Type III Environmental Product Declaration No. 621/2024

Issuance date: 19.04.2024
Validation: 12.06.2024
Validity date: 24.01.2029

PVC-U Windows (dimension 1230x1480)

Owner of the EPD:

Przedsiębiorstwo Wielobranżowe
WITAL Ryszard Tymofiejewicz
ul. Strefowa 7, 19-500
Gołdap, Poland
Phone: +48 87 615 20 39
Fax.: +48 87 615 20 83
Contact: wital@wital-profile.pl

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Michał Piasecki
m.piasecki@itb.pl
energia@itb.pl

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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-A3, A4-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+A2:2016

Service Life: 25 years for standard product

PCR: ITB-PCR A (PCR based on EN 15804)

Declared unit: 1 m^2

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

Fig. 1. The view of WITAL plant in Gołdap

The WITAL production plant is located on a plot of approximately 5 hectares in Gołdap, Poland. The production and warehouse halls cover an area of approximately 7,000 m², with twenty technological lines for the production of window and door profiles. Two modern veneers from the Italian company WPR are used to cover profiles with wood-like veneers and more. Manufacturer is supplied with machines and tools by leading global suppliers in the industry and uses the most modern technological solutions available on the market. Company cooperates with suppliers of raw materials from Western Europe, including: Germany, England, the Netherlands, Belgium, Sweden and Poland. German technology and Polish quality of workmanship ensure the high quality of the products. Own fully automated mixing plant allows us to produce PVC-U raw material for the production of window and door profiles of the highest quality. The production offer includes window systems: Wital 7000 Lux (5 chambers 70 mm), Wital Prestige (6 chamber 70 mm), Wital Prestige Therm – a new system for passive windows (6-chamber 86 mm), the offer is complemented by door systems and renovation profiles. The production volume and efficiency of machines allows to cooperate with the largest window and door manufacturers in Poland and abroad. The products meet the requirements of the PN-EN 12608 for the production of sections made of unplasticized polyvinyl chloride. Out of concern for the environment, Wital uses calcium-zinc stabilizers and uses waste generated in the extrusion process for further production.

PRODUCTS DESCRIPTION AND APPLICATION

EPD covers a single-leaf PVC-U window with dimensions of 1.23 m x 1.48 m, glazed with triple glass in various profile variants (white, painted, veneered with PVC foil) made of PVC profiles of the Wital system. Equipped with steel fittings and plasticized PVC, EPDM (ethylene-propylene-diene monomers) or TPE (thermoplastic elastomers) seals. PVC profiles reinforced with profiles made of steel. The PVC reference window consists of the following raw materials: 17.0% of PVC profile (polyvinyl chloride), 10.0% of steel reinforcements, 70.0% of glass insert, 3.0% of the fittings. The weight of 1 reference window is 76 kg. The characteristics and properties of the reference window are shown in Table 1. Additionally, for the production of windows, secondary raw material is used, obtained from post-production waste and used to produce the transport strip.

Table 1. Characteristics and properties of the reference window

Name	Value	Unit
Glass heat transfer coefficient Ug according to /EN 673/	0.5	W/(m^{2}K)
Glass construction	4/18/4/18/4	-
Total transmittance g according to /EN 410/	53	%
Window heat transfer coefficient Uw according to /EN 674/, /EN 675/	0,72	W/(m^{2}K)
Water resistance according to /EN 1027/, /EN 12208/	Class 4A-9A	-
Min. air permeability according to /EN 1026/, /EN 12207/	Class 3	-
Min. wind load resistance according to /EN 12211/, /EN 12210/	Class C1	-

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit

The declared unit consists of 1 m^2 of window (approx. 42 kg) area on a reference window (similar to EN 14351-1 and EN 17213) - single-leaf PVC-U window with dimensions of 1.23 m x 1.48 m, glazed with triple glass with a mass of 76 kg/piece).

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of PVC windows and doors is a line process executed by Termo Profil Sp. z o.o. in plant located in Poland. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of Termo Profil Sp. z o.o. were inventoried and 100% were allocated to PCV windows and doors.No co-product allocation is necessary in foreground processes. Co-products for which an allocation is present in in the chain for PVC, for example when producing vinyl chloride. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, transport and installation A4-A5, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% 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. The total mass of biogenic carbon materials is less than 5 % of the total mass of the product and the associated packaging.

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

The product includes glass (70%), PVC profiles (17%), steel components (13%), auxiliary materials and packaging materials mainly from local suppliers. The means of transport are trucks. Polish and European fuel averages were used for calculations. Input data were determined and collected at the profile’s production plant and at the window production plant.

Module A3: *Production*

The production of PVC windows includes the receipt of deliveries of components from the plant. Then, the elements are subjected to processes such as cutting, welding, cleaning and glazing, along with the installation of fittings. After complete assembly, the finished products are subjected to quality control and transported to the warehouse, where they are packed. The diagram of the production process is shown in Fig. 2.

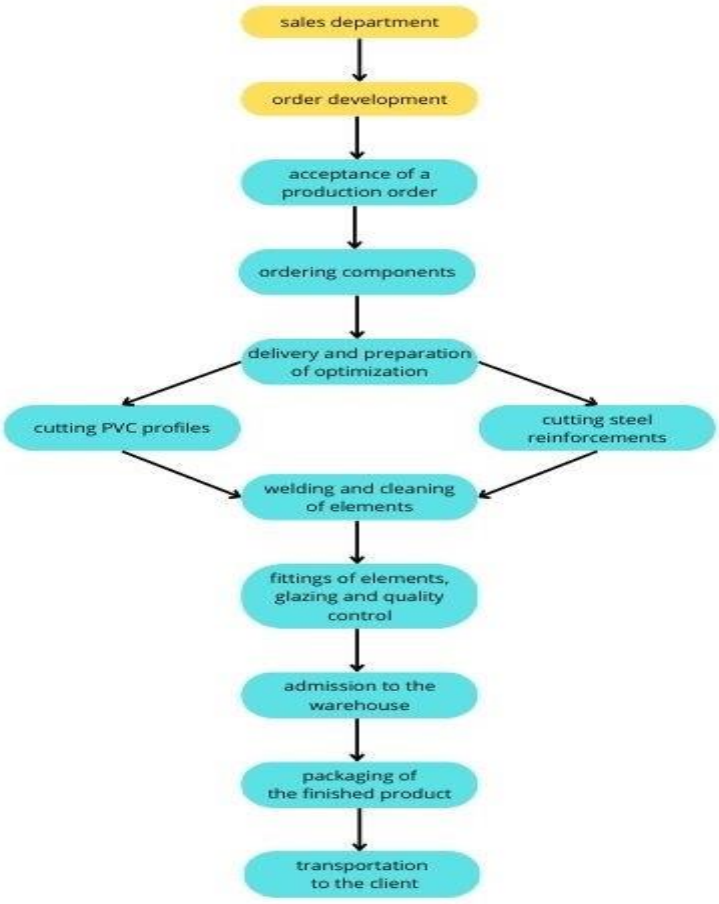

Fig. 2. The scheme of production by Termo Profil Sp. z o.o.

Module A4: *Transport to a construction site*

The windows produced are delivered to Polish as well as foreign customers. In the adapted scenario an average distance of 100 km from the factory gate to a recipient is assumed. Means of transport include 16 - 32 t lorry (EURO 5) with fuel consumption of 35 l per 100 km.

A5. Installation

The auxiliary materials (sealant) are included in the window's LCA and the energy consumption (0.2 KWh/m^2) during installation.

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

It is assumed that at the end-of-life, 100 % of PVC windows are demounted using power tools. Materials recovered from dismantled products are recycled, incinerated (module C3) and landfilled (module C4) according to the realistic treatment practice (mass allocation) of industrial waste what is presented in Table 2, 60 % of plastic and 30 % of glass undergo waste processing while the remaining are forwarded to landfill in the form of mixed construction and demolition wastes. A potential credit resulting from the recycling of plastic, steel and glass are presented in module D. Utilization of packaging material which constitutes less than 1 % of the total system flows was not taken into consideration.

Table 2. End-of-life scenario for PVC windows and windows components

Material	Waste processing		Landfilling
	Material recovery (reuse, recycling)	**Energy recovery** (incineration)	
plastics	30 %	30 %	40 %
glass	30 %	0 %	70 %
steel	95%	0%	5%

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 specific input/ouput LCI values determined to calculate the LCA originate from verified Przedsiębiorstwo Wielobranżowe WITAL Ryszard Tymofiejewicz and Termo Profil Sp. z o.o. inventory data.

Data collection period
The data for manufacture of the declared products refers to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates
The impacts of PVC windows were aggregated using weighted average. Impacts were inventoried and calculated for reference PVC windows with dimensions of 1230x1480.

Calculation rules
LCA was done in accordance with ITB PCR A document (v. 1.6) an EN 15804+A2.

Databases
The data for the processes comes from the following databases: Ecoinvent v.3.10, specific EPDs, ITB-Database. Specific data quality analysis was a part of audit. Polish electricity mix used (production) is 0.685 kg CO_2/kWh (KOBiZE 2023). European electricity mix used is 0.430 kg CO_2/kWh for the end of life (Ecoinvent v3.10, RER).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m^2 of reference PVC windows with dimensions of 1230x1480 produced by Termo Profil Sp. z o.o.

Table 3. 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 4. Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	7.01E+01	4.27E+00	7.38E+00	8.18E+01	6.97E-01	1.10E-01	1.32E-01	3.48E-01	6.32E+00	2.73E-01	-6.56E+00
Greenhouse potential - fossil	eq. kg CO_2	3.35E+01	1.97E+00	4.28E+00	3.98E+01	3.21E-01	5.10E-02	6.11E-02	1.60E-01	2.92E+00	1.25E-01	-3.04E+00
Greenhouse potential - biogenic	eq. kg CO_2	-1.15E+00	1.28E-03	7.98E-03	-1.14E+00	1.10E-03	1.93E-03	2.32E-03	5.48E-04	1.28E-03	1.26E-03	-6.25E-03
Global warming potential - land use and land use change	eq. kg CO_2	2.24E-02	6.46E-04	4.16E-04	2.34E-02	1.26E-04	2.32E-05	2.78E-05	6.30E-05	1.65E-04	1.27E-04	-1.68E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	2.88E-06	3.92E-08	6.39E-08	2.98E-06	7.42E-08	1.35E-09	1.62E-09	3.71E-08	3.23E+00	3.80E-08	-1.83E-07
Soil and water acidification potential	eq. mol H+	2.45E-01	6.17E-03	2.57E-02	2.77E-01	1.30E-03	7.33E-04	8.80E-04	6.51E-04	5.79E-02	1.06E-03	-8.57E-03
Eutrophication potential - freshwater	eq. kg P	1.16E-02	1.32E-04	3.93E-03	1.57E-02	2.16E-05	1.25E-04	1.51E-04	1.08E-05	3.72E-05	3.63E-05	-7.97E-04
Eutrophication potential - seawater	eq. kg N	4.27E-02	2.08E-03	3.76E-03	4.86E-02	3.93E-04	1.06E-04	1.27E-04	1.97E-04	3.65E-02	3.64E-04	-1.83E-03
Eutrophication potential - terrestrial	eq. mol N	4.82E-01	2.26E-02	3.35E-02	5.38E-01	4.29E-03	8.97E-04	1.08E-03	2.14E-03	3.32E-01	3.96E-03	-1.99E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.55E-01	9.66E-03	1.16E-02	1.76E-01	1.31E-03	2.51E-04	3.01E-04	6.56E-04	8.18E-02	1.15E-03	-1.04E-02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.39E-03	6.45E-06	1.28E-06	1.40E-03	1.14E-06	3.22E-07	3.87E-07	5.69E-07	4.73E-07	4.23E-07	-3.58E-05
Abiotic depletion potential - fossil fuels	MJ	4.84E+02	2.77E+01	5.84E+01	5.70E+02	4.76E+00	1.12E+00	1.34E+00	2.38E+00	3.07E+00	2.89E+00	-3.17E+01
Water deprivation potential	eq. m^3	1.10E+01	1.34E-01	7.22E-01	1.19E+01	2.20E-02	2.32E-02	2.78E-02	1.10E-02	5.08E-02	1.68E-02	-2.58E-01

Table 5. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 m^2)

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 6. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 m^2)

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	3.95E+01	4.69E-01	3.52E+00	4.35E+01	6.83E-02	8.30E-02	9.96E-02	3.42E-02	4.59E-03	5.07E-02	-1.30E+00
Consumption of renewable primary energy resources used as raw materials	MJ	1.28E+01	0.00E+00	0.00E+00	1.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	5.24E+01	4.69E-01	3.52E+00	5.64E+01	6.83E-02	8.30E-02	9.96E-02	3.42E-02	5.40E-02	5.07E-02	-1.30E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.03E+02	2.77E+01	5.06E+01	4.82E+02	4.76E+00	1.12E+00	1.35E+00	2.38E+00	-4.24E+01	3.12E+00	-3.29E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	8.09E+01	0.00E+00	7.80E+00	8.87E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.26E+01	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	4.84E+02	2.77E+01	5.84E+01	5.70E+02	4.76E+00	1.12E+00	1.35E+00	2.38E+00	3.29E+00	3.12E+00	-3.29E+01
Consumption of secondary materials	kg	9.56E-01	1.27E-02	5.74E-03	9.74E-01	1.60E-03	1.02E-04	1.23E-04	7.98E-04	1.13E-04	0.00E+00	-2.43E-01
Consumption of renew. secondary fuels	MJ	7.99E-01	1.60E-04	1.96E-05	7.99E-01	1.76E-05	5.70E-07	6.84E-07	8.80E-06	1.54E-06	0.00E+00	-3.23E-04
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-04	1.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	3.27E-01	3.68E-03	1.04E-01	4.35E-01	5.99E-04	3.04E-04	3.65E-04	3.00E-04	6.61E-04	4.51E-04	-1.34E-02

Table 7. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	3.56E-01	3.99E-02	4.19E-01	8.15E-01	5.34E-03	1.16E-05	1.39E-05	2.67E-03	4.45E-06	4.55E-06	-2.02E-04
Non-hazardous waste	kg	1.82E+01	8.42E-01	1.91E+01	3.82E+01	9.49E-02	6.02E-04	7.23E-04	4.74E-02	1.17E+01	1.19E+01	-2.72E-01
Radioactive waste	kg	4.55E-04	8.83E-06	7.49E-06	4.71E-04	3.55E-07	8.40E-07	1.01E-06	1.78E-07	1.85E-05	1.76E-05	-2.78E-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	1.06E-02	2.08E-04	3.24E-04	1.11E-02	1.47E-05	1.16E-06	1.39E-06	7.37E-06	2.65E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.86E-05	1.76E-06	6.41E-07	6.10E-05	1.19E-07	1.01E-08	1.22E-08	5.96E-08	2.09E-08	0.00E+00	0.00E+00
Exported Energy	MJ	2.54E+00	1.15E-02	2.43E+00	4.97E+00	0.00E+00	3.34E-03	4.01E-03	0.00E+00	2.55E-01	0.00E+00	0.00E+00

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. C.E., D.Sc., eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility 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
- 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 category 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
- EN 14351-1:2016-12, Windows and doors –Product standard, performance characteristics –Part 1: Windows and external pedestrian doorsets
- https://ecoinvent.org/

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE № 621/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

PVC-U Windows (dimension 1230x1480)

Manufacturer:

Przedsiębiorstwo Wielobranżowe Wital Ryszard Tymofiejewicz

ul. Strefowa 7, 19-500 Gołdap, 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 19th April 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, April 2024