Type III Environmental Product Declaration No. 787/2025

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Aluminium window and door systems, balustrades and balcony enclosures

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: 2025
Product standards: EN 573, EN 755, EN 12020
Service Life: 25 years for standard product
PCR: ITB-PCR A (PCR based on EN 15804+A2)
Declared unit: 1 kg
Reasons for performing LCA: B2B
Representativeness: Polish, European, Global, 2023

MANUFACTURER

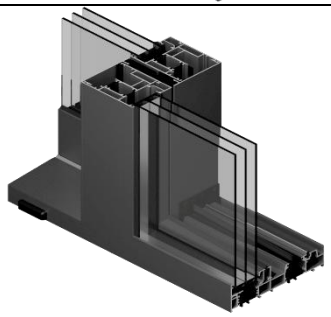
Fig. 1. The view of MORAD Sp. z o. o. in Tuchom (Poland)

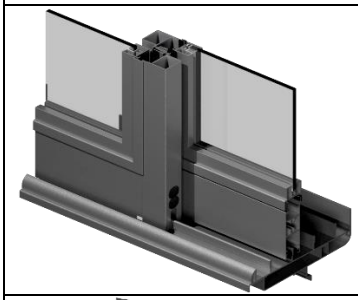
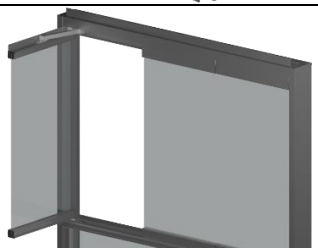
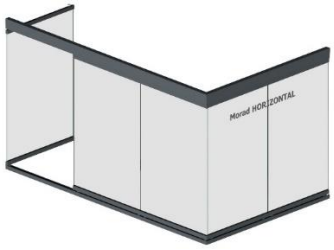
MORAD Sp. z o. o. specializes in the production and distribution of aluminium and glass systems. Morad is a modern company whose priorities are the process of continuous improvement, appropriate selection of assortment and optimal management of the logistics network in the country and abroad. The aluminium systems and profiles produced are used in many industries. They enrich the enclosures and improve the functioning of office buildings, medical practices, offices, banks and modern residential premises. The manufacturer focuses on continuous development and improvement of its technologies, and the products are manufactured from high-quality materials.

PRODUCTS DESCRIPTION AND APPLICATION

MORAD Sp. z o. o. has a range of aluminium products including:

View	Code	Description
	AZ-45	A system of aluminum profiles used to create internal architectural elements that do not require thermal insulation, such as partition walls, windows, doors. The system is made of high-quality aluminum profiles without thermal breaks.

	AC-62	A system of aluminum profiles with a thermal break intended for external construction: windows, doors, showcases. The system is constructed of three-chamber profiles made of the highest quality aluminum and connected with a thermal break. The width of the profiles allows you to combine very high technical and thermal parameters with a low price of the system
	AC-77 HI	The system is intended for external construction requiring particularly high thermal insulation parameters. High thermal insulation of the profiles is ensured by the increased depth of the profiles and the multi-chamber structure of thermal breaks, which also ensures greater stiffness of the profile. The system combines wide design possibilities with an affordable price.
	AC-84 EI	Aluminum system designed for interior and exterior doors where fire resistance class EI30 or EI60 is required, with the possibility of expanding the development with double-sided sidelights and an upper transom. Three-chamber aluminum profiles, connected with a thermal break, ensuring very good strength and thermal parameters.
	AP-180	A modern aluminum lift-and-slide door system, ideal for both small and large spaces. The basis of the system are aluminum profiles connected with a thermal break, thanks to which it is possible to obtain excellent insulation and mechanical parameters of the structure.
	AC-77F	The folding door system offers a unique solution for using space while maintaining a high standard of aesthetics and functionality.

	AC-77P	The design of panel doors is based on the three-chamber AC-77 system, which uses an innovative thermal break. Allowing for the construction of doors faced on both sides.
	AB-OPTIMAL	The AB-OPTIMAL system is a multi-system of post balustrades, designed so that on the basis of several profiles you can easily and quickly build a balustrade filled with glass, perforated sheet, HPL board or vertical balusters. It is characterized by high quality aluminum elements and mechanical properties.
	BE-25	A modern aluminum system designed for external terraces and balconies, allowing for maximizing space. The tightness of the structure is ensured by properly designed aluminum profiles of the window sashes, protecting against external weather conditions. This system is dedicated to developing spaces that do not require heating.
	BE-53	A modern aluminum system designed for external balcony enclosures, allowing for maximizing space. The tightness of the structure is ensured by properly designed aluminum profiles of the window sashes, protecting against external weather conditions and noise. This system is dedicated to developing spaces that do not require heating.
	HORIZONTAL	A modern system of aluminum profiles for balcony enclosures, allowing integration with balustrade systems. It provides additional protection against unfavorable weather conditions, such as rain, snow and wind, while increasing the usable space of the balcony. Thanks to the use of high-quality materials, it allows for improved acoustic and thermal insulation.

More information about balcony and terrace construction systems on the manufacturer's website.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared Unit

The declared unit is the production of 1 kg of the aluminium product (aluminium window and door systems, balustrades and balcony enclosures made from aluminium) representative for a wide range of products.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A (v1.6). Production of aluminium window and door systems, balustrades and balcony enclosures from aluminium is a line process executed by of MORAD Sp. z o. o. in plant located in Tuchom (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 MORAD Sp. z o. o. were inventoried and were allocated aluminium window and door systems, balustrades and balcony enclosures from aluminium. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, 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.

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

The product includes aluminium profiles, thermal breaks, powder paints and packaging materials mainly from foreign and local suppliers. The means of transport are trucks. Polish and European fuel averages were used for calculations. These modules A1 and A2 represents the processing of input materials (mainly aluminium profiles) the transport to production site. Means of transport include ships and lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: *Production*

The production includes receiving shipments of components to the plant. Then the elements are subjected to processes such as bridging, joining aluminium profiles with thermal breakes, cleaning and powder coating. 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.

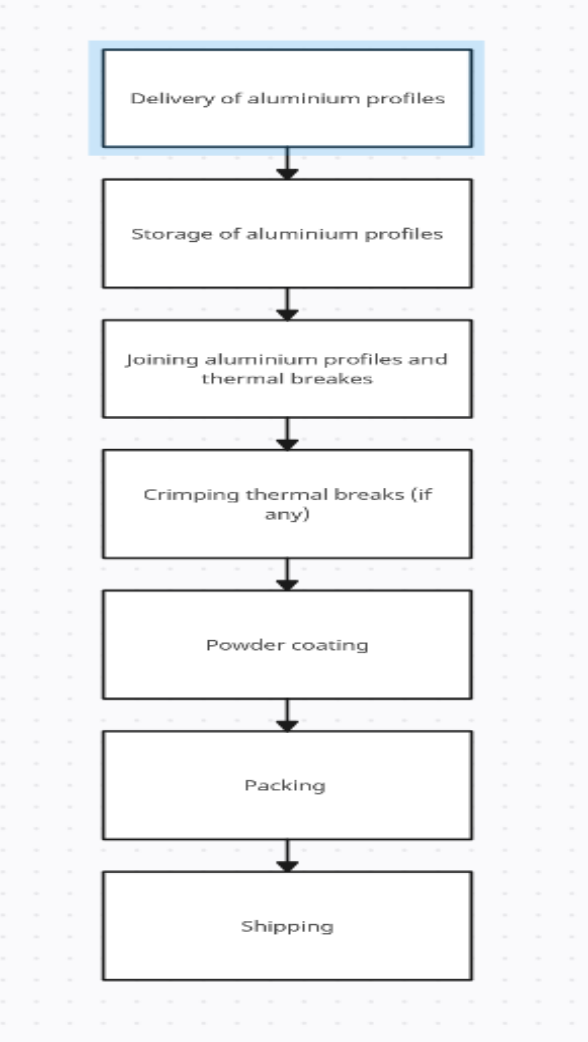


Fig. 2. The scheme of production by MORAD Sp. z o. o. in Tuchom

Module A4 and A5: ***Transport to consumer and installation***

Transport of the products from plant to the recipient is carried out using trucks. Vehicle transport at distance 100 km is considered (emission standard: Euro 5) with 100% load capacity. Packaging material is sent for either incineration or recycling according to EUROSTAT data for packaging waste. It was assumed that the products would be installed using electric power tools (approx. 6 kWh/ton).

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

It is assumed that at the end-of-life, 100 % of aluminium window and door systems, balustrades and balcony enclosures from aluminium 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, 98 % of the resulting aluminium undergo recycling after sorting and cutting while the remaining 2 % is forwarded to landfill as mixed construction and demolition wastes. A potential credit resulting from the recycling of aluminium (production 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 window and door systems, balustrades and balcony enclosures

Material	Waste processing		Landfilling
	Material recovery (recycling)	**Energy recovery** (incineration)	
aluminium	98 %	0 %	2 %

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 manufacturer and verified during data audit. No data collected is older than five years and no generic datasets used are older than ten years. The values determined to calculate A1-A3 originate from verified Process LCI inventory data from manufacturing plant. A1 values were prepared considering input products characteristics and are based on Ecoinvent 3.10 data (EF v2). The energy consumption of production and its impact on the production lines (profiles) was inventoried and calculated. For aluminum, the weighted average carbon footprint declared by suppliers was used. In accordance with Annex E of the EN 15804 + A2, a data quality assessment was performed. For technical representativeness, processes with a quality level of "very good" account for 99% of the value for climate change indicator. For geographical and time representativeness, processes level of "very good" is obtained.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2023 – 31.12.2023 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of aluminium window and door systems, balustrades and balcony enclosures 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 (National for 2023). As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of aluminium window and door systems, balustrades and balcony enclosures produced by MORAD Sp. z o. o. in Tuchom

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	6.75E+00	1.07E-01	9.90E-01	7.85E+00	1.67E-02	3.43E-03	4.11E-03	1.67E-02	7.60E-01	2.13E-04	-2.39E+00
Greenhouse potential - fossil	eq. kg CO_2	6.64E+00	1.06E-01	9.90E-01	7.73E+00	1.66E-02	3.43E-03	4.11E-03	1.66E-02	7.59E-01	2.10E-04	-2.40E+00
Greenhouse potential - biogenic	eq. kg CO_2	2.93E-02	6.93E-05	2.54E-03	3.19E-02	5.68E-05	1.00E-04	1.20E-04	5.68E-05	5.32E-04	2.12E-06	-6.02E-03
Global warming potential - land use and land use change	eq. kg CO_2	8.64E-02	3.49E-05	1.58E-04	8.66E-02	6.52E-06	1.20E-06	1.44E-06	6.52E-06	1.34E-03	2.13E-07	1.39E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	2.17E-07	2.12E-09	4.02E-08	2.59E-07	3.85E-09	7.00E-11	8.40E-11	3.85E-09	2.27E-08	6.40E-11	-8.96E-08
Soil and water acidification potential	eq. mol H+	4.27E-02	3.33E-04	8.25E-03	5.13E-02	6.75E-05	3.80E-05	4.56E-05	6.75E-05	6.74E-03	1.78E-06	-1.56E-02
Eutrophication potential - freshwater	eq. kg P	3.57E-03	7.10E-06	6.92E-04	4.27E-03	1.12E-06	6.50E-06	7.80E-06	1.12E-06	3.19E-04	6.11E-08	-1.13E-03
Eutrophication potential - seawater	eq. kg N	6.00E-03	1.12E-04	1.23E-03	7.35E-03	2.04E-05	5.50E-06	6.60E-06	2.04E-05	9.84E-04	6.13E-07	-9.56E-05
Eutrophication potential - terrestrial	eq. mol N	5.66E-02	1.22E-03	1.09E-02	6.88E-02	2.22E-04	4.65E-05	5.58E-05	2.22E-04	1.07E-02	6.66E-06	-1.86E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	2.15E-02	5.22E-04	4.14E-03	2.61E-02	6.80E-05	1.30E-05	1.56E-05	6.80E-05	4.02E-03	1.93E-06	-6.49E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	2.39E-05	3.48E-07	4.40E-07	2.47E-05	5.89E-08	1.67E-08	2.00E-08	5.89E-08	1.68E-05	7.13E-10	-1.17E-05
Abiotic depletion potential - fossil fuels	MJ	9.53E+01	1.50E+00	2.49E+01	1.22E+02	2.47E-01	5.80E-02	6.96E-02	2.47E-01	9.10E+00	4.86E-03	-2.92E+01
Water deprivation potential	eq. m^3	1.11E+00	7.22E-03	2.39E-01	1.36E+00	1.14E-03	1.20E-03	1.44E-03	1.14E-03	2.44E-01	2.82E-05	-5.16E+00

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	3.56E+01	2.53E-02	1.14E+00	3.68E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.70E-01	8.54E-05	-9.63E+00
Consumption of renewable primary energy resources used as raw materials	MJ	3.81E-02	0.00E+00	0.00E+00	3.81E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.81E-02
Total consumption of renewable primary energy resources	MJ	3.56E+01	2.53E-02	1.14E+00	3.68E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.70E-01	8.54E-05	-9.63E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.04E+02	1.50E+00	1.37E+01	1.19E+02	2.47E-01	5.82E-02	6.98E-02	2.47E-01	9.10E+00	5.26E-03	-2.91E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.44E+00	0.00E+00	1.10E+01	1.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.44E+00
Total consumption of non-renewable primary energy resources	MJ	1.06E+02	1.50E+00	2.49E+01	1.32E+02	2.47E-01	5.82E-02	6.98E-02	2.47E-01	9.10E+00	5.26E-03	-3.09E+01
Consumption of secondary materials	kg	1.51E-01	6.84E-04	2.85E-03	1.55E-01	8.27E-05	5.30E-06	6.36E-06	8.27E-05	3.26E-02	0.00E+00	-1.39E-01
Consumption of renew. secondary fuels	MJ	1.36E-03	8.64E-06	6.91E-06	1.37E-03	9.11E-07	2.95E-08	3.55E-08	9.11E-07	1.37E-04	0.00E+00	-1.16E-03
Consumption of non-renewable secondary fuels	MJ	2.08E-03	0.00E+00	0.00E+00	2.08E-03	0.00E+00	4.70E-05	5.63E-05	0.00E+00	0.00E+00	0.00E+00	-2.08E-03
Net consumption of freshwater	m^3	1.28E+00	1.99E-04	3.39E-02	1.31E+00	3.10E-05	1.58E-05	1.89E-05	3.10E-05	5.46E-03	7.59E-07	-1.13E+00

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	5.68E-01	2.15E-03	1.40E-01	7.10E-01	2.77E-04	6.00E-07	7.20E-07	2.77E-04	5.79E-02	7.66E-09	-6.21E-02
Non-hazardous waste	kg	1.15E+01	4.55E-02	6.25E+00	1.78E+01	4.92E-03	3.12E-05	3.74E-05	4.92E-03	1.33E+00	2.01E-02	-1.17E+00
Radioactive waste	kg	2.05E+00	4.76E-07	3.83E-06	2.05E+00	1.84E-08	4.35E-08	5.22E-08	1.84E-08	1.07E-05	2.96E-08	3.70E-01
Components for re-use	kg	1.89E-02	0.00E+00	0.00E+00	1.89E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.89E-02
Materials for recycling	kg	1.46E-01	1.12E-05	1.20E-04	1.46E-01	7.64E-07	6.00E-08	7.20E-08	7.64E-07	5.91E-02	0.00E+00	-1.43E-01
Materials for energy recovery	kg	1.94E-06	9.48E-08	3.40E-07	2.37E-06	6.18E-09	5.25E-10	6.30E-10	6.18E-09	9.35E-07	0.00E+00	-5.97E-07
Exported Energy	MJ	8.71E-02	6.23E-04	9.32E-03	9.71E-02	0.00E+00	1.73E-04	2.08E-04	0.00E+00	6.44E-03	0.00E+00	-7.52E-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+A2 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 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 (v 1.6)
- PN-EN 12201-2:2024-04 - Systemy przewodów rurowych z tworzyw sztucznych do przesyłania wody oraz do kanalizacji ciśnieniowej - Polietylen (PE) - Część 2: Rury
- PN-EN 12666-1+A1:2011 - Systemy przewodów rurowych z tworzyw sztucznych do podziemnego bez ciśnieniowgo odwadniania i kanalizacji -- Polietylen (PE) -- Część 1: Specyfikacje rur, kształtek i systemu
- PN-EN ISO 22391-2:2010 - Systemy przewodów rurowych z tworzyw sztucznych do instalacji wody ciepłej i zimnej - Polietylen o podwyższonej odporności termicznej (PE-RT) -- Część 2: Rury
- 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
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2023
- https://ecoinvent.org/

LCA, LCI, weryfikacja danych
dr hab., inż. Michał Piasecki

Kwalifikowany podpis elektroniczny

Kierownik Zakładu Fizyki Cieplnej, Akustyki i Środowiska
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Kwalifikowany podpis elektroniczny

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00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 787/2025
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Aluminum window and door systems, balustrades and balcony.

Manufacturer:

MORAD Sp. z o.o.
ul. Kościerska 13, 83-300 Kartuzy, 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 9th May 2025 is valid for 5 years or until amendment of mentioned Environmental Declaration

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