Environmental Product Declaration

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

Pressure pipe

from

HAKA Plast OÜ

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-13311
Publication date:	2024-04-09
Valid until:	2029-04-09

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

Program information:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm; Sweden www.environdec.com info@environdec.com
EPD owner	HAKA Plast OÜ Tööstuse 35, Kadrina borough, 45201 Lääne-Viru County; Estonia https://hakaplast.ee/en/home/ hakaplast@hakaplast.ee
EPD developer	Kaari Susi Hendrikson & Ko https://hendrikson.ee/en kaari@dge.ee
Third-party verifier	Anni Oviir LCA Support https://www.lcasupport.com/ anni.oviir@lcasupport.com Approved by: The International EPD® System

CEN standard EN 15804 (based on EF 3.1) serves as the Core Product Category Rules (PCR)
Product category rules (PCR): Construction Products PCR 2019:14, version 1.3.3 (valid until 2024-12-20).
PCR review was conducted by: Claudia A. Peña. The review panel may be contacted via info@environdec.com.
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Procedure for follow-up of data during EPD validity involves a 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

Description of the organisation: HAKA Plast OÜ is an Estonian company established in 2003, which is grown into the largest polyethylene pipe manufacturer in the Baltics. The factory production is divided into two: the production of pipes, where pipes are manufactured on 6 extrusion lines, and the production of handicrafts, where various handicraft products are made. HAKA Plast produces pipes for various purposes from ø16mm up to ø630mm by using high-quality and approved raw materials in the production. The products are mostly sold to the Baltic and Nordic countries. HAKA Plast's products are already well-known and recognized in these areas and the customer base is constantly expanding. The furthest country to which HAKA Plast has sold its products so far is Iceland.

Product-related or management system-related certifications: HAKA Plast's pressure pipes have been certified by certification bodies in various countries. HAKA Plast has also been issued an ISO 9001: 2015 and ISO 14001:2015 Quality Management System certificate.

HAKA Plast is a member of the Estonian Chamber of Commerce and Industry (EKTK), a member of the Association of Construction Material Producers of Estonia (EETL), and a member of the Estonian Heat Pump Association (ESPL).

Name and location of production site: HAKA Plast OÜ, Estonia – Tööstuse 35, Kadrina borough, 45201 Lääne-Viru County.

Product information

Product name: Pressure pipe.

Product identification: A pressure pipe is used in the LCA calculation. The dimensions are ø20 mm up to ø630mm of pressure pipes and the length is 6-800 m, up to 3 km in coil, straight pipe up to 22 m, depending on the diameter and/or special length by customer order. The density of the pressure pipe is ~0.955 kg/m^3.

Pressure pipe has two different types:

- Type 1 pipe is single-layer, to which only the marking is added after extrusion.
- Type 2 pipe is a two-layer, produced by extrusion from two raw materials.

Product description: Pressure pipes are produced mainly from black HDPE granules in smaller amounts of blue and brown HDPE granules. The pressure pipes are used for buried underground water supply and drainage and sewerage under pressure (see Figure 1).

UN CPC code: 3632

Figure 1. HDPE pressure pipes installation process stage

LCA information

Declared unit: 1 kg of pressure pipe, mass per declared unit 1 kg, density ~955 kg/m^3.

Time representativeness: The reference year for collected data was 2022. The data collection was performed by the EPD owner, HAKA Plast OÜ.

Databases and LCA software used:

LCA software: SimaPro 9.5.0.0

Database: Ecoinvent 3.9.1

Additional data sources: HAKA Plast OÜ and its suppliers (the reference year is 2022).

Electricity information: The dataset for Estonian residual mix in this study has climate change impact - total, 0.715 kg CO_2/kWh. Geographical representativeness description: electricity produced from Fossil fuels 83,11%; Renewable sources 7,22%; Nuclear energy 9,67%. The reference year of the dataset is 2022.

Description of system boundaries:

Cradle-to-gate with options, i.e., module A4, modules C1–C4 and module D (A1–A4 + C + D). In other words, the life cycle stages are the product stage (A1-A3), construction process stage module A4, end-of-life stage (C1-C4), and benefits and loads beyond the system boundary (D). The modules declared geographical scope and share of specific data can be seen below. A system diagram that specifies what is covered in each module can be seen in Figure 2 shows a flow diagram of the pressure pipe production processes and its system boundaries.

Construction (A5) and use stages (module B) are omitted, because they are not associated with any major energy or material used during its expected lifetime, and the environmental impact is considered negligible.

System diagram

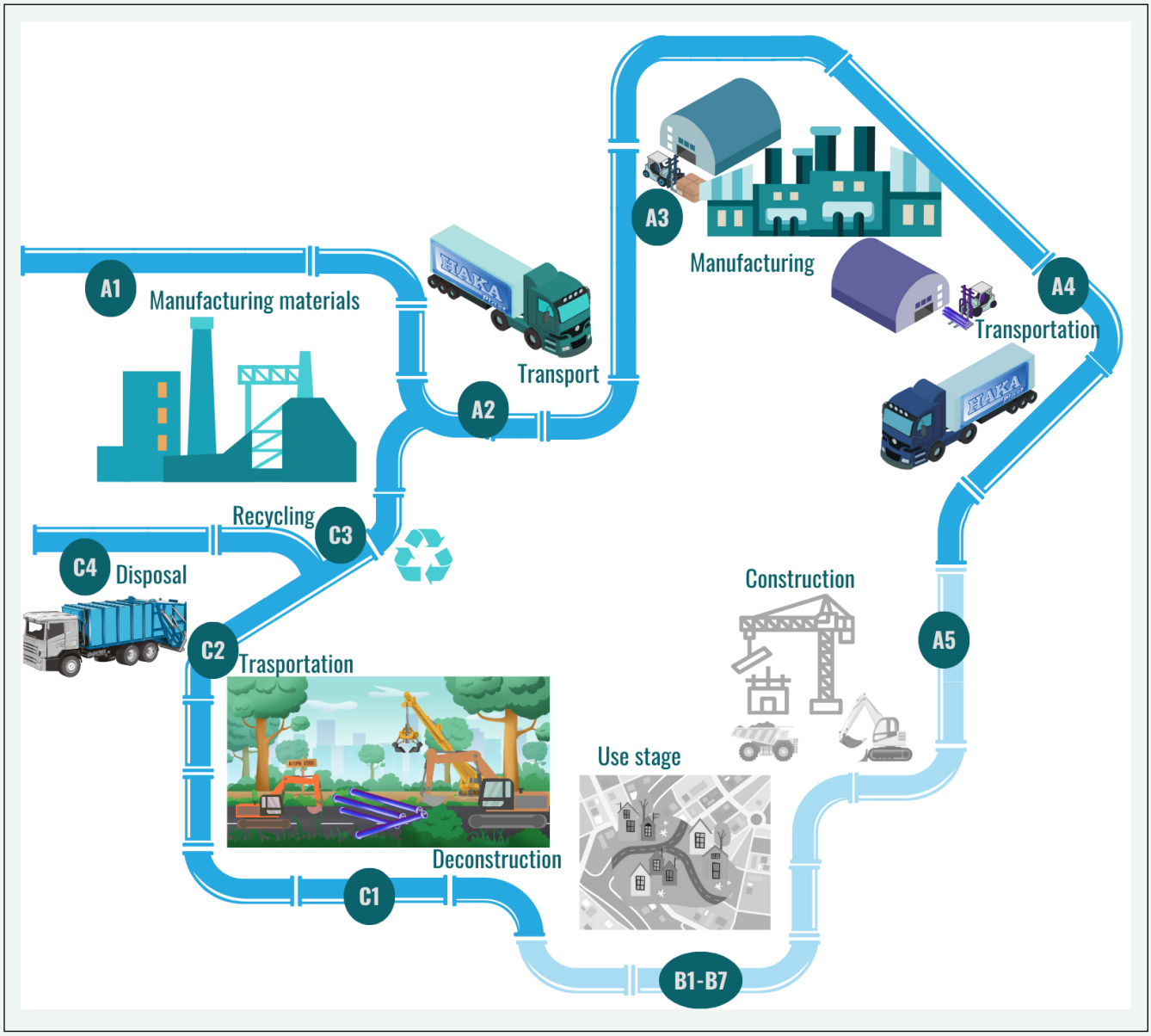

Figure 2. Flow diagram of the assessed life cycle phases of the pipes. Beginning with raw material extraction and production, followed by transport from suppliers to HAKA Plast factory and manufacturing

A further description of the life cycle phases included in the assessment is provided in the "Production process" chapter.

More information: For more information regarding the products and the company, see EPD owner's HAKA Plast website: https://hakaplast.ee/en/

Additional information: For further information regarding the underlying LCA, contact LCA practitioner Kaari Susi: kaari@dge.ee

Assumptions: Assumptions that are general for this LCA are:

1. The reference year for collected data was 2022 (A1).
2. Transportation by truck is made with the Euro 6 emission standard (modeled in SimaPro with the process Transport, freight, lorry 16-32 metric ton EURO6 {RER}). There aren't losses in the transportation, because the products are packaged properly (A2).
3. Transportation by ship is modeled with the process Transport, freight, sea, ferry {GLO}| transport, freight, sea, ferry. There aren't losses in the transportation, because the products are packaged properly (A2).
4. The general electricity mix for Estonia is used (A3).
5. A4 has been calculated using an average scenario: the finished pressure pipes are distributed to different European countries; therefore, the transport distances are calculated as an average (arithmetic average) of the European countries (Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden). The estimated distance is ~389 km with a truck and ~217 km with a ferry (A4)
6. End-of-life the pressure pipes are dismantled from the ground and collected separately. It is estimated that there isn't mass loss in the usage of the pipes, so the end-of-life product is assumed to be of the same weight as the declared product (C1).
7. All of the end-of-life products are assumed to be recycled regranulated and transported to the closest recycling center by truck and the distance is estimated as 200 km (C2).
8. Transportation by truck is made with the Euro 5 emission standard since this chain is not under HAKA Plast control (modeled in SimaPro with the process Transport, freight, lorry 16-32 metric ton EURO5 {RER}).C3).
9. There is no disposal of the pressure pipe because it is regranulated (C4).
10. Pressure pipes are assumed to be recycled at the end-of-life, and packaging wood material is incinerated producing electricity and district heating (D).

Cut-off rules: All materials and processes, and input and output data in the life cycle have been included in the assessment to the best of the LCA practitioner's knowledge. The method chosen for the allocation procedure of this LCA is the cut-off method. There is no neglected unit process of more than 1% of total mass and energy flows. Some production solvents that constitute less than 1% of the product weight have been excluded (e.g., for the maintenance of the machines at the manufacturing site, e.g., oils and cleaning solvents, etc.). This cut-off rule does not apply to hazardous materials and substances.

Data quality: The specific activity data for raw material, transport, manufacturing, and distribution have been provided by HAKA Plast (i.e., material amounts, transport distances and modes of transportation, manufacturing energy consumption, etc.).

Allocation methodology: The allocation is performed according to EN15804. According to EN 15804, all by-products must take their environmental responsibility upstream and inherent properties cannot be allocated away. Allocation is based on the production rate in 2022 and all other processes (electricity, generated waste, etc.) are calculated as a weighted average per produced kg of all products.

There generated no co-products with the main production.

Production process

The scope of this LCA is cradle-to-gate with options, i.e., module A4, modules C1–C4, and module D (A1–A4 + C + D). The present EPD is a product-specific EPD.

In Life Cycle Assessments (LCAs) and EPDs, different modules represent distinct stages or aspects of a product or service's life cycle, from raw material extraction to production, distribution, use, and disposal. When interpreting the results, all results from the EPD modules must be taken into account to enable a holistic approach.

Production A1-A3

- The primary HDPE granule is from Germany. Packaging materials are from Estonia and Latvia (A1).
- The HDPE granules are transported to HAKA Plast territory with EURO 6 trucks. The data used in LCA represents the average transportation distances to the factory (A2).
- The manufacturing process (A3) starts with raw material conveying, dosing, and melting HDPE granules. Then, the corresponding mixture is directed in the extrusion process, forming with a vacuum tank and calibration. After the vacuum tank, the pipe is cooled down in tanks positioned after the vacuum tank. The pipes are marked where needed with specific information. The pressure pipes are being cut to the required length and, when needed, moved to the coiler.
- The products are stacked and shipped with PET, PP band or metal strap, stretch tape, and plastic knots. Spike plates and wood, including euro pallets, are additionally used for packaging.
- After inspection and acceptance, the pipes are stored to await dispatch.
- The bought HDPE granules are packaged in reused big bags and sent back to the HDPE granule manufacturer by HAKA Plast when the bags are empty.
- Euro pallets are reused and returned to raw material manufacturers or used as product packaging. No Euro pallets have been brought in for packaging.
- An average electricity mix for Estonia is used.
- The leftover HDPE pressure pipe beginning and end cuts, shavings, etc. are sent to HDPE granule producers in Estonia.
- The generated waste is transported to the recycling center.

Transport A4

- The pipes are then transported with EURO 6 trucks to the warehouses in the European countries or the customers (A4).
- The finished HDPE pressure pipes are distributed mostly by trucks to the warehouses (A4) of different European countries. Therefore, the transport distances are calculated as an average of the European countries (Estonia, Finland, Iceland, Latvia, Lithuania, Norway, and Sweden).

End-of-life stage and benefits C1-C4, D

- The pressure pipes length of product life is estimated to be 100 years.
- The pressure pipes are dismantled from the ground and collected separately. It is assumed to be associated with minimal energy consumption and is not included in the LCA (C1).
- All of the end-of-life products are assumed to be transported to the closest plastic regranulation factory by truck, the average transport distance is estimated to be 200 km (C2).
- Pressure pipes are assumed to be sent to the regranulation center at the end of life, where it is sorted (C3).
- There is no disposal of pipes because it is sent to regranulation center (C4).
- To look at benefits outside system boundaries, due to the recycling potential of high-pressure polyethylene, the end-of-life product is converted into recycled material. The benefits and loads of waste packaging materials in A5 are also considered in module D, recycled plastic

packaging material can be processed into granules, and used as a secondary raw material, and incinerated products (wooden pallets and frames) are being converted to energy (D).

Modules declared, geographical scope, the 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**	No	No	No	No	No	No	No	No	**X**	**X**	**X**	**X**	**X**
Geography	DE/ EE/LV	EE/CZ /LV	EE	EE/FI/ SE/IS/ LV/LT/ NO									EE/FI /SE/I S/LV/ LT/N O	EE/ FI/S E/IS/ LV/L T/N O	EE/F I/SE/ IS/L V/LT /NO	EE/F I/SE/ IS/L V/LT /NO	EE/FI/SE/IS/ LV/LT/NO
Specific data used	More than 50% comes from specific LCA data				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	-				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	Not relevant				-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
HDPE granule (black, brown, blue)	1.000	0 %	0%
TOTAL	**1.000**	**0%**	**0%**
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Plastic tape	0.0007	0.007	0
PP band	0.0002	0.002	0
PET band	0.0002	0.02%	0
Metal (steel) strap	0.0006	0.06%	0
Spike plate	0.0002	0.02%	0
Wood for packaging (sideboards)	0.0048	0.48%	0.0019
Plastic knot	0.00004	0.004%	0
TOTAL	**0.00674**	**0.67%**	**0.0019**

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**	**C1**	**C2**	**C3**	**C4**	**D**
AP	mol H^+ eq.	1.09E-02	9.29E-04	0.00E+00	1.23E-04	3.20E-03	0.00E+00	-5.77E-03
GWP-total	kg CO2 eq	3.05E+00	9.77E-02	0.00E+00	3.77E-02	1.07E+00	0.00E+00	-1.70E+00
GWP-fossil	kg CO2 eq	3.03E+00	9.75E-02	0.00E+00	3.77E-02	1.01E+00	0.00E+00	-1.69E+00
GWP-biogenic	kg CO2 eq	1.15E-02	6.11E-05	0.00E+00	3.41E-05	6.24E-02	0.00E+00	-5.09E-03
GWP-luluc	kg CO2 eq	9.17E-04	5.33E-05	0.00E+00	1.83E-05	9.67E-04	0.00E+00	-6.14E-05
EP-marine	kg N eq	2.16E-03	2.35E-04	0.00E+00	4.22E-05	1.08E-03	0.00E+00	-1.07E-03
EP-freshwater	kg P eq	7.17E-04	5.89E-06	0.00E+00	2.63E-06	2.76E-04	0.00E+00	-6.63E-05
EP-terrestrial	mol N eq	2.23E-02	2.57E-03	0.00E+00	4.46E-04	8.34E-03	0.00E+00	-1.16E-02
ODP	kg CFC11 eq	5.56E-08	1.95E-09	0.00E+00	8.19E-10	1.22E-08	0.00E+00	-9.06E-09
POCP	kg NMVOC eq	1.28E-02	8.26E-04	0.00E+00	1.83E-04	3.05E-03	0.00E+00	-6.28E-03
ADP-fossil*	MJ	9.14E+01	1.34E+00	0.00E+00	5.34E-01	1.21E+01	0.00E+00	-6.57E+01
ADP-minerals&metals*	kg Sb eq	1.08E-05	2.57E-07	0.00E+00	1.21E-07	5.36E-06	0.00E+00	-8.19E-06
WDP	m^3	1.69E+00	4.88E-03	0.00E+00	2.18E-03	1.46E-01	0.00E+00	-1.54E+00
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**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO_2 eq.	3.04E+00	9.76E-02	0,00E+00	3.77E-02	1.03E+00	0,00E+00	-1.69E+00
EP-freshwater	kg PO_4^{3-} eq.	3.02E-03	1.02E-04	0.00E+00	2.38E-05	2.41E-03	0.00E+00	-6.07E-04

** 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 CO2 is set to zero.*

Resource use indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.89E+00	1.81E-02	0.00 E+00	8.30E-03	1.34E+00	0.00 E+00	-3.35E-01
PERM	MJ	6.48E-02	0.00E+00	0.00 E+00	0.00E+00	-6.48E-02	0.00 E+00	0.00E+00
PERT	MJ	1.95E+00	1.81E-02	0.00E+00	8.30E-03	1.28E+00	0.00E+00	-3.35E-01
PENRE	MJ	6.14E+01	1.34E+00	0.00E+00	5.34E-01	4.21E+01	0.00E+00	-6.57E+01
PENRM	MJ	3.00E+01	0.00E+00	0.00E+00	0.00E+00	-3.00E+01	0.00E+00	0.00E+00
PENRT	MJ	9.14E+01	1.34E+00	0.00E+00	5.34E-01	1.21E+01	0.00E+00	-6.57E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.63E+00	4.87E-03	0.00E+00	2.17E-03	1.45E-01	0.00E+00	-1.48E+00
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							

Waste indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.57E-03	2.94E-05	0.00E+00	1.32E-05	1.14E-02	0.00E+00	-3.94E-04
Non-hazardous waste disposed	kg	3.63E-01	5.14E-02	0.00E+00	2.61E-02	4.31E-01	0.00E+00	-4.94E-02
Radioactive waste disposed	kg	6.99E-05	3.66E-07	0.00E+00	1.73E-07	3.59E-05	0.00E+00	2.08E-06

Output flow indicators

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**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
Material for recycling	kg	1.60E-02	0.00E+00	0.00E+00	0.00E+00	1.00E+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
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
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

Information on biogenic carbon content

Results per functional or declared unit	
Biogenic carbon content in product	0 kg C (0 kg CO2)
Biogenic carbon content in packaging	0.0019 kg C (0.007 kg CO2)

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

References

General Programme Instructions of the International EPD® System. Version 4.0. Date 2021-03-29.

PCR 2019:14 Construction products (EN 15804:A2). Version 1.3.3. Valid until 2024-12-20.

ISO 14025. Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures (ISO 14025:2006). Estonia. Estonian Centre for Standardization.

ISO 14040. Environmental Management – Life cycle assessment – Principles and framework (EVS-EN ISO 14040:2006 + ISO 14040:2006/A1:2020). Estonia. Estonian Centre for Standardization.

ISO 14044. Environmental Management – Life cycle assessment – Requirements and guidelines (EVS-EN ISO 14044:2006). Estonia. Estonian Centre for Standardization.

EN 15804:2012+A2:2019. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products (EVS-EN 15804:2012+A2:2019). Estonia. Estonian Centre for Standardization.

Environmental Footprint reference package (EF 3.1) [https://eplca.jrc.ec.europa.eu/LCDN/developerEF.html]

Guinée. J.. Gorrée. M.. Heijungs. R.. Huppes. G.. Kleijn. R.. Koning. A. d.. Sleeswijk. A. (2004). Handbook on Life Cycle Assessment - Operational Guide to the ISO Standards. Kluwer Academic Publications

Elering. Residual mix. 2022 [https://elering.ee/en/residual-mix]

EPD®

www.environdec.com