Type III Environmental Product Declaration No. 605/2024

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Facade and elevation systems

Owner of the EPD:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A5, C1-C4 and D modules in accordance with EN 15804+A2
(Cradle-to-Gate with options)
The year of preparing the EPD: 2024
Product standard: EN 14351-1:2006+A2:2
Service Life: 30 years for standard product
PCR: ITB-PCR A (PCR based on EN 15804+A2)
Declared unit: 1 kg of aluminium system
Reasons for performing LCA: B2B
Representativeness: Polish, European

MANUFACTURER

Yawal S.A. is one the leading suppliers of architectonic systems of aluminium profiles for building and residential buildings construction in Poland. The experience of over 30 years of working in the construction and architecture sector in Europe and a wide range of innovative solutions. The company's mission has always been to design and offer comprehensive system solutions at a global level that ensure comfort of life and safety of use. Yawal has been cooperating very closely with architects, general contractors, manufacturers of window joinery and investors invariably for thirty years.

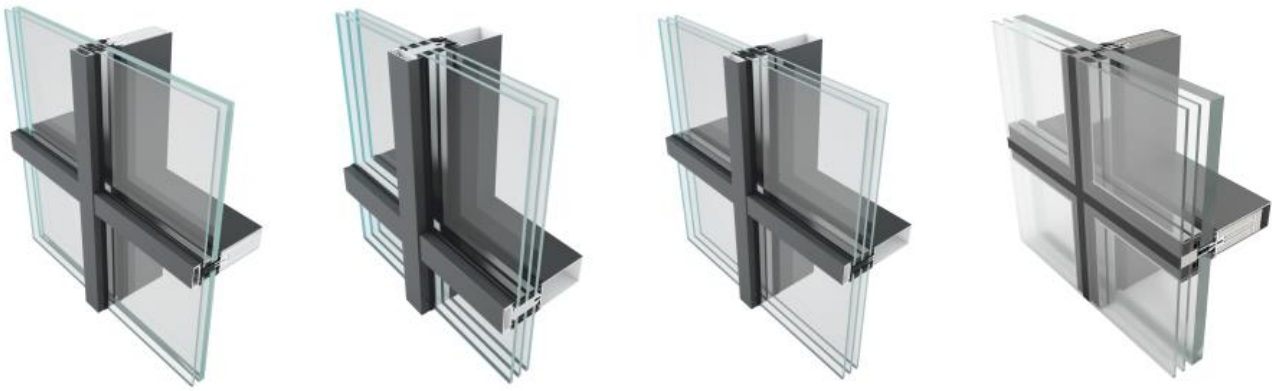
Fig. 1. The view of Yawal S.A. in Herby

PRODUCTS DESCRIPTION AND APPLICATION

In the field of commercial architecture, façade systems covered by EPD constitute a crucial element not only in terms of aesthetics but also in the creation of functional and exceptional structures. When designing office buildings, banks, hotels, or other commercial facilities, architects often pay attention to modern façade solutions that not only emphasize the character of the building but also introduce functional elements, such as optimal interior lighting or ensuring comfort for users.

In this context, unitized curtain wall systems become an extremely attractive choice. The innovative design of the FA50N by Yawal, brings an original approach to shaping profiles and accessories, while guaranteeing the highest quality of thermal insulation and tightness.

Equally important are unitized mullion and transom wall systems, such as the FA 50N HI, which stand out not only for their high thermal insulation but also for their structural diversity, allowing the façade to be tailored to individual project needs. They are used not only in façade construction but also in window structures, both in classic turn-and-tilt windows and those integrated with the façade.



FA 50N	Mullion-transom wall system
FA 50N A	Mullion-transom wall system
FA 50N HI	Mullion-transom wall system featuring enhanced thermal insulation performance
FA 50N SL	Semi-structural façade
FA 50N HL/VL	Mullion-transom wall system
FA 50N SW	Awning-parallel outward-opening window
FA 50N INV	Inward-opening window
FA 50N PV	Mullion-transom wall system
FA 50N EI	Fire protection and smoke exhaust system
FA 50N ROOF REI	Roof window Fire protection system
YSP	Yawal sun protect system
UFA 75	Segment-based façade
Vertiline	Facade cladding

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit

The declared unit is 1 kg of aluminium system (aluminum with coatings, representative for a wide range of products).

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, “Transport and Installation”,A4-A5, “end of life” C1-C4+D modules in accordance with EN 15804+A2 and actual ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried in manufacturing plant (LCI) and were included in the calculation. It can be assumed that the total sum of omitted processes does not exceed 1% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of aluminium fasade and elevation systems from aluminium is a line process executed by of Yawal S.A. in plant located in Herby (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of Yawal S.A. were inventoried and 18.9% were allocated to facade systems. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration.

System limits

Minimum 99.0% input materials and 100% energy consumption (electricity, gas, LPG, other) were inventoried in a processing plants and were included in the calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, and electric power consumption, direct production waste and available emission measurements. Tires consumption for transport was not considered. Substances with a percentage share of less than 0.05% of total mass were excluded from the calculations. The packaging products (wooden pallets) are included. Packing assessment were included.

Modules A1 and A2: ***Raw materials supply and transport***

The product includes aluminum profiles (89%), thermal breaks (7%), coatings (2%), auxiliary materials (1%) and packaging materials mainly from local suppliers. Aluminium used come from a specific supplier. Polish and European fuel averages were used for calculations.

Module A3: ***Production***

The production includes receiving shipments of components from the plant. Then the elements are subjected to processes such as cleaning, varnishing with polymerization, sublimation and thermal insulation processes of elements. After complete assembly, the finished products are packed and transported to the main warehouse. Quality checks are carried out at individual production stages. A diagram of the production process is shown in Fig. 2.

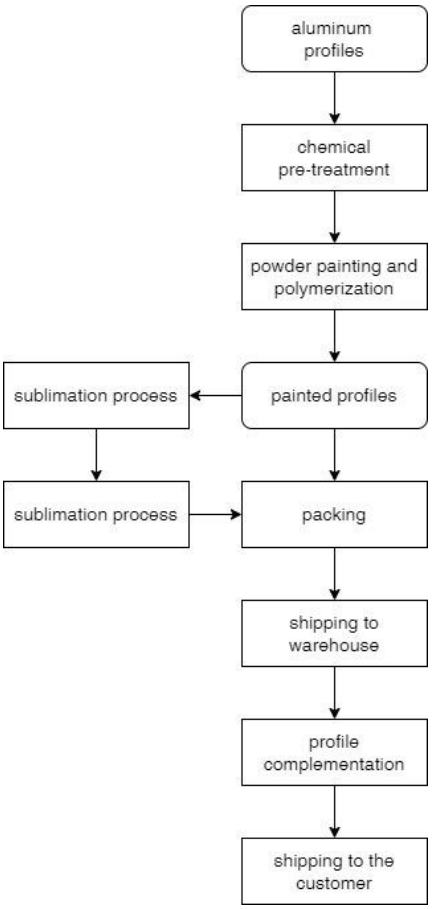


Fig. 2. The scheme of production by Yawal S.A.

Module A4: transport to consumer

Vehicle transport at distance 100 km is considered (emission standard: Euro 5) with 100% load capacity.

Modules *C1-C4 and D: End-of-life (EOL)*

It is assumed that at the end-of-life, 100 % of façade systems from aluminum are demounted using electric tools. Materials recovered from dismantled products are recycled, (module C3) and landfilled (module C4) according to the realistic treatment practice (mass allocation) of industrial waste what is presented in Table 1, 90 % of the resulting aluminum undergo recycling after sorting and cutting while the remaining 10 % is forwarded to landfill as mixed construction and demolition wastes. A potential credit resulting from the recycling of aluminum are presented in module D. Utilization of packaging material which constitute less than 1 % of the total system flows was not taken into consideration.

Table 1. End-of-life scenario for aluminium systems

Material	Waste processing		Landfilling
	Material recovery (reuse, recycling)	Energy recovery (incineration)	
aluminium	90%	0 %	10 %

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Yawal and verified during data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good. The background data for the processes come from the following resources database Eco invent v.3.10 and specific EPD for aluminium input material. Specific (LCI) data quality analysis was a part of the input data verification. Where no background data was available, data gaps were complemented by manufacturer information and literature research.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Additional information

Polish electricity (Ecoinvent v.3.10 supplemented by actual national KOBiZE data) emission factor used is 0.685 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are considered. In practice, this means that concrete may be compared in a specific application with the selected usage scenario.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of aluminium systems produced by Yawal S.A.

Table 2. System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

Table 3. Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	7.38E+00	5.34E-03	1.93E+00	9.32E+00	1.67E-02	2.64E-03	3.17E-03	1.67E-02	6.98E-01	1.06E-03	-8.73E-01
Greenhouse potential - fossil	eq. kg CO_2	7.49E+00	5.32E-03	3.29E+00	1.08E+01	1.66E-02	2.64E-03	3.17E-03	1.66E-02	6.97E-01	1.05E-03	-8.97E-01
Greenhouse potential - biogenic	eq. kg CO_2	-6.86E-02	1.82E-05	5.32E-02	-1.54E-02	5.68E-05	1.00E-04	1.20E-04	5.68E-05	4.89E-04	1.06E-05	-7.21E-03
Global warming potential - land use and land use change	eq. kg CO_2	5.56E-02	2.09E-06	6.43E-04	5.62E-02	6.52E-06	1.20E-06	1.44E-06	6.52E-06	1.23E-03	1.07E-06	-6.66E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	3.94E-07	1.23E-09	1.14E-07	5.09E-07	3.85E-09	7.00E-11	8.40E-11	3.85E-09	2.08E-08	3.20E-10	-4.72E-08
Soil and water acidification potential	eq. mol H+	5.03E-02	2.16E-05	2.03E-02	7.07E-02	6.75E-05	3.80E-05	4.56E-05	6.75E-05	6.19E-03	8.88E-06	-6.03E-03
Eutrophication potential - freshwater	eq. kg P	3.21E-03	3.58E-07	3.37E-03	6.57E-03	1.12E-06	6.50E-06	7.80E-06	1.12E-06	2.93E-04	3.06E-07	-3.84E-04
Eutrophication potential - seawater	eq. kg N	6.27E-03	6.52E-06	3.05E-03	9.33E-03	2.04E-05	5.50E-06	6.60E-06	2.04E-05	9.04E-04	3.06E-06	-7.52E-04
Eutrophication potential - terrestrial	eq. mol N	5.75E-02	7.11E-05	2.51E-02	8.27E-02	2.22E-04	4.65E-05	5.58E-05	2.22E-04	9.84E-03	3.33E-05	-6.88E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.94E-02	2.18E-05	7.18E-03	2.66E-02	6.80E-05	1.30E-05	1.56E-05	6.80E-05	3.70E-03	9.64E-06	-2.33E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.32E-05	1.89E-08	8.85E-06	4.21E-05	5.89E-08	1.67E-08	2.00E-08	5.89E-08	1.55E-05	3.56E-09	-3.98E-06
Abiotic depletion potential - fossil fuels	MJ	8.03E+01	7.89E-02	3.62E+01	1.17E+02	2.47E-01	5.80E-02	6.96E-02	2.47E-01	8.36E+00	2.43E-02	-9.59E+00
Water deprivation potential	eq. m^3	5.18E+00	3.65E-04	6.50E-01	5.83E+00	1.14E-03	1.20E-03	1.44E-03	1.14E-03	2.24E-01	1.41E-04	-6.20E-01

Table 4. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 5. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.71E+01	1.13E-03	2.23E+00	1.93E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.07E-01	4.27E-04	-2.04E+00
Consumption of renewable primary energy resources used as raw materials	MJ	6.80E-01	0.00E+00	0.00E+00	6.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.29E-02
Total consumption of renewable primary energy resources	MJ	1.78E+01	1.13E-03	2.24E+00	2.00E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.07E-01	4.27E-04	-2.11E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	7.78E+01	7.90E-02	3.01E+01	1.08E+02	2.47E-01	5.82E-02	6.98E-02	2.47E-01	8.36E+00	2.63E-02	-9.32E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.77E+00	0.00E+00	0.00E+00	2.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.02E-01
Total consumption of non-renewable primary energy resources	MJ	8.05E+01	7.90E-02	3.69E+01	1.17E+02	2.47E-01	5.82E-02	6.98E-02	2.47E-01	8.36E+00	2.63E-02	-9.62E+00
Consumption of secondary materials	kg	1.56E-01	2.65E-05	3.17E-03	1.60E-01	8.27E-05	5.30E-06	6.36E-06	8.27E-05	2.99E-02	0.00E+00	-1.88E-02
Consumption of renew. secondary fuels	MJ	4.84E-03	2.92E-07	1.61E-05	4.86E-03	9.11E-07	2.95E-08	3.55E-08	9.11E-07	1.25E-04	0.00E+00	-5.30E-04
Consumption of non-renewable secondary fuels	MJ	1.15E-02	0.00E+00	2.42E-02	3.57E-02	0.00E+00	4.70E-05	5.63E-05	0.00E+00	0.00E+00	0.00E+00	-1.38E-03
Net consumption of freshwater	m^3	1.13E-01	9.93E-06	1.89E-02	1.32E-01	3.10E-05	1.58E-05	1.89E-05	3.10E-05	5.01E-03	3.79E-06	-1.35E-02

Table 6. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	7.39E-02	8.86E-05	9.50E-04	7.50E-02	2.77E-04	6.00E-07	7.20E-07	2.77E-04	5.31E-02	3.83E-08	8.84E-03
Non-hazardous waste	kg	2.47E+00	1.57E-03	1.20E-01	2.59E+00	4.92E-03	3.12E-05	3.74E-05	4.92E-03	1.22E+00	1.00E-01	2.95E-01
Radioactive waste	kg	7.71E-04	5.89E-09	4.74E-05	8.18E-04	1.84E-08	4.35E-08	5.22E-08	1.84E-08	9.81E-06	1.48E-07	9.25E-05
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	2.05E-01	2.44E-07	3.30E-01	5.35E-01	7.64E-07	6.00E-08	7.20E-08	7.64E-07	5.43E-02	0.00E+00	2.46E-02
Materials for energy recovery	kg	2.36E-05	1.98E-09	7.27E-07	2.43E-05	6.18E-09	5.25E-10	6.30E-10	6.18E-09	8.58E-07	0.00E+00	2.82E-06
Exported Energy	MJ	6.32E-01	0.00E+00	9.21E-02	7.24E-01	0.00E+00	1.73E-04	2.08E-04	0.00E+00	5.91E-03	0.00E+00	1.40E-02

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ external ☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCI audit and verification: Filip Poznański, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products (2023)
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2023
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product cate
- Life-Cycle inventory data for aluminium production and transformation processes in Europe. Environmental Profile Report. February 2018.
- Aluminium Recycling in LCA – European Aluminium Association, 2013.
- gory of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- https://ecoinvent.org/

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CERTIFICATE № 605/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Facade and elevation systems

Manufacturer:

YAWAL S.A.

Lubliniecka 36, 42-284 Herby, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 7th June 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director
for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, June 2024