

ENVIRONMENTAL PRODUCT DECLARATION

According to EN ISO 14025 and EN 15804

This Declaration is based on the Product Category Rules (PCR) for 'Luminaires, lamps and components for luminaires' - 11.2017

|                     |                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------|
| Declaration Holder: | Thorn Lighting Limited<br>Green Lane Industrial Estate, Spennymoor, Co. Durham, DL16 6JE Spennymoor - UK    |
| Program Holder:     | Institut Bauen und Umwelt e. V. (IBU), Deutschland ( <a href="http://www.ibu-epd.com">www.ibu-epd.com</a> ) |
| Declaration number: | ECO-ZGR-96259972-Amenity-SE-2024-04-29                                                                      |
| Date of Issue:      | 2024-04-29                                                                                                  |
| Validity Date:      | 2029-04-29                                                                                                  |



LED Amenity lighting lantern  
PLD O 18L35 R/S BPSW CL2 N4M D60 L740  
96259972

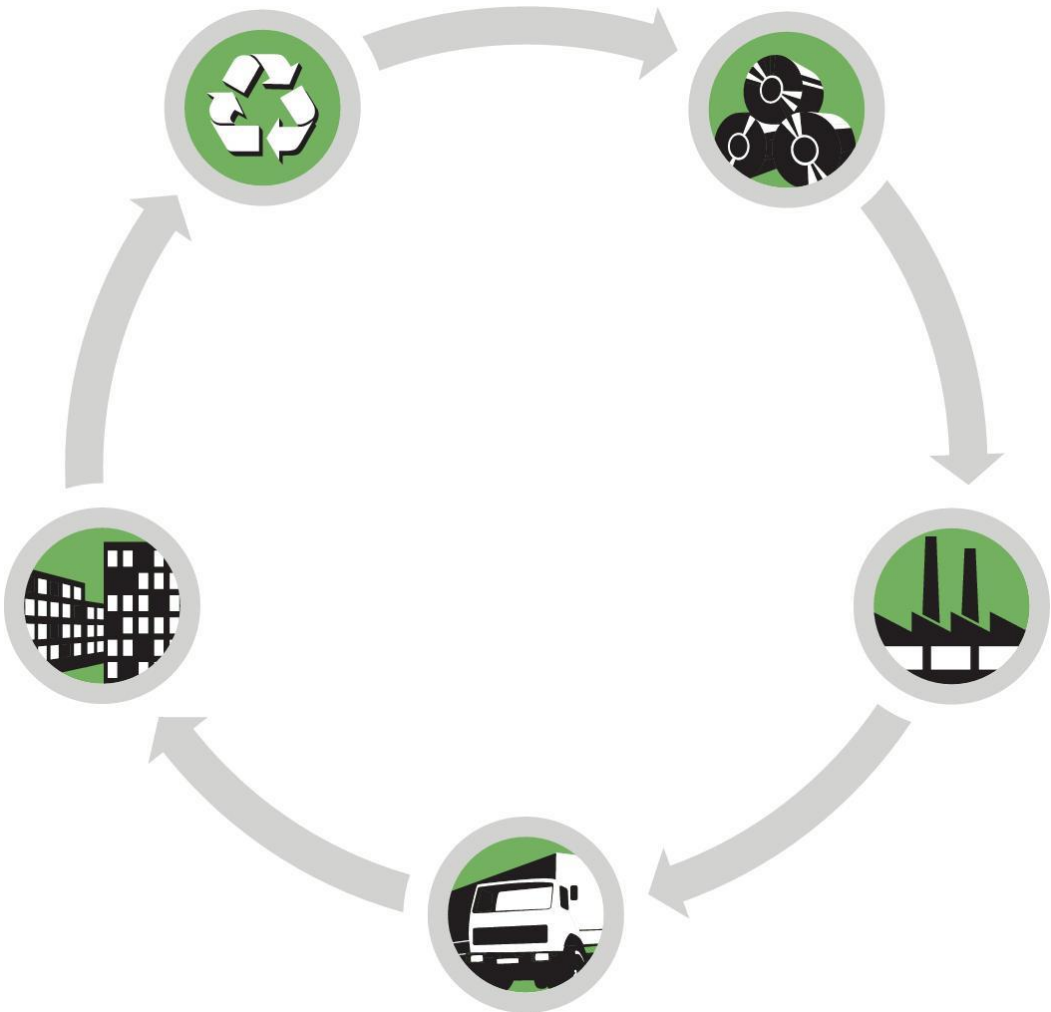


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| Environmental Product Declaration<br>According to EN ISO 14025 and EN 15804 |                                        |  |
|-----------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|
| Declaration Holder:                                                         | Thorn Lighting Limited                 |                                                                                       |
| Program Holder:                                                             | Institut Bauen und Umwelt e. V. (IBU)  |                                                                                       |
| Declaration number:                                                         | ECO-ZGR-96259972-Amenity-SE-2024-04-29 |                                                                                       |
| Date of Issue:                                                              | 2024-04-29                             |                                                                                       |
| Validity Date:                                                              | 2029-04-29                             |                                                                                       |

Summary

Thorn is a globally trusted supplier of both outdoor and indoor luminaires and integrated controls. Our mission is to provide products and services which make it easier for customers to specify, install and maintain good quality, energy efficient lighting. Reconciling energy performance, efficiency and comfort and making customers more aware of environmentally friendly lighting concepts are part of our main mission. Employing life cycle assessments will measure the environmental impact of the solution throughout the product's life cycle.

This Environmental Product Declaration (EPD) is based on EN ISO 14025 and EN 15804 and describes the specific environmental impacts of the mentioned product. The declaration follows also the specified, concretising requirements of the verifying program holder Institut Bauen und Umwelt e.V. (IBU) with respect to the LCA calculation rules and the content of the (core-)EPD according to the underlying PCR-instructions (PCR: Product Category Rules) for 'Luminaires, lamps and components for luminaires' (Ref: IBU PCR Teil A und B). The described product serves as declared unit. The declaration includes a product description, information on material composition, manufacturing, transport, use-stage, disposal and recycling, as well as results of the life cycle assessment. EPDs of construction products are only comparable if figures are calculated according to the same PCR and suitable, mandatory use-stage scenarios.



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LCA results of selected parameters on basis of the chosen scenario

| Assessment parameter              | Unit                                  | Production-Stage | Construction Process Stage | Use-stage | End-of-Life Stage | Benefits and loads beyond the system boundary |
|-----------------------------------|---------------------------------------|------------------|----------------------------|-----------|-------------------|-----------------------------------------------|
|                                   |                                       | A1-A3            | A4, A5                     | B4, B6    | C2-C4             | D                                             |
| Acidification Potential (AP)      | [kg SO <sub>2</sub> eq]               | 2,15E-01         | 2,35E-03                   | 1,69E-01  | 4,18E-03          | -1,67E-01                                     |
| Eutrophication Potential (EP)     | [kg PO <sub>4</sub> <sup>3-</sup> eq] | 1,64E-02         | 3,66E-04                   | 3,15E-02  | 5,48E-04          | -8,84E-03                                     |
| Global Warming Potential (GWP100) | [kg CO <sub>2</sub> eq]               | 5,03E+01         | 4,55E+00                   | 4,98E+01  | 6,81E+00          | -3,07E+01                                     |
| Primary energy, renewable         | [MJ]                                  | 3,46E+02         | 3,74E+00                   | 3,74E+03  | 6,69E+00          | -1,54E+02                                     |
| Primary energy, non renewable     | [MJ]                                  | 8,69E+02         | 1,46E+01                   | 4,78E+03  | 1,97E+01          | -3,94E+02                                     |

For a comprehensive description of the results please refer to chapter 4 Life Cycle Assessment Results.

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## 1 Product description\* and application

Decorative, post-top lantern with LED package with electronic driver. Class II electrical, IP66, IK08. Base in cast aluminium, powder coated silver-grey. Canopy in original shape, made from aluminium textured silver-grey (close to RAL9006). UV stabilised polycarbonate clear diffuser with anti-glare prisms. Internal symmetric reflector. Equipped with 50% power reduction circuit, effective 3 hours before and 5 hours after a calculated midnight. It can be deactivated at installation with an easily accessible internal switch. Supplied complete in one box. Complete with 4000K LED

To be post top mounted on a spigot of Ø60mm, length 75mm. Pre-cabled with 4m HO5-W F 2 x 1.5mm<sup>2</sup> cable.

Dimensions: Ø564 x 567 mm

Luminaire input power: 21 W

Weight: 7.8 kg

Scx: 0.074m<sup>2</sup>

Luminaire efficacy: 123 lm/W

*Note: Other technical data are not relevant with respect to the given context.*

Additional information is available at <http://www.thornlighting.com/96259972>.

### Base materials / Ancillary materials\*

| Materials                                        | weight [kg] | weight [%] | Materials                  | weight [kg] | weight [%] |
|--------------------------------------------------|-------------|------------|----------------------------|-------------|------------|
| Steel                                            | 2,18E-01    | 3,43       | PVC                        | 4,50E-03    | 0,07       |
| Epoxy resin                                      | 8,22E-03    | 0,13       | Electrolyte                | 1,70E-03    | 0,03       |
| Silicon dioxide (SiO <sub>2</sub> )              | 2,29E-03    | 0,04       | EPDM                       | 9,69E-03    | 0,15       |
| Silicon                                          | 9,71E-05    | 0,00       | PBT                        | 5,61E-03    | 0,09       |
| Tin                                              | 5,05E-03    | 0,08       | PA6                        | 2,15E-01    | 3,38       |
| Aluminum and alloys                              | 3,37E+00    | 53,08      | Silver in alloy            | 4,17E-05    | 0,00       |
| Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ) | 1,45E-03    | 0,02       | Polyurethane               | 2,10E-03    | 0,03       |
| Glass                                            | 1,77E-05    | 0,00       | Unsaturated polyester      | 7,42E-07    | 0,00       |
| Copper alloys                                    | 1,59E-03    | 0,03       | PC                         | 1,14E+00    | 17,88      |
| Zinc                                             | 1,34E-03    | 0,02       | Colophony                  | 2,25E-05    | 0,00       |
| Lead                                             | 7,34E-06    | 0,00       | Silicone                   | 1,29E-04    | 0,00       |
| Tetrabromobisphenol A (TBBA)                     | 3,28E-04    | 0,01       | ABS                        | 6,87E-01    | 10,83      |
| Tin in alloy                                     | 1,71E-03    | 0,03       | Brass                      | 1,02E-03    | 0,02       |
| Antimony oxide (Sb <sub>2</sub> O <sub>3</sub> ) | 2,23E-05    | 0,00       | Lacquers                   | 1,35E-01    | 2,13       |
| Silver                                           | 1,37E-04    | 0,00       | PE                         | 1,22E-02    | 0,19       |
| Inorganic flame retardants                       | 5,49E-08    | 0,00       | Plastics unspecified       | 1,15E-02    | 0,18       |
| Nickel in alloy                                  | 3,93E-06    | 0,00       | PMMA                       | 6,45E-02    | 1,02       |
| Gold                                             | 2,96E-06    | 0,00       | Silicone rubber            | 1,13E-01    | 1,77       |
| Nickel                                           | 2,07E-05    | 0,00       | Paper                      | 7,80E-04    | 0,01       |
| Palladium in alloy                               | 3,97E-06    | 0,00       | Unsaturated polyester (UP) | 7,42E-07    | 0,00       |
| Copper                                           | 3,00E-01    | 4,73       | Zinc in alloy              | 6,91E-06    | 0,00       |
| PET                                              | 5,27E-03    | 0,08       | Not Considered             | 1,00E-03    | 0,02       |

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| Materials | weight [kg] | weight [%] | Materials    | weight [kg] | weight [%] |
|-----------|-------------|------------|--------------|-------------|------------|
| Ferrites  | 3,27E-02    | 0,51       | Total Weight | 6,35E+00    | 100,00     |

\* The calculation of the LCA results are solely based on the actual weight of all single material components in the table. The product weight in the product description may differ from the declared total weight in the EPD.

## Regulation (EC) No 1907/2006 (REACH), Annex XIV

Zumtobel Group fulfils the requirements of the EU-Regulation REACH.

For lighting components from Tridonic the conformity of products is declared overall in a letter that can be downloaded from internet (status 12-2018): <http://www.tridonic.com/com/en/environmental-declarations.asp>

For the luminaire brands Thorn and Zumtobel a defined process was set up to secure the REACH conformity of purchased components for luminaire production. On that basis separate requests are answered individually.

| Packaging       | weight [kg] | weight [%] |
|-----------------|-------------|------------|
| PE              | 1,30E-02    | 0,36       |
| Cardboard/Paper | 3,61E+00    | 99,64      |
| Not Considered  | 0,00E+00    | 0,00       |
| Total Weight    | 3,62E+00    | 100,00     |

## Life Cycle Stages - Overview



### Manufacturing

The product is made in France, Les Andelys. The originating plant is certified according to ISO 9001 and ISO 14001.



### Delivery

Products are mostly delivered by truck in Europe.



### Use-stage

During the use-stage, consumption of electricity and potential replacement of components is taken into account.

## Abnormal effects: Fire

The thermal load of the product is approximately 55,495 MJ. The calculation is based on the material composition and the gross calorific values of plastics.

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End of life

The product is obliged to be professionally collected and recycled in accordance with the EU Directive 2012/19/EU on waste of electric and electronic equipment (WEEE). Thorn fulfils its responsibility inside EU via participation in the national WEEE-Schemes. Outside EU the same is valid respectively, according to actual national regulations.

|                                                                                    |                                        |                                                                                                                            |
|------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
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| Declaration number:                                                                | ECO-ZGR-96259972-Amenity-SE-2024-04-29 |                                                                                                                            |
| Date of Issue:                                                                     | 2024-04-29                             |                                                                                                                            |

## 2 LCA: Framework / Calculation rules

The declared unit is the product described in chapter 1 with a total weight of 6,348 kg.

### System boundaries

The life cycle assessment covers the whole life cycle; the EPD type is cradle-to-grave. The declared product does not contribute to any potential environmental effects in the modules marked with MND.

The following table provides an overview of the declared modules:

| Product assessment information (x = included in LCA, MND = module not declared) |           |               |                            |                                   |           |             |        |             |               |                        |                       |                             |           |                  |          |                                                         |
|---------------------------------------------------------------------------------|-----------|---------------|----------------------------|-----------------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-----------------------------|-----------|------------------|----------|---------------------------------------------------------|
| Product life cycle information                                                  |           |               |                            |                                   |           |             |        |             |               |                        |                       |                             |           |                  |          | Supplementary information beyond the product life cycle |
| Production-Stage                                                                |           |               | Construction Process Stage |                                   | Use-stage |             |        |             |               |                        |                       | End-of-Life Stage           |           |                  |          | Benefits and loads beyond the system boundary           |
| Raw material supply                                                             | Transport | Manufacturing | Transport to building site | Construction installation process | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction / demolition | Transport | Waste processing | Disposal | Reuse, recovery or recycling potential                  |
| A1                                                                              | A2        | A3            | A4                         | A5                                | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                          | C2        | C3               | C4       | D                                                       |
| X                                                                               |           |               | X                          | X                                 | MND       | MND         | MND    | X           | MND           | X                      | MND                   | MND                         | X         | X                | X        | X                                                       |

- A1-A3: Production: Power generation, production of base materials, pre-products, ancillary materials, processing of secondary materials, packaging materials, installation of products; transport of base materials and purchased components as well as in-house transport is taken into account.
- A4: delivery of products from plant to customer
- A5: effort (energy and material) and emissions of packaging incineration / landfilling
- B4: replacement of components, disposal of failed light sources and production of new light sources
- B6: operational energy use (electricity consumption)
- C2: transport scenario for material recovery resp. Incineration or waste disposal
- C3: Incineration of non-recyclable and combustible materials (assumption: incineration plant with R1 > 0,6), pre-treatment of scrap for the subsequent recycling process (shredder)
- C4: disposal of non-combustible residual materials
- D: Returns for succeeding systems by energy recovery from incineration plants (from A5 and C3) and material recovery incl. recycling efforts

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## Cut-off rules

In the assessment of the production stage (A1-A3), all available data from production are considered, i.e. all raw materials used as per formulation, utilised thermal energy, and electric power consumption. Thus material and energy flows contributing less than 1 % of mass or energy may have also been considered to some extent. Machines and facilities required during production are neglected. The production of etiquettes, tape and glue is also neglected.

It can be assumed that the total sum of neglected processes does not exceed 5 % of energy usage and mass per module A, B, C or D.

## Data quality

The data for the manufacturing of the product are average values, due to the analysis of the factory for 12 months. The used data are not older than 5 years. The basic data used in the calculation are consistent, reproducible, comparable and up to date. Necessary background data result from the GaBi database 12-2018. The geographical representativeness of generic or average data reflects the region where the production is located.

## Description of data

The demand of energy for the manufacturing processes is modelled, depending on the product type (luminaires resp. components for lighting systems, e. g. control gears etc.), by using the average consumption of process energy per piece which is reported yearly at Zumtobel Group. By doing that, electrical as well as thermal energy is considered. The average consumption of process energy in the manufacturing sites includes the energy of additional appliances that is not measured separately, e. g. air condition and lighting (incl. outdoor).

For luminaires the energy consumption is modelled with an European grid mix. For system components, a mix of 50% European and 50% Asian grid mix is applied. The energy mix considered for the electric energy consumption during the use-stage is described in the use-stage scenario.

Generic data is used for the upstream processes beyond manufacturer's influence. Information on secondary materials for upstream processes is available and considered.

## Allocation

Recycling of metals and glass is considered. Material reused in succeeding systems is included in module D.

During manufacture of the products no side products arise. In background datasets appropriate allocations are used according to documentation.

## Comparability

Basically a comparison or an evaluation of EPD data is only reasonable if all respective datasets are made according to EN 15804 and the context of the building respectively the use-stage scenario and the specific characteristic of the product are considered.

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## 3 LCA: Scenarios and additional technical information

### Delivery scenario

Standard scenario is the delivery in Europe by truck with a transport distance of 700 km (maximum). The weight of the transported unit includes product with packaging.

### Transport to building site

| Name                                            |          |
|-------------------------------------------------|----------|
| fuel [l/100 km]                                 | 9,17E-03 |
| Transport distance [km]                         | 700      |
| Transport route                                 | Europe   |
| Capacity utilisation (including empty runs) [%] | 55       |

### Use-stage scenario

During the use-stage, consumption of electricity is calculated, based on a chosen standardised scenario which is characteristic for this luminaire type. Not only operating time and average product lifetime is considered but also additional influences like stand-by circuits, dimming function and more.

| Use-stage model                                                                                                   |             |
|-------------------------------------------------------------------------------------------------------------------|-------------|
| Scenario                                                                                                          | Amenity     |
| Reference Service Lifetime [years]                                                                                | 20          |
| Total active time [hours]                                                                                         | 83 200      |
| Total passive time [hours]                                                                                        | 92 000      |
| Correction factors F <sub>CP</sub> /F <sub>D</sub> /F <sub>N</sub> /F <sub>O</sub> for dimming/presence detection | 1/1/0.645/1 |
| Energy Mix                                                                                                        | SE          |

The Constant Illuminance Factor  $F_{CP}$ , the Daylight Dependency Factor  $F_D$  and the Occupancy Dependency Factor  $F_O$  are considered according to EN 15193. The factor  $F_N$  reflects energy savings from dimming during the non-daylight active hours.

| Energy consumption in the use-stage according to the use-stage model |         |
|----------------------------------------------------------------------|---------|
| Nominal Power [W]                                                    | 21,0    |
| Passive Power [W]                                                    | 0,0     |
| Constant Illuminance Control                                         | False   |
| Dimmable                                                             | True    |
| Presence Detector                                                    | False   |
| Total Energy Consumption [kWh] (B6)                                  | 1 126,9 |
| Primary energy demand due to Total Energy Consumption [MJ]           | 8 525,1 |

Some functionality may require further controls not considered in this context.

Precise power consumption data for specific lighting solutions or applications need to be calculated separately.

Potential replacement of parts is considered in the LCA calculations (B4) and shown here if applicable. The respective lifetimes are taken from manufacturers' data or are estimated.

|                                                                                                |                                        |                                                                                                                                     |
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End-of-life scenario (C/D)

The End of Life scenario is based on a material split and respective recycling rates. In the applied scenario it is assumed that all metals and 70 % of glass parts are to be recycled, plastics are incinerated. The remaining parts of the product are landfilled. The energy required for treatment of materials (e.g. shredding processes) is included.

End-of-Life (C1-C4) and reuse, recovery and/or recycling potentials (D), relevant scenario information

| Name                             | Value in kg | Share in % |
|----------------------------------|-------------|------------|
| Collected separately (WEEE)      | 6,348       | 100,000    |
| Recycling / Reuse in next system | 3,799       | 59,843     |
| Energy recovery                  | 2,414       | 38,028     |
| Landfilling                      | 0,134       | 2,117      |

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## 4 LCA: Life Cycle Assessment Results

The evaluation is conducted according to characterization factors of EN 15804-1+A1 (and essential addenda).

**Table 1: LCA results: environmental impacts of the product**

| Assessment parameter | Unit                                  | Production-Stage                      | Construction Process Stage |                                   | Use-stage                 |                        | End-of-Life Stage |                  |          | Benefits and loads beyond the system boundary |
|----------------------|---------------------------------------|---------------------------------------|----------------------------|-----------------------------------|---------------------------|------------------------|-------------------|------------------|----------|-----------------------------------------------|
|                      |                                       | Raw material supply and manufacturing | Transport to building site | Construction installation process | Replacement of components | Operational energy use | Transport         | Waste processing | Disposal | Reuse, recovery or recycling potential        |
|                      |                                       | A1-A3                                 | A4                         | A5                                | B4                        | B6                     | C2                | C3               | C4       | D                                             |
| ADPE                 | [kg Sb eq]                            | 1,48E-03                              | 3,28E-08                   | 2,71E-07                          | 0,00E+00                  | 1,32E-04               | 4,69E-09          | 1,34E-06         | 1,57E-09 | -1,34E-03                                     |
| ADPF                 | [MJ]                                  | 7,40E+02                              | 5,44E+00                   | 5,34E+00                          | 0,00E+00                  | 3,34E+02               | 7,78E-01          | 1,18E+01         | 1,01E-01 | -3,31E+02                                     |
| AP                   | [kg SO <sub>2</sub> eq]               | 2,15E-01                              | 9,20E-04                   | 1,43E-03                          | 0,00E+00                  | 1,69E-01               | 1,31E-04          | 4,01E-03         | 3,23E-05 | -1,67E-01                                     |
| EP                   | [kg PO <sub>4</sub> <sup>3-</sup> eq] | 1,64E-02                              | 2,32E-04                   | 1,34E-04                          | 0,00E+00                  | 3,15E-02               | 3,31E-05          | 3,92E-04         | 1,23E-04 | -8,84E-03                                     |
| GWP                  | [kg CO <sub>2</sub> eq]               | 5,03E+01                              | 4,00E-01                   | 4,15E+00                          | 0,00E+00                  | 4,98E+01               | 5,71E-02          | 6,62E+00         | 1,26E-01 | -3,07E+01                                     |
| ODP                  | [kg R11 eq]                           | 2,94E-07                              | 1,09E-14                   | 2,23E-12                          | 0,00E+00                  | 2,90E-09               | 1,56E-15          | 4,05E-12         | 1,95E-15 | -7,94E-07                                     |
| POCP                 | [kg C <sub>2</sub> H <sub>4</sub> eq] | 1,37E-02                              | -3,08E-04                  | 8,93E-05                          | 0,00E+00                  | 2,01E-02               | -4,40E-05         | 2,20E-04         | 3,15E-05 | -9,12E-03                                     |

GWP = Global Warming Potential  
 ODP = Ozone Depletion Potential  
 AP = Acidification Potential  
 EP = Eutrophication Potential  
 POCP = Photochemical ozone creation potential  
 ADPE = Abiotic Depletion Potential (ADP elements)  
 ADPF = Abiotic Depletion Potential (ADP fossil fuels)

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**Table 2: LCA results: input of resources**

| Assessment parameter | Unit | Production-Stage                      | Construction Process Stage |                                   | Use-stage                 |                        | End-of-Life Stage |                  |          | Benefits and loads beyond the system boundary |
|----------------------|------|---------------------------------------|----------------------------|-----------------------------------|---------------------------|------------------------|-------------------|------------------|----------|-----------------------------------------------|
|                      |      | Raw material supply and manufacturing | Transport to building site | Construction installation process | Replacement of components | Operational energy use | Transport         | Waste processing | Disposal | Reuse, recovery or recycling potential        |
|                      |      | A1-A3                                 | A4                         | A5                                | B4                        | B6                     | C2                | C3               | C4       | D                                             |
| PERE                 | [MJ] | 3,46E+02                              | 3,01E-01                   | 3,44E+00                          | 0,00E+00                  | 3,74E+03               | 4,31E-02          | 6,64E+00         | 8,12E-03 | -1,54E+02                                     |
| PERM                 | [MJ] | 0,00E+00                              | 0,00E+00                   | 0,00E+00                          | 0,00E+00                  | 0,00E+00               | 0,00E+00          | 0,00E+00         | 0,00E+00 | 0,00E+00                                      |
| PERT                 | [MJ] | 3,46E+02                              | 3,01E-01                   | 3,44E+00                          | 0,00E+00                  | 3,74E+03               | 4,31E-02          | 6,64E+00         | 8,12E-03 | -1,54E+02                                     |
| PENRE                | [MJ] | 8,13E+02                              | 5,46E+00                   | 9,16E+00                          | 0,00E+00                  | 4,78E+03               | 7,81E-01          | 7,43E+01         | 1,05E-01 | -3,94E+02                                     |
| PENRM                | [MJ] | 5,55E+01                              | 0,00E+00                   | 0,00E+00                          | 0,00E+00                  | 0,00E+00               | 0,00E+00          | -5,55E+01        | 0,00E+00 | 0,00E+00                                      |
| PENRT                | [MJ] | 8,69E+02                              | 5,46E+00                   | 9,16E+00                          | 0,00E+00                  | 4,78E+03               | 7,81E-01          | 1,88E+01         | 1,05E-01 | -3,94E+02                                     |
| SM                   | [kg] | 2,72E-02                              | 0,00E+00                   | 0,00E+00                          | 0,00E+00                  | 0,00E+00               | 0,00E+00          | 0,00E+00         | 0,00E+00 | 0,00E+00                                      |
| RSF                  | [MJ] | 0,00E+00                              | 0,00E+00                   | 0,00E+00                          | 0,00E+00                  | 0,00E+00               | 0,00E+00          | 0,00E+00         | 0,00E+00 | 0,00E+00                                      |
| NRSF                 | [MJ] | 0,00E+00                              | 0,00E+00                   | 0,00E+00                          | 0,00E+00                  | 0,00E+00               | 0,00E+00          | 0,00E+00         | 0,00E+00 | 0,00E+00                                      |
| FW                   | [kg] | 5,02E+02                              | 5,55E-01                   | 4,76E+00                          | 0,00E+00                  | 7,18E+03               | 7,93E-02          | 2,27E+01         | 1,54E-02 | -4,27E+02                                     |

PERE = Use of renewable primary energy as energy source  
 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 as energy source  
 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

**Table 3: LCA results: Waste categories and other output flows**

|      |      | A1-A3    | A4       | A5       | B4       | B6       | C2       | C3       | C4       | D         |
|------|------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| HWD  | [kg] | 2,16E-05 | 3,16E-07 | 4,37E-09 | 0,00E+00 | 2,20E-06 | 4,51E-08 | 2,31E-08 | 5,41E-10 | -7,09E-08 |
| NHWD | [kg] | 8,96E+00 | 4,58E-04 | 9,76E-03 | 0,00E+00 | 5,77E+00 | 6,54E-05 | 6,26E-01 | 1,04E-01 | -7,88E+00 |
| RWD  | [kg] | 5,10E-02 | 7,48E-06 | 1,51E-03 | 0,00E+00 | 1,85E+00 | 1,07E-06 | 2,78E-03 | 1,54E-06 | -2,56E-02 |
| CRU  | [kg] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| MFR  | [kg] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,80E+00 | 0,00E+00 | 0,00E+00  |
| MER  | [kg] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| EEE  | [MJ] | 0,00E+00 | 0,00E+00 | 6,12E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,04E+01 | 0,00E+00 | 0,00E+00  |
| EET  | [MJ] | 0,00E+00 | 0,00E+00 | 1,40E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,40E+01 | 0,00E+00 | 0,00E+00  |

HWD = Hazardous waste disposed  
 NHWD = Non-hazardous waste disposed

## Environmental Product Declaration

According to EN ISO 14025 and EN 15804

Declaration number: ECO-ZGR-96259972-Amenity-SE-2024-04-29  
 Date of Issue: 2024-04-29



96259972 PLD O 18L35 R/S BPSW CL2 N4M D60 L740

- 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

Interpretation

The primary energy demand and environmental impact of the considered product is basically determined by the expenditure in the use-stage. This is due to the provision of light based on electricity consumption and the related upstream processes for electricity generation.

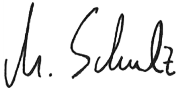
The production stage has a minor contribution on the environmental impact regarding the overall life cycle. The considered transport processes are not significant.

The heating value, resulting from the content of plastic determines the energy gain during the end-of-life scenario. Recycled material can be reused in next systems. Energie gained from incineration processes and recycled materials for succeeding systems are considered in modul D.

5 Verification

This EPD including the results of the Life-Cycle Analysis is based on an LCA modelling (EPD system), verified by an independent third party.

It's the sole responsibility of the manufacturer to secure the correctness of any input data entered into the system. The owner of the declaration is liable for the underlying data and certificates; liability of IBU is disclosed with respect to manufacturer's information, LCA data and certificates.

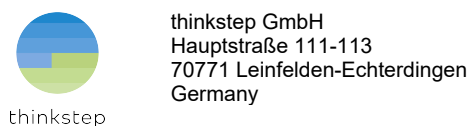
|                                                                                                                                                                                                                                   |                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The CEN standard EN 15804 serves as core PCR. The verification of the generation process of this EPD was done externally by a third party independent according to EN ISO 14025.                                                  |                                                                                                                                                                                                      |
| Third party verifier:<br><br><br><br>Matthias Schulz, appointed by the Advisory Board of the Institute Construction and Environment (IBU) e.V. | Director:<br><br><br><br>Dr. Alexander Röder, Director of the Institute Construction and Environment (IBU) e.V. |

|                                                                                    |                                        |                                                                                       |
|------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|
| <b>Environmental Product Declaration</b><br>According to EN ISO 14025 and EN 15804 |                                        |  |
| Declaration number:                                                                | ECO-ZGR-96259972-Amenity-SE-2024-04-29 |                                                                                       |
| Date of Issue:                                                                     | 2024-04-29                             |                                                                                       |

## Literature

|               |                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AgBB          | Health-related Evaluation Procedure for Volatile Organic compounds Emissions (VOC and SVOC) from building Products                                                                                                                                                                                                                                                |
| EN 15804      | EN 15804:2012+A1:2013 Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products                                                                                                                                                                                                    |
| EN 15193-1    | EN 15193-1:2017 Energy performance of buildings. Energy requirements for lighting                                                                                                                                                                                                                                                                                 |
| EN ISO 14025  | EN ISO 14025:2011: Environmental labels and declarations - Type III environmental declarations — Principles and procedures                                                                                                                                                                                                                                        |
| EN ISO 14040  | EN ISO 14040:2006: Environmental management – Life cycle assessment – Principles and framework                                                                                                                                                                                                                                                                    |
| EN ISO 14044  | EN ISO 14044:2006 + A1:2018 Environmental management – Life cycle assessment – Requirements and guidelines                                                                                                                                                                                                                                                        |
| GaBi          | GaBi Software Family, thinkstep AG                                                                                                                                                                                                                                                                                                                                |
| GaBi DB       | GaBi 2018, dataset documentation for the software-system and database, LBP, University of Stuttgart and thinkstep AG, Leinfelden-Echterdingen, 2018 ( <a href="http://www.gabi-software.com/international/support/gabi/gabi-database-2018-lci-documentation/">http://www.gabi-software.com/international/support/gabi/gabi-database-2018-lci-documentation/</a> ) |
| ISO 15686     | ISO 15686:2011-05, Buildings and constructed assets - Service life planning - Part 1: General principles and framework                                                                                                                                                                                                                                            |
| PCR part 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, Version 1.7, 2018, Institut Bauen und Umwelt e.V. (IBU)                                                                                                                                         |
| PCR part B    | Product Category Rules for Building-Related Products and Services Part B: Requirements on the EPD for Luminaires, lamps and components for luminaires, Version 1.6, November 2017, Institut Bauen und Umwelt e.V. (IBU)                                                                                                                                           |
| REACH         | Regulation (EC) No 1907/2006 of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)                                                                                                                                                                                                                      |
| RoHS 2011     | Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment                                                                                                                                                                                                                          |
| Screening LCA | Screening Study Zumtobel: Influence of the energy consumption in the production phase, thinkstep 2018                                                                                                                                                                                                                                                             |
| WEEE 2012     | Directive 2012/19/EU of 4 July 2012 on waste of electric and electronic equipment (WEEE)                                                                                                                                                                                                                                                                          |

## Author of the Life Cycle Assessment:



|                                                                                          |                                        |                                                                                                                                 |
|------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <h1>Environmental Product Declaration</h1> <p>According to EN ISO 14025 and EN 15804</p> |                                        |  <p>Institut Bauen<br/>und Umwelt e.V.</p> |
| Declaration number:                                                                      | ECO-ZGR-96259972-Amenity-SE-2024-04-29 |                                                                                                                                 |
| Date of Issue:                                                                           | 2024-04-29                             |                                                                                                                                 |

Annex A: Additional assessment parameter France

Table A 1:  
Additional Data according to French requirements (supplement Table 1)

| Assessment parameter | Unit      | Production-Stage                      | Construction Process Stage |                                   | Use-stage                 |                        | End-of-Life Stage |                  |          | Benefits and loads beyond the system boundary |
|----------------------|-----------|---------------------------------------|----------------------------|-----------------------------------|---------------------------|------------------------|-------------------|------------------|----------|-----------------------------------------------|
|                      |           | Raw material supply and manufacturing | Transport to building site | Construction installation process | Replacement of components | Operational energy use | Transport         | Waste processing | Disposal | Reuse, recovery or recycling potential        |
|                      |           | A1-A3                                 | A4                         | A5                                | B4                        | B6                     | C2                | C3               | C4       | D                                             |
| ADPE (Fr)*           | kg Sb-eq. | 1,48E-03                              | 3,27E-08                   | 2,70E-07                          | 0,00E+00                  | 1,31E-04               | 4,67E-09          | 1,34E-06         | 1,53E-09 | -1,34E-03                                     |
| Water Pollution      | m³        | 9,52E+00                              | 1,36E-01                   | 1,28E-01                          | 0,00E+00                  | 5,54E+01               | 1,94E-02          | 2,86E-01         | 9,26E-03 | -2,88E+00                                     |
| Air Pollution        | m³        | 4,17E+03                              | 1,75E+01                   | 3,32E+01                          | 0,00E+00                  | 5,24E+03               | 2,50E+00          | 1,29E+02         | 3,64E+01 | -2,77E+03                                     |

ADPE (fr) = Abiotic Depletion Potential (ADP elements) - French version

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