Type III Environmental Product Declaration No. 260/2021

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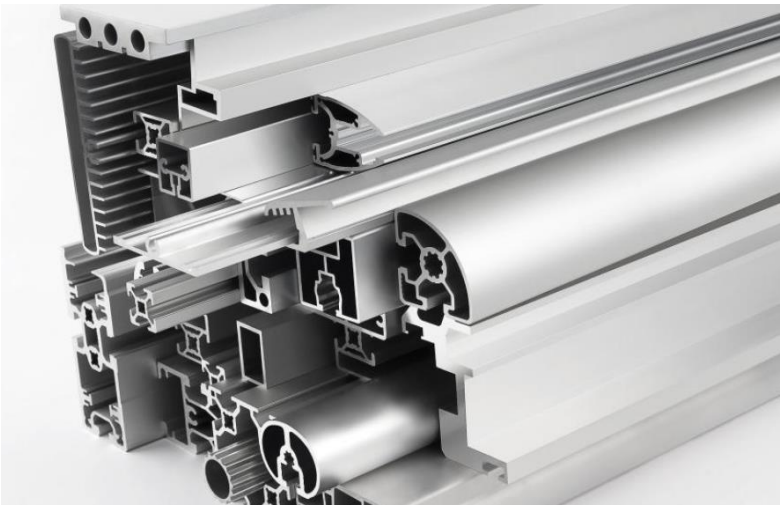
Aluminium profiles



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 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 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C1-C4 and D modules in accordance with EN 15804
(Cradle-to-Gate with options)
The year of preparing the EPD: 2021
Product standard: EN 573, EN 755, EN 12020
Service Life: 25 years for standard product
PCR: ITB-PCR A (PCR based on EN 15804)
Declared unit: 1 kg
Reasons for performing LCA: B2B
Representativeness: Polish, European, Global

MANUFACTURER

Extral Sp. z o.o. is an extrusion plant of aluminum profiles which was founded in 2008 in Silesia in Żory (Poland). Aluminum profiles produced by Extral are supplied to customers throughout Europe. Production of profiles takes place on three extrusion presses.

Fig. 1. The view of the extrusion plant of Extral Sp. z o.o. in Żory.

PRODUCTS DESCRIPTION AND APPLICATION

Extruding plant Extral specializes in the production of complex aluminum products based on Clients requirements, technical documentation and manufacturing technologies individually developed under each customer project. Special profiles are made on the basis of individual design solutions. Usually subject to further machining and surface treatment.

The aluminium profiles are produced using the following aluminium alloys: EN AW-1060 (Al 99,6), EN AW-1070A (Al 99,7), EN AW-6060 (Al MgSi), EN AW-6063 (Al Mg0,7Si), EN AW-6005A (Al SiMg(A)), EN AW-6082 (Al Si1MgMn) and EN AW-6463 (Al Mg0,7Si(B)).
Manufacturing of extruded aluminum products is divided into: rods, tubes, sections and extruded profiles. Each of these groups is assigned accordingly to ranges dimensional or wall thickness defined by standards and mechanical properties, fulfilled by the extrusion plant Extral. In cases of non-standard implementations of production on special sections individual mechanical parameters can be agreed in detail with the customer depending on the typology of use of the product and customer expectations.

Table 1. Technical parameters of the aluminium profiles manufactured by Extral Sp. z o.o.

Properties	Test according to	Parameters
Minimal order quantity	1000 kg/profile/length	1000 kg/profile/length
Quantity tolerance	+/-10% of the ordered quantity	
Length tolerance	-0/+10 mm (individual requirement)	-0/+10 mm (individual requirement)
Standard length of profiles (without additional charge)	3000 - 7500 mm	
Maximum profiles length	16 000 mm	
Minimal Wall thickness	0.9 – 1.2 mm	
The maximum weight of profile	7.5 kg/m	
Packaging	Standard Extral or special packaging	Needs individual agreement

The aluminium profiles can be used for buildings and construction, general engineering, transport, automotive, scaffolding, construction, ladders, electrical engineering, interior design, furniture, intermediaries, machining and other applications.

Extral in 2015 extended its offer for buying of scrap aluminum from the market and from its customers in order to further recycling in accordance with Polish regulations on environmental protection and purchase of waste.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the aluminium profiles a line process executed by Extral Sp. z o.o. in extrusion plant located in Żory (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 Extral Sp. z o.o. were inventoried and 100% were allocated to the aluminium profiles extrusion. 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+A1 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+A1, 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*

Aluminium billets (83.36% of primary aluminium, 16.59% pre-consumer content, 0.05% post-consumer content), ancillary materials and packaging materials come from both local and foreign suppliers. Means of transport include ships and lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: *Production*

Production of extruded aluminum products is divided into: rods, tubes and sections extruded profiles. Each of these groups is assigned accordingly to ranges dimensional or wall thickness defined by standards and mechanical properties, fulfilled by the extrusion plant Extral. A scheme of the production process is presented in Fig. 2.

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

It is assumed that at the End-of-Life, the aluminium profiles are dismantled using power tools. Recovered material is transported to waste processing plant distant of about 60 km using > 24t lorry with 85% capacity utilization and fuel consumption of 35 L per 100 km (module C2). About 99% of the resulting aluminium scrap undergo recycling after shredding (C3) while the remaining 1% of is forwarded to landfill in the form of mixed construction and demolition waste. Environmental burdens declared in module C4 are associated with treatment of aluminium scrap, prepared for recycling at refiner and waste-specific emissions to air and groundwater via landfill. A potential credit resulting from the recycling of the aluminium scrap are presented in module D (calculated only for the primary aluminium content).

Table 2. End-of-life scenario for the aluminium profiles produced by Extral Sp. z o.o.

Material	Material recovery	Recycling	Landfilling
Aluminium scrap	100%	99%	1%

Data quality

The values determined to calculate the LCA originate from verified Extral Sp. z o.o. inventory data.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2020 – 31.12.2020 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of the aluminium profiles were aggregated using weighted average. Impacts were inventoried and calculated for all products of the aluminium profiles.

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-Database. Specific data quality analysis was a part of external ISO 14001 audit.

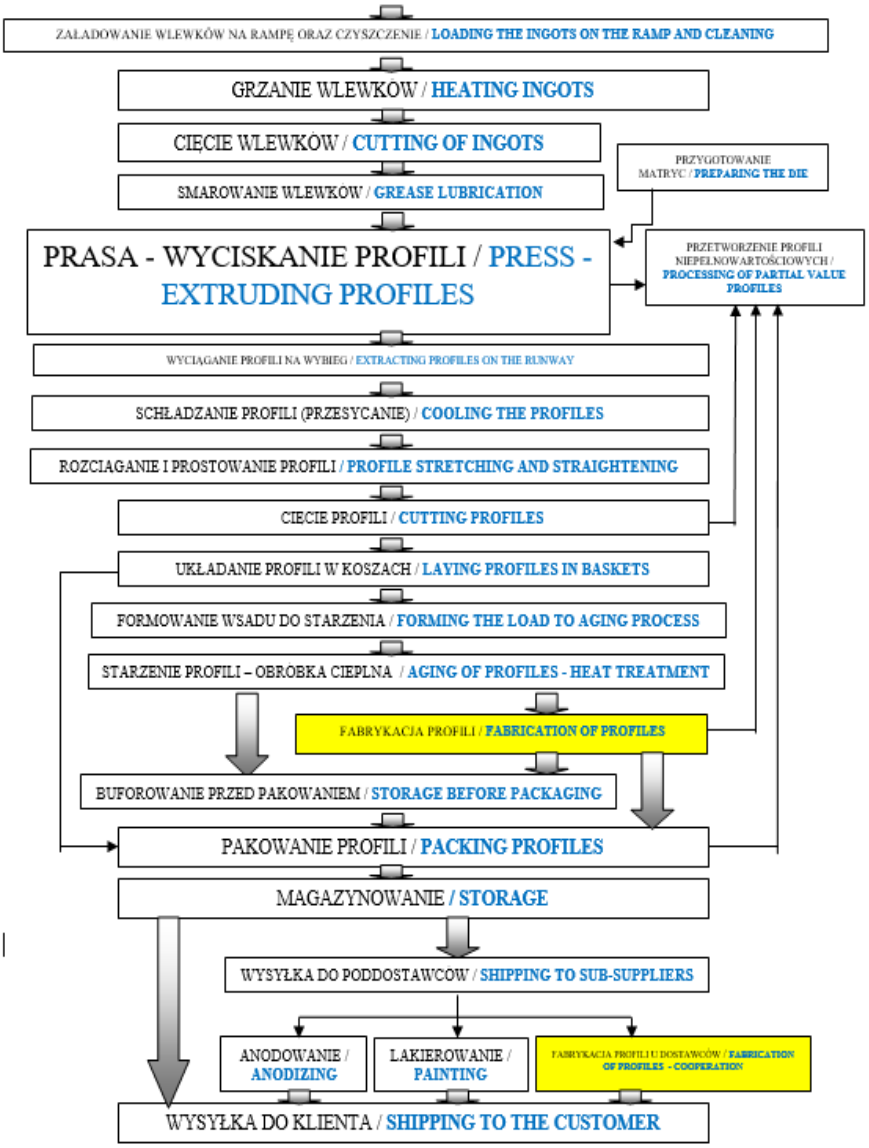

Fig. 2. The scheme of the aluminium profiles production by Extral Sp. z o.o.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of the aluminium profiles produced by Extral Sp. z o.o.

Table 3. System boundaries for the environmental characteristic of the aluminium profiles

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

List of abbreviations:

GWP – Global warming potential;
ODP – Depletion potential of the stratospheric ozone layer;
AP – Acidification potential of land and water;
EP – Eutrophication potential;
POCP – Formation potential of tropospheric ozone photochemical oxidants;
ADPE – Abiotic depletion potential for non-fossil resources;
ADPF – Abiotic depletion potential for fossil resources;
PERE – Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PERM – Use of renewable primary energy resources used as raw materials;
PERT – Total use of renewable primary energy resources;
PENRE – Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM – Use of non-renewable primary energy resources used as raw materials;
PENRT – Total use of non-renewable primary energy resources;
SM – Use of secondary material;
RSF – Use of renewable secondary fuels;
NRSF – Use of non-renewable secondary fuels;
FW – Use of net fresh water;
HWD – Hazardous waste disposed;
NHWD – Non-hazardous waste disposed;
RWD – Radioactive waste disposed;
CRU – Components for re-use;
MFR – Materials for recycling;
MER – Materials for energy recovery;
EE – Exported energy

Table 4. Life cycle assessment (LCA) results of the aluminium profiles produced by Extral Sp. z o.o.

Environmental impacts: (DU) 1 kg										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP	kg CO_2 eq.	1.92E+01	2.63E-01	3.67E-01	1.99E+01	3.60E-03	2.78E-03	9.45E-01	5.30E-01	-1.44E+01
ODP	kg CFC 11 eq.	8.38E-07	0.00E+00	6.61E-09	8.44E-07	3.54E-11	0.00E+00	4.38E-09	4.28E-08	-5.34E-07
AP	kg SO_2 eq.	1.11E-01	5.40E-03	8.45E-05	1.16E-01	2.83E-05	3.33E-05	4.63E-04	8.48E-03	-8.28E-02
POCP	kg Ethene eq.	7.12E-03	9.06E-05	8.42E-06	7.22E-03	1.05E-06	2.43E-06	1.19E-05	3.47E-04	-5.24E-03
EP	kg $(PO_4)^{3-}$ eq.	2.75E-02	7.50E-04	1.39E-05	2.83E-02	1.55E-05	5.87E-06	2.06E-04	2.49E-03	-1.94E-02
ADPE	kg Sb eq.	2.15E-05	0.00E+00	1.36E-06	2.29E-05	7.65E-09	0.00E+00	8.66E-07	1.85E-04	1.39E-05
ADPF	MJ	2.37E+02	1.69E+00	3.76E+00	2.42E+02	4.95E-02	3.79E-02	1.03E+00	6.27E+00	-1.42E+02
Environmental aspects on resource use: (DU) 1 kg										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERT	MJ	3.24E+01	0.00E+00	3.58E-01	3.28E+01	2.54E-03	2.65E-03	1.99E-01	1.09E+00	-1.93E+01
PENRE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRT	MJ	2.48E+02	1.78E+00	3.95E+00	2.54E+02	5.20E-02	3.98E-02	1.09E+00	6.80E+00	-1.49E+02
SM	kg	1.35E-04	0.00E+00	0.00E+00	1.35E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.88E-06	8.88E-02	0.00E+00	8.88E-02	0.00E+00	1.99E-03	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	6.10E+00	0.00E+00	0.00E+00	6.10E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-01	4.37E-01
FW	m^3	INA	INA	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (DU) 1 kg										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	7.27E-05	5.74E-09	1.41E-06	7.42E-05	6.79E-09	1.29E-10	1.24E-06	2.67E-03	4.35E-05
NHWD	kg	3.82E+00	2.56E-06	1.71E-03	3.82E+00	1.01E-02	5.75E-08	2.66E-02	1.01E-01	-2.89E+00
RWD	kg	3.85E-04	1.48E-08	0.00E+00	3.85E-04	6.71E-09	3.32E-10	2.75E-06	1.67E-05	-2.07E-04
CRU	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
MFR	kg	1.43E-05	0.00E+00	2.03E-01	2.03E-01	9.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	1.20E-08	1.20E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ per energy carrier	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

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 LCA, LCI audit and input data verification: PhD. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: PhD. D.Sc. 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
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- Department for Business, Energy & Industrial Strategy. Calorific values and density of fuels, 2021. https://www.gov.uk/
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2020
- EN 573-3:2019 Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products
- EN 755-2:2016 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties
- EN 12020-2:2016 Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 - Part 2: Tolerances on dimensions and form

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

CERTIFICATE № 260/2021
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Aluminium profiles

Manufacturer:

Extral Sp. z o.o.
ul. Wygoda 2, 44-240 Żory, Poland

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 21st September 2021 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, 21 September 2021