations may be used and reported.

Data on cold rolled steel production provided by Worldsteel shall be considered when referring to selected generic data for steel plate production.

4.10 RECOMMENDED DATABASES FOR GENERIC DATA

Table 3 lists recommended databases for generic data. Please note that this listing does not imply that other data that fulfil the data quality requirements may not be used and that data quality assessment shall also be performed for the data sets in the recommended database by an LCA practitioner.

The following databases could be used for Europe as sources of selected generic data, paying attention to the year of reference (i.e. the year for which the data is valid):

PROCESS	GEOGRAPHICAL SCOPE	RECOMMENDED DATASET	DATABASE
Steel	Global/Europe	-	Worldsteel association - www.worldsteel.org – Eu plate without considering a burden for scrap input or a credit for the EoL recycling ecoprofile
Zinc	Global/Europe	-	IZA (International Zinc Association) – SHG zinc ecoprofile
Electricity	Global/Europe	-	Data combined with IEA (International Energy Agency) statistics on electricity generation mixes for nations, regions, etc.

Table 3 Recommended databases for generic data.

Please note that the listing of these databases does not replace data quality assessment during the LCA study.

If these data sources do not supply the necessary data, other generic data sources listed at the http://lct.jrc.ec.europa.eu may be used. It is recommended to consistently use one database for the entire LCA.

In case, other generic data may be used and documented. The environmental impact of the processes where the other generic data are used must not exceed 10% of the overall environmental impact from the product system.

4.11 LIFESPAN CALCULATION CRITERIA

Lifespan shall always be calculated specifically for each of the plates according to their specific expected performance (e.g. coating type and thicknesses) as below and declared in the EPD.

To normalize results for functional unit definition purposes, criteria from relevant standards for each corrosion protection technology shall be used. Normalised results shall consider ISO 9223 and related standards. From a general point of view, the service life predicted by the material/coating performance should not exceed the realistic service life of a product and it must be clearly reported for a plate (in strict relationship with the functional unit).

For each corrosion protection technology, only information and data from testing and measurements performed in accordance to standardized test methods (by ISO, CEN, ASTM or any individual standardization body, to be mentioned explicitly in the study) shall be provided, e.g. to define corrosion protection properties and durability (ISO EN 14713 shall be taken as reference for metallic coatings, median value of Class C3 shall be considered).

Only data collected exclusively with the above criterion and/or figures directly extracted from standards issued by ISO, CEN, ASTM, or any individual standardization body or provided exclusively by universities or by accredited data-bases can be used to calculate normalized figures and provided in the EPD. In any case, university studies or other information documents shall be referred to only if a peer review is carried out and EPD shall quote the references. Studies published on official scientific journals or proceedings of conferences are preferable. Durability calculated on the basis of short term (accelerated) corrosion tests should not be used in a way that implies comparability with long-term (field) corrosion testing.

It should be noted that the choice of plate geometry for the EPD will not reflect the real viability of application of certain coating types to steel products of different geometry. This is especially important when considering hollow steel products where internal protection by some coating types will not be practical and will result in a lesser product service life.

For duplex-systems (i.e., a combination of hot-dip galvanising and an organic coating) to a special formula can be used to determine the life-time. The synergistic effect of the two coating can be expressed by the following empirical formula:

Dduplex = 1.5 to 2.3 (Dzinc + Dorg.coating)

where Dduplex is the life span (durability) until not more than 5% of steel substrate surface has rusted. Dzinc and Dorg.coating are the life span of hot-dip galvanising coating and organic coating respectively, when directly applied on the steel surface.

[1.5 value should be used as a reference, deviations within the range are allowed according to technical data availability as independent third party documentation or specific literature

4.12 RECYCLING DECLARATION AND WASTE TREATMENT

Product end of life shall be considered according to the requirements of the General Programme Instructions, so that only the environmental impact connected to the treatment of wastes not being used by any subsequent user rest with the generator of the waste, while the environmental impact connected to the processing of the waste into a resource for a subsequent user rests with the user of the resulting resource.

Due to the fact that steel products are mainly delivered to recycling processes, the EPD shall explain that environmental benefits arising from end of life recycling are not considered.

Recommendations for recycling of packaging materials shall be given, as well as recommendations for other waste treatment of product parts if relevant.

In some cases waste output of galvanised steel production process can be used as input in other process (e.g. ashes and dross from zinc kettle) and could be considered by – product. If by-product are produced, the following information shall be reported:

Name of by-product	Criteria that enable the output to be considered a by – product instead of a waste	Originating process	Intended use	Allocation method
-	-	-	-	-
-	-	-	-	-

4.13 IMPACT CATEGORIES AND IMPACT ASSESSMENT

The EPD shall declare the default impact categories as described in the General Programme Instructions. The characterisation models and factors to use for the default impact categories are available on www.environdec.com and shall be updated on a regular basis based on the latest developments in LCA methodology and ensuring the market stability of EPDs. The source and version of the characterisation models and the factors used shall be reported in the EPD. Alternative regional life cycle impact assessment methods and characterisation factors are allowed to be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

4.14 OTHER CALCULATION RULES AND SCENARIOS

4.14.1 UPSTREAM PROCESSES

The following requirements apply to the upstream processes:

- Data referring to processes and activities upstream in a supply chain over which an organisation has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- The transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place based on the actual transportation mode, distance from the supplier, and vehicle load.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used.
- For the electricity used in the upstream processes, electricity production impacts shall be accounted for in this priority when specific data are used in the upstream processes:

  1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.[3]
  2. National residual electricity mix or residual electricity mix on the market
  3. National electricity production mix or electricity mix on the market.

  The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.
- Packaging: specific data shall be used for the consumer packaging production if it is under the direct control of the organization or if the environmental impact related to the consumer packaging production is more than 10% of the total product environmental indicators. In other cases, generic data may be used. When consumer packaging shows the organization's logo, the LCA report should report the exerted/non exerted direct control on the production of consumer packaging by the organization.

4.14.2 CORE PROCESSES

The following requirements apply to the core processes:

- Specific data (also referred to as primary data[4]) shall be used for the assembly of the product and for the manufacture of main parts as well as for on-site generation of steam, heat, electricity, etc., where relevant.

[3] The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

[4] *Primary data: data gathered from the actual manufacturing plant where product specific processes are carried out, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided from a contracted supplier being able to provide data for the actual delivered services, transportation taking place based on the actual fuel consumption and related emissions, etc.*

- For stain resistant steel production, even if the production process is included in the upstream processes, specific data are required.
- For the electricity used in the core processes, electricity production impacts shall be accounted for in this priority:

  1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.[5]
  2. National residual electricity mix or residual electricity mix on the market
  3. National electricity production mix or electricity mix on the market.

  The mix of electricity used in the core processes shall be documented in the EPD, where relevant.

  If the electricity consumption in A3 accounts for more than 30% of the total energy in stage A1 to A3, the energy sources behind the electricity grid in module A3 shall be documented in the EPD and given in g CO2e/kWh.
- Coating thickness should be specific or representative of the actual coated steel production.
- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.
- Waste treatment processes of manufacturing waste should be based on specific data, if available.

4.14.3 DOWNSTREAM PROCESSES

The following requirements apply to the downstream processes:

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.
- Data on the pollutant emissions from the use stage should be based on documented tests, verified studies in conjunction with average or typical product use, or recommendations concerning suitable product use. Whenever applicable, test methods shall be internationally recognised.
- The use of electricity in the region/country where the product is used (as specified in the geographical scope of the EPD) shall be accounted for in the following priority:

  1. National residual electricity mix or residual mix on the market
  2. National electricity production mix or electricity mix on the market

  The mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.
- The transport of the product to the customer shall be described in the reference PCR, which should reflect the actual situation to the best extent possible. The following priority should be used:

  1. Actual transportation distances and types.
  2. Calculated as the average distance of a product of that product type transported by different means of transport modes.
  3. Calculated as a fixed long transport, such as 1 000 km transport by lorry or 10 000 km by airplane, according to product type.
- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. Key assumptions regarding the end-of-life stage scenario shall be documented.

[5] The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

5 CONTENT AND FORMAT OF EPD

EPDs based on this PCR shall contain the information described in this section. Flexibility is allowed in the formatting and layout provided that the EPD still includes the prescribed information. A generic template for EPDs is available via www.environdec.com

As a general rule the EPD content:

- shall be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations - General principles),
- shall be verifiable, accurate, relevant and not misleading, and
- shall not include rating, judgements or direct comparison with other products.

An EPD should be made with a reasonable number of pages for the intended audience and use.

5.1 EPD LANGUAGES

EPDs should be published in English, but may also be published in additional languages. If the EPD is not available in English, it shall contain an executive summary in English including the main content of the EPD. This summary is part of the EPD and thus subject to the same verification procedure.

5.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used, e.g., kilograms (kg), Joules (J) and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
  - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power and geothermal power.
  - Water use should be expressed in cubic metres (m^3)
  - Temperature should be expressed in degrees Celsius (°C),
  - Time should be expressed in the units most practical, e.g., seconds, minutes, hours, days or years.
- Three significant figures[6] should be adopted for all results, The number of significant digits shall be appropriate and consistent.
- The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant figures shown for illustration):
  - SI style (French version): 1 234,56
  - SI style (English version): 1 234.56

  In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.
- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:
  - Only contain values or the letters “INA” (Indicator Not Assessed). It is not possible to specify INA for mandatory indicators. INA shall only be used for voluntary parameters that are not quantified because no data is available.[7]
  - Contain no blank cells, hyphens, less than or greater than signs or letters (except “INA”).

[6] Significant figures are those digits that carry meaning contributing to its precision. For example with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as $1.2*10^2$ and $1.2*10^{-2}$.

[7] This requirement does not intend to give guidance on what indicators are mandated (“shall”) or voluntary.

- Use the value 0 only for parameters that have been calculated to be zero.
- Footnotes shall be used to explain any limitation to the result value.

5.3 USE OF IMAGES IN EPD

Images used in the EPD, especially pictures featured on the cover page, may in themselves be interpreted as an environmental claim. Images such as trees, mountains, wildlife that are not related to the declared product should therefore be used with caution and in compliance with national legislation and best available practices in the markets in which the EPD is intended to be used.

5.4 EPD REPORTING FORMAT

The reporting format of the EPD shall include the following sections:

- Cover page (see Section 5.4.1)
- Programme information (see Section 5.4.2)
- Product information (see Section 5.4.3)
- Content declaration (see Section 5.4.4)
- Environmental performance (see Section 5.4.6)
- Additional environmental information (see Section 5.4.8)
- References (see Section 5.4.11)

The following information shall be included, when applicable:

- Information related to Sector EPDs (see Section 5.4.9)
- Differences versus previous versions (see Section 5.4.10)
- Executive summary in English (see Section 5.4.12)

5.4.1 COVER PAGE

The cover page shall include:

- Product name and image,
- Name and logotype of EPD owner,
- The text “Environmental Product Declaration” and/or “EPD”
- *Programme: The International EPD® System, www.environdec.com,*
- *Programme operator: EPD International AB*
- Logotype of the International EPD® System,
- EPD registration number as issued by the programme operator[8],
- *Date of publication (issue): 20XX-YY-ZZ,*
- *Date of revision: 20XX-YY-ZZ*, when applicable,
- *Date of validity; 20XX-YY-ZZ*
- A note that “*An EPD should provide current information, and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com*.”

[8] The EPD shall not include a “registration number” if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

- A statement of conformity with ISO 14025,

5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following mandatory statement from ISO 14025: "*EPDs within the same product category but from different programmes may not be comparable*."
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- A statement that the EPD only covers the Cradle to Gate stage, or the Cradle to Gate plus construction stage, because other stages are very dependent on particular scenarios and are better developed for specific building or construction works.
- A statement that EPD of construction products may not be comparable if they do not comply with the requirements of comparability set in EN 15804.
- Information about verification[9] and reference PCR in a table with the following format and contents:

Product category rules (PCR): 2011:16 Corrosion protection of fabricated steel products, Version 2.3. UN CPC 88731.
PCR review was conducted by: *The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com.*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☐ EPD verification
Third party verifier: *<name, organisation and signature of the third party verifier>* *In case of certification bodies:* Accredited by: *<name of the accreditation body and accreditation number, if applicable>.* *In case of individual verifiers:* Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☐ No

5.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- Address and contact information to EPD owner,
- Description of the organisation. This may include information on products- or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),
- Name and location of production site,
- Product identification by name, and an unambiguous identification of the product by standards, concessions or other means,

[9] If the EPD has been verified by an approved individual verifier who has received contractual assistance from a certification body that is not accredited, this certification body shall not be included in this table.

- Identification of the product according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
  - Common Procurement Vocabulary (CPV),
  - United Nations Standard Products and Services Code® (UNSPSC),
  - Classification of Products by Activity (NACE/CPA) or
  - Australian and New Zealand Standard Industrial Classification (ANZSIC),
- Description of the product, its application/intended use and technical functions, e.g. expected service life time,
- Geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated,
- Functional unit or declared unit,
- Reference service life (RSL), if applicable,
- Declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- Reference to the main database(s) for generic data and LCA software used, if relevant,
- System diagram of the processes included in the LCA, divided into the life cycle stages,
- Description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- Information on which life cycle stages are not considered (if any), with a justification of the omission,
- Relevant websites for more information or explanatory materials.

For sector EPDs specific indication shall be given upfront stating that the document covers average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared unit is not available for purchase on the market.

This section may also include:

- Name and contact information of organisation carrying out the underlying LCA study,
- Additional information about the underlying LCA-based information, such as assumptions, cut-off rules, data quality and allocation.

5.4.4 CONTENT DECLARATION

The content declaration shall have the form of a list of materials and chemical substances including information on their environmental and hazardous properties. The gross weight of material shall be declared in the EPD at a minimum of 99 % of one unit of product.

The material content shall be reported as in Table 4.

When referring to general steel plate, hence when not producing the plates, the steel content shall be quantified on the relative weights.

Type of product/service	**Type of material**	**% of material by weight**
Substrate – bulk steel plate	Steel	
	Other alloying elements (to be specified)	
Metallic Coating	Main constituent (e.g.. zinc)	
	Other alloy elements (to be specified)	
Organic coating	Polymers by category (e.g. PU, Acrylic)	
	Solvents, binders, pigments and other additives (if permanent in the product)	
	Others	

Table 4 **Material content (in final product) to declare**

The declaration shall list as a minimum substances contained in the product that are listed in the "Candidate List of Substances of Very High Concern for authorisation" when their content exceeds the limits for registration with the European Chemicals Agency.

Content of substances, present in concentrations >0.1% of the steel plate, that are designated as SVHC (substances of very high concern) under REACH Regulation shall be declared**.**

Information on the hazardous properties of materials and chemical substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)[10], issued by United Nations or national or regional applications of the GHS.

As an example, the following regulations should be used for EPDs intended to be used in the European Union:

- Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures

5.4.4.1. Information about recycled materials

Not relevant for this product category.

5.4.5 FLOW DIAGRAM

The Table 5 below or likewise shall be included in the EPD to describe the scope of the inventory performed in the LCA (see 7.2.1 in EN15804). This flow diagram may be complemented or combined with a more detailed process chart or figure typically covering A1 to A3.

To illustrate the product system studied, the EPD shall contain a simple flow diagram of the processes included in the LCA. They shall be sub-divided at least into the life cycle stages of the product: production, and if applicable construction, use and end-of-life. The stages may be further sub-divided.

Product stage			Construction process stage		Use stage							End of Life				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	transport	Waste processing	disposal	Reuse.Recovery -Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	NR	NR	NR	NR	NR	NR	NR	NR	NR	X	NR	X	X

Table 5 Examle of flow diagram

The following alternatives are valid:

- When a module is accounted for the box in the last row is then marked with an "X".
- When a module is not accounted for the box in the last row is then market with "MND", not declared.
- In some cases, certain modules may not be relevant to the environmental performance of a product, meaning that its environmental contribution is assumed negligible. In such cases the irrelevant module shall be declared as "NR", not relevant. Such a declaration shall not be regarded as an indicator result of zero. "NR" is only used when a functional unit is declared and a full life cycle is supposed to be accounted for.

The EPD shall specify which EPD-type is declared:

- A "Cradle-to gate" EPD

[10] The GHS document is available on www.unece.org.

- A “Cradle-to-gate with options” EPD
- A “Cradle-to-grave” EPD.

For a “Cradle-to-gate with options” EPD the declaration of the RSL is possible only if all scenarios for the modules A1- A3 and B1-B5 are given. For a “Cradle to Grave” EPD that is covering all modules in the stages A to C, a declaration of the RSL is required.

5.4.6 AGGREGATION OF INFORMATION MODULES

In some cases certain modules may not be relevant to the environmental performance of a product. In such cases the irrelevant module shall be declared as “not relevant”. Such a declaration shall not be regarded as an indicator result of zero.

The indicators declared in the individual information modules of a product life cycle A1 to A5, B1 to B7, C1 to C4 and module D as shall not be added up in any combination of the individual information modules into a total or sub-total of the life cycle stages A, B, C or D. As an exception information modules A1, A2, and A3 may be aggregated. In conclusion according to EN 15804 all life cycle stages modules shall be reported separately as information modules. i.e. except module A1-3, that may be aggregated. However, as supplement information it is acceptable to give a figure for the total impact across all phases.

5.4.7 ENVIRONMENTAL PERFORMANCE

5.4.7.1. Environmental impacts

The indicators related to potential environmental impact listed in Table 6 shall be declared per functional unit or declared unit, and per life cycle stage.

PARAMETER		UNIT	A1	A2	etc.
Global warming potential (GWP)	Fossil	kg CO_2 eq.			
	Biogenic	kg CO_2 eq.			
	Land use and land transformation	kg CO_2 eq.			
	TOTAL	kg CO_2 eq.			
Acidification potential (AP)		kg SO_2 eq.			
Eutrophication potential (EP)		kg PO_4^{3-} eq.			
Formation potential of tropospheric ozone (POCP)		kg C_2H_4 eq.			
Abiotic depletion potential – Elements		kg Sb eq.			
Abiotic depletion potential – Fossil fuels		MJ, net calorific value			
Water scarcity potential		m^3 eq.			

Table 6 Indicators describing potential environmental impacts[11].

The impact categories shall be calculated using characterisation factors recommended in regionally accepted impact assessment methods. In Europe, the characterisation factors outlined in EN 15804 (CML baseline) shall be used, or improves ones if these factors are updated in a forthcoming revision of EN 15804. The characterisation factors for ADP-fossil fuels are the net calorific values at the point of extraction of the fossil fuels. Abiotic depletion of elements includes all non-renewable, abiotic material resources (i.e. excepting fossil resources). CML characterisation factors can be downloaded at http://cml.leiden.edu/software/data-cmlia.html or are available in many commercial LCA soft wares.

[11] Please check www.environdec.com for the latest list of default impact categories, units and characterisation factors as they may have been updated compared to this table.

The US Environment Protection Agency (EPA) recommends methods used in TRACI while in Australia, the Building Products Innovation Council (BPIC) has published applicable impact assessment methods for that region. However, the impact categories reported in the EPD is not limited to this list and other impact categories may be used as supplements or parallel to the impact categories listed above. In this cases the impact assessment method must be public available and the reference shall reported in the EPD.

Notes:

- Abiotic depletion potential is calculated and displayed as two separate indicators. ADP-fossil fuels include all fossil resources, while ADP-elements include all non-renewable material resources.

5.4.7.2. Use of resources

The indicators for resource use based on the life cycle inventory (LCI) listed in Table 7 shall be declared per functional unit or declared unit, and per life cycle stage.

PARAMETER		UNIT	A1	A2	etc.
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value			
	Used as raw materials	MJ, net calorific value			
	TOTAL	MJ, net calorific value			
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value			
	Used as raw materials	MJ, net calorific value			
	TOTAL	MJ, net calorific value			
Secondary material		kg			
Renewable secondary fuels		MJ, net calorific value			
Non-renewable secondary fuels		MJ, net calorific value			
Net use of fresh water		m^3			

Table 7 Indicators describing use of primary and secondary resources.

Notes:

- In order to identify the primary energy used as an energy carrier (and not used as raw materials), the parameter may be calculated as the difference between the total input of primary energy and the input of energy resources used as raw materials.
- Energy content of biomass used for feed or food purposes shall not be considered.
- The net use of fresh water does not constitute a “water footprint” as potential environmental impacts due to the water use in different geographical locations is not captured. For this indicator:
  - Evaporation, transpiration, product integration, release into different drainage basins or the sea, displacement of water from one water resource type to another water resource type within a drainage basin (e.g. from groundwater to surface water) is included.
  - In-stream water use is not included.
  - For water used in closed loop processes (such as cooling system) and in power generation only the net water consumption (such as reintegration of water losses) should be considered.

- Seawater shall not be included
- Tap water or treated water (e.g. from a water treatment plant), or wastewater that is not directly released in the environment (e.g. sent to a wastewater treatment plant) are not elementary water flows, but intermediate flows from a process within the technosphere.
- Additional transparency in terms of geographical location, type of water resource (e.g. groundwater, surface water), water quality and temporal aspects may be included as additional information.

5.4.7.3. Waste production and output flows

Waste generated along the whole life cycle production chains shall be treated following the technical specifications described in the General Programme Instructions. When the amount of waste or the output flows is from the life cycle inventory (LCI) are declared, the indicators in Table 8 and Table 9 shall be reported per functional unit or declared unit, and per life cycle stage.

PARAMETER	UNIT	A1	A2	etc.
Hazardous waste disposed	kg			
Non-hazardous waste disposed	kg			
Radioactive waste disposed	kg			

Table 8 Indicators describing waste production.

PARAMETER	UNIT	A1	A2	etc.
Components for reuse	kg			
Material for recycling	kg			
Materials for energy recovery	kg			
Exported energy, electricity	MJ			
Exported energy, thermal	MJ			

Table 9 Indicators describing output flows.

Notes:

- The parameters are calculated on the gross amounts leaving the system boundary of the product system in the LCI. If e.g. there is no gross amount of “exported energy, electricity” leaving the system boundary, this indicator is set to zero,
- The parameter “Materials for energy recovery” does not include materials for waste incineration. Waste incineration is a method of waste processing, when R1<60% (European Guideline on R1 energy interpretation), and is allocated within the system boundary.
- In case there are never any flows of these types leaving the system boundary for a product category, the indicators may be removed by the PCR.

5.4.8 ADDITIONAL INFORMATION

An EPD may include additional environmental information not derived from the LCA-based calculations. In general, this part of the EPD describing additional environmental information may include various issues e.g. on specific information about the use and end-of-life:

- Overall thickness (referring standard gauge or heavy gauge mm)
- Indications on product performance before the fire (e.g. The materials are not combustible, the softening of enamelled steel takes place at 900ºC)
- Downstream process data may include waste code numbers of the waste generated at the end of product life

- The EPD may include various specific relevant issues for the product or the process as specific information about the use and end-of-life (if downstream processes are reported). Also some aspects can be relevant for the proper use and maintenance of the product to improve the environmental performance or constructive and mechanic characteristics for the product (i.e. proper maintenance and service of the product, information on recycling ...)
- instruction for a proper use of the product, e.g. to minimise the energy or water consumption or to improve the durability of the product
- instructions for a proper maintenance and service of the product
- information on key parts of the product determining its durability
- information on recycling including e.g. suitable procedures for recycling the entire product or selected parts and the potential environmental benefits gained
- information on a suitable method of reuse of the product (or parts of the products) and procedures for disposal as waste at the end of its life cycle, and
- information regarding disposal of the product or inherent materials, and any other information considered necessary to minimise the product's end-of-life impacts.

Additional environmental information can also include a more detailed description of an organisation´s overall environmental work such as:

- the existence of a quality or environmental management system or any type of organised environmental activity,
- any activity related to supply chain management, social responsibility (SR) etc., and
- information on where interested parties may find more details about the organisation´s environmental work.

Additional information may include results (or parts of them) provided for the declared unit with a specific description of the relationship between the functional and declared units

5.4.8.1. Waste production

End of Life recycling

Additional figures may be added in order to provide the effect of using a different approach, then leading a comparison with other systems.

Additional quantitative information on the benefits/burdens of end-of-life recycling should be presented separately from the overall results.

5.4.9 INFORMATION RELATED TO SECTOR EPDS

This PCR is developed for a corporate EPD. For application to a Sector EPD, the general approach provided by this PCR is still valid but the following modifications are required:

5.4.9.1. DECLARED UNIT

- Results shall be presented for only one single plate 8 mm thick
- Coating thickness shall be defined generically by standard requirements or expert judgement (as measurement approaches used for a corporate EPD may not be practicable).

If the 8mm plate class is not commercially/technically feasible for the product under study, then one of the other plate classes (2mm or 5mm) may be chosen as the basis for the functional unit. The reasons for this deviation shall be justified.

5.4.9.2. SPECIFICATION OF THE PRODUCT

Results shall be modified and completed with a description of the representativeness of the sector sample according to a set of parameters as the following:

- A list of the contributing manufacturers that the Sector EPD covers and a statement that the document covers average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared product is an average that is not available for purchase on the market.
- A description of how the selection of the sites/products has been done and how the average has been determined
- Total production of companies involved and estimation of the total production in the sector
- Consideration concerning the set of technologies/process included and the type of production to which the sector EPD would be relevant.
- Geographical coverage of the sample

5.4.9.3. TIME BOUNDARIES

The data shall be representative for the year/time frame for which the EPD is valid (maximum five years); the basic time period for data collection is 1 year.

5.4.9.4. AVERAGES

Results should be provided for a representative sample mirroring the scope of the EPD. Criteria adopted for defining the sample and the final average shall be clearly described in the EPD. Averages shall take into account actual single company results appropriately averaged (weighting factors based on actual plant productions).

If transport data cannot be provided for each production plant, a standard value of 100 km should be considered.

5.4.9.5. Data management

Due to local legislation and habits, some of the participating companies may provide incomplete or non-exhaustive datasets that may contain important information on the most relevant data requirements. Case-by-case plant data may be accepted, rejected or integrated in order to achieve the highest level of accuracy. An “expert judgement” appropriately traced, justified and described in the EPD may be applied. The verifier should take into account details concerning this specific issue.

5.4.9.6. Verification procedure

A number of site visits should be defined to validate the primary data collection approach and the crucial environmental aspects. A number of 2-3 plants could be generally appropriate but is dependent on the sample size.

The whole dataset for the considered sample should then be verified with a specific focus on the identified key aspects taking into account also general criteria in accordance with specific conditions, as:

- General representativeness (time, market, geography, technology)
- Averaging criteria
- Hypotheses introduced to achieve the final results

5.4.10 DIFFERENCES VERSUS PREVIOUS VERSIONS

For EPDs that have been updated, the following information shall also be included:

- a description of the differences versus previously published versions, e.g. a description of the percentage change in results and the main reason for the change;
- a revision date on the cover page

5.4.11 REFERENCES

This section shall include a list of references, including the General Programme Instructions (including version number), standards and PCR (registration number, name and version). The source and version of the characterisation models and the factors used shall be reported in the EPD.

- The underlying LCA

- The name, CPC code and version number of the PCR used
- Other documents that verify and complement the EPD
- The General Programme instructions of the International EPD® System
- ISO 14025:2006 Environmental Labels and Declarations - Type III
- ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- EN 15804, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products
- ISO 14713
- ISO 9223

5.4.12 EXECUTIVE SUMMARY IN ENGLISH

For EPDs published in another language than English, an executive summary in English shall be included.

The executive summary should contain relevant summarised information related to the programme, product, environmental performance, additional information, information related to sector EPDs, references and differences versus previous versions.

6 GLOSSARY

CO_2	Carbon dioxide
CPC	Central product classification
EPD	Environmental product declaration
ISO	International Organization for Standardization
kg	kilogram
LCA	Life cycle assessment
PCR	Product Category Rules
SI	The International System of Units
SO_2	Sulphur dioxide
UN	United Nations

7 REFERENCES

CEN (2013), EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com

EPD International (2018a) PCR 2012:01 Construction product and construction services version. Version 2.3, dated 2018-11-15. www.environdec.com

EPD International (2018b) PCR Basic Module CPC Division 88 Manufacturing services on physical inputs owned by others, version 3.01, dated 2018-11-06

ISO (2000), ISO 14020:2000, Environmental labels and declarations – General principles

ISO (2004), ISO 8601:2004 Data elements and interchange formats – Information interchange – Representation of dates and times

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 (2013), ISO/TS 14067:2013, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication

ISO (2014), ISO 14046:2014, Environmental management – Water footprint – Principles, 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

8 VERSION HISTORY OF PCR

VERSION 1.0, 2011-10-27

Original version

VERSION 2.0, 2016-04-05

- Compliance with the General Programme Instructions, version 2.01
- Use of the latest PCR template
- Added reference to UN CPC classification
- Reference to the latest version of the PCR basic module for CPC division 88
- Reference to ISO 15804
- Improved differentiation between “Other environmental indicators” and “Additional environmental information”

VERSION 2.1, 2016-07-01

- Editorial changes
- Flow diagram insertion

VERSION 2.2, 2017-06-08

Minor update following stakeholder comment on the PCR Forum:

- Clarified of physical units
- Minor editorial changes

VERSION 2.3, 2019-04-26

Updated in accordance with GPI 3.0 and new PCR basic module.

VERSION 2.31, 2019-09-06

- Clarified terms of use
- Editorial changes

VERSION 2.32, 2020-11-12

- Extension of the validity of the PCR with 1 year until 2021-04-05, in accordance with Section 5.5.2.1 of the GPI.
- Editorial changes.