Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021 for:

GOLD RX 070/080 – SILVER C RX 070/080

from

Swegon Operations AB

EPD of multiple products, based on worst-case results, all referenced products are described in the section "Products included in the EPD"

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

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Swegon

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction products. Version 1.3.2, date 2023-12-08

PCR 2019:14-c-PCR-018 c-PCR-018 Ventilation components (Adapted from EPD Norway, "Part B for ventilation components" NPCR 030 version 1.1) date 2021-05-18

PCR review was conducted by: The Technical Committee of the International EPD® System.
Chair: Claudia A. Peña. Contact via info@environdec.com

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process certification ☒ EPD verification

LCA accountability: Anna Liljenroth, IVL

Third party verifier: Viktor Hakkarainen, EPD Lead Auditor at Bureau Veritas Certification Sverige AB

Accredited by: SWEDAC, accreditation nr 1236

Procedure for follow-up of data during EPD validity involves third party verifier:

☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD
Swegon Group AB

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Description of the organisation
People spend most of their time indoors, which is why we need a sound indoor climate for our health, well-being, and happiness. Swegon´s ambition is to achieve the world's best indoor environment with the least possible impact on the external environment. Our business models, services, products, and systems are all designed to provide the right solution for each individual project.

Swegon Group AB is a market-leading supplier in the field of indoor environment, offering solutions for ventilation, heating, cooling, and climate optimisation, as well as connected services and expert technical support. Swegon has subsidiaries in and distributors all over the world and 21 production plants in Europe, North America, and India. The company employs more than 3 000 people.

Product-related or management system-related certifications
All Swegon Group production plants in Sweden are certified under ISO 14001 and ISO 9001.

Name and location of production site
Swegon Operations AB, Frejgatan 14, 535 30 Kvänum, Sweden

Product information

Product name

Swegon GOLD RX 070/ 080 and SILVER C RX 070/ 080

Product identification

The table below provides information on the representative product GOLD RX 080. The results presented in this EPD are calculated for this specific configuration.

Product	Weight (kg)	Product dimensions (LxWxH)	Airflow max. (m^3/s)	Product related standards and certifications:
GOLD RX 080	2482	3112 x 2637 x 2740 mm	9.5	• Eurovent certified • RLT certified • Passive House certified • EN 13053:2019 Air Handling units - rating and performance • EN 1886:2007 - Ventilation for buildings - Air handling units - mechanical performance • EN 308:1997 - Heat exchangers- test procedures for establishing performance of air and flue gases heat recovery devices

Product description

An air handling unit (AHU) is a unit that helps to maintain indoor temperature and air flow in high quality. Swegon's GOLD and SILVER C RX units are designed for comfort ventilation. To ensure superior performance, Swegon designs its own components, such as the rotary heat exchanger, fan impeller, and control equipment.

Units with rotary heat exchangers allow to achieve the ultimate in temperature and annual energy efficiency; heat exchangers with turbulent air flow are uniquely effective. This combined with the short installation length typically makes them the first choice for most applications. The turbulent flow in the rotor and the Carry-Over Control feature make them ideally compatible with VAV and DCV system applications. Swegon's GOLD and SILVER C RX units are designed to minimize the risk of air and odor transmission between the air flows.

The reference unit weight of a Swegon AHU in size 070/ 080 is 2482 kg, however, the weight can differ between different configurations. In terms of material content, an AHU consists primarily of steel, aluminium, different types of polymer materials, insulation materials, and electronic components. AHUs are expected to be used for 20 years before they reach the end of life.

AHU Production Process

In the production of Air Handling Units (AHUs), a highly coordinated process unfolds. It begins with the shaping of flat sheet metal through punching and bending, creating the core casing of the AHU. Diverse flat sheets, varying in thickness, undergo specific shaping via various press machines, navigating through multiple buffers before converging in the assembly stage to form the AHU's structural core. Simultaneously, a rotor is meticulously folded and rolled in a dedicated machine, later becoming the centered heart of the AHU. The creation of fan impellers involves fan blades and sides passing through press machines and washing, and they are assembled into complete fans through laser cutting and welding, combining components produced through punching and bending with purchased electronics.

An assembly line further integrates various externally sourced components. Throughout, the AHU units transition from assembly to temporary storage in a motorized bearing before concluding with packing for delivery, ensuring precision and quality throughout the production process.

Products included in the EPD

AHUs can be customized to meet the needs of different applications. This EPD covers different configurations of an AHU. The variations influence the total weight and material composition. Details on the studied product and investigated configurations are presented below. In summary the variations concern:

- Two different sizes of the model noted as 070 or 080 variants.
- Inclusion or exclusion of control equipment noted as "GOLD" or "SILVER C" respectively.
- Different weights, types, and origins of aluminium of the rotary heat exchanger.

To investigate whether all these configurations could be included in this EPD, different product cases provided by Swegon were modelled and compared. The worst-case results are declared and therefore there is no limit on the variations, however the actual variation for all impact indicators shall be declared for the best case and this variation is presented in the result section of this EPD.

The data and results presented in this EPD refer to the reference product GOLD RX 080 (in this specific configuration – Chinese aluminium with sorption coating for the rotary heat exchanger) but can be applied to the products listed in the table below, as well as to products with similar configuration and weight but with e.g., additions of minor components such as a filter.

Product Name	Weight (kg)	Control Equipment	Aluminium in rotor
GOLD RX 080	2449	**Control equipment included**	European, No coating
	2462		European, Epoxy coating
	2482		**Chinese, Sorption coating**
GOLD RX 070	2350	Control equipment included	European, No coating
	2363		European, Epoxy coating
	2382		Chinese, Sorption coating
SILVER C RX 080	2436	Control equipment excluded	European, No coating
	2449		European, Epoxy coating
	2468		Chinese, Sorption coating
SILVER C RX 070	2337	Control equipment excluded	European, No coating
	2350		European, Epoxy coating
	2369		Chinese, Sorption coating

Note: The product variant marked in bold text is the modelled product.

UN CPC code

The CPC code applied is CPC 54632 Ventilation and air-conditioning equipment installation services.

Geographical scope

Global.

LCA information

Declared unit	Description
1 finished product	An air handling unit (AHU) developed and produced by Swegon using rotary heat exchanger. The specific models included in this LCA and EPD concern: **GOLD RX 070/ 080 and SILVER C RX 070/ 080** The notation 070 or 080 refers to two different sizes of the model. The notation "GOLD" or "SILVER C" refers to the inclusion or exclusion of control equipment.

Reference service life

This EPD does not indicate Reference Service Life (RSL).

Time representativeness

The data used to model product manufacturing corresponds to 2021. The data used for model B6 scenario corresponds to 2023. The data from generic databases are from 2014 – 2021. No data used is older than 10 years.

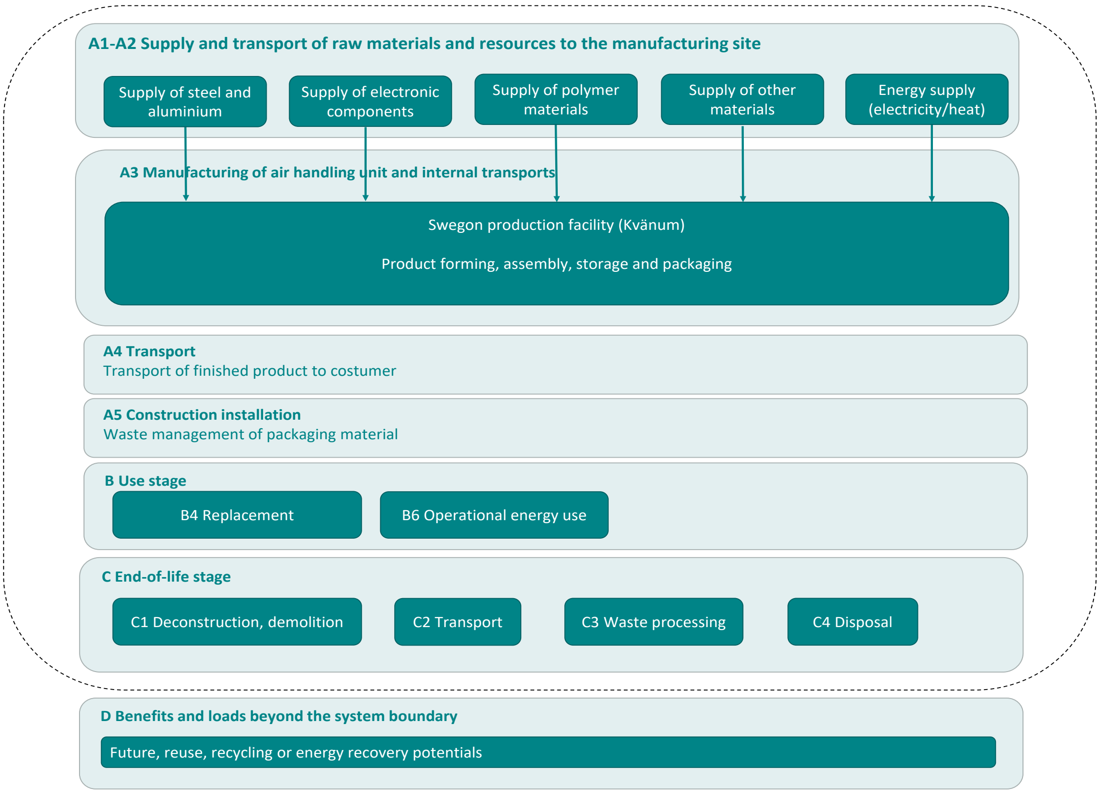
Database(s) and LCA software used

Databases used are mainly from Sphera's own database 2023.1 with minor datasets from Ecoinvent database (3.6 and 3.9). The LCA software used is LCA for Experts version 10.7. The characterization factors used in this study refer to PCR 2019:14 and EN 15804+A2 (based on EF 3.0)

Description of system boundaries

This LCA is a "Cradle to gate with module A4-A5 (A5, only when it comes to waste management of packaging material), B1-B7, C1-C4 and D.

System diagram



Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction, demolition	Transport	Waste processing	Disposal	Reuse, recycling or energy recovery potentials
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	(X)*	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EU, Asia	EU, Asia	SE	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific data used	1.0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	6%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation -sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Module declared
ND: Module not declared
*This stage (A5) is partly declared i.e. only handling of packaging material is included.

More information - Calculation rules

Allocations

Co-product allocation has been avoided whenever possible by increasing the level of detail of the production process and by collecting the environmental data related to these sub-processes. In processes where product specific data could not be obtained allocation was based on physical properties (e.g., mass or volume produced).

Scenarios

The analysis is carried out using factory-specific data for use of energy and utilities and waste generation, as well as product-specific data for use of raw materials. Therefore, the results represent the product system and no other scenarios were applied.

Data quality

Site-specific production data has been retrieved for 2021 from the production site. The upstream and downstream processes have been modelled based on data from generic databases, mostly Sphera database. The collected data was reviewed in terms of consistency, and it is estimated as good quality.

Cut-off criteria

Close to 100% of all material and energy flows have been included in the model calculations. The maximum cut-off criteria established by the PCR is 1% of all material and energy flows to a single unit process and 5% of total inflows (mass and energy) to the upstream and core module. No cut-offs exceeding this limit have been made. The excluded material and energy flows to a single unit process are significantly lower than 1 %. Particular care should be taken to include material and energy flows known to have the potential to cause significant emissions into air and water or soil related to the environmental indicators of EN 15804+A2.

Modelling of transportation modules

Transportation processes included in this EPD consist of the transport of raw materials and their packaging to the production sites (A2), the transport of the final products to the customers (A4), and the transport of waste materials to disposal (C2). The final product is distributed to different customers globally with a focus on Nordic, European, US and CAN markets. A distribution scenario based on yearly average sale volumes has been provided by Swegon. This scenario considers transport by road and boat. The transportation by road is modelled as 469 km with a 28-32 ton truck and a load capacity of 85%. The transportation by boat is modelled as 298 km with a container ship. The product at the end of life is assumed to be transported 150 km with a 26-28 ton truck with a load capacity of 85%.

Modelling of product manufacturing (A3)

The product under evaluation is manufactured at Swegon's production facility in Kvänum. Metal sheets produced in upstream modules are processed and formed in Swegon's production facility. Certain components are supplied as finished components and mounted to the product directly. The inventory performed for the production process accounts for all the energy and heat flows needed during the production process (including electricity) as well as the energy demands for auxiliary processes such as internal transports. Electricity demand in the facility is modelled using the site-specific renewable electricity mix that is supplied to Swegon, consisting of 100% hydropower with a climate impact of 0.014 kg CO_2/kWh. Biomass-based heat is supplied by district heating.

Modelling of use stage (B1-B7)

Since the product under study is an electrical product, the PCR states that all B-modules need to be included. There is no guidance in either c-PCR or PCR on how to perform this type of calculation and no reference service life (RSL) is specified. Therefore, these calculations were based on the type of actions that need to be made (reasonable assumptions) and the energy consumed during one year of use.

The details relevant to the calculation of average energy consumption is given in the table below. Important to remember is that this is a simulated value, and the real value depends on several parameters of which selected ones are presented below. Temperatures and climate are irrelevant for this calculation since only fan power is included and no added heating or cooling. The values calculated for RX 070 and RX 080 are 25 500 and 27 400 kWh/year respectively. And just like the end of life was estimated with European electricity, the same assumption was made here since most products end up within Europe.

Scenario	Parameter	Unit / description	RX 080
Design airflow rate (100%)	Design airflow rate	m^3/s	5.4
	Operating hours	hrs./year	1404
	External static pressure (on supply)	Pa	235
	External static pressure (on extract)	Pa	235
Airflow rate (75%)	Design airflow rate	m^3/s	4.05
	Operating hours	hrs./year	1612
	External static pressure (on supply)	Pa	140
	External static pressure (on extract)	Pa	140
Airflow rate (50%)	Design airflow rate	m^3/s	2.7
	Operating hours	hrs./year	1612
	External static pressure (on supply)	Pa	90
	External static pressure (on extract)	Pa	90
Airflow rate (25%)	Design airflow rate	m^3/s	1.35
	Operating hours	hrs./year	2392
	External static pressure (on supply)	Pa	85
	External static pressure (on extract)	Pa	85
Airflow rate (0%)	Design airflow rate	m^3/s	0
	Operating hours	hrs./year	1712
	External static pressure (on supply)	Pa	-
	External static pressure (on extract)	Pa	-
Operating hours weighted mean airflow rate		m^3/s	2.48
Operating hours weighted mean external static pressure*		Pa	207

*The pressure is calculated based on annual average SFP (Specific Fan Power) from all sold RX models in 2023. The annual average SFP is 1.6 kW / m3 * s.

Furthermore, some filter components need to be replaced (B4). The remaining B-modules do not contribute to any impact.

Modelling of End-Of-Life (C1-C4)

Module C consists of Deconstruction, Demolition (C1), Transport (C2), Waste processing (C3), and Disposal (C4). The deconstruction of the AHU (C1) follows the processes adopted for steel elements and was modeled based on literature values. The entire product was assumed to be demolished. The waste processing scenario for the AHU (C3) represents the most likely scenario based on current practices and technologies available in Europe. The scope of the EPD is global, but Swegon's main market to which they sell products is Europe, and therefore an end-of-life scenario that is valid for the European region was chosen. To develop the waste scenario the material content of the AHU was analyzed. The metal share of the products and more specifically the steel and aluminium, is assumed to be recycled. The recycling rate applied for these metals was 85% based on literature data. Polymer components are assumed to be incinerated with energy recovery assuming both electricity and heat recovery. Insulation material is landfilled (C4). Other materials as well as the non-recyclable part of steel and aluminium is inertly incinerated without energy recovery (C3).

Based on the above information, the end-of-life scenario applied is given in the following table:

Waste stream	Scenario	Waste (kg/finished product)	Source for scenario
The entire product after use	Recycling of steel (C3)	1600	Assumption
	Recycling of aluminium (C3)	313	
	Recycling of electronics (C3)	143	
	Incineration of polymers with energy recovery (C3)	43	
	Landfilling of insulation material (C4)	44	
	Other waste for inert waste incineration (C3)	339	

Modelling of benefits beyond End-Of-Life (D)

For module D, the benefits from the recovered and recycled waste streams are accounted. Each recycled waste stream is credited with the avoided production of the virgin raw material, or in the case of waste incineration with energy recovery, with the avoided production of electricity and heat.

The recycled steel and aluminium are credited with the avoided production of virgin raw material that would be displaced if recycled. The steel was assumed to consist of 12.7 % scrap (based on an average value presented by Worldsteel) which therefore was subtracted before crediting. Aluminium was assumed to consist of 0 % scrap since primary aluminium was used in the modelling. Furthermore, the material yield, between point of end of waste and point of substitution have been accounted for. For steel it is already included in the dataset for value of scrap and for aluminium a remelting process has been added.

The heat and electricity corresponded to the incineration process avoid production of European district heating mix and European electricity.

Content information

Here information on the material content of the AHU is provided. Content declaration includes the declared unit of product and the associated packaging material; therefore, the gross material weight is larger than 2482 kg.

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/declared unit
Steel	1834.0-1884.8	0	0 resp. 0
Aluminium	340.0-367.9	0	0 resp. 0
Polymers	42.6-42.9	0	0 resp. 0
Electric components	108.3-142.7	0	0 resp. 0
Stone wool	44.0	0	0 resp. 0
Other	0.16	0	0 resp. 0
TOTAL	**2369-2482**		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/declared unit**
Plastic film	4	0.2	
TOTAL	**4**		

No substances that appear in the REACH candidate list of SVHC (Candidate List of Substances of Very High Concern) are present or used in the product concerning this EPD.

Environmental information

Main environmental information

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. Furthermore, usage of results of modules A1-A3 without considering the results of module C is not encouraged.

Potential environmental impact – mandatory indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	B1-B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	1.62E+04	1.01E+02	1.20E+01	0.00E+00	8.04E+01	0.00E+00	8.68E+03	0.00E+00	1.06E+00	2.76E+01	1.13E+02	3.14E+01	-5.16E+03
GWP-total	kg CO_2 eq.	1.62E+04	1.02E+02	1.20E+01	0.00E+00	8.04E+01	0.00E+00	8.68E+03	0.00E+00	1.07E+00	2.78E+01	1.13E+02	3.14E+01	-5.15E+03
GWP-fossil	kg CO_2 eq.	1.62E+04	1.01E+02	1.20E+01	0.00E+00	8.00E+01	0.00E+00	8.58E+03	0.00E+00	1.06E+00	2.75E+01	1.13E+02	3.12E+01	-5.15E+03
GWP-biogenic	kg CO_2 eq.	1.01E+01	2.94E-01	2.79E-04	0.00E+00	3.41E-01	0.00E+00	1.02E+02	0.00E+00	3.44E-03	8.87E-02	4.75E-02	1.24E-01	1.61E-01
GWP-luluc	kg CO_2 eq.	6.27E+00	8.83E-01	2.47E-05	0.00E+00	2.25E-02	0.00E+00	9.24E-01	0.00E+00	8.95E-03	2.31E-01	4.93E-02	2.79E-02	-5.51E-01
ODP	kg CFC-11 eq.	1.02E-04	1.73E-07	3.27E-13	0.00E+00	9.98E-11	0.00E+00	1.57E-07	0.00E+00	1.40E-16	3.60E-15	3.15E-11	1.27E-10	-2.04E-08
AP	mol H^+ eq.	6.92E+01	6.40E-01	1.96E-03	0.00E+00	1.15E-01	0.00E+00	1.81E+01	0.00E+00	7.50E-03	9.16E-02	4.63E-02	6.51E-02	-2.09E+01
EP-freshwater	kg P eq.	2.62E+00	3.19E-03	1.72E-07	0.00E+00	2.21E-04	0.00E+00	3.18E-02	0.00E+00	3.25E-06	8.37E-05	2.71E-05	1.38E-04	-1.82E-03
EP-marine	kg N eq.	1.25E+01	1.62E-01	3.80E-04	0.00E+00	3.37E-02	0.00E+00	4.33E+00	0.00E+00	3.72E-03	4.21E-02	1.87E-02	2.81E-02	-3.19E+00
EP-terrestrial	mol N eq.	1.36E+02	1.84E+00	8.95E-03	0.00E+00	3.60E-01	0.00E+00	4.53E+01	0.00E+00	4.11E-02	4.72E-01	2.28E-01	3.00E-01	-3.29E+01
POCP	kg NMVOC eq.	3.98E+01	4.68E-01	1.03E-03	0.00E+00	1.39E-01	0.00E+00	1.15E+01	0.00E+00	7.10E-03	8.24E-02	5.14E-02	7.45E-02	-1.06E+01
ADP-minerals & metals*, **	kg Sb eq.	7.42E-01	1.42E-04	4.42E-09	0.00E+00	1.43E-05	0.00E+00	1.31E-03	0.00E+00	8.32E-08	2.15E-06	6.95E-06	1.88E-06	-6.64E-03
ADP-fossil*	MJ	1.73E+05	1.36E+03	1.81E+00	0.00E+00	2.32E+03	0.00E+00	1.78E+05	0.00E+00	1.46E+01	3.75E+02	1.72E+02	5.13E+02	-5.58E+04
WDP*	m^3	3.48E+03	3.85E+00	1.12E+00	0.00E+00	7.09E+00	0.00E+00	1.87E+03	0.00E+00	9.49E-03	2.45E-01	1.14E+01	4.47E+01	-8.53E+02
Acronyms	*GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption*													

[1] *The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.*

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

*** Disclaimer: The results of the impact category abiotic depletion of minerals and metals may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

Use of resources

Indicator	Unit	A1-A3	A4	A5	B1-B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	2.07E+04	1.18E+02	4.52E-01	0.00E+00	1.06E+02	0.00E+00	1.07E+05	0.00E+00	8.12E-01	2.09E+01	2.30E+01	1.99E+02	-1.39E+04
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.07E+04	1.18E+02	4.52E-01	0.00E+00	1.06E+02	0.00E+00	1.07E+05	0.00E+00	8.12E-01	2.09E+01	2.30E+01	1.99E+02	-1.39E+04
PENRE	MJ	1.71E+05	1.36E+03	1.81E+00	0.00E+00	1.40E+03	0.00E+00	1.78E+05	0.00E+00	1.46E+01	3.76E+02	1.72E+02	5.13E+02	-5.58E+04
PENRM	MJ	1.75E+03	0.00E+00	0.00E+00	0.00E+00	9.16E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.22E+03	0.00E+00	0.00E+00
PENRT	MJ	1.73E+05	1.36E+03	1.81E+00	0.00E+00	2.32E+03	0.00E+00	1.78E+05	0.00E+00	1.46E+01	3.76E+02	1.72E+02	5.13E+02	-5.58E+04
SM	kg	3.07E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.60E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.88E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.09E+02	2.03E-01	2.64E-02	0.00E+00	3.54E-01	0.00E+00	8.57E+01	0.00E+00	9.30E-04	2.40E-02	2.77E-01	1.14E+00	-4.81E+01
Acronyms	*PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water*													

The method used for separating the use of primary energy into energy used as raw material and energy used as energy carrier is option B in PCR.

Waste production and output flows

Waste production

Indicator	Unit	A1-A3	A4	A5	B1-B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	9.82E-04	5.44E-08	0.00E+00	0.00E+00	2.36E-07	0.00E+00	0.00E+00	0.00E+00	7.34E-10	1.89E-08	3.79E-10	0.00E+00	-2.33E-05
Non-hazardous waste disposed	kg	1.69E+03	2.53E-01	9.32E-02	0.00E+00	9.04E-01	0.00E+00	1.31E+02	0.00E+00	2.16E-03	5.58E-02	9.75E+00	1.31E+02	-4.66E+02
Radioactive waste disposed	kg	1.12E+00	1.75E-03	1.34E-04	0.00E+00	5.34E-02	0.00E+00	2.83E+01	0.00E+00	1.76E-05	4.55E-04	3.38E-03	6.05E-02	-2.01E+00

Output flows

Indicator	Unit	A1-A3	A4	A5	B1-B3	B4	B5	B6	B7	C1	C2	C3	C4	D
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	9.08E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E+03	0.00E+00	0.00E+00
Material 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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E+02	0.00E+00	0.00E+00
Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E+02	0.00E+00	0.00E+00

Extra environmental information

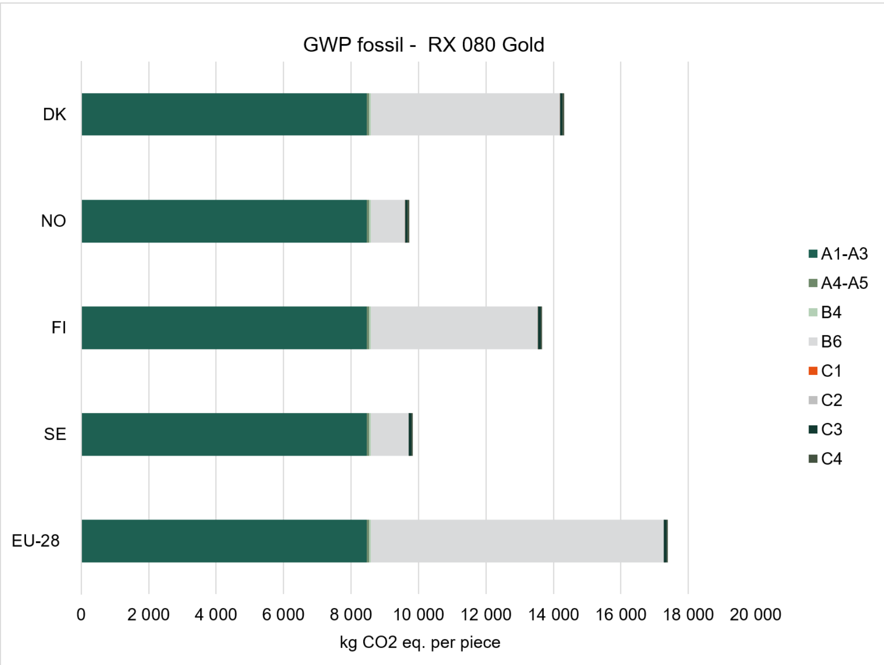
The results provided in the section above are representative of the global scope of the EPD. However, since the B6 module has a large impact on the total results, some extra results are provided for this module for all mandatory environmental impact categories in the table below.

The extra results represent switching the electricity used in module B6 to either Danish, Finnish, Norwegian, or Swedish electricity. The rest of the modules have identical results and are excluded from this table.

		Module B6				
PARAMETER	UNIT	DK	FI	NO	SE	EU-28
GWP-GHG	kg CO_2 eq.	5.60E+03	4.95E+03	1.01E+03	1.12E+03	8.68E+03
GWP-total	kg CO_2 eq.	5.60E+03	4.95E+03	1.01E+03	1.12E+03	8.68E+03
GWP-fossil	kg CO_2 eq.	5.55E+03	4.93E+03	1.00E+03	1.11E+03	8.58E+03
GWP-biogenic	kg CO_2 eq.	5.35E+01	2.17E+01	2.70E+00	4.71E+00	1.02E+02
GWP-luluc	kg CO_2 eq.	1.17E+00	8.27E-01	1.22E-01	3.73E-01	9.24E-01
ODP	kg CFC-11 eq.	1.39E-07	1.18E-08	6.93E-09	2.07E-08	1.57E-07
AP	mol H^+ eq.	1.04E+01	2.09E+01	9.63E-01	3.66E+00	1.81E+01
EP-freshwater	kg P eq.	4.43E-02	9.42E-03	2.92E-03	2.38E-02	3.18E-02
EP-marine	kg N eq.	3.49E+00	4.60E+00	3.15E-01	1.35E+00	4.33E+00
EP-terrestrial	mol N eq.	3.36E+01	4.95E+01	3.19E+00	1.17E+01	4.53E+01
POCP	kg NMVOC eq.	8.12E+00	1.33E+01	7.89E-01	2.94E+00	1.15E+01
ADP-minerals & metals	kg Sb eq.	2.28E-03	4.95E-04	6.09E-04	6.42E-04	1.31E-03
ADP-fossil	MJ	7.44E+04	1.54E+05	1.47E+04	1.20E+05	1.78E+05
WDP	m^3	6.54E+02	5.14E+02	2.02E+02	9.34E+02	1.87E+03

The environmental impact category GWP-fossil was selected for a more detailed analysis, the changes for the other impact categories are seen in the table above. Note that European electricity is not the worst in all impact categories.

Additionally, a graph presenting the total results from A-C for the European electricity mix (at the bottom) compared to the Danish, Norwegian, Finnish, and Swedish electricity mixes in B6 is presented below. This graph illustrates how the importance of the use phase changes depending on which type of electricity is used. Note that the results presented below are for 1 year of use.



Variation between products

This EPD covers the products GOLD and SILVER C RX of sizes 070 and 080. The product can have different configurations and one of these configurations is the material and size of the rotary heat exchanger in the air handling unit. To declare the worst-case results the configuration with the heaviest rotary heat exchanger and with the worst material was chosen (aluminium with Chinese origin and with sorption coating). It is however mandatory to declare the variation in results and therefore a calculation was made where instead the lower weight of the rotary heat exchanger and with the best material choice was made (aluminium with European origin and no coating). The variation results are shown in the table below. As a clarification, the best case is SILVER C RX 070 with a standard rotary heat exchanger, and the worst case is GOLD RX 080 with a sorption rotary heat exchanger.

Indicator	Unit	Results of declared product (A-C)	Results of the best variant (A-C)	Variation (%)
GWP-GHG	kg CO_2 eq.	2.53E+04	2.38E+04	6%
GWP-total	kg CO_2 eq.	2.53E+04	2.38E+04	6%
GWP-fossil	kg CO_2 eq.	2.51E+04	2.37E+04	6%
GWP-biogenic	kg CO_2 eq.	1.13E+02	1.05E+02	8%
GWP-luluc	kg CO_2 eq.	8.40E+00	7.33E+00	14%
ODP	kg CFC-11 eq.	1.02E-04	7.60E-05	30%
AP	mol H^+ eq.	8.86E+01	8.21E+01	8%
EP-freshwater	kg P eq.	2.65E+00	1.97E+00	29%
EP-marine	kg N eq.	1.71E+01	1.59E+01	8%
EP-terrestrial	mol N eq.	1.85E+02	1.72E+02	8%
POCP	kg NMVOC eq.	5.22E+01	4.85E+01	7%
ADP-minerals & metals	kg Sb eq.	7.43E-01	5.55E-01	29%
ADP-fossil	MJ	3.55E+05	3.32E+05	7%
WDP	m^3	5.37E+03	5.02E+03	7%

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	Negligible
Biogenic carbon content in packaging	kg C	0

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2

Additional information

All production plants in Sweden are certified according to ISO 9001 for many years and working constantly with improved and more efficient processes. Which also results in less waste, of both raw materials and purchased components. The production sites are as well, for many years, certified according to ISO 14001. That means that focus is always on environmental aspects as well as in improved environmental target areas. The waste that is generated is sorted into separate fractions and then recycled or energy recovered as far as possible. All storage and handling of waste is according to European waste law as well as national regulation. Risk assessments are carried out continuously regarding the external environment, work environment and quality. Risk assessments are done in the whole process (development, production, delivery and assembly). Some of the products are possible to reuse or/and disassembly, especially the modular products with the possibility of variation during modulation and are easy to clean for reusability.

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