



# ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Insulation Piercing Connector Type 2  
Melbye As



**EPD HUB, HUB-7086**

Published on 30.07.2026, last updated on 30.07.2026, valid until 29.07.2031

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



Created with One Click LCA

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## GENERAL INFORMATION

### MANUFACTURER

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| Manufacturer    | Melbye As                                             |
| Address         | Prost Stabels Vei 22, 2019 Skedsmokorset, Norway      |
| Contact details | kontakt@melbye.no                                     |
| Website         | <a href="https://melbye.com/">https://melbye.com/</a> |

### EPD STANDARDS, SCOPE AND VERIFICATION

|                    |                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program operator   | EPD Hub, hub@epdhub.com                                                                                                                                                                |
| Reference standard | EN 15804:2012+A2:2019/AC:2021 and ISO 14025                                                                                                                                            |
| PCR                | EPD Hub Core PCR Version 1.2, 24 Mar 2025                                                                                                                                              |
| Sector             | Manufactured product                                                                                                                                                                   |
| Category of EPD    | Third party verified EPD                                                                                                                                                               |
| Parent EPD number  | -                                                                                                                                                                                      |
| Scope of the EPD   | Cradle to gate with options, A5, and modules C1-C4, D                                                                                                                                  |
| EPD author         | Aditya Dharmendra Nishad                                                                                                                                                               |
| EPD verification   | Independent verification of this EPD and data, according to ISO 14025:<br><br><input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification |
| EPD verifier       | Afzal khan Peerukhan as an authorized verifier for EPD Hub                                                                                                                             |

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

## PRODUCT

|                                            |                                       |
|--------------------------------------------|---------------------------------------|
| Product name                               | Insulation Piercing Connector Type 2  |
| Additional labels                          | -                                     |
| Product reference                          | -                                     |
| Place(s) of raw material origin            | France                                |
| Place of production                        | CS 90100, 01160 Pont-d'Ain, France    |
| Place(s) of installation and use           | Global                                |
| Period for data                            | 1st January 2023 - 31st December 2023 |
| Averaging in EPD                           | Multiple products                     |
| Variation in GWP-fossil for A1-A3 (%)      | -2.1% - (-1.7%)                       |
| GTIN (Global Trade Item Number)            | -                                     |
| NOBB (Norwegian Building Product Database) | -                                     |
| A1-A3 Specific data (%)                    | 5.94                                  |

## ENVIRONMENTAL DATA SUMMARY

|                                             |        |
|---------------------------------------------|--------|
| Declared unit                               | 1 kg   |
| Declared unit mass                          | 1 kg   |
| Mass of packaging                           | 0.3 kg |
| GWP-fossil, A1-A3 (kgCO <sub>2</sub> e)     | 7.22   |
| GWP-total, A1-A3 (kgCO <sub>2</sub> e)      | 6.78   |
| Secondary material, inputs (%)              | 8.64   |
| Total energy use, A1-A3 (kWh)               | 32.3   |
| Net freshwater use, A1-A3 (m <sup>3</sup> ) | 0.17   |

# PRODUCT AND MANUFACTURER

## ABOUT THE MANUFACTURER

Melbye As is one of Norway's oldest family-owned companies, with a history dating all the way back to 1907. We have a proud tradition of technical innovation and trade, and today, we are a leading provider of forward-thinking products and system solutions for critical infrastructure. We have expertise in transmission and utilities, fiber, ducts and chambers and safety. We serve customers throughout the Nordic region and the United Kingdom, engage with stakeholders across Europe, and collaborate with around 200 partners and suppliers.

While our headquarters are located just outside Oslo, Norway, we also have offices at multiple locations in Norway, Sweden, and the United Kingdom, as well as representatives in Finland, India and China. Together, we are more than 120 co-workers who share the company's core values: Innovation, teamwork, and professionalism.

With advanced expertise spread across our core areas and a dedication to long-term operation and future-oriented development, we stand at the forefront of addressing future challenges. We take pride in contributing to the development of critical infrastructure that will shape tomorrow's society.

Note: Melbye As is a distributor and not the original manufacturer of the product

## PRODUCT DESCRIPTION

The declared product group comprises insulation piercing connectors (IPCs) designed for making insulated branch connections in low-voltage overhead distribution networks. The connectors establish a secure electrical connection by piercing the insulation of the main and branch conductors without requiring insulation stripping, enabling fast, reliable, and safe installation.

The product family includes variants suitable for aluminum and/or copper conductors. The products are equipped with insulated terminals, shear-head

bolts to ensure correct tightening torque, and open clamping channels for simplified installation. Depending on the variant, the connectors differ in conductor compatibility, branch conductor capacity, and surface protection (bare or tinned), while performing the same fundamental function of providing durable and reliable electrical branch connections in overhead distribution systems.

Key features:

Insulation piercing technology enables fast electrical connections without stripping conductor insulation, reducing installation time.

Shear-head bolt mechanism ensures consistent tightening torque for secure, reliable, and maintenance-free electrical connections.

Further information can be found at:

<https://melbye.com/>

## PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass % | Material origin |
|-----------------------|----------------|-----------------|
| Metals                | 51.8           | France          |
| Minerals              | -              | -               |
| Fossil materials      | 48.2           | France          |
| Bio-based materials   | -              | -               |

## 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 | 0.1445 |

## FUNCTIONAL UNIT AND SERVICE LIFE

|                        |      |
|------------------------|------|
| Declared unit          | 1 kg |
| Mass per declared unit | 1 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             | ND             | x        | ND        | ND          | ND     | ND          | ND            | ND                     | ND                    | x                          | x         | x                | x        | x                            | x         |
| Raw materials | Transport | Manufacturing | Transport      | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/ demolition | Transport | Waste processing | Disposal | Reuse                        | Recycling |

Not declared = ND.

### MANUFACTURING AND PACKAGING (A1-A3)

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

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

The manufacturing stage includes raw material processing, injection molding of glass fiber-reinforced plastic (GFRP) components, and the in-house mechanical assembly and quality control of insulation piercing connectors. All non-molded components are procured as ready-to-use parts and assembled without further material processing. Electricity from the national grid is used as the primary energy source for manufacturing operations. Actual supplier-provided transport distances are applied for all raw materials, packaging materials, and ancillary inputs. Production losses are assumed to be 2% for glass fiber-reinforced plastic and 2% for rubber. All manufacturing activities are carried out at a single production facility. The finished products are packaged in externally sourced corrugated cardboard boxes and wooden pallets. Manufacturing waste, consisting primarily of approximately 2% glass fiber-reinforced plastic and EPDM rubber, is treated through a combination of incineration and landfill. At the end of the product's life, steel components are assumed to undergo 85% recycling and 15% landfill disposal, while copper components are assumed to undergo 60% recycling and 40% landfill disposal. All end-of-life waste is assumed to be transported 50 km by truck to the respective treatment facilities.

## INSTALLATION (A5)

### A5 – Installation Phase

**Material Loss:** There is no material loss during installation, as fuse switch connectors are robust electrical components designed for long-term durability.

**Additional Materials:** Fuse switch connectors are installed directly into the electrical system without requiring additional materials such as adhesives or consumables.

**Installation Method:** Installation is conducted manually using standard hand

tools. An energy consumption of 0.01 kWh/kg is considered a standard assumption for manual installation activities.

### A5 – End-of-Life Waste Management

**Transport to Waste Facility:** The average distance to the recycling or disposal facility is assumed to be 50 km, carried out by a lorry (>32 metric tons, EURO 5 standard).

**Packaging Waste:** Fuse switch connectors are typically packaged using wooden boxes or cardboard. Untreated wood waste is assumed to be incinerated with energy and heat recovery, following the EU waste wood packaging scenario.

**Wood packaging:** 32% recycled 30% incinerated and 38% landfill.

**Cardboard packaging:** 83% recycled, 8% incinerated and 9% landfill.

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

### C1 – Deconstruction / Demolition

100% of the insulation piercing connectors are manually removed at the end of their service life, typically during dismantling or renewal of overhead/underground distribution lines. A standard energy consumption of 0.01 kWh/kg is assumed for manual removal activities, consistent with typical practices for small electrical connectors.

### C2 – Transport to Waste Processing

100% of the removed insulation piercing connectors are transported to waste treatment facilities. The average assumed distances are 250 km to recycling facilities and 50 km to landfill. Transportation is carried out using lorries (16–32 metric tons, EURO 6 standard), reflecting common waste logistics in regions where the product is mainly used.

### C3 – Waste Processing

Insulation piercing connectors contain steel, copper, aluminium, rubber, and polymer components. 85% of the steel, 90% of the aluminium, and 60% of the copper are directed to recycling, involving sorting and preparation for remelting. All recycling processes are assumed to take place within Europe, utilizing the region's established infrastructure for electrical component

end-of-life management.

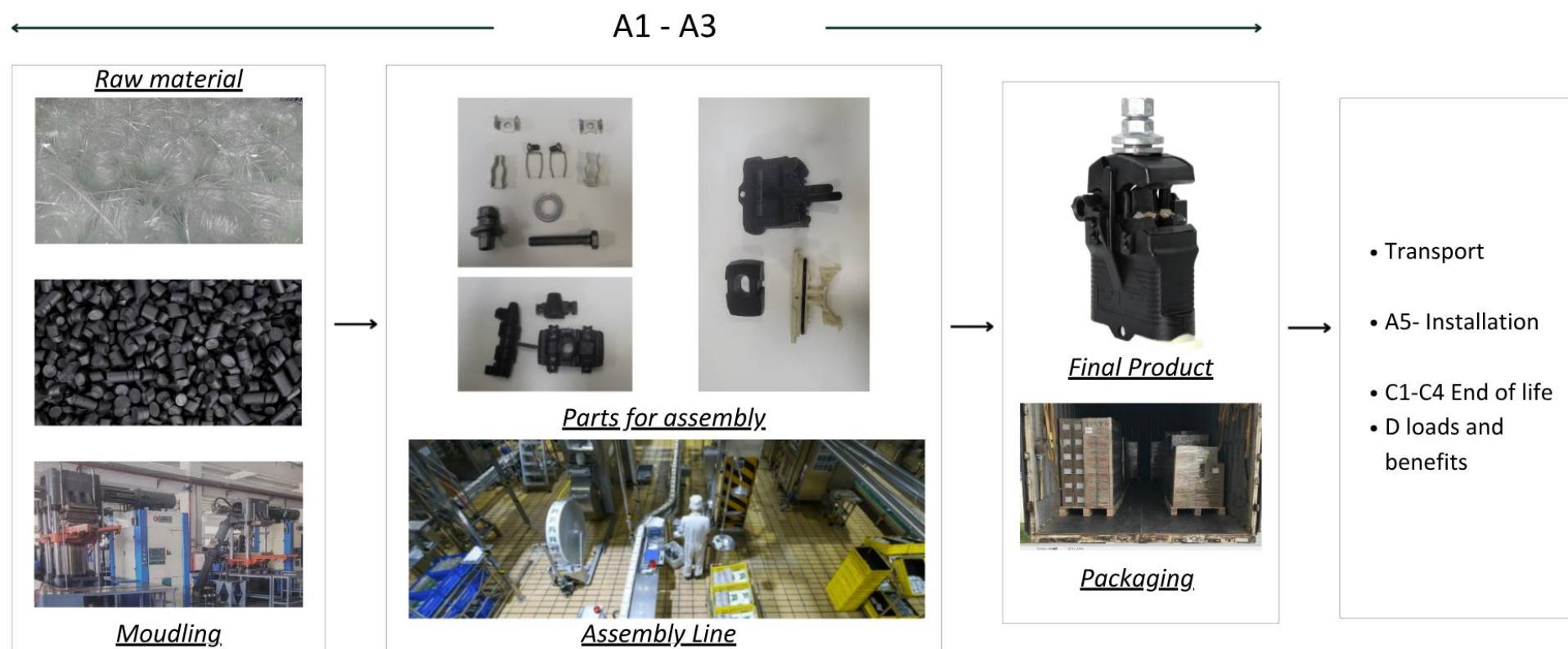
#### C4 – Disposal

100% of the combustible raw materials (Rubber, and other combustible polymer components) are sent to landfill. In addition, 15% of the steel, 10% of the aluminium, and 40% of the copper are assumed to be disposed of in landfill. Environmental impacts from these fractions are modeled based on standard European landfill practices.

#### D – Benefits and Loads Beyond the System Boundary

Metal recycling (steel, aluminium, and copper) generates significant avoided burdens due to substitution of primary metal production. Packaging waste (cardboard cartons and untreated wood pallets) is assumed to be treated at end of life. Cardboard is recycled, while untreated wood is incinerated with energy and heat recovery, credited according to the EU waste packaging scenario.

## LIFE CYCLE FLOW DIAGRAM



## LIFE-CYCLE ASSESSMENT

### CUT-OFF CRITERIA

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

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

### VALIDATION OF DATA

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

### ALLOCATION, ESTIMATES AND ASSUMPTIONS

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

| Data type                      | Allocation          |
|--------------------------------|---------------------|
| Raw materials                  | Physical Properties |
| Packaging material             | Physical Properties |
| Ancillary materials            | Physical Properties |
| Manufacturing energy and waste | Physical Properties |

### PRODUCT & MANUFACTURING SITES GROUPING

|                                      |                                                           |
|--------------------------------------|-----------------------------------------------------------|
| Type of grouping                     | Multiple products                                         |
| Grouping method                      | Based on average results of product group - by total mass |
| Variation in GWP-fossil for A1-A3, % | -2.1% - (-1.7%)                                           |

This EPD is product and factory specific.

### NOTE ON INDICATOR CONSISTENCY

A technical inconsistency between PENRT (total use of non-renewable primary energy) and ADP-fossil (abiotic depletion potential for fossil resources) has been identified in the end-of-life modules (C1–C4). A review of the One Click LCA model and background datasets indicates that the remaining discrepancy originates from the characterization factors and environmental profiles of the background datasets used for end-of-life processes. These inconsistencies are inherent to the third-party verified background databases and cannot be adjusted by the practitioner.

### LCA SOFTWARE AND BIBLIOGRAPHY

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

EN 15804 + A2:2019 – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction

products.

EPD Hub General Programme Instructions (GPI), (2023)

EPD Hub Product Category Rules (PCR): Electrification Components and Systems, Version 1.0 (2023)

Ecoinvent v3.9 (2023) – Life Cycle Inventory database used for background data.

ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and framework.

ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines.

Manufacturer primary data (2023) – Material composition, energy consumption, packaging, transport distances, and waste treatment provided by the manufacturer.

Eurostat (2023) – Recycling and waste management statistics for Norway and Sweden used for end-of-life assumptions.

European Commission JRC (2021) – Electricity and heat mix data for substitution modelling.

# ENVIRONMENTAL IMPACT DATA

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

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

| Impact category                     | Unit                   | A1       | A2       | A3        | A1-A3     | A4 | A5       | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1       | C2       | C3        | C4       | D         |
|-------------------------------------|------------------------|----------|----------|-----------|-----------|----|----------|----|----|----|----|----|----|----|----------|----------|-----------|----------|-----------|
| GWP – total <sup>1)</sup>           | kg CO <sub>2</sub> e   | 6.75E+00 | 3.70E-02 | -6.59E-03 | 6.78E+00  | ND | 5.39E-01 | ND | ND | ND | ND | ND | ND | ND | 3.61E-03 | 1.88E-02 | 1.16E-02  | 3.27E-01 | -1.10E-02 |
| GWP – fossil                        | kg CO <sub>2</sub> e   | 6.67E+00 | 3.70E-02 | 5.18E-01  | 7.22E+00  | ND | 1.38E-02 | ND | ND | ND | ND | ND | ND | ND | 3.60E-03 | 1.87E-02 | 1.16E-02  | 3.27E-01 | -3.48E-02 |
| GWP – biogenic                      | kg CO <sub>2</sub> e   | 5.28E-02 | 5.73E-06 | -5.25E-01 | -4.72E-01 | ND | 5.25E-01 | ND | ND | ND | ND | ND | ND | ND | 3.68E-07 | 4.16E-06 | -2.44E-05 | 1.84E-05 | 2.39E-02  |
| GWP – LULUC                         | kg CO <sub>2</sub> e   | 2.80E-02 | 1.65E-05 | 2.51E-04  | 2.83E-02  | ND | 1.42E-05 | ND | ND | ND | ND | ND | ND | ND | 3.69E-07 | 8.32E-06 | 1.13E-05  | 2.69E-06 | -5.45E-05 |
| Ozone depletion pot.                | kg CFC-11e             | 4.77E-08 | 5.41E-10 | 3.75E-08  | 8.57E-08  | ND | 2.11E-10 | ND | ND | ND | ND | ND | ND | ND | 5.52E-11 | 2.67E-10 | 1.49E-10  | 1.26E-10 | -4.30E-10 |
| Acidification potential             | mol H <sup>+</sup> e   | 4.68E-02 | 1.27E-04 | 2.90E-03  | 4.99E-02  | ND | 8.63E-05 | ND | ND | ND | ND | ND | ND | ND | 3.25E-05 | 6.32E-05 | 1.07E-04  | 6.41E-05 | -2.19E-04 |
| EP-freshwater <sup>2)</sup>         | kg Pe                  | 9.84E-04 | 3.48E-06 | 2.72E-05  | 1.02E-03  | ND | 2.75E-06 | ND | ND | ND | ND | ND | ND | ND | 1.04E-07 | 1.55E-06 | 5.41E-06  | 9.79E-07 | -2.16E-05 |
| EP-marine                           | kg Ne                  | 8.54E-03 | 4.20E-05 | 6.93E-04  | 9.28E-03  | ND | 7.62E-05 | ND | ND | ND | ND | ND | ND | ND | 1.51E-05 | 2.06E-05 | 2.35E-05  | 9.68E-04 | -3.33E-05 |
| EP-terrestrial                      | mol Ne                 | 6.55E-02 | 4.55E-04 | 6.93E-03  | 7.29E-02  | ND | 3.79E-04 | ND | ND | ND | ND | ND | ND | ND | 1.65E-04 | 2.24E-04 | 2.64E-04  | 2.84E-04 | -3.28E-04 |
| POCP (“smog”) <sup>3)</sup>         | kg NMVOCe              | 2.21E-02 | 1.87E-04 | 1.94E-03  | 2.42E-02  | ND | 1.21E-04 | ND | ND | ND | ND | ND | ND | ND | 4.93E-05 | 8.98E-05 | 8.13E-05  | 1.01E-04 | -1.06E-04 |
| ADP-minerals & metals <sup>4)</sup> | kg Sbe                 | 2.45E-05 | 1.05E-07 | 2.13E-06  | 2.67E-05  | ND | 3.47E-08 | ND | ND | ND | ND | ND | ND | ND | 1.29E-09 | 5.84E-08 | 5.87E-07  | 1.97E-08 | -4.45E-08 |
| ADP-fossil resources                | MJ                     | 8.55E+01 | 5.32E-01 | 3.02E+01  | 1.16E+02  | ND | 1.84E-01 | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 2.65E-01 | 1.41E-01  | 8.07E-02 | -5.75E-01 |
| Water use <sup>5)</sup>             | m <sup>3</sup> e depr. | 5.81E+00 | 2.88E-03 | 2.58E+00  | 8.39E+00  | ND | 3.80E-03 | ND | ND | ND | ND | ND | ND | ND | 1.18E-04 | 1.30E-03 | 2.04E-03  | 1.39E-02 | -1.11E-02 |

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, EF 3.1

| Impact category                  | Unit          | A1       | A2       | A3       | A1-A3    | A4 | A5       | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1       | C2       | C3       | C4       | D         |
|----------------------------------|---------------|----------|----------|----------|----------|----|----------|----|----|----|----|----|----|----|----------|----------|----------|----------|-----------|
| Particulate matter               | Incidence     | 5.48E-07 | 3.66E-09 | 1.87E-08 | 5.71E-07 | ND | 1.85E-09 | ND | ND | ND | ND | ND | ND | ND | 9.25E-10 | 1.62E-09 | 1.46E-09 | 9.09E-10 | -1.85E-09 |
| Ionizing radiation <sup>6)</sup> | kBq<br>11235e | 2.74E-01 | 4.54E-04 | 1.20E+00 | 1.48E+00 | ND | 4.32E-04 | ND | ND | ND | ND | ND | ND | ND | 2.09E-05 | 2.19E-04 | 6.69E-04 | 9.77E-05 | -1.11E-02 |
| Ecotoxicity (freshwater)         | CTUe          | 5.82E+01 | 9.39E-02 | 9.04E+00 | 6.74E+01 | ND | 1.20E-01 | ND | ND | ND | ND | ND | ND | ND | 2.60E-03 | 4.32E-02 | 6.76E-02 | 1.35E+02 | -6.85E-02 |
| Human toxicity, cancer           | CTUh          | 9.20E-09 | 5.94E-12 | 4.95E-10 | 9.71E-09 | ND | 5.73E-12 | ND | ND | ND | ND | ND | ND | ND | 3.71E-13 | 3.13E-12 | 7.99E-12 | 4.07E-12 | -7.24E-12 |
| Human tox. non-cancer            | CTUh          | 2.25E-07 | 3.37E-10 | 3.61E-09 | 2.28E-07 | ND | 2.98E-10 | ND | ND | ND | ND | ND | ND | ND | 5.87E-12 | 1.67E-10 | 5.10E-10 | 2.74E-10 | -2.94E-10 |
| SQP <sup>7)</sup>                | -             | 4.32E+02 | 5.33E-01 | 1.16E+01 | 4.44E+02 | ND | 1.27E-01 | ND | ND | ND | ND | ND | ND | ND | 3.30E-03 | 1.98E-01 | 2.21E-01 | 2.82E-01 | -2.07E-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             | 1.36E+01 | 7.34E-03 | 9.63E-01  | 1.46E+01 | ND | -4.39E+00 | ND | ND | ND | ND | ND | ND | ND | 2.99E-04 | 3.65E-03 | 1.95E-02 | 2.20E-03  | 6.80E-01  |
| Renew. PER as material             | MJ             | 0.00E+00 | 0.00E+00 | 3.07E+00  | 3.07E+00 | ND | -3.07E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 2.12E-01  |
| Total use of renew. PER            | MJ             | 1.36E+01 | 7.34E-03 | 4.04E+00  | 1.76E+01 | ND | -7.46E+00 | ND | ND | ND | ND | ND | ND | ND | 2.99E-04 | 3.65E-03 | 1.95E-02 | 2.20E-03  | 8.92E-01  |
| Non-re. PER as energy              | MJ             | 7.14E+01 | 5.32E-01 | 2.99E+01  | 1.02E+02 | ND | 1.84E-01  | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 2.65E-01 | 1.39E-01 | -1.64E+01 | -5.75E-01 |
| Non-re. PER as material            | MJ             | 1.64E+01 | 0.00E+00 | -4.29E-02 | 1.64E+01 | ND | 0.00E+00  | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | -1.64E+01 | 6.70E-02  |
| Total use of non-re. PER           | MJ             | 8.78E+01 | 5.32E-01 | 2.98E+01  | 1.18E+02 | ND | 1.84E-01  | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 2.65E-01 | 1.39E-01 | -3.27E+01 | -5.08E-01 |
| Secondary materials                | kg             | 8.64E-02 | 2.24E-04 | 3.96E-02  | 1.26E-01 | ND | 1.25E-04  | ND | ND | ND | ND | ND | ND | ND | 1.96E-05 | 1.17E-04 | 1.40E-04 | 5.50E-05  | -7.36E-05 |
| Renew. secondary fuels             | MJ             | 2.56E-03 | 2.89E-06 | 4.53E-06  | 2.57E-03 | ND | 1.01E-06  | ND | ND | ND | ND | ND | ND | ND | 5.12E-08 | 1.49E-06 | 6.24E-06 | 1.40E-06  | -4.95E-07 |
| Non-ren. secondary fuels           | MJ             | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | ND | 0.00E+00  | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00  |
| Use of net fresh water             | m <sup>3</sup> | 1.35E-01 | 7.74E-05 | 3.09E-02  | 1.66E-01 | ND | -3.22E-04 | ND | ND | ND | ND | ND | ND | ND | 3.12E-06 | 3.65E-05 | 5.66E-05 | 2.04E-04  | -4.33E-04 |

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   | 9.07E-01 | 2.23E-03 | 1.82E-02 | 9.27E-01 | ND | 1.09E-03 | ND | ND | ND | ND | ND | ND | ND | 5.25E-05 | 6.60E-04 | 8.50E-04 | 5.97E-03 | -2.49E-03 |
| Non-hazardous waste | kg   | 9.09E+00 | 4.35E-02 | 2.12E+00 | 1.12E+01 | ND | 5.85E-01 | ND | ND | ND | ND | ND | ND | ND | 7.15E-04 | 1.26E-02 | 2.63E-02 | 5.98E-01 | -1.10E-01 |
| Radioactive waste   | kg   | 9.34E-05 | 1.10E-07 | 4.81E-04 | 5.75E-04 | ND | 1.08E-07 | ND | ND | ND | ND | ND | ND | ND | 5.12E-09 | 5.35E-08 | 1.69E-07 | 2.44E-08 | -2.85E-06 |

## 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 | ND | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for recycling       | kg   | 0.00E+00 | 0.00E+00 | 1.50E+00 | 1.50E+00 | ND | 1.17E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 3.66E-01 | 0.00E+00 | 0.00E+00 |
| Materials for energy rec      | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 1.00E-03 | 0.00E+00 | 0.00E+00 |
| Exported energy               | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | 4.17E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy – Electricity | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | 1.77E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy – Heat        | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | 2.40E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

## ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

| 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               | 6.67E+00 | 3.68E-02 | 5.08E-01 | 7.21E+00 | ND | 2.37E-02 | ND | ND | ND | ND | ND | ND | ND | 3.59E-03 | 1.86E-02 | 1.15E-02 | 3.23E-01 | -3.47E-02 |
| Ozone depletion Pot. | kg CFC <sub>11</sub> e             | 4.33E-08 | 4.32E-10 | 3.05E-08 | 7.43E-08 | ND | 1.70E-10 | ND | ND | ND | ND | ND | ND | ND | 4.37E-11 | 2.13E-10 | 1.22E-10 | 1.10E-10 | -3.58E-10 |
| Acidification        | kg SO <sub>2</sub> e               | 3.99E-02 | 9.73E-05 | 2.34E-03 | 4.23E-02 | ND | 6.29E-05 | ND | ND | ND | ND | ND | ND | ND | 2.29E-05 | 4.83E-05 | 8.60E-05 | 4.67E-05 | -1.86E-04 |
| Eutrophication       | kg PO <sub>4</sub> <sup>3</sup> e  | 4.76E-03 | 2.51E-05 | 2.97E-03 | 7.75E-03 | ND | 2.55E-05 | ND | ND | ND | ND | ND | ND | ND | 5.34E-06 | 1.20E-05 | 1.22E-05 | 4.26E-05 | -1.95E-05 |
| POCP (“smog”)        | kg C <sub>2</sub> H <sub>4</sub> e | 2.23E-03 | 8.56E-06 | 1.24E-04 | 2.36E-03 | ND | 7.18E-06 | ND | ND | ND | ND | ND | ND | ND | 1.71E-06 | 4.30E-06 | 5.18E-06 | 1.59E-05 | -1.05E-05 |
| ADP-elements         | kg Sbe                             | 1.76E-05 | 1.02E-07 | 2.12E-06 | 1.98E-05 | ND | 3.36E-08 | ND | ND | ND | ND | ND | ND | ND | 1.26E-09 | 5.70E-08 | 5.86E-07 | 1.33E-08 | -4.40E-08 |

| Impact category | Unit | A1       | A2       | A3       | A1-A3    | A4 | A5       | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1       | C2       | C3       | C4       | D         |
|-----------------|------|----------|----------|----------|----------|----|----------|----|----|----|----|----|----|----|----------|----------|----------|----------|-----------|
| ADP-fossil      | MJ   | 7.90E+01 | 5.25E-01 | 3.02E+01 | 1.10E+02 | ND | 1.76E-01 | ND | ND | ND | ND | ND | ND | ND | 4.68E-02 | 2.62E-01 | 1.30E-01 | 7.92E-02 | -3.79E-01 |

### ADDITIONAL INDICATOR – GWP-GHG

| Impact category       | Unit                 | A1       | A2       | A3       | A1-A3    | A4 | A5       | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1       | C2       | C3       | C4       | D         |
|-----------------------|----------------------|----------|----------|----------|----------|----|----------|----|----|----|----|----|----|----|----------|----------|----------|----------|-----------|
| GWP-GHG <sup>9)</sup> | kg CO <sub>2</sub> e | 6.70E+00 | 3.70E-02 | 5.18E-01 | 7.25E+00 | ND | 1.38E-02 | ND | ND | ND | ND | ND | ND | ND | 3.61E-03 | 1.87E-02 | 1.16E-02 | 3.27E-01 | -3.49E-02 |

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH<sub>4</sub> fossil, CH<sub>4</sub> biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO<sub>2</sub> is set to zero

## SCENARIO DOCUMENTATION

### DATA SOURCES

#### Manufacturing energy scenario documentation

1. Electricity, France, residual mix, 2022, France, One Click LCA, 0.20 kgCO<sub>2</sub>e/kWh

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

| Scenario parameter                       | Value                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Energy: type and consumption (MJ or kWh) | -                                                                                                                                                                                                                                                                                                                                       |
| Water use (m <sup>3</sup> )              | -                                                                                                                                                                                                                                                                                                                                       |
| Ancillary materials: type and mass (kg)  | -                                                                                                                                                                                                                                                                                                                                       |
| Waste materials: type and mass (kg)      | Installation-related waste is limited to packaging materials only. No product material waste is generated during installation. The packaging waste per unit consists of approximately 0.045 kg of cardboard (box) and 0.25 kg of wood (pallet). These values represent typical packaging quantities under standard delivery conditions. |
| Waste materials: output routes           |                                                                                                                                                                                                                                                                                                                                         |
| Direct emissions (kg)                    |                                                                                                                                                                                                                                                                                                                                         |

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

| Scenario information                                        | Value |
|-------------------------------------------------------------|-------|
| Collection process: collected separately (kg)               |       |
| Collection process: Mixed waste (kg)                        |       |
| Recovery: re-use (kg)                                       | 0     |
| Recovery: recycling (kg)                                    | 0.37  |
| Recovery: energy recovery (kg)                              | 0     |
| Disposal (kg)                                               | 0     |
| Scenario assumptions e.g. transportation (mode, km) & other |       |

## THIRD-PARTY VERIFICATION STATEMENT

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

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

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

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

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

### Verified tools

Tool verifier: Magaly Gonzalez Vazquez

Tool verification validity: 27 March 2025 - 26 March 2028

Afzal khan Peerukhan as an authorized verifier for EPD Hub Limited 30.07.2026

