PEP ecopassport® PROGRAM

PSR

Specific rules for
COMFORT TERMINAL UNITS (CTU)

PSR-0009-ed2.0-EN-2018 02 09

According to PSR-modele-ed1-EN-2015 03 20

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Contents

1. Introduction

This reference document complements and explains the Product Environmental Profile Drafting Rules defined by the PEP ecopassport® program (PEP-PCR ed.3-EN-2015 04 02), available at www.pep-ecopassport.org.

It defines the additional requirements applicable to terminal comfort units. Compliance with these requirements is necessary to:

- Qualify the environmental performance of these products on an objective and consistent basis.
- Publish PEPs compliant with the PEP ecopassport® program and international reference standards.[1]

This reference document was drawn up in compliance with the open, transparent rules of the PEP ecopassport® program with the support of stakeholders and professionals in the COMFORT TERMINAL UNIT market.

PEP ecopassport®	www.pep-ecopassport.org
PSR reference	PSR-0009-ed2.0-EN-2018 02 09
Critical review	The third-party Critical review was carried out by EVEA. The declaration of conformity published on 16/01/2018 can be found in the Appendices.
Availability	The Critical review report is available on request from the P.E.P. Association contact@pep-ecopassport.org
Scope of validity	The critical review report and the declaration of conformity remain valid within 5 years or until the PEP Drafting Rules, or the normative reference texts to which they refer, are modified.

With the publication of the PCR edition 3 (PEP-PCR-ed 3-EN-2015 04 02), this PSR was the object of an impact study which led to an editorial revision. This PSR also incorporated modifications to facilitate the use of the PEP to perform an LCA for a building in accordance with EN 15978.

[1] ISO 14025, ISO 14040 and ISO 14044 standards

2. Scope

In accordance with the general instructions of the PEP ecopassport® program (PEP-General instructions-4.1-EN-2017 10 17) and additional to the PCR, "Product Category Rules", (PEP-PCR ed.3-EN-2015 04 02) of the PEP ecopassport® eco-declaration program, this document sets out the specific rules for COMFORT TERMINAL UNITS and defines the product specifications to be adopted by manufacturers in the development of their Product Environmental Profiles (PEPs) particularly with regard to:

- The technology and its type of application,
- The reference lifetime taken into account for the Life Cycle Assessment (LCA),
- The conventional use scenarios to be adopted during the product use stage.

The main purpose of these specific rules is to provide manufacturers of COMFORT TERMINAL UNITS with a common base for the development of their product life cycle assessments. The different available technologies are therefore presented:

- Fan coil unit
- Chilled beam
- Dynamic heater.

The specific rules for COMFORT TERMINAL UNITS can be updated in order to take account of all technological advances not included in this document, provided that such advances form part of a request to the P.E.P. Association to include them in the specific rules for COMFORT TERMINAL UNITS; the P.E.P. Association will then decide whether the new technology can be included and whether the performance claims are justified.

2.1. Definition of the product families concerned

2.1.1. Fan coil unit

Can be called a FAN COIL:
"Device used for heating and cooling and to ensure good indoor air quality and a minimum mixing rate to achieve the comfort required, as specified in NF EN ISO 7730. "

It consists of:

- One or more exchangers
- One or more fans fitted with electric motor(s)
- A casing
- A condensate retrieval pan for use in cold mode
- An air filter
- A mounting bracket (if supplied)
- And, for ducted fan coil units, a distribution plenum.

2.1.2. Chilled beam

2.1.2.1. Active chilled beam

Can be called an active chilled beam:
"Device used to heat, cool and, if applicable, ventilate a building, as specified by EN 15116"

It consists of:

- An air distribution system (plenum, injector and mixed air flow path)
- An exchanger
- A perforated face plate through which air can be drawn
- A mounting bracket (if supplied)
- And, if applicable, a casing.

2.1.2.2. Passive chilled beam

Can be called a passive chilled beam:
"Device used for cooling and to provide the comfort required, as specified by EN 14518. "

It consists of:

- An exchanger
- A casing
- A mounting bracket (if supplied).

2.1.3. Dynamic heater

Can be called a dynamic heater:
"Device used to heat and / or cool a building and from which air is evacuated by forced convection through one or more air outlets. Most of its power is hydraulic power generated from an exchange between ambient air and a fluid originating from a generator external to the device. "

It consists of:

- An emitter
- One or more hydraulic exchangers, providing most of the total power of the device
- One or more air outlets
- A room thermostat integrated in the device, controlling at least the secondary heating unit(s) and the forced convection device
- A forced convection cut out device
- A filtration system
- A mounting bracket (if supplied)
- And, possibly, one or more secondary heating units consisting of one or more electric heating elements

Only devices with a total power up to 2000 W are concerned.

3. Product life cycle assessment

3.1. Functional unit and reference flow description

These specific rules are additional to section "Functional unit and reference flow description" of the current PCR (PEP-PCR-ed.3-EN-2015 04 02).

3.1.1. Functional unit

3.1.1.1. Fan coil unit

The following functional unit is associated with the fan coil units:

"Emit 1 kW of sensitive cooling or heating (if only heating is required) via a fan coil unit, by providing the ventilation, filtration, heating and/or cooling functions for 16 years"

The reference lifetime is as specified in section 3.1.2 “Reference product and reference flow description” of these specific rules.

3.1.1.2. Chilled beam

The functional unit of the chilled beam active or passive is designed to:

"Ventilate and/or heat and/or cool a building for 25 years via a chilled beam of L x W x H m or an equivalent unit volume in m^3, as specified by EN 14518 for passive chilled beams, or EN 15116 for active chilled beams."

The reference lifetime is as specified in section 3.1.2 “Reference product and reference flow description” of these specific rules.

3.1.1.3. Dynamic heater

The functional unit of the dynamic heater is designed to:

"Provide a heating or cooling capacity of 1 kW as specified by the manufacturer over a period of 16 years."

The reference lifetime is as specified in section 3.1.2 “Reference product and reference flow description” of these specific rules.

3.1.2. Reference product and reference flow description

For each of product categories defined, the analysis carried out includes the following reference flows:

- A comfort terminal unit with a specific reference lifetime and, where applicable, whose energy consumption in use is expressed in kWh according to the use scenario in Section 3.5.4 "Use stage" of these rules,
- Its packaging
- Any products or components required for installation.

In the context of a PEP for a range of products, extrapolation rules will apply to all the reference products, as described in section 3.6 “Rules for extrapolation to a homogeneous environmental family”. In this case, the analysis will be carried out on the reference product, which is defined as follows:

Products	Reference product	Reference lifetime
Fan coil unit	• Sensitive cold capacity equal to 1000 W under Eurovent certification conditions	16 years
Active or passive chilled beam	• Dimensions 1.2 x 0.6 x 0.12 m, i.e. 0.0864 m3	25 years
Dynamic heater	• Output capacity equivalent to 1000 W	16 years

If no product corresponds to the above definition, the product with the most similar characteristics in the product range will be used.

3.2. System boundaries

These specific rules are additional to section 2 "System boundaries" of the current PCR.

3.2.1. Manufacturing stage

All components supplied with the product and contributing to its proper operation must be included in the scope of the study.

3.2.2. Distribution stage

For this stage, the rules defined in the current PCR apply.

3.2.3. Installation stage

Conventionally, the installation of a comfort terminal unit may involve modifications to the structure (e.g. masonry work, electrical connections, addition of cladding, etc., for better aesthetic integration of the product in the building). Any modification to the structure and/or addition of elements not anticipated by the manufacturer is excluded from the scope of the study. The impact of these operations must be calculated by the user of the declaration if desired according to the installation elements used during the worksite phase.

The treatment of packaging waste is, however, included. The packaging waste produced during the installation phase should be disposed of by the installer once the equipment has been installed.

3.2.4. Use stage

Once the unit is installed, the COMFORT TERMINAL UNIT use stage includes:

- Energy consumption (applicable to FAN COIL UNITS and DYNAIMC RADIATORS).
- Energy conversion (into heating and/or cooling and/or ventilation),
- Standby consumption by electronic components,
- Any functions used to optimise energy consumption,
- Service operations for maintenance.

Additional CHILLED BEAM components that consume energy, such as electronic controls, built-in light fixtures, back-up heating, etc. might not fall within the scope of the study because they are not always supplied by the manufacturer with the product.

3.2.5. End-of-life stage

For this stage, the rules defined in the current PCR apply.

3.3. Cut-off criteria

The rules specified in section 2.3 "Cut-off criteria" of the current PCR (PEP-PCR-ed3-EN- 2015 04 02) apply.

3.4. Specific allocation rule

These specific rules are additional to section 2.4 "Rules for allocation between co-products" of the current PCR.

Where primary data are shared with products other than those covered by these specific rules, the impact calculation is determined according to the mass of products manufactured.

3.5. Development of scenarios (default scenarios)

These specific rules are additional to the section on "Development of scenarios (default scenarios)" of the current PCR.

3.5.1. Manufacturing stage

A COMFORT TERMINAL UNIT is composed of:

- Components directly made by the manufacturer
- Or components ready to be fitted together.

The rules defined in section 3.8 "Requirements for collecting primary and secondary data" of these specific rules apply.

3.5.1.1. Waste generated during the manufacturing stage

Waste generation and treatment are included in the manufacturing stage.

Manufacturers can dispose of manufacturing waste themselves or arrange for it to be disposed of. The LCA report shall specify how the manufacturer, or any person working for him or on his behalf fulfils the requirements of these stages, by distinguishing between hazardous manufacturing waste and non-hazardous manufacturing waste and providing evidence of such claims.
When the treatment processes are known (waste-to-energy recovery, burying, incineration without recovery), they shall be presented and justified in the LCA report and the associated environmental impacts shall be taken into account.

For products exploitation (recycling, re-use or incineration as fuel for energy production), environmental impacts must be considered in the life cycle analysis for COMFORT TERMINAL UNITS, as shown in section 2.5.6 “End of life treatment scenarios” from the current PCR.
The justification for the treatment processes must then be accompanied in the LCA report by the justification for the treatment systems and the recovery rate for each type of waste (e.g. via an annual report on the end-of-life processing of equipment by an eco-organisation).

When the manufacturer does not provide evidence of the processes used to treat the waste generated during the manufacturing stage of the product in question, the treatment process shall be calculated by default as follows:

- For nonhazardous waste: Mass of raw product x 0.30 = 50% of incinerated waste (without waste-to-energy recovery) and 50% of buried waste.
- For hazardous waste: Bare product mass x 0.30 = 100% incinerated waste (without waste-to-energy recovery).

When the worst performer value is used by default, no waste-to-energy recovery will be taken into account. The production of this lost material must be taken into account.

By sector-based agreement, the transport stage for this waste shall be taken into account, assuming that it is trucked over a distance of 100 km.

3.5.2. Distribution stage

The distribution stage applicable to comfort terminal units must be analysed in accordance with the PCR section 2.5.3 "transport scenarios".

3.5.3. Installation stage

Installation conditions mean any process, component, energy or consumption and/or emission required to install a comfort terminal unit. The installation conditions do not imply that particular consumables and/or products to be itemised shall be used, provided that an installation template wall bracket has already been included during the manufacturing stage.

In the absence of a wall-mount that serves as a mounting template, the supporting report specifies the elements required for the installation of the comfort terminal unit. These elements must be described and inventoried in the LCA report in the installation stage.

The treatment of packaging waste is included. The packaging waste produced during the installation phase should be disposed of by the installer once the equipment has been installed.

3.5.3.1. Waste generated during the installation phase

The end of life of the packaging, whose production is taken into account during the manufacturing stage, is taken into account during the installation stage.
The packaging waste from produced during the installation stage is classed as non-hazardous waste and, in principle, shall be disposed of by the installer once the equipment has been installed.

Its processing is calculated as follows, by default[2]:

On the packaging mass	**Cardboard, wood, corn starch, cellulose**	**Plastic and other products considered as non-hazardous waste**
Percentage of packaging recycled at end of life	89%	21%
Percentage of packaging recovered for energy production at end of life	8%	32%
Percentage of packaging incinerated (50%) and buried (50%) without recovery at end of life	3%	47%

Any other packaging material must be considered as buried.

[2] Extract from the ADEME "Recycling report 1999-2008: Materials and recycling listed by sector - general summary", 2010, in particular page 63.

By sector-based agreement, the transport stage for this waste shall be taken into account, assuming that it is trucked over a distance of 100 km.

Plastic film, straps, packing notes, labels or any other paper on or inside the package are considered to be insignificant and will not be included in the life cycle assessment for packaging waste if these items represent in total less than 50% of the total mass of the packaging.

3.5.4. Use stage

The energy consumption of a comfort terminal unit shall be expressed in kWh of final energy, in compliance with the specifications of the reference product analysis, as defined in section 3.1 “Functional unit and reference flow” of these specific rules, according to the COMFORT TERMINAL UNIT typologies described below.

The PEP shall specify the operating water systems used to determine the energy consumption of the comfort terminal unit according to current EN standards and/or the Eurovent certification program. The following sentence must be included in the PEP: "The power consumed depends on the conditions of use and operation of the building concerned. "

3.5.4.1. Fan coil unit

3.5.4.1.1. Energy consumption

For fan coil units, electricity consumption in the use stage during the reference lifetime can be expressed as follows:

$$C\ (kWh) = (C_{hot} + C_{Cold} + C_{standby}) * RLT$$
$$= [(t_{HOT} * (5\%\ PelecHS + 25\%\ PelecMS + 70\%\ PelecLS))$$
$$+ (t_{COLD} * (5\%\ PelecHS + 30\%\ PelecMS + 65\%\ PelecLS))$$
$$+ C_{standby}]$$
$$* RLT$$

Where:

C = electricity consumption of the fan coil unit expressed in kWh

C_{Hot} = annual electricity consumption in heating mode of the fan coil unit expressed in kWh/year

C_{Cold} = annual electricity consumption in cooling mode of the fan coil unit expressed in kWh/year

$C_{standby}$ = annual standby electricity consumption of a fan coil unit expressed in kWh/year

t_{HOT} = operating time in heating mode in winter in hours

t_{COLD} = operating time in cooling mode in summer in hours

Pelec = electrical power input at the different fan operating speeds as defined for the Eurovent high-speed "HS", medium speed "MS" and low speed "LS" certification in kW

RLT = reference lifetime of the device in years.

By default, the operating times[3] applied are:

- 1500 hrs in winter
- 1100 hrs in summer.

By default, the annual standby consumption of the unit is equal to the electrical power input, 2 W by default, multiplied by the number of hours the fan coil unit remains on standby, i.e.:
2 * (8760-1500-1100) = 2 * 6160 = 12.32 kWh/year.

The PEP shall mention the Eurovent Certification energy class.

For ducted fan coil units, the following sentence must be included in the PEP: "Ducted fan coil units must be combined with an appropriately sized return air and air blower diffuser."

3.5.4.1.2. Liquid waste

A quantity of water, expressed in litres, discharged from fan coil units is taken into account by default.
The discharged water is often dirty water that, for lack of more precise information, can be only modelled by water alone.

By sector-based agreement, the formula used to calculate the number of litres of condensate discharged from each device is:
Q (litres) = (Total capacity in W – Sensitive capacity in W) * summer operating time / 680

The capacities used are those given in the Eurovent conditions for indoor air and water systems. If applicable, this data shall be mentioned in the PEP.

3.5.4.2. Chilled beam

Chilled beams do not use electrical power in operation. The following note must be added to the Use stage - energy consumption section of the PEP: "Active chilled beams shall be connected to an appropriately dimensioned air handling unit."

[3] Times obtained from RT 2012 scenarios

3.5.4.3. Dynamic heater

3.5.4.3.1. Energy consumption

The electricity consumption of a dynamic heater during the reference lifetime is calculated as follows:

$$C\ (kWh) = (C_{hot} + C_{cold} + C_{standby}) * RLT$$

Where:
C = electricity consumption of a device expressed in kWh
C_{Hot} = annual electricity consumption in heating mode of a dynamic heater expressed in kWh/year
C_{cold} = annual electricity consumption in cooling mode of a dynamic heater expressed in kWh/year
$C_{standby}$ = annual standby electricity consumption of a dynamic heater expressed in kWh/year
RLT = reference lifetime of the device in years.

The inclusion of energy-saving functions shall be justified in the LCA report, which shall also specify their certification by an independent laboratory associated with the product category mentioned in this PSR. For lack of certification, these functions shall be indicated and justified in the LCA report and up to 50% of the associated percentage of energy savings taken into account, by sector-based agreement.

Calculation of Chot

The electricity consumption of a dynamic heater in heating mode is determined by the formula:

$$C_{hot} = (C_{fan} + C_{back\text{-}up})$$
$$= [(t_{HOT} * (5\%\ PelecHS + 25\%\ PelecMS + 70\%\ PelecLS)) + (t_{EB} * Pelec_{EB})]$$

Where:
C_{fan} = annual electricity consumption of the fan, expressed in kWh
$C_{back\text{-}up}$ = annual electricity consumption of any electrical back-up equipment, expressed in kWh
Pelec = electrical power input at the different fan operating speeds as defined for the Eurovent high-speed "HS", medium speed "MS" and low speed "LS" certification in kW
$Pelec_{EB}$: electrical power input by the electrical back-up equipment in kW
t_{HOT} : operating time in heating mode in winter in hours
t_{EB} = operating time of electrical back-up equipment in hours

By default, the following hypotheses are adopted:

- Electrical back-up equipment is only used two hours per day in mid-season from 15 April to 20 June and from 22 September to 14 October (90 days), i.e. 180 hours,
- The operating time of the appliance in hot mode in winter is 4368 h, i.e. 182 days, considering the legal heating period of 15 October to 15 April.

Calculation of CCold

RT 2012 weather data is used in the H2b climatic area as described in RT 2012 to determine the number of hours the device operates in cold/cooling mode. The cumulative number of hours starts at an outdoor temperature higher than 25°C, as stipulated by the French Building and Housing Code.

Outdoor air temperature	Hours/year
26	59
27	54
28	22
29	7
30	6
31	5
32	1
33	0
34	0
35	0
Total	154

The annual electricity consumption of a dynamic heater in cooling mode C_{Cold} expressed in kWh/year is defined on the assumption that the cooling capacity generated by the device at Delta T 10°C[4] is always lower than the needs of the theoretical reference part. We can therefore deduce that the device will operate permanently at the maximum ventilation speed.
The following formula is obtained:
C_{Cold} = (154 * Pe(vmax))

Where:
$Pe_{(vmax)}$ = maximum electrical power of the device (heating element) in kW

[4] Delta T de 10°C corresponds to the difference in temperature between the average temperature of the emitter and the ambient temperature for a water system at 7/12°C.

Example:
For a dynamic heater, model X, the manufacturer shall state the:

Electricity consumption of the device (kW)	Pe(vmax)	$4.96.10^{-3}$

The annual electricity consumption of this device in cooling mode is therefore:
C_{cold} = (154*4.96x10^{-3}) = 0.76 kWh/year

Calculation of Cstandby

The annual electricity consumption of a dynamic heater, $C_{standby}$ expressed in kWh/year, is defined by considering that the device still on outside the use ranges in heating and/or cooling mode.

The analysis will be carried out for a new construction in climatic zone H2b according to the criteria for the number of heating and cooling hours required as defined by RT 2012.

The following formula is used to calculate $C_{standby}$:
$C_{standby} = Pe_{standby} * (H_{year} – H_{hot} – H_{cold}) / 1000$

Where:
$Pe_{standby}$ = electric power input by the electronic components in standby mode expressed in W. Value to be justified in the LCA report; otherwise it will be set, by default, at 2 W
H_{year} = number of hours per year = 8760 h
H_{hot} = number of operating hours in heating mode = 1500 h + 158 h = 1658 h
H_{cold} = number of operating hours in cooling mode (T_{ext} > 25°C) = 154 h

For a non-reversible device only used for heating, H_{cold} will be assumed to be = 0 h.

Example:
For a dynamic heater, model X, the manufacturer shall state the:

Electricity consumption of the device in standby mode (W)	$Pe_{standby}$	0.44

$C_{standby}$ is calculated as follows:
$C_{standby}$ (0.44 x (8760 – 1658 – 154)) / 1000 = 3.06 kWh/year

3.5.5. Maintenance stage

If parts are to be replaced during the service life of the product, in compliance with the manufacturer's specifications, the impact of their manufacture, distribution and installation will have to be taken into account. The replacement of parts due to malfunction will not be taken into account.

For lack of available information, COMFORT TERMINAL UNITS require maintenance based on the following considerations:

Equipment	Type of intervention over the RLT	Frequency over the RLT
Fan coil unit	Filters Motor-driven fan	Twice a year Once
Chilled beam	-	-
Dynamic heater	Filter	Once a year

The treatment of any other waste generated by the installation and maintenance stages, essential for the COMFORT TERMINAL UNIT to operate correctly, and not specified in the above-mentioned list, shall be taken into account and justified in the LCA report.

If a new product on the market requires maintenance or consumables not taken into account in this document, these items will be included in the analysis.

By sector-based agreement, the transport stage for this waste shall be taken into account, assuming that it is trucked over a distance of 100 km.

3.5.5.1. Waste generated during the maintenance stage

The manufacture of spare parts as well as the end-of-life of the waste generated during the maintenance stage (spare parts end-of-life) are taken into account in the use stage.

The material components, as specified in Section 3.5.5 "Maintenance stage" of the present document, must be considered as "waste generated during the maintenance stage" and their end-of-life must be considered here.

The end-of-life of these elements is then handled the same way as described in Section 3.5.6 "End-of-life stage" of the present document.

By sector-based agreement, the transport stage for this waste shall be taken into account, assuming that it is trucked over a distance of 100 km.

3.5.6. End-of-life stage

Within the European Union, waste generated by comfort terminal units containing electric or electronic components is classed as WEEE (Waste from Electrical and Electronic Equipment).

The LCA report will explain the organisation of known disposal and/or recovery systems, the associated environmental impacts and how the manufacturer meets these requirements, if applicable. These items will determine the applicable end-of-life treatment (case 1, 2 or 3 explained below).

If the end-of-life treatment of equipment not included in the WEEE has not been justified, it will be treated as for case 4 below.

With regard to recovery processes, the analysis will focus on all the stages of the system, up to intermediate storage prior to reuse.

For lack of specific justified information, the values specified below will be used:

On the bare product mass	**Case 1: recovery of at least 80% (75% of which is to be recycled/reused)** [5]	**Case 2: recovery of less than 80% (75% which is to be recycled/reused)** [7]	**Case 3: no evidence of recovery** [7]	**Case 4: equipment not covered by the WEEE** [7]
Percentage of product recycled at end of life	75 %	40 %	20 %	60%
Percentage of product recovered for energy production at end of life	5 %	0 %	20 %	20%
Percentage of product incinerated without recovery at end of life	10 %	30 %	30 %	10%
Percentage of product buried without recovery at end of life	10 %	30 %	30 %	10%

By sector-based agreement, the transportation to collect the end-of-life product and convey it from the location of use to its final treatment site is calculated according to an assumption that it is carried by truck over a distance of 100 km.

3.5.6.1. Special case of end-of-life filters

100% of these filters are incinerated without waste-to-energy recovery. 100% of filters containing classified particulates or pollutants are buried without waste-to-energy recovery.

[5] Extract from the ADEME "Recycling report 1999-2008", 2010.

3.6. Rule for extrapolation to a homogeneous environmental family

These rules are additional to section 2.6 "Rules for extrapolation to a homogeneous environmental family" of the PCR.

A homogeneous environmental family means devices from the same range satisfying the following characteristics:

- Identical function
- Same product standard
- Similar manufacturing technology: identical type of materials and identical manufacturing processes

To develop a valid PEP for a range of comfort terminal units, environmental impact weighting factors are applied to all the reference products in the same product range, as specified in section 3.1.2 “Reference product and reference flow description” of these specific rules.

The extrapolation rule or the tables indicating the extrapolation coefficients applicable to the various stages of the life cycle and to each product in the range covered must be stated in the PEP.

When the product range contains none of the reference products defined in section 3.1.2 “Reference product and reference flow description” of these specific rules, the calculation is performed on the product with the most similar characteristics.

3.6.1. Extrapolation rules applicable to fan coil units and dynamic heaters

3.6.1.1. Extrapolation rule applicable during the manufacturing stage

The environmental impacts produced during the manufacturing stage are directly correlated to the total mass of the product (including packaging).

As the mass of so-called “EEE” components does not change in the same ratio as the other components of the product, it is accepted that they are excluded from the extrapolation coefficient calculation.

For the manufacturing and end-of-life stages, the mass extrapolation coefficient to be applied to the PEP results for any other power from the same range is as follows:

Coefficient on the FU scale	$\left(\frac{mass\ of\ product\ considered\ -\ total\ mass\ of\ EEE\ components\ (kg)}{total\ mass\ of\ the\ reference\ product\ of\ the\ range\ (including\ packaging),\ excluding\ EEE\ components\ (kg)}\right) \times \left(\frac{Power\ of\ the\ reference\ product\ (kW)}{Power\ of\ the\ product\ considered\ (kW)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{mass\ of\ product\ considered\ -\ total\ mass\ of\ EEE\ components\ (kg)}{total\ mass\ of\ the\ reference\ product\ of\ the\ range\ (including\ packaging),\ excluding\ EEE\ components\ (kg)}\right)$

Note: The extrapolation coefficient takes into account the power of the products in order to guarantee consistent environmental impact results between the functional unit, the reference product, and the product under consideration.

The power of the reference product is defined in Section 3.1 “Functional unit and description of the reference flow” of these specific rules.

3.6.1.2. Extrapolation rule in distribution stage

The environmental impacts produced during the distribution stage are directly correlated to the total mass of the product (including any EEE components and the packaging).

For the distribution stage, the mass extrapolation coefficient to be applied to the PEP results for any other power from the same range is as follows:

Coefficient on the FU scale	$\left(\frac{mass\ of\ the\ product\ considered\ (kg)}{total\ mass\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Power\ of\ the\ reference\ product\ (kW)}{Power\ of\ the\ product\ considered\ (kW)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{mass\ of\ the\ product\ considered\ (kg)}{total\ mass\ of\ the\ reference\ product\ (kg)}\right)$

3.6.1.3. Extrapolation rule in installation stage

The environmental impacts produced in the installation stage are directly correlated to the mass of the packaging of the product concerned or the reference product.

For the installation stage, the mass extrapolation coefficient to be applied to the PEP results for any other power from the same range is as follows:

Coefficient on the FU scale	$\left(\frac{Mass\ of\ the\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ packaging\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Power\ of\ the\ reference\ product\ (kW)}{Power\ of\ the\ product\ considered\ (kW)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Mass\ of\ the\ packaging\ of\ the\ product\ considered\ (kg)}{Total\ mass\ of\ the\ packaging\ of\ the\ reference\ product\ (kg)}\right)$

3.6.1.4. Extrapolation rule applied during the use stage (excluding maintenance)

For units that consume electricity during use (fan coil unit and dynamic heater), the environmental impacts produced during the use stage, excluding maintenance, are directly correlated to energy consumption.

For the use stage (excluding maintenance), the energy extrapolation coefficient to be applied to the PEP results for any other power from the same range is as follows:

Coefficient on the FU scale	$\left(\frac{C\ of\ the\ product\ considered\ (kWh)}{C\ of\ the\ reference\ product\ (kWh)}\right) \times \left(\frac{Power\ of\ the\ reference\ product\ (kW)}{Power\ of\ the\ product\ considered\ (kW)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{C\ of\ the\ product\ considered\ (kWh)}{C\ of\ the\ reference\ product\ (kWh)}\right)$

The method for calculating C is described in Section 3.5.4 of these specific rules.

For fan coil units, these extrapolation coefficients also apply to liquid waste from the use stage.

3.6.1.5. Extrapolation rule applicable in the maintenance stage

The environmental impacts produced during the maintenance stage are due to the annual travel of one operator and the replacement of the maintenance parts. These parts are considered as identical within the homogeneous family.

For the maintenance stage, the environmental impacts of the reference product are considered as identical to any other power from the same range.

3.6.1.6. Extrapolation rule applied during the end-of-life stage

The environmental impacts produced during the end-of-life stage are directly correlated to the total mass of the product (excluding packaging).

For the end-of-life stage, the mass extrapolation coefficient to be applied to the PEP results for any other power from the same range is as follows:

Coefficient on the FU scale	$\left(\frac{Mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{Mass\ of\ the\ reference\ product\ of\ the\ range, excluding\ packaging\ (kg)}\right) \times \left(\frac{Power\ of\ the\ reference\ product\ (kW)}{Power\ of\ the\ product\ considered\ (kW)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{Mass\ of\ the\ reference\ product\ of\ the\ range, excluding\ packaging\ (kg)}\right)$

3.6.2. Extrapolation rules applicable to chilled beams

3.6.2.1. Extrapolation rule applied to the manufacturing and distribution stages

For these stages, the extrapolation rule to be used for any other product from the same range is calculated according to the total mass of the product (with packaging). The weight of the device corresponds to its global mass, expressed in kilograms (kg), as supplied to the customer, packaging included.

The mass extrapolation coefficient to be used on the PEP results for any other product in the same product range is as follows:

Coefficient on the FU scale	$\left(\frac{Total\ mass\ of\ the\ product\ considered, with\ packaging\ (kg)}{Total\ mass\ of\ the\ reference\ product\ of\ the\ range, with\ packaging\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (m3/h)}{Volume\ of\ the\ product\ considered\ (m3/h)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Total\ mass\ of\ the\ product\ considered, with\ packaging\ (kg)}{Total\ mass\ of\ the\ reference\ product\ of\ the\ range, with\ packaging\ (kg)}\right)$

The power of the reference product is defined in Section 3.1 “Functional unit and description of the reference flow” of these specific rules.

3.6.2.2. Extrapolation rule applied during the installation stage

For the installation stage, the extrapolation rule to be used for any other product from the same range is calculated according to the mass of the product packaging in kg.

The mass extrapolation coefficient to be used on the PEP results for any other product in the same product range is as follows:

Coefficient on the FU scale	$\left(\frac{mass\ of\ the\ packaging\ of\ the\ product\ considered\ (kg)}{mass\ of\ the\ packaging\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (m3/h)}{Volume\ of\ the\ product\ considered\ (m3/h)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{mass\ of\ the\ packaging\ of\ the\ product\ considered\ (kg)}{mass\ of\ the\ packaging\ of\ the\ reference\ product\ (kg)}\right)$

3.6.2.3. Extrapolation rules applied to the use stage

Because chilled beams consume no energy during use, there is no need to apply an extrapolation rule.

3.6.2.4. Extrapolation rule applied during the maintenance stage

The environmental impacts produced during the maintenance stage are due to the travel of one operator and the replacement of the maintenance parts. These parts are considered as identical within the homogeneous family.

For the maintenance stage, the environmental impacts of the reference product are considered as identical to any other product from the same range.

3.6.2.5. Extrapolation rule applied during the end-of-life stage

For the end-of-life stage, the extrapolation rule to be used for any other product from the same range is calculated according to the total mass of the product (excluding packaging). The weight of the device corresponds to its overall mass, expressed in kg.

The mass extrapolation coefficient to be used on the PEP results for any other product in the same product range is as follows:

Coefficient on the FU scale	$\left(\frac{total\ mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{total\ mass\ of\ the\ reference\ product\ of\ the\ range, excluding\ packaging\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (m3/h)}{Volume\ of\ the\ product\ considered\ (m3/h)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{total\ mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{total\ mass\ of\ the\ reference\ product\ of\ the\ range, excluding\ packaging\ (kg)}\right)$

3.7. Rules applying to joint environmental declarations

These rules are complementary to PCR section 2.7 "Rules applying to joint environmental declarations".

For a joint environmental declaration, the analysis must cover a "typical product" compliant with the rules defined in Section 3.1.2 "Reference product and reference flow description" of these specific rules.

3.8. Requirements concerning the collection of primary and secondary data

These rules are additional to the sections 2.9 "Requirements for the collection of primary data" and 2.10 "Requirements for secondary data" of the PCR.

As far as possible, the primary data (i.e. all the data associated with the manufacturing stage of the reference product and specific to an organisation) is to be preferred and shall be justified in the LCA report, specifying:

1) Primary data in case of a single supplier,
2) In case of procurement from several suppliers, the primary data to be taken into account is the data provided by major suppliers representing at least 50% of the procurement volume (with respect to the total quantity bought). For example, for ten suppliers each providing 10 % of the procurement volume, at least five suppliers shall be considered in order to obtain an overall view of the primary information provided. Any other distribution rule should be mentioned in the LCA report and in the PEP.

If primary data are shared with products other than those referred to in these specific rules, the calculation of impacts will be done in proportion to the mass of the products manufactured.

This information is not always available to manufacturers. For lack of primary data, secondary data, i.e. data obtained from the life cycle analysis software database should be used. PCR explains how to select the LCI modules. If the transportation information is not available, the data defined in the section "Transport scenarios" of the current PCR will be used.

3.9. Data quality evaluation

The specific rules specified in section 2.11 "Data quality evaluation" in the current PCR apply.

3.10. Calculation of environmental impact

To ensure consistency of the results of environmental impacts between the functional unit and the reference product, the PEP shall show the environmental impacts of the manufacturing, distribution, installation, use (including maintenance) and end-of-life stages as follows:

- For fan coil units and dynamic heaters:

Environmental impacts from the PEP (for 1 kW) =
Environmental impacts of the reference product /Power of the reference product (kW)

The power of the reference product is defined in Section 3.1 “Functional unit and description of the reference flow”.

For reversible products, i.e. those operating in cold and hot mode, the power of the reference product to be considered is: $Pref = (t_{hot} * P_{hot} + t_{cold} * P_{cold})/ (t_{hot} + t_{cold})$

- For chilled beams:

Environmental impacts from the PEP (for a beam measuring 1.2 x 0.6 x 0.12 m, i.e. 0.0864 m^3)= [Environmental impacts of the reference product / Volume of the product considered (m3)] * Volume of the reference product (m3)

The size of the reference product is defined in Section 3.1 “Functional unit and description of the reference flow”.

4. Drafting of the Product Environmental Profile

4.1. General information

The specific rules specified in section 4.1 "General information" of the current PCR apply.

The PEP must specify:

- The product sub-category and characteristics to be declared according to Section 2.1.
- For chilled beams, the following sentence shall be added in the PEP: "Active chilled beams shall be connected to an appropriately dimensioned air handling unit."
- Any other end-of-life treatment scenario for the product used, according to section 3.5.6

4.2. Constituent materials

The rules specified in section 4.2 "Constituent materials" of the current PCR apply.

4.3. Additional environmental information

These specific rules are additional to section 4.3 "Additional environmental information" of the PCR.

In the context of performing Life Cycle Analyses on the scale of a building, the environmental impacts of the equipment must be considered on the scale of the product and the impacts related to energy consumption in the use stage must be treated separately.

To facilitate the use of the PEP in conducting a building LCA, the PEP may include:

- The table of the environmental impacts of the reference product expressed on the product (or declared product) scale in addition to the table on the functional unit scale. The values must then be indicated in numerical values, expressed in the appropriate units to three significant figures (and, optionally, as a percentage) for each stage of the life cycle, and the total for each indicator of the complete life cycle analysis.

  The following details must be indicated in the PEP, to ensure clarity and transparency for the user:
  - For environmental impacts expressed per functional unit, the following wording is included: "per kW corresponding to the functional unit"
  - For environmental impacts expressed per declared product, the following wording is included: "per device corresponding to the reference product".

- The results of the environmental impacts in the use stage according to a breakdown of Module B (B1 to B7) in compliance with standards EN 15978 and EN 15804.

PEP ecopassport®	Manufacturing stage (Section 3.5.1)			Distribution stage (Section 3.5.2)	Installation stage (Section 3.5.3)	Use stage (Sections 3.5.4 and 3.5.5)							End-of-life stage (Section 3.5.6)				Benefits
EN 15978 / 15804	Production stage			Construction stage		Use stage							End-of-life stage				Benefits
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Supply of raw materials	Transport	Manufacture	Transport	Installation process	Use	Maintenance	Repair	Replacement	Rehabilitation	Energy use during use of the building	Water use during use of the building	Demolition/Deconstruction	Transport	Waste treatment	Disposal	Benefits beyond the system boundaries

Lookup table showing breakdown of life cycle by stage or by module

- The extrapolation rules on the scale of the declared product.

4.4. Environmental impacts

The table of environmental impacts represents the environmental impact on the functional unit scale.

For fan coil units and dynamic heaters:

The table of environmental impacts represents the environmental impact of the functional unit, i.e. 1 kW of cold or hot.

Thus, the total impact of the installed product must be calculated by the user of the PEP according to the power of the equipment by multiplying the impact concerned by the total number of kW of the device.

The following details must be completed and included in the PEP, to ensure clarity and transparency for the user:
The PEP was drawn up under the assumption of 1 kW of heating power being supplied. The real impact of the stages of the life cycle of a product installed in an actual situation is to be calculated by the user of the PEP by multiplying the impact concerned by the total heating capacity** in kW.*
*to be specified according to the functions performed by the equipment: 1 kW of cooling, 1 kW of heating or cooling.
** to be specified according to the functions performed by the equipment: cooling, heating or cooling.

When extrapolation rules are used, the following statement must be included:
Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. the emission of 1 kW heating power. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.*
*to be specified according to the functions performed by the equipment: 1 kW of cooling, 1 kW of heating or cooling.

For chilled beams:

The table of environmental impacts represents the environmental impact of the functional unit, i.e. a beam whose dimensions are 1.2 x 0.6 x 0.12 m, i.e. 0.0864 m3.

Thus, the total impact of the product installed in a real situation must be calculated by the user of the PEP by multiplying the impact concerned by the volume of the product.

The following details must be completed and included in the PEP, to ensure clarity and transparency for the user:
The PEP was drawn up by considering a beam of dimensions 1.2 x 0.6 x 0.12 m, i.e. 0.0864 m3. The real impact of the stages of the life cycle of a product installed in an actual situation is calculated by the user of the PEP by multiplying the impact concerned by the total volume of the installed product.

When extrapolation rules are used, the following statement must be included:
The extrapolation coefficients are given for the environmental impact of the functional unit, i.e. a beam whose dimensions are 1.2 x 0.6 x 0.12 m, i.e. 0.0864 m3. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.

5. Appendices

5.1. Glossary

C	Final energy consumption
EEE	Electrical and Electronic Equipment
kWh	Kilowatt hour
LCA	Life cycle analysis
LCI	Life cycle inventory
PCR	Product category rules
PEP	Product environmental profile
Primary data	Actual data measured by the manufacturer or supplier
PSR	Product specific rules
RLT	Reference lifetime
Secondary data	Generic data from a database or according to sector-based agreement
W	Watt

Sources used

PSR ref	**Description**	**Sources used**
Sections 3 and 7	Functional unit Use stage	EUROVENT fan coil unit certification program 2011-10 RS-6C002 and 2011-10 RS-6C002A
Section 2	Scope	NF EN ISO 7730 March 2006: Ergonomics of the thermal environment - Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
Sections 2 and 3	Scope Functional unit	NF EN 15116 June 2008: Ventilation in buildings - Chilled beams - Testing and rating of active chilled beams
Sections 2 and 3	Scope Functional unit	NF EN 14518 September 2005: Ventilation in buildings - Chilled beams - Testing and rating of passive chilled beams

Declaration of conformity

Programme PEP Ecopassport®

Attestation de revue critique des règles additionnelles sectorielles pour les unités terminales de confort

Document revu : PSR0009 - REGLES SPECIFIQUES AUX UNITES TERMINALES DE CONFORT (UTC) version 16/01/2018 (date de réception)
Etabli par : Uniclima : le syndicat des industries thermiques, aérauliques et frigorifiques

Uniclima, le syndicat des industries thermiques, aérauliques et frigorifiques, a demandé à EVEA, en tant que cabinet conseil spécialisé en Analyse du Cycle de Vie, la revue critique des règles additionnelles sectorielles pour les unités terminales de confort.

Référentiels :
L'objectif de cette revue critique est de vérifier la conformité de ce document avec les référentiels suivants :

- Le PCR référence PEP-PCR ed.3-FR-2015 04 02, disponible sur www.pep-ecopassport.org établit par le programme PEP Ecopassport®,
- Les normes NF EN ISO 14020 - 2002 et NF EN ISO 14025 -2010,
- Les normes NF EN ISO 14040 et 14044 – 2006.

Conclusion :
Le document revu ne présente pas de non-conformité avec les référentiels précités. Par conséquent le PSR relatif aux unités terminales de confort est conforme aux exigences de ces référentiels.

Jean Baptiste Puyou
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Tim Osmond
Vérificateur PEP Ecopassport® EVEA

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