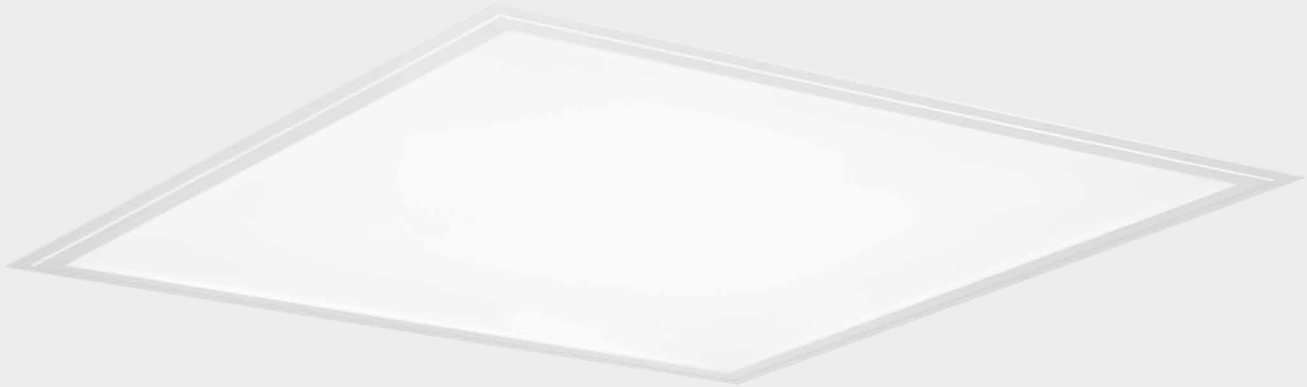




PRODUCT ENVIRONMENTAL PROFILE



PRODUCT ENVIRONMENTAL PROFILE OF LUMINAIRES FOR RECESSED LED LUMINAIRE

Reference product: Siella G8 M84 PW19 28-44/4ML-840 ETDD

Registration number	TRLX-00003-V02.02-EN	Drafting rules	PCR-ed4-EN-2021 09 06
		Supplemented by	PSR-0014-ed2.0-EN-2023 07 13
Verifier accreditation number	VH31	Information and reference documents	www.pep-ecopassport.org
Date of issue	09-2024	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 and EN 50693:2019 or NF E38-500:2022			
The components of the present PEP cannot be compared with elements from another program.			
Document complies with ISO 14025:2006 “Environmental labels and declarations. Type III environmental declarations”			

1	General information	3
1.1	Company information	3
1.2	Product information	3
1.3	Functional unit	5
1.4	Homogeneous environmental family	6
2	Constituent materials	7
2.1	Overview	7
2.2	Product	7
2.3	Packaging	7
3	Information on life cycle stages	8
3.1	Manufacturing	8
3.2	Distribution	8
3.3	Installation	8
3.4	Use	8
3.5	End-of-life	9
3.6	Benefits and loads beyond the system boundaries	9
4	Environmental impacts	10
4.1	Introduction	10
4.2	Results per functional unit	11
4.3	Results per unit of product	13
5	Extrapolation coefficients to a homogeneous environmental family	15



1.1 Company information

TRILUX - Simplify Your Light stands for the simplest way to intelligent, individual light. For more than 100 years TRILUX has been inspiring its customers with high-quality and individual lighting solutions - because light is our passion. This includes not only innovative luminaires but also perfectly matched lighting solutions for offices, industry, healthcare, education, retail and sports. At TRILUX we know that the perfect luminaire alone is not enough. TRILUX focuses on people and contributes with its solutions to a sustainable, healthy and connected world. Because where there is light, there is life.

1.2 Product information

The name of the product under study is "Recessed LED luminaire".
Recessed LED luminaire with micro prismatic cover. Version M84 (625 mm x 625 mm). For system ceilings with exposed grids. The luminaire is also suitable for surface-mounted installation with an accessory ordered separately. The luminaire is also suitable for applications in plasterboard ceilings with an accessory ordered separately. (Siella ZBB/4). Further information and data regarding luminaire installation and fixing can be found in the installation instructions. The prismatic PMMA surface of the optical system has a glare-reducing effect. With narrow-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. Harmonious light effect due to homogeneously illuminated light emission. Luminaire luminous flux adjustable in 4 steps. Luminaire luminous flux 2800 lm - 4400 lm, connected load 18,00 W - 31,00 W, maximum luminous efficiency of luminaire 145 lm/W. Light color neutral white, correlated color temperature (CCT) 4000 K, general color rendering index (CRI) $R_a > 80$. Mean rated service life $L_{80}(t_q 25^\circ\text{C}) = 50000 \text{ h}$. The light source is replaceable according to the eco-design requirements (VO (EU) 2019/2020). Frame is made of aluminum, rear luminaire body made of sheet steel. Surface coated white (RAL 9016). Dimensions (L x W): 620 mm x 620 mm, luminaire height 29 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: 2,12 kg. With external operating device, 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 eco-design requirements (VO (EU) 2019/2020). The luminaire complies with the Siella G8 M84 PW19 28-44/4ML-840 ETDD TOC: 8365451.

All technical data including details of weight and dimensions have been compiled with all due care. Product illustrations serve as examples and may differ from the original. We reserve the right to make alterations in the interest of improving our products. 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.

Further technical information can be obtained by contacting Heidestraße, D-59759 Arnsberg, Germany or on the website <https://www.trilux.com> or by E-Mail s.ke@trilux.com.

Technical Data

The evaluated product family includes a range of different product characteristics. These have all the characteristics described in PSR-0014-ed2.0-EN-2023 07 13 as belonging to a homogeneous environmental family. The evaluated product family can be divided into ET (switchable) and ETDD (dimmable) series. The categorization is based on the presence (ETDD) or absence (ET) of energy saving functions. The ETDD series can be connected via DALI and energy saving coefficients are equal to 0.5 according to table 5 in PSR-0014-ed2.0-EN-2023 07 13. For the ET series, there are no energy saving functions and energy saving coefficients are equal to 1. This family includes the following products in the following table:

Table 1: The energy saving functions among Recessed LED luminaire

TK	TOC	Description	Energy saving functions	Energy saving coefficient
10312502	8364140	Siella G8 M73 DW 28-40/3ML-8MC ET	/	1
10312503	8364251	Siella G8 M73 DW 28-44/4ML-8MC ETDD	DALI	0.5
10312504	8364340	Siella G8 M73 PW19 28-40/3ML-8MC ET	/	1
10312505	8364451	Siella G8 M73 PW19 28-44/4ML-8MC ETDD	DALI	0.5
10312506	8364540	Siella G8 M73 PW19 28-40/3ML-840 ET	/	1
10312507	8364651	Siella G8 M73 PW19 28-44/4ML-840 ETDD	DALI	0.5
10312508	8364740	Siella G8 M46 PW19 28-40/3ML-8MC ET	/	1
10312509	8364851	Siella G8 M46 PW19 28-44/4ML-8MC ETDD	DALI	0.5
10312510	8364940	Siella G8 M84 DW 28-40/3ML-8MC ET	/	1
10312511	8365051	Siella G8 M84 DW 28-44/4ML-8MC ETDD	DALI	0.5
10312512	8365140	Siella G8 M84 PW19 28-40/3ML-8MC ET	/	1
10312513	8365251	Siella G8 M84 PW19 28-44/4ML-8MC ETDD	DALI	0.5
10312514	8365340	Siella G8 M84 PW19 28-40/3ML-840 ET	/	1
10312515	8365451	Siella G8 M84 PW19 28-44/4ML-840 ETDD	DALI	0.5
10312516	8365540	Siella G8 M73 DW 28-40/3ML-8MC ET X2	/	1
10312517	8365651	Siella G8 M73 DW 28-44/4ML-8MC ETDD X1	DALI	0.5
10312518	8365740	Siella G8 M73 PW19 28-40/3ML-8MC ET X2	/	1
10312519	8365851	Siella G8 M73 PW19 28-44/4ML-8MC ETDD X1	DALI	0.5
10312520	8365940	Siella G8 M73 PW19 28-40/3ML-840 ET X2	/	1
10312521	8366051	Siella G8 M73 PW19 28-44/4ML-840 ETDD X1	DALI	0.5

1 GENERAL INFORMATION

The reference product is the Siella G8 M84 PW19 28-44/4ML-840 ETDD. The most important information is summarized in the following table:

Table 2: Key technological data

Information	Unit	Description
Light source	-	Integrated LED module
Control gear	-	External
Color temperature	K	4000
Protection index for water and dust (IP)	-	IP20/IP40 (Room side)
Impact resistance index (IK)	-	IK03
Nominal operating voltage	V	220-240
Declared lifetime of the luminaire	Hours	50000
Declaration lifetime of the light source	Hours	50000
Outgoing luminous flux/Useful output flux	Lumen	2800/3600/4200/4400
Electrical input power	W	18/25/29/31
Luminous efficiency	Lumen/W	Up to 145
Dimension	mm	620 x 620 x 29

For the Recessed LED luminaire with an assigned lifetime of 50000 hours that can be installed in indoor applications, the Recessed LED luminaire has the following annual service time.

Table 3: Recessed LED luminaire annual operating times according to the type of building

Type of building	Annual operating hours by default	Operational lifetime (years)
Residential building	3500	14.3
Office	2500	20
Educational institutions	2500	20

Following the requirements of the PSR, the operational lifetime of Recessed LED luminaire is 14.3 years.

1.3 Functional unit

The functional unit of RECESSED LED LUMINAIRE is defined as "Provide lighting that delivers an outgoing artificial luminous flux of 1000 lumens during a reference lifetime of 35000 hours".

The reference flow is the amounts of products needed to provide the defined function. All other input and output flows in the analysis quantitatively relate to it. The reference flow of RECESSED LED LUMINAIRE corresponding to the functional unit shall consider the value of the outgoing artificial luminous flux as well as the rated lifetime of the luminaire. According to test report, the outgoing artificial luminous flux of the RECESSED LED LUMINAIRE is 4400 Lumen. The assigned lifetime of the RECESSED LED LUMINAIRE is 50000 Hours, which estimated by the test report.

The reference flow is calculated as: (1000/outgoing luminous flux of the analyzed product in lumens) x (35000/declared product lifetime of the analyzed product in hours). Consequently, the reference flow of the RECESSED LED LUMINAIRE corresponds to:

$$(1000/4400) \times (35000/50000) = 0.159$$

1.4 Homogeneous environmental family

The present PEP declaration is valid for all the products in the described homogenous environmental family. The parameters used to calculate the coefficients according to the rules of extrapolation required in PSR-0014-ed2.0-EN-2023 07 13 are listed in Table 14 and the range of variations for the products in the same family are listed in Table 4.

Table 4: The range of variations for the products in the same family

Parameter	Value for the reference product	Minimum value in product range	Maximum value in product range
Power (W)	18/25/29/31	18/25/29	18/25/29/31
Lumen (lm)	2800-3600-4200-4400	2800-3600-4200	2800-3600-4200-4400
Weight of luminaire (g)	2125.4	1608.25	2375
Weight of packaging (g)	932.97	932.97	952.97
Theoretical coefficient of energy saving	0.5	0.5	1

2.1 Overview

Table 5: Product composition

Information	Weight [in kg]	Share [in %]
Product	2.130	69.54
Packaging	0.933	30.46

2.2 Product

Table 6: Material composition – Product

Information	Weight [in kg]	Share [in %]
Metals	1.180	55.42
Plastics	0.783	36.76
Others	0.167	7.82

2.3 Packaging

Table 7: Material composition – Packaging

Information	Weight [in kg]	Share [in %]
Paper/board	0.785	84.19
Plywood	0.138	14.74
Plastics	0.010	1.07



3.1 Manufacturing

The manufacturer acquires all parts from suppliers. At the manufacturing site located in China, the manufacturer fabricated Printed Circuit Board Assembly through surface mounting and hole-through mounting processes from the Printed Circuit Board by utilizing energy and auxiliaries. Subsequently, the product was assembled and tested with the application of energy. In the end, the product is packaged in packaging materials and distributed to the client.



3.2 Distribution

The main market for product is Europe and there is no specific data are available. For this reason, an intercontinental transport from China to the arrival of the product at the place of use following PCR-ed4-EN-2021 09 06 is considered in the model.

Ship: 19,000 km

Lorry: 1000 km



3.3 Installation

During the installation process, product testing lasts for 0.1 hours and consumes 0.0031 kWh of electricity. No material input is required for installation. The end-of-life scenario of packaging materials was utilized in accordance with PSR-0014-ed2.0-EN-2023 07 13. The transportation of packaging materials follows PSR-0014-ed2.0-EN-2023 07 13.

Lorry: 100 km



3.4 Use stage

The product has no direct emissions, and no maintenance is required. Given that the assigned lifetime of the integrated LED module is 50,000 Hours, which is the same as that of the RECESSED LED LUMINAIRE, no light sources need replacement. Furthermore, no standard repairs or refurbishments are anticipated. The use of the product consumes electricity, but no water.

The Recessed LED luminaire of Siella G8 M84 PW19 28-44/4ML-840 ETDD can be connected via DALI, which has a light management function in accordance with PSR-0014-ed2.0-EN-2023 07 13. The energy saving coefficients as per Table 5 in PSR-0014-ed2.0-EN-2023 07 13 shall be applied.

The market of the product is Europe, and the distribution ratio by country/region is as follows:

Country/Region	Share (%)	Energy model
Germany	46	Electricity, low voltage {DE} market for electricity, low voltage Cut-off, S
France	36	Electricity, low voltage {FR} market for electricity, low voltage Cut-off, S
Poland	2	Electricity, low voltage {PL} market for electricity, low voltage Cut-off, S
Spain	2	Electricity, low voltage {ES} market for electricity, low voltage Cut-off, S
Netherland	2	Electricity, low voltage {NL} market for electricity, low voltage Cut-off, S
Austria	3	Electricity, low voltage {AT} market for electricity, low voltage Cut-off, S
Great Britain	2	Electricity, low voltage {GB} market for electricity, low voltage Cut-off, S
Other countries in EU	7	Electricity, low voltage {RER} market group for Cut-off, S



3.5 End of life

There is no specific data available to calculate the shipment of product from the installation site to the approved treatment centers. The default distance is 1000 km by lorry was used according to PCR-ed4-EN-2021 09 06.

The product and its PCB falls under the Waste from Electrical and Electronic Equipment (WEEE) directive 2012/19/EU. The valuable fractions (Aluminum, Steel and Plastics, etc.) are recycling within the default recycling recovering rate established in EN 50693. The remaining parts, based on mass balance, are sent to sanitary landfill.

3.6 Benefits and loads beyond the system boundaries

The reuse/recycling of the product (incl. packaging) and incineration with energy recovery generates environmental benefits by avoiding the production of primary materials or energy. The scope of the Module D is With Net Benefits and the net benefits and loads beyond the system boundaries are calculated using the formulas described in PCR-ed4-EN-2021 09 06. The amount and type of material flows used for the calculation of benefits are listed in Table 8.

Table 8: Material flows for reuse, recycling and/or recovery per unit of product (declared unit, 4400 lumens during a lifetime of 50000 hours)

Information	Unit	Value
Total weight of product going into reuse	kg	0.000
Total weight of product going into recycling	kg	1.079
Share of metals	%	84.98
Share of plastics	%	11.62
Share of others	%	3.40
Total weight of product going into incineration with energy recovery	kg	0.329
Share of metals	%	0.0
Share of plastics	%	100.0
Share of others	%	0.0
Total weight of packaging going into reuse	kg	0.138
Total weight of packaging going into recycling	kg	0.648
Share of Paper/board	%	99.4
Share of Plastics	%	0.06
Total weight of packaging going into incineration with energy recovery	kg	0.074
Share of Paper/board	%	95.0
Share of Plastics	%	5.0

4.1 Introduction

The Recessed LED luminaire evaluated in this PEP are in lined with EN 60598-1.

The primary data collected were representative of a current scenario in terms of geographical coverage and technological, which coverage averaged 3 months. The environmental information included in this study cover all the stages of the life cycle ("cradle to grave"). The life cycle be divided into manufacturing stage (A1-A3), distribution stage (A4), installation stage (A5), use stage (B1-B7, the value of B1-B7 except B6 are 0 and not reflected in the table 9 and table 11), End-of-life stage (C1-C4) and benefits and loads beyond the system boundaries stage (D). The results refer to the core environmental impact indicators and mandatory indicators describing resource use, waste categories, and output flows according to PCR-ed4-EN-2021 09 06.

The environmental impacts assessment of the reference product has been performed using Simapro 9.5 software. Background datasets have been retrieved from Ecoinvent 3.9.1. The results refer to the core environmental impact indicators and mandatory indicators describing resource use, waste categories, and output flows according to PCR-ed4-EN-2021 09 06.

4.2 Results per functional unit

The following results of the environmental declaration have been developed by considering an outgoing artificial luminous flux of 1000 lumens over a reference lifetime of 35000 hours.

Table 9: Results core environmental impact indicators per functional unit

Impact category	Unit	Total	Manufacturing			Distribution	Installation
			A1	A2	A3		
GWP-total	kg CO ₂ eq	4.24E+01	2.89E+00	5.18E-02	7.15E-02	1.48E-01	3.28E-02
ODP	kg CFC11 eq	8.48E-07	2.06E-07	8.02E-10	1.51E-10	2.26E-09	1.53E-10
POCP	kg NMVOC eq	9.70E-02	1.15E-02	3.00E-04	2.61E-03	2.40E-03	7.65E-05
AP	mol H ⁺ eq	1.74E-01	1.96E-02	2.22E-04	3.80E-04	3.02E-03	5.01E-05
EP-freshwater	kg P eq	4.67E-02	1.51E-03	4.12E-06	1.38E-05	7.28E-06	1.38E-06
EP-marine	kg N eq	3.66E-02	3.20E-03	8.16E-05	7.82E-05	7.81E-04	4.08E-05
EP-terrestrial	mol N eq	3.08E-01	3.20E-02	8.73E-04	8.34E-04	8.61E-03	1.94E-04
WDP	m ³ depriv.	5.97E+00	5.43E-01	3.21E-03	8.01E-03	6.51E-03	8.69E-04
ADPF	MJ	1.11E+03	3.80E+01	7.17E-01	6.72E-01	1.90E+00	1.30E-01
ADPE	kg Sb eq	7.61E-04	1.79E-04	1.63E-07	2.82E-07	2.29E-07	4.21E-08
GWP-fossil	kg CO ₂ eq	4.17E+01	2.83E+00	5.18E-02	7.15E-02	1.48E-01	1.10E-02
GWP-biogenic	kg CO ₂ eq	6.19E-01	4.86E-02	1.68E-05	1.43E-05	3.89E-05	2.19E-02
GWP-lulut	kg CO ₂ eq	6.52E-02	5.41E-03	2.66E-05	2.82E-05	9.88E-05	4.80E-06
							Benefits and loads beyond the system boundaries stage
Impact category	Unit	Use	End of life				
		B6	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	3.87E+01	1.08E-01	3.59E-02	2.84E-01	8.75E-02	-1.31E+00
ODP	kg CFC11 eq	6.32E-07	1.85E-10	7.69E-10	5.70E-09	4.07E-11	-2.11E-08
POCP	kg NMVOC eq	7.86E-02	8.86E-05	2.20E-04	1.21E-03	4.24E-05	-4.93E-03
AP	mol H ⁺ eq	1.47E-01	1.19E-04	1.45E-04	3.21E-03	1.97E-05	-7.56E-03
EP-freshwater	kg P eq	4.49E-02	8.81E-06	2.50E-06	2.85E-04	1.83E-06	-7.83E-04
EP-marine	kg N eq	3.18E-02	3.41E-05	5.50E-05	3.41E-04	2.05E-04	-1.47E-03
EP-terrestrial	mol N eq	2.61E-01	3.23E-04	5.87E-04	3.53E-03	5.58E-05	-1.46E-02
WDP	m ³ depriv.	5.31E+00	4.56E-03	2.49E-03	8.97E-02	1.38E-03	-2.97E-01
ADPF	MJ	1.06E+03	2.41E-01	5.14E-01	3.87E+00	3.94E-02	-1.55E+01
ADPE	kg Sb eq	5.51E-04	1.55E-07	9.49E-08	2.98E-05	7.20E-09	-3.90E-05
GWP-fossil	kg CO ₂ eq	3.81E+01	1.08E-01	3.59E-02	2.74E-01	7.07E-03	-1.29E+00
GWP-biogenic	kg CO ₂ eq	4.59E-01	5.35E-05	1.30E-05	9.37E-03	8.04E-02	-1.03E-02
GWP-lulut	kg CO ₂ eq	5.93E-02	3.76E-05	1.67E-05	3.32E-04	2.52E-06	-2.45E-03

Acronyms: GWP-total=Global Warming Potential total; GWP-biogenic=Global Warming Potential biogenic; GWP-fossil=Global Warming Potential fossil; GWP-lulut=Global Warming Potential land use and land use transformation; 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 resource deprivation.

Table 10: Results of mandatory indicators per functional unit

Indicators	Unit	Value
Renewable primary energy (without raw material)	MJ	1.96E+02
Renewable primary energy (raw material)	MJ	2.87E+00
Total use of renewable primary energy	MJ	1.99E+02
Non-renewable primary energy (without raw material)	MJ	1.10E+03
Non-renewable primary energy (raw material)	MJ	4.90E+00
Total use of non-renewable primary energy	MJ	1.11E+03
Use of secondary materials	kg	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00
Net use of fresh water	m ³	5.27E-01
Hazardous waste disposed	kg	1.75E-05
Non-hazardous waste disposed	kg	1.26E-01
Radioactive waste disposed	kg	0.00E+00
Components for reuse	kg	2.19E-02
Materials for recycling	kg	2.78E-01
Materials for energy recovery	kg	6.41E-02
Exported energy	MJ	0.00E+00
Biogenic carbon content of the product	kg of C	0.00E+00
Biogenic carbon content of the associated packaging	kg of C	7.34E-02

4.3 Results per unit of product

The following results of the environmental declaration have been developed by considering one product (outgoing artificial luminous flux of 4400 lumens over a declared lifetime of 50000 hours).

Table 11: Results core environmental impact indicators per unit of product (declared unit, 4400 lumens during a lifetime of 50000 hours)

(allocated unit), 1000 tonnes during a lifetime of 50000 hours							
Impact category	Unit	Total	Manufacturing			Distribution	Installation
			A1	A2	A3	A4	A5
GWP-total	kg CO ₂ eq	2.66E+02	1.82E+01	3.26E-01	4.50E-01	9.32E-01	2.07E-01
ODP	kg CFC11 eq	5.33E-06	1.29E-06	5.04E-09	9.51E-10	1.42E-08	9.65E-10
POCP	kg NMVOC eq	6.10E-01	7.22E-02	1.89E-03	1.64E-02	1.51E-02	4.81E-04
AP	mol H+ eq	1.09E+00	1.23E-01	1.40E-03	2.39E-03	1.90E-02	3.15E-04
EP-freshwater	kg P eq	2.94E-01	9.51E-03	2.59E-05	8.67E-05	4.58E-05	8.66E-06
EP-marine	kg N eq	2.30E-01	2.01E-02	5.13E-04	4.92E-04	4.91E-03	2.56E-04
EP-terrestrial	mol N eq	1.94E+00	2.01E-01	5.49E-03	5.25E-03	5.42E-02	1.22E-03
WDP	m³ depriv.	3.76E+01	3.42E+00	2.02E-02	5.04E-02	4.09E-02	5.47E-03
ADPF	MJ	6.97E+03	2.39E+02	4.51E+00	4.23E+00	1.19E+01	8.19E-01
ADPE	kg Sb eq	4.78E-03	1.13E-03	1.02E-06	1.77E-06	1.44E-06	2.65E-07
GWP-fossil	kg CO ₂ eq	2.62E+02	1.78E+01	3.26E-01	4.50E-01	9.31E-01	6.89E-02
GWP-biogenic	kg CO ₂ eq	3.90E+00	3.06E-01	1.05E-04	8.99E-05	2.45E-04	1.38E-01
GWP-lulut	kg CO ₂ eq	4.10E-01	3.40E-02	1.67E-04	1.77E-04	6.21E-04	3.02E-05
							Benefits and loads beyond the system boundaries stage
Impact category	Unit	Use	End of life				
		B6	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.43E+02	6.77E-01	2.26E-01	1.78E+00	5.50E-01	-8.22E+00
ODP	kg CFC11 eq	3.97E-06	1.17E-09	4.84E-09	3.58E-08	2.56E-10	-1.33E-07
POCP	kg NMVOC eq	4.94E-01	5.57E-04	1.39E-03	7.59E-03	2.66E-04	-3.10E-02
AP	mol H+ eq	9.25E-01	7.47E-04	9.12E-04	2.02E-02	1.24E-04	-4.76E-02
EP-freshwater	kg P eq	2.82E-01	5.54E-05	1.57E-05	1.79E-03	1.15E-05	-4.93E-03
EP-marine	kg N eq	2.00E-01	2.14E-04	3.46E-04	2.14E-03	1.29E-03	-9.25E-03
EP-terrestrial	mol N eq	1.64E+00	2.03E-03	3.69E-03	2.22E-02	3.51E-04	-9.18E-02
WDP	m³ depriv.	3.34E+01	2.87E-02	1.57E-02	5.64E-01	8.70E-03	-1.87E+00
ADPF	MJ	6.68E+03	1.51E+00	3.23E+00	2.44E+01	2.48E-01	-9.73E+01
ADPE	kg Sb eq	3.46E-03	9.72E-07	5.97E-07	1.87E-04	4.53E-08	-2.45E-04
GWP-fossil	kg CO ₂ eq	2.40E+02	6.76E-01	2.26E-01	1.72E+00	4.45E-02	-8.14E+00
GWP-biogenic	kg CO ₂ eq	2.89E+00	3.37E-04	8.15E-05	5.89E-02	5.06E-01	-6.46E-02
GWP-lulut	kg CO ₂ eq	3.73E-01	2.37E-04	1.05E-04	2.09E-03	1.58E-05	-1.54E-02

Acronyms: GWP-total=Global Warming Potential total; GWP-biogenic=Global Warming Potential biogenic; GWP-fossil=Global Warming Potential fossil; GWP-lulut=Global Warming Potential land use and land use transformation; 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 resource deprivation.

Table 12: Results of mandatory indicators per unit of product (declared unit, 4400 lumens during a lifetime of 50000 hours)

Indicators	Unit	Value
Renewable primary energy (without raw material)	MJ	1.23E+03
Renewable primary energy (raw material)	MJ	1.80E+01
Total use of renewable primary energy	MJ	1.25E+03
Non-renewable primary energy (without raw material)	MJ	6.94E+03
Non-renewable primary energy (raw material)	MJ	3.08E+01
Total use of non-renewable primary energy	MJ	6.97E+03
Use of secondary materials	kg	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00
Net use of fresh water	m ³	3.32E+00
Hazardous waste disposed	kg	1.10E-04
Non-hazardous waste disposed	kg	7.95E-01
Radioactive waste disposed	kg	0.00E+00
Components for reuse	kg	1.38E-01
Materials for recycling	kg	1.75E+00
Materials for energy recovery	kg	4.03E-01
Exported energy	MJ	0.00E+00
Biogenic carbon content of the product	kg of C	0.00E+00
Biogenic carbon content of the associated packaging	kg of C	4.61E-01

5 Extrapolation coefficients to a homogeneous environmental family

The extrapolation coefficients at product level (declared unit) are listed in table 13 and the parameters of homogeneous environmental family was used in rules of extrapolation are listed in table 14.

Table 13: The extrapolation coefficients at product level (declared unit)

Product name	Manufacturing stage	Distribution stage	Installation stage	Use stage	End of life stage	Module D
10312515 Siella G8 M84 PW19 28-44/4ML-840 ETDD	1.000	1.000	1.000	1.000	1.000	1.000
10312502 Siella G8 M73 DW 28-40/3ML-8MC ET	0.962	0.918	1.021	1.871	0.872	0.971
10312516 Siella G8 M73 DW 28-40/3ML-8MC ET X2	0.979	0.937	1.021	1.871	0.901	0.986
10312503 Siella G8 M73 DW 28-44/4ML-8MC ETDD	0.966	0.923	1.021	1.000	0.879	0.976
10312517 Siella G8 M73 DW 28-44/4ML-8MC ETDD X1	1.020	0.984	1.021	1.000	0.967	1.022
10312504 Siella G8 M73 PW19 28-40/3ML-8MC ET	1.055	1.022	1.021	1.871	1.023	1.055
10312518 Siella G8 M73 PW19 28-40/3ML-8MC ET X2	1.073	1.042	1.021	1.871	1.051	1.073
10312505 Siella G8 M73 PW19 28-44/4ML-8MC ETDD	1.059	1.027	1.021	1.000	1.030	1.059
10312519 Siella G8 M73 PW19 28-44/4ML-8MC ETDD X1	1.114	1.088	1.021	1.000	1.117	1.115
10312506 Siella G8 M73 PW19 28-40/3ML-840 ET	0.941	0.940	1.021	1.871	0.905	0.944
10312520 Siella G8 M73 PW19 28-40/3ML-840 ET X2	0.974	0.973	1.021	1.871	0.952	0.975
10312507 Siella G8 M73 PW19 28-44/4ML-840 ETDD	0.839	0.837	1.021	1.000	0.757	0.860
10312521 Siella G8 M73 PW19 28-44/4ML-840 ETDD X1	0.899	0.898	1.021	1.000	0.844	0.907
10312508 Siella G8 M46 PW19 28-40/3ML-8MC ET	1.078	1.049	1.021	1.871	1.061	1.078
10312509 Siella G8 M46 PW19 28-44/4ML-8MC ETDD	1.074	1.044	1.021	1.000	1.053	1.074
10312510 Siella G8 M84 DW 28-40/3ML-8MC ET	0.969	0.926	1.000	1.871	0.893	0.975
10312511 Siella G8 M84 DW 28-44/4ML-8MC ETDD	0.973	0.931	1.000	1.000	0.901	0.979
10312512 Siella G8 M84 PW19 28-40/3ML-8MC ET	1.065	1.034	1.000	1.871	1.049	1.065
10312513 Siella G8 M84 PW19 28-44/4ML-8MC ETDD	1.069	1.039	1.000	1.000	1.056	1.069
10312514 Siella G8 M84 PW19 28-40/3ML-840 ET	0.996	0.995	1.000	1.871	0.993	0.996

Note: The extrapolation coefficients are intended at product level (declared unit) and not at functional unit, and the extrapolation coefficients at functional unit level shall be taken into account with the following formula:

Extrapolation coefficient at the product level x Lighting output of reference product (lumens)/ Lighting output of concerned product (lumens)

5 Extrapolation coefficients to a homogeneous environmental family

Table 14: The parameters of homogeneous environmental family was used in rules of extrapolation

Product name	Power (W)	Lumen (lm)	Weight of product (g)	Weight of packaging (g)	Weight of luminaire structure (g)	Weight of power equipment (g)	Weight of light source (g)
10312515 Siella G8 M84 PW19 28-44/4ML-840 ETDD	18-25-29-31	2800-3600-4200-4400	2125.400	932.970	1925.000	94.100	106.300
10312502 Siella G8 M73 DW 28-40/3ML-8MC ET	18-25-29	2800-3600-4200	1854.010	952.970	1565.000	79.110	209.900
10312516 Siella G8 M73 DW 28-40/3ML-8MC ET X2	18-25-29	2800-3600-4200	1914.010	952.970	1625.000	79.110	209.900
10312503 Siella G8 M73 DW 28-44/4ML-8MC ETDD	18-25-29-31	2800-3600-4200-4400	1869.000	952.970	1565.000	94.100	209.900
10312517 Siella G8 M73 DW 28-44/4ML-8MC ETDD X1	18-25-29-31	2800-3600-4200-4400	2055.000	952.970	1751.000	94.100	209.900
10312504 Siella G8 M73 PW19 28-40/3ML-8MC ET	18-25-29	2800-3600-4200	2174.010	952.970	1885.000	79.110	209.900
10312518 Siella G8 M73 PW19 28-40/3ML-8MC ET X2	18-25-29	2800-3600-4200	2234.010	952.970	1945.000	79.110	209.900
10312505 Siella G8 M73 PW19 28-44/4ML-8MC ETDD	18-25-29-31	2800-3600-4200-4400	2189.000	952.970	1885.000	94.100	209.900
10312519 Siella G8 M73 PW19 28-44/4ML-8MC ETDD X1	18-25-29-31	2800-3600-4200-4400	2375.000	952.970	2071.000	94.100	209.900
10312506 Siella G8 M73 PW19 28-40/3ML-840 ET	18-25-29	2800-3600-4200	1923.260	952.970	1740.000	79.110	104.150
10312520 Siella G8 M73 PW19 28-40/3ML-840 ET X2	18-25-29	2800-3600-4200	2023.260	952.970	1840.000	79.110	104.150
10312507 Siella G8 M73 PW19 28-44/4ML-840 ETDD	18-25-29-31	2800-3600-4200-4400	1608.250	952.970	1410.000	94.100	104.150
10312521 Siella G8 M73 PW19 28-44/4ML-840 ETDD X1	18-25-29-31	2800-3600-4200-4400	1794.250	952.970	1596.000	94.100	104.150
10312508 Siella G8 M46 PW19 28-40/3ML-8MC ET	18-25-29	2800-3600-4200	2254.000	952.970	1950.000	94.100	209.900
10312509 Siella G8 M46 PW19 28-44/4ML-8MC ETDD	18-25-29-31	2800-3600-4200-4400	2239.010	952.970	1950.000	79.110	209.900
10312510 Siella G8 M84 DW 28-40/3ML-8MC ET	18-25-29	2800-3600-4200	1899.010	932.970	1610.000	79.110	209.900
10312511 Siella G8 M84 DW 28-44/4ML-8MC ETDD	18-25-29-31	2800-3600-4200-4400	1914.000	932.970	1610.000	94.100	209.900
10312512 Siella G8 M84 PW19 28-40/3ML-8MC ET	18-25-29	2800-3600-4200	2229.010	932.970	1940.000	79.110	209.900
10312513 Siella G8 M84 PW19 28-44/4ML-8MC ETDD	18-25-29-31	2800-3600-4200-4400	2244.000	932.970	1940.000	94.100	209.900
10312514 Siella G8 M84 PW19 28-40/3ML-840 ET	18-25-29	2800-3600-4200	2110.410	932.970	1925.000	79.110	106.300

