Type III Environmental Product Declaration No. 607/2024

Issuance date: 20.09.2024
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Aluminium alloy 8079

Owner of the EPD:

GRÄNGES KONIN S.A.
Address: ul. B. Prusa 2
00-493 Warszawa, Poland
Tel.: +48 63 247 49 00
Website: https://www.granges.com/markets-and-products/europe/konin/
Contact: info.konin@granges.com

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Michał Piasecki
m.piasecki@itb.pl
energia@itb.pl

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-A5, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

Product standards: EN 485-1 to EN 485-4, EN 541, EN 546-1 to EN 546-4, EN 683-1 to EN 683-3, EN 1386, EN 1396

The year of preparing the EPD: 2024

Service Life: distribution, further processing and use of the products, as well as end-of-life treatment are unknown

PCR: ITB-PCR A v. 1.6 (PCR based on EN 15804+A2)

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Poland, European, 2023

MANUFACTURER

Fig. 1 The view of Gränges Konin S.A. plant in Konin

Gränges Konin S.A. is a plant in Konin (Poland) producing aluminium products such as: materials for heat exchangers, construction and structural sheets, materials for battery housings, materials for closures and packaging, and common alloys for the distribution industry.

The production plant in Konin began operating as a state-owned enterprise in 1966. Initial activity included the production of aluminium in the electrolysis and foundry departments. In 1972, a rolling mill department was launched, which initiated the production of rolled flat products from aluminium and aluminium alloys. The company operating under the name Huta Aluminium Konin was privatized in 1995, and in 2008 it was merged with Impexmetal S.A. In 2009, the electrolysis department was closed, and production activities were continued only in the foundry and rolling mill departments.

In 2020, the plant was taken over by Gränges AB and the Company's name was changed to Gränges Konin S.A. The annual production capacity of the plant in Konin is approximately 100 thousand tons of flat rolled products, and thanks to investments in both the foundry and rolling mill departments, the plant's annual production capacity in 2025 is to increase to 140 thousand tons of rolled products.

PRODUCTS DESCRIPTION AND APPLICATION

Aluminium alloy 8079 are characterized by very good ductility due to their finegrained structure. The main alloying elements are iron and silicon, which increase the strength properties relative to pure aluminum while maintaining very good ductility. The 8079 aluminum alloy is used in the food industry. The composition of the charge structure used to produce alloy 8079 (scope 3) is: internal scrap 8079 alloy, primary aluminium, external scrap RSI, AlFe 10 master alloy.

Target chemical composition of Aluminium alloy 8079 are presented in Table 1.

Table 1. Chemical composition of Aluminium alloy 8079 produced by Gränges Konin S.A.

Fe [%]	Si [%]	Cu [%]	Zn [%]	Ti [%]	Mg [%]	Mn [%]	Cr [%]	Al [%]
0,70-1,3	0,05-0,3	0,05	0,10	0,05	0,004	0,05	0,05	rest

All additional technical information about the product is available on the manufacturer's website.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared Unit

The declared unit is 1 kg of aluminum product (averaged).

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, “Transport and Installation”,A4-A5, “end of life” C1-C4+D modules in accordance with EN 15804+A2 and actual ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried in manufacturing plant (LCI) 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. Inputs and processes of product system are presented in Figure 1.

Allocation

The allocation principles used in this EPD are based on the general standards ITB PCR A v. 1.6 and EN 15804+A2. The production of aluminium products is carried out by Gränges Konin S.A. at the production plant located in Konin (Poland) and covers 100% of production. The allocation is made based on the product weight. All predicted impacts from the extraction and processing of raw materials are allocated in module A1 of the LCA. Raw materials for production such as external scrap for remelting, primary aluminium and recycled aluminium are supplied from external suppliers. Impacts from the global linear production of Gränges Konin S.A. are estimated at 100% and have been assigned to the production of aluminium products. Water and energy consumption, related emissions and waste generation are assigned to module A3. Packaging materials are taken into account.

System limits

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.

Modules A1 and A2: Raw materials supply and transport

Modules A1 and A2 show the extraction and processing of raw materials and transportation to the production site. The input material of aluminum, auxiliary materials come from both local and foreign suppliers. Means of transportation include ships and trucks. Average fuel consumption in Poland and Europe was used for calculation purposes. Recycled aluminum is delivered from one supplier with a distance of 725 km. Primary aluminum is delivered from one supplier, transportation by ship 2800 km and transportation by truck 800 km.

Module A3: Production

Production is based on the direct casting method carried out in the casting house. Further processing takes place in appropriate hot and cold rolling mills. Finishing equipment includes tension levelling, automatic inspection systems, slitting machines for thin and thick sheets, as well as lines for cutting to length and chemical processing. The production processes are shown in Figure 2. Electricity supplied is from grid electricity.

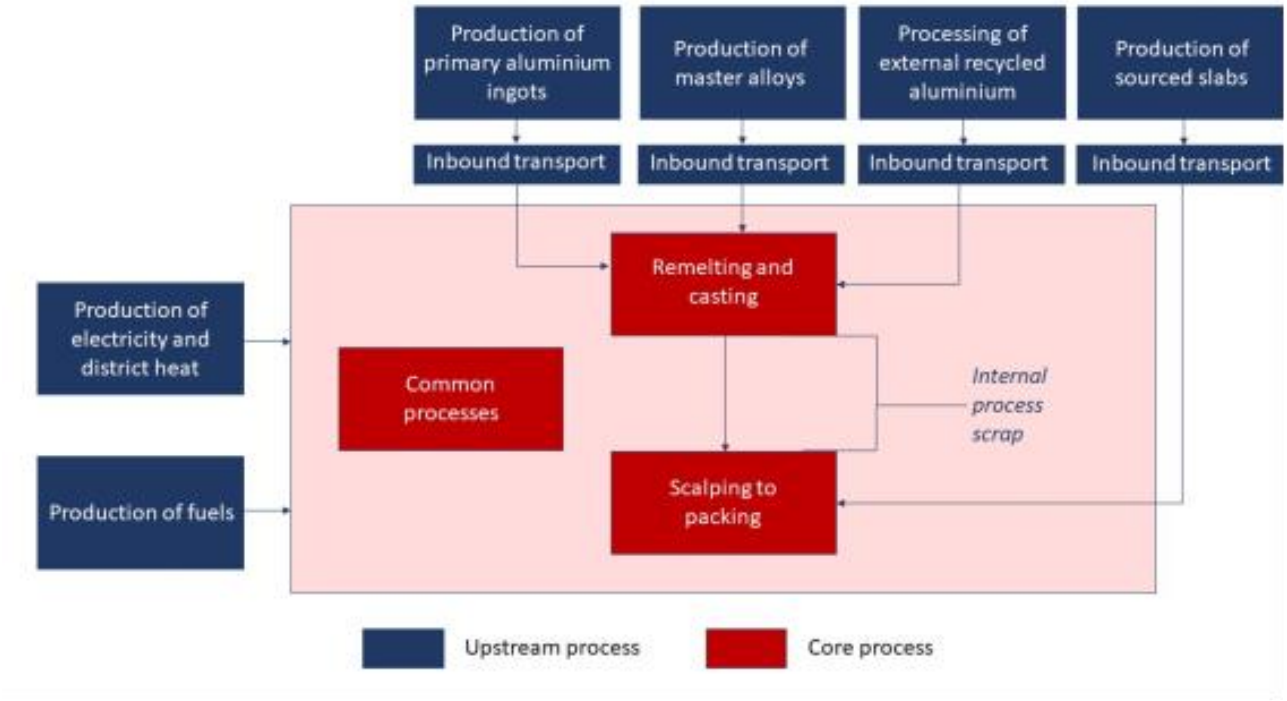

Figure 2. Diagram of the manufacturing process of aluminium alloy 8079

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 at the End-of-Life, the aluminium products are dismantled using power tools. Recovered material is transported to waste processing plant distant of about 100 km using > 24t lorry with 85% capacity utilization and fuel consumption of 35 L per 100 km (module C2). About 90% of the resulting aluminium scrap undergo recycling after shredding (C3) while the remaining 10% 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).

Table 2. End-of-life scenario for the aluminium products produced by Gränges Konin S.A.

Material	Material recovery	Recycling	Landfilling
Aluminium scrap	100%	90%	10%

Data collection period

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

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 v 3.10 and available supplier EPDs. The energy consumption in production and its impact on the production process were inventoried and calculated. For aluminium, 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.

Assumptions and estimates

The impacts of the representative product were aggregated using a weighted average (all products). According to the data adopted for the Ecoinvent v3.10 the scrap database, post-consumer is not burdened with the environmental impacts, however, scrap processing impacts were included.

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. 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, specific EPDs for suppliers. Specific data quality analysis was a part of external audit.

Additional information

The manufacturer provided certificates of origin of electricity from renewable energy sources (75%). Traditional electricity (Ecoinvent v.3.10 data) emission factor used is 0.685 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of the Aluminium alloy 8079 produced by Gränges Konin S.A. in Poland. The following life cycle modules (Table 2) were included in the analysis.

Table 2 System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)															
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
MD	**MD**	**MD**	**MD**	**MD**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MD**	**MD**	**MD**	**MD**	**MD**

Table 3 Life cycle assessment (LCA) results of the product – environmental impacts (DU: 1 kg)- EF v.3.1 EN 15804

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	3.13E+00	1.25E-01	6.56E-01	3.91E+00	1.67E-02	3.43E-03	4.11E-03	1.67E-02	6.98E-01	1.06E-03	-5.73E-01
Greenhouse potential - fossil	eq. kg CO_2	3.11E+00	1.24E-01	6.55E-01	3.89E+00	1.66E-02	3.43E-03	4.11E-03	1.66E-02	6.97E-01	1.05E-03	-5.55E-01
Greenhouse potential - biogenic	eq. kg CO_2	5.12E-03	3.62E-04	8.56E-03	1.40E-02	5.68E-05	1.00E-04	1.20E-04	5.68E-05	4.89E-04	1.06E-05	-2.63E-03
Global warming potential - land use and land use change	eq. kg CO_2	9.49E-02	5.59E-05	3.05E-04	9.53E-02	6.52E-06	1.20E-06	1.44E-06	6.52E-06	1.23E-03	1.07E-06	-1.53E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	8.50E-08	2.81E-08	3.50E-08	1.48E-07	3.85E-09	7.00E-11	8.40E-11	3.85E-09	2.08E-08	3.20E-10	-1.45E-08
Soil and water acidification potential	eq. mol H+	4.63E-02	6.62E+00	3.93E-03	6.67E+00	6.75E-05	3.80E-05	4.56E-05	6.75E-05	6.19E-03	8.88E-06	-3.81E-03
Eutrophication potential - freshwater	eq. kg P	2.60E-03	7.66E-06	5.51E-04	3.16E-03	1.12E-06	6.50E-06	7.80E-06	1.12E-06	2.93E-04	3.06E-07	-3.25E-04
Eutrophication potential - seawater	eq. kg N	6.68E-03	2.93E-04	6.39E-04	7.61E-03	2.04E-05	5.50E-06	6.60E-06	2.04E-05	9.04E-04	3.06E-06	-8.23E-04
Eutrophication potential - terrestrial	eq. mol N	6.72E-02	3.22E-03	5.35E-03	7.58E-02	2.22E-04	4.65E-05	5.58E-05	2.22E-04	9.84E-03	3.33E-05	-4.96E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	2.51E-02	8.88E-04	1.71E-03	2.77E-02	6.80E-05	1.30E-05	1.56E-05	6.80E-05	3.70E-03	9.64E-06	-1.88E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	7.91E-05	3.96E-07	8.32E-06	8.78E-05	5.89E-08	1.67E-08	2.00E-08	5.89E-08	1.55E-05	3.56E-09	-1.01E-06
Abiotic depletion potential - fossil fuels	MJ	8.18E+01	1.80E+00	8.71E+00	9.23E+01	2.47E-01	5.80E-02	6.96E-02	2.47E-01	8.36E+00	2.43E-02	-9.05E+00
Water deprivation potential	eq. m^3	6.23E+00	7.89E-03	2.29E-01	6.47E+00	1.14E-03	1.20E-03	1.44E-03	1.14E-03	2.24E-01	1.41E-04	-9.09E-01

Table 4 Life cycle assessment (LCA) results of the product – additional impacts indicators - EF v.3.1 EN 15804

Indicator	Unit	A1-A5	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 5 Life cycle assessment (LCA) results of the product - the resource use - EF v.3.1 EN 15804

Indicator	Unit	A1	A2	A3	A1-A3	A4		C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.26E+01	2.39E-02	4.92E+00	2.75E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.07E-01	4.27E-04	-3.92E+00
Consumption of renewable primary energy resources used as raw materials	MJ	9.05E-02	0.00E+00	0.00E+00	9.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	2.27E+01	2.39E-02	4.93E+00	2.76E+01	3.54E-03	4.30E-03	5.16E-03	3.54E-03	7.07E-01	4.27E-04	-3.92E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	7.60E+01	1.80E+00	5.72E+00	8.35E+01	2.47E-01	5.82E-02	6.98E-02	2.47E-01	8.36E+00	2.63E-02	-1.04E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	8.27E-01	0.00E+00	0.00E+00	8.27E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	7.68E+01	1.80E+00	9.05E+00	8.76E+01	2.47E-01	5.82E-02	6.98E-02	2.47E-01	8.36E+00	2.63E-02	-1.04E+01
Consumption of secondary materials	kg	5.90E-01	6.35E-04	2.44E-03	5.93E-01	8.27E-05	5.30E-06	6.36E-06	8.27E-05	2.99E-02	0.00E+00	-6.50E-03
Consumption of renew. secondary fuels	MJ	2.54E-04	6.01E-06	7.99E-05	3.40E-04	9.11E-07	2.95E-08	3.55E-08	9.11E-07	1.25E-04	0.00E+00	-3.12E-05
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	3.42E-03	3.42E-03	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	1.25E-01	2.10E-04	1.01E-02	1.35E-01	3.10E-05	1.58E-05	1.89E-05	3.10E-05	5.01E-03	3.79E-06	-2.20E-02

Table 6 Life cycle assessment (LCA) results of the product – waste categories - EF v.3.1 EN 15804

Indicator	Unit	A1	A2	A3	A1-A3	A4		C1	C2	C3	C4	D
Hazardous waste	kg	1.43E-02	2.08E-03	9.78E-03	2.62E-02	2,77E-04	6,00E-07	7,20E-07	2,77E-04	5,31E-02	3,83E-08	-7,78E-02
Non-hazardous waste	kg	1.62E-01	3.35E-02	2.80E-01	4.75E-01	4,92E-03	3,12E-05	3,74E-05	4,92E-03	1,22E+00	1,00E-01	-1,56E+00
Radioactive waste	kg	1.80E-04	1.21E-07	6.52E-06	1.86E-04	1,84E-08	4,35E-08	5,22E-08	1,84E-08	9,81E-06	1,48E-07	-3,71E-01
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8.91E-01	3.41E-05	8.88E-02	9.80E-01	7,64E-07	6,00E-08	7,20E-08	7,64E-07	5,43E-02	0,00E+00	-4,80E-04
Materials for energy recovery	kg	2.73E-06	4.52E-08	3.02E-05	3.30E-05	6,18E-09	5,25E-10	6,30E-10	6,18E-09	8,58E-07	0,00E+00	-2,06E-07
Exported Energy	MJ	6.19E-01	4.14E-04	1.62E-02	6.36E-01	0,00E+00	1,73E-04	2,08E-04	0,00E+00	5,91E-03	0,00E+00	-1,84E-03

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 LCI audit and verification: Filip Poznański, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- EN 485-1 Aluminium and aluminium alloys. Sheet, strip and plate. Part 1: Technical conditions for inspection and delivery.
- EN 485-2 Aluminium and aluminium alloys. Sheet, strip and plate. Part 2: Mechanical properties.
- EN 485- 3 Aluminium and aluminium alloys. Sheet, strip and plate. Part 3: Tolerances on dimensions and shape for hot-rolled product.
- EN 485-4 Aluminium and aluminium alloys. Sheet, strip and plate. Part 4: Tolerances on dimensions and shape for cold-rolled product.
- EN 541 Aluminum and aluminum alloys. Rolled products for cans, closures and lids. Technical Specifications.
- EN 546-1 Aluminium and aluminium alloys. Foil. Part 1: Technical conditions for inspection and delivery.
- EN 546-2 Aluminium and aluminium alloys. Foil. Part 2: Mechanical properties.
- EN 546-3 Aluminium and aluminium alloys. Foil. Part 3: Tolerances on dimensions.
- EN 546-4 Aluminium and aluminium alloys. Foil. Part 4: Special property requirements.
- EN 683-1 Aluminium and aluminium alloys. Finstock. Part 1: Technical conditions for inspection and delivery.
- EN 683-2 Aluminium and aluminium alloys. Finstock. Part 2: Mechanical properties.
- EN 683-3 Aluminium and aluminium alloys. Finstock. Part 3: Tolerances on dimensions and form.
- EN 1386 Aluminium and aluminium alloys. Tread plate. Specifications.
- EN 1396 Aluminium and aluminium alloys. Coil coated sheet and strip for general applications. Specifications.
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework

- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2021
- World Steel Association 2017 Life Cycle inventory methodology report for steel products
- https://ecoinvent.org/

LCA,LCI, input data verification
Michał Piasecki, PhD. D.Sc.

Qualified electronic signature

Head of Thermal Physic, Acoustic and Environment Department
Agnieszka Winkler-Skalna, PhD.

Qualified electronic signature

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 607/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Aluminium alloy 8079

Manufacturer:

Gränges Konin S.A.

B. Prusa 2, 00-493 Warszawa, Poland

Production plant

Hutnicza 1, 62-510 Konin, 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 20th September 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

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, September 2024