Type III Environmental Product Declaration No. 831/2025

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INORA small-sized modular concrete blocks INORBLOCK®

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

The year of preparing the EPD: 2025

Product standard: EN 771-4:2011+A1:2015

Service Life: 120 years for standard product

PCR: ITB-PCR A (PCR based on EN 15804+A2) and EN 16757:2022

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Polish, European, 2023

MANUFACTURER

INORA is an independent Polish geotechnical engineering and consulting company. Since 1991 company has been designing, advising, and providing opinions in the field of geotechnics, with a particular emphasis on modern technologies – primarily in road, railway, civil, and hydraulic engineering construction. Production of INORA small-sized modular concrete blocks, at the time of preparation of the declaration, was provided in two plants : Księżyno and Charsznica (Poland). The company specializes in geotechnical design and consulting. It provides expert opinions, analyses, and technical designs for engineering structures, primarily in difficult and complex ground conditions, where traditional methods prove insufficient, unreliable, and largely uneconomical.

PRODUCTS DESCRIPTION AND APPLICATION

INORA small-sized modular concrete blocks are used in civil engineering and water construction in masonry structures. These masonry elements are intended for use in plastered or unglazed masonry structures, load-bearing or non-load-bearing, and are suitable for construction of retaining walls. INORA small-sized modular concrete blocks are manufactured in accordance with the EN 771-4:2011+A1:2015 product standard in two concrete classes: C35/45 and C30/37. Their basic dimensions and physical properties are presented in Table 1. Cement for production is local CEM II BV 42,5R (cement content: 0.31 and 0.33 kg of cement per kg of product).

Table 1. Dimensions and properties of produced INORA small-sized modular concrete blocks

Standard Features	Unit	Value
Nominal dimensions:		
Length	mm	300
Width	mm	240
Height	mm	125
Dimension tolerances:		
Length	mm	+10/-10
Width	mm	+3/-3
Height	mm	+3/-3
Compressive strength (parallel to forming direction 300 mm)	N/mm^2	≥30/37
Water absorption	$g/(m^2 \times s)$	≤2,0
Dry density	kg/m^3	≥2200
Resistance to weather conditions – frost	≥F 150	

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit

The declared unit is 1 ton of INORA small-sized modular concrete blocks with an average dry density:

- for C35/45 concrete blocks equal to 2380 kg/m^3,
- for C30/37 concrete blocks equal to 2377 kg/m^3.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of INORA small-sized modular concrete blocks is a line process executed in two plants in Poland:

- RAK-BUD Raczkowscy sp. k. located in ul. Przemysłowa 6, 16-001 Księżyno;
- Grupa CHYŻBET Sp. z o.o. located in ul. Miechowska 8, 32-250 Charsznica.

Allocation was made based on product mass. All impacts related to raw material extraction and processing were allocated in Module A1 of the Life Cycle Analysis (LCA). Impacts resulting from global linear production for the two aforementioned plants were inventoried and allocated to INORA small-sized modular concrete blocks. Water and energy consumption, associated emissions, and waste generation were assigned to Module A3. Calculations were performed separately for each plant and the results were then averaged.

System limits

Type of the EPD is: cradle to gate - with options. The following life cycle stages were considered. Production stage including: A1 - Raw material extraction and processing, A2 - Transport to the manufacturer and A3 - Manufacturing, A4 - Transport to Site, A5 - installation, End-of-life stage: C1-Deconstruction, C2 - Transport to waste processing, C3 - Waste processing, C4 - Disposal (landfill). This includes provision of all materials, products and energy, packaging processing and its transport, as well as, waste processing up to the end-of waste state or disposal of final residues. EPD includes D module - declaration of all benefits and loads beyond product system. Energy and water consumption, emissions as well as information on generated wastes were inventoried and included. 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. 99.8 % materials submitted for the formulations and production data were taken into consideration. In the assessment, all available data from production have been considered, i.e. all raw materials/elements used as per formulation process, utilized thermal energy for heating, and electric power consumption. Thus, material and energy flows contributing less than 1 % of mass or energy have been considered. It can be assumed, that the total sum of neglected processes does not exceed 0.5 % of energy use and mass per modules.

Modules A1 and A2: *Raw materials supply and transport*

The product consists of sand, gravel, CEM II BV 42,5 R (with EPD), gypsum, ash, and additives from local suppliers. The means of transport were trucks. Average fuel consumption in Poland and Europe was used for the calculations.

Module A3: *Production*

The production of INORA small-sized modular concrete blocks begins with the acquisition of raw materials. After grinding, the raw materials are dosed and mixed with additives and water according to the recipe. The resulting concrete mix is then poured onto production trays, which are then transferred to a vibropress, where the products are formed. After initial quality control, the products are transferred to curing chambers. The finished blocks, which have passed quality control, are

packed on pallets and transported to a warehouse, from where they are then distributed to customers. The scheme of the production process is shown in Figure 1.

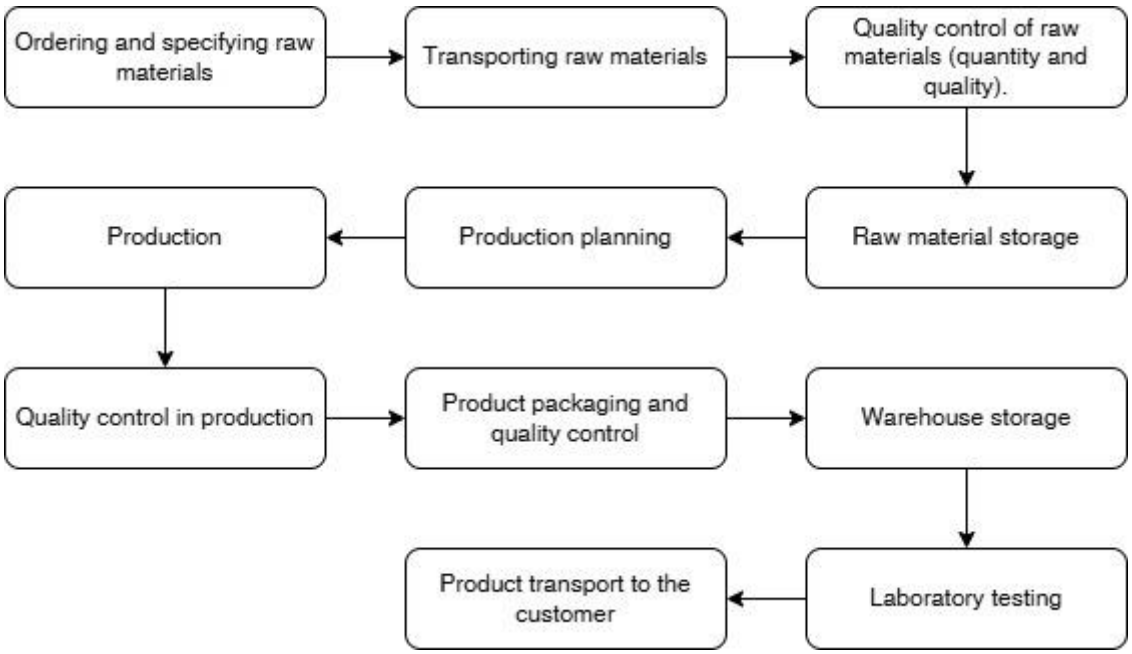

Fig. 1. The scheme of INORA small-sized modular concrete blocks production

Module A4: ***Transport to a construction site***

The concrete blocks are delivered to Polish as well as foreign customers. In the adapted scenario an average distance of 100 km from the factory gate to a recipient is assumed. Means of transport include 16 - 32 t lorry (EURO 5) with fuel consumption of 35 l per 100 km.

Module A5: ***Installation***

The INORA small-sized modular concrete blocks are installed as predefined elements using auxiliary materials, machinery and manpower, throughout Europe. A flat amount of construction waste is assumed for all products equal to 1 %. The declared product is thus the inclusion of the construction waste in the product.

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

In the adapted scenario, dismantling of concrete blocks (C1) is performed as part of construction renovation or demolition processes. The concrete block products are assumed demolished using an excavator (C1). Impacts are accounted for in the form of energy consumption from the excavator used for demolition, sorting, placement, and additional crushing of concrete blocks waste elements in large stacks and loading of waste for the transport. It is assumed that 100 % of concrete blocks are recovered at the EoL cycle. Recovered material is transported either to landfill or recycling site distant by 100 km, on 16-32 t lorry (EURO 5) with fuel consumption of 35 l per 100 km. In the adapted scenario 90 % of the concrete blocks is recycled and further used as aggregate for road foundation or ballast(credits presented in module D) while remaining 10 % is forwarded to landfill in the form of mixed construction and demolition wastes. Environmental burdens declared in module C4 are associated with waste-specific emissions to air, soil and groundwater. Electricity at end-of-life (module C) has been modelled. Electricity at end-of-life (module D) has been modelled using an average EU-27 electricity mix as the location where the product reaches end-of-life is unknown.

Table 2. End-of-life scenario for the INORA small-sized modular concrete blocks

Material	Material recovery	Recycling	Landfilling
waste concrete	100 %	90 %	10 %

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data quality
The data selected for LCA originate from ITB LCI questionnaires completed by INORA sp. z o.o. and verified during data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. Specific (LCI) data quality analysis was a part of the input data verification.

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.

Assumptions and estimates
The impacts of INORA small-sized modular concrete blocks were aggregated using weighted average.

Calculation rules
LCA was done in accordance with ITB PCR A document. LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC GWP method with a 100-year horizon. Emission of acidifying substances, emission of substances to water contributing to oxygen depletion, emission of gases that contribute to the creation of ground-level ozone, abiotic depletion, and ozone depletion emissions were all calculated with the EF 3.1. method.

Databases
The data for the processes come from the following databases: Ecoinvent v.3.11, specific EPDs, ITB-Database. Specific EPD was used for CEM II BV 42.5R from ITB-Database. Where no background data was available, data gaps were complemented by manufacturer information and literature research. Specific data quality analysis was a part of external ISO 14001 audit. Polish electricity (Ecoinvent v 3.11, supplemented by national KOBiZE data) emission factor used is 0.685kg CO_2/kWh (National for 2023).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of INORA small-sized modular concrete blocks produced for INORA sp. z o.o.

Table 3. 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 4. Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	9.38E+01	1.78E+01	9.56E+00	1.21E+02	1.67E+01	1.37E+00	3.43E-03	1.67E+01	1.50E+01	1.06E+00	-9.04E+00
Greenhouse potential - fossil	eq. kg CO_2	9.36E+01	1.78E+01	9.56E+00	1.21E+02	1.66E+01	1.37E+00	3.43E-03	1.66E+01	1.50E+01	1.05E+00	-9.00E+00
Greenhouse potential - biogenic	eq. kg CO_2	1.39E-01	1.14E-02	4.43E-03	1.55E-01	5.68E-02	3.69E-03	9.23E-06	5.68E-02	5.11E-02	1.06E-02	-5.40E-04
Global warming potential - land use and land use change	eq. kg CO_2	2.78E-02	5.90E-03	4.20E-04	3.42E-02	6.52E-03	2.14E-04	5.36E-07	6.52E-03	5.87E-03	1.07E-03	-4.13E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	4.61E-05	3.88E-07	3.01E-08	4.65E-05	3.85E-06	7.53E-09	1.88E-11	3.85E-06	3.46E-06	3.20E-07	-1.69E-06
Soil and water acidification potential	eq. mol H+	2.89E-01	5.71E-02	2.91E-02	3.75E-01	6.75E-02	1.45E-02	3.62E-05	6.75E-02	6.07E-02	8.88E-03	-3.78E-01
Eutrophication potential - freshwater	eq. kg P	6.24E-02	1.21E-03	4.44E-03	6.81E-02	1.12E-03	2.36E-03	5.90E-06	1.12E-03	1.01E-03	3.06E-04	-1.37E-02
Eutrophication potential - seawater	eq. kg N	4.49E-02	1.92E-02	3.84E-03	6.80E-02	2.04E-02	2.05E-03	5.13E-06	2.04E-02	1.83E-02	3.06E-03	-3.36E-02
Eutrophication potential - terrestrial	eq. mol N	6.55E-01	2.09E-01	3.29E-02	8.97E-01	2.22E-01	1.79E-02	4.47E-05	2.22E-01	2.00E-01	3.33E-02	-4.51E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.98E-01	8.66E-02	1.03E-02	2.95E-01	6.80E-02	5.15E-03	1.29E-05	6.80E-02	6.12E-02	9.64E-03	-1.08E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	6.82E-02	6.13E-05	3.79E-06	6.83E-02	5.89E-05	5.16E-07	1.29E-09	5.89E-05	5.30E-05	3.56E-06	-2.68E-03
Abiotic depletion potential - fossil fuels	MJ	3.52E+02	2.52E+02	5.21E+01	6.56E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.43E+01	-3.16E+02
Water deprivation potential	eq. m^3	2.90E+01	1.32E+00	1.05E+00	3.14E+01	1.14E+00	4.14E-01	1.03E-03	1.14E+00	1.03E+00	1.41E-01	-2.34E+01

Table 5. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 ton)- based on concrete C30/37

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 6. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 ton) – based on concrete C30/37

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.82E+01	4.10E+00	5.24E+00	5.76E+01	3.54E+00	1.78E+00	4.45E-03	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of renewable primary energy resources used as raw materials	MJ	3.83E-02	0.00E+00	0.00E+00	3.83E-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	4.82E+01	4.10E+00	5.24E+00	5.76E+01	3.54E+00	1.78E+00	4.45E-03	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.49E+02	2.52E+02	4.80E+01	6.49E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	3.01E+00	0.00E+00	4.13E+00	7.14E+00	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	3.52E+02	2.52E+02	5.21E+01	6.56E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of secondary materials	kg	6.00E+01	1.13E-01	4.77E-03	6.01E+01	8.27E-02	1.88E-03	4.70E-06	8.27E-02	7.44E-02	0.00E+00	-1.91E-01
Consumption of renew. secondary fuels	MJ	2.58E+01	1.48E-03	4.57E-05	2.58E+01	9.11E-04	9.49E-06	2.37E-08	9.11E-04	8.20E-04	0.00E+00	-1.16E-02
Consumption of non-renewable secondary fuels	MJ	1.47E+01	0.00E+00	0.00E+00	1.47E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	7.90E-01	3.05E-02	1.22E-01	9.42E-01	3.10E-02	6.21E-02	1.55E-04	3.10E-02	2.79E-02	3.79E-03	-5.73E-01

Table 7. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 ton)- based on concrete C30/37

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.27E+00	3.61E-01	4.37E-01	2.07E+00	2.77E-01	1.68E-01	4.19E-04	2.77E-01	2.49E-01	3.83E-05	2.21E+00
Non-hazardous waste	kg	3.73E+01	7.75E+00	2.38E+01	6.89E+01	4.92E+00	1.13E+01	2.82E-02	4.92E+00	4.42E+00	1.00E+02	6.15E+01
Radioactive waste	kg	2.21E-04	7.42E-05	8.91E-06	3.04E-04	1.84E-05	3.25E-06	8.12E-09	1.84E-05	1.66E-05	1.48E-04	8.34E-04
Components for re-use	kg	6.44E-06	0.00E+00	0.00E+00	6.44E-06	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	4.29E-01	3.02E-03	9.73E-01	1.40E+00	7.64E-04	1.45E-04	3.63E-07	7.64E-04	6.87E-04	0.00E+00	4.28E-03
Materials for energy recovery	kg	1.68E-01	1.60E-05	4.00E-01	5.68E-01	6.18E-06	2.33E-07	5.83E-10	6.18E-06	5.56E-06	0.00E+00	3.98E-04
Exported Energy	MJ	1.11E-01	1.10E-01	1.65E-02	2.38E-01	0.00E+00	6.92E-02	1.73E-04	0.00E+00	0.00E+00	0.00E+00	8.59E-01

Table 8. Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 ton) - based on concrete C35/45

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	9.87E+01	1.78E+01	9.56E+00	1.26E+02	1.67E+01	1.37E+00	3.43E-03	1.67E+01	1.50E+01	1.06E+00	-9.04E+00
Greenhouse potential - fossil	eq. kg CO_2	9.85E+01	1.78E+01	9.56E+00	1.26E+02	1.66E+01	1.37E+00	3.43E-03	1.66E+01	1.50E+01	1.05E+00	-9.00E+00
Greenhouse potential - biogenic	eq. kg CO_2	1.47E-01	1.14E-02	4.43E-03	1.62E-01	5.68E-02	3.69E-03	9.23E-06	5.68E-02	5.11E-02	1.06E-02	-5.40E-04
Global warming potential - land use and land use change	eq. kg CO_2	2.89E-02	5.90E-03	4.20E-04	3.52E-02	6.52E-03	2.14E-04	5.36E-07	6.52E-03	5.87E-03	1.07E-03	-4.13E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	4.90E-05	3.88E-07	3.01E-08	4.94E-05	3.85E-06	7.53E-09	1.88E-11	3.85E-06	3.46E-06	3.20E-07	-1.69E-06
Soil and water acidification potential	eq. mol H+	3.01E-01	5.71E-02	2.91E-02	3.87E-01	6.75E-02	1.45E-02	3.62E-05	6.75E-02	6.07E-02	8.88E-03	-3.78E-01
Eutrophication potential - freshwater	eq. kg P	6.61E-02	1.21E-03	4.44E-03	7.18E-02	1.12E-03	2.36E-03	5.90E-06	1.12E-03	1.01E-03	3.06E-04	-1.37E-02
Eutrophication potential - seawater	eq. kg N	4.57E-02	1.92E-02	3.84E-03	6.88E-02	2.04E-02	2.05E-03	5.13E-06	2.04E-02	1.83E-02	3.06E-03	-3.36E-02
Eutrophication potential - terrestrial	eq. mol N	6.74E-01	2.09E-01	3.29E-02	9.16E-01	2.22E-01	1.79E-02	4.47E-05	2.22E-01	2.00E-01	3.33E-02	-4.51E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	2.04E-01	8.66E-02	1.03E-02	3.01E-01	6.80E-02	5.15E-03	1.29E-05	6.80E-02	6.12E-02	9.64E-03	-1.08E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	7.26E-02	6.13E-05	3.79E-06	7.27E-02	5.89E-05	5.16E-07	1.29E-09	5.89E-05	5.30E-05	3.56E-06	-2.68E-03
Abiotic depletion potential - fossil fuels	MJ	3.62E+02	2.52E+02	5.21E+01	6.66E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.43E+01	-3.16E+02
Water deprivation potential	eq. m^3	2.86E+01	1.32E+00	1.05E+00	3.09E+01	1.14E+00	4.14E-01	1.03E-03	1.14E+00	1.03E+00	1.41E-01	-2.34E+01

Table 9. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 ton)- based on concrete C35/45

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 10. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 ton)- based on concrete C35/45

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	5.07E+01	4.10E+00	5.24E+00	6.01E+01	3.54E+00	1.78E+00	4.45E-03	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of renewable primary energy resources used as raw materials	MJ	4.08E-02	0.00E+00	0.00E+00	4.08E-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	5.07E+01	4.10E+00	5.24E+00	6.01E+01	3.54E+00	1.78E+00	4.45E-03	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.59E+02	2.52E+02	4.80E+01	6.59E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	3.17E+00	0.00E+00	4.13E+00	7.30E+00	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	3.62E+02	2.52E+02	5.21E+01	6.66E+02	2.47E+02	2.16E+01	5.41E-02	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of secondary materials	kg	6.00E+01	1.13E-01	4.77E-03	6.01E+01	8.27E-02	1.88E-03	4.70E-06	8.27E-02	7.44E-02	0.00E+00	-1.91E-01
Consumption of renew. secondary fuels	MJ	2.75E+01	1.48E-03	4.57E-05	2.75E+01	9.11E-04	9.49E-06	2.37E-08	9.11E-04	8.20E-04	0.00E+00	-1.16E-02
Consumption of non-renewable secondary fuels	MJ	1.57E+01	0.00E+00	0.00E+00	1.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	7.81E-01	3.05E-02	1.22E-01	9.33E-01	3.10E-02	6.21E-02	1.55E-04	3.10E-02	2.79E-02	3.79E-03	-5.73E-01

Table 11. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 ton)- based on concrete C35/45

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.30E+00	3.61E-01	4.37E-01	2.10E+00	2.77E-01	1.68E-01	4.19E-04	2.77E-01	2.49E-01	3.83E-05	-2.21E+00
Non-hazardous waste	kg	3.82E+01	7.75E+00	2.38E+01	6.97E+01	4.92E+00	1.13E+01	2.82E-02	4.92E+00	4.42E+00	1.00E+02	-6.15E+01
Radioactive waste	kg	2.27E-04	7.42E-05	8.91E-06	3.10E-04	1.84E-05	3.25E-06	8.12E-09	1.84E-05	1.66E-05	1.48E-04	-8.34E-04
Components for re-use	kg	6.85E-06	0.00E+00	0.00E+00	6.85E-06	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	4.30E-01	3.02E-03	9.73E-01	1.41E+00	7.64E-04	1.45E-04	3.63E-07	7.64E-04	6.87E-04	0.00E+00	-4.28E-03
Materials for energy recovery	kg	1.68E-01	1.60E-05	4.00E-01	5.68E-01	6.18E-06	2.33E-07	5.83E-10	6.18E-06	5.56E-06	0.00E+00	-3.98E-04
Exported Energy	MJ	1.13E-01	1.10E-01	1.65E-02	2.39E-01	0.00E+00	6.92E-02	1.73E-04	0.00E+00	0.00E+00	0.00E+00	-8.59E-01

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ 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
- 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
- EN 771-4:2011+A1:2015 Specification for masonry units Concrete blocks masonry units
- EN 197-1:2011 Cement - Part 1: Composition, specifications and conformity criteria for common cements
- EN 459-1:2015 Building lime - Definitions, specifications and conformity criteria
- https://ecoinvent.org/

LCA, LCI audit and input data verification
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CERTIFICATE № 831/2025
of TYPE III ENVIRONMENTAL DECLARATION

Products:

INORA small-sized modular concrete blocks InorBlock®

Manufacturer:

Przedsiębiorstwo Realizacyjne "Inora"
Inorganic Activities Sp. z o.o.
ul. Prymasa Stefana Wyszyńskiego 11, 44-101 Gliwice, 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 18th August 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, August 2025