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Thermano insulations



Owner of the EPD:

Balex Metal Sp. z o. o.
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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. Their aspects were verified by the independent body according to ISO 14025. Basically, a 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, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

The year of preparing the EPD: 2024

Product standards: EN 13165+A2:2016-08

Service Life: > 50 years

PCR: ITB-PCR A, v. 1.6

Declared unit: 1 m²

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

Balex Metal Sp. z o.o. is a manufacturer of sandwich panels, roofing sheets, thermal insulation, cold-formed profiles, guttering and trapezoidal sheets. For more than 25 years it has been present in the market of building materials manufacturers, providing solutions for industrial, residential and agricultural construction.

Balex Metal Sp. z o.o. is a sandwich panel manufacturer in this part of the globe, with their materials sold to destinations across the planet, from the USA to New Zealand. Balex Metal Sp. z o.o. has production facilities in Poland and Slovakia: Bolszewo, Tomaszów Mazowiecki, Długoleka (near Wrocław), Zylina (Slovakia). They have 11 sales branches:

Poland

- Bolszewo
- Tomaszów Mazowiecki
- Wrocław
- Pustków

Slovakia

- Zylina

Czech Republic

- Hradec Kralove
- Plzen-Slovany
- Luka na Jihlavou

Latvia

- Riga
- Broceni



Figure 1 A view of Balex Metal production plant located in Bolszewo (Poland).

PRODUCTS DESCRIPTION AND APPLICATION

THERMANO ROOF

Modular width [mm]: 1185 (TOP), 1200 (BASIC)

Overall width [mm]: 1200

Standard length [mm]: 2400

Thickness [mm]: 40 - 160

Cladding: Multi-layered, with aluminium cladding

Age-weighted thermal conductivity coefficient, λ [W/mK]: 0,023

Bulk density [kg/m³]: 30

Absorbability [%]: ≤ 2

Compression strength: min. 200 kPa (10 % deformation)

Reaction to fire: Euroclass E (EN 13501)

Certificates: CE (EN 13165)



PIR THERMANO COMPACT

Modular width [mm]: 1185 (TOP), 1200 (BASIC)

Overall width [mm]: 1200

Standard length [mm]: 600

Thickness [mm]: 20 - 125

Cladding: Multi-layered, with aluminium cladding

Age-weighted thermal conductivity coefficient, λ [W/mK]: 0,023

Bulk density [kg/m³]: 30

Absorbability [%]: ≤ 2

Compression strength:

≥ 150 kPa (at 10% deformation)

Reaction to fire: Euroclass E (EN 13501)

Certificates: CE (EN 13165)



IZOLITE

Modular width [mm]: 1185 (TOP), 1200 (BASIC), 1190 (MASTER)

Overall width [mm]: 1200

Standard length [mm]: 2400

Thickness [mm]: 30 - 200

Cladding: Gas-tight multi-layer cladding. Aluminium coated outer layer

Age-weighted thermal conductivity coefficient, λ [W/mK]:

- 0,023 for thickness: 30÷90 mm
- 0,022 for thickness: 100÷200 mm

Bulk density [kg/m³]: ≥ 30

Absorbability: $\leq 2\%$

Compression strength:

- ≥ 150 kPa (15000 kg/m²) - for 30÷160 mm thick.
- ≥ 200 kPa (at 10% deformation) - of thick 170÷200 mm

Reaction to fire: Euroclass E (EN 13501)

Certificates: CE (EN 13165)



PIR THERMANO DECK

Modular width [mm]: 1185 (TOP), 1200 (BASIC), 1190 (MASTER)

Overall width [mm]: 1200

Standard length [mm]: 2400

Thickness [mm]: 30, 40, 50, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 145, 150, 160, 170, 180, 190, 200

Cladding: Gas-tight multi-layer cladding. Aluminium coated outer layer

Age-weighted thermal conductivity coefficient, λ [W/mK]:

- 0,023 for thickness: 30÷90 mm
- 0,022 for thickness: 100÷200 mm

Bulk density [kg/m³]: ≥ 30

Absorbability: $\leq 2\%$

Compression strength:

- ≥ 150 kPa (15000 kg/m²) - for 30÷160 mm thick.
- ≥ 200 kPa (at 10% deformation) - of thick 170÷200 mm

Fire reaction class: Euroclass E (EN 13501)

Certificates: CE (EN 13165)



THERMANO ALU

Modular width [mm]: 1200 (BASIC)

Overall width [mm]: 1200

Standard length [mm]: 2400

Thickness [mm]: 40 -100

Cladding: 50 µm aluminium sheet with enhanced mechanical strength

Age-weighted thermal conductivity coefficient, λ [W/mK]: 0,023

Bulk density [kg/m³]: 30

Absorbability: $\leq 2\%$

Compression strength: min. 200 kPa (10% deformation)

Reaction to fire: Euroclass E (EN 13501)

Certificates: CE (EN 13165)



THERMANO FIBER

Modular width [mm]: 1200 (BASIC)

Overall width [mm]: 1200

Standard length [mm]: 2400

Thickness [mm]: 40-100

Cladding: One side: unsaturated GFR polyester resin with enhanced mechanical strength; other side: multi-layered, with aluminium cladding

Age-weighted thermal conductivity coefficient, λ [W/mK]:

- 0,028 for thickness: 50÷60 mm
- 0,027 for thickness: from 80 mm

Bulk density [kg/m³]: 30

Absorbability: $\leq 2\%$

Compression strength: min. 200 kPa (10% deformation)

Reaction to fire: Euroclass F (EN 13501)

Certificates: CE (EN 13165)



More information can be found on the Balex Metal Sp. z o.o. website : [https:// www.balex.eu/](https://www.balex.eu/)

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared Unit

The declaration refers to declared unit (DU) – 1 m² of Thermano insulations

Allocation

The allocation rules used for this EPD are based on general ITB PCR A, v. 1.6. Production of Thermano insulations is a line process conducted in the factory of Balex Metal Sp. z o.o., located in Tomaszów Mazowiecki (Poland). Allocation was done on product mass basis.

All impacts from raw materials extraction and processing are allocated in module A1 of LCA. Impacts from the Balex Metal Sp. z o.o. production were inventoried on the annual production volume expressed in mass units. 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, 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, v. 1.6. All materials and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data were inventoried and were included in the calculations, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste, water consumption and all available emission measurements.

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*

Raw materials such as laminates: aluminium foil, PE polymer, kraft paper and chemical compounds, boundary tape, protective foil or packaging materials come from both local and foreign suppliers. Means of transport include big trucks (> 16 t), train and ship are applied. European standards for average combustion were used for calculations.

Module A3: *Production*

A scheme of the Thermano insulations production process is presented in Figure 2. Raw materials such as laminates: aluminium foil, PE polymer, kraft paper and chemical compounds, boundary tape or protective foil or packaging materials are delivered to factory located in Tomaszów Mazowiecki, where are manufacturing in a few step process including mixing of components (polyols, isocyanates and primers) and PIR injection, lamination processing and cutting the panels. Then the panels are packing, palleting and shipment.

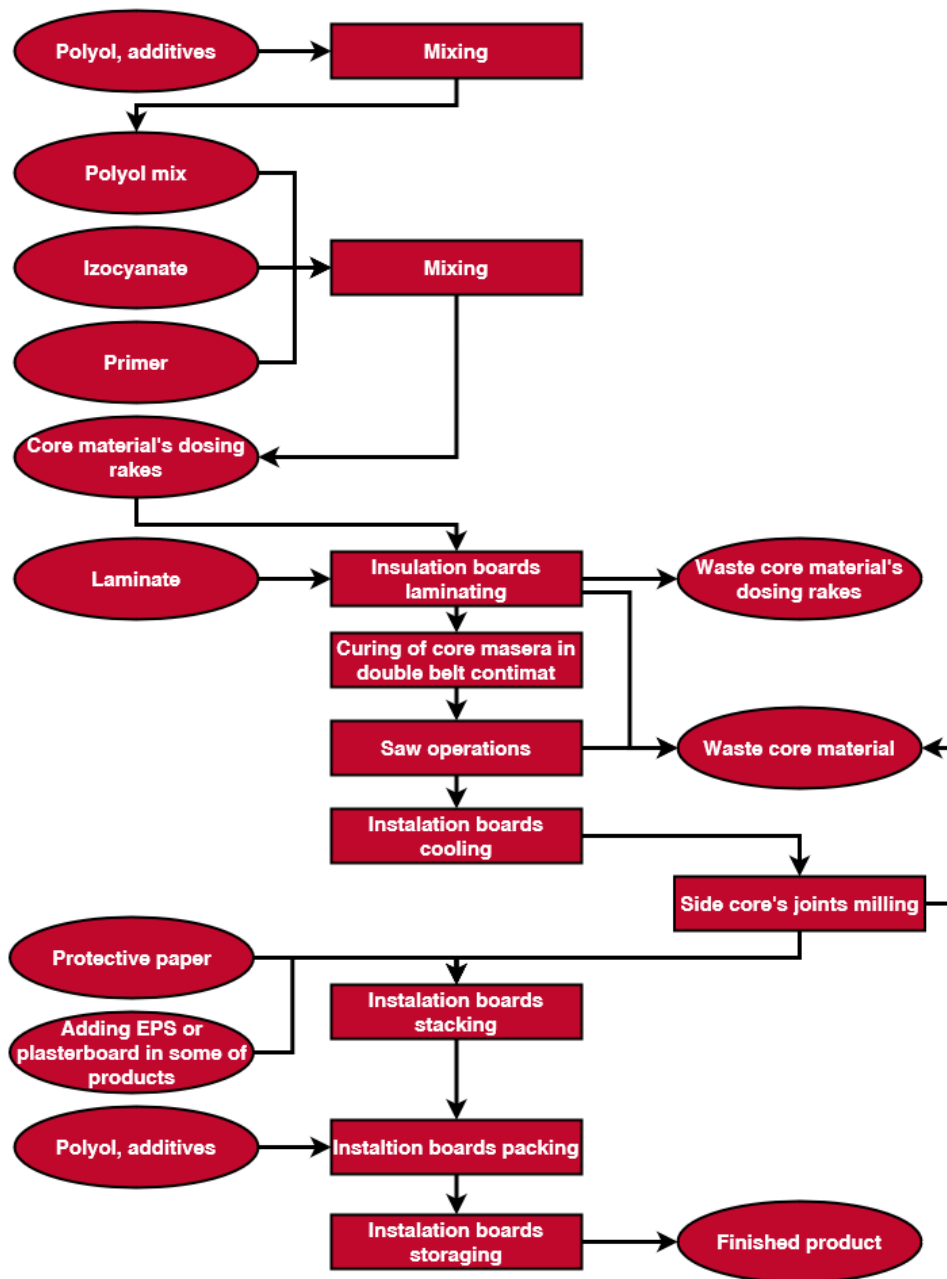


Figure 2. The scheme of Thermano insulations production process by Balex Metal Sp. z o.o.

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

It is assumed that at the end-of-life, 100% of Thermano insulations are demounted using electric tools (module C1) and is transported to waste processing plant which is 100 km away, on 16-32 t lorry EURO 5 (module C2). It is assumed that 40% of PIR cores and 50% of laminates are energy recovery. The residue wastes are forwarded to a landfill in the form of mixed construction and demolition wastes (60% PIR cores and 50% laminates). End-of-life scenario was summarized in Table 1. Environmental burdens declared in module C4 are associated with waste-specific emissions to air and groundwater. A potential credit resulting from the recycling are presented in module D.

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Table 1. End-of-life scenario for Thermano insulations panels manufactured by Balex Metal Sp. z o.o.

Material	Waste processing (energy / material recovery)	Landfilling
Laminates	50%	50%
PIR core	40%	60%

Data quality

The data selected for LCA analysis originates from ITB-LCI questionnaires completed by Balex Metal Sp. z o.o. using the inventory data, ITB database, Ecoinvent database v. 3.10 and KOBiZE. KOBiZE data is supplemented with Ecoinvent v. 3.10 data on the national electricity mix impact where no specific indicator data is provided. No specific 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.

Data collection period

Primary data provided by Balex Metal Sp. z o.o. covers a period of 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 the representative of roof and wall Thermano insulations were inventoried and calculated based on consumption for all these products presented in Tables 4-7 for the PIR with densities of 30 kg/m³ and thickness of 100 mm. Conversion factors for different panel thicknesses are presented in Table 2.

Table 2. Conversion factors for the estimation of environmental impact for different panel thicknesses about density of 30 kg/m³. Multiply the LCA-result of each impact category in the environmental impact table with the corresponding factors.

Panel thickness	20 mm	30 mm	40 mm	50 mm	60 mm	70 mm	80 mm	90 mm	100 mm	
Conversion factor	0.25	0.34	0.44	0.53	0.63	0.72	0.81	0.91	1.00	
Panel thickness	110 mm	120 mm	130 mm	140 mm	150 mm	160 mm	170 mm	180 mm	190 mm	200 mm
Conversion factor	1.09	1.19	1.28	1.38	1.47	1.56	1.66	1.75	1.84	1.94

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804 + A2.

Databases

The data for the processes comes from Ecoinvent v. 3.10 and ITB-Database. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.685 kg CO₂/kWh (KOBiZE 2023).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m² of roof and wall Thermano insulations about density of 30 kg/m³ and thickness of 100 mm. Conversion factors for different panel thickness are presented above (Table 2).

Table 3. System boundaries for the environmental characteristics of Thermano insulations production process by Balex Metal Sp. z o.o.

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results for Thermano insulations about density of 30 kg/m³ and thickness of 100 mm manufactured by Balex Metal Sp. z o.o. - environmental impacts (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO ₂	1.32E+01	3.71E-01	2.35E-01	1.38E+01	8.54E-02	5.23E-02	3.33E+00	1.61E+00	-3.33E+00
Greenhouse gas potential - fossil	eq. kg CO ₂	1.31E+01	3.66E-01	2.33E-01	1.37E+01	8.50E-02	5.21E-02	3.28E+00	1.60E+00	-3.28E+00
Greenhouse gas potential - biogenic	eq. kg CO ₂	1.03E-01	4.42E-03	1.36E-03	1.08E-01	3.16E-04	1.78E-04	4.90E-02	1.33E-02	-4.90E-02
Global warming potential - land use and land use change	eq. kg CO ₂	9.55E-03	2.20E-04	7.34E-05	9.84E-03	7.92E-05	2.04E-05	3.08E-05	2.58E-05	-3.08E-05
Stratospheric ozone depletion potential	eq. kg CFC 11	8.81E-07	7.06E-08	9.81E-09	9.61E-07	1.44E-09	1.21E-08	2.99E-09	1.79E-09	-2.99E-09
Soil and water acidification potential	eq. mol H ⁺	8.41E-02	1.56E-03	2.23E-03	8.79E-02	6.34E-04	2.11E-04	2.81E-03	5.35E-03	-2.81E-03
Eutrophication potential - freshwater	eq. kg P	4.82E-03	7.60E-05	3.73E-04	5.26E-03	8.60E-05	3.50E-06	1.93E-05	9.35E-06	-1.93E-05
Eutrophication potential - seawater	eq. kg N	2.44E-02	4.83E-04	3.21E-04	2.52E-02	1.56E-04	6.38E-05	2.17E-03	2.90E-02	-2.17E-03
Eutrophication potential - terrestrial	eq. mol N	1.39E-01	5.18E-03	2.75E-03	1.47E-01	1.43E-03	6.96E-04	1.50E-02	3.01E-02	-1.50E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	6.07E-02	1.57E-03	9.55E-04	6.33E-02	4.52E-04	2.13E-04	3.68E-03	7.51E-03	-3.68E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.39E-04	1.24E-06	3.18E-07	1.41E-04	1.90E-07	1.85E-07	3.69E-07	2.17E-07	-3.69E-07
Abiotic depletion potential - fossil fuels	MJ	2.94E+02	5.37E+00	3.91E+00	3.03E+02	1.27E+00	7.73E-01	1.87E+00	1.17E+00	-1.87E+00
Water deprivation potential	eq. m ³	1.27E+01	3.28E-02	6.91E-02	1.28E+01	4.67E-02	3.58E-03	2.38E-01	9.52E-02	-2.38E-01

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Table 5. Life cycle assessment (LCA) results for Thermano insulations about density of 30 kg/m³ and thickness of 100 mm manufactured by Balex Metal Sp. z o.o. - additional impacts indicators (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

Table 6. Life cycle assessment (LCA) results for Thermano insulations about density of 30 kg/m³ and thickness of 100 mm manufactured by Balex Metal Sp. z o.o. - environmental aspects related to resource use (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.76E+01	1.87E-01	2.43E-01	1.80E+01	-1.68E+01	1.11E-02	-5.78E-01	-3.40E-01	5.78E-01
Consumption of renewable primary energy resources used as raw materials	MJ	1.08E+00	0.00E+00	0.00E+00	1.08E+00	1.69E+01	0.00E+00	6.16E-01	3.64E-01	-6.16E-01
Total consumption of renewable primary energy resources	MJ	1.86E+01	1.87E-01	2.44E-01	1.91E+01	5.85E-02	1.11E-02	3.86E-02	2.45E-02	-3.86E-02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.20E+02	5.37E+00	3.66E+00	2.29E+02	1.30E+00	7.73E-01	-3.54E+01	-5.52E+01	3.54E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	7.41E+01	0.00E+00	0.00E+00	7.41E+01	0.00E+00	0.00E+00	3.73E+01	5.64E+01	-3.73E+01
Total consumption of non-renewable primary energy resources	MJ	2.94E+02	5.37E+00	4.16E+00	3.04E+02	1.30E+00	7.73E-01	1.87E+00	1.17E+00	-1.87E+00
Consumption of secondary materials	kg	4.17E-02	2.59E-03	3.10E-04	4.46E-02	1.18E-03	2.59E-04	7.55E-04	4.69E-04	-7.55E-04
Consumption of renewable secondary fuels	MJ	1.02E-03	1.96E-05	1.61E-06	1.04E-03	1.43E-05	2.86E-06	2.52E-05	1.21E-05	-2.52E-05
Consumption of non-renewable secondary fuels	MJ	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
Net consumption of freshwater resources	m ³	3.04E-01	8.91E-04	1.11E-03	3.06E-01	8.49E-04	9.73E-05	4.77E-03	-3.17E-04	-4.77E-03

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Table 7. Life cycle assessment (LCA) results for Thermano insulations about density of 30 kg/m³ and thickness of 100 mm manufactured by Balex Metal Sp. z o.o. - environmental information describing waste categories (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste. neutralized	kg	3.81E-01	7.55E-03	6.59E-04	3.89E-01	9.37E-03	8.68E-04	6.28E-02	2.35E-02	-6.28E-02
Non-hazardous waste neutralised	kg	5.00E+00	3.54E-01	2.04E-02	5.38E+00	4.92E+00	1.54E-02	1.51E+00	4.24E+00	-1.51E+00
Radioactive waste	kg	1.16E-04	3.36E-05	4.31E-06	1.54E-04	7.16E-07	5.33E-06	4.37E-07	3.80E-07	-4.37E-07
Components for re-use	kg	0.00E+00	0.00E+00	7.36E-02	7.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	3.59E-03	3.65E-05	2.15E-05	3.65E-03	1.04E-05	2.39E-06	7.74E-04	9.34E-06	-7.74E-04
Materials for energy recovery	kg	6.71E-06	1.68E-07	6.03E-03	6.04E-03	5.22E-08	1.94E-08	2.36E-07	1.16E-07	-2.36E-07
Energy exported	MJ	8.45E-01	7.82E-03	9.96E-03	8.62E-01	1.95E-03	8.58E-04	1.01E-03	7.05E-04	-1.01E-03

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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.)	
<input checked="" type="checkbox"/> external	<input type="checkbox"/> internal
External verification of EPD: Halina Prejzner, PhD Eng	
LCA, LCI audit and input data verification: Mateusz Kozicki, PhD	
Verification of LCA: Michał Piasecki, PhD. DSc. Eng	

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programmes may not be comparable. 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. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

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 (17065/17025 certified). 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, v. 1.6 General Product Category Rules for Construction Products
- EN 13165+A2:2016-08 Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification
- 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
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- 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
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Emissions (CO₂. SO₂. NO_x. CO and total dust) from electricity, 2023



Instytut Techniki Budowlanej

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Thermal Physics, Acoustics and Environment Department

02-656 Warsaw, Ksawerów 21

CERTIFICATE No 638/2024 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Thermano insulations

Manufacturer:

Balex Metal Sp. z o. o.

Wejherowska 12C, 84-239 Bolszewo, 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 28th 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



Deputy Director
for Research and Innovation

Krzysztof Kuczyński, PhD

Warsaw, June 2024