

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	ROMOLD GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ROG-20260142-IBC1-EN
Issue date	07.07.2026
Valid to	06.07.2031

I PP DN 1000 and DN 800 Manholes Romold GmbH

www.ibu-epd.com | <https://epd-online.com>



1. General Information

Romold GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-ROG-20260142-IBC1-EN

This declaration is based on the product category rules:

Plastic manholes for underground non-pressurized sewer pipe systems, 12.04.2024
(PCR checked and approved by the SVR)

Issue date

07.07.2026

Valid to

06.07.2031



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Dr. Martina Bender
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I PP DN 1000 and DN 800 Manholes

Owner of the declaration

ROMOLD GmbH
Sägewerkstraße 5
83416 Saaldorf-Surheim
Germany

Declared product / declared unit

1 kg I PP manhole

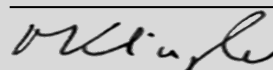
Scope:

This EPD applies to the manhole systems
- I PP DN 800
- I PP DN 1000
from Romold GmbH, manufactured at the Teisendorf plant in Germany. The manhole systems are used worldwide. The sales focus is Europe. This is an average EPD in which the above-mentioned products are declared via an average product variant. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidence.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard is abbreviated as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
☐	internal
☒	external



Matthias Klingler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The manhole systems to be declared are the I PP manhole system product family from Romold GmbH, which is made of filler-free polypropylene (PP) from virgin material. The manholes are available in sizes DN 800 and DN 1000. The manholes consist of a manhole base, a cone and optionally one or more manhole rings. Steps are also installed as access aids. Seals made of ethylene propylene diene rubber (EPDM) are installed between the individual elements. The use of the product is subject to the respective national regulations at the place of use, in Germany for example the building regulations of the federal states, and the technical provisions based on these regulations.

2.2 Application

The manhole system under consideration is used for sewer systems in civil engineering to convey wastewater, combined wastewater and rainwater. In addition, the manholes can be climbed, thus serving as an entry point into the sewer system and offering the possibility of inspecting and cleaning the sewer. The manhole systems can be used for municipal drainage for new developments or when replacing sewer manholes.

2.3 Technical data

The I PP manhole systems comply with the relevant standards *DIN EN 13598-2*, *DIN EN 476* and *EN 681-1*.

Structural data

Name	Value	Unit
Material	Polypropylene (PP), filler-free	-
Density of the material according to EN 13598-1,-2, geprüft nach EN ISO 1183-1	890 - 950	kg/m ³
Ring stiffness of the riser pipe, according to EN 13598-2, geprüft nach EN ISO 13268	at least 4	kN/m ²
Nominal diameter of the riser pipe according to EN 13598-1, 2 **	800 - 1000	mm

Performance values of the product in relation to its characteristics according to the relevant technical regulation (no CE marking).

2.4 Delivery status

The individual elements of the selected manhole system are usually delivered on returnable pallets. Final assembly takes place on the construction site.

2.5 Base materials/auxiliary materials

Composition of the manhole

The composition of the average manhole in mass % in relation to the declared unit is shown in the following table.

Name	Value	Unit
Polypropylene (used in cones, shaft rings, inliners, sleeves, and shaft bases)	94.5	%
EPDM (used in seals)	3.3	%
Polypropylene, 30 % per weight glass fibres (used in steps)	2.2	%

1. This product/article/at least one partial article contains substances listed in the candidate list (Substances of Very High Concern – SVHC) (date: 01.10.2025) exceeding 0.1 percentage by mass: **no**
2. This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are

not on the candidate list, exceeding 0.1 percentage by mass: **no**

3. Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): **no**

2.6 Manufacture

The components of the I PP manholes (cone, manhole ring and base, sockets and approx. 72 % of the inliners) are manufactured using the injection molding process. A PP granulate is mixed with a carbon black masterbatch and stabilizers for the cone, manhole ring and base and sockets. Inliners do not contain carbon black. The material is filled into the injection molding machine, plasticized and injected under pressure into a shaping tool.

Some of the manholes (approx. 28 %) are supplied with an inliner, which is produced using the thermoforming process.

Polypropylene sheets are used for thermoforming.

Thermoforming is a process for manufacturing plastic parts in which a thermoplastic sheet is heated, formed and then cooled. Any excess material is removed by punching.

2.7 Environment and health during manufacturing

The legal regulations on handling exhaust air, waste water, waste and noise emissions are complied with or undercut. The health of employees is not endangered during production.

2.8 Product processing/Installation

The manholes are installed in the trench either manually or using a mechanical lowering device. The seals are attached to the connection points of the individual components and the components are connected in the trench.

2.9 Packaging

Depending on the size selected, the individual elements of the manhole system are delivered in varying numbers, stacked on reusable pallets with transport protection or without further packaging. Final assembly takes place on site. The pallets used are returnable pallets that can be reused.

2.10 Condition of use

No material changes occur during use, as all the plastics used are stabilized and resistant to ageing.

2.11 Environment and health during use

There are no known interactions between the manhole system, the environment and health during use. The product does not contain or form any harmful substances that could be released.

2.12 Reference service life

A reference service life in accordance with *ISO 15686* is not specified. According to *the BBSR table*, a service life of more than 50 years can be expected for the sewer manhole when used as intended.

2.13 Extraordinary effects

Fire

Due to the underground installation, the effects in the event of fire can be neglected when considering the sewer shaft system.

Water

Due to the sealing system, the manhole can be classified as tight against both groundwater infiltration and exfiltration of wastewater into the surrounding soil. Corresponding system tests in accordance with *EN 13598-2* are fulfilled and are subject to regular external monitoring by accredited testing and monitoring institutes.

Mechanical destruction

Mechanical destruction of the product during use is not to be assumed.

2.14 Re-use phase

At the end of its service life, the manhole can be removed and sent for material recycling. If material recycling is not possible or desired, the manhole can be thermally recycled with energy recovery.

2.15 Disposal

3. LCA: Calculation rules

3.1 Declared unit

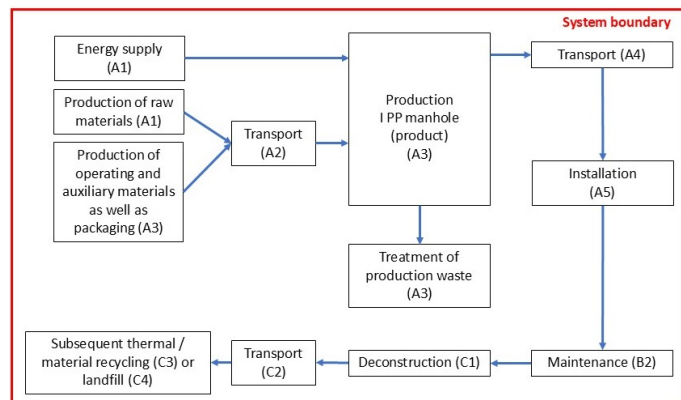
The declared unit for the I PP manhole is defined in accordance with PCR Part-B as 1 kg of manhole when leaving the factory. The declared unit refers to the manhole system consisting of cone, manhole ring, manhole base, inliner, sleeves, seals and risers. The product packaging is considered separately. This EPD covers the product variants I PP manhole DN 1000 and I PP manhole DN 800. An average manhole is assessed based on the average values for annual production in 2023. The results of the LCA can be converted to the complete system using the weight data for the respective manhole.

Specification of the declared unit

Name	Value	Unit
Declared unit	1	kg
Mass reference	77 - 130	kg/pce
Bulk density (averaged)	925	kg/m ³

3.2 System boundary

The project report and the EPD take into account the life cycle of the product from the cradle to the factory gate with options, modules C1-C4 and module D (A1-A3 + C + D and additional modules A4, A5 and B2). The following flow chart shows the system boundaries for the balancing of I PP manholes:



The following is a detailed list of the life cycle stages or process modules taken into account for the manufacture of the manhole systems:

A1-A3 Manufacturing phase

- Production of raw, auxiliary and operating materials as well as preliminary products, including transportation to the respective plants
- Provision of energy for production
- Packaging of the manhole system
- External reprocessing of production waste
- Recycling of other waste incl. transportation

A4-A5 Installation

In addition to mechanical and thermal recycling, landfilling is also possible, depending on local conditions. Waste code according to the European Waste Catalogue: 20 01 39 Plastics

2.16 Further information

Further information can be found in the product catalogs or on the corresponding websites:
<https://romold.de/produkte/entsorgung/schaechte-dn-1000/>
<https://romold.de/produkte/entsorgung/schaechte-dn-800/>

B Utilization phase

- Maintenance of the manhole system (B2)

C1-C4 Disposal

Three 100% disposal scenarios are assumed:

1. End-of-life (EoL) basic scenario: 100% dismantling of the manhole with subsequent material recycling (modules C3 and D)
2. EoL scenario 1: 100% dismantling of the manhole with subsequent energy recovery (modules C3/1 and D/1)
3. EoL scenario 2: 100% dismantling of the manhole and disposal in a local landfill (module C4/2)

D Reuse, recovery and/or recycling potentials

Reuse, recovery and/or recycling potentials are available in the disposal scenarios, as the manhole systems are recycled for energy or materials. The recovered energy or secondary materials can be used outside the system boundary.

The use of green electricity was calculated for the environmental impact, taking into account the residual electricity mix for the remaining electricity. The proportion of the total electricity demand covered by green electricity is 98.6%. The GWP of the electricity mix balanced in modules A1-A3 is 0.364 kgCO₂ eq./kWh.

3.3 Estimates and assumptions

The production and recycling of raw material packaging for injection molded parts are taken into account in the balance, while the raw material packaging for the production of EPDM gaskets, thermoformed inliners and risers is assumed to be negligible due to its low mass content. The production and recycling of reusable packaging is neglected, as a high reuse rate can be assumed. The outward and return transport, on the other hand, is taken into account.

60 % of Romold GmbH's electrical energy requirements are covered by green electricity from renewable sources with proof of origin and 40 % by the company's own photovoltaic system. Electricity from hydropower for consumers in Austria is used for the electrical energy required to manufacture the injection molded components. Electricity from renewable energies with a guarantee of origin is used for the production of element seals. The German residual mix is assumed for all other production processes for intermediate products. The GWP of the electricity mix balanced in modules A1-A3 is 0.364 kg CO₂-eq./kWh.

3.4 Cut-off criteria

This study included all significant inputs and outputs in the life cycle assessment. The majority of the data (>95% by mass) consists of site-specific primary data. Existing data gaps were

filled using conservative assumptions and generic secondary data. Due to missing data, a low mass fraction, or low expected environmental impacts, the following processes and materials were not included:

- The production and recycling of the reusable packaging used
- The antioxidant used in the injection molding formulations
- The vulcanization accelerator used in the manufacture of the seals
- PET strapping bands used in product packaging

All processes and materials not considered have a mass fraction of less than 1% relative to the declared unit.

3.5 Background data

The life cycle assessment model underlying this EPD was created using Sphera's *LCA for Experts* software (version 10.9.5.2). Sphera's *Managed LCA Content Database* (version 2026.1) was used.

For the PP used in A1-A3, a manufacturer-specific GWP_{fossil} of 1.80 kg CO₂-eq./kg was used in accordance with *ISO 14067* and *TfS Guidelines Version 3.0*. This value was provided directly by the plastics manufacturer for the PP used.

3.6 Data quality

The foreground data collected by Romold GmbH for the production year 2023 was used to model the production of the manhole systems. All relevant information and data for modeling the manholes are available. The data used is consistent. The input and output data for production and data on the packaging of the manholes come directly from the manufacturing company or from suppliers.

The background data used comes from Sphera's *Managed LCA content database*. Where possible, data from the year 2023 was used. No data older than five years was used.

3.7 Period under review

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a building product when it leaves the factory gate. No biogenic carbon is bound in the manhole system product. The wooden pallet used with a mass of 0.240 kg in relation to the declared unit has approx. 43 % biogenic carbon per kg according to the background data set, which results in 0.103 kg biogenic carbon in relation to the declared unit.

Information on the description of the biogenic carbon content at the factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.103	kg C

The uptake and release of biogenic CO₂ by the wood in the packaging materials are excluded from the results.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

The following technical information is the basis for the declared modules or can be used for the development of specific scenarios in the context of a building assessment if modules are not declared (MND).

The production data refer to average values for 2023.

3.8 Geographic representativeness

Country or region in which the declared product system is manufactured, used or handled at the end of the product's life span: EU-27 Member States

3.9 Allocation

During the production of the I PP manhole (module A1-A3), co-products are created from the production waste from the manufacture of the injection molded components and from the thermoforming process. These are processed internally and reused directly in other products. For this reason, 50% of the production waste from each of the processes mentioned was allocated for this study and thus attributed to another product of the manufacturer.

The recycling or thermal recovery of the product and packaging materials generates benefits in the form of recovered energy or secondary materials that can be used outside the system boundaries (Module D). When using secondary materials or recycling, the waste to be recycled loses its waste status at the end of its life when it is processed into regrind. Up to and including regrinding, the emissions and effects are attributed to the original product. The regrind is included in the balance of the downstream product without any load. Possible further processing, such as regranulation, influences the balance of the downstream product.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to *EN 15804* and the building context and product-specific performance characteristics are taken into account. The *managed LCA content database* (version 2026.1) from Sphera was used.

Transport to construction site (A4)

Transportation to the construction site is carried out using 32-ton trucks with a load weight of 22 tons. An average transport distance of 450 km is assumed.

Name	Value	Unit
Transport distance	450	km
Manhole	1.00	kg
Reusable pallet	0.240	kg
Diesel for Transport	0.015	kg

Installation in the building (A5)

Installation is carried out using an excavator. The joints at the seals are prepared with lubricant and the components are connected in the trench. Sand is used for underlining. Open spaces are backfilled with the excavated material.

Name	Value	Unit
Manhole	1	kg
Auxiliary (lubricant)	4.93E-06	kg
Other energy carriers (thermal energy from combustion)	0.043	MJ
Sand	3.35E-04	m ³
Output substances following waste treatment on site (reusable pallet)	0.24	kg

Maintenance (B2)

Sewers must be flushed every 10 years. This involves using 3.3 liters of water and 3.7 g of diesel as fuel for the sewer cleaning machine per declared unit of the sewer shaft per flushing cycle.

Name	Value	Unit
Maintenance cycle	10	Number/RSL
Water consumption	0.0033	m ³
Other energy carriers Thermische Energie	1.59	MJ

Romold GmbH estimates the service life of the manholes to be at least 100 years if they are installed professionally and is considered realistic. No verification data is available to prove the service life.

Ende des Lebenswegs (C1-C4)

The installed manhole is excavated using an excavator. In addition, 0.022 m³ of soil is excavated per declared unit of the manhole, which is backfilled after dismantling (Module C1). Transport by 32 t truck over a transport distance of 50 km is assumed (module C2).

Module C3, C4 - Recycling/material recovery: The recycling process takes into account the processing steps "washing" and "grinding" of the waste. As regrind, the product has an economic value and thus reaches the status of end-of-waste. Water and electrical energy are required for processing. A conservative processing rate of 95 % is assumed. The remaining 5 % is transported by 32 t truck over 50 km to a customer and used for energy recovery.

Module C3/1, C4/1 - Energy recovery: Here, the waste is incinerated without prior treatment and used for energy recovery.

Module C3/2, C4/2 - Waste disposal / landfill: For this EoL scenario, the manhole is disposed of in a landfill.

Name	Value	Unit
Recycling (Module C3)	1	kg
Energy recovery (Module C3/1)	1	kg
Landfilling (Module C4/2)	1	kg

Reuse, recovery, and recycling potential (D), relevant scenario information

Module D comprises the benefits and loads for the incineration processes of the manhole from C3 and C3/1 in a waste incineration plant. From the EoL scenario 1 (module C3/1), PP regrind can be produced from the dismantling of the chute, which leaves the product system. After regranulation, it can replace virgin material with an assumed factor of 0.5 (D).

Name	Value	Unit
Exported electrical energy (from C3)	0.093	kWh
Exported thermal energy (from C3)	0.594	MJ
Reusable recycled material (from C3)	0.451	kg
Exported electrical energy (from C3/1)	1.86	kWh
Exported thermal energy from C3/1)	11.9	MJ

5. LCA: Results

The results of the life cycle assessment and the impact assessment for the I PP manholes examined are listed in detail below. The EoL baseline scenario (100 % mechanical recycling) comprises the modules C1, C2, C3, C4 and D, the EoL scenario 1 (100 % energy recovery) comprises the modules C1, C2/1, C3/1, C4/1 and D/1 and the EoL scenario 2 (100 % landfilling) comprises the modules C1, C2/2, C4/2 and D/2.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	X	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg Kanalschacht

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
GWP-total	kg CO ₂ eq	2.19E+00	4.36E-02	1.25E-02	1.89E-01	9.39E-03	4.58E-03	2.69E-01	3.13E+00	0	0	0	2.93E-02	-7.65E-01	-1.44E+00	0
GWP-fossil	kg CO ₂ eq	2.17E+00	4.31E-02	1.23E-02	1.71E-01	9.5E-03	4.52E-03	2.69E-01	3.13E+00	0	0	0	2.92E-02	-7.6E-01	-1.43E+00	0
GWP-biogenic	kg CO ₂ eq	1.38E-02	3.38E-04	0	1.8E-02	0	3.55E-05	7.27E-05	9.85E-05	0	0	0	0	-4.45E-03	-8.3E-03	0
GWP-luluc	kg CO ₂ eq	8.16E-03	1.86E-04	9.36E-05	1.76E-05	3.91E-05	1.95E-05	2.6E-05	2.29E-05	0	0	0	3.87E-05	-3.39E-04	-2.56E-03	0
ODP	kg CFC11 eq	3.61E-11	2.06E-14	5.57E-15	4.7E-13	2.05E-15	2.16E-15	4.27E-14	3.48E-13	0	0	0	1.85E-13	-9.17E-12	-8.49E-11	0
AP	mol H ⁺ eq	3.45E-03	5.13E-05	1.18E-05	2.02E-04	1.13E-04	7.54E-06	1.67E-04	3.17E-04	0	0	0	1.79E-04	-1.44E-03	-2.86E-03	0
EP-freshwater	kg P eq	2.42E-06	1.1E-07	1.77E-08	2.09E-05	2.33E-08	1.16E-08	2.65E-08	1.34E-08	0	0	0	1.68E-05	-9.05E-07	-1.8E-06	0
EP-marine	kg N eq	9.06E-04	1.85E-05	3.96E-06	1.47E-04	5.74E-05	3.07E-06	5.33E-05	6.85E-05	0	0	0	3.87E-05	-3.83E-04	-8.11E-04	0
EP-terrestrial	mol N eq	9.95E-03	1.99E-04	4.4E-05	7.2E-04	6.26E-04	3.32E-05	6.19E-04	1.5E-03	0	0	0	4.25E-04	-4.17E-03	-9.64E-03	0
POCP	kg NMVOC eq	3.72E-03	4.66E-05	1.19E-05	2.07E-04	1.57E-04	6.97E-06	1.49E-04	2.02E-04	0	0	0	1.22E-04	-1.67E-03	-1.97E-03	0
ADPE	kg Sb eq	4.35E-07	3.15E-09	8.75E-10	8.76E-09	6.67E-10	3.31E-10	1.09E-09	3.16E-09	0	0	0	2.34E-09	-1.11E-07	-1.96E-07	0
ADPF	MJ	7.41E+01	5.68E-01	1.59E-01	2.06E+00	1.19E-01	5.96E-02	1.34E+00	3.61E-01	0	0	0	4.79E-01	-3.11E+01	-2.29E+01	0
WDP	m ³ world eq deprived	5.92E-02	1.77E-04	3.48E-05	2.7E-03	3.21E-05	1.85E-05	7.95E-02	2.89E-01	0	0	0	3.65E-03	-3.36E-02	-1.25E-01	0

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg Kanalschacht

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PERE	MJ	2.13E+01	4.04E-02	8.88E-03	1.29E-01	8.26E-03	4.24E-03	1.21E-02	1.09E-01	0	0	0	8.67E-02	-2.04E+00	-1.1E+01	0
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	2.13E+01	4.04E-02	8.88E-03	1.29E-01	8.26E-03	4.24E-03	1.21E-02	1.09E-01	0	0	0	8.67E-02	-2.04E+00	-1.1E+01	0
PENRE	MJ	2.17E+01	5.68E-01	1.59E-01	2.06E+00	1.19E-01	5.96E-02	3.46E+00	3.61E-01	0	0	0	4.79E-01	-3.11E+01	-2.29E+01	0
PENRM	MJ	5.23E+01	0	0	0	0	0	-2.12E+00	0	0	0	0	0	0	0	0
PENRT	MJ	7.41E+01	5.68E-01	1.59E-01	2.06E+00	1.19E-01	5.96E-02	1.34E+00	3.61E-01	0	0	0	4.79E-01	-3.11E+01	-2.29E+01	0
SM	kg	6.64E-03	0	0	0	0	0	0	0	0	0	0	0	9.5E-01	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	1.95E-02	1.26E-05	3.49E-06	1.55E-04	2.42E-06	1.33E-06	2.01E-03	6.76E-03	0	0	0	1.05E-04	-3.14E-03	-6.07E-03	0

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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:

1 kg Kanalschacht

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
HWD	kg	1.83E-08	2.63E-11	8.85E-12	3.42E-10	5.06E-12	2.76E-12	2.74E-11	2.23E-10	0	0	0	1.22E-10	-4.71E-09	-1.77E-08	0
NHWD	kg	2.14E-02	1.09E-04	3.81E-05	3.36E-02	2.2E-05	1.15E-05	1.47E-03	1.24E-02	0	0	0	9.96E-01	-6.02E-03	-1.52E-02	0
RWD	kg	2.37E-04	8.94E-07	1.59E-07	7.19E-06	1.3E-07	9.39E-08	2.01E-05	1.74E-05	0	0	0	5.18E-06	-1.38E-04	-1.6E-03	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	1.84E-03	0	0	0	0	0	2E+00	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	3.34E-01	6.68E+00	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	5.94E-01	1.19E+01	0	0	0	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1 kg Kanalschacht

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PM	Disease incidence	4.01E-08	5.44E-10	1.09E-10	1.75E-09	1.35E-09	7.79E-11	1.77E-09	1.87E-09	0	0	0	1.86E-09	-1.38E-08	-2.28E-08	0
IR	kBq U235 eq	2.21E-02	1.17E-04	1.45E-05	6.6E-04	1.64E-05	1.22E-05	1.63E-03	2.59E-03	0	0	0	6.71E-04	-2.14E-02	-2.44E-01	0
ETP-fw	CTUe	4.83E+01	4.89E-01	1.35E-01	2.47E+00	1.02E-01	5.13E-02	1.78E-01	1.44E-01	0	0	0	1.1E+00	-2.09E+01	-5.78E+00	0
HTP-c	CTUh	8.69E-10	9.69E-12	2.57E-12	1.34E-10	2.02E-12	1.02E-12	5.91E-12	1.98E-11	0	0	0	1.55E-11	-3.67E-10	-3.22E-10	0
HTP-nc	CTUh	1.7E-08	5.03E-10	7.46E-11	1.05E-08	1.06E-10	5.28E-11	2.56E-10	1.16E-10	0	0	0	2.84E-10	-6.75E-09	-1.16E-08	0
SQP	SQP	2.54E+00	1.52E-01	3.14E-02	6.2E-02	3.21E-02	1.6E-02	2.06E-02	0	0	0	0	0	-1.15E+00	0	0

PM = Potential incidence of disease due to PM emissions; IR = Potential human exposure efficiency relative to U235; ETP-fw = Potential comparative toxic unit for ecosystems; HTP-c = Potential comparative toxic unit for humans (carcinogenic); HTP-nc = Potential comparative toxic unit for humans (not carcinogenic); SQP = Potential soil quality index

Restriction notice 1 - applies to the indicator 'Potential effect of human exposure to U235'.

This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposure, nor to the disposal of radioactive waste in underground facilities. Potential ionizing radiation from soil, radon and some building materials is also not measured by this indicator.

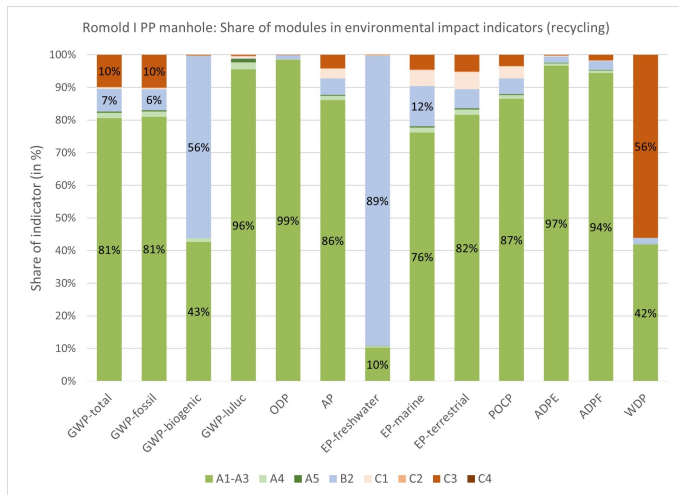
Caveat 2 - applies to the indicators: 'Potential for depletion of abiotic resources - non-fossil resources', 'Potential for depletion of abiotic resources - fossil fuels', 'Water depletion potential (user)', 'Potential toxicity comparison unit forecosystems', 'Potential toxicity comparison unit for humans - carcinogenic effect', 'Potential toxicity comparison unit for humans - non-carcinogenic effect', 'Potential soil quality index'.

The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or because there is only limited experience with the indicators.

6. LCA: Interpretation

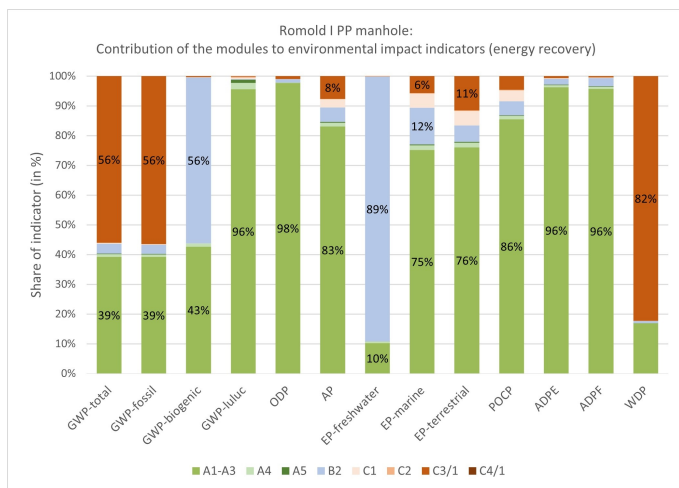
The following section presents an interpretation of the life cycle assessment results. The graph shows the percentage contributions of the modules to the core indicators for the three end-of-life (EoL) scenarios under consideration.

Contributions of the modules to environmental impact indicators in the EoL baseline scenario (recycling):



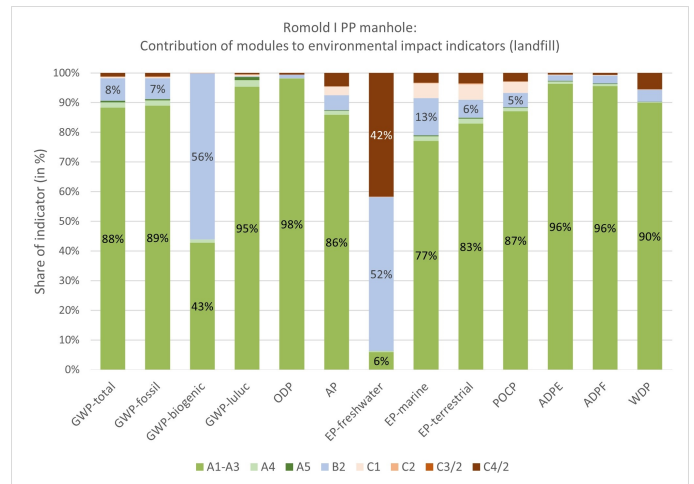
The majority of the core indicators for the I PP access shaft are dominated by the manufacturing phase (modules A1–A3). In all core indicators, except for $GWP_{biogenic}$, $EP_{freshwater}$, and WDP, modules A1–A3 account for a share of 76% or more. For GWP_{total} , the manufacturing phase accounts for 81%, the recovery phase (Module C3) for 10%, and the maintenance phase (Module B2) for 7%. For the WDP indicator, in addition to the manufacturing phase A1–A3 (43%), there is a significant influence from recovery in the disposal phase (C3) at 56% due to water use for cleaning the waste material. For $GWP_{biogenic}$ and $EP_{freshwater}$, the maintenance phase is dominant at 56% and 89%, respectively.

Shares of the modules in environmental impact indicators in EoL scenario 1 (energy recovery):



Energy recovery in the form of incineration of the plastic shaft system results in high greenhouse gas emissions. The share of C3/1 in GWP_{total} is 56% here, giving it a higher contribution to total emissions than the manufacturing phase (39%). Incineration also influences the core indicators $EP_{terrestrial}$ (11%), AP (8%), and EP_{marine} (6%). In water use as well, waste treatment accounts for a high share of 82% (WDP).

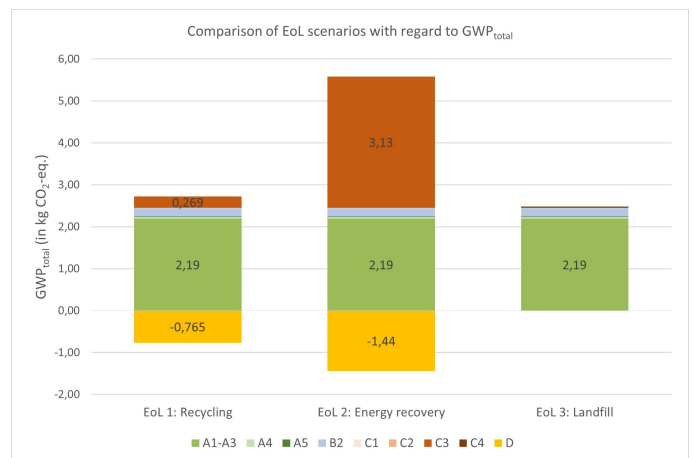
Share of modules in environmental impact indicators in EoL Scenario 2 (landfilling):



In EoL Scenario 2, in 100% of cases, the sewer manhole is removed from the ground and sent for disposal at a landfill. Accordingly, module C3/2 has no influence on the indicators. The manufacturing phase (A1–A3) dominates the core indicators. Disposal in module C4/2 is clearly reflected in the $EP_{freshwater}$ indicator (42%). In the other core indicators, the impacts are smaller. For GWP_{total} , disposal in C4/2 accounts for a small share of 1%.

Direct comparison of the EoL scenarios regarding GWP_{total} :

In this comparison, only the impact on climate change via GWP_{total} is considered. The benefits and burdens outside the system boundaries are also explicitly presented for the respective scenarios.



The scenarios differ particularly in Modules C and D. In Module C, landfilling results in the lowest emissions regarding GWP_{total} . However, no additional benefits outside the system boundaries are gained through the disposal of the product. In contrast, landfilling has the highest environmental impacts of the EoL scenarios in other environmental categories, such as eutrophication potential. Recycling results in low additional greenhouse gas emissions of 0.27 kg CO_2 -eq. from the collection and processing of the waste. In contrast, potential benefits of -0.77 kg CO_2 -eq. outside the system boundaries (Module D) through the potential use of the recovered recycled material instead of virgin material. In energy recovery, the incineration of the plastic results in high additional greenhouse gas emissions of 3.13 kg CO_2 -eq. The benefits of energy recovery outside the system boundaries in

Module D result in -1.44 CO₂-eq., meaning that less than half of

the additional emissions from incineration can be offset.

7. Requisite evidence

No separate evidence is required for these EPDs.

8. References

Standards

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General requirements for components for sewerage pipes and sewers.

DIN EN 13598-2:2020-12

Plastic piping systems for non-pressurised underground sewers and drains – Unplasticised polyvinyl chloride (PVC-U), polypropylene (PP) and polyethylene (PE) – Part 2: Requirements for access chambers and inspection chambers.

EN 15804:2012+A2:2019+AC:2021

Sustainability of construction works – Environmental product declarations – Basic rules for the product category: construction products.

EN ISO 14025:2011

Environmental labelling and declarations – Type III environmental declarations – Principles and procedures.

DIN EN ISO 14040:2006

Environmental management – Life cycle assessment – Principles and framework.

DIN EN ISO 14044:2006

Environmental management – Life cycle assessment – Requirements and guidance.

EN 681-1

Elastomeric seals – Requirements for materials for pipe seals in water and wastewater applications – Part 1: Vulcanised rubber.

EN ISO 1183-1

Plastics – Methods for determining the density of non-foamed plastics – Part 1: Immersion method, liquid pycnometer method and titration method

ISO 13268

Thermoplastic piping systems – Thermoplastic pipes for non-pressure applications – Determination of ring stiffness.

EN 13598-1

Plastic piping systems for non-pressure underground drainage and sewerage systems – Non-accessible manholes and inspection chambers – Part 1: Specifications for ancillary components made of polyethylene (PE), polypropylene (PP) and polyvinyl chloride (PVC-U)

ISO 15686

Buildings and building components – Life cycle planning

ISO 14067

Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification

Further Literature

TfS Guidelines Version 3.0

Together for Sustainability (TfS). TfS Initiative – Audit Programme: Guidelines, Version 3.0

ECHA SVHC List

Substances of Very High Concern (SVHC) Candidate List in accordance with the REACH Regulation. Available at: <https://echa.europa.eu/candidate-list-table>

BBSR Table

"Service Life of Building Components for Life Cycle Analysis According to BNB." Available at: <http://www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/nutzungsdauern-von-bauteilen.html>

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