

# ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

**PERT pipes**  
**Tycroc OÜ**



Programme operator: Rakennustieto Oy

EPD registration number: RTS\_402\_25

Publication date: 2.7.2025

Valid until: 2.7.2030

*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.*

## GENERAL INFORMATION

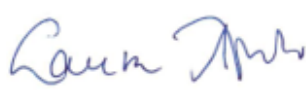
### MANUFACTURER

|                 |                           |
|-----------------|---------------------------|
| Manufacturer    | Tycroc OÜ                 |
| Address         | Pirni 7/1, 10617, Tallinn |
| Contact details | info@tycroc.com           |
| Website         | www.tycroc.com            |

### PRODUCT IDENTIFICATION

|                     |                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------|
| Product name        | PERT pipes                                                                                                        |
| Product reference   | PERT16-120; PERT16-240; PERT16-480;<br>PERT17-120; PERT17-240; PERT17-480;<br>PERT20-120; PERT20-240; PERT20-480; |
| Place of production | Germany, Kleve                                                                                                    |
| Period for data     | 01.01.2024-31.12.2024                                                                                             |

  
Jukka Seppänen  
RTS EPD Committee Secretary

  
Laura Apilo  
Managing Director

### EPD INFORMATION

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

|                        |                                                                                                                                                                                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EPD program operator   | Rakennustieto Oy                                                                                                                                                                   |
| EPD standards          | This EPD is in accordance with EN 15804+A2:2019 and ISO 14025                                                                                                                      |
| Product category rules | The CEN standard EN 15804 serves as the core PCR. In addition, the RTS EPD PCR 2024 (12.11.2024) is used.                                                                          |
| Scope of the EPD       | Cradle to gate with options, A4-A5, and modules C1-C4, D                                                                                                                           |
| EPD author             | Andra Ainsaar, Sustinere OÜ                                                                                                                                                        |
| Category of EPD        | Third party verified EPD                                                                                                                                                           |
| EPD verification       | Independent verification of this EPD and data, according to ISO 14025:<br><input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification |
| EPD verifier           | Anni Oviir, LCA Support (Rangi Maja OÜ)                                                                                                                                            |
| EPD number             | RTS_402_25                                                                                                                                                                         |
| Verification date      | 11.06.2025                                                                                                                                                                         |
| Publishing date        | 2.7.2025                                                                                                                                                                           |
| EPD valid until        | 2.7.2030                                                                                                                                                                           |

## PRODUCT INFORMATION

### PRODUCT DESCRIPTION

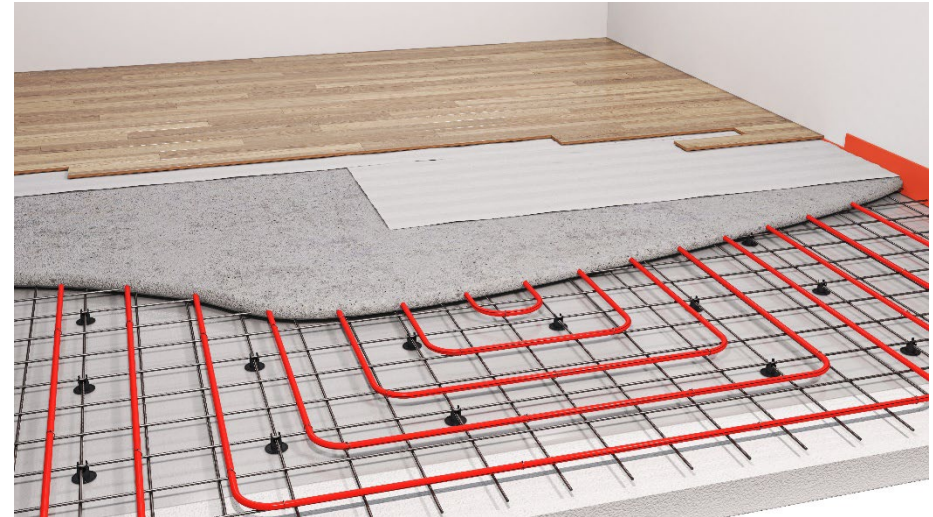
Tycroc PERT 5-layer pipes are made of the high-performance material PE-RT. Tycroc PERT pipe is an oxygen-tight composite pipe that consists of 5 layers. The base pipe and the outer layer are made of PE-RT and thus enclose the sensitive EVOH layer. In order to ensure an inseparable connection of the materials, they are firmly fused together by layers of adhesive polymer. The result is a high quality, highly flexible pipe with a securely protected oxygen barrier layer to ensure a long service life of the pipe (50 years warranty).

### PRODUCT APPLICATION

Tycroc PERT pipes are mainly used for floor heating – both, on Tycroc UHP underfloor heating panels and on concrete or gypsum floors. Other main applications include cooling ceilings and floors, as well as heating ceilings and walls.

### PRODUCT STANDARDS

Tycroc PERT 5-layer pipes are produced according to the international standards DIN ISO 22391 / DIN ISO 24033 / DIN ISO 21003 / DIN 16833. In addition, according to the national standards BRL 5602, BRL 5607 and the SKZ guidelines HR 3.16. The oxygen tightness is determined according to ISO 17455 and DIN EN ISO 291 and fulfils the requirements according to DIN 4726, BRL 5602 and BRL 5607. The production and product monitoring is carried out by KIWA N.V. and SKZ Würzburg. The pipes meet the requirements of ISO 10508 (class 5) 6 bar.



Further information can be found at [www.tycroc.com](http://www.tycroc.com).

## TECHNICAL SPECIFICATIONS

| TECHNICAL PROPERTY                      | STANDARD               | VALUE   | UNIT                                  | COMMENT               |
|-----------------------------------------|------------------------|---------|---------------------------------------|-----------------------|
| Thermal conductivity                    | DIN 52612              | 0.41    | W/mK                                  | at 20°C               |
| Coefficient of linear thermal expansion | DIN 52328              | 0.195   | mm/mK                                 |                       |
| Surface roughness inside                | acc. Prandl/Colebrook  | 0.007   | mm                                    |                       |
| Oxygen diffusion barrier at 80°C        | DIN 4726 and ISO 17455 | ≤ 3.6   | O <sub>2</sub> mg/m <sup>2</sup> .day | at 80°C (ISO 21003-2) |
| Oxygen diffusion barrier at 40°C        | DIN 4726 and ISO 17455 | ≤ 0.32  | O <sub>2</sub> mg/m <sup>2</sup> .day | at 40°C (ISO 21003-2) |
| Tensile modulus                         | DIN 16833              | 580-950 | Mpa                                   |                       |
| Building material class                 | DIN 16833              | B2      |                                       |                       |
| Pipe outer diameter                     |                        | 8-32    | mm                                    |                       |
| Pipe wall thickness                     |                        | 1-4     | mm                                    |                       |
| Average weight                          |                        | 0.093   | kg/m                                  |                       |

## SUBSTANCES, REACH - VERY HIGH CONCERN

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

## BIOGENIC CARBON CONTENT

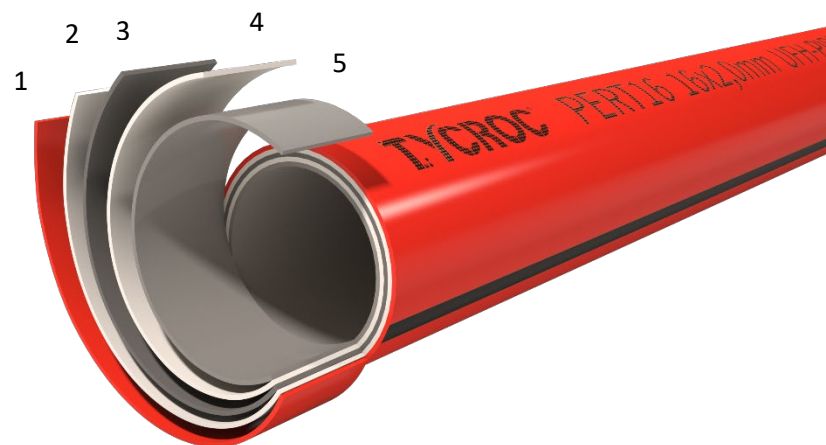
Product's biogenic carbon content at the factory gate

|                                            |        |
|--------------------------------------------|--------|
| Biogenic carbon content in product, kg C   | 0      |
| Biogenic carbon content in packaging, kg C | 0.0238 |

## PRODUCT RAW MATERIAL COMPOSITION

All product raw materials are 100% fossil materials.

| Material                                  | Amount, mass % | Usability |               |          | Origin |
|-------------------------------------------|----------------|-----------|---------------|----------|--------|
|                                           |                | Renewable | Non-renewable | Recycled |        |
| PE-RT                                     | 95.5%          |           | x             |          | DE     |
| EVOH                                      | 1.3%           |           | x             |          | BE     |
| Adhesive                                  | 3.2%           |           | x             |          | DE     |
| Colour                                    | 0.03%          |           | x             |          | DE     |
| <b>Packaging raw material composition</b> |                |           |               |          |        |
| Eur-flat pallet                           | 76.4%          | x         |               |          | NL     |
| Packaging film                            | 10.1%          |           | x             |          | DE     |
| Corrugated board                          | 13.6%          | x         |               |          | DE     |



1. Polyethylene resistant to high temperatures (PE-RT)
2. Adhesive layer (A-Polymer)
3. Oxygen barrier (EVOH)
4. Adhesive layer (A-Polymer)
5. Polyethylene resistant to high temperatures (PE-RT)

## PRODUCT LIFE-CYCLE

### MANUFACTURING AND PACKAGING (A1-A3)

This module takes into account the extraction and processing of all raw materials (PE-RT, EVOH, adhesive and colour) and energy which occur upstream to the studied manufacturing process. Additionally, it considers the transportation of these raw materials to the manufacturing site. And also the production process, which involves melting and compacting of resins using an extrusion screw, followed by cooling in a vacuum bath, and finally coiling the product. The finished product is packed with plastic film and corrugated paper. Ready and packed products are supplied to construction site on pallets.

### TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

This module takes into account the transportation from the factory in Germany to the central warehouse in Rapla, Estonia, and then further to the main customers in Estonia, Finland, and Latvia.

Environmental impacts from installation into the building include a 2% product installation loss, waste packaging materials and release of biogenic carbon dioxide from wood pallets. The impacts of material production, its processing and its disposal as installation waste are also included.

### PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

### PRODUCT END OF LIFE (C1-C4, D)

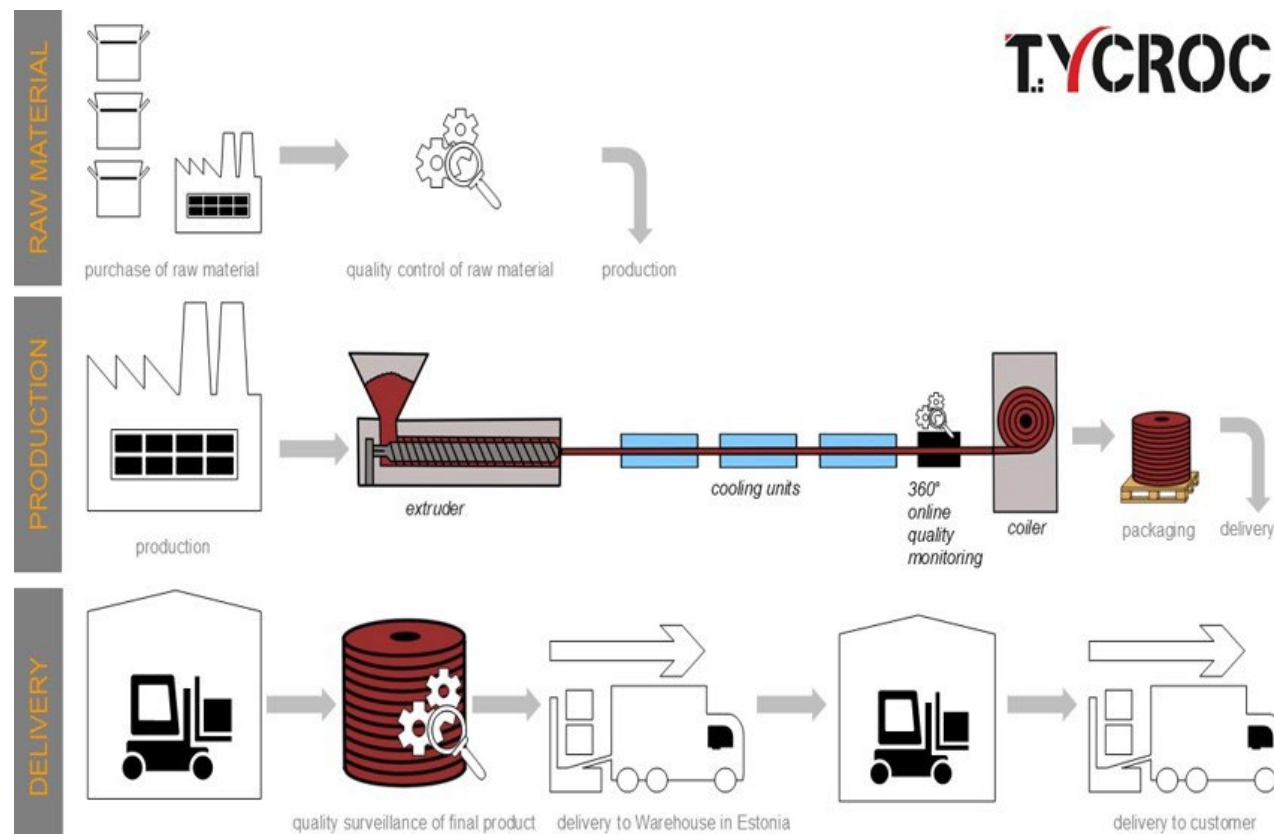
Given that the product is shipped mainly to Estonia, the end-of-life scenario is modelled according to that region.

Demolition is assumed to take 0.01 kWh/kg (Bozdağ, Ö & Seçer, M, 2007) and the Level(s) project). It is assumed that 100% of the waste is collected and transported to the waste treatment centre. Based on Estonian construction and demolition waste study (Keskkonnaagentuur, 2024), 88% of plastic is recycled, the other 12% is assumed to be incinerated.

The loads beyond the system boundaries include the recycling process of the product waste. The benefits beyond the system boundaries include the avoided production of virgin material (polyethylene granulates) recycled during end-of-life of the main product; as well as heat and electricity generated during the incineration of part of the product waste.



## MANUFACTURING PROCESS



## LIFE-CYCLE ASSESSMENT

### DATA PERIOD

The period for data represents 01.01.2024-31.12.2024.

### DECLARED UNIT

|                        |              |
|------------------------|--------------|
| Declared unit          | 1 kg of pipe |
| Mass per declared unit | 1 kg         |

Key environmental impact indicators are also given per 1 m of the pipe (average Tycroc PE-RT pipe weight is 0.093 kg per 1 m).

### SYSTEM BOUNDARY

The scope of the EPD is cradle to gate with options, A4-A5, and modules C1-C4 and D.

| 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                            |
| x             | x         | x             | x              | x        | MND       | MND         | MND    | MND         | MND           | MND                    | MND                   |                            | x                 | x                | x        | x     | x                            |
| Raw materials | Transport | Manufacturing | Transport      | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/ demolition | Transport         | Waste processing | Disposal | Reuse | Recycling                    |

Modules not declared = MND. Modules not relevant = MNR

### CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. 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.

### 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.

For the use of energy and the use of the surface area, only facility-level data were available. Energy consumed, and the surface area used during the manufacturing stage have been allocated to the analysed product based on the amount of kg that is produced.

## LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

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3rd CEER Report on Power Losses 2025, Council of European Energy

Regulators. Accessed on: <https://www.ceer.eu/publication/3rd-ceer-report-on-power-losses/>



# ENVIRONMENTAL IMPACT DATA

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| Impact category                     | Unit                   | A1       | A2       | A3        | A1-A3     | A4       | A5       | B1-B7 | C1       | C2       | C3        | C4       | D         |
|-------------------------------------|------------------------|----------|----------|-----------|-----------|----------|----------|-------|----------|----------|-----------|----------|-----------|
| GWP – total <sup>1)</sup>           | kg CO <sub>2</sub> e   | 2,50E+00 | 5,31E-02 | 4,80E-01  | 3,03E+00  | 2,54E-01 | 2,47E-01 | MND   | 3,53E-03 | 5,28E-03 | 4,24E-01  | 0,00E+00 | -2,25E+00 |
| GWP – fossil                        | kg CO <sub>2</sub> e   | 2,50E+00 | 5,31E-02 | 5,66E-01  | 3,12E+00  | 2,54E-01 | 7,20E-02 | MND   | 3,53E-03 | 5,27E-03 | 4,24E-01  | 0,00E+00 | -2,27E+00 |
| GWP – biogenic                      | kg CO <sub>2</sub> e   | 1,62E-03 | 1,20E-05 | -8,71E-02 | -8,55E-02 | 5,74E-05 | 8,73E-02 | MND   | 3,60E-07 | 1,19E-06 | -7,63E-05 | 0,00E+00 | 1,90E-02  |
| GWP – LULUC                         | kg CO <sub>2</sub> e   | 1,56E-03 | 2,37E-05 | 4,12E-04  | 1,99E-03  | 1,14E-04 | 8,72E-02 | MND   | 3,62E-07 | 2,36E-06 | 8,07E-05  | 0,00E+00 | -1,67E-03 |
| Ozone depletion pot.                | kg CFC-11e             | 1,12E-07 | 7,83E-10 | 1,99E-08  | 1,33E-07  | 3,75E-09 | 2,75E-09 | MND   | 5,41E-11 | 7,79E-11 | 4,87E-10  | 0,00E+00 | -9,58E-08 |
| Acidification potential             | mol H <sup>+</sup> e   | 7,81E-03 | 1,81E-04 | 2,99E-03  | 1,10E-02  | 9,31E-04 | 2,46E-04 | MND   | 3,19E-05 | 1,80E-05 | 2,90E-04  | 0,00E+00 | -8,11E-03 |
| EP-freshwater <sup>2)</sup>         | kg Pe                  | 5,10E-04 | 4,13E-06 | 9,39E-05  | 6,08E-04  | 1,97E-05 | 1,30E-05 | MND   | 1,02E-07 | 4,11E-07 | 1,55E-05  | 0,00E+00 | -3,81E-04 |
| EP-marine                           | kg Ne                  | 1,55E-03 | 5,95E-05 | 4,55E-04  | 2,06E-03  | 3,00E-04 | 5,19E-05 | MND   | 1,48E-05 | 5,91E-06 | 1,80E-04  | 0,00E+00 | -1,37E-03 |
| EP-terrestrial                      | mol Ne                 | 1,58E-02 | 6,47E-04 | 4,62E-03  | 2,10E-02  | 3,27E-03 | 5,11E-04 | MND   | 1,62E-04 | 6,43E-05 | 1,02E-03  | 0,00E+00 | -1,48E-02 |
| POCP (“smog”) <sup>3)</sup>         | kg NMVOCe              | 1,34E-02 | 2,67E-04 | 1,40E-03  | 1,51E-02  | 1,32E-03 | 3,36E-04 | MND   | 4,83E-05 | 2,65E-05 | 2,91E-04  | 0,00E+00 | -1,21E-02 |
| ADP-minerals & metals <sup>4)</sup> | kg Sbe                 | 2,35E-05 | 1,48E-07 | 2,50E-07  | 2,39E-05  | 7,04E-07 | 5,07E-07 | MND   | 1,27E-09 | 1,47E-08 | 5,35E-07  | 0,00E+00 | -1,67E-05 |
| ADP-fossil resources                | MJ                     | 7,67E+01 | 7,70E-01 | 7,31E+00  | 8,48E+01  | 3,68E+00 | 1,79E+00 | MND   | 4,62E-02 | 7,65E-02 | 4,90E-01  | 0,00E+00 | -6,72E+01 |
| Water use <sup>5)</sup>             | m <sup>3</sup> e depr. | 6,91E-01 | 3,80E-03 | 4,27E+00  | 4,97E+00  | 1,81E-02 | 1,00E-01 | MND   | 1,15E-04 | 3,78E-04 | 3,89E-02  | 0,00E+00 | -5,27E-01 |

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.

## ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| Impact category                  | Unit      | A1       | A2       | A3       | A1-A3    | A4       | A5       | B1-B7 | C1       | C2       | C3       | C4       | D         |
|----------------------------------|-----------|----------|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|-----------|
| Particulate matter               | Incidence | 6,20E-08 | 5,31E-09 | 7,49E-09 | 7,48E-08 | 2,53E-08 | 2,14E-09 | MND   | 9,06E-10 | 5,28E-10 | 3,99E-09 | 0,00E+00 | -6,85E-08 |
| Ionizing radiation <sup>6)</sup> | kBq U235e | 2,13E-01 | 6,71E-04 | 3,93E-02 | 2,53E-01 | 3,19E-03 | 5,24E-03 | MND   | 2,05E-05 | 6,67E-05 | 3,84E-03 | 0,00E+00 | -1,49E-01 |
| Ecotoxicity (freshwater)         | CTUe      | 1,65E+01 | 1,09E-01 | 1,10E+00 | 1,77E+01 | 5,19E-01 | 3,79E-01 | MND   | 2,54E-03 | 1,08E-02 | 1,03E+00 | 0,00E+00 | -4,81E+00 |
| Human toxicity, cancer           | CTUh      | 9,57E-10 | 8,76E-12 | 1,04E-10 | 1,07E-09 | 4,20E-11 | 2,43E-11 | MND   | 3,63E-13 | 8,71E-13 | 9,06E-11 | 0,00E+00 | -4,68E-10 |
| Human tox. non-cancer            | CTUh      | 2,22E-08 | 4,99E-10 | 2,59E-09 | 2,53E-08 | 2,37E-09 | 5,90E-10 | MND   | 5,75E-12 | 4,96E-11 | 2,00E-09 | 0,00E+00 | -1,70E-08 |
| SQP <sup>7)</sup>                | -         | 7,21E+00 | 7,76E-01 | 6,63E+00 | 1,46E+01 | 3,68E+00 | 3,95E-01 | MND   | 3,24E-03 | 7,71E-02 | 8,39E-01 | 0,00E+00 | -7,98E+00 |

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

## USE OF NATURAL RESOURCES

| Impact category                    | Unit           | A1       | A2       | A3       | A1-A3    | A4       | A5        | B1-B7 | C1       | C2       | C3        | C4       | D         |
|------------------------------------|----------------|----------|----------|----------|----------|----------|-----------|-------|----------|----------|-----------|----------|-----------|
| Renew. PER as energy <sup>8)</sup> | MJ             | 2,32E+00 | 1,06E-02 | 4,84E-01 | 2,81E+00 | 5,03E-02 | 5,91E-02  | MND   | 2,93E-04 | 1,05E-03 | 6,00E-02  | 0,00E+00 | -2,30E+00 |
| Renew. PER as material             | MJ             | 0,00E+00 | 0,00E+00 | 7,62E-01 | 7,62E-01 | 0,00E+00 | -7,62E-01 | MND   | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0,00E+00 | 1,00E-02  |
| Total use of renew. PER            | MJ             | 2,32E+00 | 1,06E-02 | 1,25E+00 | 3,58E+00 | 5,03E-02 | -7,03E-01 | MND   | 2,93E-04 | 1,05E-03 | 6,00E-02  | 0,00E+00 | -2,29E+00 |
| Non-re. PER as energy              | MJ             | 3,44E+01 | 7,70E-01 | 6,86E+00 | 4,21E+01 | 3,68E+00 | -1,62E-01 | MND   | 4,62E-02 | 7,65E-02 | -4,04E+01 | 0,00E+00 | -6,72E+01 |
| Non-re. PER as material            | MJ             | 4,23E+01 | 0,00E+00 | 2,89E-01 | 4,26E+01 | 0,00E+00 | -2,89E-01 | MND   | 0,00E+00 | 0,00E+00 | -4,23E+01 | 0,00E+00 | -3,18E-04 |
| Total use of non-re. PER           | MJ             | 3,44E+01 | 7,70E-01 | 7,15E+00 | 4,23E+01 | 3,68E+00 | -4,51E-01 | MND   | 4,62E-02 | 7,65E-02 | -4,04E+01 | 0,00E+00 | -6,72E+01 |
| Secondary materials                | kg             | 1,39E-02 | 3,28E-04 | 1,03E-02 | 2,46E-02 | 1,57E-03 | 6,11E-04  | MND   | 1,92E-05 | 3,26E-05 | 2,92E-03  | 0,00E+00 | 9,19E-01  |
| Renew. secondary fuels             | MJ             | 1,17E-04 | 4,16E-06 | 2,33E-02 | 2,34E-02 | 1,98E-05 | 4,69E-04  | MND   | 5,02E-08 | 4,14E-07 | 2,49E-05  | 0,00E+00 | -9,96E-04 |
| Non-ren. secondary fuels           | MJ             | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  | MND   | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0,00E+00 | 0,00E+00  |
| Use of net fresh water             | m <sup>3</sup> | 1,82E-02 | 1,14E-04 | 6,63E-03 | 2,50E-02 | 5,42E-04 | 5,20E-04  | MND   | 3,05E-06 | 1,13E-05 | 6,28E-04  | 0,00E+00 | -1,50E-02 |

8) PER = Primary energy resources.

## END OF LIFE – WASTE

| Impact category   | Unit | A1       | A2       | A3       | A1-A3    | A4       | A5       | B1-B7 | C1       | C2       | C3       | C4       | D         |
|-------------------|------|----------|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|-----------|
| Hazardous waste   | kg   | 9,77E-02 | 1,30E-03 | 2,62E-03 | 1,02E-01 | 6,22E-03 | 2,44E-03 | MND   | 5,14E-05 | 1,30E-04 | 1,39E-02 | 0,00E+00 | -9,30E-02 |
| Non-hazardous     | kg   | 2,14E+01 | 2,41E-02 | 2,01E-01 | 2,17E+01 | 1,15E-01 | 4,44E-01 | MND   | 7,01E-04 | 2,40E-03 | 4,12E-01 | 0,00E+00 | -1,86E+01 |
| Radioactive waste | kg   | 5,44E-05 | 1,64E-07 | 4,88E-06 | 5,95E-05 | 7,82E-07 | 1,23E-06 | MND   | 5,02E-09 | 1,63E-08 | 9,83E-07 | 0,00E+00 | -3,49E-05 |

## END OF LIFE – OUTPUT FLOWS

| Impact category               | Unit | A1       | A2       | A3       | A1-A3    | A4       | A5       | B1-B7 | C1       | C2       | C3       | C4       | D        |
|-------------------------------|------|----------|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|----------|
| Components for re-use         | kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling       | kg   | 0,00E+00 | 0,00E+00 | 1,02E-02 | 1,02E-02 | 0,00E+00 | 8,37E-03 | MND   | 0,00E+00 | 0,00E+00 | 8,62E-01 | 0,00E+00 | 0,00E+00 |
| Materials for energy rec      | kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,76E-02 | MND   | 0,00E+00 | 0,00E+00 | 1,18E-01 | 0,00E+00 | 0,00E+00 |
| Exported energy               | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy – Electricity | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND   | 0,00E+00 | 0,00E+00 | 1,15E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy – Heat        | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND   | 0,00E+00 | 0,00E+00 | 3,64E+00 | 0,00E+00 | 0,00E+00 |

## KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

| Impact category       | Unit                   | A1       | A2       | A3       | A1-A3    | A4       | A5       | B1-B7 | C1       | C2       | C3       | C4       | D         |
|-----------------------|------------------------|----------|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|-----------|
| GWP – total           | kg CO <sub>2</sub> e   | 2,50E+00 | 5,31E-02 | 4,80E-01 | 3,03E+00 | 2,54E-01 | 2,47E-01 | MND   | 3,53E-03 | 5,28E-03 | 4,24E-01 | 0,00E+00 | -2,25E+00 |
| ADP-minerals & metals | kg Sbe                 | 2,35E-05 | 1,48E-07 | 2,50E-07 | 2,39E-05 | 7,04E-07 | 5,07E-07 | MND   | 1,27E-09 | 1,47E-08 | 5,35E-07 | 0,00E+00 | -1,67E-05 |
| ADP-fossil            | MJ                     | 7,67E+01 | 7,70E-01 | 7,31E+00 | 8,48E+01 | 3,68E+00 | 1,79E+00 | MND   | 4,62E-02 | 7,65E-02 | 4,90E-01 | 0,00E+00 | -6,72E+01 |
| Water use             | m <sup>3</sup> e depr. | 6,91E-01 | 3,80E-03 | 4,27E+00 | 4,97E+00 | 1,81E-02 | 1,00E-01 | MND   | 1,15E-04 | 3,78E-04 | 3,89E-02 | 0,00E+00 | -5,27E-01 |
| Secondary materials   | kg                     | 1,39E-02 | 3,28E-04 | 1,03E-02 | 2,46E-02 | 1,57E-03 | 6,11E-04 | MND   | 1,92E-05 | 3,26E-05 | 2,92E-03 | 0,00E+00 | 9,19E-01  |
| Biog. C in product    | kg C                   | n/a      | n/a      | 0,00E+00 | 0,00E+00 | n/a      | n/a      | MND   | n/a      | n/a      | n/a      | n/a      | n/a       |
| Biog. C in packaging  | kg C                   | n/a      | n/a      | 2,38E-02 | 2,38E-02 | n/a      | n/a      | MND   | n/a      | n/a      | n/a      | n/a      | n/a       |

9) Biog. C in product = Biogenic carbon content in product

## KEY INFORMATION TABLE – KEY INFORMATION PER 1 M OF PRODUCT

| Impact category       | Unit                   | A1       | A2       | A3        | A1-A3     | A4       | A5       | B1-B7 | C1       | C2       | C3        | C4       | D         |
|-----------------------|------------------------|----------|----------|-----------|-----------|----------|----------|-------|----------|----------|-----------|----------|-----------|
| GWP – total           | kg CO <sub>2</sub> e   | 2.33E-01 | 4.94E-03 | 4.46E-02  | 2.82E-01  | 2.36E-02 | 2.30E-02 | MND   | 3.28E-04 | 4.91E-04 | 3.94E-02  | 0.00E+00 | -2.09E-01 |
| GWP – fossil          | kg CO <sub>2</sub> e   | 2.33E-01 | 4.94E-03 | 5.26E-02  | 2.90E-01  | 2.36E-02 | 6.70E-03 | MND   | 3.28E-04 | 4.90E-04 | 3.94E-02  | 0.00E+00 | -2.11E-01 |
| GWP – biogenic        | kg CO <sub>2</sub> e   | 1.51E-04 | 1.12E-06 | -8.10E-03 | -7.95E-03 | 5.34E-06 | 8.12E-03 | MND   | 3.35E-08 | 1.11E-07 | -7.10E-06 | 0.00E+00 | 1.77E-03  |
| GWP – LULUC           | kg CO <sub>2</sub> e   | 1.45E-04 | 2.20E-06 | 3.83E-05  | 1.85E-04  | 1.06E-05 | 8.11E-03 | MND   | 3.37E-08 | 2.19E-07 | 7.51E-06  | 0.00E+00 | -1.55E-04 |
| ADP-minerals & metals | kg Sbe                 | 2.19E-06 | 1.38E-08 | 2.33E-08  | 2.22E-06  | 6.55E-08 | 4.72E-08 | MND   | 1.18E-10 | 1.37E-09 | 4.98E-08  | 0.00E+00 | -1.55E-06 |
| ADP-fossil            | MJ                     | 7.13E+00 | 7.16E-02 | 6.80E-01  | 7.89E+00  | 3.42E-01 | 1.66E-01 | MND   | 4.30E-03 | 7.11E-03 | 4.56E-02  | 0.00E+00 | -6.25E+00 |
| Water use             | m <sup>3</sup> e depr. | 6.43E-02 | 3.53E-04 | 3.97E-01  | 4.62E-01  | 1.68E-03 | 9.30E-03 | MND   | 1.07E-05 | 3.52E-05 | 3.62E-03  | 0.00E+00 | -4.90E-02 |
| Secondary materials   | kg                     | 1.29E-03 | 3.05E-05 | 9.58E-04  | 2.29E-03  | 1.46E-04 | 5.68E-05 | MND   | 1.79E-06 | 3.03E-06 | 2.72E-04  | 0.00E+00 | 8.55E-02  |
| Biog. C in product    | kg C                   | n/a      | n/a      | 0.00E+00  | 0.00E+00  | n/a      | n/a      | MND   | n/a      | n/a      | n/a       | n/a      | n/a       |
| Biog. C in packaging  | kg C                   | n/a      | n/a      | 2.21E-03  | 2.21E-03  | n/a      | n/a      | MND   | n/a      | n/a      | n/a       | n/a      | n/a       |

10) Average Tycroc PE-RT pipe = 0.093 kg per m

## SCENARIO DOCUMENTATION

### Manufacturing energy scenario documentation

| Scenario parameter                  | Value                                                    |
|-------------------------------------|----------------------------------------------------------|
| Electricity data source and quality | Electricity, Germany, residual mix, 2023 (One Click LCA) |
| Electricity CO2e / kWh              | 0.94                                                     |

### Transport scenario documentation A4

| Scenario parameter                               | Value |
|--------------------------------------------------|-------|
| Specific transport CO2e emissions, kg CO2e / tkm | 0.11  |
| Average transport distance, km                   | 534   |
| Capacity utilization (including empty return) %  | 100%  |
| Bulk density of transported products             | -     |
| Volume capacity utilization factor               | 1     |

### Installation scenario documentation A5

| Scenario information                                                                                                           | Value                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg | Packaging waste, film, 0.00577 kg<br>PERT pipe installation loss, 0.02 kg |

|                                                                                                                                                                                |                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Output materials (specified by type) as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal (specified by route) / kg | Materials for energy recovery, 0.0613 kg<br>Materials for recycling, 0.0159 kg |
| Direct emissions to ambient air, soil and water / kg                                                                                                                           | 0.0872 kg                                                                      |

### End of life scenario documentation

| Scenario information                      | Value     |
|-------------------------------------------|-----------|
| Recovery process – kg for recycling       | 0.8624 kg |
| Recovery process – kg for energy recovery | 0.1176 kg |
| Scenario assumptions e.g. transportation  | 50 km     |