Environmental Product Declaration

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

[*Wafer Butterfly Valve*]

from

[*Tianjin Galaxy Valve Co., Ltd*]

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Type of EPD:	EPD of a single product from a manufacturer
EPD registration number:	EPD-IES-0029306:001
Version date:	2026-03-13
Validity date:	2031-03-12
	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>*
PCR review was conducted by: Rob Rouwette (chair) and Noa Meron (co-chair) who can be contacted via support@environdec.com.

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 individual verifier: *<Martijn van Hövell>* Approved by: International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

EPDs within the same product category but published in different EPD programmes, 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: Tianjin Galaxy Valve Co., Ltd.
Address: No.49, Guanghui Road, Beizha Town, Jinnan District, Tianjin, China.
Contact: Fei Gao, info@galaxyvalves.com
Description of the organisation: Galaxy is an enterprise suppling full-service valves with vertical-integration supply chain which established in 2003 and located in Tianjin, China. Now, Galaxy integrated Castings, Machining, Rubber Dealing, Painting, Assembling, Color Painting, Warehousing, Testing, etc.

Galaxy has an independent R&D center covering an area of 3,000 square meters in Tianjin production facility. The center provides strong support for the research and development of new products, the optimization and upgrading of product lines, and the sustainable development of Galaxy valve products. Currently, Galaxy operates from two facilities in Tianjin China and Bangkok, Thailand.

In the future, Galaxy will dedicate to expediting the world's journey towards a more sustainable future and keep in close contact with the customers with tailored product for each regional market, actively participate in global competition, and strive to build itself into a trusted world-class company.

Product-related or management system-related certifications: Galaxy has been accredited by international certification authorities, including ISO9001, ISO45001, ISO14001. In addition, the company has been approved and/or listed by authorized organizations of various applications, including FM, UL, CCS, WRAS, Watermark, NSF, ABS, BV, CCS, DNV, LR.

PRODUCT INFORMATION

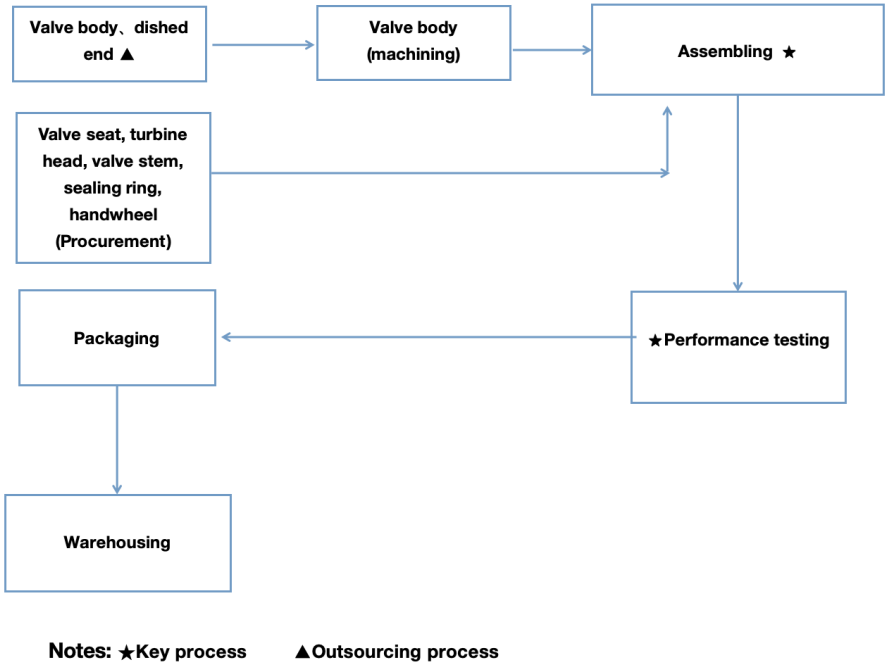
Product name: Wafer Butterfly Valve
Product identification:
Name: Wafer Butterfly Valve
Size: DN50 ~ DN600 (DN100 is the chose model for the declaration)
Design Standard: BS EN593 / MSS SP-67
Test Standard: BS EN 12266 /
Top Flange Standard: ISO 5211

Visual representation of the product

UN CPC code: 43240 Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like
Product description: A butterfly valve is a widely used type of valve, with simple structure and quick to open and close feature. Core function is to cut off or regulate the flow of fluid in the pipeline. Galaxy offers a wide range of valve for diverse industries and applications including commercial building, data center, industrial factory, marine, fire protection, waterworks and others.

Features:
1. Completely sealed in both directions - airtight grade.
2. Valve plate has a precision-machined spherical sealing surface, which has low torque and long service life.
3. Three self-lubricating bushings on the valve stem prevent the valve stem from deflecting.
4. Scientific design with excellent flow characteristics and low-pressure loss.
5. The valve has passed the sulfur dioxide corrosion resistance test and salt spray test.
6. Four flange positioning holes ensure the correct position of the valve during installation.
7. Can be installed in any direction.
8. Free for maintenance

Production process stages of valves: The production takes place in Tianjin, China. For simplification purposes, only main stages of manufacturing are presented. The production process starts from outsourcing process of valve body and dished end. And then the valve body will be machined in the factory, Valve seat, turbine head, valve stem, sealing ring, and handwheel will be procured and transported into the factory. After that, all the parts will be assembled and go to performance testing process to ensure the valve reaches the designated quality. Finally, it will be packaged and warehoused.



Name and location of production site(s): Tianjin Galaxy Valve Co., Ltd
For more information about the product please see https://www.galaxyvalves.com/butterfly-valve/

CONTENT DECLARATION

The mass (weight) of one unit of a product, as purchased: 5.518kg per product.

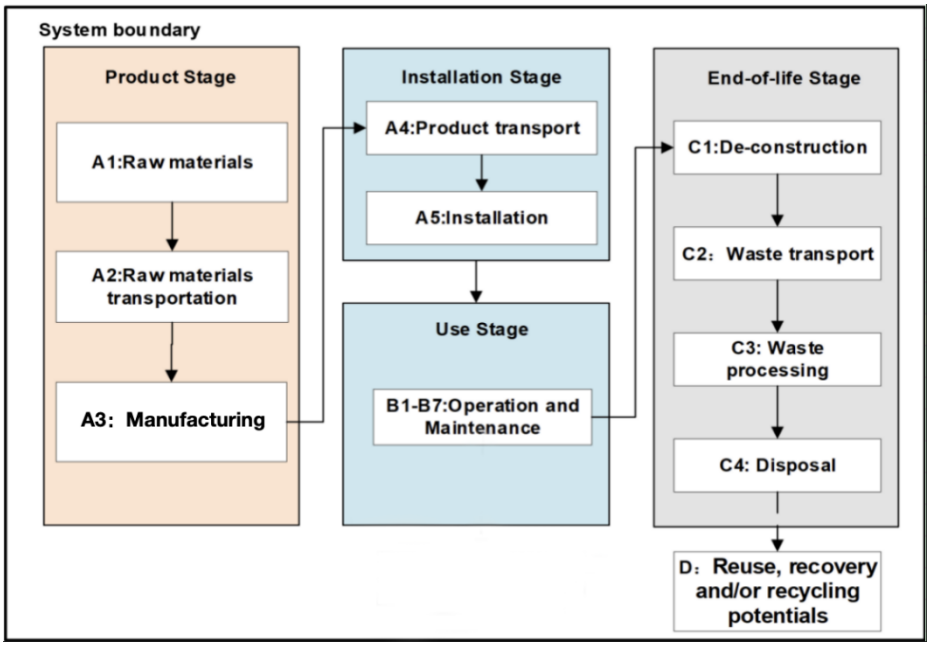
Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Stainless steel	1.466	0%	0%	0
Steel	0	0%	0%	0
Iron	3.6	0%	0%	0
Aluminium	0.002	0%	0%	0
Rubber	0.42	0%	0%	0
Plastics	0.03	0%	0%	0
TOTAL	**5.518**	**0%**	**0%**	**0**

No substance in the product greater than 0.10% by weight is present on the “Candidate List of Substances of Very High Concern (SVHC)” under the REACH legislation.

The product does not contain any other substances with hazardous and toxic properties that can be of concern for human health and/or the environment.

LCA INFORMATION

Declared unit: 1kg of the valve
Product’s lifespan: 10 years
Time representativeness: July, 2024 to June, 2025
Geographical scope: Modules A1-A3 in China, A4 Globally. Modules A4-A5, B, C and D in EU.
Database(s) and LCA software used: Ecoinvent 3.11 and SimaPro 10.2.0.0
Description of system boundaries:
Cradle to gate with options, modules C1-C4, module D and with optional modules (A1-A3 + C + D and A4-A5, B1-B7)
Process flow diagram:



More information:

The climate impact (in kg CO_2 eq./kWh using the GWP-GHG indicator) of electricity and natural gas purchased in the manufacturing process in A3 is declared below.

Consumption type	Electricity process type	GWP
Electricity use in manufacturing stage (from grid)	Electricity, medium voltage {CN-NCGC}| market for electricity, medium voltage | Cut-off, U	1.03E+0 kg CO_2eq./kWh
Electricity use in manufacturing stage (from PV)	Electricity, low voltage {CN-TJ}| electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted | Cut-off, U	5.52E-6 kg CO_2eq./kWh
Natural gas use in manufacturing stage	Natural gas, high pressure {CN}| market for natural gas, high pressure | Cut-off, U	5.37E-1 kg CO_2eq./m^3

Scenario used in the modelling of downstream stages and module D is listed below. In this study, PEF EoL default values in Europe is referred.

IEC62474 Classname	IEC62474 ID	Recycling	Incineration	Landfill
Stainless steel	M-100	85.00%	5.25%	9.75%
Other ferrous alloys, non-stainless steels	M-119	85.00%	5.25%	9.75%
Aluminium and its alloys	M-120	90.00%	3.50%	6.50%
Other unfilled thermoplastics	M-249	0.00%	5.00%	95.00%
Ethylene-Propylene-Diene-Rubber (EPDM)	M-324	94.00%	1.00%	5.00%
Other organic materials	M-399	0.00%	35.00%	65.00%

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

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	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	x	x	x	x	x	x	x	x	x	x	x	x
Geography	CN	CN	CN	GLO	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU
Share of primary data	2.25%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%				-	-	-	-	-	-	-	-	-	-	-	-	-

Process	**Source type**	**Source**	**Reference year**	**Data category**	**Share of primary data, of GWP-GHG results for A1-A3**
Electricity and natural gas use, emission, solid and hazardous waste, transport of waste in Manufacturing	Collected data	EPD owner	2024, 2025	Primary data	2.10%
Transport of raw material to manufacturing site	Collected data	EPD owner	2024, 2025	Primary data	0.15%
Production of chromium steel	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Production of Tetrafluoroethylene	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Production of cast iron	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Metal working for chromium steel	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Metal working for cast iron	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Other processes	Database	Ecoinvent v3.11	2024, 2025	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3					2.25%

Steps were taken to ensure that the LCI data were reliable and representative. The type of data that was used is clearly stated in the inventory analysis in LCA report, be it measured or calculated from primary sources or whether data are from the LCI databases. In this study, the data quality requirements were as follows:

• Specific data of the considered system (such as materials or energy flows that enter the production system, emissions and waste output from the production system) was collected from the manufacturer based on production inventory from July 2024 to June 2025. The time period is representative.

• The background datasets selected from Ecoinvent are at most 6 years old.

• The LCI data related to the geographical locations where the processes occurred.

• The technology represented the average technologies at the time of data collection.

The overall data quality is good.

Allocation

The allocation is made in accordance with the provisions of EN 15804+A2:2019/AC:2021 and Core PCR. Allocation refers to the partitioning of input or output flows of a process or a product system between the product systems under study and one or more other product systems. In this study, there are three types of allocation procedures considered:

a. Multi-input allocation

For data sets in this study, raw materials of different valves are based on the BOM from Galaxy, no allocation is used at the stage. As for the manufacturing process, the energy consumption, emission and waste are allocated based on production volume of different valves, i.e., the electricity consumption and the emissions are calculated based on the ratio of production volume of each valve to total production volume in factory in the year.

b. Multi-output allocation

No other by-products are produced from the production, hence there is no production of by-products that need to be used to allocate the situation.

c. End-of-life allocation

The polluter pays and the modularity principles as well have been followed.

d. Allocation of materials for recycling:

- Post-consumer: When a flow enters the manufacturing process (A1-A3), it is treated with waste allocation (as defined in EN15804+A2). All the steps after its “End of Waste” status are quantified. The incoming flow contributes to module D and Secondary Materials indicator.
- Pre-consumer: When a flow enters the manufacturing process (A1-A3), it is considered as an incoming co-product that bears a fraction of the impact of the original manufacturing process where it was generated.

Cut-off criteria

- All inputs and outputs to a (unit) process are included in the calculation for which data is available. Data gaps are filled by conservative assumptions with average or generic data. Any assumptions for such choices are documented;
- According to PCR, life cycle inventory data shall according to EN 15804 include a minimum of 95% of total inflows (mass and energy) per module. In addition, if less than 100% of the inflows

are accounted for, proxy data or extrapolation should be used to achieve 100% completeness. The requirements are fulfilled in this study;

- Infrastructure/capital goods for upstream, core and downstream processes is excluded.

Flow name	Process stage	Mass %	Criteria to cut-off
Devices external to the systems itself required for installation	Installation stage	N/A	Cut-off due to small impact
Any extraordinary maintenance done on the product	Use & Maintenance	N/A	Specified in PCR
Devices external to the systems itself required for deconstruction	Deconstruction stage	N/A	Cut-off due to small impact
Total cut-off mass % estimated			<5%

A4 Distribution stage

For the distribution stage, this study takes EU as the target market. The transportation destination is provided by Galaxy. The route and distance are assumed based on map. The products are firstly transported from the manufacturing site, Tianjin plant, to Tianjin Port, with a 45.7km distance by lorry. Then, it is transported through container ship from Tianjin Port to Marseilles Port. And, the product will be transported 500km from Marseilles Port to warehouse and further to customer by lorry. A 16-32 metric ton EURO 5 lorry is selected to be the transportation vehicle for the road transportation, in the absence of primary data on the category of lorry. The distribution information is shown below.

Sales market	Transportation vehicle	Distance (km)	Start location	End location
Europe	Lorry 16-32 metric ton, EURO 5	45.7km	Tianjin plant	Tianjin Port
	Container ship	17205.08km	Tianjin Port	Marseilles Port
	Lorry 16-32 metric ton, EURO 5	500km	Marseilles Port	Warehouse and customer

A5 Installation stage

In the installation stage, the energy use is negligible since the installation process is mainly done manually. According to the product category rules (PCR), end of life of the packaging material is considered in this stage.

B1-B7 Use stage

The Galaxy valves are designed to be free of maintenance during its service life. And there is no electricity and water use during this stage. Therefore, no inputs and outputs are taken place in the stage in this study.

C1-C4 End-of-life stage

For end-of-life (EoL) stage, assumptions are made according to the PCR due to a lack of data. De-installation stage of valves is assumed to be demolition of steel, wood, and other materials in the PCR, which use 1.1 kWh diesel per tonne. Waste transportation distance from the de-installation plant to the waste treatment facilities is assumed to 130km for that to be incinerated. Others are 80km. The vehicle used is assumed as EURO 5 lorry with 16 - 32 ton capacity. The valves disposal and recycling stage involves removing valuable materials and metal scraps. The most recyclable materials constitute the metal components. In this study, PEF EoL default values in Europe is referred. The proportions of recycling, incineration and landfill of each material are listed below.

Disposal scenarios proportion

IEC62474 Classname	IEC62474 ID	Recycling	Incineration	Landfill
Stainless steel	M-100	85.00%	5.25%	9.75%
Other ferrous alloys, non-stainless steels	M-119	85.00%	5.25%	9.75%
Aluminium and its alloys	M-120	90.00%	3.50%	6.50%
Other unfilled thermoplastics	M-249	0.00%	5.00%	95.00%
Ethylene-Propylene-Diene-Rubber (EPDM)	M-324	0.00%	35.00%	65.00%
Other organic materials	M-399	0.00%	35.00%	65.00%

Materials mass, transported distance and means of transport in C2. Processes and mass in C3, and landfill mass in C4 are listed below.

Data for modelling module C

Processes in C1	**kg per DU**	**Energy carrier**	**Quantity(kWh/tonne)**
Demolition of steel, and other materials	1	Diesel	1.1
Processes in C2	**kg per DU**	**Distance**	**Means of transport**
Transport (recycling and landfill)	0.925	80km	16-32 tonne lorry EURO 5
Transport (incineration)	0.075	130km	
Processes in C3	**kg per DU**	**Energy carrier**	**Quantity(kWh/tonne)**
Loading and unloading at sorting facility	1	Diesel	1.8
Mechanical sorting	1	Electricity	2.2
Fragging of steel	0.918	Diesel	7.4
Treatment of other materials	0.082	Diesel	0.8
Processes in C4	**kg per DU**	**Energy carrier**	**Quantity(kWh/tonne)**
Compacting of inert construction waste for landfills (including backfilling)	0.049	Diesel	1.6

ENVIRONMENTAL PERFORMANCE

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

Mandatory impact category indicators according to EN 15804

Results for 1kg of the Valve																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	4.03E+00	5.07E-01	1.70E+00	0	0	0	0	0	0	0	3.70E-03	1.28E-02	3.61E-03	1.05E-01	-1.10E+00
GWP-fossil	kg CO_2 eq.	5.58E+00	5.07E-01	2.49E-02	0	0	0	0	0	0	0	3.70E-03	1.28E-02	3.61E-03	9.25E-02	-1.33E+00
GWP-biogenic	kg CO_2 eq.	-1.56E+00	2.54E-05	1.67E+00	0	0	0	0	0	0	0	1.63E-07	4.46E-07	1.75E-06	1.23E-02	2.25E-01
GWP-luluc	kg CO_2 eq.	5.70E-03	2.03E-05	4.86E-06	0	0	0	0	0	0	0	1.35E-07	2.03E-07	2.20E-06	5.33E-07	-9.24E-04
ODP	kg CFC 11 eq.	1.91E-05	6.82E-09	5.41E-10	0	0	0	0	0	0	0	5.58E-11	2.92E-10	5.45E-11	5.63E-11	-7.06E-09
AP	mol H^+ eq.	2.18E-02	1.07E-02	1.29E-04	0	0	0	0	0	0	0	4.66E-05	3.31E-05	4.00E-05	2.67E-05	-5.59E-03
EP-freshwater	kg P eq.	2.77E-04	1.50E-06	1.63E-07	0	0	0	0	0	0	0	2.82E-09	7.93E-09	7.14E-08	2.10E-07	-7.86E-05
EP-marine	kg N eq.	4.37E-03	2.72E-03	5.88E-05	0	0	0	0	0	0	0	2.17E-05	1.26E-05	1.75E-05	7.77E-05	-1.10E-03
EP-terrestrial	mol N eq.	4.62E-02	3.02E-02	5.96E-04	0	0	0	0	0	0	0	2.37E-04	1.38E-04	1.92E-04	1.10E-04	-1.25E-02
POCP	kg NMVOC eq.	1.61E-02	8.28E-03	1.99E-04	0	0	0	0	0	0	0	6.64E-05	5.49E-05	5.39E-05	3.35E-05	-4.17E-03
ADP-minerals &metals*	kg Sb eq.	4.41E-05	1.72E-08	2.31E-09	0	0	0	0	0	0	0	1.02E-10	3.35E-10	1.26E-10	5.44E-10	-1.23E-05
ADP-fossil*	MJ	6.21E+01	6.37E+00	3.69E-01	0	0	0	0	0	0	0	4.79E-02	1.71E-01	5.43E-02	3.77E-02	-1.47E+01
WDP*	m^3	1.01E+00	4.48E-03	-7.13E-02	0	0	0	0	0	0	0	3.05E-05	5.59E-05	1.74E-04	-1.36E-03	-1.80E-01
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 results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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.

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).

Additional mandatory and voluntary impact category indicators

Results for 1kg of the Valve																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO2 eq.	5.59E+00	5.07E-01	2.49E-02	0	0	0	0	0	0	0	3.70E-03	1.28E-02	3.61E-03	9.25E-02	-1.33E+00
Ecotoxicity, freshwater	CTU e	3.52E+01	3.60E-01	7.86E-02	0	0	0	0	0	0	0	1.31E-03	6.10E-03	2.36E-03	5.51E-01	-8.67E+00
Particulate matter	disease inc.	3.86E-07	1.90E-08	2.15E-09	0	0	0	0	0	0	0	5.74E-11	8.54E-10	5.28E-11	3.38E-10	-1.03E-07
Human toxicity, cancer	CTU h	7.68E-09	6.06E-11	8.22E-12	0	0	0	0	0	0	0	1.12E-13	8.65E-13	1.62E-13	2.89E-12	-1.83E-09
Human toxicity, non-cancer	CTU h	2.39E-07	1.80E-09	6.59E-10	0	0	0	0	0	0	0	5.62E-12	8.51E-11	8.01E-12	1.81E-10	-1.08E-08
Ionising radiation	kBq U-235 eq	1.23E-01	4.85E-04	2.00E-04	0	0	0	0	0	0	0	3.62E-06	1.64E-05	1.53E-04	6.71E-05	-2.16E-02
Land use	Pt	4.65E+01	2.96E-02	2.51E-01	0	0	0	0	0	0	0	6.24E-05	2.17E-04	1.94E-03	4.00E-02	-7.28E+00

Resource use indicators

Results for 1kg of the Valve																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	9.52E+00	1.23E-02	5.76E+00	0	0	0	0	0	0	0	9.11E-05	4.26E-04	3.84E-03	1.08E-03	-2.62E+00
PERM	MJ	5.75E+00	0.00E+00	-5.75E+00	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.53E+01	1.23E-02	5.44E-03	0	0	0	0	0	0	0	9.11E-05	4.26E-04	3.84E-03	1.08E-03	-2.62E+00
PENRE	MJ	3.11E+01	2.02E-01	2.17E-02	0	0	0	0	0	0	0	3.88E-04	1.13E-03	1.26E-02	2.06E+00	0.00E+00
PENRM	MJ	2.05E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	-2.05E+00	0.00E+00
PENRT	MJ	3.32E+01	2.02E-01	2.17E-02	0	0	0	0	0	0	0	3.88E-04	1.13E-03	1.26E-02	7.10E-03	-1.08E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	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	0	0	0	0	0	0	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	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.35E-02	1.76E-04	-1.64E-03	0	0	0	0	0	0	0	1.30E-06	3.30E-06	1.11E-05	-3.58E-05	-6.24E-03
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

Results for 1kg of the Valve															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	3.36E-04	3.49E-05	2.36E-06	0	0	0	0	0	0	0	3.28E-07	1.14E-06	2.89E-07	3.67E-07	-1.10E-04
Non-hazardous waste disposed	kg	2.01E-01	2.67E-04	4.56E-01	0	0	0	0	0	0	0	1.42E-06	5.64E-06	1.14E-05	1.45E-01	-5.04E-02
Radioactive waste disposed	kg	8.27E-05	2.66E-07	1.54E-07	0	0	0	0	0	0	0	1.98E-09	1.03E-08	1.24E-07	7.82E-08	-1.48E-05

Output flow indicators

Results for 1kg of the Valve																
Indicator	**Unit**	**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	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	4.57E-02	0.00E+00	3.00E-01	0	0	0	0	0	0	0	0.00E+00	0.00E+00	7.81E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	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	8.58E-01	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	1.72E-01	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	4.26E-01	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	8.75E-02	0.00E+00

Additional LCA results (other environmental performance results) of the product(s)

C1-D results for 100% recycling scenario

Indicator	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.70E-03	1.23E-02	3.63E-03	0	-2.29E+00
GWP-fossil	kg CO2 eq.	3.70E-03	1.23E-02	3.61E-03	0	-2.52E+00
GWP-biogenic	kg CO2 eq.	5.92E-07	2.76E-06	2.60E-05	0	2.26E-01
GWP-luluc	kg CO2 eq.	1.35E-07	1.94E-07	2.20E-06	0	-1.22E-03
ODP	kg CFC 11 eq.	5.58E-11	2.79E-10	5.45E-11	0	-1.91E-05
AP	mol H+ eq.	4.66E-05	3.17E-05	4.00E-05	0	-7.58E-03
EP-freshwater	kg P eq.	2.82E-09	7.57E-09	7.14E-08	0	-9.65E-05
EP-marine	kg N eq.	2.17E-05	1.21E-05	1.75E-05	0	-1.46E-03
EP-terrestrial	mol N eq.	2.37E-04	1.32E-04	1.92E-04	0	-1.65E-02
POCP	kg NMVOC eq.	6.64E-05	5.24E-05	5.39E-05	0	-6.24E-03
ADP-minerals&metals*	kg Sb eq.	1.02E-10	3.20E-10	1.26E-10	0	-1.72E-05
ADP-fossil*	MJ	4.79E-02	1.63E-01	5.43E-02	0	-2.31E+01
WDP*	m3	3.05E-05	5.34E-05	1.74E-04	0	-3.39E-01

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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.

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).

C1-D results for 100% incineration scenario

Indicator	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.70E-03	1.99E-02	3.63E-03	2.60E-01	1.74E-01
GWP-fossil	kg CO2 eq.	3.70E-03	1.99E-02	3.61E-03	2.60E-01	-5.83E-02
GWP-biogenic	kg CO2 eq.	5.92E-07	4.48E-06	2.60E-05	4.93E-05	2.33E-01
GWP-luluc	kg CO2 eq.	1.35E-07	3.15E-07	2.20E-06	9.49E-07	-2.60E-04
ODP	kg CFC 11 eq.	5.58E-11	4.53E-10	5.45E-11	2.46E-10	-7.68E-10
AP	mol H+ eq.	4.66E-05	5.15E-05	4.00E-05	8.65E-05	-2.87E-04
EP-freshwater	kg P eq.	2.82E-09	1.23E-08	7.14E-08	6.68E-08	-4.78E-06
EP-marine	kg N eq.	2.17E-05	1.96E-05	1.75E-05	3.82E-05	-5.12E-05
EP-terrestrial	mol N eq.	2.37E-04	2.14E-04	1.92E-04	4.19E-04	-5.58E-04
POCP	kg NMVOC eq.	6.64E-05	8.52E-05	5.39E-05	1.20E-04	-1.77E-04
ADP-minerals&metals*	kg Sb eq.	1.02E-10	5.20E-10	1.26E-10	1.48E-09	-4.59E-09
ADP-fossil*	MJ	4.79E-02	2.65E-01	5.43E-02	1.35E-01	-1.19E+00
WDP*	m3	3.05E-05	8.67E-05	1.74E-04	-3.40E-04	-1.35E-02

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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.

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).

C1-D results for 100% landfill scenario

Indicator	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.70E-03	1.23E-02	3.63E-03	3.85E-02	1.98E-01
GWP-fossil	kg CO2 eq.	3.70E-03	1.23E-02	3.61E-03	1.40E-02	-3.50E-02

GWP-biogenic	kg CO2 eq.	5.92E-07	2.76E-06	2.60E-05	2.45E-02	2.34E-01
GWP-luluc	kg CO2 eq.	1.35E-07	1.94E-07	2.20E-06	5.49E-07	-1.90E-04
ODP	kg CFC 11 eq.	5.58E-11	2.79E-10	5.45E-11	7.40E-11	-4.13E-10
AP	mol H+ eq.	4.66E-05	3.17E-05	4.00E-05	4.51E-05	-1.75E-04
EP-freshwater	kg P eq.	2.82E-09	7.57E-09	7.14E-08	3.08E-07	-2.45E-06
EP-marine	kg N eq.	2.17E-05	1.21E-05	1.75E-05	1.22E-04	-3.65E-05
EP-terrestrial	mol N eq.	2.37E-04	1.32E-04	1.92E-04	1.99E-04	-3.92E-04
POCP	kg NMVOC eq.	6.64E-05	5.24E-05	5.39E-05	6.35E-05	-1.24E-04
ADP-minerals&metals*	kg Sb eq.	1.02E-10	3.20E-10	1.26E-10	3.12E-10	-3.04E-09
ADP-fossil*	MJ	4.79E-02	1.63E-01	5.43E-02	6.70E-02	-6.37E-01
WDP*	m3	3.05E-05	5.34E-05	1.74E-04	-1.28E-03	-8.44E-03

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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.

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).

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
AP	Acidification potential
BOM	Bill of materials
CPC	Central product classification
CRU	Components for re-use
EE	Exported energy per energy carrier
EF	Environmental footprint
EN	European Norm (Standard)
EP	Eutrophication potential
EPD	Environmental Product Declaration
FW	Use of net fresh water
GPI	General Programme Instructions
GWP	Global Warming Potential

HWD	Hazardous waste disposed
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
LCA	Life cycle assessment
LCI	Life cycle inventory
LCIA	Life cycle impact assessment
LULUC	Land Use, Land-Use Change
MER	Materials for energy recovery
MFR	Materials for recycling
ND	Not Declared
NHWD	Non-hazardous waste disposed
NRSF	Use of none renewable secondary fuels
PCR	Product Category Rules
PEF	Production Environmental Footprint
PENRE	Non-renewable primary resources used as an energy carrier (fuel)
PENRM	Non-renewable primary resources with energy content used as material
PENRT	Total use of non-renewable primary energy resources
PERE	Renewable primary energy used as energy carrier (fuel)
PERM	Renewable primary resources with energy content used as material
PERT	Total use of renewable primary energy resources
POFP	Photochemical oxidant formation potential
PPP	Polluter pays principles
PV	Photovoltaic
RSF	Use of renewable secondary fuels
RSL	Reference Service Life
RWD	Radioactive waste disposed
SM	Secondary materials

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