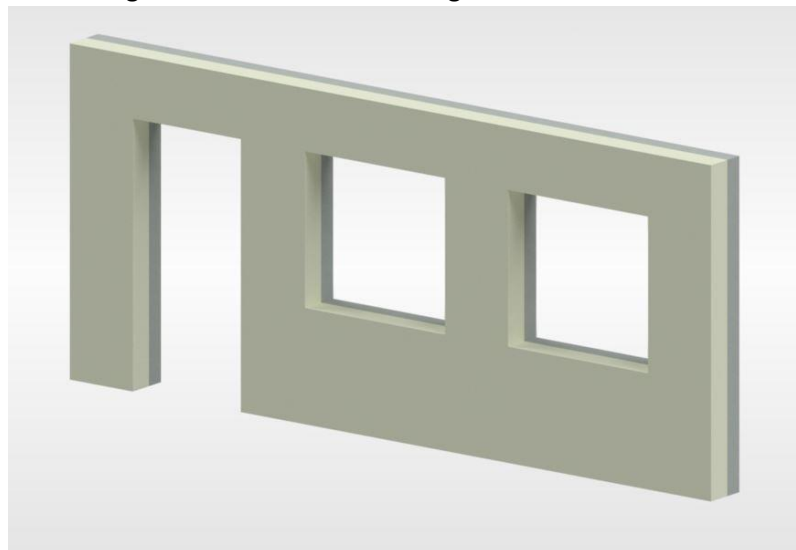


ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Prefabricated Insulated Wall Elements
Heidelberg Materials Precast Abetong



EPD HUB, HUB-0390

Publishing date 14 April 2023, last updated date 4 July 2023, valid until 14 April 2028

GENERAL INFORMATION

MANUFACTURER

| | |
|-----------------|---|
| Manufacturer | Heidelberg Materials Precast Abetong |
| Address | Box 24, S-351 03 VÄXJÖ, Sweden |
| Contact details | info.precastabetong@heidelbergmaterials.com |
| Website | www.precastabetong.heidelbergmaterials.se |

EPD STANDARDS, SCOPE AND VERIFICATION

| | |
|--------------------|---|
| Program operator | EPD Hub, hub@epdhub.com |
| Reference standard | EN 15804+A2:2019 and ISO 14025 |
| PCR | EPD Hub Core PCR version 1.0, 1 Feb 2022 |
| Sector | Construction product |
| Category of EPD | Third party verified EPD |
| Scope of the EPD | Cradle to gate with options, A4, and modules C1-C4, D |
| EPD author | Andreas Lidö, Heidelberg Materials Precast Abetong |
| EPD verification | Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification |
| EPD verifier | E.A as an authorized verifier acting for EPD Hub Limited |

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 | Prefabricated Insulated Wall Elements |
| Additional labels | - |
| Product reference | - |
| Place of production | Falkenberg, Sweden, Kvikksund, Sweden |
| Period for data | Data for the calendar year 2021 is used in this study. |
| Averaging in EPD | No averaging |
| Variation in GWP-fossil for A1-A3 | - % |

ENVIRONMENTAL DATA SUMMARY

| | |
|---|----------------------------------|
| Declared unit | 1 metric ton of concrete element |
| Declared unit mass | 1000 kg |
| GWP-fossil, A1-A3 (kgCO ₂ e) | 1,66E2 |
| GWP-total, A1-A3 (kgCO ₂ e) | 1,66E2 |
| Secondary material, inputs (%) | 3,21 |
| Secondary material, outputs (%) | 79,8 |
| Total energy use, A1-A3 (kWh) | 486,0 |
| Total water use, A1-A3 (m ³ e) | 2,99 |

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Heidelberg Materials Precast Abetong is one of the leading companies for the development, manufacture and sale of concrete elements and concrete-based products. The company employs more than 500 employees and has a turnover of approximately SEK 1,3 billion per year and is part of the international building materials group Heidelberg Materials. The company's production of concrete elements and products takes place in a responsible manner in one of the six factories. The finished parts are then transported out to construction sites, where Heidelberg Materials Precast Abetong or the customer handles the assembly. Customers are found in both the construction and agriculture sectors.

PRODUCT DESCRIPTION

The product is prefabricated insulated concrete wall elements consisting of aggregate, cement, reinforcement, insulation and the necessary cast-in-material of steel for transport and assembling. The product is almost exclusively used for facades in heated buildings. The product fulfils the requirements of SS-EN 13369:2018 Common rules for precast concrete products and SS-EN 14992:2007+A1:2012 Precast concrete products - Wall elements.

Technical specifications:
 Concrete strength C30/37.
 Exposure classes up to XC4+XF3.
 Life length class up to L100 (100 years).
 Fire classes up to REI90.

Typical dimensions are:
 Length of element 6,0 m.

Height of element 2,8 m.
 Thickness of element 350 mm.
 (150 mm inner panel and 200 mm polystyrene insulation)

Further information can be found at
www.precastabetong.heidelbergmaterials.se.

PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass- % | Material origin |
|-----------------------|-----------------|-----------------|
| Metals | 3,4 | Europe |
| Minerals | 95,7 | Sweden |
| Fossil materials | 0,9 | Europe |
| Bio-based materials | 0 | - |

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

| | |
|--|---|
| Biogenic carbon content in product, kg C | - |
| Biogenic carbon content in packaging, kg C | - |

FUNCTIONAL UNIT AND SERVICE LIFE

| | |
|------------------------|----------------------------------|
| Declared unit | 1 metric ton of concrete element |
| Mass per declared unit | 1000 kg |
| Functional unit | - |
| Reference service life | - |

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 | MND | MND | MND | MND | MND | MND | MND | MND | x | x | x | x | x | | |
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstr./demol. | Transport | Waste processing | Disposal | Reuse | Recovery | Recycling |

Modules not declared = MND. Modules not relevant = MNR.

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.

The production of insulated concrete wall elements starts by manufacturing parts for the custom-made moulds. At the same time, the reinforcement is prepared by bending and cutting meshes and bars into the designed dimensions. The casting table is cleaned before the moulds are assembled. Reinforcement and cast-in-materials are mounted, form oil applied and the elements casted. As the concrete sets and reaches the right consistency, the surface treatment is applied (generally fine rolling). After curing the concrete reaches the designed demoulding strength and

the elements can be lifted to an intermediate storage area for quality control and finishing, before they are finally transported out into the storage yard ready for delivery to the construction site.

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.

After notification from the construction site, the elements are loaded onto lorries for transport. The transports are optimised for both efficient assembling at the construction site and reducing the number of required vehicles. Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions and environmental impacts of fuel production. Average distance of transportation from production plant to building site is assumed as 100 km and the transportation method is assumed to be lorry. Transportation does not cause losses. Optional A5 module is not declared.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

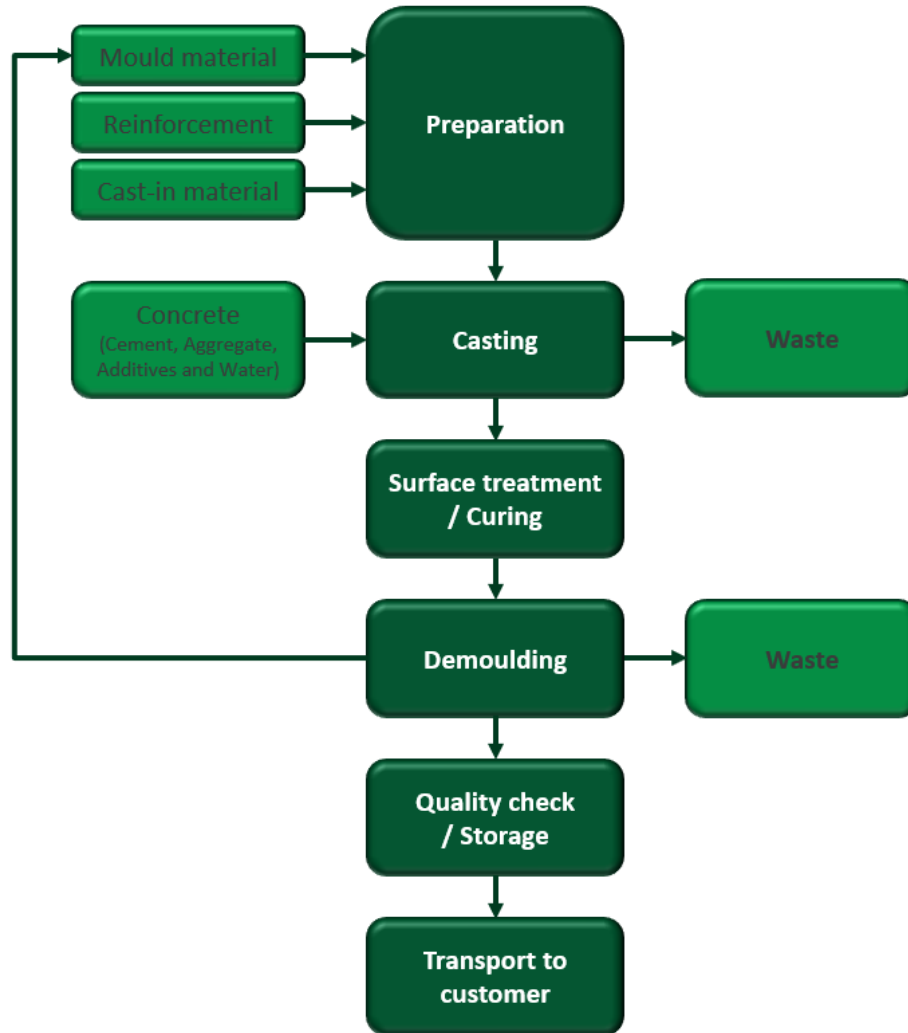
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as separate construction waste. The demolition process consumes energy in the form of diesel fuel used by building machines (C1). The dismantled concrete elements are delivered to the nearest construction waste treatment plant (C2). At the waste treatment plant, waste that can be reused, recycled or recovered for energy is separated

and diverted for further use (C3). Unusable materials are disposed of in a landfill (C4). Due to the recycling potential of reinforcement steel and concrete, they can be used as secondary raw material. 95% of the steel and 80% of the concrete are recycled, this avoids the use of virgin raw materials (D).

MANUFACTURING PROCESS



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.

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 | Allocated by mass or volume |
| Packaging materials | Not applicable |
| Ancillary materials | Allocated by mass or volume |
| Manufacturing energy and waste | Allocated by mass or volume |

AVERAGES AND VARIABILITY

| | |
|-----------------------------------|----------------|
| Type of average | No averaging |
| Averaging method | Not applicable |
| Variation in GWP-fossil for A1-A3 | - % |

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent 3.6 and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| 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 | 1,56E2 | 4,39E0 | 6,16E0 | 1,66E2 | 8,63E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 3,3E0 | 4,36E0 | 3,84E0 | 3,16E1 | -6,7E0 |
| GWP – fossil | kg CO ₂ e | 1,55E2 | 4,38E0 | 6,02E0 | 1,66E2 | 8,71E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 3,3E0 | 4,35E0 | 3,89E0 | 3,16E1 | -6,61E0 |
| GWP – biogenic | kg CO ₂ e | 2,84E-1 | 2,61E-3 | 4,41E-2 | 3,31E-1 | 6,6E-3 | MND | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | -7,57E-2 |
| GWP – LULUC | kg CO ₂ e | 6,83E-2 | 1,65E-3 | 1,01E-1 | 1,71E-1 | 2,74E-3 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 2,79E-4 | 1,37E-3 | 1,2E-3 | 3,82E-4 | -8,18E-3 |
| Ozone depletion pot. | kg CFC ₋₁₁ e | 4,22E-6 | 1,04E-6 | 1,99E-6 | 7,25E-6 | 2,14E-6 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 7,12E-7 | 1,07E-6 | 7,8E-7 | 4,52E-7 | -5,8E-7 |
| Acidification potential | mol H ⁺ e | 4,15E-1 | 2,56E-2 | 1,74E-2 | 4,58E-1 | 2,8E-2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 3,45E-2 | 1,4E-2 | 4,21E-2 | 1,37E-2 | -4,24E-2 |
| EP-freshwater ²⁾ | kg Pe | 1,02E-3 | 3,58E-5 | 7,71E-5 | 1,14E-3 | 7,39E-5 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 1,33E-5 | 3,7E-5 | 6,97E-5 | 1,58E-5 | -4,17E-4 |
| EP-marine | kg Ne | 5,1E-2 | 5,66E-3 | 4,04E-3 | 6,07E-2 | 6,16E-3 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 1,52E-2 | 3,08E-3 | 1,63E-2 | 5,19E-3 | -8,94E-3 |
| EP-terrestrial | mol Ne | 1,12E0 | 6,31E-2 | 4,65E-2 | 1,23E0 | 6,85E-2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 1,67E-1 | 3,43E-2 | 1,81E-1 | 5,66E-2 | -1,17E-1 |
| POCP (“smog”) ³⁾ | kg NMVOCe | 4,02E-1 | 2,05E-2 | 1,38E-2 | 4,36E-1 | 2,69E-2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,59E-2 | 1,34E-2 | 4,96E-2 | 1,55E-2 | -3,06E-2 |
| ADP-minerals & metals ⁴⁾ | kg Sbe | 7,25E-4 | 8,09E-5 | 1,97E-5 | 8,26E-4 | 1,55E-4 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 5,03E-6 | 7,75E-5 | 5,07E-5 | 1,5E-5 | -6,97E-4 |
| ADP-fossil resources | MJ | 8,25E2 | 6,89E1 | 2,75E2 | 1,17E3 | 1,41E2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,54E1 | 7,07E1 | 5,36E1 | 3,15E1 | -9,27E1 |
| Water use ⁵⁾ | m ³ e depr. | 4,6E1 | 2,45E-1 | 3,79E0 | 5E1 | 5,26E-1 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 8,46E-2 | 2,63E-1 | 2,42E-1 | 1,54E0 | -1,13E1 |

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| 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 | 5,08E-6 | 3,43E-7 | 1,71E-7 | 5,59E-6 | 7,64E-7 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 9,14E-7 | 3,82E-7 | 4,01E-6 | 2,08E-7 | -5,03E-7 |
| Ionizing radiation ⁶⁾ | kBq U235e | 6,48E3 | 3E-1 | 6,47E0 | 6,49E3 | 6,18E-1 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 1,94E-1 | 3,09E-1 | 2,38E-1 | 1,23E-1 | -5,72E-1 |
| Ecotoxicity (freshwater) | CTUe | 8,39E2 | 5,22E1 | 8,9E1 | 9,8E2 | 1,08E2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 2,66E1 | 5,4E1 | 7,37E1 | 1,75E2 | -1,2E2 |
| Human toxicity, cancer | CTUh | 2,46E-7 | 1,54E-9 | 1,83E-9 | 2,49E-7 | 2,72E-9 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 9,53E-10 | 1,36E-9 | 2,09E-9 | 2,4E-9 | -5,71E-9 |
| Human tox. non-cancer | CTUh | 2,02E-6 | 5,81E-8 | 4,14E-8 | 2,12E-6 | 1,23E-7 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 2,35E-8 | 6,17E-8 | 7,92E-8 | 9,13E-8 | -8,19E-8 |
| SQP ⁷⁾ | - | 1,06E3 | 8,88E1 | 3,42E1 | 1,19E3 | 2,13E2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 1,16E0 | 1,07E2 | 3,95E0 | 4,96E1 | -6,32E1 |

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 | 9,25E1 | 8,58E-1 | 7,56E1 | 1,69E2 | 1,78E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 2,45E-1 | 8,9E-1 | 2,04E0 | 3E-1 | -7,69E0 |
| Renew. PER as material | MJ | 1,24E-1 | 0E0 | 0E0 | 1,24E-1 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Total use of renew. PER | MJ | 9,26E1 | 8,58E-1 | 7,56E1 | 1,69E2 | 1,78E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 2,45E-1 | 8,9E-1 | 2,04E0 | 3E-1 | -7,69E0 |
| Non-re. PER as energy | MJ | 9,74E2 | 6,89E1 | 2,75E2 | 1,32E3 | 1,41E2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,54E1 | 7,07E1 | 5,36E1 | 3,15E1 | -9,27E1 |
| Non-re. PER as material | MJ | 1,93E2 | 0E0 | 0E0 | 1,93E2 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Total use of non-re. PER | MJ | 1,17E3 | 6,89E1 | 2,75E2 | 1,51E3 | 1,41E2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,54E1 | 7,07E1 | 5,36E1 | 3,15E1 | -9,27E1 |
| Secondary materials | kg | 3,21E1 | 0E0 | 1,19E-3 | 3,21E1 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 1,42E-1 |
| Renew. secondary fuels | MJ | 9,91E1 | 0E0 | 0E0 | 9,91E1 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Non-ren. secondary fuels | MJ | 1,62E2 | 0E0 | 0E0 | 1,62E2 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Use of net fresh water | m ³ | 2,86E0 | 1,34E-2 | 1,11E-1 | 2,99E0 | 2,94E-2 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,01E-3 | 1,47E-2 | 8,42E-3 | 4,33E-2 | -9,04E-1 |

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 | 5,67E0 | 6,98E-2 | 1,62E-1 | 5,9E0 | 1,37E-1 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 4,88E-2 | 6,87E-2 | 0E0 | 2,59E-1 | -5,08E-1 |
| Non-hazardous waste | kg | 7,46E2 | 6,52E0 | 6,67E1 | 8,2E2 | 1,52E1 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 5,22E-1 | 7,6E0 | 0E0 | 2,02E2 | -1,97E1 |
| Radioactive waste | kg | 2,88E-3 | 4,73E-4 | 2,93E-3 | 6,28E-3 | 9,71E-4 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 3,18E-4 | 4,86E-4 | 0E0 | 1,96E-4 | -4,15E-4 |

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 | 3,01E-4 | 0E0 | 0E0 | 3,01E-4 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Materials for recycling | kg | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 7,98E2 | 0E0 | 0E0 |
| Materials for energy rec | kg | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Exported energy | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | MND | MND | MND | MND | MND | MND | MND | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Elisabet Amat, as an authorized verifier acting for EPD Hub Limited
Updated 04.07.2023

