Environmental Product Declaration

In accordance with ISO 14025 and EN 15804: 2012+A1:2013 for:

CLIMATE RECOVERY DUCTS

From:

Climate Recovery Ind AB

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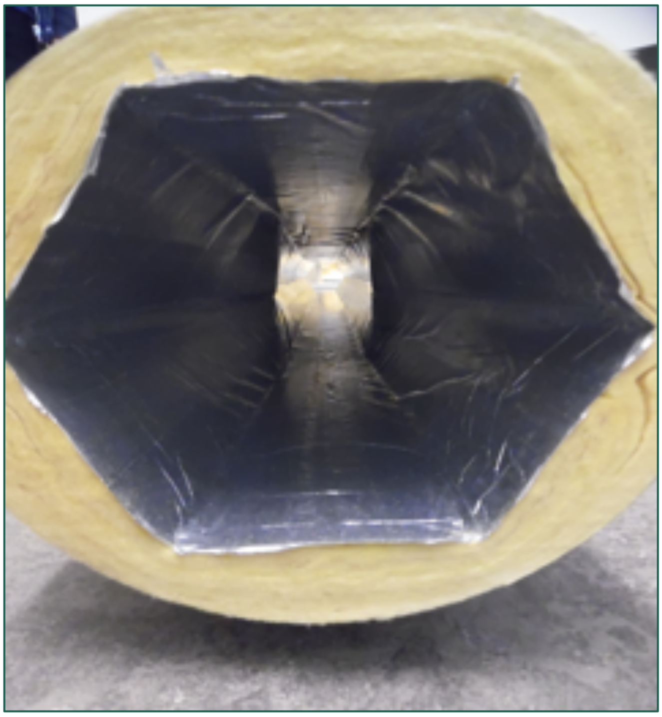

Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com

Product category rules (PCR): PCR 2012:01. Construction products and construction services. Version 2.3. of 2018-11-15
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Company information

Owner of the EPD:
Climate Recovery Ind AB

Description of the organisation:
Climate Recovery is a platform for sustainable solutions in ventilation systems, starting at our Innovation Lab in Kalmar, Sweden. Through continued development by our dedicated team of engineers and current production of the CR Duct System, we are improving our existing product lines and designing machinery for the next generation of sustainable ventilation products.

The purpose of Climate Recovery is to develop new technology and establish new products to global HVAC ductwork markets that offer sustainable benefits to the environment, building industry, and end user. New laws are being passed, new practices are being adopted and therefore new products are needed. We are the future of sustainable HVAC ductwork.

We offer better uses for limited resources. There are more important applications for sheet metal than to simply move air. When other ductwork options are possible, especially those that consist of sustainable materials, limited resources should be preserved. Climate Recovery pushes everyone to explore these alternatives, regardless of location or industry, all around the world.

We also offer ventilation system LCC savings. HVAC systems account for up to 50% of a building's annual energy usage. The CR Duct System offers the ability for decreased energy cost in buildings through maintaining consistent temperature, pressures, and tightness, delivering both decreased costs and better Life Cycle Costs (LCC) for the building. Oh, and we'll throw in lower noise level of your system for free.

Product information

Product name:
Climate Recovery (CR) Ducts

Production site:
Torsåsgatan 3B, 39 239, Kalmar (Sweden)

UN CPC code:
41536 Tubes, pipes and tube or pipe fittings, of aluminium

Geographical scope:
Sweden

Application
Climate Recovery (CR) Ducts work as a complete, pre-insulated round ductwork system for heating, ventilation, and air-conditioning (HVAC). CR Ducts and CR Bends, comprising the CR Duct System, have a patented CR aluminium foil on both inside and outside. This works optimally as a condensation prevention barrier. CR Ducts are normally mounted round but can be adjusted in-system as rectangular through a patented internal hexagonal shape, if necessary. The ducts are lightweight, offer flexibility during installation, logistics benefits on site, dimensions consistent with current market standards, are pre-insulated and offer high sound damping properties.

- Labour savings in working time while mounting
- Material savings through a 2-in-1 product
- Consistent mounting quality through pre-insulated ductwork
- Better aesthetics
- Straightforward mechanical and technical design process
- Savings in life cycle costs (LCC)

Today, CR Ducts are installed in all kind of buildings. In office ventilation systems, mostly as supply air ductwork. In residential ventilation systems, mostly for intake and exhaust ductwork.

Technical Data
The most relevant technical information about the product is presented in the table below.

Technical property	Value	Standard of compliance
Tightness class	Class D	EN 1507:2006
Fire class	A2-sl, d0. Fireproof.	EN 13501-1:2018
Pressure nominal Minimum Maximum	 -400 Pa +1000 Pa	
Thermal conductivity (λ)	0,030 W/mK	
Operational temperature Minimum Maximum	 -40°C +60°C	

Placing on the market / Application rules

CR systems can only be used indoors. The CR duct must not be connected to a cooker hood. All technical requirements in the regulations must be followed when using CR systems. The product is CE-marked (ETA 17/1007 of 02/05/2018).

Manufacturing of the product:

The raw material is over 80% from recycled glass from bottles and smashed car windows. Sand and baking soda are added to this mix, which is heated and spun together with a binder to mineral insulation wool. The uncured wool is then formed under pressure and heated to form the different products.

Packaging

The product is packed in polyethylene bags.

Reference service life

The expected service life is at least 30 years. Some in-house stress tests have been carried out but the main reason for this 30-year estimation is the fact that similar duct wall components have been installed for over 50 years without any problem, by rectangular ducting.

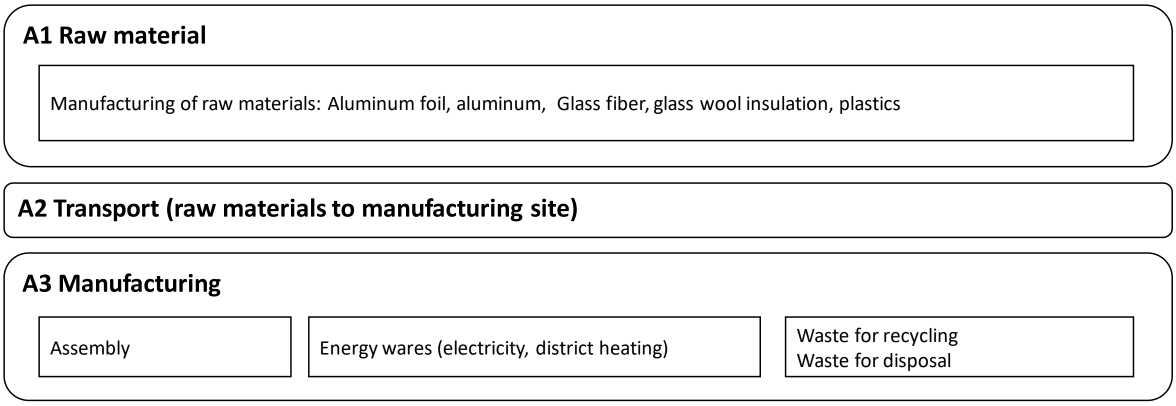
LCA information

Declared unit:
1m² of ventilation ducts with 125mm diameter.

Time representativeness:
The data used to model product manufacturing corresponds to 2019. The data from generic databases are from 2011 – 2018. No data used is older than 10 years.

Database(s) and LCA software used:
Databases used are mainly from Thinkstep´s own database from 2019. The LCA software used is GaBi.

System diagram:



Description of system boundaries:
Cradle-to-gate.

Description of the manufacturing process in A3
The production process comes as follows. The raw material is over 80% from recycled glass from bottles and smashed car windows. Sand and baking soda are added to this mix, which is heated and spun together with a binder to mineral insulation wool. The uncured wool is then formed under pressure and heated to form the different products.

Excluded lifecycle stages:
The life cycle stages included are A1-A3.
The life cycle stages excluded are A4, A5, B1-B7, C1-C4 and D.

Allocation:
No other by-products are produced besides the CR ducts and allocation procedure were therefore not necessary.

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 used:
Site-specific production data has been retrieved for 2019 from the production site. The upstream and downstream processes have been modelled based on data from generic databases, mostly Thinkstep's database.

Cut-off:
The study applies a cut-off criterion of maximum 1% of the material and energy inputs of the system.

Transportation:
The transport of the raw materials to the production site is carried out by EURO6 trucks, and empty return trips have been assumed.

Energy utilities:
Only heat and electricity are used at the final product manufacturing site in Kalmar. The electricity is obtained from the grid and has been modelled using the Swedish residual electricity grid mix in the Thinkstep database. The heat is district heating, and generic data for Swedish district heating has been used to model heat production.

Direct emissions from production site:
No direct emissions are produced at the manufacturing site.

Content declaration

Material content:
The material content (in % weight for the product is glass wool (87%), binding agent (6%), aluminium foil (2,7%), polyethylene foil (2,6%), PET (1,4%) and others (0,3%).

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.

Recycled material:
The product contains recycled material in the glass wool. About 86% of the raw materials for the glass wool are secondary, resulting in 1,52 kilograms of secondary materials per declared unit in the whole product.

Environmental performance

Potential environmental impact per m² of CR ducts

Parameter describing environmental impacts	PRODUCT STAGE			
	Raw material supply (A1)	Transport (A2)	Manufacturing (A3)	Sum of A1-A3
Global warming potential – fossil (GWP) [kg CO_2 eq.]	2.43E+00	9.93E-02	6.66E-01	3.19E+00
Depletion potential of the stratospheric ozone layer (ODP) [kg CFC-11 eq.]	6.64E-15	1.61E-17	2.74E-14	3.41E-14
Acidification potential (AP) [kg SO_2 eq.]	2.60E-03	8.40E-05	2.79E-03	5.47E-03
Eutrophication potential (EP) [kg $(PO_4)^{3-}$ eq.]	1.87E-04	1.60E-05	3.23E-04	5.26E-04
Formation potential of tropospheric ozone (POCP) [kg C_2H_4 eq.]	2.09E-04	-3.13E-06	3.84E-04	5.89E-04
Abiotic depletion potential (ADP-elements) for non-fossil resources [kg Sb eq.]	1.18E-07	7.24E-09	4.09E-07	5.34E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources [MJ]	1.30E+01	1.34E+00	1.01E+01	2.44E+01

Use of resources per m² of CR ducts

Parameter describing environmental impacts	PRODUCT STAGE			
	Raw material supply (A1)	Transport (A2)	Manufacturing (A3)	Sum of A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials [MJ]	8.36E+00	7.54E-02	1.32E+01	2.17E+01
Use of renewable primary energy resources used as raw materials [MJ]	0	0	3.60E-01	3.60E-01
Total use of renewable primary energy resources, sum of two above (PERT) [MJ]	8.36E+00	7.54E-02	1.36E+01	2.20E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials [MJ]	7.68E+01	1.34E+00	4.92E+01	1.27E+02
Use of non-renewable primary energy resources used as raw material [MJ]	2.54E-04	5.04E-05	1.57E-03	1.88E-03
Total use of non-renewable primary energy resources (PENRT), sum of two above [MJ]	7.68E+01	1.34E+00	4.92E+01	1.27E+02
Use of secondary material (SM) [kg]	1.52E+00	0	0	1.52E+00

Parameter describing environmental impacts	PRODUCT STAGE			
	Raw material supply (A1)	Transport (A2)	Manufacturing (A3)	Sum of A1-A3
Use of renewable secondary fuels (RSF) [MJ]	0	0	0	0.00E+00
Use of non-renewable secondary fuels (NRSF) [MJ]	0	0	0	0
Net use of fresh water (FW) [m^3]	8.43E-03	8.74E-05	2.78E-02	3.63E-02

Waste production and output flows

Waste production per m² of CR ducts

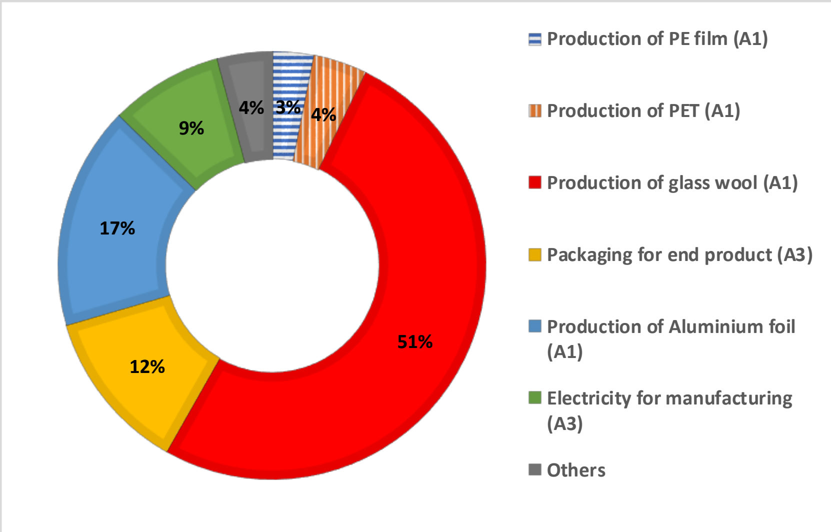
Parameter describing environmental impacts	PRODUCT STAGE			
	Raw material supply (A1)	Transport (A2)	Manufacturing (A3)	Sum of A1-A3
Hazardous waste disposed (HWD) [kg]	6.54E-09	6.25E-08	1.01E-08	7.92E-08
Non-hazardous waste disposed (NHWD) [kg]	1.49E-01	2.06E-04	1.38E-02	1.63E-01
Radioactive waste disposed (RWD) [kg]	5.26E-04	1.66E-06	1.37E-02	1.42E-02

Output flows per m² of CR ducts

Parameter describing environmental impacts	PRODUCT STAGE			
	Raw material supply (A1)	Transport (A2)	Manufacturing (A3)	Sum of A1-A3
Components for re-use [kg]	0	0	0	0
Materials for recycling [kg]	4.22E-03	0	0	4.22E-03
Materials for energy recovery [kg]	0	0	0	0
Exported electrical energy [MJ]	0	0	0	0
Exported thermal energy [MJ]	0	0	0	0

LCA: Interpretation

A detailed contribution analysis is presented in the figure below. As can be observed, the processes with the highest contribution are the process for the glass wool that makes up the filling of the product (51%) and the production of the Aluminium foil (17%). The manufacturing of the packaging of the final product (12%), the generation of electricity for the manufacturing process (9%), the production of PET fibre (4%) and the production of PE film (3%) are also significant contributors. These contributions are somewhat expected based on the weight content of the product. Moreover, the significant contribution from the aluminium foil even as its weight is not relatively high suggests that this is the process with the highest potential for mitigation. The result is plausible given the low content of recycled material, since most of the raw materials are of primary origin.



Additional environmental information

The EPD is a confirmation of absolute numbers. Still, in our everyday work we evaluate the alternatives from the indirect consequences compared to the alternative options. The main alternatives to the CR ducting are sheet metal ducting and other fossil-based types of ducting.

Since climate impact is a global problem, any comparison between products should be carried out from the raw material perspective. There is a shortage of recycled material so even if someone can pay and use recycled material this, will may result in a need for new virgin material in another part of the world. The climate impact of the CR ducting is about 20% of that of sheet metal ducting is causing.

Concerning the transport of the finished products to the building site, the CR ducts are delivered as a folded flat with up to 85 meters of ducting on an europallet. This together with 1/3 of the weight reduces the impact of the transport from the production over the distributer to the building site as well as the handling on the building site.

The pressure drop in the ducting is also crucial for the LCC. The CR ducts have a slightly bigger area compared to the standard dimensions of the round sheet metal ducting. The inner surface has lower friction. The radius of a CR bend is mostly larger, and the CR T-piece has a significantly higher radius. All this results in a lower pressure drop. If 40% of the pressure drop is in the bends and T-pieces, up to 30% less energy consumption can be expected if compared to a normal round sheet metal installation.

The quality of the duct insulation is essential for controlling the distributed air temperature and condensation. For CR ducts, the insulation is in the duct and the density of the insulation is about 60 to 70 kg/m^3, compared to 15-25kg/m^3 for the insulation used today after the duct has been mounted. The higher density results in a lower λ value (0,030W/mK). In addition, the outer vapor tight foil is never penetrated by the CR ducting. The insulation is hermetically contained in a vapor tight foil.

The CR ducting is efficiently dampening any sound. The impact of this sound dampening property is that most of the traditional sound dampers can be avoided, which consist of sheet metal and insulation. This way materials, pressure drop and therefore further environmental impacts can be avoided.

The waste produced at the factory is recycled back in the manufacturing process. The waste produced at the building site by the customer is taken back by the manufacturer for recycling.

The company is in the process of certifying its environmental management system under ISO 14001:2015.

References

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