**Type III Environmental Product Declaration No. 633/2024**

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# H+H Autoclaved aerated concrete

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**ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org**

**Basic information**

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

**Life cycle analysis (LCA):** A1-A5, B1, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

**The year of preparing the EPD:** 2024

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

**Service Life:** 150 years for standard product

**PCR:** ITB-PCR A (PCR based on EN 15804+A2, 2023) and EN 16757:2022

**Declared unit:** 1 $m^3$

**Reasons for performing LCA:** B2B

**Representativeness:** Polish, European, 2022

## MANUFACTURER

Fig. 1. The view from the street of H+H Polska Sp. z o. o. in Warsaw

**H+H Polska Sp. z o. o.** belongs to the H+H International A/S Group, a leading manufacturer of "white wall materials" in Europe, listed on the Copenhagen Stock Exchange. It has been operating on the Polish market since 2006. It produces and supplies a complete range of products made of autoclaved aerated concrete, and since 2018 also calcium silicate elements. The success of H+H Polska is the result of the joint work of nearly 600 people employed in 11 production plants. It is measured by customer trust, attention to the highest standards of service, occupational safety and environmental protection, as well as the quality of products intended for energy-efficient construction that provide users with thermal and acoustic comfort and structural safety.

The company owes its strong position on the Polish market to its transparent strategy and solid product offer, and numerous investments ensure the company's continuous development.

## PRODUCTS DESCRIPTION AND APPLICATION

H+H produces autoclaved aerated concrete (AAC) and sand-lime products and solutions primarily for walls in residential, industrial, and commercial construction. The main purpose of the autoclaved aerated concrete blocks is as building material for making walls. The autoclaved aerated concrete blocks are covered by harmonised technical specification in EN 771-4. When producing autoclaved aerated concrete, aluminum powder or paste is added, which starts the mass rising process - a chemical reaction occurs between aluminum powder and calcium hydroxide. Autoclaved aerated concrete is used to build single-layer, multi-layer external and internal walls. It is produced, among others, in a version with tongue and groove profiling (vertical joint not filled with mortar). The list of products covered by this EPD is presented in Table no. 1.

*Table 1. Types, dimensions and properties of produced cellular concrete blocks*

| ***Product designation*** | ***Density*** | ***Length*** | ***Width*** | ***Height*** | ***Resistance [MPa]*** | ***Finish*** | ***Color*** | ***Thermal conductivity coefficient [W/(mK)]*** |
|---|---|---|---|---|---|---|---|---|
| *H+H Autoclaved aerated concrete 1,5-300* | *275±25* | *625* | *240, 300, 365, 420* | *250* | *1,5* | *smooth element* | *White* | *0,085* |
| | | *500* | *480* | | | | | |
| *H+H Autoclaved aerated concrete 2,0-350* | *325±25* | *625* | *240, 300, 365, 420* | *250* | *2,0* | *Smooth element* | *White* | *0,095* |
| | | *500* | *480* | | | | | |
| *H+H Autoclaved aerated concrete 2,0-400* | *400±50* | *590* | *60, 80, 100, 120, 150, 180, 200, 240, 300, 360, 420* | *240* | *2,0* | *Smooth element* | *White* | *0,105 \| 0,11* |
| *H+H Autoclaved aerated concrete 2,5-400* | *375±25* | *600* | *115, 150, 175, 200, 240, 300, 365, 420* | *200* | *2,5* | *Smooth element* | *White* | *0,105* |
| | | *590* | | *240, 250* | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *H+H Autoclaved aerated concrete 2,5-500* | *500±50* | *590* | *60, 80, 100, 120, 150, 180, 200, 240, 300, 360, 420* | *240* | *2,5* | *Smooth element* | *White* | *0,135* |
| *H+H Autoclaved aerated concrete 3,0-500* | *500±50* | *590* | *120, 150, 180, 200, 240, 300, 360, 420* | *240* | *3,0* | *Smooth element* | *White* | *0,130 \| 0,135* |
| *H+H Autoclaved aerated concrete 4,0-500* | *475±25* | *600* | *115, 150, 175, 200, 240, 300, 365, 420* | *200* | *4,0* | *Smooth element* | *White* | *0,130* |
| | | *600* | *75, 100, 115, 120* | *500* | | | | |
| | | *625* | *50, 75, 100, 115, 150, 175, 200, 240, 300, 365* | *250* | | | | |
| *H+H Autoclaved aerated concrete 4,5-550* | *550±25* | *625* | *50, 75,100, 240* | *250* | *4,5* | *Smooth element* | *White* | *0,140* |
| *H+H Autoclaved aerated concrete 5,0-550* | *525±25* | *1500* | *80, 120* | *240* | *5,0* | *Smooth element* | *White* | *0,140* |
| | | | *75, 100, 115* | *250* | | | | |
| *H+H Autoclaved aerated concrete 3,0-600* | *600±50* | *590* | *60, 80, 100, 120, 150, 180, 200, 240, 300, 360, 420* | *240* | *3,0* | *Smooth element* | *White* | *0,155 \| 0,160* |
| *H+H Autoclaved aerated concrete 5,0-600* | *575±25* | *600* | *75, 100, 115, 120* | *500* | *5,0* | *Smooth element* | *White* | *0,155* |
| | | *625* | *115, 150, 175, 200, 240, 300, 365* | *250* | | | | |
| *H+H Autoclaved aerated concrete 4,0-700* | *700±50* | *590* | *60, 80, 100, 120, 150, 180, 200, 240, 300* | *240* | *4,0* | *Smooth element* | *White* | *0,180* |
| *H+H Autoclaved aerated concrete 6,0-700* | *675±25* | *500* | *240, 300, 365* | *250* | *6,0* | *Smooth element* | *White* | *0,185* |
| *H+H Autoclaved aerated concrete 7,3-700* | *700±50* | *440* | *100* | *215* | *7,3* | *Smooth element* | *White* | *0,180* |

## LIFE CYCLE ASSESSMENT (LCA) – general rules applied

### Declared unit

Declared unit is 1 $m^3$ of autoclaved concrete blocks with a dry average density of 550 kg/$m^3$. To calculate/converte the impact on a specific product with a specific density, the results from the table should be divided by factor 550 and multiplied by the product density value in kg/$m^3$.

### Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production is a line process executed by of H+H Polska Sp. z o. o. in 5 plants:

- Plant Gorzkowice located in ul. Przemysłowa 40, 97-350 Gorzkowice;
- Plant Lidzbark located in ul. Przemysłowa 14, 13-230 Lidzbark;

- Plant Puławy located in ul. Kwiatkowskiego 2, 24-100 Puławy;
- Plant Reda located in ul. Gniewowska 5, 84-240 Reda;
- Plant Żelisławice in Żelisławice, 29-145 Secemin.

Allocation in specific plants was done on product mass basis. Impacts and material consumption from 5 locations were averaged based on the inventoried data. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the lines of production of H+H Polska Sp. z o. o. were inventoried and 100% were allocated to product. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration. The calculations were performed separately for each plant, then the results were averaged on a weighted average basis.

**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, B1: Use, 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 were 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 includes sand, lime, cement, gypsum, AL powder, mould oil and packaging materials mainly from local suppliers. The means of transport are trucks and ships. Polish and European fuel averages were used for calculations.

**Module A3: *Production***

The production of autoclaved aerated concrete blocks begins with obtaining raw materials. After grinding, the raw materials are dosed and mixed according to the recipe. Then the resulting mixture is poured into molds where the casting process takes place. After the casting rises, the molds are removed and mechanical processing takes place. The next stage is autoclaving of the formed blocks. The mixture is poured into casting molds, where air pores are created with chemical reactions. The homogeneous structure is exposed to a saturated steam atmosphere to form specific characteristic properties for the autoclaved aerated concrete products. The finished blocks are packed on pallets and transported to the warehouse. A diagram of the production process is shown in Fig. 2.

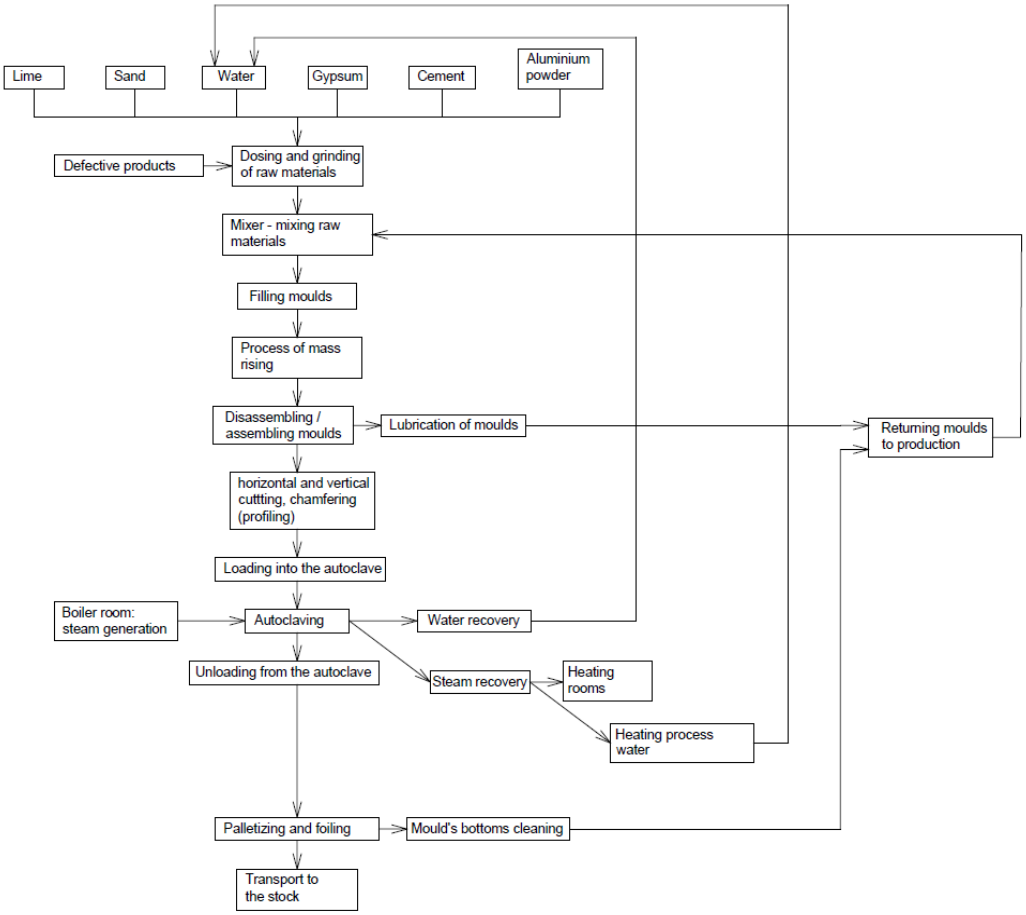


Fig. 2. The scheme of production by H+H Polska Sp. z o. o.

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

The products are delivered to Polish as well as foreign customers. In the adapted scenario an average distance of 98 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 autoclaved aerated concrete blocks are installed as predefined elements using auxiliary materials or machinery. The autoclaved aerated concrete blocks are installed in 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.

***Module B:Use***

For B1 $CO_2$ uptake (minus value) from carbonation has been calculated based on the reactive CaO specifications on each product and the rate of carbonation set to 95%.

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

In the adapted scenario, dismantling of autoclaved aerated concrete (C1) is performed as part of building renovation or demolition processes. The autoclaved aerated concrete 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 autoclaved aerated concrete waste elements in large piles and loading of waste for the transport.
It is assumed that 100% of autoclaved aerated concrete are recovered at the EoL cycle. Recovered material is transported to either to landfill or recycling site distant by 100km, on 16-32t lorry (EURO 5) with fuel consumption of 35l per 100 km. In the adapted scenario 90% of the autoclaved aerated concrete 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. Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. 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. At the recycling facility the autoclaved aerated concrete is crushed (C3), where after 90% are recycled and used as road fill. The remaining 10% of the autoclaved aerated concrete is sent to a local landfill (C4) Re-use, recovery, and recycling potential (D) includes: Module D includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits. These included substitution of aggregate from the recycling of crushed product, however, only the quantity of the product which constitutes primary material.

*Table 2. End-of-life scenario for the cellular concrete*

| Material | Material rockopery | 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 values determined to calculate the LCA originate from verified H+H Polska Sp. z o. o. inventory data. The data selected for LCA originate from ITB LCI questionnaires completed by H+H Polska 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 are 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 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

**Assumptions and estimates**
The impacts of autoclaved aerated concrete concrete were aggregated using average.

**Calculation rules**
LCA was done in accordance with ITB PCR A document (2023) and EN 16757:2022.

**Databases**
The data for the processes comes from the following databases: Ecoinvent v.3.10, specific EPDs, ITB-Database. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.685 kg $CO_2$/kWh (KOBiZE 2023). European electricity mix used is 0.430 kg $CO_2$/kWh for the end of life (Ecoinvent v3.10, RER).

## LIFE CYCLE ASSESSMENT (LCA) – Results

### Declared unit

The declaration refers to declared unit (DU) – 1 $m^3$ of autoclaved aerated concrete produced by H+H Polska 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** | **MD** | **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 $m^3$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Global Warming Potential | eq. kg $CO_2$ | 9.46E+01 | 5.49E+00 | 4.68E+01 | 1.47E+02 | 8.99E+00 | 7.54E-01 | -6.66E+01 | 1.88E+00 | 9.18E+00 | 8.26E+00 | 5.85E-01 | -4.95E+00 |
| Greenhouse potential - fossil | eq. kg $CO_2$ | 1.36E+02 | 5.47E+00 | 4.68E+01 | 1.89E+02 | 8.96E+00 | 7.54E-01 | -6.66E+01 | 1.88E+00 | 9.14E+00 | 8.23E+00 | 5.79E-01 | -4.95E+00 |
| Greenhouse potential - biogenic | eq. kg $CO_2$ | -4.13E+01 | 1.86E-02 | -1.34E-01 | -4.14E+01 | 3.06E-02 | 2.03E-03 | 0.00E+00 | 5.08E-03 | 3.12E-02 | 2.81E-02 | 5.84E-03 | -2.97E-04 |
| Global warming potential - land use and land use change | eq. kg $CO_2$ | 3.24E-02 | 2.16E-03 | 5.59E-03 | 4.02E-02 | 3.52E-03 | 1.18E-04 | 0.00E+00 | 2.95E-04 | 3.59E-03 | 3.23E-03 | 5.87E-04 | -2.27E-02 |
| Stratospheric ozone depletion potential | eq. kg CFC 11 | 1.52E-06 | 1.26E-06 | 1.55E-06 | 4.34E-06 | 2.07E-06 | 4.14E-09 | 0.00E+00 | 1.04E-08 | 2.12E-06 | 1.90E-06 | 1.76E-07 | -9.31E-07 |
| Soil and water acidification potential | eq. mol H+ | 2.29E-01 | 2.34E-02 | 4.69E-01 | 7.22E-01 | 3.64E-02 | 7.97E-03 | 0.00E+00 | 1.99E-02 | 3.71E-02 | 3.34E-02 | 4.89E-03 | -2.08E-01 |
| Eutrophication potential - freshwater | eq. kg P | 1.64E-02 | 3.66E-04 | 3.59E-02 | 5.27E-02 | 6.02E-04 | 1.30E-03 | 0.00E+00 | 3.25E-03 | 6.15E-04 | 5.53E-04 | 1.68E-04 | -7.54E-03 |
| Eutrophication potential - seawater | eq. kg N | 4.88E-02 | 6.98E-03 | 4.76E-02 | 1.03E-01 | 1.10E-02 | 1.13E-03 | 0.00E+00 | 2.82E-03 | 1.12E-02 | 1.01E-02 | 1.68E-03 | -1.85E-02 |
| Eutrophication potential - terrestrial | eq. mol N | 5.17E-01 | 7.63E-02 | 4.45E-01 | 1.04E+00 | 1.20E-01 | 9.84E-03 | 0.00E+00 | 2.46E-02 | 1.22E-01 | 1.10E-01 | 1.83E-02 | -2.48E-01 |
| Potential for photochemical ozone synthesis | eq. kg NMVOC | 2.10E-01 | 2.32E-02 | 2.61E-01 | 4.93E-01 | 3.67E-02 | 2.83E-03 | 0.00E+00 | 7.08E-03 | 3.74E-02 | 3.37E-02 | 5.30E-03 | -5.95E-02 |
| Potential for depletion of abiotic resources - non-fossil resources | eq. kg Sb | 3.25E-04 | 1.93E-05 | 1.45E-05 | 3.59E-04 | 3.18E-05 | 2.84E-07 | 0.00E+00 | 7.10E-07 | 3.24E-05 | 2.92E-05 | 1.96E-06 | -1.48E-03 |
| Abiotic depletion potential - fossil fuels | MJ | 5.90E+02 | 8.11E+01 | 5.96E+02 | 1.27E+03 | 1.33E+02 | 1.19E+01 | 0.00E+00 | 2.97E+01 | 1.36E+02 | 1.22E+02 | 1.34E+01 | -1.74E+02 |
| Water deprivation potential | eq. $m^3$ | 7,21E+00 | 3,74E-01 | 5,49E+00 | 1,31E+01 | 6.15E-01 | 2.27E-01 | 0.00E+00 | 5.69E-01 | 6.27E-01 | 5.65E-01 | 7.77E-02 | -1.29E+01 |

*Table 5. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 $m^3$)*

| Indicator | Unit | A1-A3 | A4-A5 | B1 | C1-C4 | D |
|---|---|---|---|---|---|---|
| Particulate matter | disease incidence | INA | INA | INA | INA | INA |
| Potential human exposure efficiency relative to U235 | eg. kBq U235 | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for ecosystems | CTUe | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (cancer effects) | CTUh | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (non-cancer effects) | CTUh | INA | INA | INA | INA | INA |
| Potential soil quality index | dimensionless | INA | INA | INA | INA | INA |

*Table 6. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 $m^3$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 6.03E+02 | 1.16E+00 | 2.08E+01 | 6.25E+02 | 1.91E+00 | 9.79E-01 | 0.00E+00 | 2.45E+00 | 1.95E+00 | 1.75E+00 | 2.35E-01 | -2.00E+01 |
| Consumption of renewable primary energy resources used as raw materials | MJ | 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 | 0.00E+00 |
| Total consumption of renewable primary energy resources | MJ | 6.03E+02 | 1.16E+00 | 2.09E+01 | 6.25E+02 | 1.91E+00 | 9.79E-01 | 0.00E+00 | 2.45E+00 | 1.95E+00 | 1.75E+00 | 2.35E-01 | -2.00E+01 |
| Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 3.13E+02 | 8.12E+01 | 5.99E+02 | 9.93E+02 | 1.33E+02 | 1.19E+01 | 0.00E+00 | 2.97E+01 | 1.36E+02 | 1.22E+02 | 1.45E+01 | -1.74E+02 |
| Consumption of non-renewable primary energy resources used as raw materials | MJ | 2.90E+02 | 0.00E+00 | 0.00E+00 | 2.90E+02 | 0.00E+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 | 6.04E+02 | 8.12E+01 | 5.99E+02 | 1.28E+03 | 1.33E+02 | 1.19E+01 | 0.00E+00 | 2.97E+01 | 1.36E+02 | 1.22E+02 | 1.45E+01 | -1.74E+02 |
| Consumption of secondary materials | kg | 1.65E+01 | 2.70E-02 | 5.25E-02 | 1.66E+01 | 4.46E-02 | 1.03E-03 | 0.00E+00 | 2.59E-03 | 4.55E-02 | 4.09E-02 | 0.00E+00 | -1.05E-01 |
| Consumption of renew. secondary fuels | MJ | 8.36E-02 | 2.98E-04 | 3.30E-04 | 8.43E-02 | 4.91E-04 | 5.22E-06 | 0.00E+00 | 1.31E-05 | 5.01E-04 | 4.51E-04 | 0.00E+00 | -6.40E-03 |
| Consumption of non-renewable secondary fuels | MJ | 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 | 0.00E+00 |
| Net consumption of freshwater | $m^3$ | 3.97E-01 | 1.02E-02 | 6.32E-01 | 1.04E+00 | 1.67E-02 | 3.42E-02 | 0.00E+00 | 8.54E-02 | 1.71E-02 | 1.54E-02 | 2.09E-03 | -3.15E-01 |

*Table 7. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 $m^3$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste | kg | 9.17E-01 | 9.05E-02 | 4.40E+00 | 5.41E+00 | 1.49E-01 | 9.22E-02 | 0.00E+00 | 2.31E-01 | 1.52E-01 | 1.37E-01 | 2.11E-05 | -1.21E+00 |
| Non-hazardous waste | kg | 1.43E+01 | 1.61E+00 | 7.26E+01 | 8.85E+01 | 2.65E+00 | 6.21E+00 | 0.00E+00 | 1.55E+01 | 2.70E+00 | 2.43E+00 | 5.51E+01 | -3.39E+01 |
| Radioactive waste | kg | 6.21E-04 | 9.70E-06 | 4.58E-05 | 6.76E-04 | 9.93E-06 | 1.79E-06 | 0.00E+00 | 4.46E-06 | 1.01E-05 | 9.12E-06 | 8.13E-05 | -4.59E-04 |
| Components for re-use | kg | 1.12E-02 | 0.00E+00 | 5.17E+00 | 5.18E+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 | 4.81E-02 | 2.50E-04 | 5.50E+00 | 5.55E+00 | 4.12E-04 | 7.99E-05 | 0.00E+00 | 2.00E-04 | 4.20E-04 | 4.95E+02 | 0.00E+00 | -2.36E-03 |
| Materials for energy recovery | kg | 1.43E-04 | 2.02E-06 | 2.31E+00 | 2.31E+00 | 3.33E-06 | 1.28E-07 | 0.00E+00 | 3.21E-07 | 3.40E-06 | 3.06E-06 | 0.00E+00 | -2.19E-04 |
| Exported Energy | MJ | 3.50E+01 | 0.00E+00 | 6.55E-01 | 3.57E+01 | 0.00E+00 | 3.81E-02 | 0.00E+00 | 9.52E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -4.73E-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 and ITB PCR A |
|---|
| Independent verification corresponding to ISO 14025 (subclause 8.1.3.)<br>☒ external ☐ internal |
| External verification of EPD: PhD. Eng. Halina Prejzner<br>LCI audit and verification: Filip Poznański, M.Sc. Eng.<br>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 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 Autoclaved aerated concrete 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/


Signature Not Verified
Dokument podpisany przez Michał Piasecki, ITB
Data: 2024.09.03 14:56:07 CEST

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# CERTIFICATE № 633/2024
# of TYPE III ENVIRONMENTAL DECLARATION

Products:

**H+H Autoclaved aerated concrete**

Manufacturer:

**H+H Polska Sp. z o.o.**
Kupiecka 6, 03-046 Warszawa, 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 10th May 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, May 2024