



ENVIRONMENTAL PRODUCT DECLARATION



Laminated
PVC Profile

PROGRAMME

The International EPD® System, www.environdec.com
EPD® Turkey, www.epdturkey.org

PROGRAMME OPERATOR

EPD® International AB & EPD Turkey

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Programme Information

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Product category rules (PCR)

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The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

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EPD verification

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Procedure for follow-up of data during EPD validity involves third party verifier:

Yes



No

LCA Study & EPD Design Conducted by

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EPDs within the same product category but from different programmes may not be comparable. EPDs 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.

Company Information

Owner of the EPD

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Based on its stable financial growth trend since its establishment in 1990, ASAŞ is one of the leading manufacturers in Europe and exports to more than 90 countries across 6 continents. With over 3000 employees, ASAŞ provides services for its clients at its Aluminium Extrusion Profile, Aluminium Composite Panel, Aluminium Flat Rolled Products, PVC Profile and Roller Shutter production facilities which are located in a total of 923.000 m² area, of which 300.000 m² is enclosed, in Turkey. Company offers the advantage of keeping all processes under control both in terms of quality & cost and getting service from a single point with its fully integrated manufacturing facilities which combines all the production functions that customers needed in the supply chain. ASAS GmbH, sub company of ASAŞ, serves as a logistics and service center with 72.793m² closed area in neighboring Koblenz city of Neuwied, Germany.

Passion of “Adding Value” to every job it does, the sector and the society in which it operates and sustainability is at the heart of ASAŞ’s business philosophy. Corporate social responsibility projects are carried out with this philosophy to strengthen the society. ASAŞART, which is positioned as an “Art Production Center, operates as a learning+ sharing+ designing+ production platform that brings art and design students together with academics and professionals. Within ASAŞART, special projects are developed to support young talents in their art carrier; aluminium sculpture contest, training programs with universities, international workshops and art exhibitions are organized. Children are at the center of ASAS’ corporate social responsibility projects. Company established ASAS Basketball Club so as to support children to be successful individuals in the future with sports as well as social and educational activities.

ASAŞ positions itself as a solution partner with a passion of trying to foresee the future trends by following the innovations and always offering the best for its customers by investing in technology. Therefore, while making investments company adopts the principles of “continuous investment in sustainability, technology, integration and innovation” to always serve its customers better. With this perspective, company established the first R & D Center in aluminium sector in Turkey. Alloy development, process development and product development studies are carried out under the umbrella of R&D Center. Company develops projects to use its resources more efficiently and grows with environment friendly investments. Besides these, ASAŞ takes part in international projects to contribute the development of new processes that helps to minimize the environmental impact of the production processes and increase the energy efficiency.



ASAŞ produces wide range of value-added products for various sectors like automotive, railway, commercial vehicles, energy, packaging, construction, consumer products, maritime etc. worldwide. Finished and semi-finished products are produced to meet its customers’ needs in their own projects. Besides this, the company enrich its knowledge in the field of production with design & product development studies and offers its high-quality products to the market under its own brands. Aluminium architectural systems (door, window, and curtain wall systems), aluminum composite panels, u-PVC door and window systems, aluminum design products (aluminum flag and lighting poles, aluminum furniture etc.), roller shutter systems, garage doors and motor control systems are product groups that the company sells with its own brand.

Product Information

Product Name:

Laminated PVC Profile

Laminated PVC profile Production facilities were established in Akyazı and Sakarya in 1997 within the body of ASAŞ in order to meet the growing demand for high quality products in Turkey and the world market. PVC profile and Shutter production facilities located in the same campus continue their activities on an area of 60.000 m², 30.000 m² of which is closed. The facility serves with an annual production capacity of 35,000 tons of PVC profiles. In ASAŞ PVC profile Production Facilities, only European origin raw materials are used. PVC window profiles manufactured in ASAŞ include white and coloured profiles, where a percentage of the latter are laminated.

These special mixture recipes used in production is acrylic-based, resistant to different climatic conditions and impacts, and is an environmentally friendly material with lead-free calcium zinc and low calcite content.

Production

PVC profile production process starts with extrusion process. The blend of PVC and other additives are transported to the extruder in order to move through the line. At the end of the line the PVC profiles are formed. The profile comes out of the line are cooled. The final PVC profile then goes to the lamination process. In this process, lamination films are pasted on the surface of the profile. Lamination film is very strong, its outside is notable for high resistance to atmospheric impacts and UV-rays, and it keeps coloration brightness for long time. The laminated profiles then finish the production line and are packaged to be delivered to the customer.

Intended Use of Product

Laminated PVC profiles are mainly made of Polyvinyl Chloride (PVC) known as the most valuable raw material within the chemical industry. Products may also contain other raw materials such as acrylic impact modifiers, stabilizers, and calcium carbonate.

The use of PVC is predominant in the home construction industry. It is regularly used as a replacement or alternative to metal pipes and in many applications where corrosion can compromise functionality and increase maintenance costs. In addition to residential applications, PVC is routinely used for municipal, industrial, military, and commercial projects.

PVC is durable and unaffected by corrosion or other forms of deterioration and therefore can be stored for a long time. Its formulation can be easily converted into different forms for use in a variety of industries and applications. PVC also has chemical stability, which is an important factor when PVC products are applied in environments with different chemicals. This feature ensures that PVC retains its properties without undergoing significant changes when chemicals are added.

Lamination of PVC profile is mostly used at production of plastic windows by individual orders or in case when it is necessary to preserve the original look of the building facade. Lamination film is very strong, its outside is notable for high resistance to atmospheric impacts and UV-rays, and it keeps coloration brightness for long time. Such film can imitate the construction and colour of different kinds of wooden patterns.



Technical Specifications

Product	Standarts	Description
Laminated PVC Profile	EN 12608-1	Unplasticized poly(vinyl chloride) (PVC-U) profiles for the fabrication of windows and doors – Classification, requirements and test methods
	RAL GZ 716	Quality And Test Requirements For Plastic Window Profile Systems - Quality Assurance Guidelines – Section 1: Plastic Window Profiles - Parts 1-3, 5, 7
	EN ISO 306	Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST)
	EN ISO 178	Plastics - Determination of flexural properties
	EN ISO 527	Plastics - Determination of tensile properties
	EN ISO 3451-5	Plastics - Determination of ash - Part 5: Poly(vinyl chloride)
	EN ISO 8256	Plastics - Determination of tensile-impact strength
	EN 479	Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of heat reversion
	EN 478	Determination of the appearance after exposure at 150 °C
	EN ISO 179-2	Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of the resistance to impact of profiles by falling mass
	EN 514	Determination of the strength of welded corners and T- joints
	EN ISO 1183-1	Plastics - Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method
EN 513	Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of the resistance to artificial weathering	

UN CPC Code : 363, semi-manufactures of plastics

LCA Information

Declared Unit

1 kg of Laminated PVC profile manufactured in ASAŞ Manufacturing plant in Akyazi (TR).

Reference Service Life

Not applicable.

Time Representativeness

The inventory for the LCA study is based on the period of 1st January 2021 and 30st June 2021

Database(s) and LCA software used

SimaPro LCA v9.2.0.2 software with Ecoinvent v3.7.1

Description of System Boundaries

Cradle to gate with options, modules, C1-C4, D (A1–A3 + C + D)

Data Quality and Data Collection

According to EN 15804:2012+A2:2019 specific data was used for module A3 (Processes the manufacturer has influence over) and was gathered from the manufacturing plant. Specific data includes actual product weights, amounts of raw materials used, product content, energy consumption, transport figures, water consumption and amounts of wastes.

There is two manufacturing plant in Sakarya and Akyazi, Turkey. However, PVC Profile products are manufactured in Akyazi. The manufacturing data (specific) are monitored and recorded by ASAŞ PVC Profile manufacturing responsible people. Specific energy and chemical consumption values and raw materials/chemicals are collected from ASAŞ.

For A1 and A2 modules, According to EN 15804:2012+A2:2019, generic data was applied and was obtained from Ecoinvent v3.7.1.

Data collection for this LCA study has been carried out in accordance with data requirement stated in ISO 14040-44, ISO 14025, ISO 14020, and the requirements given in the

General Program Instructions v3.01; PCR Construction products 2019:14, version 1.11 by The International EPD® System and EN 15804:2012+A2:2019.

Specific data used in this LCA study is less than 1 year old. Generic data used in the study was obtained from Ecoinvent v3.7.1 which is less than 10 years old.

Cut-off criteria for the upstream generic data is at least 99%, according to the General Programme Requirement in terms of the energy, the mass, and the overall environmental relevance of the flows. Inventory data covers all elementary flows and are obtained from Ecoinvent v3.7.1.

Allocation

Waste and packaging data are allocated to two different PVC profile products which are, white/coloured PVC and laminated PVC profile, taking into account the total amount in the relevant time period. Electricity consumption is met from both grid and tri-generation system. Total electricity consumption was considered in order to allocate the consumption from tri-generation, and tri-generation share was calculated. Thus, tri-generation and grid electricity consumption share were allocated according to the total electricity consumption for aluminium profile products in the relevant time period.

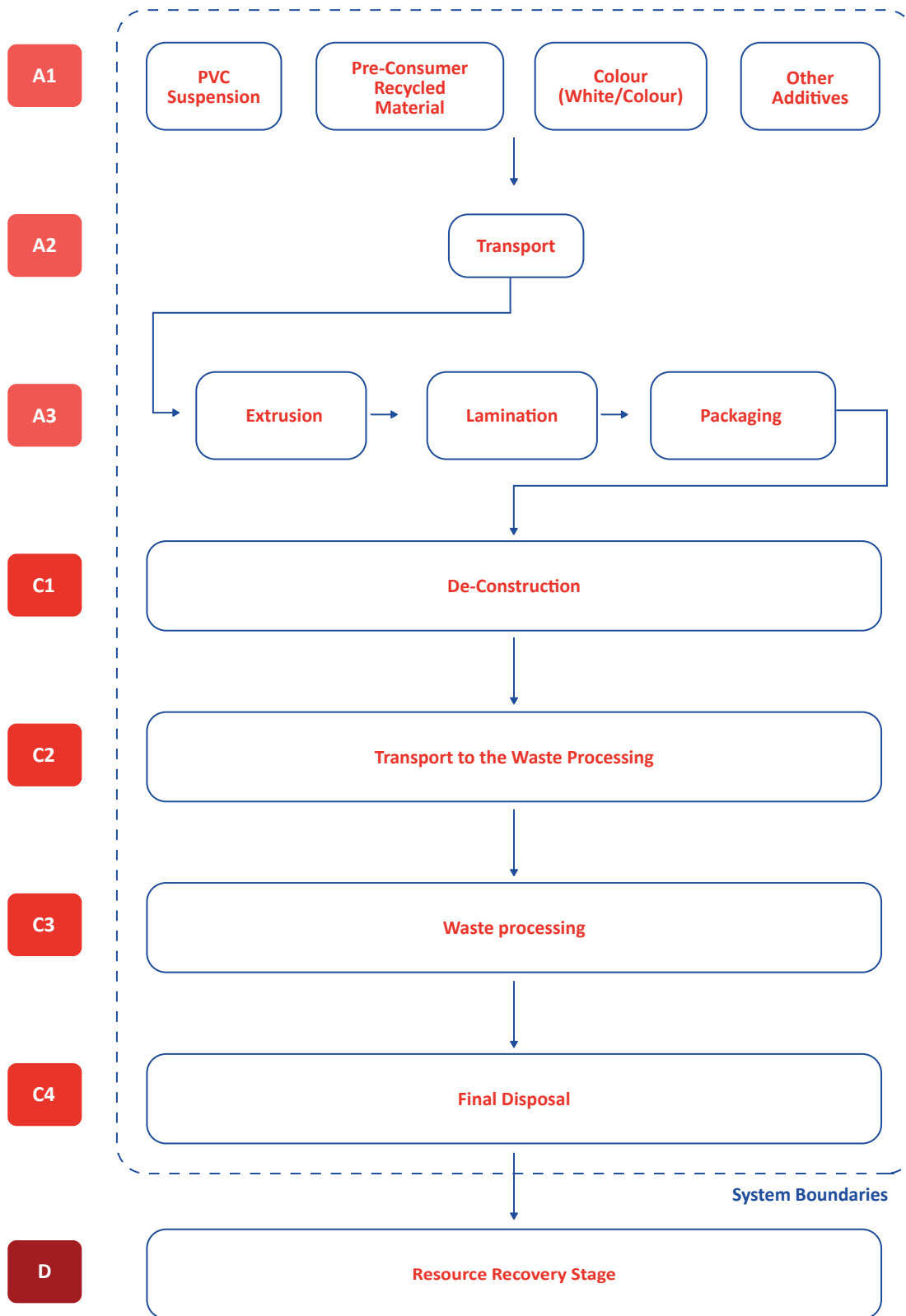
Cut-off Rules

Life Cycle Inventory data for a minimum of 99 % of total inflows to the three life cycle stages have been included and a cut-off rule of 1% regarding energy, mass, and environmental relevance was applied.

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	De-construction demolition	Transport	Waste processing	Disposal	Recycling Potential
MODULES	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	TR	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>99.5%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

System Diagram



Description of Declared Modules

A1 - Raw Materials Supply

This module takes into account raw material extraction, processing and energy used in the production process.

A2 - Transport to the Manufacturer

This module includes transportation of the raw materials from supplier to factory gate. Transportation types are considered as seaway and roadway.

A3 - Manufacturing

This stage includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered in this module. The processing of any waste arising from this stage is also included. Followed production processes are as;

- Extrusion
- Lamination
- Packaging

C1 - De-construction

In module C1, it is assumed that demolition of the laminated PVC profiles from base construction material is done manually. Given the scenario that is assumed, environmental impact of de-construction process is not considered in this study.

C2 - Transport to Waste Processing

In module C1, it is assumed that demolition of the laminated PVC profiles from base construction material is done manually. Given the scenario that is assumed, environmental impact of de-construction process is not considered in this study.

Parameters C2 Module	
Transport by road*	Lorry, 16-32 metric ton
Distance (km)	200
Database	Ecoinvent v3.7.1

*Technology is Euro 6

C3 - Waste Processing for Reuse, Recovery and/or Recycling

This module includes the energy consumption required for the sorting of laminated PVC profiles in the recycling process.

C4 - Final Disposal

100% of the product after its lifetime will be collected and recycled into the manufacturing system. It has been assumed that 32.1% of the product is recycled and 67.9% of the product is sent to landfill according to the PEFCR Guidance v6.3.

D - Reuse, Recovery or Recycling Potential

Laminated PVC profile inputs to the production stage are subtracted from the construction to be recycled at end-of-life in order to obtain the PVC profile from the product system. It has been assumed that 32.1% of the product is net PVC profile sent to recycling. Module D reports the environmental aspects of recycled scrap generated at the end of life minus that used at the production stage.

Information on which life cycle stages are not considered

This EPD only cover the Cradle to Gate with options A1-3 and C1-4 and D stages because other stages are very dependent on particular scenarios and are better developed for specific building or construction works.

Content Declaration

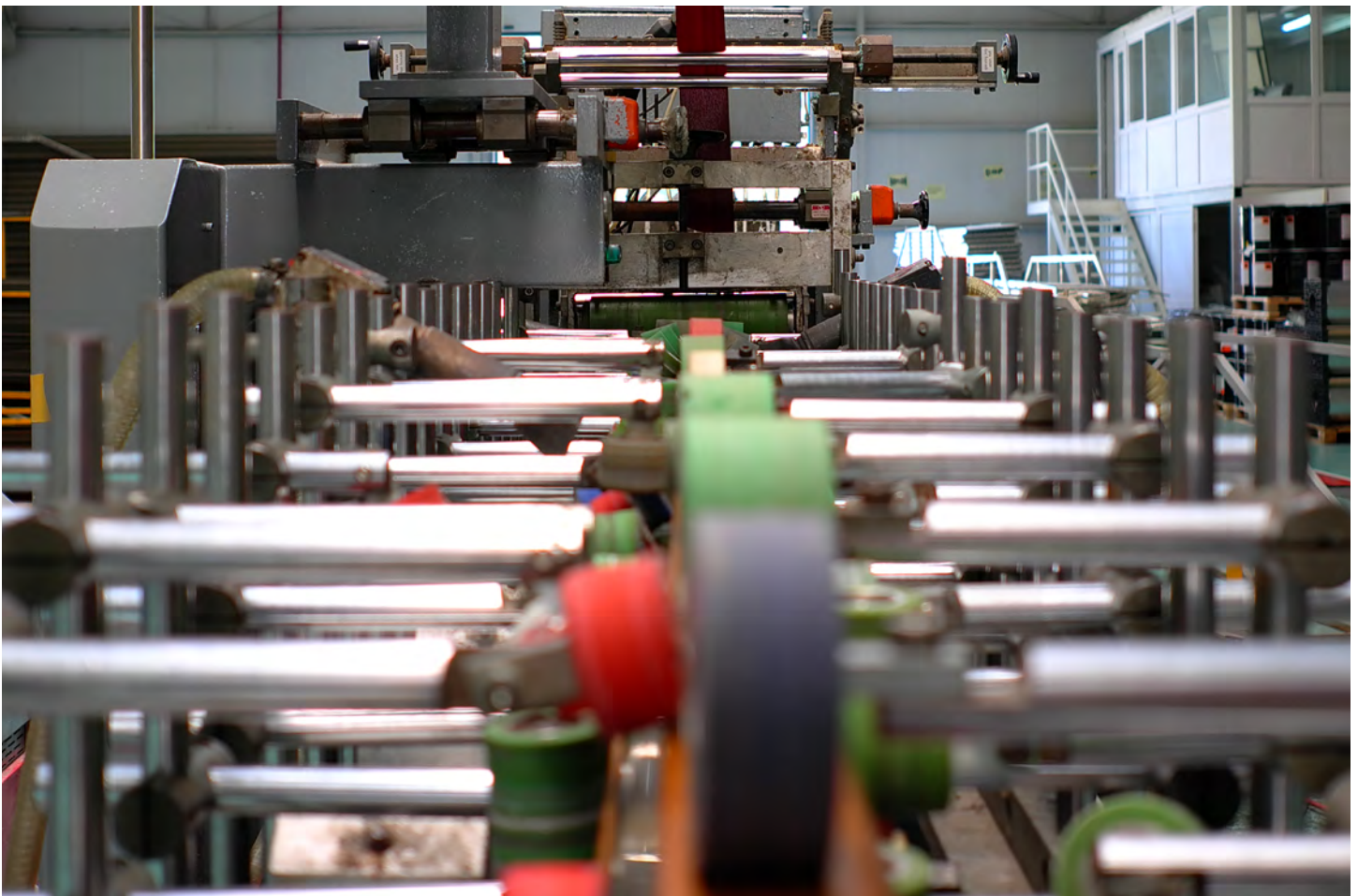
Content Declaration by mass%, 1 kg of Laminated PVC Profile

Product	PVC suspension, weight-%	Pre-consumer recycled materials, weight-%	Additives, weight-%	Renewable material, weight-%	Biogenic carbon, weight-%
Laminated PVC Profiles	55-65	10-20	15-25	0	0

Packaging Declaration by mass% (versus the product)

Laminated PVC Profile	Weight, %	Biogenic carbon, kg C
LDPE	1-5	-
Metal	<1	-

Disclaimer: There are no SVHC compounds in the products which is declared in the report.



Environmental Performance

Potential Environmental Impact *Mandatory Indicators According to EN 15804+A2*

Results for 1 kg of Laminated PVC Profile							
Indicator	Unit	A1-3 Total	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq	2.39	0	0.033	0.015	0.057	-0.476
GWP -biogenic	kg CO ₂ eq	0.033	0	7.90E-05	4.22E-04	8.79E-05	-0.008
GWP-luluc	kg CO ₂ eq	0.001	0	1.11E-05	1.58E-05	3.36E-06	-3.39E-04
GWP-total	kg CO ₂ eq	2.43	0	0.033	0.016	0.057	-0.48
ODP	kg CFC 11eq	1.24E-06	0	7.40E-09	2.05E-09	2.21E-09	-2.78E-07
AP	mol H+ eq	0.013	0	9.05E-05	1.10E-04	6.22E-05	-1.88E-03
EP-Freshwater	kg PO ₄ ³⁻ eq	0.001	0	9.67E-06	1.52E-05	1.54E-05	-1.98E-04
EP-aquatic freshwater	kg P eq	9.36E-05	0	2.44E-07	8.02E-07	1.18E-07	-2.00E-05
EP-Marine	kg N eq	0.002	0	1.84E-05	3.56E-05	3.48E-05	-3.53E-04
EP-Terrestrial	kg N eq	0.022	0	2.05E-04	3.93E-04	2.29E-04	-3.64E-03
POCP	kg NMVOC eq	0.008	0	7.84E-05	1.09E-04	7.78E-05	-1.29E-03
ADP-minerals & metals*	kg Sb eq	3.74E-05	0	1.19E-07	6.91E-08	2.38E-08	-9.27E-06
ADP-fossil*	MJ	56.7	0	0.493	0.259	0.169	-12.4
WDP	m ³	3.25	0	0.001	0.002	0.007	-0.836

* 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.

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-aquatic freshwater** = Eutrophication potential, fraction of nutrients reaching aquatic 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

Environmental Performance

Potential Environmental Impact *Additional Mandatory and Voluntary Indicators*

Results for 1 kg of Laminated PVC Profile							
Indicator	Unit	A1-3 Total	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ eq	2.44	0	0.032	0.015	0.049	-0.453
Results according to EN 15804+A2 for 1 kg of Laminated PVC Profile							
PM	[disease inc.]	9.46E-08	0	2.05E-09	1.90E-09	1.18E-09	-1.33E-08
IRP	[kBq U235 eq]	0.122	0	0.002	0.002	0.001	-0.027
ET-freshwater	[CTUe]	40.0	0	0.379	0.158	2.618	-7.356
HT-cancer	[CTUh]	2.38E-09	0	1.34E-11	5.94E-12	6.15E-12	-3.37E-10
HT-non-cancer	[CTUh]	4.34E-08	0	3.71E-10	1.25E-10	5.56E-10	-8.55E-09
SQP	[pt]	8.06	0	0.345	0.040	0.403	-1.22



Acronyms

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology; **IRP** = Ionizing radiation, human health; **ET-freshwater** = Eco-toxicity (freshwater); **HT-cancer** = Human toxicity, cancer effects; **HT-non-cancer** = Human toxicity, non-cancer effects; **SQP** = Potential soil quality index (SQP)

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 equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of Resources

Results according to EN 15804+A2 for 1 kg of Laminated PVC Profile							
Indicator	Unit	A1-3 Total	C1	C2	C3	C4	D
PERE	MJ	5.25	0	0.007	0.028	0.003	-0.576
PERM	MJ	0	0	0	0	0	0
PERT	MJ	5.25	0	0.007	0	0.003	-0.576
PENRE	MJ	60.8	0	0.524	0.273	0.180	-13.3
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	60.8	0	0.524	0	0.180	-13.3
SM	kg	0.170	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m ³	0.231	0	4.50E-04	1.42E-03	3.50E-04	-0.054

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 resources; **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

Results according to EN 15804+A2 for 1 kg of Laminated PVC Profile							
Indicator	Unit	A1-3 Total	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0.001	0	0	0	0	0
Non-hazardous waste disposed	kg	0.001	0	0	0	0.679	0
Radioactive waste disposed	kg	0	0	0	0	0	0

Output Flows

Results according to EN 15804+A2 for 1 kg of Laminated PVC Profile							
Indicator	Unit	A1-3 Total	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0
Material for recycling	kg	0.005	0	0	0	0	0.321
Materials for energy recovery	kg	0.002	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0

References

- **ISO 14040** 2006 Environmental management - Life cycle assessment - Principles and framework
- **ISO 14044** 2006 Environmental management - Life cycle assessment - Requirements and guidelines
- **ISO 14025** 2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- **ISO 14020** 2000 Environmental labels and declarations - General principles
- **EN 15804:2012+A2:2019** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- **The International EPD® System** www.environdec.com
- **The International EPD® System** The General Programme Instructions v3.01
- **The International EPD® System** PCR 2029:14 Construction products v1.1 (EN 15804:A2)
- **Ecoinvent 3.7** www.ecoinvent.org
- **SimaPro LCA Software** www.simapro.com
- **Asas Alüminyum Sanayi ve Ticaret A.Ş.** www.asastr.com

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