ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Shackle 75
Melbye As

EPD HUB, HUB- 3664
Publishing date 18 July 2025, last updated on 18 July 2025, valid until 17 July 2030.

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.1 (5 Dec 2023) and JRC characterization factors EF 3.1.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Melbye As
Address	Prost Stabels Vei 22, 2019 Skedsmokorset, Norway
Contact details	kontakt@melbye.no
Website	https://melbye.com/

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 1.1, 5 Dec 2023
Sector	Electrical product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, B6, and modules C1-C4, D
EPD author	Aditya Dharmendra Nishad
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Magaly González Vázquez, as an authorized verifier acting for EPD Hub Limited

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	Shackle 75
Additional labels	See appendix
Product reference	Shackle 75, Shackle 100,
Place(s) of raw material origin	Austria
Place of production	Mosdorfergasse 1, 8160 Weiz, Austria
Place(s) of installation and use	Norway and Sweden
Period for data	1st January 2023 - 31st December 2023
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 (%)	15.2

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 Unit of shackle is 0.966 Kg.
Declared unit mass	0.966 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	3.57E+00
GWP-total, A1-A3 ($kgCO_2e$)	3.59E+00
Secondary material, inputs (%)	33.6
Secondary material, outputs (%)	85.9
Total energy use, A1-A3 (kWh)	14.6
Net freshwater use, A1-A3 (m^3)	0.02

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 within 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.

PRODUCT DESCRIPTION

The hot-dip galvanized steel shackle used in overhead transmission line systems to connect and secure components such as insulators, conductors, or fittings. The shackle is typically U-shaped with a threaded pin or bolt, enabling quick and secure assembly.

Manufactured from galvanized steel and equipped with 8.8 grade bolts, the shackle provides high mechanical strength and corrosion resistance, making it suitable for long-term outdoor use in high-voltage environments. It is commonly installed in insulator strings and connected to crossarms on transmission towers.

This EPD covers the following products:
Shackle 75,
Shackle 100,

Further information can be found at:
https://melbye.com/

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	100	Austria
Minerals	-	-
Fossil materials	-	-
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	0.03545

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 Unit of shackle is 0.966 Kg.
Mass per declared unit	0.966 kg
Functional unit	-
Reference service life	40 years

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	MND	MND	MND	MND	MND	x	MND	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

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.

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

Manufacturing waste percentage is 5% for steel.
All the manufacturing process are done inhouse, the facility uses a mix of renewable and conventional energy sources. Shackle are packed in wooden boxes, which is assembled inhouse. Manufacturing waste – generated waste is collected and sent for recycling & land filling using truck, 250 km and 50 Km is considered respectively.

The use of green energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc.), and its use is ensured throughout the validity period of this EPD.

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.

A4 – Transportation to Construction Site
The transportation impacts from final product delivery to the construction site (A4) include emissions from direct fuel combustion, environmental impacts from fuel production, and emissions from associated transport infrastructure.

Shackles are primarily used in Norway and Sweden. Therefore, the average transportation distance, including the distance from the port to the final customer, is assumed to be 100 km, carried out by a lorry (>32 metric tons, EURO 5 standard).

A5 – Installation Phase
Material Loss: There is no material loss during installation, as shackles are robust metallic components designed for high durability and strength.

Additional Materials: Shackles are installed directly into the mechanical assembly or support system without requiring additional materials such as fasteners, adhesives, or consumables.

Installation Method: Installation is conducted manually using basic hand tools. However, 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: Shackles are typically packaged using wooden boxes. Untreated wood waste is incinerated with energy and heat recovery, following the EU waste wood packaging scenario.

REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of 40 years is based on the expected durability and long-term performance of the shackle under standard operating conditions. This estimate considers the material composition (typically forged or cast steel), resistance to corrosion and mechanical fatigue, and manufacturer experience with similar load-bearing components. The RSL assumes proper installation and usage in accordance with standard practice, without exposure to excessive loads, corrosive environments, or mechanical abuse.

B6 – OPERATIONAL ENERGY USE

The shackle is a passive, non-powered component and does not consume any energy during its use phase. It operates without the need for electricity or fuel throughout its entire service life.

This stage is included in the scope in accordance with the requirements of EN 15804 and the program operator's General Program Instructions (GPI) for electrical infrastructure components. However, the operational energy use is 0 kWh per declared unit (1 unit of shackle over a 40-year Reference Service Life).
As a result, there are no environmental impacts associated with this stage. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

C1 – Deconstruction / Demolition

The shackle is manually removed at the end of its service life, typically during dismantling or decommissioning of the assembly or structure it is part of. A standard energy consumption of 0.01 kWh/kg is assumed for manual demolition activities, in line with typical practices for small metal components.

C2 – Transport to Waste Processing

After removal, shackles are transported to either recycling facilities or landfill sites. 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 typical waste logistics in Norway and Sweden, where the product is primarily used.

C3 – Waste Processing

Metal components such as shackles are primarily directed to metal recycling, which involves sorting and preparation for remelting. A small percentage is sent to landfill due to degradation or contamination. All recycling processes are assumed to take place within Europe, primarily in Norway and Sweden, where relevant infrastructure and end-of-life management systems are well established.

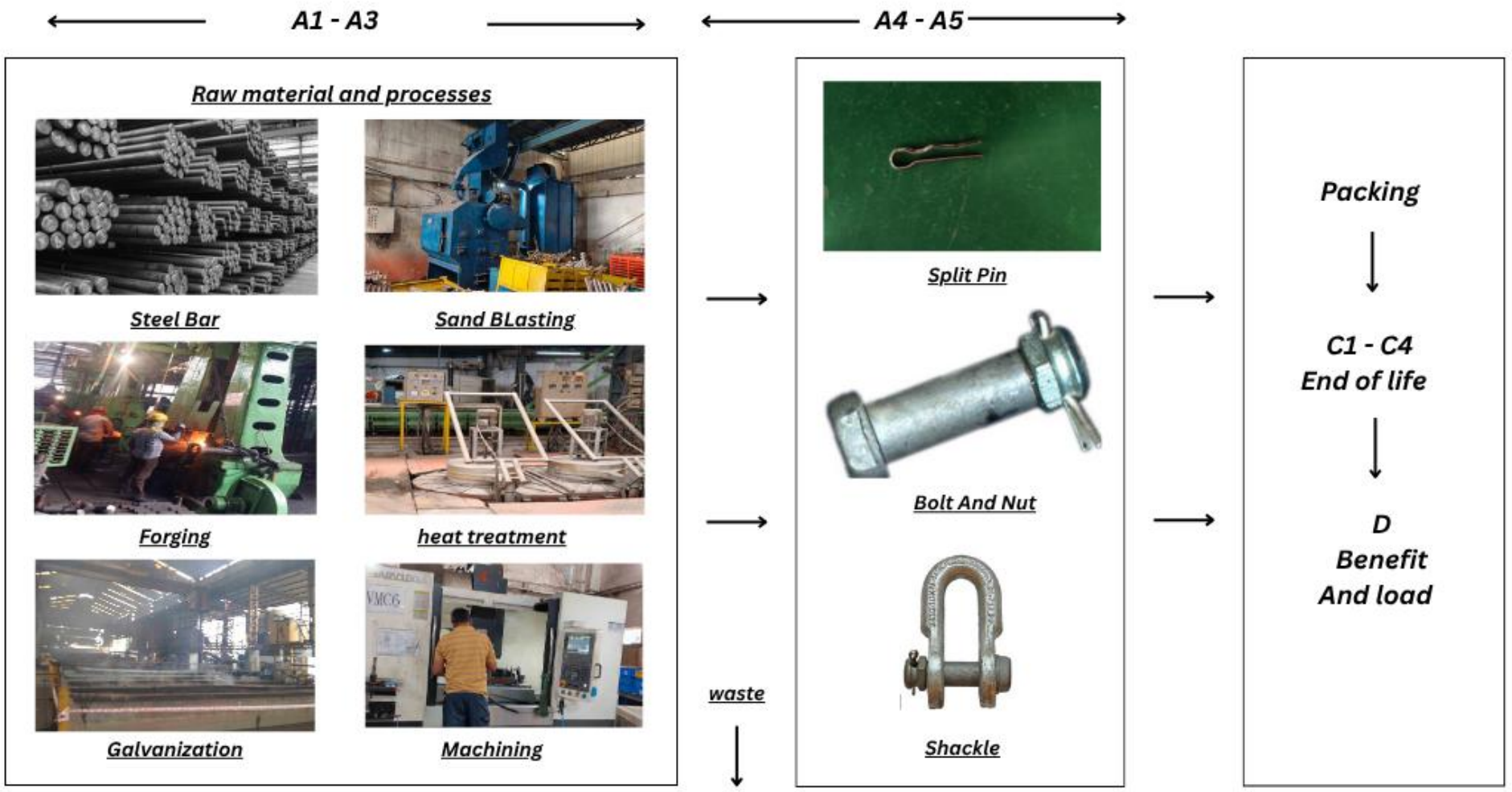
C4 – Disposal

The portion of shackles that is not recycled (e.g., contaminated or damaged parts) is sent to landfill. Environmental impacts from this fraction are modeled based on standard disposal practices for ferrous metals in European landfills.

D – Benefits and Loads Beyond the System Boundary

Wooden packaging used for transporting shackles is assumed to be untreated and incinerated at end of life. The energy and heat recovery from incineration is credited based on the EU Wood Packaging scenario, resulting in avoided burdens attributed to energy substitution beyond the system boundary.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.
Minor components such as nails and the plastic sheet used in packaging have not been included, as they contribute to less than 1% of the total mass and energy use.
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	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

PRODUCT & MANUFACTURING SITES GROUPING

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

This EPD is product and factory specific.

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. The EPD Generator uses Ecoinvent v3.10.1 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

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

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	3.17E+00	1.98E-02	3.99E-01	3.59E+00	1.99E-01	1.36E-01	MND	MND	MND	MND	MND	0.00E+00	MND	3.48E-03	4.17E-02	1.87E-02	5.34E-02	-1.14E+00
GWP – fossil	kg CO_2e	3.15E+00	1.97E-02	4.07E-01	3.57E+00	1.99E-01	5.94E-03	MND	MND	MND	MND	MND	0.00E+00	MND	3.48E-03	4.17E-02	1.88E-02	5.34E-02	-1.15E+00
GWP – biogenic	kg CO_2e	2.31E-02	4.25E-06	-7.94E-03	1.51E-02	4.51E-05	1.30E-01	MND	MND	MND	MND	MND	0.00E+00	MND	3.55E-07	9.11E-06	-3.98E-05	-3.95E-07	8.41E-03
GWP – LULUC	kg CO_2e	2.59E-03	8.84E-06	1.30E-04	2.73E-03	8.92E-05	4.09E-06	MND	MND	MND	MND	MND	0.00E+00	MND	3.57E-07	1.85E-05	2.32E-05	5.65E-07	-1.49E-04
Ozone depletion pot.	kg CFC_{-11}e	2.89E-08	2.92E-10	3.50E-08	6.42E-08	2.94E-09	9.38E-11	MND	MND	MND	MND	MND	0.00E+00	MND	5.33E-11	5.83E-10	2.52E-10	3.07E-11	-3.86E-09
Acidification potential	mol H^+e	1.30E-02	6.73E-05	2.57E-03	1.57E-02	6.80E-04	4.51E-05	MND	MND	MND	MND	MND	0.00E+00	MND	3.14E-05	1.39E-04	2.23E-04	9.85E-06	-4.56E-03
EP-freshwater[2)]	kg Pe	1.84E-02	1.54E-06	6.03E-05	1.84E-02	1.55E-05	7.52E-07	MND	MND	MND	MND	MND	0.00E+00	MND	1.01E-07	3.24E-06	1.21E-05	1.36E-07	-4.94E-04
EP-marine	kg Ne	2.83E-03	2.21E-05	4.78E-04	3.33E-03	2.23E-04	2.91E-05	MND	MND	MND	MND	MND	0.00E+00	MND	1.46E-05	4.50E-05	4.94E-05	4.11E-06	-1.01E-03
EP-terrestrial	mol Ne	2.93E-02	2.41E-04	7.70E-03	3.72E-02	2.43E-03	2.15E-04	MND	MND	MND	MND	MND	0.00E+00	MND	1.60E-04	4.90E-04	5.58E-04	4.50E-05	-1.11E-02
POCP ("smog")[3)]	kg NMVOCe	1.02E-02	9.93E-05	1.37E-03	1.16E-02	1.00E-03	6.59E-05	MND	MND	MND	MND	MND	0.00E+00	MND	4.76E-05	1.94E-04	1.65E-04	1.38E-05	-3.76E-03
ADP-minerals & metals[4)]	kg Sbe	5.56E-05	5.51E-08	2.99E-06	5.87E-05	5.56E-07	7.87E-09	MND	MND	MND	MND	MND	0.00E+00	MND	1.25E-09	1.37E-07	1.33E-06	2.62E-09	-1.10E-05
ADP-fossil resources	MJ	3.65E+01	2.87E-01	5.56E+00	4.24E+01	2.89E+00	8.05E-02	MND	MND	MND	MND	MND	0.00E+00	MND	4.55E-02	5.85E-01	2.52E-01	2.34E-02	-1.05E+01
Water use[5)]	m^3e depr.	1.13E+00	1.42E-03	1.70E+00	2.83E+00	1.43E-02	1.07E-03	MND	MND	MND	MND	MND	0.00E+00	MND	1.14E-04	2.71E-03	4.53E-03	7.42E-04	-1.93E-01

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

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	2.33E-07	1.98E-09	1.51E-08	2.50E-07	2.00E-08	1.14E-09	MND	MND	MND	MND	MND	0.00E+00	MND	8.93E-10	3.31E-09	3.03E-09	1.61E-10	-7.58E-08
Ionizing radiation[6)]	kBq U235e	1.56E-01	2.50E-04	4.91E-03	1.61E-01	2.52E-03	1.11E-04	MND	MND	MND	MND	MND	0.00E+00	MND	2.02E-05	4.74E-04	2.13E-03	2.18E-05	3.97E-02
Ecotoxicity (freshwater)	CTUe	2.10E+01	4.05E-02	3.45E+00	2.45E+01	4.09E-01	1.41E-02	MND	MND	MND	MND	MND	0.00E+00	MND	2.51E-03	9.25E-02	1.47E-01	1.86E-02	-2.80E+00
Human toxicity, cancer	CTUh	3.92E-09	3.26E-12	1.96E-10	4.12E-09	3.29E-11	1.56E-12	MND	MND	MND	MND	MND	0.00E+00	MND	3.58E-13	7.09E-12	1.67E-11	6.56E-11	-1.84E-10
Human tox. non-cancer	CTUh	5.21E-08	1.86E-10	3.24E-09	5.55E-08	1.87E-09	7.19E-11	MND	MND	MND	MND	MND	0.00E+00	MND	5.67E-12	3.66E-10	1.14E-09	2.01E-10	-9.05E-09
SQP[7)]	-	1.03E+01	2.89E-01	5.33E+00	1.60E+01	2.91E+00	3.56E-02	MND	MND	MND	MND	MND	0.00E+00	MND	3.19E-03	3.49E-01	4.90E-01	3.82E-02	-3.34E+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	3.87E+00	3.93E-03	6.15E+00	1.00E+01	3.96E-02	-1.06E+00	MND	MND	MND	MND	MND	0.00E+00	MND	2.88E-04	8.02E-03	4.69E-02	3.30E-04	-5.16E-01
Renew. PER as material	MJ	0.00E+00	0.00E+00	7.19E-01	7.19E-01	0.00E+00	-7.19E-01	MND	MND	MND	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E-02
Total use of renew. PER	MJ	3.87E+00	3.93E-03	6.87E+00	1.07E+01	3.96E-02	-1.78E+00	MND	MND	MND	MND	MND	0.00E+00	MND	2.88E-04	8.02E-03	4.69E-02	3.30E-04	-4.56E-01
Non-re. PER as energy	MJ	3.66E+01	2.87E-01	5.56E+00	4.24E+01	2.89E+00	8.05E-02	MND	MND	MND	MND	MND	0.00E+00	MND	4.55E-02	5.85E-01	2.52E-01	-2.00E-01	-1.05E+01
Non-re. PER as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-02
Total use of non-re. PER	MJ	3.66E+01	2.87E-01	5.56E+00	4.24E+01	2.89E+00	8.05E-02	MND	MND	MND	MND	MND	0.00E+00	MND	4.55E-02	5.85E-01	2.52E-01	-2.00E-01	-1.05E+01
Secondary materials	kg	3.25E-01	1.22E-04	2.84E-04	3.25E-01	1.23E-03	4.22E-05	MND	MND	MND	MND	MND	0.00E+00	MND	1.89E-05	2.63E-04	3.07E-04	1.49E-05	6.28E-01
Renew. secondary fuels	MJ	4.91E-04	1.55E-06	8.61E-06	5.01E-04	1.56E-05	2.84E-07	MND	MND	MND	MND	MND	0.00E+00	MND	4.95E-08	3.35E-06	1.43E-05	1.38E-07	-9.41E-05
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	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.97E-02	4.24E-05	1.31E-03	2.10E-02	4.28E-04	-8.69E-05	MND	MND	MND	MND	MND	0.00E+00	MND	3.01E-06	7.75E-05	1.34E-04	2.96E-05	-2.62E-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	1.00E+00	4.86E-04	1.07E-02	1.01E+00	4.90E-03	2.74E-04	MND	MND	MND	MND	MND	0.00E+00	MND	5.07E-05	1.02E-03	1.65E-03	1.12E-03	-3.77E-01
Non-hazardous waste	kg	1.06E+01	8.99E-03	2.03E+00	1.26E+01	9.07E-02	1.59E-01	MND	MND	MND	MND	MND	0.00E+00	MND	6.91E-04	1.91E-02	5.94E-02	2.40E-02	-2.96E+00
Radioactive waste	kg	4.12E-05	6.11E-08	3.97E-06	4.52E-05	6.17E-07	2.76E-08	MND	MND	MND	MND	MND	0.00E+00	MND	4.95E-09	1.16E-07	5.47E-07	5.43E-09	1.03E-05

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	0.00E+00	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	1.72E+00	1.72E+00	0.00E+00	2.30E-02	MND	MND	MND	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00	8.30E-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	MND	MND	MND	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+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	1.14E-01	MND	MND	MND	MND	MND	0.00E+00	MND	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	0.00E+00	4.80E-02	MND	MND	MND	MND	MND	0.00E+00	MND	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	0.00E+00	6.60E-02	MND	MND	MND	MND	MND	0.00E+00	MND	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_2e	3.15E+00	1.96E-02	4.09E-01	3.58E+00	1.98E-01	7.46E-03	MND	MND	MND	MND	MND	0.00E+00	MND	3.46E-03	4.15E-02	1.87E-02	5.34E-02	-1.14E+00
Ozone depletion Pot.	kg $CFC_{-11}e$	2.48E-08	2.33E-10	2.76E-08	5.26E-08	2.35E-09	7.48E-11	MND	MND	MND	MND	MND	0.00E+00	MND	4.22E-11	4.66E-10	2.08E-10	2.47E-11	-4.24E-09
Acidification	kg SO_2e	1.06E-02	5.14E-05	1.87E-03	1.25E-02	5.19E-04	3.22E-05	MND	MND	MND	MND	MND	0.00E+00	MND	2.21E-05	1.06E-04	1.79E-04	7.12E-06	-3.67E-03
Eutrophication	kg PO_4^3e	2.01E-03	1.25E-05	1.12E-03	3.14E-03	1.26E-04	8.82E-06	MND	MND	MND	MND	MND	0.00E+00	MND	5.16E-06	2.59E-05	2.60E-05	2.40E-06	-6.74E-04
POCP (“smog”)	kg C_2H_4e	1.05E-03	4.58E-06	9.10E-05	1.15E-03	4.62E-05	2.81E-06	MND	MND	MND	MND	MND	0.00E+00	MND	1.66E-06	9.54E-06	1.06E-05	6.11E-07	-5.75E-04
ADP-elements	kg Sbe	5.54E-05	5.37E-08	2.99E-06	5.84E-05	5.42E-07	7.57E-09	MND	MND	MND	MND	MND	0.00E+00	MND	1.21E-09	1.34E-07	1.33E-06	2.19E-09	-1.10E-05
ADP-fossil	MJ	3.40E+01	2.83E-01	5.52E+00	3.98E+01	2.85E+00	7.87E-02	MND	MND	MND	MND	MND	0.00E+00	MND	4.52E-02	5.78E-01	2.15E-01	2.30E-02	-1.12E+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[9)]	kg CO_2e	3.15E+00	1.98E-02	4.07E-01	3.58E+00	1.99E-01	5.94E-03	MND	MND	MND	MND	MND	0.00E+00	MND	3.48E-03	4.17E-02	1.88E-02	5.34E-02	-1.15E+00

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 zero.

SCALING TABLE FOR THE SHACKLES:

This EPD covers the following Shackles:

Sr no.	Shackles description	Weight (Kg)	Centre Distance(mm)	GWP-total, (kgCO2e)	GWP-fossil, (kgCO2e)
1	Shackle (75)	0.966	75	4.04	3.9
2	Shackle (100)	0.961	100	4.64	4.49

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity, Austria, 2022 (One Click LCA)
Electricity CO2e / kWh	0.2
District heating data source and quality	-
District heating CO2e / kWh	-

Transport scenario documentation A4

Scenario parameter	Value
Fuel and vehicle type. Eg, electric truck, diesel powered truck	Market for transport, freight, lorry >32 metric ton, EURO5
Average transport distance, km	1682
Capacity utilization (including empty return) %	50
Bulk density of transported products	-
Volume capacity utilization factor	1

Installation scenario documentation A5

Scenario information	Value
Ancillary materials for installation (specified by material) / kg or other units as appropriate	-
Water use / m³	-
Other resource use / kg	-
Quantitative description of energy type (regional mix) and consumption during the installation process / kWh or MJ	0.00966
Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg	0
Output materials (specified by type) as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal (specified by route) / kg	0.072 of Wood packaging waste
Direct emissions to ambient air, soil and water / kg	0

Use stages scenario documentation - B6-B7 Use of energy and use of water

Scenario information	Value
Ancillary materials specified by material / kg or units as appropriate	0
Net fresh water consumption / m^3	0
Type of energy carrier, e.g., electricity, natural gas, district heating / kWh	0
Power output of equipment / kW	0
Characteristic performance, e.g., energy efficiency, emissions, variation of performance with capacity utilization, etc.	NA
Further assumptions for scenario development, e.g., frequency and period of use, number of occupants	NA

End of life scenario documentation

Scenario information	Value
Collection process – kg collected separately	0
Collection process – kg collected with mixed waste	0.966
Recovery process – kg for re-use	-
Recovery process – kg for recycling	0.465
Recovery process – kg for energy recovery	-
Disposal (total) – kg for final deposition	0.121
Scenario assumptions e.g. transportation	Transported 250 km (recycling) and 50 km (landfill) by lorry

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

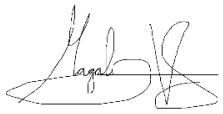
I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried 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.

Magaly González Vázquez, as an authorized verifier acting for EPD Hub Limited
18.07.2025



VERIFIED ISO 14025