Environmental Product Declaration Type III ITB No. 143/2020

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Corrugated steel profile sheets

for roofing, ceiling, cladding and flooring

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 and verified according to ISO 14025 by an external auditor. It contains the environmental impacts of the declared construction materials. 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 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C3, C4 and D according to EN 15804 (Cradle-to-Gate with options)
The year of preparing the EPD: 2020
Product standard: EN 10169:2012, EN 10346:2009, EN 13501-1:2010
Service Life: 50 years for standard products
PCR: ITB-PCR A (PCR based on EN 15804)
Declared unit: 1 m^2 of corrugated steel profile sheets
Reasons for performing LCA: B2B
Representativeness: Portuguese products

MANUFACTURER

Fig 1. A view of ArcelorMittal Construcao Portugal SA production plant in Cartaxo (Portugal).

ArcelorMittal is a steel and mining company, present in 60 countries with an industrial footprint in 18 countries. The company supplies steel products in all major markets including automotive, construction, household appliance and packaging. ArcelorMittal Construcao Portugal SA is a part of ArcelorMittal Group and is specialized in the production of corrugated steel profile sheets for roofing, ceiling, cladding, flooring and Hairisol® panels intended for roofs and walls.

PRODUCT DESCRIPTION AND APPLICATION

Corrugated steel profile sheets are intended to clad, cover and support roof, wall and floors with an easiest building solution.The support structure to which they are fix can be made of steel, concrete or wood.

This document covers our profiles range: Perfil 4.250.35T; Perfil 4.250.35B; Perfil 5.207.32B; Perfil 11.76.18T; Perfil 11.76.18B; Perfil 11.100.8B; Perfil 5.189.39B; Haircol 59 S; Suporte 4.262,5.30S; Suporte 4.225.54S; Suporte 100S; Bandeja 1.500.90SR; Bandeja 1.500.90BS.

Characteristics of the corrugated steel profile sheet products produced by ArcelorMittal Construcao Portugal SA are presented in Table 1.

Table 1. Characteristics of the corrugated steel profile sheets produced by ArcelorMittal Construcao Portugal SA.

Product Range	Roof / Wall profiles	Support deck profiles	Trays	Composite floor deck
Thickness (mm)	0.4; 0.50. 0.60. 0.63 ; 0.75; 0.88; 1.00; 1.25	0.70; 0.75; 0.80; 0.88; 1.00; 1.25	0.75; 0.88; 1.00; 1.25	0.75; 0.88; 1.00; 1.25
Grade	S220; S280; S320; S350	S220; S280; S320; S350	S320 ; S350	S320 ; S350
Metallic coating	Z100; Z140; Z200; Z225; Z275; ZM 60; ZM80; ZM100; ZM120	Z100; Z140; Z200; Z225; Z275; ZM 60; ZM80; ZM100; ZM120	Z100; Z140; Z200; Z225; Z275; ZM 60; ZM80; ZM100; ZM120	Z100; Z140; Z200; Z225; Z275; ZM 60; ZM80; ZM100; ZM120
Organic Coating	SP 12; SP15; SP25; SP35; PVDF25; PVDF35; PVDF60; PUR45; PUR50; PUR60;	SP 12; SP15; SP25; SP35; PVDF25; PVDF35; PVDF60; PUR45; PUR50; PUR60; PUR85; PVC(P)100;	SP 12; SP15; SP25; SP35; PVDF25; PVDF35; PVDF60; PUR45;PUR5; PUR60;PUR8; PVC(P)100; PVC(P)150; PVC(P)200	SP 12; SP15; SP25; SP35; PVDF25; PVDF35; PVDF60; PUR45; PUR50; PUR60; PUR85; PVC(P)100;

	PUR85; PVC(P)100; PVC(P)150; PVC(P)200	PVC(P)150; PVC(P)200		PVC(P)150; PVC(P)200

Corrugated steel profile sheets are fastened to the steel structure by means of self-drilling fasteners (screws). Using this technique eliminates the need to drill a hole through the profile leading to a hole in the bearing structure. The fasteners increase the fastening reliability and reduce the number of necessary tools to a power screwdriver (before, it used to require a driller, drills and a screwdriver). Maximum steel thickness to screw for self-tapping fasteners is 16 mm. They are made of quenched carbon steel with an anti-corrosion protective surface coating. All fasteners come with aluminum or steel washers with vulcanized EPDM rubber. In case of steel structures whose thickness exceeds 6mm as well as wooden and concrete structures, it is possible to use other fasteners accordingly:

- In case of steel base (thicker than 16 mm) or wooden base – it is recommended to use self-tapping fasteners with properly shaped working thread profile;
- In case of concrete base – it is recommended to use fasteners with an anchor element of self-tapping with a properly shaped working thread profile.

The number of fasteners depends on the climatic loading (snow and wind loading) conditions. Depending on the type of the material, to which are the corrugated profiles fastened, self-tapping steel fasteners are applied (fasteners are differentiated to cold-bended steel and hot-bended), wood or concrete.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on product mass basis in accordance with ITB PCR A. The corrugated steel profile sheets production is a line process in the production plant of ArcelorMittal Construcao Portugal SA located in Cartaxo (Portugal). The allocation of the environmental burdens was done on product mass basis. All the impacts from raw materials extraction and processing are allocated in the module A1 of the LCA. Impacts from the global line production of the corrugated steel profile sheets were inventoried and were allocated to the production of the specific products as following: 43% roof and wall profiles, 51% support deck profiles, 1% trays and 5% composite floor decks. The packaging materials were included in the system boundaries. Impacts associated with metal coatings were not taken into consideration. Module A2 includes transport of raw materials, semi-products, ancilliary materials and packaging materials from their suppliers to ArcelorMittal Construcao Portugal SA production plant in Cartaxo (Portugal). Water and energy consumption, associated emissions and generated wastes are allocated to module A3.

System boundary

The life cycle analysis of the declared products covers “Product Stage”, A1-A3, C3, C4 and D modules (Cradle-to-Gate - with options) in accordance with EN 15804:2012+A1:2013 and ITB PCR A. The details of the system limits are provided in the backgroud report. Energy and water consumption, emissions to air, soil and water as well as information on generated waste s were inventoried and were included in the calculations. It can be assumed that the total sum of the omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804:2012+A1:2013, machines and facilities (capital goods) required for the production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Semi-finished steel products (coils), plastic films, cardboards and wood come from both Portuguese and foreign suppliers. Means of transport include trucks with load: <10t, 10–16t and >16t. For calculation purposes Portuguese and European fuel averages were applied.

A3: Production

The production process of the corrugated steel profile sheets intended for roofing, ceiling, cladding and flooring by ArcelorMittal Construcao Portugal SA is presented in Fig. 2.

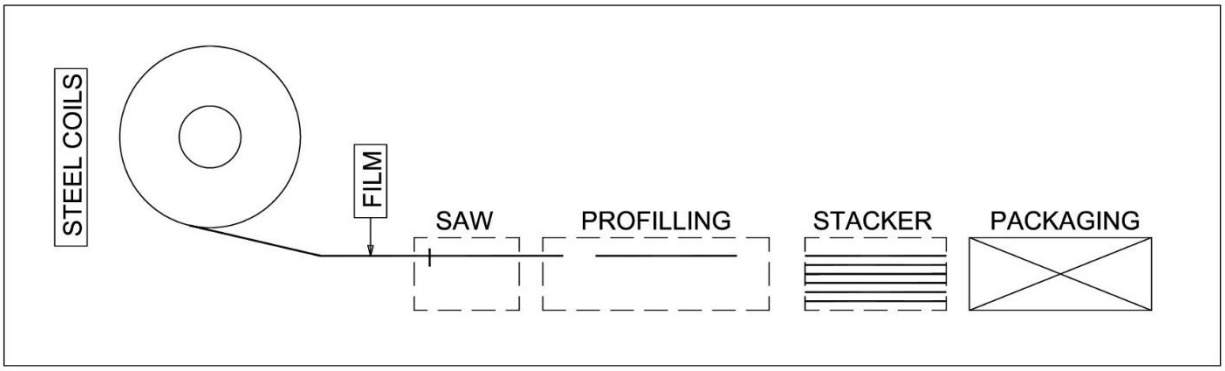

Fig. 2. A scheme of manufacturing of the corrugated steel profile sheets for roofing, ceiling, cladding and flooring by ArcelorMittal Construcao Portugal SA.

C3, C4 and D Modules: End-of-life scenario

At the end of life, the corrugated steel profile sheets (roofing, ceiling, cladding and flooring) are deconstructed with the use of electrical tools. It is assumed that 100% of the material is recovered. 98% of the resulting steel scrap undergo recycling after cutting and shredding while the remaining 2% is forwarded to landfill as mixed construction and demolition wastes. Waste processing – module C3 – includes impacts associated with collecting of the steel scrap and sorting. Environmental burdens occurring in module C4 are associated with exchanges to process-specific burdens (energy, land use), emissions to air via landfill gas incineration and landfill leachate. Benefits and loads beyond the system boundary resulting from the recycling of the steel scrap are included in module D. Utilization of packaging material such as plastic films and wood which constitute less than 1.0% of the total system flows was not taken into consideration.

Table 2. End-of-life scenario for the corrugated steel profile sheets.

Component	Material recovery	Recycling	Landfilling
Steel scrap	100%	98%	2%

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2019 – 31.12.2019 (1 year). The life cycle assessments were prepared for Portugal as reference area.

Data quality

The values determined to calculate the LCA originate from verified ArcelorMittal Construcao Portugal SA inventory data.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent v.3.7, specific EPDs, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m^2 of corrugated steel profile sheets for roofing, ceiling, cladding and flooring produced by ArcelorMittal Construcao Portugal SA.

Table 3. System boundaries for the environmental characteristic of the corrugated steel profile sheets for roofing, ceiling, cladding and flooring produced by ArcelorMittal Construcao Portugal SA.

Environmental assessment information (MNA – Module not assessed, MD – Module 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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MD	MD	MD

The corrugated steel profile sheets
with thickness 50/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	8.86E+00	7.86E-01	1.20E-01	9.77E+00	7.85E-03	4.16E-04	-6.44E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.63E-09	0.00E+00	8.25E-09	1.19E-08	2.70E-14	1.50E-10	1.27E-12
Acidification potential of soil and water	kg SO_2 eq.	1.54E-02	5.73E-03	1.12E-03	2.22E-02	2.66E-05	3.13E-06	-1.55E-02
Formation potential of tropospheric ozone	kg Ethene eq.	2.79E-03	4.18E-04	4.85E-05	3.26E-03	3.14E-06	2.89E-07	-2.00E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	1.69E-03	1.01E-03	2.56E-04	2.96E-03	1.86E-06	6.62E-07	-1.33E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.03E-04	3.74E-09	4.67E-10	6.63E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	7.67E+01	5.86E+00	1.44E+00	8.40E+01	8.83E-02	1.28E-02	-5.10E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	4.86E+00	4.10E-01	1.50E+00	6.77E+00	4.40E-02	2.77E-04	4.67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	7.60E+01	5.72E+00	1.51E+00	8.33E+01	1.35E-01	1.34E-02	-4.83E+01
Use of secondary material	kg	2.75E+00	0.00E+00	0.00E+00	2.75E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	2.87E-02	2.73E-06	2.88E-04	2.90E-02	6.01E-05	0.00E+00	2.26E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.56E-06	1.55E-05	0.00E+00	2.30E-05	8.56E-10	8.52E-09	-3.38E-08
Non-hazardous waste disposed	kg	3.42E-02	6.91E-03	1.01E-02	5.12E-02	7.89E-02	1.57E-01	-1.02E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	1.84E-05	8.43E-08	1.15E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	3.85E+00	3.85E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 55/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	9.74E+00	7.86E-01	1.20E-01	1.06E+01	8.81E-03	4.57E-04	-7.08E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.63E-09	0.00E+00	8.25E-09	1.19E-08	3.03E-14	1.64E-10	1.39E-12
Acidification potential of soil and water	kg SO_2 eq.	1.69E-02	5.73E-03	1.12E-03	2.37E-02	2.99E-05	3.44E-06	-1.71E-02
Formation potential of tropospheric ozone	kg Ethene eq.	3.06E-03	4.18E-04	4.85E-05	3.52E-03	3.52E-06	3.18E-07	-2.20E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	1.84E-03	1.01E-03	2.56E-04	3.11E-03	2.09E-06	7.28E-07	-1.46E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.03E-04	4.20E-09	5.13E-10	7.30E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	8.42E+01	5.86E+00	1.44E+00	9.15E+01	9.91E-02	1.40E-02	-5.61E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	4.97E+00	4.10E-01	1.50E+00	6.88E+00	4.93E-02	3.05E-04	5.14E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	8.34E+01	5.72E+00	1.51E+00	9.07E+01	1.51E-01	1.47E-02	-5.31E+01
Use of secondary material	kg	3.02E+00	0.00E+00	0.00E+00	3.02E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	3.02E-02	2.73E-06	2.88E-04	3.05E-02	6.74E-05	0.00E+00	2.49E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.56E-06	1.55E-05	0.00E+00	2.30E-05	9.60E-10	9.38E-09	-3.72E-08
Non-hazardous waste disposed	kg	3.56E-02	6.91E-03	1.01E-02	5.27E-02	8.85E-02	1.73E-01	-1.13E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	2.07E-05	9.27E-08	1.27E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	4.32E+00	4.23E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 60/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1,06E+01	7,86E-01	1,20E-01	1,15E+01	9,61E-03	4,99E-04	-7,72E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3,64E-09	0,00E+00	8,25E-09	1,19E-08	3,31E-14	1,79E-10	1,52E-12
Acidification potential of soil and water	kg SO_2 eq.	1,83E-02	5,73E-03	1,12E-03	2,52E-02	3,26E-05	3,75E-06	-1,87E-02
Formation potential of tropospheric ozone	kg Ethene eq.	3,32E-03	4,18E-04	4,85E-05	3,79E-03	3,84E-06	3,47E-07	-2,40E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	1,99E-03	1,01E-03	2,56E-04	3,26E-03	2,28E-06	7,94E-07	-1,60E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2,03E-04	0,00E+00	1,20E-07	2,03E-04	4,58E-09	5,60E-10	7,96E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	9,17E+01	5,86E+00	1,44E+00	9,90E+01	1,08E-01	1,53E-02	-6,12E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5,09E+00	4,10E-01	1,50E+00	7,00E+00	5,38E-02	3,32E-04	5,60E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	9,09E+01	5,72E+00	1,51E+00	9,81E+01	1,65E-01	1,60E-02	-5,79E+01
Use of secondary material	kg	3,30E+00	0,00E+00	0,00E+00	3,30E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	4,01E-01	0,00E+00	4,01E-01	0,00E+00	0,00E+00	0,00E+00
Use 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
Net use of fresh water	m^3	3,17E-02	2,73E-06	2,88E-04	3,20E-02	7,35E-05	0,00E+00	2,71E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7,57E-06	1,55E-05	0,00E+00	2,30E-05	1,05E-09	1,02E-08	-4,06E-08
Non-hazardous waste disposed	kg	3,71E-02	6,91E-03	1,01E-02	5,41E-02	9,66E-02	1,88E-01	-1,23E-01
Radioactive waste disposed	kg	2,30E-06	3,99E-05	0,00E+00	4,22E-05	2,26E-05	1,01E-07	1,38E-03
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
Materials for recycling	kg	0,00E+00	0,00E+00	1,80E-01	1,80E-01	4,71E+00	4,62E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 63/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1.11E+01	7.86E-01	1.20E-01	1.20E+01	1.01E-02	5.24E-04	-8.11E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.64E-09	0.00E+00	8.25E-09	1.19E-08	3.48E-14	1.88E-10	1.60E-12
Acidification potential of soil and water	kg SO_2 eq.	1.92E-02	5.73E-03	1.12E-03	2.61E-02	3.42E-05	3.94E-06	-1.96E-02
Formation potential of tropospheric ozone	kg Ethene eq.	3.48E-03	4.18E-04	4.85E-05	3.94E-03	4.03E-06	3.64E-07	-2.52E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	2.09E-03	1.01E-03	2.56E-04	3.35E-03	2.40E-06	8.34E-07	-1.68E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.03E-04	4.81E-09	5.88E-10	8.36E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	9.62E+01	5.86E+00	1.44E+00	1.04E+02	1.13E-01	1.61E-02	-6.43E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5.16E+00	4.10E-01	1.50E+00	7.07E+00	5.65E-02	3.49E-04	5.89E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	9.53E+01	5.72E+00	1.51E+00	1.03E+02	1.73E-01	1.68E-02	-6.08E+01
Use of secondary material	kg	3.46E+00	0.00E+00	0.00E+00	3.46E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	3.26E-02	2.73E-06	2.88E-04	3.29E-02	7.72E-05	0.00E+00	2.85E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.57E-06	1.55E-05	0.00E+00	2.30E-05	1.10E-09	1.07E-08	-4.26E-08
Non-hazardous waste disposed	kg	3.79E-02	6.91E-03	1.01E-02	5.50E-02	1.01E-01	1.98E-01	-1.29E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	2.37E-05	1.06E-07	1.45E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	4.94E+00	4.85E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 70/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1.24E+01	7.86E-01	1.20E-01	1.33E+01	1.12E-02	5.82E-04	-9.01E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.64E-09	0.00E+00	8.25E-09	1.19E-08	3.86E-14	2.09E-10	1.77E-12
Acidification potential of soil and water	kg SO_2 eq.	2.13E-02	5.73E-03	1.12E-03	2.82E-02	3.80E-05	4.38E-06	-2.18E-02
Formation potential of tropospheric ozone	kg Ethene eq.	3.85E-03	4.18E-04	4.85E-05	4.31E-03	4.48E-06	4.04E-07	-2.80E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	2.30E-03	1.01E-03	2.56E-04	3.57E-03	2.66E-06	9.26E-07	-1.86E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.03E-04	5.34E-09	6.53E-10	9.29E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.07E+02	5.86E+00	1.44E+00	1.14E+02	1.26E-01	1.79E-02	-7.14E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5.32E+00	4.10E-01	1.50E+00	7.23E+00	6.28E-02	3.88E-04	6.54E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.06E+02	5.72E+00	1.51E+00	1.13E+02	1.92E-01	1.87E-02	-6.76E+01
Use of secondary material	kg	3.85E+00	0.00E+00	0.00E+00	3.85E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	3.48E-02	2.73E-06	2.88E-04	3.50E-02	8.58E-05	0.00E+00	3.17E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.58E-06	1.55E-05	0.00E+00	2.30E-05	1.22E-09	1.19E-08	-4.74E-08
Non-hazardous waste disposed	kg	3.99E-02	6.91E-03	1.01E-02	5.70E-02	1.13E-01	2.20E-01	-1.43E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	2.63E-05	1.18E-07	1.61E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	5.49E+00	5.39E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 75/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1.32E+01	7.86E-01	1.20E-01	1.41E+01	1.20E-02	6.23E-04	-9.66E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.64E-09	0.00E+00	8.25E-09	1.19E-08	4.14E-14	2.24E-10	1.90E-12
Acidification potential of soil and water	kg SO_2 eq.	2.28E-02	5.73E-03	1.12E-03	2.97E-02	4.07E-05	4.69E-06	-2.33E-02
Formation potential of tropospheric ozone	kg Ethene eq.	4.11E-03	4.18E-04	4.85E-05	4.58E-03	4.80E-06	4.33E-07	-3.00E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	2.45E-03	1.01E-03	2.56E-04	3.72E-03	2.85E-06	9.93E-07	-2.00E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.03E-04	5.72E-09	7.00E-10	9.95E-07
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.14E+02	5.86E+00	1.44E+00	1.22E+02	1.35E-01	1.91E-02	-7.65E+01
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5.44E+00	4.10E-01	1.50E+00	7.35E+00	6.73E-02	4.15E-04	7.01E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.13E+02	5.72E+00	1.51E+00	1.20E+02	2.06E-01	2.00E-02	-7.24E+01
Use of secondary material	kg	4.12E+00	0.00E+00	0.00E+00	4.12E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	3.63E-02	2.73E-06	2.88E-04	3.66E-02	9.19E-05	0.00E+00	3.39E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.58E-06	1.55E-05	0.00E+00	2.31E-05	1.31E-09	1.28E-08	-5.08E-08
Non-hazardous waste disposed	kg	4.14E-02	6.91E-03	1.01E-02	5.84E-02	1.21E-01	2.36E-01	-1.54E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	2.82E-05	1.26E-07	1.73E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	5.89E+00	5.77E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 100/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1,76E+01	7,86E-01	1,20E-01	1,85E+01	1,60E-02	8,31E-04	-1,29E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3,65E-09	0,00E+00	8,25E-09	1,19E-08	5,52E-14	2,99E-10	2,54E-12
Acidification potential of soil and water	kg SO_2 eq.	3,02E-02	5,73E-03	1,12E-03	3,71E-02	5,43E-05	6,25E-06	-3,11E-02
Formation potential of tropospheric ozone	kg Ethene eq.	5,42E-03	4,18E-04	4,85E-05	5,89E-03	6,40E-06	5,78E-07	-4,00E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	3,22E-03	1,01E-03	2,56E-04	4,49E-03	3,80E-06	1,32E-06	-2,66E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2,03E-04	0,00E+00	1,20E-07	2,03E-04	7,63E-09	9,33E-10	1,33E-06
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1,52E+02	5,86E+00	1,44E+00	1,59E+02	1,80E-01	2,55E-02	-1,02E+02
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6,02E+00	4,10E-01	1,50E+00	7,92E+00	8,97E-02	5,54E-04	9,34E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,50E+02	5,72E+00	1,51E+00	1,57E+02	2,75E-01	2,67E-02	-9,66E+01
Use of secondary material	kg	5,50E+00	0,00E+00	0,00E+00	5,50E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	4,01E-01	0,00E+00	4,01E-01	0,00E+00	0,00E+00	0,00E+00
Use 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
Net use of fresh water	m^3	4,38E-02	2,73E-06	2,88E-04	4,41E-02	1,23E-04	0,00E+00	4,52E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7,61E-06	1,55E-05	0,00E+00	2,31E-05	1,75E-09	1,70E-08	-6,77E-08
Non-hazardous waste disposed	kg	4,86E-02	6,91E-03	1,01E-02	6,57E-02	1,61E-01	3,14E-01	-2,05E-01
Radioactive waste disposed	kg	2,30E-06	3,99E-05	0,00E+00	4,22E-05	3,76E-05	1,69E-07	2,30E-03
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
Materials for recycling	kg	0,00E+00	0,00E+00	1,80E-01	1,80E-01	7,85E+00	7,69E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

The corrugated steel profile sheets
with thickness 125/100

Environmental impacts: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	2.20E+01	7.86E-01	1.20E-01	2.29E+01	2.00E-02	1.04E-03	-1.61E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	3.66E-09	0.00E+00	8.25E-09	1.19E-08	6.90E-14	3.74E-10	3.17E-12
Acidification potential of soil and water	kg SO_2 eq.	3.77E-02	5.73E-03	1.12E-03	4.45E-02	6.79E-05	7.81E-06	-3.89E-02
Formation potential of tropospheric ozone	kg Ethene eq.	6.74E-03	4.18E-04	4.85E-05	7.21E-03	8.00E-06	7.22E-07	-4.99E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	3.98E-03	1.01E-03	2.56E-04	5.25E-03	4.75E-06	1.65E-06	-3.33E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	2.03E-04	0.00E+00	1.20E-07	2.04E-04	9.54E-09	1.17E-09	1.66E-06
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.89E+02	5.86E+00	1.44E+00	1.96E+02	2.25E-01	3.19E-02	-1.28E+02
Environmental aspects on resource use: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6.60E+00	4.10E-01	1.50E+00	8.50E+00	1.12E-01	6.92E-04	1.17E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.87E+02	5.72E+00	1.51E+00	1.95E+02	3.43E-01	3.34E-02	-1.21E+02
Use of secondary material	kg	6.87E+00	0.00E+00	0.00E+00	6.87E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	4.01E-01	0.00E+00	4.01E-01	0.00E+00	0.00E+00	0.00E+00
Use 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
Net use of fresh water	m^3	5.13E-02	2.73E-06	2.88E-04	5.16E-02	1.53E-04	0.00E+00	5.65E-03
Other environmental information describing waste categories: (DU) 1 m²								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.63E-06	1.55E-05	0.00E+00	2.31E-05	2.18E-09	2.13E-08	-8.46E-08
Non-hazardous waste disposed	kg	5.58E-02	6.91E-03	1.01E-02	7.29E-02	2.01E-01	3.93E-01	-2.56E-01
Radioactive waste disposed	kg	2.30E-06	3.99E-05	0.00E+00	4.22E-05	4.70E-05	2.11E-07	2.88E-03
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
Materials for recycling	kg	0.00E+00	0.00E+00	1.80E-01	1.80E-01	9.81E+00	9.62E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

Verification

The process of this EPD verification 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 this validity period, 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.) [x] external [ ] internal
External verification of EPD: Ph.D. Halina Prejzner Input data verification, LCI audit, LCA: Ph.D. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: Ph.D. Eng. Michał Piasecki, m.piasecki@itb.pl

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+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15942:2012 Sustainability of construction works - Environmental product declarations - Communication format business-to-business
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2019
- EN 10169:2012 Continuously organic coated (coil coated) steel flat products – technical delivery conditions
- EN 10346:2009, Continuously hot-dip coated steel flat products – technical delivery conditions
- EN 13501-1:2010 Fire classification of construction products and building elements – Part1: Classification using data from reaction to fire tests

p.o. KIEROWNIKA
Zakładu Fizyki Cieplnej, Akustyki i Środowiska
dr inż. Agnieszka Winkler-Skalna

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 143/2020
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Corrugated steel profile sheets for roofing, ceiling, cladding and flooring

Manufacturer:

ArcelorMittal Construcao Portugal, SA

Estrada Nacional 3 Apartado 14, 2071-909 Cartaxo, Portugal

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

PN-EN 15804+A1

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

This certificate, issued for the first time on 28th December 2020 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Deputy 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, December 2020