epd-norge
Global program operatør

# Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

## Sense IP65

The Norwegian EPD Foundation

**Owner of the declaration:**
SG Armaturen AS

**Product:**
Sense IP65

**Declared unit:**
1 pcs

**This declaration is based on Product Category Rules:**
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
IBU PCR - Part B for luminaires, lamps, and components for luminaires

**Program operator:**
The Norwegian EPD Foundation

**Declaration number:**

NEPD-4742-4001-EN

**Registration number:**

NEPD-4742-4001-EN

**Issue date:** 09.08.2023

**Valid to:** 09.08.2028

**EPD Software:**
LCA.no EPD generator ID: 64919

## General information

**Product**

Sense IP65

**Owner of the declaration:**

SG Armaturen AS
Contact person: Audun Skare
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**Program operator:**

Post Box 5250 Majorstuen, 0303 Oslo, Norway
The Norwegian EPD Foundation
Phone: +47 23 08 80 00
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**Manufacturer:**

SG Armaturen AS
Skytterheia 25
4790 Lillesand, Norway

**Declaration number:** NEPD-4742-4001-EN

**Place of production:**

SG Armaturen production site Odense (Denmark
Egestubben 26
5270 Odense, Denmark

**This declaration is based on Product Category Rules:**

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
IBU PCR - Part B for luminaires, lamps, and components for luminaires

**Management system:**

**Statement of liability:**

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

**Organisation no:**

958560931

**Declared unit:**

1 pcs Sense IP65

**Issue date:** 09.08.2023

**Declared unit with option:**

A1,A2,A3,A4,A5,B6,C1,C2,C3,C4,D

**Valid to:** 09.08.2028

**Year of study:**

2022

**Functional unit:**

1 Sense IP65 LED luminaire manufactured and installed, used according to a specific lighting regime over 25 years, including waste treatment at end-of-life.

**Comparability:**

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

**General information on verification of EPD from EPD tools:**

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i integrated into the company's environmental management system, ii the procedures for use of the EPD tool are approved by EPD-Norway, and iii the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools

**Development and verification of EPD:**

The declaration is created using EPD tool lca.tools ver EPD2021.09, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.

Developer of EPD: Sabrina Loman Hansen

Reviewer of company-specific input data and EPD: Peter Søe Mikkelsen - SG Armaturen AS

**Verification of EPD tool:**

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools. Approval number: NEPDT41.

Third party verifier:

**Approved:**

Håkon Hauan
Managing Director of EPD-Norway

Vito D'Incognito - Take Care International

(no signature required

## Product

### Product description:

Sense IP65 is an all-round luminaire for use in places such as industrial kitchens, hospitals, laboratories and production facilities. It is easily installed in T-ceilings, and the tempered glass front makes it easy to clean.

Wattage: 43W. Luminous flux: 4830lm. Efficacy: 112 lm/W. Colour temperature: 3000K. Colour rendering: Ra>80. MacAdams factor: SDCM: 3. Lifetime: L80/B50>100,000. Light distribution: Direct. UGR: UGR<19. Control/Dimming type: DALI/Push Dim. Luminaire class: Class I. Contains light source of energy class: D. Housing: Sheet steel. Length: 595 mm. Width: 595 mm. Height: 94 mm. EAN: 5703821181600.

The EPD also covers the following products:

EAN: 5703821181204 - Sense IP65 595x595 White 5110lm 4000K Ra>90 DALI / Push Dim
EAN: 5703821181617 - Sense IP65 595x595 White 5060lm 4000K Ra>80 DALI / Push Dim
EAN: 5703821181594 - Sense IP65 595x595 White 4670lm 3000K Ra>90 DALI / Push Dim
EAN: 5703821181624 - Sense IP65 599x599 White 5050lm 4000K Ra>80 DALI / Push Dim
EAN: 5703821181433 - Sense IP65 599x599 White 5110lm 4000K Ra>90 DALI / Push Dim

Please note that the above has been calculated with the Norwegian energi-mix. If you want an EPD with a specific energi-mix, please send us a request.

### Product specification

| Materials | kg | % |
|---|---|---|
| Coating materials | 0,31 | 2,52 |
| Plastic - Plexiglass (PMMA) | 1,68 | 13,78 |
| Metal - Steel | 6,90 | 56,68 |
| Electronic - Connector | 0,01 | 0,12 |
| Electronic - Wire | 0,29 | 2,42 |
| Electronic - LED driver | 0,21 | 1,72 |
| Plastic - Polybutylene terephthalate (PBT) | 0,00 | 0,01 |
| Electronic - LED chip | 0,00 | 0,04 |
| Rubber, synthetic | 0,01 | 0,06 |
| Electronic - LED plate | 0,43 | 3,56 |
| Glass | 2,32 | 19,08 |
| Plastic - Polycarbonate (PC) | 0,00 | 0,02 |
| Total | 12,17 | |

| Packaging | kg | % |
|---|---|---|
| Packaging - Cardboard | 0,62 | 100,00 |
| Total incl. packaging | 12,79 | |

### Technical data:

Link to the CE Declaration on our website:
https://www.sg-as.com/storage/data/130253_Sense%20IP65/50/130253_Sense%20IP65.pdf

Link to product data on our website:
https://www.sg-as.com/products/sense-ip65/8246096317

### Market:

Nordic + Northwestern Europe

### Reference service life, product

25 years. Estimated based on the characteristics of the product and the intended application.

### Reference service life, building or construction works

60 years. Standard service life for buildings according to the PCR Part A of EPD Norway.

## LCA: Calculation rules

### Declared unit:

1 pcs Sense IP65

### Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) can be excluded. These cut-off criteria do not apply for hazardous materials and substances.

### Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

### Data quality:

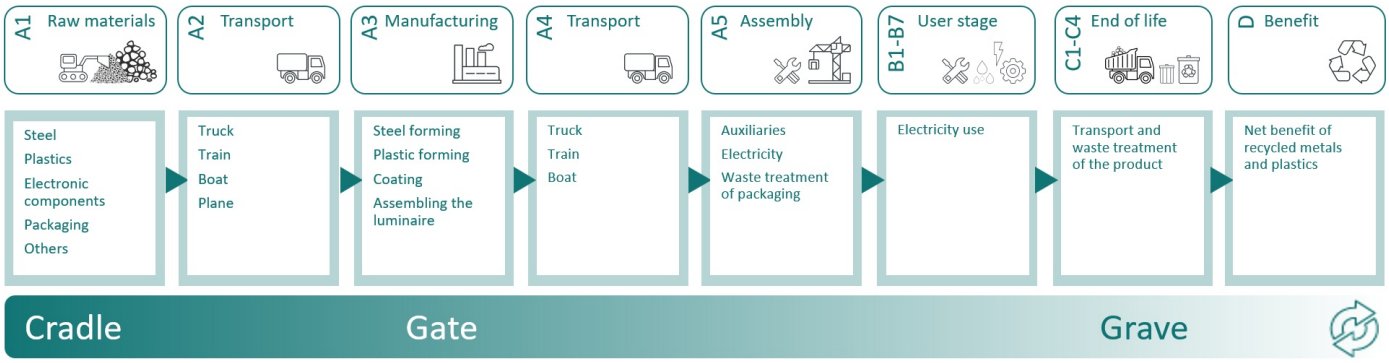
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

| Materials | Source | Data quality | Year |
|---|---|---|---|
| Coating materials | Ecoinvent 3.6 | Database | 2019 |
| Electronic - LED plate | ecoinvent 3.6 | Database | 2019 |
| Glass | ecoinvent 3.6 | Database | 2019 |
| Metal - Steel | ecoinvent 3.6 | Database | 2019 |
| Packaging - Cardboard | ecoinvent 3.6 | Database | 2019 |
| Plastic - Plexiglass (PMMA) | ecoinvent 3.6 | Database | 2019 |
| Plastic - Polybutylene terephthalate (PBT) | ecoinvent 3.6 | Database | 2019 |
| Plastic - Polycarbonate (PC) | ecoinvent 3.6 | Database | 2019 |
| Rubber, synthetic | ecoinvent 3.6 | Database | 2019 |
| Electronic - Connector | Material composition + ecoinvent 3.6 | Supplier data + database | 2019 |
| Electronic - LED driver | Material composition + ecoinvent 3.6 | Supplier data + database | 2019 |
| Electronic - Wire | Material composition + ecoinvent 3.6 | Supplier data + database | 2019 |
| Electronic - LED chip | Scholand et al. (2012) + Ecoinvent 3.6 | Scientific literature + database | 2017 |
| Metal - Steel | SG Armaturen + ecoinvent 3.6 | Database | 2019 |

## System boundaries (X=included, MND=module not declared, MNR=module not relevant)

| Product stage | | | Construction installation stage | | Use stage | | | | | | | End of life stage | | | | Beyond the system boundaries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | X | MND | MND | MND | MND | MND | X | MND | X | X | X | X | X |

### System boundary:




### Additional technical information:

Link to the user manual on our website, for proper use of the product:
https://www.sg-as.com/assets/product/default/data/130253_Sense%20IP65/20/130253_Sense%20IP65_User%20Manual.pdf

## LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Module A4 = Transportation is done by truck (1000 km) from the production site in Odense, Denmark to the warehouse in Lillesand, Norway or to the warehouse in Mechelen, Belgium + 800 km for Nordic / Northwestern Europe Market.

Module A5 = Installation is performed in the Nordic / Northwestern Europe Market and done by manual labor, with the use of electrical machines, that fall under the cut-off criteria of 1% and is therefore neglected. Packaging of the final product consist of a corrugated board box.

Module B6 = The operational energy use of the luminaire is calculated based on the methodology provided in IBU PCR Part B for luminaires, lamps, and components for luminaires. The energy consumption model for luminaire used in the PCR follows the application scenarios developed in EN 15193:2007. To calculate the electricity use of the luminaire, the following scenario parameters have been applied:

- Active power of the luminaire (Pa) = 43 watt
- Passive power of the luminaire (Pp) = 0,15 watt
- Daylight time usage (tD) = 3000 hours
- Non-daylight time usage (tN) = 2000 hours
- Standard year time (ty) = 8760 hours
- The occupancy depency factor (FO) = 1
- The daylight dependency factor (FD) = 0,8
- The product specific constant illuminance factor (FCP) = 1
- The non-daylight dimming factor (FN) = 1
- The application specific empiric lifetime of the luminaire in years (a) = 25 years (corresponding to the reference service life of the product).

Module C1 = The de-installation of the luminaire is done by manual labor, with the help of electrical machines. The use of portable electrical devices (e.g., drill) usually have low energy requirements falling under the cut-off-criterion of 1% and is therefore neglected.

Module C2 = Transportation from building site to the waste treatment facility with an average distance of 300km.

Modules C3 and C4 = Waste treatment of the product follows the default values provided in EN 50693, Product Category Rules for life cycle assessments of electronic and electrical products and systems, table G.4. This table specified how different types of raw materials used in A1 will likely be treated during the end-of-life of the product. Waste treatments in C3 include material recycling and incineration with and without energy recovery and fly ash extraction. Disposal in C4 consist of landfilling of different waste fractions and of ashes.

Module D = The recyclability of metals, plastics, and electronic components allows the producers a credit for the net scrap that is produced at the end of a product's life. The benefits from recycling of net scrap are described in formula from EN 15804:2012+A2:2019. Substitution of heat and electricity generated by the incineration with energy recovery of plastic insulation and other parts is also calculated in module D.

| Transport from production place to user (A4) | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) |
|---|---|---|---|---|---|
| Truck, 16-32 tonnes, EURO 6 (km) - Europe | 36,7 % | 1800 | 0,043 | l/tkm | 77,40 |

| Assembly (A5) | Unit | Value | | | |
|---|---|---|---|---|---|
| Waste, cardboard and paper, to average treatment - A5 including transport (kg) | kg | 0,62 | | | |

| Operational energy (B6) | Unit | Value | | | |
|---|---|---|---|---|---|
| Electricity, Norway (kWh) | kWh/DU | 4763,00 | | | |

| Transport to waste processing (C2) | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) |
|---|---|---|---|---|---|
| Truck, 16-32 tonnes, EURO 6 (km) - Europe | 36,7 % | 300 | 0,043 | l/tkm | 12,90 |

| Waste processing (C3) | Unit | Value | | | |
|---|---|---|---|---|---|
| Copper to recycling (kg) | kg | 0,10 | | | |
| Glass to recycling (kg) | kg | 1,39 | | | |
| Steel to recycling (kg) | kg | 5,55 | | | |
| Waste treatment of hazardous waste, incineration with fly ash extraction (kg) | kg | 0,31 | | | |
| Waste treatment of plastic mixture, incineration with energy recovery and fly ash extraction (kg) | kg | 0,94 | | | |
| Waste treatment per kg electronics scrap from LED plate, without components, recycling of copper - C3 (kg) | kg | 0,22 | | | |
| Waste treatment per kg electronics scrap from PWB, with components, recycling of metals C3 (kg) | kg | 0,06 | | | |
| Waste treatment per kg used electronic components, manual seperation (kg) | kg | 0,52 | | | |
| Waste treatment per kg used PWB, shredding and separation - C3 (kg) | kg | 0,55 | | | |

| Disposal (C4) | Unit | Value | | | |
|---|---|---|---|---|---|
| Landfilling of ashes from incineration of Hazardous waste, process per kg ashes and residues - C4 (kg) | kg | 0,06 | | | |
| Landfilling of ashes from incineration of Plastic mixture, process per kg ashes and residues (kg) | kg | 0,03 | | | |
| Landfilling of copper (kg) | kg | 0,06 | | | |
| Landfilling of glass (kg) | kg | 0,93 | | | |
| Landfilling of hazardous waste (kg) | kg | 0,28 | | | |
| Landfilling of plastic mixture (kg) | kg | 0,94 | | | |
| Landfilling of steel (kg) | kg | 1,39 | | | |

| Benefits and loads beyond the system boundaries (D) | Unit | Value | | | |
|---|---|---|---|---|---|
| Substitution of copper with net scrap from PWB, without components (kg) | kg | 0,02 | | | |
| Substitution of electricity, in Norway (MJ) | MJ | 1,45 | | | |
| Substitution of primary copper with net scrap (kg) | kg | 0,07 | | | |
| Substitution of primary glass with net scrap (kg) | kg | 1,39 | | | |
| Substitution of primary metals with net scrap from PWB, with components (kg) | kg | 0,02 | | | |
| Substitution of primary steel with net scrap (kg) | kg | 0,85 | | | |
| Substitution of thermal energy, district heating, in Norway (MJ) | MJ | 21,89 | | | |

## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

| Environmental impact | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indicator** | | **Unit** | A1 | A2 | A3 | A4 | A5 |
| | GWP-total | kg $CO_2$ -eq | 1,09E+02 | 4,44E-01 | 6,52E+00 | 3,76E+00 | 1,06E+00 |
| | GWP-fossil | kg $CO_2$ -eq | 1,09E+02 | 4,44E-01 | 6,18E+00 | 3,76E+00 | 1,00E-02 |
| | GWP-biogenic | kg $CO_2$ -eq | -2,20E-01 | 1,84E-04 | 3,21E-01 | 1,56E-03 | 1,05E+00 |
| | GWP-luluc | kg $CO_2$ -eq | 1,53E-01 | 1,58E-04 | 1,86E-02 | 1,34E-03 | 3,32E-06 |
| | ODP | kg CFC11 -eq | 8,07E-06 | 1,01E-07 | 3,36E-07 | 8,52E-07 | 2,12E-09 |
| | AP | mol H+ -eq | 8,42E-01 | 1,28E-03 | 2,32E-02 | 1,08E-02 | 4,76E-05 |
| | EP-FreshWater | kg P -eq | 1,50E-02 | 3,55E-06 | 4,27E-04 | 3,00E-05 | 8,25E-08 |
| | EP-Marine | kg N -eq | 1,16E-01 | 2,52E-04 | 4,56E-03 | 2,14E-03 | 1,57E-05 |
| | EP-Terrestial | mol N -eq | 1,29E+00 | 2,82E-03 | 6,00E-02 | 2,39E-02 | 1,70E-04 |
| | POCP | kg NMVOC -eq | 4,25E-01 | 1,08E-03 | 1,38E-02 | 9,16E-03 | 4,90E-05 |
| | ADP-minerals&metals[1] | kg Sb -eq | 9,46E-03 | 1,23E-05 | 4,72E-05 | 1,04E-04 | 2,45E-07 |
| | ADP-fossil[1] | MJ | 1,41E+03 | 6,71E+00 | 8,16E+01 | 5,69E+01 | 1,41E-01 |
| | WDP[1] | $m^3$ | 4,47E+03 | 6,49E+00 | 9,78E+02 | 5,50E+01 | 1,78E-01 |

| **Indicator** | | **Unit** | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| | GWP-total | kg $CO_2$ -eq | 1,16E+02 | 0,00E+00 | 6,27E-01 | 3,02E+00 | 2,23E-01 | -3,73E+00 |
| | GWP-fossil | kg $CO_2$ -eq | 1,12E+02 | 0,00E+00 | 6,27E-01 | 3,02E+00 | 2,22E-01 | -3,71E+00 |
| | GWP-biogenic | kg $CO_2$ -eq | 3,11E+00 | 0,00E+00 | 2,59E-04 | 2,01E-03 | 1,34E-04 | -1,81E-02 |
| | GWP-luluc | kg $CO_2$ -eq | 4,63E-01 | 0,00E+00 | 2,23E-04 | 5,96E-04 | 5,42E-04 | -6,87E-03 |
| | ODP | kg CFC11 -eq | 7,70E-06 | 0,00E+00 | 1,42E-07 | 8,89E-08 | 1,60E-08 | -9,24E-03 |
| | AP | mol H+ -eq | 8,78E-01 | 0,00E+00 | 1,80E-03 | 1,95E-03 | 6,43E-04 | -1,22E-01 |
| | EP-FreshWater | kg P -eq | 8,08E-03 | 0,00E+00 | 5,01E-06 | 2,09E-05 | 3,49E-06 | -7,16E-04 |
| | EP-Marine | kg N -eq | 9,65E-02 | 0,00E+00 | 3,56E-04 | 5,22E-04 | 2,93E-04 | -8,46E-03 |
| | EP-Terrestial | mol N -eq | 1,26E+00 | 0,00E+00 | 3,99E-03 | 5,65E-03 | 2,00E-03 | -1,11E-01 |
| | POCP | kg NMVOC -eq | 3,38E-01 | 0,00E+00 | 1,53E-03 | 1,49E-03 | 7,15E-04 | -3,20E-02 |
| | ADP-minerals&metals[1] | kg Sb -eq | 8,38E-03 | 0,00E+00 | 1,73E-05 | 3,33E-06 | 7,14E-07 | -1,83E-03 |
| | ADP-fossil[1] | MJ | 1,53E+03 | 0,00E+00 | 9,48E+00 | 4,33E+00 | 1,69E+00 | -3,99E+01 |
| | WDP[1] | $m^3$ | 2,67E+05 | 0,00E+00 | 9,17E+00 | 2,21E+01 | 1,79E+01 | -7,00E+00 |

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment: EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

### Remarks to environmental impacts

The product is compliant with the European RoHS Directive 2011/65/EU on Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment and with the European REACH regulation (EC) No 1907/2006 on Registration, Evaluation, Authorization and Restriction of Chemicals.

## Additional environmental impact indicators

| Indicator | | Unit | A1 | A2 | A3 | A4 | A5 |
|---|---|---|---|---|---|---|---|
| | PM | Disease incidence | 5,86E-06 | 2,72E-08 | 2,79E-07 | 2,30E-07 | 7,02E-10 |
| | IRP[2] | kgBq U235 -eq | 4,86E+00 | 2,93E-02 | 3,44E-01 | 2,49E-01 | 6,01E-04 |
| | ETP-fw[1] | CTUe | 5,91E+03 | 4,97E+00 | 1,40E+02 | 4,22E+01 | 1,87E-01 |
| | HTP-c[1] | CTUh | 2,30E-07 | 0,00E+00 | 2,78E-09 | 0,00E+00 | 6,00E-12 |
| | HTP-nc[1] | CTUh | 6,14E-06 | 5,43E-09 | 1,01E-07 | 4,61E-08 | 2,35E-10 |
| | SQP[1] | dimensionless | 3,67E+02 | 4,69E+00 | 1,38E+02 | 3,98E+01 | 9,43E-02 |

| Indicator | | Unit | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| | PM | Disease incidence | 6,29E-06 | 0,00E+00 | 3,84E-08 | 2,07E-08 | 1,13E-08 | -4,92E-07 |
| | IRP[2] | kgBq U235 -eq | 2,78E+01 | 0,00E+00 | 4,14E-02 | 1,97E-02 | 6,74E-03 | -9,65E-02 |
| | ETP-fw[1] | CTUe | 6,99E+03 | 0,00E+00 | 7,03E+00 | 2,05E+01 | 9,02E+02 | -9,04E+02 |
| | HTP-c[1] | CTUh | 3,33E-07 | 0,00E+00 | 0,00E+00 | 2,05E-09 | 3,36E-10 | -1,23E-08 |
| | HTP-nc[1] | CTUh | 7,85E-06 | 0,00E+00 | 7,68E-09 | 8,51E-08 | 3,53E-09 | -5,12E-07 |
| | SQP[1] | dimensionless | 7,72E+02 | 0,00E+00 | 6,63E+00 | 1,40E+00 | 4,20E+00 | -3,41E+01 |

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

## Resource use

| Indicator | | Unit | A1 | A2 | A3 | A4 | A5 |
|---|---|---|---|---|---|---|---|
| | PERE | MJ | 1,27E+02 | 9,60E-02 | 8,03E+01 | 8,14E-01 | 2,31E-03 |
| | PERM | MJ | 5,09E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,09E+00 |
| | PERT | MJ | 1,32E+02 | 9,60E-02 | 8,03E+01 | 8,14E-01 | -5,09E+00 |
| | PENRE | MJ | 1,36E+03 | 6,71E+00 | 8,16E+01 | 5,69E+01 | 1,41E-01 |
| | PENRM | MJ | 5,69E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | PENRT | MJ | 1,41E+03 | 6,71E+00 | 1,03E+02 | 5,69E+01 | 1,41E-01 |
| | SM | kg | 5,50E+00 | 0,00E+00 | 7,64E-04 | 0,00E+00 | 0,00E+00 |
| | RSF | MJ | 2,16E+00 | 3,44E-03 | 2,03E+00 | 2,91E-02 | 7,67E-05 |
| | NRSF | MJ | 1,13E+01 | 1,23E-02 | 1,86E+00 | 1,04E-01 | 3,16E-04 |
| | FW | $m^3$ | 1,09E+00 | 7,18E-04 | 2,19E-01 | 6,08E-03 | 6,63E-05 |

| Indicator | | Unit | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| | PERE | MJ | 1,99E+04 | 0,00E+00 | 1,36E-01 | 7,45E-01 | 3,25E-01 | -1,46E+01 |
| | PERM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | PERT | MJ | 1,99E+04 | 0,00E+00 | 1,36E-01 | 7,45E-01 | 3,25E-01 | -1,46E+01 |
| | PENRE | MJ | 1,54E+03 | 0,00E+00 | 9,48E+00 | 4,33E+00 | 1,69E+00 | -3,99E+01 |
| | PENRM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,83E+01 | 0,00E+00 | 0,00E+00 |
| | PENRT | MJ | 1,54E+03 | 0,00E+00 | 9,48E+00 | -5,40E+01 | 1,69E+00 | -3,99E+01 |
| | SM | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,34E-02 | 4,92E-02 |
| | RSF | MJ | 1,56E+01 | 0,00E+00 | 4,85E-03 | 1,46E-02 | 2,40E-03 | 3,64E-02 |
| | NRSF | MJ | 3,88E+01 | 0,00E+00 | 1,74E-02 | -8,49E-05 | 5,50E-02 | 3,28E-01 |
| | FW | $m^3$ | 1,48E+02 | 0,00E+00 | 1,01E-03 | 6,30E-03 | 1,70E-03 | -3,86E-02 |

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 materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## End of life - Waste

| Indicator | | Unit | A1 | A2 | A3 | A4 | A5 |
|---|---|---|---|---|---|---|---|
| | HWD | kg | 5,81E-01 | 3,46E-04 | 5,78E-02 | 2,93E-03 | 0,00E+00 |
| | NHWD | kg | 1,76E+01 | 3,26E-01 | 5,68E+00 | 2,77E+00 | 6,21E-01 |
| | RWD | kg | 3,93E-03 | 4,57E-05 | 2,30E-04 | 3,87E-04 | 0,00E+00 |

| Indicator | | Unit | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| | HWD | kg | 9,85E-01 | 0,00E+00 | 4,89E-04 | 3,70E-05 | 3,35E-01 | -1,64E-02 |
| | NHWD | kg | 1,18E+02 | 0,00E+00 | 4,61E-01 | 3,58E-01 | 3,40E+00 | -8,00E-01 |
| | RWD | kg | 1,37E-02 | 0,00E+00 | 6,46E-05 | 2,00E-06 | 4,79E-06 | -1,01E-04 |

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## End of life - Output flow

| Indicator | | Unit | A1 | A2 | A3 | A4 | A5 |
|---|---|---|---|---|---|---|---|
| | CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | MFR | kg | 0,00E+00 | 0,00E+00 | 5,57E+00 | 0,00E+00 | 5,78E-01 |
| | MER | kg | 0,00E+00 | 0,00E+00 | 2,31E-05 | 0,00E+00 | 4,34E-02 |
| | EEE | MJ | 0,00E+00 | 0,00E+00 | 1,91E-01 | 0,00E+00 | 3,55E-02 |
| | EET | MJ | 0,00E+00 | 0,00E+00 | 2,89E+00 | 0,00E+00 | 5,37E-01 |

| Indicator | | Unit | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| | CRU | kg | 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 | 7,04E+00 | 9,80E-05 | -1,92E-03 |
| | MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,25E+00 | 1,86E-04 | -2,53E-04 |
| | EEE | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,45E+00 | 1,76E-03 | -6,21E-04 |
| | EET | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,19E+01 | 2,67E-02 | -9,39E-03 |

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## Biogenic Carbon Content

| Indicator | Unit | At the factory gate |
|---|---|---|
| Biogenic carbon content in product | kg C | 0,00E+00 |
| Biogenic carbon content in accompanying packaging | kg C | 2,88E-01 |

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

## Additional requirements

### Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

| Electricity mix | Data source | Amount | Unit |
|---|---|---|---|
| Electricity, Denmark (kWh) | ecoinvent 3.6 | 338,20 | g CO2-eq/kWh |

### Dangerous substances

The product contains substances given by the REACH Candidate list and the Norwegian priority list that are less than 0,1 % by weight.

| Name | CASNo | Amount |
|---|---|---|
| Lead | 7439-92-1 | <0,1% |

### Indoor environment

No effect on indoor environment.

## Additional Environmental Information

| Additional environmental impact indicators required in NPCR Part A for construction products | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | A1 | A2 | A3 | A4 | A5 | |
| GWPIOBC | kg $CO_2$ -eq | 1,10E+02 | 4,44E-01 | 7,95E+00 | 3,76E+00 | 0,00E+00 | |

| **Indicator** | **Unit** | B6 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| GWPIOBC | kg $CO_2$ -eq | 1,16E+02 | 0,00E+00 | 6,27E-01 | 3,02E+00 | 5,32E-02 | -4,10E+00 |

GWP-IOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

## Bibliography

ISO 14025:2010. Environmental labels and declarations - Type III environmental declarations - Principles and procedures. International Organization for Standardization.
ISO 14044:2006. Environmental management - Life cycle assessment - Requirements and guidelines. International Organization for Standardization.
EN 15804:2012+A2:2019. Environmental product declaration - Core rules for the product category of construction products. European Committee for Standardization.
ISO 21930:2017. Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products. International Organization for Standardization.
EN 50693:2019. Product category rules for life cycle assessments of electronic and electrical products and systems. European Committee for Standardization.
Ecoinvent v3, 2019. Allocation, cut-off by classification. Swiss Centre of Life Cycle Inventories.
Iversen et al., (2021). eEPD v2021.09, background information for EPD generator tool system verification, LCA.no. Report number: 07.21. System verification report.
Philis et al., (2022). EPD generator for IBU PCR part B for luminaires, lamps, and components for luminaires, background information for EPD generator application and LCA data, LCA.no. Report number: 04.22. PCR verification report.
EPD Norway (2022). NPCR Part A: Construction products and services. The Norwegian EPD foundation. Version 2.0 published 24.03.2021.
IBU (2017). PCR part B for luminaires, lampes and components for luminaires. Institut Bauen und Umwelt e.V. Version 1.7, published 30.11.2017.

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