



# PRODUCT ENVIRONNEMENTAL PROFIL



39HXC,  
Has a compliant  
environmental declaration



## 39HXC

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## 1.1 – Commercial reference of the reference product

39HXC std 020

**Nominal capacity of the device :** 2000

**Product family :** Air Handling Unit

**Product category :** Air Handling Unit double flow, active product.

## 1.2 – Functional Unit

"Transfer 1 m<sup>3</sup> of air per hour for the ventilation and/or air treatment and/or smoke exhaust and/or filtration of a building over the reference lifetime of 17 years. "

## 1.3 – Additional environmental information

The environmental impacts are calculated using a Life Cycle Analysis of the product in accordance with ISO standards 14040 and 14044. All the stages of the manufacture, distribution, installation (packaging end of life), maintenance and end of life of the product are included in this study.

## 1.4 - Manufacturing



### - Production

The product is manufactured in France at a production plant, which implements an ISO 14001-certified environmental management system. The manufacturing site has also obtained ISO 9001 and OHSAS 18001 certification.

The ranges of products from the Carrier Group's comply with the requirements of the "RoHS" Directive (EU) 2015/863 of 31 March 2015 and 2011/65/EU of 8 June 2011 and the "REACH" regulation 1907/2006 of 18 December 2006. The Carrier Group's suppliers are obliged to inform them of any change in the composition of the components.

During the manufacturing phase, a procurement scenario is taken in to account ; information on the provenance of the components and the mode of transport has been gathered from the purchasing department.

### - Energy model

Electricity Mix; AC; consumption mix, at consumer; < 1kV; EU-27

## 1.5 - Distribution



### - Production

The distribution scenario has been defined using data recommended by the PEP Ecopassport® program, adjusted to the average sales distance for our customers. The environmental impact is then calculated pro rata using the total weight of the products transported, to ensure trucks carry an optimised load when outbound and are 25% full on their return.

### - Energy model

ELCD - Lorry Transport; articulated lorry, 27t capacity; RER ; ELCD - Transoceanic transport, Container ship, 27 500 t capacity; RER

## 1.6 - Installation



### - Production

When the product is supplied packed, the impact of the end of life for this packaging is taken into account in this phase. We therefore take into consideration an average journey of 200 km in a van, and the water and/or oil consumption linked to the connection to the hydraulic network.

### - Energy model

ELCD - Lorry transport; Small lorry, 3,3 t capacity; RER

## 1.7 - Use



## - Production

There are two filters, the pre-filter and the fine filters.

The scenario is 3000 hours of operation per year and an air flow Q of 2000 m<sup>3</sup>/h, we obtain for C [kWh]:

Consumption = 95 166 kWh  
 Consumption in France = 76 133 kWh  
 Consumption in Europe = 19 033 kWh  
 Consumption in rest of world = 0 kWh

Filters once a year (according to the PSR)

FMA once during the life cycle (according to the PSR)

End of life of the FMA follows a WEEE disposal process.

## - Energy model

For France : the model chosen is : "Electricity mix ; AC ; consumption mix, at consumer ; 230 V ; FR"

For Europe : the model chosen is : "Electricity Mix ; AC ; consumption mix, at consumer ; < 1 kV ; EU-27"

For the rest of the world, as there is no electricity model for modelling the rest of the world, we have used the European model : "Electricity Mix ; AC ; consumption mix, at consumer ; < 1 kV ; EU-27".

## 1.8 – End of life



### - Production

The product end of life follows a WEEE disposal process :

- stage 1 : the equipment is collected with a 200 km van journey.
- stage 2 : decontamination, crushing then sorting of the various materials.
- stage 3 : specific processing of the electronic components, electrical heaters, cables, bulbs and screens.
- stage 4 : recycling of other materials (this flow is outside of the system and its benefit is not recorded), with a 100 km van journey.
- stage 5 : incineration without energy recovery of components with no re-use value, with a 100 km journey.
- stage 6 : offloading of the rest of the material, with a 100 km journey.

### - Energy model

Waste pretreatment of electrical and electronic equipment (WEEE) ; including dismantling and material separation ;

- technology mix, at waste pretreatment plant ; GLO ;
- Waste recycling ; in compliance with stock method ; World, GLO ;
- Waste incineration of WEEE ; after dismantling ; GLO ;
- Landfill of WEEE ; after dismantling ; GLO

## 1.9 - PEP ecopassport program hypothesis

The life cycle analysis was carried out according to the hypothesis and scenarios provided by the PEP ecopassport program.

Activity area :	Tertiaire
Expected lifetime :	17 years
Annual operating time in heating mode :	-
Eurovent operating time in heating mode :	-
Annual operating time in cooling mode :	-
Annual operating time in cooling mode :	-
Annual operating time :	3000 hours
Average extracted air flow :	2000 m <sup>3</sup> /h
Pressure loss Δp :	250 Pa
Momentary refrigerant leaks :	0%
Refill threshold :	0%
Number of engine changes during the life cycle :	Once
Number of filter changes during the life cycle :	Once a year

## 1.10 – Technical description of the device

The 39HX double-flow air handling unit is a PLUG & PLAY ventilation device equipped with a high-efficiency energy recovery, plug fan fans with high-efficiency EC motors, intended to meet all the requirements of the new eco-regulations. design. It allows hygienic air renewal by saving on average 80% of the power required for air conditioning (cooling and heating).

TEWI (Total Equivalent Warming Impact) :	Direct effect :	Indirect effect :
- tCO <sub>2</sub> eq	- tCO <sub>2</sub> eq	- tCO <sub>2</sub> eq
Calorific value of the device :	0,6 MJ/kg	
Electrical power absorbed by the fan :	2 kW	
Cooling capacity :	- kW	SEER : -
Heating capacity :	- kW	SCOP : -
Sensitive capacity :	0 kW	
Refrigerant :	-	GWP = - tCO <sub>2</sub> eq
Liquid waste (condensates) :	324,428 m <sup>3</sup>	
Water consumption of the device :	0 m <sup>3</sup>	

## 1.11 – Sales scenarios

Sales of the device are distributed as follows :

Country name	Share in sales (%)	
France	80	%
Europe	20	%
World	0	%

This distribution affects the distance travelled during the phase and the electric mix used during the usage phase.



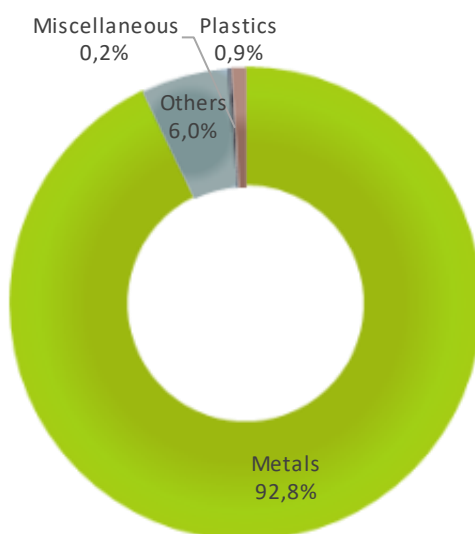
## 2 – COMPONENT MATERIALS

### 2.1 – Reference product

Modelled total weight :

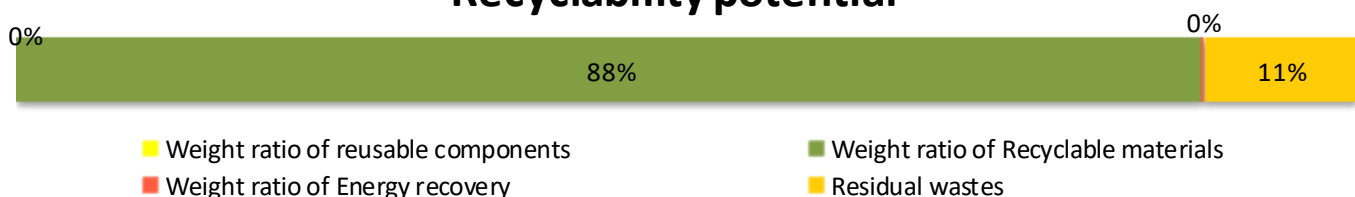
PEP material category	Materials	Weight (kg)	Pourcentage
Metals	Steel 35% recycled	274,47	77,5%
Metals	Aluminium	47,05	13,3%
Others	Glass wool	13,85	3,9%
Others	Wood ; for palet	3,64	1,0%
Metals	Copper	3,02	0,9%
Metals	Steel	2,58	0,7%
Miscellaneous	Miscellaneous	2,18	0,6%
Plastics	Polyvinylchloride (PVC)	1,68	0,5%
Metals	Brass	1,64	0,5%
Others	Paint	1,62	0,5%
Plastics	Polyethylene high density (PE-HD)	1,45	0,4%
Plastics	Polypropylene (PP)	0,26	< 0,1%
Others	Paper ; virgin fiber	0,25	< 0,1%
Metals	Zamak	0,23	< 0,1%
Plastics	Ethylene-propylene diene rubber (EPDM)	0,10	< 0,1%
<b>Total</b>		<b>354,0</b>	<b>100,00%</b>

### 2.2 – Component materials



Recyclability rate : 88%

### Recyclability potential



### 3 – ENVIRONMENTAL IMPACTS

Per m³/h corresponding to the functional unit

Environmental indicators		Total	Manufacturing	Distribution	Installation	Use Σ B1 à B7	End of life	Potential benefits Module D
Global warming	kg CO <sub>2</sub> eq	1,59E+01	1,29E+00	1,14E-02	1,93E-03	1,46E+01	1,14E-02	
Depletion of the ozone layer	kg CFC-11 eq	8,74E-07	2,12E-07	0*	0*	6,61E-07	1,12E-09	
Acidification of soil and water	kg SO <sub>2</sub> eq	2,60E-02	5,94E-03	5,14E-05	0*	2,00E-02	2,20E-05	
Eutrophication of water	kg (PO <sub>4</sub> ) <sup>3-</sup> eq	6,75E-03	1,04E-03	1,18E-05	0*	5,70E-03	5,59E-06	
Photochemical ozone creation	kg C <sub>2</sub> H <sub>4</sub> eq	4,15E-03	4,50E-04	3,65E-06	0*	3,69E-03	3,45E-06	
Depletion of abiotic resources - elements	kg Sb eq	2,21E-05	1,69E-05	0*	0*	5,20E-06	0*	
Depletion of abiotic resources – fossil fuels	MJ	1,20E+02	1,18E+01	1,61E-01	0*	1,08E+02	1,16E-01	
Water pollution	m³	5,35E+02	7,95E+01	1,88E+00	0*	4,52E+02	1,74E+00	
Air pollution	m³	1,51E+03	1,79E+02	4,69E-01	0*	1,33E+03	1,56E+00	
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1,38E+00	1,02E+00	2,16E-04	0*	3,59E-01	1,65E-04	
Use of renewable primary energy resources as raw materials	MJ	3,67E-02	3,67E-02	0*	0*	0*	0*	
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,42E+00	1,06E+00	2,16E-04	0*	3,59E-01	1,65E-04	
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	7,19E+02	5,26E+01	1,62E-01	0*	6,66E+02	1,67E-01	
Use of non-renewable primary energy resources used as raw materials	MJ	4,07E-01	1,75E-01	0*	0*	2,32E-01	0*	
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	7,19E+02	5,28E+01	1,62E-01	0*	6,66E+02	1,67E-01	
Use of secondary materials	kg	1,08E-01	7,99E-02	0*	0*	2,85E-02	0*	
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
Net use of fresh water	m³	1,14E+00	1,18E+00	0*	0*	0*	0*	
Hazardous waste disposed of	kg	7,88E+00	4,98E-01	0*	0*	7,18E+00	1,99E-01	
Non-hazardous waste disposed of	kg	3,75E+00	1,78E+00	4,06E-04	6,25E-04	1,98E+00	5,65E-04	
Radioactive waste disposed of	kg	8,07E-03	2,80E-03	0*	0*	5,26E-03	1,08E-06	
Components for re-use	kg	1,99E-02	0*	0*	1,82E-02	0*	1,76E-03	
Materials for recycling	kg	1,66E-01	0*	0*	1,82E-03	9,46E-03	1,55E-01	
Materials for energy recovery	kg	1,87E-04	0*	0*	0*	0*	1,87E-04	
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
Total use of primary energy during the life cycle	MJ	7,20E+02	5,38E+01	1,62E-01	0*	6,66E+02	1,67E-01	

The Life Cycle Analysis was conducted using EIME software : EIME© v5.8.1. With its database version : CODDE-2018-11 \*The results of this PEP represent the use of the product in countries with energy mixes of varying pollution levels, which significantly affects the product's environmental impact. To obtain the results that correspond to your product, please contact your Carrier representative.

The PEP was drawn up on the basis of 1 m³/h air transfer. The real impact of the life cycle of the product installed in a real situation must be calculated by the user of the PEP by multiplying the impact concerned by the average exhaust air flow from the use profile in m³/h (value of Q defined in the use stage).

\* represents less than 0.01% of the total life cycle of the reference flow

### 3 – ENVIRONMENTAL IMPACTS

Environmental indicators		Use B1	Maintenance B2	Repair B3	Replacement B4	Refurbishment B5	Operational energy use B6	Operational water use B7
Global warming	kg CO <sub>2</sub> eq	4,62E+00	2,63E-01	0,00E+00	0,00E+00	0,00E+00	9,75E+00	0,00E+00
Depletion of the ozone layer	kg CFC-11 eq	2,88E-08	5,97E-09	0,00E+00	0,00E+00	0,00E+00	6,26E-07	0,00E+00
Acidification of soil and water	kg SO <sub>2</sub> eq	1,00E-02	7,53E-04	0,00E+00	0,00E+00	0,00E+00	9,17E-03	0,00E+00
Eutrophication of water	kg (PO <sub>4</sub> ) <sup>3-</sup> eq	3,12E-03	8,07E-05	0,00E+00	0,00E+00	0,00E+00	2,50E-03	0,00E+00
Photochemical ozone creation	kg C <sub>2</sub> H <sub>4</sub> eq	5,40E-04	9,20E-05	0,00E+00	0,00E+00	0,00E+00	3,06E-03	0,00E+00
Depletion of abiotic resources - elements	kg Sb eq	6,18E-08	3,72E-06	0,00E+00	0,00E+00	0,00E+00	1,42E-06	0,00E+00
Depletion of abiotic resources – fossil fuels	MJ	1,29E+01	2,48E+00	0,00E+00	0,00E+00	0,00E+00	9,24E+01	0,00E+00
Water pollution	m³	4,28E+01	3,34E+00	0,00E+00	0,00E+00	0,00E+00	4,06E+02	0,00E+00
Air pollution	m³	4,72E+01	3,90E+01	0,00E+00	0,00E+00	0,00E+00	1,25E+03	0,00E+00
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1,42E-01	4,45E-02	0,00E+00	0,00E+00	0,00E+00	1,73E-01	0,00E+00
Use of renewable primary energy resources as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,42E-01	4,45E-02	0,00E+00	0,00E+00	0,00E+00	1,73E-01	0,00E+00
Use of non-renewable primary energy, excluding non- renewable primary energy resources used as raw materials	MJ	1,39E+01	1,45E+01	0,00E+00	0,00E+00	0,00E+00	6,37E+02	0,00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	2,32E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,39E+01	1,47E+01	0,00E+00	0,00E+00	0,00E+00	6,37E+02	0,00E+00
Use of secondary materials	kg	0,00E+00	2,85E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m³	-1,46E-01	6,53E-03	0,00E+00	0,00E+00	0,00E+00	9,76E-02	0,00E+00
Hazardous waste disposed of	kg	9,86E-05	7,31E-02	0,00E+00	0,00E+00	0,00E+00	7,11E+00	0,00E+00
Non-hazardous waste disposed of	kg	1,12E+00	6,94E-02	0,00E+00	0,00E+00	0,00E+00	7,88E-01	0,00E+00
Radioactive waste disposed of	kg	3,39E-04	5,60E-05	0,00E+00	0,00E+00	0,00E+00	4,87E-03	0,00E+00
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	9,46E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of primary energy during the life cycle	MJ	1,40E+01	1,48E+01	0,00E+00	0,00E+00	0,00E+00	6,38E+02	0,00E+00

The Life Cycle Analysis was conducted using EIME software : EIME© v5.8.1. With its database version : CODDE-2018-11 \* The results of this PEP represent the use of the product in countries with energy mixes of varying pollution levels, which significantly affects the product's environmental impact. To obtain the results that correspond to your product, please contact your Carrier representative.

As part of the life cycle analysis of buildings, the environmental impacts of the use stage must be declared according to modules B1 to B7 (B1: use; B2: maintenance; B3: repair; B4: replacement; B5: rehabilitation; B6: energy use; B7: water use).



## 4 – EXTRAPOLATION TO THE OTHER SIZES IN THE RANGE

		Air flow [m³/h]	Manufacturing	Distribution	Installation	Use	End of life
REF	39HXC std 010	1000	1,143	1,143	2,000	0,876	1,140
	39HXC std 020	2000	1,000	1,000	1,000	1,000	1,000
	39HXC std 030	3000	0,886	0,886	1,075	1,153	0,885
	39HXC std 040	4000	0,829	0,829	1,113	1,286	0,828
	39HXC std 060	6000	0,729	0,729	0,817	0,995	0,728

Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. 1m<sup>3</sup>/h air transfer. 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.


std : standard

The set of indicators used in this study is : Indicators for PEP ecopassport® - PCR 3 - 2015

### 5.1 – The mandatory indicators are :

- **GWP (Global Warming Potential)** : This indicator is used to calculate the global warming potential caused by emissions in the air contributing to the greenhouse effect. It is expressed in kg CO<sub>2</sub> eq. The calculation methodology comes from the IPCC (International Panel of Climate Change, US, 2007), and we used a 100-year horizon. (IPCC 2007 method via CML, GWP 100).
- **ODP (Ozone Depletion)** : This indicator is used to calculate the contribution of atmospheric emissions to the depletion of the stratospheric ozone layer. It is expressed in kg CFC-11 eq. The calculation methodology comes from the WMO (World Meteorological Organization, CML 2012).
- **A (Acidification for soil and water)** : This indicator is used to calculate the acidification of the soil and water. It is expressed in kg SO<sub>2</sub>-eq. The calculation methodology was developed by Huijbregts (CML, 2012).
- **EP (Eutrophication)** : This indicator is used to calculate the eutrophication (enrichment with nutrients) of oceans and lakes by effluent. It is expressed in kg PO<sub>4</sub><sup>3</sup>-eq. Eutrophication of water courses results from excessive enrichment with nutrient molecules (organic molecules) in the environment. Phosphorus, nitrogen, carbon and potassium allow the development of algae and aquatic species that can lead to a reduction in the oxygen level and an unbalanced biocoenosis. The calculation methodology was developed by Heijungs et al. 1992 (CML, 2012).
- **POCP (Photochemical Oxidation)** : This indicator, expressed in kg C<sub>2</sub>H<sub>4</sub>-eq, is used to calculate the amount of ozone produced in the troposphere due to the action of solar radiation on oxidising gas emissions (known as summer smog; see summer peak ozone levels). The calculation methodology was developed by Jenkin & Hayman - Derwent et al. (CML, 2012).
- **ADPe (Depletion of Abiotic Resources - Elements)** : This indicator is used to calculate the depletion of non-renewable mineral resources by taking into account the extent of natural reserves. It is expressed in equivalents of kilograms of antimony (kg Sb-eq). The calculation methodology was developed by Oers et al. (CML, 2012).
- **EP (Total use of primary energy)** : This indicator is used to calculate the primary energy consumption during the life cycle of the product. It is expressed in MJ.
- **NUFW (Net use of fresh water)** : This indicator represents the net consumption of fresh water used for the system. It is expressed in m<sup>3</sup>. In EIME, fresh water is broken down into river, lake, underground and surface water, as well as water of unspecified origin. Water extracted and discharged into these environments with the same quality level is not covered by this indicator.
- **ADPf (Depletion of Abiotic Resources - Fossil Fuels)** : This indicator is used to calculate the consumption of non-renewable fossil fuel resources. It is expressed in equivalents of kilograms of antimony (kg eq Sb). The calculation methodology was developed by Oers et al. (CML, 2012).
- **WP (Water Pollution)** : this indicator, expressed as a critical volume (m<sup>3</sup>), is used to calculate water pollution by taking into account the authorised effluent concentration limits. The methodology comes from the DHUP (French directorate of housing, urbanism and landscape) based on the recommendations of the AIMCC (French construction industry trade association).
- **AP (Air Pollution)** : this indicator, expressed as a critical volume (m<sup>3</sup>), is used to calculate ambient air pollution (troposphere) by taking into account the authorised concentration limits for atmospheric emissions. The methodology comes from the DHUP (French directorate of housing, urbanism and landscape) based on the recommendations of the AIMCC (French construction industry trade association).
- **Module B1 - Border for products installed during use** : it corresponds to the impacts and aspects of normal (i.e. expected) conditions of use of building construction products, materials and components, excluding those related to water and energy consumption, which are processed in modules B6 and B7. Module B1 also includes the impacts and aspects related to fugitive refrigerant emissions.
- **Module B2 – Border for maintenance** : it must include the production and transportation of construction products and materials, components and ancillary products used for maintenance; all cleaning processes for the interior and exterior of the building; all maintenance processes for the functional and technical performance of the building structure and the building-integrated technical systems, as well as the aesthetic qualities of the components inside and outside the building.
- **Module B3 – Border for repair** : it must include any repair process for building components carried out during the use phase of the building.
- **Module B4 – Border for replacement** : it must include the following as part of the planned replacement of building components based on their expected lifespan.
- **Module B5 – Border for refurbishment** : it corresponds to any major planned modification of the structure, layout and / or technical systems of the building, generally following a change / adjustment of its intended use / function.
- **Module B6 – Border for operational energy use** : it includes the impacts and aspects of the energy requirement during the operation phase according to the << service categories >> described in the standard relating to the energy performance of buildings (EPB), EN ISO 52000-1.
- **Module B7 – Border for operational water use** : it must include all the water consumed and its treatment (before and after consumption) during the normal operation of the building (are excluded from module B7 maintenance, repair, replacement and rehabilitation of water supply systems and equipment. water).
- **Module D - Border for the benefits and charges outside the system border** : it quantifies the environmental benefits or charges resulting from the following re-use, recycling and energy recovery from the net flows of materials leaving the system boundary; and services exported outside the border of the system.



Registration number : <b>CARR-10003-V01.01-EN</b>	Drafting rules : « <b>PCR-ed3-FR-2015 04 02</b> » <b>Supplemented by « PSR-0008-ed2.0-EN-2018 02 09 »</b>
Vérifier accreditation number : <b>VH18</b>	Information and reference documents : <b>www.pep-ecopassport.org</b>
Date of issue : <b>1-2020</b>	Valid period : <b>5 ans</b>
<b>Independent verification of the declaration and data according to ISO 14025 : 2010</b>	
<b>Internal :</b> <input type="checkbox"/>	<b>External :</b> <input checked="" type="checkbox"/>
The PCR review was conducted by a panel of experts chaired by Philippe Osset (SOLINNEN)	
PEP are compliant with XP C08-100-1 :2016 The elements of the present PEP cannot be compared with elements from another program.	
Document in compliance with ISO 14025 : 2010 « Environmental labels and declarations. Type III environmental declarations »	
	

Jérôme BARBIER - ✉ [jerome.barbier@carrier.com](mailto:jerome.barbier@carrier.com) - ☎ +(33)4 72 25 24 17

CARRIER S.A. - 📍 1 Rte de Thil, 01120 Montluel, France

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