Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Steel Flange

from

ECHJAY FORGINGS PVT. LTD.

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Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD India, www.environdecindia.com
Type of EPD:	EPD of a single product from a manufacturer
EPD registration number:	EPD-IES-0028653:001
Version date:	2026-02-12
Validity date:	2031-02-11

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

GENERAL INFORMATION

Programme Information	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products (version 2.0.1)* ***and UNCPC code:*** *412*
PCR review was conducted by: The Technical Committee of the International EPD System. See www.envirodec.com for a list of members. The review panel may be contacted via support@environdec.com. Review chair: Rob Rouwette, Co-chair: Noa Meron
c-PCR, if applicable: *NA*

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: Dr. Subramanian Senthilkannan Muthu, Hong Kong. Approved by: International EPD System
The procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programs may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.
For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: Echjay Forgings Pvt. Ltd.

Address: Honad village, Taluka- Khalapur, District- Raigad, Khopoli, 410203, Maharashtra, India

Contact: Mr. Dhaval Doshi

Phone: +91(22)40770000/ +91 9820011304

Email: dhaval@echjay.com

Website: www.echjay.com

Address and contact information of the LCA practitioner commissioned by the EPD owner, if applicable: Ms. Arati Bhosale and Ms. Pooja Bhunje, Greenex Environmental, Pune, India

Description of the organisation:

Echjay Forgings Pvt. Ltd. is a professionally managed manufacturing company engaged in the production of steel forgings, flanges, fittings, auto parts, machined components, and ring-rolled products, including railway tyres and rectangular and profiled rings/flanges up to 3 metres in diameter. The company operates an integrated manufacturing facility with open forging, Thyssen-Wagner ring rolling, CNC-based machining (VMC, VTL), an in-house die shop, and chemical and physical testing laboratories, supported by inspection and testing equipment. Echjay Forgings has an installed capacity of approximately 30,000 metric tonnes per annum and serves industries such as food processing, oil and gas, petrochemicals, automobiles, defence, railways, aerospace, and general and heavy engineering. In addition to the domestic market, the company exports to customers across the USA, UK, Canada, Europe, the Middle East, and Turkey, and holds international compliance certifications including AD 2000 Merkblatt W0 / PED 2014/68/EU and PESR 2016, certified by TÜV NORD.

PRODUCT INFORMATION

Product name: Steel Flange

Visual representation (e.g., an image) of the product

Figure 1 Steel flange (Image source: www.echjay.com)

UNCPC code: 412

Product description: Steel flanges are circular forged components used to connect pipes, valves, pumps, and other equipment in piping systems, enabling easy assembly, disassembly, inspection, and maintenance. Common flange types include weld neck, slip-on, blind, lap joint, threaded, and socket weld flanges.

These steel flanges are designed for use in high-pressure and high-temperature industrial applications such as oil and gas, chemical processing, power generation, water treatment, and HVAC systems. They offer high mechanical strength, excellent corrosion resistance, and long service life, ensuring reliable and leak-tight connections throughout their use phase.

Technical Specifications:

- Product: Flanges, Fittings & Stub Ends
- Specifications according to American standards:
  - Material Standard: ASTM A182/ ASME SA182
  - Dimensional Standard: ASME B16.5/ MSS SP 43/ ASME B16.9
  - Pressure Class (ASME): Class 150 to Class 2500
  - Size Range (ASME): 1/2 inch to 40 inch
- Specifications according to DIN/ EN standards:
  - Material Standard: EN 10222-5
  - Dimensional Standard (DIN/EN): DIN / EN 1092-1
  - Pressure Rating (DIN/EN): PN 6 to PN 160
  - Nominal Diameter (DIN/EN): DN 10 to DN 1000

Other technical Specifications:

Parameters	Unit	Quantity
Yield strength	N/mm sq	180 min -280 min*
Carbon (C)	%	0.03 max - 0.08 max (0.03: L- grade and 0.08: Regular)
Phosphorus (P)	%	<0.045
Sulfur (S)	%	<0.030
Manganese (Mn)	%	2 max
Pressure rating	PN/Class	PN 10–PN 160 / 150–2500 lbs

* As per the grade of material

Special features:

- Manufactured in accordance with ASTM A182 / ASME SA182/ EN 10222-5, ensuring consistent material quality and compliance with international standards.
- Wide pressure rating coverage, suitable for both ASME Class 150–2500 and DIN/EN PN 6–PN 160 systems.

- Broad size range, accommodating 1/2" to 40" (ASME) and DN 10 to DN 1000 (DIN/EN), enabling use across diverse piping applications.
- Compatibility with both ASME and DIN/EN piping standards, allowing flexibility in global and mixed-standard projects.

Name and location of production site(s): The EPD refers to the production of steel flanges in the manufacturing site, placed in Honad village, Khalapur-Taluka, Raigad-District, Khopoli-410203, India.

CONTENT DECLARATION

The mass (weight) of one unit of a product, as purchased or per declared unit: 1 MT (1000 Kg) of steel flange

The declared share of biogenic/recycled materials: The product consists of stainless steel flanges, manufactured entirely from stainless steel. No biogenic materials are present in the product itself; therefore, the steel flange contains 0% biogenic material and 0% biogenic carbon.

No post-consumer recycled materials are incorporated in the product composition, as the raw materials are all of virgin chemical grade, sourced from established suppliers to maintain purity and performance standards

The packaging system, with a total mass of 75.49 kg per tonne of product, consists of both biogenic and non-biogenic materials. Biogenic materials include a wooden box and a corrugated sheet. The biogenic fraction in the packaging is 7.5406%, which corresponds to 33.81 kg of biogenic carbon per declared unit, calculated from the biogenic packaging materials.

All biogenic values are calculated on a dry mass basis, and the biogenic carbon balance is maintained throughout the product life cycle in line with EN 15804+A2. The packaging is fully recyclable, and the biogenic materials are expected to re-enter the material cycle through wood and paper recycling streams, thereby minimising disposal impacts.

Product components	Mass, kg	Post-consumer recycled material, mass% of product	Biogenic material, mass% of product	Biogenic material, kg C/product or declared unit
Stainless steel	1736.13	-	0	0

Packaging Material	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Wooden box	60	6	30
Corrugated sheet	7.6137	0.7614	3.81
LDPE protective wrapping film	0.2149	0.0125	0
Protective caps	7.6667	0.7667	0
TOTAL (Product)	75.49	7.5406	33.81

Note: 1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.

LCA INFORMATION

Declared unit: 1 MT (1000 kg) of steel flange.

Reference service life: 30 years

Time representativeness: Information on the production of the steel flange has been collected in January 2025- December 2025, all generic data referred to the ecoinvent v3.11 database, including updated datasets.

Geographical scope: Global

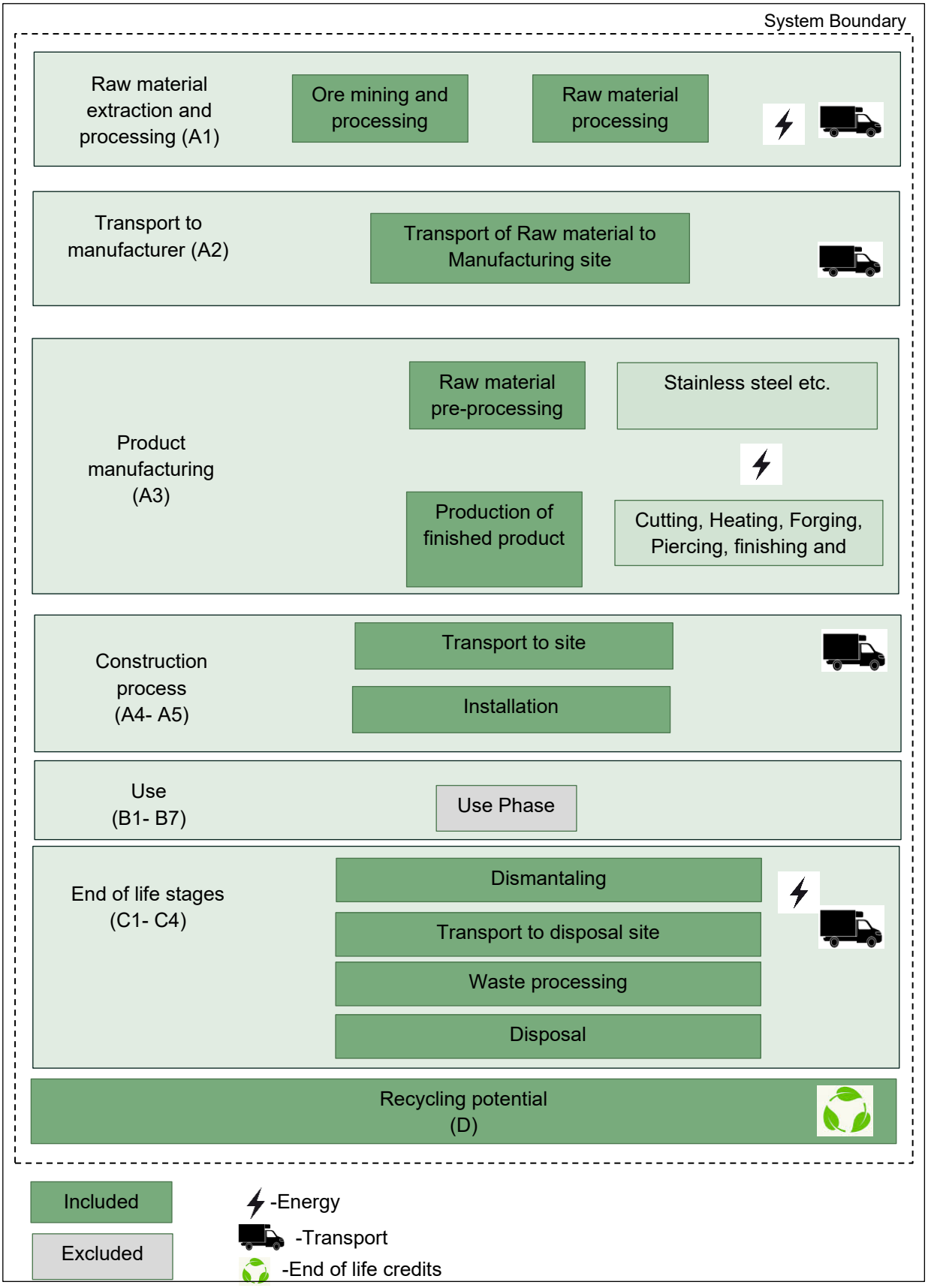
Database(s) and LCA software used: Ecoinvent v3.11 and OpenLCA V-2.6.0.

Description of system boundaries:
The system boundary is defined as cradle-to-gate with options, covering modules (A1–A3 + A4–A5 + C + D and additional modules). As depicted in Figure 6, the A1 module includes the extraction of raw materials. The A2 module includes the transportation of each raw material to the manufacturing site. The A3 module includes all the activities/processes taking place on the manufacturing site. The module A4 includes the transportation of finished products. A5 module related to packaging waste, The C1 module includes activities or processes taking place on-site for deconstruction or demolition. The C2 module includes the transportation of waste from the site to the waste processing facility. The C3 module includes activities or processes taking place at waste processing facilities. The C4 module includes the impacts due to waste disposal. D module includes the impacts or loads reduced on the environment due to the reuse/ recycling of the product. Excluded lifecycle stages: Module B is not considered as the no repair or maintance considered in this phase the product does not generate relevant environmental impacts during the use phase.

Fig. shows the considerations of declared modules.

A1 MODULE	•Extraction of raw materials.
A2 MODULE	•Transportation of raw materials to the manufacturing company.
A3 MODULE	•Manufacturing of the product in the unit.
A4 MODULE	•Transportation of final product to the client.
A5 MODULE	•Disposal of packaging waste.
C1 MODULE	•Deconstruction or demolition on site.
C2 MODULE	•Transport of waste from the site to waste processing facility.
C3 MODULE	•Processing of waste at waste processing facility.
C4 MODULE	•Disposal of waste.
D MODULE	•Recycle of the product.

Process flow diagram:



Manufacturing Process:

Echjay Forgings manufactures steel flanges using a precise and high-quality forging process. The process begins with selecting suitable steel billets or bars based on the required grade, followed by cutting them to the appropriate size. The blanks are then heated in a furnace to high temperatures to make the steel malleable for forging. Depending on the flange type and size, Echjay employs closed-die forging, open-die forging, or ring rolling to shape the flange, ensuring proper grain flow and structural strength. After forging, excess material is trimmed, and the blanks are cleaned to prepare for heat treatment, which may include normalizing, annealing, or quenching and tempering to achieve the desired mechanical properties. Once heat treatment is complete, the flanges undergo precision machining to create bolt holes, sealing surfaces, bore, and flange faces according to international standards. The finished flanges are then inspected using dimensional checks, non-destructive testing, and material tests to ensure quality and compliance. Finally, each flange is marked, coated with rust-preventive protection if needed, and packed for shipment, ready for use in pipelines and industrial applications.

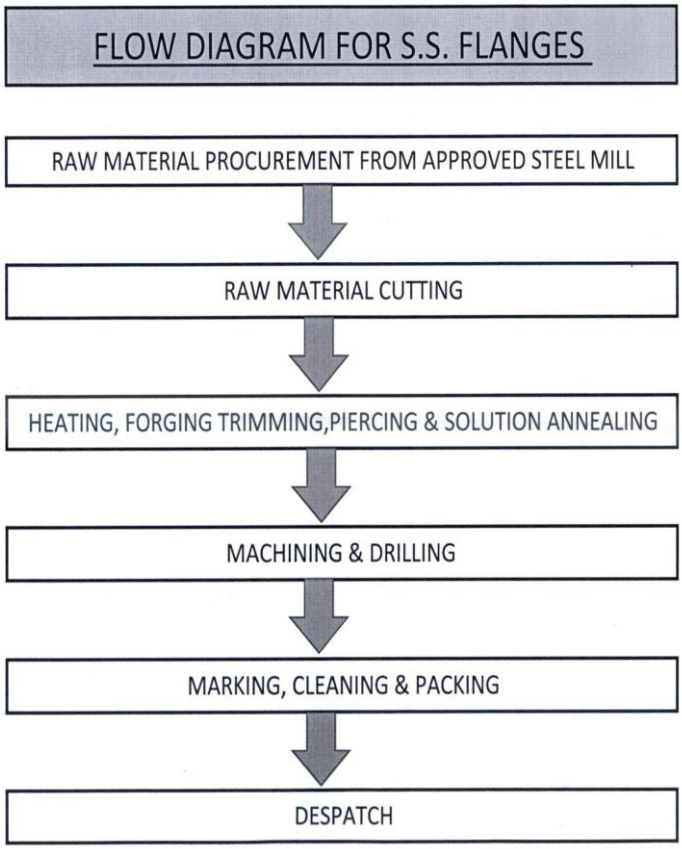


Figure 2. Process flow diagram (Image source: www.echjay.com)

More information:

Allocation and Cut-off rules:

According to the reference PCR, “Construction Products (PCR 2019:14, Version 2.0.1)" in Life Cycle Inventory, the minimum percentage of total mass and energy flows equal to 96% has been respected, considering the flows included in the modules A1-A3, A4, C1, C2, C3, C4 and D of the system boundary. No cut-off has been considered for calculations. Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. Considering the overall

inputs and outputs, mass allocation is used to calculate the inventory for 1 MT (1000Kg) steel flange manufacturing for raw material consumption and resources used for raw material consumption and resources used.

Assumptions:

The following assumptions have been made in this EPD:

- It does not include the manufacturing processes of the capital goods or spare parts and/or maintenance.
- The environmental impact of infrastructure for general management, office and headquarters operations is not included.
- The impact caused by people (common activities, travel for work) is not considered.
- The processes associated with fuel production are intrinsically included in the indicators in the Ecoinvent V 3.11 database used in carrying out the LCA.
- The environmental impact of external transport has been calculated using lorries from the Ecoinvent V 3.11 database, EURO 6. These Lorries have been selected to reflect the most realistic scenario possible.
- Module B is assumed to be zero for the steel flange. The product does not consume energy or water, does not require maintenance, repair, replacement, or refurbishment, and does not generate emissions during its use phase.
- The distance of transportation from the site to the waste processing facility is assumed to be 80 km in Module C2. (Default value from PCR has been considered).
- For the C3 stage, diesel use is estimated at 1.8 kWh per tonne for sorting operations and 7.4 kWh per tonne for steel fragging, following the default data specified in the applicable PCR.
- For Module C4, diesel use associated with disposing waste at landfill is assumed to be 1.6 kWh/t, in accordance with PCR default values.
- The disposal of waste is assumed to be 10% of the total waste generated, and 90% of the waste is assumed to be recycled.

Exclusions:

- No other environmental, economic, and social impacts are declared.

Data collection:

Specific data have been collected in 2025 for the data collection period from January 2025 to December 2025. The data was collected for the Khopoli site, and the site visit was arranged for the same. The evidence for formulating the inventory was gathered from the bills and registers maintained on site during the site visit.

Data quality assessment and declaration:

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP- GHG results for A1- A3 (%)
Raw material	Collected data	EPD owner	2025	Primary data	58.81
Manufacturing of product	Collected data	EPD owner	2025	Primary data	4.07
Generation of electricity used in manufacturing of product	Database	Ecoinvent v3.11	2025	Primary data	33.41
Transport of raw materials to the manufacturing site	Database	Ecoinvent v3.11	2025	Primary data	3.68
Total share of primary data, of GWP- GHG results for A1- A3					~100% (>90%)

Note: The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that does not capture all relevant aspects of data quality. The indicator is not comparable across product categories.

Life Cycle Stage	Data Contribution to GWP (%)	Geographical Representativeness	Temporal Representativeness	Technological Representativeness
A1: Raw Material Supply	58.81	Very Good (Site-specific (India) raw material consumption is considered)	Very Good (2025 data)	Very Good (actual raw materials used)
A2: Transport	3.68	Fair (Global/ RoW data used, not region-specific)	Good (2025 data)	Good (EURO 6 trucks modelled)
A3: Manufacturing	4.07	Very Good (Site-specific in India)	Very Good (2025 primary data)	Very Good (actual process data)
Electricity Supply (used in A3)	33.41	Good (generic India grid)	Good (ecoinvent 2025)	Good (national average processes)

Overall, the data quality for the foreground and background systems is assessed as Good to Very Good, with all key contributing datasets (⩾80% of total impact) meeting acceptable quality thresholds, ensuring reliable LCA results.

Electricity details:

The electricity used for the manufacturing of the steel flanges is sourced from the Indian Western Grid and is considered non-renewable. The climate impact associated with this electricity consumption is 1.41 kg CO_2 eq. per kWh

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	IN	IN	IN	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

(X- Declared modules and ND- modules not declared)

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	5.51E+03	4.32E+02	4.72E+00	3.16E+00	1.58E+01	7.56E-01	3.24E+02	-2.91E+03
GWP-biogenic	kg CO_2 eq.	-3.99E+01	0.00E+00	3.99E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	kg CO_2 eq.	3.25E+00	2.09E-01	8.64E-03	7.20E-04	7.25E-03	1.96E-04	1.48E-01	-1.33E+00
GWP-total	kg CO_2 eq.	5.47E+03	4.32E+02	4.47E+01	3.16E+00	1.58E+01	7.56E-01	3.24E+02	-2.91E+03
ODP	kg CFC 11 eq.	2.88E-05	5.92E-06	6.71E-08	1.62E-07	2.14E-07	4.25E-08	1.19E-06	-1.07E-05
AP	mol H^+ eq.	2.23E+01	4.90E+00	2.17E-02	1.75E-02	3.80E-02	3.25E-03	1.20E+00	-1.08E+01
EP-freshwater	kg P eq.	2.90E+00	3.66E-02	8.13E-04	1.47E-04	1.73E-03	4.54E-05	1.18E-01	-1.06E+00
EP-marine	kg N eq.	5.01E+00	1.21E+00	8.19E-03	2.99E-03	8.70E-03	5.88E-04	2.81E-01	-2.52E+00
EP-terrestrial	mol N eq.	5.23E+01	1.34E+01	8.26E-02	3.25E-02	9.41E-02	6.29E-03	3.06E+00	-2.76E+01
POCP	kg NMVOC eq.	1.76E+01	4.09E+00	2.96E-02	2.83E-02	5.12E-02	6.53E-03	1.03E+00	-9.26E+00
ADP-minerals&metals*	kg Sb eq.	4.31E-03	1.11E-03	2.01E-05	1.80E-06	5.29E-05	4.71E-07	2.98E-04	-2.68E-03
ADP-fossil*	MJ	6.89E+04	5.75E+03	6.53E+01	1.63E+02	2.19E+02	4.12E+01	3.23E+03	-2.90E+04
WDP*	m^3	1.10E+03	2.98E+01	8.01E-01	7.76E-01	1.34E+00	2.55E-01	7.78E+01	-7.00E+02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

** Disclaimer:*

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

If the EPD covers the end-of-life stage: "The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Note: 1. The biogenic carbon in kilograms of CO_2 equivalent is recorded as negative because of packaging material, i.e., wooden box, corrugated sheet. This indicates the carbon uptake by the wood during its growth phase, which offsets emissions to some extent.

2. Negative values in Module D represent the environmental benefits from recycling, reuse, or energy recovery beyond the product's life cycle. These credits highlight the product's contribution to a circular economy by offsetting environmental burdens.

3. As the biogenic carbon emissions are from packaging, A1-A3 emissions are balanced out in module A5 as per the PCR.

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	5.47E+03	4.32E+02	4.47E+01	3.16E+00	1.58E+01	7.56E-01	3.24E+02	-2.91E+03
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017	-								

Resource use indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.09E+03	6.97E+01	2.42E+00	3.90E-01	3.09E+00	1.09E-01	1.12E+02	-1.01E+03
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.09E+03	6.97E+01	2.42E+00	3.90E-01	3.09E+00	1.09E-01	1.12E+02	-1.01E+03
PENRE	MJ	6.89E+04	5.76E+03	6.54E+01	1.63E+02	2.19E+02	4.12E+01	3.23E+03	-2.90E+04
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.89E+04	5.76E+03	6.54E+01	1.63E+02	2.19E+02	4.12E+01	3.23E+03	-2.90E+04
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.10E+03	2.98E+01	8.01E-01	7.76E-01	1.34E+00	2.55E-01	7.78E+01	-7.00E+02
Acronyms		PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Waste indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	5.10E+02	8.64E+00	2.16E-01	4.51E-02	3.71E-01	1.16E-02	4.11E+01	-3.70E+02
Non-hazardous waste disposed	kg	3.66E+03	5.24E+01	4.73E+00	2.98E-01	2.15E+00	7.89E-02	2.67E+02	-2.41E+03
Radioactive waste disposed	kg	2.83E-02	9.82E-04	3.26E-05	6.78E-06	4.37E-05	1.76E-06	1.20E-03	-1.08E-02

Output flow indicators

Indicator	Unit	A1-A3	A4	A5	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	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional LCA results

Additional results for end-of-life 100% scenarios for modules C1-C4, D

1. Mandatory impact indicators (corresponding scenario: 100% recycling)

Indicator	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.16E+00	1.58E+01	7.56E-01	0.00E+00	-3.23E+03
GWP-biogenic	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+01
GWP- luluc	kg CO_2 eq.	7.20E-04	7.25E-03	1.96E-04	0.00E+00	-1.48E+00
GWP- total	kg CO_2 eq.	3.16E+00	1.58E+01	7.56E-01	0.00E+00	-3.22E+03
ODP	kg CFC 11 eq.	1.62E-07	2.14E-07	4.25E-08	0.00E+00	-1.19E-05
AP	mol H^+ eq.	1.75E-02	3.80E-02	3.25E-03	0.00E+00	-1.20E+01
EP-freshwater	kg P eq.	1.47E-04	1.73E-03	4.54E-05	0.00E+00	-1.18E+00
EP- marine	kg N eq.	2.99E-03	8.70E-03	5.88E-04	0.00E+00	-2.80E+00
EP-terrestrial	mol N eq.	3.25E-02	9.41E-02	6.29E-03	0.00E+00	-3.06E+01
POCP	kg NMVOC eq.	2.83E-02	5.12E-02	6.53E-03	0.00E+00	-1.03E+01
ADP-minerals&metals*	kg Sb eq.	1.80E-06	5.29E-05	4.71E-07	0.00E+00	-2.98E-03
ADP-fossil*	MJ	1.63E+02	2.19E+02	4.12E+01	0.00E+00	-3.23E+04
WDP	m^3	7.76E-01	1.34E+00	2.55E-01	0.00E+00	-7.78E+02

2. Mandatory impact indicators (corresponding scenario: 100% disposal)

Indicator	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.16E+00	1.58E+01	7.56E-01	3.23E+03	0.00E+00
GWP-biogenic	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	-1.09E+01	0.00E+00
GWP- luluc	kg CO_2 eq.	7.20E-04	7.25E-03	1.96E-04	1.48E+00	0.00E+00
GWP- total	kg CO_2 eq.	3.16E+00	1.58E+01	7.56E-01	3.22E+03	0.00E+00
ODP	kg CFC 11 eq.	1.62E-07	2.14E-07	4.25E-08	1.19E-05	0.00E+00
AP	mol H^+ eq.	1.75E-02	3.80E-02	3.25E-03	1.20E+01	0.00E+00
EP-freshwater	kg P eq.	1.47E-04	1.73E-03	4.54E-05	1.18E+00	0.00E+00
EP- marine	kg N eq.	2.99E-03	8.70E-03	5.88E-04	2.80E+00	0.00E+00
EP-terrestrial	mol N eq.	3.25E-02	9.41E-02	6.29E-03	3.06E+01	0.00E+00
POCP	kg NMVOC eq.	2.83E-02	5.12E-02	6.53E-03	1.03E+01	0.00E+00
ADP-minerals&metals*	kg Sb eq.	1.80E-06	5.29E-05	4.71E-07	2.98E-03	0.00E+00
ADP-fossil*	MJ	1.63E+02	2.19E+02	4.12E+01	3.23E+04	0.00E+00
WDP	m^3	7.76E-01	1.34E+00	2.55E-01	7.78E+02	0.00E+00

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO_2 eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO_2 eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO_2 eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO_2 eq.)
GWP-total	Total Global Warming Potential (kg CO_2 eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO_2 eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H^+ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m^3)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m^3)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)

EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m^3	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO_2 eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO_2 eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

REFERENCES

- EPD International (2017) General Programme Instructions for the InternationalEPD® System. Version 5.0.1, dated 2025-02-27. www.environdec.com
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VERSION HISTORY

Original Version of the EPD, 2026-02-12

EPD
INTERNATIONAL EPD SYSTEM
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