PHILIPS

Pacific LED gen5

Product declaration

LIFE CYCLE ASSESSMENT REPORT

Pacific LED gen5

as per ISO 14021, based on ISO 14040/14044

Pacific LED gen5 is an innovative and best-in-class LED waterproof luminaire that is praised for its optimal performance. It meets the demanding requirements of contemporary and harsh industries. It is a very robust, compact and reliable luminaire with excellent quality of light. With a high degree of mechanical (IK08), water and dust protection (IP66), combined with proven chemical resistance, the Pacific LED gen5 can perfectly withstand the harsh conditions of the automotive, food and heavy industries. But it also performs well in parking garages and warehouses.

Pacific LED gen5 luminaires provide superior, artefact-free light quality and homogeneous light, offered with multiple optics and broad range of light outputs (up to 15,000 lm). This ensures more flexibility in optimized light scheme planning. They are also designed with a circular approach, which means these fully-serviceable luminaires can be upgraded to extend their overall lifecycle.

The luminaires stand out because of their quick and easy installation that facilitates through wiring and various connection and mounting options. But also, because of their attractive TCO, energy efficiency, and ease of maintenance – with minimum of disruption to operations in demanding applications.
To make the Pacific LED gen5 even more complete, system integration with Interact Industry opens up additional opportunities for optimized efficiency, energy savings, improved light management, productivity, and safety. Making it future proof in every aspect.

Product

Product family description

Family's technical features include:
• Highly energy efficient and long lifetime: up to 160 lm/W and lifetime up to 100,000 hrs L80.
• Wide application coverage with extensive lumen output (up to 15000 lumen) and optics choice, combined with high quality chemical-resistant materials.
• Robust and compact product architecture, with high water and dust protection (IP66), combined with a high degree of mechanical protection (IK08).
• High uniformity, glare control and artefact-free light distributions.
• Hassle-free installation and maintenance.

Product family range

The Pacific LED gen5 family includes 1500 products configurations, the assembly of the products is implemented on manufacturing site of Signify Poland sp. z o.o. (Kętrzyn, Poland). Manufacturing site of the product has achieved carbon neutrality as of 2019. The EPD does not present the assessment of the impacts of the whole range, and focused on representation through the most probable worst case scenario rather than through average impacts with assessment of deviations. This approach is based on the Signify developed EPD framework.

Representative product

Pacific LED gen5 WT490C LED150S/840 PSD WB ELD3 PI7 L1800 is chosen as a representative product for the family as the luminaire with the highest power consumption over the lifetime, with inclusion of an emergency power supply module. Based on multiple LCA studied of the LED based luminaires, it is defined that the use stage (and electricity consumption in particular) tends to contribute the majority of the life-cycle impacts. Thus, a product with the largest power consumption over the lifetime in the family is most likely to have largest impacts, and thus present a worst case. That choice of a product aligns with pessimistic assumptions and precautionary principle in view of the task to represent other products in the family. This approach is based on the Signify developed EPD framework.

Product application

The luminaires of the family are designed for a broad range of applications such as parking garages, cold storage facilities, industrial halls, manufacturing facilities (sensitive as well as discrete processing).

Technical Data

The system comprises a set of modules that are the key building blocks for a luminaire. A typical application has the following technical features:
• 1x PC tube - housing
• 2x PC end caps + 1x cable gland
• 1x metal gear tray, containing
• 1x Xitanium driver
• LED boards (6x2ft)
• 1x Trustsight Emergency module and batteries
• internal connectors
• cables (wiring)
• metal brackets and fasteners

Delivery status

Product weight: 4,41 kg (including 0,62 kg packaging), dimensions of the packed product: 1970mm*110mm*80mm

Driver:

i.	Type	Xitanium 100W 0.25-0.7A 220V TD16 230V
ii.	Failure rate (max % @lifetime)	10%
iii.	Dimensions, mm	360 x 30 x 16

LED board

i.	Type	LBA SlimS 2ft 1700lm 840 H9 D
ii.	Dimension board, mm	560 x 20
iii.	Amount of PCBA per luminaire	6
iv.	Number of LEDs per PCBA	36

Constructional data

Name	Value	Unit
Dimensions	1810x96x80	Mm*mm*mm
Luminous flux	15000	lm
Luminous efficacy	149	Lm/W
Radiation angle	120	Deg
Colour temperature	4000	K

Base materials/Ancillary materials

Materials	Mass, kg
Plastics / PC (Polycarbonate)	1,148
Metals / Steel Painted	1,13
Packaging / Paper	0,61
Metals / Steel	0,57
Electric Comp's / Electronic ballasts with connectors	0,34
Electric Comp's / PCBA without cables	0,20
Batteries / Lithium-ion	0,20
Electric Comp's / Cables PVC	0,06
Metals / Stainless Steel	0,06
Electric Comp's / Connectors	0,05
LEDs/ LEDs (general)	0,02
Plastic / PVC flexible	0,01
Packaging / Labels , ink, adhesives	0,01
Plastic / Silicone	0,01
Product weight (including packaging):	**4,41 kg**

Manufacturing
Complete luminaire is assembled in Ketrzyn, Poland. Mechanical parts are supplied from Poland (metal parts, gear trays) and Hungary (PC tube, end caps), drivers and LED boards are supplied from Pila, Poland, Batteries of the emergency module are supplied from China.

Product processing/Installation
Product can be mounted on the ceiling or on the wall.

Packaging
0,62 kg, including cardboard box, paper-printed instructions, and plastic wrapping.

Condition of use
Luminaire is designed for indoor use, outdoor can be installed only under the canopy. Luminaire can be exposed to chemical substances (e.g. sensitive processing like food, pharma, automotive-tires), but can also be applied in discrete manufacturing thanks to its “clean” and compact design, which does not contain any loose parts. Indoor condition - temperatures from - 25 C deg up to 45 C deg. Applications may apply dimming or lighting controls (InterAct) to allow further energy savings.
Product is used in the European market context and assumed to use average European electricity mix.

Environment and health during use
The product is compliant with CE, European ENEC certificate, ROHS directive, REACH regulation, EMC compliancy.

Reference service life
The RSL is established as 75 000 hours operation, the equivalent of 18,75 years operation in a manufacturing sites application (4000 hours per year).

End of life
In the European Union, luminaires fall within the scope of the WEEE directive. Efforts are made to improve collection, reuse and recycling of the product mainly via collective Collection & Recycling Service Organizations (CRSOs). In the end of life, the luminaire is 85% collected and disassembled. The collected parts are disassembled and steel, aluminium, glass, electronic parts, and cables are sent to recycling. Batteries are collected and sent to treatment. The quantitative assessments are based on a material split and respective recycling rates. Non-collected and non-recycled after disassembly content is disposed to the municipal waste stream where it undergoes separation, preparation and treatment according to the average European statistics. Waste generated in installation and parts replacement are 100% collected and sent to respective treatment.

Extraordinary effects
• Fire: effects of fire can lead to emissions of PBDD/F (brominated compounds).
• Water: no known impacts on the environment following unforeseeable influence of water, e.g. flooding.
• Mechanical destruction: no known impacts on the environment following unforeseeable mechanical destruction.

Calculation rules

Declared unit

Declared product	Value	Declared unit
WT490C LED150S/840 PSD WB ELD3 PI7 L1800	Unit	1 piece

The declared unit is a luminaire with aluminium housing, 1 driver, 6 LED boards, emergency module, cables, and other plastic, and metal constructive components totalling a weight of 3 788 grams excluding packaging, providing a luminous flux of 15 000 lm, including luminaire losses. The luminaire, provides sufficient light for a typical office application, operated in a European context for 75 000 hours.

System boundary

Cradle to gate with options
Modules A1-A3 include: raw material extraction, processing, energy and materials and manufacture of modules and packaging. The following scenarios are also included:

- Transport to installation (A4);
- Disposal of packaging materials (A5);
- Replacement of driver, LED boards, the PC tube and the metal bracket (10% rate) (B4);
- Operational energy use (B6);
- Transport to end of life (C2);
- Waste processing (C3);
- Final disposal for WEEE fraction not recycled (C4).

Benefits and loads beyond system boundary:
Recycling of cardboard packaging, electronics, cables, aluminium, steel elements of luminaire. (D)

Estimates and assumptions

Background data are used for suppliers' specific processes. Foreground data are used for the assembly of the lighting unit in regards to the components of the luminaire (system). When necessary, generic data was generated based on averaging the data of multiple products of the same category. Data on collection and recycling are based on data of the generic European statistics. The end of life scenario assumes recycling of the separated materials, but does not include energy recovery from incineration of the waste. Representation of the family is assumed on the worst case scenario with largest power consumption over the lifetime, and is not compliant with EN15804+A1.

Cut-off criteria

Where no data was available, items that represent less than 1% of the total product weight were neglected. No excluded flows were of any known particular environmental concern.

Background data

Necessary background data are sourced from the Signify database and the Ecoinvent database v3.7.1

Data quality

Specific data used is less than 5 years old. Background data is geographically representative of the production location, and is less than 10 years old.

Period under review

The period under review is the year 2021 for the product composition, RSL, and product performance and characteristic, year 2019 for the energy and material consumption at the assembly factory.

Allocation

Avoided burden approach is applied to allocation of recycled and/or secondary raw materials, as well as loads and benefits beyond the system boundary from material recycling. No loads and benefits beyond the system boundary from energy recovery in the end of life of the product or packaging is included. Energy consumption, material and waste generation at the manufacturing site not attributed to bill of materials of the products, is allocated by partitioning, on the basis of units produced.

Comparability

A comparison or an evaluation of the presented data is only possible if the data to be compared were created according to the Signify/Philips lighting framework and the building context, respectively the product specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

Transport to the site (A4)

Name	Value	Unit
Transport distance	1200	Km
Transport mode	truck, unspecified generic	-
Capacity utilisation incl. empty runs	45	%
Bulk density of transported product	254	kg/m3

Installation at the site (A5)

Name	Value	Unit
Packaging waste	0.62	kg

Reference service life

Name	Value	Unit
Reference service life	18,75	Years
Operating hours per year	4000	Hours
Quality of work	L90B50	-
Environment of operation	Ambient temperature from 25oC up to 40oC. The luminaire can be exposed to chemical substances (e.g. sensitive processing like food, pharma, automotive-tires), but can also be applied in discrete manufacturing	-
Usage conditions	indoor	-

Repair (B3)

Name	Value 1	Value 2	Value 3	Value 4	Value 5	Unit
Repair process	Replacement of the driver (main/ emergency module)	Replacement of the LED boards	Replacement of the tube	Replacement of the bracket	Replacement of the batteries	-
Repair cycle	0,1	0,1	0,1	0,1	2,1	Number/RSL
Resources	0,34	0,22	0,92	0,28	0,2	kg
Transportation distance	4,8	4,8	4,8	4,8	4,8	Km
Transportation mode	Van	Van	Van	Van	Van	-

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	7189	kWh
Equipment output	100,9	W

End of life (C1-C4)

Name	Value	Unit
Collected separately	3,21	kg
Sent to recycling	2,14	kg
Sent to energy recovery	0,59	kg
Sent to landfilling	1,06	kg
Transportation distance from point of use to collection and sorting point	30	km
Transportation distance from collection point to recycling	100	km
Transportation distance from collection point to incineration and landfilling	30	km
Mode of transportation	Truck, unspecified	-

LCA Results

Description of the system boundary (X = included in lca; MND = module not declared; MNR = module not relevant)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundarys
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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	MNR	X	MNR	X	MND	MND	X	X	X	X

Results of the LCA - environmental impact

Parameter	Unit	A1-A3	A4	A5	B4	B6	C2	C3	C4	D
GWP	[kg CO2Eq.]	9,0E+01	6,9E-01	4,9E-02	2,4E+01	3,0E+03	4,9E-02	1,6E-01	3,1E+00	-5,1E+00
ODP	[kg CFC11Eq]	5,4E-05	1,3E-07	4,6E-09	2,9E-06	1,7E-04	9,1E-09	1,3E-08	9,2E-09	-1,1E-06
AP	[kg SO2Eq.]	4,7E-01	2,9E-03	2,2E-04	1,1E-01	1,4E+01	2,1E-04	9,0E-04	6,0E-04	-3,3E-02
EP	[kg (PO4)3Eq]	8,3E-02	5,5E-04	3,3E-05	1,8E-02	1,9E-00	3,9E-05	1,7E-04	2,5E-04	-5,9E-03
POCP	[kg Ethen Eq.]	3,0E-02	9,3E-05	1,2E-05	5,9E-03	5,6E-03	8,3E-06	4,9E-05	3,4E-05	-2,2E-03
ADPE	[kg Sb Eq.]	2,1E-02	2,2E-06	1,8E-06	3,4E-03	2,7E-02	1,3E-07	4,2E-06	7,9E-06	-2,6E-03
ADPF	[MJ]	9,9E+02	1,0E+01	6,2E-01	3,0E+02	3,4E+04	7,5E-01	1,8E+00	8,6E-01	-7,0E+01
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources									

Results of the LCA - resource use

Parameter	Unit	A1-A3	A4	A5	B4	B6	C2	C3	C4	D
PERE	[MJ]	1,2E+02	1,5E-01	7,2E-02	2,1E+01	1,2E+04	8,6E-03	2,4E-01	2,2E-01	-6,3E+00
PERM	[MJ]	1,5E+01	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	-1,0E+01
PERT	[MJ]	1,3E+02	1,5E-01	7,2E-02	2,1E+01	2,1E+04	8,6E-03	2,4E-01	2,2E-01	-1,6E+01
PENRE	[MJ]	1,1E+03	1,1E+01	7,3E-01	3,5E+02	6,6E+04	8,1E-01	2,3E+00	9,5E-01	-5,5E+01
PENRM	[MJ]	1,5E+02	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	-2,8E+01
PENRT	[MJ]	1,2E+03	1,1E+01	7,3E-01	3,5E+02	6,6E+04	8,1E-01	2,3E+00	9,5E-01	-8,3E+01
SM	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
RSF	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
NRSF	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
FW	[m3]	IND	IND	IND	IND	IND	IND	IND	IND	IND
Caption	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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Results of the LCA – output flows and waste categories

Parameter	Unit	A1-A3	A4	A5	B4	B6	C2	C3	C4	D
HWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
NHWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
RWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
CRU	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
MFR	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	2,14
MER	[kg]	IND	IND	IND	IND	IND	IND	IND	0,59	IND
EEE	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
EET	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
Caption	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 electrical energy; EEE = Exported thermal energy									

Not all background datasets support the methodical approach of the water and waste indicators. The value of the indicator is therefore subject to greater uncertainty. These indicators are thus not declared. IND is used in cases where the inventory does not support the methodological approach or the calculation of the specific indicator.

The life cycle impact assessment by stage (contribution analysis) is illustrated in the picture on the right:

Use phase of the product associated with electricity consumption for lighting (stage B6 on the chart), and along with sourcing and processing of the raw materials (stage A1-A3 on the chart) have the highest and most significant contribution to the overall environmental impacts of the product over its life cycle. In particular, impacts in global warming potential (GWP), acidification potential (AP), eutrophication potential (EP), photochemical ozone formation potential (POCP), and abiotic depletion potential (fossil) (APDF) categories are dominated by the use phase and could be attributed to generation of electricity used by the luminaire. Abiotic depletion potential (elements) (ADPE) impacts are significant also for the raw materials sourcing and production stage. The impact to the ADPE is mostly due to extraction of virgin materials used to make electric components (such as gold, silver, copper and zinc), as well as due to extraction and production of steel used in the housing. The raw materials sourcing stage has also significant impacts in ozone depletion potential, which could be attributed to sourcing temperature-resistant polymers. End of life of the product has a marginal contribution to the reduction of overall impacts in all categories apart from ADPE. There, recycling in the end of life reduces the cumulative impact of production (A1-A3), distribution and installation (A4-A5), use (B3, B6), and end of life (C2-C4) by 4,97%, relating to -5,23% of the total ADPE over the life cycle. This is achieved by high rates of luminaires collection in the end of their service, and high rates of recycling of the metal components in the end of life of the luminaire (predominantly, precious metals in electronic parts).

Requisite evidence

The measurements are based on documentation and bill of materials of the product.

References

EN 15804:2012-04+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14021:2016, Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)

ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework

ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines

Disclaimer

All environmental calculations are based on a luminaire used in European context. The calculations are performed on the most commonly used luminaire in the range. The implemented life cycle analysis is compliant with DIN EN ISO 14040:2006: Environmental management - Life Cycle Assessment - Principles and framework. The LCA has been performed to the best of Signify's knowledge. No right or claim might be derived from this. Signify disclaims any and all claims with respect thereto.

Further information Please contact:

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Collection and Recycling (brochure)

Ecoinvent (website)

ADP (Abiotic Depletion Potential): Impact related to the depletion of non-renewable resources, i.e. fossil fuels (ADPF), metals and minerals (ADPE).

AP (Acidification Potential): Contributions of SO2, NOx, HCl, NH3 and HF to the potential acid deposition, causing a wide range of impacts on soil, groundwater, surface water, organisms, ecosystems and buildings.

EP (Eutrophication Potential): Potential to cause over-fertilization of water and soil, which can result in increased growth of biomass.

GWP (Global Warming Potential): Relative measure of how much heat a greenhouse gas (CO2, N2O, CH4...) traps in the atmosphere. It is calculated over a specific time interval, commonly 20, 100 or 500 years.

LCA: Life cycle assessment.

PCR: Product Category Rules.

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.

POCP (Photo-chemical Oxidation Potential or photochemical smog): Formation of reactive substances (mainly ozone) which are injurious to human health and ecosystems and which also may damage crops.

RSL: Reference service life.

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