

ENVIRONMENTAL PRODUCT DECLARATION

OF MULTIPLE PRODUCTS, BASED ON A REPRESENTATIVE PRODUCT

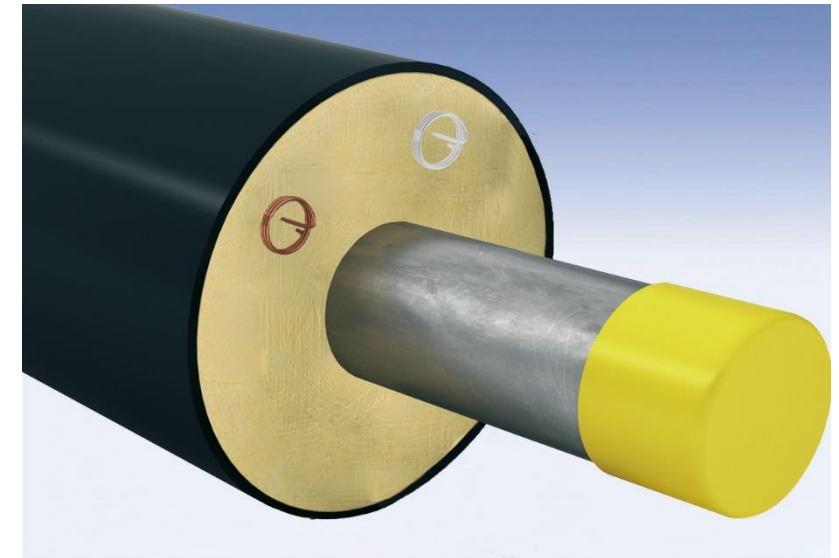
IN ACCORDANCE WITH EN 15804+A2/AC:2021 & ISO 14025:2006 FOR:

Single pipe system

Pre-insulated steel pipes for district energy



Programme: The international EPD[®] system
Programme operator: EPD International AB
EPD registration number: EPD-IES-0016090
Version: 1
Publication date: 2024-09-05
Valid until: 2029-08-19
Geographical scope: Europe
EPD owner: isoplus Suomi Oy



The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes 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.

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

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	isoplus Suomi Oy
Address	Kappelinmäentie 240, 65370 Vaasa, Finland
Contact details	sales.vaasa@isoplus.group
Website	https://isoplus.fi/
Management system-related certification	ISO 9001, ISO 14001
Product-related certifications	EHP Certificate 05/08

ISOPLUS Suomi Oy is a leading supplier of pre-insulated piping systems for district heating and cooling in Finland, Sweden and Estonia.

ISOPLUS Group is represented in over 30 countries, it is European market leader in transformative and sustainable energy solutions for millions of households, cities, municipalities, and utility companies. With its products, high quality standards and holistic service orientation ISOPLUS makes an important contribution to the success of the energy transition in Europe.

EPD INFORMATION

EPD program operator	The International EPD System EPD International AB – Box 210 60 – SE-100 31 Stockholm - Sweden
EPD standards	This EPD is in accordance with EN 15804:2012+A2:2019/AC:2021 and ISO 14025:2006

Product category rules

The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.3.4 (2024-04-30) is used. Product specific complementary category rules have not been applied in this EPD.

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

LCA software

One Click LCA

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EPD verification

Independent verification of this EPD and data, according to ISO 14025:
 Internal verification External verification

Verification date

2024-08-19

EPD verifier

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Approved by: The International EPD® System Technical Committee, supported by the Secretariat

EPD number

EPD-IES-0016090

Publishing date

2024-09-05

EPD valid until

2029-08-19

PRODUCT INFORMATION

PRODUCT IDENTIFICATION

Product name Single pipe system. *This EPD is manufacturer specific for multiple products, based on a representative product.*

Representative product: S2P100-12

This has been chosen as a representative product as it is the most sold one.

GWP-results for all different products covered by this EPD are represented in Annex 1.

Additional label(s) Single, 2Mpuk (Finland)

Product number / reference See Annex 1

Place(s) of production Vaasa, Finland

UN CPC code 41287 Other tubes and pipes of circular cross-section, welded, of steel

PRODUCT DESCRIPTION AND APPLICATION

Pre-insulated single pipes systems are manufactured according to EN253:2019+A1:2024 and the Energy industry's recommendation L1/2020 in size classes DN 20-1200 in different insulation classes. The delivery lengths of the pipes are 12 m, 16 m and, depending on the project, also 18 m.

Single pipe system consists of a steel carrier pipe, polyurethane insulation (PUR) and impact-resistant and break-proof HDPE casing pipes. PUR consists of polyol and isocyanate according to the EN 253 standard. The exothermic chemical reaction that takes place in it enables high-quality insulation with minimal specific weight and exceptionally good thermal conductivity: $\lambda_{50} = 0.0241$. The unbreakable and waterproof HDPE shell, on the other hand, effectively protects all pre-insulated single pipe systems from various environmental factors. In this EPD, there is also considered copper alarm wires. Products covered by this EPD are presented in Annex 1.

TECHNICAL SPECIFICATIONS AND PRODUCT STANDARDS

The products comply with the standard with standards:

- EN 253:2019 + A1 2024
- EN 10217-2:2019
- EN 10217-5:2019
- EN 14419:2019
- EN 13941-1:2019
- EN 13941-2:2019
- EN 17248:2019

More information about the products covered by this EPD is available at <https://isoplus.fi/>

PRODUCT RAW MATERIAL MAIN COMPOSITION

Main substances of the products covered by this EPD in declared unit (1 meter) is presented in Table 1.

Table 1. Product raw material main composition

Product components	Weight (kg)	Post-consumer material weight (%)	Biogenic material weight, kg C/kg	Material origin
Steel	9.8 (1.6 – 372.0)	30.0 (2.6 – 30.0)*	0	EU
Plastic (HDPE)	2.6 (0.9 – 55.5)	0		EU
PUR	2.0 (0.4 – 41.0)	0		EU / ROK
Other	0.17 (0.05 – 1.9)	0		EU
TOTAL	14.6 (2.8 - 455.0)	20.14 (Varies)		EU/ ROK
Packaging materials	Weight (kg)	Weight-% (vs the product)	Biogenic material, weight, kg C/kg	Material origin
Wood	0.008161	< 1 %	Unknown	EU
Plastic caps	0.00065	< 1 %		
Plastic film	0.00011	< 1 %		
Steel straps	0.00008	< 1 %		
Paper	0.000053	< 1 %		
TOTAL	0.009054	< 1 %		

*Post-consumer material weight varies depending on the raw material origin.

SUBSTANCES, REACH - VERY HIGH CONCERN

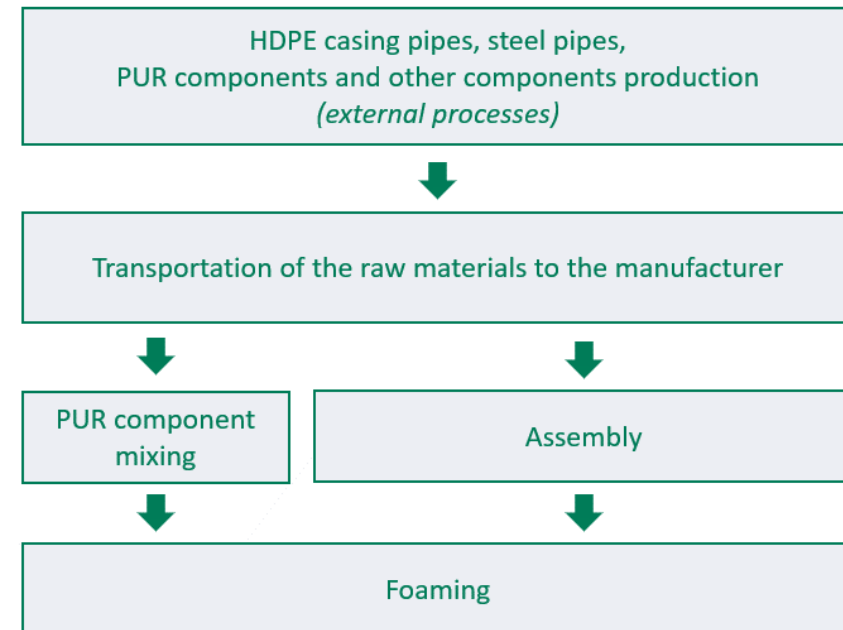
The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The product stage is subdivided into three modules: A1 (Raw material supply), A2 (Transportation) and A3 (Manufacturing).

MANUFACTURING PROCESS



RAW MATERIALS A1

This stage covers the environmental impacts of manufacturing raw materials, for example emissions generated when raw materials are taken from nature. Raw material losses are also considered. This stage includes all raw materials which end up in the final products. In our case, product mainly consists of steel, HPDE and PUR.

TRANSPORTATION A2

The considered transportation impacts include exhaust emissions resulting from transportation of raw materials from suppliers to manufacturing facilities as well as the environmental impacts of the production of the fuel used. The transportation distances and methods were provided by the manufacturer.

MANUFACTURING A3

The environmental impacts considered for the production stage cover the manufacturing of materials used in the production but not included in the final products such as packaging materials and other ancillary materials. Also, fuels used by machines, as well as handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study considers also the losses occurring during the manufacturing processes. Also, the transmission losses of energy have been included. Isoplus Suomi Oy has a guarantee of origin for their electricity use and details for electricity production was asked personally from the provider of electricity.

Table 2. Parameters for manufacturing energy use (stage A3)

Energy type	GWP-value	Data quality
Electricity	0.0065 kg CO ₂ e/kWh	Electricity production, nuclear, pressure water reactor (Finland) (Ecoinvent 3.8)
District heating	Not applicable	Not applicable

TRANSPORT AND INSTALLATION (A4-A5)

TRANSPORTATION A4

This module includes transport from the production gate to the building site / customer. A transport distance of 420 km is assumed because the actual location varies. Default distance is the distance from the manufacturer to the capital of Finland.

INSTALLATION A5

This module includes product installation losses, emissions of energy use in installation and generation of waste at the installation phase.

In our case, there is no loss in the installation stage. It can be assumed that there are no significant environmental impacts caused by energy or water use in installation phase. Thus, in the LCA, this phase only includes the end-of-life of the packaging materials that are discarded after installation. For waste treatment a transport distance of 50 km is assumed because the actual location of disposal is unknown.

From packaging materials, metal straps are assumed to be recycled. Other materials are assumed to be incinerated and used as energy beyond the system boundary.

Transportation and installation phase is calculated based on a scenario with the parameters described in the following table (Table 3).

Table 3. Scenario parameters for transportation in stages A4 and A5

Parameter	Value
Fuel type and consumption of vehicle used for transport	Transport, freight, lorry 16-32 metric ton, EURO5 (0.17 kg CO ₂ e / tkm)
Distance (km)	Stage A4: <ul style="list-style-type: none"> Assumed distance: 420 km Stage A5: <ul style="list-style-type: none"> Assumed distance: 50 km
Capacity utilization (%)	100 %
Density of transported products (kg/m ³)	Density varies depending on the mass and size of the module or product type
Volume capacity utilization factor	1

PRODUCT USE AND MAINTENANCE (B1-B7)

Stages B1-B7 are not declared in this study. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4)

End of life stage is subdivided into four modules: C1 (Deconstruction, demolition), C2 (Transportation), C3 (Waste processing for reuse, recovery and/or recycling) and C4 (Disposal).

Most common practice is to leave pipelines underground after their service life. Thus, there is no impacts in stages C1-C3.

Table 4. Scenario parameters for stages C3 and C4

Process		Value (%)	Value (kg)
Collection process	Collected separately	0	0
	Collected with mixed waste	0	0
Recovery process	For reuse	0	0
	For recycling	0	0
	For energy recovery	0	0
Disposal	Materials left under ground	100	14.6 (2.8-455.2)

BENEFITS AND LOADS BEYOND SYSTEM BOYNDARY (D)

Module D covers the net benefits and loads arising from the reuse of products or the recycling or recovery of energy from end-of-waste state materials. In our case product is usually left on the ground at the end of life. This is why there is no impacts arising from the product itself but benefits and load from packaging materials from stage A5 are considered.

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	1.1.2023-31.12.2023
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DECLARED AND FUNCTIONAL UNIT

Declared unit	1 m
Mass per declared unit	Mass of the representative product is 14.6 kg <i>Mass of the product per declared unit depends on the size and type of the product. Products covered by this EPD, and their weight are represented in Annex 1.</i>
Functional unit	Not declared
Reference service life	Not declared

SYSTEM BOUNDARY

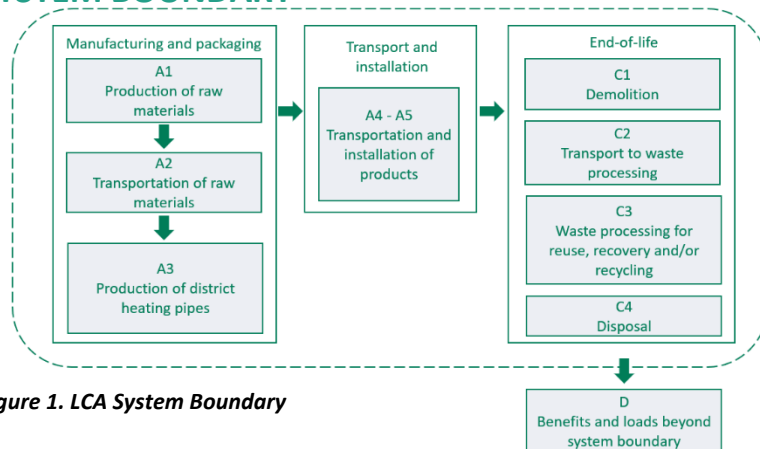


Figure 1. LCA System Boundary

This EPD is “Cradle to gate with options, modules C1–C4, module D and with optional modules”

	Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
	Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
Modules declared	x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x	x	x
Geography	EU*	EU*	FI	FI	FI	-	-	-	-	-	-	-	FI	FI	FI	FI	FI	FI	FI

Modules not declared = ND

*One raw material origin outside Europe

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019/AC:2021 and PCR (Int’l EPD System PCR 2019:14 Construction products, version 1.3.4 (2024-04-30) requirements.

The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation.

There is no neglected unit process more than 1 % of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5 % of energy usage or mass. Machines and facilities (capital

goods) required for and during production are excluded, as is transportation of employees.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

The allocations in the Ecoinvent 3.8 datasets used in this study follow the Ecoinvent system model 'Allocation, cut-off, EN15804'

Raw material use was known by product level, so allocation was not needed. Avoiding allocation could not be avoided for following inputs as the information was only measured on factory process level:

- Energy consumption
- Manufacturing waste
- Packaging materials

The inputs were allocated to studied products based on production volume (mass in kilograms).

AVERAGES AND VARIABILITY

This EPD is manufacturer specific for multiple products. Average has not been calculated as the impacts have been calculated separately for each product. To obtain the environmental performance associated with every specific product, each impact category (e.g. GWP) expressed in this EPD must be multiplied by its corresponding scaling factor which can be found in Annex 1.

Variation in GWP-GHG has been calculated in a relation to representative product. The large variation between results is due to the declared unit (per one meter) and the mass of one meter varies a lot. If the results were declared per one kg, the variation would be in the +-10 % range.

	A1-A3	A4	A5	C1-C4	D
Specific data used	90.40%	-	-	-	-
Variation – products	-44.3 % / +1291.3 %	-43.7 % / +1390.7 %	-54.8 % / +1107.9 %	0 %	-45.8 % / +1327.9 %
Variation – sites	0%	-	-	-	-

ENVIRONMENTAL IMPACT DATA

As specified in EN 15804:2012+A2:2019/AC:2021 and the Product Category Rules, the environmental impacts are declared and reported using the baseline characterization factors from the ILCD. Specific data has been supplied by the manufacturer, and generic data is from Ecoinvent (3.8) databases. The Characterization Factors are based on EF 3.0 package.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks. *Disclaimer: The A1-A3 result should not be used without considering the results of module C. This holds for all results reported below.*

All results in the table below refer to impacts of 1 meter of product named S2P100-12. To obtain the environmental performance associated with every specific product, each impact category (e.g. GWP) expressed in this EPD must be multiplied by its corresponding scaling factor which can be found in Annex 1.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	3,95E+01	1,03E+00	2,05E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,04E-01
GWP – fossil	kg CO ₂ e	3,96E+01	1,03E+00	3,20E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,04E-01
GWP – biogenic	kg CO ₂ e	-1,73E-01	-5,46E-20	1,73E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,34E-04
GWP – LULUC	kg CO ₂ e	2,32E-02	4,04E-04	1,14E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,62E-04
Ozone depletion pot.	kg CFC ₁₁ e	8,86E-06	2,38E-07	3,93E-10	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,71E-09
Acidification potential	mol H ⁺ e	2,24E-01	4,17E-03	2,80E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,02E-04
EP-freshwater ²⁾	kg Pe	7,49E-03	7,22E-06	3,70E-08	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,12E-06
EP-marine	kg Ne	4,90E-02	1,25E-03	1,25E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,46E-05
EP-terrestrial	mol Ne	5,32E-01	1,37E-02	1,34E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,11E-03
POCP (“smog”) ³⁾	kg NMVOCe	1,67E-01	4,21E-03	3,37E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,09E-04
ADP-minerals & metals ⁴⁾	kg Sbe	8,46E-04	3,64E-06	1,06E-08	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,09E-08
ADP-fossil resources	MJ	5,29E+02	1,53E+01	3,42E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,30E+00
Water use ⁵⁾	m ³ e depr.	1,17E+01	7,06E-02	9,11E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,66E-02

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁶⁾	MJ	5,30E+01	2,19E-01	7,04E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,78E-01
Renew. PER as material	MJ	1,36E+01	0,00E+00	-1,52E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	6,66E+01	2,19E-01	-1,52E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,78E-01
Non-re. PER as energy	MJ	5,90E+02	1,53E+01	3,42E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,32E+00
Non-re. PER as material	MJ	2,46E+02	0,00E+00	-4,79E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	8,36E+02	1,53E+01	-4,45E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,32E+00
Secondary materials	kg	3,03E+00	5,12E-03	4,81E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,68E-03
Renew. secondary fuels	MJ	5,35E-02	5,64E-05	1,97E-07	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,50E-07
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	3,73E-01	1,92E-03	-2,10E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,06E-03

6) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,86E+00	1,71E-02	4,68E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,48E-03
Non-hazardous waste	kg	2,24E+01	3,04E-01	1,32E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,25E-01
Radioactive waste	kg	8,20E-03	1,05E-04	1,07E-07	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,34E-06

END OF LIFE – OUTPUT FLOWS

Impact category	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	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	2,28E-01	0,00E+00	1,20E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	1,50E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁷⁾	kg CO ₂ e	3,96E+01	1,03E+00	3,20E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,04E-01

7) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.3.2 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

BIBLIOGRAPHY

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- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
- Ecoinvent database v3.8 (2021) and One Click LCA database.
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ANNEX 1: SCALING FACTORS

In the table below the main products with specific sizes are listed. To obtain the environmental performance associated with every specific product, each impact category (e.g. GWP) expressed in this EPD must be multiplied by its corresponding scaling factor.

Product name	Product item	Insulation class	DN	d * s (mm)	D (mm)	Weight (kg/m)	Scaling factor
S1P20-12	100019	1	20	26.9 * 2.6	90	2.8	0.20
S1P25-12	102162	1	25	33.7 * 2.6	90	3.2	0.23
S1P32-12	102163	1	32	42.4 * 2.6	110	4.2	0.29
S1P40-12	102164	1	40	48.3 * 2.6	110	4.5	0.32
S1P50-12	102165	1	50	60.3 * 2.9	125	6.0	0.42
S1P65-12	102166	1	65	76.1 * 2.9	140	7.3	0.52
S1P80-12	102167	1	80	88.9 * 3.2	160	9.3	0.66
S1P100-12	102168	1	100	114.3 * 3.6	200	13.5	0.94
S1P125-12	102170	1	125	139.7 * 3.6	225	16.4	1.14
S1P150-12	102172	1	150	168.3 * 4.0	250	21.0	1.49
S1P200-12	102174	1	200	219.1 * 4.5	315	30.8	2.14
S1P250-12	102176	1	250	273.0 * 5.0	400	44.2	3.04
S1P300-12	102178	1	300	323.9 * 5.6	450	57.6	3.80
S1P350-12	101465	1	350	355.6 * 5.6	500	65.3	4.48
S1P400-12	102180	1	400	406.4 * 6.3	560	83.0	5.72
S1P450-12	100017	1	450	457.0 * 6.3	630	97.6	6.13
S1P500-12	102182	1	500	508.0 * 6.3	710	111.9	6.96
S1P600-12	102184	1	600	610.0 * 7.1	800	145.7	9.11
S1P700-12	104306	1	700	711.0 * 8.0	900	188.9	11.82
S1P800-12	104020	1	800	813.0 * 8.8	1000	229.5	14.41

S1P900-12	104036	1	900	914.0 * 10.0	1100	285.5	17.92
S1P1000-12	100011	1	1000	1016.0 * 11.0	1200	342.4	21.54
S1P1200-12	100010	1	1200	1219.0 * 12.5	1400	455.2	28.61

S2P20-12	102409	2	20	26.9 * 2.6	110	3.2	0.22
S2P25-12	102410	2	25	33.7 * 2.6	110	3.7	0.25
S2P32-12	102412	2	32	42.4 * 2.6	125	4.6	0.31
S2P40-12	102414	2	40	48.3 * 2.6	125	4.9	0.34
S2P50-12	102416	2	50	60.3 * 2.9	140	6.4	0.44
S2P65-12	102418	2	65	76.1 * 2.9	160	7.9	0.55
S2P80-12	102420	2	80	88.9 * 3.2	180	9.9	0.70
S2P100-12	102422	2	100	114.3 * 3.6	225	14.6	1.00
S2P125-12	102425	2	125	139.7 * 3.6	250	17.5	1.20
S2P150-12	102428	2	150	168.3 * 4.0	280	22.6	1.55
S2P200-12	102431	2	200	219.1 * 4.5	355	33.5	2.29
S2P250-12	102434	2	250	273.0 * 5.0	450	48.7	3.29
S2P300-12	102437	2	300	323.9 * 5.6	500	62.4	4.25
S2P350-12	102439	2	350	355.6 * 5.6	560	71.9	4.84
S2P400-12	102441	2	400	406.4 * 6.3	630	91.6	6.20
S2P450-12	101610	2	450	457.0 * 6.3	710	105.8	6.58
S2P500-12	102443	2	500	508.0 * 6.3	800	125.0	7.75
S2P600-12	104031	2	600	610.0 * 7.1	900	162.0	10.23
S2P700-12	102446	2	700	711.0 * 8.0	1000	201.2	12.61
S2P800-12	102447	2	800	813.0 * 8.8	1100	246.1	15.42
S2P900-12	100012	2	900	914.0 * 10.0	1200	301.2	18.91

S3P20-12	100018	3	20	26.9 * 2.6	125	3.6	0.24
S3P25-12	102696	3	25	33.7 * 2.6	125	4.0	0.27

S3P32-12	102697	3	32	42.4 * 2.6	140	4.9	0.33
S3P40-12	102698	3	40	48.3 * 2.6	140	5.2	0.36
S3P50-12	102699	3	50	60.3 * 2.9	160	6.9	0.48
S3P65-12	102700	3	65	76.1 * 2.9	180	8.5	0.59
S3P80-12	102701	3	80	88.9 * 3.2	200	10.6	0.74
S3P100-12	102702	3	100	114.3 * 3.6	250	15.6	1.07
S3P125-12	102704	3	125	139.7 * 3.6	280	19.0	1.28
S3P150-12	102706	3	150	168.3 * 4.0	315	24.4	1.66
S3P200-12	102708	3	200	219.1 * 4.5	400	36.5	2.45
S3P250-12	102710	3	250	273.0 * 5.0	500	53.1	3.57
S3P300-12	102712	3	300	323.9 * 5.6	560	68.5	4.61
S3P350-12	102002	3	350	355.6 * 5.6	630	79.8	5.32
S3P400-12	102715	3	400	406.4 * 6.3	710	101.6	6.78
S3P450-12	100016	3	450	457.0 * 6.3	800	134.0	8.35
S3P500-12	102717	3	500	508.0 * 6.3	900	136.0	8.78
S3P600-12	100015	3	600	610.0 * 7.1	1000	174.2	10.99
S3P700-12	100014	3	700	711.0 * 8.0	1100	215.5	13.49
S3P800-12	100013	3	800	813.0 * 8.8	1200	263.5	16.53