



ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT ENVIRONMENTAL PROFILE – OPENDO

Reference product: Opendo H2-L PW19 64-840 ETDD 01

Registration number	TRLX-00009-V01.01-EN	Drafting rules	PCR-ed4-EN-2021 09 06
		Supplemented by	PSR-0014-ed2.0-EN2023 07 13
Verifier accreditation number	VH45	Information and reference documents	www.pep-ecopassport.org
Date of issue	14.10.2024	Validity period	5 years
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)			
PEPs are compliant with XP C08-100-1:2016 or EN 50693:2019			
The components of the present PEP may not be compared with components from any other program.			
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"			



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1. GENERAL INFORMATION

1.1 Product information

Rectangular suspended LED luminaire, direct-indirect distribution, with full-surface, borderless PMMA cover. Suitable for use in HACCP, IFS and/or BRC Global Standard Food certified companies. For individual or continuous line applications by means of accessories to be ordered separately. Suitable for through-wiring. With an internal microprismatic cover and an opal PMMA cover smooth on room side. With symmetric limited wide light distribution. Glare evaluation according to UGR rating (EN 12464-1) < 19. Suitable for VDU workstations according to EN 12464-1 via limited luminance $L \leq 3000 \text{ cd/2}$ for beam angle above 65° all-round. Luminaire luminous flux and light color fixed. Luminaire luminous flux 6400 lm, connected load 52 W, maximum luminous efficiency of luminaire 123 lm/W. Light colour neutral white, correlated colour temperature (CCT) 4000 K, general colour rendering index (CRI) $R_a > 80$. Colour locus tolerance (initial MacAdam) $\leq 3 \text{ SDCM}$. Mean rated service life $L_{80}(t_q 25^\circ\text{C}) = 50,000 \text{ h}$. The light source is replaceable according to the ecodesign requirements (VO (EU) 2019/2020). Luminaire body sheet steel. Surface coated white (RAL 9016). Dimensions (L x W): 1408 mm x 160 mm, luminaire height 47 mm. Safety class (EN 61140): I, protection rating (DIN EN 60529): IP20, impact resistance level in accordance with IEC 62262: IK03, testing temperature of wire glow test in accordance with IEC 60695-2-11: 650 °C. Weight: 4,9 kg. With electronic transformer, digitally dimmable (DALI). Control gear unit according to DALI-2 standard (EN 62386). Luminaire is switchable and dimmable by means of touch functionality via DALI control terminals (Touch DIM). The control gear unit is replaceable in accordance with the ecodesign requirements (VO (EU) 2019/2020). The luminaire can be equipped with the Monitoring Ready (MOR) functionality on request. The luminaire complies with the fundamental requirements of applicable EU regulations and product safety legislation and bears the CE symbol. The luminaire is also ENEC-certified by an independent testing authority. Luminaire available for 10 years, spare parts (LED module, control gear unit, optical system) for 15 years from date of invoice, subject to reasonable modifications in the interests of progress.

1. GENERAL INFORMATION

Table 1: Key technological data

Information	Unit	
Light source	-	Integrated LED module
Power supply	-	Integrated power supply
Color temperature	K	4000
Protection index for water and dust (IP)	-	IP20
Impact resistance index (IK)	-	IK03
Nominal operating voltage	V	220-240
Declared lifetime of the luminaire	Hours	50.000
Declaration lifetime of the light source	Hours	50.000
Outgoing luminous flux/Useful output flux	Lumen	6.400
Electrical input power	W	52
Luminous efficiency	Lumen/W	123
Dimension	mm	1.408 x 160 x 47
Reference use scenario	-	Office
Lifetime in years according to reference use scenario	yr	20

1.2 Goal and Scope

Following information have been used to generate the PEP:

Table 2: Goal and Scope

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*	0.1094 pieces of product
Life cycle stages covered	Cradle-to-grave and Module D
Product category according to PSR	Luminaires
Product name	OPENDO H2-L PW19 64-840 ETDD 01

* The reference flow is calculated as: $(1,000/\text{outgoing luminous flux of the analyzed product in lumens}) \times (35,000/\text{declared product lifetime of the analyzed product in hours})$

Consequently, the reference flow of the following product correspond to: $(1,000/6,400) \times (35,000/50,000) = 0.1094$

2. CONSTITUENT MATERIAL

2.1 Overview

The product composition is shown in the following table.

Table 3: Product composition

	Weight [in kg]	Share [in %]
Total weight	6.400	100
Product	4.900	77
Packaging	1.500	23
Additional equipment	0	0

2.2 Product

The material composition of the product is shown in the following table.

Table 4: Material composition - product

	Weight [in kg]	Share [in %]
Total weight	6.400	100
Metals	2.863	58
• Stainless Steel	0.008	<1
• Steel	2.855	58
Plastics	1.175	24
• PC	0.036	1
• Polymethyl methacrylate (PMMA)	0.921	18
• Polyamide (PA)	0.021	1
• Polyester	0,197	4
Electronics (incl. wires)	0.862	18

2.3 Packaging

The product composition is shown in the following table.

Table 5: Material composition – packaging

	Weight [in kg]	Share [in %]
Total weight	1.500	100
Paper/cardboard	1.453	97
Plastics	0.047	3

3. INFORMATION ON LIFE CYCLE STAGES



3.1 Manufacturing stage (A1-A3)

The product components are manufactured or assembled by TRILUX GmbH & Co. KG in Arnsberg (Germany). The production sites in Arnsberg, Alhama de Aragón and Zaragoza (both Spain) have certified environmental management systems in accordance with ISO 14001. The Arnsberg site also has a certified energy management system according with ISO 50001. TRILUX products are manufactured in compliance with RoHS 2011/65/EU and REACH 1907/2006 declarations.

The energy model used in manufacturing is based on Sphera's Managed LCA Content and primary information on the energy mix of TRILUX.



3.2 Distribution stage (A4)

The main market of the product is Europe and there is no specific data available. For this reason, an intracontinental transport (3,500 km by truck (diesel driven, EURO 0-6, >27t payload) to the place of use following PEP-PCR-ed4-EN-2021 09 06 is considered.



3.3 Installation stage (A5)

The product can easily be installed without any special tool. No energy or material input is required. Packaging waste is treated according to the scenario given in PEP-PSR-0014-ed2-EN-2023 07 13.



3.4 Use stage (B1-B7)

The product has no direct emissions (B1). No maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) is required. The use of the product does consume electricity (B6), but no water (B7).

The operational electricity consumption over the entire lifetime of the product is 2,350 kWh. It has been calculated according to PSR edition 2. The used energy model refers to an average European electricity grid mix from Sphera's Managed LCA Content.



3.5 End-of-life stage (C1-C4)

The product falls under the Waste from Electrical and Electronic Equipment (WEEE) directive 2012/19/EU. Therefore, a collection rate of 100% and a typical end-of-life scenario for electronic products is assumed. All (mechanical and electronic) metals are recycled. Plastic & renewable materials are incinerated with energy recovery. Batteries & glass are landfilled.

For the transport to end-of-life treatment 1,000 km by truck according to PEP PCR is considered.

3.6 Benefits and loads beyond the system boundaries stage (D)

The recycling of the product (incl. packaging) and incineration with energy recovery generates environmental benefits and loads beyond the system boundaries (D). The calculation of this module is in line with the formulars described in PEP-PCR-ed4-EN-2021 09 06. The amount of the material flows used for the calculation are listed in the table below.

3. INFORMATION ON LIFE CYCLE STAGES

Table 7: Material flows for benefits and loads beyond the system boundaries per functional unit

	Weight [in kg]
Total weight going into reuse	0
Total weight of product going into recycling	3,33E-01
Total weight of product going into incineration with energy recovery	2,03E-01
Total weight of packaging going into recycling	1,32E-01
Total weight of packaging going into incineration with energy recovery	1,62E-02

4. ENVIRONMENTAL INFORMATION

The environmental information included in this study cover all stages of the life cycle („cradle-to-grave“). The life cycle is divided into manufacturing stage (A1-A3), distribution stage (A4), installation stage (A5), use stage (B1-B7, but only applicable modules are shown), End-of-life stage (C1-C4) and benefits and loads beyond the system boundaries (D). The results refer to the core environmental impact indicators and mandatory indicators describing resource use, waste categories, and output flows according to PEP-PCR-ed4,- EN-2021 09 06 and EN 15804+A2:2019.

The results have been calculated using the LCA Software “LCA for Experts 10” and the LCI database “Sphera Managed LCA Content”.

4.1 Results per functional unit

The following results of the environmental declaration have been developed, considering an outgoing artificial luminous flux of 1,000 lumens over a reference lifetime of 35,000 hours.

Acronyms: GWP-total=Global Warming Potential total; GWP-biogenic=Global Warming Potential biogenic; GWP-fossil=Global Warming Potential fossil; GWP-luluc=Global Warming Potential land use and land use change; ODP=Ozone Depletion; AP=Acidification; E=Eutrophication; POCP=Photochemical ozone formation; ADPE=Depletion of abiotic resources-minerals and metals; ADPF=Depletion of abiotic resources-fossil fuels; WDP=Water re- source deprivation; PERE=Renewable primary energy (without raw material); PERM=Renewable primary energy (raw material); PERT=Total use of renewable primary energy; PENRE=Non-renewable primary energy (without raw material); PENRM=Non-renewable primary energy (raw material); PENRT=Total use of non-renewable primary energy; SM=Use of secondary materials; RSF=Use of renewable secondary fuels; NRSF=Use of non-renewable secondary fuels; FW=Net use of fresh water; HWD=Hazardous waste disposed; NHWD=Non-hazardous waste disposed; RWD=Radioactive waste disposed; CRU=Components for reuse; MFR=Materials for recycling; MER=Materials for energy recovery; EEE=Exported electricity; EET=Exported thermal energy; Biog. C in product=Biogenic carbon content of the product; Biog. C in packaging=Biogenic carbon content of the associated packaging

4. ENVIRONMENTAL INFORMATION

Table 8: Results core environmental impact indicators per functional unit (0.1094 kg product incl. packaging)

Impact category	Unit	Total (excl. D)	Manufacturing			Distribution	Installation	
			A1	A2	A3	A4	A5	
GWP - total	kg CO2 eq.	5,28E+01	5,09E+00	7,74E-02	5,99E-01	1,85E-01	1,36E-01	
GWP - fossil	kg CO2 eq.	5,23E+01	5,10E+00	7,35E-02	5,71E-01	1,81E-01	8,68E-02	
GWP - biogenic	kg CO2 eq.	4,74E-01	-9,54E-03	3,38E-03	2,66E-02	3,21E-03	4,86E-02	
GWP - luluc	kg CO2 eq.	1,19E-02	4,25E-03	4,84E-04	1,09E-03	4,48E-04	3,25E-04	
ODP	kg CFC-11 eq.	8,74E-10	2,20E-11	8,30E-15	5,14E-12	1,54E-14	1,45E-13	
AP	Mole of H+ eq.	1,22E-01	1,91E-02	5,89E-04	1,00E-03	3,16E-03	1,50E-04	
EP - freshwater	kg P eq.	2,11E-04	2,87E-05	1,96E-07	7,83E-06	2,06E-07	2,21E-06	
EP - marine	kg N eq.	2,87E-02	3,40E-03	2,13E-04	4,25E-04	1,13E-03	6,77E-05	
EP - terrestrial	Mole of N eq.	3,01E-01	3,60E-02	2,35E-03	4,22E-03	1,24E-02	6,34E-04	
POCP	kg NMVOC eq.	7,79E-02	1,03E-02	5,73E-04	1,03E-03	3,11E-03	1,43E-04	
ADPE	kg Sb eq.	3,37E-04	3,30E-04	3,67E-09	1,23E-07	4,41E-09	3,20E-08	
ADPF	MJ	1,05E+03	7,07E+01	9,80E-01	8,69E+00	2,29E+00	1,16E+00	
WDP	m³ world equiv.	1,12E+01	9,12E-01	6,68E-04	2,83E-02	8,04E-04	5,12E-03	
Impact category	Unit	Use	End of life				Benefits and loads beyond the system boundaries stage	
			B2	B6	C2	C3	C4	D
GWP - total	kg CO2 eq.	0,00E+00	4,63E+01	3,91E-02	3,88E-01	0,00E+00	-1,12E+00	
GWP - fossil	kg CO2 eq.	0,00E+00	4,59E+01	3,63E-02	3,88E-01	0,00E+00	-1,31E+00	
GWP - biogenic	kg CO2 eq.	0,00E+00	3,99E-01	2,37E-03	1,29E-04	0,00E+00	1,91E-01	
GWP - luluc	kg CO2 eq.	0,00E+00	4,99E-03	3,41E-04	9,07E-06	0,00E+00	-1,21E-03	
ODP	kg CFC-11 eq.	0,00E+00	8,47E-10	4,79E-15	3,39E-13	0,00E+00	1,02E-12	
AP	Mole of H+ eq.	0,00E+00	9,80E-02	5,91E-05	1,15E-04	0,00E+00	-4,48E-03	
EP - freshwater	kg P eq.	0,00E+00	1,71E-04	1,35E-07	8,00E-08	0,00E+00	-3,66E-06	
EP - marine	kg N eq.	0,00E+00	2,34E-02	2,28E-05	3,53E-05	0,00E+00	-9,04E-04	
EP - terrestrial	Mole of N eq.	0,00E+00	2,45E-01	2,62E-04	5,21E-04	0,00E+00	-9,62E-03	
POCP	kg NMVOC eq.	0,00E+00	6,25E-02	5,25E-05	9,34E-05	0,00E+00	-2,80E-03	
ADPE	kg Sb eq.	0,00E+00	7,10E-06	2,44E-09	2,58E-09	0,00E+00	-1,62E-04	
ADPF	MJ	0,00E+00	9,66E+02	5,02E-01	4,26E-01	0,00E+00	-1,27E+01	
WDP	m³ world equiv.	0,00E+00	1,02E+01	4,45E-04	4,45E-02	0,00E+00	-1,25E-01	

4. ENVIRONMENTAL INFORMATION

Table 9: Results indicators describing resource use, waste categories, and output flows per functional unit (0.1094 kg product incl. packaging)

Impact category	Unit	Total (excl. D)	Manufacturing			Distribution	Installation	
			A1	A2	A3	A4	A5	
PERE	MJ	5,93E+02	1,39E+01	5,30E-02	1,39E+00	5,48E-02	5,18E-01	
PERM	MJ	2,72E+00	4,07E-01	0,00E+00	2,55E+00	0,00E+00	-2,37E-01	
PERT	MJ	5,96E+02	1,43E+01	5,30E-02	3,94E+00	5,48E-02	2,81E-01	
PENRE	MJ	1,05E+03	6,61E+01	9,83E-01	8,50E+00	2,29E+00	1,24E+00	
PENRM	MJ	1,18E+00	4,80E+00	0,00E+00	1,93E-01	0,00E+00	-8,37E-02	
PENRT	MJ	1,05E+03	7,09E+01	9,83E-01	8,70E+00	2,29E+00	1,16E+00	
SM	kg	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	
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
FW	M3	5,14E-01	4,18E-02	5,83E-05	4,20E-03	6,17E-05	1,14E-03	
HWD	kg	2,56E-06	2,43E-06	3,06E-12	9,28E-08	7,19E-12	3,55E-08	
NHWD	kg	1,05E+00	2,57E-01	1,33E-04	2,72E-02	2,50E-04	1,62E-02	
RWD	kg	1,56E-01	1,83E-03	1,65E-06	3,51E-04	3,15E-06	2,46E-05	
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
MFR	kg	7,04E-01	0,00E+00	0,00E+00	2,39E-01	0,00E+00	1,32E-01	
MER	kg	2,36E-01	0,00E+00	0,00E+00	1,62E-02	0,00E+00	1,62E-02	
EEE	MJ	6,35E-01	1,00E-03	0,00E+00	0,00E+00	0,00E+00	4,52E-02	
EET	kg	1,44E+00	1,39E-03	0,00E+00	0,00E+00	0,00E+00	7,11E-02	
Biog. C in product	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
Biog. C in packaging	kg	7,32E+00	1,03E+00	0,00E+00	6,29E+00	0,00E+00	0,00E+00	
Impact category	Unit	Use	End of life				Benefits and loads beyond the system boundaries stage	
			B2	B6	C2	C3	C4	D
PERE	MJ	0,00E+00	5,77E+02	3,65E-02	2,02E-01	0,00E+00	-2,86E+00	
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
PERT	MJ	0,00E+00	5,77E+02	3,65E-02	2,02E-01	0,00E+00	-2,86E+00	
PENRE	MJ	0,00E+00	9,66E+02	5,04E-01	4,15E+00	0,00E+00	-1,28E+01	
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	-3,73E+00	0,00E+00	0,00E+00	
PENRT	MJ	0,00E+00	9,66E+02	5,04E-01	4,26E-01	0,00E+00	-1,28E+01	
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,03E-01	
RSF	MJ	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	
FW	M3	0,00E+00	4,66E-01	4,00E-05	1,11E-03	0,00E+00	-6,16E-03	
HWD	kg	0,00E+00	0,00E+00	1,56E-12	9,19E-10	0,00E+00	-3,73E-08	
NHWD	kg	0,00E+00	7,07E-01	7,68E-05	4,49E-02	0,00E+00	-4,73E-02	
RWD	kg	0,00E+00	1,54E-01	9,43E-07	4,15E-05	0,00E+00	-1,20E-04	
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	3,33E-01	0,00E+00	0,00E+00	
MER	kg	0,00E+00	0,00E+00	0,00E+00	2,03E-01	0,00E+00	0,00E+00	
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	5,89E-01	0,00E+00	0,00E+00	
EET	kg	0,00E+00	0,00E+00	0,00E+00	1,37E+00	0,00E+00	0,00E+00	
Biog. C in product	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
Biog. C in packaging	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	

4. ENVIRONMENTAL INFORMATION

4.2 Results per unit of product

The following results of the environmental declaration have been developed, considering one piece of product.

Table 10: Results core environmental impact indicators per unit of product

Impact category	Unit	Total (excl. D)	Manufacturing			Distribution	Installation	
			A1	A2	A3	A4	A5	
GWP - total	kg CO2 eq.	4,83E+02	4,65E+01	7,07E-01	5,47E+00	1,69E+00	1,24E+00	
GWP - fossil	kg CO2 eq.	4,78E+02	4,66E+01	6,72E-01	5,22E+00	1,66E+00	7,94E-01	
GWP - biogenic	kg CO2 eq.	4,33E+00	-8,72E-02	3,09E-02	2,43E-01	2,94E-02	4,44E-01	
GWP - luluc	kg CO2 eq.	1,09E-01	3,89E-02	4,43E-03	9,93E-03	4,09E-03	2,97E-03	
ODP	kg CFC-11 eq.	7,99E-09	2,01E-10	7,59E-14	4,70E-11	1,41E-13	1,32E-12	
AP	Mole of H+ eq.	1,12E+00	1,75E-01	5,39E-03	9,14E-03	2,88E-02	1,37E-03	
EP - freshwater	kg P eq.	1,92E-03	2,63E-04	1,79E-06	7,16E-05	1,89E-06	2,02E-05	
EP - marine	kg N eq.	2,63E-01	3,11E-02	1,95E-03	3,88E-03	1,03E-02	6,19E-04	
EP - terrestrial	Mole of N eq.	2,75E+00	3,29E-01	2,15E-02	3,85E-02	1,13E-01	5,79E-03	
POCP	kg NMVOC eq.	7,12E-01	9,46E-02	5,24E-03	9,40E-03	2,84E-02	1,31E-03	
ADPE	kg Sb eq.	3,08E-03	3,02E-03	3,35E-08	1,12E-06	4,03E-08	2,93E-07	
ADPF	MJ	9,60E+03	6,47E+02	8,96E+00	7,94E+01	2,09E+01	1,06E+01	
WDP	m³ world equiv.	1,03E+02	8,34E+00	6,11E-03	2,59E-01	7,35E-03	4,68E-02	
Impact category	Unit	Use	End of life				Benefits and loads beyond the system boundaries stage	
			B2	B6	C2	C3	C4	D
GWP - total	kg CO2 eq.	0.00E+00	4,23E+02	3,57E-01	3,55E+00	0.00E+00	-1,02E+01	
GWP - fossil	kg CO2 eq.	0.00E+00	4,19E+02	3,32E-01	3,55E+00	0.00E+00	-1,20E+01	
GWP - biogenic	kg CO2 eq.	0.00E+00	3,65E+00	2,16E-02	1,18E-03	0.00E+00	1,75E+00	
GWP - luluc	kg CO2 eq.	0.00E+00	4,56E-02	3,12E-03	8,29E-05	0.00E+00	-1,10E-02	
ODP	kg CFC-11 eq.	0.00E+00	7,74E-09	4,38E-14	3,10E-12	0.00E+00	9,32E-12	
AP	Mole of H+ eq.	0.00E+00	8,96E-01	5,40E-04	1,05E-03	0.00E+00	-4,10E-02	
EP - freshwater	kg P eq.	0.00E+00	1,56E-03	1,23E-06	7,31E-07	0.00E+00	-3,35E-05	
EP - marine	kg N eq.	0.00E+00	2,14E-01	2,08E-04	3,22E-04	0.00E+00	-8,26E-03	
EP - terrestrial	Mole of N eq.	0.00E+00	2,24E+00	2,40E-03	4,76E-03	0.00E+00	-8,79E-02	
POCP	kg NMVOC eq.	0.00E+00	5,72E-01	4,79E-04	8,54E-04	0.00E+00	-2,56E-02	
ADPE	kg Sb eq.	0.00E+00	6,49E-05	2,23E-08	2,35E-08	0.00E+00	-1,48E-03	
ADPF	MJ	0.00E+00	8,83E+03	4,59E+00	3,89E+00	0.00E+00	-1,16E+02	
WDP	m³ world equiv.	0.00E+00	9,35E+01	4,07E-03	4,07E-01	0.00E+00	-1,14E+00	

