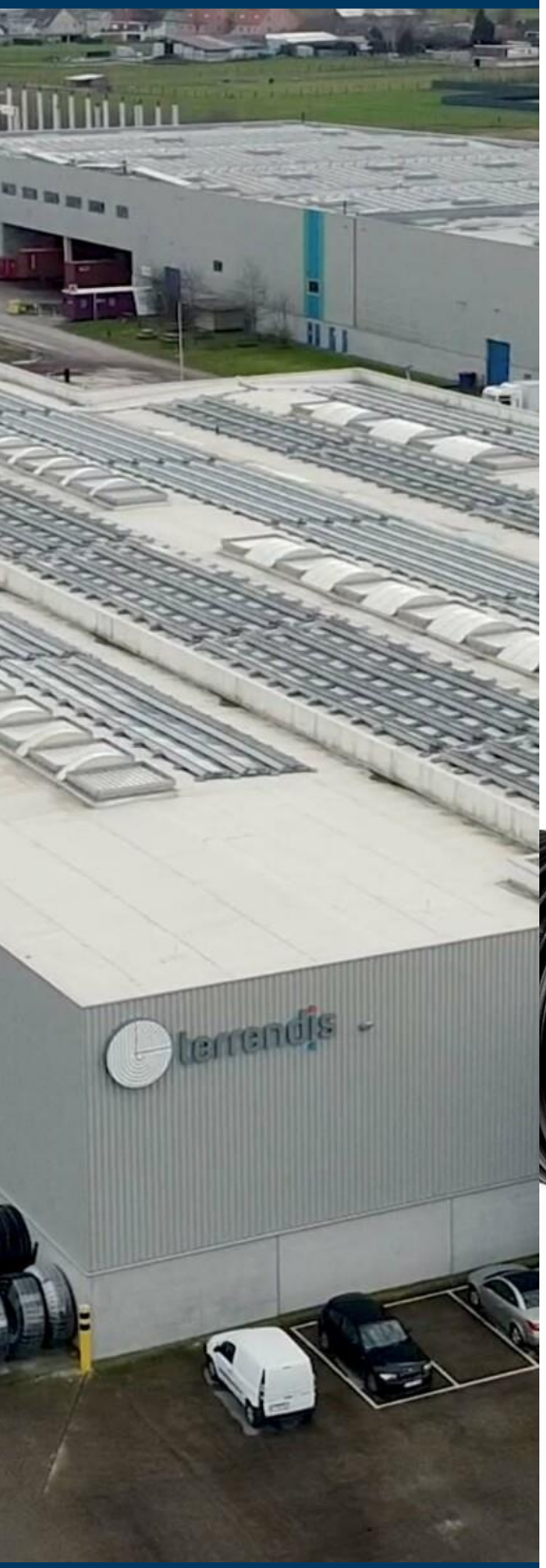


ENVIRONMENTAL PRODUCT DECLARATION

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

PROGRAMME: The International EPD System, www.environdec.com

PROGRAMME OPERATOR: EPD International AB

Pre-insulated double heating pipe

EPD of multiple products, based on a representative product.

References covered: See annex 1 for details

EPD registration number as issued by the programme operator:
EPD-IES-0021827

Date of publication: 2025-04-10
Date of validity: 2030-04-09

GENERAL INFORMATION

This EPD concerns several variations of product (pre-insulated pipes) which diameter range is declared in paragraph "variations" below. Products variations are described in annexe 1.

MANUFACTURER

Terrendis has the sole ownership, liability, and responsibility of the EPD

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.

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.

Name	Terrendis NV/SA
Address	Korte Mate 10, 9042 Desteldonk, Belgium
Contact	+ 32 9 395 96 10
Website	https://www.terrendis.com/
Management system-related certification	ISO 9001
Product-related certification	EN 15632- 1&3

Terrendis is a subsidiary of the Elydan group. We design and manufacture high-performance and sustainable products with a virtuous life cycle for the environment. Our products contribute to improving the performance of tomorrow's networks infrastructure and buildings. Their environmental footprint is positive for the ecosystem.

Terrendis is entirely dedicated to the manufacturing and marketing of a complete range of hyper flexible pre-insulated pipes and accessories, primarily used for the transport of heating water, sanitary hot water, cold potable water, cooling and wastewater or other fluids in underground networks.

EPD STANDARDS, SCOPE AND VERIFICATION

Programme operator	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com
Reference standard	EN 15804+A2 :2019 and ISO 14025
PCR	PCR 2019 :14 Construction products, version 1.3.4

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	Marie BELLEMARE, MB Consulting Signature :  Approved by: The International EPD System
LCA Organization Practitioner informations	TRANSYLIENCE, 770 chemin de la Bourderie, 38134 Saint-joseph-de-rivière
LCA Practitioner informations	Batiste ROBIN, batiste.robin@transylience.fr, 07.57.18.57.73
Scope of the EPD	Cradle to date with options, A4-A5, and modules C1-C4, D

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.

PRODUCT INFORMATION

PRODUCT IDENTIFICATION

The product is a hyper flexible, pre-insulated piping system, combining both the flow and the return medium pipes in the same jacket, primarily intended for the transport of heating water or other media in underground distribution networks.

This EPD is based on a representative product, the HD14032, which was chosen being the best-selling in 2023. There is no co-product.

Product name	TERRENDIS pre-insulated double heating pipe
Product number / reference	HD11025 - HD11032 - HD14025 -HD14032 - HD14040 - HD16025 - HD16032 - HD16040 - HD16050 - HD20050 - HD20063 - HD22563 - HD22575
Place of production	Korte Mate 10, 9042 Desteldonk, Belgium
UN CPC code	22.21Z: Manufacture of plastic plates, sheets, tubes and profiles
Date of production	2023
RSL	30 years

PRODUCT DESCRIPTION AND APPLICATION

In view of the urgent need to minimize C02 emissions as much as possible, heating network technology is becoming increasingly important.

With the demand for more renewable energy supply, higher efficiency and lower network temperatures, the requirements for a performing hyper-flexible heating network piping system are also increasing. Terrendis pipes combine optimal energy efficiency with outstanding functionality in serving low temperature heating networks.

This EPD covers Terrendis pre-insulated double heating pipes with double pipe configurations, listed in Annex 1

1.1 – System properties

- Hyper flexible piping system
- Fast and easy to install
- Durable and cost effective
- Energy saving

1.2 – Areas of applications

- Local and district heating supply
- Sanitary hot water supply
- Drinking water supply
- Chilled water supply
- Snow and ice melting systems
- Swimming pools, leisure parks and resorts

1.3 – Heat sources

- CHP, biomass and biogas plants
- Ground source, air and geothermal heat pumps
- Wood and pellet boilers
- Industrial process heat
- Incineration plants

The medium pipes are made from cross-linked polyethylene PE-Xa with an orange-colored oxygen-diffusion barrier for the flow line, and a blue colored one for the return. The colour code enables easy identification of flow and return during installation, even with mounted dust or shrink end caps. The multilayer thermal insulation is made from cross-linked, microcellular polyethylene PE-X foam with a water-repellent closed cell structure, characterized by its durable, non-ageing insulation performance, and its permanent elasticity, maximizing and maintaining the thickness of the insulation layer, even after bending multiple times.

The high-grade, black coloured UV-resistant, double walled, corrugated HDPE jacket pipe shields the pre-insulated piping system against mechanical impacts and moisture, whilst maintaining maximum flexibility.

CONTENT DECLARATION

Product Component	Weight [kg/declared unit]	Post-consumer recycled material [weight-% of product]	Biogenic material [weight-% of product]	Biogenic material [kg C/declared unit]
Cap pipe 32 SDR11	2,03E-04	0	0	0
Dust End Cap 140/2x32	1,25E-03	0	0	0
Centre Piece Insulation Twin 68/2x32	6,68E-02	0	0	0
Corrugated pipe Dout=140mm	1,11E+00	0	0	0
PE-X foam insulation sheet t= 15mm w=280mm l=100m	2,54E-01	0	0	0
Heating 32x2.9 PE-Xa SDR11 PN6 Blue	1,31E-01	0	0	0
Heating 32x2.9 PE-Xa SDR11 PN6 Red	1,31E-01	0	0	0
Tape reinforced width 50 mm length 750m	2 [meters]	0	0	0

Packaging Component	Weight [kg/declared unit]	Post-consumer recycled material [weight-% of product]	Biogenic material [weight-% of product]	Biogenic material [kg C/declared unit]
Foiler	2,58E-06	0	0	0
Label	2,20E-02	0	0	0
Packaging film	1,27E-05	0	0	0

TECHNICAL SPECIFICATIONS AND PRODUCT STANDARDS

- Medium pipes : PE-Xa/SDR 11/PN 6
- EVOH oxygen barrier in accordance with ISO 17455
- Continuous operating temperature : 80°C
- Max. operating temperature : 95°C
- PE-X insulation foam : < 1% water absorption in accordance with ISO 2896
- Full coil length, all dimensions : 100 m
- Designed in accordance with European standard EN 15632-1&3
- CFC-free production process
- Thermal conductivity : 0,040 W/m.K at 40 °C

PRODUCT RAW MATERIAL MAIN COMPOSITION

The main substances of the products covered by this EPD in declared units (1 meter) are presented below.

Jacket pipe
• Material: Not recycled HDPE-100 outside, LLDPE inner layer.
Containing minimal 2% carbon black according to ISO 6964
• Structure: Double walled, corrugated profile
• Properties: UV resistant, highly robust, hyper flexible
• Color: Black

Insulation
• Material: CFC-free, microcellular PE-X foam with closed cell structure
• Structure: Multilayer sheet foam, improving pipe flexibility
• Properties: Ageing resistant, water resistant, stable thermal conductivity
• Color: Dark grey

Dog bone
• Material: 100% extruded PE-X foam
• Properties: Ageing resistant, water resistant, stable thermal conductivity
• Color: Dark grey

PE-Xa medium pipe
• Material: High-density polyethylene, peroxide cross-linked (Engel process)
• Standards: ISO 15875
• Pipe series: Serie 5 (SDR 11) for heating
• Oxygen barrier: Ethylene vinyl alcohol (EVOH), heat-stabilized, permeability to oxygen as per ISO 17455
• Color: Orange (heating flow), blue (heating return)

SUBSTANCES, REACH - VERY HIGH CONCERN

This product does not contain any substances listed in the latest 'Candidate List of Substances of Very High Concern for Authorisation' exceeding the limits for registration.

Product component	Weight [kg/ declared unit]	Substances of very high concern, weight [[kg/ declared unit]
Cap pipe 32 SDR11	2,03E-04	0
Dust End Cap 140/2x32	1,25E-03	0
Centre Piece Insulation Twin 68/2x32	6,68E-02	0
Corrugated pipe Dout=140mm	1,11E+00	0
PE-X foam insulation sheet t= 15mm w=280mm l=100m	2,54E-01	0
Heating 32x2.9 PE-Xa SDR11 PN6 Blue	1,31E-01	0
Heating 32x2.9 PE-Xa SDR11 PN6 Red	1,31E-01	0
Tape reinforced width 50 mm length 750m	2 [meters]	0

Packaging Component	Weight [kg/declared unit]	Substances of very high concern, weight [[kg/ declared unit]
Foiler	2,58E-06	0
Label	2,20E-02	0
Packaging film	1,27E-05	0

This product does not require any process using CFC substances. This is assumed based on the manufacturer's declaration : "2504 Eco Declaration.pdf" listed in the references.

PRODUCT LIFE-CYCLE

SYSTEM BOUDARY

This EPD covers the life-cycle modules listed in the diagram below:

	Production stage			Construction stage		Use stage							End of life stage				Benefits and loads beyond system boundary		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
	Raw Materials	Transport	Manufacturign	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operatinal water use	Deconstruction	Transport	Water Processing	Dosposal	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	GLO	GLO	BE	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Variation - product	49%			39%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Share of specific data	60%			37%		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Module not declared = ND, Global = GLO

Due to large annual production and limited infrastructures (only one production site), infrastructures and equipment were not included in the study. Indeed, only the energy consumption of these infrastructures and equipment linked to the life cycle of the reference product were considered.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials. Also, electricity used by machines in the production processes at the manufacturing facilities are included in this stage.

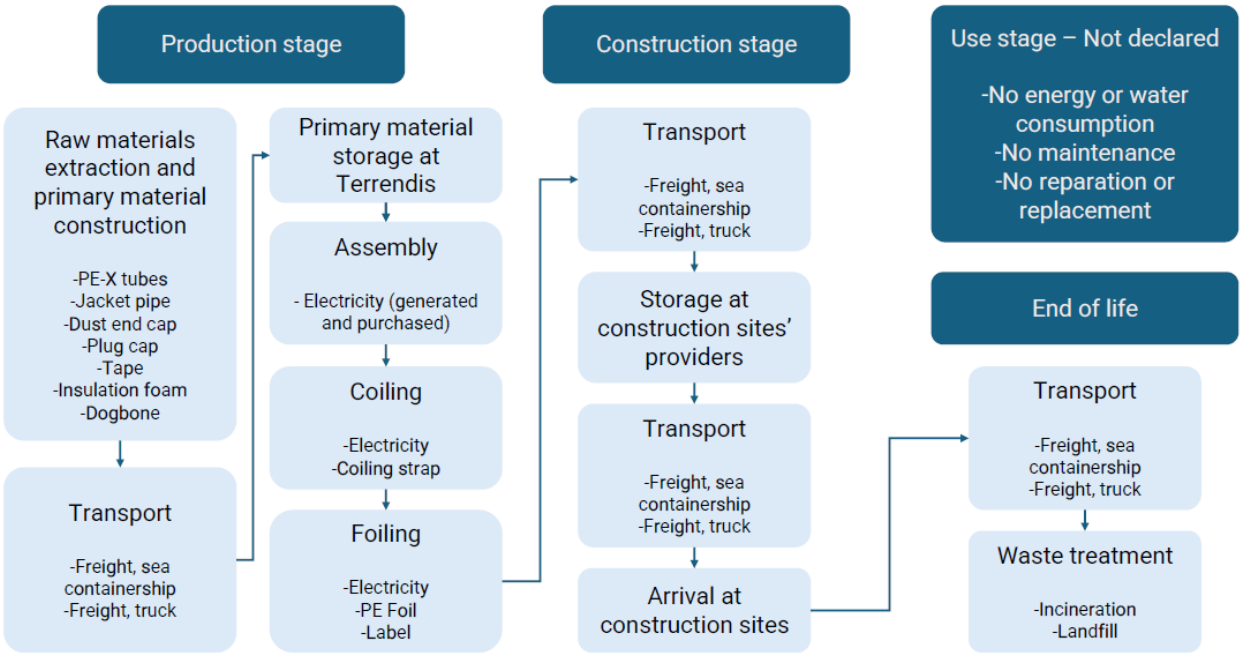
The primary material (jacket pipe and internal pipes) together with the insulation and the dog bone are brought into the assembly line and assembled over a length of 100m.

Once the 100m are produced, they are coiled and foiled. The packaging does not contain any biogenic carbon.

Electricity mix was modelled using generic data from ecoinvent 3.10. The electricity used from Belgium network was modelled by a residual mix from the country, which climate impact is 0.20426 kg CO_2 eq/kWh. The electricity used from Terrendis own photovoltaic production was modelled by a Belgian photovoltaic production mix which climate impact is 0.11074 kg CO_2 eq/kWh.

The year representative for manufacturing module is 2023.

MANUFACTURING PROCESS



The global manufacturing process involves the following steps: Extern production of all primary materials, import at Terrendis factory, insulating foam cutting and assembling of pre-insulated pipes. The main energy inputs are electricity for the extern production processes and for assembling. The main material inputs are HDPE, PE-X, PE-Xa and LLDPE. The main outputs are the finished pre-insulated pipes and production scrap. The year representative for the inventory above is 2023.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts related to delivering final products to construction sites (A4) include fuel combustion emissions, environmental effects from fuel production, and emissions linked to supporting infrastructure. Based on specific data from Terrendis, assumption was made that transport is separated in three modes:

- Transport by truck in Europe from Terrendis to manufacturing facility (business to business) and from manufacturing facility to installation site (business to client),
- Transport by truck out of Europe from Terrendis to manufacturing facility (business to business)
- Transport by boat from Terrendis to manufacturing facility (business to business)

The weighted average transportation distance for each mode is determined considering the mass exported in each country. For the average transportation distance from the manufacturing facility

to the installation site, the calculation is based on the company's actual average sales data within local markets. Environmental impacts from installation encompass standardized energy use, tools for installation, waste packaging materials, and the release of biogenic carbon dioxide from wooden pallets.

Concerning A5 modules, this type of product is buried on construction sites. Assumption was made that it requires a negligible quantity of energy, which means that A5 is assumed to be 0 impact unit for each category.

PRODUCT USE AND MAINTENANCE (B1-B7)

As the PCR: 2019:14 rules indicate about modules to declare, stages B1-B7 are optional. In this case, assumptions were made that pre-insulated pipes do not need any maintenance, reparation or replacement and do not consume any energy or water. Considering this, 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, D)

Terrendis do not have any feedback on products end of life as it is quite new with a long lifetime of reference. Energy and natural resource consumption during the disassembly of end-of-life products is considered insignificant, and thus, the environmental impacts of demolition are assumed to be negligible (C1). After approximately 30 years of service life, it is estimated that 100% of the end-of-life product is either buried underground or landfilled or burned (C4). Generic data from ecoinvent 3.10 representing an average treatment in Europe including those scenarios is used to model the products end of life.

Through the recycling process, the polyethylene (PE) from the end-of-life product is repurposed into recycled PE (D).

LIFE-CYCLE ASSESSMENT INFORMATIONS

DECLARED AND FUNCTIONAL UNIT

The reference product is the system designated HD14032. It has an outer sheath diameter of 140 mm and contains 2 PE-X pipes with a diameter of 32 mm.

Reference product	HD14032
Declared unit	1 m

Mass per declared unit	- Mass of the representative product: 1.29 kg - Mass of the product per declared unit depends on the size and type of the product. Products covered by this EPD are represented in Annex 1.
Software	OpenLCA 2.4
Database	ecoinvent 3.10

The period for data is the year 2023. The share of specific data used in the GWP-GHG indicator calculation is 63%. This share is calculated based on the specific data used in modules A3 and A4, excluding any generic data from module A1.

EN 15804 reference package has been used (based on EF 3.1).

ALLOCATION, ESTIMATES AND ASSUMPTIONS

A 1% cut-off was applied in this study. Allocation rules are used in this EPD.

Excluded process from study	Reasons
Maintenance of cuting machine	Rare, negligible at the study scale
Transports within the factory	Not quantified and assumed negligible
Material loss during production process	Not quantified and assumed negligible

Other assumptions

- The pipes have an assumed service life of over 30 years before replacement.
- Every generic data comes from ecoinvent 3.10 database. This was chosen because of its large quantity of data, providing data homogeneity for the calculations. Moreover, the database was released in 2023, which provide consistency and representativeness with products.
- Transport has been approximated using data from Terrendis and raw material tonnages. 3 transports modes have ben uses: Truck inside Europe, Truck outside Europe and containership.
- The same cut-off criteria were used as reported in the underlying LCA report.
- .The energy mix results in a climate impact of 0,03034 kg CO2 eq/kWh within the GWP-GHG indicator.

SAMPLING PROCESS

Product variations were assessed, and the best-selling one in 2023 was chosen as representative.

DATA QUALITY

In each life cycle stage, generic data used from ecoinvent 3.10 has a time validity including year 2023 which guarantee temporal representativeness. Moreover, using data from this database

only guarantee homogeneity in the calculations. Specific data from Terrendis is used in modules A1 to A5. Specific data was checked by LCA practitioner.

ADDITIONAL INFORMATION

This EPD presents restrictions:

- This EPD is only applicable to Terrendis pre-insulated double heating pipes
- This EPD should not be used for applications outside of underground networks
- The environmental performance data is only valid for the product configurations listed in Annex1

GEOGRAPHICAL COVERAGE

The geographical scope of this EPD is global.

ENVIRONNEMENTAL IMPACT DATA

REFERENCE SYSTEM

CORE ENVIRONMENTAL IMPACT INDICATORS - EN 15804+A2							
Impact category	Unit	Total	A1-A3 – Production stage	A4-A5 – Construction stage	B1-B7 – Use stage	C1-C4 – End of life stage	D – Benefits and loads beyond system boundary
Climate change	kg CO2-Eq	1.02E+01	6.02E+00	3.48E-01	ND	3.79E+00	-1.62E+00
Climate change: fossil	kg CO2-Eq	1.02E+01	6.01E+00	3.47E-01	ND	3.80E+00	-1.62E+00
Climate change: biogenic	kg CO2-Eq	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00
Climate change: land use and land use change	kg CO2-Eq	4.48E-03	4.33E-03	1.21E-04	ND	3.36E-05	-1.26E-03
Ozone depletion	kg CFC-11-Eq	1.76E-07	1.68E-07	6.67E-09	ND	1.22E-09	-6.62E-08
Acidification	mol H+-Eq	2.51E-02	2.33E-02	1.17E-03	ND	6.45E-04	-7.59E-03
Eutrophication: freshwater	kg P-Eq	1.50E-03	1.47E-03	2.33E-05	ND	6.60E-06	-5.00E-04
Eutrophication: marine	kg N-Eq	5.23E-03	4.52E-03	2.85E-04	ND	4.20E-04	-1.30E-03
Eutrophication: terrestrial	mol N-Eq	5.36E-02	4.74E-02	3.11E-03	ND	3.10E-03	-1.39E-02
Photochemical oxidant formation: human health	kg NMVOC-Eq	2.93E-02	2.69E-02	1.49E-03	ND	9.35E-04	-7.63E-03
Material resources: metals/minerals	kg Sb-Eq	4.70E-05	4.57E-05	1.12E-06	ND	1.74E-07	-3.60E-05

Energy resources: non-renewable	MJ. net calorific value	1.52E+02	1.46E+02	4.86E+00	ND	8.68E-01	-3.86E+01
Water use	m3 world Eq deprived	2.58E+00	2.47E+00	2.32E-02	ND	8.60E-02	-8.62E-01

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS - EN 15804+A2

Impact category	Unit	Total	A1-A3 – Production stage	A4-A5 – Construction stage	B1-B7 – Use stage	C1-C4 – End of life stage	D – Benefits and loads beyond system boundary
Particulate matter formation	disease incidence	2.75E-07	2.44E-07	2.49E-08	ND	6.02E-09	-7.22E-08
Ionising radiation: human health	kBq U235-Eq	4.45E-01	4.38E-01	5.97E-03	ND	1.02E-03	-8.75E-02
Ecotoxicity: freshwater	CTUe	4.31E+01	4.03E+01	1.30E+00	ND	1.51E+00	-1.33E+01
Human toxicity: carcinogenic	CTUh	2.41E-08	2.10E-08	2.37E-09	ND	7.53E-10	-6.53E-09
Human toxicity: non-carcinogenic	CTUh	7.57E-08	6.64E-08	3.08E-09	ND	6.24E-09	-2.83E-08
Land use	dimensionless	2.82E+01	2.46E+01	2.84E+00	ND	6.90E-01	-8.66E+00

ENVIRONMENTAL IMPACT GWP-GHG – THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	Total	A1-A3 – Production stage	A4-A5 – Construction stage	B1-B7 – Use stage	C1-C4 – End of life stage	D – Benefits and loads beyond system boundary
Climate change | Global warming potential (GWP100)	kg CO2-Eq	1.02E+01	6.02E+00	3.48E-01	ND	3.79E+00	-1.62E+00

ENERGY RESSOURCE USE INDICATORS - EN 15804+A2

Impact category	Unit	Total	A1-A3 – Production stage	A4-A5 – Construction stage	B1-B7 – Use stage	C1-C4 – End of life stage	D – Benefits and loads beyond system boundary
Total use of primary energy resources (PERT + PENRT)	MJ	1,60E+02	1,54E+02	5,00E+00	0,00E+00	9,03E-01	0,00E+00
Resource | Total use of non-renewable primary energy resources (PENRT)	MJ	1,53E+02	1,48E+02	4,92E+00	0,00E+00	8,86E-01	0,00E+00
Resource | Total use of renewable primary energy resources (PERT)	MJ	6,76E+00	6,66E+00	8,09E-02	0,00E+00	1,70E-02	0,00E+00
Resource | Use of non renewable primary energy resources used as energy carrier (PENRE)	MJ	1,53E+02	1,48E+02	4,92E+00	0,00E+00	8,86E-01	0,00E+00
Resource | Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Resource | Use of renewable primary energy resources used as energy carrier (PERE)	MJ	6,76E+00	6,66E+00	8,09E-02	0,00E+00	1,70E-02	0,00E+00
Resource | Use of renewable primary energy resources used as raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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.

OTHER PRODUCTS THAN REFERENCE SYSTEM

To obtain the values of the environmental impacts "y" of concerned products other than the reference product. the sum of the square diameter's "x" with x given in annex 1. can therefore be multiplied by the values of the environmental indicators (A and B) according to the formula y=A*x +B. taking in account the associated uncertainty given in annex 2.

Example of calculation: Impact on climate change of the designated product HD16032 :

The reference system HD16032 has an outer sheath diameter of 160 mm and contains 2 PE-X pipes with a diameter of 32 mm. The sum of the square diameters is therefore x= 0.027648 mm^2.

According to annex 2 below. the coefficients given for climate change category are A=3.02E+02 kg CO2-Eq/m^2 and B=3.63E+00 kg CO2-Eq. with un uncertainty of 2.07E-00 kg CO2-Eq.

The impact of the designated system HD16032 concerning climate change category is therefore: $I_{HD16032}$ = A*x+B = 3.02E+02 *0.027648 + 3.63E+00 = **11.9 ± 2.07 kg CO2-Eq**.

All x values for each variant. allowing extrapolations to be calculated. are given in annex 1.

VARIATIONS

This EPD declares the variation of each environmental impact indicator result for which the variation. aggregated over all included modules (from A to C). is above 10% between any of the included products. The following table shows the variations for the impact categories where the 10% threshold is exceeded. Every product here is the same. with different diameters (49% of variation). This implies for each greater diameter more materials. and more weight transported (energy used to assemble products is considered to be the same whatever the diameter

Impact category	Impact unit (IU)	Impact range for a jacket pipe diameter range of [110;225]mm [IU]		Impact variations between products (%)
		Min	Max	
Acidification	mol H+-Eq	1,62E-02	5,11E-02	315%
Climate change	kg CO2-Eq	6,67E+00	2,23E+01	334%
Climate change | Global warming potential (GWP100)	kg CO2-Eq	6,67E+00	2,23E+01	334%
Climate change: biogenic	kg CO2-Eq	2,44E-03	7,27E-03	298%
Climate change: fossil	kg CO2-Eq	6,67E+00	2,23E+01	334%
Climate change: land use and land use change	kg CO2-Eq	2,88E-03	8,65E-03	300%
Ecotoxicity: freshwater	CTUe	2,82E+01	8,92E+01	316%
Energy resources: non-renewable	MJ, net calorific value	1,01E+02	3,19E+02	317%
Eutrophication: freshwater	kg P-Eq	9,80E-04	3,01E-03	307%
Eutrophication: marine	kg N-Eq	3,40E-03	1,09E-02	321%
Eutrophication: terrestrial	mol N-Eq	3,48E-02	1,11E-01	320%
Human toxicity: carcinogenic	CTUh	1,57E-08	5,00E-08	319%
Human toxicity: non-carcinogenic	CTUh	4,67E-08	1,38E-07	295%
Ionising radiation: human health	kBq U235-Eq	3,09E-01	8,43E-01	273%
Land use	dimensionless	1,83E+01	5,93E+01	323%
Material resources: metals/minerals	kg Sb-Eq	3,04E-05	9,17E-05	301%
Ozone depletion	kg CFC-11-Eq	1,17E-07	3,72E-07	317%
Particulate matter formation	disease incidence	1,76E-07	5,67E-07	322%
Photochemical oxidant formation: human health	kg NMVOC-Eq	1,92E-02	6,15E-02	320%
Water use	m3 world Eq deprived	1,72E+00	5,14E+00	298%

INTERPRETATION

This LCA results show that production stage (A1-A3) has the biggest impact share on all impact categories. Within those categories. the biggest impact share is du to high density polyethylene. Climate change categories also shows that end of life stage has here a significant share of the impact (around 36%). Going deeper in the analysis. we can identify polyethylene end of life as the hotspot here.

This study present limitations. First. the calculation methods used to obtain the results in each impact category include the IPCC 2021 method for the GWP100 category. and the EF V3.1 method for all other categories. The estimated impact results are only relative statements that do not indicate impact category endpoints. thresholds or risks. This report does not consider all the potential impacts and is based on scenarios and assumptions.

Next, it is notable that the generic data used from ecoinvent 3.10 database may not be perfectly representative of the reality of the products. Note that the EPD associated with the report is only valid over a certain period of time and only applies to the described use case of the product. Data quality can also influence the results (date of data, geographical representativeness, technical representativeness, associated uncertainty). We can note a low geographical representativeness for the production of polyethylene, which is a global average. For each polyethylene component, the impact linked to production can be more or less significant, which makes this stage of the life cycle less reliable.

LIST OF REFERENCES

CEN (2013): EN 15804:2012+A2/CN 2022. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

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EPD International (2018): PCR 2019:14 Construction products and construction services. version 1.3.4.

EPD International (2021): General Programme Instructions for the International EPD System. Version 4.0 dated 2021-03-29.

ISO (2023): ISO 14020:2023. Environmental statements and programmes for products - Principles and general requirements

ISO (2010): ISO 14025:2010. Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO (2006a): ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework

ISO (2006b): ISO 14044: 2006. Environmental management – Life cycle assessment – Requirements and guidelines

"2504 Eco Declaration.pdf" – declaration concerning CFC used in processes by Terrendis

ANNEX 1: REFERENCES COVERED BY THIS STUDY

Reference number	Ø Jacket pipe [m]	Ø Inner tube [m]	Sum of diameters squared x [m²]
HD11025	0.11	0.025	0.01335
HD11032	0.11	0.032	0.014148
HD14025	0.14	0.025	0.02085
HD14032	0.14	0.032	0.021648
HD14040	0.14	0.04	0.0228
HD16025	0.16	0.025	0.0208
HD16032	0.16	0.032	0.027648
HD16040	0.16	0.04	0.0288
HD16050	0.16	0.05	0.0306
HD20050	0.2	0.05	0.045
HD20063	0.2	0.063	0.047938
HD22563	0.225	0.063	0.058563
HD22575	0.225	0.075	0.061875

ANNEX 2 : SCALING FACTORS

Impact category	A value [IU/m²]	B value [IU]	Uncertainty [IU]	Impact unit (IU)
Acidification	6.69E-01	1.05E-02	6.12E-03	mol H+-Eq
Climate change	3.02E+02	3.63E+00	2.07E+00	kg CO2-Eq
Climate change | Global warming potential (GWP100)	3.02E+02	3.63E+00	2.07E+00	kg CO2-Eq
Climate change: biogenic	9.20E-02	1.72E-03	9.36E-04	kg CO2-Eq
Climate change: fossil	3.01E+02	3.63E+00	2.07E+00	kg CO2-Eq
Climate change: land use and land use change	1.10E-01	2.07E-03	1.18E-03	kg CO2-Eq
Ecotoxicity: freshwater	1.18E+03	1.74E+01	9.80E+00	CTUe
Energy resources: non-renewable	4.25E+03	5.99E+01	3.31E+01	MJ. net calorific value
Eutrophication: freshwater	3.89E-02	6.52E-04	3.60E-04	kg P-Eq
Eutrophication: marine	1.45E-01	2.08E-03	1.21E-03	kg N-Eq
Eutrophication: terrestrial	1.47E+00	2.15E-02	1.27E-02	mol N-Eq
Human toxicity: carcinogenic	6.66E-07	9.65E-09	5.82E-09	CTUh
Human toxicity: non-carcinogenic	1.68E-06	3.80E-08	2.34E-08	CTUh
Ionising radiation: human healt	1.04E+01	2.18E-01	9.44E-02	kBq U235-Eq
Land use	7.92E+02	1.10E+01	6.57E+00	dimensionless
Material resources: metals/minerals	1.17E-03	2.13E-05	1.20E-05	kg Sb-Eq
Ozone depletion	4.96E-06	6.88E-08	3.78E-08	kg CFC-11-Eq
Particulate matter formation	7.51E-06	1.11E-07	6.89E-08	disease incidence
Photochemical oxidant formation: human health	8.18E-01	1.15E-02	6.64E-03	kg NMVOC-Eq
Water use	6.57E+01	1.15E+00	5.76E-01	m3 world Eq deprived