

Programme for Environmental Product Declarations (EPD)

of the Swiss Supervisory Association for Stone Construction Materials
www.sugb.ch



PCR Instructions for Stone Construction Materials

Part B: Requirements for an EPD for Natural and Recycled Aggregates

PCR code: 1.4.1-1

Version 27.05.2019



Legal notice

Publisher:

SÜGB – Swiss Supervisory Association for Stone Construction Materials

Schwanengasse 12
CH-3011 Bern

www.sugb.ch
info@sugb.ch

This document refers to the German version of 2019-05-08.

This document may be translated into different languages. In case of contradictions the GERMAN VERSION is valid in any case.

Tracking of the versions

Version	Comment	Last updated
1.0	PCR Florian Gschösser	04.11.2016
1.1	Input Frank Werner	17.11.2017
1.2	EPD launched for public consultation of interested parties	26.02.2018
1.3	PKR adapted and verified by PCR Panel and launched officially for EPD creation.	30.03.2018
1.4	Input Susanne Kytzia and Simone Stürwald resp. cemsuisse	02.05.2018
1.5	Adaptation with regards to remarks Audit ECO Platform	08.05.2018

The PCR were drawn up according to the specifications of ISO 14025. Existing PCR documents for the same product categories from comparable market regions and standards of the CEN and ISO committees were taken into account.

These PCR were examined for conformity to standards and approved by the PCR committee of the programme operator on March 30 in 2018. They meet the requirements of EN ISO 14025 and EN 15804 as well as the general programme rules of SÜGB.

These PCR were available from 2018-02-26 to 2018-03-29 for at least 30 days as part of public consultation on www.sugb.ch. Received comments were taken into account when drawing up the PCR document.

Contents

Scope of application	4
Specifications for EPD presentation	4
Contents of the EPD	5
1 General information.....	6
2 Product	7
2.1 General product description	7
2.2 Use	7
2.3 Technical data	7
2.4 Product-related standards, regulations and guidelines.....	9
2.5 Delivery condition	10
2.6 Base materials/auxiliary materials	10
2.7 Production	11
2.8 Product processing/installation.....	12
2.9 Packaging.....	12
2.10 Use condition.....	13
2.11 Environment & health during use	13
2.12 Reference service life (RSL)	13
2.13 Reuse stage.....	14
2.14 Disposal	14
2.15 Further information	14
3 LCA: calculation rules	14
3.1 Declared unit/functional unit.....	14
3.2 System boundary	15
3.3 Estimations and assumptions.....	16
3.4 Cut-off rules	16
3.5 Background data	16
3.6 Data quality.....	16
3.7 Reporting period	16
3.8 Allocation	16
3.9 Comparability	17
4 LCA: Scenarios and further technical information	17
4.1 A1-A3 Product stage.....	17
4.2 A4-A5 Construction stage.....	17
4.3 B1-B7 Use stage	18
4.4 C1-C4 End-of-life stage.....	19
4.5 Potential for reuse, recovery and recycling	20
4.6 Flow chart of the processes in the life cycle	20
5 LCA: Results	20
6 LCA: Interpretation.....	22
7 Presentation of the representativeness of average EPD	23

8	References	23
9	Lists and glossary.....	24
9.1	List of figures.....	24
9.2	List of tables.....	24
9.3	Abbreviations.....	24

Scope of application

This document contains the **requirements for an Environmental Product Declaration (EPD) Type III** of the EPD programme of the Swiss Supervisory Association for Stone Construction Materials (SÜGB) according to SN EN 15804 (SIA 490.052).

The document applies to:

- Aggregates for concrete (SN EN 12620, SN 670102b-NA)
- Aggregates for mortar (SN EN 13139, SN-670101-NA)
- Aggregates for bituminous mixtures (SN EN 13043, SN 670103b-NA)
- Aggregates for unbound and hydraulically bound materials (SN EN 13242, SN 670119-NA, SN EN 13285)
- Aggregates for railway ballast (SN EN 13450, SN 670110-NA)

The requirements for the EPD comprise:

- Requirements from SN EN ISO 14025
- Requirements from SN EN 15804 (incl. National Foreword and National Annex) as European core EPD
- Complementary requirements for EPD of the EPD programme of the Swiss Supervisory Association for Stone Construction Materials (SÜGB)

The calculation rules for the life cycle assessment and the requirements for the background report are laid down in the document "Managementsystem-Handbuch (EPD-MS-HB)" (Management System Manual) of the EPD programme of the Swiss Supervisory Association for Stone Construction Materials (SÜGB).

Specifications for EPD presentation

The following specifications correspond to the specifications in *Annex 10.1.5-04 Allgemeine Anleitung für Erstellung EPD* (General Instructions for Creating EPD) of the *Managementsystem-Handbuch (EPD-MS-HB)* of the EPD programme of SÜGB:

- The scope of the EPD is not limited.
- The design of the title page is specified (see Annex 10.1.5-04.01 of the *Managementsystem-Handbuch (EPD-MS-HB)*) and can be downloaded from the SÜGB website.
- At the end, on the last page of the EPD, the publisher and programme operator (SÜGB), the creator of the life cycle assessment and the owners of the declaration must be listed with logo and complete address (incl. telephone, fax, e-mail, web address).
- The font "Verdana" must be used.

Contents of the EPD

The following **instructions/style sheets** describe the required structure of the EPD document with the **required content for the individual chapters**.

In addition, **specific comments on the creation of an EPD of aggregates** and **specific life cycle assessment rules for aggregates** which are to be taken into account when creating an EPD and the required life cycle assessment are presented in the individual chapters of this document.

Comment from *Annex 10.1.5-04 Allgemeine Anleitung für Erstellung EPD* of the *Managementsystem-Handbuch (EPD-MS-HB)* of the EPD programme of SÜGB:

The following instructions refer to an EPD of a component. They shall also be applied correspondingly to semi-finished products (e.g. aggregates, concretes, etc.), but here information for non-essential modules may be omitted.

1 General information

Name of the manufacturer	Name of the product
Programme operator SÜGB – Swiss Supervisory Association for Stone Construction Materials Schwanengasse 12 CH-3011 Bern Switzerland	Owner of the declaration Name of the manufacturer Street Post code/town
Declaration number	Declared product/declared unit Name of the declared product and the declared unit
This EPD is based on the Product Category Rules (PCR): PCR Instructions for Stone Construction Materials 11.2016 The PCR have been examined and approved by the PCR committee of the EPD programme of SÜGB and meet the requirements of EN ISO 14025 and EN 15804.	Range of validity: Description of the range of validity: The products, plants and their location countries on whose data the life cycle assessment is based and to which the declaration applies must be named. For average EPD, this type of EPD must be referred to; detailed information on the representativeness of average EPD is given in chapter 7.
Issue date xxx	Liability: The owner of the declaration is liable for the underlying information and evidence. SÜGB accepts no liability for the manufacturer's information, life cycle assessment data and evidence.
Valid until xxx	Verification CEN standard EN 15804 serves as the core PCR Verification of the EPD by an independent third party according to ISO 14025 ☐ Internal ☒ External
Insert signature	Insert signature
xxx (Head of programme operator SÜGB)	Name of the verifier, Independent examiner appointed by the PCR committee
Insert signature	
xxx (Chair of the PCR committee)	

2 Product

2.1 General product description

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

Orientation points for the general product description are:

- Separate description of the products according to the applicable product standard, indicating the type designations
- Description of the characteristic components

Specific comment on the creation of an EPD of aggregates:

Possible explanation using an example:

The declared product is, for example, a natural, crushed aggregate of particle size range 2/63 (gravel) from a quarry. The aggregate is used as an additive for concrete (2/63) and asphalt (2/32) production in the concrete and asphalt plant adjacent to the quarry.

2.2 Use

The intended use of the listed products must be specified. The individual uses (with functions) must be indicated as text or in table form.

2.3 Technical data

For products whose harmonised European product standard provides for a CE marking (even if this is not mandatory in Switzerland), the EPD must contain at least the technical data that must also be included in the manufacturer's declaration of performance. The harmonised product standard specifies which data this is.

Optionally, further technical characteristics can be listed if these are necessary for the differentiation or specification of the product(s).

Specific comment on the creation of an EPD of aggregates:

The (construction-related) technical data in Table 1 is based on the National Annexes to the harmonised European product standards for aggregates (see 2.4 Product-related standards, regulations and guidelines) and must be indicated 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 or National Annex (see footnotes).**

Table 1: Technical data for aggregates

Description	Value	Unit
Gross density, storage density	Value ^g	kg/m ³
Bulk density	Value ^g	kg/m ³
Particle size		
Description	(d/D) ^g	mm
Particle size distribution – category	G _{CX} /X ^{b,a,h,u} , G _{AX} ^{b,a,h,u} , G _{FX} ^{b,a,h,u} , G _{NGX} ^b , G _A ^u , G _B ^u , G _C ^u , G _O ^u , G _P ^u , G _E ^u , G _U ^u , G _V ^u , G _N ^u Category A to F ^s	-
Largest particle	OC _{xx} ^u	
Tolerance category	G _X /X ^a , G _{TCX} ^a	-
Particle shape	Flakiness index (FI _{xx}) ^{b,a,h,u} Shape index (SI _{xx}) ^s	-
Angularity	Flow coefficient (E _{CSXX}) ^a	-
Particle length	Particle length category A to E ^s	
Percentage of crushed particles	C _{X/X} ^{a,h,u}	-
Cleanliness		
Fines content	f _x ^{b,a,h,u}	-
Upper limit for fines	UF _x ^u	%
Lower limit for fines content particles	LF _x ^u	%
Limits for the fine particle content	Category 1 to 5 ^m	-
Fine grain content	Category A to C ^s	-
Finest grain content	Category A to D ^s	-
Quality of proportion of fines		
Threshold value (3%)	Passed/failed ^{b,h,u,m}	%
Performance comparison with known aggregates	Passed/failed ^{b,h,u}	-
Resistance to fragmentation/crushing	Los Angeles coefficient (LA _{xx}) ^{a,h} , (LA _{RBXX}) ^s	-
Resistance to polishing	Polished stone value (PSV _{xx}) ^{b,a}	-
Resistance to wear	M _{DERB} X ^s	-
Frost resistance	CBR ₂ /CBR and CBR _F /CBR ≤ 0.5 ^u	-
Particle/stone gross density	Value ^{b,a,h,m}	Mg/m ³
Water absorption	% WA ^{b,a,h,m}	%
Dry density	Value ^u	kg/m ³
Optimum water content	Mass % ^u	%
Durability	SN 670 115 (4.4 and 4.5) ^{b,a,m,s} , SN 670 116 (4.4 and 4.5) ^b	-
Bearing capacity	CBR value ^u	-
Affinity to bituminous binders	Degree of bitumen coverage ^a	%
Composition/content		
Composition of coarse recycled aggregates	Ra _x ^{b,h,u} , Rb _x ^{b,h,u} , Rc _x ^{b,h,u} , Ru _x ^{b,h,u} , Rg _x ^{b,h,u} , FL _x ^{b,h,u} , X _x ^{b,h,u}	%, cm ³ /kg
Water-soluble chlorides	% C ^b	%

Acid-soluble chlorides	% C ^b	%
Acid-soluble sulphates	AS _x ^{b, h, m}	%
Total sulphur threshold (1% or 2%)	Passed/failed ^{b, h, m}	%
Water-soluble sulphates	SS _x ^{b, h, u}	%
Components which alter the setting and hardening behaviour of concrete/mortar/hydraulically bound materials		
Extension of setting time – threshold value 120 min.	Passed/failed ^h	min.
Reduction of cube compressive strength – threshold value 20%	Passed/failed ^h	%
Influence on initial setting time of cement	A _{xx} ^b	min.
Coarse organic impurities	m _{LPCX} ^a	%
No visible impurities	Passed/failed ^{h, u}	

^g ... general specification, ^b ... aggregate (A) for concrete, ^m ... A for mortar, ^a ... A for asphalt, ^h ... A for hydraulically bound materials, ^u ... A for unbound materials, ^s ... A for railway ballast

For single EPD, the technical data of the product shall be indicated as required in Table 1.

For "sector EPD"/"group EPD" or "association EPD"/EPD covering several plants and/or products, the table must be completed, but an average or range can be given or a reference to the individual technical product data sheets can be made with "see product data sheets". The technical data can be obtained from the manufacturers. The manufacturer shall ensure that the relevant data is made available. The creator of the EPD (LCA practitioner) must list the sources of supply in the EPD document or indicate where the technical data can be accessed.

In this case, in chapter 3.1 "Declared unit/functional unit" the average value for the gross density (storage density) used in the life cycle assessment must be indicated.

2.4 Product-related standards, regulations and guidelines

The applicable standard(s) or a comparable national regulation must be specified.

As an option, evidence can be cited within the framework of a CE marking such as certificates of constancy of performance, certificates of conformity of the plant's production control, declarations of performance, registration certificates, European Technical Assessments and structural approvals.

Specific comment on the creation of an EPD of aggregates:

The rules for use applicable to the aggregate must be specified (e.g. standards, guidelines, other provisions). Examples of product standards for aggregates in Switzerland are given in Table 2.

Table 2: Standards for aggregates in Switzerland

Standard	Title
SN 670 050	Aggregates – basic standard
SN EN 12620	Aggregates for concrete
SN 670102b-NA	Aggregates for concrete – National Annex
SN EN 13139	Aggregates for mortar
SN-670101-NA	Aggregates for mortar – National Annex
SN EN 13043	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
SN 670103b-NA	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas – National Annex
SN EN 13242	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction
SN 670119a-NA	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction-NA
SN EN 13285	Unbound materials – specifications
SN EN 13450	Aggregates for railway ballast
SN 670110-NA	Aggregates for railway ballast – National Annex
SN 670071	Recycling – basic standard

2.5 Delivery condition

A text description of the delivery condition, the delivery units, dimensions and storage requirements that are important for the declared product(s) must be given here.

2.6 Base materials/auxiliary materials

The product components and/or ingredients shall be expressed in mass % to enable the user of the EPD to understand the composition of the product as delivered. This information also aims to support safety and efficiency when installing, using and disposing of the product.

The mass % can be given exactly or as a range analogous to REACH¹. The quantity of substances which make up less than 1 mass % of the total product can be given as "< 1 mass %".

The declaration of the material content of the product must at least list those substances contained in the product which are on the list of substances of very high concern for authorisation, provided that their content exceeds the limit value (0.1 mass % at product level) for registration by the European Chemicals Agency (ECHA²). If the product does not contain any SVHC above the specified limit, the following information may be provided: "The product does not contain any substances of very high concern on the Candidate List for authorisation according to REACH, as of [date of list valid at the time the EPD was created]."

An exception to the declaration obligation exists for substances and preparations which lose their hazardous properties during manufacture (e.g. due to reaction).

If the content of the substance is below the limit value of ECHA, the following reference should be made in the EPD:

"The content of XXXX is below the limit values for registration by the European Chemicals Agency."

Indications such as "... is free of ..." must not be used in the EPD.

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>

The product components must be defined in such a way that their nature is clearly recognisable, but company secrets are not disclosed. For additives, at least the function and the substance class or chemical group (e.g. hydraulic binders) must be specified.

Specific comment on the creation of an EPD of aggregates:

Table 3: Base materials in mass %

Components:	Mass %
Natural, crushed aggregates ^{x)}	
Natural round gravel ^{x)}	
Natural sand ^{x)}	
River and lake aggregates ^{x)}	
Recycled aggregates – concrete granulate from demolition ^{x)}	
Recycled aggregates – mixed granulate from demolition ^{x)}	
Recycled aggregates – asphalt granulate ^{x)}	
...	

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

2.7 Production

The production process must be described and can be illustrated with a simple diagram. If the EPD applies to several sites, the production processes of all sites must be described or a meaningful summary description must be inserted. Quality management systems etc. can be named.

Specific comment on the creation of an EPD of aggregates:

Natural aggregates are extracted from quarries (crushed aggregate), gravel pits (sand and round gravel) or from under the seabed/lakebed (sea and lake aggregates).

The production processes involved in all cases are:

- Blasting (hard rock) or excavation (sand, round gravel and sea and lake aggregates)
- Crushing for particle size reduction (possibly multi-stage)
- Washing (washing out of clay and minute particles)
- Classification by particle size (possibly multi-stage)
- Storage on stockpiles or in containers (ready for loading or feeding)

Figure 1 shows the schematic of the production processes including the relevant inputs and outputs and the system boundaries for the production process (red dotted line). The blue dotted line shows the system boundary for recycled aggregates. In the case of recycled aggregates, it is particularly important to ensure that the system boundary is set at the point where the secondary raw material has reached the “end-of-waste state”. The end-of-waste state is determined by 4 criteria (EN 15804 – Annex B). Compliance with these criteria must be monitored regularly.

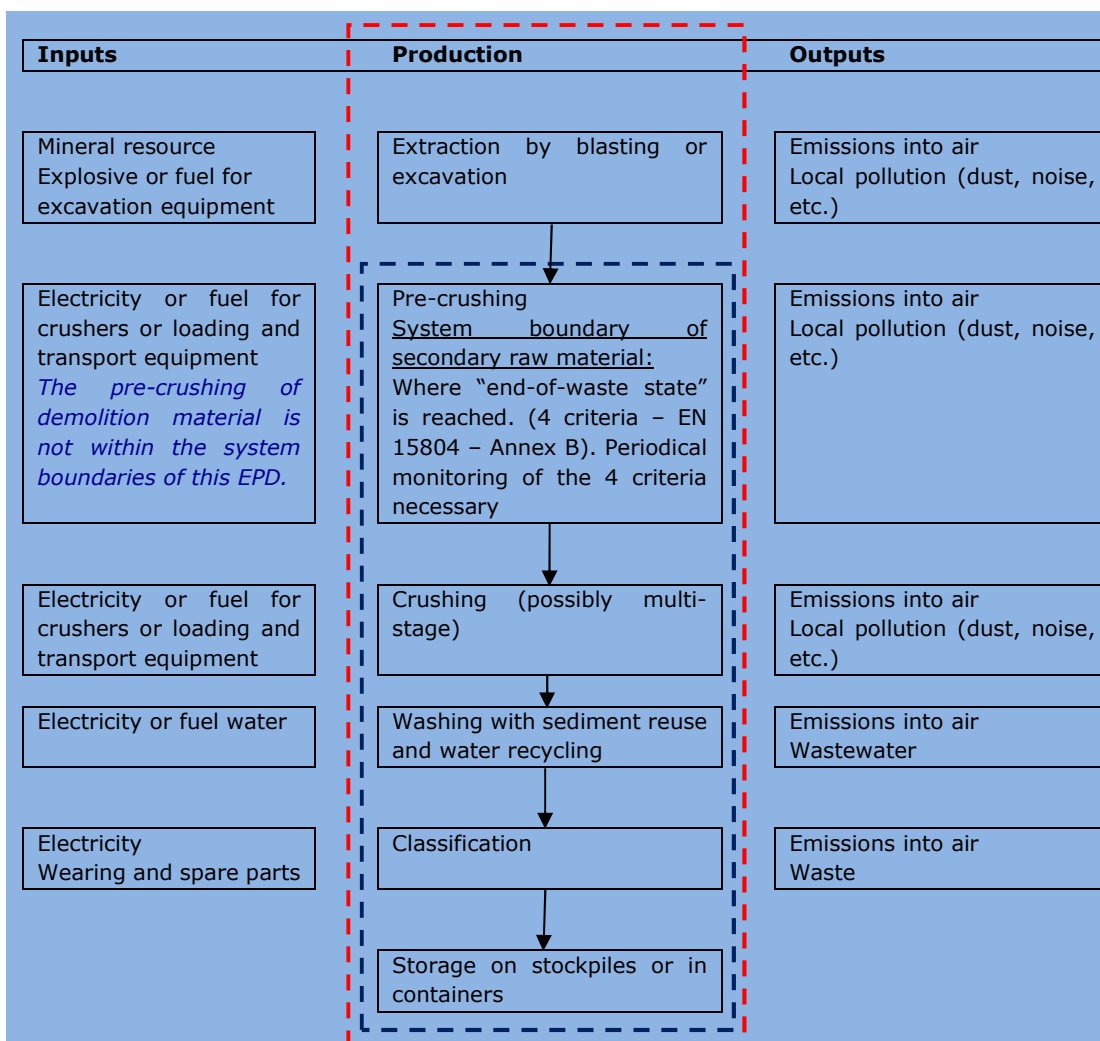


Figure 1: Flow chart of production processes

2.8 Product processing/installation

Description of the type of processing, the machines, tools, dust extraction systems, auxiliary materials, etc. to be used, as well as the noise reduction measures.

References to the rules of engineering and occupational safety and environmental protection are possible.

References to detailed processing guidelines and the safe use instruction sheet of the manufacturer are desired.

Specific comment on the creation of an EPD of aggregates:

The product processing and installation of aggregates strongly depends on the possible or planned applications of the aggregate (raw material for construction materials or directly as construction material).

If the aggregate is used as a raw material for another construction material (e.g. concrete), the processing takes place in the course of the production of the concrete, etc.

If the aggregate is used as a separate construction material (e.g. as an unbound foundation layer in road construction), the installation of the aggregate must be described accordingly here.

2.9 Packaging

Information on packaging materials that occur during the life cycle of a product:

type (film, pallet, etc.),
material (paper, polyethylene, etc.; if necessary incl. origin, e.g. waste paper) and
possible subsequent use (e.g. reusable pallets)

Specific comment on the creation of an EPD of aggregates:

As a rule, aggregates are delivered in loose form (without packaging material).

2.10 Use condition

Here, references must be made to particular features of the material composition which are relevant for the period of use.

Specific comment on the creation of an EPD of aggregates:

In the case of aggregates as construction material (e.g. unbound foundation layer in road superstructure), there are no changes in the material composition over the period of use provided that the planning is carried out properly, the installation is carried out properly and professionally and the use is trouble-free.

If the aggregate is used as a raw material for other building products (e.g. concrete), it is no longer possible to consider the use stage or the use condition of the aggregate itself and this must be done in the EPD of the concrete.

2.11 Environment & health during use

Here, environmental impacts are to be indicated on the basis of impact relationships between the product, environment and health.

B1: Environmental aspects and impacts associated with the normal (i.e. intended) use of the products, e.g. release of substances from roofs, floor coverings and other surfaces (indoor or outdoor) or contamination of railway ballast, are declared as additional information.

2.12 Reference service life (RSL)

The specification of the RSL is mandatory for the EPD if the life cycle assessment covers the entire use stage (modules B1 to B7) or if it contains a use scenario that refers to the service life of the product.

The RSL must refer to the declared technical and functional quality of the product. It must be established in accordance with any specific rules existing in the European product standards and must take the ISO 15686-1, -2, -7 and -8 standards into account. However, information on the RSL in SN EN construction product standards always has priority.

According to ISO 15686-1, -2, -7 and -8, the indication of an RSL is voluntary if not all modules of the use stage are specified or no use scenario is determined.

The assumptions on which the determination of the RSL is based and to which the RSL applies exclusively must be stated.

The influences on ageing during use shall be assessed according to the rules of engineering.

Specific comment on the creation of an EPD of aggregates:

If the use of the aggregate as a construction material in a building or other structure is known, the RSL of the product must be consistent with (and at least equal to) the estimated service life (ESL).

Note: The estimated service life (ESL) is normally determined on the basis of the reference service life (RSL) depending on the actual 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 aggregates should be tested by the manufacturer for intended use.

2.13 Reuse stage

Possibilities of reuse and recycling shall be described.

2.14 Disposal

The possible disposal routes for the declared product must be specified. The VeVA code (Ordinance on the Transport of Waste) and the EWC waste code number (waste code according to the European Waste Catalogue) must be given.

2.15 Further information

In this chapter, optional details such as the source of further information, the website, the source of the safety data sheet, etc. can be provided.

3 LCA: calculation rules

3.1 Declared unit/functional unit

The declared unit, the mass reference and the conversion factor to 1 kg must be indicated as declared in the provided table.

Specific life cycle assessment rules for aggregates:

The declared unit for aggregates is 1 t. The average gross density (storage density) must be indicated. Other declared units are permitted if the conversion to 1 t is presented transparently.

If averages of different products are declared, the averaging shall be explained.

Table 4: Declared unit

Description	Value	Unit
Declared unit	1	t
Gross density (bulk density)		kg/m ³
Release factor		-
Storage density		kg/m ³

A functional unit can be specified for aggregates if they are used directly as construction material. The functional unit is then based on the function of the product installed in the structure (e.g. 1 m³ unbound mixture as foundation layer in the road superstructure) and the reference service life of the product.

3.2 System boundary

The type of EPD with regard to the applied system boundaries must be specified in the EPD:

- from cradle to gate
- from cradle to gate – with options or
- from cradle to grave

The modules considered in the life cycle assessment in accordance with *chapter 10.2.5 Systemgrenze* (System boundary) of the “Managementsystem-Handbuch (EPD-MS-HB)” of the EPD programme of SÜGB must be briefly described. It should become clear which processes are considered in which modules and how the system boundary to nature or to other product systems is defined (if relevant for the declared product).

If modules are not included in the assessment as part of an EPD, this must be conclusively justified and explained.

Specific life cycle assessment rules for aggregates:

A1-A3:

In the product stage, all substances, products and energies, as well as any waste generated and its treatment or disposal, must be taken into account. Modules A1, A2 and A3 can be evaluated and displayed in aggregated form.

A4-A5:

Aggregates can be used as raw material for construction materials (concrete, asphalt, hydraulically bound materials) or directly as construction material (unbound materials, armourstones, railway ballast).

If the aggregate is processed as a raw material in another construction material (e.g. concrete), this cannot be represented meaningfully in an aggregate EPD beyond A3.

If the aggregate is used as its own construction material (e.g. unbound foundation layer in road superstructures), the EPD can consider the transport of the aggregate to the construction site (A4) and the installation as construction material (A5).

B1-B7:

If the aggregate is used as a raw material for other building products (e.g. concrete), it is no longer possible to consider the use stage of the aggregate itself.

In the case of aggregates as construction material (e.g. railway ballast), there are usually no changes in the material composition of the aggregate over the period of use, i.e. the aggregate fulfils its function continuously.

C1 - C4 and D:

If the aggregate is used as a raw material for other building products (e.g. concrete), it is no longer possible to consider the end-of-life stage of the aggregate itself.

In principle, aggregates are reused as construction material (unbound materials, armourstones, railway ballast) at the end of their use and thus substitute new primary aggregates (module D). However, during their use stage, these aggregates may be exposed to a corresponding pollution load and may need to be processed for reuse or, in the worst case, disposed of.

If the end-of-life stage is assessed, at least one scenario must contain the dumping of the aggregate in the case of aggregates with a pollution load. Further scenarios for recycling can be described.

Recommendation of the draft of a standard on the PCR of aggregates:

The *Draft (V5) PCR AGGREGATES* standard of CEN/TC 154 recommends consideration “from cradle to gate” (A1-A3) due to the multitude of possible applications for aggregates.

3.3 Estimations and assumptions

The assumptions and estimations that are important for the interpretation of the life cycle assessment and which have not already been dealt with in other points should be mentioned here.

3.4 Cut-off rules

The use of the cut-off criteria according to the “Managementsystem-Handbuch” (EPD-MS-HB) must be documented here.

Specific life cycle assessment rules for aggregates:

If material losses in the plant exceed the limit of 1%, these must be determined during processing and reported. In this case, it is also necessary to declare how the losses are dealt with (in-house recycling, etc.).

3.5 Background data

The source of the used background data must be indicated. It must be indicated that the current average Swiss electricity mix was used for products manufactured in Switzerland.

Specific life cycle assessment rules for aggregates:

If no life cycle inventory analysis (LCI) data is available for individual components of a product (upstream products), it is possible to obtain the necessary information on the environmental impacts for upstream products from environmental product declarations (EPD). If possible, compatible EPD data should be transferred from the same or a similar EPD system which is also in compliance with EN 15804.

3.6 Data quality

The quality of the used data must be described. The age/reference year of the used data must be indicated here.

The requirements for the quality of the generic data as described in the National Annex of SN EN 15804 must be taken into account and documented.

3.7 Reporting period

The reporting period (for average EPD, this is the basis for averaging) must be documented.

3.8 Allocation

The allocations relevant for the calculation (allocations of expenses to different products) must be indicated. These include at least:

- Setting system boundaries when using recycle or secondary raw materials
- Allocation for co-products which arise
- Allocation of used energies, auxiliary and operating materials to the individual products of a plant
- Loads and potential benefits from recycling and/or thermal utilisation of packaging materials and production waste
- Loads and potential benefits from recycling the dismantled product

Reference must be made to the modules in which the allocations are made.

Specific life cycle assessment rules for aggregates:

The following points must be observed with regard to the assessment of secondary raw materials and the allocation of co-products:

- Assessment of secondary raw materials:
 - The system boundary for secondary raw materials is where they have reached the “end-of-waste state”. This system boundary is defined by the 4 criteria describing the end-of-waste state (EN 15804 – Annex B). The system boundary for recycled granulate can be set at the moment when the dismantled material (after the pre-crushing operations) is available as raw material in the plant warehouse for the crushing operation for the required particle size class.
 - Processes such as collection, transport and sorting of waste before reaching the end-of-waste state are part of the disposal system of the generating product system.
- Co-product allocation:
 - Products are outputs provided by the process that have a positive economic value
 - If co-products are manufactured in the plant in addition to the analysed (main) product, an economic allocation must be carried out in principle.
 - If the difference in the operating income generated by the products is small, the allocation must be based on physical properties (mass, volume).
 - Co-products, which may have been omitted from the declaration and whose material flows cannot be deduced from the production data, are subject to the allocation rules of the “Managementsystem-Handbuch (EPD-MS-HB)” of the EPD programme of SÜGB

3.9 Comparability

With regard to the comparability of EPD data, the following should be noted:

In principle, a comparison or evaluation of EPD data is only possible if all data sets to be compared have been created in accordance with EN 15804, the same programme-specific PCR/any additional rules and the same background database have been used, and the building context/product-specific performance characteristics are also taken into account.

4 LCA: Scenarios and further technical information

The following information is mandatory for declared modules, and optional for undeclared modules. Only modules for which declarations are made are to be listed. If necessary, additional information may be provided.

4.1 A1-A3 Product stage

According to SN EN 15804, no technical scenario information is required for modules A1-A3 because the assessment of these modules is the responsibility of the manufacturer and may not be changed by the user of the life cycle assessment.

4.2 A4-A5 Construction stage

The parameters in Table 5 and Table 6 and their listed units shall be used to calculate the environmental impacts of the construction stage.

Table 5: Description of the scenario “Transport to the building site (A4)”

Parameters to describe the transport to the building site (A4)	Value	Measurement
Average transport distance		km

Vehicle type according to Commission Directive 2007/37/EC (European Emission Standard)		-
Average fuel consumption, fuel type:		l/100 km
Average transport mass		t
Average capacity utilisation (including empty returns)		%
Average gross density of transported products		t /m ³
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)		-

* in the case of rail or sea transport, the definitions and units must be adapted accordingly

Table 6: Description of the scenario "Installation of the product in the building (A5)"

Parameters to describe the installation of the product in the building (A5)	Value	Measurement
Auxiliary materials for installation (specified by material)		kg/t t/t l/t
Tools for installation (specified by type)		-
Water consumption		m ³ /t l/t
Other resource use		kg/t t/t l/t
Electricity consumption		kWh or MJ/t
Other energy carriers:		kWh or MJ/t
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by material)		kg/t
Output materials (specified by material) as a result of waste processing at the building site, e.g. of collection for recycling, for energy recovery, disposal (specified by route)		kg/t
Direct emissions to ambient air (e.g. dust, VOC), soil and water		kg/t

4.3 B1-B7 Use stage

With regard to environmental impacts during use (B1), i.e. environmental impacts due to interactions between the product, environment and health, reference must be made to chapter 2.11.

Table 7: Reference service life

Description	Unit
Reference service life	Years
Declared product characteristics (at the factory gate) and details of implementation, etc.	Meaningful units
Parameters for the planned use (if specified by the manufacturer), including instructions for appropriate use and rules for use	Meaningful units
The assumed implementation quality, if performed in accordance with the manufacturer's specifications	Meaningful units
Outdoor conditions (for outdoor use), e.g. weather exposure, pollutants, UV and wind exposure, building orientation, shading, temperature	Meaningful units
Indoor conditions (for indoor use), e.g. temperature, humidity, chemical exposure	Meaningful units
Conditions of use, e.g. frequency of use, mechanical stress	Meaningful units
Maintenance, e.g. required frequency, type and quality and replacement of components	Meaningful units

Specific comment on the creation of an EPD of aggregates:

In the use stage (B1), no material and energy flows relevant for the life cycle assessment take place for aggregates used as construction material (e.g. unbound mixture or railway ballast) (i.e. the results for B1 are to be set at "zero"). With regard to "Environment & health during use", i.e. environmental impacts due to interactions between the product, environment and health, reference must be made to chapter 2.11.

As a rule, no maintenance (B2) or repair processes (B3) take place for aggregates used as construction material. The replacement of the product (B4) and the renewal of the surrounding component (B5) lead directly to the disposal of the product. Modules B6 and B7 are not relevant for concretes and concrete elements. Therefore, for modules B2 to B7, no data is required to describe scenarios.

4.4 C1-C4 End-of-life stage

Here there is a brief description of the disposal processes and the associated scenarios (e.g. for transport).

Specific life cycle assessment rules for aggregates:

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

Table 8: Description of the scenario “Disposal of the product (C1 to C4)”

(Collection processes and recovery systems are to be defined separately in a footer (including technical specifications)).

Parameters for end-of-life stage (C1-C4)	Value	Measurement per t
Collection process specified by type		kg collected separately
		kg collected with mixed construction waste
Recovery system specified by type		kg potential for reuse
		kg recycling
		kg for energy recovery
Disposal specified by type		kg product or material for final deposition

4.5 Potential for reuse, recovery and recycling

Here there is a brief description of the assumptions regarding potential for reuse, recovery and recycling.

Table 9: Description of the scenario “Potential for reuse, recovery and recycling (Module D)”

(Replaced primary products/technologies are to be defined separately in a footer (including technical specifications)).

Parameters for the module (D)	Value	Measurement
Materials for reuse or recycling from A4-A5*		kg/t
Exported energy or secondary fuels from A4-A5*		MJ/t or kg/t
Materials for reuse or recycling from C1-C4*		kg/t
Exported energy or secondary fuels from C1-C4*		MJ/t or kg/t

Separate consideration of benefits from the use of the product and packaging

4.6 Flow chart of the processes in the life cycle

To illustrate the examined product system, the EPD must contain a simple flow chart of the processes covered in the life cycle assessment. These must be divided at least into the life cycle stages of the product (product stage, optional: construction, use and disposal – Table 10). The stages can also be further subdivided.

5 LCA: Results

All declared life cycle stages (modules) must be indicated with an “X” in Table 10. Non-declared modules must be indicated with MND (= module not declared) and non-relevant modules with MNR (= module not relevant).

The reasons for not taking individual modules into account are given in chapter 3.2.

Table 10: Declared life cycle stages

PRODUCT STAGE			CON-STRUC-TION STAGE		USE STAGE							END-OF-LIFE STAGE				ADVANTAGES AND LOADS
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/installation	Use	Maintenance	Repair	Replacement	Conversion, renovation	Energy use for operations	Water use for operations	Demolition	Transport	Waste management	Disposal	Potential for reuse, recovery and recycling

X = included in life cycle assessment; MND = module not declared; MNR = module not relevant

In the following tables (Table 11 to Table 13) columns must be provided only for the declared modules. The numerical values must be indicated with 3 valid digits, the exponential notation can be used (example: 2.53E-4 for 0.000253). The same number format should always be used for a particular impact indicator. If possible, the names of the environmental indicators should be written out fully in Table 11 to Table 13 in addition to the abbreviations in order to ensure best possible readability. If space is limited due to too many module columns, the defined abbreviations will be accepted.

Specific life cycle assessment rules for aggregates:

If no reference service life is declared (see chapter 2.12), the results of the life cycle assessment of modules B1-B2 and B6-B7 must refer to a period of 1 year in each case. This must be documented in an explanatory text in this chapter. The calculation formula for the overall life cycle assessment must also be given in this case.

Table 11: Results of the life cycle assessment – environmental impacts

Parameter	Unit	A1 - A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
GWP	kg CO ₂ equiv													
ODP	kg CFC-11 equiv													
AP	kg SO ₂ equiv													
EP	kg PO ₄ ³⁻ equiv													
POCP	kg C ₂ H ₄ equiv													
ADPE	kg Sb equiv													
ADPF	MJ H _u													
Legend		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; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources												

Table 12: Results of the life cycle assessment – resource use

Parameter	Unit	A1-A3	A4	A5	B1	B2	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ H _u													
PERM	MJ H _u													
PERT	MJ H _u													
PENRE	MJ H _u													
PENRM	MJ H _u													
PENRT	MJ H _u													
SM	kg													
RSF	MJ H _u													
NRSF	MJ H _u													
FW	m ³													
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; 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												

Table 13: Results of the life cycle assessment – output flows and waste categories

Parameter	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												

6 LCA: Interpretation

In order to understand the life cycle assessment, both the aggregated indicators of the life cycle inventory analysis and the life cycle impact assessment (LCIA) from chapter 5 must be interpreted in a dominance analysis.

The interpretation must also include a description of the range or variance of the LCIA results if the EPD is valid for several products.

It is recommended to illustrate the interpretation of the results with diagrams (e.g. the dominance analysis regarding the distribution of environmental influences over the modules, etc.).

With regard to module D, the interpretation in the EPD must point out that the benefits and loads lie outside the product system boundaries. Diagrams for the interpretation of results of the life cycle must be designed in such a way that modules A1-C4 are shown in one diagram and module D in separate diagrams. Alternatively, the results can also be interpreted without diagrams.

7 Presentation of the representativeness of average EPD

This chapter is only relevant for average EPD and can be deleted for other EPD.

For average EPD, the following has to be indicated here:

- a) The market to which the average EPD refers;
- b) A list of all plants and products which have been taken into consideration;
- c) An indication if the list of considered plants is not exhaustive (e.g. if individual plants or countries of a manufacturer have not been taken into account);
- d) It also has to be indicated whether the EPD is ONLY applicable or representative for those plants and sites which have also provided data or for which other market segments/industry segments the EPD is representative. A detailed justification needs to be given (e.g. technologies used, market conditions, etc.). If other representativeness is given, this should be described in a separate paragraph below the list of plants participating in the study.

Additional references to required information in the EPD document:

- a) Technical and functional characteristics: indication of relevant ranges AND average values used for the life cycle assessment, for the latter the averaging must be explained.
- b) Composition, base materials: indication of relevant ranges AND average values used for the life cycle assessment, for the latter the averaging must be explained.
- c) Field of application, intended use: list, if possible for all products, as a paragraph or table.

8 References

Standards already cited in full in the EPD and standards on technical evidence or technical properties do not have to be listed here. However, any further literature referenced in the EPD must be cited in full.

The references must be presented in the following form:

Author's Last Name, First Initial and Author's Last Name, First Initial (Year). Article title. Subheading. Place: publisher.

Author's Last Name, First Initial (Year). Article title. In: Surname, First Initial and Surname, First Initial (eds.): Name of the journal. Vol. 2 or Year no., 207-210.

Organisation (Year): Full name of the regulation or rule. Release date. Place: legislative body.

The following must always be cited:

SN EN ISO 14025: 2010-08 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

SN EN ISO 14040: 2006-10 Environmental management – Life cycle assessment – Principles and framework

SN EN ISO 14044: 2006-11 Environmental management – Life cycle assessment – Requirements and guidelines

SN EN 15804+A1: 2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

Managementsystem-Handbuch (EPD-MS-HB) of the EPD programme of the Swiss Supervisory Association for Stone Construction Materials (SÜGB) – indication of the version number and date

9 Lists and glossary

9.1 List of figures

Figure 1: Flow chart of production processes	12
--	----

9.2 List of tables

Table 1: Technical data for aggregates	8
Table 2: Standards for aggregates in Switzerland	10
Table 3: Base materials in mass %	11
Table 4: Declared unit	14
Table 5: Description of the scenario "Transport to the building site (A4)"	17
Table 6: Description of the scenario "Installation of the product in the building (A5)"	18
Table 7: Reference service life	19
Table 8: Description of the scenario "Disposal of the product (C1 to C4)"	20
Table 9: Description of the scenario "Potential for reuse, recovery and recycling (Module D)"	20
Table 10: Declared life cycle stages	21
Table 11: Results of the life cycle assessment – environmental impacts	21
Table 12: Results of the life cycle assessment – resource use	22
Table 13: Results of the life cycle assessment – output flows and waste categories	22

9.3 Abbreviations

9.3.1 Abbreviations according to SN 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

9.3.2 Abbreviations according to these PCR

CE marking	French Communauté Européenne = "European Community" or Conformité Européenne, i.e. indicating compliance with EU directives
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SVOC	Semi-volatile organic compounds
TVOC	Total volatile organic compounds
VOC	Volatile organic compounds