

# ENVIRONMENTAL PRODUCT DECLARATION

## IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

**PRECAST CONCRETE MASONRY AND WALLING ELEMENTS**
**LEIER ROM SRL**

**EPD HUB, HUB-6716**
Published on 19.06.2026, last updated on 19.06.2026, valid until 18.06.2031

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

# GENERAL INFORMATION

## MANUFACTURER

| | |
|---|---|
| Manufacturer | Leier Rom SRL |
| Address | 14 Cibinului Street, 400615, Cluj-Napoca, Cluj County, Romania |
| Contact details | info@leier.ro |
| Website | www.leier.ro |

## EPD STANDARDS, SCOPE AND VERIFICATION

| | |
|---|---|
| Program operator | EPD Hub, hub@epdhub.com |
| Reference standard | EN 15804:2012+A2:2019/AC:2021 and ISO 14025 |
| PCR | EPD Hub Core PCR Version 1.2, 24 Mar 2025<br>EN 16757 Product Category Rules for concrete and concrete elements |
| Sector | Construction product |
| Category of EPD | Third party verified EPD |
| Parent EPD number | - |
| Scope of the EPD | Cradle to gate with options, A4-A5, and modules C1-C4, D |
| EPD author | Stefan Cosuta, Envirocert SRL |
| EPD verification | Independent verification of this EPD and data, according to ISO 14025:<br>☐ Internal verification ☑ External verification |
| EPD verifier | Afzal khan Peerukhan as an authorized verifier for EPD Hub |

This EPD is intended for business-to-business and/or business-to-consumer communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

## PRODUCT

| | |
|---|---|
| Product name | Precast concrete masonry and walling elements |
| Additional labels | - |
| Product reference | - |
| Place(s) of raw material origin | Romania, Hungary, Austria |
| Place of production | Romania: Catcau village, Cluj county; Iasi, Iasi county; Unirea, county Alba |
| Place(s) of installation and use | Romania, EU |
| Period for data | calendar year 2025 |
| Averaging in EPD | Multiple factories |
| Variation in GWP-fossil for A1-A3 (%) | -8.2%; +7.3% |
| GTIN (Global Trade Item Number) | - |
| NOBB (Norwegian Building Product Database) | - |
| A1-A3 Specific data (%) | 88,1 |

## ENVIRONMENTAL DATA SUMMARY

| | |
|---|---|
| **Declared unit** | 1 tonne |
| **Declared unit mass** | 1000 kg |
| **Mass of packaging** | 3,815 kg |
| **GWP-fossil, A1-A3 ($kgCO_2e$)** | 90,1 |
| **GWP-total, A1-A3 ($kgCO_2e$)** | 84,7 |
| **Secondary material, inputs (%)** | 0,4 |
| **Total energy use, A1-A3 (kWh)** | 244 |
| **Net freshwater use, A1-A3 ($m^3$)** | 1,58 |

# PRODUCT AND MANUFACTURER

## ABOUT THE MANUFACTURER

*Company Overview*

Founded in 1965, the Leier Group possesses over 60 years of experience and history in operating at full capacity within the construction materials industry across Europe. Present on the Romanian market since 2005 through LEIER ROM S.R.L., the group has established itself as a leading manufacturer of primary importance nationwide. Following a continuous strategy of reinvesting profits into plant modernization, technological upgrades, and production capacity expansion, Leier supports regional economic and social progress by driving private investment and creating numerous stable jobs.

*Production Facilities and Strategic Presence*

To ensure efficient distribution and to meet nationwide demand, Leier operates advanced, highly performing industrial facilities in strategic locations throughout Romania. The company's production footprint includes major manufacturing plants in Unirea (Alba County), Iași, Câțcău (Cluj County), and Feldioara (Brașov County). These modern units utilize advanced technologies and high-capacity machinery to deliver a comprehensive and diverse portfolio of construction materials that strictly comply with applicable European quality standards.

*LEIER Group plants network in Eastern Europe*

## PRODUCT DESCRIPTION

This Environmental Product Declaration covers the precast concrete masonry units (concrete blocks and shuttering blocks) product ranges manufactured by LEIER ROM S.R.L. within its designated production plants. The Leier concrete masonry line is defined by a high-density, vibro-pressed concrete structure. As the concrete mix, manufacturing methodology, and essential raw materials are similar across the production plants—the environmental impact results are presented for 1 ton (1,000 kg) of finished product. Additionally, the Annex to this EPD presents the specific GWP (Global Warming Potential) values obtained individually for each of the manufacturing plants.

| Product type | Reference standard |
|---|---|
| Concrete masonry units | EN 771-3:2011+A1:2015 |
| Shuttering blocks | EN 15435:2008 |

*Construction and Materials*
Leier concrete masonry units are engineered using specialized, optimized concrete recipes to establish a highly reliable, cost-efficient, and structurally stable configuration:
- Vibro-pressed concrete core: formulated from high-quality cement, water, and strictly graded aggregates, processed through advanced industrial vibro-pressing technology to ensure high structural stability, superior compressive strength, and low dimensional variation.
- Optimized hollow layout: designed with a specialized inner-rib geometry, vertical hollow structures, and an tongue-and-groove interlocking layout. This layout provides reduced self-weight, exceptional structural bonding and a top-sealed layout that prevents unnecessary mortar vertical flow during installation.

*Manufacturing and Sustainability*
The production process takes place across Leier's indicated concrete manufacturing plants in Romania, operating under standardized industrial protocols. The manufacturing process relies on natural raw materials, establishing a clean, mineral-based profile. The highly automated vibro-pressing setup ensures consistent dimensional execution, minimizing waste and energy demand per tonne of finished product.

*Product Benefits*
Structural Durability & High Load Capacity: the dense, vibro-pressed concrete mix delivers excellent mechanical resistance, rendering these masonry units perfect for walls, basements, agricultural facilities, industrial warehouses, garages and residential layouts.
Speed of Execution & Material Efficiency: the precise dimensional uniformity (Class D3) paired with the integrated tongue-and-groove alignment system enables rapid, straightforward installation. This configuration reduces overall construction times, ensures flawless wall leveling, and significantly cuts down on structural mortar consumption.
Fire Safety & Thermal Inertia: holding Class A1 reaction to fire rating, the mineral layout provides reliable fire protection and containment properties. Furthermore, its density guarantees beneficial thermal mass effects, aiding in temperature regulation within internal compartments.
Secure Delivery: finished precast concrete masonry units are delivered securely on organized wooden pallets, optimized for transport efficiency, forklift mechanical handling and safe, rapid loading/unloading sequences directly onto the construction site layout.

Further information can be found at:
www.leier.ro

## PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass % | Material origin |
|---|---|---|
| Metals | - | - |
| Minerals | 100 | Romania |
| Fossil materials | - | - |
| Bio-based materials | - | - |

## BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

| | |
|---|---|
| Biogenic carbon content in product, kg C | 0,022 |
| Biogenic carbon content in packaging, kg C | 1,5 |

## FUNCTIONAL UNIT AND SERVICE LIFE

| | |
|---|---|
| Declared unit | 1 tonne |
| Mass per declared unit | 1000 kg |
| Functional unit | - |
| Reference service life | 50 years |

## SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

# PRODUCT LIFE-CYCLE

## SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

| Product stage | | | Assembly stage | | Use stage | | | | | | | End of life stage | | | | Beyond the system boundaries | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D | | |
| x | x | x | x | x | ND | ND | ND | ND | ND | ND | ND | x | x | x | x | x | | |
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/ demolition | Transport | Waste processing | Disposal | Reuse | Recovery | Recycling |

*Not declared = ND.*

## MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in the factory.

*A1 – Raw material supply*
This stage includes the extraction, processing and delivery of the primary materials used in the manufacture of Leier Rom SRL precast concrete masonry units (including concrete blocks and shuttering blocks). The product formulation is based on a mineral-intensive composition, relying on natural raw materials to establish a clean, mineral-based ecological profile. The main raw material inputs consist of strictly graded aggregates, cement and water, supplemented by specialized concrete admixtures to optimize the vibro-pressing performance. The environmental burdens of all material inputs are tracked and allocated to the declared unit of 1 tonne of finished product, utilizing the Ecoinvent v3.10.1/3.11/3.12 database to model the upstream impacts of raw material production.

*A2 – Transport to factory*
This stage covers the transportation of raw materials from suppliers to the Leier Rom SRL designated manufacturing plants. The primary raw materials originate mainly from local Romanian sources. Transport distances are derived from actual logistics records, while vehicle types, load factors, and fuel consumption are modeled based on operational data. Standard road freight using lorries over 32 metric tons (EURO 5, diesel) is assumed. Assumptions on empty-return trips and load consolidation are specified in the LCA modelling to reflect regional transport infrastructure.

*A3 – Manufacturing, Finishing and Packaging*
In this stage, raw materials are transformed into finished precast concrete masonry units at Leier's Romanian manufacturing facilities. Key processes include:
- Batching and mixing: precise dosing and automated mixing of cement, graded aggregates, water and performance admixtures to produce optimized concrete recipes that ensure consistent mechanical density.
- Pressing and curing: the concrete mixture is discharged into high-capacity industrial molds and shaped using advanced vibropressing technology to secure structural uniformity, followed by controlled curing to achieve the required compressive strength and structural stability.
- Quality control: the masonry units undergo strict quality control protocols to meet the applicable technical standards, including compressive strength verification, dimensional tolerance compliance, and water absorption.

Electricity modeling: the production facilities utilize a combination of self-generated solar power from the factories' on-site photovoltaic installations (0.0770 kgCO2e/kWh) and purchased electricity mapped to the national grid residual mix (0.33 kgCO2e/kWh).
Packaging: finished items are securely palletized using industrial wooden pallets alongside protective stretch films and securing plastic bands to guarantee safe delivery, block stability, and efficient forklift mechanical handling or vehicle loading.
Waste Management: materials lost during the manufacturing process, internal production scraps, and ancillary streams are strictly recorded. Manufacturing waste and packaging scraps are collected, sorted and sent to authorized local partners for recycling or proper disposal in compliance with industrial environmental protocols.

*System boundary and cut-off criteria*
For modules A1–A3, the system boundary is established as Cradle-to-Gate, including all major extraction, transport, and manufacturing processes under the direct control of LEIER ROM S.R.L.. Per the applied PCR and reference standards, the production of capital equipment, construction activities, infrastructure maintenance and personnel-related operational energy or water flows are excluded from the inventory. Cut-off criteria ensure that no mandatory unit processes or major raw material and energy flows are omitted. There are no neglected unit processes exceeding 1% of

the total mass or energy flows, and the cumulative neglected inputs across the product stage do not exceed 5% of total energy or mass inventory.

*Data quality and representativeness*
The lifecycle inventory data utilized within this study reflect the actual production operations of LEIER ROM S.R.L. for the specific calendar year 2025. All specific foreground data, including material inputs, packaging weights, transport logistics, and site-specific energy profiles, were collected directly from the manufacturing plants in Câțcău village, Iași, and Unirea. Upstream background processes are modeled using high-quality data from recognized sources, primarily Ecoinvent v3.10.1/3.11/3.12, calculated via the One Click LCA EPD Generator tool. The plausibility and consistency of the combined plant data have been fully examined, ensuring high geographical, technological, and time-specific representativeness for the Romanian and wider EU context.

## TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

*A4 – Transport to Building Site*
This stage includes the transportation of the finished precast concrete masonry units (including concrete blocks and shuttering blocks) from the designated manufacturing facilities to the construction or installation site. The average transport distance to the construction site is ~77 km. This representative value is derived directly from internal operational data, reflecting the distribution matrix from the regional manufacturing facilities to building sites across Romania.

*A5 – Installation into the Building / Infrastructure*
This stage covers the on-site layout, manual alignment, and structural installation of Leier precast concrete masonry units into final structural or non-structural wall configurations.
Energy consumption: the structural assembly and placement of the masonry units are performed manually, requiring no heavy construction machinery or primary fuel-driven lifting equipment. Operational energy flows are restricted to the occasional use of low-power electric handheld tools (e.g., mixers) and are modeled within the conservative cut-off boundaries.
Ancillary Materials: to account for the structural integration and bonding of the masonry units per declared unit (1 tonne of finished product), the installation scenario incorporates the on-site preparation and consumption of 180 kg of masonry mortar alongside 20 kg of mixing water.
Installation losses: material flows account for a product installation loss rate of 5% to accurately reflect on-site cutting, shaping, and fitting waste generated directly during the masonry layout and structural alignment process.
Waste Management of Packaging: accounts for the collection and environmental treatment of all packaging materials removed during the site installation phase. Based on the unified core environmental indicators, the end-of-life treatment for the packaging material mass is modeled through a verified system scenario:
- Wood Packaging: the processing matrix covers the management of the 3.6 kg of wood packaging material, where waste handling and specific output routes are tracked under a split recovery approach: 32% recycling, 30% incineration, and 38% landfill.
- Plastic Packaging: 0.2 kg of plastic packaging tracked as: 40% recycling, 37% incineration, and 23% landfill.

*System Boundary and Cut-Off Criteria*
Per the reference standards and the applied PCR, the system boundary for module A5 includes the direct environmental impacts of the product installation losses, packaging waste processing and the primary ancillary materials (mortar and water) required for basic execution. Any external

reinforcement steel bars or structural concrete infill poured inside the shuttering blocks that are not part of the core masonry block product formulation are excluded from these specific boundaries.
All logistical and construction calculations—including transport distances, mortar ratios, and manual placement assumptions—are verified for strict technological, temporal, and geographical representativeness for the Romanian market contexts.

## PRODUCT END OF LIFE (C1-C4, D)

*C1 – Deconstruction / Demolition*
At the end of its reference service life (RSL of 50 years), the precast concrete masonry units are removed from the building's structural or non-structural wall configurations. The structural masonry elements are dismantled concurrently with the internal bonding mortar layer, generating a single, integrated mineral waste stream. As the fully cured concrete matrix and the associated masonry mortar are chemically inert, no volatile organic compounds or hazardous emissions are released into the atmosphere during this deconstruction phase.

*C2 – Transport to Waste Processing Facilities*
Following disassembly, the combined concrete masonry and mortar waste materials are loaded and transported to recycling facilities or final disposal yards. For the LCA model, the transport distance to waste processing and final treatment facilities is defined as 50 km. The transport module covers the direct exhaust emissions of the transport vehicles, fuel production impacts, and associated infrastructure burdens, modeled using standard heavy-duty transport datasets from the Ecoinvent database to ensure regional technological representativeness.

*C3 – Waste Processing*
This stage involves the mechanical crushing of the dismantled masonry elements. Per the life-cycle inventory data and the applied end-of-life scenario, 70% of the total co-demolished mass (comprising both the precast concrete units and the installation mortar) is directed toward recycling pathways. The mineral mixture is crushed down into high-quality recycled concrete aggregates (RCA) to be prepared for secondary applications in road construction, sub-base structural layers or new low-carbon concrete formulations, supporting a low-waste circular economy model.

*C4 – Final Disposal*
The final disposal scenario accounts for the remaining fraction that cannot be recovered or recycled through secondary processing streams. According to the specific end-of-life parameters established for this product family, 30% of the co-demolished material mass is sent to compliant non-hazardous landfills for inert waste. The entire mineral matrix is a non-leaching, structurally stable configuration that does not contain any REACH SVHC substances, ensuring it does not generate dangerous landfill gases or environmental leaching contamination during final disposal.

*Module D – Benefits and Loads Beyond the System Boundary*
The recycling of concrete masonry elements alongside their joint mortar and the associated recovery of packaging materials at the end-of-life provide significant environmental benefits beyond the system boundary, which are reported as negative environmental impacts (credits) in Module D.
Net Flow Calculation: net flows for recycling are determined by accounting for the total end-of-life waste recovery flows directed to recycling pathways. As the precast concrete masonry units are manufactured utilizing 100% virgin, primary raw materials without any secondary material inputs during the raw material supply stage (A1-A3), the net output flow equals the full amount of crushed mineral aggregates successfully recovered at the end-of-life stage (reflecting the 70% recycling split).
Material Recycling Credits: the structural recovery of concrete and mortar aggregates replaces the demand for virgin, primary mineral aggregates in the regional construction market, significantly reducing the abiotic depletion of natural mineral resources.

Packaging Recovery Benefits: Module D also incorporates the net benefits generated by the recycling and energy recovery of packaging materials collected during the site installation stage (Module A5). This includes credits from exported energy generated during controlled thermal processing, substituting the need for primary grid energy and fossil fuels.

*Data Quality and Representativeness*

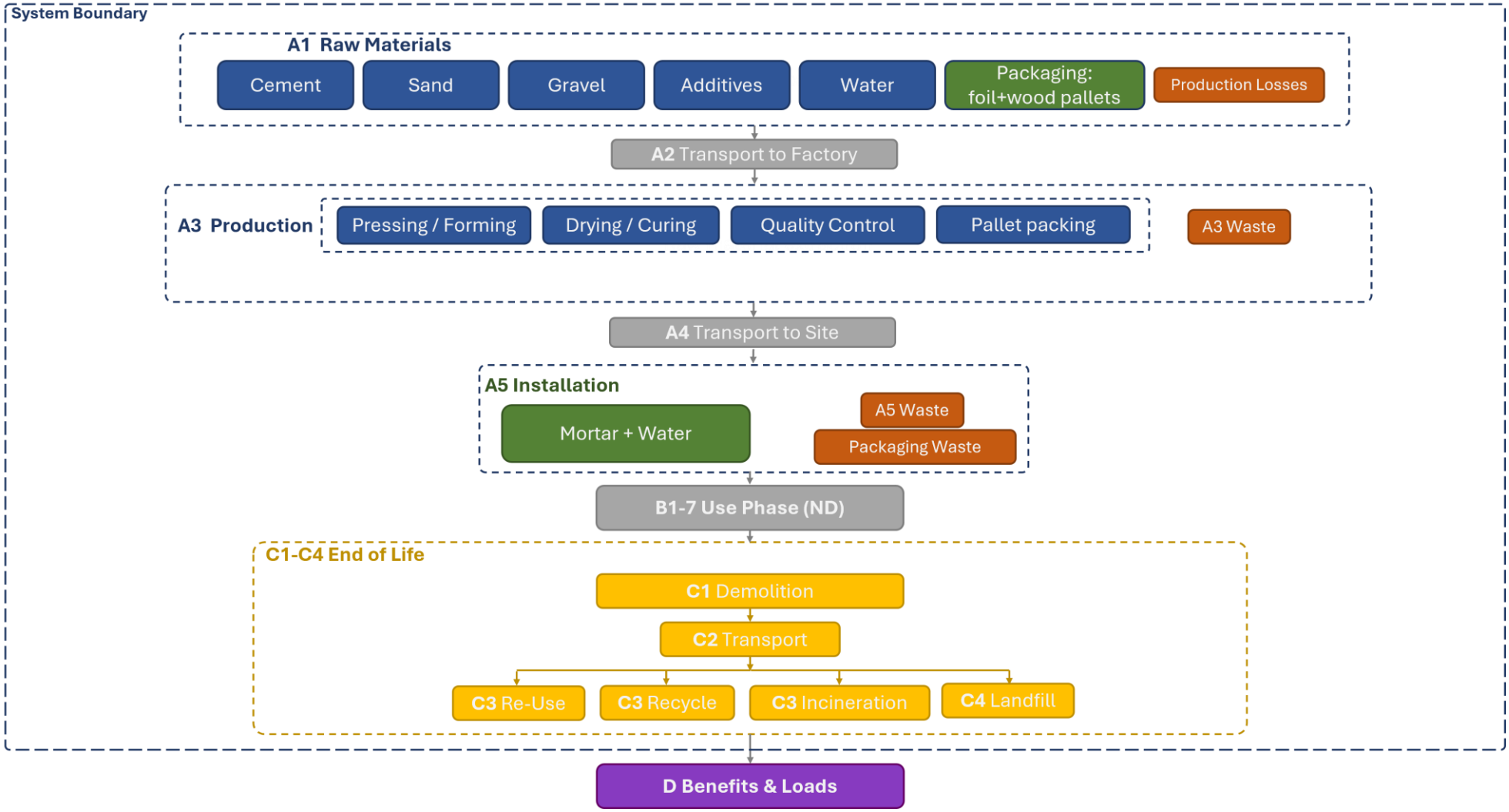
The scenarios modeled for Modules C and D fully reflect concrete and masonry waste management and circular economy practices within the targeted European construction markets:

Specific transport distances (50 km), end-of-life allocation split (70% recycling / 30% landfill), co-dismantled mortar integration, recycling rates, product composition and packaging variables are sourced directly from time and site specific information provided by the manufacturer.

Environmental impact factors for mechanical processing, material recycling, landfilling and primary energy substitution are derived from the Ecoinvent v3.10.1/3.11/3.12 databases using the 'Cut-Off, EN 15804+A2' allocation method, calculated via the One Click LCA EPD Generator tool.

*LEIER ROM Shuttering block*

# LIFE CYCLE FLOW DIAGRAM



# LIFE-CYCLE ASSESSMENT

## CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

In accordance with EN 15804+A2 and the EPD Hub PCR, the following flows and processes have been excluded from the system boundaries of this study as they are outside the product system control or fall below the applicable cut-off thresholds:
Personnel-related impacts: Employee commuting, business travel, catering services, and daily office-administrative activities (such as office paper consumption or IT support systems) across the three regional manufacturing facilities.
Capital goods, maintenance, and infrastructure: The manufacturing and environmental impacts associated with the production machinery (vibro-presses, automated mixing stations), factory buildings, structural storage yards, and on-site forklift fleets. This explicitly includes machinery spare parts, general equipment maintenance, as their environmental load is distributed over long operational lifespans.
External structural elements (Module A5 execution): Horizontal or vertical steel reinforcement bars and external concrete infill poured inside the shuttering blocks on the construction site, as these materials do not form part of the primary factory precast product formulation.

## VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

## ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

| Data type | Allocation |
|---|---|
| Raw materials | No allocation |
| Packaging material | Physical Properties |
| Ancillary materials | Physical Properties |
| Manufacturing energy and waste | Physical Properties |

-

## PRODUCT & MANUFACTURING SITES GROUPING

| | |
|---|---|
| Type of grouping | Multiple factories |
| Grouping method | Based on average results of product group - by total mass |
| Variation in GWP-fossil for A1-A3, % | -8.2%; +7.3% |

This multi-site EPD represents the production-share-weighted average of concrete masonry units manufactured by LEIER ROM S.R.L. across three distinct production facilities located in Romania: Unirea (Alba county), Câțcău (Cluj county), and Iași (Iași county).
Geographical Coverage: 100% of the manufacturing data is sourced from production plants located within Romania, ensuring comprehensive regional representativeness for the Romanian and broader Eastern/Central European construction markets.
Technical and Product Description: The EPD covers a standardized group of precast concrete masonry elements, including concrete masonry blocks and shuttering blocks. The assessed products share a similar raw material matrix. The product group exhibits a technical bulk density profile ranging from approximately 1,150 kg/m³, depending on the specific hollow layout and destination.
Sampling and Data Quality: No sampling was applied; 100% of the active manufacturing sites (all 3 plants) under the manufacturer's operational control provided primary inventory data, representing the total production volume of this product family. The foreground data collected covers the complete calendar year 2025, ensuring high temporal, technological, and geographical representativeness.
Impact Variation: The environmental impacts across the different facilities are highly consistent. The specific Global Warming Potential (GWP-GHG / GWP-fossil) variation between the individual production sites and the calculated weighted average is strictly within the range of -8.2% and +7.3%, which is well below the mandatory ±10% variation threshold defined by the PCR. To maintain absolute environmental transparency, a factory-specific GWP breakdown table is included in the annex/final section of this EPD document.

## LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

1. EN 15804:2012+A2:2019 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
2. EN 16757:2023 - Sustainability of construction works - Environmental product declarations - Product Category Rules for precast concrete products.
3. ISO 14025:2006 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
4. EN 771-3:2011+A1:2015 — Specification for masonry units - Part 3: Aggregate concrete masonry units (Dense and lightweight aggregates)
5. EN 15435:2008 (Precast concrete products - Shuttering blocks of normal weight and lightweight concrete)
6. Primary operational data from Leier Rom S.R.L. for the calendar year 2025 (internal bills of materials, energy logs, transport and waste records for Unirea, Câțcău and Iași plants).

# ENVIRONMENTAL IMPACT DATA

*The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.*

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP – total[1)] | kg $CO_2$e | 7,34E+01 | 9,53E+00 | 1,74E+00 | 8,47E+01 | 8,59E+00 | 4,29E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,70E+00 | 2,22E-01 | 2,31E+00 | -1,40E+01 |
| GWP – fossil | kg $CO_2$e | 7,33E+01 | 9,52E+00 | 7,23E+00 | 9,01E+01 | 8,58E+00 | 3,85E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,23E+00 | 2,14E-01 | 2,31E+00 | -1,26E+01 |
| GWP – biogenic | kg $CO_2$e | 7,44E-02 | 2,18E-03 | -5,50E+00 | -5,42E+00 | 1,97E-03 | 4,32E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,51E-01 | 6,85E-03 | 1,04E-03 | -1,46E+00 |
| GWP – LULUC | kg $CO_2$e | 6,20E-03 | 4,24E-03 | 6,88E-03 | 1,73E-02 | 3,82E-03 | 3,99E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,22E-01 | 6,12E-04 | 1,32E-03 | -1,22E-02 |
| Ozone depletion pot. | kg $CFC\text{-}_{11}$e | 4,12E-06 | 1,38E-07 | 1,79E-07 | 4,43E-06 | 1,25E-07 | 3,13E-07 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,20E-07 | 3,47E-09 | 6,43E-08 | -1,09E-07 |
| Acidification potential | mol $H^+$e | 2,00E-01 | 3,31E-02 | 4,02E-02 | 2,73E-01 | 2,98E-02 | 8,41E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,66E-02 | 1,06E-03 | 1,62E-02 | -7,82E-02 |
| EP-freshwater[2)] | kg Pe | 1,92E-03 | 1,03E-03 | 1,39E-03 | 4,35E-03 | 9,30E-04 | 5,97E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,75E-04 | 1,90E-04 | 2,02E-04 | -4,45E-03 |
| EP-marine | kg Ne | 6,77E-02 | 1,09E-02 | 1,33E-02 | 9,19E-02 | 9,87E-03 | 2,72E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,18E-02 | 1,89E-04 | 6,21E-03 | -1,84E-02 |
| EP-terrestrial | mol Ne | 7,78E-01 | 1,18E-01 | 1,43E-01 | 1,04E+00 | 1,07E-01 | 2,89E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,97E-02 | 1,65E-03 | 6,78E-02 | -2,21E-01 |
| POCP ("smog")[3)] | kg NMVOCe | 1,99E-01 | 4,85E-02 | 5,23E-02 | 2,99E-01 | 4,38E-02 | 8,20E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,82E-02 | 5,40E-04 | 2,45E-02 | -6,19E-02 |
| ADP-minerals & metals[4)] | kg Sbe | 3,40E-04 | 2,72E-05 | 3,22E-05 | 3,99E-04 | 2,46E-05 | 4,14E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,21E-05 | 5,16E-07 | 3,44E-06 | -7,29E-05 |
| ADP-fossil resources | MJ | 3,64E+02 | 1,36E+02 | 1,38E+02 | 6,38E+02 | 1,22E+02 | 2,70E+02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,19E+02 | 4,88E+00 | 5,66E+01 | -1,62E+02 |
| Water use[5)] | $m^3$e depr. | 1,30E+02 | 7,93E-01 | 4,91E+00 | 1,36E+02 | 7,15E-01 | 1,04E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,76E-01 | 1,28E-01 | 2,48E+00 | -1,88E+01 |

*1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.*

## ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Particulate matter | Incidence | 1,87E-06 | 9,32E-07 | 7,14E-07 | 3,52E-06 | 8,41E-07 | 1,27E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,90E-07 | 4,81E-09 | 3,72E-07 | -1,20E-06 |
| Ionizing radiation[6)] | kBq U235e | 3,09E+00 | 1,14E-01 | 2,20E+00 | 5,41E+00 | 1,03E-01 | 1,46E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,04E-01 | 1,34E-01 | 3,38E-02 | -1,21E+00 |
| Ecotoxicity (freshwater) | CTUe | 4,32E+02 | 2,82E+01 | 6,70E+01 | 5,27E+02 | 2,54E+01 | 1,11E+02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,44E+02 | 5,43E+00 | 3,78E+01 | -3,64E+02 |
| Human toxicity, cancer | CTUh | 1,54E-08 | 1,50E-09 | 6,86E-09 | 2,38E-08 | 1,35E-09 | 1,50E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,90E-09 | 7,01E-11 | 4,19E-10 | -3,38E-09 |
| Human tox. non-cancer | CTUh | 6,25E-07 | 8,44E-08 | 4,77E-08 | 7,57E-07 | 7,61E-08 | 3,52E-07 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,13E-08 | 3,38E-09 | 9,41E-09 | -1,01E-07 |
| SQP[7)] | - | 5,72E+02 | 1,36E+02 | 5,01E+02 | 1,21E+03 | 1,22E+02 | 2,05E+02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,26E+02 | 7,09E-01 | 1,11E+02 | -1,40E+02 |

*6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.*

## USE OF NATURAL RESOURCES

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Renew. PER as energy[8)] | MJ | 5,95E+01 | 1,89E+00 | 5,82E+01 | 1,20E+02 | 1,70E+00 | 1,23E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,57E+00 | 1,08E+00 | 5,28E-01 | -3,88E+00 |
| Renew. PER as material | MJ | 0,00E+00 | 0,00E+00 | 5,47E+01 | 5,47E+01 | 0,00E+00 | -5,47E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,45E+01 |
| Total use of renew. PER | MJ | 5,95E+01 | 1,89E+00 | 1,13E+02 | 1,74E+02 | 1,70E+00 | -4,24E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,57E+00 | 1,08E+00 | 5,28E-01 | 1,07E+01 |
| Non-re. PER as energy | MJ | 3,60E+02 | 1,36E+02 | 1,23E+02 | 6,19E+02 | 1,22E+02 | 2,79E+02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,21E+02 | 4,88E+00 | 5,66E+01 | -1,62E+02 |
| Non-re. PER as material | MJ | 3,88E+00 | 0,00E+00 | 1,22E+01 | 1,61E+01 | 0,00E+00 | -1,22E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | -2,72E+00 | -1,16E+00 | 4,41E+00 |
| Total use of non-re. PER | MJ | 3,64E+02 | 1,36E+02 | 1,35E+02 | 6,35E+02 | 1,22E+02 | 2,67E+02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,21E+02 | 2,17E+00 | 5,54E+01 | -1,58E+02 |
| Secondary materials | kg | 3,97E+00 | 5,69E-02 | 2,35E-01 | 4,26E+00 | 5,13E-02 | 7,89E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,60E-02 | 2,99E-03 | 1,41E-02 | -8,08E-02 |
| Renew. secondary fuels | MJ | 6,26E+01 | 7,42E-04 | 1,85E+00 | 6,44E+01 | 6,69E-04 | 3,22E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,41E-04 | 3,19E-06 | 2,94E-04 | -1,21E-03 |
| Non-ren. secondary fuels | MJ | 7,49E+01 | 0,00E+00 | 0,00E+00 | 7,49E+01 | 0,00E+00 | 3,75E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Use of net fresh water | $m^3$ | 1,44E+00 | 1,95E-02 | 1,14E-01 | 1,58E+00 | 1,76E-02 | 1,86E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,08E-02 | 2,97E-03 | 5,85E-02 | -4,34E-01 |

*8) PER = Primary energy resources.*

## END OF LIFE – WASTE

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste | kg | 5,03E-01 | 8,69E-01 | 6,35E-01 | 2,01E+00 | 7,83E-01 | 3,35E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,63E-01 | 1,27E-02 | 6,44E-02 | -1,23E+00 |
| Non-hazardous waste | kg | 2,04E+01 | 1,72E+01 | 4,70E+01 | 8,46E+01 | 1,55E+01 | 1,95E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,94E+00 | 9,42E-01 | 1,49E+00 | -2,59E+01 |
| Radioactive waste | kg | 1,85E-03 | 2,72E-05 | 6,80E-04 | 2,56E-03 | 2,46E-05 | 7,71E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,51E-05 | 3,45E-05 | 8,25E-06 | -2,94E-04 |

## END OF LIFE – OUTPUT FLOWS

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Components for re-use | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling | kg | 1,22E-03 | 0,00E+00 | 0,00E+00 | 1,22E-03 | 0,00E+00 | 1,51E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 8,61E+02 | 0,00E+00 | 0,00E+00 |
| Materials for energy rec | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,27E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy – Electricity | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,06E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy – Heat | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,21E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

## ADDITIONAL INDICATOR – GWP-GHG

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-GHG[9)] | kg $CO_2e$ | 7,33E+01 | 9,53E+00 | 7,24E+00 | 9,01E+01 | 8,59E+00 | 3,86E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,55E+00 | 2,15E-01 | 2,31E+00 | -1,26E+01 |

*9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero*

## SCENARIO DOCUMENTATION

## DATA SOURCES

### Manufacturing energy scenario documentation

1. Heat production, natural gas, Ecoinvent, 0.0757 kgCO2e/MJ
2. Electricity, medium voltage, residual mix, Romania, Ecoinvent, 0.33 kgCO2e/kWh
3. Market for diesel, Ecoinvent, 0.10 kgCO2e/MJ
4. Electricity production, photovoltaic, Romania, Ecoinvent, 0.0770 kgCO2e/kWh

### Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 77.0 km

### Transport to the building site (A4) - Scenario documentation

| Scenario parameter | Value |
|---|---|
| Capacity utilization (including empty return) % | 85 |
| Bulk density of transported products | 837 |
| Volume capacity utilization factor | <1 |

### Installation at the building site (A5) - Scenario documentation

| Scenario parameter | Value |
|---|---|
| Energy: type and consumption (MJ or kWh) | - |
| Water use ($m^3$) | 0.02 m3 |
| Ancillary materials: type and mass (kg) | mortar: 180 kg |
| Waste materials: type and mass (kg) | wood pallets - 3.613 kg  plastic foil - 0.093 kg  PP strips - 0.109 kg |
| Waste materials: output routes | wood packaging: 1.16 kg recycled, 1.08 kg incinerated, 1.37 kg landfilled<br>plastic packaging: 0.08 kg recycled, 0.07 kg incinerated, 0.05 kg landfilled<br>concrete waste: 35 kg recycled, 15 kg landfilled |
| Direct emissions (kg) | - |

### End of life (C1-C4) - Scenario documentation

| Scenario information | Value |
|---|---|
| Collection process: collected separately (kg) | collected separately: 1230 kg |
| Collection process: Mixed waste (kg) | mixed waste: 0 |
| Recovery: re-use (kg) | 0 |
| Recovery: recycling (kg) | 861 |
| Recovery: energy recovery (kg) | 0 |
| Disposal (kg) | 0 |
| Scenario assumptions e.g. transportation (mode, km) & other | Landfill: 50 km, Recycling: 50 km |

# THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Afzal khan Peerukhan as an authorized verifier for EPD Hub Limited 19.06.2026

# ANNEX 1 – GWP VARIATION ACROSS PRODUCTION PLANTS

| PLANT | PRODUCT FAMILIES | GWP TOTAL (KG CO2E / 1000 KG) | VARIATION |
|---|---|---|---|
| UNIREA, ALBA COUNTY | SHUTTERING BLOCKS: EF 20, EF25, EF30, EF40, ES20, ES30<br>MASONRY ELEMENTS: VF10, NF25, NF30 | 84.31 | -0.4% |
| CATCAU, CLUJ COUNTY | SHUTTERING BLOCKS: EF15, EF 20, EF25, EF30, ES20, ES30 | 77.76 | -8.2% |
| IASI, IASI COUNTY | SHUTTERING BLOCKS: EF15, EF 20, EF25, EF30, EF40, ES20, ES30<br>MASONRY ELEMENTS: VF10, 12NF | 90.82 | +7.3% |

*Leier ROM plants: Unirea (County Alba), Catcau (County Cluj), Iasi (County Iasi)*