

Version 1.0

# PRODUCT-CATEGORY RULES

EN 15804

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## ***Explosives and Initiation Systems***



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## REVISION LOG

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

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

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

<b>Date</b> (2016-03-15)	<b>Type</b>	<b>Description of change</b>
<b>Version 1.0</b>		
Original version, issued 2016-03-15.		

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## 1 Introduction

These product category rules (PCR) are intended for companies preparing an Environmental Product Declaration (EPD) for:

- Explosives
  - Packaged Explosives
  - Bulk Explosives
  - Black Powder
- Initiation Systems
  - Electrical detonators
  - Non electric detonators
  - Electronic detonators
  - Plain detonators (fuse caps)
  - Detonating cords
  - Safety fuses

The purpose of this document is to define clear guidelines for performing the underlying life cycle assessment (LCA) to ensure comparability between EPDs.

The PCR is based on and represent a supplement to the European standard EN 15804 -*Sustainability of construction works – Environmental Product Declarations – core rules for the product category of construction products*. The PCR complies with the standard ISO14044: 2006, *Environmental management – Life cycle assessment – Requirements and guidelines* and ISO14025: 2006, *Environmental management – Type III environmental declarations – Principles and procedure*.

The EPDs based on this PCR-document are covering two perspectives:

- EPD 1: Declared unit, cradle to gate with options for (A1 – A5 mandatory)
- EPD 2: Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional)

The two perspectives will present data that has been aggregated over the relevant life cycle stages as described in chapter 5 and shown in Figure 1.

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This PCR is a common European PCR with an appendix A1 giving specific guidelines according to Norwegian requirements.

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## Cross references

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

Table 1: PCR for Technical - Chemical products for the building- and construction industry executive summary

Chapter	Topic	PCR – Explosives and Initiation Systems	Cross references			
			ISO 14044	ISO 14025	ISO 21930	EN 15804
4	Terms and definitions		3	3	3	3
5.2	Type of EPDs with respect to life cycle stages covered	Declared unit, cradle to gate with options for (A1 – A5 mandatory)  Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional)				5.2
6.1	Definition of product category	Explosives and Initiation Systems  A reactive substance that decomposes rapidly under certain conditions with the production of gases, which expand by the heat of the reaction.		6.7.1 6.7.2	6.2.2	6.1
	<u>Calculation Rules</u>					
6.3.1	Functional unit	This PCR covers only declared unit with options.	4.2.3.2		6.2.4	6.3.1
6.3.2	Declared unit	<b>EPD Cradle to gate with options (A1 – A5):</b>  1 kg of manufactured, installed and used (detonated) product: <ul style="list-style-type: none"> <li>• Explosives <ul style="list-style-type: none"> <li>○ Packaged Explosives</li> <li>○ Bulk Explosives</li> <li>○ Black Powder</li> </ul> </li> </ul> or  1 ea (detonator) manufactured, installed and used product: <ul style="list-style-type: none"> <li>• Initiation systems <ul style="list-style-type: none"> <li>○ Electrical detonators</li> <li>○ Non electric detonators</li> <li>○ Electronic detonators</li> </ul> </li> </ul>			6.2.3	6.3.2

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Chapter	Topic	PCR – Explosives and Initiation Systems	Cross references			
			ISO 14044	ISO 14025	ISO 21930	EN 15804
		<ul style="list-style-type: none"> <li>○ Plain detonators (fuse caps)</li> </ul> or  1 meter manufactured, installed and used product: <ul style="list-style-type: none"> <li>• Initiation systems               <ul style="list-style-type: none"> <li>○ Detonating cords</li> <li>○ Safety fuses</li> </ul> </li> </ul>				
6.3.3	Reference service life	Reference service life not relevant for products covered by this PCR.				6.3.3
6.3.4	System Boundaries	EPD Cradle to gate with options (A1-A5)	4.2.3.3 4.3.3.4		6.2.5 5.5	6.3.4
<u>6.3.7</u>	<u>Data quality</u>		4.2.3.6		6.2.6 6.2.8	6.3.7
	<u>Scenarios</u>					
6.3.8	Construction stage A4-A5	Mandatory, EPD Cradle to gate with options. A5 is detonation of explosives.				6.3.8
6.3.8	Use B1- B7	Use B1-B7 not relevant for explosives, detonators or initiation systems.				6.3.8
6.3.8	End of life C1-C4	Treatment of remaining of explosives and waste.				6.3.8
6.4.1	Allocation rules	Allocation according to mass or volume. At large value differences (>25%), economic allocation shall be used.	4.3.4		6.2.7.1	6.4.3
7.4	Additional information	The content of harmful substances/chemicals, as well as impacts on indoor environment must be declared in EPD.		7.2.3 7.2.4		7.4 8.2

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## 2 Scope

The intended application of this Product Category Rules (PCR) is to give guidelines for development of Environmental Product Declarations (EPD) for Explosives and Initiation Systems and to further specify the underlying requirements of the LCA. The core rules valid for all construction products are given in standard EN 15804, and are expected known by those preparing the EPD.

## 3 Normative references

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

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

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

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

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

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

EN15942: 2011, *Sustainability of construction works — Environmental product declarations — Communication formats: business-to-business*

## 4 Terms and definitions

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

### 4.1 Environmental product declaration (EPD)

Environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information

[EN 15804]

### 4.2 Life cycle assessment (LCA)

Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[ISO 14044]

### 4.3 Declared Unit

The quantity of a construction product for use as a reference unit in an EPD for an environmental declaration based on one or more information modules. Information modules are illustrated and given numbers in figure 1.

[EN 15804]

### 4.4 Functional Unit

The quantified performance of a product system for use as reference unit.

[EN 15804]



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## **4.5 Explosives and Initiation Systems specific definitions**

### **4.5.1 Packaged Explosives**

Packaged Explosives are manufactured at explosives manufacturing plants and are packaged in suitable and approved boxes, bags or similar before distribution to customers. The packaged explosives may also be packed in smaller inner packaging (eg. plastic or paper cartridges or plastic bags).

### **4.5.2 Bulk Explosives**

Bulk Explosives are normally manufactured at the blasting location in specially designed Mobile Explosives Manufacturing Units (MEMUs). MEMUs or other suitable vehicles transport raw materials to the relevant quarry, mine or construction site where the explosives are to be used. At the site MEMUs make the bulk explosives and normally pump, auger or blow charge them into the bore holes where they are to be used.

### **4.5.3 Electrical detonators**

Detonators (also called blasting caps) are used to initiate explosives. Electrical detonators are initiated by use of electrical power through attached electric wires. These detonators can be of an instantaneous type or with a variety of time delays. The time delays are normally controlled by the use of pyrotechnical delay elements inside the detonator.

### **4.5.4 Non electric detonators**

Non-electric detonators are shock tube detonators. Instead of electric wires (used by electrical detonators), a hollow plastic tube delivers the firing impulse to the detonators, making them immune to most of the hazards associated with stray electrical currents. This type of detonators can also have a variety of time delays normally controlled by the use of pyrotechnical delay elements inside the detonator.

### **4.5.5 Electronic detonators**

Electronic detonators are fired by use of electric wires like electrical detonators, but the time delay and other built in safety features are controlled by use of electronic components inside the detonator.

### **4.5.6 Plain detonators (fuse caps).**

Plain detonators (fuse caps) are used to initiate explosives, normally in combination with a safety fuse. Time delays are obtained by using different lengths of safety fuse.

### **4.5.7 Detonating cords.**

Detonating cords consist of a thin flexible plastic/textile tube filled with a suitable explosive such as PETN, RDX or HMX. Cords of different strengths (5-100 grams/meter) are used depending on application. Detonation travels along the detonating cord at high speed.

### **4.5.8 Safety fuse**

These fuses burn at controlled rates and are typically used to start a detonation in combination with plain detonators (fuse caps). Safety fuses typically consist of a pyrotechnical composition at the core wrapped in a plastic sheeting.

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## 5 Abbreviations

EPD Environmental product declaration

PCR Product category rules

LCA Life cycle assessment

LCI Life cycle inventory analysis

LCIA Life cycle impact assessment

RSL Reference service life

ESL Estimated service life

ea Each. A unit of count defining the number of items regarded as separate units.

## 6 General aspects

### 6.1 Objective of this PCR

The objective of this PCR is to:

e.g.:

- define the parameters to be declared and the way in which they are collated and reported,
- describe which stages of a product's life cycle are considered in the EPD and which processes are to be included in the life cycle stages,
- define rules for the development of scenarios, including the rules for calculating the Life Cycle Inventory and the Life Cycle Impact Assessment underlying the EPD, including the specification of the data quality to be applied

### 6.2 Types of EPD

This PCR cover the following type(s) of EPD (see Figure 1):

- EPD 1: Declared unit, cradle to gate with options for (A1 – A5 mandatory)
- EPD 2: Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional)

### 6.3 Comparability of EPD of construction products

Comparison of the environmental performance of construction products using EPD information shall consider the complete life cycle (all information modules).

A justification shall be given for any excluded aspects. Contents of EPD project report and EPD shall be as specified in chapter 8, in EN 15804.

### 6.4 Additional information

See clause 7.4.

### 6.5 Ownership, responsibility and liability for the EPD

The manufacturer or a group of manufacturers are the sole owners and have liability and responsibility for an EPD.

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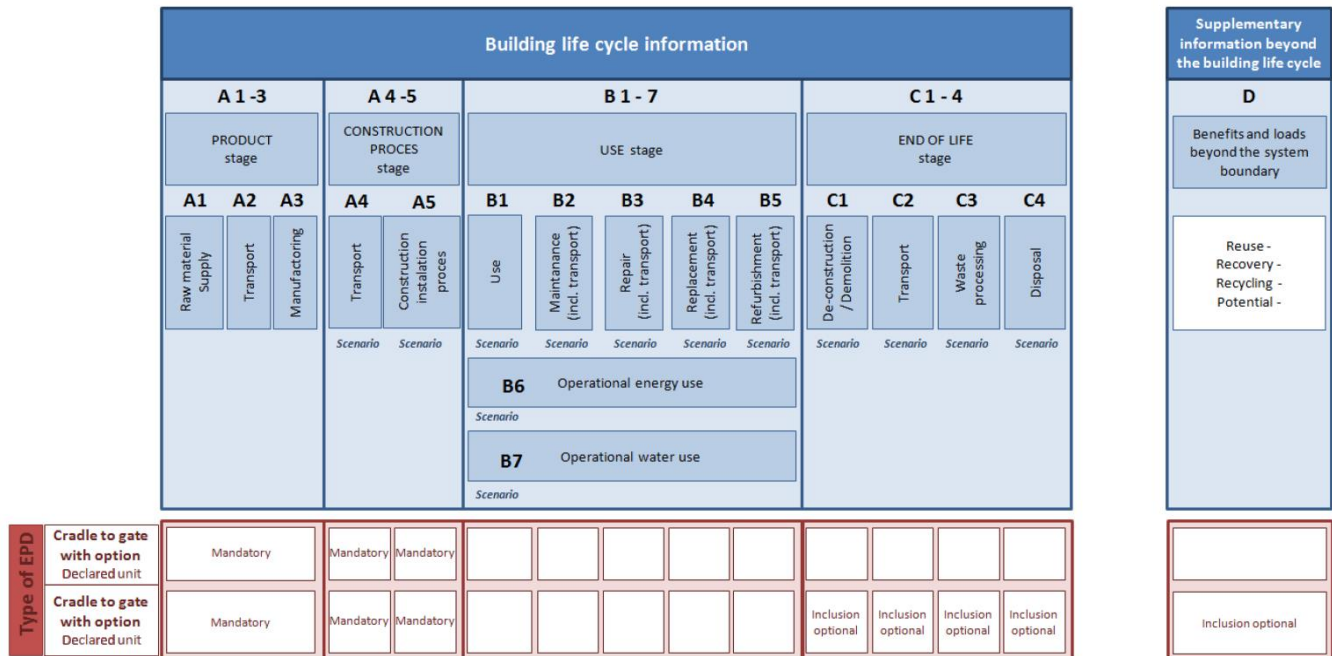


Figure 1: Types of EPD with respect to life cycle stages and modules covered for the assessment. Modules A1-A5 are mandatory for EPD 1 Declared unit cradle to gate with options, modules A1-A5 are mandatory and module C1-C4 and module D are optional for EPD 2 Declared unit cradle to gate with options.

## 6.6 Communication format

The communication format of the EPD shall be in accordance with EN15942: 2010.

## 7 Product Category Rules for LCA

### 7.1 Product Category

The product group explosives includes all types of commercial Explosives and Initiation Systems.

- Explosives
  - Packaged Explosives
  - Bulk Explosives
  - Black Powder
- Initiation systems
  - Electrical detonators
  - Non electric detonators
  - Electronic detonators
  - Plain detonators (fuse caps)
  - Detonating cords
  - Safety fuses

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## 7.2 Life cycle stages and their information modules to be declared

### 7.2.1 General

Which modules or life cycle stages to include are dependent on defined type of EPD given in chapter 6.2. All additional technical information is declared in the module, to which it refers (e.g. technical information about the installation and detonation of a product in the stage module A5.)

EPDs based on this PCR include the following life cycle stages or modules as given (mandatory or optional) in figure 1:

**EPD 1:** Declared unit, cradle to gate with options for (A1 – A5)

- Information modules A1- A3 (mandatory)
- Information modules A4- A5 (mandatory)

The module A5 may be further subdivided:

- A5-1: Installation
- A5-2: Use of explosives - detonation

**EPD 2:** Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional)

- Information modules A1- A3 (mandatory)
- Information modules A4- A5 (mandatory)
- Information modules C1-C4 (optional)
- Information module D (optional)

The module A5 may be further subdivided:

- A5-1: Installation
- A5-2: Use of explosives – detonation

### 7.2.2 A1-A3, Product stage, information modules

The product stage shall include as given in standard EN 15804, clause 6.2.2:

- A1, raw material extraction and processing, processing of secondary material input (e.g. recycling processes),
- A2, transport to the manufacturer,
- A3, manufacturing, including provision of all materials, products and energy, as well as waste processing up to the end-of waste state or disposal of final residues during the product stage.

Module A1, A2 and A3 may be declared as one aggregated module A1-3.

### 7.2.3 A4-A5, Construction process stage, information modules

The construction/installation process stage shall be included for EPD 1: Declared unit, cradle to gate with options for (A1 – A5) and EPD 2: Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional), as given in standard EN 15804, clause 6.2.3:

- A4, transport to the site of use.

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- A5-1, installation at site of use including provision of all materials, products and energy, as well as waste processing up to the end-of-waste state or disposal of residues during the product stage.
- A5-2, use of explosives, detonation of explosives.

The stage A5-1 does not include the drilling of blast holes. This is not covered by this PCR and drilling of blast holes shall not be included in the EPD.

The stage A5-2 includes the part of the life cycle in which the explosives are fulfilling its intended function (detonation), and is therefore mandatory to be included in the EPD.

Emissions to air are based on the chemical reaction from the ideal theoretical composition of the explosive. Weight or volume of released gases from detonation and explosion should be calculated from a balanced chemical reaction, at final state and 1 bar, for the decomposition of the explosive, using stoichiometry and thermochemistry. This calculation is obtained from explosives manufacturers. The inventory analysis of stage A5-2 shall include all substances in table 2.

The values should not be presented as definitive values or fume values/fume tables. The reason is that the use of explosives is dependent on geological and user conditions; the formation of some gases are secondary reactions with air, water and rock around the blast site (and can vary widely from site to site). Substances in table 3 are site specific and are not required to be included in the inventory analysis of stage A5-2. If these are included, it shall be clearly stated which substances have been included and how these have been calculated.

*Table 2: Substances that shall be included in the inventory analysis, calculated from a balanced chemical reaction, at final state and 1 bar, for the explosive.*

Name	Chemical formula
Carbon	C
Methane	CH <sub>4</sub>
Carbon dioxide	CO <sub>2</sub>
Dihydrogen monoxide (water)	H <sub>2</sub> O
Nitrogen	N <sub>2</sub>
Sodium carbonite	Na <sub>2</sub> CO <sub>2</sub>
Other substances may be included if relevant. All substances included shall be stated in the EPD.	

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Table 3: Substances that may be included in the inventory analysis. These are formed in secondary reactions with air, water and rock around the blast site (and can vary widely from site to site).

Name	Chemical formula
Carbon monoxide	CO
Hydrogen	H <sub>2</sub>
Ammonia	NH <sub>3</sub>
Nitrogen Monoxide	NO
Nitrogen dioxide	NO <sub>2</sub>
Oxygen	O <sub>2</sub>

Waste and emissions from rock, soil, etc. (products, material and masses not covered by chapter 4.5, e.g. particles from rock after detonation) to air, land or water may be included in separate calculations. All substances included shall be stated in the EPD.

Module A5-1 and A5-2 may be declared as one aggregated module A5.

#### 7.2.4 B1-B5, Use stage, information modules related to the use scenario

Use stage B1-B5 in a building life cycle is not relevant for explosives, detonators or initiation systems.

#### 7.2.5 B6-B7, use stage, information modules related to the operation scenario

Use stage B5-B7 in a building life cycle is not relevant for explosives, detonators or initiation systems.

#### 7.2.6 C1-C4 End-of-life stage, information modules

The end of life stage, C1-C4, are optional for EPD 2: Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional), as given in standard EN 15804, clause 6.2.6. Included if relevant to analysed system.

- C1, de-construction, demolition
- C2, transport to waste processing
- C3, waste processing for reuse, recovery and/or recycling
- C4, disposal

Stage C1 includes all activities done prior to transport to final waste treatment, e.g. removal of explosive remaining and waste from packaged explosives, black powder and initiation systems.

Stage C2 includes transport to final waste treatment.

Stage C3 includes processing of waste for reuse, recovery and/or recycling.

Stage C4 includes disposal, i.e. waste handling that does not give a useful product. Examples include landfilling and incineration without energy recovery.

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### 7.2.7 D, Benefits and loads beyond the system boundary, information module

Stage D are optional for EPD 2: Declared unit, cradle to gate with options for (A1 – A5 mandatory, C1- C4 optional, D optional). Included if relevant to analysed system.

Stage D includes reuse, recycling and/or recovery potentials.

## 7.3 Calculation rules for the LCA

### 7.3.1 Functional unit

This PCR covers only declared unit with options.

### 7.3.2 Declared unit

Results shall be displayed per declared unit with options (A1-A5).

The declared unit with options (A1-A5) is defined as:

1 kg of manufactured, installed and used (detonated) product:

- Explosives
  - Packaged Explosives
  - Bulk Explosives
  - Black Powder

or

1 ea (detonator) manufactured, installed and used product:

- Initiation systems
  - Electrical detonators
  - Non electric detonators
  - Electronic detonators
  - Plain detonators (fuse caps)

or

1 meter manufactured, installed and used product:

- Initiation systems
  - Detonating cords
  - Safety fuses

### 7.3.3 Reference service life (RSL)

Not relevant. Explosives and detonators cannot be used several times.

### 7.3.4 System boundaries

#### 7.3.4.1 General

Life cycle stages and information modules, which are included, are presented in figure 1. The environmental impact shall be documented for each of the life cycle stages. Module A1, A2, and A3 may be declared as one aggregated module A1-A3 (see clause 8.5).

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#### 7.3.4.2 *Product stage*

- A1 Extraction and processing of raw materials (e.g. mining processes) and biomass production and processing;
- A1 Reuse of products or materials from a previous product system;
- A1 Processing of secondary materials used as input for manufacturing the product, but not including those processes that are part of the waste processing in the previous product system;
- A1 Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport;
- A1 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 up to the factory gate and internal transport;
- A3 Production of ancillary materials or pre-products;
- A3 Manufacturing of products and co-products;
- A3 Manufacturing of Packaging;
- A1-A3 Processing up to the end-of-waste state or disposal of final residues including for any packaging not leaving the factory gate with the product.

#### 7.3.4.3 *Construction stage*

- A4: Transport from production gate to site of use.
- A5: Amount of product and energy needed for fulfilling the functional unit. Installation and detonation of explosives. This module should include all waste and direct emissions (to air, soil and water) from detonation (use) of analysed product. Weight or volume of released gases from detonation and explosion should be calculated from a balanced chemical reaction for the decomposition of the explosive, using stoichiometry and thermochemistry. This calculation is obtained from explosives manufacturers. See chapter 7.2.3 for description.  
Waste and emissions from rock, soil, etc. (products, material and masses not covered by chapter 4.5, e.g. particles from rock after detonation) shall not be included in the calculations.

#### 7.3.4.4 *Use stage*

B1-B7: Use stage B1-B7 in a building life cycle is not relevant for explosives, detonators or initiation systems.

#### 7.3.4.5 *End of life stage*

- C1: Demounting and sorting of remaining of explosives, packaging waste and other waste. Waste and emissions from rock, soil, etc. (products, material and masses not covered by chapter 4.5) shall not be included in the EPD.
- C2: Transport from site of use to waste processing site including internal transport (describe and justify).
- C3: Waste processing for reuse, recycling and energy recovery
- C4: Waste disposal

#### 7.3.4.6 *Benefits and loads beyond the product system boundary in modul D*

- D: Information of net benefits that is realistic and operational in current practice, and loads that has not been allocated as co-products and that have passed end-of-waste state. If waste management systems exist, it can be described. Calculation methods shall be displayed.



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### 7.3.5 Criteria for the inclusion of inputs and outputs (cut-off)

General cut-off criteria are given in standard EN 15804, clause 6.3.5.

The declaration of material content of the product shall list as a minimum substances contained in the product that are listed in the “Candidate list of Substances of Very High Concern for authorization” when their content exceeds the limits for registration with the European Chemicals Agency. Chemicals listed on the Norwegian list of priority substances shall also be listed if used in Norway. National priority lists shall be used if this PCR is to be used by other program operators.

### 7.3.6 Selection of data

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

In addition, the following rules should be applied:

- For manufacturing of product, specific annual data shall be applied
- Actual data age (when data was collected) shall be stated.
- For upstream processes EPDs are preferable, then specific data and generic if the two other categories are not available
- If site-specific data cannot be obtained, the mix of electricity used shall be the grid mix in the country where main energy-consuming processes take place. The mix of electricity (calculation procedure) shall be documented. Any deviations from this shall be justified.
- When PCRs are available for other background data, the procedures in the respective PCRs shall be followed.

Table 4— Application of generic and specific data. Source: EN 15804 (modified).

MODULES	Module A1-A3		A4	A5	B1-B7	C1-C4
	Production of commodities, raw materials	Product manufacture	Transport of products	Installation processes and detonation of explosives	Not relevant	End-of-life processes
Process type	Upstream processes	Processes the manufacturer has influence over	Downstream processes			
Data type	a) EPD-data b) Specific data c) Generic data <sup>1</sup>	Manufacturer's average or specific data	Generic data	Generic data for installation. Weight or volume of released gases from detonation and explosion should be calculated from a balanced chemical reaction for the	Generic data	

<sup>1</sup> See CEN/TR 15941 "Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data".

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				decomposition of the explosive, using stoichiometry and thermochemistry. This calculation is obtained from explosives manufacturers. See chapter 7.2.3 for description.	
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### 7.3.7 Data quality requirements

The quality of the data used to calculate an EPD shall be addressed in the project report (see chapter 8 and ISO 14044: 2006, 4.2.3.6). Specific requirements apply for construction products given in EN 15804, clause 6.3.7. In addition, the following requirements shall be applied:

- When calculating cradle to gate data for input data, the PCR for the given product shall be used. E.g. for directly consumed heat and electricity, infrastructure shall be included in accordance with PCR for Electricity, Steam, and Hot and Cold Water Generation and Distribution, PCR CPC 17 [7].
- Hazardous waste shall be specified according to relevant national regulations (specific and/or average background).

### 7.3.8 Scenarios on product level

Scenarios for installation, detonation, end of life and transport shall be described and documented in the LCA-report according to EN 15804, clause 7.3, tables 5-10. Scenarios shall support the calculation of information modules except the modules A1-A3. A scenario shall be based on relevant technical information and is shown in 8.3.

## 7.4 Inventory analysis

### 7.4.1 Allocation of input flows and output emissions

The allocation rules given in the standard EN 15804 chapter 6.4.3 shall be followed.

Resource use (material and energy) shall be reported in the LCA-report according to EN 15804, chapter 7.2.4, table 4.

## 7.5 Impact assessment

The characterisation factors in EN 15804 shall be used.

Environmental impact shall be declared as stated in EN 15804, clause 7.2.3, table 3:

- Global warming potential, GWP, in kg CO<sub>2</sub> equivalents, 100 years
- Depletion potential of the stratospheric ozone layer, ODP, in kg CFC 11 equivalents, 20 years
- Acidification potential of land and water sources, AP, in kg SO<sub>2</sub> equivalents
- Eutrophication potential, EP in kg (PO<sub>4</sub>)<sup>3-</sup> equivalents
- Formation potential of tropospheric ozone photochemical oxidants, POCP, in kg C<sub>2</sub>H<sub>4</sub> equivalents.
- Abiotic depletion potential (ADP-elements) for non-fossil resources, in Sb equivalents.

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- Abiotic depletion potential (ADP-fossil fuels) for fossil resources, in MJ, net calorific value.

## **8 Content of the EPD**

### **8.1 Declaration of general information**

The content of the EPD shall follow the instruction given in EN 15804 clauses 7.1 and 7.2.

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

The statement of comparability, as given in EN 15804 clause 7.1h, shall reflect take into consideration that this PCR covers only declared unit with options: EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context. A comparison of explosives, detonators and initiation systems must be based on scenarios with comparable technical specifications.

Technical specifications of the declared product (energy content, chemical composition, type of explosive and other relevant information) must be declared in the EPD. The scenarios declared shall be one of the most likely scenarios, and include specifications for installation including number of detonators, meter of cord, etc.

### **8.2 Declaration of environmental parameters derived from LCA**

#### **8.2.1 General**

Documentation of technical information for the construction process shall follow the requirements given in EN 15804 clause 7.3.2.

Transport shall be allocated based on weight or volume. Generic data may be used for emission factors from the transportation vehicle.

#### **8.2.2 Rules for declaring LCA information per module**

The rules shall follow EN 15804, clause 7.2.2.

#### **8.2.3 Parameters describing environmental impacts**

Parameters shall be according to EN 15804, table 3.

#### **8.2.4 Parameters describing resource use**

Parameters shall be according to EN 15804, table 4.

#### **8.2.5 Other environmental information describing waste categories and output flows**

Parameters shall be according to EN 15804, table 5 and 6.

## **8.3 Scenarios and additional technical information**

### **8.3.1 General**

Documentation of technical information for the construction process shall follow the requirements given in EN 15804 clause 7.3.2.

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Transport shall be allocated based on weight or volume. Generic data may be used for emission factors from the transportation vehicle.

### **8.3.2 Construction process stage**

#### **7.3.2.1 A4, Transport from production site to the site of use.**

If no European information is available, national transport scenarios and distances may be used and documented in the EPD project report.

#### **7.3.2.2 A5, Installation**

A5-1: The installation phase includes all materials and activities connected to installation. If the EPD deviates from the predefined scenarios, this shall be clearly stated and justified.

A5-2: Direct emissions from detonation, calculation method shall be specified.

### **8.3.3 Use stage**

B1-B7: Use stage B1-B7 in a building life cycle is not relevant for explosives, detonators or initiation systems.

### **8.3.4 End of life**

End of life shall be specified accord to EN 15804, Table 12.

## **8.4 Additional information**

### **8.4.1 Indoor air**

If the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available, the EPD can lack this information.

### **8.4.2 Soil and water**

Releases to ground and surface water during the use are site and user specific, and not included in the PCR.

## **8.5 Aggregation of information modules**

Indicators declared in the individual information modules 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, with exception of A1, A2 and A3 that may be aggregated.

## **9 Project report**

The project report is the systematic and comprehensive summary of the project documentation supporting the verification of an EPD. The project report shall record that the LCA based information and the additional information as declared in the EPD meet the requirements of this European Standard. It shall be made available to the verifier with the requirements on confidentiality stated in ISO 14025. The project report is not part of the public communication.

The project report shall follow the instructions given in ISO 14044 clause 5.2 and EN 15804 clause 8.

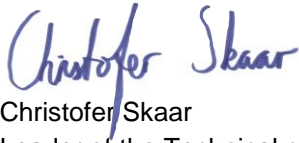
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## 10 Verification and validity of an EPD

The process of verification of an EPD shall be in accordance with EN ISO14025, clause 8 and ISO21930, clause 9. After verification, an EPD is valid for a 5-year period. An EPD does not have to be recalculated after 5 years, if the underlying data has not changed significantly.

Approved 15.03.2016, valid until 15.03.2021.

Norwegian EPD Foundation, Technical committee



Christofer Skaar  
Leader of the Technical committee

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## 11 Bibliography

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## APPENDIX A1

(normative)

### 1 Norwegian requirements

This appendix describes Norwegian recommendations given by the program operator The Norwegian EPD Foundation.

### 2 Communication format and content of the Norwegian EPD

The communication format of the EPD shall be in accordance to EN15942: 2010 and the presentation template shown in [www.epd-norge.no](http://www.epd-norge.no)

### 3 Treatment of electricity

The electricity used shall be shown in the EPD as emissions of kg CO<sub>2</sub> equivalents per kWh or kg CO<sub>2</sub> equivalents per MJ.

### 4 Reference service life

Not relevant for explosives

### 5 Chemicals in the Candidate list and the Norwegian Priority list

If the product contains substances given in the Candidate list or the Norwegian Priority list, they shall be declared and justified. If no such substances occur the following statement shall be given in the EPD: "The product contain no substances given in the Candidate list or the Norwegian Priority list".

Substances on the Candidate list and the Norwegian Priority list will be found on the following websites:

- <http://www.echa.europa.eu/web/guest/candidate-list-table>
- <http://www.miljostatus.no/no/Tema/Kjemikalier/Kjemikalielister/Prioritetslisten/>

See also the requirement in the **BREAM-NOR A-20 list**.

- [http://www.byggalliansen.no/veiledere/dokumenter/Sjekklister\\_A20.pdf](http://www.byggalliansen.no/veiledere/dokumenter/Sjekklister_A20.pdf)

### 6 Scenarios

#### 6.1 Installation and detonation (A5)

The Installation and detonation stage includes the part of the life cycle in which the explosives is fulfilling its intended function (detonation).

Weight or volume of released gases from detonation and explosion should be calculated from a balanced chemical reaction for the decomposition of the explosive, using stoichiometry and thermochemistry. This calculation is obtained from explosives manufacturers. See chapter 7.2.3 for description.

#### 6.2 End of life

End-of-life phase can be modelled with the use of generic data, e.g. from databases such as Ecoinvent and ELCD. The representativeness of the generic data should be stated.

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## **7 Emission classification of building materials**

Not relevant for explosives