



## ENVIRONMENTAL PRODUCT DECLARATION

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

Solaio Cube 21/5  
Sicilferro Torrenovese SRL



**EPD HUB, HUB-1034**

Published on 19.01.2024, last updated on 19.01.2024, valid until 19.01.2029.

## GENERAL INFORMATION

### MANUFACTURER

|                 |                                 |
|-----------------|---------------------------------|
| Manufacturer    | Sicilferro Torrenovese SRL      |
| Address         | C.da Pietra di Roma SNC - Italy |
| Contact details | info@sicilferro.it              |
| Website         | https://scfssystem.it           |

### 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<br>EN 16783:2017 Thermal insulation products                                                                                              |
| Sector             | Construction product                                                                                                                                                               |
| Category of EPD    | Third party verified EPD                                                                                                                                                           |
| Scope of the EPD   | Cradle to gate with options, A5, and modules C1-C4, D                                                                                                                              |
| EPD author         | Mauro Scurria                                                                                                                                                                      |
| EPD verification   | Independent verification of this EPD and data, according to ISO 14025:<br><input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification |
| EPD verifier       | Haiha Nguyen, 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                      | Solaio Cube 21/5         |
| Additional labels                 | STD, CAM, ECO30, ECO100+ |
| Product reference                 | 21/5                     |
| Place of production               | Torrenova (ME) - Italy   |
| Period for data                   | 2022                     |
| Averaging in EPD                  | No averaging             |
| Variation in GWP-fossil for A1-A3 | < 44 %                   |

### ENVIRONMENTAL DATA SUMMARY

|                                           |                  |
|-------------------------------------------|------------------|
| Declared unit                             | 1 m <sup>2</sup> |
| Declared unit mass                        | 6.23 kg          |
| GWP-fossil, A1-A3 (kgCO <sub>2</sub> e)   | 2,73E+01         |
| GWP-total, A1-A3 (kgCO <sub>2</sub> e)    | 2,74E+01         |
| Secondary material, inputs (%)            | 32.5             |
| Secondary material, outputs (%)           | 84.1             |
| Total energy use, A1-A3 (kWh)             | 99.9             |
| Total water use, A1-A3 (m <sup>3</sup> e) | 3,99E-01         |

## PRODUCT AND MANUFACTURER

### ABOUT THE MANUFACTURER

Sicilferro Torrenovese SRL was founded in 1982, in Torrenova, along the northern coast of Sicily. Operating in the construction sector for two generations with an approach focused on the offer of innovative construction solutions, in 1998 the company started a new division, the SCF Sistemi Costruttivi Futuri with the industrial intent of proposing on the market a leading company in the EPS construction products sector. SCF developed EPS slabs, sheet, wall and ventilated crawlspace. The company is certified in according to UNI EN 1090-2:2018, UNI EN ISO 3834-1:2021, UNI EN ISO 9001:2015, UNI EN ISO 14001:2015, PAS 2060 Carbon Neutrality.

### PRODUCT DESCRIPTION

Formwork in Expanded Polystyrene (EPS) with variable geometry, reinforced and continuously co-sintered with two flat sheet of galvanized steel which give it particular characteristics of resistance and partial self-supporting, thermal insulation and elimination of thermal bridges. Usable for the formation of bidirectional slabs to be reinforced and cast on site, characterized by extreme lightness and contained weight indicated to reduce the overall masses of the building by improving the safety and seismic resistance. Suitable for upward-extension, residential and tertiary buildings and multi-storey buildings. It is quick to install and adapts to all possible project geometries. Supplied in according to UNI EN 13163:2017 with CE marking. The formwork panel can be supplied in the version that meets the Minimum Environmental Criteria (C.A.M.) according to the D.M. 23/06/2022. The formwork covered by the following LCA is the Solaio Cube 21/5, with a structural height of 21 cm and an insulation fin 5 cm thick.

### RECYCLED MATERIAL IN THE PRODUCT

The formwork Solaio Cube is made up of two types of materials, EPS and steel. In the following LCA analysis, virgin Expandable Polystyrene was considered, which does not contain any recycled material. As regards the

galvanized steel of which the two sheets embedded inside the EPS are composed, coming entirely from an electric arc furnace (EAF), the declarations and assertions of the suppliers are considered, which gives an average percentage of recycled material inside the Solaio Cube of approximately 32% by weight.

The formwork Solaio Cube can be supplied with % recycled material meeting C.A.M. criteria, or with 30% recycled material in the ECO30 version or with 100% recycled material in the ECO100+ version.

### LCA INFORMATION

This LCA complies with the regulations EN 16783:2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations.

This LCA study includes the provision of all materials, transportation, energy and emission flows, and end of life processing of product. The use phase is not covered, assuming there are no use emissions or replacements. For easier modelling and because of lack of accuracy in available modelling resources, some constituents under 0,1% of product mass are excluded. These include some materials which are used in the product manufacturing only in very small amounts and have a negligible impact on the emissions of the product, for example grease and lubricating oil consumed at plant.

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.

Further information can be found at <https://scfssystem.it>.

#### PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass- % | Material origin |
|-----------------------|-----------------|-----------------|
| Metals                | 48              | Europe          |
| Minerals              | -               | -               |
| Fossil materials      | 52              | Europe          |
| Bio-based materials   | -               | -               |

#### BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

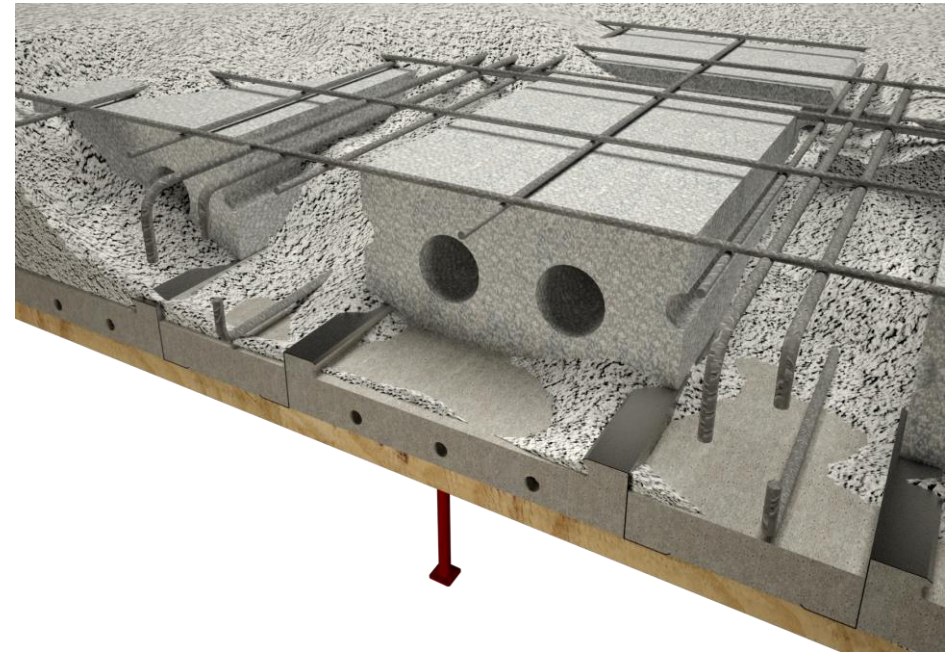
|                                            |   |
|--------------------------------------------|---|
| Biogenic carbon content in product, kg C   | 0 |
| Biogenic carbon content in packaging, kg C | 0 |

#### FUNCTIONAL UNIT AND SERVICE LIFE

|                        |                  |
|------------------------|------------------|
| Declared unit          | 1 m <sup>2</sup> |
| Mass per declared unit | 6.23 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             | MND            | x        | 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 | Deconstruction | 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 raw materials are expandable polystyrene and sheet of galvanized deep steel. The process begins with the pre-expansion of the expandable polystyrene granules using steam produced by boilers. The pre-expanded granules are stored in silos for seasoning. The galvanized sheet metal is drilled with circular section holes in order to lighten them without however compromising the structural characteristics. During this phase we have a production loss of approximately 10% in weight due to waste from the drilling process, which is entirely recovered for recycling. Metal scraps are collected and sent to a waste facility located 200 km from the manufacturing site for recycling. Last step is the moulding phase, through

which the specially shaped galvanized steel sheets are incorporated inside the formwork. Each EPS slab is customized according to project requests. No packaging materials are used as the materials are supplied without.

## 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.

The transportation phase is not object of the analysis. In the assembly stage the only material required is installation wood.

## PRODUCT USE AND MAINTENANCE (B1-B7)

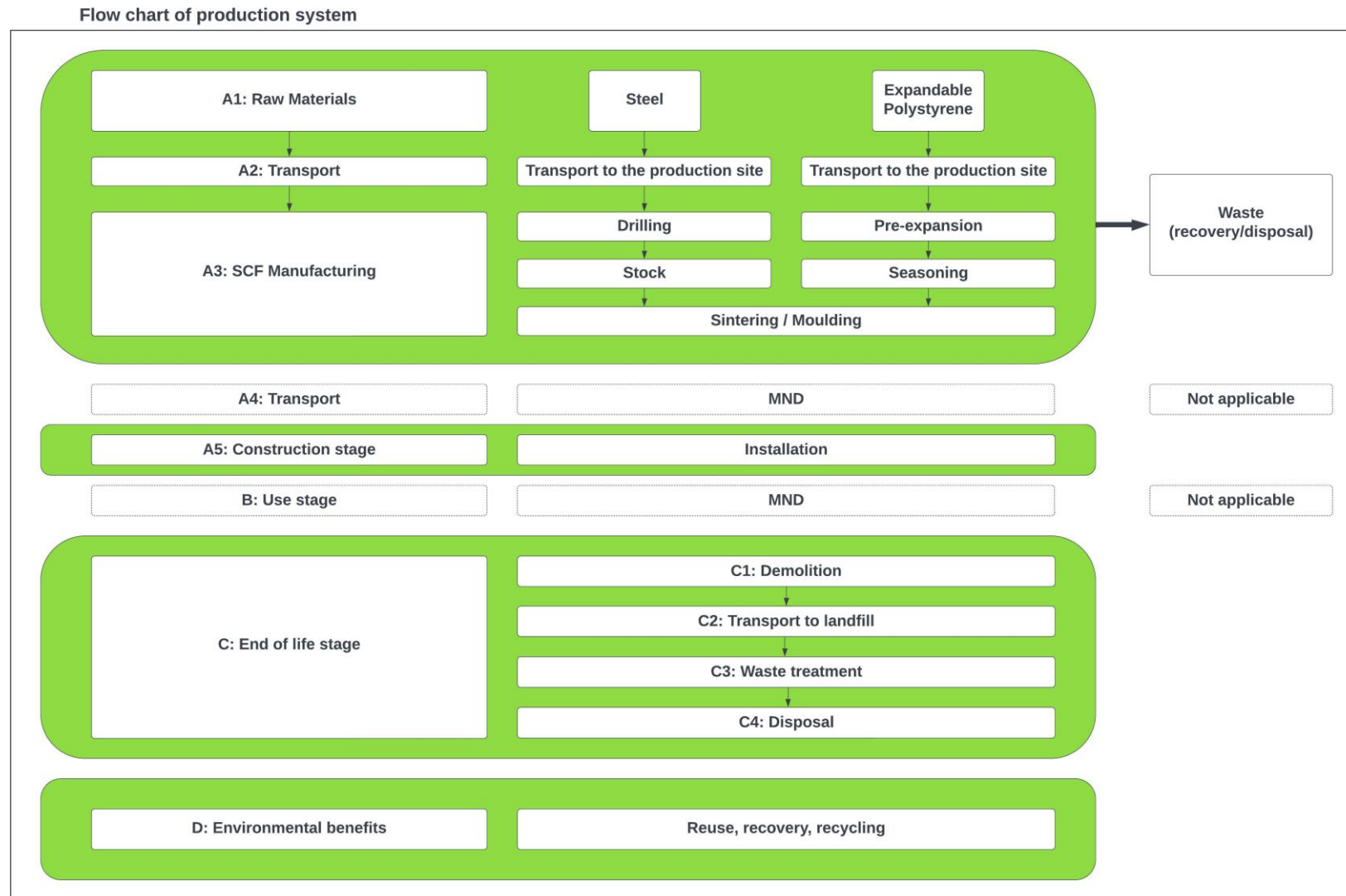
Use stage not considered.

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

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

Demolition is assumed to consume 0,01 kWh/kg of product. The source of energy is diesel fuel used by construction machines (C1). The distance for transportation to disposal is assumed as 200 km and the transportation method is assumed to be lorry (C2). The EOL of EPS is assumed to be incinerated by 80% and by 20% landfilled waste without reuse, recovery or recycling according to the AIPE (Italian Expanded Polystyrene Association). Approximately 85% of steel is assumed to be recycled based on World Steel Association; it is assumed that the remaining 15% of steel is taken to landfill for final disposal (C3,C4). Module D includes the benefits due to the EPS incineration and steel recycling; also the installation wood is re-used (D).

## MANUFACTURING PROCESS AND SYSTEM BOUNDARY



## 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                  | No allocation               |
| 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 | < 44 %         |

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

Variation in GWP-fossil for A1-A3 is 44% how variation between product reference 'Cube 21/5' and the max and the min values reported in the Scaling Table of Annex I. The dimensions influence in a directly proportional way the consumption of material and energy.

### 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 v3.8 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 <sup>1)</sup>           | kg CO <sub>2</sub> e   | 2,25E+01 | 1,31E+00 | 3,56E+00 | 2,74E+01 | 0,00E+00 | 1,04E-01  | MND | MND | MND | MND | MND | MND | MND | 2,06E-02 | 2,73E-01 | 8,02E+00 | 1,00E-01 | -5,98E+00 |
| GWP – fossil                        | kg CO <sub>2</sub> e   | 2,24E+01 | 1,31E+00 | 3,56E+00 | 2,73E+01 | 0,00E+00 | 1,15E-01  | MND | MND | MND | MND | MND | MND | MND | 2,06E-02 | 2,72E-01 | 8,02E+00 | 1,00E-01 | -8,14E+00 |
| GWP – biogenic                      | kg CO <sub>2</sub> e   | 7,81E-02 | 4,99E-04 | 4,67E-03 | 8,33E-02 | 0,00E+00 | -1,23E-02 | MND | MND | MND | MND | MND | MND | MND | 3,78E-06 | 1,23E-04 | 3,73E-04 | 5,69E-05 | 2,16E+00  |
| GWP – LULUC                         | kg CO <sub>2</sub> e   | 1,30E-02 | 5,38E-04 | 3,21E-04 | 1,39E-02 | 0,00E+00 | 1,20E-03  | MND | MND | MND | MND | MND | MND | MND | 2,05E-06 | 1,28E-04 | 1,06E-04 | 9,49E-06 | -1,33E-03 |
| Ozone depletion pot.                | kg CFC <sub>11</sub> e | 9,89E-07 | 2,90E-07 | 7,22E-07 | 2,00E-06 | 0,00E+00 | 1,43E-08  | MND | MND | MND | MND | MND | MND | MND | 4,41E-09 | 6,12E-08 | 1,40E-08 | 3,04E-09 | -4,99E-07 |
| Acidification potential             | mol H <sup>+</sup> e   | 4,32E-01 | 6,37E-03 | 2,74E-02 | 4,66E-01 | 0,00E+00 | 7,26E-04  | MND | MND | MND | MND | MND | MND | MND | 2,14E-04 | 1,08E-03 | 1,77E-03 | 8,17E-05 | -5,18E-02 |
| EP-freshwater <sup>2)</sup>         | kg Pe                  | 7,97E-04 | 1,05E-05 | 1,80E-05 | 8,25E-04 | 0,00E+00 | 1,02E-05  | MND | MND | MND | MND | MND | MND | MND | 6,83E-08 | 2,22E-06 | 4,13E-06 | 1,39E-07 | -3,13E-04 |
| EP-marine                           | kg Ne                  | 2,73E-02 | 1,82E-03 | 2,32E-03 | 3,15E-02 | 0,00E+00 | 2,33E-04  | MND | MND | MND | MND | MND | MND | MND | 9,48E-05 | 3,12E-04 | 6,32E-04 | 5,16E-05 | -7,17E-03 |
| EP-terrestrial                      | mol Ne                 | 1,70E+00 | 2,01E-02 | 2,52E-02 | 1,74E+00 | 0,00E+00 | 2,54E-03  | MND | MND | MND | MND | MND | MND | MND | 1,04E-03 | 3,45E-03 | 6,91E-03 | 3,03E-04 | -8,38E-02 |
| POCP (“smog”) <sup>3)</sup>         | kg NMVOCe              | 8,16E-02 | 5,97E-03 | 8,44E-03 | 9,60E-02 | 0,00E+00 | 8,61E-04  | MND | MND | MND | MND | MND | MND | MND | 2,86E-04 | 1,06E-03 | 1,73E-03 | 1,09E-04 | -2,98E-02 |
| ADP-minerals & metals <sup>4)</sup> | kg Sbe                 | 1,17E-03 | 4,48E-06 | 6,88E-06 | 1,18E-03 | 0,00E+00 | 2,86E-07  | MND | MND | MND | MND | MND | MND | MND | 1,05E-08 | 1,26E-06 | 8,35E-06 | 2,88E-08 | -5,84E-05 |
| ADP-fossil resources                | MJ                     | 3,97E+02 | 1,89E+01 | 4,53E+01 | 4,62E+02 | 0,00E+00 | 1,48E+00  | MND | MND | MND | MND | MND | MND | MND | 2,77E-01 | 3,99E+00 | 1,55E+00 | 2,25E-01 | -8,12E+01 |
| Water use <sup>5)</sup>             | m <sup>3</sup> e depr. | 1,61E+01 | 8,30E-02 | 2,79E-01 | 1,65E+01 | 0,00E+00 | 4,50E-02  | MND | MND | MND | MND | MND | MND | MND | 7,46E-04 | 2,09E-02 | 1,97E-01 | 1,16E-03 | -1,47E+00 |

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 PO<sub>4</sub>e; 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, 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 | 4,39E-06 | 1,10E-07 | 2,22E-07 | 4,73E-06 | 0,00E+00 | 8,78E-09 | MND | MND | MND | MND | MND | MND | MND | 5,74E-09 | 2,03E-08 | 1,47E-08 | 1,62E-09 | -5,50E-07 |
| Ionizing radiation <sup>6)</sup> | kBq U235e | 1,41E+00 | 9,00E-02 | 2,35E-01 | 1,73E+00 | 0,00E+00 | 8,91E-03 | MND | MND | MND | MND | MND | MND | MND | 1,27E-03 | 2,16E-02 | 1,06E-02 | 1,07E-03 | -1,56E-01 |
| Ecotoxicity (freshwater)         | CTUe      | 8,22E+02 | 1,70E+01 | 2,79E+01 | 8,67E+02 | 0,00E+00 | 1,95E+00 | MND | MND | MND | MND | MND | MND | MND | 1,67E-01 | 3,46E+00 | 4,48E+01 | 2,57E-01 | -2,16E+02 |
| Human toxicity, cancer           | CTUh      | 8,57E-08 | 4,97E-10 | 1,21E-09 | 8,74E-08 | 0,00E+00 | 1,04E-10 | MND | MND | MND | MND | MND | MND | MND | 6,39E-12 | 1,21E-10 | 6,36E-10 | 6,50E-12 | 2,27E-08  |
| Human tox. non-cancer            | CTUh      | 5,75E-07 | 1,60E-08 | 2,28E-08 | 6,14E-07 | 0,00E+00 | 1,73E-09 | MND | MND | MND | MND | MND | MND | MND | 1,21E-10 | 3,39E-09 | 2,52E-08 | 1,44E-10 | -1,19E-07 |
| SQP <sup>7)</sup>                | -         | 4,09E+01 | 1,29E+01 | 6,35E+00 | 6,01E+01 | 0,00E+00 | 2,57E+02 | MND | MND | MND | MND | MND | MND | MND | 3,61E-02 | 2,40E+00 | 1,88E+00 | 5,21E-01 | -4,71E+01 |

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 <sup>8)</sup> | MJ             | 1,55E+01 | 2,29E-01 | 3,60E+00 | 1,93E+01 | 0,00E+00 | 2,46E+01 | MND | MND | MND | MND | MND | MND | MND | 1,59E-03 | 6,86E-02 | 1,62E-01  | 3,55E-03  | -1,42E+01 |
| Renew. PER as material             | MJ             | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,80E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0,00E+00  | 0,00E+00  |
| Total use of renew. PER            | MJ             | 1,55E+01 | 2,29E-01 | 3,60E+00 | 1,93E+01 | 0,00E+00 | 2,46E+01 | MND | MND | MND | MND | MND | MND | MND | 1,59E-03 | 6,86E-02 | 1,62E-01  | 3,55E-03  | -1,42E+01 |
| Non-re. PER as energy              | MJ             | 2,76E+02 | 1,89E+01 | 4,53E+01 | 3,41E+02 | 0,00E+00 | 1,48E+00 | MND | MND | MND | MND | MND | MND | MND | 2,77E-01 | 3,99E+00 | 1,55E+00  | 2,25E-01  | -8,12E+01 |
| Non-re. PER as material            | MJ             | 1,21E+02 | 0,00E+00 | 0,00E+00 | 1,21E+02 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | -9,68E+01 | -2,42E+01 | -1,76E+01 |
| Total use of non-re. PER           | MJ             | 3,97E+02 | 1,89E+01 | 4,53E+01 | 4,62E+02 | 0,00E+00 | 1,48E+00 | MND | MND | MND | MND | MND | MND | MND | 2,77E-01 | 3,99E+00 | -9,53E+01 | -2,40E+01 | -9,88E+01 |
| Secondary materials                | kg             | 2,02E+00 | 6,29E-03 | 3,95E-03 | 2,03E+00 | 0,00E+00 | 1,33E-03 | MND | MND | MND | MND | MND | MND | MND | 1,09E-04 | 1,64E-03 | 1,82E-03  | 6,97E-05  | 1,64E+00  |
| Renew. secondary fuels             | MJ             | 9,06E-04 | 7,73E-05 | 5,70E-05 | 1,04E-03 | 0,00E+00 | 3,78E-05 | MND | MND | MND | MND | MND | MND | MND | 3,55E-07 | 1,89E-05 | 5,43E-05  | 2,50E-06  | -3,02E-04 |
| Non-ren. secondary fuels           | MJ             | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0,00E+00  | 0,00E+00  |
| Use of net fresh water             | m <sup>3</sup> | 3,83E-01 | 2,24E-03 | 1,37E-02 | 3,99E-01 | 0,00E+00 | 4,97E-04 | MND | MND | MND | MND | MND | MND | MND | 1,68E-05 | 5,61E-04 | 2,51E-03  | 2,42E-04  | -5,54E-02 |

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   | 3,61E+00 | 2,60E-02 | 4,19E-02 | 3,68E+00 | 0,00E+00 | 7,97E-03 | MND | MND | MND | MND | MND | MND | MND | 3,71E-04 | 5,20E-03 | 5,53E-03 | 0,00E+00 | -1,38E+00 |
| Non-hazardous waste | kg   | 2,36E+01 | 4,19E-01 | 7,11E-01 | 2,48E+01 | 0,00E+00 | 1,22E-01 | MND | MND | MND | MND | MND | MND | MND | 2,61E-03 | 9,40E-02 | 2,68E+00 | 1,11E+00 | -2,02E+01 |
| Radioactive waste   | kg   | 4,89E-04 | 1,26E-04 | 3,06E-04 | 9,21E-04 | 0,00E+00 | 7,11E-06 | MND | MND | MND | MND | MND | MND | MND | 1,95E-06 | 2,72E-05 | 4,76E-06 | 0,00E+00 | -1,45E-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 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling  | kg   | 0,00E+00 | 0,00E+00 | 3,10E-01 | 3,10E-01 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 2,74E+00 | 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 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 2,50E+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 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 7,07E+01 | 0,00E+00 | 0,00E+00 |

## ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

| Impact category      | Unit                               | A1       | A2       | A3       | A1-A3    | A4       | A5       | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D         |
|----------------------|------------------------------------|----------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|-----------|
| Global Warming Pot.  | kg CO <sub>2</sub> e               | 2,13E+01 | 1,29E+00 | 3,54E+00 | 2,61E+01 | 0,00E+00 | 1,13E-01 | MND | MND | MND | MND | MND | MND | MND | 2,04E-02 | 2,70E-01 | 8,02E+00 | 8,16E-02 | -7,90E+00 |
| Ozone depletion Pot. | kg CFC <sub>11</sub> e             | 9,84E-07 | 2,30E-07 | 5,74E-07 | 1,79E-06 | 0,00E+00 | 1,14E-08 | MND | MND | MND | MND | MND | MND | MND | 3,49E-09 | 4,86E-08 | 1,17E-08 | 2,41E-09 | -4,47E-07 |
| Acidification        | kg SO <sub>2</sub> e               | 2,57E-01 | 4,98E-03 | 2,41E-02 | 2,86E-01 | 0,00E+00 | 5,56E-04 | MND | MND | MND | MND | MND | MND | MND | 1,53E-04 | 8,46E-04 | 1,32E-03 | 6,20E-05 | -4,37E-02 |
| Eutrophication       | kg PO <sub>4</sub> <sup>3</sup> e  | 6,92E-02 | 1,04E-03 | 1,75E-03 | 7,19E-02 | 0,00E+00 | 2,02E-04 | MND | MND | MND | MND | MND | MND | MND | 3,54E-05 | 1,99E-04 | 8,51E-04 | 3,85E-03 | -1,29E-02 |
| POCP ("smog")        | kg C <sub>2</sub> H <sub>4</sub> e | 5,81E-03 | 1,89E-04 | 9,35E-04 | 6,93E-03 | 0,00E+00 | 5,15E-05 | MND | MND | MND | MND | MND | MND | MND | 3,34E-06 | 3,57E-05 | 3,55E-05 | 1,51E-05 | -3,13E-03 |
| ADP-elements         | kg Sbe                             | 1,17E-03 | 4,38E-06 | 6,83E-06 | 1,18E-03 | 0,00E+00 | 2,81E-07 | MND | MND | MND | MND | MND | MND | MND | 1,03E-08 | 1,24E-06 | 8,30E-06 | 2,80E-08 | -5,82E-05 |
| ADP-fossil           | MJ                                 | 3,97E+02 | 1,89E+01 | 4,53E+01 | 4,62E+02 | 0,00E+00 | 1,48E+00 | MND | MND | MND | MND | MND | MND | MND | 2,77E-01 | 3,99E+00 | 1,55E+00 | 2,25E-01 | -8,12E+01 |

# ANNEX I – SCALING TABLE

| Model                                        | 18/5                  | 19/5                  | 20/5                  | 21/5                  | 22/5                  | 23/5                  | 24/5                  | 25/5                  | 26/5                  | 27/5                  | 28/5                  | 29/5                  | 30/5                  | 31/5                   | 32/5                  |
|----------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| ht - Structural Thickness                    | 18 cm                 | 19 cm                 | 20 cm                 | 21 cm                 | 22 cm                 | 23 cm                 | 24 cm                 | 25 cm                 | 26 cm                 | 27 cm                 | 28 cm                 | 29 cm                 | 30 cm                 | 31 cm                  | 32 cm                 |
| Sf - Insulation Thickness                    | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                  | 5 cm                   | 5 cm                  |
| Product Weight per 1 m <sup>2</sup>          | 5,9 kg/m <sup>2</sup> | 6,0 kg/m <sup>2</sup> | 6,1 kg/m <sup>2</sup> | 6,2 kg/m <sup>2</sup> | 6,4 kg/m <sup>2</sup> | 6,5 kg/m <sup>2</sup> | 6,6 kg/m <sup>2</sup> | 6,8 kg/m <sup>2</sup> | 6,9 kg/m <sup>2</sup> | 7,0 kg/m <sup>2</sup> | 7,2 kg/m <sup>2</sup> | 7,3 kg/m <sup>2</sup> | 7,4 kg/m <sup>2</sup> | 7,48 kg/m <sup>2</sup> | 7,6 kg/m <sup>2</sup> |
| HT - Slab Thickness [cm]                     | 28                    | 29                    | 30                    | 31                    | 32                    | 33                    | 34                    | 35                    | 36                    | 37                    | 38                    | 39                    | 40                    | 41                     | 42                    |
| Rs - Thermal resistance [m <sup>2</sup> K/W] | 4,32                  | 4,51                  | 4,70                  | 4,88                  | 5,06                  | 5,25                  | 5,43                  | 5,62                  | 5,80                  | 5,98                  | 6,17                  | 6,35                  | 6,54                  | 6,72                   | 6,91                  |
| <b>Impact Category</b>                       | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>           | <b>A1-A3</b>          |
| GWP - total                                  | 0,93                  | 0,95                  | 0,98                  | 1,00                  | 1,02                  | 1,05                  | 1,07                  | 1,09                  | 1,11                  | 1,14                  | 1,16                  | 1,18                  | 1,21                  | 1,23                   | 1,25                  |
| GWP - fossil                                 | 0,93                  | 0,95                  | 0,98                  | 1,00                  | 1,02                  | 1,05                  | 1,07                  | 1,09                  | 1,11                  | 1,14                  | 1,16                  | 1,18                  | 1,21                  | 1,23                   | 1,25                  |
| GWP - biogenic                               | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,13                  | 1,13                  | 1,13                  | 1,13                  | 1,13                  | 1,13                  | 1,25                  | 1,25                  | 1,25                  | 1,25                   | 1,25                  |
| GWP - LULUC                                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                   | 1,00                  |
| Ozone depletion potential                    | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                  |
| Acidification potential                      | 0,98                  | 0,98                  | 0,98                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,02                  | 1,02                  | 1,02                  | 1,04                  | 1,04                  | 1,04                  | 1,04                   | 1,06                  |
| EP - freshwater                              | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                  |
| EP - marine                                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,33                   | 1,33                  |
| EP - terrestrial                             | 0,99                  | 0,99                  | 1,00                  | 1,00                  | 1,01                  | 1,01                  | 1,01                  | 1,01                  | 1,01                  | 1,02                  | 1,02                  | 1,02                  | 1,02                  | 1,02                   | 1,03                  |
| POCP ("smog")                                | 0,90                  | 0,90                  | 0,90                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,00                  | 1,10                  | 1,10                  | 1,10                  | 1,10                  | 1,10                  | 1,10                   | 1,20                  |
| ADP - minerals & metals                      | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                  |
| ADP - fossil resources                       | 0,92                  | 0,95                  | 0,97                  | 1,00                  | 1,03                  | 1,05                  | 1,08                  | 1,11                  | 1,13                  | 1,16                  | 1,18                  | 1,21                  | 1,24                  | 1,26                   | 1,29                  |
| Water use                                    | 0,94                  | 0,96                  | 0,98                  | 1,00                  | 1,02                  | 1,04                  | 1,06                  | 1,08                  | 1,11                  | 1,13                  | 1,15                  | 1,17                  | 1,19                  | 1,21                   | 1,23                  |

| Model                                        | 18/8                  | 19/8                  | 20/8                  | 21/8                  | 22/8                  | 23/8                  | 24/8                  | 25/8                  | 26/8                  | 27/8                  | 28/8                  | 29/8                  | 30/8                  | 31/8                   | 32/8                   |
|----------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|
| ht - Structural Thickness                    | 18 cm                 | 19 cm                 | 20 cm                 | 21 cm                 | 22 cm                 | 23 cm                 | 24 cm                 | 25 cm                 | 26 cm                 | 27 cm                 | 28 cm                 | 29 cm                 | 30 cm                 | 31 cm                  | 32 cm                  |
| Sf - Insulation Thickness                    | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                  | 8 cm                   | 8 cm                   |
| Product Weight per 1 m <sup>2</sup>          | 7,1 kg/m <sup>2</sup> | 7,2 kg/m <sup>2</sup> | 7,3 kg/m <sup>2</sup> | 7,5 kg/m <sup>2</sup> | 7,6 kg/m <sup>2</sup> | 7,7 kg/m <sup>2</sup> | 7,9 kg/m <sup>2</sup> | 8,0 kg/m <sup>2</sup> | 8,1 kg/m <sup>2</sup> | 8,2 kg/m <sup>2</sup> | 8,4 kg/m <sup>2</sup> | 8,5 kg/m <sup>2</sup> | 8,7 kg/m <sup>2</sup> | 8,73 kg/m <sup>2</sup> | 8,85 kg/m <sup>2</sup> |
| HT - Slab Thickness [cm]                     | 28                    | 29                    | 30                    | 31                    | 32                    | 33                    | 34                    | 35                    | 36                    | 37                    | 38                    | 39                    | 40                    | 41                     | 42                     |
| Rs - Thermal resistance [m <sup>2</sup> K/W] | 5,33                  | 5,52                  | 5,70                  | 5,89                  | 6,07                  | 6,25                  | 6,44                  | 6,62                  | 6,81                  | 6,99                  | 7,18                  | 7,36                  | 7,54                  | 7,73                   | 7,91                   |
| <b>Impact Category</b>                       | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>          | <b>A1-A3</b>           | <b>A1-A3</b>           |
| GWP - total                                  | 1,12                  | 1,14                  | 1,16                  | 1,19                  | 1,21                  | 1,23                  | 1,26                  | 1,28                  | 1,30                  | 1,33                  | 1,35                  | 1,37                  | 1,39                  | 1,42                   | 1,44                   |
| GWP - fossil                                 | 1,12                  | 1,14                  | 1,16                  | 1,19                  | 1,21                  | 1,23                  | 1,26                  | 1,28                  | 1,30                  | 1,33                  | 1,35                  | 1,37                  | 1,39                  | 1,42                   | 1,44                   |
| GWP - biogenic                               | 1,13                  | 1,25                  | 1,25                  | 1,25                  | 1,25                  | 1,25                  | 1,25                  | 1,38                  | 1,38                  | 1,38                  | 1,38                  | 1,38                  | 1,50                  | 1,50                   | 1,50                   |
| GWP - LULUC                                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                  | 2,00                   | 2,00                   |
| Ozone depletion potential                    | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                   |
| Acidification potential                      | 1,17                  | 1,17                  | 1,17                  | 1,19                  | 1,19                  | 1,19                  | 1,19                  | 1,21                  | 1,21                  | 1,21                  | 1,23                  | 1,23                  | 1,23                  | 1,23                   | 1,26                   |
| EP - freshwater                              | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                   |
| EP - marine                                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                  | 1,33                   | 1,33                   |
| EP - terrestrial                             | 1,19                  | 1,19                  | 1,20                  | 1,20                  | 1,20                  | 1,20                  | 1,20                  | 1,21                  | 1,21                  | 1,21                  | 1,21                  | 1,21                  | 1,22                  | 1,22                   | 1,22                   |
| POCP ("smog")                                | 1,10                  | 1,10                  | 1,10                  | 1,10                  | 1,20                  | 1,20                  | 1,20                  | 1,20                  | 1,20                  | 1,20                  | 1,30                  | 1,30                  | 1,30                  | 1,30                   | 1,30                   |
| ADP - minerals & metals                      | 0,00                  | 0,00                  | 0,00                  | 1,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                  | 0,00                   | 0,00                   |
| ADP - fossil resources                       | 1,11                  | 1,14                  | 1,16                  | 1,19                  | 1,22                  | 1,24                  | 1,27                  | 1,29                  | 1,32                  | 1,35                  | 1,37                  | 1,40                  | 1,43                  | 1,45                   | 1,48                   |
| Water use                                    | 1,13                  | 1,15                  | 1,17                  | 1,19                  | 1,21                  | 1,23                  | 1,25                  | 1,28                  | 1,30                  | 1,32                  | 1,34                  | 1,36                  | 1,38                  | 1,40                   | 1,42                   |

ht = Altezza travetto; Sf = Spessore aletta di coibentazione; HT = Altezza solaio totale con caldana da 5 cm

Rs = Resistenza termica definita come la resistenza termica media ponderata delle resistenze (Ri) relativa ad ogni sezione (Si) caratterizzante il sistema solaio gettato in opera, escludendo dal calcolo le finiture ed il contributo degli strati liminari,  $R = \sum Ri Si / \sum Si$ .

## 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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited  
19.01.2024

