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Environmental Product Declaration

Polypropylene (PP) smooth wall cable protection pipe system RIGID MONO SRS

1. DECLARATION OF GENERAL INFORMATION

Introduction

The present EPD outlines the various environmental aspects, which accompany the polypropylene (PP) smooth wall cable protection pipe system RIGID MONO SRS, from the primary extraction of raw materials up to and including the end of life (EoL) treatment after its reference service lifetime.

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PP pipe system's use and functional unit

The EPD refers to a PP smooth wall cable protection pipe system RIGID MONO SRS, from the cradle to the grave, including raw material extraction, transportation to converters, converting process, transport to trench, construction, use and end of life. Environmental indicators are expressed for the complete life cycle, from the cradle to the grave. The functional unit is defined as "The below ground protection and installation of telecommunications, medium and high voltage cables by PP smooth wall pipe system RIGID MONO SRS (DN/OD 110 - 160 mm) over its complete service life cycle of 100 years, calculated per year".

Product name & graphic display of product

PP smooth wall cable protection pipe system RIGID MONO SRS (civil applications).

Description of the PP smooth wall cable protection pipe system RIGID MONO SRS components

The environmental burdens are calculated in relation to the functional unit, which resulted for the PP smooth wall cable protection pipe system RIGID MONO SRS in the following basic pipe system components: PP pipes, PP fittings, and EPDM sealing rings.
The system consists of PP smooth wall pipes and fittings, yellow or green plastic material, SN8, diameters DN/OD from 110 mm to 160 mm, 6 m length. Representative for the typical pipe diameter is DN/OD 110 mm pipe.
The EPD is declared as the average environmental performance for PP smooth wall cable protection pipe system RIGID MONO SRS, over its reference service life cycle of 100 years, calculated per year, in accordance to EN 13476.

EPD program and program operator

The present EPD is in line with the ongoing standardization work. A program operator has not been established yet.

Date of declaration and validity

September 2021
The EPD has a 5-year validity period (September 2026)

Comparability
Please note that EPDs of construction products may not be comparable if they do not comply with the CEN standards.

Content of the product system
The product system does not contain materials or substances that can adversely affect human health and the environment in all stages of the life cycle.

Retrieve information
Explanatory material may be obtained by contacting EVOPIPES (http://www.evopipes.com)

2.DECLARATION OF THE MATERIAL CONTENT

The Polypropylene (PP) smooth wall cable protection pipe system RIGID MONO SRS does not contain any substances as such or in concentration exceeding legal limits, which can adversely affect human health and the environment in any stages of its entire life cycle.

Construction of the RIGID MONO SRS pipe

Material	Proportion, %	Description of the component
PP	~ 98 – 99	Polypropylene block copolymer
Pigment	~ 1 – 2	Polypropylene-based color masterbatch or mix of such

3. DECLARATION OF THE ENVIRONMENTAL PARAMETERS DERIVED FROM LCA

3.1 Life cycle flow diagram
The EPD refers to PP smooth wall cable protection pipe system RIGID MONO SRS, from the cradle to the grave, including product stage, transport to construction site and construction process stage, use stage and end of life stage.

-Product stage: raw material extraction and processing, recycling processes for recycled material input, transport to the manufacturer, manufacturing (including all energy provisions, waste management processes during the product stage up to waste for final disposal):
o Production of raw materials for PP pipes
o Transport of PP pipe raw materials to converter
o Converting process for PP smooth wall pipes (extrusion)
o Production of raw materials for PP fittings
o Transport of PP fittings raw materials to converter
o Converting process for PP fittings (injection molding)
o Production raw materials for EPDM rings
o Transport of EPDM raw materials to converter
o Converting process for EPDM rings

-Construction process stage: including all energy provisions, waste management processes during the construction stage up to waste for final disposal:
o Transport of complete PP smooth wall cable protection pipe system RIGID MONO SRS to the trench;
o Installation of complete PP smooth wall cable protection pipe system RIGID MONO SRS in the trench.

-Use stage (maintenance and operational use): including transport and all energy provisions, waste management processes up to waste for final disposal during this use stage:
o Use and maintenance of the complete PP smooth wall cable protection pipe system RIGID MONO SRS during 100 years of reference service lifetime.

-End of life stage: including all energy provisions during the end of life stage:
o Disassembly of complete PP smooth wall cable protection pipe system RIGID MONO SRS after 100 years of reference service lifetime;
o Transport of complete PP smooth wall cable protection pipe system RIGID MONO SRS after 100 years of reference service lifetime;
o End-of-life waste treatment of complete PP smooth wall cable protection pipe system RIGID MONO SRS after 100 years of reference service lifetime.

3.2 Parameters describing environmental impacts

The following environmental parameters are expressed with the impact category parameters of the life cycle impact assessment (LCIA).

Impact category	Abiotic depletion	Acidification	Eutrophication	Global warming	Ozone layer depletion	Photochemical oxidation
	kg Sb eq	kg SO2 eq	kg PO4--- eq	kg CO2 eq	kg CFC-11 eq	kg C2H4 eq
Product stage	0.04799	0.01154	0.00278	3.20980	0.000000105	0.00099
Construction process stage	0.00969	0.00886	0.00229	1.40458	0.000000157	0.00027
Use stage	0	0	0	0	0	0
End of life stage	-0.00019	-0.00008	-0.00008	0.06420	0,0000000005	-0.000001
Total	**0.04624**	**0.01634**	**0.00401**	**3.76396**	**0.00000021**	**0.001006**

3.3 Parameters describing resource input

The following environmental parameters apply data based on the life cycle inventory (LCI).

Environmental parameter	Non-renewable energy indicator	Renewable energy indicator	Non-renewable material resources (other than energy)	Renewable material resources (other than energy)	Crude oil (feedstock and energy)	Natural gas (feedstock and energy)	Input of net fresh water
	MJ primary	MJ primary	kg	kg	kg	kg	m^3
Product stage	112.57066	2.35806	0.12723	0.02744	1.21563	0.79861	4.51316
Construction process stage	24.13262	0.66710	0.05075	0.00368	0.38454	0.03914	4.10620
Use stage	0	0	0	0	0	0	0
End of life stage	-0.56285	-0.00707	0.00025	-0.0001	0.00365	-0.0028	-0.27079
Total	**109.52650**	**2.42808**	**0.14339**	**0.02495**	**1.29029**	**0.67172**	**6.71651**

3.4 Parameters describing different waste categories and further output material flows

The parameters describing waste categories and other material flows are output flows derived from the life cycle inventory (LCI)

Parameters describing different waste categories

Environmental parameter	Hazardous waste	Non-hazardous waste	Nuclear waste
	kg	kg	kg
Product stage	0.01164	0.09102	0.0000575
Construction process stage	0.00002	0.18058	0.0000418
Use stage	0	0	0
End of life stage	-0.0000007	3.64094	-0.0000052
Total	**0.00938**	**3.14769**	**0.000075**

Parameters describing further output material flows

Parameter	Parameter unit expressed per functional unit
Components for re-use	1,16 kg
Materials for recycling	0,14 kg
Materials for energy recovery	0,03 kg

4. SCENARIOS AND TECHNICAL INFORMATION

4.1 Construction process stage

Transport from the production gate to the construction site (trench)

Parameter	Parameter unit expressed per functional unit
Fuel type consumption of vehicle or vehicle type used for transport e.g. long-distance truck, boat etc.	The PP smooth wall cable protection pipe system RIGID MONO SRS is transported over an average distance of 400 km by means of a truck from the producers of the different pipe system components to the trench. The loading factor for RIGID MONO SRS pipes is limited by volume. Environmental burdens associated with this kind of transport are calculated by means of the Ecoinvent V2.2 datarecord “Transport, lorry 16-32t, EURO4/tkm/RER”.
Capacity utilization (including empty returns)	
Bulk density	
Volume capacity utilization factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	

Construction (installation at trench)

Parameter	Parameter unit expressed per functional unit
Ancillary materials for installation	0,34 m³ of backfilling sand trucked to trench over an average distance of 10 km. Environmental burdens associated with this kind of energy are calculated by means of the Ecoinvent V2.2 datarecord "Sand, at mine/CH + Transport, lorry >32t, EURO4/tkm/RER"
Other resource consumption	Not relevant
Quantitative description of energy type (regional mix) and consumption during the installation process	44 MJ of mechanical energy is needed for excavating the soil (dig up), for excavating the backfilling soil and sand, for the stamping process (compaction next pipe) and for the vibration plate (compaction top). Environmental burdens associated with this kind of energy are calculated by means of the Ecoinvent V2.2 datarecord "Diesel, burned in building machine/MJ/GLO"
Waste on the building site, generated by the product's installation	0,09 kg of PP pipe left over during installation: 80% to landfill, 15% to incineration and 5% to mechanical recycling. Transportation of PP pipe left over to waste management treatment facilities is included: 600 km to recycling plant, 150 km to incineration with energy recovery and 50 km to landfill. Environmental burdens are calculated by means of the Ecoinvent v2.2 datarecord "Transport, lorry 3.5-7.5t, EURO4/tkm/RER". 0,24 kg of packaging waste: treated according to European average packaging waste scenarios (EU27, 2006). 0,43 m³ of soil that has to be transported over an average distance of 5 km to the nearest depot. Environmental burdens are calculated by means of the Ecoinvent v2.2 datarecord "Transport, lorry 3.5-7.5t, EURO4/tkm/RER".
Output materials as result of waste management processes at the building site e.g. of collection for recycling, for energy recovery, final disposal	
Emissions to ambient air, soil and water	No direct emissions at the trench. Emissions are related to the upstream processes (mining of sand, transportation processes and mechanical energy) and downstream processes (waste management and treatment) and are included in the Ecoinvent datarecords that are used for modelling the environmental impacts.

4.2 Use stage: operation and maintenance

Operation:
Operational use is not relevant for the EPD, since it falls outside the system boundaries of the LCA project. Moreover, the PP smooth wall cable protection pipe system RIGID MONO SRS is a gravity pipe system.

Maintenance:
Energy consumption for jetting: 7 MJ per FU
Water consumption for jetting: 0,15 m^3 per FU
Maintenance in case of the PP smooth wall cable protection pipe systems is specifically related to jetting. Jetting happens 4 times in a 100-year service life time. One jetting operation needs an energy consumption of 5 liter of gasoline and 3,75 m^3 of water per 100 meter of pipe system.

4.3 End of life
The following end of life scenarios have been taken into account:
- Estimated reference service life time of 100 years based on technical assumptions
- EoL approach for landfill, incineration with energy recovery (impacts and credits are assigned to the life cycle that generates the waste flows)
- Recycled content approach for recycling and use of recycled materials (= impact of recycling and credits for recycled materials, because less virgin materials are needed is assigned to the life cycle that uses the recycled materials).

Parameter	Parameter unit expressed per functional unit
Collection process Recycling system Final deposition	After a reference service lifetime of 100 years the PP smooth wall cable protection pipe system might be replaced. In most cases (95%) the pipe system will be left in the ground. In some cases (5%) the pipe system is taken out and treated (mechanical recycling, incinerated or landfilled). So, for the functional unit 1,067 kg of pipe system components (pipes, fittings, sealing rings) are available at the trench. 2,5% (0,026 kg) is transported over an average distance of 600 km to a recycling plant, 2,5% (0,026 kg) is transported over an average distance of 150 km to an incinerator, and the remaining 95% (1,013 kg) is left in the ground. For the functional unit 0,045 kg of EPDM rings are available at the trench. 5% (0,0022) will be transported to landfill over an average distance of 50 km, the rest is left in the ground. **EoL scenario PP pipes and fittings:** Mechanical recycling 2,5% Incineration 2,5% Left in ground 95% **EoL scenario EPDM rings:** Landfill 5% Left in ground 95% Environmental burdens associated with transportation are calculated by means of the following Ecoinvent v2.2 datarecord “Transport, lorry 3.5-7.5t, EURO4/tkm/RER”

5. ADDITIONAL INFORMATION ON EMISSIONS TO INDOOR AIR, SOIL AND WATER DURING USE STAGE

Emissions to indoor air:
Since the PP smooth wall cable protection pipe system RIGID MONO SRS is a buried system (in trench) we can confirm that emissions to indoor air are not relevant.
Emissions to soil and water:
Despite there is no approved European measurement method available, we can confirm that the PP smooth wall cable protection pipe system RIGID MONO SRS does not contain any substances mentioned on the REACH-list.

6. OTHER ADDITIONAL INFORMATION

Product certification, conformity, marking

EN 13476, Plastics piping systems for non-pressure underground drainage and cable protectionage - Smooth-wall piping systems of unplasticized poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)

In compliance with European Construction Products Directive (89/106/EEC).

EVOPIPES' quality management system's compliance with ISO 9001, ISO 14001 and ISO 50001 is certified by Bureau Veritas Quality Inspection.

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