Environmental Product Declaration

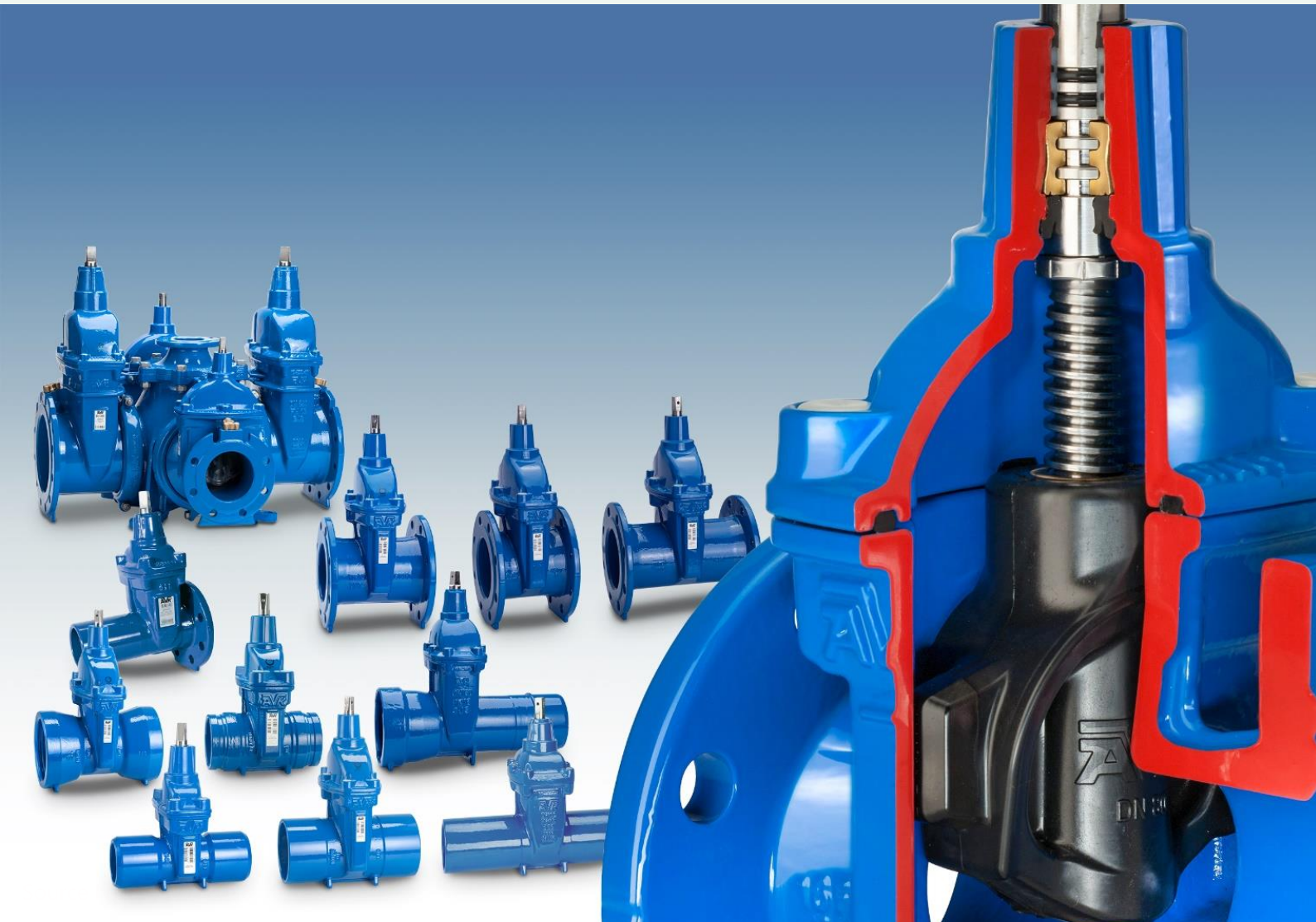
In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Resilient seated gate valves

AVK International A/S

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-09366
Publication date:	2023-06-02
Valid until:	2028-06-01

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at 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:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
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, UN CPC code: 412*
PCR review was conducted by: *The Technical Committee of the International EPD@ System*
Life Cycle Assessment (LCA)
LCA accountability: *Jesper Kokborg Lassen, EnergySolution A/S, www.EnergySolution.dk*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by individual verifier Third-party verifier: <*Vito D'Incognito; Take Care International,*  > Approved by: The 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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: AVK International A/S
Contact: Niels Jørgen Hedegaard, +45 87 54 21 00.
Description of the organisation: AVK International A/S is part of the AVK Group, a privately owned Danish company employing +4,800 people worldwide. At AVK International A/S, we manufacture valves and accessories, and thanks to additional product types from other AVK factories, we are able to offer a wide selection of high-quality products to the markets in our geographical region covering Continental Europe, Central Asian and Caucasian countries and North Africa.
Product-related or management system-related certifications: AVK International is certified for: ISO 9001, ISO 14001, ISO 45001, ISO 50001, ISO29001
Name and location of production site(s): AVK International A/S, Smedeskovvej 40, 8464, Galten, Denmark

Product information

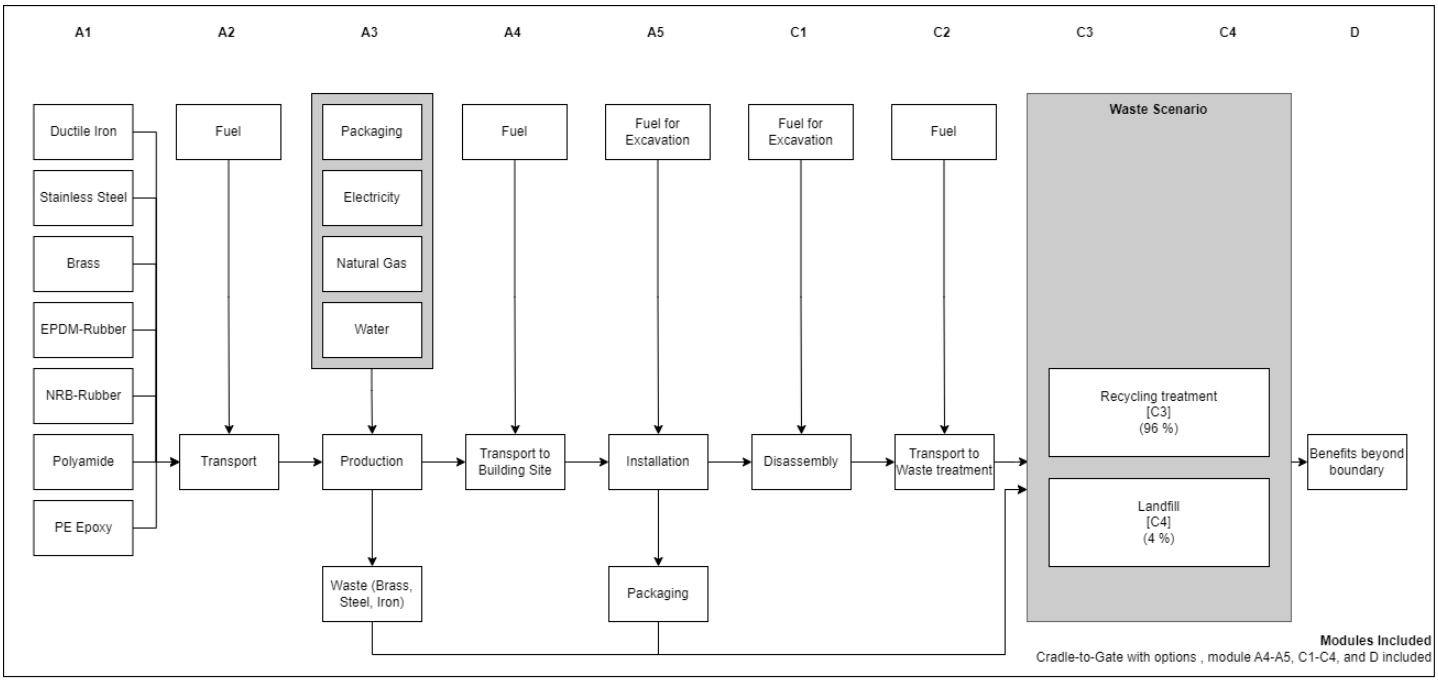
Product name: Resilient seated gate valves
Product identification: Resilient seated gate valves
Product description: AVK International's resilient seated gate valves are designed for underground installation, with their primary function being the facilitation of the distribution of drinking water. The valves are part of the intermediate distribution system utilized in combination with the piping system. The valves within this study do not embody any motorized or electric components. AVK International's valves require no maintenance or inspection once installed and are only assumed to need repair/replacement if exterior damage is inflicted upon them.
Geographical scope: Global

LCA information

Functional unit / declared unit: 1 "average" kg of Resilient seated gate valves
Reference service life: Not applicable
Time representativeness: Data input was collected in November 2022- February 2023, based on data related to the year 2022. All generic data refer to the Ecoinvent v3.8 database.
Database(s) and LCA software used: Ecoinvent v3.8, SimaPro v9.4.
Description of system boundaries: Cradle to gate, with options (A1-A3, A4, A5, C1-C4, D)

The following information describes the scenarios in the different modules of the EPD.
Module A1-A3 = Sourcing of raw materials from the world, primarily EU, and production in DK. Primary shipping, and transport contributors are tied to China, India.
Module A4 = An average of 80 km for the transport to the assembly place. Numbers are based on the average for the fiscal year of 2022.
Module A5 = Installation is performed underground by excavation. The average installation depth is 1.6 m below the earth's surface. Bolts required for installation are included per 15804+A2.
Module C1 = Removal of the valve is performed by excavation handled by assumed professionals.
Module C2 = Transportation from dismantling site to waste treatment facility with an average of 270 km.
Module C3, and C4 = Waste treatment of the product. The product containing 96 % metals is assumed to be waste treated as a collective unit. The remaining 4 % are assumed to generate slag during the recycling of the metals, as limited separation is performed during waste handling.
Module D = Benefits beyond the system are tied to the recycling of metals, and the subsequent substitution of iron cf. Annex D in 15804+A2.

System Diagram



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	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	GLO, EU	GLO, EU	GLO, EU	GLO, EU	GLO, EU								GLO, EU	GLO, EU	GLO, EU	GLO, EU	GLO, EU
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	>10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

Content information

The resilient seated gate valves consist of the following main components:

- Body and bonnet of ductile iron with fusion-bonded epoxy coating
- Wedge of ductile iron fully vulcanized with EPDM rubber
- Stem of stainless steel
- Wedge nut and thrust collar of brass
- Bearing of polyamide and seals of EPDM rubber

The composition of a valve, per declared unit is as follows:

Product Components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Iron	9.20E-01	0	0
Stainless steel	3.47E-02	0	0
Brass	7.09E-03	0	0
Rubber	1.73E-02	0	0
Coating	1.96E-02	0	0
Polyamide	5.78E-04	0	0
TOTAL	1.00E+00	0	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Pallet	1.11E-05	0.00%	
Cardboard	1.70E-04	0.02%	
Plastic (PE)	1.11E-04	0.01%	
TOTAL	2.92E-04	0.03%	

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
Lead	231-100-4	7439-92-1	<0.1 %

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit									
Indicator	**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	2.06E+00	2.87E-02	1.00E-01	1.58E-02	1.30E-02	2.96E-02	3.13E-02	-9.81E-01
GWP-biogenic	kg CO2 eq.	5.68E-03	2.19E-05	5.78E-04	7.50E-06	1.27E-05	3.15E-02	1.60E-06	5.19E-03
GWP-luluc	kg CO2 eq.	1.69E-03	1.22E-05	8.75E-05	1.98E-06	4.86E-06	2.17E-05	2.38E-07	-7.64E-04
GWP-total	kg CO2 eq.	2.07E+00	2.87E-02	1.01E-01	1.58E-02	1.30E-02	6.12E-02	3.13E-02	-9.83E-01
ODP	kg CFC 11 eq.	1.38E-07	6.92E-09	7.34E-09	3.41E-09	3.27E-09	3.01E-09	1.23E-10	-4.54E-08
AP	mol H+ eq.	1.67E-02	2.11E-04	6.61E-04	1.62E-04	4.17E-05	1.50E-04	6.68E-06	-4.28E-03
EP-freshwater	kg P eq.	1.12E-03	1.80E-06	3.04E-05	7.72E-07	8.51E-07	9.14E-06	6.05E-08	-3.70E-04
EP-marine	kg N eq.	2.89E-03	5.03E-05	1.58E-04	7.13E-05	9.34E-06	6.74E-05	6.56E-06	-9.43E-04
EP-terrestrial	mol N eq.	3.17E-02	5.55E-04	1.71E-03	7.80E-04	1.02E-04	4.55E-04	3.15E-05	-9.86E-03
POCP	kg NMVOC eq.	8.83E-03	1.37E-04	4.25E-04	1.87E-04	2.60E-05	1.12E-04	8.86E-06	-2.98E-03
ADP-minerals&metals*	kg Sb eq.	1.38E-04	6.48E-08	2.43E-06	1.16E-08	3.13E-08	6.96E-07	1.77E-09	-2.84E-06
ADP-fossil*	MJ	2.51E+01	4.54E-01	1.17E+00	2.19E-01	2.13E-01	2.95E-01	9.45E-03	-1.10E+01
WDP*	m3	4.60E-01	1.50E-03	2.94E-02	4.62E-04	7.33E-04	3.87E-03	1.24E-04	-1.73E-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 of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit									
Indicator	Unit	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO2 eq.	2.07E+00	2.87E-02	1.01E-01	1.58E-02	1.30E-02	4.30E-02	3.3E-02	-8.83E-01

The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Resource use indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.41E+00	5.31E-03	2.25E-01	1.82E-03	2.71E-03	2.82E-02	1.78E-04	-6.55E-01
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	1.41E+00	5.31E-03	2.25E-01	1.82E-03	2.71E-03	2.82E-02	1.78E-04	-6.55E-01
PENRE	MJ	1.22E+00	7.36E-03	8.60E-02	2.33E-03	4.00E-03	4.48E-02	1.78E-04	-4.79E-01
PENRM	MJ	2.39E+01	4.47E-01	1.09E+00	2.16E-01	2.09E-01	2.51E-01	9.28E-03	-1.05E+01
PENRT	MJ	2.51E+01	4.54E-01	1.17E+00	2.19E-01	2.13E-01	2.95E-01	9.45E-03	-1.10E+01
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	m3	4.54E-01	1.48E-03	2.91E-02	4.21E-04	7.22E-04	3.75E-03	0.00E+00	-1.71E-01
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 per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.67E-04	1.03E-06	1.26E-06	6.03E-07	5.16E-07	7.62E-07	4.48E-08	-6.77E-05
Non-hazardous waste disposed	kg	8.07E-01	3.76E-02	8.99E-02	4.53E-04	1.99E-02	7.49E-02	2.42E-02	-2.67E-01
Radioactive waste disposed	kg	6.18E-05	3.07E-06	3.75E-06	1.46E-06	1.44E-06	1.83E-06	5.05E-08	-1.72E-05

Output flow indicators

Results per functional or declared unit									
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	5.46E-02	0.00E+00	2.39E-05	0.00E+00	0.00E+00	9.62E-01	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 environmental impact indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-IOBC	kg CO2 eq.	2.06E+00	2.87E-02	1.01E-01	1.58E-02	1.30E-02	2.97E-02	3.13E-02	-9.82E-01

Information on biogenic carbon content

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	Kg C	0

Biogenic carbon content in accompanying packaging	Kg C	4.85E-04

Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in the grid) of applied electricity for the manufacturing process (A3). Residual mix is sourced from https://www.aib-net.org/facts/european-residual-mix.

National electricity grid	Unit	Value
Danish Residual Mix, Medium Voltage, 2022	kg CO2 -eq/kWh	0.532

Additional environmental information

Cut-off criteria:

The general rules apply for the exclusion of inputs and outputs in the LCA which complies with 15804:2012+A2:2019. 6.3.6. In cases of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that. The total neglected input flows, e.g., per module A1-A3, A4-A5, and B1-B5, B6-B7, C1-C4 and module D shall be a maximum of 5 % of energy usage and mass.
All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Product series, and size variants included:

The EPD is a group EPD where the declared unit is calculated to an average, embodied by 22 series, and 181 subsequent size variants. The average has been calculated based on the 181 series below. additionally, a screening was conducted on the sizes DN50, DN250, and DN500 for select product series to ensure linearity in materiality.

Product series	Size
02/20-021	DN50-DN400
02/21-001	DN50-DN400
02/60-0035	DN40-DN500
02/60-015	DN80-DN200
02/63-013	DN40-DN500
06/30-0035	DN40-DN400
06/30-0038	DN40-DN400
06/30-0045	DN40-DN400
06/30-0060	DN40-DN400
06/34-008	DN40-DN400
06/34-0035	DN40-DN400
06/38-003	DN50-DN300
12/51-005	DN50-DN300
12/51-015	DN80-DN100
32/40-010	DN80-DN300
32/60-010	DN80-DN450
32/70-003	DN50-DN300

33/10-010	DN80-DN300
33/50-011	DN80-DN300
50/60-003	DN80-DN200
50/60-015	DN80-DN200
Series 18	DN80-DN400

References

General Programme Instructions of the International EPD® System. Version 4.0.
PCR 2019:14. Name. Version

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
PCR Part A:	Construction products and services. Ver. 2.0. March 2021, EPD-Norge.
SimaPro	9.4.0.2 ecoinvent 3.8 - allocation. cut-off by classification database
Electricity Mix	https://www.aib-net.org/facts/european-residual-mix
Statistics Denmark, Transport	https://www.statistikbanken.dk/NVG1
Statistics Denmark, Transport	https://www.statistikbanken.dk/NVG41
Statistics Denmark, Waste	https://www.statistikbanken.dk/20294
Transport, Waste treatment	https://www.eebguide.eu/eebblog/?p=1636
Eurostat, waste ferrous	https://ec.europa.eu/eurostat/databrowser/bookmark/353668d9-dbe1-40fb-9140-7279168e8707?lang=en

EPD®

www.environdec.com