PEP ecopassport® PROGRAM

PSR

SPECIFIC RULES FOR THERMODYNAMIC GENERATORS WITH ELECTRIC COMPRESSION FOR SPACE HEATING AND/OR COOLING AND/OR THE PRODUCTION OF DOMESTIC HOT WATER

PSR-0013-ed2.0-EN-2019 12 06

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

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List of the modifications of the present document

Online version 2020 02 03 :

Modified section	Modification
Introduction	Third party critical review of PSR edition 2.0 carried out by Julie Orgelet from DDemain
§ 3.5.1.2	Clarification on the default scenario to apply for waste generated during manufacturing phase
§ 3.5.4.1.3	Modification of the definition of the power to be taken into account for the calculation of energy consumption during the use phase and removal of the paragraph dealing with VRF
§ 3.5.6.2.1	Correction of the 2nd formula relating to the treatment of refrigerants at the end of equipment life in order to be consistent with the formulas given on the quantity of incinerated refrigerant
§ 3.6	Introduction of extrapolation rules for PEPs covering homogeneous environmental families

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 thermodynamic generators with electric compression. 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 thermodynamic generator with electric compression market and the interested parties.

PEP eco PASS PORT®	www.pep-ecopassport.org
PSR reference	PSR-0013-ed2.0-EN-2019 12 06
Critical review	The initial third-party Critical review was carried out by T. OSMOND from EVEA Conseil. The declaration of conformity published on 30/03/2018 can be found in the appendices. A complementary third-party critical review was carried out by J. ORGELET from DDemain in order to check the compliance PSR edition 2.0 especially relating to extrapolation rules. The declaration of conformity published on 21/11/2019 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 standards reference texts to which they refer, are modified.

[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 of the PEP ecopassport® eco-declaration program, this document sets out the specific rules for thermodynamic generator with electric compression 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 products' 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 thermodynamic generators with electric compression with a common basis for the development of their product life cycle assessments. The various thermodynamic generator with electric compression technologies available are therefore presented.

2.1. Definition of the product families concerned

The product family concerned is designated by the following terminology: thermodynamic generator with electric compression.
This product family comprises the following devices:

- Heat pumps,
- Air conditioners (without energy recovery function),
- VRF (Variable Refrigerant Flow) units
- Chillers.

These devices can be reversible or not, using air, water, or brine as cold and/or heat sources.
These devices all involve the use of a refrigerant.

The PEP and the LCA report must state the product family to which the product covered by the environmental declaration belongs, i.e.: thermodynamic generators with electric compression as well as the sub-category to which it belongs (heat pumps, air conditioners, chillers). According to the category to which the product covered by the declaration belongs, the technical characteristics presented in the following table must be given:

Product sub-category	Characteristics to be declared
Heat pumps	- Technology: Water/water or air/water or air/air or water/air or ground/water - Reversible/Non-reversible - Cooling and/or heating capacity - SCOP and/or SEER - Refrigerant used - Refill threshold
Air conditioners	- Technology: Air/air or water/air - Reversible/Non-reversible - Cooling and/or heating capacity - SCOP and/or SEER

Product sub-category	Characteristics to be declared
	- Refrigerant used - Refill threshold
VRF Unit	- Technology: Air/air - Reversible/Non-reversible - Cooling and/or heating capacity - SCOP and/or SEER - Refrigerant used - Refill threshold
Chillers	- Technology: Water/water or air/water - Reversible/Non-reversible - Cooling and/or heating capacity - SCOP and/or SEER - Refrigerant used - Refill threshold

2.2. Special case of other types of heat pump

For ground/ground heat pumps and units operating simultaneously with heat and cold, the rules to be applied are those defined in the Sections of the present document, except the rules for energy consumption in the usage phase. These latter rules are defined by harmonised calculation methods. They will be specified when the present PSR is updated.

2.3. Consideration of the functions and technologies not included in this document

The specific rules for thermodynamic generators with electric compression will take account of all technological advances not included in this document, provided that such advances form part of a request to include them in the specific rules for thermodynamic generators with electric compression in the PEP ecopassport® Program; the P.E.P. Association will then decide whether the new technology can be included and whether the performance claims are justified.

For heat pumps dedicated solely to the production of domestic hot water, PSR0004 concerning ‘for individual, standalone devices for production of stored domestic hot water only’ applies.

If the heat pump is characterised in heating only in accordance with Regulation No. 813/2013 and produces domestic hot water, refer to the present PSR for the heating and/or cooling function, and refer to the PSR concerning storage tanks for the domestic hot water production function. The impact of consumption related to domestic hot water production should be considered on a building-wide level.

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-ed3-EN- 2015 04 02).

3.1.1. Functional unit

The functional unit is determined on the basis of the main technical characteristics of the family of thermodynamic generators with electric compression.

The common function of all the products grouped in the present PSR is the production of cooling and/or heat.
The unit used to quantify product performance with regard to its cold production function is ***cooling capacity.***
The unit used to quantify product performance with regard to its heat production function is ***heating capacity.***

The functional unit is defined below:

- For reversible devices with heat and cold production:
  - Use in heating and cooling mode:

"To produce 1 kW of heating or 1 kW of cooling according to the appropriate usage scenario defined in the EN 14825[2] standard and during the XX-year reference lifetime of the product."

  - Use in mixed mode (heating and cooling, as well as domestic hot water production):

"To produce 1 kW of heating or 1 kW of cooling and produce domestic hot water, according to the reference usage scenario and during the XX-year reference lifetime of the product."

- For non-reversible devices with heat (or cold) production:
  - Use in heating mode only:

"To produce 1 kW of heating, according to the appropriate usage scenario defined in the EN 14825 standard and during the XX-year reference lifetime of the product."

  - Use in cooling mode only:

"To produce 1 kW of cooling, according to the appropriate usage scenario defined in the EN 14825 standard and during the XX-year reference lifetime of the product."

  - Use in mixed mode (heating only and domestic hot water production):

"To produce 1 kW of heating and produce domestic hot water, according to the reference usage scenario and during the XX-year reference lifetime of the product."

[2] See the sources used in Section 5.2 of the present document.

The reference lifetime of the device (XX years) must be specified in the description of the functional unit as indicated in Section 3.1.2, "Reference product and description of the reference flow".

3.1.2. Reference product and reference flow description

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

- a thermodynamic generator with electric compression with a specific reference lifetime
- its packaging
- any products or components required for installation.

The chosen study duration, characterising the reference lifetime of the equipment, is:

Product	**Reference lifetime (RLT) in years**	
	Individual residential	**Collective residential / Commercial**
Air conditioner	17 years	22 years
VRF unit	17 years	22 years
Heat pump	17 years	22 years
Chiller	Not applicable	22 years

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”.
The product selected from the range, which will be used as the reference product, will be the product with the most unfavourable characteristics (all possible functions or options). This choice must be described and justified in the LCA report.

The specific rules do not define any selection criteria concerning the power of the equipment.

3.2. System boundaries

These rules are additional to section "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.
In the case of mixed systems and when the production of domestic hot water is accumulated, the storage tank must be taken into account 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 thermodynamic generators involves:

- The manufacture and treatments of components of the equipment that are necessary for its operation but are not added until the time of its installation.
- The processes and energy sources implemented at the time of installation.

  The flows related to the installation procedure may be, when necessary for the proper operation of the equipment in its installation location:

  - Any additional loads of refrigerant and oils for the equipment (including the associated emissions).
  - The installation of a concrete slab
  - Transportation by lifting machines on site
  - The energy consumed during a test phase in the actual service location

  The energy flows related to the use of portable hand tools can be neglected.
- The treatment of packaging waste. The packaging waste produced during the installation phase should be disposed of by the installer once the equipment has been installed.

The installation phase can include:

- Modifications to the structure (e.g. masonry work, connection to the electrical network).

  Any modification to the structure and/or addition of elements not anticipated by the manufacturer is excluded from the scope of the study. The real 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 procedures, components, and energies counted in the installation phase shall be described and justified in the LCA report and must be specified in the PEP.

3.2.4. Use stage

Once the unit is installed, the thermodynamic generator with electric compression use stage includes:

- Electrical energy consumption,
- Refrigerant emissions,
- Refrigerant refill operations and the treatment of refrigerants recovered after refills,

and if applicable:

- Water consumption.

3.2.5. End-of-life stage

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

3.2.6. Consideration of refrigerants in all stages of the life cycle

When applicable, each stage of the life cycle must take the refrigerants into consideration, i.e.:

- Refrigerants: production and transportation upstream, their emission into the air and end-of-life treatment.
- Machine oils: production and transportation upstream, and end-of-life treatment.
- Water and any associated additional treatments (e.g. brine): water consumption and associated treatments.

3.3. Cut-off criteria

The specific rules specified in section "Cut-off criteria" of the current PCR apply.

3.4. Specific allocation rule

These specific rules are additional to section "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 appliances manufactured. Any other rule should be mentioned in the LCA report and in the PEP.

3.5. Development of scenarios (default scenarios)

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

3.5.1. Manufacturing stage

A thermodynamic generator with electric compression is made of components supplied by the manufacturer:

- 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. Momentary leakage of refrigerants during manufacturing stage

Momentary leaks of refrigerants into the air during the production stage (E_{fp}) are equal to C_n multiplied by the average leakage rate from the assembly site (T_{fp}) thus:

$$E_{fp} = C_n \times T_{fp}$$

T_{fp} the average rate of leakage from assembly site determined in accordance with the "solvent management plan" or the "risk prevention plan". The average rate used must be stated and justified in the LCA report. If no justification is given, 2% shall be used as the average rate.

3.5.1.2. 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.

Where known, the treatment processes (reuse, recycling, energy recovery, landfill, incineration without energy recovery) must be presented and justified in the LCA report, and the associated environmental impacts must be taken into account as indicated in the section on "Product end-of-life treatment scenarios" of the PCR in force.
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 device concerned, the treatment process shall be calculated by default as follows:

- For non-hazardous waste:
  Bare product mass 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).

If applicable, when the worst performer value is used by default, no waste-to-energy recovery will be taken into account. The production (60% waste) of this lost material must be taken into account.

Any other scenario for the treatment of waste during the manufacturing stage used for the calculation must be justified in the report and mentioned in the PEP.

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 must be analysed in accordance with the section on "System boundaries / Distribution stage" of the PCR in force.

This stage does not consider any specific treatment for refrigerants.

3.5.3. Installation stage

The installation phase includes any process, component, energy or consumption and/or emission required to install a thermodynamic generator with electric compression.

3.5.3.1. Momentary leakage of refrigerants during installation stage

Let C_i be the quantity of refrigerant added to the machine during installation. We consider that in accordance with regulation 1516/2007, all necessary measures were taken to avoid momentary emissions. Thus refrigerant leaks during the installation stage E_{fi} are considered as zero.

3.5.3.2. Waste generated during the installation phase

The end of life of the packaging, whose production was 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[3]:

On the packaging mass	Cardboard, wood, corn starch, cellulose	Plastic and other products 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%

[3] 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

This section does not apply to the types of heat pump mentioned in Section 2.2.

3.5.4.1. Energy consumption

3.5.4.1.1. Use profile considered in heating or cooling

For each product that consumes energy during use, a typical use scenario for calculating the environmental impacts related to such energy consumption has been defined.
This use scenario is defined for each of the product categories in European standard EN 14825, which is cited in Regulation No. 813/2013[4].
This standard gives an annual energy consumption according to a given operating time representative of the average use observed in Europe, and takes the following into consideration:

- Seasonal performance of the products
- Operating time

By default, the following hypotheses are adopted:

- Average climate (equivalent to Strasbourg)

[4] See the sources used in Section 5.2 of the present document.

- Applications defined by product type and operating mode according to the following table:

Type	Heat source		Cold source	
	Air	Water (brine)	Air	Water
Outside air/Recycled air Cold mode	35(24) °C		27(19)°C	
Tower water/Air Cold mode		30°C - 35 °C	27(19)°C	
Ground water/Air Cold mode		10°C - 15 °C	27(19) °C	
Air/Water Cold mode	35°C			12°C - 7 °C
Water/Water Cold only		30°C - 35 °C		12°C - 7 °C
Brine/Water Cold only		10°C - 15 °C		12°C - 7 °C
Outside air/Recycled air Hot mode	7(6) °C		20 °C	
Water/Air Hot mode		10°C - 7 °C	20 °C	
Brine/Air Hot mode		0-(-3) °C	20 °C	
Air/Water Hot only	7(6) °C			30°C - 35°C
Air/Water Hot only	7(6) °C			47°C - 55°C
Water/Water Hot only		10°C - 7°C		30°C - 35°C
Water/Water Hot only		10°C - 7°C		47°C - 55°C
Brine/Water Hot only		0-(-3) °C		30°C - 35°C
Brine/Water Hot only		0-(-3) °C		47°C - 55°C
Air/Water Reversible	7(6) °C			30°C - 35°C
	35°C			23°C - 18 °C
Water/Water Reversible		10°C - 7°C		30°C - 35°C
		30°C - 35 °C		23°C - 18 °C
Extracted air/Fresh air Hot mode	20(12)°C		7(6) °C	
Extracted air/Fresh air Cold mode	27(19) °C		35(24) °C	
Extracted air/Water Hot mode	20(12)°C			30°C - 35°C
Extracted air/Water Hot mode	20(12)°C			47°C - 55°C

The conditions on the air are given by the dry temperature and by the humid temperature between parentheses. The conditions on the water (brine) are given by the refrigerant intake-outlet temperatures. The table is not exhaustive. For the other applications, refer to the corresponding tables in the EN 14825 standard.

If the device is declared for several temperature levels in hot mode in the context of the eco design regulations, the highest temperature level data must be used.

3.5.4.1.2. *Use profile in domestic hot water production*

The draw-off profile used is the one defined according to regulation No 813/2013 or the EN 16147 standard.

The draw-off profile chosen must be indicated in the PEP.

3.5.4.1.3. *Calculation method*

The energy consumption calculation relates to the reference flow perimeter only.
For example, in the case of a heat exchanger, if the product does not include the circuit feed pumps, the consumption related to the use of the reference product does not include the consumption by the pumps.
If the use scenario for the life cycle analysis of the reference product is not given in the EN 14825 standard (for heating or cooling), in the EN 16147 standard (for domestic hot water), or is fundamentally different from it, you must:

- Justify and document the usage scenario used in the LCA report,
- Indicate the usage scenario used in the PEP.

Let C_{tot} be the total energy consumption of the reference product over its reference lifetime. The energy consumption in the use stage is calculated as follows:

- For non-reversible heat (or cold) production devices:
  - Use in heating mode only:

$$Ctot\ (in\ kWh) = \frac{P_h}{\mathrm{SCOP}} * theating * RLT$$

  - Use in cooling mode only:

$$Ctot\ (in\ kWh) = \frac{P_c}{\mathrm{SEER}} * tcooling * RLT$$

  - Use in mixed mode (heating and domestic hot water production):

$$C_{tot}\ (in\ kWh) = \frac{P_h}{\mathrm{SCOP}} * t_{heating} * RLT + AEC * RLT$$

- For reversible heat and cold production devices:
  - Use in heating and cooling mode:

$$Ctot\ (in\ kWh) = \left(\frac{P_h}{\mathrm{SCOP}} * theating + \frac{P_c}{\mathrm{SEER}} * tcooling\right) * RLT$$

  - Use in mixed mode (heating and cooling and hot water production):

$$C_{tot}\ (in\ kWh) = \left(\frac{P_h}{\mathrm{SCOP}} * t_{heating} + \frac{P_c}{\mathrm{SEER}} * t_{cooling}\right) * RLT + AEC * RLT$$

With:

- P_h or P_c = capacity of the equipment defined according to the European eco design regulations or European standards in force:

Type of generator	**P_h**	**P_c**
Heat pump air/water or water/water used in heating-only mode with P ≤ 400 kW (Regulation n°813/2013)	Pratedh	NA*
Heat pump or air conditioner air/air reversible or not with P ≤ 12 kW (Regulation n°206/2012)	Pdesignh	Pdesignc
Heat pump water/air used in heating-only mode with P ≤ 1 MW	Pdesignh = Pratedh	NA*
Heat pump or air conditioner air/air reversible or not with 12 kW < P ≤ 1 MW (Regulation n°2016/2281)	Pdesignh = Pratedh	Pdesignc = Pratedc
Chiller (comfort chiller) air/water or water/water used in cooling-only mode with P ≤ 2 MW (Regulation n°2016/2281)	NA*	Pdesignc = Pratedc
Other case	Heating capacity	Cooling capacity

*NA = not applicable

- SCOP = seasonal coefficient of performance for heating according to EN 14825
- SEER = seasonal energy efficiency ratio for cooling according to EN 14825
- $t_{heating}$ = number of equivalent active mode hours of the device for heating
- $t_{cooling}$ = number of equivalent active mode hours of the device for cooling
- AEC = annual energy consumption of electricity for hot water for the declared according to the regulation n°811/2013 expressed in kWh
- RLT = reference life time of the device

When the manufacturers do not provide SCOP or SEER, they can be obtained from the provisions defined in the regulations in force. For example, for heat pump under regulation n°813/2013, the formula is the following:

SCOP ou SEER = $\frac{(seasonal\ ratio + 3) \times Pef}{100}$

This formula includes the influence of a regulation associated or not to the device (correction of +3% in case of regulation) and a factor corresponding to the conversion of the electricity in primary energy named “PEF” which the value is defined in the eco design regulation.

To calculate the energy consumption, the active mode duration by default are the followings:

Type of generators	t heating (h)	t cooling (h)
Heat pump or air conditioner, air/air P < 12 kW	1400	350
Heat pump or air conditioner, air/air P > or = 12 kW	1400	600
Heat pump or chiller, air/water	2066	600
Heat pump or air conditioner, water/air	1400	600
Heat pump or chiller, water/water	2066	600
VRF unit	1400	600

Any other use scenario used for the calculation must be justified in the LCA report and mentioned in the PEP.

3.5.4.2. Consideration of refrigerants during use stage

In the use stage, the following aspects relating to refrigerants will be taken into account:

- Momentary refrigerant leaks,
- Refilling the equipment with refrigerant,
- The treatment of refrigerants recovered after refilling the equipment.

3.5.4.2.1. *Momentary refrigerant leaks*

It is assumed that leakage of refrigerants during the use stage (E_{fu}) is equal to C_t multiplied by the average annual rate of leakage during the use stage (T_{fu}) multiplied by the reference lifetime, thus:

$$E_{fu} = C_t \times T_{fu} \times RLT$$

Since there is no standard calculation method or value for leakages available at the moment, the leakage rate used for the reference product (T_{fu}) is based on a default value of 2%.

The choice of a value for T_{fu} lower than the proposed default must be justified and documented in the supporting report.

3.5.4.2.2. *Refilling the equipment with refrigerant*

Counting the impacts related to refilling (partially or totally according to the nature of the refrigerant) the equipment includes the production of the new refrigerant to be inserted. The impacts associated with the operator's travel to refill the equipment are not taken into consideration (because they are already included in the classic maintenance trips described in Section 3.5.5 "Maintenance stage").

The refill threshold (S_r) is the ratio of refrigerant (expressed in %) below which we consider that the equipment can no longer operate properly.
By default, the refill threshold to be considered is 90% of the total load, whatever the equipment type.
If the refill threshold value used to analyse the reference product life cycle is different from that specified above for the category of product, it is necessary to:

- Justify and document the new refill threshold used in the LCA report,
- Indicate this in the PEP.

The number of refills, N, is calculated as follows:

$$N = \text{ENT SUP [RLT / n] with } n = 1 + \frac{1 - S_r}{T_{fu}}$$

According to the number of refills, the production of new refrigerant to be inserted is:

- In case of partial refill:

$$N \times (1\text{-}S_r) \times C_t$$

- In case of total refill:

$$N \text{ x } Ct$$

- In case of replacements with the recovered refrigerant and top-ups:

$$N \text{ x } Ct \text{ x } (1\text{-}(\varepsilon_r \text{ x } S_r))$$

The recovery efficiency ε_r does not vary according to the type of refrigerant. It is set to 90% by default.

The type of refill (partial or total) must be justified in the LCA report.

3.5.4.2.3. Treatment of refrigerants recovered after refills

The treatment of refrigerants after recovery on the working site includes:

1. Collection of refrigerant (transport),
2. Treatment of refrigerant
    - 2.1 Incineration without energy recovery
    - 2.2 Regeneration and incineration with energy recovery

Calculation method:

The impacts related to the treatment of refrigerants recovered after refill will be calculated as follows:

- For a partial refill or a replacement with the recovered refrigerant and top-up:
  ➔ No refrigerant to be treated
- In case of a total refill with new refrigerant
  ➔ The quantity of refrigerant to be treated during the use stage is equal to:

$$N \times \varepsilon_r \times S_r \times C_t$$

Thus,

- o The collection distance to be taken into account will be 1000 km in a truck by default for the total refrigerant quantity (recovered or not).
- o The quantity of refrigerant incinerated (without energy recovery) is calculated as follows:
    1. $100\% \times N \times \varepsilon_r \times S_r \times C_t$ for CFCs
    2. $10\% \times N \times \varepsilon_r \times S_r \times C_t$ for other types of refrigerant
- o The quantity of refrigerant recovered (regeneration or incineration with energy recovery) is calculated as follows:
    1. 0% for CFCs,
    2. $90\% * N * \varepsilon_r * S_r * C_t$ for other types of refrigerant

Concerning refrigerant regeneration or incineration with energy recovery, only transportation to the treatment site is counted, in accordance with the stock method.

If the scenario used to analyse the reference product life cycle is different from that specified above for the product category, it is necessary to:

- Justify and document the usage scenario used in the LCA report,
- Indicate the usage scenario used in the PEP.

3.5.4.3. Inclusion of water consumption

If the equipment needs water in order to function, the quantity of water consumed must be entered in the PEP, taking into account the type of water and the type of circulation.

- Only consumption of pre-treated water (mains water, demineralised water, etc.) should be considered, along with any additional treatments (e.g. brine, etc.)
  - In the case of circulation of pre-treated water in an open loop, the quantity of water consumed must be calculated (e.g. atomisers on the chillers). Pre-discharge treatments must also be taken into account. The chosen calculation method must be documented in the LCA report.
  - In the case of circulation of pre-treated water in a closed loop, the quantity of water consumed throughout the equipment life cycle is equivalent to the volume of the equipment's water circuit plus any top-ups due to evaporation over the reference lifetime.
- Because the consumption of water taken up and discharged directly in the same medium does not change the average temperature of the source, the effects are considered to be negligible, so not modelled.

3.5.5. Maintenance stage

Any maintenance scenario different from those presented below must be justified and documented in the LCA report, and must be mentioned in the PEP.

3.5.5.1. Mandatory inspection

Maintenance operations are performed by a professional during a mandatory inspection. The inspection frequency must be specified at least in the LCA report. By default, the transportation shall be equal to a 100-km return trip in a van.

In particular, manufacturers may apply the scenarios of European regulation No. 517/2014 ("F'Gas") to specify the frequency of maintenance operations for equipment containing fluorinated coolants (HFC type), or any other appropriate regulations.

3.5.5.2. Inclusion of maintenance part

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

By default, one replacement of the tank's protective anodes shall be allowed for during the product's lifetime, as well as one service call every two years. If the device is equipped with one or more active anodes or a permanent anti-corrosion system, no replacement needs to be allowed for during the reference lifetime.

The treatment of replaced components as waste must be modelled according to the assumptions of the end-of-life stage (see Section 3.5.6 "End-of-life stage").

3.5.5.3. Inclusion of oil changes-out

When oil changes are necessary, the oil change frequency specified by the manufacturer of the subassembly concerned is taken into consideration, combined with the impacts related to the production of the new oil and the impacts related to the disposal of the used oil. For this aspect, all the oil is considered to be treated (50% regeneration, 50% incineration with energy recovery).
Oil changes are considered to be carried out during a mandatory inspection, so that no additional transportation needs to be counted.

3.5.5.4. Inclusion of refrigerant changes-out

To take refrigerant changes into account, refer to Section 3.5.4.2, "Consideration of refrigerants during use stage".

3.5.6. End-of-life stage

Equipment that has reached the end of its life could need two types of treatment, described below:

- Special treatment for the bare product, drained of all oil or other refrigerants
- Special treatment for the liquids (refrigerant, oil, and water).

3.5.6.1. Treatment of waste generated during the end-of-life stage

Within the European Union, waste from thermodynamic generators is classed as WEEE (Waste from Electrical and Electronic Equipment).

After presenting the local requirements for managing end-of-life thermodynamic generators, the LCA report will explain the organisation of known disposal and/or recovery systems, the associated environmental impacts and how the manufacturer shall meet 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 Directive 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 in accordance with the stock method.

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

On the mass of the **bare drained product**	1st case: recovery of at least 80% (of which 75% is recycling / reuse)[5]	Case 2: recovery of less than 80% (75% of which is to be recycled / reused)[2]	Case 3: No evidence of recovery[2]	Case 4: equipment not covered by the WEEE
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.

3.5.6.2. Treatment of refrigerants in the end-of-life stage

3.5.6.2.1. Treatment of refrigerants

There is a two-stage process for the end of life stage for refrigerants:

1. Recovery of refrigerant on the working site, and treatment of the refrigerant.
    - 1.1 Collection of refrigerant (transport),
    - 1.2 Treatment of refrigerant
        - a) Incineration without energy recovery
        - b) Regeneration and incineration with energy recovery
2. Treatment of equipment at end of life
    - 2.1 Direct leakages of non-recovered refrigerant.

When recovering the equipment at the working site, the quantity of refrigerant collected is calculated as follows: C_t x S_r. The default transport distance considered for collection of the refrigerants will be 1000 km.

The impacts related to the regeneration of refrigerant or its incineration with energy recovery will not be taken into account in accordance with the stock method.

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

The quantity of refrigerant incinerated (without energy recovery) is calculated as follows:

- 100% x $\varepsilon_r \times C_t$ for CFCs
- 10% x $\varepsilon_r \times C_t$ for other types of refrigerant

The quantity of refrigerant recovered (regeneration or incineration with energy recovery) is calculated as follows:

- 0% for CFCs,
- $90\% * \varepsilon_r * C_t$ for other types of refrigerant

During treatment of the equipment, a quantity equal to (1 - ε_r) x C_t will be considered as being discharged directly into the air when the equipment is crushed.

If the scenario used to analyse the reference product life cycle is different from that specified above for the category of product, it is necessary to:

- Justify and document the end of life scenario used in the LCA report,
- Indicate the end of life scenario used in the PEP.

3.5.6.2.2. Treatment of oils

All the oil is considered to be treated (50% regeneration, 50% incineration with energy recovery), so only the impacts related to transportation to the treatment site are taken into account.
Oil changes are considered to be carried out during a mandatory inspection, so that no additional transportation needs to be counted.

By sector-based agreement, the transportation shall be equal to a 100-km return trip in a van.

3.5.6.2.3. Treatment of water

For the treatment of water, we consider a treatment process for industrial waste water.

3.6. Rules for extrapolation to a homogeneous environmental family

These rules are additional to section "Rule(s) for extrapolation to a homogeneous environmental family" of the PCR (PEP-PCR-ed3-EN- 2015 04 02).

The following paragraphs detail the conditions of belonging to a homogeneous environmental family and the extrapolation rules applicable to each stage of the life cycle.

To use these extrapolation rules, the manufacturer must justify in the LCA report that the range of products covered by the PEP fulfill all the conditions presented in the paragraph 3.6.1. The use of any other extrapolation rule and/or definition of environmental homogeneous family shall be justified in the LCA report.

3.6.1. Definition of a homogeneous environmental family

It is accepted that the PEP covers products different from the reference product. These other products may be named (commercial references) in the PEP and in the LCA file, if they belong to the same homogeneous environmental family as the reference product.
A homogeneous environmental family means a group of products satisfying the following characteristics:

- Same function
- Same product standard
- Same manufacturing technology: same type of materials and same manufacturing processes

3.6.2. Application of extrapolation rules

If the conditions to belong to a homogeneous environmental family as defined in the paragraph 3.6.1 are satisfied, the extrapolation rules to be applied for each stage of the life cycle are those given in the paragraphs from 3.6.3 to 3.6.8. These rules are applicable at the product level (or declared unit). The extrapolation coefficients calculation at the functional unit level shall take into account the instructions of the paragraph 3.6.3 to 3.6.8 which use the following formula:

$$Extrapolation\ coefficient\ at\ the\ product\ level \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$$

The capacity to take into account is defined in the paragraph 3.10.

NOTE - The application of the extrapolation rules generates strong variations on the ODP indicator, the use of modeling from primary data is recommended if the manufacturer wishes to obtain more representative values for this indicator.

3.6.3. Extrapolation rule applied to manufacturing stage

The environmental impacts generated during the manufacturing stage are directly correlated to the total mass of the thermodynamic generator including its packaging.

For the manufacturing stage, the extrapolation rule to be applied to the reference product to evaluate the impact of any other thermodynamic generator within the same product family is the following one:

Coefficient at the declared product level (or declared unit level)	$\left(\frac{Mass\ of\ the\ product\ considered + Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ reference\ product + Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right)$
Coefficient at the functional unit level	$\left(\frac{Mass\ of\ the\ product\ considered + Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ reference\ product + Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$

3.6.4. Extrapolation rule applied to distribution stage

The environmental impacts generated during the distribution stage are directly correlated to the total mass of the thermodynamic generator including its packaging.

For the distribution stage, the extrapolation rule to be applied to the reference product to evaluate the impact of any other thermodynamic generator within the same product family is the following one:

Coefficient at the declared product level (or declared unit level)	$\left(\frac{Mass\ of\ the\ product\ considered + Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ reference\ product + Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right)$
Coefficient at the functional unit level	$\left(\frac{Mass\ of\ the\ product\ considered + Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ reference\ product + Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$

3.6.5. Extrapolation rule applied to installation stage

The environmental impacts generated during the installation stage are directly correlated to the total mass of the packaging of the thermodynamic generator.

For the installation stage, the extrapolation rule to be applied to the reference product to evaluate the impact of any other thermodynamic generator within the same product family is the following one:

Coefficient at the declared product level (or declared unit level)	$\left(\frac{Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right)$
Coefficient at the functional unit level	$\left(\frac{Mass\ of\ packaging\ of\ the\ product\ considered\ (kg)}{Mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$

3.6.6. Extrapolation rule applied to use stage (excluding maintenance)

The environmental impacts generated during the use stage (excluding maintenance) are directly correlated to the total energy consumption of the thermodynamic generator.

For the use stage (excluding maintenance), the extrapolation rule to be applied to the reference product to evaluate the impact of any other thermodynamic generator within the same product family is the following one:

Coefficient at the declared product level (or declared unit level)	$\left(\frac{Total\ energy\ consumption\ of\ the\ product\ considered\ (kWh)}{Total\ energy\ consumption\ of\ the\ reference\ product\ (kWh)}\right)$
Coefficient at the functional unit level	$\left(\frac{Total\ energy\ consumption\ of\ the\ product\ considered\ (kWh)}{Total\ energy\ consumption\ of\ the\ reference\ product\ (kWh)}\right) \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$

3.6.7. Extrapolation rule applied to 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 capacity from the same range.

3.6.8. Rules of extrapolation applied to end of life stage

The environmental impacts generated during the end of life stage are directly correlated to the total mass of the thermodynamic generator.

For the end of life stage, the extrapolation rule to be applied to the reference product to evaluate the impact of any other thermodynamic generator within the same product family is the following one:

Coefficient at the declared product level (or declared unit level)	$\left(\frac{Mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{Mass\ of\ the\ reference\ product, excluding\ packaging\ (kg)}\right)$
Coefficient at the functional unit level	$\left(\frac{Mass\ of\ the\ product\ considered, excluding\ packaging\ (kg)}{Mass\ of\ the\ reference\ product, excluding\ packaging\ (kg)}\right) \times \left(\frac{Capacity\ of\ the\ reference\ product}{Capacity\ of\ the\ product\ considered}\right)$

3.7. Rules applying to joint environmental declarations

These rules are complementary to PCR section "Rules applying to joint environmental declarations" (PEP-PCR-ed3-FR- 2015 04 02).

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 "Requirements for the collection of primary data" and "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 regard 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 justified in the LCA report and in the PEP.

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

This information is not always available to manufacturers of thermodynamic generators with electric compression: for lack of primary data, secondary data, i.e. data obtained from the life cycle assessment software database shall be used. PCR explains how to select the LCI modules. If the transportation information is not available, the data defined in section "Transport scenarios" of the current PCR will be used.

3.9. Data quality evaluation

The specific rules specified in the section "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:

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

- For on-reversible heat (or cold) production devices:
  - Use in heating-only mode and/or mixed mode with domestic hot water production:

Capacity of reference product = P_h of reference product

- Use in cooling mode only:

Capacity of reference product = P_c of reference product

- For reversible heat and cold and/or mixed equipment with domestic hot water production:

Capacity of reference product = P_{rev}

With:

- P_h or P_c = capacity of the equipment defined according to the European eco design regulation or European standards in force :

Type	P_h	P_c
Heat pump air/water or water/water used in heating-only mode with P ≤ 400 kW (Regulation n°813/2013)	Pratedh	NA*
Heat pump or air conditioner air/air reversible or not with P ≤ 12 kW (Regulation n°206/2012)	Pdesignh	Pdesignc
Heat pump water/air used in heating-only mode with P ≤ 1 MW	Pdesignh = Pratedh	NA*
Heat pump or air conditioner air/air reversible or not with 12 kW < P ≤ 1 MW (Regulation n°2016/2281)	Pdesignh = Pratedh	Pdesignc = Pratedc
Chiller (comfort chiller) air/water or water/water used in cooling-only mode with P ≤ 2 MW (Regulation n°2016/2281)	NA*	Pdesignc = Pratedc
Other case	Heating capacity	Cooling capacity

*NA = not applicable

- P_{rev} = rated load of the device in cold and hot modes, with respect to the operating time in each of the modes expressed in kW and defined by the following formula:

$$P_{rev} = (t_{heating} * P_h + t_{cooling} * P_c)/(t_{heating} + t_{cooling})$$

4. Drafting of the Product Environmental Profile

4.1. General information

These rules are additional to the section "General information" of the current PCR.

The PEP must include:

- The product category and characteristics to be declared according to Section 2.1.
- The processes, components and energies counted in the installation stage according to Section 3.2.3
- The use profile considered in the use stage according to sections 3.5.4.1.1 and 3.5.4.1.2
- The volume of the tank for a system with production of domestic hot water

- The value of the refrigerant refill threshold during the use stage if different from the default value given in Section 3.5.5.2.2
- The quantity of water consumed in the use stage according to Section 3.5.5.3
- Any change in the default scenario as defined in Section 3.5
- For a PEP covering several products, the extrapolation coefficients as defined in paragraph 3.6.

4.2. Constituent materials

The rules specified in the section "Constituent materials" of the current PCR apply (PEP-PCR-ed3-EN- 2015 04 02).

4.3. Additional environmental information

These specific rules are additional to section 4.3 "Additional environmental information" of the PCR (PEP-PCR-ed3-EN- 2015 04 02).

In the context of performing Life Cycle Analyses on a building-wide level, 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 included in the PEP, to ensure clarity and transparency for the user:
  - For environmental impacts expressed per functional unit, the following wording must be included: "per kW corresponding to the functional unit"
  - For environmental impacts expressed per declared product, the following wording must be 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 3.5.7)				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 of the functional unit, i.e. the production of 1 kW of heating and/or 1 kW of cold and/or of domestic hot water.

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 heating and/or cooling required by the installation.

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 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 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, 1 kW of heating and domestic hot water production, 1 kW of heating or cooling and domestic hot water production.
** to be specified according to the functions performed by the equipment: cooling, heating and 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, 1 kW of heating and domestic hot water production, 1 kW of heating or cooling and domestic hot water production.

5. Appendices

5.1. Glossary

AEC	Annual electricity consumption in domestic hot water production mode for the chosen draw-off profile
C_i	Quantity of refrigerant introduced during installation stage
C_n	Rated load equivalent to the quantity of refrigerant added during manufacturing stage
C_t	Total load in the equipment when operating
EEE	Electrical and Electronic Equipment
E_{fi}	Momentary leakage in installation stage
E_{fp}	Momentary leakage during production stage at assembly site
E_{fu}	Momentary leakage in use stage
ε_r	Efficiency of recovery
EN	European standard
kg	Kilogram
kWh	Kilowatt hour
LCA	Life cycle analysis
LCI	Life cycle inventory
N	Number of refills during reference lifetime
PCR	Product category rules
$P_{design\ c}$	Rated cooling capacity according to EN 14825
$P_{design\ h}$	Rated heating capacity according to EN 14825
PEP	Product environmental profile

Primary data	Actual data measured by the manufacturer or supplier
PSR	Product specific rules
RLT	Reference lifetime
SCOP	Seasonal performance coefficient
Secondary data	Generic data from a database or according to sector-based agreement
SEER	Seasonal cooling capacity
S_r	Refill threshold
$t_{cooling}$	Number of equivalent annual operating hours of the device in cold production
T_{fp}	Rate of leakage at assembly site
T_{fu}	Rate of leakage in use stage
$t_{heating}$	Number of equivalent annual operating hours of the device in heat production
Wh	Watt hour

5.2. References

Chapter	Subject	Source
3.1 Functional unit and reference flow description 3.5.4 Use stage	EN 14825	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 (September 2013).
3.5.3.1 Momentary leakage of refrigerants during installation stage	Regulation (EU) 1516/2007	REGULATION (EC) No 1516/2007 OF THE COMMISSION dated 19 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases.
3.5.4 Use stage	Regulation (EU) No. 813/2013	REGULATION (EU) No. 813/2013 of the Commission dated 2 August 2013 in application of Directive 2009/125/EC of the European Parliament and the Council concerning the ecodesign requirements for space heaters and combination heaters (Text with EEA relevance).
3.5.5 Maintenance stage	F-Gas	European Regulation No. 517/2014 concerning certain fluorinated greenhouse gases
4.3 Additional environmental information	EN 15804	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

5.3. Declaration of conformity

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Programme PEP Ecopassport®
Attestation de revue critique des règles additionnelles sectorielles pour les générateurs thermodynamiques à compression électrique assurant le chauffage et/ou le refroidissement des locaux

Document revu : PSR0013 – règles spécifiques aux générateurs thermodynamiques à compression électrique assurant le chauffage et/ou le refroidissement des locaux et/ou la production d'eau chaude sanitaire, version du 19/12/2017
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 générateurs thermodynamiques.

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 :
La recommandation d'une méthode de calcul plus précise pour évaluer les impacts déclarés des équipements réversibles n'a pas été retenue. Cependant, la différence entre les méthodes étant minime, le calcul retenu est jugé acceptable. Les règles d'extrapolation n'ont pas non plus été retenues; il est donc de la responsabilité de l'auteur de l'étude d'élaborer des règles d'extrapolation applicables d'ici la mise à jour du PCR.
Le document revu ne présente pas de non-conformité avec les référentiels précités. Par conséquent le PSR relatif aux générateurs thermodynamiques est conforme aux exigences de ces référentiels.

Jean Baptiste Puyou	Tim Osmond
Président Directeur Général EVEA	Vérificateur PEP Ecopassport® EVEA

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Attestation de revue critique des « REGLES SPECIFIQUES AUX GENERATEURS THERMODYNAMIQUES » - Extension aux règles d'extrapolation

Chargée de revue critique : Julie ORGELET

Document revu : PSR – Règles spécifiques aux générateurs thermodynamiques

Version et date : PSR-0013-Ed2-FR-2019

Période de revue : Octobre/Novembre 2019

Etabli par : Uniclima

Référentiel de revue :

L'objectif de la revue critique est de vérifier la conformité des compléments apportés au document, à savoir :

- Ajout des règles d'extrapolation
- Correction de la formule de prise en compte des fluides en fin de vie
- Correction de l'expression des puissances
- Corrections mineures

avec les référentiels ci-dessous :

- Les règles par catégorie de produits du Programme PEP ecopassport® - PSR-0013-Ed2-FR-2019, disponible sur www.pep-ecopassport.org
- Les normes NF EN ISO 14020-2002 et NF EN ISO 14 025-2010
- Les normes NF EN ISO 14040-2006 et 14 044-2006

Conclusion :

Le document revu ne présente pas de non-conformité avec les référentiels précités. Par conséquent le PSR relatif aux générateurs thermodynamiques est conforme aux exigences de ces référentiels.

Julie ORGELET - DDemain

Expert ACV indépendant

Le 21/11/2019