

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Steel Tactile Indicators
Smart Tactiles AS



EPD HUB, HUB-7999
Published on 30.10.2026, last updated on 30.10.2026, valid until 29.10.2031

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

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Smart Tactiles AS
Address	Grenseveien 99, 0663 Oslo, Norway
Contact details	info@smarttactiles.com
Website	www.smarttactiles.com

This EPD is intended for business-to-business 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.

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
c-PCR	-
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Christopher Dahl, Smart Tactiles AS
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Vera Durão, as an authorised verifier acting for EPD Hub Limited

PRODUCT

Product name	Steel Tactile Indicators
Additional labels	N/A
Product reference	Smart Tactiles
Place(s) of raw material origin	China
Place of production	Province of Zhejiang, China
Place(s) of installation and use	Norway, Sweden, Denmark, Finland, Iceland and beyond
Place(s) of end-of-life	Europe
Period for data	01/01/2025 - 31/12/2025
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	44,1

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of steel tactile indicators
Declared unit mass	1 kg
Mass of packaging	0,093146 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	8,88
GWP-total, A1-A3 ($kgCO_2e$)	8,94
Secondary material, inputs (%)	77,7
Total energy use, A1-A3 (kWh)	31,6
Net freshwater use, A1-A3 (m^3)	0,07

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Smart Tactiles AS is a Norwegian distributor specializing in tactile indicators and universal design products which enhance accessibility for blind and visually impaired people.

Our tactile systems in steel are engineered for durability, strong adhesion and long service life, complying with ISO 23599:2019, EN 17210:2021, CEN/TR 17621:2021, BS 8300-2:2018, AS/NZS 1428.4.1:2021, JIS T 9251:2022, NS11001, NS11005 and TEK17 standards for safe and inclusive navigation in public and private spaces.

In addition to indicators in steel, we provide tactile indicators in other metals as well as composite, tiles and signage and stair nosing - all designed to improve orientation, safety and visual contrast. This also includes outdoor tactile products.

Smart Tactiles AS integrates sustainability and transparency across its operations, documenting environmental performance through Environmental Product Declarations (EPDs) and prioritising recyclable materials and low-waste production.

Through technical innovation and collaboration with architects and contractors, we contribute to safer, more inclusive and universally designed environments across Scandinavia and beyond.

PRODUCT DESCRIPTION

Product Description
Smart Tactiles tactile indicators in steel are surface-mounted guidance- and warning elements designed to provide orientation and safety for blind and visually impaired users.

The product meet international standards being ISO 23599, ISO 21542 and EN 17210 as well as Norwegian standards NS11001 and NS11005.

The indicators are made of steel combining high mechanical strength and excellent wear resistance. Each tactile unit is delivered with a pre-applied 3M VHB5952 strong adhesive for fast and durable installations on most indoor- and several outdoor surfaces. Alternatively the products may be supplied with studs.

Product Application
Tactile indicators in steel are used as part of universal design and accessibility solutions in public and private buildings, transport terminals, stations and outdoor walkways.

They are applied to mark guiding lines, warning fields and decision points to assist navigation for people with visual impairments. Typical applications include entrances, stairways, ramps, platform edges, receptions and circulation areas.

The system can be installed on concrete, ceramic, vinyl, wood or stone surfaces and is suitable for both new construction and retrofit projects.

Technical Characteristics / Property Description:

- Material: Steel
- Dimensions/weight per individual indicator: Stud Ø32mm/17gr, Rib-13 cm/84gr, Rib 28 cm/188gr
- Thickness: 3,7 mm
- Colour: Steel
- Adhesive: 3M VHB5952 high-bond acrylic adhesive tape
- Surface finish: Anti-slip textured on smooth matt finish
- Temperature resistance: −40 °C to +80 °C

- UV resistance: High (tested for outdoor use)
- Slip resistance: R10-11 (DIN 51130) depending on surface type
- Expected service life: > 10 years under normal conditions
- Maintenance: Periodic cleaning with neutral detergent; no repainting required
- End-of-life: Normally melted and recycled used as secondary raw material
- REACH materials: The indicators are REACH compliant and contains no SVHCs.

Further information can be found at:
www.smarttactiles.com

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	94	China
Minerals	-	-
Fossil materials	6	China
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	0,002095

1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of steel tactile indicators
Mass per declared unit	1 kg
Functional unit	N/A
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	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND

MANUFACTURING AND PACKAGING (A1-A3)

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

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

A1 – Raw material supply
The tactile indicators are made of stainless-steel grade AISI 316, an iron alloy containing approximately 16–18% chromium, 10–14% nickel and 2–3% molybdenum. The molybdenum content provides improved resistance to chloride-induced corrosion. A 3M VHB 5952 double-sided adhesive tape is applied to the underside of the products.

A2 – Transport to manufacturer
The steel and the adhesive tape are both sourced from suppliers in China and transported by lorry to the factory, approximately 120 km and 20 km respectively.

A3 – Manufacturing and packaging in China
The studs and ribs are given their final shape and surface finish by CNC machining, after which the adhesive tape is applied. The finished products undergo final inspection and are packed [two per bag] in thin polyethylene (PE) bags. The bags are placed in corrugated cardboard boxes with polystyrene foam and stacked on wooden pallets.

Energy use at the factory consists of electricity for machinery and lighting. The factory is not heated. Electricity is supplied from the local grid and modelled using a market-based approach.

Transport to warehouse- A3
The packed products are transported approximately 450 km by lorry to the port of Shanghai, 19,800 km by container ship to Oslo, and 10 km by lorry from the port to our warehouse.

A3 – Warehouse operations in Oslo
On arrival, the wooden pallets, polystyrene foam and cardboard boxes are removed and transported approximately 5 km by lorry to waste treatment facilities in Norway. Cardboard and wood are treated according to an average EoL scenario from Eurostat, and polystyrene foam according to average EU scenario and statistics from Eurostat. The products are repacked in new cardboard boxes, keeping the original PE bags, and stored on shelves until sold.

The warehouse uses electricity for both heating and lighting. This is modelled using a market-based approach with the Norwegian residual mix.

The production stage includes the warehouse in Oslo, as the EPD is modelled following a two step approach, where both the Chinese factory and warehouse in Oslo are included in A3.

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

Customer orders whether from across the Nordic region (Norway, Sweden, Denmark, Finland and Iceland) or directly from construction projects are fulfilled by repacking materials into smaller quantities using corrugated cardboard boxes and then shipped to the respective sites.

In addition to deliveries, orders are often picked up directly by end-customers at our warehouse.

Our warehouse maintains a large inventory of materials to ensure availability at all times. Approximately one-third of all orders are shipped via local transportation companies, another third is delivered by our own fleet within the local area and the remaining third are collected directly from the warehouse by customers.

We have calculated that on average the transportation distance for an order is 78,5 km. Most deliveries are made using electric vehicles, aligning with our sustainability goals. The transportation process does not result in any material losses.

There are no installation losses during the installation in A5. The waste in A5 is mainly packaging materials that is sent to clients with the product. The waste processing plant site is assumed to be located approximately 50 km away from the installation site.

The plastic packaging is treated based on the scenario from Eurostat where 40% is recycled, 37% is incinerated with energy recovery and 23% is landfilled. The cardboard packaging is also treated according to an average scenario for cardboard packaging from Eurostat where 83% is recycled, 8% is incinerated with energy recovery and 9% is landfilled. The fuel efficiency of the power plant is 38%, of which electricity accounts for 16% and heat for 22%.

PRODUCT END OF LIFE (C1-C4, D)

In Module C1 (deconstruction), the stainless steel tactile indicators are assumed to be removed manually or with minimal mechanical support.

In Module C2 (transport), the dismantled tactile indicators are assumed to be transported to a local waste collection or recycling facility by lorry over a distance of 50 km.

In Module C3 (waste processing), the main product material is AISI 316 stainless steel. Stainless steel is technically 100% recyclable and has an established recycling infrastructure and economic value as secondary raw material.

As the end-of-life treatment of the tactile indicators is assumed to take place in Norway, a geographically representative and conservative end-of-life scenario is applied. Based on World Steel Association statistics for steel products 2020, 85 % of the stainless steel is assumed to be collected and processed for recycling.

The adhesive tape is treated separately from the stainless steel fraction. In the absence of specific recycling data for the adhesive material, the tape is conservatively assumed to be 100% landfilled.

In Module C4 (disposal), the remaining 15% of the stainless steel that is not recovered for recycling is assumed to be landfilled. The adhesive fraction is also assumed to be landfilled.

The end-of-life treatment is assumed to take place in Norway, and the applied scenario is intended to represent Norwegian waste management conditions.

Module D – Benefits and Loads Beyond the System Boundary
Module D accounts for potential benefits and loads beyond the product system boundary associated with material recovery and recycling.

At the end of the product's service life, 85% of the AISI 316 stainless steel is assumed to be collected and processed for recycling, while the remaining 15% is assumed to be landfilled in accordance with the applied end-of-life scenario.

Recovered AISI 316 stainless steel is treated as secondary metallic raw material and may substitute primary material in the production of new stainless steel or be used as an alloying input in other steel production.

The recycling processes generate environmental loads associated with collection, sorting and processing of the recovered stainless steel. Potential environmental benefits arise from the substitution of primary material production by recovered secondary material.

The AISI 316 stainless steel entering the product system contains approximately 65% recycled content according to information provided by the manufacturer. The recycled material entering the system and the recyclable material leaving the system are accounted for in accordance with the applicable PCR, EN 15804+A2 and EPD programme rules in order to avoid double counting of recycling benefits.

No recycling benefits are accounted for for the stainless steel fraction assumed to be landfilled.

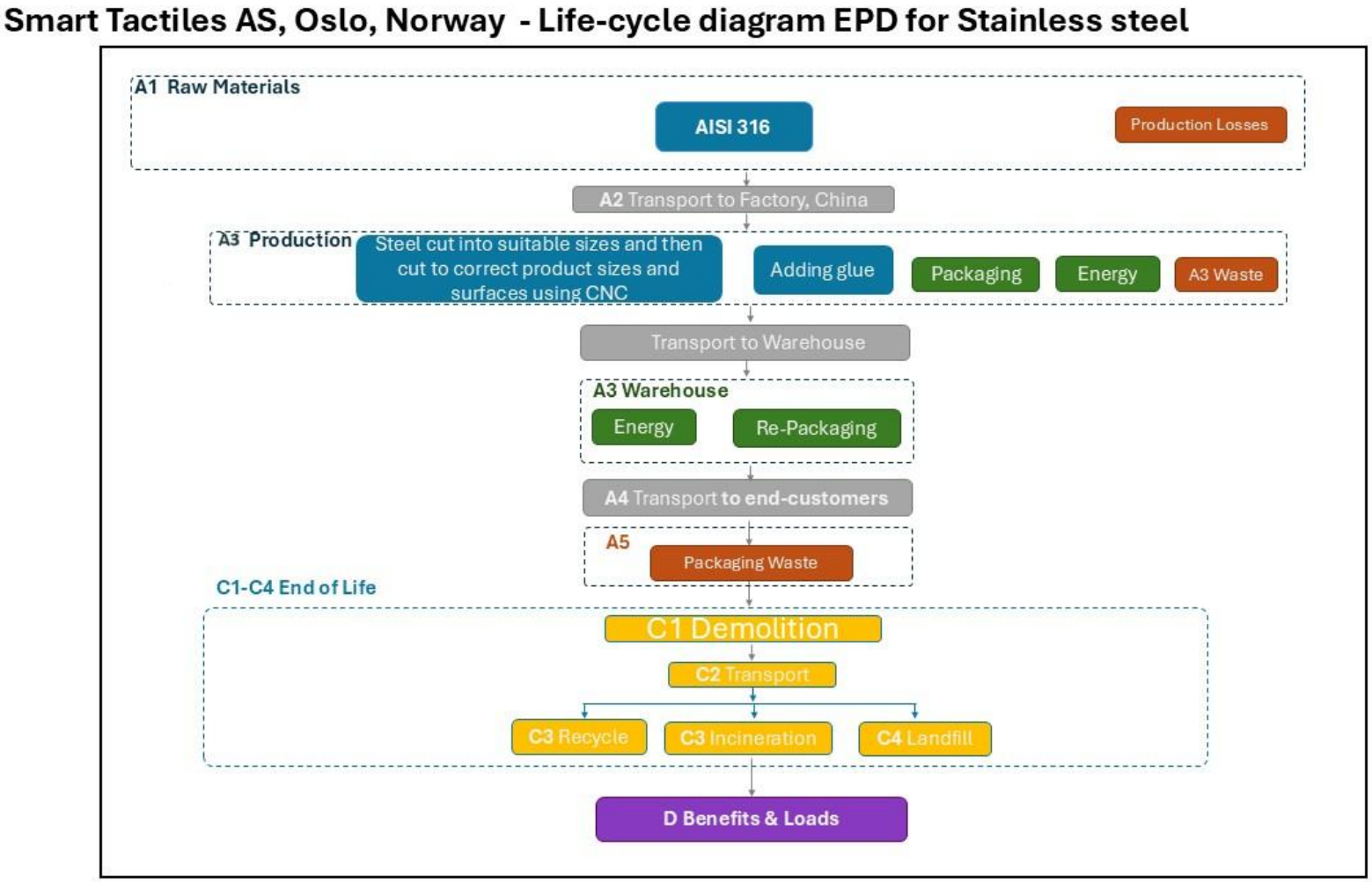
Module D also includes relevant benefits and loads associated with the end-of-life treatment of packaging materials. For cardboard and plastic packaging, benefits from material recycling and, where applicable, energy recovery through incineration are included according to the selected end-of-life scenarios.

Loads associated with recycling processes are included, while benefits represent the avoided production of equivalent primary materials. For packaging materials subject to incineration with energy recovery, benefits from substituted energy production are also included.

Where packaging materials are incinerated, the incineration process is assumed to have a total energy efficiency of 38%, of which 16% is allocated to electricity generation and 22% to heat generation.

Transfers of renewable and non-renewable energy contained in the materials are accounted for in accordance with the applied LCA methodology.

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.

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. All industrial processes from raw material acquisition and pre-processing, production, product distribution and installation, use and end-of-life management are included. 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. 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.

VALIDATION OF DATA

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

ALLOCATION, ESTIMATES AND ASSUMPTIONS

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

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

All estimations and assumptions regarding the cut off criteria and the allocation are declared in the part "Cut-off Criteria except the estimations/assumptions below:

- Module A1: Proxy data is used for certain materials during their absence from the database such as datapoint for double-sided tape.
- Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small, the variety in load is assumed to be negligible. Empty returns are included as an average load factor in the ecoinvent database. Transport distances for waste transportation at EOL were assumed to be within 50 km radius
- Module A4: Transportation does not cause losses as products are packaged properly. Also, volume capacity utilization factor is assumed to be 1 for the nested packaged products. Additionally, transportation distances are assumed based on an average of deliveries locally, regionally, nationally and in the Nordics minus pick-up orders from our warehouse in Oslo. We have calculated that on average the transportation distance for an order is 78,5 km.

For modelling of this EPD a two-step production process has been assumed, both the Chinese factory and the warehouse in Norway is assumed to be part of A3.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

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‘.

End-of-life scenario for the main product is based on statistics from World Steel Association 2020. It is assumed that 85% of the stainless steel is sent for recycling and 15% is sent to landfill.

This is considered a conservative and geographically representative end-of-life scenario, as the end-of-life treatment of the tactile indicators is assumed to take place in Norway.

Average EU scenarios for cardboard and plastic packaging treatment are based on Eurostat statistics for packaging waste and waste treatment. Protective foam used for the tactile studs is modelled according to the applicable European waste-treatment scenario for the relevant plastic material.

References:

World Steel Association 2020
Eurostat – Packaging waste by waste management operations. Used for European average treatment scenarios for cardboard and plastic packaging.

ENVIRONMENTAL IMPACT DATA

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

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	4,31E+00	3,20E-02	4,59E+00	8,94E+00	1,81E-01	1,02E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,39E-03	1,78E-02	1,43E-03	-4,16E-01
GWP – fossil	kg CO_2e	4,25E+00	3,20E-02	4,60E+00	8,88E+00	1,81E-01	9,78E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,39E-03	1,80E-02	1,43E-03	-4,16E-01
GWP – biogenic	kg CO_2e	5,63E-02	7,11E-06	-6,25E-03	5,00E-02	8,74E-05	4,33E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,22E-06	-2,60E-04	2,86E-06	-1,85E-04
GWP – LULUC	kg CO_2e	4,13E-03	1,39E-05	2,47E-03	6,62E-03	1,02E-04	3,79E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,41E-06	2,23E-05	6,45E-07	-1,35E-04
Ozone depletion pot.	kg CFC-$_{11}$e	5,93E-08	4,63E-10	5,68E-08	1,17E-07	2,71E-09	5,17E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,95E-11	2,40E-10	4,30E-11	-4,74E-09
Acidification potential	mol H^+e	1,94E-02	7,26E-05	2,95E-02	4,89E-02	8,49E-04	2,55E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,84E-05	2,15E-04	1,23E-05	-1,69E-03
EP-freshwater[2)]	kg Pe	2,50E-03	2,47E-06	9,30E-04	3,44E-03	2,41E-05	8,38E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,29E-07	1,20E-05	1,02E-06	-2,58E-04
EP-marine	kg Ne	4,34E-03	1,66E-05	5,75E-03	1,01E-02	2,74E-04	1,98E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,05E-06	4,78E-05	3,91E-06	-3,53E-04
EP-terrestrial	mol Ne	4,00E-02	1,80E-04	6,06E-02	1,01E-01	3,01E-03	1,05E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,58E-05	5,40E-04	4,25E-05	-3,81E-03
POCP ("smog")[3)]	kg NMVOCe	1,37E-02	9,93E-05	2,20E-02	3,58E-02	1,16E-03	3,10E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,71E-05	1,60E-04	1,54E-05	-1,54E-03
ADP-minerals & metals[4)]	kg Sbe	4,82E-05	1,04E-07	1,35E-05	6,18E-05	1,44E-06	2,74E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,51E-08	1,28E-06	2,27E-09	-4,03E-06
ADP-fossil resources	MJ	5,26E+01	4,42E-01	6,26E+01	1,16E+02	2,49E+00	4,43E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,82E-02	2,44E-01	3,46E-02	-5,70E+00
Water use[5)]	m^3e depr.	2,10E+00	1,97E-03	2,13E+01	2,34E+01	1,63E-02	3,00E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,90E-04	4,75E-03	1,56E-03	-9,87E-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 PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	3,25E-07	2,06E-09	1,62E-07	4,89E-07	1,79E-08	3,03E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,39E-10	2,94E-09	2,36E-10	-2,64E-08
Ionizing radiation[6)]	kBq U235e	3,67E-01	3,64E-04	1,38E-01	5,06E-01	4,46E-03	1,96E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,79E-05	2,10E-03	2,93E-05	-3,11E-03
Ecotoxicity (freshwater)	CTUe	3,46E+01	7,60E-02	3,87E+01	7,33E+01	4,26E-01	6,01E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E-02	1,19E+00	7,06E-01	-1,45E+01
Human toxicity, cancer	CTUh	3,39E-09	4,96E-12	1,93E-09	5,33E-09	2,08E-10	5,64E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,87E-13	1,60E-11	3,81E-13	-6,68E-11
Human tox. non-cancer	CTUh	1,02E-07	2,59E-10	2,87E-08	1,31E-07	1,56E-09	2,17E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,05E-11	1,10E-09	1,74E-11	-2,97E-09
SQP[7)]	-	1,93E+01	2,31E-01	2,79E+01	4,74E+01	1,02E+00	5,23E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,87E-02	4,67E-01	7,45E-02	-1,36E+00

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

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	8,54E+00	6,39E-03	9,14E-01	9,46E+00	6,70E-02	-2,42E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,07E-03	4,46E-02	4,51E-04	-4,14E-01
Renew. PER as material	MJ	4,45E-01	0,00E+00	1,97E-01	6,42E-01	0,00E+00	-1,98E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	-4,45E-01	1,70E-03
Total use of renew. PER	MJ	8,98E+00	6,39E-03	1,11E+00	1,01E+01	6,70E-02	-4,40E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,07E-03	4,46E-02	-4,44E-01	-4,12E-01
Non-re. PER as energy	MJ	5,20E+01	4,42E-01	5,18E+01	1,04E+02	2,49E+00	-3,10E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,82E-02	2,44E-01	3,46E-02	-5,70E+00
Non-re. PER as material	MJ	5,55E-01	0,00E+00	3,30E+00	3,86E+00	0,00E+00	-3,30E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	-5,55E-01	1,32E+00
Total use of non-re. PER	MJ	5,26E+01	4,42E-01	5,51E+01	1,08E+02	2,49E+00	-6,40E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,82E-02	2,44E-01	-5,20E-01	-4,38E+00
Secondary materials	kg	7,77E-01	1,89E-04	4,37E-02	8,21E-01	1,38E-03	1,32E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,32E-05	2,96E-04	9,53E-06	2,08E-01
Renew. secondary fuels	MJ	3,45E-03	2,27E-06	3,61E-02	3,96E-02	1,19E-05	1,04E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,23E-07	1,38E-05	1,91E-07	-2,92E-05
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,22E-02	5,75E-05	4,51E-02	6,74E-02	4,40E-04	-4,03E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,15E-05	1,09E-04	-1,32E-04	-2,02E-03

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	6,34E+00	7,58E-04	2,09E-01	6,55E+00	6,32E-03	1,17E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,53E-04	1,61E-03	4,51E-05	-1,09E-01
Non-hazardous waste	kg	3,13E+01	1,46E-02	5,59E+00	3,69E+01	1,32E-01	1,39E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,87E-03	6,32E-02	1,83E-01	-2,00E+00
Radioactive waste	kg	9,95E-05	8,90E-08	3,11E-05	1,31E-04	1,11E-06	4,98E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,66E-08	5,35E-07	7,08E-09	-7,77E-07

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	2,60E-03	0,00E+00	8,11E-02	8,37E-02	0,00E+00	4,39E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	8,02E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	7,77E-02	0,00E+00	7,36E-01	8,13E-01	0,00E+00	4,70E-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	3,09E-01	3,09E-01	0,00E+00	1,98E-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	4,26E-01	4,26E-01	0,00E+00	2,72E-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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Radioactive waste, high	kg	2,47E-05	2,70E-08	6,58E-06	3,13E-05	3,09E-07	1,21E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,87E-09	1,28E-07	1,83E-09	-4,36E-07
Radioactive waste, int/low	kg	6,72E-05	6,21E-08	2,42E-05	9,15E-05	8,05E-07	3,77E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,17E-08	4,07E-07	5,26E-09	-3,41E-07

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_2e	4,27E+00	3,18E-02	4,58E+00	8,88E+00	1,80E-01	9,92E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,36E-03	1,80E-02	1,42E-03	-4,13E-01
Ozone depletion Pot.	kg $CFC_{-11}e$	5,09E-08	3,69E-10	4,70E-08	9,83E-08	2,16E-09	4,25E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,35E-11	2,07E-10	3,43E-11	-4,18E-09
Acidification	kg SO_2e	1,59E-02	5,86E-05	2,44E-02	4,04E-02	6,49E-04	1,88E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,41E-05	1,73E-04	9,52E-06	-1,38E-03
Eutrophication	kg PO_4^3e	4,03E-03	1,31E-05	8,23E-03	1,23E-02	2,03E-04	7,92E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,45E-06	2,54E-05	2,87E-06	-3,45E-04
POCP (“smog”)	kg C_2H_4e	1,28E-03	5,53E-06	2,50E-03	3,79E-03	8,48E-05	2,22E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,25E-06	1,02E-05	7,54E-07	-1,97E-04
ADP-elements	kg Sbe	4,77E-05	1,01E-07	1,33E-05	6,11E-05	1,43E-06	2,65E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,47E-08	1,27E-06	2,20E-09	-4,02E-06
ADP-fossil	MJ	4,65E+01	4,37E-01	6,08E+01	1,08E+02	2,42E+00	4,10E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,71E-02	2,07E-01	3,41E-02	-5,67E+00

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	4,26E+00	3,20E-02	4,60E+00	8,89E+00	1,81E-01	9,78E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,39E-03	1,81E-02	1,43E-03	-4,16E-01

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

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity, medium voltage, residual mix, Norway, Ecoinvent, 0.73 kgCO2e/kWh
2. Electricity, consumption mix w/o renewables, China, 2023, China, One Click LCA, 1.15 kgCO2e/kWh

Transport scenario documentation - A4 (Transport resources)

1. Transport, freight, light commercial vehicle, 78.5 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	50
Bulk density of transported products	90,4
Volume capacity utilization factor	1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	N/A
Water use (m^3)	N/A
Ancillary materials: type and mass (kg)	N/A
Waste materials: type and mass (kg)	Cardboard: 0.01542 kg Plastic: 0.077726 kg
Waste materials: output routes	% are for recycling, incinerated w. energy recovery, landfill respectively. Cardboard: 83%, 8%, 9% Plastic: 40%, 37%, 23%
Direct emissions (kg)	N/A

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	Steel indicators 1 kg
Collection process: Mixed waste (kg)	0
Recovery: re-use (kg)	0
Recovery: recycling (kg)	0,85
Recovery: energy recovery (kg)	0
Disposal (kg)	0,15
Scenario assumptions e.g. transportation (mode, km) & other	50 km transport by truck to local recycling station / landfill

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

Vera Durão, as an authorised verifier acting for EPD Hub Limited

30.10.2026



VERIFIED ISO 14025