



# LEDVANCE

## ENVIRONMENTAL PRODUCT DECLARATION

Independent verification of the declaration and  
data in compliance with ISO 14025: 2006

### LEDVANCE LED TUBE T8 EM SUPERIOR

Reference product:

**LED TUBE T8 EM SUPERIOR 1500 MM  
16.7W/22.1W 840**



|  |                      |                                      |  |
|--|----------------------|--------------------------------------|--|
| Registration number  | LEDV-00056-V01.01-EN |                                      |  |
| Verifier accreditation number  | VH08                 | Supplemented by                      | PSR-0014-ED2.0-EN-2023<br>07 13                                      |
| Date of issue  | 08-2025              | Validity period                      | 5 years  |
| EPD prepared by  | LEDVANCE GmbH        | Information and reference documents: | <a href="http://www.pep-ecopassport.org">www.pep-ecopassport.org</a> |
| Independent verification of the declaration and data in compliance with ISO 14025: 2006  |                      |                                      |  |
| Internal   |                      | External                             | X  |
| The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)<br>PEP are compliant with XP C08-100-1:2016 or EN 50693:2019 |                      |                                      |  |
| The elements of the present PEP cannot be compared with elements from another program.   |                      |                                      |  |
| Document in compliance with ISO 14025: 2006 « Environmental labels and declarations. Type III environmental declarations»                          |                      |                                      |  |



# 1. General information

## 1.1 Company information

Further technical information can be obtained by contacting:

- LEDVANCE GmbH, Parkring 1-5, 85748 Garching, Germany
- or on the website [www.ledvance.com](http://www.ledvance.com)
- or by E-Mail [LCA@ledvance.com](mailto:LCA@ledvance.com).

## 1.2 Reference product information

The name of the product under study is “LED TUBE T8 EM SUPERIOR 1500 MM 16.7W/22.1W 840” with the following product description:

### Product benefits

- Energy savings of up to 71 % (compared to T8 fluorescent lamp)
- Quick, simple and safe replacement with or without rewiring
- Highly versatile thanks to selectable power/lumen steps (1200 mm, 1500 mm)
- No bending thanks to glass technology
- Support the implementation of the HACCP concepts from production through to presentation
- Very high resistance to switching loads
- Instant-on light, therefore ideally suitable in combination with sensor technology
- Also suitable for operation at low temperatures

### Areas of application

- General illumination within ambient temperatures from -20...+50 °C
- Illumination of production areas
- Traffic zones and corridors
- Supermarkets and department stores
- Industry

### Product features

- LED replacement for classic T8 fluorescent lamps with G13 socket for use in CCG luminaires or on AC mains
- Multi Lumen function: 2 power steps selectable (1200 mm, 1500 mm)
- LED tube made of glass with shatter protection e.g. for food industry applications
- ENEC 10 VDE mark
- Single and tandem operation on conventional control gear ( $\leq 0.9$  m versions)
- Extremely long lifetime: up to 100,000 h
- Type of protection: IP20
- Mercury-free and RoHS compliant

- Low flicker according to EU 2019-2020 (SVM  $\leq$  0.4 / PstLM  $\leq$  1)

### Equipment / Accessories

- Suitable for operation with low-loss and conventional control gears

The key information about the product is summarized in the following table.

**Table 1: Key technological data**

| Information                |   |
|----------------------------|---|
| Type of luminaire          | LED Tube  |
| Short Text Product         | LED TUBE T8 EM SUPERIOR 1500 MM 16.7W/22.1W 840 |
| Operating mode             | CCG, AC Mains                                   |
| Lamp type                  | Integrated LED not exchangeable                 |
| Colour temperature         | 4000 K  |
| Nominal wattage            | 22.10 W   |
| Luminous flux              | 4,100 lm  |
| Luminous efficacy          | 185 lm/W  |
| Colour rendering index Ra  | 80  |
| Type of protection         | IP20  |
| Nominal voltage            | 220...240 V                                     |
| Nominal lifetime (L70/B50) | 100,000 h                                       |
| Length                     | 1500 mm   |
| Diameter                   | 26.7 mm   |
| Energy efficiency class    | B   |
| Area of Application        | Office; Retail; Industry                        |

Based on the assigned lifetime according EN 15193-1:2017:

**Table 2: Calculated operation lifetime in years per type of building**

| Type of building               | Annual operating hours by default [h] | Operational lifetime [years] |
|--------------------------------|---------------------------------------|------------------------------|
| Retail, Hotel, Hospital        | 5,000                                 | 20                           |
| Industry, Sport establishments | 4,000                                 | 25                           |
| Residential building           | 3,500                                 | 28.6                         |
| Office, Catering               | 2,500                                 | 40                           |
| Educational institutions       | 2,000                                 | 50                           |

Following the requirements of the PSR, the operational lifetime of the luminaire of study is 20 years.

## 1.3 Overview

The general information used for the EPD are listed below:

**Table 3: Basic EPD information**

| Information   |   |
|---|---|
| Functional unit                                     | Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours |
| Reference flow / declared unit*                     | 0.0854 product(s)   |
| Life cycle stages covered (according to EN15804+A2) | Cradle-to-grave and Module D  |
| Product category according to PSR                   | Luminaires  |
| Product family name (if family EPD)                 | LED TUBE T8 EM SUPERIOR   |

\* The reference flow is calculated as:

$$\frac{1,000 \text{ lm}}{\text{Outgoing Luminous Flux of the Analyzed Product (lm)}} \times \frac{35,000 \text{ h}}{\text{Declared Product Lifetime of the Analyzed Product (h)}}$$

Consequently, the reference flow of the following product corresponds to:

$$\frac{1,000}{4,100} \times \frac{35,000}{100,000} = 0.0854$$

## 1.4 Homogeneous environmental family

The reference product represents the LED TUBE T8 EM SUPERIOR family, which differs in terms of power (W), useful output flux (lm), colour temperature, weight, and dimensions (length).

The range of variations for the products in the same family are the following:

**Table 4: Range of variation for homogeneous environmental family**

| Criteria           | Unit | Value for the reference product | Minimum value in product range | Maximum value in product range |
|--------------------|------|---------------------------------|--------------------------------|--------------------------------|
| Electrical Power   | W    | 22.1                            | 5.1                            | 22.1                           |
| Useful output flux | lm   | 4,100                           | 810                            | 4,100                          |
| Colour Temperature | K    | 4,000                           | 3,000                          | 6,500                          |
| Weight (Product)   | kg   | 0.265                           | 0.087                          | 0.265                          |
| Length             | mm   | 1,500                           | 438                            | 1,500                          |

The present PEP declaration is valid for all the products in the described homogenous environmental family. The spreadsheet provided in paragraph 5 Extrapolation of this document shall be used by the PEP user to extrapolate the impact of the other products from the LED TUBE T8 EM SUPERIOR Family, based on the technical parameters of the considered product, as requested by the PSR.

## 2 Constituent materials

### 2.1 Overview

**Table 5: Product composition**

| Information         | Weight [kg]  | Share [%]  |
|---------------------|--------------|------------|
| <b>Total weight</b> | <b>0.391</b> | <b>100</b> |
| Product             | 0.265        | 67.8       |
| Packaging           | 0.126        | 32.2       |

### 2.2 Product

**Table 6: Material composition - product**

| Information                 | Weight [kg]  | Sum of weight [kg] | Share [%]   |
|-----------------------------|--------------|--------------------|-------------|
| <b>TOTAL</b>                | <b>0.265</b> | <b>100</b>         |             |
| <b>Metals</b>               | <b>0.006</b> |                    | <b>2.3</b>  |
| - Aluminium Stamping        | 0.006        |                    | 2.3         |
| <b>Plastics</b>             | <b>0.024</b> |                    | <b>8.9</b>  |
| - PET Extrusion             | 0.013        |                    | 4.8         |
| - Silicone Glue             | 0.009        |                    | 3.2         |
| - Polycarbonate (PC)        | 0.002        |                    | 0.9         |
| <b>Others</b>               | <b>0.235</b> |                    | <b>88.8</b> |
| - Glass                     | 0.187        |                    | 70.6        |
| - Electronics               | 0.048        |                    | 18.0        |
| - Internal & External Wires | 0.001        |                    | 0.2         |

### 2.3 Packaging

**Table 7: Material composition - packaging**

| Information     | Weight [kg]  | Share [%]  |
|-----------------|--------------|------------|
| <b>TOTAL</b>    | <b>0.126</b> | <b>100</b> |
| Paper/cardboard | 0.126        | 100        |

Secondary packaging with cardboard is used for shipping. In addition, packaging of raw materials and components is considered as an average quantity of 5 % in mass of the luminaire according to /PSR-0014-ED2.0-EN-2023 07 13/. This additional packaging is not considered in Table 7 as it is an additional assumption.

## 3 Information on life cycle stages



### 3.1 Manufacturing

The manufacturer sources all parts from international suppliers. Within the manufacturing site in China, the product is assembled using energy and auxiliaries, if needed. Afterwards the product is packed in packaging materials and distributed to the client.

The production site has a certified Environmental management system according to ISO 14001:2015.



### 3.2 Distribution

The main market for the product is Europe. For this reason, an Intercontinental transport following PEP-PCR-ed4-EN-2021 09 06 is considered in the model:

- Ship: 19,000 km
- Truck: 1,000 km

The background assumptions for the transportation are listed below.

**Table 8: Background information distribution**

| Information                                 | Unit      | Truck    | Ship           |
|---|-----------|----------|----------------|
| Fuel type                                   | -         | Diesel   | Heavy fuel oil |
| Fuel consumption                            | l/(kg*km) | 2.80E-03 | 2.30E-04       |
| Total distance                              | km        | 1,000    | 19,000         |
| Capacity utilisation (including empty runs) | %         | 85       | 48             |
| Bulk density of transported products        | kg/m3     | n.a.     | n.a.           |
| Volume capacity utilisation factor          | -         | n.a.     | n.a.           |



### 3.3 Installation

No energy or material input is required. During installation, the product is unpacked. The packaging materials is treated by applying default values following PSR-0014-ED2.0-EN-2023 07 13.

**Table 9: End of life data for packaging in Europe**

| Treatment scenario                   | Metal | Paper & Cardboard | Wood | Plastics |
|--------------------------------------|-------|-------------------|------|----------|
| Incineration without energy recovery | 0 %   | 0 %               | 0 %  | 0 %      |
| Incineration with energy recovery    | 2 %   | 9 %               | 31 % | 37 %     |
| Landfill                             | 21 %  | 9 %               | 38 % | 23 %     |
| Recycling rate                       | 77 %  | 82 %              | 31 % | 41 %     |



### 3.4 Use stage

The product has no direct emissions (B1) and is designed so that no maintenance is required (B2) or parts need to be replaced (B4). Furthermore, no standard repairs (B3) or refurbishments (B5) are foreseen. The use of the product does consume electricity (B6), but no water (B7).

The main market for the product is Europe. Therefore, the European average grid mix has been used. In addition, the reference product does not contain any component associated with light management function, nor a motion and light sensor. Therefore, the total energy consumption in B6 is calculated with an energy saving coefficient of 1 according to /PSR-0014-ED2.0-EN-2023 07 13/.



### 3.5 End of life

The product falls under the Waste from Electrical and Electronic Equipment (WEEE) directive 2012/19/EU and its main market is Europe. Therefore, European statistics on the treatment of lighting equipment as subcategory of WEEE from 2018 has been used. The EoL scenario displays a European average and is the following:

- Incineration without energy recovery: 6.5%
- Incineration with energy recovery: 7.6%
- Landfilling: 6.5%
- Recycling: 79.4%



### 3.6 Benefits and loads beyond the system boundaries stage

The incineration with energy recovery and recycling of the product (incl. packaging) generates environmental benefits by avoiding the production of primary materials or energy. The amount and type of material flows used for the calculation of benefits are listed in Table 10.

**Table 10: Material flows for Benefits and loads beyond the system boundaries**

| Information   | Unit               | Value |
|---|--------------------|-------|
| Total weight going into re-use                            | kg/functional unit | 0     |
| Total weight going into recycling                         | kg/functional unit | 0.018 |
| - Share of metals   | %                  | 2.3   |
| - Share of plastics                                       | %                  | 8.9   |
| - Share of others   | %                  | 88.8  |
| Total weight going into incineration with energy recovery | kg/functional unit | 0.012 |
| - Share of paper  | %                  | 100   |

# 4 Environmental impacts

## 4.1 Introduction

The following table summarizes the key information for the calculation of the environmental impacts:

**Table 11: Basic information LCA model**

| Information       | Value   |
|-------------------|---|
| Used LCA software | Sphera Solutions, Inc.©, LCA for experts 10   |
| Used LCI database | Sphera Professional 2025.1 + Electronics Extension 2025.1   |
| PCR version       | PEP-PCR-ED4-EN-2021 09 06   |
| PSR version       | PEP-PSR-0014-ED2.0-EN-2023 07 13  |
| Functional unit   | Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours |

## 4.2 Results per functional unit

The following results of the environmental declaration have been developed by considering an outgoing artificial luminous flux of 1,000 lumens over a reference lifetime of 35,000 hours. The results refer to the core environmental impact indicators and indicators describing resource use, waste categories, and output flows according to EN 15804:2012+A2:2019.

**Table 12: Results for core environmental impact indicators per functional unit**

|   | Total<br>(excl. D) | Raw materials<br>& parts |           | Manufacturing | Distribution | Installation | Use      | End of life |           |           | Benefits and<br>loads beyond<br>the system<br>boundaries |
|---|--------------------|--------------------------|-----------|---------------|--------------|--------------|----------|-------------|-----------|-----------|--|
|   |                    | A1                       | A2        |               |              |              |          | A5          | B6        | C2        |  |
| GWP - total [kg CO <sub>2</sub> eq.]    | 6.07E+01           | 1.84E-01                 | 1.78E-03  | 1.43E-02      | 9.21E-03     | 8.68E-03     | 6.04E+01 | 1.66E-03    | 7.93E-02  | 1.09E-03  | -1.53E-01  |
| GWP - fossil [kg CO <sub>2</sub> eq.]   | 5.99E+01           | 1.86E-01                 | 1.77E-03  | 2.94E-02      | 9.19E-03     | 5.30E-03     | 5.96E+01 | 1.65E-03    | 7.94E-02  | 1.09E-03  | -1.67E-01  |
| GWP - biogenic [kg CO <sub>2</sub> eq.] | 5.99E-01           | -1.76E-03                | -1.14E-05 | -1.53E-02     | -8.88E-06    | 3.36E-03     | 6.13E-01 | -1.06E-05   | -7.59E-05 | -1.14E-07 | 1.33E-02   |
| GWP - luluc [kg CO <sub>2</sub> eq.]    | 1.97E-01           | 1.86E-04                 | 1.85E-05  | 1.36E-04      | 2.57E-05     | 1.92E-05     | 1.97E-01 | 1.72E-05    | -4.17E-05 | 3.45E-07  | -2.31E-04  |
| ODP [kg CFC-11 eq.]                     | 1.36E-09           | 1.60E-12                 | 2.98E-16  | 1.42E-13      | 1.05E-15     | 1.40E-14     | 1.36E-09 | 2.78E-16    | -1.76E-13 | 5.70E-16  | -2.71E-12  |
| AP [Mole of H+ eq.]                     | 1.32E-01           | 1.19E-03                 | 3.24E-06  | 9.94E-05      | 1.52E-04     | 1.39E-05     | 1.31E-01 | 3.01E-06    | -4.21E-05 | 1.01E-06  | -2.21E-03  |
| EP - freshwater [kg P eq.]              | 1.28E-04           | 4.79E-07                 | 4.85E-09  | 2.12E-07      | 8.40E-09     | 1.19E-07     | 1.27E-04 | 4.51E-09    | -1.62E-08 | 2.48E-10  | -2.89E-07  |
| EP - marine [kg N eq.]                  | 3.16E-02           | 1.84E-04                 | 1.37E-06  | 3.10E-05      | 5.45E-05     | 7.43E-06     | 3.13E-02 | 1.28E-06    | -2.13E-05 | 4.26E-07  | -1.39E-04  |
| EP - terrestrial [Mole of N eq.]        | 3.54E-01           | 2.06E-03                 | 1.47E-05  | 3.10E-04      | 5.96E-04     | 6.28E-05     | 3.51E-01 | 1.36E-05    | -1.97E-04 | 4.99E-06  | -1.50E-03  |
| POCP [kg NMVOC eq.]                     | 7.84E-02           | 5.41E-04                 | 2.91E-06  | 7.45E-05      | 1.50E-04     | 1.15E-05     | 7.77E-02 | 2.71E-06    | -5.33E-05 | 1.12E-06  | -4.75E-04  |
| ADPE [kg Sb eq.]                        | 2.36E-05           | 1.12E-05                 | 1.20E-10  | 6.41E-09      | 3.34E-10     | 3.67E-09     | 1.24E-05 | 1.11E-10    | -1.71E-09 | 6.40E-12  | -2.99E-05  |
| ADPF [MJ]                               | 1.22E+03           | 2.76E+00                 | 2.30E-02  | 3.41E-01      | 1.11E-01     | 7.16E-02     | 1.22E+03 | 2.15E-02    | -1.45E-01 | 1.33E-03  | -1.99E+00  |
| WDP [m <sup>3</sup> world equiv.]       | 1.50E+01           | 4.13E-02                 | 8.22E-06  | 1.02E-02      | 2.39E-05     | 7.15E-04     | 1.49E+01 | 7.66E-06    | -1.80E-03 | 2.36E-04  | -3.71E-02  |

**Table 13: Results for indicators describing resource use, waste categories, and output flows per functional unit**

| Indicator   | Acronym [Unit]            | Value    |
|---|---------------------------|----------|
| Renewable primary energy (without raw material)     | PERE [MJ]                 | 8.32E+02 |
| Renewable primary energy (raw material)             | PERM [MJ]                 | 1.94E-01 |
| Total use of renewable primary energy               | PERT [MJ]                 | 8.32E+02 |
| Non-renewable primary energy (without raw material) | PENRE [MJ]                | 1.22E+03 |
| Non-renewable primary energy (raw material)         | PENRM [MJ]                | 4.34E-02 |
| Total use of non-renewable primary energy           | PENRT [MJ]                | 1.22E+03 |
| Use of secondary materials                          | SM [kg]                   | 2.52E-02 |
| Use of renewable secondary fuels                    | RSF [MJ]                  | 0.00E+00 |
| Use of non-renewable secondary fuels                | NRSF [MJ]                 | 0.00E+00 |
| Net use of fresh water                              | FW [m3]                   | 1.50E+01 |
| Hazardous waste disposed                            | HWD [kg]                  | 1.59E-06 |
| Non-hazardous waste disposed                        | NHWD [kg]                 | 9.28E-01 |
| Radioactive waste disposed                          | RWD [kg]                  | 1.92E-01 |
| Components for reuse                                | CRU [kg]                  | 0.00E+00 |
| Materials for recycling                             | MFR [kg]                  | 5.76E-02 |
| Materials for energy recovery                       | MER [kg]                  | 6.31E-02 |
| Exported electricity                                | EEE [MJ]                  | 1.26E-01 |
| Exported thermal energy                             | EET [MJ]                  | 2.87E-01 |
| Biogenic carbon content of the product              | Biog. C in product [kg]   | 0.00E+00 |
| Biogenic carbon content of the associated packaging | Biog. C in packaging [kg] | 4.63E-03 |

## 4.3 Results per unit of product

The following results of the environmental declaration have been developed by considering the entire life cycle of one product with the technical properties described in paragraph 1.

**Table 14: Results core environmental impact indicators per unit of product**

|   | Total<br>(excl. D) | Raw materials<br>& parts |           | Manufacturing | Distribu-<br>tion | Installations | Use      | End of life |           |           | Benefits and<br>loads beyond<br>the system<br>boundaries |
|---|--------------------|--------------------------|-----------|---------------|-------------------|---------------|----------|-------------|-----------|-----------|--|
|   |                    | A1                       | A2        | A3            | A4                | A5            | B6       | C2          | C3        | C4        | D  |
| GWP - total [kg CO <sub>2</sub> eq.]    | 7.11E+02           | 2.16E+00                 | 2.08E-02  | 1.67E-01      | 1.08E-01          | 1.02E-01      | 7.07E+02 | 1.94E-02    | 9.28E-01  | 1.28E-02  | -1.80E+00  |
| GWP - fossile [kg CO <sub>2</sub> eq.]  | 7.02E+02           | 2.17E+00                 | 2.08E-02  | 3.44E-01      | 1.08E-01          | 6.21E-02      | 6.98E+02 | 1.93E-02    | 9.30E-01  | 1.28E-02  | -1.95E+00  |
| GWP - biogenic [kg CO <sub>2</sub> eq.] | 7.01E+00           | -2.06E-02                | -1.34E-04 | -1.79E-01     | -1.04E-04         | 3.93E-02      | 7.18E+00 | -1.25E-04   | -8.89E-04 | -1.34E-06 | 1.56E-01   |
| GWP - luluc [kg CO <sub>2</sub> eq.]    | 2.31E+00           | 2.18E-03                 | 2.17E-04  | 1.59E-03      | 3.01E-04          | 2.25E-04      | 2.30E+00 | 2.02E-04    | -4.88E-04 | 4.04E-06  | -2.70E-03  |
| ODP [kg CFC-11 eq.]                     | 1.59E-08           | 1.88E-11                 | 3.50E-15  | 1.66E-12      | 1.23E-14          | 1.64E-13      | 1.59E-08 | 3.26E-15    | -2.07E-12 | 6.67E-15  | -3.17E-11  |
| AP [Mole of H <sup>+</sup> eq.]         | 1.55E+00           | 1.39E-02                 | 3.79E-05  | 1.16E-03      | 1.78E-03          | 1.63E-04      | 1.53E+00 | 3.53E-05    | -4.94E-04 | 1.18E-05  | -2.59E-02  |
| EP - freshwater [kg P eq.]              | 1.50E-03           | 5.62E-06                 | 5.68E-08  | 2.49E-06      | 9.84E-08          | 1.40E-06      | 1.49E-03 | 5.29E-08    | -1.90E-07 | 2.90E-09  | -3.39E-06  |
| EP - marine [kg N eq.]                  | 3.70E-01           | 2.15E-03                 | 1.61E-05  | 3.64E-04      | 6.38E-04          | 8.71E-05      | 3.67E-01 | 1.50E-05    | -2.49E-04 | 4.99E-06  | -1.63E-03  |
| EP - terrestrial [Mole of N eq.]        | 4.14E+00           | 2.41E-02                 | 1.72E-04  | 3.63E-03      | 6.98E-03          | 7.36E-04      | 4.11E+00 | 1.60E-04    | -2.31E-03 | 5.84E-05  | -1.76E-02  |
| POCP [kg NMVOC eq.]                     | 9.19E-01           | 6.34E-03                 | 3.40E-05  | 8.73E-04      | 1.75E-03          | 1.35E-04      | 9.10E-01 | 3.17E-05    | -6.24E-04 | 1.31E-05  | -5.57E-03  |
| ADPE [kg Sb eq.]                        | 2.77E-04           | 1.32E-04                 | 1.40E-09  | 7.50E-08      | 3.91E-09          | 4.30E-08      | 1.45E-04 | 1.30E-09    | -2.00E-08 | 7.49E-11  | -3.50E-04  |
| ADPF [MJ]                               | 1.43E+04           | 3.24E+01                 | 2.70E-01  | 3.99E+00      | 1.30E+00          | 8.39E-01      | 1.42E+04 | 2.51E-01    | -1.70E+00 | 1.56E-02  | -2.33E+01  |
| WDP [m <sup>3</sup> world equiv.]       | 1.76E+02           | 4.84E-01                 | 9.63E-05  | 1.20E-01      | 2.80E-04          | 8.38E-03      | 1.75E+02 | 8.97E-05    | -2.11E-02 | 2.77E-03  | -4.35E-01  |

**Table 15: Results indicators describing resource use, waste categories, and output flows per unit of product**

| Indicator   | Acronym [Unit]            | Value    |
|---|---------------------------|----------|
| Renewable primary energy (without raw material)     | PERE [MJ]                 | 9.74E+03 |
| Renewable primary energy (raw material)             | PERM [MJ]                 | 2.27E+00 |
| Total use of renewable primary energy               | PERT [MJ]                 | 9.74E+03 |
| Non-renewable primary energy (without raw material) | PENRE [MJ]                | 1.43E+04 |
| Non-renewable primary energy (raw material)         | PENRM [MJ]                | 5.08E-01 |
| Total use of non-renewable primary energy           | PENRT [MJ]                | 1.43E+04 |
| Use of secondary materials                          | SM [kg]                   | 2.96E-01 |
| Use of renewable secondary fuels                    | RSF [MJ]                  | 0.00E+00 |
| Use of non-renewable secondary fuels                | NRSF [MJ]                 | 0.00E+00 |
| Net use of fresh water                              | FW [m3]                   | 1.75E+02 |
| Hazardous waste disposed                            | HWD [kg]                  | 1.86E-05 |
| Non-hazardous waste disposed                        | NHWD [kg]                 | 1.09E+01 |
| Radioactive waste disposed                          | RWD [kg]                  | 2.25E+00 |
| Components for reuse                                | CRU [kg]                  | 0.00E+00 |
| Materials for recycling                             | MFR [kg]                  | 6.74E-01 |
| Materials for energy recovery                       | MER [kg]                  | 7.39E-01 |
| Exported electricity                                | EEE [MJ]                  | 1.47E+00 |
| Exported thermal energy                             | EET [MJ]                  | 3.36E+00 |
| Biogenic carbon content of the product              | Biog. C in product [kg]   | 0.00E+00 |
| Biogenic carbon content of the associated packaging | Biog. C in packaging [kg] | 5.42E-02 |

# 5 Extrapolation

## 5.1 Extrapolation rules

Extrapolations rules have been calculated following PCR-ed4-EN-2021 09 14 and PSR-0014-ed2.0- EN-2023 07 18. The defined rules shall be applied using the Extrapolation rules file provided in the following tables.

**Table 16: Extrapolation parameters for reference product**

| Parameter                     | Value for reference product (DP S 1500 46W 840 IP65 GY) |
|-------------------------------|---|
| Lighting output [lm]          | 4,100   |
| Weight of light source [kg]   | 0.030   |
| Weight of lamp structure [kg] | 0.215   |
| Weight of control gear [kg]   | 0.020   |
| Weight of packaging [kg]      | 0.126   |
| Power [W]                     | 22.1  |
| Length [mm]                   | 1,500   |
| Diameter [mm]                 | 25.6  |

The extrapolation coefficients calculation at the functional unit level shall be taken into account with the following formula:

$$\text{Extrapolation coefficient at the product level} \times \frac{\text{Lighting output of reference product (lm)}}{\text{Lighting output of concerned product (lm)}}$$

## 5.2 Extrapolation coefficients

The reported extrapolation coefficients are intended at product level (declared unit) and not at functional unit.

- As no motion & daylight sensor is installed across the product family, the energy saving coefficient is 1.

**Table 17: Calculated Extrapolation coefficients per product**

| Product Name   | Useful output flux [lm] | Manufacturing | Distribution | Installation | Use         | EoL         |
|--|-------------------------|---------------|--------------|--------------|-------------|-------------|
| <b>LED TUBE T8 EM SUPERIOR 1500 mm 16.7W/22.1W 840</b> | <b>4,100</b>            | <b>1.00</b>   | <b>1.00</b>  | <b>1.00</b>  | <b>1.00</b> | <b>1.00</b> |
| LED TUBE T8 EM SUPERIOR 438 5.1W 830                   | 810                     | 0.46          | 0.39         | 0.52         | 0.23        | 0.33        |
| LED TUBE T8 EM SUPERIOR 438 5.1W 840                   | 900                     | 0.46          | 0.39         | 0.52         | 0.23        | 0.33        |
| LED TUBE T8 EM SUPERIOR 438 5.1W 865                   | 900                     | 0.46          | 0.39         | 0.52         | 0.23        | 0.33        |
| LED TUBE T8 EM SUPERIOR 600 6.3W 830                   | 990                     | 0.52          | 0.46         | 0.61         | 0.29        | 0.39        |
| LED TUBE T8 EM SUPERIOR 600 6.3W 840                   | 1,100                   | 0.52          | 0.46         | 0.61         | 0.29        | 0.39        |
| LED TUBE T8 EM SUPERIOR 600 6.3W 865                   | 1,100                   | 0.52          | 0.46         | 0.61         | 0.29        | 0.39        |
| LED TUBE T8 EM SUPERIOR 900 9.7W 830                   | 1,530                   | 0.66          | 0.61         | 0.73         | 0.44        | 0.56        |
| LED TUBE T8 EM SUPERIOR 900 9.7W 840                   | 1,700                   | 0.66          | 0.61         | 0.73         | 0.44        | 0.56        |
| LED TUBE T8 EM SUPERIOR 900 9.7W 865                   | 1,700                   | 0.66          | 0.61         | 0.73         | 0.44        | 0.56        |
| LED TUBE T8 EM SUPERIOR 1050 11.4W 830                 | 1,800                   | 0.74          | 0.70         | 0.78         | 0.52        | 0.66        |
| LED TUBE T8 EM SUPERIOR 1050 11.4W 840                 | 2,000                   | 0.74          | 0.70         | 0.78         | 0.52        | 0.66        |
| LED TUBE T8 EM SUPERIOR 1050 11.4W 865                 | 2,000                   | 0.74          | 0.70         | 0.78         | 0.52        | 0.66        |
| LED TUBE T8 EM SUPERIOR 1200 11.3W/14W 830             | 2,300                   | 0.82          | 0.82         | 0.82         | 0.63        | 0.82        |
| LED TUBE T8 EM SUPERIOR 1200 11.3W/14W 840             | 2,600                   | 0.82          | 0.82         | 0.82         | 0.63        | 0.82        |
| LED TUBE T8 EM SUPERIOR 1200 11.3W/14W 865             | 2,600                   | 0.82          | 0.82         | 0.82         | 0.63        | 0.82        |
| LED TUBE T8 EM SUPERIOR 1500 16.7W/22.1W 830           | 3,700                   | 1.00          | 1.00         | 1.00         | 1.00        | 1.00        |
| LED TUBE T8 EM SUPERIOR 1500 16.7W/22.1W 865           | 4,100                   | 1.00          | 1.00         | 1.00         | 1.00        | 1.00        |
| LED TUBE T8 EM SUPERIOR 1200 14W 940                   | 2,600                   | 0.82          | 0.82         | 0.82         | 0.63        | 0.82        |
| LED TUBE T8 EM SUPERIOR 1500 22.1W 940                 | 4,100                   | 1.00          | 1.00         | 1.00         | 1.00        | 1.00        |