

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



www.bau-epd.at

Part B: Requirements on the EPD for Insulating materials made from renewable resources

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Tracking of versions

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4.0	Adaptation as per EN 15804:2019+A2:2019; adaptation of rules for declaration of geographical representativity	2020-11-05
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11.0	Incorporation of the extension for insulation materials made of sheep's wool (created by PB, checked by FG and AS and approved by SR)	2023-04-03

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1. Scope

This document contains the requirements for an environmental product declaration (EPD) of Bau-EPD GmbH according to EN 15804 and ISO 14025.

This document applies – until further product categories are added – to the following insulating materials made from renewable raw materials:

- Straw bales for thermal insulation
- Wood fibre insulation boards (wood fibre boards for thermal insulation)
- Bulk insulation made of wood fibres
- Insulation mats and panels made of hemp

insulation materials made of sheep's wool

The requirements on the EPD include:

- Requirements from EN ISO 14025
- Requirements on the EN 15804 standard as a European core EPD
- Requirements from EN 16783 as complementary product PCR for insulating materials
- In the case of wood products, the requirements in ÖNORM EN 16485 Logs and sawn timber - Environmental product declarations - Product category rules for wood and wood-based materials in construction and
- Requirements from ÖNORM EN 16449 - Wood and wood products - Calculation of the storage of atmospheric carbon dioxide
- 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 of materials made from renewable resources** and **specific LCA calculation rules for materials made from renewable resources** 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



OWNER AND 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
HOLDER OF THE DECLARATION	Name of declaration holder
DECLARATION NUMBER	To be accorded with Bau EPD GmbH
ISSUE DATE	Date
VALID TO	Date
NUMBER OF DATASETS	Number
ENERGY MIX APPROACH	MARKET BASED APPROACH

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**

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1. General information

<p>Product name Name and description of product</p>	<p>Declared Product / Declared Unit Description of the declared product and declared unit/functional unit</p>
<p>Declaration number To be accorded with Bau EPD GmbH</p>	<p>Number of datasets in EPD Document(s): XX</p>
<p>Declaration data <input type="checkbox"/> Specific data <input type="checkbox"/> Average data</p>	<p>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.</p>
<p>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.</p>	
<p>Type of Declaration as per EN 15804 From cradle to LCA-Method: (i.e. cut-off by classification)</p>	<p>Database, Software, Version Declaration of background database, Software used and both its versions Version Characterisation Factors: Quelle, Version</p>
<p>Author of the Life Cycle Assessment Name of the author Institution, Address website</p>	<p>The CEN standard EN 15804:2014+A1 serves as the core-PCR. Independent verification of the declaration according to ISO 14025:2010</p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <p>Verifier 1: Name Verifier 2: Name</p>
<p>Holder of the Declaration Name of the manufacturer/owner Institution, Address website</p>	<p>Owner, Publisher and Programme Operator Bau EPD GmbH Seidengasse 13/3 1070 Vienna Austria</p>

DI (FH) DI DI Sarah Richter
Head of Conformity Assessment Body

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 materials made from renewable resources:

- Separate description of materials made from renewable resources for each product standard applicable
- The declared product is...

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.

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 materials made from renewable resources:

For thermal insulation materials for which a harmonized European standard is available:

Table 1: Product specific standards

Standard	Title
ÖNORM EN 13171	Thermal insulation products for buildings - Factory made wood fibre (WF) products - Specification
ÖNORM EN 622-4	Fibreboards - Requirements - Part 4 Requirements for porous boards and ÖNORM EN 14964 - Underlay boards - Definition and properties

For insulating materials made from renewable raw materials for which there are no harmonized European standards (e.g. straw bales and insulation materials made of sheep's wool), the following must be stated in the EPD:

"There is no harmonized European standard for <insulation group designation>. A CE marking is only possible on the basis of a European Technical Assessment (ETB)."

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 materials made from renewable resources:

For construction straw bales and insulation materials made of hemp fibres and insulation materials made of sheep's wool, for which no declarations of performance are currently required, at least the technical data of the product listed in Table 1 must be given:

Table 2: Technical data of the declared construction product for straw bales, hemp fibres and sheep's wool

Characterization	Value	Unit
nominal density		kg/m ³
density range		kg/m ³
Nominal value of the thermal conductivity λ_D stating the test geometry ¹⁾		W/(mK)
Conversion factor to calculate the rated value of thermal conductivity (23 °C/80 % relative humidity) ²⁾		-
Euro class of fire behaviour according to ÖNORM EN 13501-1 ³⁾		-
Resistance to biological agents		-
Flow resistance (Measurement method:).		(kPa s) / m ²
Tensile strength parallel to the board level test according to EN 1608:2013 ⁴⁾		kPa
Sound absorption according to EN ISO 354:2003 and EN ISO 11654:1997 ⁴⁾		H
Sound absorption class according to EN ISO 354:2003 and EN ISO 11654:1997 ⁴⁾		-

- 1) If the nominal value of the thermal conductivity λ_D defined in the European standards is not given, it must be defined which nominal value is quoted.
- 2) Austria: according to ÖNORM B 6015-2, determination of the building material-specific thermal conductivity and the reference thermal conductivity for homogeneous building materials
- 3) If the product is in system 1, the reaction to fire classification must be verified by the EC certificate.
- 4) Required for hemp insulation panels

For thermal insulation materials made of wood fibres (WF), the designation key according to ÖN EN 13171 (product name, number codes, etc.) and the technical data listed in Table 3 must be given.

Table 3: Technical data of the declared wood fibre board insulation according to EN 13171

Characterization	Value	Unit
Thermal conductivity λ_D according to EN 12667 or EN 12939		W/(mK)
Mean raw density or raw density range		kg/m ³
Euro class of fire behavior according to ÖNORM EN 13501-1 ¹⁾		

- 1) The classification must be proven by the EC certificate.

For specific EPD the technical data of the product must be declared as required in [Table 1](#) to [Table 13](#).

For average EPD ("Sector or Branch-EPD", "Group EPD" or "EPD from Associations") in [Table 1](#) to [Table 3](#) 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.

Note:

When averaging, it should be taken into account that, with regard to possible grouping into classes, the gross density is more decisive than the application according to EN 16783.

In case of declaring average values ÖNORM EN 16783 chapter 6.3.6 must be considered:
Grouping of products and declaring average values is allowed without reporting differences, if the differences in each impact category are lower than 25 %. In other cases, the differences in the impact categories shall be reported together with average values.

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 REACH¹. 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 (ECHA²). 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 materials made from renewable resources:

Table 4: base materials in mass-% (example)

Components	Function	Mass fraction in percent
Conventional wheat straw 1)	insulation material	25
Organic wheat straw 2)	insulation material	25
Conventional rye straw 3)	insulation material	25
Organic rye straw 4)	insulation material	25
Polypropylene cord 5)	lacing	0,09

Optional: footnote with description for each component

Examples:

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) text
- 2) text
- 3) text

Auxiliaries / additives

Specifications and proportions of excipients are to be stated (in text or tabular format)

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 materials made from renewable resources:

Description of raw material extraction, processing and geographical origin of raw materials, special processing chains....

Example of flow chart/graphic

Figure 1: Example of a flow chart/graphic production stage

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).

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.

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 materials made from renewable resources:

If the products are installed professionally and if the phase of utilization is not disturbed, no modifications of the material composition occur.

2.12 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 notes for the creation of an EPD for materials made from renewable resources:

Table 5: Reference service life (RSL)

Characterization	value	unit
construction straw bale		years
Insulating materials made from wood fibres		years
Insulating materials made from hemp fibres		years
Insulation materials made of sheep's wool		years
Reference conditions on which the RSL is based (if relevant)		Individual units

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 PCR 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).

2.13 Reuse and recycling

Possibilities and scenarios of reuse and recycling must be described.

2.14 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.

2.15 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 materials made from renewable resources:

The declared unit is 1 m³ insulation material. Option: In addition, the data can be declared referring to a functional unit (e.g. 1 m² insulation material for a specific thermal resistance; R_D -value).

In „Cradle-to-Grave-EPD“, the R-value per unit (= thermal insulation resistance) as per ÖNORM EN 16783 must be indicated as one functional unit.

Table 6: Declared unit

characterization	value	unit
declared unit	1	m ³
gross density for conversion into kg		kg/m ³

Table 7: Functional unit

characterization	value	unit
functional unit i.e. for R _D = 1 m ² K/W	1	m ²
Calculation factor for conversion into kg		-

If average results of different products are declared, the methods of calculating the average values must be explained.

In this case the average value of nominal density/ weight per unit used for calculating the LCA must be declared as an additional information.

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 8. Undeclared modules are to be marked with ND (= not declared).

Table 8: 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 materials made from renewable resources:

ÖNORM EN 16485 is to be used for the life cycle assessment of wood fibre insulation boards. There is no standard with specific product category rules for construction straw bales and insulation materials made from hemp fibres and insulation materials made of sheep's wool.

A1-A3

- Energy content and biogenic carbon

o are considered as a material property (ÖNORM EN 16485, 6.3.4.2). For the balancing, the carbon contained in the renewable raw material at the system entry is calculated negatively. The flows leaving the system are calculated accordingly at the system boundary - the biogenic carbon as emission of carbon dioxide, the energy content as output of renewable primary energy (in analogy to ÖNORM EN 16485, Fig*1.). If no product-specific data is available, the carbon content values given in Table 9 below can be used.

o This regulation also applies to the use of secondary raw materials.

- Straw and hemp production:

o Are the straw bales or and hemp fibres as (co-)products of the grain. and hemp cultivation, the proportionate expenditure of the agricultural processes (cultivation of the arable land, production and application of fertilizers and sprays, harvest) must be balanced (economic allocation).

o If no specific data is available, the following Ecoinvent or GaBi data can be used to balance the straw or hemp fibre production:

- Wheat straw extensive, at farm/CH S
- Barley straw extensive, at farm/CH S
- Rye straw conventional, at farm/RER S
- Rye straw extensive, at farm/CH S
- Rye straw IP, at farm/CH S
- Rye straw organic, at farm/CH S

- Wool from sheep farming:

- o Sheep wool is usually not purchased directly from sheep farmers but through a trader who buys the sheep wool most favourably in terms of price and quantities. The origin, an exact description and the prices of the wool should be collected and additional transports should be considered.

- o For insulating materials made from sheep's wool, the expenses of sheep farming, such as for accommodation, transport, feed, water and possibly medicines, must be accounted for. The proportional expenses must be economically allocated to the products meat, milk, sheep husbandry as cultural care and wool. Even if the allocation for wool is below the cut-off criteria, the methane emissions of the animals must be allocated in the balance.
- o The transport of the sheep wool to the laundry, a complete life cycle inventory of the laundry and the transport from the laundry to the production site must be included in the calculation.
- o If no specific data are available, corresponding generic data can be used for the balancing of sheep husbandry and the laundry.
-

A4-A5

- By-products:

o Straw or hemp fibre residues that occur during installation can be used as bedding (straw), in biogas plants or as fuel. Combustion scenarios are to be taken in accordance with C1-C4. Sheep wool residues are also thermally recycled

- Guideline values for material losses during installation:

o Wood fibre insulation boards

- 10% of the delivery quantity for insulating boards for insulating external walls
- 5% of the delivery quantity for insulating boards for insulating ceilings and roofs

If lower values are to be used, the manufacturer must submit proof of this.

o No specifications for straw bales and insulating materials made from hemp fibres and sheep fibres

B1-B7

• The stages B1 use, B2 maintenance and B3 repair are not relevant for this product group. The stage B4 replacement is equivalent to the product end of life. There are no material and energy flows when the product is removed. Stages B5 conversion/renewal, B6 energy use and B7 water use are not applicable at insulation level.

Therefore: No product group-specific rules

C1 - C4 and D

• When balancing the disposal phase, at least one scenario with incineration of the insulating material must be included (thermal waste treatment or incineration with energy recovery).

• EN 16485, Table 1 applies to the assignment of disposal methods to modules C1 – C4 and D for all insulating materials made from renewable raw materials. The material properties energy content and biogenic carbon content must be exported in the corresponding indicators and information modules. Instructions for doing this are given below.

o When applying the “thermal waste treatment” scenario, the environmental impact of the waste treatment and the incineration processes are declared as a disposal process in C4. Useful energy produced during waste treatment is declared as exported energy (EEE and EET indicators) in C4 and the credits related to the produced useful energy in Module D.

- The indicator “Energy Recovery Material (MER)” is to be indicated in C4 with “0” (zero).
- The primary energy from material use (PERM, PENRM) must be specified as a negative value in C4 and taken into account as a corresponding flow in Module D (indicators PERE, PENRE), if Module D is declared.
- The global warming potential (GWP) of the CO₂ stored in the product is to be posted in module C4 (see EN 16485).

o When applying the “Incineration with energy recovery” scenario, the environmental impact of the waste treatment and the incineration process are declared in C3. Useful energy produced during waste treatment is declared as exported energy in C3 (indicators EEE and EET) and the credits related to the produced useful energy are declared in module D, if module D is declared.

- The Energy Recovery Material (MER) indicators shall be reported in C3 as “0” (zero).
- The primary energy from material use (PERM, PENRM) must be specified as a negative value in C3 and taken into account as a corresponding flow in Module D (indicators PERE, PENRE).
- The global warming potential (GWP) of the CO₂ stored in the product is to be posted in module C3 (see EN 16485).

When applying the “Use as secondary fuel” scenario, the material flow at the system boundary is classified as secondary fuel: the environmental impact in the processing of waste into secondary fuel are balanced in C3. The material flow is declared as energy recovery material (INDICATOR MER) in C3 and the incineration process and the credits associated with the useful energy produced are declared in Module D, if Module D is declared.

- The indicators for exported energy (EEE and EET) are to be indicated in C3 with “0” (zero).
- The primary energy from material use (PERM, PENRM) must be specified as a negative value in C3 and taken into account as a corresponding flow in Module D (indicators PERE, PENRE).
- The global warming potential (GWP) of the CO₂ stored in the product is to be posted in module C3 (see EN 16485).

- If no product-specific values are available, the calorific value can be calculated as follows.

$$H_{n,v} = H_n \left(\frac{100 - F}{100} \right) - \frac{2,442}{100} F$$

whereby:

H_{n,v} ... (lower) calorific value in MJ/kg

H_n ... Calorific value (related to the anhydrous fuel) in MJ/kg

F ... moisture content of the product as a percentage of total dry matter

2.442 ... latent heat of vaporization of water at 25 °C (MJ/kg)

Calorific values (upper calorific values) for various renewable raw materials can be found in the following table:

The remaining product components (flame retardants, binders, etc.) must be taken into account accordingly.

Further scenarios for recycling can be created.

Tabelle 9: Fuel data for straw (source: www.bhkw-anlagen.com) softwood (Weidema et al. 2013), hemp fibres (Reinhardt J. et al.2019) and sheep wool (chem. composition: Komorowska et al 2022, calorific value and heat value calculated and compared with <https://bauforumstahl.de/upload/documents/brandschutz/kennwerte/Heizwertalpha.pdf>)

raw material/product	Yellow Straw	Gray Straw	Softwood	Hemp Fibre	Sheep’s wool
moisture content	10-20 %	10-20 %	10 %		Depending on ambient humidity ≈ 18 %
Volatiles	> 70 %	> 70 %			
ash	4 %	3 %			
carbon	42 %	43 %			41,8 %
hydrogen	5 %	5,2 %			
oxygen	37 %	38 %			
chloride	0,75 %	0,2 %			
nitrogen	0,35 %	0,41 %			11,4 %
sulfur	0,16 %	0,13 %			5,0
calcium					5,8 %
magnesium					1,4 %
potassium					16,4 %
sodium					1,1%
phosphorus					0,3
calorific value	18,2 MJ/kg	18,7 MJ/kg			24,6
Calorific value at 15% moisture content	15,1 MJ/kg	15,5 MJ/kg			20,8 MJ/kg
Calorific value at 10% moisture content			17,3MJ/kg	14,9	21,9 MJ/kg

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.

3.6 Data sources

The quality of the collected data must be described.

3.7 Data quality

The sources of the background 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.

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 in the same version, the same programme specific PCR-rules or other additional rules. The same background 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 unit
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/m ³
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.

Table 11: Description of the scenario „Installation of the product in the building (A5)“ as per table 8 in ÖNORM EN 15804

Parameters to describe the installation of the product in the building (A5)	Quantity per unit
Ancillary materials for installation (specified by material);	Meaningful unit
Water use	m ³

Other resource use	kg
Electricity demand	kWh or MJ
Other energy carrier(s):	kWh or other unit (e.g. litres)
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	kg
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	kg
Direct emissions to ambient air, soil and water	kg

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 12: 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 freshwater 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 13: 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 freshwater consumption during repair		m ³
Energy input during repair, e.g. crane activity, energy carrier type, e.g. electricity, and amount		kWh

Table 14: 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 15: 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 16: 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 materials made from renewable resources:

For materials made from renewable resources no LCA-relevant material- and energy flows occur in use stage (B1). Therefore, results in B1 must be declared with “0”.

During use stage no processes with regard to maintenance, repair or replacement and refurbishment occur, therefore no environmental impact is to calculate in modules B2-B5 (the results must be declared with “0”). Modules B6 and B7 are not relevant for insulating materials, with that no impact is to calculate (B6 and B7 must be declared with “0”).

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 materials made from renewable resources:

Existing processes of treatment should be described, even if technical or economic framework conditions make treatment not sensible at the time of publication of the EPD.

Table 17: 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 m ³ 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 materials made from renewable resources:

Any substitutions of primary materials with regards to any considered share of secondary materials from insulating materials removed in C1 must be declared in module D (net flows).

Table 18: 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.

Note: ÖNORM EN 16783 Section 6.3.6 applies when specifying averages:

Groupings of substances and declaration of mean values are acceptable without stating differences if the differences in each impact category are less than 25%. In other cases, the differences in the impact categories must be given together with mean values.

Table 19: Parameters to describe the environmental impact of mineral insulating products per declared/functional unit

Parameter	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	m ³ 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 20: 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 Particulate 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 21: Parameters to describe the use of resources of mineral insulating products per declared/functional unit

Parameter	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 22 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 22: 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 23: Parameters describing LCA-output flows and waste categories of mineral insulating products per declared/functional unit

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													

Table 24: 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 13162: Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification

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

EN 16485

ÖNORM EN 16485 Round and sawn timber - Environmental product declarations - Product category rules for wood and wood-based materials in construction

ÖNORM 16783- Wärmedämmstoffe - Produktkategorieregeln (PCR) für werkmäßig hergestellte und an der Verwendungsstelle hergestellte Wärmedämmstoffe zur Erstellung von Umweltproduktdeklarationen

Literature used in this PCR:

Komorowska, M.; Niemiec, M.; Sikora, J.; Szeląg-Sikora, A.; Gródek-Szostak, Z.; Findura, P.; Gurgulu, H.; Stuglik, J.; Chowaniak, M.; Atılgan, A. Closed-Loop Agricultural Production and Its Environmental Efficiency: A Case Study of Sheep Wool Production in Northwestern Kyrgyzstan. *Energies* 2022, 15, 6358. <https://doi.org/10.3390/en15176358> Academic Editor: Attilio Converti

Reinhardt, J., Veith, C., Lempik, J., Knappe, F., Mellwig, P., Giegrich, J., Muchow, N., Schmitz T. und Voß, I. (2019). Ganzheitliche Bewertung von verschiedenen Dämmstoffalternativen. Heidelberg / Neckargemünd: IFEU. Management-System Handbuch inkl. mitgeltende Unterlagen der Bau EPD GmbH

Weidema B P, Bauer C, Hischier R, Mutel C, Nemecek T, Reinhard J, Vadenbo C O, Wernet G. (2013). Overview and methodology. Data Quality guideline for the ecoinvent database version 3. Ecoinvent Report 1(v3). St. Gallen: The ecoinvent Centre

Management system handbook including applicable documents from Bau EPD GmbH

8. Directory and Glossary

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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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