

DESICCANT DEHUMIDIFIERS

PRODUCT GROUP CLASSIFICATION: UN CPC 43912

C-PCR-XXX (TO PCR 2019:14) TO BE ADDED UPON PUBLICATION

DRAFT VERSION: 20XX-YY-ZZ FOR OPEN CONSULTATION. DO NOT USE OR CITE



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INTRODUCTION TO OPEN CONSULTATION

This draft PCR document is available for open consultation from 2024-08-01 until 2024-10-01. Feel free to forward the draft to any other stakeholder you might think is relevant, including colleagues and other organisations.

We are interested in comments from stakeholders on:

- General
 - Alignment with PCRs available in other programmes for type III environmental declarations, industry-specific LCA guidelines or similar.
- Scope of PCR
 - Product category definition and description
 - Classification of product category using CPC codes
- Goal and scope, life cycle inventory and life cycle impact assessment
 - Functional unit/declared unit
 - System boundary
 - Allocation rules
 - Data quality requirements
 - Recommended databases for generic data
 - Impact categories and impact assessment methodology
- Additional information

Comments shall be sent directly to the PCR Moderator (contact details available in Section 1). There is a template for comments on www.environdec.com that may be used.

For questions about the PCR, please contact the PCR moderator. For general questions about the International EPD System, EPD or PCR development, please contact the Secretariat via pcr@environdec.com.

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1 INTRODUCTION

1.1 GENERAL

This document constitutes complementary Product Category Rules (c-PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations¹ according to ISO 14025:2006, ISO 14040:2006, ISO 14044:2006, and product-specific standards such as EN 15804 and ISO 21930 for construction products. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent, consistent and verifiable information about environmental performance of their product (goods or services).

The rules for the overall administration and operation of the programme are the General Programme Instructions (GPI), publicly available at www.environdec.com. PCRs and c-PCRs complement the GPI and the normative standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR/c-PCR should enable different practitioners using the PCR/c-PCR to generate consistent results when assessing products of the same product category.

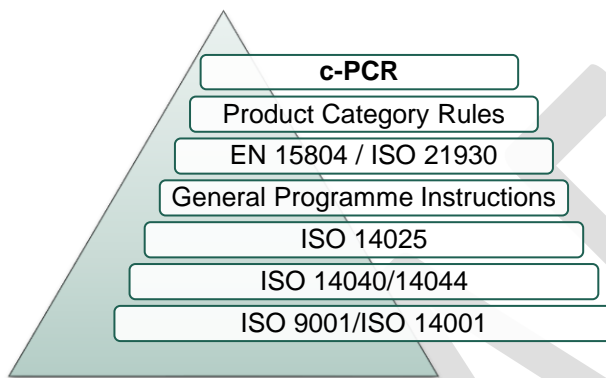


Figure 1 This c-PCR in relation to the hierarchy of standards and other documents.

Within the present c-PCR, the following terminology is adopted:

- The term “shall” is used to indicate what is obligatory, i.e. a requirement.
- The term “should” is used to indicate a recommendation, rather than a requirement. Any deviation from a “should” requirement shall be justified in the PCR development process.
- The terms “may” or “can” is used to indicate an option that is permissible.

For definitions of further terms used in the document, see the normative standards.

A PCR and its c-PCRs are valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR and its c-PCRs are available at www.environdec.com. Stakeholder feedback on PCRs and c-PCRs is very much encouraged. Any comments on this c-PCR may be sent directly to the PCR Moderator and/or the Secretariat during its development or during its period of validity.

Any references to this document shall include the PCR registration number, name and version.

The programme operator maintains the copyright of the document to ensure that it is possible to publish, update, and make it available to all organisations to develop and register EPDs. Stakeholders participating in c-PCR development should be acknowledged in the final document and on the website.

1.2 ROLE OF THIS DOCUMENT

This document provides complementary product category rules (c-PCR) to PCR 2019:14 Construction products available at www.environdec.com. This document cannot be used by itself but shall be used together with PCR 2019:14 and the European standard EN 15804:2012+A2:2019 (called EN 15804 in short). If a c-PCR is available for a product category, it shall be used.

See Figure 2 for an illustration on how PCR 2019:14 and this c-PCR relate to each other and the EPDs that may be based on them.

¹ Type III environmental declarations in the International EPD® System are referred to as EPD, Environmental Product Declarations.

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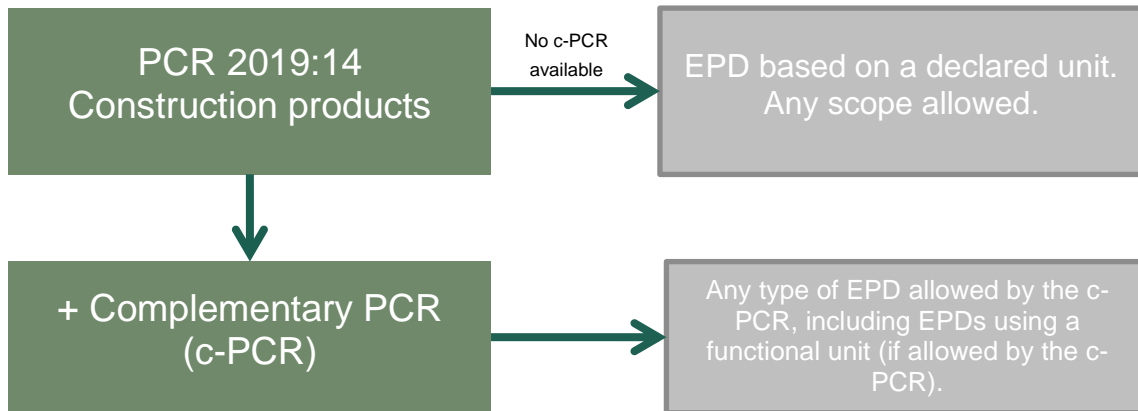



Figure 2 Overview of using PCR 2019:14 directly to develop an EPD, or how to use it together with a c-PCR.

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2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Desiccant Dehumidifiers
Registration number and version:	<i>To be added by the Secretariat</i>
Programme:	 THE INTERNATIONAL EPD [®] SYSTEM The International EPD System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
PCR Moderator:	Viktor Hakkarainen, Bureau Veritas Certification Sverige AB, on behalf of Munters AB. Viktor.hakkarainen.ext@bureauveritas.com
PCR Committee:	<ul style="list-style-type: none"> • Christopher Jensen, Munters AB, www.munters.com • Magnus Andrae, Seibu Giken DST AB, www.dst-sg.com • Rasmus Toftegaard, Cotes A/S, www.cotes.com
Date of publication and last revision:	<i>To be added by the Secretariat</i>
Valid until:	<i>To be added by the Secretariat</i>
Schedule for renewal:	This document will be revised together with the PCR for Construction products. In case a c-PCR is developed by a CEN Product TC, the standard will replace this c-PCR, with a transition period of at least 90 days under which both are valid.
Standards conformance:	<ul style="list-style-type: none"> ▪ General Programme Instructions (GPI) for the International EPD System, version 5.0.0, based on ISO 14025:2006, ISO 14040:2006 and ISO 14044:2006 ▪ EN 15804:2012+A2:2019 ▪ ISO 21930:2017. This standard is used in selected sections, such as allocation, when it provides additional but not contradictory rules to EN 15804. EPDs may comply with this standard if additional requirements are met, see PCR 2019:14 for further information. ▪ EN 50693. This standard is used for construction products that are also Electric and Electronic Equipment (EEE) products. <p>All EPDs based on this PCR are compliant with EN 15804:2012+A2:2019/AC:2021. EPDs of EEE products may also be compliant with EN 50693, unless there are requirements in this c-PCR that deviates from EN 50693. If additional requirements in PCR 2019:14 are followed, this c-PCR may also be used to develop EPDs compliant with ISO 21930:2017.</p>
PCR language(s):	This PCR was developed and is available in English. In case of translated versions, the English version takes precedence in case of any discrepancies.

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2.2 SCOPE

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides a complementary Product Category Rules (c-PCR) for the assessment of the environmental performance of regeneratable adsorbent dehumidifiers and the declaration of this performance by an EPD. The product category corresponds to a subset of the UN CPC 43912 Air-conditioning machines.

Desiccant dehumidifiers are units whose primary purpose is to extract moisture from air using a type of desiccant media. Examples of desiccant dehumidifier types include:

- Rotor Dehumidifiers
- Dehumidifiers including or not including a condensing coil
- Liquid desiccant dehumidifier
- Column dehumidifier

When moisture from the air is adsorbed, the temperature of the air increases. Due to this, this c-PCR defines the dehumidification product systems as either:

- Products used for only dehumidification (with or without a pre² condensing coil), or
- Products used for dehumidification and post³ temperature control

Post temperature control includes a temperature requirement of the supply air that is leaving the product. This c-PCR allows the creation of an EPD for both aforementioned products systems.

This c-PCR is only for desiccant dehumidifiers and does not cover condensing coil only dehumidification (direct cooling) or adsorbent dehumidifiers that are not regeneratable.

For units providing only dehumidification, the c-PCR allows an alternative functional unit for a standardized use case (called a "Type 1 EPD as described below). This is to enable easier comparison for standardized units while units that are manufactured for non-standard conditions can use another functional unit that better reflects the setting in which they are used. For Type 1 EPDs, the energy source for the use stage shall be electricity.

This c-PCR also allows for client specific EPDs to be developed. EPDs developed on a client specific basis are only valid for one exact unit, with environmental impacts calculated for the exact conditions that the unit will use. This is to allow for more detailed EPDs to be developed, in the case that a certain client has the need for such an EPD.

EPDs developed with c-PCR shall therefore be defined as a "Type 1", "Type 2" or a "Type 3" EPD.

- **Type 1 EPD** are for pre-determined operating conditions
 - Type 1 EPDs are for desiccant only dehumidification without pre or post conditioning that have fixed conditions according to the parameters presented in chapter 4.1.1
- **Type 2 EPD** are for product specific operating conditions
 - Type 2 EPDs are for all dehumidification systems that have the functional unit calculated according to the "Functional unit for type 2 EPDs" as stated in chapter 4.1.2.
- **Type 3 EPD** are for product and client specific operating conditions
 - Type 3 EPDs cover all dehumidification systems in this c-PCR but is only valid for exactly one product. EPDs developed as Type 3 EPDs shall have the functional unit calculated according to the "Functional unit for type 2 EPDs" as stated in chapter 4.1.2 but all listed parameters shall be specific to the unit that the EPD is valid for.

² "Pre" in this case refers to before the rotor

³ "Post" in this case refers to after the rotor

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The UN CPC classification hierarchy of this production category is:

- Section 4 Metal products, machinery and equipment
 - Division 43 – General-purpose machinery
 - Group 439 – Other general-purpose machinery and parts thereof
 - Class 4391 – Gas generators; distilling plant; air-conditioning and refrigerating equipment; filtering machinery
 - Subclass 43912 – Air-conditioning machines

This subclass is defined through the following headings/subheadings of the HS 2007 (WCO Harmonized System Nomenclature):

- 8415.82: Air conditioning machines incorporating a refrigerating unit but without a valve for reversal of the cooling-heat cycle (excl. of a kind used for persons in motor vehicles, and self-contained or "split-system" window or wall air conditioning machines)
- 8415.83: Air conditioning machines comprising a motor-driven fan, not incorporating a refrigerating unit but incorporating elements for changing the temperature and humidity (excl. of a kind used for persons in motor vehicles, and self-contained or "split-system" window or wall air conditioning machines)
- 8479.90.70 Parts of machines and mechanical appliances having individual functions, n.e.s. (excl. of cast iron or cast steel)

U.S. Harmonized Tariff Schedule

- 8479.89.10.00: Air humidifiers or dehumidifiers

China Import Tariff & Tax China HS Code Classification (January 18, 2024)

- 84798920.00: Air humidifiers or dehumidifiers

Additional information on the UN CPC classification is available at <https://unstats.un.org/unsd/classifications/Family/Detail/1074> (EU), <https://www.flexport.com/data/> (US) or <https://www.htshub.com/cn-hs/detail/8479892000> (CN).

2.2.2 TYPE OF EPD AND INFORMATION MODULES INCLUDED

Following the requirements in Section 2.2.2 of PCR 2019:14, an EPD based on this c-PCR is a type c EPD (cradle to grave and module D). Section 4.2 below provides more information on each life-cycle stage concerning the product category in scope.

2.2.3 GEOGRAPHICAL SCOPE

This c-PCR may be used globally.

2.2.4 EPD VALIDITY

See PCR 2019:14.

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3 PCR REVIEW AND BACKGROUND INFORMATION

This c-PCR was developed in accordance with the PCR development process described in the GPI of the International EPD® System, including open consultation and review.

3.1 OPEN CONSULTATION

3.1.1 VERSION 20XX-YY-ZZ

This c-PCR was available for open consultation from 2024-08-01 until 2024-10-01, during which any stakeholder was able to provide comments by contacting the PCR Moderator and/or the Secretariat.

Stakeholders were invited via e-mail or other means to take part in the open consultation and were encouraged to forward the invitation to other relevant stakeholders. The following stakeholders provided comments during the open consultation and agreed to be listed as contributors in the c-PCR and at www.environdec.com.

- *List of stakeholder names and affiliation*

3.2 PCR REVIEW

3.2.1 VERSION 20XX-YY-ZZ

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members is available at www.environdec.com . The review panel may be contacted via info@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	<i>To be added by the Secretariat</i>
Review dates:	<i>To be added by the Secretariat</i>

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3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this c-PCR, existing PCRs/c-PCRs and other internationally standardised methods that could potentially act as c-PCRs were considered to avoid unnecessary overlaps in scope and to ensure harmonisation with established methods of relevance for the product category. The existence of such documents was checked among the following EPD programmes and international standardisation bodies:

- International EPD System. www.environdec.com.
- IBU – Institut Bauen und Umwelt e.V., <https://epd-online.com/>
- Epd-norge, <https://www.epd-norge.no>
- EPD Italy, <https://www.epditaly.it/en/documents/>
- PEP ecopassport, <http://www.pep-ecopassport.org/>
- ASTM International, <https://www.astm.org/products-services/certification/environmental-product-declarations/epd-pcr.html>
- UL Environment, <https://www.ul.com/resources/product-category-rules-pcrs>
- JEMAI EcoLeaf, <http://www.ecoleaf-jemai.jp/eng/pcr.html>
- NSF International Center for Sustainability Standards EPD, <https://www.nsf.org/standards-development/product-category-rules>

Table 1 lists the identified PCRs and other standardised methods.

Table 1 Existing PCRs/c-PCRs and other internationally standardized methods that were considered to avoid overlap in scope and to ensure harmonisation with established methods.

NAME OF PCR/c-PCR/STANDARD	PROGRAMME/STANDARDISATION BODY	REGISTRATION NUMBER, VERSION NUMBER/DATE OF PUBLICATION	SCOPE
PCR 2021:02 Air conditioning machines	International EPD System	PCR 2021:02 Version 1.0.1, published 2023-04-28	UN CPC 43912 Air conditioning machines (excluding HS 2007 subclass 8415.83)
c-PCR-027 (To PCR 2019:14) Fan Coils	International EPD System	c-PCR-027 (To PCR 2019:14) Version 2023-12-19, published 2023-12-19	UN CPC 43912 Air conditioning machines excluding HS 2007 subclasses: 8415.10 8415.81 8415.82
NPCR 030 Part B for ventilation components	EPD-Norge (adopted by International EPD System)	NPCR 030 Part B for ventilation components. Approved 18.05.2021, valid until 18.05.2026.	Ventilation components
COMFORT TERMINAL UNITS (CTU)	PEP ecopassport®	PSR-0009-ed2.0-EN-2018 02 09	Comfort terminal units
HVAC HOME APPLIANCES	EPD Italy	PCR EPDItaly019 – HVAC Home Appliances, published 2021-05-11, revised 2021-06-08	43912 “Air-conditioning machines” 43913 “Refrigerating and freezing equipment and heat pumps, except household type equipment”

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3.4 REASONING FOR DEVELOPMENT OF C-PCR

This c-PCR was developed to provide requirements and guidelines additional to those in PCR 2019:14 and EN 15804, for developing EPDs for the product category. The c-PCR thereby enables different practitioners to generate consistent results when assessing the environmental impact of products of the same product category, and thereby it supports comparability of products within a product category.

There are multiple PCRs that are covering the same product category (PCR 2021:02, c-PCR-027 & PCR EPDItaly 019). All of these PCRs however are relating the functional unit to the exchange of energy in air (heating or cooling) and none refer to dehumidification.

Even if temperature and dehumidification is related, the efficiency of dehumidification cannot be measured only in thermal energy transfer, but also requires the functional unit to relate to amount of water removed from the air, which is the primary purpose of a dehumidification unit.

The efficiency and design of dehumidification units are also highly sensitive to the use conditions (both ambient moisture & temperature as well as the target moisture and temperature). This high sensitivity is one of the main reasons for the development of this c-PCR, to enable accurate comparisons or at least transparent reporting.

Related, it's important that EPDs of dehumidifiers comply with EN 15804, to be able to be used as input to EPDs of buildings and other whole-building assessments.

3.5 UNDERLYING STUDIES USED FOR C-PCR DEVELOPMENT

The methodological choices made during the development of this c-PCR (functional unit, system boundary, allocation methods, impact categories, data quality rules, etc.) were primarily based on the following underlying study:

- Hakkarainen, V (2022) Life Cycle Assessment of Dehumidification and air treatment products for Munters.

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4 GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

This section provides specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1.

4.1 FUNCTIONAL UNIT

EPDs based on this c-PCR shall use a functional unit (FU). All subsequent analyses then refer to that FU, as all inputs and outputs in the life cycle inventory (LCI) and consequently the life cycle impact assessment (LCIA) results are related to the FU.

As dehumidification products vary widely in their design, this c-PCR allows the EPD owner to choose between a Type 1, Type 2 or Type 3 EPD that has different definitions.

The reporting requirement is different between Type 1, Type 2 and Type 3 EPDs. Type 1 EPDs have standardized parameters in the definition of the functional unit while Type 2 & 3 EPDs do not. This is for both allowing the option of having standardized use scenarios for desiccant dehumidifiers, while not excluding those products that fall outside of the listed Type 1 EPD parameter conditions.

The lifetime for dehumidifiers shall be 15 years with an annual runtime of 4000 hours for static conditions⁴. If the use phase is simulated with a BIN analysis, it shall be based on a full year weather analysis.

All temperatures are expressed as dry bulb (DB).

When presenting the reference flow, the amount of water removed from the unit should be subdivided on the water removing components (e.g., pre-cooler, rotor, etc).

4.1.1 FUNCTIONAL UNIT FOR TYPE 1 EPD

Type 1 EPDs shall have the functional unit 1 kg of water removed from the air according to the conditions in Table 2. The EPD author can chose to use the listed parameters from one column from the 4 different use cases. The chosen use case shall be reported in the LCA report and EPD.

Table 2 Use phase conditions for type 1 EPDs

Parameter	Use case 1: “Pre-cooling Industrial process”	Use case 2: “Dry air storage type 1”	Use case 3: “Dry air storage type 2”	Use case 4: “Cold rooms”
Process air inlet Temperature [°C]	10	20	20	4
Process air inlet humidity [g/kg]	7,6	7,3	4,3	3,0
Reactivation inlet air Temperature [°C]	15	20	15	15
Reactivation inlet air humidity [g/kg]	8,0	7,3	8,0	5,5
External static pressure [Pa]	200	200	200	200
Minimum Δx [g/kg] ⁵	3,0	0	0	0

4.1.2 FUNCTIONAL UNIT FOR TYPE 2 EPD

Type 2 EPDs shall have the functional unit 1 kg of water removed from the air.

The EPD shall report the used conditions as in Table 2. This table shall be included in the EPD containing minimum all parameters listed in this c-PCR. If the listed component is not part of the product-system “part not included” shall be stated. The value for all

⁴ As dehumidifiers are very energy consuming products, the lifespan is of less importance when presenting the result on a FU basis.

⁵ “ Δx ” = moisture difference, i.e., the minimum moisture that must be removed from the airstream that is dried.

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parameters shall be stated per FU. If there are multiple values for one parameter⁶, all those values shall be presented (with more rows added to the table).

Table 3 EPD reporting requirements for type 2 EPDs

Parameter	Value	Unit	Comment
Electricity and fuel parameters			
Electric energy amount		MJ/kg	Based on input power to the product
Electricity source		Name	
Combusted fuel energy		MJ/kg	Based on input power to the product
Cooling parameters			
Energy required for chilled fluid ⁷		MJ/kg	
Chilled fluid type		Name	
Cooling fluid supply temperature		°C	Design temperature
Cooling fluid return temperature		°C	Design temperature
Cooling fluid inlet gas ratio		%	Between 0-100% (0 = fully liquid, 100 = fully gas)
Cooling fluid outlet gas ratio		%	Between 0-100% (0 = fully liquid, 100 = fully gas)
Cooling COP		dimensionless	If not known 3,0 shall be used.
Heating parameters			
Energy required for heated fluid		MJ/kg	
Fluid type		Name	
Heating fluid supply temperature		°C	Design temperature
Heating fluid return temperature		°C	Design temperature
Heating fluid inlet gas ratio		%	Between 0-100% (0 = fully liquid, 100 = fully gas)
Heating fluid outlet gas ratio		%	Between 0-100% (0 = fully liquid, 100 = fully gas)
Heating efficiency		dimensionless	If not known 0,8 shall be used.
Air parameters			
External static pressure		Pa	Supply air pressure with process air inlet pressure subtracted
Return inlet air - Temperature		°C	
Return inlet air - Humidity		g/kg,dry air	
Return inlet air - Airflow		N ^o m ³ /h	
Outdoor inlet air – Temperature		°C	

⁶ Such as more than one type of fluid

⁷ Examples of fluids are: liquid water, steam, refrigerants, ammonia, carbon dioxide, glycol

⁸ Nm³ = Normal cubic meter (20 °C, 1,2 kg/m³, 101 325 Pa)

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Parameter	Value	Unit	Comment
Outdoor inlet air - Humidity		g/kg, dry air	
Outdoor inlet air - Airflow		Nm ³ /h	
Supply air – Temperature		°C	
Supply air – Humidity		g/kg, dry air	
Supply air – Airflow		Nm ³ /h	
Reactivation air inlet - Temperature		°C	
Reactivation air inlet – Humidity		g/kg, dry air	
Reactivation air inlet – Airflow		Nm ³ /h	
Other parameters			
Barometric pressure		Pa	Sea level barometric pressure is 101 325 Pa
Climate file used in modelling		Location and year	The climate file shall at minimum include: Temperature, humidity and number of hours at weather condition.
Name of database used for climate file		-	E.g, ASHRAE, SMHI, etc.

4.1.3 FUNCTIONAL UNIT FOR TYPE 3 EPD

Type 3 EPDs shall have the functional unit 1 kg of water removed from the air.

The EPD shall report the used conditions as in Table 3 with all parameters specific for a product for one specific application.

4.2 SYSTEM BOUNDARIES

EPDs that are developed based on this c-PCR shall cover product stage (A1-A3), construction process stage (A4-A5), use stage (B1-B7), end-of-life stage (C1-C4) as well as benefits and loads beyond the system boundary (D).

The following subsections describe the covered information modules and the respective processes. For detailed information on each module, see EN 15804 (Section 6.3.5). Here only specific descriptions related to this c-PCR are provided.

Table 4: Life cycle stages and information modules

Life cycle stage	Information module		Comment
A1-A3 Product stage	A1	Raw materials and components supply	Included
	A2	Transport	Included
	A3	Manufacturing	Included
A4-A5 Construction process stage	A4	Transport	Included
	A5	Installation	Included
B1-B7 Use stage	B1	Use	Included
	B2	Maintenance	Included
	B3	Repair	Included
	B4	Replacement	Included

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Life cycle stage	Information module		Comment
	B5	Refurbishment	Included
	B6	Operational energy use	Included
	B7	Operational water use	Included
C1-C4 End-of-life stage	C1	Deconstruction	Included
	C2	Transport	Included
	C3	Waste processing	Included
	C4	Waste disposal	Included
D Benefits and loads beyond the system boundary	D	Reuse, recovery, recycling	Included

4.2.1 PRODUCT STAGE: MODULES A1-A3

See PCR 2019:14 and Section 6.3.5.2 of EN 15804.

- **A1 Raw materials and components supply:** Extraction and production of raw material for parts and components needed to produce the dehumidifier, including:
 - Extraction and processing of raw materials,
 - Recycling processes of secondary materials from other product life cycles,
 - Production of input components,
 - Production of the packaging of raw materials/components and of the packaging of the finished product
 - Relevant services, such as transport of raw materials and components along the upstream supply chain (between A1 processes) to a distribution point (e.g. a stockroom or warehouse).
 - Generation of electricity and production of fuels, steam and other energy carriers used in upstream processes
- **A2 Transport:** Transportation of raw material and components to manufacturing site (outsourced and in-house) from direct suppliers, i.e. from previous production or extraction process.
 Transport distances should be based on actual data or, if justified, on estimated data.
- **A3 Manufacturing:** Manufacturing and assembly of components to produce the dehumidifier, including:
 - Generation of electricity and production of fuels, steam and other energy carriers used during the manufacturing stage,
 - Production of auxiliary materials consumed,
 - Direct emissions to air, water or soils due to fuels combustion during the manufacturing stage, and
 - End-of-life treatment of manufacturing waste (including wastewater), even if carried out by third parties, including transportation,

The following shall not be included in the manufacturing stage:

- manufacturing of production equipment, buildings, and other capital goods,
- building (or dismantling) of a production site, infrastructure, production and maintenance of manufacturing equipment, and personnel activities
- Business travel of personnel,
- Travel to and from work by personnel, and
- Research and development activities.

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4.2.2 CONSTRUCTION PROCESS STAGE: MODULES A4-A5

See PCR 2019:14 and Section 6.3.5.3 of EN 15804.

- **A4 Transportation:** Transportation of the product from the manufacturing site to the installation site.

The transport of the product to the customer shall be described in the EPD, where relevant, and be accounted for in this priority:

1. Actual transportation modes and distances to a specific customer or market, representing the geographical scope of the EPD.
 2. A weighted average of transportation modes and distances, based on transportation to several customers or markets, representing the geographical scope of the EPD.
 3. Calculated as a fixed long transport: a 1 000 km transport by lorry and a 10 000 km by ship.
- **A5 Installation:** Installation of the dehumidifier including:
 - The production and transport of auxiliary materials and energy and water used during the installation of the dehumidifiers (if relevant); material, water and energy consumption should be based on the installation manual provided by the manufacturer; and
 - End-of-life treatment of waste generated from dehumidifier packaging, including transportation.

4.2.3 USE STAGE: MODULES B1-B7

See PCR 2019:14 and Section 6.3.5.4 of EN 15804.

- **B1 Use:** Direct emissions dehumidifier including (if relevant):
 - Direct emissions from fuels combusted for heat, e.g., natural gas.

The effect of water being moved from the biosphere (ambient air) to the technosphere (wastewater stream) due to condensing/adsorbing the water in the airstream shall be excluded. Subsequently, potential wastewater treatment of this water shall be excluded.

- **B2 Maintenance:** Maintenance of parts including (if relevant):
 - the production and transport of the parts and auxiliary materials, water and energy (e.g. washing and electric consumption for filter cleaning) used for dehumidifier maintenance activities, and
 - The end-of-life processes of any waste generated in the maintenance activities (e.g from the parts and their packaging).

The expected maintenance should be based on the maintenance manual.

- **B3 Repair:** Repair of parts including (if relevant):
 - Repair process of the repaired part of a component including production of the repaired part or ancillary materials,
 - The production of energy used for dehumidifier repair activities,
 - The transportation of the repaired part of component and ancillary materials, and
 - The end-of-life processes of any waste from transportation and the repair process, including the part of the component and ancillary materials removed.
- **B4 Replacement:** Replacement of parts including (if relevant):
 - Replacement activity, e.g. direct energy used for the replacement,
 - The production of any components (e.g filters if they require replacement) and of ancillary materials used in the replacement activity,
 - The transportation of any components and ancillary materials used, or waste generated, in the replacement activity, and
 - The end-of-life processes of any waste generated in the replacement activities, production or transportation.

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In the case of dehumidification systems equipped with a filter that needs to be replaced periodically, the following processes shall be included:

- The production of the materials constituting the new filter,
- Transportation of the new filter, and
- The end-of-life processes of the replaced filter.

The transport of maintenance personnel, if the replacement is not carried out by the end user, shall not be included.

Annual frequency to be considered, based on type of filter and replacement/cleaning recommendation by the manufacturer.

- **B5 Refurbishment:** Refurbishment of the product (if relevant):
 - Transport of the product
 - Generation of electricity and production of fuels, steam and other energy carriers used during the refurbishment stage,
 - Production of auxiliary materials consumed,
 - Direct emissions to air, water or soils due to fuels combustion during the refurbishment stage, and
 - End-of-life treatment of manufacturing waste (including wastewater), even if carried out by third parties, including transportation
- **B6 Operational energy use:** Expected energy consumption from the operation of the dehumidifier:
 - Use of any energy carriers, such as electricity, steam, district heating, etc.
 - Energy requirements for heat removal, such as chilled water or district cooling.
 - The pressure drop for heating and cooling fluids shall be excluded.

Type 1 EPDs shall calculate operational energy use according to the conditions in Table 2.

Type 2 EPDs shall calculate operational energy use according to self-defined conditions. These conditions shall be reported in the EPD with minimum reporting requirements listed in Table 3.

Type 3 EPDs shall calculate operational energy use for a product for one specific application. These conditions shall be reported in the EPD with minimum reporting requirements listed in Table 3.

The used parameters shall be reasonable and justified in the background report.

- **B7 Operational water use:** Water consumption during the use stage of the product (if relevant):
 - Generation of water used during the use stage of dehumidifier
 - Wastewater treatment
 - Energy consumption from pressure drop through the components is assumed to be negligible and can be excluded.

4.2.4 END-OF-LIFE (EOL) STAGE: MODULES C1-C4

See PCR 2019:14 and Section 6.3.5.5 of EN 15804.

- **C1 Deconstruction:** including (if relevant):
 - Dismantling or demolition of the product from the building,
 - Initial on-site sorting of the materials, and
 - Auxiliary materials and energy used during the deconstruction of the dehumidifier.
- **C2 Transport:** transportation of the deconstructed product from the building site to the waste treatment site.
- **C3 Waste processing:** e.g. collection of waste fractions from the deconstruction and waste processing (up to the end-of-waste state) of material flows intended for reuse, recycling and energy recovery according to the most representative scenario defined by the company.

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- **C4 Waste disposal:** including physical pre-treatment and management of the disposal site, according to the most representative scenario defined by the company.

The EPD owner shall define its own end-of-life scenario, considering the specifics of the geographical region where the dehumidifier is installed (or intended to be installed). The end-of-life scenario shall be clearly documented and justified in the EPD, describing the final method of disposal, i.e. reuse, recycling, incineration and/or landfill.

Processes excluded are:

- Production, maintenance, and disposal of infrastructure (buildings, machinery, and capital goods) at the sites where the product is disposed

4.2.5 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY: MODULE D

See PCR 2019:14 and Section 6.4.3.3 of EN 15804.

4.2.6 OTHER BOUNDARY SETTING

See PCR 2019:14 and EN 15804.

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4.3 SYSTEM DIAGRAM

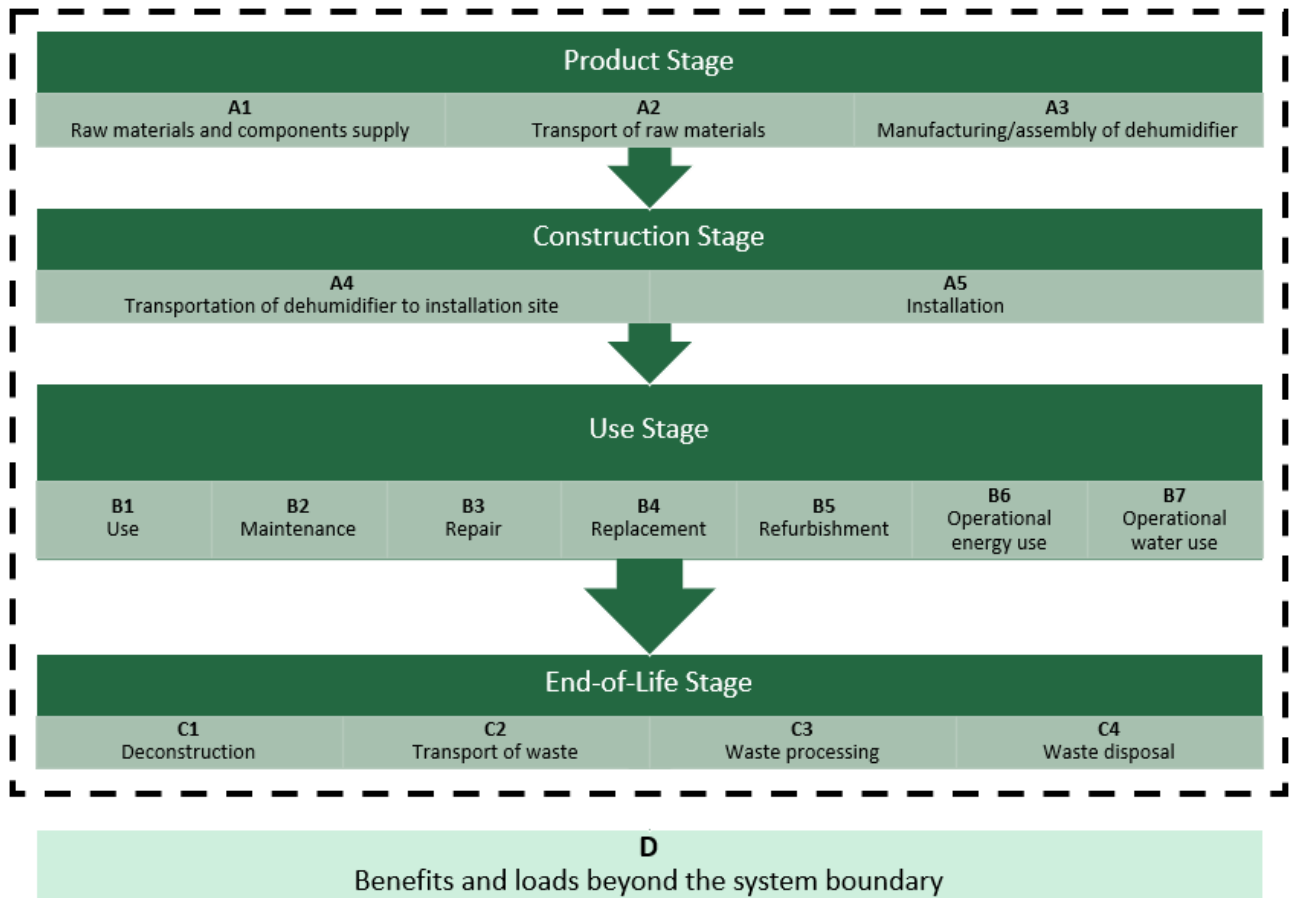


Figure 3 System diagram illustrating the processes that are included in the product system, divided into life-cycle stages and information modules.

4.4 CUT-OFF RULES

See PCR 2019:14 and EN 15804.

4.5 ALLOCATION RULES

See PCR 2019:14 and EN 15804.

4.6 DATA QUALITY REQUIREMENTS

See PCR 2019:14 and EN 15804.

4.7 ENVIRONMENTAL PERFORMANCE INDICATORS

See PCR 2019:14 and EN 15804.

4.8 INCLUDING MULTIPLE PRODUCTS IN THE SAME EPD

See PCR 2019:14.

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5 CONTENT AND FORMAT OF EPD

See PCR 2019:14.

5.1 EPD LANGUAGE

See PCR 2019:14.

5.2 UNIT AND QUANTITIES

See PCR 2019:14.

5.3 USE OF IMAGES IN EPD

See PCR 2019:14.

5.4 EPD REPORTING FORMAT

See PCR 2019:14.

The following additional information may be reported in the EPD:

- Type 3 EPDs may report “share of specific data” for the B-modules.

5.4.6 ADDITIONAL INFORMATION

The following additional information shall be stated on the front page of the EPD:

- For Type 1 EPDs “Type 1 EPD for pre-determined operating conditions”
- For Type 2 EPDs “Type 2 EPD for product specific operating conditions”
- For Type 3 EPDs “Type 3 EPD for product and client specific operating conditions”

The following additional information shall be reported in the EPD:

- Dimensions (mm)
- Weight (kg)
- Design air flow (Nm³/h)
- Type of climate for which the use phase is modelled (climate file or other), if relevant.
- Information regarding the details of the module B scenarios, including those presented as additional environmental information in the EPD.
- Total electricity use (kWh) during the B6 operational use stage (for a lifespan of 15 years).
- kg CO₂ eq./kWh (calculated using the GWP-GHG indicator) of the energy carriers used in module B6, such as electricity, steam, district heating, etc.
- kg CO₂ eq./kWh (calculated using the GWP-GHG indicator) of the energy carriers used for heat removal, such as chilled water or district cooling.

The following additional information should be reported in the EPD:

- Instruction on disassembling, reuse, recycling and disposal of each component of the dehumidifier.
- A statement stating whether the performances used for the thermal and electrical energy calculation are certified and, if so, with which certification programme (e.g., Eurovent).

The following additional information may be reported in the EPD:

- A1-A3 GWP-GHG emissions for the full unit over the full lifespan. This is equivalent to dividing A1-A3 GWP-GHG results with the reference flow⁹.

⁹ The purpose of this is to enable easier reporting for the Greenhouse Gas protocol scope 3-1 downstream of the EPD owner.

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6 LIST OF ABBREVIATIONS

In addition to abbreviations listed in PCR 2019:14, Section 6:

DB	Dry bulb
°C	Degrees Celsius
Pa	Pascal
kWh	Kilowatt hour
mm	Millimetres
Nm ³ /h	Cubic meters per hour at standard conditions
RH	Relative Humidity
x	Humidity

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8 VERSION HISTORY OF C-PCR

VERSION 20XX-YY-ZZ

Original version of the c-PCR.

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