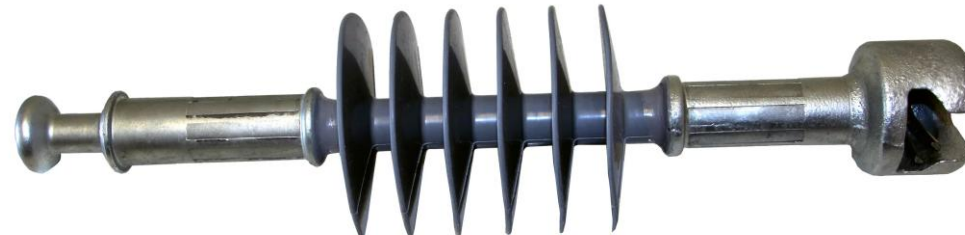




ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Suspension Insulator
Melbye AS



EPD HUB, HUB-6915

Published on 08.07.2026, last updated on 08.07.2026, valid until 07.07.2031

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
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 1.2, 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: ☐ Internal verification ☒ 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	Suspension Insulator
Additional labels	-
Product reference	-
Place(s) of raw material origin	India
Place of production	Sardana Nagar Ambala Road, Jagadhri, Haryana 135003, India
Place(s) of installation and use	Global
Period for data	January 2024 - December 2024
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	-0.1% - 7.7%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	14.2

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of suspension insulator
Declared unit mass	1 kg
Mass of packaging	0.33 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	8.95
GWP-total, A1-A3 (kgCO ₂ e)	8.25
Secondary material, inputs (%)	28.5
Total energy use, A1-A3 (kWh)	31
Net freshwater use, A1-A3 (m ³)	0.12

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 is a family of suspension insulators intended for use in medium-voltage overhead distribution systems. The product range comprises insulators with different end-fitting configurations to accommodate various installation and connection requirements while maintaining the same intended function and comparable electrical and mechanical performance. Each insulator consists of a fiberglass-reinforced polymer (FRP) core rod enclosed in a silicone rubber housing with weather sheds and fitted with hot-dip galvanized steel end fittings. The composite

construction provides electrical insulation, mechanical load-bearing capability, and resistance to environmental influences such as moisture, pollution, and UV exposure, making the products suitable for long-term outdoor service in overhead line applications.

key points:

- Composite suspension insulators for medium-voltage overhead distribution lines
- Fiberglass-reinforced polymer (FRP) core for high mechanical strength
- Silicone rubber housing and weather sheds for enhanced insulation performance and pollution resistance
- Hot-dip galvanized steel end fittings
- Available with multiple end-fitting configurations for different line hardware requirements
- Designed for reliable outdoor operation under a wide range of environmental conditions.

Further information can be found on:

<https://melbye.com/>

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	63.33	India/China
Minerals	-	-
Fossil materials	36.67	India
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	0.2127

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of suspension insulator
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		
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.

The manufacturing stage includes the molding, assembly, and quality control of suspension insulators using ductile cast iron end fittings, silicone rubber housing, and an FRP core rod. The silicone rubber housing is manufactured in-house through molding processes, while all other components are supplied ready-to-use and assembled without further material processing at the manufacturing facility. Electricity consumption represents conventional grid-based energy sources.

Actual transport distances provided by the supplier are used for all raw materials, packaging, and ancillary materials. Production losses are limited to silicone rubber molding, with an estimated loss rate of 2%, which is sent as scrap to a third-party recycling company located 50 km from the manufacturing facility. No significant production losses are considered for the ductile cast iron end fittings or FRP core rod.

All manufacturing, molding, assembly, and quality control processes are performed in-house at a single facility operating on conventional grid electricity. Products are packaged using corrugated cardboard boxes placed on wooden pallets, both sourced externally. Packaging materials are considered the only installation-related losses. Manufacturing waste generated during assembly is managed through recycling and landfill disposal routes. End-of-life treatment assumes recycling, incineration, and landfill disposal pathways depending on the material composition of the suspension insulator.

INSTALLATION (A5)

No significant material loss occurs during installation of the suspension insulator, as the process involves direct mechanical mounting without additional material processing or removal. Installation is carried out using standard manual or low-power mechanical tools, ensuring minimal waste generation. A reference installation energy consumption of approximately

0.01 kWh/kg is assumed, representing typical tool operation under standard field conditions.

A5 – Packaging Waste Management:

Packaging waste mainly consists of corrugated cardboard boxes and wooden pallets. Based on typical regional waste treatment practices, the following end-of-life assumptions are applied:

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

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

Packaging waste is assumed to be transported 50 km for recycling processes and 50 km for landfill and incineration treatment.

PRODUCT END OF LIFE (C1-C4, D)

C1 – Deconstruction / Demolition

Suspension insulators are manually removed at the end of their service life, typically during dismantling or replacement of overhead transmission and distribution lines. A standard energy consumption of 0.01 kWh/kg is assumed for manual removal activities, consistent with typical practices for electrical insulation components.

C2 – Transport to Waste Processing

After removal, suspension insulators are transported to recycling, incineration, or landfill facilities depending on the material type and waste treatment route. An average transport distance of 50 km is assumed for recycling processes and 50 km for landfill and incineration treatment. Transportation is carried out using standard lorries representative of conventional regional waste logistics operations.

C3 – Waste Processing

Suspension insulators consist primarily of ductile cast iron end fittings, silicone rubber housing, and an FRP core rod.

Ductile cast iron components are assumed to undergo 80% recycling and 20% landfill disposal. Recycled metal fractions are sorted and processed for secondary metal recovery.

Silicone rubber components are assumed to undergo 24% recycling, 49%

incineration with energy recovery, and 27% landfill disposal.

FRP core rod materials are assumed to undergo 10% incineration and 90% landfill disposal due to limited recycling infrastructure for composite materials.

Packaging materials, including corrugated cardboard and wooden pallets, are treated separately through recycling, incineration, or landfill pathways according to regional waste management practices.

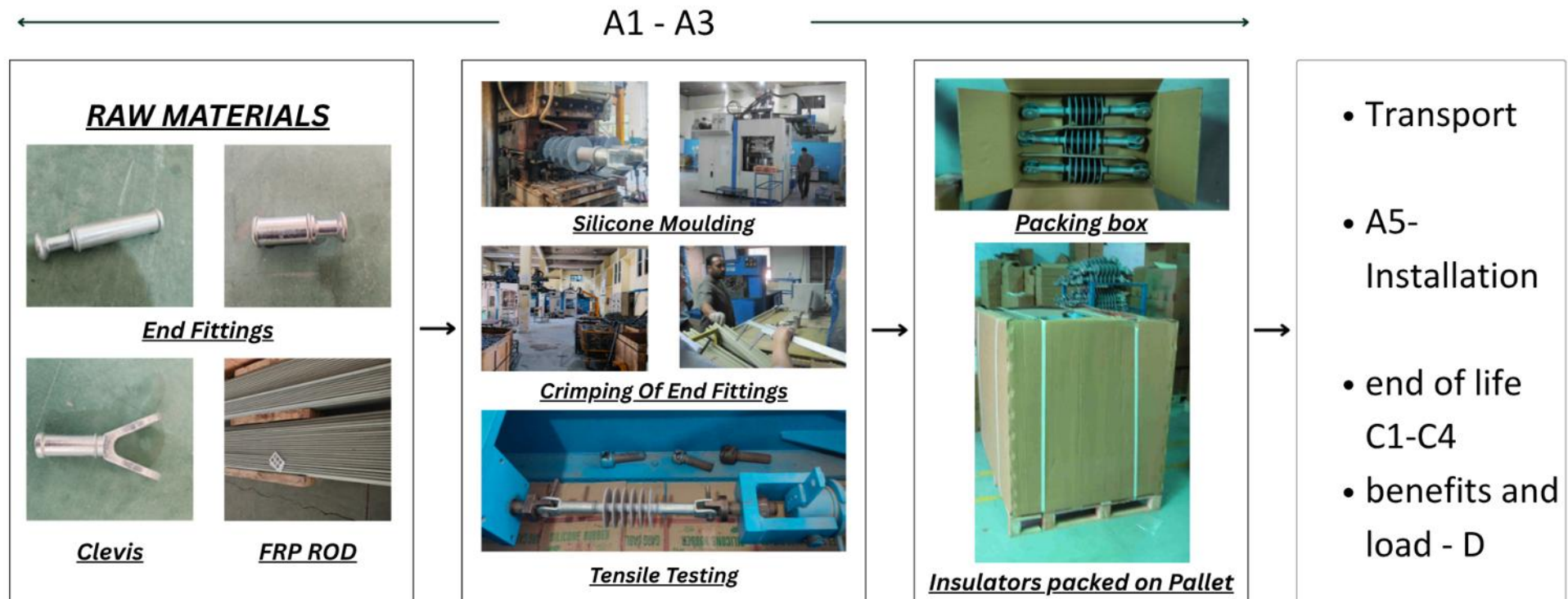
C4 – Disposal

The non-recyclable fractions of suspension insulator materials, including composite and polymer residues, are directed to landfill or incineration according to the specified end-of-life scenarios. Environmental impacts from disposal are modeled using standard waste treatment datasets representative of conventional regional practices.

D – Benefits and Loads Beyond the System Boundary

Benefits and loads beyond the system boundary are not accounted for the suspension insulator materials and components. Module D includes only the impacts and credits associated with packaging waste treatment. Corrugated cardboard packaging is assumed to be recycled, while wooden pallet materials are assumed to undergo incineration with energy recovery according to typical regional waste management practices.

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, %	-0.1% - 7.7%

AVERAGING ASSUMPTION

The average EPD covers a range of 24 kV suspension insulator products with similar design principles, applications, material composition, and manufacturing processes. The main differences between the included products are related to dimensional variations and mechanical strength ratings, covering products with rated strengths of 90kN, 120kN, and 160kN. Since the declared unit is 1 kg of product, variations caused by differences in product weight were normalized. The representativeness of the average

product was assessed based on the material composition per declared unit and the corresponding environmental impact results.

The comparison between the included product variants showed limited variation, with the GWP-fossil results for modules A1-A3 ranging from a minimum variation of -0.1% to a maximum variation of 7.7% compared to the representative product. Therefore, the selected average is considered representative of the suspension insulator product range included in this EPD.

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 ¹⁾	kg CO ₂ e	7.53E+00	3.67E-01	3.55E-01	8.25E+00	ND	7.96E-01	ND	ND	ND	ND	ND	ND	ND	3.61E-03	2.81E-02	1.12E-02	8.85E-01	-1.14E-01
GWP – fossil	kg CO ₂ e	7.45E+00	3.67E-01	1.13E+00	8.95E+00	ND	1.46E-02	ND	ND	ND	ND	ND	ND	ND	3.60E-03	2.80E-02	1.14E-02	8.85E-01	-3.02E-02
GWP – biogenic	kg CO ₂ e	7.02E-02	8.27E-05	-7.82E-01	-7.11E-01	ND	7.82E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.88E-06	-1.64E-04	5.05E-05	-8.39E-02
GWP – LULUC	kg CO ₂ e	5.56E-03	1.64E-04	5.89E-03	1.16E-02	ND	1.37E-05	ND	ND	ND	ND	ND	ND	ND	3.69E-07	1.25E-05	1.41E-05	7.68E-06	-5.15E-05
Ozone depletion pot.	kg CFC-11e	2.46E-07	5.34E-09	1.79E-08	2.69E-07	ND	2.09E-10	ND	ND	ND	ND	ND	ND	ND	5.52E-11	3.63E-10	1.51E-10	2.97E-10	-3.76E-10
Acidification potential	mol H ⁺ e	7.07E-02	1.28E-03	6.98E-03	7.90E-02	ND	9.13E-05	ND	ND	ND	ND	ND	ND	ND	3.25E-05	9.54E-05	1.36E-04	1.44E-04	-1.90E-04
EP-freshwater ²⁾	kg Pe	2.44E+00	3.95E-05	2.67E-04	2.44E+00	ND	3.15E-06	ND	ND	ND	ND	ND	ND	ND	1.04E-07	3.02E-06	7.60E-06	3.02E-06	-1.89E-05
EP-marine	kg Ne	6.04E-03	4.22E-04	1.18E-03	7.64E-03	ND	7.66E-05	ND	ND	ND	ND	ND	ND	ND	1.51E-05	3.03E-05	3.02E-05	2.35E-04	-2.94E-05
EP-terrestrial	mol Ne	8.03E-02	4.56E-03	1.10E-02	9.58E-02	ND	3.87E-04	ND	ND	ND	ND	ND	ND	ND	1.65E-04	3.29E-04	3.41E-04	6.10E-04	-2.90E-04
POCP (“smog”) ³⁾	kg NMVOCe	2.96E-02	1.87E-03	3.03E-03	3.45E-02	ND	1.27E-04	ND	ND	ND	ND	ND	ND	ND	4.93E-05	1.30E-04	1.01E-04	1.63E-04	-9.17E-05
ADP-minerals & metals ⁴⁾	kg Sbe	4.80E-04	1.05E-06	9.23E-07	4.82E-04	ND	5.06E-08	ND	ND	ND	ND	ND	ND	ND	1.29E-09	9.41E-08	8.07E-07	6.33E-08	-3.94E-08
ADP-fossil resources	MJ	8.38E+01	5.24E+00	1.27E+01	1.02E+02	ND	1.87E-01	ND	ND	ND	ND	ND	ND	ND	4.72E-02	3.88E-01	1.54E-01	1.62E-01	-4.92E-01
Water use ⁵⁾	m ³ e depr.	2.23E+00	3.05E-02	1.50E+01	1.73E+01	ND	4.71E-03	ND	ND	ND	ND	ND	ND	ND	1.18E-04	2.06E-03	3.00E-03	4.76E-02	-9.75E-03

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	5.04E-07	3.60E-08	2.68E-08	5.66E-07	ND	2.49E-09	ND	ND	ND	ND	ND	ND	ND	9.25E-10	2.17E-09	1.86E-09	1.06E-09	-1.60E-09
Ionizing radiation ⁶⁾	kBq	3.37E-01	4.40E-03	8.34E-02	4.25E-01	ND	3.98E-04	ND	ND	ND	ND	ND	ND	ND	2.09E-05	3.20E-04	1.32E-03	2.79E-04	-9.48E-03
	11235e																		
Ecotoxicity (freshwater)	CTUe	4.78E+02	1.08E+00	6.72E+00	4.86E+02	ND	1.74E+00	ND	ND	ND	ND	ND	ND	ND	2.60E-03	4.33E-01	7.54E-01	1.78E+00	-7.46E-01
Human toxicity, cancer	CTUh	1.06E-08	5.77E-11	1.89E-10	1.08E-08	ND	9.93E-12	ND	ND	ND	ND	ND	ND	ND	3.71E-13	4.72E-12	1.01E-11	1.34E-11	-5.37E-12
Human tox. non-cancer	CTUh	4.21E-07	3.26E-09	7.64E-09	4.32E-07	ND	4.75E-10	ND	ND	ND	ND	ND	ND	ND	5.87E-12	2.41E-10	6.92E-10	5.22E-10	-2.08E-10
SQP ⁷⁾	-	2.86E+01	5.23E+00	7.14E+01	1.05E+02	ND	1.26E-01	ND	ND	ND	ND	ND	ND	ND	3.30E-03	2.28E-01	2.95E-01	1.35E-01	-1.86E-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 ⁸⁾	MJ	7.88E+00	7.28E-02	3.73E+00	1.17E+01	ND	-5.00E+00	ND	ND	ND	ND	ND	ND	ND	2.99E-04	5.44E-03	2.82E-02	6.71E-03	5.34E-01
Renew. PER as material	MJ	0.00E+00	0.00E+00	7.12E+00	7.12E+00	ND	-7.12E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.19E-01
Total use of renew. PER	MJ	7.88E+00	7.28E-02	1.09E+01	1.88E+01	ND	-1.21E+01	ND	ND	ND	ND	ND	ND	ND	2.99E-04	5.44E-03	2.82E-02	6.71E-03	1.35E+00
Non-re. PER as energy	MJ	8.12E+01	5.24E+00	1.33E+01	9.98E+01	ND	1.87E-01	ND	ND	ND	ND	ND	ND	ND	4.72E-02	3.88E-01	1.54E-01	-1.07E+01	-4.92E-01
Non-re. PER as material	MJ	2.72E+00	0.00E+00	8.80E-02	2.80E+00	ND	-1.41E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	-2.66E+00	5.40E-02
Total use of non-re. PER	MJ	8.39E+01	5.24E+00	1.34E+01	1.03E+02	ND	4.61E-02	ND	ND	ND	ND	ND	ND	ND	4.72E-02	3.88E-01	1.54E-01	-1.33E+01	-4.38E-01
Secondary materials	kg	2.85E-01	2.19E-03	1.29E-01	4.16E-01	ND	1.54E-04	ND	ND	ND	ND	ND	ND	ND	1.96E-05	1.71E-04	1.87E-04	1.44E-04	2.53E-05
Renew. secondary fuels	MJ	6.35E-03	2.86E-05	1.21E-02	1.85E-02	ND	1.13E-06	ND	ND	ND	ND	ND	ND	ND	5.12E-08	2.21E-06	8.75E-06	4.65E-06	1.40E-05
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 ³	1.06E-01	7.52E-04	1.70E-02	1.24E-01	ND	-2.78E-04	ND	ND	ND	ND	ND	ND	ND	3.12E-06	5.20E-05	6.89E-05	5.47E-04	-2.25E-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	1.59E+00	3.29E-02	2.59E-02	1.65E+00	ND	1.52E-03	ND	ND	ND	ND	ND	ND	ND	5.25E-05	8.74E-04	1.02E-03	1.99E-02	-2.01E-03
Non-hazardous waste	kg	2.77E+01	6.49E-01	4.41E-01	2.88E+01	ND	3.20E-01	ND	ND	ND	ND	ND	ND	ND	7.15E-04	1.69E-02	3.99E-02	7.44E-01	-9.53E-02
Radioactive waste	kg	1.54E-04	1.05E-06	1.40E-05	1.69E-04	ND	9.83E-08	ND	ND	ND	ND	ND	ND	ND	5.12E-09	7.85E-08	3.38E-07	7.04E-08	-2.43E-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	0.00E+00	0.00E+00	ND	1.72E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	5.07E-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	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	3.69E-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	1.55E-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	2.14E-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 ₂ e	7.15E+00	3.65E-01	1.13E+00	8.64E+00	ND	3.40E-02	ND	ND	ND	ND	ND	ND	ND	3.59E-03	2.79E-02	1.14E-02	8.85E-01	-3.01E-02
Ozone depletion Pot.	kg CFC ₁₁ e	2.56E-07	4.26E-09	1.74E-08	2.78E-07	ND	1.69E-10	ND	ND	ND	ND	ND	ND	ND	4.37E-11	2.92E-10	1.31E-10	2.70E-10	-3.12E-10
Acidification	kg SO ₂ e	4.81E-02	9.74E-04	5.89E-03	5.50E-02	ND	6.71E-05	ND	ND	ND	ND	ND	ND	ND	2.29E-05	7.33E-05	1.09E-04	1.06E-04	-1.61E-04
Eutrophication	kg PO ₄ ³ e	6.69E-03	2.63E-04	1.23E-03	8.18E-03	ND	3.33E-05	ND	ND	ND	ND	ND	ND	ND	5.34E-06	1.83E-05	1.60E-05	3.79E-05	-1.76E-05
POCP (“smog”)	kg C ₂ H ₄ e	2.94E-03	8.48E-05	2.69E-04	3.30E-03	ND	1.02E-05	ND	ND	ND	ND	ND	ND	ND	1.71E-06	6.40E-06	6.46E-06	8.16E-06	-9.06E-06
ADP-elements	kg Sbe	4.79E-04	1.02E-06	1.12E-06	4.81E-04	ND	4.93E-08	ND	ND	ND	ND	ND	ND	ND	1.26E-09	9.17E-08	8.04E-07	4.19E-08	-3.87E-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	7.83E+01	5.17E+00	1.29E+01	9.64E+01	ND	1.81E-01	ND	ND	ND	ND	ND	ND	ND	4.68E-02	3.83E-01	1.31E-01	1.58E-01	-3.24E-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 ₂ e	7.46E+00	3.67E-01	1.14E+00	8.96E+00	ND	1.46E-02	ND	ND	ND	ND	ND	ND	ND	3.61E-03	2.80E-02	1.14E-02	8.85E-01	-3.02E-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 – 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

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity, India, 2024, India, One Click LCA, 1.13 kgCO₂e/kWh

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	-
Water use (m ³)	-
Ancillary materials: type and mass (kg)	-
Waste materials: type and mass (kg)	Waste generation during manufacturing is limited primarily to silicone rubber losses from the molding process. Silicone rubber production waste is estimated at approximately 0.0055 kg per unit and is sent as scrap to a third-party recycling company located 50 km from the manufacturing facility. Installation-related waste is limited to packaging materials only, with no product material waste generated during installation. The packaging waste per unit consists of approximately 0.13 kg of corrugated

cardboard packaging and 0.2 kg of wooden pallet material, representing typical packaging quantities under standard delivery conditions. Packaging waste is assumed to be transported 50 km for recycling processes and 50 km for landfill and incineration treatment.

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)	0.51
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 08.07.2026

