Type III Environmental Product Declaration No. 763/2025

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Aluminium billets

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-A3, A4, A4, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)
The year of preparing the EPD: 2025
Product standard: EN 486
Service Life: 50 years
PCR: ITB-PCR A
Declared unit: 1 kg
Reasons for performing LCA: B2B
Representativeness: 2024, Polish, European, Global

MANUFACTURER

The foundry is a new **Extral** investment, located in Rybnik. The entire industrial complex includes a modern line for scrap melting and billets production. It is one of the large and most modern facilities of its kind in Europe, with a capacity of 60,000 tons per year. It consists of:

- The 85T melting furnace with both cold and hot chambers equipped with an electromagnetic pump designed for melting shavings and for the circulation and transportation of metal.
- The 55T holding furnace with a magnetic stirring system for liquid alloy.
- Casting pit with a Wagstaff table for vertical casting in crystallizers (semi-continuous casting).
- The fully automatic homogenization furnace for ingots .

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

PRODUCTS DESCRIPTION AND APPLICATION

REMELT Aluminium ingots are a brand of Extral products with high quality parameters, produced from recycled raw materials and manufactured with an above-standard share of scrap, amounting to approximately 98%.

Remelt billets are produced using the low-emission LCO2ET (Low CO_2 Emission Technology) process, which utilizes mathematical models. This approach significantly reduces energy consumption during production, thereby effectively contributing to lower CO_2 emissions and the protection of the natural environment.

Diameter of ingots 7”, 8”, 10” i.e. 178, 203, 254 mm.

The aluminium billets are produced using the following aluminium alloys from group AlSiMg: 6060, 6063, 6005A, 6082, 6061.

Maximum length of ingots - 8000 mm

The plant uses purchased green electricity.

Ultimately, the plant will use 100% green energy.

All additional technical information about the product is available on the https://extral.com/en and producer’s catalogues.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is the production of 1 kg of the aluminium billets (based on full recycled content) manufactured in Rybnik Foundry.

This EPD covers a wide range of aluminum extrusion billets that are intermediate products which feed other processing steps for the production of other products. The production process includes the remelting of scrap and primary ingots and the following casting process. During the process, impurities are removed and alloying elements are added, if needed, to adjust the chemical composition and to reach the quality standard. Billets are stored to be sold externally or to be used internally as input in the extrusion process for profiles production. The results declared in this EPD are an average representative of all aluminium billets produced for Extral in Rybnik Plant. 6000 series aluminium alloys is the predominant production covered by this document.

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, A4, C1-C4+D modules in accordance with EN 15804 and ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. It can be assumed that the total sum of omitted processes does not exceed 2% 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.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the aluminium billets a line process executed by Extral Sp. z o.o. in plant located in Rybnik (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 billets. 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, A4-A5 transport to site and instalation, 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*

This modules A1 and A2 represents the extraction and processing of raw materials (ingots) the transport to production site and the manufacture of billets. Aluminium billets, ancillary materials and packaging materials come from both local and foreign suppliers. Means of transport include lorries. For calculation purposes Polish and European fuel averages were applied. Primary aluminium used for production is declared on the level up to 1%. Which gives a recycled content of input is almost of 99%. Mg, Si alloy additions, TiB2 rods and material additives and technical gases (Argon, Nitrogen, Oxygen) are used for production. The vast majority of the recyclate input comes from the factory in Żory, where the impact of used aluminium by-product production has been incorporated into aluminium production in Żory.

Module A3: *Production*

Billett-shaped products with varying diameters and final lengths of up to 8m formed by pouring molten metal or alloy into a form and allowing it to solidify. The installation for melting and casting non-ferrous metals (aluminum) with a capacity of over 20 tons of aluminum smelting per day include:

• two-chamber static melting furnace with a capacity of 85 Mg and a melting capacity of approx. 75 Mg/day, equipped with: 2 high-speed HT burners + 1 OXY oxygen burner with a total power of 1,300 kW in the cold chamber and 2 oxy-fuel burners with a rotating flame with a total power of 4,000 kW in warm chamber,

• tilting melting/casting furnace with a capacity of 55 Mg and a melting capacity of 180 Mg/day, equipped with 2 regenerative gas burners (with a total power of 3,000 kW) and 2 direct gas burners (with a total power of 2,000 kW),

• electromagnetic stirrer with low energy consumption bakes 55 Mg,

The production process is continue in a homogenizing furnace heated by gas stakes with a power of approx. 4,360 kW. The process assumes the consumption of electricity from the grid, including 30% renewable energy. In addition, LNG gas consumption is delivered by tanker trucks.

A diagram of the production process is shown in Figure 2.

Production is based on Extral aluminium by-product (from plant Żory, almost 100%), where the impacts were taken into account in the original aluminium product, therefore the input of this by-product is treated as recycled/secondary material with no environmental impact.

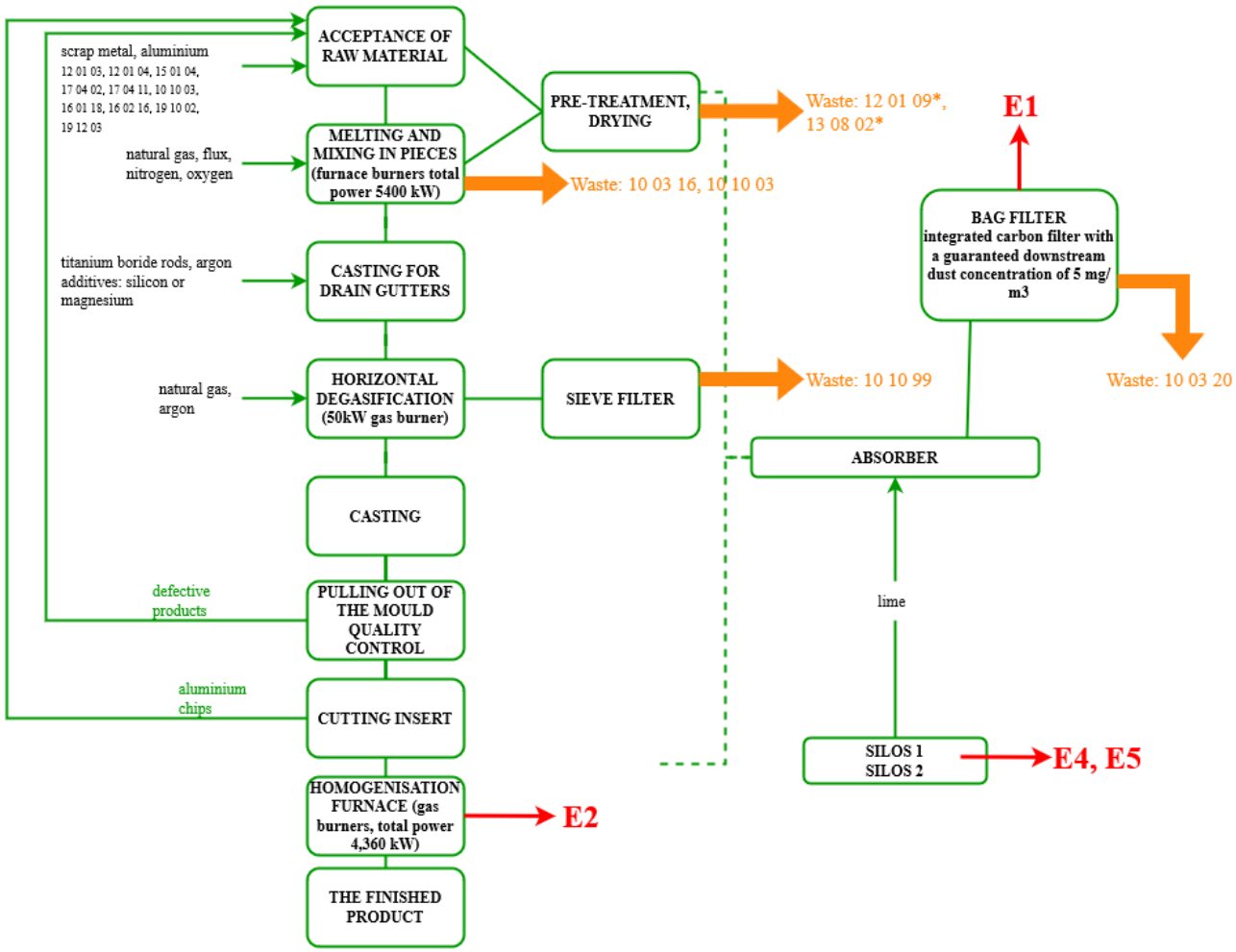

Fig. 2. The scheme of the aluminium billets production by Extral Sp. z o.o.

Module A4: transport to consumer

Vehicle transport at distance 100 km is considered (emission standard Euro 5) with 100% load capacity.

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

It is assumed that the aluminium billets are dismantled/stored at the end of their service life. Recovered material is transported to waste processing plant distant of about 200 km using > 24t lorry with 85% capacity utilization and fuel consumption of 35 L per 100 km (module C2). About 98% of the resulting aluminium scrap undergo recycling after shredding (C3) while the remaining 2% of them 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 for the primary aluminium content). Due to the fact that the production of ingots takes place using recycled material, the D module will have a marginal value,

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

Material	Material recovery	Recycling	Landfilling
Aluminium scrap	100%	98%	2%

Data quality

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. The energy consumption of production and its impact on the production lines 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 01.01.2024 – 31.12.2024 (6 month). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of the representative product were aggregated using a weighted average. Process scrap from billets is considered that has never fulfilled its purpose as a product and is remelted once more. According to the data adopted for the Ecoinvent 3.10 the scrap database, pre-consumer and post-consumer is not burdened with the environmental impacts, however, scrap processing impacts were included. For by-product from Żory it takes into account the transport process.

Calculation rules

LCA was done in accordance with ITB PCR A document. Characterization factors are CML ver. 4.2 (GWP) and other based on EN 15804+A2. ITB-LCA own algorithms were used for impact calculations. A1 was calculated based on data from the specific data from manufacturing plant and using database (European Area) for resources (primary ingots, oils, mixed alloys). A3 and A2 are calculated based on the specific input data.

Databases

The data for the processes come from the following databases: Ecoinvent v.3.10. Data quality analysis was a part of external audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

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

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

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

Table 4. Life cycle assessment (LCA) results of the aluminium billets produced by Extral Sp. z o.o. – environmental impacts (DU: 1 kg)

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	8.61E-01	1.67E-02	3.43E-03	4.11E-03	1.67E-02	7.60E-01	2.13E-04	-3.68E-02
Greenhouse potential - fossil	eq. kg CO_2	8.76E-01	1.66E-02	3.43E-03	4.11E-03	1.66E-02	7.59E-01	2.10E-04	-3.30E-02
Greenhouse potential - biogenic	eq. kg CO_2	-1.41E-02	5.68E-05	1.00E-04	1.20E-04	5.68E-05	5.32E-04	2.12E-06	-2.36E-04
Global warming potential - land use and land use change	eq. kg CO_2	2.27E-03	6.52E-06	1.20E-06	1.44E-06	6.52E-06	1.34E-03	2.13E-07	-3.48E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	7.07E-08	3.85E-09	7.00E-11	8.40E-11	3.85E-09	2.27E-08	6.40E-11	-1.17E-09
Soil and water acidification potential	eq. mol H+	7.01E-03	6.75E-05	3.80E-05	4.56E-05	6.75E-05	6.74E-03	1.78E-06	-4.05E-04
Eutrophication potential - freshwater	eq. kg P	8.11E-04	1.12E-06	6.50E-06	7.80E-06	1.12E-06	3.19E-04	6.11E-08	-2.74E-05
Eutrophication potential - seawater	eq. kg N	1.31E-03	2.04E-05	5.50E-06	6.60E-06	2.04E-05	9.84E-04	6.13E-07	-9.75E-05
Eutrophication potential - terrestrial	eq. mol N	1.19E-02	2.22E-04	4.65E-05	5.58E-05	2.22E-04	1.07E-02	6.66E-06	-1.62E-04
Potential for photochemical ozone synthesis	eq. kg NMVOC	5.03E-03	6.80E-05	1.30E-05	1.56E-05	6.80E-05	4.02E-03	1.93E-06	-2.18E-06
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	5.77E-06	5.89E-08	1.67E-08	2.00E-08	5.89E-08	1.68E-05	7.13E-10	-4.85E-07
Abiotic depletion potential - fossil fuels	MJ	3.04E+01	2.47E-01	5.80E-02	6.96E-02	2.47E-01	9.10E+00	4.86E-03	-9.84E-01
Water deprivation potential	eq. m^3	3.85E-01	1.14E-03	1.20E-03	1.44E-03	1.14E-03	2.44E-01	2.82E-05	-1.62E-01

Table 5. Life cycle assessment (LCA) results of the aluminium billets produced by Extral Sp. z o.o. – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1-A4	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA

Table 6. Life cycle assessment (LCA) results of the aluminium billets produced by Extral Sp. z o.o. - the resource use (DU: 1 kg)

Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.08E+00	4.30E-03	5.16E-03	3.54E-03	7.70E-01	8.54E-05	-8.81E-01
Consumption of renewable primary energy resources used as raw materials	MJ	1.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.74E-03
Total consumption of renewable primary energy resources	MJ	2.25E+00	4.30E-03	5.16E-03	3.54E-03	7.70E-01	8.54E-05	-8.21E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.03E+01	5.82E-02	6.98E-02	2.47E-01	9.10E+00	5.26E-03	-2.40E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.47E-04
Total consumption of non-renewable primary energy resources	MJ	3.05E+01	5.82E-02	6.98E-02	2.47E-01	9.10E+00	5.26E-03	0.98E+00
Consumption of secondary materials	kg	1.10E+00	5.30E-06	6.36E-06	8.27E-05	3.26E-02	0.00E+00	-8.89E-03
Consumption of renew. secondary fuels	MJ	5.82E-03	2.95E-08	3.55E-08	9.11E-07	1.37E-04	0.00E+00	-1.23E-04
Consumption of non-renewable secondary fuels	MJ	0.00E+00	4.70E-05	5.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	2.59E-02	1.58E-05	1.89E-05	3.10E-05	5.46E-03	7.59E-07	-4.56E-03

Table 7 Life cycle assessment (LCA) results of the aluminium billets produced by Extral Sp. z o.o. – waste categories (DU: 1 kg)

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.18E-02	2,77E-04	7,20E-07	2,77E-04	5,79E-02	7,66E-09	-1,64E-02
Non-hazardous waste	kg	5.77E-01	4,92E-03	3,74E-05	4,92E-03	1,33E+00	2,01E-02	-2,99E-01
Radioactive waste	kg	4.00E-02	1,84E-08	5,22E-08	1,84E-08	1,07E-05	2,96E-08	-8,65E-02
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	4.28E-02	7,64E-07	7,20E-08	7,64E-07	5,91E-02	0,00E+00	-2,26E-03
Materials for energy recovery	kg	2.25E-07	6,18E-09	6,30E-10	6,18E-09	9,35E-07	0,00E+00	-2,09E-08
Exported Energy	MJ	4.40E-03	0,00E+00	2,08E-04	0,00E+00	6,44E-03	0,00E+00	-1,80E-04

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: Halina Prejzner, PhD. Eng. LCI audit and input data verification: Michał Chwedaczuk, 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 (2023, v1.6)
- 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
- EN 15804+A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- CRU Group. Carbon footprint by cold metal by country - https://www.crugroup.com/about-cru/
- EAA 2020 - Circular Aluminium Action Plan - A strategy for achieving aluminium's full potential for circular economy by 2030.
- European Life Cycle Database. ELCD 3.2. http://eplca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default
- Ecoinvent Database. http://www.ecoinvent.org/database/.
- Life-Cycle inventory data for aluminium production and transformation processes in Europe. Environmental Profile Report. February 2018.
- Aluminium Recycling in LCA – European Aluminium Association, 2013.
- https://ecoinvent.org/

LCA,LCI, input data verification
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CERTIFICATE № 763/2025
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Aluminium billets

Manufacturer:

EXTRAL Sp z o.o.
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

EN 15804+A2

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

This certificate, issued on 14th February 2025 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, February 2025