Statement of Verification

BREG EN EPD No.: 000556 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Duco Ventilation & Sun Control

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

DucoGrille Classic

Company Address

Duco Ventilation & Sun Control
Bedrijvenlaan 2
8630 Veurne
Belgium

Signed for BRE Global Ltd	Emma Baker Operator	04 March 2024 Date of this Issue
04 March 2024 Date of First Issue		03 March 2029 Expiry Date

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Environmental Product Declaration

EPD Number: 000556

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.1
Commissioner of LCA study	**LCA consultant/Tool**
Duco Ventilation & Sun Control Bedrijvenlaan 2 8630 Veurne Belgium	Enperas NV Thorpark 8300 B-3600 Genk Belgium
Declared/Functional Unit	**Applicability/Coverage**
1 m^2 of installed ventilation louvre The weight per reference flow is 15,4 kg.	DucoGrille Classic 20V, DucoGrille Classic 20Z, DucoGrille Classic 45HP, DucoGrille Classic 50/75Z, DucoGrille Classic 50HP, DucoGrille Classic 50Z, DucoGrille Classic 70V DucoGrille Classic 50Z is used as the representative product. A variability study has been done (see further).
EPD Type	**Background database**
Cradle-to-grave	Ecoinvent 3.8 and Industry 2.0

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Pat Hermon
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Duco Ventilation & Sun Control
Bedrijvenlaan 2, 8630 Veurne, Belgium

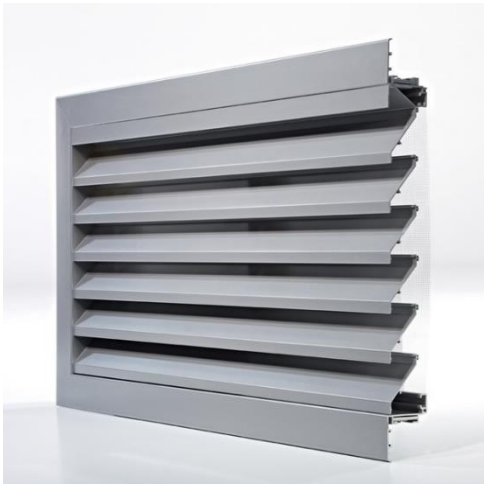
Construction Product:

Product Description

Wall or window louvres, whereby the aluminium louvre blades are locked into place on plastic blade holders with DUCO's patented Turn-Click system. DUCO provides a wide range of louvre blades.

Technical Information

	20Z		20V		50Z 65		50Z 75		45HP		50HP		70V	
	Grille	+ options	Grille	+ options	Grille	+ options	Grille	+ options	Grille	+ options	Grille	+ options	Grille	+ options
Ce	0.203	0.203	0.155	0.149	0.232	0.207	0.239	0.219	0.341	0.295	0.399	0.352	0.117	0.111
Ke	24.27	24.27	41.62	45.04	18.58	23.34	17.51	20.85	8.60	11.49	6.28	8.07	73.05	81.16
Cd	0.174	0.174	0.155	0.149	0.263	0.266	0.278	0.288	0.365	0.369	0.392	0.415	0.109	0.103
Kd	33.03	33.03	41.62	45.04	14.46	14.13	12.94	12.06	7.51	7.34	6.51	5.81	84.17	94.26
Water resistance horizontal														
v = 0 m/s	C	B	A	A	C	A	C	A	C	B	C	B	B	A
v =0,5 m/s	C	B	B	A	C	B	C	B	C	B	C	B	B	B
v = 1 m/s	C	C	C	B	C	B	C	B	D	C	C	B	B	B
v = 1.5 m/s	D	D	D	B	D	C	D	C	D	C	D	C	C	C
v = 2 m/s	D	D	D	C	D	C	D	C	D	C	D	C	D	D
v = 2.5 m/s	D	D	D	D	D	D	D	D	D	C	D	C	D	D
v = 3 m/s	D	D	D	D	D	D	D	D	D	D	D	D	D	D
v = 3,5 m/s	D	D	D	D	D	D	D	D	D	D	D	D	D	D



Main Product Contents

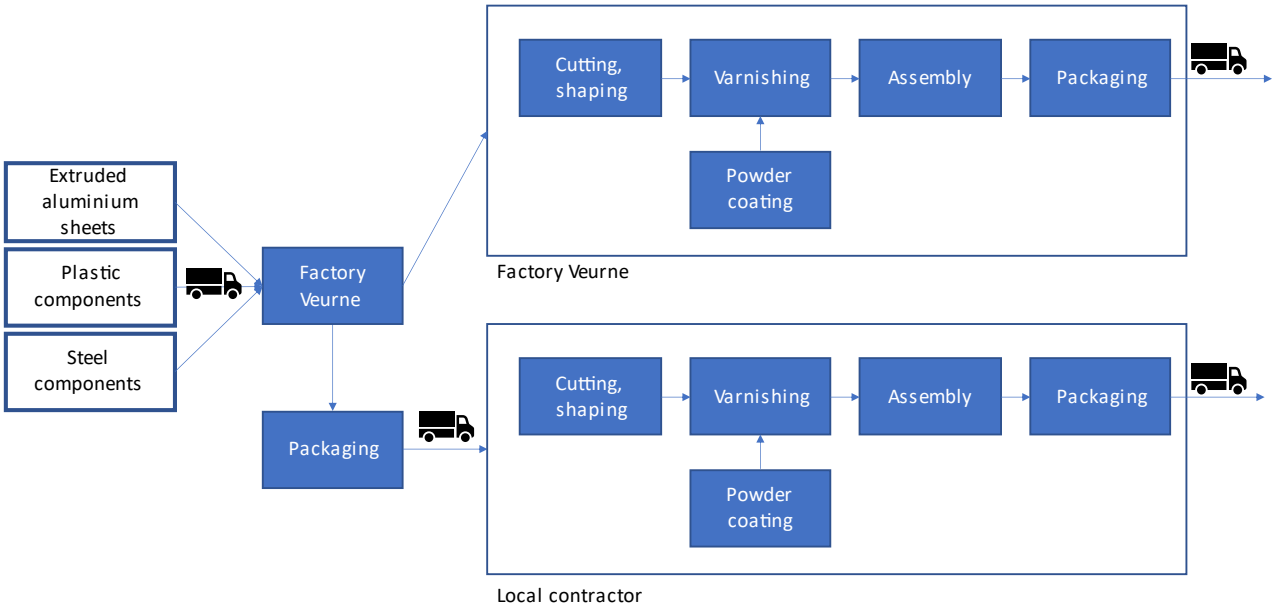
Material/Chemical Input	%
Aluminium (75% recycled content)	+/- 90%
Stainless steel (46% recycled content)	+/- 5%
Plastics	+/- 5%

Manufacturing Process

Raw materials such as extruded aluminium sheets, plastic and steel components are delivered at the factory in Veurne, Belgium. At this point two possible manufacturing routes exist. The components are either processed into the final product at the factory in Veurne or they are further shipped to a local subcontractor in the country of installation, who will process the components into the final product according to DUCO's design and specifications. The processing of the components consists of cutting and forming to correct size and shape, varnishing the aluminium with a powder coating, assembly of the product and packed for transportation. The assembly is depending on the product sometimes performed directly at the installation site.

Note that in the reference model the manufacturing impact is based on the inputs/outputs used in the headquarters in Veurne, Belgium. It is important to consider that the type of operations at the local subcontractors are the same as in DUCO Veurne. Therefore, it can be assumed that the main difference is the electricity mix used. The variability between the electricity mix in Veurne and the UK has been described in the section 'Variability study'.

Process flow diagram



Construction Installation

The distance between Veurne (Belgium) and Manchester (UK) has been used as a representative distance between Veurne and the UK

As these are ordinary 1x1m grids, there is no need to use scaffolding or a cherry picker. The following scenario was adopted: use of a 600-watt electric screwdriver for 3 s per screw (24 screws in total).

Use Information

No emissions arise during the use phase, no maintenance/repair is required under normal conditions of use.

End of Life

The aluminium and steel are 95% recycled and 5% landfilled. The plastic components are 100% incinerated.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description.

1 m^2 of installed ventilation louvre.

The weight per reference flow of the representative product is 15,4 kg.

System boundary

This is a cradle-to-grave EPD

Data sources, quality and allocation

Information on data collection
Manufacturer specific data have been collected for the year 2021.

Company specific data for the production at the factory in Veurne has been collected by Duco and were provided to Enperas through an excel file. The LCI data has been checked by the EPD verifier (Pat Hermon. Enperas uses publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc. Primary data is used for modules A1, A2, A3 and A5. The rest of the study is based on scenarios (modules A4, C1-C4, and module D).

Software
For the calculation of the LCA results, the software program SimaPro 9.3.0.3 (PRé Consultants, 2021) has been used in combination with a specific LCA software program for Duco. This specific LCA tool has been verified by BRE.

Data sources
Ecoinvent 3.8 and Industry 2.0

Electricity from the grid: Electricity, medium voltage {BE}| market for | Cut-off, U
Electricity from own solar panels: Electricity, low voltage {BE}| electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted | Cut-off, U

Aluminium (main impact): recycled content of 75%. For the 25% primary material the European average 'market for' (i.e. including import from outside Europe) datarecord has been used.

Information on allocation
For processes, where allocation is necessary (multiple input or output processes), the allocation procedure described by the European standard EN 15804+A2 has been followed. Furthermore, joint co-production, where the processes cannot be divided, as well as allocation of secondary materials or secondary fuels is not applicable in this study.

- No co-products are produced.
- Allocation of factory data: at DUCO, different products are produced. For the baseline products only facility level data were available for the energy consumption (i.e. electricity, natural gas, diesel …), water use and ancillary materials. The facility level data have been allocated to 1 kg of product by dividing the factory data by the total production volume (approximated by total purchased aluminium). The percentage of production at local subcontractors has also been considered in this calculation.

Cut-off criteria

The following processes are considered below cut-off:

- Ancillary materials at production site
- General waste at production site. Only aluminium waste has been considered, as this is the main waste flow and general waste stream also contains waste from offices, sanitary facilities etc …
- Environmental impacts caused by the personnel of the production plants are not included in the LCA, e.g. waste from the cafeteria and sanitary installations, accidental pollution caused by human mistakes, or environmental effects caused by commuter traffic. Heating or cooling of the plants to ensure a comfortable indoor climate for the personnel for example is also neglected.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts								
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	6,62E+01	6,66E+01	-1,13E+00	6,95E-01	4,54E-06	4,80E-01	3,24E-03
	Transport	A2	2,81E-01	2,80E-01	9,88E-05	1,10E-04	6,49E-08	1,14E-03	1,97E-06
	Manufacturing	A3	8,89E+00	1,32E+01	-4,29E+00	1,92E-02	1,98E-06	2,83E-02	2,37E-04
	Total (Consumption grid)	A1-3	7,54E+01	8,00E+01	-5,41E+00	7,14E-01	6,58E-06	5,09E-01	3,48E-03
Construction process stage	Transport	A4	1,88E+00	1,87E+00	6,71E-04	7,50E-04	4,34E-07	5,32E-03	1,34E-05
	Construction	A5	6,74E+00	1,00E+00	5,72E+00	7,22E-03	1,02E-07	5,97E-03	3,68E-05
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario									
End of life	Deconstruction, demolition	C1	3,81E-03	3,80E-03	2,93E-06	5,24E-06	2,61E-10	1,33E-05	8,15E-08
	Transport	C2	5,50E-01	5,49E-01	1,96E-04	2,20E-04	1,27E-07	1,56E-03	3,92E-06
	Waste processing	C3	4,61E-01	3,37E-01	1,14E-01	3,12E-04	3,97E-08	2,03E-03	1,18E-05
	Disposal	C4	2,40E+00	2,39E+00	6,26E-03	1,63E-04	3,10E-08	1,12E-03	4,63E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2,92E+01	-2,58E+01	-2,86E+00	-4,69E-01	-2,00E-06	-1,72E-01	-1,05E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			EP-marine	EP-terrestrial	POCP	ADP-mineral& metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	5,83E-02	6,62E-01	2,09E-01	1,36E-03	9,50E+02	2,29E+01	4,15E-06
	Transport	A2	3,39E-04	3,75E-03	1,15E-03	7,45E-07	4,24E+00	1,27E-02	2,41E-08
	Manufacturing	A3	7,61E-03	8,03E-02	2,51E-02	6,10E-05	2,70E+02	1,92E+00	4,29E-07
	Total (Consumption grid)	A1-3	6,63E-02	7,46E-01	2,35E-01	1,42E-03	1,22E+03	2,48E+01	4,60E-06
Construction process stage	Transport	A4	1,06E-03	1,18E-02	4,53E-03	5,08E-06	2,84E+01	8,65E-02	1,51E-07
	Construction	A5	9,91E-04	1,07E-02	3,34E-03	1,48E-05	1,48E+01	2,63E-01	6,26E-08
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario									
End of life	Deconstruction, demolition	C1	2,65E-06	3,20E-05	7,94E-06	2,54E-08	9,98E-02	2,19E-04	5,76E-11
	Transport	C2	3,10E-04	3,45E-03	1,33E-03	1,49E-06	8,33E+00	2,53E-02	4,41E-08
	Waste processing	C3	6,26E-04	5,99E-03	1,65E-03	5,90E-06	4,00E+00	4,73E-02	3,08E-08
	Disposal	C4	3,76E-04	4,08E-03	1,10E-03	1,25E-06	1,86E+00	1,83E-01	1,23E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2,27E-02	-2,50E-01	-8,48E-02	2,64E-04	-3,40E+02	-5,39E+00	-2,01E-06

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts							
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	4,48E+00	2,06E+03	1,73E-07	3,45E-06	4,44E+02
	Transport	A2	1,84E-02	3,31E+00	1,07E-10	3,47E-09	2,91E+00
	Manufacturing	A3	1,42E+00	1,69E+02	3,95E-09	1,02E-07	7,06E+02
	Total (Consumption grid)	A1-3	5,91E+00	2,23E+03	1,77E-07	3,56E-06	1,15E+03
Construction process stage	Transport	A4	1,23E-01	2,23E+01	7,17E-10	2,25E-08	1,98E+01
	Construction	A5	7,20E-02	2,92E+01	2,13E-09	3,86E-08	1,40E+01
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario							
End of life	Deconstruction, demolition	C1	1,74E-03	5,83E-02	1,59E-12	4,57E-11	4,41E-02
	Transport	C2	3,61E-02	6,53E+00	2,10E-10	6,60E-09	5,80E+00
	Waste processing	C3	2,15E-02	2,26E+01	5,21E-10	1,00E-08	1,33E+01
	Disposal	C4	8,47E-03	4,47E+02	5,44E-10	9,78E-09	2,56E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1,45E+00	-4,20E+02	-6,04E-08	-7,77E-07	-3,23E+02

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	2,47E+02	1,53E+01	2,62E+02	1,07E+03	5,17E+01	1,13E+03
	Transport	A2	5,88E-02	0,00E+00	5,88E-02	4,26E+00	0,00E+00	4,26E+00
	Manufacturing	A3	1,07E+02	3,80E+01	1,45E+02	2,99E+02	-8,43E+00	2,90E+02
	Total (Consumption grid)	A1-3	3,54E+02	5,32E+01	4,07E+02	1,38E+03	4,33E+01	1,42E+03
Construction process stage	Transport	A4	1,57E-01	0,00E+00	4,00E-01	1,12E+01	0,00E+00	2,86E+01
	Construction	A5	1,66E+01	-3,15E+01	-1,49E+01	1,69E+01	-2,74E-01	1,67E+01
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario								
End of life	Deconstruction, demolition	C1	2,09E-02	0,00E+00	2,09E-02	1,10E-01	0,00E+00	1,10E-01
	Transport	C2	1,17E-01	0,00E+00	1,17E-01	8,37E+00	0,00E+00	8,37E+00
	Waste processing	C3	4,14E-02	0,00E+00	3,93E-01	4,64E-01	0,00E+00	4,40E+00
	Disposal	C4	1,64E-01	0,00E+00	1,84E-01	4,47E+01	-4,27E+01	2,11E+00
Potential benefits and loads beyond the system	Reuse, recovery, recycling potential	D	0,00E+00	2,90E+01	2,90E+01	0,00E+00	3,44E+00	3,44E+00

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	1,15E+01	0,00E+00	0,00E+00	1,86E+00
	Transport	A2	0,00E+00	0,00E+00	0,00E+00	3,07E-04
	Manufacturing	A3	0,00E+00	0,00E+00	0,00E+00	5,95E-02
	Total (Consumption grid)	A1-3	1,15E+01	0,00E+00	0,00E+00	1,91E+00
Construction process stage	Transport	A4	0,00E+00	0,00E+00	0,00E+00	2,09E-03
	Construction	A5	1,15E-01	0,00E+00	0,00E+00	2,04E-02
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario						
End of life	Deconstruction, demolition	C1	0,00E+00	0,00E+00	0,00E+00	1,90E-05
	Transport	C2	0,00E+00	0,00E+00	0,00E+00	6,12E-04
	Waste processing	C3	0,00E+00	0,00E+00	0,00E+00	1,61E-03
	Disposal	C4	0,00E+00	0,00E+00	0,00E+00	1,47E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0,00E+00	0,00E+00	0,00E+00	-5,63E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1,02E-01	1,71E+01	4,19E-03
	Transport	A2	1,11E-05	2,18E-01	2,87E-05
	Manufacturing	A3	6,07E-04	1,66E+00	1,36E-03
	Total (Consumption grid)	A1-3	1,02E-01	1,90E+01	5,58E-03
Construction process stage	Transport	A4	7,42E-05	1,49E+00	1,92E-04
	Construction	A5	1,03E-03	1,83E+00	7,30E-05
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00
Market Scenario					
End of life	Deconstruction, demolition	C1	8,98E-08	2,74E-04	8,73E-07
	Transport	C2	2,17E-05	4,36E-01	5,63E-05
	Waste processing	C3	1,05E-05	2,89E-01	2,51E-05
	Disposal	C4	2,19E-05	1,60E+00	9,56E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2,18E-02	-7,08E+00	-1,37E-03

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Transport	A2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Manufacturing	A3	1,88E-01	5,82E-01	0,00E+00	3,30E+00	0,00E+00	1,67E+00
	Total (Consumption grid)	A1-3	1,88E-01	5,82E-01	0,00E+00	3,30E+00	0,00E+00	0,00E+00
Construction process stage	Transport	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Construction	A5	1,88E-03	1,46E+00	0,00E+00	4,10E+00	0,00E+00	0,00E+00
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Market Scenario								
End of life	Deconstruction, demolition	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Transport	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Waste processing	C3	0,00E+00	1,33E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Disposal	C4	0,00E+00	0,00E+00	0,00E+00	1,28E+01	0,00E+00	0,00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	The distance between Veurne (Belgium) and Manchester (UK) has been used as a representative distance between Veurne and the UK		
	Fuel type / Vehicle type	liter of diesel/km	0.254
	Distance	km	600
	Capacity utilisation (incl. empty returns)	%	Ecoinvent
	Bulk density of transported products	kg/m^3	2710 (density aluminium)
A5 – Installation in the building	As these are ordinary 1x1m grids, there is no need to use scaffolding or a cherry picker. The following scenario was adopted: use of a 600-watt electric screwdriver for 3 s per screw (24 screws in total). The dimensions of the products are made to measure at the manufacturer, and therefore the installation losses are very limited. As a conservative approach and to account for some unexpected losses a percentage of 1% has been declared.		
Reference service life	50 years		
B use phase	No emissions arise during the use phase No maintenance/repair/refurbishment required under normal conditions of use No operational water/energy use.		
C1 to C4 End of life,	The following end-of-life scenario has been assumed: • Aluminium and steel components: 95% recycling and 5% landfill • Plastic components: 100% incineration For the transport to the waste treatment facilities the following distance have been assumed: • From the installation site to the sorting facility: 30 km • From the sorting facility to landfill: 50 km • From the sorting facility to incineration: 150 km • From the sorting facility to recycling: 200 km • In all cases a 16-32 Truck EURO6 is used		
Module D	Recycling of aluminium components • Loads after end-of-waste state: remelting of aluminium scrap into new aluminium alloy • Benefits: avoided impact of virgin aluminium alloy • The amount considered is 3,3 kg. Note that the recycled content of the aluminium used to produce the product under study (75%) is considered by subtracting this from the recycled amount and end-of-life. Recycling of steel components • Loads after end-of-waste state: remelting of steel scrap into new steel ingot • Benefits: avoided impact of virgin steel ingot Energy recovery during incineration of plastics • Avoided impact of production of electricity (UK mix) • Avoided impact of production of heart from natural gas Energy recovery and benefits from recycling of packaging materials are also considered, but are less significant		

Variability study

To prove the representativeness of **DucoGrille Classic 50Z** for the other products included in the scope of the EPD a variability was performed. The analysis shows that the variability is less than +/- 30%, and thus DucoGrille Classic 50Z is representative for the products DucoGrille Classic 20V, DucoGrille Classic 20Z (→ MIN variation -30%), DucoGrille Classic 45HP, DucoGrille Classic 50/75Z, DucoGrille Classic 50HP and **DucoGrille Classic 70V (→ MAX variation +30%)**.

The table below shows an overview of the amount of aluminium components per declared unit for the different products. Note that the amount of aluminium is the most important factor influencing the environmental impact of the product. The variability study showed that the variation in the environmental impact is proportional to the variation in the aluminum content.

Product name	Relative weight of aluminium components compared to the reference product (in %)
DucoGrille Classic 20Z	64%
DucoGrille Classic 20V	77%
DucoGrille Classic 50Z	100% → reference
DucoGrille Classic 50Z/75	93%
DucoGrille Classic 45HP	95%
DucoGrille Classic 50HP	99%
DucoGrille Classic 70V	129%

	DucoGrille Classic 20Z (MIN variation)	DucoGrille Classic 70V (MAX variation)
15804+A2-Climate change	72%	125%
15804+A2-Ozone depletion	69%	127%
15804+A2-Ionising radiation	72%	125%
15804+A2-Photochemical ozone formation	71%	127%
15804+A2-Particulate matter	70%	128%
15804+A2-Human toxicity, non-cancer	73%	124%
15804+A2-Human toxicity, cancer	77%	121%
15804+A2-Acidification	69%	128%
15804+A2-Eutrophication, freshwater	69%	128%
15804+A2-Eutrophication, marine	71%	127%
15804+A2-Eutrophication, terrestrial	70%	127%
15804+A2-Ecotoxicity, freshwater	69%	127%
15804+A2-Land use	72%	133%
15804+A2-Water use	67%	129%
15804+A2-Resource use, fossils	72%	125%
15804+A2-Resource use, mineral, metals	68%	128%

Production at local factories
The products are processed from aluminium sheets to final products at DUCO, Veurne (Belgium), or the sheets are shipped to a local subcontractor at the location of installation (i.e. UK) where it is further processes. Note that in the reference model the manufacturing impact at local subcontractors is extrapolated based on the inputs/outputs used in the headquarters in Veurne, Belgium. In other words, it is assumed that the local factories have the same impact per declared unit. It should be noted that the type of operations at the local subcontractors are the same as in DUCO Veurne, therefore it can be assumed that mainly the difference in electricity mix used will cause the variability.

A variability study from cradle-to-grave (Module A1-C4) between the reference product using 100% electricity mix at the factory in Veurne and a product using 100% UK electricity mix, has been performed in the LCA background report. This exercise showed that the variance is <5%, if the local subcontractors use the same production process and thus same energy consumption as at the production site in Veurne, Belgium.

Interpretation of the results

This EPD shows the environmental profile of 1 m^2 of Duco's classic ventilation louvres. The EPD contains multiple products for which DucoGrille Classic 50Z is used as representative product.

The environmental profile shows that the raw materials have the highest contribution on most impact categories followed by the production process. The other life cycle stages are less significant.

When looking at the raw materials the production of aluminium contributes more than 80% to the environmental impact. During the production process, energy consumption is most relevant.

Outside the system's boundaries, module D shows benefits from the recycling of aluminium, recycling of steel and energy recovery from plastic components. Also recycling and energy recovery of packaging is included in module D but is not significant. As aluminium is the main component of the product, the main benefit in module D comes from recycling of aluminium. Note that to calculate the benefits from recycling in module D the recycled content of the aluminium (75%) used to produce the product under study has been considered by subtracting this from the recycled amount and end-of-life.

References

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