Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:
GOLD RX 011/012 – SILVER C RX 011/012
from
Swegon Group AB

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Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)	
Product category rules (PCR): PCR 2019:14 Construction products. Version 1.11, date 2021-02-05	
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	
Third party verifier: Bureau Veritas Sverige AB Accredited by: SWEDAC, accreditation nr 1236	
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Company information

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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 16 production plants in Europe, North America and India. The company employs more than 2 600 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 011/012 and SILVER C RX 011/012

Product identification

The table below provides information on the representative product GOLD RX 012. The results presented in this EPD are calculated for this specific configuration.

Product	Weight (kg)	Product dimensions (LxWxH)	Product related standards and certifications:
GOLD RX 012	488	1859 x 1199 x 1295mm	• 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 their 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 being 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 makes 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 011/012 is 488 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 material and electronic components. AHUs are expected to be used for 20 years before they reach end of life.

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 011 or 012 variants.
- inclusion or exclusion of control equipment noted as "Gold" or "Silver C" respectively
- two variants of aluminium found in the rotor (coated and non-coated)

To investigate whether all these configurations could be included in this EPD, different product cases provided by Swegon were modelled and compared. The results indicated that in terms of the Global Warming Potential indicator (GWP) and greenhouse gas (GHG) emissions the difference among the different products and configurations tested was lower than 10% which allows grouping according to the PCR followed in this EPD.

The data and results presented in this EPD refer to the reference product GOLD RX 012 (in this specific configuration) 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.

Products included in the EPD

Product name	Weight (kg)	Control Equipment	Aluminium in rotor
GOLD RX 012	488	Control equipment included	No coating
	491		Epoxy coating
GOLD RX 011	466	Control equipment included	No coating
	471		Epoxy coating
SILVER C RX 012	484	Control equipment excluded	No coating
	487		Epoxy coating
SILVER C RX 012	465	Control equipment excluded	No coating
	467		Epoxy coating

UN CPC code

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

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 011/012 and SILVER C RX 011/012** The notation 011 or 012 refers to two different sizes of the model. The notation "GOLD" or "SILVER" 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 2020. The data from generic databases are from 2014 – 2021. No data used is older than 10 years.

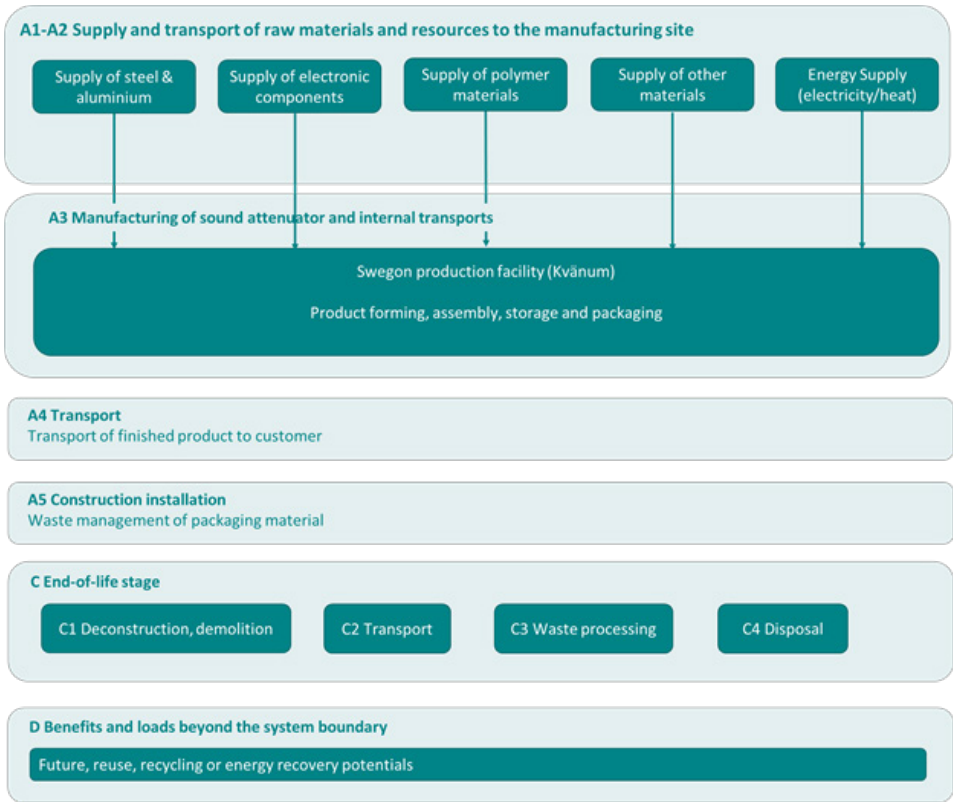
Database(s) and LCA software used

Databases used are mainly from Sphera's own database from 2021 as well as from the Ecoinvent database v3.7.1 (2019). The LCA software used is GaBi version 10.

Description of system boundaries

This LCA is a "Cradle to gate with modules C1-C4, module D and optional modules". More specifically it includes modules A1-A3, A4, A5 (only when it comes to waste management of packaging material) C (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)*	MNA	MNA	MNA	MNA	MNA	MNA	MNA	X	X	X	X	X
Geography	EU, Asia	EU, Asia	SE	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	2.5%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation -sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

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

Allocation

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 2020 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 %.

Modelling of transportation modules

Transportation processes included in this EPD consist of the transport of raw materials and its 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 in Europe (including Sweden and the Nordic countries). A distribution scenario based on yearly average sale volumes has been provided by Swegon. This scenario considers transport by road and boat.

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 process such as internal transports. Electricity demand in the facilities is modelled using the site-specific renewable electricity mix that is supplied to Swegon, consisting 100% of hydro power. Biomass based heat is supplied by district heating.

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) represent a most likely scenario based on current practises and technologies available in Sweden or the Nordic region. 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 while the remaining share will also be incinerated (C4).

Based on the above, 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)	316	Assumption
	Recycling of aluminium (C3)	41	
	Recycling of electronics (C3)	38	
	Incineration of polymers with energy recovery (C3)	15	
	Landfilling of insulation material (C4)	15	
	Other waste for inert waste incineration	64	

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 is credited with the avoided production of virgin raw material that would be displaced if recycled. A loss factor of 15 % for steel was applied to the benefits from the recycling waste streams since losses exits in the recycling process. Furthermore, 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 a primary aluminium was used in the modelling.

The avoided heat and electricity corresponded to process steam from natural gas and European average 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 488 kg.

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Steel	371.8	12.7	0
Aluminium	48.4	0	0
Polymers	14.5	0	0
Electric components	37.8	0	0
Insulation material	15.0	0	0
Other	0.8	0	0
TOTAL	**488.3**		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Wodden pallet	37	7.6	
Plastic film	2	0.4	
TOTAL	**39**		

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

Potential environmental impact – mandatory indicators according to EN 15804

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	2.45E+03	2.41E+03	2.40E+01	1.81E+01	1.61E+01	6.89E+00	1.61E-01	4.25E+00	3.73E+01	5.64E+00	-8.14E+02
GWP-total	kg CO_2 eq.	2.46E+03	2.47E+03	2.47E+01	-3.76E+01	1.65E+01	6.60E+01	1.66E-01	4.38E+00	3.75E+01	6.00E+00	-8.39E+02
GWP-fossil	kg CO_2 eq.	2.52E+03	2.47E+03	2.43E+01	1.85E+01	1.63E+01	6.93E+00	1.63E-01	4.30E+00	3.75E+01	5.98E+00	-8.37E+02
GWP-biogenic	kg CO_2 eq.	-5.46E+01	1.32E+00	1.85E-01	-5.61E+01	1.47E-01	5.91E+01	1.60E-03	4.21E-02	2.65E-03	1.25E-02	-1.07E+00
GWP-luluc	kg CO_2 eq.	1.66E+00	1.46E+00	1.48E-01	4.80E-02	1.22E-01	5.79E-04	1.35E-03	3.54E-02	8.71E-03	7.80E-03	-8.91E-02
ODP	kg CFC-11 eq.	4.19E-05	4.18E-05	3.00E-15	1.18E-07	2.06E-15	4.57E-15	2.10E-17	5.52E-16	1.39E-14	3.64E-14	-2.59E-09
AP	mol H^+ eq.	1.05E+01	1.02E+01	1.89E-01	7.66E-02	7.78E-02	1.23E-02	9.47E-04	1.31E-02	1.49E-02	1.21E-02	-2.84E+00
EP-freshwater	kg P eq.	7.24E-01	7.23E-01	5.49E-05	1.74E-04	4.47E-05	1.57E-06	4.88E-07	1.28E-05	4.75E-06	2.48E-05	-2.86E-04
EP-marine	kg N eq.	2.08E+00	1.96E+00	8.62E-02	3.00E-02	2.31E-02	3.06E-03	4.64E-04	6.02E-03	6.30E-03	5.23E-03	-4.60E-01
EP-terrestrial	mol N eq.	2.29E+01	2.16E+01	9.50E-01	3.30E-01	2.57E-01	5.29E-02	5.13E-03	6.73E-02	7.65E-02	5.57E-02	-4.90E+00
POCP	kg NMVOC eq.	6.63E+00	6.31E+00	2.14E-01	1.10E-01	5.95E-02	8.21E-03	8.93E-04	1.18E-02	1.83E-02	1.40E-02	-1.62E+00
ADP-minerals & metals	kg Sb eq.	1.92E-01	1.92E-01	1.59E-06	2.22E-06	1.18E-06	9.23E-08	1.25E-08	3.29E-07	1.33E-06	6.86E-07	-1.24E-03
ADP-fossil*	MJ	3.01E+04	2.94E+04	3.26E+02	3.33E+02	2.16E+02	1.51E+01	2.19E+00	5.75E+01	3.49E+01	9.46E+01	-9.26E+03
WDP	m^3	7.08E+02	7.06E+02	1.67E-01	1.91E+00	1.32E-01	7.16E+00	1.43E-03	3.75E-02	3.99E+00	8.42E+00	-1.33E+03
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.*

Use of resources

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	5.50E+03	4.78E+03	1.37E+01	7.01E+02	1.12E+01	3.62E+00	1.22E-01	3.21E+00	4.61E+00	3.18E+01	-1.66E+03
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
PERT	MJ	5.50E+03	4.78E+03	1.37E+01	7.01E+02	1.12E+01	3.62E+00	1.22E-01	3.21E+00	4.61E+00	3.18E+01	-1.66E+03
PENRE	MJ	2.97E+04	2.90E+04	3.26E+02	4.20E+02	2.16E+02	1.51E+01	2.19E+00	5.76E+01	3.49E+01	9.46E+01	-9.26E+03
PENRM	MJ	3.81E+02	4.68E+02	0.00E+00	8.66E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.01E+04	2.95E+04	3.26E+02	3.33E+02	2.16E+02	1.51E+01	2.19E+00	5.76E+01	3.49E+01	9.46E+01	-9.26E+03
SM	kg	3.18E+01	3.18E+01	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	4.47E-22	4.47E-22	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	5.25E-21	5.25E-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
FW	m^3	2.40E+01	2.39E+01	1.58E-02	7.34E-02	1.28E-02	1.71E-01	1.40E-04	3.68E-03	9.55E-02	2.16E-01	-3.46E+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.*											

Waste production

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.04E-03	1.04E-03	1.27E-08	7.06E-06	1.02E-08	2.17E-09	1.10E-10	2.90E-09	3.70E-09	1.57E-08	-2.02E-06
Non-hazardous waste disposed (NHWD)	kg	1.92E+02	1.89E+02	4.43E-02	2.67E+00	3.13E-02	9.16E-01	3.26E-04	8.56E-03	3.52E+00	2.39E+01	-4.27E+01
Radioactive waste disposed (RWD)	kg	4.13E-01	3.99E-01	3.83E-04	1.33E-02	2.60E-04	1.29E-03	2.65E-06	6.97E-05	8.20E-04	1.15E-02	-2.76E-01

Output flows

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use (CRU)	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
Materials for recycling (MFR)	kg	1.88E+02	0.00E+00	0.00E+00	1.88E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E+02	0.00E+00	0.00E+00
Material for energy recovery (MER)	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
Exported electrical energy (EEE)	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	8.05E+01	0.00E+00	0.00E+00
Exported thermal energy (EET)	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	1.45E+02	0.00E+00	0.00E+00

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	18.5

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 hole process (development, production, delivery and assembly). Some of the products are possible the 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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