ENVIRONMENTAL PRODUCT DECLARATION

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

LEDVANCE FLOODLIGHT MAX

Reference product:

FL MAX LUM 900W 757 SYM 30 WAL & FL MAX POWER SUPPLY 900W WAL

Registration number	**LEDV-00007-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	**01-2024**	**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 "FL MAX LUM 900W 757 SYM 30 WAL" with power supply "FL MAX POWER SUPPLY 900W WAL" with the following product description:

Product benefits

- Very bright, robust and durable
- Energy savings of up to 45 % compared to luminaires that use conventional discharge lamps
- Easy dimming to 33% by wiring
- No upper light output ratio (ULOR 0%) when mounted at 0° tilt
- Optimized product logistic, luminaire heads and power supplies to be ordered separately
- Low flicker light

Areas of application

- Outdoor use (IP66)
- Lighting of large areas
- Sports facilities
- Construction areas
- Direct replacement for luminaires using HID lamps

Product features

- Modular, high-power floodlight with up to 135 lm/W
- Joint or separate installation with Floodlight Max power supply with up to 40 m distance
- Available with 10°, 30° and 60° symmetric beam angles, as well as 50°x110° asymmetric light distribution
- Mounting bracket for up to 180° tilting
- Highly-transparent, tempered glass diffusor

Equipment / Accessories

- Power supply not included in luminaire head delivery unit
- Operation only with official 900 W power supply, GTIN(EAN) 4058075580732

Reference Service Life

LEDVANCE declares for the luminaire following service lifetimes:

- Lifespan L70/B50 at 25 °C: 100,000 h
- Lifespan L80/B10 at 25 °C: 75,000 h
- Lifespan L90/B10 at 25 °C: 50,000 h

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

Table 1: Key technological data

Information	
Type of luminaire	Flood light
Short Text Product	FL MAX LUM P 900W 757 SYM 30 WAL
Operating mode	External LED driver (product: FL MAX POWER SUPPLY 900W WAL)
Lamp type	Integrated LED not exchangeable
Color temperature	5700 K
Nominal wattage	900.00 W
Luminous flux	121,000 lm
Color rendering index Ra	>= 70
Protection class IK	IK08
Type of protection	IP66
Nominal voltage	180 V
Nominal lifetime (L70/B50)	100,000 h
Length	660.00 mm
Width	279.00 mm
Height	591.00 mm
Area of Application (PSR)	Outdoor - Urban; Zone, open Space; Sport
LOR (light output ratio)	η = 92.7 %

Based on the assigned lifetime according EN 15193-1:2017 for outdoor application and the maximum annual operating hours taken from the PSR, the luminaire has the following annual service time:

Type of building	Annual operating hours by default	Operational lifetime (years)
Outdoor – Urban	**4,000**	**25**
Outdoor – Zone, open space	**4,000**	**25**
Outdoor – Sport (recreational)	2,500	40

Following the requirements of the PSR, the operational lifetime is 25 years.

1.3 Overview

The general information used for the EPD are listed below:

Table 2: 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*	0.0029 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)	FLOODLIGHT MAX

* 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:

$$\frac{1{,}000}{121{,}000} \times \frac{35{,}000}{100{,}000} = 0.0029$$

1.4 Homogeneous environmental family

The reference product represents the FLOODLIGHT MAX family, which differs in terms of power (W), useful output flux (lm) of the integrated LED installed in the luminaries, beam angles and dimension (length in mm and weight in kg).

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

Table 3: Range of variation for homogeneous environmental family:

Criteria	Unit	Value for the reference product	Minimum value in product range	Maximum value in product range
Electrical Power	W	900	600	1200
Useful output flux	lm	121,000	78,000	164,000
Weight (Luminaire)	kg	21.0	16.3	31.9
Length (Luminaire)	mm	660	472	841

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 FLOODLIGHT MAX 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 [in kg]	Share [in %]
Total weight	**37.7**	**100.0**
Total weight (Luminaire)	**23.3**	**61.7**
Product (Luminaire)	21.1	55.9
Packaging (Luminaire)	2.2	5.9
Total weight (Power Supply)	**14.4**	**38.2**
Product (Power Supply)	13.1	34.7
Packaging (Power Supply)	1.3	3.6

2.2 Product

Table 5: Material composition – product (Luminaire and Power Supply)

Information	Weight [in kg]	Sum of weight [in kg]	Share [in %]
TOTAL		34.143	**100.0**
Metals		25.175	**73.7**
- Aluminium	14.250		41.7
- Steel	10.482		30.7
- Brass	0.443		1.3
Plastics		1.981	**5.8**
- Polyamide 6.6 (PA 6.6)	0.915		2.7
- Polycarbonate (PC)	0.896		2.6
- Silicone	0.170		0.5
Others		6.986	**20.5**
- Internal & External Cable	0.554		1.6
- Electronics	4.482		13.1
- Glass	1.950		5.7

2.3 Packaging

Table 6: Material composition – packaging (Luminaire and Power Supply)

Information	Weight [in kg]	Share [in %]
TOTAL	**3.559**	**100**
Plastics	0.824	23.1
Paper/cardboard	2.718	76.4
Wood	0.018	0.5

Plywood pallet and other secondary packaging with cardboard are used for shipping. In addition, Plywood pallet is reused 28 times and Packaging of raw materials and components is considered as an average quantity of 5 % in mass of the luminaire according to /PSR-0014-ED2.0-EN-2023 07 13/. This additional packaging is not considered in Table 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 & auxiliaries. Afterwards the product is packed, luminaire and power supply separately, in packaging materials and distributed to the client.

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

3.2 Distribution

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

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

The background assumptions for the transportation are listed below.

Table 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

The product is designed for tool-free installation. No energy or material input is required. Luminaire and Power Supply are separately packed. During installation, the products are 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.

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	7.83E-02
- Share of metals	%	73.7
- Share of plastics	%	5.8
- Share of others	%	20.5
Total weight going into incineration with energy recovery	kg/functional unit	1.92E-02
- Share of paper	%	41.3
- Share of others	%	58.7

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	GaBi / LCA for experts 10
Used LCI database	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.]	8,59E+01	8,73E-01	7,32E-03	1,01E-02	2,83E-02	8,79E-03	8,49E+01	6,73E-03	4,82E-02	4,79E-03	-3,72E-01
GWP - fossil [kg CO2 eq.]	8,52E+01	8,92E-01	7,24E-03	4,91E-03	2,82E-02	6,08E-03	8,42E+01	6,65E-03	4,81E-02	4,79E-03	-3,81E-01
GWP - biogenic [kg CO2 eq.]	7,20E-01	-1,96E-02	1,69E-05	5,23E-03	3,66E-05	2,70E-03	7,32E-01	1,55E-05	9,32E-05	-4,30E-06	9,46E-03
GWP - luluc [kg CO2 eq.]	9,69E-03	3,04E-04	6,82E-05	2,56E-06	6,96E-05	1,17E-05	9,15E-03	6,27E-05	1,62E-05	5,97E-07	-1,11E-04
ODP [kg CFC-11 eq.]	1,56E-09	1,75E-12	6,45E-16	1,35E-14	2,08E-15	1,03E-14	1,55E-09	5,93E-16	1,84E-13	4,01E-15	-7,34E-13
AP [Mole of H+ eq.]	1,85E-01	4,49E-03	1,09E-05	9,41E-06	4,92E-04	7,38E-06	1,80E-01	1,00E-05	8,41E-05	4,48E-06	-1,68E-03
EP - freshwater [kg P eq.]	3,16E-04	1,23E-06	2,69E-08	2,05E-08	3,20E-08	1,16E-07	3,14E-04	2,47E-08	5,45E-08	1,56E-09	-4,18E-07
EP - marine [kg N eq.]	4,39E-02	6,74E-04	4,20E-06	2,81E-06	1,76E-04	3,25E-06	4,30E-02	3,86E-06	3,21E-05	1,84E-06	-2,58E-04
EP - terrestrial [Mole of N eq.]	4,59E-01	7,33E-03	4,85E-05	2,51E-05	1,93E-03	3,03E-05	4,50E-01	4,46E-05	3,58E-04	2,15E-05	-2,82E-03
POCP [kg NMVOC eq.]	1,18E-01	2,11E-03	9,65E-06	7,18E-06	4,84E-04	6,95E-06	1,15E-01	8,87E-06	9,29E-05	4,86E-06	-7,72E-04
ADPE [kg Sb eq.]	2,50E-05	1,20E-05	4,78E-10	2,32E-10	6,76E-10	1,58E-09	1,30E-05	4,40E-10	3,10E-09	2,00E-11	-6,19E-06
ADPF [MJ]	1,78E+03	1,10E+01	1,00E-01	3,28E-02	3,56E-01	5,56E-02	1,77E+03	9,20E-02	3,64E-01	6,30E-03	-5,23E+00
WDP [m³ world equiv.]	1,89E+01	1,49E-01	8,49E-05	1,07E-03	1,21E-04	4,78E-04	1,88E+01	7,80E-05	5,15E-03	1,04E-03	-3,55E-02

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]	1,06E+03
Renewable primary energy (raw material)	PERM [MJ]	1,43E-01
Total use of renewable primary energy	PERT [MJ]	1,06E+03
Non-renewable primary energy (without raw material)	PENRE [MJ]	1,78E+03
Non-renewable primary energy (raw material)	PENRM [MJ]	2,65E-01
Total use of non-renewable primary energy	PENRT [MJ]	1,78E+03
Use of secondary materials	SM [kg]	7,50E-02
Use of renewable secondary fuels	RSF [MJ]	0,00E+00
Use of non-renewable secondary fuels	NRSF [MJ]	0,00E+00
Net use of fresh water	FW [m3]	1,89E+01
Hazardous waste disposed	HWD [kg]	-1,15E-07
Non-hazardous waste disposed	NHWD [kg]	1,41E+00
Radioactive waste disposed	RWD [kg]	2,82E-01
Components for reuse	CRU [kg]	0,00E+00
Materials for recycling	MFR [kg]	6,82E-02
Materials for energy recovery	MER [kg]	1,54E-02
Exported electricity	EEE [MJ]	5,50E-02
Exported thermal energy	EET [MJ]	1,19E-01
Biogenic carbon content of the product	Biog. C in product [kg]	0,00E+00
Biogenic carbon content of the associated packaging	Biog. C in packaging [kg]	3,41E-03

4.3 Results per unit of product

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

Table 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.]	2,96E+04	3,01E+02	2,53E+00	3,50E+00	9,77E+00	3,03E+00	2,93E+04	2,32E+00	1,66E+01	1,65E+00	-1,28E+02
GWP - fossil [kg CO2 eq.]	2,94E+04	3,08E+02	2,50E+00	1,69E+00	9,73E+00	2,10E+00	2,90E+04	2,29E+00	1,66E+01	1,65E+00	-1,32E+02
GWP - biogenic [kg CO2 eq.]	2,48E+02	-6,77E+00	5,81E-03	1,80E+00	1,26E-02	9,30E-01	2,52E+02	5,34E-03	3,21E-02	-1,48E-03	3,26E+00
GWP - luluc [kg CO2 eq.]	3,34E+00	1,05E-01	2,35E-02	8,84E-04	2,40E-02	4,02E-03	3,16E+00	2,16E-02	5,57E-03	2,06E-04	-3,82E-02
ODP [kg CFC-11 eq.]	5,36E-07	6,04E-10	2,22E-13	4,66E-12	7,18E-13	3,56E-12	5,36E-07	2,04E-13	6,34E-11	1,38E-12	-2,53E-10
AP [Mole of H+ eq.]	6,38E+01	1,55E+00	3,77E-03	3,25E-03	1,70E-01	2,54E-03	6,20E+01	3,46E-03	2,90E-02	1,54E-03	-5,78E-01
EP - freshwater [kg P eq.]	1,09E-01	4,26E-04	9,26E-06	7,06E-06	1,10E-05	4,01E-05	1,08E-01	8,51E-06	1,88E-05	5,38E-07	-1,44E-04
EP - marine [kg N eq.]	1,51E+01	2,32E-01	1,45E-03	9,69E-04	6,08E-02	1,12E-03	1,48E+01	1,33E-03	1,11E-02	6,34E-04	-8,91E-02
EP - terrestrial [Mole of N eq.]	1,58E+02	2,53E+00	1,67E-02	8,67E-03	6,66E-01	1,05E-02	1,55E+02	1,54E-02	1,23E-01	7,42E-03	-9,71E-01
POCP [kg NMVOC eq.]	4,05E+01	7,28E-01	3,33E-03	2,48E-03	1,67E-01	2,40E-03	3,96E+01	3,06E-03	3,20E-02	1,67E-03	-2,66E-01
ADPE [kg Sb eq.]	8,63E-03	4,14E-03	1,65E-07	7,99E-08	2,33E-07	5,46E-07	4,49E-03	1,52E-07	1,07E-06	6,91E-09	-2,14E-03
ADPF [MJ]	6,15E+05	3,78E+03	3,45E+01	1,13E+01	1,23E+02	1,92E+01	6,11E+05	3,17E+01	1,26E+02	2,17E+00	-1,80E+03
WDP [m³ world equiv.]	6,52E+03	5,15E+01	2,93E-02	3,69E-01	4,17E-02	1,65E-01	6,47E+03	2,69E-02	1,77E+00	3,59E-01	-1,23E+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]	3,66E+05
Renewable primary energy (raw material)	PERM [MJ]	4,92E+01
Total use of renewable primary energy	PERT [MJ]	3,66E+05
Non-renewable primary energy (without raw material)	PENRE [MJ]	6,13E+05
Non-renewable primary energy (raw material)	PENRM [MJ]	9,14E+01
Total use of non-renewable primary energy	PENRT [MJ]	6,13E+05
Use of secondary materials	SM [kg]	2,59E+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]	6,51E+03
Hazardous waste disposed	HWD [kg]	-3,95E-05
Non-hazardous waste disposed	NHWD [kg]	4,87E+02
Radioactive waste disposed	RWD [kg]	9,72E+01
Components for reuse	CRU [kg]	0,00E+00
Materials for recycling	MFR [kg]	2,35E+01
Materials for energy recovery	MER [kg]	5,31E+00
Exported electricity	EEE [MJ]	1,90E+01
Exported thermal energy	EET [MJ]	4,11E+01
Biogenic carbon content of the product	Biog. C in product [kg]	0,00E+00
Biogenic carbon content of the associated packaging	Biog. C in packaging [kg]	1,18E+00

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
Lighting output [lm]	121,000
Weight of light source [kg]	0.132
Weight of luminaire structure [kg]	29.290
Weight of control gear [kg]	4.720
Weight of light management system [kg]	-
Weight of packaging [kg]	3.560
Power [W]	900
Length [mm]	660
Beam angle	30°

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.

As the concerned product does not provide any light management functions, the extrapolation coefficient for the light management function components is zero.

As the concerned product does not provide any energy saving functions, its energy saving coefficient is one. No replacement of the light source is possible.

Table 16: Calculated Extrapolation coefficients per product

Product name	Power Supply	Manufacturing	Distribution	Installation	Use	EoL
FL MAX LUM P 600W 757 SYM 10 WAL	FL MAX POWER SUPPLY P 600W WAL	0.71	0.71	0.63	0.67	0.72
FL MAX LUM P 600W 757 SYM 30 WAL	FL MAX POWER SUPPLY P 600W WAL	0.71	0.71	0.63	0.67	0.72
FL MAX LUM P 600W 757 SYM 60 WAL	FL MAX POWER SUPPLY P 600W WAL	0.71	0.71	0.63	0.67	0.72
FL MAX LUM P 600W 757 ASYM50X110WAL	FL MAX POWER SUPPLY P 600W WAL	0.71	0.71	0.63	0.67	0.72
FL MAX LUM P 900W 757 SYM 10 WAL	FL MAX POWER SUPPLY P 900W WAL	1.00	1.00	1.00	1.00	1.00
FL MAX LUM P 900W 757 SYM 30 WAL	**FL MAX POWER SUPPLY P 900W WAL**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
FL MAX LUM P 900W 757 SYM 60 WAL	FL MAX POWER SUPPLY P 900W WAL	1.00	1.00	1.00	1.00	1.00
FL MAX LUM P 900W 757 ASYM50X110WAL	FL MAX POWER SUPPLY P 900W WAL	1.00	1.00	1.00	1.00	1.00
FL MAX LUM P 1200W 757 SYM 10 WAL	FL MAX POWER SUPPLY P 1200W WAL	1.37	1.37	1.25	1.33	1.38
FL MAX LUM P 1200W 757 SYM 30 WAL	FL MAX POWER SUPPLY P 1200W WAL	1.37	1.37	1.25	1.33	1.38
FL MAX LUM P 1200W 757 SYM 60 WAL	FL MAX POWER SUPPLY P 1200W WAL	1.37	1.37	1.25	1.33	1.38
FL MAX LUM P 1200W 757 ASYM50x110WAL	FL MAX POWER SUPPLY P 1200W WAL	1.37	1.37	1.25	1.33	1.38