PEP ecopassport® PROGRAM

PSR

SPECIFIC RULES FOR INDIVIDUAL, STANDALONE DEVICES FOR PRODUCTION OF STORED DOMESTIC HOT WATER ONLY:

PSR-0004-ed3.0-EN-2018 02 09
According to PSR-modele-ed1-EN-2015 03 20

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 individual and standalone devices for exclusive production of accumulated domestic hot water. 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 individual and standalone devices for exclusive production of accumulated domestic hot water market.

PEP eco PASS PORT®	www.pep-ecopassport.org
PSR reference	PSR-0004-ed3.0-EN-2018 02 09
Critical review	The third-party critical review was conducted by [name of company responsible for the critical review panel] 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-ed4.1-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 individual and standalone devices for exclusive production of accumulated domestic hot water 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 individual, standalone devices for exclusive production for stored domestic hot water with a common base from which to work when producing their product life cycle analyses. it describes the various individual, standalone technologies for production of stored domestic hot water.

2.1. Description of the product families concerned

The product family concerned is designated by the following terminology: an "individual, standalone device for production of stored domestic hot water only", corresponding to a product with the following elements:

- a tank,
- one or more of auxiliary energy units (exchangers, resistances, etc.),
- one or more control units,
- one or more sensor components built-in (probes, anode, etc.),

and if applicable:

- a base, and/or wall fixings, and/or tripod,
- solar sensors and accessories needed,
- a heat pump and accessories needed,
- one or more electrical resistances.

The study does not cover:

- Devices with a storage volume under 50 litres,
- devices with a storage volume of 400 litres or more,
- devices providing both domestic hot water and ensuring the heating function,
- storage units for domestic hot water that do not include a direct energy input,
- solar water heaters with a burner built into the cylinder.

2.1.1. Electrically powered, individual, standalone device for production of stored domestic hot water only

May be called, electrically powered, individual, standalone device for production of stored domestic hot water only:
"Device intended to heat water in an insulated tank fitted with at least one water temperature thermostat control, and an electrical resistance for heating water".

2.1.2. Solar-powered, individual, standalone device for production of stored domestic hot water only

May be called solar-powered, individual, standalone device for production of stored domestic hot water only:
"Individual solar-powered water-heater with forced circulation and separate elements with or without built-in auxiliary energy input in the storage tank. The solar heater consists of:

- one or more solar heaters (independent or built into the roof, on the terrace or the porch roof),
- a hot water storage cylinder with heat exchanger, called "solar cylinder", linked to sensor with heat-insulated piping,
- safety and control equipment.

2.1.3. Thermo-cycle individual, standalone device for production of stored domestic hot water only

Any individual, standalone device for production of stored domestic hot water only may be called thermocycle:
"Stored domestic hot water production device:

- Whose compressor is driven by an electric motor,
- fitted with a regulating thermostat,
- providing domestic hot water, but not the room heating function,
- providing ventilation for the dwelling, in addition to the production of stored domestic hot water,
- designed and supplied as a unit, or which could be linked to a heat exchanger and storage cylinder which could be fitted with an auxiliary electrical or hydraulic system. "

The following thermo-dynamic water heating technology is involved:

- **extracted air**

The heat pump uses heat energy from the air in the dwelling.
This system also provides continual, general ventilation for the dwelling as specified in orders of 24 March 1982 and 28 October 1983.

- **outside air:**

The heat pump uses heat energy from outside air. These may or may not be monobloc systems, with the evaporator fitted with frost-free or de-icing devices.

- **unheated ambient air:**

The heat pump uses unheated ambient air from a room outside the heated space (cellar, garage, etc.). These may or may not be monobloc systems, with the evaporator fitted with frost-free or de-icing devices.

- **water and brine geothermal sensor:**

the heat pump uses heat energy from a network of underground sensors containing brine. In a groundwater system, the evaporator must have a minimum flow safety device.

- **direct expansion geothermal sensor:**

The heat pump uses ground heat energy from an underground direct expansion sensor which acts as evaporator.

These combined technologies are acceptable and are covered by these particular rules, to be justified in the supporting report.

2.1.4. Gas-powered, individual, standalone device for production of stored domestic hot water only

A gas-powered individual, standalone device for production of stored domestic hot water only is:
"A hot water production storage device for domestic use, using gas fuel to heat and store a quantity of water held in a tank at a preset temperature with the heat source placed inside the tank".

2.1.5. Mixed energy, individual, standalone device for production of stored domestic hot water only

The various power sources for an individual, standalone device for production of stored domestic hot water only described in section 2 - Scope - of these specific rules, can be combined.

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

Specific rules for individual, standalone devices for production of stored domestic hot water only will cover any technological advances, once a request has been made to the P.E.P. Association to include them in the specific rules mentioned above, which will then give a decision on the new technology described and the evidence provided of the claimed performances.

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.

3.1.1. Functional unit

The functional unit is defined below:

"Produce 1 litre of stored domestic hot water at a temperature at 40°C equivalent according to the reference use scenario and with a product reference lifetime of 17 years"

3.1.2. Reference product and reference flow description

The study is carried out:

- on an individual, standalone device for production of stored domestic hot water only,
- for a reference lifetime of 17 years,
- whose energy consumption in use is expressed in kWh final energy per litre according to the use scenario in section 3.5.4.2 – Energy consumption of active components (family 2) - in these specific rules.

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 study is performed on a device equipped with a 200-litre capacity tank, or the product with the nearest volume to that.

3.2. System boundaries

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

The domestic system, and any other modification to the structure needed for the individual, standalone device for production of stored domestic hot water only to operate are not included in the scope of this study (examples: washbasin, taps, cupboard, etc.).

3.2.1. Consideration of refrigerant fluids for individual and standalone thermo-cycle devices for exclusive production of stored domestic hot water

The coolant fluids must be considered at each stage of the life cycle as described in Section 2.5 of the present document.

Rating:

$C_t = C_n + C_i$, total load in the equipment when operating

C_n, rated load equivalent to the quantity of fluid added during manufacturing stage

C_i, quantity of fluid introduced during installation stage

E_{fp}, leakage during production stage at assembly site

T_{fp}, rate of leakage at assembly site

E_{fi}, leakage in installation stage

E_{fu}, leakage in use stage

T_{fu}, rate of leakage in use stage

S_r, refill threshold.

N, Number of refills during reference lifetime

εr : efficiency of recovery. By default, ε_r = 90%

3.3. Cut-off criteria

The specific rules specified in the 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.

3.5. Development of scenarios (default scenarios)

3.5.1. Manufacturing stage

An individual, standalone device for production of stored domestic hot water only consists 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. 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 will specify how the manufacturer, or anyone working on its behalf or account, should follow these stages identifying hazardous manufacturing waste from non-hazardous manufacturing waste, and ensuring the provide evidence of their statements.

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, the treatment process shall be calculated by default as follows:

- Mass of raw product x 0.30 = 50% of incinerated waste (without waste-to-energy recovery) and 50% of buried waste.

When the worst performer value is used by default, no waste-to-energy recovery will 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.

3.5.1.2. Consideration of impact of coolant fluid during manufacturing stage

Leaks of fluids 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".

By default, the value of T_{fp} will be 2%.

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

3.5.2. Distribution stage

The distribution stage must be analysed in accordance with the section 2.5.3 "Transport scenario" of the PCR in force.

3.5.3. Installation stage

The installation stage includes any procedure, component, power or any consumption and/or emission required to install an individual, standalone device for production of stored domestic hot water only.

The components of the individual, standalone device for production of stored domestic hot water only already considered in the analysis of the device's life cycle in the manufacturing stage, and delivered by the manufacturer have not been analysed in the installation stage.

Elements not considered in analysing the life cycle during the manufacturing stage, whether or not delivered by the manufacturer, but needed for operation of the individual, standalone device for production of stored domestic hot water only, must be described and listed in the installation stage life cycle and specified in the supporting report.

The following minimum list of components is needed for operation of the individual, standalone device for production of stored domestic hot water only, depending on their energy source:

- Safety unit in accordance with the DTU
- For electrically powered, individual, standalone device for production of stored domestic hot water only:
  - No component needs be included.
- For solar-powered, individual, standalone device for production of stored domestic hot water only:
  - heat-transfer fluid,
  - primary flexible pipes,

    - sensor fixing assembly,
    - circulation pump (where applicable).
- For thermo-cycle, individual, standalone device for production of stored domestic hot water only:
    - coolant fluid (as applicable),
    - coolant link (as applicable),
    - installation fittings for outdoor unit (as applicable),
    - air duct connections (as applicable),
    - circulation pumps (where applicable),
    - flexible water hoses (heat source).
- For gas-powered, individual, standalone device for production of stored domestic hot water only:
    - fume extractor kit
    - venting kit (as applicable)
    - electrical kit (as applicable)

3.5.3.1. Waste generated during the installation phase

Packaging waste from individual, standalone devices for production of stored domestic hot water only produced during the installation stage comes under the category of non-hazardous waste and is removed, in principle, by the installer, once the individual, standalone devices for production of stored domestic hot water only has been installed.

Its removal 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%

[2] Extract from the ADEME "Industrial, commercial and household packaging" report, 2008, and the "Recycling report 1999-2008: Materials and recycling itemised by sector", 2010, in particular pages 102 & 113

Any other packaging material must be considered as buried.

plastic film, strapping, packing notes, labels or any other paper present on or in the packaging of the individual, standalone devices for production of stored domestic hot water only are considered as negligible and are not included in the life cycle analysis for packaging waste, as long as these parts form less than 50% of the total mass of packaging.

The transport stage for this waste must be taken into account assuming a journey by lorry of 100 km.

3.5.3.2. Consideration of impact of coolant fluid during installation stage

Let C_i be the quantity of coolant fluid 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 coolant fluid leaks during the installation stage E_{fi} are considered as zero.

3.5.4. Use stage

The use stage of the individual, standalone device for production of stored domestic hot water only includes, once the component is installed:

- energy consumption,
- energy transformed to domestic hot water,
- functions for optimising energy consumption,
- water loss, linked to expansion in the safety unit,
- use of coolant fluid for thermo-cycle individual, standalone devices for production of stored domestic hot water only,
- consumption of heat-transfer fluid for solar-powered, individual, standalone devices for production of stored domestic hot water only,

Energy consumption of an individual, standalone device for production of stored domestic hot water only is expressed in kWh of final energy per litre, as specified for the reference product study, described in section 3.1.2 – Reference flow description – of these specific rules, using the component families identified below.

	Family 1	**Family 2**
Definition	Components not consuming energy during use stage	Components consuming energy during the use stage
Rules for calculating consumption	100% use rate	See section 3.3.4.2
Examples of components	Wall mounting, base unit, tripod, tank, solar sensors, sleeving, connectors, exchangers, etc.	Resistances, controllers, circulation pumps, heat pump, solar plant, etc.
Duration of use	Reference lifetime 17 years	

3.5.4.1. Energy consumption of components from family 1

There is no energy consumption in the use stage for this component family, which includes wall mountings, base unit, tripod, solar sensors, etc.

3.5.4.2. Energy consumption of components from family 2

The following formula is used to calculate final energy consumption for an individual, standalone device for production of stored domestic hot water only, to heat 1 litre of domestic hot water stored at 40°C:

$$C = [(Be + D)*F]$$

$$= \Big[[(1 * (TUE - TEE) * (1.163 / 1000)) / R]* [(1-(BA + 0.5 BM)] + [(Qpr / V) / R]* [1- (DA + 0.5 DM)] \Big] * (1-(BDA + 0.5 BDM))$$

Where:

Be: **Energy needs [kWh]**
= [[1 * (TUE - TEE) * (1.163 / 1000)] / R]

D: **Losses (kWh)**
= [(Qpr / V) / R]* [1- (DA + 0.5 DM)]

F: **Energy savings linked to needs AND to losses**
= (1-(BDA + 0.5 BDM))

C is the final energy consumption expressed to heat 1 litre of domestic water for the reference lifetime, expressed in kWh per litre, compliant with the functional unit as described in section 3.1.1 - Functional unit - of these specific rules.
This consumption by the individual, standalone device for production of stored domestic hot water only is defined by its power needs and losses generated by the device.
The following sections describe how to calculate each of the above elements.

For a solar domestic hot water production system, the final energy consumption, C, includes the consumption of energy supplied by the pump (electrical energy), by the back-up system (electrical energy or natural gas) and by the solar panel (solar energy), as expressed in the following formula: $C_{solar\ energy} = C * (1-1/R)$

The consumption of solar energy should be modelled with the elementary flow ELCD "Elementary flow/Resources/Resources from air/Renewable energy resources from air / Primary energy from solar energy".

3.5.4.2.1. <u>*Taking energy-saving functions into account*</u>

Some energy saving functions reduce the device's consumption and should be considered as follows:

	Energy saving functions linked to losses	**Energy savings linked to needs and to losses**
Energy saving functions that do not need predetermined action by consumer	"DA" type functions ***(Losses - Automatic)***	"BDA" type functions ***(Needs - losses - automatic)***
Energy saving functions that need predetermined action by consumer	"DM" type functions ***(Losses - Manual)***	Function type "BDM" ***(Needs - losses - manual)***

Bonus values associated with these energy-saving functions are normally based on the assumptions in section 5.4 - Justification of bonus values for energy saving functions - of these specific rules, while waiting for further studies.

These bonus values are normally proposed as follows, and described in detail in the following sections:

	Energy saving functions linked to losses	**Energy savings linked to needs and to losses**
Energy saving functions that do not need predetermined action by consumer	DA-1 = 4% DA-2 = 6%	BDA-1 = 13% BDA-2 = 0 to -8%. BDA-3 = 8%
Energy saving functions that need predetermined action by consumer	DM-1 = 4%	-

* Function BDA-2 penalised by its specific application, described in section 3.3.4.2.1.2 – [Be]: Calculation of energy needs - from these specific rules.

3.5.4.2.2. [Be]: Calculating energy needs:

[Be] (kWh) = Energy needs

= [[1 * (TUE - TEE) * (1.163 / 1000)] / R]

= (0.03489 / R)

1	Litre	Volume of domestic hot water from functional unit
TUE	°C	Hot water use temperature in degrees Celsius, according to the functional unit definition (=40°C)
TEE	°C	Standard temperature for cold water intake to tank as specified in EN 15316-4-3 for individual solar water heaters and EN 16 147 for thermo-cycle water heaters (=10°C).
1.163	Wh/L/°C	Thermal capacity of water: consumption needed to raise the temperature of 1 litre of water by 1°C.
R	-	Coefficient of power efficiency for INDIVIDUAL, standalone device for production of stored domestic hot water only.

For each of the technologies, the default value of this energy efficiency coefficient R is given, or else is determined by another certified value, as specified in the following table:

Type of individual, standalone device for production of stored domestic hot water only	Efficiency coefficient R (default value)	Energy efficiency coefficient R justified
Electrical power	1.00	- Not applicable -
Gas power	0.84 for all devices except for condensation 0.98 (on net calorific value)	- Certified performance, according to EN89 under European directive 2009/142/CE
Solar energy	2.00	Energy efficiency at factory temperature setting, certified by an independent laboratory, related to the category of products covered by this PSR*.
Thermodynamic energy	1.80	COP (Coefficient of Performance) value, justified according to EN 16 147 by an independent laboratory, related to the category of products covered by this PSR**.

* For solar energy, in the PEP you should specify the climate and the draw-off cycle used to calculate the coefficient R. Use the nominal volume of the tank, six hours after the solar zenith as defined in the EN 12976-2 standard.

** For a thermodynamic cycle, in the PEP you should specify the draw-off cycle used to calculate the coefficient R. For thermodynamic water heaters using extracted air, the flow rate used to determine the COP must be specified in the PEP. For thermodynamic water-heaters using ambient air, the test temperature is 15°C (without sleeving).

3.5.4.2.3. [D]: Calculating losses

[D] (kWh) = Losses
= [(Qpr / V) / R]* [1- (DA + 0.5 DM)]

Qpr [(1)]	kWh/24h	Cooling constant for individual, standalone devices for production of stored domestic hot water only: certified or default value equal to 3.02 except for gas water heaters, whose default value is 10.4.
V	Litres	Volume of tank
R	-	Coefficient of efficiency for individual, standalone device for production of stored domestic hot water only
DA [(2)]	%	Bonus values for energy saving functions linked to losses, needing no prior action by the consumer, as described below
DM [(2)]	%	Bonus values of energy saving functions linked to losses, needing prior action by the consumer, as described below
0.5	-	A weighting coefficient of 0.5 is applied to the percentage of the bonus for type "DM" functions, these energy saving functions necessarily implying specific behaviour on the part of the end user. - Coefficient assumed by convention, while awaiting further studies.

(1) Note on Qpr:

Without Qpr, the thermocycle individual, standalone devices for production of stored domestic hot water only have:

- a Pes value (reserve electrical power expressed in kW or W) certified by an independent laboratory linked to the category of products covered by this PSR.

The Pes of an individual, standalone device for production of stored domestic hot water only must then be corrected using the following formula so it can be compared to any other Qpr value:

If Pes is expressed in W: Qpr (kWh/24h) = (Pes X 24) / 1000
If Pes is expressed in kW: Qpr (kWh/24h) = Pes X 24

The Pes value used is that supplied with the reference COP value in the bleed-off cycle, according to EN 16147.

Example:
A thermo-cycle water-heater using ambient air uses the following Qpr value, for a Pes of 0.05 kW, resulting in a certified COP of 3.10:
Qpr = 0.05 * 24
Qpr = 1.2 kWh/24h

- giving a value K (or Cr - cooling constant - expressed in W/degree/litre/day)
  The K (or Cr) of an individual, standalone device for production of stored domestic hot water only must then be corrected using the following formula so it can be compared to any other Qpr value:

Qpr (kWh/24h) = [K (or Cr) / 1000)] * capacity * 45

Example:

A water-heater uses the following Qpr value, for a certified K of 0.25, for a device with a capacity of 200 litres:

Qpr = [0.25 /1000)] * 200 * 45

Qpr = 2.25 kWh/24h

(2) *Note on energy saving functions (Fd) type "DA" and "DM"*

DA-1 / DM-1: Definition of Vacation mode

Mode in which stored domestic hot water production is shut down for a period that can be specified as a specific number of days.

This function may be considered type "DA-1" if it is combined with a frost-free setting on the heating; the DA-1 and DM-1 bonuses cannot therefore be cumulative.

Vacation mode saves 4% energy, as shown in section 5.4 - Justification of energy saving functions bonus - in these specific rules.

DA-2: Definition of load shift

This system allows the cylinder water heater to be activated, in order to minimise static losses on the device. Load shifting saves 6% energy, as shown in section 5.4 - Justification of energy saving functions bonus - in these specific rules.

3.5.4.2.4. [F]: Calculation of energy saving functions linked to needs and to losses

[F] (kWh) = Energy savings linked to needs AND to losses
= (1-(BDA + 0.5 BDM))

BDA [1]	%	Bonus values of energy saving functions linked to losses, needing no prior action by the consumer, as described below
BDM [1]	%	Bonus values of energy saving functions linked to losses, needing prior action by the consumer, as described below
0.5	-	A weighting coefficient of 0.5 is applied to the percentage of the bonus for type "BDM" functions, these energy saving functions necessarily implying specific behaviour on the part of the end user. - Coefficient assumed by convention, while awaiting further studies.

(1) *Note on energy saving functions type "BDA" and "BDM"*

BDA-1: Definition of learning and automatic adjustment system for temperature setting

function for automatically adapting the temperature setting for the individual, standalone device for production of stored domestic hot water only as a function of the volume of hot water at 40°C actually consumed by users.

The learning and automatic adaptation system for the temperature setting saves 13% energy, as shown in section 5.4 - Justification of energy saving functions bonus - in these specific rules.

BDA-2: Definition of the operating range of the heat pump working on outside air

Temperature range within which the heat pump for the thermo-cycle individual, standalone device for production of stored domestic hot water only operates. Penalties are applied here according to the operating limits of the heat pump, expressed as a "negative bonus" (penalty).

Energy savings from the heat pump operating range depend on the particular features of each pump, according to manufacturer's recommendations.

% of energy savings (=PENALTY)

PAC operating limits depending on external temperature	Up to 30°	Between 31 and 34°	35° and upper
Down to 0°	-8%	-8%	-8%
Between -1° and -4°	-4%	-3%	-3%
-5° and lower	-1%	0%	0%

These savings are justified in section 5.4 - Justification of energy saving functions bonus - in these specific rules.

BDA-3: Definition of the electrical device incorporating a package of certified functionalities

Device with the following functionalities certified by an independent laboratory, related to the category of products covered by this PSR:

- a heating indicator, and
- certified static losses (Qpr), with:
    - o for horizontal models: Qpr < 0.675 + 0.0072 V
    - o for vertical models: Qpr <0.0198 +0.0513V2/3, and
- a value of V40 (electrically powered water heater) or Vmax (thermo-cycle water heater) > 1.75 Vn, and
- thermal load from the energy transmission unit to the stored water < 6W/m², and
- permanent anti-corrosion protection.

The device incorporating a package of certified functionalities saves 8% energy, as shown in section 5.4 - Justification of energy saving functions bonus - in these specific rules.

3.5.4.1. Consideration of impact of coolant fluid during use stage

Leakage of fluids during the use stage (E_{fu}) are equivalent to C_t multiplied by the average annual rate of leakage during the use stage (T_{fu}) multiplied by the reference lifetime (here “RLT”), thus:

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

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 defined by the manufacturer based on its experience and experimental values available. By default, the value of T_{fu} will be 2 %. The choice of a value for T_{fu} lower than the proposed default is justified and documented in the supporting report. In all cases this value is declared in the PEP.

3.5.5. Maintenance stage

Individual, standalone devices for production of stored domestic hot water only require maintenance
The average return trip distance covered by an operator is 100 km.
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 during the maintenance stage.
The replacement of parts due to malfunction will not be taken into account.

In the absence of accessible data, the devices require maintenance involving the following elements:

Energy type for individual, standalone device for production of stored domestic hot water only	**Number of maintenance services during reference lifetime**	**Nature of intervention on reference lifetime**
Electrical	1.7	1 protection anode on tank (unless active anode or a permanent anti-corrosion system installed)
Solar	8.5	1 solar sensor probe changed
		1 protection anode on tank (unless active anode or a permanent anti-corrosion system installed)
		2 fluid changes (brine)
Thermo-dynamic	8.5	1 protection anode on tank (unless active anode or a permanent anti-corrosion system installed)
Gas	8.5	1 protection anode on tank (unless active anode or a permanent anti-corrosion system installed)

Treatment of any other waste produced during installation and maintenance stages, essential to the proper working of the individual, standalone device for production of stored domestic hot water only, not specified in the above table must be considered and justified in the supporting report.

If a new product on the market requires maintenance or consumables other than those listed in the table above, these items will be included in the analysis.

3.5.5.1. Waste generated during the maintenance stage

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

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

This waste is described in detail in the following table, for each type of work :

Energy type for individual, standalone device for production of stored domestic hot water only	Nature of intervention on reference lifetime
Electrical	- *
Solar	1 solar sensor probe changed
	- *
	2 fluid changes (brine)
Thermo-dynamic	- *
Gas	- *

* The anodes replaced are not treated as waste generated in the maintenance stage since they are sacrificial components.

The end-of-life of these elements is then handled in 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 from individual, standalone devices for production of stored domestic hot water only comes into the WEEE category (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).

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	1st case: recovery of at least 80% (of which 75% is recycling / reuse)	2nd case: exploitation below 80% (of which 75% is recycling/reuse)	Case 3: No evidence of recovery
Percentage of product recycled at end of life	75%	40%	20%
Percentage of product recovered for energy production at end of life	5%	0%	20%
Percentage of product incinerated without recovery at end of life	10%	30%	30%
Percentage of product buried without recovery at end of life	10%	30%	30%

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. Consideration of impact of coolant fluid during use stage

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

- recovery of fluid on the working site, and processing :
  - collection of fluid (transport),
  - incineration without energy recovery,
  - regeneration.
- treatment of equipment at end of life:
  - direct leakages of non-recovered coolant fluid.

Only transport to treatment site will be considered in regeneration and incineration with energy recovery of fluid. The regenerated fluid will actually be identified as a secondary material, impacts linked to the regeneration process will therefore be allocated to the product in which it will be used.

Method of calculation:

When recovering fluid at the working site, the quantity of fluid collected is calculated as follows: $\varepsilon_r \times C_t$. The default transport distance considered will be 100 km.

The quantity of fluid incinerated is calculated as follows:

100% x $\varepsilon_r \times C_t$ for CFCS,

10% x $\varepsilon_r \times C_t$ for other types of coolant fluids.

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 usage scenario used in the supporting report,
- indicate the usage scenario used in the PEP.

3.6. Rules for extrapolation to a homogeneous family

These rules are additional to section "Rule(s) 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 products, environmental impact weighting factors are applied to all the 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 devices defined in section 3.1.2 “Reference product and reference flow description” of these specific rules, the calculation is performed on the device with the most similar characteristics.

When systems combine several technologies in a single device, the extrapolation rules can be adapted and must be justified for each stage of the life cycle. The extrapolation rules specific to those products shall be mentioned in the PEP and cover the whole product range under consideration.

3.6.1. Extrapolation rule applied during the manufacturing stage

The environmental impacts produced during the manufacturing stage are directly correlated to the mass of the tank of the product alone (excluding packaging).

For the manufacturing stage, the 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	$\left(\frac{Mass\ of\ the\ tank\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ tank\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (l)}{Volume\ of\ the\ product\ considered\ (l)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Mass\ of\ the\ tank\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ tank\ of\ the\ reference\ product\ (kg)}\right)$

Where:
Mass of the tank = mass of the tank of the product only (excluding packaging) in kg
Volume = volume of the tank of the product in litres

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

3.6.2. Extrapolation rule in distribution stage

The environmental impacts produced during the distribution stage are directly correlated to the total mass of the product and its 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	$\left(\frac{Total\ mass\ of\ product\ considered\ +\ Mass\ of\ packaging\ of\ product\ considered\ (kg)}{Total\ mass\ of\ reference\ product\ +\ Mass\ of\ packaging\ of\ reference\ product\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (l)}{Volume\ of\ the\ product\ considered\ (l)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Total\ mass\ of\ product\ considered\ +\ Mass\ of\ packaging\ of\ product\ considered\ (kg)}{Total\ mass\ of\ reference\ product\ +\ Mass\ of\ packaging\ of\ reference\ product\ (kg)}\right)$

Where:
Total mass = product mass (excluding packaging) in kg
Packaging mass = total mass of instruction manuals, plastic films, polystyrene, pallet, etc. in kg
Volume = volume of the tank of the product in litres

3.6.3. Extrapolation rule in installation stage

The installation stage includes only the end-of-life treatment of the packaging. The environmental impacts produced during the installation stage are directly correlated to the total mass of the product and its packaging.

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	$\left(\frac{Packaging\ mass\ of\ the\ product\ considered\ (kg)}{Packaging\ mass\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (l)}{Volume\ of\ the\ product\ considered\ (l)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Packaging\ mass\ of\ the\ product\ considered\ (kg)}{MPackaging\ mass\ of\ the\ reference\ product\ (kg)}\right)$

Where:
Packaging mass = total mass of instruction manuals, plastic films, polystyrene, pallet, etc. in kg
Volume = volume of the tank of the product in litres

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

The environmental impacts produced during the use stage are directly correlated to their consumption.

When drawing up a PEP valid for a full range of devices, the calculation rule to be used for any other volume in the same homogeneous family is as described in section .3.5.4.2 – Energy consumption of components for family 2 - of these specific rules.

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

Where:
C = Energy consumption of the product (in kWh) during the use stage throughout the lifetime of the product (see Section 3.4.5.2 of the present document)
Volume = volume of the tank of the product in litres

When calculating the environmental impact linked to the use stage, the PEP must specify efficiency coefficients "R" and cooling constants "Qpr" for each tank capacity covered by the PEP carried out for the product range.

3.6.5. Extrapolation rule applied during 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 volume from the same range.

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

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

For the end-of-life stage, the 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	$\left(\frac{Mass\ of\ the\ tank\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ tank\ of\ the\ reference\ product\ (kg)}\right) \times \left(\frac{Volume\ of\ the\ reference\ product\ (l)}{Volume\ of\ the\ product\ considered\ (l)}\right)$
Coefficient on the scale of the declared product (additional information)	$\left(\frac{Mass\ of\ the\ tank\ of\ the\ product\ considered\ (kg)}{Mass\ of\ the\ tank\ of\ the\ reference\ product\ (kg)}\right)$

Where:
Mass of the tank = mass of the tank of the product only (excluding packaging) in kg
Product volume = volume of the tank in litres

3.7. Rule(s) applying to joint environmental declarations

These rules are complementary to PCR section "Rules applying to joint environmental declarations" (PEP-PCR-ed3-EN-2015 04 02).
For joint environmental declarations, the study shall be conducted on a typical product, that shall be a 200 liters model, or the product closest to this level.

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 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 rules should be mentioned in the LCA report and in the PEP.

Where these 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.

This information is not always available to manufacturers of individual, standalone devices for production of stored domestic hot water only: for lack of primary data, standard secondary data, i.e. data obtained from the life cycle assessment software database shall be used. If no transport information is available, the information in the PCR section 2.5.3 – "Transport scenarios" will be used.

The proportion of primary and secondary data used in the life cycle analysis for individual, standalone device for production of stored domestic hot water only must be shown in the LCA report and may be included in the PEP under the section describing the environmental impacts, to supplement the information required in section 2.12 – Environmental impacts – of the PCR. This proportion will be determined with respect to the product mass.

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 the results of the environmental impacts are consistent between the functional unit (production of 1 litre of domestic hot water at 40°C) and reference product (200 litre system), the PEP must 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 litre) =
Environmental impacts of reference product / Number of litres produced

Where:

- Number of litres produced = actual average consumption corresponding to the volume of hot water ultimately consumed by users. This consumption is defined by the user's average daily consumption, the average number of users and the device's reference lifetime, or:

50 litres X 2.26 inhabitants X 365 days X 17 years' service life = 701,165 litres

If

Environmental impacts from the PEP (for 1 litre) =
Environmental impacts of reference product / 701 165

3.11. PEP update rule

Any PEP document recorded by the PEP association must be updated and re-registered when the individual, standalone devices for production of stored domestic hot water only to which it refers is modified, by an increase or reduction of more than 5% in:

- - mass,
- - new components,
- - its environmental indicators considered as important,
- - any other element considered as important,
- - material used.

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 sub-category and characteristics to be declared according to Section 2.1.
- The use profile considered in the use stage according to Section 3.5.4.2
- When extrapolation rules are used, the efficiency coefficients R and the cooling constants Qpr for each cylinder covered by the PEP created for the product range, in accordance with Section 3.6

4.2. Constituent materials

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

4.3. Additional environmental information

These specific rules are additional to the section "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 environmental impacts of the reference product expressed on the product (or declared product) scale instead of 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 3.5.6)				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 environmental impact table shows the functional unit's environmental impact, namely production of 1 litre of domestic hot water stored at 40°C.

The full impact of the device, installed in a real situation, can be calculated by the PEP user according to the reference use scenario or the user's own use scenario.

In addition, the following details must be completed and included in the PEP, to ensure clarity and transparency for the user:
This environmental declaration was drawn up on the basis of the production of 1 litre of domestic hot water stored at 40°C equivalent, for a device supplying a residence with 2.26 inhabitants at a daily consumption rate of 50 litres.
For a usage other than the reference scenario, the impacts of this declaration for the production, distribution, installation, and end-of-life stages must be multiplied by the following coefficient:

$$\frac{701165}{Daily\ consumption\ per\ user\ (L)\ x\ Number\ of\ inhabitants\ x\ 365\ x\ 17}$$

The actual impact of the life cycle of the installed product in a real situation must be calculated by the user of the declaration by multiplying the impact concerned by the total number of litres of water produced over 17 years according to the use scenario (701 165 litres for the reference scenario).

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 production of 1 litre of domestic hot water. 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	Degree Celsius
C	Final energy consumption
CE	European Community
CENELEC	European Committee for Electrotechnical Standardization
COP	Coefficient of performance
Cr	Cooling constant
EEE	Electrical and Electronic Equipment
EMC	Electro-Magnetic Compatibility
EN	European standards
EU	European Union
Final energy	Final energy is the energy supplied to the consumer for final use (petrol at the pump, electricity to the home, etc.) http://www.insee.fr/fr/methodes/default.asp?page=definitions/energie-finale.htm
IEC	International Electrotechnical Commission, IEC
Kg	Kilogram
KWh	Kilowatt hour

L	Litre
LCA	Life cycle analysis
LCI	Life cycle inventory
LCIE	Laboratoire central des industries électriques [Central Electrical Industry Laboratory - France]
NF	“Norme française” [French standard]
PAC	Heat pump
PCR	Product category rules
PEP	Product environmental profile
Pes	Reserve electrical power
PSR	Product specific rules
Qpr	Static losses
ROHS	Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
TEE	Water intake temperature
TUE	Water use temperature
UE	European Union
UTE	Technical Electricity Union
V	Volume (of cylinder)
V40 / Vmax	Hot water temperature 40°C (for electricaly powered water heater / thermo-cycle water heater)
VMC	Controlled mechanical ventilation
Vn	Rated volume
WEEE	Waste Electrical and Electronic Equipment.
Wh	Watt hour

5.2. References

PSR ref	Subject	Sources used
2	Definition of the various types of individual, standalone devices for production of stored domestic hot water only	Specification N° LCIE 103-14
		NF Individual solar-powered water heaters N° NF 441
		Order 13/05/2011 repealing and replacing the order of 29/07/2009 on approval of the request for heading V for inclusion of thermodynamic individual electrical domestic hot water heaters in the thermal regulations 2005.
		EN 26 and EN 89
3	Reference lifetime 17 years	Working group consensus, especially from data available from the energy saving certificates process, and from manufacturer feedback.
3.3.4.2	Water intake temperature at 10°C	specifications NF Cesi and EN 16 147
3.3.4.2	Definition of cooling constant value	Value of Qpr from specification N° LCIE 103-14: Category A, 200-litre, wall-mounted horizontal device
		EN12 977-3
3.3.4.2	Calculating energy needs:	Standards EN 15316-4-3 and 12976-2 for CESI Certified performance, according to EN89 under gas directive 2009/073

PSR ref	Subject	Sources used
3.3.4.2	Energy savings for a device incorporating a package of certified functionalities	Specification N° LCIE 103-14
3.3.4.3	Frequency of maintenance operations	The frequency of inspections and maintenance operations described meet the manufacturers' recommendations depending on the lifetime of some components and feedback as generally noted; as well as respect for mandatory regulation operations for maintenance / inspections
3.3.3.1	Packaging waste	Extract from ADEME report, "industrial, commercial and household packaging", 2008, and "recycling report 1999-2008: materials and recycling itemised by process", 2010, especially pages 102 & 113.
3.3.5	Recycling devices at the end of their life	Data assumed by convention, while awaiting further studies. If no data are accessible from the industry, we used the information available and especially the data from the Eco D3E study.
4	Incineration of coolant fluids	10% incineration = ratio from a study carried out by CETIM for the "thermodynamic generators" PSR
5.1	Average daily consumption of domestic hot water	http://www.promotelec.com/les-sources-de-consommation-d-energie/
5.2	Justification of bonus for learning and automatic adjustment system for temperature setting	ECS BBC agreement 2011
		Insee, Annual census surveys, 2004 to 2006, Population censuses from 1954 to 1999.
		Benchmark for sales of individual electric water-heaters on the French market. Internal document - Groupe Atlantic - 12/2011
		ERP study, lot 2
5.2	Justification for bonus linked to heat pump operating range	Order 13 May 2011 relating to approval of the request for heading V for inclusion of thermodynamic individual electrical domestic hot water heaters in the thermal regulations 2005: monthly average climate data from hourly meteorological data files for each climate zone, used in the Th-C-E method.
5.2	Justification for load shifting bonus	Definition of average power of an individual, standalone device for production of stored domestic hot water only: benchmark of main European manufacturers
5.2	Justification of bonus for the electrical device incorporating a package of certified functionalities	CSTB: Final evaluation report on the thermal performance of electric stored water heats, category C (December 2008)

PSR ref	Subject	Sources used
5.2	Justification of vacation mode bonus	Insee: Household market survey 1979, on-going survey on living conditions (2004).
All	Average transport distance	100 km = average default value, from manufacturer - working group feedback, already covered in other PSRs from similar industries (same distribution networks, recycling centres, etc.).

5.3. Justification of hypotheses for calculating reference flow

Reference flow as described in section 3.1.2 – Reference flow description – mentions average effective consumption figures, for calculating environmental impacts generated by the product analysed, in accordance with the functional unit.

The following data are used:
Average effective consumption: Average volume of hot water ultimately consumed by users. This consumption is defined by the user's average daily consumption, the average number of users and the device's reference lifetime, or:
50 litres X 2.26 inhabitants X 17 years' service life = 701,165 litres

Where:
- 50 litres = Average daily consumption of domestic water at 40°C per person (source: Promotelec)
- 2.26 inhabitants = average number of occupants per household

Repartition households / number of occupants					
1	**2**	**3**	**4**	**5**	**Average**
33%	33%	15%	13%	6%	**2,26**

Source: Insee, Annual census surveys, 2004 to 2006, Population census from 1954 to 1999.

- 17 years = reference lifetime, as described in section 3.1 – Functional unit and reference flow description – in these specific rules.

5.4. Justification of bonuses for energy-saving functions

The values of energy saving functions were calculated from a standardised use context.
All chosen scenarios try to be as representative as possible of the use observed in by users.

Type "x-**A**" functions are all those **automatic** energy saving functions that do not need the consumer to take any pre-determined action; and type "x-**M**" functions are all those **manual** energy saving functions that need the consumer to take a pre-determined action.
Consumption by individual, standalone devices for production of stored domestic hot water only with these functions will be deducted from this bonus, using the calculation rule in section 3.5.4.2 - Energy consumption of active components (family 2) - of these specific rules.

Any request for altering values noted in the specific rules applied to individual, standalone devices for production of stored domestic hot water only, made to the PEP association, must be accompanied by a technical dossier justifying the modification. The PEP association pronounces these requests according to the organisation's rules.

DA-1 or DM-1: Vacation mode

Energy savings produced by the Vacation mode come from an analysis of household holiday periods. Having no water heating when away provides energy savings.

Departure rate	64,60%
Average number of vacation per year	2,2
Average length of stay	11,8
Number of anticipated days for restart of operation	1
Number of days without operation	15,35
Number of days / year	365
Energy savings	**4%**

A day ahead of the user's return, the device resumes its operating cycle thus reducing risks associated with the legionella organism.

The bonus linked to this function cannot be added to that linked to the self-learning and automatic adaptation system for the temperature setting (BDA-1); the energy savings for this last function already include a Vacation mode.

Note: Although theoretically, switching off the device via the meter saves energy during a period of absence, this is strongly discouraged: the device should always be powered up, in order to prevent freezing and to avoid the risk of legionnaire's disease. The Vacation mode is designed to handle this, by acting as a firewall in the event of a problem, and also by restarting the heating a day before the user returns.

DA-2: Load shifting

This system means that the cylinder can be heated mainly at night, to reduce the period during which it is at the preset temperature.

By moving the heating of the device to the end of the night-time period, it will reach the set temperature at the same time as the water is needed for use. Moving the load thus reduces losses associated with heat wastage, since without this system, there is static wastage on the system as the heating shuts down.

Reference cylinder's volume (litres)	200
Heat capacity of water (Wh/L/°C)	1,163
TUE (°C) - water usage temperature	65
TEE (°C) - water intake temperature	10
Average power of 1 CHOD elec 200 litres (Watts)	2418

source: market benchmark for individual, standalone devices for production of stored domestic hot water only.

Heating time of cylinder (hours)	5,29

Part of cylinder to be heated to T° setting	54%

source: Average household consists of 2.26 inhabitants each using 50 litres of domestic hot water at 40°C a day, with an average-sized water-heater of 210 litres.st

Number of HC / day	8
Wait time for setting	0,5

Load shifting time	4,65

So avoiding consumption of (kWh/L/day)	0,0029
Compared to a basic consumption of (kWh/L/day)	0,0500
Giving savings of:	**6%**

BDA-1: Learning and automatic adjustment system of temperature setting

This is based on the idea that consumption is comparable every Monday, every Tuesday and so on throughout the week, so the automatic learning and adjustment system for the temperature setting can vary the temperature setting for day N as a function of the consumption for day N-7. Using a needs-based design in this way for individual stored water heating, the learning system will have the overall effect of keeping the temperature setting down, thus reducing heat loss in storage and annual energy consumption.

The bonus allowed for this function cannot be added to that for the vacation mode (DA-1 or DM-1); energy savings for the learning and automatic temperature setting adjustments already include an automatic vacation mode component.

Learning and automatic adjustment system of temperature setting					
Percentage of energy savings depending on tank volume and number of occupants:					
Tank volume	Number of occupants				
	1	2	3	4	5
300	19%	16%	14%	12%	8%
250	19%	16%	12%	9%	6%
200	21%	14%	9%	6%	3%
150	16%	10%	6%	3%	1%

Source: Pacte ECS BBC, 2011

Repartition households / number of occupants					
1	**2**	**3**	**4**	**5**	**Average**
33%	33%	15%	13%	6%	**2,26**

Source: Insee, Annual census surveys, 2004 to 2006, Population census from 1954 to 1999.

Market distribution for individual electric water-heaters (in liters)					
150	200	250	300	Other	**Average**
20%	30%	15%	10%	25%	**210**

Source: Benchmark for sales of electric water heaters

Tank volume	Number of occupants		
	2	**2,26**	**3**
250	16%	15%	12%

BDA-2: Heat pump operating range

The extent the heat pump's operating range directly affects the device's consumption: the wider the range, and the greater use the device makes of the heat pump the lower the energy consumption of the device. Thus a penalty should be applied to heat pumps whose operating range is not within the standard range [-5°;+35°].

Operating limit, lower temperature	Nb of hours	Standardisation	% heat pump not working
Down to 0°	1555	1473	17%
Between -1° and - 4°	572	490	6%
-5° and lower	82	0	0%

Operating limit, upper temperature	Nb of hours	Standardisation	% heat pump not working
Up to 30°	166	153	2%
Between 31 and 34°	79	66	1%
35° and upper	13	0	0%

Functional share of heat pump	**Up to 30°**	**between 31 and 34°**	**35° and upper**
Down to 0°	19%	18%	17%
Between -1° and - 4°	8%	7%	6%
-5° and lower	2%	1%	0%

Average functional share of heat pump 44% *Assuming COP default of 1.80*

PAC efficiency

	Up to 30°	**between 31 and 34°**	**35° and upper**
Down to 0°	36%	36%	37%
Between -1° and - 4°	41%	41%	42%
-5° and lower	44%	44%	44%

% of energy savings (=PENALTY)

PAC operating limits depending on external temperature	**Up to 30°**	**between 31 and 34°**	**35° and upper**
Down to 0°	-8%	-8%	-8%
Between -1° and - 4°	-4%	-3%	-3%
-5° and lower	-1%	0%	0%

BDA-3: Electrical device incorporating a package of certified functionalities

An individual, standalone devices for production of stored domestic hot water only provides at least 8% energy saving, assuming it includes the following functionalities (Source CSTB – final evaluation report on the thermal performance of electric stored water heats, category C – December 2008):

- a heating indicator, and
- certified static losses (Qpr), with:
  - for horizontal models: $Qpr < 0.675 + 0.0072\ V$
  - for vertical models: $Qpr < 0.0198 + 0.0513\ V^{2/3}$, and
- a value of V40 (electrically powered water heater) or Vmax (thermo-cycle water heater) > 1.75 Vn, and
- thermal load from the energy transmission unit to the stored water < 6W/cm², and permanent anti-corrosion protection.

5.5. Declaration of conformity

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Programme PEP Ecopassport®

Attestation de revue critique des règles additionnelles sectorielles pour les appareils individuels et autonomes de production exclusive d'eau chaude sanitaire accumulée

Document revu : PSR0004 - REGLES SPECIFIQUES AUX APPAREILS INDIVIDUELS ET AUTONOMES DE PRODUCTION EXCLUSIVE D'EAU CHAUDE SANITAIRE ACCUMULEE 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 appareils de production d'eau chaude sanitaire.

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 appareils de production d'eau chaude sanitaire est conforme aux exigences de ces référentiels.

Jean Baptiste Puyou	Tim Osmond
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Page 1 sur 1

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