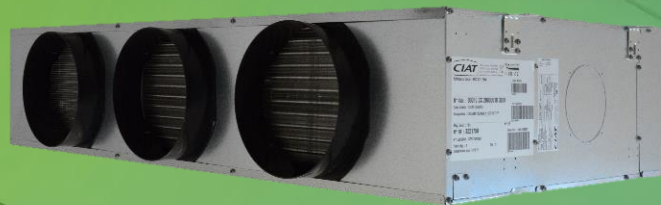




PRODUCT ENVIRONMENTAL PROFILE

Comfort line,
Has a compliant
environmental statement



Comfort line

Nominal cooling capacity : 0.6 - 9 kW
Nominal heating capacity : 1 - 12 kW

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1.1 – Commercial reference of the reference product

Reference product :	COMFORT LINE 64R I STD HEE
Nominal capacity of the device :	9.84 kW
Product family :	Fan Coil Unit
Product category :	Ducted Fan Coil Unit

1.2 – Functional Unit

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

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; Production mix; Low voltage; FR (reference year : 2018)

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

The CARRIER Group is continuously striving to improve the acoustic and energy performance of its products in the usage phase. Energy efficient motors play a crucial role in this.

The power consumed depends on the conditions of use and operation of the building concerned. Ducted fan coil units must be combined with an appropriately sized return air and air blower diffuser.

Our hypothesis is based on default usage of the unit as per the PSR :

- 1500 hours in winter 70%(LS) 25%(MS) 5%(HS)
- 1100 hours in summer 65%(LS) 30%(MS) 5%(HS)
- Unit in standby: 12.32 kWh

Eurovent conditions :

Indoor :

- Heating mode conditions: 20 °C; 50% humidity.
- Cooling mode conditions: 27 °C; 47% humidity

Refrigerant temperature:

- heating mode: 65/55 °C
- cooling mode: 7/12 °C

Consumption of the device :

- Consumption = 4791 kWh
- Consumption in France = 4791 kWh
- Consumption in Europe = 0 kWh
- Consumption in rest of world = 0 kWh

Filters twice 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 chosen module is : "Electricity Mix; Production mix; Low voltage; FR" (reference year : 2018)

For Europe, the chosen module is : "Electricity Mix; Production mix; Low voltage; UE-27" (reference year : 2018)

For the rest of the world, as there is no electricity module, the European module has been chosen : "Electricity Mix; Production mix; Low voltage; UE-27" (reference year : 2018)

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 :	Tertiary
Expected lifetime :	16 years
Annual operating time in heating mode :	1500 hours
Eurovent operating time in heating mode :	70% LS ; 25% MS ; 5% HS
Annual operating time in cooling mode :	1100 hours
Annual operating time in cooling mode :	65% LS ; 30% MS ; 5% HS
Annual operating time :	2600 hours
Average extracted air flow :	- m ³ /h
Pressure loss Δp :	-
Momentary refrigerant leaks :	-
Refill threshold :	-
Number of engine changes during the life cycle :	Once
Number of filter changes during the life cycle :	Twice a year

1.10 – Technical description of the device

With its range of ducted comfort units, CIAT is reinforcing its strategy of sustainable development and responding to new demands for comfort, energy optimisation and Indoor Environment Quality. By incorporating the latest technological developments, COMFORT LINE is the customisable solution to satisfy the summer and winter comfort needs of occupants in new buildings and renovations.

Easy to install, COMFORT LINE is available in 6 frame sizes and 3 thicknesses: 240, 245 and 280, allowing perfect integration in any type of false ceiling. For total flexibility and adaptability, COMFORT LINE is available in several assemblies: I, Y, H, U, U Compact, LI and LY.

In its HEE (High Energy Efficiency) version, COMFORT LINE not only provides energy savings of up to 85%, but also meets the strict requirements of thermal regulations such as RT 2012 in France. Moreover, COMFORT LINE is compliant with the ErP 2015 directive on all its sizes.

Associated with the Epure technology, COMFORT LINE treats particulate pollution. EPURE is the answer to guarantee an excellent Indoor Air Quality and obtain a PM2.5 concentration below the threshold recommended by the WHO (10 µg/m³).

TEWI (Total Equivalent Warming Impact) :	Direct effect :	Indirect effect :
- tCO ₂ eq	- tCO ₂ eq	- tCO ₂ eq
Calorific value of the device :	6.8 MJ/kg	
Electrical power absorbed by the fan :	0.170 kW	
Cooling capacity :	8.491 kW	SEER : -
Heating capacity :	10.829 kW	SCOP : -
Sensitive capacity :	6.214 kW	
Refrigerant :	-	GWP = - tCO ₂ eq
Liquid waste (condensates) :	3.684 m ³	
Water consumption of the device :	0 m ³	

1.11 – Sales scenarios

Sales of the device are distributed as follows :

Country name	Share in sales (%)	
France	100	%
Europe	0	%
World	0	%

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

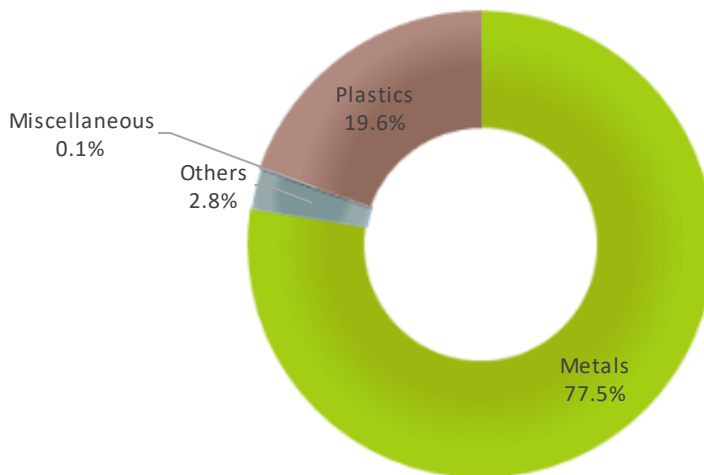
2 – COMPONENT MATERIALS

2.1 – Reference product

Modelled total weight :

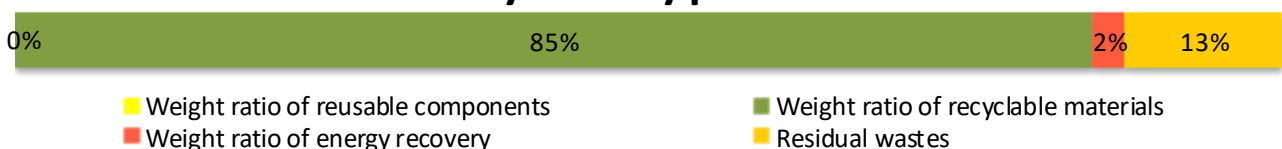
Material PEP category	Material	Mass (kg)	Percentage
Metals	Galvanised steel	19.12	55.3%
Metals	Copper	4.76	13.8%
Metals	Aluminium	2.87	8.3%
Plastics	Polypropylene (PP)	1.80	5.2%
Plastics	Acrylonitrile butadiene styrene (ABS)	1.67	4.8%
Plastics	Polyamide 6.6 with 30% glass fiber (PA 6.6 GF30)	1.50	4.3%
Plastics	Polyester fiber	1.29	3.7%
Others	Wood ; for palet	0.68	2.0%
Plastics	Ethylene Propylene Diene rubber (EPDM)	0.35	1.0%
Others	Cardboard	0.13	0.4%
Others	Paper ; virgin fiber	0.11	0.3%
Plastics	Polyvinylchloride (PVC)	0.09	0.3%
Plastics	Polyethylene high density (PE-HD)	0.08	0.2%
Others	Printed Wire Board (PWB)	0.04	0.1%
Metals	Brass	0.02	< 0.1%
Miscellaneous	Miscellaneous	0.04	0.1%
Total		34.56	100.0%

2.2 – Component materials



Recyclability rate : 85%

Recyclability potential



3 – ENVIRONMENTAL IMPACTS

Per kW corresponding to the functional unit

Environmental indicators		Total	Manu facturing	Distribution	Installation	Use Σ B1 à B7	End of life	Potential benefits Module D
Ozone depletion	kg.CFC-11 eq	3.69E-06	2.12E-06	3.46E-10	2.60E-09	1.04E-06	5.24E-07	-4.92E-07
Acidification (AP)	mole H ⁺ eq	6.35E-01	2.52E-01	1.43E-03	1.23E-04	3.29E-01	5.29E-02	-3.25E-01
Freshwater eutrophication	kg P eq	2.00E-03	1.22E-04	0*	0*	1.72E-03	1.55E-04	-2.62E-02
Marine aquatic eutrophication	kg N eq	1.02E-01	2.63E-02	6.70E-04	4.42E-05	5.36E-02	2.17E-02	-2.06E-02
Terrestrial eutrophication	mole N eq	9.52E-01	2.62E-01	7.35E-03	5.17E-04	6.24E-01	5.77E-02	-2.49E-01
Photochemical Ozone formation	kg NMVOC eq	2.69E-01	9.44E-02	1.85E-03	1.50E-04	1.55E-01	1.76E-02	-7.59E-02
Depletion of abiotic resources - elements	kg Sb eq	1.45E-03	1.02E-03	0*	0*	3.93E-04	3.84E-05	-9.76E-04
Depletion of abiotic resources - fossil fuels	MJ	8.98E+03	1.47E+03	3.15E+00	0*	7.43E+03	8.13E+01	-1.53E+02
Climate change - total	kg CO ₂ eq.	1.13E+02	3.49E+01	2.26E-01	1.14E-01	7.17E+01	6.14E+00	-1.30E+01
Climate change - fossil fuels	kg CO ₂ eq.	1.12E+02	3.44E+01	2.26E-01	2.15E-02	7.14E+01	5.84E+00	-1.26E+01
Climate change - biogenics	kg CO ₂ eq.	1.15E+00	4.63E-01	0*	9.28E-02	2.91E-01	3.07E-01	-4.16E-01
Climate change - land use and land use transformation	kg CO ₂ eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Water requirement	m ³	6.17E+03	1.55E+01	0*	1.48E+00	2.08E+03	4.07E+03	-1.10E+04
Total use of primary energy during the life cycle	MJ	9.60E+03	1.50E+03	3.15E+00	0*	8.01E+03	9.38E+01	-1.90E+02
Emission of fine particles	incidence of diseases	1.01E-05	1.59E-06	1.16E-08	1.36E-09	8.10E-06	3.73E-07	-1.26E-06
Ionizing radiation, human health	kBq U235 eq	1.10E+03	2.01E+02	0*	0*	8.96E+02	4.24E-01	-8.25E+00
Ecotoxicity (fresh water)	CTUe	3.31E+03	1.27E+03	0*	0*	1.32E+03	7.26E+02	-2.05E+03
Human toxicity, carcinogenic effects	CTUh	1.49E-05	1.23E-05	0*	0*	2.52E-06	4.08E-08	-1.48E-07
Human toxicity, non-carcinogenic effects	CTUh	3.38E-06	1.94E-06	4.29E-10	0*	1.13E-06	3.14E-07	-3.24E-06
Impacts related to land use/soil quality	-	2.54E+01	2.56E-01	0*	0*	7.86E+00	1.73E+01	-5.07E+01
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	6.15E+02	1.65E+01	0*	0*	5.86E+02	1.25E+01	-3.73E+01
Use of renewable primary energy resources used as raw materials	MJ	9.35E+00	9.35E+00	0*	0*	0.00E+00	0*	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6.25E+02	2.59E+01	0*	0*	5.86E+02	1.25E+01	-3.73E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	8.90E+03	1.42E+03	3.15E+00	0*	7.40E+03	8.13E+01	-1.53E+02
Use of non-renewable primary energy resources used as raw materials	MJ	8.66E+01	5.60E+01	0*	0*	3.06E+01	0*	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	8.98E+03	1.47E+03	3.15E+00	0*	7.43E+03	8.13E+01	-1.53E+02
Use of secondary materials	kg	0.00E+00	0.00E+00	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	m ³	1.50E+02	3.62E-01	0*	5.93E-02	5.05E+01	9.93E+01	-2.61E+02
Hazardous waste disposed of	kg	1.05E+02	7.88E+01	0*	0*	2.27E+01	3.44E+00	-2.99E-04
Non-hazardous waste disposed of	kg	2.21E+01	1.59E+01	7.92E-03	0*	6.19E+00	1.10E-02	-1.07E-01
Radioactive waste disposed of	kg	4.55E-02	3.79E-02	5.64E-06	0*	7.62E-03	2.02E-05	-7.02E-05
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	0.00E+00	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
Biogenic carbon content of the product	kg of C.	1.67E-01	1.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	1.28E+00	1.28E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The Life Cycle Analysis was conducted using EIME software : EIME© v5.9.4. With its database version : CODDE-2022-01 *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 under the assumption of 1 kW of heating or cooling power being supplied. The real impact of the stages of the life cycle of a product installed in an actual situation is to be calculated by the user of the PEP by multiplying the impact concerned by the total heating or cooling capacity in kW.

* 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
Ozone depletion	kg.CFC-11 eq	5.08E-08	5.15E-07	0.00E+00	0.00E+00	0.00E+00	4.79E-07	0.00E+00
Acidification (AP)	mole H ⁺ eq	2.95E-02	1.11E-01	0.00E+00	0.00E+00	0.00E+00	1.88E-01	0.00E+00
Freshwater eutrophication	kg P eq	7.95E-07	1.70E-04	0.00E+00	0.00E+00	0.00E+00	1.55E-03	0.00E+00
Marine aquatic eutrophication	kg N eq	9.04E-03	1.87E-02	0.00E+00	0.00E+00	0.00E+00	2.59E-02	0.00E+00
Terrestrial eutrophication	mole N eq	9.17E-02	1.59E-01	0.00E+00	0.00E+00	0.00E+00	3.73E-01	0.00E+00
Photochemical Ozone formation	kg NMVOC eq	2.29E-02	5.57E-02	0.00E+00	0.00E+00	0.00E+00	7.68E-02	0.00E+00
Depletion of abiotic resources - elements	kg Sb eq	1.37E-07	3.78E-04	0.00E+00	0.00E+00	0.00E+00	1.54E-05	0.00E+00
Depletion of abiotic resources - fossil fuels	MJ	3.20E+01	1.14E+03	0.00E+00	0.00E+00	0.00E+00	6.25E+03	0.00E+00
Climate change - total	kg CO ₂ eq.	1.08E+01	2.84E+01	0.00E+00	0.00E+00	0.00E+00	3.25E+01	0.00E+00
Climate change - fossil fuels	kg CO ₂ eq.	1.08E+01	2.82E+01	0.00E+00	0.00E+00	0.00E+00	3.24E+01	0.00E+00
Climate change - biogenics	kg CO ₂ eq.	0.00E+00	2.07E-01	0.00E+00	0.00E+00	0.00E+00	8.38E-02	0.00E+00
Climate change - land use and land use transformation	kg CO ₂ eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Water requirement	m ³	-1.44E+01	2.10E+03	0.00E+00	0.00E+00	0.00E+00	2.36E+00	0.00E+00
Total use of primary energy during the life cycle	MJ	3.24E+01	1.15E+03	0.00E+00	0.00E+00	0.00E+00	6.82E+03	0.00E+00
Emission of fine particles	incidence of diseases	1.27E-07	6.86E-07	0.00E+00	0.00E+00	0.00E+00	7.29E-06	0.00E+00
Ionizing radiation, human health	kBq U235 eq	4.12E-02	5.29E+01	0.00E+00	0.00E+00	0.00E+00	8.43E+02	0.00E+00
Ecotoxicity (fresh water)	CTUe	4.76E+00	1.08E+03	0.00E+00	0.00E+00	0.00E+00	2.30E+02	0.00E+00
Human toxicity, carcinogenic effects	CTUh	2.37E-10	2.51E-06	0.00E+00	0.00E+00	0.00E+00	5.44E-09	0.00E+00
Human toxicity, non-carcinogenic effects	CTUh	1.95E-08	8.74E-07	0.00E+00	0.00E+00	0.00E+00	2.35E-07	0.00E+00
Impacts related to land use/soil quality	-	0.00E+00	6.82E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	0.00E+00
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	3.28E-01	8.05E+00	0.00E+00	0.00E+00	0.00E+00	5.78E+02	0.00E+00
Use of renewable primary energy resources used 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	3.28E-01	8.05E+00	0.00E+00	0.00E+00	0.00E+00	5.78E+02	0.00E+00
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	3.20E+01	1.11E+03	0.00E+00	0.00E+00	0.00E+00	6.25E+03	0.00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	0.00E+00	3.06E+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	3.20E+01	1.14E+03	0.00E+00	0.00E+00	0.00E+00	6.25E+03	0.00E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	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	m ³	-3.36E-01	5.08E+01	0.00E+00	0.00E+00	0.00E+00	5.49E-02	0.00E+00
Hazardous waste disposed of	kg	2.28E-04	2.22E+01	0.00E+00	0.00E+00	0.00E+00	4.84E-01	0.00E+00
Non-hazardous waste disposed of	kg	2.58E+00	4.83E-01	0.00E+00	0.00E+00	0.00E+00	3.13E+00	0.00E+00
Radioactive waste disposed of	kg	7.83E-04	5.53E-03	0.00E+00	0.00E+00	0.00E+00	1.31E-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	0.00E+00	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
Biogenic carbon content of the product	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The Life Cycle Analysis was conducted using EIME software : EIME© v5.9.4. With its database version : CODDE-2022-01 * 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

	Capacity [kW]	Manufacturing	Distribution	Installation	Use	End of life
02J AC	1.048	3.997	4.056	7.306	2.070	3.972
02J HEE	0.866	4.838	4.909	8.843	1.441	4.807
22J AC	1.545	3.212	3.246	4.953	2.160	3.202
22J HEE	1.531	3.241	3.276	4.998	1.248	3.231
22M AC	1.736	2.859	2.889	4.408	1.922	2.850
22M HEE	1.675	2.963	2.994	4.569	1.303	2.954
32J AC	2.672	2.221	2.236	2.864	3.101	2.220
32J HEE	2.683	2.212	2.227	2.853	1.027	2.211
32M AC	3.281	1.808	1.821	2.332	2.556	1.808
32M HEE	2.944	2.015	2.030	2.600	0.959	2.015
42J AC	3.092	2.098	2.110	2.475	2.859	2.101
42J HEE	3.449	1.881	1.891	2.219	1.039	1.883
42M AC	3.249	1.996	2.008	2.355	2.645	1.999
42M HEE	3.366	1.927	1.938	2.274	1.005	1.930
52J AC	6.089	1.343	1.346	1.616	2.884	1.339
52J HEE	5.803	1.409	1.412	1.696	1.091	1.405
52M AC	6.776	1.207	1.209	1.452	2.475	1.203
52M HEE	6.422	1.273	1.276	1.532	0.897	1.269
62J AC	9.372	1.050	1.050	1.050	2.954	1.050
62J HEE	8.269	1.190	1.190	1.190	1.367	1.190
62M AC	10.995	0.895	0.895	0.895	2.465	0.895
62M HEE	9.205	1.069	1.069	1.069	1.092	1.069
04P AC	1.194	3.508	3.560	6.412	1.817	3.486
04P HEE	1.194	3.508	3.560	6.412	1.045	3.486
24P AC	1.911	2.597	2.625	4.005	1.747	2.590
24P HEE	1.991	2.493	2.519	3.844	1.212	2.485
34P AC	3.003	1.976	1.990	2.548	2.702	1.975
34P HEE	2.806	2.115	2.130	2.728	1.006	2.114
44P AC	3.558	1.823	1.834	2.151	2.416	1.825
44P HEE	3.833	1.693	1.702	1.997	0.978	1.695
54R AC	7.047	1.160	1.163	1.396	2.371	1.157
54R HEE	5.882	1.390	1.393	1.673	0.831	1.386
64P AC	8.037	1.224	1.224	1.224	2.762	1.224
64P HEE	8.674	1.134	1.134	1.134	1.159	1.134
64R AC	11.412	0.862	0.862	0.862	2.351	0.862
REF	64R HEE	9.840	1.000	1.000	1.000	1.000


Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. the emission of 1 kW of heating or cooling power. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.

The set of indicators used in this study is : Indicators for PEF EF 3.0 (Compliance : PEP ed.4, EN15804+A2) v2.0

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 CO₂ 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 SO₂-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 PO₄³eq. 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 C₂H₄-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 m³. 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.
- **ADP_f (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 (m³), 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 (m³), 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 : CIAT-10002-V04.01-EN	Drafting rules : « PCR-ed4-EN-2021 09 06 » Supplemented by « PSR-0009-ed2.0-EN-2018 02 09 »
Vérifier accreditation number : VH18	Information and reference documents : www.pep-ecopassport.org
Date of issue : 1-2024	Validity period : 5 years
Independent verification of the declaration and data, in compliance with ISO 14025 : 2006	
Internal : <input type="checkbox"/>	External : <input checked="" type="checkbox"/>
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)	
PEP are compliant with XP C08-100-1 :2016 ou EN 50693 :2019 The elements of the present PEP cannot be compared with elements from another program.	
Document in compliance with ISO 14025 : 2006 « Environmental labels and declarations. Type III environmental declarations »	
	

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