PRODUCT CATEGORY RULES FOR BUILDING RELATED PRODUCTS AND SERVICES

as per ISO 14025 and EN 15804+A2

**for preparation of EPDs (Environmental Product Declarations)
according to the EPD programme of the BAU EPD GmbH**

Bau-EPD
Baustoffe mit Transparenz

www.bau-epd.at

Part B: Requirements on the EPD for

Concrete and concrete elements

PCR-Code: 2.17 Date 2021-11-27

Imprint

Publisher:

Bau EPD GmbH

Seidengasse 13/3
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Picture credits frontpage: VÖB

Tracking of versions

Version	Comments	Date of changes
1.0	Changes due to the comments received from the PGF and PCR review panel and approval for the creation of the EPD	2018-06-13
2.0	Changes following decisions of TAC since last publication. Changes on occasion of verification of PCR for concrete and concrete elements as well as resulting from working out the PCR for steel reinforcement. Changes to be made in all PCR B parts as well as some editorial chances. Index now included.	2019-07-06
3.0	Adaptation as per EN 15804:2019+A2:2019; adaptation of rules for declaration of geographical representativity	2020-11-05
4.0	Public version for interested parties after approval of PCR review panel.	2021-01-12
5.0	Consideration of comments, approval for EPD creation	2021-04-07
6.0	Adaptation tables module B and C, minor editorial changes	2021-08-27
7.0	**Change ECO Platform logo, note to photographic rights, minor editorial changes (created by SR, checked and approved by FG**	**2021-11-27**

Contents

1. Scope 5
Requirements on the layout of the EPD 5
Content of the EPD 5
1. General information 7
2. Product 9
2.1 General product description 9
2.2 Application field 9
2.3 Standards, guidelines and regulations relevant for the product 9
2.4 Technical data 11
2.5 Basic/auxiliary materials 12
2.6 Production 13
2.7 Packaging 13
2.8 Conditions of delivery 13
2.9 Transport 13
2.10 Processing/ installation 14
2.11 Use stage 14
2.12 Reference service life (RSL) 15
2.13 Reuse and recycling 15
2.14 Disposal 16
2.15 Further information 16
3. LCA: Calculation rules 17
3.1 Declared unit/ Functional unit 17
3.2 System boundary 18
3.3 Flow chart of processes/stages in the life cycle 24
3.4 Estimations and assumptions 24
3.5 Cut-off criteria 24
3.6 Data sources 24
3.7 Data quality 25
3.8 Reporting period 25
3.9 Allocation 25
3.10 Comparability 26
4. LCA: Szenarios and additional technical information 26
4.1 A1-A3 product stage 26
4.2 A4-A5 Construction process stage 26
4.3 B1-B7 use stage 27
4.4 C1-C4 End-of-Life stage 31
4.5 D Potential of reuse and recycling 31
5. LCA: results 31

6. LCA: Interpretation 35
7. Literature 36
8. Directory and Glossary 36
8.1 List of figures 36
8.2 List of tables 36
8.3 Abbreviations 37

1. Scope

This document contains the **Requirements on an Environmental Product Declaration (EPD)** as per EN 15804 and ISO 14025 and requirements of Bau EPD GmbH.

The document applies to:
• Concrete according to ÖNORM EN 206 or ÖNORM B 4710-1
o Normal, heavy and lightweight concrete
o Site concrete, ready-mixed concrete and types of concrete produced in precast plants
o Compacting or self-compacting concrete
• Precast concrete parts according to ÖNORM EN 13369, i.e.:
o unreinforced prefabricated parts made of lightweight, normal or heavy concrete of different formats, sizes and areas of application/applications with/without thermal insulation
o Reinforced or prestressed prefabricated parts made of lightweight, normal or heavy concrete of different formats, sizes and areas of application/applications with/without thermal insulation
o Prefabricated parts made of chipboard concrete of different formats, sizes and areas of use/applications with/without thermal insulation

The requirements on the EPD include:

- Requirements from EN ISO 14025
- Requirements on the EN 15804 standard as a European core EPD
- Requirements from the European standard ÖNORM EN 16757:2017
- Complementary requirements on EPD of Bau EPD GmbH

The calculation rules for the Life Cycle Assessment and Requirements on the project report are specified in a separate document – "Management System Handbook chapter 5" of Bau EPD GmbH.

Requirements on the layout of the EPD

Bau-EPD GmbH determines the following features with regard to the layout of the EPD:

- The document on hand defines the format template for EPD-document that is to fill in (Word file „Format template EPD Bau EPD GmbH", download at www.bau-epd.at).
- The content of an EPD is not limited in length of text.
- The layout of the front page of the EPD is defined and picture material must be accorded with Bau EPD GmbH (not more than 4 MB).
- On the last page of the EPD the publishing institution as well as the programme operator (Bau EPD GmbH in both cases), the LCA practitioner and owner of the declaration must be indicated with a logo and full address (including telephone number, fax number, email and website).
- Generally the font „Calibri" must be used.
- In addition to the EPD as Microsoft Word format an Excel-document (BAU EPD M-DOCUMENT 8- excel-file for electronic data transfer Editor baubook ECO Platform) must be created including the result tables for electronic transfer and complying to EN 15942 (ITM Matrix). The templates of Bau EPD GmbH must be used, for these tables also serve to forward data to database owners (ECO Platform/ECO Portal, OEKOBAUDAT and BAUBOOK).

Content of the EPD

The following format template respective guidance describes the required structure of the EPD document including the **required content for each individual chapter**.
In addition to that, this document is giving **specific notes for the creation of an EPD for concrete and concrete elements** and **specific LCA calculation rules for Concrete and concrete elements** that must be considered when creating the EPD and underlying LCA study.

Parts of the content that are considered as additional information of optional character (=not required as per international standard and/or guidelines from ECO Platform) are marked in lilac colour. This information is free to choose whether to declare or not and indications can be delivered by the owner of the declaration on optional basis.

Legend:

Blue:	required content for each chapter
Turquoise:	specific requirements for EPD of materials from the scope of the PCR
Green:	specific LCA rules for EPD of material from the scope of the PCR
Violet:	additional information of optional character

EPD - ENVIRONMENTAL PRODUCT DECLARATION

As per ISO 14025 and EN 15804

PUBLISHER	Bau EPD GmbH, A-1070 Wien, Seidengasse 13/3, www.bau-epd.at
PROGRAMME OPERATOR	Bau EPD GmbH, A-1070 Wien, Seidengasse 13/3, www.bau-epd.at
OWNER OF THE DECLARATION	Name of declaration owner
DECLARATION NUMBER	To be accorded with Bau EPD GmbH
ISSUE DATE	Date
VALID TO	Date
NUMBER OF DATASETS	Number

Name and description of product

Name of declaration owner

picture
To be accorded with declaration owner and Bau EPD GmbH
(Note: photographic rights must be clarified and cited)

Company logo of declaration owner

Contents:

Content of the EPD 5
1. General information 7
2. Product 9
2.1 General product description 9
2.2 Application field 9
2.3 Standards, guidelines and regulations relevant for the product 9
2.4 Technical data 11
2.5 Basic/auxiliary materials 12
2.6 Production 13
2.7 Packaging 13
2.8 Conditions of delivery 13
2.9 Transport 13
2.10 Processing/ installation 14
2.11 Use stage 14
2.12 Reference service life (RSL) 15
2.13 Reuse and recycling 15
2.14 Disposal 16
2.15 Further information 16
3. LCA: Calculation rules 17
3.1 Declared unit/ Functional unit 17
3.2 System boundary 18
3.3 Flow chart of processes/stages in the life cycle 24
3.4 Estimations and assumptions 24
3.5 Cut-off criteria 24
3.6 Data sources 24
3.7 Data quality 25
3.8 Reporting period 25
3.9 Allocation 25
3.10 Comparability 26
4. LCA: Szenarios and additional technical information 26
4.1 A1-A3 product stage 26
4.2 A4-A5 Construction process stage 26
4.3 B1-B7 use stage 27
4.4 C1-C4 End-of-Life stage 31
4.5 D Potential of reuse and recycling 31
5. LCA: results 31
6. LCA: Interpretation 35
7. Literature 36
8. Directory and Glossary 36
8.1 List of figures 36
8.2 List of tables 36
8.3 Abbreviations 37

1. General information

Product name Name and description of product	**Declared Product / Declared Unit** Description of the declared product and declared unit/functional unit **Number of datasets in EPD Document(s):** XX **Range of validity** The products considered in the data of the life cycle assessment and for which the declaration applies must be named. In the case of an average EPD, this type of EPD must be pointed out. The representativeness of the declaration must be shown with regard to the production volume covered by the life cycle assessment and the technology used. Likewise, the range of fluctuation of the product group considered, must be specified in the interpretation.
Declaration number To be accorded with Bau EPD GmbH	
Declaration data ☐ Specific data ☐ Average data	
Declaration based on: MS-HB version dated dd.mm.yyyy: Name of PCR PCR Code Version (PCR tested and approved by the independent expert committee = PKR-Gremium) The owner of the declaration is liable for the underlying information and evidence; Bau EPD GmbH is not liable with respect to manufacturer information, life cycle assessment data and evidence.	
Type of Declaration as per EN 15804 From cradle to ... . LCA-method: (i.e. Cut-off by classification)	**Database, Software, Version** Declaration of backround database, Software used and both its versions
Author of the Life Cycle Assessment Name of the author Institution, Address website	**The CEN standard EN 15804:2014+A1 serves as the core-PCR.** **Independent verification of the declaration according to ISO 14025:2010** ☐ internally ☒ externally **Verifier 1:** Name **Verifier 2:** Name
Owner of the Declaration Name of the manufacturer/owner Institution, Address website	**Publisher and Programme Operator** Bau EPD GmbH Seidengasse 13/3 1070 Vienna Austria

DI (FH) DI DI Sarah Richter
Managing director Bau EPD GmbH

DI Dr. sc ETHZ Florian Gschösser/ N.N.
chairperson/vice chairperson of expert committee (PCR-Gremium)

Academic Title Name
Verifier

Academic Title Name,
Verifier

Note: EPDs from similar product groups from different programmes might not be comparable.

2. Product

2.1 General product description

For the product description the characteristics of the declared product must be described. In case of average EPD ("sector or branch" EPD) all declared products must be described separately.

Indications for the general product description:

- Separate description of products/materials for each product standard applicable, citing the product types and names.
- Description of characteristic components.
- All factory locations for the respective product categories must be declared, alternatively a reference can be made to an overview in an appendix (mandatory information in the project report, voluntary information in the EPD document)

Specific notes for the creation of an EPD for concrete and concrete elements:

Explanation based on an example:

The declared product is e.g. a concrete according to ÖNORM EN 206, compressive strength class C30/37, exposure classes XC4 and XF1, nominal value largest particle size Dmax 32, class of the chloride content Cl 0.10, consistency class C3, no freeze-thaw resistance

2.2 Application field

The use and application purpose of the named products are to specify. The individual applications (including functions) must be declared as a text or table format.

Specific notes for the creation of an EPD for concrete and concrete elements:

None.

2.3 Standards, guidelines and regulations relevant for the product

The respective standard and/or general technical approval or comparable national regulation can be indicated.

Optional: Documentation under the frame of CE -certification such as certificates of constancy of performance, certificates of conformity of the internal production control on the manufacturer's site, Declarations of performance, Official certificates of registration, European Technical Assessments or Technical permissions of construction industry can be cited.

Specific notes for the creation of an EPD for concrete and concrete elements:

The standards regulating concrete and concrete elements must be cited (i.e. standards, guidelines, other regulations)
Examples for product standards for Concrete and concrete elements in Austria are illustrated in table 1.

Table 1: Standards for concrete and concrete elements in Austria

Standard	Title
ÖNORM B 3256	Concrete curbs - Requirements, test methods and proof of conformity - National specifications for ÖNORM EN 1340
ÖNORM B 3258	Concrete paving stones and slabs - Requirements, test methods and proof of conformity - National specifications for ÖNORM EN 1338 and ÖNORM EN 1339
ÖNORM B 3260	Precast concrete parts - Precast concrete garages - Requirements for monolithic reinforced concrete garages or reinforced concrete garages consisting of room-sized individual parts - National application of ÖNORM EN 13978-1
ÖNORM B 3328	Precast concrete products - Requirements, tests and methods for demonstrating the standard conformity of precast concrete, reinforced concrete and prestressed concrete
ÖNORM B 4710-1	Concrete - Part 1: Definition, production, use and proof of conformity (rules for the implementation of ÖNORM EN 206-1 for normal and heavy concrete)

ÖNORM B 5072	Manholes and inspection manholes made of concrete, steel fibre concrete and reinforced concrete - supplementary provisions to ÖNORM EN 1917
ÖNORM B 5074	Pipes and fittings made of concrete, steel fibre concrete and reinforced concrete - Supplementary provisions and associated test methods for ÖNORM EN 1916
ÖNORM EN 206	Concrete - Specification, properties, manufacture and conformity
ÖNORM EN 771-3	Specifications for bricks - Part 3: Concrete bricks (with dense and porous aggregates)
ÖNORM EN 771-5	Specifications for bricks - Part 5: Concrete blocks
ÖNORM EN 1168	Precast concrete elements – hollow core slabs
ÖNORM EN 1338	Concrete pavers - Requirements and test methods
ÖNORM EN 1339	Concrete slabs - Requirements and test methods
ÖNORM EN 1340	Concrete curbs - Requirements and test methods
ÖNORM EN 1433	Drainage channels for traffic areas - classification, construction and testing principles, marking and assessment of conformity
ÖNORM EN 1916	Pipes and fittings made of concrete, steel fibre concrete and reinforced concrete
ÖNORM EN 1917	Manholes and inspection shafts made of concrete, steel fibre concrete and reinforced concrete
ÖNORM EN 12737	Precast concrete parts - slatted floors for animal husbandry
ÖNORM EN 12794	Precast concrete elements - foundation piles
ÖNORM EN 12839	Precast concrete elements - concrete elements for fences
ÖNORM EN 12843	Precast concrete elements - masts
ÖNORM EN 13198	Precast concrete elements - street furniture and garden design elements
ÖNORM EN 13224	Precast concrete elements - ceiling slabs with webs
ÖNORM EN 13225	Precast concrete parts - bar-shaped load-bearing components
ÖNORM EN 13369	General rules for precast concrete
ÖNORM EN 13693	Precast concrete elements - Special precast elements for roofs
ÖNORM EN 13747	Precast concrete elements - ceiling slabs with in-situ concrete addition
ÖNORM EN 13978-1	Precast concrete parts - Precast concrete garages - Part 1: Requirements for monolithic reinforced concrete garages or those consisting of room-sized individual parts
ÖNORM EN 14474	Precast Concrete - Woodchip Concrete - Requirements and Test Methods
ÖNORM EN 14650	Precast concrete - General rules for factory production control of concrete with metallic fibres
ÖNORM EN 14843	Precast concrete - stairs
ÖNORM EN 14844	Precast concrete elements - hollow box elements
ÖNORM EN 14991	Precast concrete elements - foundation elements
ÖNORM EN 14992	Precast concrete - wall elements
ÖNORM EN 15037-1	Precast concrete elements - Beam ceilings with intermediate components - Part 1: Beams
ÖNORM EN 15037-2	Precast concrete elements - Beam floors with intermediate elements - Part 2: Concrete intermediate elements
ÖNORM EN 15037-3	Precast concrete elements - Beam floors with intermediate elements - Part 3: Ceramic intermediate elements
ÖNORM EN 15037-4	Precast concrete elements - Beam ceilings with intermediate elements - Part 4: Intermediate elements made of expanded polystyrene foam
ÖNORM EN 15050	Precast concrete elements - precast elements for bridges

ÖNORM EN 15191	Precast Concrete - Classification of performance properties of glass fibre reinforced concrete
ÖNORM EN 15258	Precast concrete elements - retaining wall elements
ÖNORM EN 15422	Precast concrete - Specification for glass fibres as reinforcement in mortar and concrete
ÖNORM EN 15435	Precast concrete parts - formwork blocks made of normal and lightweight concrete - product properties and performance characteristics
ÖNORM EN 15498	Precast concrete parts - chipboard formwork blocks - product properties and performance characteristics
ÖNORM EN 15564	Precast concrete - Synthetic resin concrete - Requirements and test methods

2.4 Technical data

For products carrying a CE marking as per Construction Products Regulation (CPR) the EPD must declare at least the same technical data as required and indicated in the declaration of performance of the manufacturer. What kind of data is required in each individual case is to learn from the document underlying the CE marking: any Harmonized European Standard or European Technical Assessment (ETA). Additional technical data must be listed if relevant for product distinction or specification.

Specific notes for the creation of an EPD for oncrete and concrete elements:
The (construction) technical data listed in Table 2 to Table 4 are based on the national standards or the harmonized European product standards for construction products made of cast iron (see scope) and must be specified with reference to the test standard. An indication in the different categories is only to be made if these are relevant for the declared product according to the product standard (see footnotes).

Table 2: Technical data for concrete and concrete elements

Designation	Value	Unit
bulk density		kg/m³
compressive strength		N/mm²
tensile strength		N/mm²
flexural strength		N/mm²
modulus of elasticity		N/mm²
equilibrium moisture content		%
prestressing steel tension		N/mm²
transverse flexural strength		N/mm²
exposure class		-
Nominal value of maximum particle size Dmax		mm
Chloride content class		%
Consistency class C		-
thermal conductivity	from ... to	W/(mK)
Rated thermal conductivity	from ... to	W/(mK)
water vapor resistance factor		-
sound absorption level		%
Dimensions		
broad		mm
height		mm
depth		mm
diameter		mm

For specific EPD the technical data of the product must be declared as required in Table 2 to Table 4.
For average EPD ("Sector or Branch-EPD", "Group EPD" or "EPD from Associations") Table 2 must be filled, average values or ranges are accepted, in addition a note stating „see product sheets" pointing to single technical product sheets can be cited. Technical data must be provided by the manufacturers. The manufacturers are to ensure that the relevant data are accessible, and the LCA-practitioner must indicate the sources where the technical data can be downloaded.
In this case the average value of nominal density/ weight per m² used for calculating the LCA must be declared as an additional information in chapter 3.1.

2.5 Basic/auxiliary materials

The product components and/or contents and ingredients must be declared in mass-% to enable the user of the EPD to understand the composition and structure of the product in delivery status. These indications shall also support security and efficiency in installation, use and disposal of the product.

The declaration of mass-% can be accurate numbers or a range by analogy with REACH[1] . The mass of components that make up less than 1 mass-% of the total product mass can be declared with < 1 mass-%.

The declaration of material product content must list at least those substances contained in the product which are included in the "Candidate List of Substances of Very High Concern for Authorization" where their contents exceed the limit values (0.1 mass-% on product level) for registration by the European Chemicals Agency (ECHA[2]). If substances and preparations lose their hazardous features during manufacturing (e.g. after a complete chemical reaction) they are exempted from the obligation of declaration.
If the content of the material is below the limit of ECHA the following note must be stated in the EPD:
„The content of XXXX is below the limit values of the registration by the European Chemicals Agency (ECHA). Interpreting statements such as "… free of …" or "… are entirely harmless …" are not permissible.

The product components must be described in detail, so that their sort of product is clear, but the protection of sensitive data is assured, and company secrets are not revealed.
For additives, the function and substance class respective chemical group (i.e. hydraulic binders) must be stated. In addition to that all auxiliary materials and additives that stay within the product must be declared.

Specific notes for the creation of an EPD for Concrete and concrete elements:
Basic materials are to be listed according to Table 3, auxiliary materials are to be listed separately.

Table 3: base materials in mass-% (example)

Components:	**Mass %**
Aggregates (aggregates etc.) x)	
Binder (here: cement type) x)	
water x)	
Additives x)	
Additives (inert, latently hydraulic) x)	
rebar x)	
fibers x)	
Other products x)	

x) Optional: Footnote for each component with a brief explanation of the substance and raw material extraction (recycling, etc.)

[1] 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), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

[2] European Chemicals Agency: http://echa.europa.eu/de

1)

2.6 Production

The process of production must be described and illustrated with a simple figure (i.e. flow chart). In case of average EPD the production processes of all sites must be described respective a useful summary must be included and a list of all production sites must be provided in an annex. Quality management systems, eco management systems etc. can be referred to.

Specific notes for the creation of an EPD for concrete and concrete elements:
Concrete is made by mixing cement, coarse and fine aggregates and water, with or without the addition of admixtures and additives or fibres and obtains its properties from hydration of the cement.

A concrete element is a part of a structure and is either prefabricated or fabricated on site, or the fabrication can be a combination of both.
A precast concrete element consists of concrete that is cast at a location other than its final use (factory manufacture or site manufacture).

A precast concrete product according to EN 13369 or a specific product standard is manufactured at a different location than the final place of use and is protected from adverse weather conditions during production. The product is the result of an industrial process subject to a system of factory production control and may be sorted before delivery.

In the case of concrete elements or concrete products, other products or systems (e.g.
reinforcement steel, fibres, insulating material).

Ready-mixed concrete is delivered in a fresh state (to the site or to the factory) by a person or entity who is not the user of the concrete. In addition, concrete which is produced by the user outside the construction site or which is not produced by the user on the construction site is referred to as ready-mixed concrete.

Site concrete is produced on site by the user of the concrete for his own use.

Figure 1 (Chapter 3.2) shows the scheme of the manufacturing processes (A1-A3) for ready-mixed and site concrete. Figure 2 (Chapter 3.2) shows the scheme of manufacturing processes (A1-A3) for concrete elements and concrete products.

2.7 Packaging

Information concerning each component of packages:

Type (Foil, pallets, etc.),
Material (Paper, Polyethylene; including origin, e.g. recycled paper) and
Possibilities of reuse (e.g. multi way pallets).

Specific notes for the creation of an EPD for Concrete and concrete elements:
Ready-mixed and construction site concrete is usually transported in a fresh state (mixer truck, pump, crane bucket, conveyor belt, etc.), with packaging generally being omitted.

Prefabricated concrete elements and products are delivered to the place of installation in a hardened state. The possible use of packaging and its characteristics depend on the type, shape and number of finished products and on the transport distance to be covered.

2.8 Conditions of delivery

Written description of conditions of delivery, units of delivery, size and dimension as well as requirements on storage important for the declared product(s).

2.9 Transport

Description of delivery (Route and means of transport).

2.10 Processing/ installation

Description of way of treatment, used machines, tools, dust collection etc., auxiliary materials as well as measures of noise reduction. Notes regarding recognized rules of engineering, work safety or protection of the environment can be included.
References to detailed processing directives and referrals to user safety (safe use instruction sheets) of the manufacturer are required.

Specific notes for the creation of an EPD for concrete and concrete elements:
When using a functional unit, please note:

The installation processes of reinforcing steel and other products usually complete the achievement of the functional unit (the declared product only fulfils its function with these components). Depending on the application, the amount of reinforcing steel must be taken into account in the LCA (alternatively, an indication of average amounts or maximum possible reinforcement shares should be given).

2.11 Use stage

Notes describing specific features of the material composition relevant for the use stage.

Specific notes for the creation of an EPD for concrete and concrete elements:
In the case of concrete, with proper planning, proper and professional installation and trouble-free use, there are usually no changes in the material composition over the period of use.

2.12 2.11.1 Environment & Health during use

Information on environmental impacts based on the interactions between the product, the environment and health should be given here.

Specific note on creating an EPD for concrete or concrete elements:

Excerpt from ÖNORM EN 16757 - 6.3.4.1.1 Carbonation:

The effects of the use and finishing phases can include the carbonation of the concrete. Some precast concrete products may also involve carbonation during the production phase (i.e. enhanced and targeted carbonation, long-term storage prior to delivery).

Note (not in EN 16757): Carbonation can also be taken into account during storage of recycled concrete aggregates through to their application as aggregates in newly manufactured concrete. The system limit to the previous life cycle can be set at the moment from which the recycled aggregate is available in the store as a raw material that can be used for the new concrete.

Carbonation is a natural process during the life cycle of concrete that can be taken into account during the use and final stages of the product and should be taken into account during the manufacturing process. For concrete, this means that part of the carbon dioxide emitted during cement production is fed back into the concrete during the use and end phases of a building.

The amount of C02 that is sequestered varies significantly depending on the type of concrete, the current environmental conditions and the final stage scenario.

Appendix BB of ÖNORM EN 16757 offers a possibility to assess the carbon sequestration in the different phases of the life cycle depending on the parameters mentioned above. The calculation method must be selected and justified in accordance with the selected scenario. If other methods of carbonation are used, they must be described and their selection justified. If CO2 absorption is not taken into account, this will be documented in the EPD.

Additional impacts outside the system boundaries can be considered according to the principles of Module D.

In order to be able to differentiate between the services within and outside the system limits, ÖNORM EN 16757 defines the system limits at the end of the usage phase in 6.3.4.5.

Note: The Bau EPD GmbH program does not require proof of carbonation. If the carbonation is to be shown as additional information in an EPD project, the above-mentioned standard must be followed.

2.13 Reference service life (RSL)

The indication of the reference service life (RSL) is imperative for EPDs covering the complete use stage (modules B1-B7), or if a use stage scenario is described, which refers to the lifetime of the product ("from cradle to grave").
The RSL must refer to the declared technical and functional quality of the product. It must be established in line with all of the specific rules in the European product standards and must also take consideration of the ISO 15686-1, -2, -7 and -8 standards.
Where information is available for deriving the RSL from harmonized European product standards, such data has priority.
The assumption underlying the calculation of the RSL and for those only the RSL can be declared must be stated. Influence on aging as per recognized rules of engineering.

Specific note on creating an EPD for concrete or concrete elements:

Excerpt from ÖNORM EN 16757 - 6.3.3 reference service life:

If the use of the concrete or concrete component in the building or other structure is known, the RSL of the product shall be equal to (or at least equal to) the estimated service life (ESL).

Note (not in EN 16757): The expected useful life (ESL) is normally determined based on the reference useful life (RSL) depending on the real conditions of use. The ESL must at least correspond to the required service life of the building ("design life").

If the use is not known, the RSL of the concrete or concrete component should be checked by the manufacturer for the intended use. Notes on this can be found in Annex A and Annex AA of this standard.

Excerpt from ÖNORM EN 16757 - 6.3.4.4.2 B1 - B5, use phase, information modules relating to the building fabric:

In most cases, concrete and concrete components have a longer RSL than the building and no inspection, maintenance and cleaning, repair or replacement is required during the RSL of the particular unit. In the case of non-structural concrete, with an RSL shorter than the structure's ESL, replacements can be made to accommodate the changed functions of the building.

Table 4: Reference service life (RSL) according to ÖNORM EN 16757 Annex AA

Characterization	value	unit
Structural Concrete or Concrete Components for Buildings - Exterior (Wall Members)	100	years
Load-bearing concrete or concrete components for buildings - internal (floor elements, ...)	100	years
Non-load-bearing components for buildings - outside (non-loadable facade, ...)	50	years
Non-load-bearing components for buildings - inside (terrazzo panels, milling, ...)	50	years
Load-bearing concrete or concrete components for engineering structures (beams, columns, ...)	100	years
Elements for road works (noise protection, paving stone, ...)	50	years
Parts for sewage and drainage systems (pipe, manhole, ...)	100	years
Elements for domestic use (fence, garden product, ...)	50	years
Non-structural components for farm buildings – (livestock skirting boards, ...)	25	years
Reference conditions on which the RSL is based		Individual units

Other building elements:
See EN 15804+A2 clause 6.3.4 and Annex A requirements and guidelines for reference service life

If no reference service life can be determined according to the rules of EN 15804+A2 (Annex A), a default value from a complementary PCR of the CEN/TC product committees, if available, must be used. If no complementary PKR is available, the service life can be declared from service life catalogues, depending on the area of application, stating the source, e.g. according to BAU EPD-M-DOKUMENT-20-Reference-usage-times-20150810 (Austria) or the BBSR table "Useful lives of components on life cycle analysis according to BNB" (Germany). If no information can be found there, the RSL can be derived from other sets of regulations (Eurocodes, other basis).

2.14 Reuse and recycling

Possibilities and scenarios of reuse and recycling must be described.

Specific note on creating an EPD for concrete or concrete elements:

Typical concrete structures are demolished or dismantled with demolition excavators, cranes (using wrecking balls or to expose concrete components), or explosives.

After appropriate processing and reaching the end of the waste status, concrete elements or components can be reused in the following forms:

- Reuse of concrete elements, precast concrete parts or concrete products in new buildings
- Recycling of components
  - o concrete

    - Use of concrete fragments, e.g. concrete in landscape maintenance / recultivation
    - Crushed concrete replaces primary material without further waste treatment, e.g. in road construction
    - Crushed concrete replaces natural aggregate in fresh concrete
  - o Reinforced steel and prestressed steel
  - o other components

2.15 Disposal

The different ways of disposal must be described.

The EAK-waste disposal code (Disposal code following the European list of waste) must be declared.

Specific note on creating an EPD for concrete or concrete elements:

After demolition, the rough concrete rubble (including all additional components of the structure) must be considered as waste.

If the concrete debris does not reach end-of-waste status, it is disposed of in an inert material landfill. Landfilling can also take into account any carbonation effects of discarded concrete.

2.16 Further information

Optional details, indication of reference source for additional information, e.g. websites…

3. LCA: Calculation rules

3.1 Declared unit/ Functional unit

The declared resp. functional unit, the mass reference and the conversion factor to 1 kg must be declared in a table.

Specific LCA calculation rules for concrete and concrete elements:

Specific LCA rules for concrete or concrete elements:

According to ÖN EN 15804, the declared unit is used instead of the functional unit if the exact function of the product or scenarios on the building level are not mentioned or are not known. This is more the rule than the exception for concrete. The properties according to the product standards (technical properties – Table 1) nevertheless give certain indications of possible functions.

For concrete elements (if possible) the specification of a functional unit should be aimed for.

The declared unit for concrete or concrete elements is 1 t. The average bulk density must be specified. Other declared units are permitted if the conversion to 1 t is shown transparently. If averages are declared for different products, the formation of the average must be explained.

Table 5: Declared unit 1 t

characterization	value	unit
Declared unit	1	t
Bulk density		kg/m³

The functional unit is based on the function that the product performs in the structure and the RSL of the product. It depends on the type of concrete element. The functional unit is defined as a function of the use of the product in the building.

Functional units for concrete elements must provide the following information:

- Nature and scope
- Usage
- Main performances of concrete (e.g. strength class, representation class according to EN 206) or of
- Concrete component (e.g. load-bearing capacity, energy and noise protection)
- Reference useful life

Examples of a functional unit are:
1 m² or 1 m² of a load-bearing outer wall or 1 running meter of a beam with a defined load-bearing capacity that meets the performance requirements (thermal insulation, sound insulation, fire resistance, etc.) for the structure via the RSL.

Table 6: Functional unit = 1 m³

characterization	value	unit
Functional unit	1	m³
Bulk density for conversion into kg		kg/m³

Table 7: Functional unit = 1 m²

characterization	value	unit
Functional unit	1	m²
Layer thickness		m
Grammage for conversion into kg		kg/m²

Table 8: Functional unit = 1 m²

characterization	value	unit
Functional unit	1	m
Area dimensions or diameter		m/m
Length weight for conversion to kg		kg/m

If averages are declared for different products, the formation of the average must be explained.
In this case, the average value used in the life cycle assessment and the range for the raw density must be stated.

3.2 System boundary

The type of EPD with regard to the applied system boundaries must be specified in the EPD. All building products and materials must declare modules A1-A3, modules C1-C4 and module D. The following EPD types may be specified:

• from the cradle to the factory gate with modules C1-C4 and module D (A1-A3 + C + D);

• from the cradle to the factory gate with options, modules A1-A3, C1-C4 and D (A1-A3 + C + D and additional modules. The additional modules may be one or more modules selected from A4 to B7);

• from cradle to grave and module D (A + B + C + D)

Exceptions to this rule are specified in EN 15804+A2, chapter 5.2.

Note: The specifications for the modules that must be declared no longer correspond to ÖNORM EN 16783:2017 - the specifications from EN 15804:2019+A2 apply primarily.

All declared life cycle stages (modules) are to be marked with an "X" in Table 7. Undeclared modules are to be marked with ND (= not declared).

Table 9: Declared life cycle stages

PRODUCT STAGE			CON-STRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Construction, installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction, demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

X = included in LCA; MND = Module not declared

The modules assessed in the LCA study must be described shortly. It should be made apparent, which processes are calculated in which module and how the system boundaries to nature resp. to other product systems are set (if relevant for the declared product).

If not all modules are declared in an EPD, a clear justification must be given.

Specific LCA calculation rules for concrete and concrete elements:

A1-A3:

In the manufacturing phase, all materials, products and energies, as well as any waste and its treatment or disposal must be taken into account. Modules A1, A2 and A3 can be evaluated and presented in aggregated form.

Excerpt from ÖNORM EN 16757 6.3.4.2 manufacturing phase

A1 Manufacture of raw materials and components

For ready-mixed and on-site concrete, the individual components of the concrete must be taken into account (e.g. cement, aggregate, additives, admixtures, water or fibres)

Note (not in EN 16757): The system boundary for recycled aggregates is at the point in time when the recycled aggregate is ready in storage as a raw material that can be used for the new concrete (loading and transport from the recycling plant belongs to the next system).

For precast concrete elements, in addition to the constituents of the concrete, the production of any other applied product or system (e.g. reinforcing steel, insulation material, etc.) shall be considered in A1.

A2 Transport of the raw materials to the mixing plant or to the precast plant

A3 concrete production

The manufacture of ready-mixed or site-mixed concrete can include:

- Production of auxiliary materials (lubricating oils, motor oils, conveyor belts, ...)
- Transports in the factory
- Landfill, disposal and treatment (up to the end of the waste phase) of any output from the manufacturing process
- Use of materials and equipment for wastewater treatment
- Energy used for production

The production of precast concrete elements usually includes the following:

- Production of auxiliary substances and materials (coatings, lubricating oils, disposable molds, sandpaper, motor oils, ...)
- the production and processing of preliminary products (examples of preliminary products are the processing of the aggregate, the preparation of the reinforcing steel or prestressing steel)
- Manufacture of the actual products
- Transport and storage activities in the factory
- Curing of the products including the necessary energy
- Other additional processing of the products (heating, surface treatment, etc.)
- Manufacture of packaging used for the product
- Landfill, disposal and treatment (up to the end of the waste phase) of any output from the manufacturing process
- Use of materials and equipment for wastewater treatment
- Energy used for production

Production waste that reaches the end of the waste status is treated as a co-product, i.e. an allocation according to ÖNORM EN 15804 must be carried out. If production waste is reused internally, it becomes part of Module A3.

Some infrastructure components (such as formwork, etc.) can (to a limited extent) be reused. In this case, the influence of these components in the manufacturing phase is to be taken into account by dividing their total effect by the number of uses.

In the case of a cradle-to-grave declaration, the overall effect of carbonation (note – not in EN 16757: also those during the production phase) can also be taken into account.

Note (not in EN 16757): In the production phase, carbonation can be taken into account during storage of recycled concrete aggregates and during storage of finished concrete elements.

Biogenic carbon sequestration (related to wood or packaging) is taken into account according to the recommendations of CEN TR 16970 - Sustainability of construction works - Guidance for the implementation of EN 15804.

A4-A5:

Excerpt from ÖNORM EN 16757 6.3.4.3 construction phase

A4 Transport of concrete or precast concrete parts to the construction site

A5 Installation inside a building or other structure

The laying process of ready-mixed or site-mixed concrete generally includes the following:

• Reinforcing steel and other products necessary to fulfil the functional unit
• all processes for placing concrete (e.g. pouring, pumping, vibrating, curing)
• all necessary temporary structures (e.g. formwork, falsework); the re-use of temporary structures must be considered by dividing the total impact of these by the number of uses.
• any process and material applied or used in the scenarios associated with this phase

When installing or erecting precast concrete elements, the following must generally be taken into account:

• Concrete and other products necessary for installing the precast elements (e.g. placing, pumping, compacting, curing of in-situ or ready-mixed concrete)
• On-site formwork
• any use of equipment for lifting, erecting and fastening precast concrete elements on site
• any process and material used in the scenarios associated with this phase

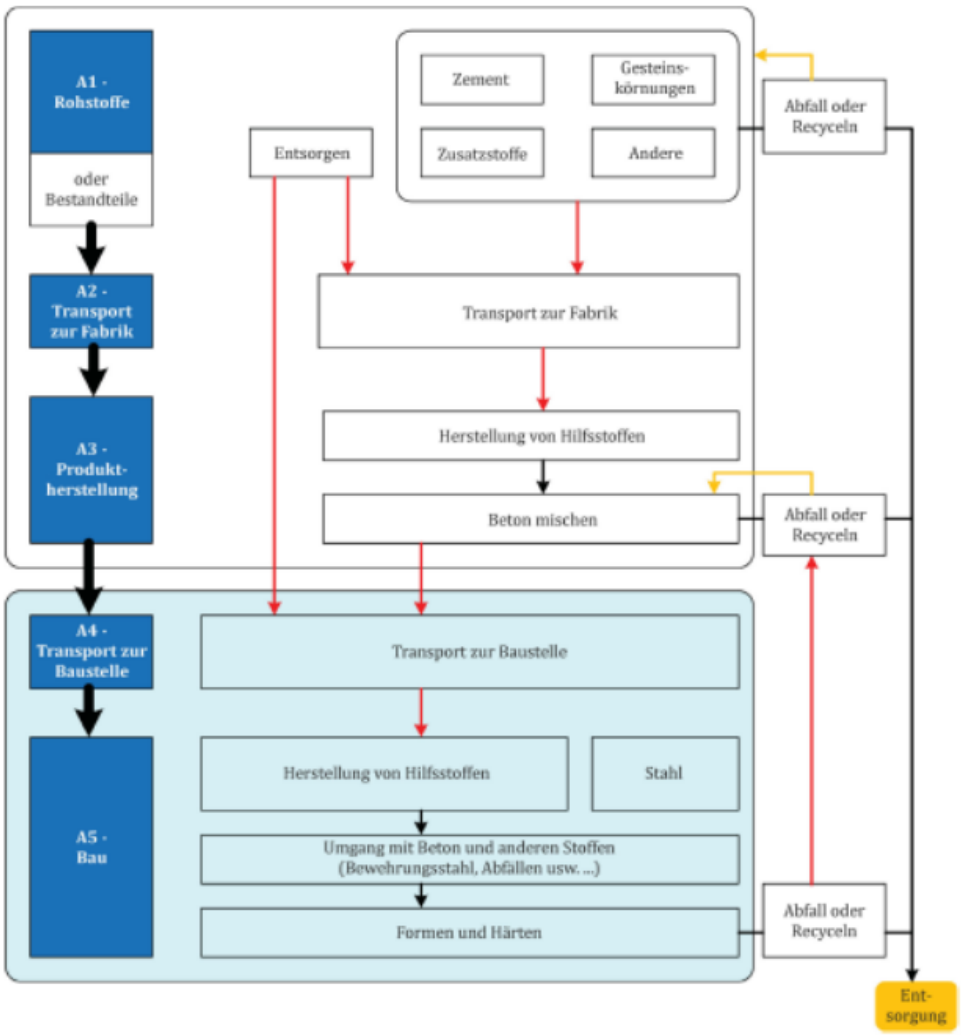

Figure 1: System boundaries A1 – A5 for ready-mixed and site concrete

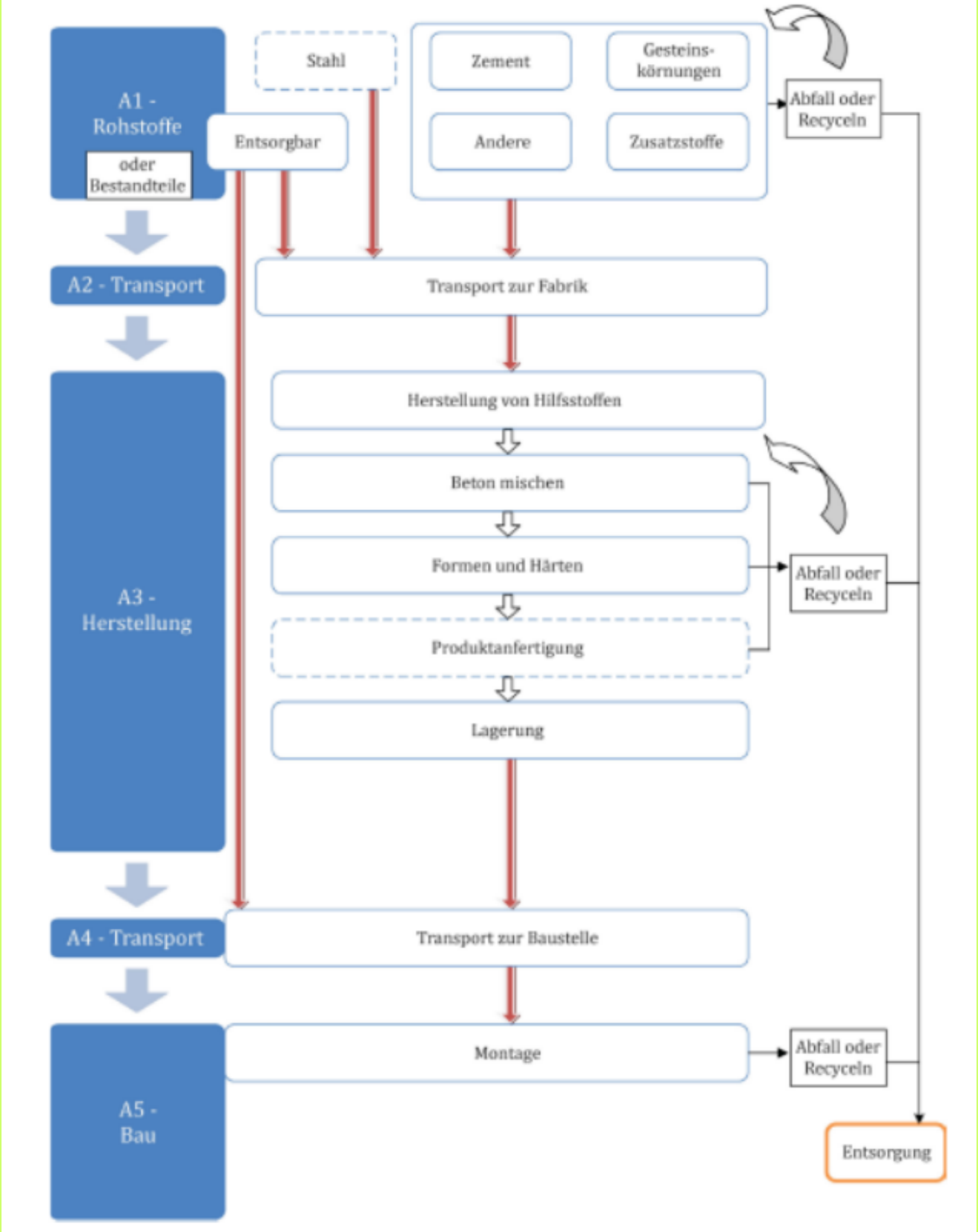

Figure 2: System boundaries A1 – A5 for precast concrete elements

B1 – B7:

If carbonation is taken into account during the use phase, it must be taken into account in module B1 (see ÖN EN 16757 Appendix BB).

Regarding B2 maintenance, periodic cleaning should be considered for some architectural concretes.

Regarding B3 repairs or B4 replacements, concrete elements in most cases have a longer RSL than the building and neither repair nor replacement is necessary during the RSL of the respective unit. In the case of non-structural concrete, with an RSL shorter than the structure's ESL, a replacement can be made.

The replacement of the product (B4) or the renewal of the surrounding component (B5) leads directly to the disposal phase C of the product at building level.

The modules B6 Operational use of energy and B7 Operational use of water are to be declared as "Module not relevant" (MNR) for concrete and concrete elements.

C1 – C4 and D:

C1 dismantling/ demolition

Scenarios for dismantling/demolition must be detailed using the most common practices. For larger and heavier components, the use of special cranes and other machinery including additional processes needed to crush the concrete must be considered. The EPD should state if no dismantling/demolition and no disposal takes place (e.g. disused subway foundation piles remain in the ground).

C2 Transport of dismantled concrete elements

Scenarios for the transport of demolition materials must consider the most plausible method (e.g. route, vehicle, etc.) for transporting the material from the construction site to disposal or processing.

Transports of demolition materials that have already reached the end of the waste status are not to be taken into account (must be attributed to the secondary raw material).

C3 waste treatment

The waste treatment scenario must include those processes associated with waste crushing, screening, washing, sorting and any processing up to the end of waste status.

Impacts related to the further processing of recycled aggregates (after reaching the end of waste status, after removal from the recycling plant) are not to be considered.

Any carbonation that may occur at the waste treatment site before a crushed precast concrete reaches end of waste status may be considered.

C4 landfill

If the concrete rubble does not reach the end of the waste status, it is sent to a landfill. The environmental impact of operating the landfill is to be recorded in Module C4.

Landfill disposal can also take into account any effects of carbonation of disposed concrete.

D Benefits and loads outside the system boundary

Possible scenarios for reuse or recycling are:

- Reuse of removed concrete elements in new structures
- Crushing/recycling of concrete
  - o Crushed concrete replaces primary material without further waste treatment (in road construction, etc.)
  - o Substitution of natural aggregates in fresh concrete

In addition, the following scenarios can be taken into account if necessary:

- Recycling or reuse of reinforcing steel
- Recycling or reuse of packaging material
- Waste that can be used as a resource for generating energy from biomass (wooden pallets, etc.)
- Output flows to secondary materials or fuels

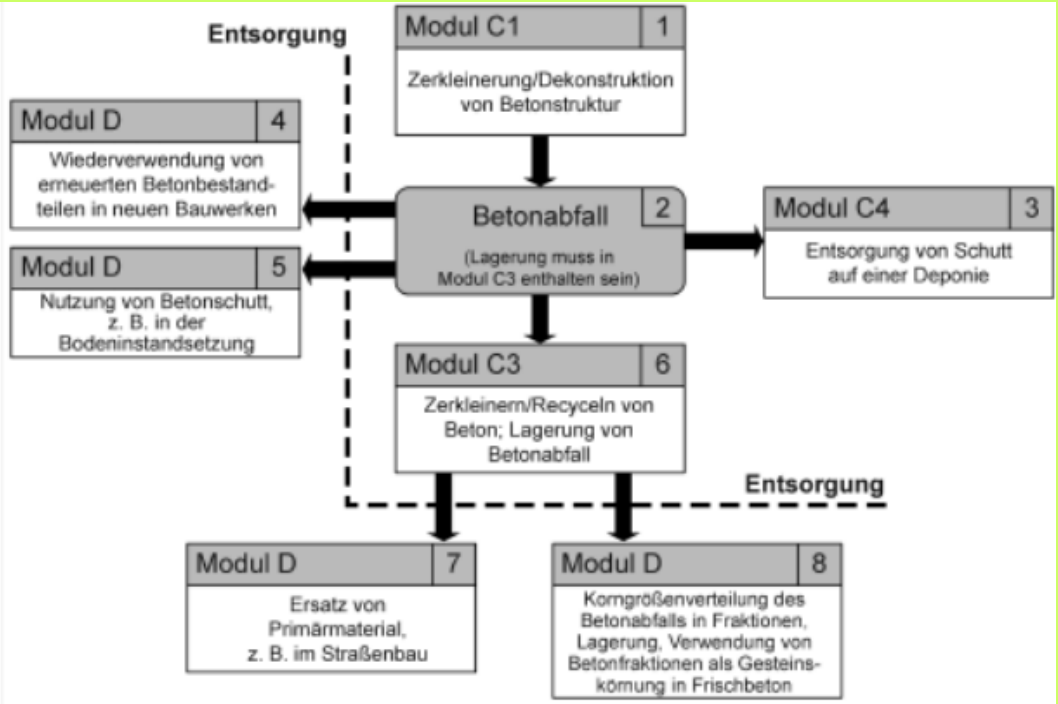

Figure 3: Typical processes in the disposal stage of concrete and concrete elements and their assignment to the life cycle modules C1-C4 and D (without transport processes)

3.3 Flow chart of processes/stages in the life cycle

A meaningful flow chart describing the manufacturing process shall give further aid to comprehension. The flow chart must be subdivided at least into the phases of life cycle declared (production, use, end-of-life). The phases can be partitioned into appropriate process stages.

3.4 Estimations and assumptions

The assumptions and assessments that are important for the interpretation of the life cycle assessment are to be listed here.

3.5 Cut-off criteria

The application of the cut-off criteria according to MS-HB Chapter 5.5.3 must be documented here.

Specific LCA rules for concrete or concrete elements:
If material losses in the factory exceed the limit of 1%, they must be recorded and stated during processing. In this case, it must also be declared how the losses are to be dealt with (internal recycling, etc.).

3.6 Data sources

The quality of the collected data must be described.

Spezifische Ökobilanzregeln für Betone bzw. Betonelemente:

Sollten für einzelne Bestandteile eines Produktes (vorgelagerte Produkte) keine Sachbilanzdaten (LCI) zur Verfügung stehen, so ist es möglich, die notwendigen Informationen zu den Umweltwirkungen für vorgelagerte Produkte aus Umweltproduktdeklarationen (EPD) zu entnehmen (z.B. A1 – A3 aus einer Gesteinskörnungs-EPD als A1 in der Beton-EPD bzw. A4 der Gesteinskörnung als A2 des Betons – siehe Figure 4). Dabei sollten möglichst kompatible EPD-Daten aus dem gleichen oder einem ähnliche EPD System übernommen werden.

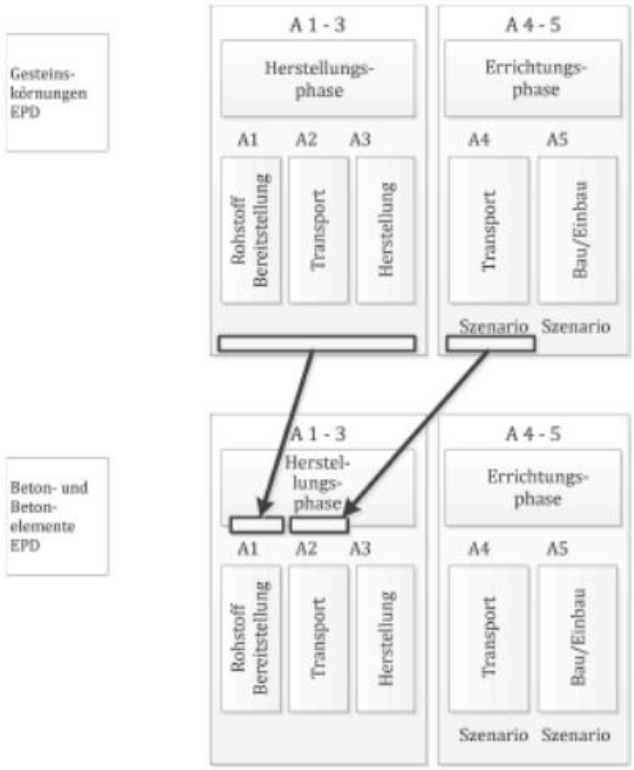

Figure 4: Typical processes in the disposal stage

3.7 Data quality

The sources of the backround data sets must be declared. If necessary, additional information on the quality of the used data sets shall be made (estimations). The issuing year of the used data material must be indicated.

3.8 Reporting period

The period under review must be documented (in case of average EPD this would be the basis of the calculated average).

3.9 Allocation

The allocations of relevance for calculation (appropriation of expenses across various products) must be indicated, at least:

- System boundary settings/allocation in the use of recycled and/or secondary raw materials
- Allocation concerning co-products
- Allocation of energy, auxiliary and operating materials used for individual products in a factory
- Loads and credits from recycling or energy recovery of packaging materials and production waste
- Loads and credits from recycling or energy recovery from the end of life of the product

whereby reference must be made to the modules in which the allocations are performed.
Detailed regulations concerning calculation of secondary materials and allocation MS-HB chapter “LCA rules” apply in all studies.

Specific LCA rules for concrete or concrete elements:

With regard to the balancing of secondary raw materials or the allocation of co-products, the following points must be observed:

• Balancing of secondary raw materials:
o The system boundary for secondary raw materials is where they have reached the "end of waste properties". This system boundary is defined using the 4 criteria that describe the end of the waste properties (EN 15804 – Annex B).
o Processes such as collection, transport and sorting of waste before reaching end-of-waste are part of the disposal system of the generating product system.

• Co-product allocation:

o Products are outputs provided by the process that have positive economic value
o If co-products are created in the plant in addition to the analyzed (main) product, an allocation according to EN 15804 must be carried out.
o Co-products, which may have been excluded from the declaration and whose material flows cannot be calculated from the production data, are subject to the allocation rules of the "General rules for life cycle assessments and requirements for the background report - PCR Part A" of Bau EPD GmbH

Excerpt from ÖNORM EN 16757 6.4.3.2 Allocation of co-products

For co-products in the production of concrete, the yield is mostly over 25%. Therefore, in such cases, the allocation according to EN 15804 must be based on economic values.

3.10 Comparability

With reference to comparability of EPD data the following facts must be mentioned:

Comparison or benchmarking of EPD data is only possible, if all compared data sets are calculating following EN 15804, the same programme specific PCR-rules or other additional rules. The same backround data sources and software versions must be applied. Moreover, the context of the function in the building or product specific features of performance must be considered.

4. LCA: Scenarios and additional technical information

The following information is mandatory to give for all declared modules, for modules not declared it is optional. If need, additional information can be declared.

4.1 A1-A3 product stage

Following EN 15804 no scenario documentation is required for A1-A3 for the declaration and calculation of these modules lies within the responsibility of the manufacturer and must not be altered by the LCA practitioner.
Note: the masses of packaging per declared unit must be indicated, this is especially important if A5 is not declared.

4.2 A4-A5 Construction process stage

Table 9 and the units listed must be used for calculation the environmental impact of the transport phase.
Table 10 and the units listed must be used for calculation the environmental impact of the installation into the building.

Table 10: Description of the scenario „Transport to building site (A4)“

Parameters to describe the transport to the building site (A4)	Quantity per m³ insulation material
Average transport distance	km
vehicle type, Commission Directive 2007/37/EC (European Emission Standard)	-
Fuel type and average consumption of vehicle	l/100 km
Maximum transport mass	tons
Capacity utilisation (including empty returns)	%
Bulk density of transported products	kg/m³
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	-

x) The table must be filled with reference to the information available from the datasets used (i.e. in case of transport by ship). The datasets used must be noted in a footnote.

Specific note on creating an EPD for concrete or concrete elements:

Excerpt from ÖNORM EN 16757 7.3.2.2 A5, installation in the building

Table 8 from ÖNORM EN 15804 is replaced by Table 11 and Table 12 for ready-mixed and site-mixed concrete or for concrete elements.

Table 11: Description of the scenario "Installation in the building (A5)" for ready-mixed and site-mixed concrete

Parameters to describe the installation of the product in the building (A5)	value	Quantity per unit
rebar a)		kg
formwork (material, e.g. wood, steel)		kg
Number of times the formwork is reused		
Falsework (material, e.g. wood, steel)		kg
Number of falsework reuses		
Auxiliary materials for installation (e.g. release agents, hardening agents, inserts a))		kg
water demand		m^3
Energy requirement for installation b)		kWh oder MJ
Concrete waste on the construction site caused by paving		kg
Output material (specified by substance)		kg
Direct emissions to ambient air (e.g. dust, VOC), soil and water		kg

a) only in the case of a functional unit

b) including heating the formwork, energy requirements for the crane, the pump or other installation devices or vibrators (if used)

Table 12: Description of the scenario "Installation in the building (A5)" for concrete elements

Parameters to describe the installation of the product in the building (A5)	value	Quantity per unit
Auxiliary materials for installation (e.g. connecting elements, fasteners, reinforcing steel)		kg
Transport or site concrete (if relevant)		kg
formwork (material, e.g. wood, steel)		kg
Number of times the formwork is reused		
water demand		m^3
Energy requirement for installation a)		kWh oder MJ
Concrete waste on the construction site caused by paving		kg
Output material (specified by substance)		kg
Direct emissions to ambient air (e.g. dust, VOC), soil and water		kg

a) including heating the formwork, energy requirements for the crane, the pump or other installation devices or vibrators (if used)

4.3 B1-B7 use stage

Reference Service life: [a]
The parameters and the units listed in the following tables must be used for calculation the environmental impact of the use stage (B2-B7). The tables can be excluded if no input or output happens. In this case a note of explanation would be sufficient: “In module BX-BY no material resp. mass flows occur, input +/- output = 0

Table 13: Description of the scenario „maintenance (B2)“ based on table 9 in EN 15804

Parameters maintenance (B2)	value	unit
Maintenance process		Description or source where description can be found
Maintenance cycle		Number per RSL or year [a]
Ancillary materials for maintenance, e.g. cleaning agent, specify materials		Kg/cycle
Waste material resulting from maintenance (specify materials)		kg
Net fresh water consumption during maintenance		m^3
Energy input during maintenance, e.g. vacuum cleaning, energy carrier type, e.g. electricity, and amount, if applicable and relevant		kWh

Table 14: Description of the scenario „repair (B3)“

Parameters repair (B3)	value	unit
Repair process		Description or source where description can be found
Inspection process		Description or source where description can be found
Repair cycle		Number per RSL or year
Ancillary materials, e.g. lubricant, specify materials		Kg or kg/cycle
Waste material resulting from repair, (specify materials)		kg
Net fresh water consumption during repair		m^3
Energy input during repair, e.g. crane activity, energy carrier type, e.g. electricity, and amount		kWh

Table 15: Description of scenario „replacement (B4)“

Parameters replacement (B4)	value	unit
Replacement cycle		Number per RSL or year
Energy input during replacement e.g. crane activity, energy carrier type, e.g. electricity and amount if applicable and relevant		kWh
Exchange of worn parts during the product's life cycle, e.g. zinc galvanised steel sheet, specify materials		kg

Table 16: Description of scenario „refurbishment (B5)“

Parameters refurbishment (B5)	value	unit
Refurbishment process		Description or source where description can be found

Refurbishment cycle		Number per RSL or year
Energy input during refurbishment e.g. crane activity, energy carrier type, e.g. electricity, and amount if applicable and relevant		kWh
Material input for refurbishment, e.g. bricks, including ancillary materials for the refurbishment process e.g. lubricant, (specify materials)		kg or kg / cycle
Waste material resulting from refurbishment (specify materials)		kg
Further assumptions for scenario development, e.g. frequency and time period of use, number of occupants		Units as appropriate

Table 17: Description of scenarios „energy (B6)“ resp. „Water (B7)“

Parameters energy (B6) and water (B7)	**value**	**unit**
Ancillary materials, e.g. lubricant, specify materials		Kg or kg/cycle
Net fresh water consumption		m^3
Type of energy carrier, e.g. electricity, natural gas, district heating		kWh or m^3
Power output of equipment		kW
Characteristic performance, e.g. energy efficiency, emissions, variation of performance with capacity utilisation etc.		units as appropriate
Further assumptions for scenario development, e.g. frequency and period of use, number of occupants		units as appropriate

Specific LCA calculation rules for concrete and concrete elements:

Excerpt from EN 16757, 6.3.8.3.1 B1, use of concrete elements:

With regard to the normal use of concrete elements, no other environmental impacts are to be expected than carbonation and the possible release of substances. The assessment of these aspects must be based on scenarios that are described for the use phase of the installed product. According to ÖN EN 15804, 7.4, the release of substances during the use phase of concrete elements that are exposed to indoor air, soil and water must be listed as additional information.
The thermal storage capacity of concrete should be considered at building level.

In addition, scenario information and assumptions for calculating the carbonation according to Annex BB of EN 16757 must be explained here. Even if no reference service life is declared, information on carbonation during the service life must be given. In this case, the results of the carbonation processes are to be related to a period of 1 year during the use phase.

Excerpt from EN 16757, 6.3.8.3.2 B2, maintenance of concrete elements:

Maintenance scenarios must include inspection, maintenance, cleaning and special maintenance work that some products (e.g. septic tanks or sewage treatment plants) may require.

For detailed information on product families see the tables in EN 16757 Annex AA.

Wherever possible, maintenance scenarios shall include:

- Maintenance process
- Maintenance cycle
- Inspection Process
- Materials for maintenance (e.g. cleaning agents)
- Material consumption
- Net use of fresh water in maintenance
- Energy use in maintenance (e.g. vacuum cleaning), type of energy source (e.g. electricity) and consumption, if applicable and relevant

Excerpt from EN 16757, 6.3.8.3.3 B3, repair of concrete elements:
If correctly designed and installed, repair of concrete elements is generally not necessary during RSL, except in cases of accidental damage (to be considered only in special cases, e.g. concrete barriers).

For detailed information on product families see the tables in EN 16757 Annex AA.

Scenarios for the repair phase B3 must contain the following information:
• Repair Process
• Inspection Process
• Repair Cycle
• Excipients
• Waste materials from repairs
• Net use of fresh water during the repair
• Energy used for the repair (e.g. crane activity), type of energy source (e.g. electricity) and consumption, if applicable and relevant

Excerpt from EN 16757, 6.3.8.3.4 B4, exchange and replacement of concrete elements:

The only situation where replacement scenarios are applicable concerns products that are at risk of accidents, e.g. B. restraint systems on bridges or certain wearing parts on engineering structures. Scenarios can indicate the probability of occurrence of the accident risk.

For detailed information on product families see the tables in EN 16757 Annex AA.

Scenarios for exchange and replacement processes B4 must contain the following information:

• Backup Cycle
• Energy use for the exchange (e.g. crane work), type of energy source (e.g. electricity) and consumption,
• if applicable and relevant
• Replacement of worn parts during the life cycle of the product (e.g. galvanised
sheet steel)

Excerpt from EN 16757, 6.3.8.3.5 B5, conversion and renewal of concrete elements:

Concrete load-bearing components are designed for a required service life that extends beyond the life of the building. If properly dimensioned and manufactured, remodeling or renewal is not relevant to the product.

Excerpt from EN 16757, 6.3.8.3.6 B6, use of operating energy:

As a rule, the use of operating energy is not relevant for concrete elements. Special scenarios are only to be described if energy-consuming systems (e.g. heating and cooling systems) are integrated in the functional unit.

For detailed information on product families see the tables in EN 16757 Annex AA.

The operational energy use scenario should take into account the thermal requirements of the building and the local climate. The calculation of the heat flows should include the thermal insulation effect of the concrete element and other components of the system. A concrete calculation should include the thermal storage capacity, e.g. B. the storage of solar energy and the delay between heat absorption and heat release during the day.

Scenarios for the use of operating energy B6 with integrated systems (e.g. heating or cooling) must contain the following information:
• Excipients
• Type of energy source (e.g. electricity, natural gas, district heating)
• Output power of devices
• characteristic performance (e.g. energy efficiency)
• further assumptions for the development of scenarios (e.g. frequency and period of use, number of residents)

Excerpt from EN 16757, 6.3.8.3.7 B7, use of water for operation

In the case of concrete elements, the use of process water is generally not relevant. Special scenarios are only to be described if water systems are integrated into the functional unit.

For detailed information on product families see the tables in EN 16757 Annex AA.

Scenarios for process water use in phase B7 for products with integrated water systems must contain the following information:

- Excipients
- Net freshwater use
- characteristic performance (e.g. change in performance with capacity utilization)
- Further assumptions for the development of scenarios (e.g. frequency and period of use, number of residents)

4.4 C1-C4 End-of-Life stage

Short description of processes concerning disposal and scenarios going with that (i.e. for transport).

Specific LCA calculation rules for Concrete and concrete elements:

For each declared "end-of-life" scenario, the respective scenario assumptions must be described. "Mixed scenarios" are permissible if the individual disposal options are also declared as 100% scenarios.

Table 18: Description of the scenario „Disposal of the product (C1 to C4)“ according to table 12 in EN 15804

Parameters for End-of-Life stage (C1-C4)	value	Quantity per m³ insulation material
Collection process specified by type		kg collected separately
		kg collected with mixed construction waste
Recovery system specified by type		kg for re-use
		kg for recycling
		kg for energy recovery
Disposal specified by type		kg product or material for final deposition
Assumptions for scenario development, e.g. transportation		Appropriate units

4.5 D Potential of reuse and recycling

Short description of assumptions for reuse-, recover- and recycling processes.

Specific LCA calculation rules for Concrete and concrete elements:

The substitution of primary raw materials, taking into account the secondary material content of the cast iron removed in C1, is shown in Module D (net flow).

Table 19: Description of the scenario „re-use, recovery and recycling potential (module D)“

(Substituted primary materials resp. technologies must be declared in a separate footnote (including technical information).

Parameters for module D	value	unit
Materials for reuse, recovery or recycling from A4-A5		%
Energy recovery or secondary fuels from A4-A5		MJ/t resp. kg/t
Materials for reuse, recovery or recycling from B2-B5		%
Energy recovery or secondary fuels from B2-B5		MJ/t resp. kg/t
Materials for reuse, recovery or recycling from C1-C4		%
Energy recovery or secondary fuels from C1-C4		MJ/t resp. kg/t

5. LCA: results

The declaration of environmental indicators must be listed in the following tables with reference only to the declared life cycle stages. Indicator values should be declared with three valid digits (eventually exponential form (e.g. 1.23E-5 = 0.0000123). A uniform format should be used for all values of one indicator. It is preferred that the definitions of the environmental indicators are spelled out completely to ensure the best possible readability. If space is needed in case of too many columns the defined abbreviations are accepted.

Specific LCA rules for concrete or concrete elements:

If no reference service life is declared (see Chapter 2.12), the results of the life cycle assessment of modules B1-B2 are to be related to a period of 1 year. This must be documented in an explanatory text in this chapter. In this case, the calculation formula for the overall life cycle assessment must also be specified.

Table 20: Parameters to describe the environmental impact of mineral insulating products per declared/functional unit

Para-meter	unit	A1-A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
GWP total	kg CO_2 eq.													
GWP fossil fuels	kg CO_2 eq.													
GWP biogenic	kg CO_2 eq.													
GWP luluc	kg CO_2 eq.													
ODP	kg CFC-11 eq.													
AP	mol H^+ eq.													
EP freshwater	kg PO_4^{3-} eq.													
EP marine	kg N eq.													
EP terrestrial	mol N eq.													
POCP	kg NMVOC eq.													
ADPE	kg Sb eq.													
ADPF	MJ H_u													
WDP	m3 Welt eq. entz.													
Legende	GWP = Global warming potential; luluc = land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP = Eutrophierungspotenzial; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources WDP = Water (user) deprivation potential, deprivation-weighted water consumption													

Table 21: Additional environmental indicators

Parameter	Unit	A1-A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
PM	disease incidence													
IRP	kBq U235 eq.													
ETP-fw	CTUe													
HTP-c	CTUh													
HTP-nc	CTUh													
SQP	dimension-less													
Legende	PM = Potential incidence of disease due to Partuculate Matter emissions; IRP = Potential Human exposure efficiency relative to U235; ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c = Potential Comparative Toxic Unit for humans – cancer effect; HTP-nc = Potential Comparative Toxic Unit for humans – non-cancer effect; SQP = Potential soil quality index													

Table 22: Parameters to describe the use of resources of mineral insulating products per declared/functional unit

Para-meter	unit	A1-A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ, net calorific value													
PERM	MJ, net calorific value													
PERT	MJ, net calorific value													
PENRE	MJ, net calorific value													
PENRM	MJ, net calorific value													
PENRT	MJ, net calorific value													
SM	kg													
RSF	MJ, net calorific value													
NRSF	MJ, net calorific value													
FW	m^3													
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilization; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilization; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of fresh water												

contains restrictions that must be declared according to the following classification in the project report and in the EPD with regard to the declaration of relevant core and additional environmental impact indicators.

Table 23 contains restrictions that must be declared according to the following classification in the project report and in the EPD with regard to the declaration of relevant core and additional environmental impact indicators.

Table 23: Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD-classification	**Indicator**	**Disclaimer**
ILCD-Type 1	GWP Global Warming Potential	none
	ODP Ozone Depletion Potential	none
	PM Particulate Matter	none
ILCD-Type 2	Acidification potential, Accumulated Exceedance (AP)	none
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	none
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	none
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	none
	Formation potential of tropospheric ozone (POCP)	none
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD-Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2
Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.		

Table 24: Parameters describing LCA-output flows and waste categories of mineral insulating products per declared/functional unit

Para-meter	unit	A1-A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg													
NHWD	kg													
RWD	kg													
CRU	kg													
MFR	kg													
MER	kg													
EEE	MJ													
EET	MJ													
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy												

Table 25: Information for description biogenic carbon content at factory gate

Biogenic carbon content	unit
Biogenic carbon content in the product	kg C
Biogenic carbon content of packing	kg C
Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2	

If the mass of biogenic carbon containing materials in the product is less than 5 % of the mass of the product, the declaration of biogenic carbon content may be omitted.
If the mass of biogenic carbon containing materials in the packaging is less than 5 % of the total mass of the packaging, the declaration of the biogenic carbon content of the packaging may be omitted.

6. LCA: Interpretation

For better understanding of the LCA, the aggregated indicators of the inventory analysis as well as those of the impact assessment (LCIA) from chapter 5 must be interpreted in a dominance analysis. The interpretation must describe a range resp. variance of LCIA results, if the EPD is valid for more than one product.

It is recommended to illustrate the results with graphic elements (i.e. the dominance analysis showing distribution of environmental impacts over several modules…)

When declaring average products, the range of possible results for the individual products for the main impact categories that are relevant to the materials used must be specified.

As for module D, the interpretation must declare, that the benefits and loads lie beyond the system boundary. Any graphic elements showing result interpretation of the life cycle must be created in a way, that modules A1-C4 and module D are displayed separate picture elements. Alternatively, the results can be interpreted without graphic elements.

Extension of an EPD:
It is mandatory to declare in a separate block in the project report:
Reasons for deviations of results of single indicators of more than 15% compared to the results before. This serves as an information for verifiers and enhances legal compliance. Users of the data can be informed of such facts.
Claims that can be published (i.e. same framework conditions, different electricity mix) can be declared in the EPD, if desired.

7. Literature

Relevant standards and sources for the preparation of the EPD resp. for the definition of the product must be listed here. The full documentation of references is to be done as follows:

Author, First name. and Author, First name. (year). Title of article. subtitle. location: publishing company.
Author, First name. (year). Title of article. In: Surname, First name. and Surname, First name. (Publishing company): Name of paper. Bd. 2 *or year number,* 207-210.
Organisation (Year): Full name of standard or rule. Date of Issue. Location. Legal institution.

Always to be quoted:

ÖNORM EN ISO 14040 Environmental management - Life cycle assessment -- Principles and framework

ÖNORM EN ISO 14044 Environmental management - Life cycle assessment -- Requirements and guidelines

ÖNORM EN ISO 14025 Environmental labels and declarations -Type III environmental declarations -- Principles and procedures

ÖNORM EN 15804 Sustainability of construction works - environmental product declarations. Core rules for the product category of construction products

Management system handbook including applicable documents from Bau EPD GmbH

8. Directory and Glossary

8.1 List of figures

Figure 1: System boundaries A1 – A5 for ready-mixed and site concrete 21
Figure 2: System boundaries A1 – A5 for precast concrete elements 22
Figure 3: Typical processes in the disposal stage of concrete and concrete elements and their assignment to the life cycle modules C1-C4 and D (without transport processes) 24
Figure 4: Typical processes in the disposal stage 25

8.2 List of tables

Table 1: Standards for concrete and concrete elements in Austria 9
Table 2: Technical data for concrete and concrete elements 11
Table 3: base materials in mass-% (example) 12
Table 4: Reference service life (RSL) according to ÖNORM EN 16757 Annex AA 15
Table 5: Declared unit 1 t 17
Table 6: Functional unit = 1 m^3 17
Table 7: Functional unit = 1 m^2 18
Table 8: Functional unit = 1 m^2 18
Table 9: Declared life cycle stages 18
Table 10: Description of the scenario „Transport to building site (A4)“ 26
Table 11: Description of the scenario "Installation in the building (A5)" for ready-mixed and site-mixed concrete 27
Table 12: Description of the scenario "Installation in the building (A5)" for concrete elements 27
Table 13: Description of the scenario „maintenance (B2)“ based on table 9 in EN 15804 28
Table 14: Description of the scenario „repair (B3)“ 28
Table 15: Description of scenario „replacement (B4)“ 28
Table 16: Description of scenario „refurbishment (B5)“ 28
Table 17: Description of scenarios „energy (B6)“ resp. „Water (B7)“ 29
Table 18: Description of the scenario „Disposal of the product (C1 to C4)“ according to table 12 in EN 15804 31
Table 19: Description of the scenario „re-use, recovery and recycling potential (module D)“ 31
Table 20: Parameters to describe the environmental impact of mineral insulating products per declared/functional unit 32
Table 21: Additional environmental indicators 32
Table 22: Parameters to describe the use of resources of mineral insulating products per declared/functional unit 33

Table 23: Classification of disclaimers to the declaration of core and additional environmental impact indicators 34
Table 24: Parameters describing LCA-output flows and waste categories of mineral insulating products per declared/functional unit 35
Table 25: Information for description biogenic carbon content at factory gate 35

8.3 Abbreviations

8.3.1 Abbreviations as per ÖNORM EN 15804

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
EPBD	Energy Performance of Buildings Directive
GWP	global warming potential
ODP	depletion potential of the stratospheric ozone layer
AP	acidification potential of soil and water
EP	eutrophication potential
POCP	formation potential of tropospheric ozone
ADP	abiotic depletion potential

8.3.2 Abbreviations as per PCR on hand

CE-mark	french: Communauté Européenne or Conformité Européenne = EC certificate of conformity
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals

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Logo	**Author of the Life Cycle Assessment** Name of creator in person Name of Institution (if rel.) Address Postcode, Location	Mail Person creator Tel Fax Mail Web
Logo	**Owner of the declaration** Name of creator in person Name of Institution (if rel.) Address Postcode, Location	Tel Fax Mail Web