# ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

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|---|---|
| Owner of the Declaration | Grundfos Holding A/S |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
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| Valid to | 22.09.2030 |

## TPE2, TPE3 50-310_360, 65-220_280, 80-210

## Grundfos Holding A/S

Institut Bauen und Umwelt e.V.

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## General Information

### Grundfos Holding A/S

**Programme holder**

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

**Declaration number**

EPD-GRU-20250568-CBI1-EN

**This declaration is based on the product category rules:**

Pumps for liquids and liquids with solids, 01.08.2021
(PCR checked and approved by the SVR)

**Issue date**

23.09.2025

**Valid to**

22.09.2030

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

### TPE2, TPE3 50-310_360, 65-220_280, 80-210

**Owner of the declaration**

Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro
Denmark

**Declared product / declared unit**

One piece of TPE2 or TPE3 50-310; or TPE2 or TPE3 50-360; or TPE2 or TPE3 65-220; or TPE2 or TPE3 65-280; or TPE2 or TPE3 80-210.

**Scope:**

This declaration applies to 1 piece of TPE2 or TPE3 pump.

The declaration covers all standard TPE2 and TPE3 pump variants with the nominal connection size DN50 and maximum head 310 or 360 dm; or nominal connection size DN65 and maximum head 220 or 280 dm; or nominal connection size DN80 and maximum head 210 dm:

TPE2/3 50-310
TPE2/3 50-360
TPE2/3 65-220
TPE2/3 65-280
TPE2/3 80-210

The product is assembled in Hungary.
The life cycle assessment is based on data collected from the ERP system of the manufacturer, including data from the manufacturing plant.
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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 evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified 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 | | | |
| ☐ | internally | ☒ | externally |



Mrs Kim Allbury,
(Independent verifier)

## Product

**Product description/Product definition**
TPE2 and TPE3 (TPE2/3) pumps are single-stage, in-line centrifugal pumps mounted with electronically speed-controlled MGE motors (motor efficiency class IE5).

The pumps are designed for systems with variable flow rates. The pumps have integrated speed control for automatic adaptation of performance to the varying flow conditions. The energy consumption is thus kept at a minimum.

The declaration covers all standard TPE2 and TPE3 pump variants with the nominal connection size DN50 and maximum head 310 or 360 dm; or nominal connection size DN65 and maximum head 220 or 280 dm; or nominal connection size DN80 and maximum head 210 dm:

1. TPE2/3 50-310
2. TPE2/3 50-360
3. TPE2/3 65-220
4. TPE2/3 65-280
5. TPE2/3 80-210

These pump models (1-5) were treated together as they physically represent very similar products in terms of materials, weights, and contents of electronics. A representative pump model from group 4 was applied to assess the impacts of the A, C, and D stages. However, for the B stage, the individual impacts related to motor variations delivering the prescribed head were considered. This entails impact correction factors to be applied for B6, as outlined in the Results section.

TPE2/3 is an electronic product and is installed as part of the service functions of buildings and systems. It does, however, not apply to the Construction Products Regulation (CPR) in requiring any Declaration of Performance.

For placing the product on the EU/EFTA market, a CE-marking is required. According to its Declaration of Conformity, TPE2/3 is in conformity with the following Council Directives:

*Machinery Directives (2006/42/EC and 2009/127/EC)*
*Radio Equipment Directive (2014/53/EU)*
*RoHS Directives (2011/65/EU and 2015/863/EU)*
*EMC Directive (2014/30/EU)*

The CE-marking takes into account the proof of conformity with the respective harmonised standards based on the legal provisions above. For the application and use the respective national provisions apply.
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**Application**
TPE2 and TPE3 pumps are applied in systems with variable flow rates. Other applications are in district water supply and industrial processes.

**Pump manufacturing**
The pumps are assembled in Hungary at a Grundfos production plant. The steps of the final assembly process comprise 1) Shaft and motor stool assembly on motor; 2) Mounting of the shaft seal and insertion of impeller; 3) Mounting of sensors; 4) Joining the motor and impeller assembly with the pump housing; 5) Semi-automated functional tests and software upload and test; and finally 6) Packing of the pump on a wooden pallet, adding paper manuals, and topping with a cardboard box.

**Technical Data**
The declared unit is represented by the pump variant whose technical data is provided in the Pump technical data table.

**Pump technical data for TPE2/3 65-280**

| Name | Value | Unit |
|---|---|---|
| Voltage | 380-500 | V |
| Frequency | 50/60 | Hz |
| Min. Eff. Index (MEI) | 0.70 | - |
| Flow range (max) | 60.4 | $m^3/h$ |
| Head max. | 28 | m |
| Rated flow | 46.4 | $m^3/h$ |
| Nominal capacity (Motor P2) | 3 | kW |
| Power input Average (from load profile) | 1.39 | kW |

Performance data of the product according to the harmonised standards, based on provisions for harmonisation.

**Base materials/Ancillary materials**
Main constituents of the representative product

| Name | Value | Unit |
|---|---|---|
| Cast iron and steel | 57.6 | % |
| Stainless steel | 3.6 | % |
| Aluminium | 7.8 | % |
| Copper | 3.1 | % |
| Electronics | 0.8 | % |
| Polymers incl. composites & rubbers | 3.4 | % |
| Paper | 0.8 | % |
| Corrugated board | 5.9 | % |
| Pallet wood | 16.6 | % |
| Other, incl. inert materials | 0.3 | % |

***REACH***
At least one partial article (component) contains substances listed in *the candidate list* (date: 30.06.2025) exceeding 0.1 percentage by mass: Yes.

Information on the concentration in the partial article(s) is available by searching for articles notified under the listed 'SCIP Number' in *ECHA*'s SCIP-database:
https://echa.europa.eu/scip-database

A list of respective substances of very high concern (SVHC), their CAS-number, and corresponding SCIP number is provided in the following table.

| CAS-number | SVHC | SCIP numbers |
|---|---|---|
| 110-71-4 | 1,2-Dimethoxyethane | 9740d99f-8bb5-4d5d-8bbf-e9f18abd2e6a<br>e2de60b1-03ce-418e-aa81-2d1820274601<br>73f37534-f2cf-42a1-9e98-bb7dd5929ca6 |
| 29420-49-3 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, potassium salt (1:1) | |
| 80-43-3 | Bis(alpha,alpha-dimethylbenzyl) peroxide | |
| 541-02-6 | Decamethylcyclopentasiloxane | |
| 540-97-6 | Dodecamethylcyclohexasiloxane | |
| 7439-92-1 | Lead | |
| 12626-81-2 | Lead titanium zirconium oxide | |
| 1317-36-8 | Lead-monoxide | |
| 556-67-2 | Octamethylcyclotetrasiloxane | |
| 79-94-7 | TBBA | |

*List of SVHCs found in at least one partial article (component).*

**CMR**
This product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on *the candidate list* (date: 30.06.2025) exceeding 0.1 percentage by mass: No

**Biocide**
Biocide products were added to this product: No

**Reference service life**
In agreement with the Europump (2024) guideline, a reference service life of 10 years was assumed for the purpose of this study, for estimating the energy consumption during the use stage of the pump.

## LCA: Calculation rules

**Declared Unit**
The declared unit is a representative TPE3 65-280 pump variant whose mass, including packaging, is provided in the table.

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | pce. |
| Mass reference | 79.9 | kg/pce |
| conversion factor | 79.9 | - |

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**System boundary**
This EPD is classified as a Cradle-to-Grave and module D. All major steps from the extraction of natural resources to the final disposal of the product are included in the scope of the study, following the modular approach of *EN 15804*. Further, this EPD follows requirements for construction products considered as Electronic or Electric Equipment, using energy in module B6 of the use stage (*ECO Platform*, 2024).

Modules A1-A3 refer to the product stage and include raw materials extraction and processing, transportation, and the manufacturing process. The product stage is included in this study, and according to *EN 15804,* the system boundary with nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing, transport up to the factory gate, as well as the processing of waste arising from those processes. The assembly of the product, as well as the packaging, are included in A3. Wastes and losses are included in the modules where they occur according to the polluter pays principle and the modular approach of *EN 15804*.
Module A4 regards the transportation from the production site to the regional distribution centre, and finally to the construction and product application site.
Module A5 refers to the installation process of the pump, including the transportation of packaging waste to the treatment site and the waste treatment of packaging. The use of energy during installation is negligible for the selected functional unit.

Modules B1-B7 refer to the use stage. All use stage modules are assessed in the study, though B1 and B7 are assessed to be zero. Module B2 regards product Maintenance in the use stage and has been included. The modules B3, B4 and B5 are declared as "MNR" (module not relevant) according to the PCR-B.
Module B6 regards energy use during the operation of the pump and includes the electricity consumption of the product. The total electricity consumption over the reference service lifetime is assessed by calculating the average power input using a specified load profile and multiplying by the number of running hours per year and the number of years of the RSL.

Modules C1-C4 refer to the End-of-life stage. A product reaches the end-of-life of its service life when it no longer provides any functionality. This life cycle stage includes all activities from the end-of-life of the pump until all materials and components are processed, reused, recycled, or disposed of.
C1 regards the dismantling of the pump, and this module is a manual activity. C2 regards the transport to waste processing, C3 refers to the processing (shredding) of waste for recycling, and C4 refers to waste disposal: landfilling and incineration. The End-of-Life assumption is that 95 % is collected as electronic waste, while 5 % goes to landfill.

Module D refers to the burdens and benefits beyond the system boundaries. According to *EN 15804*, module D includes the reuse, recovery and/or recycling potentials, expressed in net impacts and benefits. Contributions to module D come from waste incineration processes in A5 and C4 as well as material (metal) recycling in C3. The specific fractions and net flows are shown in the scenarios section of this declaration.

**Geographic Representativeness**
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

**Comparability**
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.
The primary database used for background data is *Sphera*, while *Ecoinvent* served as a secondary database.

**Emission factor of electricity mix of A3**
A residual grid mix for Hungary with a GWP-total of 0.364 kg $CO_2$-eq/kWh was applied for the product assembly process in Hungary.

## LCA: Scenarios and additional technical information

**Characteristic product properties of biogenic carbon**

In the declared net product, there is no biogenic carbon exceeding the minimal reporting requirement of 5 % of the mass of the net product. Biogenic carbon in the packaging (corrugated board and wood) is reported below.

**Information on biogenic carbon content at factory gate**

| Name | Value | Unit |
|---|---|---|
| Biogenic carbon content in product | - | kg C |
| Biogenic carbon content in accompanying packaging | 7.81 | kg C |

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of $CO_2$.

In the following, technical scenario information is provided for modules A4, A5, B2, B6, C1-C4, and D.

**Transport from the gate to the site (A4)**

| Name | Value | Unit |
|---|---|---|
| Litres of fuel | 1.7 | l/100km |
| Transport distance | 1900 | km |
| Capacity utilisation (including empty runs) | 61 | % |

**Installation in building (A5)**

| Name | Value | Unit |
|---|---|---|
| Water consumption | - | $m^3$ |
| Electricity consumption | - | kWh |
| Packaging waste for incineration (Corrugated board) | 4.7 | kg |
| Packaging waste for incineration (Pallet wood) | 13.3 | kg |

**Maintenance (B2)**

| Name | Value | Unit |
|---|---|---|
| Maintenance cycle | 1 | Number/RSL |
| Water consumption | - | $m^3$ |
| Other resources Spare parts | 2.16 | kg |
| Electricity consumption | - | kWh |
| Material loss Replaced parts | 2.16 | kg |

*Maintenance schedule: Once during the RSL, spare parts must be replaced.*

Reference Service Life (RSL): For pump products like the declared unit, an RSL of 10 years can be assumed according to the guideline by Europump (2024). Therefore, to facilitate building reference calculations, an RSL of 10 years is declared. The pump running conditions during the service life are partially specified in the PCR-B: The number of running hours per year is assumed to be 3625 h according to the guideline Europump (2024). The pump load profile for calculating the average power input during operation is specified in the PCR-B according to the first two columns of the following table, while the third column results when scaling with the annual running hours:

| Load profile Q in % of $Q_{100\%}$ | Time in % of annual operating hours | Time (h) per year |
|---|---|---|
| 100 | 6 | 217 |
| 75 | 15 | 544 |
| 50 | 35 | 1269 |
| 25 | 44 | 1595 |

**Reference service life**

| Name | Value | Unit |
|---|---|---|
| Life Span according to the manufacturer | 10 | a |
| Usage conditions: Operating hours per year | 3625 | h |

**Operational energy use (B6) and Operational water use (B7)**

| Name | Value | Unit |
|---|---|---|
| Water consumption | - | $m^3$ |
| Annual Electricity consumption | 5039 | kWh |

The electricity consumption per year results from the average power input according to the load profile (Pump technical data table) and the number of annual operating hours (Reference Service life table).

The Electricity consumption provided in the table is valid for the representative pump model. To arrive at the Electricity consumption of the less or more power-consuming pump models, the power input must be multiplied by a conversion factor as explained in the LCA Results section.

For the calculation of the Use stage Operational energy use, a European Consumption (Technology) grid mix by *Sphera* was applied.

**End of life (C1-C4)**

| Name | Value | Unit |
|---|---|---|
| Collected separately waste type [Electronics waste (WEEE)] | 61.9 | kg |
| Recycling (Steel, incl. cast iron) | 43.8 | kg |
| Recycling (Stainless steel) | 2.8 | kg |
| Recycling (Aluminium) | 5.9 | kg |
| Recycling (Brass/copper) | 2.3 | kg |
| Incineration (Plastics, electronics, paper) | 3.8 | kg |
| Landfilling | 3.3 | kg |

**Reuse, recovery and/or recycling potentials (D), relevant scenario information**

The net output flow of metals for recycling was calculated as the surplus from C3 Recycling after subtracting Secondary materials applied as input for A1-A3.

| Name | Value | Unit |
|---|---|---|
| A5, Packaging incineration w/ energy recovery (Electricity) | 40.2 | MJ |
| A5, Packaging incineration w/energy recovery (Thermal energy) | 72.5 | MJ |
| C3, Copper for recycling (net output flow) | 2.3 | kg |
| C3, Stainless Steel for recycling (net output flow) | 1.9 | kg |
| C3, Steel for recycling (net output flow) | 17.2 | kg |
| C4, Waste incineration w/energy recovery (Electricity) | 9.0 | MJ |
| C4, Waste incineration w/energy recovery (Thermal energy) | 16.3 | MJ |

## LCA: Results

Characterisation model: *EN 15804*, based on EF 3.1.
The declared unit is one piece of pump as detailed in the declared unit section of the LCA Calculation Rules.

The indicator results for module B6 have been calculated for the entire RSL of 10 years.

The indicator results for module B6 are declared for TPE3 65-280, the representative model covered in this Declaration.
NB: To derive B6 indicator results for other pump models covered in this Declaration, please apply (multiply by) the following factors:

| Pump model | Conversion factor |
|---|---|
| TPE2/3 50-310 | 1.007 |
| TPE2/3 50-360 | 0.748 |
| TPE2/3 65-220 | 0.734 |
| **TPE2/3 65-280** | **1** |
| TPE2/3 80-210 | 0.986 |

**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 | X | X | MNR | MNR | MNR | X | X | X | X | X | X | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2:**

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B2 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg $CO_2$ eq | 2.05E+02 | 1.38E+01 | 2.84E+01 | 0 | 2.43E+01 | 1.61E+04 | 0 | 0 | 1.12E+00 | 1.23E+00 | 6.01E+00 | -5.36E+01 |
| GWP-fossil | kg $CO_2$ eq | 2.33E+02 | 1.36E+01 | 6.97E-01 | 0 | 2.42E+01 | 1.59E+04 | 0 | 0 | 1.11E+00 | 1.21E+00 | 5.07E+00 | -5.36E+01 |
| GWP-biogenic | kg $CO_2$ eq | -2.82E+01 | 6.96E-02 | 2.77E+01 | 0 | 5.32E-02 | 1.64E+02 | 0 | 0 | 5.68E-03 | 1.25E-02 | 9.32E-01 | -1.57E-02 |
| GWP-luluc | kg $CO_2$ eq | 5.15E-01 | 1.44E-01 | 2.44E-03 | 0 | 4.81E-02 | 5.25E+01 | 0 | 0 | 1.18E-02 | 4E-03 | 5.7E-04 | -5.67E-02 |
| ODP | kg CFC11 eq | 8.46E-08 | 2.32E-12 | 3.46E-12 | 0 | 5.98E-09 | 3.63E-07 | 0 | 0 | 1.89E-13 | 2.76E-11 | 9.9E-13 | -1.08E-09 |
| AP | mol $H^+$ eq | 1.06E+00 | 8.8E-02 | 6.54E-03 | 0 | 1.15E-01 | 3.49E+01 | 0 | 0 | 7.18E-03 | 2.66E-03 | 3.87E-03 | -2.91E-01 |
| EP-freshwater | kg P eq | 2.51E-03 | 3.77E-05 | 1.02E-06 | 0 | 2.58E-04 | 3.4E-02 | 0 | 0 | 3.08E-06 | 2.59E-06 | 3.19E-06 | -3.83E-05 |
| EP-marine | kg N eq | 1.9E-01 | 4.36E-02 | 2.26E-03 | 0 | 1.7E-02 | 8.36E+00 | 0 | 0 | 3.55E-03 | 6.37E-04 | 1.65E-03 | -3.46E-02 |
| EP-terrestrial | mol N eq | 1.93E+00 | 4.73E-01 | 2.93E-02 | 0 | 1.85E-01 | 9.37E+01 | 0 | 0 | 3.86E-02 | 7.14E-03 | 1.88E-02 | -3.75E-01 |
| POCP | kg NMVOC eq | 5.31E-01 | 8.32E-02 | 5.71E-03 | 0 | 5.06E-02 | 2.07E+01 | 0 | 0 | 6.78E-03 | 1.58E-03 | 4.32E-03 | -1.15E-01 |
| ADPE | kg Sb eq | 1.34E-02 | 9.31E-07 | 5.05E-08 | 0 | 1.17E-03 | 3.31E-03 | 0 | 0 | 7.59E-08 | 2.52E-07 | 1.49E-08 | -7.3E-03 |
| ADPF | MJ | 3.14E+03 | 1.79E+02 | 9.58E+00 | 0 | 3.57E+02 | 3.25E+05 | 0 | 0 | 1.46E+01 | 2.47E+01 | 3.48E+00 | -5.57E+02 |
| WDP | $m^3$ world eq deprived | 5.38E+01 | 6.4E-02 | 3.21E+00 | 0 | 5.23E+00 | 3.99E+03 | 0 | 0 | 5.22E-03 | 3.04E-01 | 7.03E-01 | -6.37E+00 |

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:**

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B2 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 1.28E+03 | 1.35E+01 | 2.01E+01 | 0 | 9.04E+01 | 2.22E+05 | 0 | 0 | 1.1E+00 | 1.69E+01 | 1.08E+01 | -5.93E+01 |
| PERM | MJ | 2.81E+01 | 0 | -1.8E+01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1.01E+01 | 0 |
| PERT | MJ | 1.31E+03 | 1.35E+01 | 2.13E+00 | 0 | 9.04E+01 | 2.22E+05 | 0 | 0 | 1.1E+00 | 1.69E+01 | 7.16E-01 | -5.93E+01 |
| PENRE | MJ | 3.11E+03 | 1.79E+02 | 9.58E+00 | 0 | 3.57E+02 | 0 | 0 | 0 | 1.46E+01 | 2.47E+01 | 3.65E+01 | -5.57E+02 |
| PENRM | MJ | 3.48E+01 | 0 | 0 | 0 | 3.5E-01 | 0 | 0 | 0 | 0 | 0 | -3.3E+01 | 0 |
| PENRT | MJ | 3.14E+03 | 1.79E+02 | 9.58E+00 | 0 | 3.57E+02 | 0 | 0 | 0 | 1.46E+01 | 2.47E+01 | 3.48E+00 | -5.57E+02 |
| SM | kg | 3.36E+01 | 0 | 0 | 0 | 1.03E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 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 |
| FW | $m^3$ | 1.68E+00 | 6.68E-03 | 7.55E-02 | 0 | 1.47E-01 | 1.72E+02 | 0 | 0 | 5.45E-04 | 1.31E-02 | 1.66E-02 | -1.52E-01 |

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:**

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B2 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | 2.64E-01 | 7.2E-09 | 4E-09 | 0 | 7.83E-02 | 4.24E-04 | 0 | 0 | 5.87E-10 | 3.23E-08 | 1.31E-09 | -1.5E-03 |
| NHWD | kg | 1.61E+01 | 2.5E-02 | 6.35E-01 | 0 | 9.71E-01 | 2.52E+02 | 0 | 0 | 2.04E-03 | 1.92E-02 | 3.77E+00 | 5.19E+00 |
| RWD | kg | 1.77E-01 | 3.39E-04 | 3.98E-04 | 0 | 2.58E-02 | 5.12E+01 | 0 | 0 | 2.76E-05 | 3.91E-03 | 1.1E-04 | -1.15E-02 |
| CRU | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 0 | 0 | 0 | 0 | 1.6E+00 | 0 | 0 | 0 | 0 | 5.48E+01 | 0 | 0 |
| MER | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EEE | MJ | 0 | 0 | 4.02E+01 | 0 | 8.83E-01 | 0 | 0 | 0 | 0 | 0 | 8.96E+00 | 0 |
| EET | MJ | 3.18E-01 | 0 | 7.25E+01 | 0 | 1.67E+00 | 0 | 0 | 0 | 0 | 0 | 1.63E+01 | 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:**

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B2 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 1.72E-05 | 3.84E-07 | 3.92E-08 | 0 | 1.39E-06 | 2.88E-04 | 0 | 0 | 3.13E-08 | 2.2E-08 | 2.24E-08 | -3.9E-06 |
| IR | kBq U235 eq | 2.54E+01 | 4.86E-02 | 6.28E-02 | 0 | 2.14E+00 | 8.46E+03 | 0 | 0 | 3.96E-03 | 6.45E-01 | 1.65E-02 | -2.07E+00 |
| ETP-fw | CTUe | 1.26E+03 | 2.33E+02 | 5.74E+00 | 0 | 2.69E+02 | 5.48E+04 | 0 | 0 | 1.9E+01 | 5.08E+00 | 2.11E+00 | -1.33E+02 |
| HTP-c | CTUh | 4.93E-07 | 3.15E-09 | 3.08E-10 | 0 | 9.9E-09 | 5.17E-06 | 0 | 0 | 2.57E-10 | 1E-09 | 9.7E-11 | -3.8E-07 |
| HTP-nc | CTUh | 2.33E-06 | 1.76E-07 | 1.43E-08 | 0 | 1.67E-07 | 1.09E-04 | 0 | 0 | 1.43E-08 | 6.58E-08 | 4.64E-09 | -2.09E-07 |
| SQP | SQP | 5.35E+03 | 7.93E+01 | 3.16E+00 | 0 | 6.26E+01 | 1.3E+05 | 0 | 0 | 6.47E+00 | 9.91E+00 | 7.77E-01 | -1.21E+02 |

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 (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

## References

**STANDARDS**

***EN 15804***
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

***ISO 14025***
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

**Machinery Directive**
2006/42/EC and 2009/127/EC

**Radio Equipment Directive**
2014/53/EU

**RoHS Directive**
2011/65/EU and 2015/863/EU

**EMC Directive**
2014/30/EU

## FURTHER REFERENCES

**Software:** Sphera LCA for Experts, v. 10.9
**Databases:**
---- Sphera Professional database, v. 2025.1
---- Ecoinvent database, v. 3.11


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**PCR-A**
Product Category Rules for Building-Related Products and Services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, Version 1.4, 2024.

**PCR-B**
PCR Guidance-Text for Building-Related Products and Services, Part B: Requirements on the EPD for Pumps for liquids and liquids with solids. Version 4, 2023.

**ECO Platform**
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**Data booklet**
TPE3 (D), TPE2 (D), TPE Series 2000/1000, TP and TPD. Inline circulator pumps, 50 Hz. Grundfos Data Booklet, 351 p. Available from Grundfos Product Center, www.product-selection.grundfos.com.

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