

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

EPD HUB, HUB-2993
Published on 21.02.2025, last updated on 06.05.2025, valid until 21.02.2030

Pleiad G4 168 Surface mounted

Fagerhults Belysning AB



MANUFACTURER AND SITE

Manufacturer	Fagerhults Belysning AB
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Contact details	info@fagerhult.se
Website	www.fagerhult.com
Place of production	Habo, Sweden
Period for data	2024

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2 and ISO 14025
PCR	EPD Hub Core PCR version 1.1, 5 Dec 2023
Sector	Electrical product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, B6, and modules C1-C4, D
EPD author	Josefin Carlsson, Fagerhults Belysning AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT SPECIFICATION

Product name	Pleiad G4 168 Surface mounted
Product number / reference	-
Product description	The Pleiad G4 series includes recessed and surface-mounted downlights in different diameters. Pleiad G4 simplifies and streamlines advanced lighting planning for entire projects by using one and the same luminaire type. The combination of the different luminaire models and an ambitious range of lumen packages and reflectors makes it possible to plan functional, comfortable and energy-efficient lighting environments for any situation, regardless of ceiling height and configuration.

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	0,67
Mass of packaging, kg	0,32
Functional unit	-
Reference service life (years)	20
Assigned lifetime (hours)	100000
GWP-total, A1-A3 (kg CO_2e)	10,8
GWP-fossil, A1-A3 (kg CO_2e)	10,9
Secondary material, inputs (%)	0,06
Secondary material, outputs (%)	7,88
Total energy use, A1-A3 (kWh)	59,2
Net freshwater use, A1-A3 (m^3)	59,9

PRODUCT CLASSIFICATION

Declared operating voltage, Volt	220
Light source color temperature, Kelvin	3000
Protection index for water and dust (IP)	20
Impact resistance index (IK)	-
Luminous flux, Lumen	1513
Electrical power, Watt	10,9
Luminous efficiency, Lm/W	147
Additional characteristic	Light control: Dali For more information, please go to our website www.fagerhult.com

ABOUT THE MANUFACTURER

Fagerhult creates premium lighting solutions that enhance human well-being in professional and public environments. With sustainability and connectivity at heart, we focus on office, education, healthcare, retail and outdoor applications. We work closely with customers and partners in the European market and provide lighting solutions globally – with tailor-made solutions for our customers. The Fagerhult brand includes both the product company Fagerhults Belysning AB and 11 sales companies located around Europe.

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	x	x	MND	MND	MND	MND	MND	x	MND	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demo.	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling

Modules not declared = MND.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. There is no neglected unit process more than 1% of total mass or energy flows. The module-specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	No allocation
Ancillary materials	No allocation
Manufacturing energy and waste	Allocated by volume

AVERAGES AND VARIABILITY

This EPD is product and factory-specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

The LCA and EPD have been prepared according to the reference standards, EN 50693, and ISO 14040/14044. Ecoinvent v3.10.1 and One Click LCA databases were used as sources of environmental data.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass-%	Material origin
Metals	52,7	Global, mainly EU
Minerals	0	-
Fossil materials	24,6	Global, mainly EU
Bio-based materials	0	-
Electronic parts	22,7	Global

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate.

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,1754

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE CYCLE

MANUFACTURING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production. The material losses occurring during the manufacturing processes are treated as per the waste handling practices in the factory, while scenario assumptions are made in the absence of exact data. The study also considers the fuels used by machines as well as losses during electricity transmission.

The product is made of metals, plastics, and electronic components, including driver. All components are transported to the production facility, where the main manufacturing processes are associated with assembly of different parts and components. The finished product is packaged with polyethylene, cardboard, and/or paper as packaging material before being sent to customers.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation distances from manufacturing sites to customer locations are based on sales volume-based weighted averages. In the absence of exact data, conservative assumptions are made (A4). Environmental impacts from installation include waste packaging materials (A5). The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

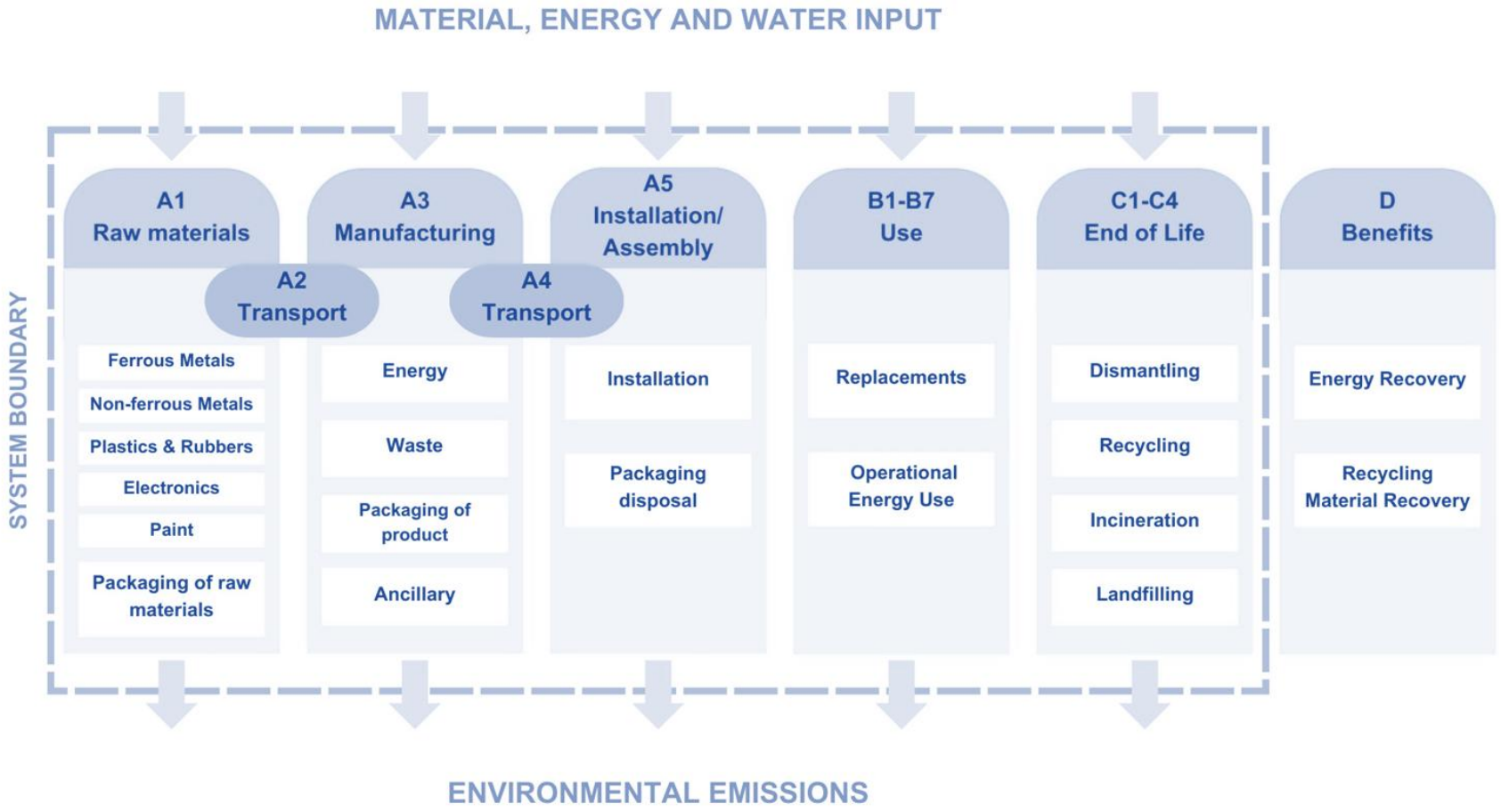
PRODUCT USE AND MAINTENANCE (B1-B7)

The product consume electricity during use phase and the scenario in this study is based on the Swedish electricity grid mix (B6). No energy savings due to controls are included in the scenario. The product could be used in several application areas, and are assumed to have an annual operating of 2500 hours in accordance to EN15193-1. The reference service life time is 100 000 hours and the outgoing artificial luminous flux of 1513 lumens. A reference flow of 35 000 hours and 1000 lumens is presented as an appendix in this EPD. Impacts due to electricity production include direct emissions to air, transformation, and transmission losses.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment centre. The transport distance is 150 km while the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 is used for treating materials in different waste treatment methods. Due to the material and energy recovery potential of parts in the lighting system, the end-of-life product is converted into recycled raw materials, while the energy recovered from incineration displaces electricity and heat production (D). The benefits and loads of incineration and recycling are included in Module D.

LIFE CYCLE FLOW DIAGRAM



ENVIRONMENTAL IMPACT DATA, RESULTS PER DECLARED UNIT

The following results refers to one unit of Pleiad G4 168 Surface mounted, with 1513 lumens for 100 000 hours. For reference flow of 1000 lumens for 35 000 hours, see appendix.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,03E+01	1,27E-01	3,25E-01	1,08E+01	4,29E-02	6,66E-01	MNR	MNR	MNR	MNR	MNR	2,06E+01	MNR	0,00E+00	1,96E-02	2,11E-01	1,05E-01	-6,09E+00
GWP – fossil	kg CO_2e	1,03E+01	1,27E-01	5,14E-01	1,09E+01	4,29E-02	2,30E-02	MNR	MNR	MNR	MNR	MNR	1,85E+01	MNR	0,00E+00	1,96E-02	2,11E-01	1,05E-01	-6,08E+00
GWP – biogenic	kg CO_2e	0,00E+00	0,00E+00	-6,43E-01	-6,43E-01	0,00E+00	6,43E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	1,78E-02	5,90E-05	4,55E-01	4,72E-01	1,65E-05	8,72E-06	MNR	MNR	MNR	MNR	MNR	2,08E+00	MNR	0,00E+00	8,66E-06	2,58E-05	6,85E-06	-1,12E-02
Ozone depletion pot.	kg CFC_{-11}e	4,82E-07	2,05E-09	2,44E-08	5,08E-07	8,47E-10	1,92E-10	MNR	MNR	MNR	MNR	MNR	5,55E-07	MNR	0,00E+00	2,74E-10	2,12E-10	1,20E-10	-3,20E-08
Acidification potential	mol H^+e	7,62E-02	2,53E-03	6,54E-03	8,53E-02	2,17E-04	6,62E-05	MNR	MNR	MNR	MNR	MNR	2,27E-01	MNR	0,00E+00	6,52E-05	1,74E-04	5,06E-05	-9,13E-02
EP-freshwater[2)]	kg Pe	2,77E-03	5,28E-06	2,05E-04	2,98E-03	2,78E-06	2,81E-06	MNR	MNR	MNR	MNR	MNR	1,64E-02	MNR	0,00E+00	1,52E-06	8,52E-06	9,36E-07	-5,03E-03
EP-marine	kg Ne	1,23E-02	6,46E-04	3,64E-03	1,66E-02	6,60E-05	6,66E-05	MNR	MNR	MNR	MNR	MNR	3,35E-02	MNR	0,00E+00	2,11E-05	5,25E-05	1,09E-04	-8,95E-03
EP-terrestrial	mol Ne	1,39E-01	7,16E-03	2,74E-02	1,74E-01	7,23E-04	2,31E-04	MNR	MNR	MNR	MNR	MNR	3,42E-01	MNR	0,00E+00	2,30E-04	5,18E-04	2,26E-04	-9,75E-02
POCP ("smog")[3)]	kg NMVOCe	4,29E-02	2,03E-03	4,09E-03	4,90E-02	2,77E-04	8,61E-05	MNR	MNR	MNR	MNR	MNR	9,11E-02	MNR	0,00E+00	9,08E-05	1,42E-04	6,56E-05	-3,23E-02
ADP-minerals & metals[4)]	kg Sbe	6,02E-04	1,88E-07	4,03E-06	6,06E-04	1,13E-07	7,23E-08	MNR	MNR	MNR	MNR	MNR	2,23E-03	MNR	0,00E+00	6,43E-08	5,66E-07	1,81E-08	-5,99E-04
ADP-fossil resources	MJ	1,27E+02	1,65E+00	6,89E+00	1,35E+02	6,15E-01	1,92E-01	MNR	MNR	MNR	MNR	MNR	2,48E+03	MNR	0,00E+00	2,74E-01	2,31E-01	9,44E-02	-6,53E+01
Water use[5)]	m^3e depr.	3,78E+00	5,78E-03	1,46E+01	1,84E+01	3,06E-03	4,72E-03	MNR	MNR	MNR	MNR	MNR	1,37E+02	MNR	0,00E+00	1,27E-03	1,62E-02	7,35E-03	-9,10E-01

1) GWP = Global Warming Potential. 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e. 3) POCP = Photochemical ozone formation. 4) ADP = Abiotic depletion potential. 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	8,62E-07	6,35E-09	7,30E-08	9,41E-07	4,07E-09	1,14E-09	MNR	MNR	MNR	MNR	MNR	1,89E-06	MNR	0,00E+00	1,55E-09	1,83E-09	7,06E-10	-3,76E-07
Ionizing radiation[6)]	kBq U235e	5,14E-01	1,15E-03	4,21E-02	5,57E-01	7,13E-04	6,68E-04	MNR	MNR	MNR	MNR	MNR	1,78E+02	MNR	0,00E+00	2,22E-04	1,40E-03	1,32E-04	-4,14E-01
Ecotoxicity (freshwater)	CTUe	1,94E+02	1,44E-01	6,87E+00	2,01E+02	7,08E-02	8,01E-01	MNR	MNR	MNR	MNR	MNR	3,11E+02	MNR	0,00E+00	4,34E-02	4,65E-01	9,57E+00	-4,46E+01
Human toxicity, cancer	CTUh	4,15E-08	2,40E-11	7,43E-10	4,22E-08	7,19E-12	7,96E-12	MNR	MNR	MNR	MNR	MNR	3,66E-08	MNR	0,00E+00	3,33E-12	2,58E-11	2,07E-11	-6,98E-09
Human tox. non-cancer	CTUh	3,59E-07	6,82E-10	2,07E-08	3,80E-07	3,85E-10	4,30E-10	MNR	MNR	MNR	MNR	MNR	1,91E-06	MNR	0,00E+00	1,72E-10	1,24E-09	1,02E-09	-5,52E-07
SQP[7)]	-	4,82E+01	6,54E-01	8,81E+01	1,37E+02	5,86E-01	1,42E-01	MNR	MNR	MNR	MNR	MNR	5,85E+02	MNR	0,00E+00	1,64E-01	2,24E-01	1,30E-01	-8,92E+02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on the human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon, and from some construction materials is also not measured by this indicator. 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	1,79E+01	1,70E-02	5,69E+01	7,48E+01	9,68E-03	-4,44E+00	MNR	MNR	MNR	MNR	MNR	1,70E+03	MNR	0,00E+00	3,76E-03	3,04E-02	2,35E-03	-9,69E+01
Renew. PER as material	MJ	0,00E+00	0,00E+00	5,58E+00	5,58E+00	0,00E+00	-5,58E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,79E+01	1,70E-02	6,25E+01	8,04E+01	9,68E-03	-1,00E+01	MNR	MNR	MNR	MNR	MNR	1,70E+03	MNR	0,00E+00	3,76E-03	3,04E-02	2,35E-03	-9,69E+01
Non-re. PER as energy	MJ	1,30E+02	1,65E+00	6,27E+00	1,38E+02	6,15E-01	-1,10E-01	MNR	MNR	MNR	MNR	MNR	2,48E+03	MNR	0,00E+00	2,74E-01	-2,75E+00	-2,89E+00	-6,52E+01
Non-re. PER as material	MJ	4,77E+00	0,00E+00	5,55E-01	5,32E+00	0,00E+00	-5,55E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	-2,38E+00	-2,38E+00	0,00E+00
Total use of non-re. PER	MJ	1,35E+02	1,65E+00	6,82E+00	1,43E+02	6,15E-01	-6,65E-01	MNR	MNR	MNR	MNR	MNR	2,48E+03	MNR	0,00E+00	2,74E-01	-5,13E+00	-5,27E+00	-6,52E+01
Secondary materials	kg	4,07E-04	0,00E+00	0,00E+00	4,07E-04	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renew. secondary fuels	MJ	1,79E-03	4,16E-06	1,27E-01	1,29E-01	3,20E-06	1,45E-06	MNR	MNR	MNR	MNR	MNR	2,20E-03	MNR	0,00E+00	1,57E-06	1,05E-05	1,54E-06	-4,78E-04
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	5,95E+01	1,55E-04	3,40E-01	5,99E+01	8,78E-05	-1,76E-04	MNR	MNR	MNR	MNR	MNR	3,26E+00	MNR	0,00E+00	3,64E-05	3,15E-04	-2,06E-04	-3,47E-02

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	5,98E-01	2,17E-03	4,25E-02	6,42E-01	8,82E-04	1,37E-03	MNR	MNR	MNR	MNR	MNR	2,53E+00	MNR	0,00E+00	4,79E-04	4,81E-03	2,84E-02	-1,23E+00
Non-hazardous waste	kg	1,04E+01	3,48E-02	1,02E+00	1,14E+01	1,74E-02	4,19E-01	MNR	MNR	MNR	MNR	MNR	8,38E+01	MNR	0,00E+00	8,97E-03	1,29E-01	6,87E-01	-2,29E+01
Radioactive waste	kg	3,93E-03	2,82E-07	1,07E-05	3,94E-03	1,76E-07	1,70E-07	MNR	MNR	MNR	MNR	MNR	3,80E-02	MNR	0,00E+00	5,44E-08	3,42E-07	3,28E-08	-1,01E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,91E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	5,28E-02	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,21E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	9,35E-01	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,03E+01	1,26E-01	1,03E+00	1,15E+01	4,27E-02	4,88E-02	MNR	MNR	MNR	MNR	MNR	2,07E+01	MNR	0,00E+00	1,95E-02	2,11E-01	1,05E-01	-6,05E+00
Ozone depletion Pot.	kg CFC_{-11}e	1,62E-07	1,63E-09	2,47E-08	1,89E-07	6,74E-10	1,56E-10	MNR	MNR	MNR	MNR	MNR	4,81E-07	MNR	0,00E+00	2,19E-10	1,81E-10	9,95E-11	-2,83E-08
Acidification	kg SO_2e	6,50E-02	2,01E-03	4,16E-03	7,12E-02	1,68E-04	5,03E-05	MNR	MNR	MNR	MNR	MNR	1,90E-01	MNR	0,00E+00	4,99E-05	1,36E-04	3,66E-05	-7,92E-02
Eutrophication	kg PO_4^3e	6,98E-03	2,37E-04	1,05E-02	1,77E-02	3,25E-05	3,43E-05	MNR	MNR	MNR	MNR	MNR	2,36E-02	MNR	0,00E+00	1,22E-05	2,60E-05	1,85E-05	-5,33E-03
POCP ("smog")	kg C_2H_4e	4,09E-03	1,05E-04	3,27E-04	4,52E-03	1,27E-05	1,02E-05	MNR	MNR	MNR	MNR	MNR	1,03E-02	MNR	0,00E+00	4,47E-06	8,17E-06	3,40E-06	-4,65E-03
ADP-elements	kg Sbe	6,00E-04	1,85E-07	4,00E-06	6,04E-04	1,10E-07	7,03E-08	MNR	MNR	MNR	MNR	MNR	2,23E-03	MNR	0,00E+00	6,27E-08	5,60E-07	1,55E-08	-5,98E-04
ADP-fossil	MJ	1,21E+02	1,63E+00	6,15E+00	1,29E+02	6,04E-01	1,81E-01	MNR	MNR	MNR	MNR	MNR	1,31E+02	MNR	0,00E+00	2,71E-01	2,09E-01	9,23E-02	-5,85E+01

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier and has been generated using an end-to-end verified tool.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification. EPD Hub confirms that it possesses sufficient knowledge and experience in construction products and the relevant standards to carry the verification.



Nemanja Nedic
Program Manager, EPD Hub

EPD Hub has performed a detailed examination of the end-to-end verified tool and underlying data to ensure that there are no deviations in the studied Environmental Product Declaration (EPD), its Life Cycle Assessment (LCA), and project report. The tool is implemented according to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules version 1.1 and General Program Instructions version 1.2.

Tool verifier: Hai Ha Nguyen & Nemanja Nedic
Tool verification validity: 11 July 2024 - 11 July 2027

EPD Hub has examined the company-specific data for plausibility and consistency. The declaration owner is responsible for ensuring its factual integrity and legal compliance.

APPENDIX

Pleiad 168 Surface mounted

The following methodology can be applied to compare environmental performance of different lighting solutions. The functional unit follows;

"Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours".

By converting the results to ensure the functional unit, a reference flow is used. The reference flow is calculated as following;

(1,000 lumens/outgoing luminous flux of the declared unit) x (35,000 hours/lifetime in hours of the declared unit).

The declared unit delivers an outgoing artificial luminous flux of 1,513 lumens during a reference lifetime of 100,000 hours. The reference flow scaling factor is given by the following calculation;

(1,000/1,513) x (35,000/100,000) = 0,2313

The results of the reference flow is given by multiplying the scaling factor with the results based on the declared unit. Which gives the following results for GWP total in A1-A5, B6, C1-C4 and D;

Reference flow, GWP total

A1	A2	A3	A4	A5	B6	C1	C2	C3	C4	D
2,38E+00	2,94E-02	7,52E-02	9,92E-03	1,54E-01	4,77E+00	0,00E+00	4,53E-03	4,88E-02	2,43E-02	-1,40E+00

As stated in the EPD, the calculations are based on a Swedish electricity grid mix on low voltage for year 2024. Be aware of this value depending on specific requirements.

Furthermore, the calculations does not include any energy saving from using controls. If a light management system is applicable, a reduction factor can be used. The factor should represent a relevant scenario for any project. The factors to be applied are presented in the table below.

Light Management Function	Reduction	Factor
No controls	0	1,00
Daylight controls	25%	0,75
Presence controls	25%	0,75
Presence and daylight controls	45%	0,55