Environmental Product Declaration

Ares

D&V Serramenti

EPD Program: International EPD System (www.environdec.com)

Programme operator: EPD International AB

Reference GPI: General Programme Instructions IES v3.01

Reference standard: ISO 14025 and EN 15804:2012+A2:2019

Reference PCR: PCR 2019:14 v1.0 “Construction products” and C-PCR-007 “Windows and Doors”

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Contents

1. The company and the product

Fundamental values of D&V are: innovation, as research and innovative technologies to guarantee the continuous improvement of environmental solutions and service quality; attention to the environment, which is essential for sustainable economic development. The primary objective of D&V is to constantly improve the effectiveness and efficiency of its structure to respond to customer needs in terms of product quality and the service offered.

The company

In 2001 D&V was born to respond to new market needs, becoming an avant-garde company in the world of PVC frames. In 2006 D&V obtained UNI EN ISO 9001: 2000 certification for Design and Production of PVC exterior doors. The company adopts modern technological production systems and uses profiles of the highest quality, the result of partnerships with an important company in the sector (Schüco), and components by Maico. D&V produces fixtures that adapt to any architectural solution, always guaranteeing excellent acoustic and thermal sealing performance, with the possibility of having a finished product in many finishes and colors.

Product description

Ares has an important 82 mm profile with 7 chambers and single or double chamber glass up to 52 mm, it also has a central fin gasket to increase thermal performance, in compliance with passive house standards. The window is available in two versions of glass (single or double chamber) and frame (elle or zeta), and four types of door (single door window, 2 door window, single door French door and 2 door French door).

For this EPD a Ares window of 1000mm x 1500mm size is chosen, with single-chamber glass, single door and elle-type frame.

Table 1 shows the composition of the Ares window.

	Components	Material	Weight (kg)	Weight (%)
Product	Frame	Steel	5.86	8.25
		PVC	8.47	11.93
		EPDM	0.62	0.87
	Door	Steel	3.82	5.38
		PVC	8.27	11.65
		EPDM	0.50	0.70
	Insulated glazing	Glass	37.5	52.82
		Gas (Argon)	0.05	0.07
		Sealant	0.63	0.89
		Steel	0.07	0.10
		PVC	0.76	1.07
	Spacers	PP	0.08	0.11
	Glass stop	PVC	1.45	2.04
	Metalware	Steel	2.63	3.70
	Accessories	PVC	0.01	0.01
		Aluminum	0.16	0.23
	Screws	Steel	0.11	0.15
Packaging	Pallet	Wood	15	96.34
	Film	Polyethylene (PE)	0.3	1.93
	Support	Polystyrene	0.16	1.03
	Bands	PET	0.07	0.44
	Accessories packaging	Cardboard	0.04	0.26

Table 1: List of Ares materials.

2. Environmental Information

Declared unit

The declared unit is represented by 1m^2 of Ares window, with single-chamber glass, single door and elle-type frame.

System boundaries

This EPD is a "from cradle to gate with options" declaration, therefore the boundaries of the LCA system include the supply of raw materials, the window production process and the waste disposal.

Table 2 shows the phases of the product life cycle and the information modules considered for the scale assessment of buildings according to UNI EN 15804.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				ADDITIONAL INFORMATION
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
raw material supply	transport	manufacturing	Transport from the gate to the site	assembly	use	maintenance	repair	replacement	refurbishment	operational energy use	operational water use	de-construction / demolition	transport	waste processing	disposal	reuse / recovery /recycling potential
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	ND	X	X

Table 1 :Information modules considered for the scale assessment of buildings according to UNI EN 15804.

In this study, the processes upstream of production include the extraction and production of raw materials and their transport, and the generation of primary energy.

Core processes, in reference to the factory, include transportation to the gate of the production site, product manufacture and its packaging.

Processes as construction phase and use phase are not included within the system boundaries of this study.

Processes related to the demolition and of waste processing are not considered due to the lack of site-specific information and the small contribution of the product disassembly phase.

Information about on the potential for reuse / recovery / recycling are assessed considering the benefit of the avoided impact of future extraction and production of raw materials, thanks to recycling of the main materials (glass, PVC, steel). The processes necessary to make the materials new raw materials for next life cycles are considered.

Downstream processes include transporting the window to the waste collection site and its subsequent disposal (Figure 2). The downstream processes not include the disposal of the final packaging.

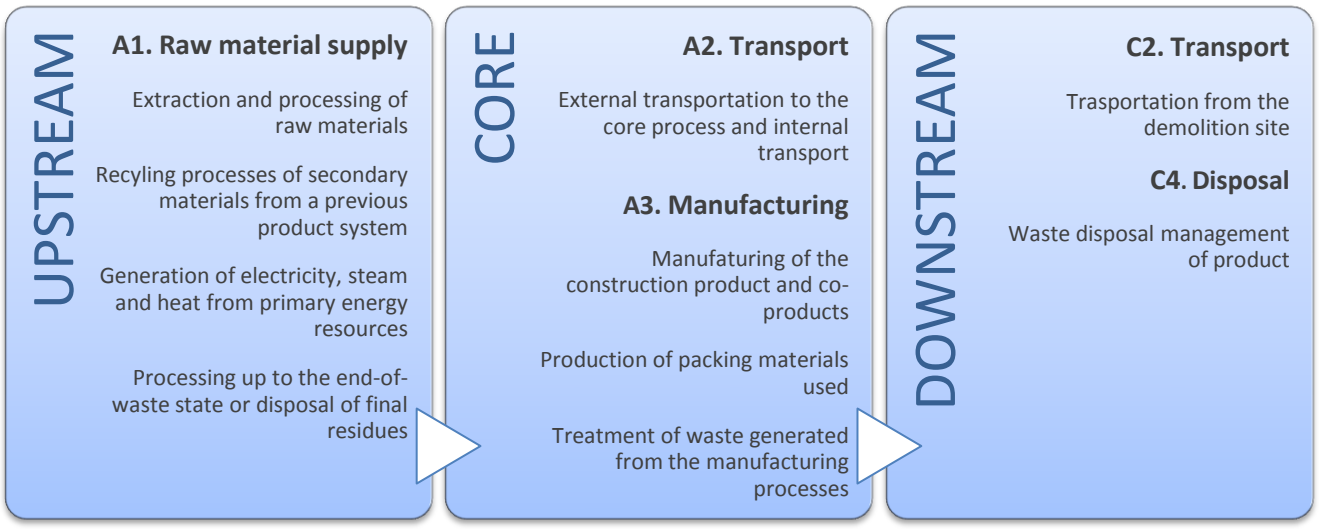

Figure 2: LCA system boundaries.

Time boundaries

Primary data originate from D&V and refer to 2018. Secondary data originate from the ecoinvent v3.5 database (allocation, cut-off by classification) published in 2018.

Geographical boundaries

D&V is located in San Bonifacio in the province of Verona. For the database processes, data relating to the single reference country were selected when available, alternatively data relating to the European or global average situation was used. The energy mix from the ecoinvent database has been modified to make it more representative of the Italian situation, modeling the individual sources on the basis of the supply declared by the bill. The Italian energy sources used originate from the ecoinvent database.

Boundaries in the life cycle

The capital goods (for example machinery and buildings) are not considered in the analysis of the product system as they do not make a significant contribution to the life cycle assessment.

The intermediate packaging of the components and their end of life have also been included in the LCA model. Containers reused for the supply of PVC profiles and glass sheets are not included.

CO_2 emissions

PCR 2019:14 establish four indicators for climate impact (GWP-GHG): GWP (total) which includes all greenhouse gases but excludes biogenic carbon; GWP (fossil fuels); GWP (biogenic carbon) which includes the emissions and absorption of biogenic carbon dioxide and biogenic carbon stored in the product; GWP (land use).

Allocation rules

Raw materials and production processes are included for virgin resources. No allocation is made for recycled materials. Recycled outputs are considered inputs for the next life cycle.

For wooden pallets, subject to internal recovery (closed-loop), the inputs relating to the recovery process and the lack of environmental impacts due to the reuse of the pallet were allocated based on the quantity of pallets replaced annually.

The consumption of the company was allocated considering the whole of 2018 production.

Inventory

This LCA is based on primary data for the fundamental aspects of the study, such as the weights of all the components of the window structure, glass, packaging and company consumption.

For all processes for which primary data were not available, representative data originate from the EPD certifications of Schüco and Arge, as regards the PVC profile and hardware respectively.

For all processes for which primary or representative data were not available, such as the production of raw materials and packaging, the processing of raw materials and packaging, generic data originate from the ecoinvent v3.5 database, allocation cut- off by classification.

The ecoinvent database is available in the SimaPro v9, software used for calculations.

The total consumption for the production of one window was obtained from the declared company consumption.

As required by the PCR 2019: 14 the use of proxy data was limited and their contribution does not exceed 10% of the overall impact of the impact category considered. All the material inputs of the production process were evaluated.

For the transport of the product at the end of its life, a road transport (truck 16-32 t) of 100 km is assumed. For the end of life scenario, average national data ISPRA have been used.

3. Environmental impacts

The table 2 shows the indicators of the environmental impact of the life cycle of 1 m^2 of single-wing Ares window, single-chamber glass.

The environmental indicators indicated by the PCR 2019: 14 v1.0 consist of 19 impact categories (global warming-total, global warming-fossil fuels, global warming-biogenic, global warming-land use, ozone layer depletion, acidification , eutrophication-fresh water, eutrophication-marine, eutrophication terrestrial, photochemical oxidation, abiotic depletion, abiotic depletion-fossil fuel, water use, respiratory inorganics, ionizing radiation, freshwater ecotoxicity, human toxicity-cancer, human toxicity-non-cancer, land use), consumption of resources (renewable and non-renewable), consumption of fresh water and waste.

The indicators are divided into the contribution of the processes to the various product phases: phase A1, relating to the supply of raw materials and packaging (upstream processes), and to phases A2 and A3 (core processes), relating respectively to the transport of raw materials at the production site and the production process, and finally to phases C2 and C4 (downstream processes), relating to the transport and management of the end of life of the product.

Ares 1 m^2, single-chamber glass, single door and elle-type frame	Unità	Totale	A1	A2	A3	C2	C4	D
Global warming (GWP100a)_total	kg CO_2 eq	96.0	79.8	1.2	5.4	0.9	8.7	-14.2
Global warming (GWP100a)_fossil	kg CO_2 eq	96.0	79.7	1.2	5.4	0.9	8.7	-14.2
Global warming (GWP100a)_biogenic	kg CO_2 eq	-3.12	-3.54	0.00	0.19	0.00	0.23	0.065
Global warming (GWP100a)_land use	kg CO_2 eq	0.066	0.062	0.000	0.000	0.000	0.003	0.000
Ozone layer depletion (ODP)	kg CFC $^{-11}$	7.39E-06	5.24E-06	2.31E-07	4.59E-07	1.62E-07	1.30E-06	3.10E-07
Acidification terrestrial and freshwater	mol H^+ eq	0.630	0.581	0.005	0.024	0.004	0.016	-0.034
Eutrophication	kg PO_4^{3-}	0.161	0.132	0.001	0.009	0.001	0.019	-0.006
Eutrophication marine	kg N eq	0.113	0.100	0.002	0.005	0.001	0.006	-0.013
Eutrophication terrestrial	mol N eq	1.31	1.17	0.02	0.06	0.01	0.04	-0.080
Photochemical ozone formation, HH	kg NMVOC eq	0.399	0.371	0.005	0.009	0.004	0.010	-0.076
Abiotic depletion	Kg Sb eq	4.62E-03	4.61E-03	2.26E-06	1.29E-06	2.64E-06	1.01E-05	-2.13E-06
Abiotic depletion (fossil fuels)	MJ	1299	1190	19	50	13	27	-327
Water use	m^3	108	105	0	1	0	2	-61.0
Respiratory inorganics	Disease incidence	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ionising radiation, HH	kBq U235 eq	6.60	5.72	0.10	0.27	0.07	0.45	0.364
Freshwater ecotoxicity	CTUe	1971	1073	4	85	4	805	-37.8
Human toxicity, cancer	CTUh	1.91E-05	1.84E-05	3.08E-08	1.49E-07	2.56E-08	5.78E-07	-1.03E-06
Human toxicity, non-cancer	CTUh	4.39E-05	3.91E-05	2.93E-07	1.41E-06	2.04E-07	2.88E-06	-2.30E-06
Land use	Pt	1151	1070	33	14	13	20	11.2
Renewable resources, energy	MJ	119	109	0	5	0	4	0.641
Renewable resources, materials	MJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Renewable resources, total	MJ	119	109	0	5	0	4	0.641
Non renewable resources, energy	MJ	0.063	0.062	0.000	0.000	0.000	0.000	0.000
Non renewable resources, materials	MJ	1632	1502	20	59	14	36	-445
Non renewable resources, total	MJ	1632	1503	20	59	14	36	-445

Total amount of water*	m^3	275	239	1	13	1	22	23.4
Hazardous waste	kg	3.84	0.41	0.00	0.05	0.00	3.37	-0.477
Radioactive waste	kg	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Non hazardous waste	kg	24.5	12.3	1.6	1.1	0.6	8.8	-0.517

Table 2: Ares environmental impact.

4. Additional environmental information

For the calculation of recyclability, reference to the OECD (Organization for Economic Co-operation and Development) definition of "Recyclability of products", for which the recyclability of each component is calculated as:

$$\frac{\text{Weight of each material (kg) x recyclability rate of the material (\%)}}{\text{Product weight (kg)}} x\ 100$$

Argon gas is considered lost in the atmosphere, while the sealant is not considered recyclable.

The sum of the recyclability of the components allows to calculate the final recyclability of the product: the Ares window with single leaf, single-chamber glass is 99% recyclable.

5. Contact and other information

D&V contact

The LCA and EPD have been produced by D&V in collaboration with 2B Srl (www.to-be.it). The company references are:

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