ENVIRONMENTAL PRODUCT DECLARATION

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

LEDVANCE BULKHEAD COMBO (SENSOR)

Reference product:

BLKH CBO RD 325 V 16W MS 840 WT & BLKH CBO RD SENSOR

Registration number	**LEDV-00051-V01.01-EN**	**Drafting rules**	**PEP-PCR–ED4-EN-2021 09 06**
Verifier accreditation number	**VH08**	**Supplemented by**	**PSR-0014-ED2.0-EN-2023 07 13**
Date of issue	**06-2025**	**Validity period**	**5 years**
EPD prepared by	**LEDVANCE GmbH**		
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)			
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
- or by E-Mail LCA@ledvance.com.

1.2 Reference product information

The name of the product under study is “BLKH CBO RD 325 V 16W MS 840 WT” and “BLKH CBO RD SENSOR” with the following product description:

Product benefits

- Highly versatile due to selectable CCT and power steps (Multi Color / Multi Lumen) on the driver
- Plug & Upgrade concept for easy conversion to sensor or emergency luminaire
- Suitable for use in dusty and damp locations thanks to high IP rating
- Suitable for use in public areas thanks to high IK rating
- Separate decor element available for an aesthetic and functional product design

Areas of application

- Direct replacement for luminaires with fluorescent lamps
- Corridors, stairways, entrance areas
- Passages, underpasses
- Public areas

Product features

- High luminous efficacy: up to 125 lm/W
- Type of protection: IP65, Impact resistance: IK10
- Luminous flux: up to 1920 lm
- Push wire terminal for tool-free connection
- Ambient temperature in operation: -20…+40 °C
- Through-wiring possible

Equipment / Accessories

- Mounting screws and dowels included
- Plug & Upgrade high frequency sensor and emergency kit separately available
- Attachable half visor ring available separately

Reference Service Life

LEDVANCE declares for the luminaire following service lifetimes:

- Lifespan L70/B50 at 25 °C: 50,000 h
- Lifespan L80/B10 at 25 °C: 50,000 h
- Lifespan L90/B10 at 25 °C: 20,000 h

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

Table 1: Key technological data

Information	
Type of luminaire	BULKHEAD COMBO (SENSOR)
Short Text Product	BLKH CBO RD 325 V 16W MS 840 WT & BLKH CBO RD SENSOR
Operating mode	Integrated LED driver
Lamp type	Integrated LED not exchangeable
Colour temperature	3000 K / 4000 K / 5700 K
Nominal wattage	16 W
Luminous flux	1,920 lm
Colour rendering index Ra	≥ 80
Protection class IK	IK10
Type of protection	IP65
Nominal voltage	220…240 V
Nominal lifetime (L70/B50)	50,000 h
Diameter	325 mm
Height	90 mm
Type of Sensor	Motion & Brightness
Area of Application	Outdoor, Open space

Based on the assigned lifetime according to EN 15193-1:2017 for indoor applications and EN 13201-5:2016 for outdoor applications:

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

Type of building	Annual operating hours by default [h]	Operational lifetime [years]
Open space	**4,000**	**12.5**

Following the requirements of the PSR, the operational lifetime of the luminaire of study is 12.5 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*	0.365 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)	BULKHEAD COMBO (SENSOR)

* The reference flow is calculated as:

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

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

$$\frac{1{,}000}{1{,}920} \times \frac{35{,}000}{50{,}000} = 0.365$$

1.4 Homogeneous environmental family

The reference product represents the BULKHEAD COMBO (SENSOR) family, which differs in the light management function. It has a Plug & Upgrade motion & brightness sensor.

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 BULKHEAD COMBO (SENSOR) Family, based on the technical parameters of the considered product, as requested by the PSR.

2 Constituent materials

2.1 Overview

Table 4: Product composition

Information	Weight [kg]	Share [%]
Total weight	**1.006**	**100**
Product	0.735	73.1
Packaging	0.271	26.9

2.2 Product

Table 5: Material composition - product

Information	Weight [kg]	Sum of weight [kg]	Share [%]
TOTAL		**0.735**	**100**
Metals		**0.019**	**2.6**
- Steel	0.019		2.6
Plastics		**0.587**	**79.9**
- Polycarbonate (PC)	0.455		62.0
- ABS	0.115		15.6
- Silicone Rubber	0.014		2.0
- Others	0.002		0.3
Others		**0.129**	**17.6**
- Electronics	0.121		16.5
- Internal & External Wires	0.008		1.1

2.3 Packaging

Table 6: Material composition - packaging

Information	Weight [kg]	Share [%]
TOTAL	**0.271**	**100**
Paper/cardboard	0.271	100
	0	0

Secondary packaging with cardboard is used for shipping. In addition, package 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 6 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 transportation are listed below.

Table 7: 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 8: 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 contains a component associated with light management function, a motion and light sensor. Therefore, the total energy consumption in B6 is calculated with an energy saving coefficient of 0.55 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 9.

Table 9: 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	0.213
- Share of metals	%	2.6
- Share of plastics	%	79.9
- Share of others	%	17.6
Total weight going into incineration with energy recovery	kg/functional unit	0.119
- Share of paper	%	82.9
- Share of others	%	17.1

4 Environmental impacts

4.1 Introduction

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

Table 10: Basic information LCA model

Information	Value
Used LCA software	Sphera LCA for experts 10
Used LCI database	Sphera / GaBi Professional 2023.2 + Electronics Extension 2023.2
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 11: Results for core environmental impact indicators per functional unit

	Total (excl. D)	Raw materials & parts		Manufac-turing	Distribu-tion	Installa-tion	Use	End of life			Benefits and loads beyond the system boundaries
		A1	A2	A3	A4	A5	B6	C2	C3	C4	D
GWP - total [kg CO2 eq.]	5.65E+01	3.62E+00	1.96E-02	2.00E-03	9.52E-02	7.70E-02	5.22E+01	1.84E-02	4.78E-01	1.28E-02	-3.50E-01
GWP - fossil [kg CO2 eq.]	5.62E+01	3.62E+00	1.94E-02	1.39E-01	9.48E-02	4.43E-02	5.17E+01	1.82E-02	4.78E-01	1.28E-02	-4.68E-01
GWP - biogenic [kg CO2 eq.]	3.38E-01	-7.09E-03	4.45E-05	-1.38E-01	1.23E-04	3.25E-02	4.50E-01	4.17E-05	1.03E-04	3.44E-06	1.19E-01
GWP - luluc [kg CO2 eq.]	9.62E-03	2.78E-03	1.82E-04	4.66E-04	2.35E-04	1.43E-04	5.62E-03	1.71E-04	1.21E-05	1.05E-06	-5.46E-04
ODP [kg CFC-11 eq.]	9.77E-10	2.08E-11	2.56E-15	4.23E-13	8.06E-15	8.41E-14	9.55E-10	2.40E-15	2.81E-13	1.04E-14	-1.92E-12
AP [Mole of H+ eq.]	1.30E-01	1.71E-02	3.15E-05	4.41E-04	1.65E-03	8.20E-05	1.11E-01	2.95E-05	1.16E-04	1.08E-05	-5.15E-03
EP - freshwater [kg P eq.]	2.30E-04	3.31E-05	7.19E-08	2.59E-06	1.08E-07	1.33E-06	1.93E-04	6.73E-08	7.27E-08	3.85E-09	-2.53E-06
EP - marine [kg N eq.]	3.01E-02	2.85E-03	1.22E-05	1.68E-04	5.92E-04	3.78E-05	2.64E-02	1.14E-05	3.35E-05	4.64E-06	-5.26E-04
EP - terrestrial [Mole of N eq.]	3.16E-01	3.00E-02	1.40E-04	1.67E-03	6.50E-03	3.45E-04	2.76E-01	1.31E-04	5.38E-04	5.45E-05	-5.65E-03
POCP [kg NMVOC eq.]	8.13E-02	8.46E-03	2.80E-05	4.29E-04	1.63E-03	7.92E-05	7.05E-02	2.62E-05	9.00E-05	1.21E-05	-1.64E-03
ADPE [kg Sb eq.]	4.41E-04	4.33E-04	1.30E-09	3.21E-08	2.31E-09	1.94E-08	8.00E-06	1.22E-09	2.18E-09	4.58E-11	-2.19E-04
ADPF [MJ]	1.15E+03	5.40E+01	2.68E-01	1.77E+00	1.20E+00	6.23E-01	1.09E+03	2.51E-01	4.79E-01	1.46E-02	-6.98E+00
WDP [m³ world equiv.]	1.26E+01	9.02E-01	2.38E-04	1.01E-01	4.21E-04	2.76E-03	1.15E+01	2.23E-04	5.12E-02	2.80E-03	-1.33E-01

Table 12: 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]	6.62E+02
Renewable primary energy (raw material)	PERM [MJ]	1.78E+00
Total use of renewable primary energy	PERT [MJ]	6.64E+02
Non-renewable primary energy (without raw material)	PENRE [MJ]	1.13E+03
Non-renewable primary energy (raw material)	PENRM [MJ]	6.20E+00
Total use of non-renewable primary energy	PENRT [MJ]	1.14E+03
Use of secondary materials	SM [kg]	1.08E-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]	1.25E+01
Hazardous waste disposed	HWD [kg]	1.09E-06
Non-hazardous waste disposed	NHWD [kg]	1.05E+00
Radioactive waste disposed	RWD [kg]	1.74E-01
Components for reuse	CRU [kg]	0.00E+00
Materials for recycling	MFR [kg]	1.04E-01
Materials for energy recovery	MER [kg]	2.05E-01
Exported electricity	EEE [MJ]	7.92E-01
Exported thermal energy	EET [MJ]	1.79E+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]	4.24E-02

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 13: Results core environmental impact indicators per unit of product

	Total (excl. D)	Raw materials & parts		Manufac-turing	Distribu-tion	Installa-tion	Use	End of life			Benefits and loads beyond the system boundaries
		A1	A2	A3	A4	A5	B6	C2	C3	C4	D
GWP - total [kg CO2 eq.]	1.55E+02	9.92E+00	5.38E-02	5.49E-03	2.61E-01	2.11E-01	1.43E+02	5.04E-02	1.31E+00	3.51E-02	-9.59E-01
GWP - fossil [kg CO2 eq.]	1.54E+02	9.94E+00	5.32E-02	3.82E-01	2.60E-01	1.22E-01	1.42E+02	4.98E-02	1.31E+00	3.51E-02	-1.28E+00
GWP - biogenic [kg CO2 eq.]	9.27E-01	-1.94E-02	1.22E-04	-3.78E-01	3.36E-04	8.93E-02	1.23E+00	1.14E-04	2.82E-04	9.44E-06	3.26E-01
GWP - luluc [kg CO2 eq.]	2.64E-02	7.63E-03	5.00E-04	1.28E-03	6.44E-04	3.92E-04	1.54E-02	4.68E-04	3.33E-05	2.87E-06	-1.50E-03
ODP [kg CFC-11 eq.]	2.68E-09	5.70E-11	7.02E-15	1.16E-12	2.21E-14	2.31E-13	2.62E-09	6.57E-15	7.70E-13	2.85E-14	-5.26E-12
AP [Mole of H+ eq.]	3.56E-01	4.68E-02	8.65E-05	1.21E-03	4.53E-03	2.25E-04	3.03E-01	8.10E-05	3.18E-04	2.97E-05	-1.41E-02
EP - freshwater [kg P eq.]	6.32E-04	9.08E-05	1.97E-07	7.10E-06	2.96E-07	3.66E-06	5.30E-04	1.85E-07	2.00E-07	1.06E-08	-6.95E-06
EP - marine [kg N eq.]	8.27E-02	7.80E-03	3.34E-05	4.62E-04	1.62E-03	1.04E-04	7.25E-02	3.13E-05	9.19E-05	1.27E-05	-1.44E-03
EP - terrestrial [Mole of N eq.]	8.66E-01	8.22E-02	3.84E-04	4.59E-03	1.78E-02	9.46E-04	7.58E-01	3.59E-04	1.47E-03	1.50E-04	-1.55E-02
POCP [kg NMVOC eq.]	2.23E-01	2.32E-02	7.68E-05	1.18E-03	4.46E-03	2.17E-04	1.94E-01	7.19E-05	2.47E-04	3.33E-05	-4.50E-03
ADPE [kg Sb eq.]	1.21E-03	1.19E-03	3.58E-09	8.80E-08	6.34E-09	5.33E-08	2.20E-05	3.35E-09	5.99E-09	1.26E-10	-5.99E-04
ADPF [MJ]	3.15E+03	1.48E+02	7.35E-01	4.84E+00	3.29E+00	1.71E+00	2.99E+03	6.88E-01	1.31E+00	4.01E-02	-1.91E+01
WDP [m³ world equiv.]	3.45E+01	2.47E+00	6.52E-04	2.77E-01	1.16E-03	7.57E-03	3.16E+01	6.11E-04	1.40E-01	7.67E-03	-3.64E-01

Table 14: 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]	1.82E+03
Renewable primary energy (raw material)	PERM [MJ]	4.87E+00
Total use of renewable primary energy	PERT [MJ]	1.82E+03
Non-renewable primary energy (without raw material)	PENRE [MJ]	3.11E+03
Non-renewable primary energy (raw material)	PENRM [MJ]	1.70E+01
Total use of non-renewable primary energy	PENRT [MJ]	3.13E+03
Use of secondary materials	SM [kg]	2.95E-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]	3.42E+01
Hazardous waste disposed	HWD [kg]	3.00E-06
Non-hazardous waste disposed	NHWD [kg]	2.88E+00
Radioactive waste disposed	RWD [kg]	4.79E-01
Components for reuse	CRU [kg]	0.00E+00
Materials for recycling	MFR [kg]	2.86E-01
Materials for energy recovery	MER [kg]	5.62E-01
Exported electricity	EEE [MJ]	2.17E+00
Exported thermal energy	EET [MJ]	4.91E+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]	1.16E-01

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 15: Extrapolation parameters for reference product

Parameter	Value for reference product (BLKH CBO RD 325 V 16W MS 840 WT & BLKH CBO RD SENSOR)
Lighting output [lm]	1,920
Weight of light source [kg]	0.070
Weight of luminaire structure [kg]	0.580
Weight of control gear [kg]	0.054
Weight of light management system [kg]	0.032
Weight of packaging [kg]	0.271
Power [W]	16
Diameter [mm]	325
Height [mm]	90

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

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

5.2 Extrapolation coefficients

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

- The reference product is equipped with a motion & brightness sensor hence it is assigned with an energy saving coefficient of 0.55.
- The product within the product family that is not equipped with a sensor is assigned with an energy saving coefficient of 1.0.

Table 16: Calculated Extrapolation coefficients per product

Product Name	Useful output flux [lm]	Manu-factur-ing	Distribu-tion	Installa-tion	Use	EoL
BLKH CBO RD 325 V 16W MS 840 WT & BLKH CBO RD SENSOR	**1,920**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
BLKH CBO RD 325 V 16W MS 840 WT	1,920	1.00	0.97	1.00	1.82	0.96