

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

Powder Coated Aluminium Profiles



Programme: The International EPD[®] System, www.environdec.com

Programme operator: EPD International AB

EPD registration number: S-P-08810

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General Information

The goal of this study is the development of a specific Environmental Product Declaration (EPD) presenting the environmental performance of **Powder Coated Aluminium Profiles** manufactured in **Sanlev Calibre Hellas SA** located in Aspropyrgos during the year 2021. The intended use of EPD aims to inform construction companies, fabricators, architectural industry and designers.

The EPD was developed according to the requirements of EN 15804:2012+A2:2019 and EN ISO 14025. Also, the EPD was developed taking into account the principles of Product Category Rules (PCR) 2019:14 "Construction products" (Version 1.11).

- The EPD owner has the sole ownership, liability, and responsibility for the EPD.
- EPDs within the same product category but from different programmes may not be comparable.
- EPD of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Programme	The International EPD® System Valhallavägen 81, SE 11427 Stockholm, Sweden www.environdec.com
Programme Operator	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden info@environdec.com
Owner of the EPD/ Location of the production site	Sanlev Calibre Hellas SA Lousiou 1, Thesi Tzitzili 193 00, Aspropyrgos, Attiki info@sanlev.gr www.sanlev.gr
LCA Practitioner	Terra Nova Ltd Kaisareias 39, 11527, Athens information@terranova.gr www.terranova.gr
Product Category Rules (PCR)	CEN standard EN 15804 serves as the Core Product Category Rules (PCR) PCR 2019:14, Version 1.11
PCR review was conducted by	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com . The review panel may be contacted via info@environdec.com .
Independent third-party verification of the declaration and data, according to ISO 14025:2010	<input checked="" type="checkbox"/> External EPD verification <input type="checkbox"/> EPD Process Certification
Third party verifier:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Verifier:	Eurocert S.A. Chlois 89, 14452, Athens info@eurocert.gr www.eurocert.gr
Procedure for follow-up of data during EPD validity involves third party verifier:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No



Company Information

About

Sanlev SA has been designing and producing specialized extruded aluminium profiles since 1971 and is considered to be one of the most competent and efficient specialists in the production of high quality extruded aluminium profiles. The company is active in Greece as well as other European countries. With the assistance of an experienced design department **Sanlev SA** provides services for tailor-made aluminium profiles and architectural industry.

Vision

The vision of **Sanlev SA** is evolving services and products, sharing of knowledge, communication and ideas, prioritizing investment and education of staff in order to meet the requirements of society and clients, build a long-lasting relationship and focusing on clients' needs with personal contact.

Facilities & Equipment

The privately owned facilities of **Sanlev SA** are located in the industrial zone at Aspropyrgos, Attiki, Greece.

Equipment is modern, consisting of an industrial production plant for extruded aluminium profiles and equipped with latest technology modern chrome-free powder coating unit. Special Investment has also been targeted on equipment for different kinds of fabrication such as microperforation, punching types, cutting at different angles & lengths, bending of profiles etc.

Quality Management System

Sanlev SA has developed and implemented an Integrated Quality Management System, Production Control, Environment and Occupational Health and Safety according to standards ISO 9001:2015, ISO 14001: 2015, ISO 45001: 2018 and EN 15088:2005, respectively, following national, European and international legal and regulatory requirements, as well as all other compliance requirements governing its operation, with full respect for man, society and the environment.



Product Information

Powder Coated Aluminium Profiles are manufactured in plenty of shapes, sizes, textures, and colors depending on the use focusing on the quality of the final product, the flawless powder coated surface of the profiles, strong adhesion and durability. **Sanlev SA** has more than 400 color codes. It covers a wide range of glossy, mat and special shades.

Some of the uses are for architectural profiles, unique profiles based on the client's drawing and need, standard profiles, roller shutters, ladders, solar panels and mounting systems for solar panels, ventilation, furniture, automotive, marine applications, solar collectors, lighting, blinds, bicycles rims and more.

This specific EPD refers to **Powder Coated Aluminium Profiles** in form of extruded profiles using technologically advanced chrome-free powder coating, manufactured by **Sanlev SA** in Aspropyrgos.

All products are in accordance with European Regulations and are in accordance with and EN 15088:2005. Aluminium profiles go through quality inspection including well-trained technicians, digital optical systems, hardness, and UTS machine for mechanical testing. Also, **Sanlev SA**, owns the quality sign of the latest SEASIDE CLASS of Qualicoat, which is the highest quality mark for the protection of powder coated profiles in seaside environments.

For more information about the products please visit <https://www.sanlev.gr/modular.html> where all specifications of the products are available.



Content Information

The components of **Powder Coated Aluminium Profiles** covered by this EPD are presented in the table.

Aluminium billets consist minimum of 70% recycled aluminium and the products are 100% recyclable.

The final products are wrapped with stretch film and crepe paper and sent to the clients by trucks. All packaging used is recyclable.



No substances included in the Candidate List of Substances of Very High Concern for authorization under REACH Regulations are present in the aluminium profiles above the threshold for registration with the European Chemicals Agency (< 0,1% wt/wt).

Components	Composition
Aluminium billets	>94%
Al	>98%
Mg	<0.6%
Si	<0.8%
Fe	<0.3%
Others	<0.2%
Powder Coating	<6%

Physical Properties of Aluminium Profiles	
Strength/Fracture strength (N/mm²)	200-275
Ductility/Elongation (%)	15
Elasticity E, Young's module (N/mm²)	70,000
Density (kg/m³)	2,700
Melting point (°C)	630-660
Working temperature range (°C)	-240 to 150
Electrical conductivity (m/Ohm-mm²)	29
Heat conductivity (W/m °C)	200
Coefficient of linear expansion (x10⁻⁶/°C)	23.5
Non-magnetic	Yes
Weldable	Yes

Description of the manufacturing process

The manufacturing process starts with the aluminium billets heated and then pushed by a hydraulic cylinder through a die with the required cross-section. The aluminium profile extruded is then cooling down, stretched and cut to the desired length. This is followed by aging with heat treatment in order to improve the mechanical properties of the products. The products continue either for packaging and storage or for coating. The extruded aluminum profiles to be painted by powder coating are cleaned with soap and chemical baths in order to passivate the surface and then powder coated electrostatically.



Powder Coated Aluminium Profiles



Aluminium Billets

Heat $\approx 400\text{ }^{\circ}\text{C}$



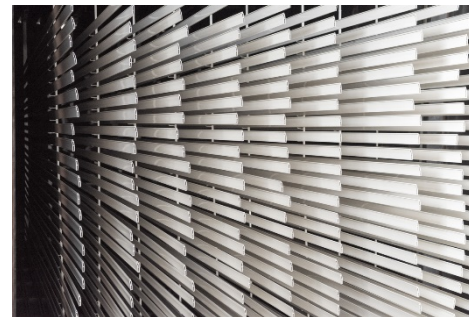
Extrusion



Cooling & Stretch



Cut & Aging



Powder Coating



Chemical Pretreatment



LCA Information

Declared unit

The declared unit is 1 kg of powder coated aluminium profile

Time representativeness

All primary data used in this study is for the reporting year 2021

Databases used

The databases that were used were Ecoinvent v.3.8 & EuGeos' 15804+A2_IA v4.1. The impact assessment method used was EN 15804_A2_2020

Geographical Scope

Worldwide

System boundaries

The approach followed is "Cradle to gate with modules C1-C4 and module D" covering the Product stage which is mandatory stage, the End-of-life stage and the Benefits and loads beyond the system boundary.

The life cycle stages A4–A5 and B, which are optional were not included in the LCA study due to the fact that there is significant uncertainty in the product construction and use phase.



Data Quality

All the data used to model the manufacturing process for the specific products covered by this EPD, are specific data and there are no data gaps. Data for raw material supply and transport to the manufacturing plant and production (A1-A3) are based on specific consumption data for the specific production process taking place at the production site in Aspropirgos for the reference year 2021. Generic datasets were used for the upstream processes (production of raw material and transportation) as well as for the End-of-Life stage calculations. For this reason, the European life cycle inventory database Ecoinvent v.3.8 & EuGeos' 15804+A2_IA v4.1 have been used, as this database contains the most extensive and updated information and its scope coincides with the geographical, technological and temporal area of the project. All the datasets used for calculations cover the area of Europe for the materials produced in Europe or global. Technological coverage is specific or average. The LCA was modelled with OpenLCA 1.11.0. Electricity mix from Greece's residual mix for 2021 was used (DAPEEP).

LCA Information

Cut-off rules and exceptions

All inputs and outputs were included in the calculation of the unit process of the production stage. The cut-off criteria were 1% for the total mass input and 5% for energy usage and mass that was included, according to EN 15804 and PCR 2019:14. The materials that were <1% for the total mass and that were excluded: specific packaging material, fuel for forklifts and minor materials. The biogenic carbon in packaging was lower than 1%. Environmental impacts from the deconstruction of aluminium profiles at End-of-life stage (module C1) were <5% for energy usage and mass and there were not included in LCA calculations.

The following activities and processes have been exempted from the LCA report: the manufacturing processes of the capital goods or spare parts, infrastructure for general management, office and headquarters operations as well as people activities (common activities, travel for work etc.) and waste streams relating to maintenance of equipment. Also, transport of finished products (A4), application of product (A5), and use stage (B1-B7) were excluded.

Assumptions

- The environmental impact of external transport has been calculated using lorries from the Ecoinvent 3.8. database, EURO 5. These lorries have been selected to reflect the most realistic scenario possible.
- The scenarios included are currently in use and are representative for one of the most probable alternatives.
- Concerning module C1 the impacts of deconstruction/dismantling of the building is assumed to be zero due to falling below the 5% cut-off criteria according to EN 15804 for energy used for the dismantling of aluminium profiles during deconstruction as well as taking into account the report of Sphera "Aluminium Extrusion EPD Background Report".
- For module C2 a distance of 100km and EURO 5 truck is assumed for the transportation of aluminium waste after deconstruction.
- Regarding modules C3 and C4 the assumption of recycling rate of metal building products is 90% and the remaining 10% of aluminium waste end in landfill.

Allocation

Taking into account that all the products are produced implementing the same production procedure, there is no allocation in different production subsystems (sub -processes). There are no co-products produced using other production procedures. Electricity, LPG, water, coating powder, chemicals, lubricants and packaging were calculated based on the division of total consumptions by the mass of final products. Also, waste has been divided by the total quantity of products. Economic allocation was not used in any case.

System boundaries

	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	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	EU	ND	ND	ND							EU		GR	GLO	
Specific data used	>95%			-	-	-							-		-	-	
Variation – products	Not relevant			-	-	-							-		-	-	
Variation – sites	Manufactured in one site			-	-	-							-		-	-	

X: Included, ND: Not declared

Description of the modules

A1: Production of all raw materials including electricity, water supply and packaging required for the manufacture of aluminium profiles

A2: Transportation of all raw materials to the manufacturing plant

A3: Manufacturing process includes the energy for the extrusion and waste management of the production

C1: Impacts of demolition for this stage of life are considered zero due to falling below the 5% cut-off criteria according to EN 15804 for energy used for the dismantling of aluminium profiles during deconstruction as well as taking into account the report of Sphera "Aluminium Extrusion EPD Background Report"

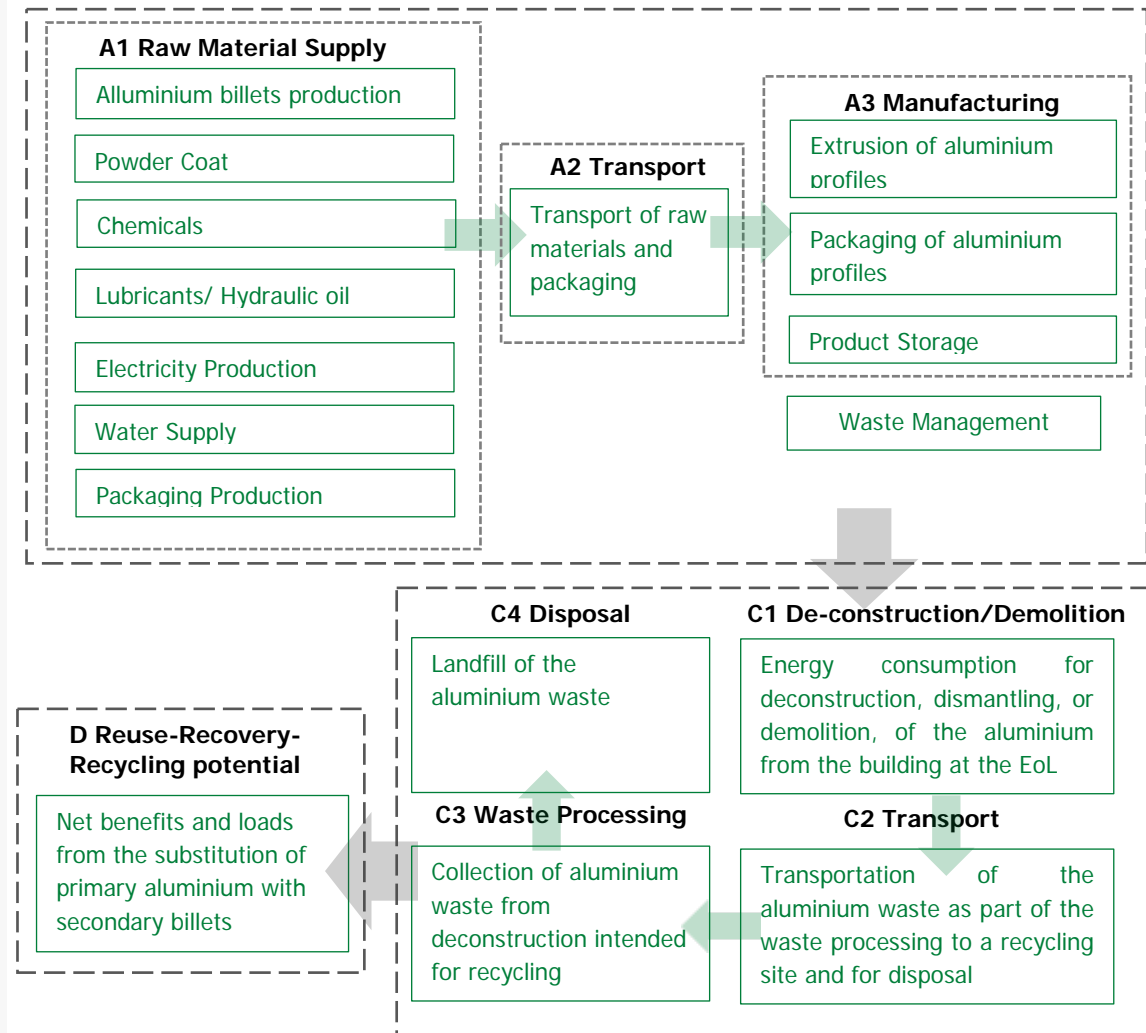
C2: The transport of waste to recycling site/ landfill is assumed to be 100 km by truck EURO 5

C3: 90% of aluminium waste at the End-of-Life stage is assumed to be recycled by the remelting process

C4: 10% of aluminium waste at the End-of-Life stage is assumed to end to landfill

D: Net benefits for using secondary billets instead of primary ingot aluminium

A flow Diagram of the system boundaries is shown below



Environmental Performance

The environmental indicators for each one of the specific products are presented in the following tables.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

1 kg of Powder Coated Aluminium Profile

Potential environmental impact – Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
AP	molc H+ eq	5,31E-02	0,00E+00	3,84E-05	8,03E-03	1,94E-05	-2,54E-02
GWP - total	kg CO ₂ eq	9,77E+00	0,00E+00	1,67E-02	4,59E-01	7,67E-02	-4,52E+00
GWP - biogenic	kg CO ₂ eq	-4,64E-02	0,00E+00	-3,68E-06	-1,60E-02	7,70E-02	2,30E-02
GWP - fossil	kg CO ₂ eq	9,74E+00	0,00E+00	1,67E-02	4,55E-01	7,19E-03	-4,51E+00
GWP - luluc	kg CO ₂ eq	2,54E-02	0,00E+00	5,91E-06	1,01E-03	1,95E-06	-1,69E-02
GWP - GHG ¹	kg CO ₂ eq	9,82E+00	0,00E+00	1,67E-02	4,75E-01	-3,64E-04	-4,54E+00
ADP - minerals and metals	kg Sb-Eq	6,23E-05	0,00E+00	4,51E-07	1,49E-04	1,80E-08	-1,12E-05
ADP - fossil	MJ	1,14E+02	0,00E+00	2,48E-01	6,96E+00	3,60E-02	-5,65E+01
EP - freshwater	kg P eq	4,59E-03	0,00E+00	1,23E-06	6,23E-04	3,17E-06	-1,50E-03
EP - freshwater ²	kg PO ₄ eq	1,41E-02	0,00E+00	3,77E-06	1,91E-03	9,74E-06	-4,61E-03
EP - marine	kg N eq	8,09E-03	0,00E+00	5,26E-06	6,21E-04	1,75E-04	-4,41E-03
EP - terrestrial	molc N eq	8,16E-02	0,00E+00	5,59E-05	7,39E-03	5,45E-05	-4,52E-02
ODP	kg CFC11 eq	6,46E-07	0,00E+00	3,79E-09	5,19E-08	3,74E-10	-1,74E-07
POCP	kg NMVOC eq	2,29E-02	0,00E+00	2,78E-05	2,09E-03	3,95E-05	-1,23E-02
WDP	m ³	3,55E+00	0,00E+00	3,78E-01	6,39E-01	1,33E-03	-1,14E+00

Use of resources – Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PENRE	MJ	1,19E+02	0,00E+00	2,53E-01	8,07E+00	3,80E-02	-5,81E+01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,19E+02	0,00E+00	2,53E-01	8,07E+00	3,80E-02	-5,81E+01
PERE	MJ	1,06E+01	0,00E+00	3,55E-03	1,13E+00	1,43E-03	-5,48E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,06E+01	0,00E+00	3,55E-03	1,13E+00	1,43E-03	-5,48E+00
FW	m ³	1,71E+01	0,00E+00	3,25E-03	2,58E+00	3,22E-03	-1,18E+01
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Output flows – Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Waste production – Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HW	kg	2,39E+00	0,00E+00	2,55E-04	0,00E+00	1,47E-04	-9,39E-01
NHW	kg	1,94E+01	0,00E+00	1,75E-02	0,00E+00	1,03E-01	-6,32E+00
RW	kg	2,10E-04	0,00E+00	1,73E-06	0,00E+00	1,83E-07	-7,12E-05

Disclaimer 1: This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013).

Disclaimer 2: Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq.

Disclaimer 3: The results of the environmental impact indicators ADP and WDP shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

References

1. General Programme Instructions of the International EPD® System Version 4.0.
2. ISO 14040:2006 Environmental management Life cycle assessment. Principles and framework.
3. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
4. ISO 14020:2000 Environmental labels and declarations – General principles.
5. ISO 14025:2010 Environmental labels and declarations – Type III Environmental Declarations– Principles and procedures.
6. PCR – “2019:14 Construction products” (Version 1.11).
7. EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
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9. EPD Background Report: Cradle-to-Gate Assessment for Aluminum Extrusions (2022), v 1.1., Sphera.
10. Environmental Profile Report for the aluminium Refining industry (2021), European Aluminium.
11. Residual Energy Mix 2021 from Renewable Energy Sources Operator & Guarantees of Origin (DAPEEP SA) <https://www.dapeep.gr/wp-content/uploads/2022/09/Residual%20Energy%20Mix%202021%20-%20English%20short%20version.pdf?t=1662359071>

Abbreviations

List of Abbreviations

AP	Acidification potential
GWP – biogenic	Global Warming Potential biogenic
GWP – fossil	Global Warming Potential fossil fuels
GWP – luluc	Global Warming Potential land use and land use change
GWP - total	Global Warming Potential total
ADP – minerals and metals	Abiotic depletion potential for non-fossil resources
ADP – fossil	Abiotic depletion potential for non-fossil resources
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
ODP	Depletion potential of the stratospheric ozone layer
POCP	Formation potential of tropospheric ozone
WDP	Water deprivation potential, deprivation – weighted water consumption
PENRE	Use of non-renewable primary energy excluding nonrenewable 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 resources
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
FW	Use of net fresh water
SM	Use of secondary material
NRSF	Use of non – renewable secondary fuels
RSF	Use of renewable secondary fuels
HW	Hazardous waste disposed
NHW	Non-hazardous waste disposed
RW	Radioactive waste disposed