PCR Guidance-Texts for Building-Related Products and Services

From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU)

Part B: Requirements on the EPD for HVAC Appliances

Institut Bauen und Umwelt e.V.

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Scope

This document contains the Requirements for an Environmental Product Declaration (EPD) for the range of environmental product declarations published by the Institut Bauen und Umwelt e.V. (IBU) based on the *EN 15804* standard. The document applies for:

Heating, Ventilation and Air Conditioning (HVAC) appliances with the main function of regulating temperature, humidity and indoor air quality in building environments, both in heating and cooling modes. These products are classified hereinafter as 'Conditioning Home Appliances' according to CPC 43912. For sake of brevity, the term 'HVAC' might be used in the rest of the document. This product family includes all the systems used to control and regulate temperature and humidity, ensuring proper air quality and living conditions in building environments. Any range of heating, cooling or ventilation power is covered by this PCR. This product category includes domestic and industrial heat pumps, ventilation units for residential usage, large air treatment units and any other electric equipment designed to maintain certain air and humidity conditions in a building space. Equipment designed to regulate air temperature and quality without acting on humidity (such as air to water/ air to air heat pumps) are covered as well by this PCR

The requirements for the EPD include:

- Requirements for the *EN 15804* standard as a European core EPD
- Complementary requirements for IBU EPD

The calculation rules for the life cycle assessment and requirements for the project report are specified in a separate document as Part A of the Product Category Rules.
The general principles for the EPD range of Institut Bauen und Umwelt e.V. (IBU) also apply.

Hints for using the database system

Insert text: Requirements for the content are shown in blue colour under the respective titles. These coloured texts can be edited by clicking. In the appearing text editor, the requirements for the content are outlined above for further

assistance. The relevant text can be entered below. After confirming the input, texts are incorporated into the document and displayed.

Inserting images: Using the text editor, "broad" and "small" pictures can be added. If you click on the respective button in the editor, you can select the image file and upload it. After uploading, the figure is shown in the text editor and can be changed in size by clicking and pulling the edges.

Technical tables: Click on the table, to open the table editor. Insert your values (= numbers) in the respective field in the column "Value". For each row, you can choose between 3 value types: value (= number), range (= consisting of two numbers separated with a hyphen) and a free text (e.g. “test passed after 3 days”). On the far left, you can hide rows that are not relevant by clicking on the check. Click the “add new property” button to generate a new row with free text space. It is not allowed to insert a picture instead of a table!

Chapter 5, "Results of the LCA": Click on the first table "system boundaries" and select all life stages you want to declare in the following dialogue. Then the following three tables are adjusted according to your entries. Now you can insert numerical values by clicking on the tables. The numerical values are to be indicated with three significant digits. The "exponential view" can be selected for each impact indicator to achieve an optimal representation.

Storing/saving is done fully automatically.

The first three pages of the document will be deleted automatically after the creation of the EPD.

Labelled sample texts are proposals to facilitate the creation of an EPD. If they are accepted into an EPD, they should be checked for their accuracy and if necessary adapted for the specific product.

Requirements for content and format:

The chapters of the EPDs must be described in a compact form and in a factually and technically correct way. Judgmental, comparative, or promotional texts are not permitted unless specifically requested in the PCR or if necessary in the context of the EPD. Each document is carefully checked before publication.

The extent of an EPD: For technical reasons, an EPD may contain one data set only. This means that the tables for the LCA results are available only once per EPD. All four tables of the LCA results (Chapter 5) must be located entirely on one side.

Quotations should be indicated in italic (formatting), for example: EN 15804. The literature cited is to be shown completely in the references (Chapter 8).

Product-group-specific LCA calculation rules from PCR part A

Definition of the reference utilisation scenario (B6):

In line with PCR EPDItaly019 EPDItaly Core PCR - HVAC Home Appliances, GPI version 5.0, 2021, in this module, the impacts related to the energy consumed by the HVAC to operate during its entire reference service life shall be considered. Any extraordinary maintenance operations may be included in the cut-off criteria. The following formula shall be used to calculate the electricity consumed during the product's service life:

$E_{use}[kWh] = (E_{heating} + E_{cooling}) * RSL$

The total energy consumed by the HVAC to operate is the combination of energy absorbed to exchange heat in heating and cooling mode along product RSL.

Calculation of $E_{heating}$

$E_{heating}$ represents the annual energy consumption in heating mode, computed according to technical standards as follows:

$$E_{heating}\ \left[\frac{kWh}{year}\right] = \frac{P_{heat,design}}{SCOP} * t_{heating}$$

- Where P_{heat}, design is the heating load declared by HVAC manufacturer at design temperature conditions expressed in kW; this value shall be computed according to EN 14825.
- SCOP is the Seasonal Coefficient of Performance, computed according to technical standard EN 14825;
- $t_{heating}$ is the total operating time per year in heating mode, expressed in hours according to EU regulations 206/212 and 811/2013 (according to the considered HVAC type)

Calculation of $E_{cooling}$

$E_{cooling}$ represents the annual energy consumption in cooling mode, computed according to technical standards as follows:

$$E_{cooling}\ \left[\frac{kWh}{year}\right] = \frac{P_{cool,design}}{SCOP} * t_{cooling}$$

- Where: P_{cool}, design is the cooling load declared by HVAC manufacturer at design temperature conditions expressed in kW; this value shall be computed according to EN 14825;
- SEER is the Seasonal Energy Efficiency Ratio, computed according to technical standard EN 14825;
- $T_{cooling}$ is the total operating time per year in cooling mode, expressed in hours according to EU regulations 206/212 and 811/2013 (according to the considered HVAC type).

The energy consumed value obtained by the formula must be included in the LCA model and must be associated with an appropriate emission factor that takes the installation site and the type of energy monitored into account. The specific energy flow in the country of installation should be considered, as well as the specific voltage measured (for example, a residential HVAC system may operate at low voltage whilst an industrial chiller may operate at medium voltage. The electricity emission factors will be different in each case).
The impacts associated with electricity generation shall be included in the 'Use & maintenance' module. The maintenance interventions that can be evaluated are exclusively those of preventive maintenance which, within this PCR, is divided between ordinary scheduled maintenance and extraordinary scheduled maintenance. Both interventions are based on monitorable parameters or other physical quantities (time, km, number of cycles, absorption, etc.) and are aimed at keeping the machine in the optimal state of efficiency. The parameters used to program maintenance are generally based on direct experience, laboratory tests and on statistical analysis of faults occurring on significant populations of identical electrical HVACs. The main difference is that extraordinary maintenance requires more demanding interventions which may require long times or even the transport of the electrical panel to specialized repair companies.
EPDs based on this PCR shall include in the 'Use & maintenance stage' environmental impacts associated to both types of maintenance. Technical standards, best practices and operational simulations performed by the manufacturer can be used as sources to model maintenance impacts. Anyway, assumptions and hypotheses for modelling these impacts shall be carefully reported in the underlaying LCA report; their consistency shall be checked by the EPD verifier during the verification.
EPDs based on this PCR shall consider an entire refill of refrigerant gas during the RSL. The corresponding amount of exhausted refrigerant shall be considered as emitted to air in the LCI analysis. In case of hermetically sealed HVAC, no releases shall be considered during the use phase.

Calculation of $E_{ventilation}$

For $E_{ventilation}$ two significant aspects have to be considered: The annual electricity consumption (AEC) as well as the annual heating saved (AHS), both indicated per 100 m2 floor area. The definition of the terms as well as the calculation method are taken over from EU regulation 1254/2014.
The annual electricity consumption (AEC) is indicated in kWh electricity per year. Whereas the annual heating saved (AHS), which means the annual saving in consumption of energy for heating, is stated in kWh primary energy per year for each type of climate ('average', 'warm', 'cold').

The characteristics are calculated as follows:

$AEC = t_a * q_{net} * MISC * CTRL^x * SPI + Q_{defr}$

$AHS = t_h * _\Delta T_h * _\eta_h^{-1}_ * c_{air} * (q_{ref} - q_{net} * CTRL * MISC * (1 - \eta_t))$

where:

— ta is annual operating hours [h/a];
— q_{net} is net ventilation rate demand per m^2 heated floor area [m^3/h.m^2];
— MISC is an aggregated general typology factor, incorporating factors for ventilation effectiveness, duct leakage and extra infiltration [-];
— CTRL is the ventilation control factor [-];
— x is an exponent that takes into account non-linearity between thermal energy and electricity saving, depending on motor and drive characteristics [-];
— SPI is specific power input [kW/(m^3/h)];
— t_h is total hours heating season [h];
— ΔT_h is the average difference in indoor (19 °C) and outdoor temperature over a heating season, minus 3 K correction
for solar and internal gains [K];
— η_h is the average space heating efficiency [-];
— c_{air} is the specific heat capacity of air at constant pressure and density [kWh/(m³ K)];
— q_{ref} is the reference natural ventilation rate per m2 heated floor area [m^3/h.m^2];
— η_t is the thermal efficiency of heat recovery [-];

Definition of calculation parameters see table 1 of EU regulation 1254/2014:

Table 1

SEC calculation parameters

general typology					MISC
Ducted ventilation units					**1,1**
Non-ducted ventilation units					**1,21**
ventilation control					**CTRL**
Manual control (no DCV)					**1**
Clock control (no DCV)					**0,95**
Central demand control					**0,85**
Local demand control					**0,65**
motor & drive					**x-value**
on/off & single speed					**1**
2-speed					**1,2**
3-speed					**1,5**
variable speed					**2**
Climate	t_h in h	ΔT_h in K	t_{defr} in h	ΔT_{defr} in K	Q_{defr} (*) in kWh/a.m²
Cold	**6 552**	**14,5**	1 003	5,2	**5,82**
Average	**5 112**	**9,5**	168	2,4	**0,45**
Warm	**4 392**	**5**	—	—	—

(*) Defrosting applies only to bidirectional units with recuperative heat exchanger and is calculated as $Q_{defr} = t_{defr} * \Delta t_{defr} * c_{air} * q_{net} * pef$. For unidirectional units or units with regenerative heat exchangers, $Q_{defr} = 0$

Defaults	value
specific heat capacity of air, c_{air} in kWh/(m³K)	**0,000344**
net ventilation requirement per m² heated floor area, q_{net} in m³/h.m²	**1,3**
reference natural ventilation rate per m² heated floor area, q_{ref} in m³/h.m²	**2,2**
annual operating hours, t_a in h	**8 760**
primary energy factor electric power generation & distribution, *pef*	**2,5**
space heating efficiency, η_h	**75 %**

The following references must be included in the EPD:

PCR EPDItaly019
EPDItaly Core PCR - HVAC Home Appliances, GPI version 5.0, 2021.
www.epditaly.it

CPC 43912
PCR 2021:02 'Air-conditioning machines product group classification: UN CPC 43912' version 1.0.

EU regulation 206/212
Implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air conditioners and comfort fans.

EU regulation 811/2013
of the Commission dated 18 February 2013 supplementing Guideline 2010/30/EU of the European Parliament and Council with regard to energy marking of room heaters, combination heating appliances, integrated systems comprising room heaters, temperature controllers and solar equipment as well as integrated systems comprising combination heating appliances, temperature controllers and solar equipment.

EU regulation 1254/2014
of the Commission dated 11 July 2014 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of residential ventilation units

IPCC, 2007
Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

ISO 817
ISO 817:2014-05 Refrigerants - Designation and safety classification, Beuth-Verlag, Berlin.

DIN EN 14825
DIN EN 14825:2019-07 Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling - Testing and rating at part load conditions and calculation of seasonal performance; German version EN 14825:2018, Beuth-Verlag, Berlin.

DIN EN 13141
DIN EN 13141-11:2015-07 Lüftung von Gebäuden - Leistungsprüfung von Bauteilen/Produkten für die Lüftung von Wohnungen - Teil 11: Zuluftsysteme; Deutsche Fassung EN 13141-11:2015, Beuth-Verlag, Berlin.

ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	
Issue date	
Valid to	

Name of declared product

Name of manufacturer/association

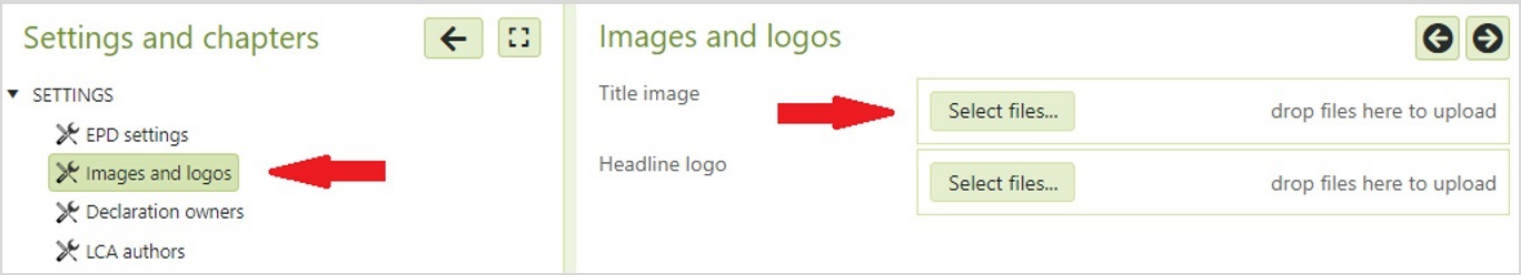
www.ibu-epd.com | https://epd-online.com

Large picture of the product

Maximum file size: 4 MB

Recommended picture size: width 1500 pixel, height 1000 pixel

Insert the picture: Click on "Images and Logos" in the tree view and specify the location of the image on your PC in the dialog on the right.



LOGO

1. General Information

Name of the manufacturer

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

This declaration is based on the product category rules:

Name of PCR,
08-2021
(PCR checked and approved by the SVR)

Issue date

Valid to

[Unterschrift]

Name of Chairman
(Chairman of Institut Bauen und Umwelt e.V.)

[Unterschrift]

Name of Managing Director
(Managing Director Institut Bauen und Umwelt e.V.)

Name of the product

Owner of the declaration

Name of the manufacturer
Street
ZipCode/City
Country

Declared product / declared unit

Name of declared product / declared unit

Scope:

The products, plants and their locations must be outlined, on which data the Life Cycle Assessment is based and for which the declaration applies.

For average EPDs, e.g. association EPDs, the plants/companies under review on whose data the LCA is based must be named; as an alternative, the representatively of the declaration can be depicted, e.g. for the association, by declaring the production volume covered by the LCA as a percentage of the entire volume of the declared product manufactured by all association members in the year of reference. In both cases, the companies that have contributed data have to be named in the project report. This clause shall clearly mention if the EPD represents an average EPD, e.g. as an association EPD.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

[Unterschrift]

Name of verifier,
(Independent verifier)

LOGO

2. Product

2.1 Product description/Product definition

The declared products must be described.

In addition to a general product description, the trade names of the products/product groups (including any product codes) must be mentioned to which the EPD applies.

If the declaration of trade names is not meaningfully possible (e.g. in the context of association EPDs), the product description must clearly demarcate the products product groups to which the EPD applies.

Example:
The declared product is an electrically powered air-to-water heat pump containing an indoor and outdoor unit. Both units consist of a refrigeration circuit containing the refrigerant R290 (Propane). The air-to-water heat pump turns ambient heat into energy. The system can be used for both cooling and heating purposes via the heating circuit of a building
Please select one of the following options and delete the header of the selected [alternative]:

[Alternative 1a: Product according to the CPR based on a hEN]:

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 1b: Products according to the CPR based on an ETA]:

For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration ETA no. xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 2a: Product not harmonised in accordance with the CPR but in accordance with other provisions for harmonisation of the EU]:

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

- *Directive no. xyz: date, title*
- *Regulation no. xyz: date, title*
- and the harmonised standards based on these provisions:
- *EN xyz: date, title*

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.

[Alternative 2b: Product harmonized as well in accordance with the CPR as with other provisions for harmonisation of the EU]:

For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011/ (CPR) and the following other provisions for harmonisation apply:

- *Directive (EU) xyz: date, title*
- *Regulation (EU) no. xyz: date, title*

The product needs a declaration of performance in accordance with the CPR taking into consideration /EN xyz: date/, title or /ETA no. xyz/:date, title respectively and the CE-marking.

The CE-marking for the product takes into account the Declaration of Performance in accordance with the CPR and the proof of conformity with the following harmonised standards or based on the other provisions for harmonisation:

- *EN xyz: date, title*
- *Source, date, title*

For the application and use the respective national provisions apply.

[Alternative 3: Product for which no legal provisions for harmonisation of the EU exist]:

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

2.2 Application

The designated application must be specified for the products covered in the EPD.

2.3 Technical Data

The technical specifications of the products within the scope of the EPD shall be listed, including the reference to the test methods/test standards for each specification.

For products with CE marking, the technical specifications must be specified in accordance with information in the declaration of performance. The properties relevant to the product should be specified in the table below. If no information is given for properties, an explanation must be given in the background report to the EPD as to why the property is not relevant to the product.

The table is to be filled according to the respective product (if criterion is applicable for the considered product).

Constructional data

Name	Value	Unit
area of application		-
nominal capacity		kW
Max airflow		m^3/h
current voltage		V
max. nominal volume flow		m^3/h
Weight		kg
Overall dimension (L x W x H)		mm
type of appliance in terms of working fluids (the first fluid identifies the heat source, the second the heat delivery fluid) - air to air - air to water - water to water - water to air		-
number of generators and distribution units considered in the EPD		-
seasonal coefficient of performance (35°C)		-
seasonal coefficient of performance (55°C)		-
heat recovery ratio (according to EN 13141-7)		%
humidity recovery ratio (according to EN 13141-7)		%
exhaust gas temperature (fuels)		°C
nominal electrical consumption during operation		kW
annual electricity consumption per 100 m² floor area (AEC)		kWh
electrical power consumption (according to EN13141-7)		W/m³/h
electricity consumption (stand by)		W
max. electrical power consumption		kW
energy carrier (fuel)		-
flow temperature max. permissible		°C
operating temperature permissible		°C
working pressure permissible		bar
sound power level (max)		dBA
sound power level (nominal) (according to EN 13141-7)		dBA
energy efficiency class		-
type of refrigerant		-
refrigerant charge		kg
type of heat transfer medium (generator)		-

Please select one of the following options and delete the header of the selected [alternative]:

[Alternative 1a: Product according to the CPR, based on a hEN]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN xyz:date, title*.
- Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 1b: Product according to the CPR, based on an ETA]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *ETA no. xyz, date, title*.
- Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 2a: Product not harmonised in accordance with the CPR but in accordance with other provisions for harmonisation of the EU]:

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 2b: Product harmonized as well in accordance with the CPR as with other legal provisions of the EU]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN xyz: date, title* or *ETA no. xyz, date, title* respectively.
- Performance data of the product, based on the harmonised standards, in accordance with the other provisions for harmonization.
- Voluntary data: *source, date, title* (not part of CE-marking)

[Alternative 3: Product for which no legal provisions for harmonisation of the EU exist]:

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

The dimensions/quantities must be declared for the products covered in this EPD in their delivery status.

2.5 Base materials/Ancillary materials

The main constituents of the product or its components shall be indicated as mass percentages to enable the user of the EPD to understand the composition of the product in delivery status. This information should support safety and efficiency during installation, use, and disposal of the product.

When substances from the “Candidate List of Substances of Very High Concern for Authorisation” (SVHC) are part of the formulation with a mass percentage of > 0,1 of the mass of the construction product, i.e. when they were added to the formulation on purpose, then the substances shall be declared including CAS-number.

If the construction product is a substance or mixture under the chemical law (*REACH*), the concentration limit value refers to the entire product; if it is an article, the partial product or component applies as a unit of reference.

The Candidate list can be found on the ECHA website address: echa.europa.eu/de/home

This declaration is mandatory for all EPDs and must be formulated as follows:

1) “This product/article/at least one partial article contains substances listed in the candidate list (date: dd.mm.yyyy) exceeding 0.1 percentage by mass: yes/no”.

[if yes: List of respective SVHC and their CAS-number]

[If yes:] - Information on the concentration and/or concentration range (comparable information on hazardous properties and if relevant, information on the partial article in the case of articles)

If the construction product is a substance or mixture under the chemical law (REACH), the safety data sheet shall be made available in the EPD, e.g. by a link. In addition, the concentrations of the hazardous substance as well as its hazardous properties have to be stated in the EPD.

Carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A and 1B must also be declared including CAS-number if a European harmonised classification is available as

well as information on treatment with biocides. For IBU-EPDs statements 2) and 3) are mandatory.
This statement on other CMR substances which are not listed as SVHC and on biocides must be formulated as follows:

2) “This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: yes/no”

[If yes:] – List the concentration and/or concentration ranges (comparable to the information on a safety data sheet), provide information on hazardous properties and if relevant information on the partial article in the case of articles.

3) “Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): yes/no”

[If yes:] - List the biocides referred to above.
The active substance and the product type (in-can preservative, film preservative, wood protection, etc. according to the Ordinance on Biocide Products (see also 1.4) must be indicated.

Ancillary materials and additives remaining on the product must also be declared.
If additives such as fire retardants, softeners or biocides are used, their functional chemical group must be indicated.

Statements like “…free of ….” and/or “…does not contain…” may not be used.

2.6 Manufacture

The manufacturing process must be described and can be illustrated using a simple graphic. If the EPD applies to several locations, the production processes must be described for all sites in case they differ.

Quality management systems can be referred to.

2.7 Environment and health during manufacturing

Presentation of measures relating to health protection during the manufacturing process extending beyond national guidelines (of the production country).

Presentation of measures relating to environmental protection during the manufacturing process extending beyond national guidelines or plant-specific requirements, e.g. description of special environmentally-friendly dealings with waste air, waste water, and waste as well as noise emissions.

Information on the Environment Management System or similar (if available)

2.8 Product processing/Installation

Description of the type of processing, machinery and tools used, dust extraction etc., auxiliary materials needed for installation as well as measures for noise reduction.
Information on the rules of technology as well as on workers safety and environmental protection is possible.

2.9 Packaging

Information on product-specific packaging:
type, composition, and possible reuse, recycling, energy recovery, and disposal of packaging materials (paper, pallets, foils, etc.).

2.10 Condition of use

Information should be provided here regarding changes in material composition over the service life of the product and/or regarding environmentally relevant material inherent properties over the service life of the product.

2.11 Environment and health during use

Information on the relationships between the product, the environment and health.

Information on the possible content of harmful substances or emissions.

Note: recommendations concerning cleaning, maintenance, etc. for the declared product should be listed in the corresponding section in 4 “Technical information on scenarios”.

2.12 Reference service life

The declaration 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. If not all modules of the use stage are declared and no use stage scenario covering the full lifetime of the product is described, then the indication of the RSL (according to *ISO 15686:1, -2, -7 and -8*) is voluntary.

Information on the product’s RSL requires specification of compatible scenarios for the product stage, construction process stage and use stage. The RSL is dependent on the properties of the prod¬uct and reference in-use conditions. These conditions shall be declared together with the RSL in clause 4 and it shall be stated that the RSL applies for the reference conditions only.

If a reference service life (RSL) cannot be declared according to ISO 15686 (or it is not relevant for consideration of the LCA), this has to be stated clearly in the EPD.

In such cases, a service life can be declared in accordance with the BBSR table "Service lives of components for life cycle assessment according to
BNB" (www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/nutzungsdauern-von-bauteilen.html).

It shall be unambiguously stated that a service life (not: a reference service life) in accordance with the BBSR table (or based on a manufacturer’s declaration (see below)) is not a RSL according to ISO 15686.

A service life provided by the manufacturer can be declared as an alternative to the value from the BBSR table. This information shall be accompanied by explanations on the origin of the declared service life, e.g. referring to simulations, tests, an assessment of the manufacturer or statistical data, etc. and shall contain the specification of the application for which the stated service life is valid (to be provided in clause 4).

The requisite information for technical building installations should be taken from *VDI 20673*.

Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

Information on the fire performance according to *EN 13501:1* or established national standards. According to *EN 13501:1*:

- The classes of building products regarding their fire performance are predefined as: A1, A2, B, C, D, E, and F;
- The classes of flaming droplets/particles are pre-defined as: d0, d1, or d2;
- The classes for smoke density are pre-defined as: s1, s2, or s3

Fire protection

Name	Value
Building material class	
Burning droplets	
Smoke gas development	

Water
Information on the product performance including possible impacts on the environment following the unforeseeable influence of water, e.g. flooding.

Mechanical destruction
If relevant: information on the product performance including possible impacts on the environment following unforeseeable mechanical destruction.

2.14 Re-use phase
The possibilities of re-use, recycling, and energy recovery must be described.

2.15 Disposal
The possible disposal channels must be indicated.
The waste code in accordance with the European Waste Index must be described.

2.16 Further information
Possible sources of additional information, e.g. website, a reference source for safety data sheet.

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit and the mass reference must be indicated in the appropriate table as declared. If there are several units to choose from, a suitable one must be selected. If averages are declared across various products, the average breakdown must be explained.

The declared unit is one HVAC home appliance; the home appliance is defined as an assembly of electric and electronic devices providing optimal air quality and temperature, ($E_{heating}$ and/or $E_{cooling}$ and/or $E_{ventilation}$) during a reference service life (RSL) of 20 years with a specific seasonal coefficient of performance (SCOP) according to DIN EN 14825 and/or air flow (max. nominal volume) according to DIN EN 13141. This value is aligned with RSL provided by the PEP-Ecopassport programme operator in the PSR-0013.

To enhance comparability of EPDs developed with this PCR with EPDs based on other existing PCR, the total energy exchanged with the building in heating or cooling mode during RSL shall be reported in the EPD and expressed in kWh.
The total energy shall be computed with the Annual Energy Demand standardized approach, as defined by EN 14825 using the seasonal efficiencies in cooling or heating mode and equivalent operating hours.
In the case of a ventilation unit both terms, the annual electricity consumption (AEC) as well as the annual heating saved (AHS), shall be taken into account for the complete RSL to summarize the total energy savings and ensure comparability of EPDs for units in the indicated range of use.

The table is to be filled according to the respective product (if criterion (Eheating, Ecooling, Eventilation) is applicable for the considered product).

Declared unit

Name	Value	Unit
Declared unit		pce.
Mass reference		kg/pce
SCOP		kWh/a
Max airflow		m^3/h
E"heating"		kWh/a
E"cooling"		kWh/a
E"ventilation" - AEC - AHS		kWh/100m² floor area

Other declared units are allowed if the conversion is shown transparently.

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning the variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by the actual production.

3.2 System boundary
Type of the EPD: choose as appropriate: cradle to gate, cradle to gate - with options, cradle to grave.

The modules considered in the life cycle assessment as per “system boundaries” outlined in section 5.5. of the PCR, Part A: “Calculation Rules for the Life Cycle Assessment and Requirements for the Project Report” must be described in brief. The description should be product specific; it should be apparent (as to) what processes are considered in what modules.
If green electricity has been calculated, the following sentence must be declared in the IBU EPD under the assumptions:
For the environmental impact, the use of green electricity was calculated taking into account the residual electricity mix for the remaining electricity. The proportion of the electricity demand covered by green electricity in the total electricity demand is x %.

3.3 Estimates and assumptions
Key assumptions and estimates for interpretation of the life cycle assessment should be listed here, provided that they are not dealt with in other sections of the main clause 3 “LCA:

Calculation rules".

3.4 Cut-off criteria

The use of cut-off criteria as per the PCR, Part A: "Calculation Rules for the Life Cycle Assessment and Requirements for the project report" must be documented here.

3.5 Background data

The sources for background data in the LCA used must be provided.

3.6 Data quality

An estimate should be made as regards data quality (addressing both foreground and background data), whereby the age of background data used must be indicated.

For average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning the variability of the production process, geographical representatively and the influence of background data and preliminary products compared to the environmental impacts caused by the actual production.

3.7 Period under review

The period under review for the collection of production data and the resulting averages (if applicable) shall be documented.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan:

3.9 Allocation

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

- Allocation of energy, auxiliary and operating materials used for individual products in a factory;
- Allocation of co-production processes;
- Allocation in the use of recycled and/or secondary raw materials;
- Loads and benefits beyond the system boundary from recycling or energy recovery of packaging materials and production waste;
- Loads and benefits beyond the system boundary 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.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.
The used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.
If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product		kg C
Biogenic carbon content in accompanying packaging		kg C

The following technical scenario information is required for the declared modules and optional for non-declared modules. Modules for which no information is declared can be deleted; additional information can also be listed if necessary.

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel		l/100km
Transport distance		km
Capacity utilisation (including empty runs)		%
Gross density of products transported		kg/m^3
Capacity utilisation volume factor		-

Assembly (A5)

Name	Value	Unit
Auxiliary		kg
Water consumption		m^3
Other resources		kg
Electricity consumption		kWh
Other energy carriers		MJ
Material loss		kg
Output substances following waste treatment on site		kg
Dust in the air		kg
VOC in the air		kg

Use or application of the installed product (B1) see section 2.12 "Use"

Name	Value	Unit

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Maintenance (B2)

Name	Value	Unit
Information on maintenance		-
Maintenance cycle		Number/RSL
Water consumption		m^3
Auxiliary		kg
Other resources		kg
Electricity consumption		kWh
Other energy carriers		MJ
Material loss		kg

Repair (B3)

Name	Value	Unit
Information on the repair process		-
Information on the inspection process		-
Repair cycle		Number/RSL
Water consumption		m^3
Auxiliary		kg
Other resources		kg
Electricity consumption		kWh
Other energy carriers		MJ
Material loss		kg

Replacement (B4) / Refurbishment (B5)

Name	Value	Unit
Replacement cycle		Number/RSL
Electricity consumption		kWh
Litres of fuel		l/100km
Replacement of worn parts		kg

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies to the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list of service life by *BNB* is declared.

Reference service life

Name	Value	Unit
Reference service life (according to ISO 15686-1, -2, -7 and -8)		a
Life Span (according to BBSR)		a
Life Span according to the manufacturer		a
Declared product properties (at the gate) and finishes		-
Design application parameters (if instructed by the manufacturer), including the references to the appropriate practices and application codes		-
An assumed quality of work, when installed in accordance with the manufacturer's instructions		-
Outdoor environment, (for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature		-
Indoor environment (for indoor applications), e.g. temperature, moisture, chemical exposure		-
Usage conditions, e.g. frequency of use, mechanical exposure		-
Maintenance e.g. required frequency, type and quality and replacement of components		-

Operational energy use (B6) and Operational water use (B7)

Name	Value	Unit
Water consumption		m^3
Electricity consumption		kWh
Other energy carriers		MJ
Equipment output		kW

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type waste type		kg
Collected as mixed construction waste		kg
Reuse		kg
Recycling		kg
Energy recovery		kg
Landfilling		kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit

5. LCA: Results

In Table 1 "Description of the system boundary", all declared modules shall be indicated with an "X"; all modules that are not declared shall be indicated with "MND" (As default the modules B3, B4, B5 are marked as MNR – module not relevant). In the following tables, columns can be deleted for modules that are not declared. Indicator values should be declared with three valid digits (eventually using the exponential form (e.g. 1,23E-5 = 0,0000123). A uniform format should be used for all values of one indicator.
If several modules are not declared and therefore have been deleted from the table, the abbreviations for the indicators can be replaced by the complete names, while the readability and clear arrangement should be maintained; the legends can then be deleted.
If due to relevant data gaps, an indicator cannot be declared in a robust way, then the abbreviation “IND” (indicator not declared) should be used for this indicator.

- 0 - calculated value is 0
- 0 - value falls under the cut-off
- 0 - assumption which exclude any flows (e.g. exported electricity A1-A3)
- IND – in cases where the inventory does not support the methodological approach or the calculation of the specific indicator IND shall be used.

If no reference service life is declared (see chapter 2.13 "Reference Service Life"), the LCA results of the modules B1-B2 and B6-B7 shall refer to a period of one year. This shall then be indicated as an explanatory text below the tables. In addition, the formula for the quantification of such B-modules over the total life cycle shall be provided.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: [declared unit and product]

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; 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)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: [declared unit and product]

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; 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 net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: [declared unit and product]

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 electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: [declared unit and product]

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

To facilitate comprehension of the life cycle assessment, both the relevant indicators of the life cycle inventory and the indicators of the impact assessment declared in section 5 “LCA results” have to be interpreted in a dominance analysis. An illustration of the results with figures is recommended, e.g. for the dominance analysis, the distribution of impacts across the modules, the CO2-balance, etc. as appropriate for a reader to understand the environmental profile of the declared product. The interpretation shall also include a description of the time frame and/or variability of the LCIA results (in qualitative or quantitative terms) if the EPD is valid for several products or producers.

7. Requisite evidence

As a general rule, all statements must be documented with measured data (presented by the corresponding test certificates). The methods of evidence and the test conditions have to be described together with the results.

If substances are not detected, the limit of detection must be included in the declaration.

Interpreting statements such as “… free of …” or “… are entirely harmless …” are not allowed.

If evidence required by the specific PCR part B is not provided, this has to be justified under the respective title for the required evidence.

If relevant for the scope of application of the declared product, or if derivable from its material composition, it is recommended to provide additional adequate evidence.

Information and explanation on the representativeness of requisite evidence have to be given in the project report for all members of the association.

Information on environmental and health-concerning aspects related to the refrigerant contained in the respective device must be enclosed (classification specified according to ISO 817).

*CO2(e) according to IPCC, 2007 for a time horizon of 20 years.

Name	Value	Unit
Refrigerant		-
refrigerant charge		kg
CO2 (e)*		t

If information is to be provided on the waste gas produced by the heat exchanger, it must be based on the specifications outlined in the Federal Emission Protection Directive. Details may be provided on Type I Declarations (e.g. Blue Angel).

8. References

Standards

EN 15804

EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

Further References

Title of the software/database

Title of the software/database. Addition to the title, version. Place: Publisher, Date of publication [Access on access date].

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Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.com

The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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