ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

CityCharm Cone BDS491

Signify N.V.

EPD HUB, HUB-5436

Published on 19.02.2026, last updated on 19.02.2026, valid until 19.02.2031

MANUFACTURER AND SITE

Manufacturer	Signify N.V.
Address	High Tech Campus 48, 5656 AE Eindhoven, The Netherlands
Contact details	sustainability@signify.com
Website	https://www.signify.com/global
Place of production	VALLADOLID, SPAIN
Place(s) of raw material origin	APAC, EU
Place(s) of installation and use	EU
Period for data	Calendar Year 2023

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR version 1.2, 24 Mar 2025
Sector	Electrical product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, B6, and modules C1-C4, D
EPD author	Signify / Sustainability
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Imane Uald Lamkaddam as an authorized verifier for EPD Hub

PRODUCT SPECIFICATION

Product name	CityCharm Cone BDS491
Product number / reference	910771135025 / BDS491 LED60/830 PSD I A GR D9 H07RN 60
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	3.61

PRODUCT DESCRIPTION

The CityCharm range is designed for use in urban areas where comfortable lighting, ambience, and design play an important role. It offers three iconic, timeless designs: CityCharm cordoba (BDS490), CityCharm cone (BDS491), and CityCharm fluid (BDS492) along with a range of decorative and practical accessories. This enables you to create a lighting solution that carries the signature of your municipality, both by day and by night. Whether you specify cordoba, cone or fluid LED lights, CityCharm provides high visual comfort while maintaining excellent performance. It offers a choice of two innovative Lighting technologies: GentleBeam, which maximizes visual comfort, or ClearGuide (cordoba or cone), which optimizes vertical illumination and visual guidance. To personalize your CityCharm lighting solution further, decorative accessories for this range make it possible to define the volume of the bowl and change its appearance. A variety of dedicated brackets and masts are also available to enable you to reshape your residential areas and city centers in the most elegant way imaginable.

This EPD is intended for business-to-business and/or business-to-consumer communication. Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1. 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 CLASSIFICATION

Declared operating voltage, Volt	220-240
Light source colour temperature, Kelvin	3000
Protection index for water and dust (IP)	66
Impact resistance index (IK)	10
Luminous flux, Lumens	4740
Electrical power, Watt	40
Luminous efficiency, Lm/W	119
Additional characteristic	Not applicable

ABOUT THE MANUFACTURER

Signify is the world leader in lighting for professionals, consumers and lighting for the Internet of Things. Our energy efficient lighting products, systems and services enable our customers to enjoy a superior quality of light, and make people's lives safer and more comfortable, businesses more productive and cities more liveable.

For more information, please visit: https://www.signify.com/global

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	53.44	APAC , EU
Minerals	1.65	APAC
Fossil materials	44.9	APAC , EU
Bio-based materials	0	

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	0.06

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	12.333
Mass of packaging, kg	0.151
Functional unit (from PEP PSR0014)	Provide lighting that delivers an outgoing artificial luminous flux of 1000 lumens during a reference lifetime of 35000 hours
Reference service life (years)	25
Assigned lifetime (hours)	100000
GWP-total, A1-A3 (kg CO_2e)	107
GWP-fossil, A1-A3 (kg CO_2e)	106
Secondary material, inputs (%)	36
Secondary material, outputs (%)	37
Total energy use, A1-A3 (kWh)	404
Net freshwater use, A1-A3 (m^3)	7.24E-01

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

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

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

Modules not declared = ND.

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.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, ancillary materials, energy & water consumption, material loss and waste generation at the manufacturing site are attributed to the bill of materials of the products, therefore, they are allocated by partitioning the quantities on the base of the total production in kg throughout the year. Thus, allocation has been done in the following ways:

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

Proxy data is used for certain materials due to their unavailability in the database. Conservative choices have been adopted when exact information was missing. Regarding module C1-C4: EOL scenarios are based on default values from EN 50693. For stages description please refer to section Product life cycle in this EPD report.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA Luminaire EPD Generator v2.2.7. The LCA and EPD have been prepared according to the reference standards, EN 50693, and ISO 14040/14044. Ecoinvent v 3.10.1 and One Click LCA databases were used as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology 'allocation, cut-off, EN 15804+A2'.

No other sources were used in the modelling of this EPD.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

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 AND PACKAGING (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. All components are transported to the production facility, where the main manufacturing processes primarily are associated with assembly. A2 transport distances are calculated always taking the capital city of component country of origin as a starting point and exact manufacturing location as destination. The finished product can be packaged with polyethylene, cardboard, and/or paper as packaging material before shipment to customers. Manufacturing loss, ancillaries and wastes are calculated according to the data that each manufacturing site is sharing with Signify. The total annual amount of waste in kg is allocated to the total annual production in kg at the specific manufacturing site responsible to produce the studied product. Thus, it is possible to allocate it according to the weight of the product analysed in this study.

Co-product allocation is neglected as revenue of co-product is very low, hence, the waste undergoes a conservative waste treatment.
The use of renewable energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc), and its use is ensured throughout the validity period of this EPD.

TRANSPORT AND INSTALLATION (A4-A5)

A4 transport distances are calculated always taking the exact manufacturing location to customer location. If the customer's location is defined as a country or its capital city, the calculation is made to the respective capital city. If the customer's location is specified as a region, the distance is calculated to the capital city of the best-performing sales country within that region. The transportation method is a combination of lorry and container ship where needed. To be conservative, empty returns are included in this study as implemented through an average load factor in the Ecoinvent transport datapoints. Environmental impacts from installation include waste packaging materials (A5). The packaging waste treatment is assumed to be conservative with incineration without energy recovery. The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

PRODUCT USE AND MAINTENANCE (B1-B7)

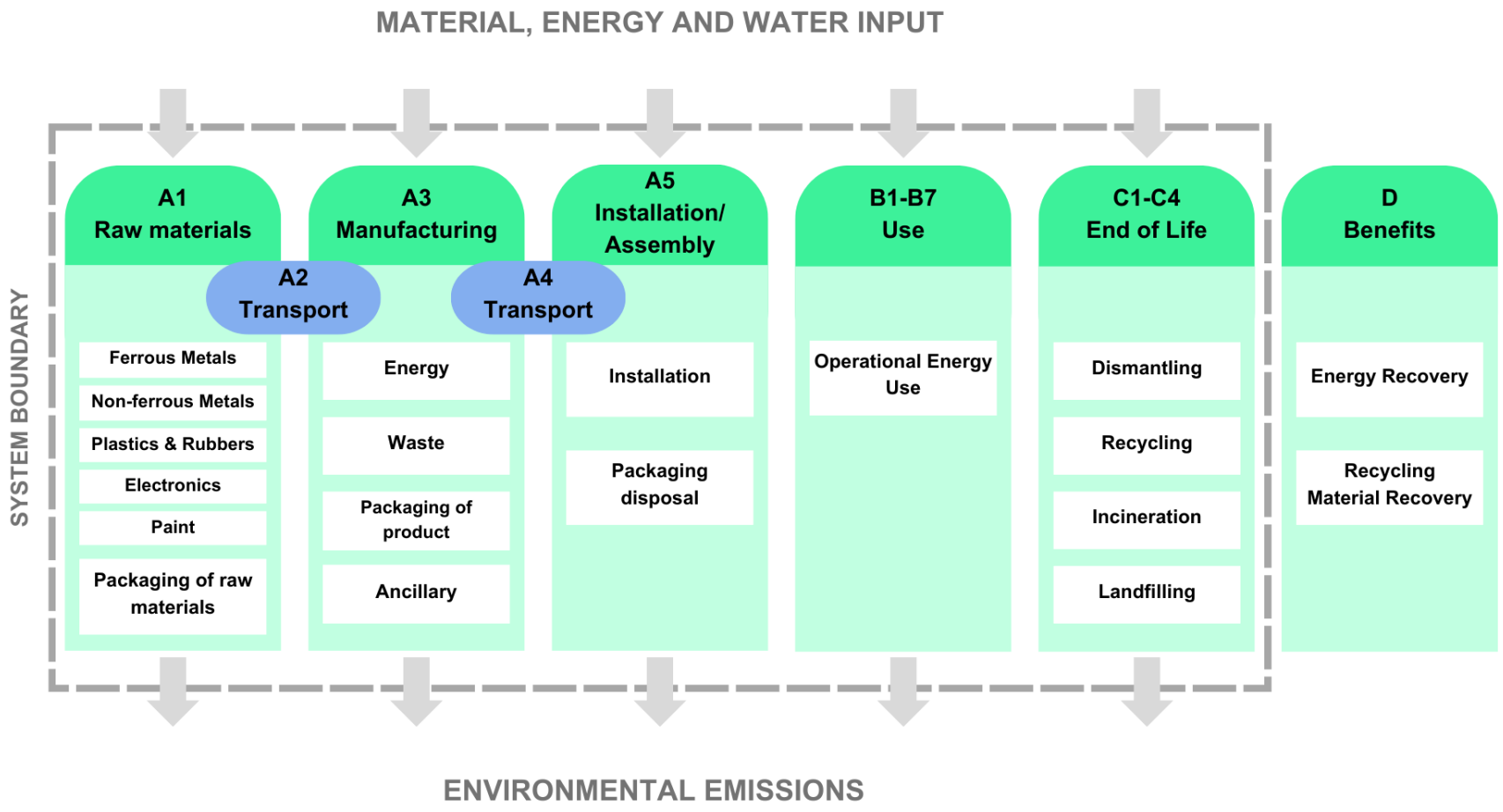
During the use phase, the product consumes electricity (B6), which is calculated multiplying the Wattage x Assigned lifetime (hours) x Country energy mix factor. To know which Country energy mix was used in this EPD, please refer to Annex 2.

The Reference service life in years is calculated according to the main application type of the product, based on annual operating hours. 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 - SYSTEM BOUNDARY



ENVIRONMENTAL IMPACT DATA, RESULTS PER DECLARED UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

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+02	2.17E+00	2.16E+00	1.07E+02	3.71E+00	2.30E-01	ND	ND	ND	ND	ND	1.32E+03	ND	0.00E+00	3.64E-01	6.45E+00	3.58E+00	-1.24E+01
GWP – fossil	kg CO_2e	1.02E+02	2.17E+00	2.00E+00	1.06E+02	3.71E+00	9.46E-03	ND	ND	ND	ND	ND	1.31E+03	ND	0.00E+00	3.64E-01	6.45E+00	3.58E+00	-1.24E+01
GWP – biogenic	kg CO_2e	1.65E-01	4.80E-04	1.51E-01	3.16E-01	8.40E-04	2.20E-01	ND	ND	ND	ND	ND	2.94E+00	ND	0.00E+00	7.95E-05	-5.10E-04	-3.78E-04	-1.71E-02
GWP – LULUC	kg CO_2e	1.49E-01	9.82E-04	5.68E-03	1.56E-01	1.66E-03	3.49E-06	ND	ND	ND	ND	ND	4.02E+00	ND	0.00E+00	1.61E-04	2.48E-04	1.18E-04	-2.02E-02
Ozone depletion pot.	kg CFC_{-11}e	2.75E-05	3.19E-08	4.78E-08	2.76E-05	5.48E-08	1.30E-10	ND	ND	ND	ND	ND	2.41E-05	ND	0.00E+00	5.09E-09	3.84E-09	2.58E-09	-7.36E-08
Acidification potential	mol H^+e	8.89E-01	1.12E-02	5.23E-03	9.06E-01	1.26E-02	5.62E-05	ND	ND	ND	ND	ND	7.70E+00	ND	0.00E+00	1.21E-03	2.91E-03	1.21E-03	-2.08E-01
EP-freshwater[2)]	kg Pe	5.28E-02	1.62E-04	3.53E-04	5.33E-02	2.89E-04	9.50E-07	ND	ND	ND	ND	ND	1.22E+00	ND	0.00E+00	2.83E-05	9.95E-05	2.15E-05	-1.36E-02
EP-marine	kg Ne	1.11E-01	3.32E-03	1.58E-03	1.16E-01	4.16E-03	2.62E-05	ND	ND	ND	ND	ND	1.21E+00	ND	0.00E+00	3.93E-04	1.14E-03	4.06E-03	-1.71E-02
EP-terrestrial	mol Ne	1.18E+00	3.64E-02	1.29E-02	1.23E+00	4.52E-02	2.39E-04	ND	ND	ND	ND	ND	1.08E+01	ND	0.00E+00	4.28E-03	1.06E-02	5.56E-03	-1.99E-01
POCP ("smog")[3)]	kg NMVOCe	4.43E-01	1.33E-02	8.27E-03	4.65E-01	1.86E-02	6.81E-05	ND	ND	ND	ND	ND	3.56E+00	ND	0.00E+00	1.69E-03	2.81E-03	1.56E-03	-5.84E-02
ADP-minerals & metals[4)]	kg Sbe	6.02E-03	5.78E-06	1.41E-05	6.04E-03	1.03E-05	2.81E-08	ND	ND	ND	ND	ND	1.77E-02	ND	0.00E+00	1.20E-06	8.00E-06	4.14E-07	-2.23E-03
ADP-fossil resources	MJ	1.41E+03	3.11E+01	2.67E+01	1.47E+03	5.38E+01	9.78E-02	ND	ND	ND	ND	ND	3.05E+04	ND	0.00E+00	5.11E+00	3.04E+00	1.89E+00	-1.49E+02
Water use[5)]	m^3e depr.	3.53E+01	1.50E-01	6.93E-01	3.62E+01	2.66E-01	1.13E-02	ND	ND	ND	ND	ND	8.30E+02	ND	0.00E+00	2.37E-02	4.45E-01	2.26E-01	-3.33E+00

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, EF 3.1

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	7.08E-06	2.07E-07	6.89E-08	7.36E-06	3.71E-07	7.01E-10	ND	ND	ND	ND	ND	2.75E-05	ND	0.00E+00	2.89E-08	2.73E-08	1.35E-08	-9.53E-07
Ionizing radiation[6)]	kBq U235e	5.71E+00	2.63E-02	4.90E-02	5.78E+00	4.69E-02	1.19E-04	ND	ND	ND	ND	ND	8.42E+02	ND	0.00E+00	4.13E-03	1.11E-02	2.83E-03	-1.36E+00
Ecotoxicity (freshwater)	CTUe	1.54E+03	4.28E+00	6.01E+00	1.55E+03	7.61E+00	2.71E-01	ND	ND	ND	ND	ND	4.64E+03	ND	0.00E+00	8.08E-01	1.33E+01	1.69E+02	-1.76E+02
Human toxicity, cancer	CTUh	9.78E-08	3.64E-10	5.41E-10	9.87E-08	6.12E-10	1.30E-11	ND	ND	ND	ND	ND	4.42E-07	ND	0.00E+00	6.19E-11	6.46E-10	6.55E-10	-2.00E-08
Human tox. non-cancer	CTUh	4.20E-06	1.94E-08	1.81E-08	4.24E-06	3.48E-08	5.33E-10	ND	ND	ND	ND	ND	2.29E-05	ND	0.00E+00	3.20E-09	2.60E-08	2.01E-08	-1.95E-06
SQP[7)]	-	4.43E+02	2.97E+01	5.47E+01	5.27E+02	5.42E+01	4.79E-02	ND	ND	ND	ND	ND	6.78E+03	ND	0.00E+00	3.05E+00	3.22E+00	2.32E+00	-7.95E+01

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	1.30E+02	4.15E-01	1.23E+01	1.42E+02	7.38E-01	-2.68E+00	ND	ND	ND	ND	ND	8.36E+03	ND	0.00E+00	7.00E-02	3.28E-01	5.27E-02	-2.12E+01
Renew. PER as material	MJ	3.64E+00	0.00E+00	-1.66E+00	1.98E+00	0.00E+00	-1.98E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER	MJ	1.33E+02	4.15E-01	1.06E+01	1.44E+02	7.38E-01	-4.66E+00	ND	ND	ND	ND	ND	8.36E+03	ND	0.00E+00	7.00E-02	3.28E-01	5.27E-02	-2.12E+01
Non-re. PER as energy	MJ	1.27E+03	3.11E+01	1.50E+01	1.31E+03	5.38E+01	9.78E-02	ND	ND	ND	ND	ND	3.05E+04	ND	0.00E+00	5.11E+00	-9.31E+01	-1.08E+02	-1.49E+02
Non-re. PER as material	MJ	1.40E+02	0.00E+00	-2.80E+00	1.37E+02	0.00E+00	-2.85E-02	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-6.84E+01	-6.85E+01	0.00E+00
Total use of non-re. PER	MJ	1.41E+03	3.11E+01	1.22E+01	1.45E+03	5.38E+01	6.93E-02	ND	ND	ND	ND	ND	3.05E+04	ND	0.00E+00	5.11E+00	-1.62E+02	-1.76E+02	-1.49E+02
Secondary materials	kg	4.44E+00	0.00E+00	0.00E+00	4.44E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. secondary fuels	MJ	8.24E-02	1.60E-04	1.18E-02	9.44E-02	2.91E-04	1.22E-06	ND	ND	ND	ND	ND	4.02E-02	ND	0.00E+00	2.92E-05	1.29E-04	3.30E-05	-1.85E-03
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	7.03E-01	4.46E-03	1.63E-02	7.24E-01	7.96E-03	1.84E-04	ND	ND	ND	ND	ND	2.63E+01	ND	0.00E+00	6.77E-04	7.93E-03	-5.62E-03	-1.20E-01

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	1.47E+01	5.20E-02	8.59E-02	1.48E+01	9.12E-02	2.98E-03	ND	ND	ND	ND	ND	7.71E+01	ND	0.00E+00	8.90E-03	1.22E-01	2.10E-01	-1.63E+00
Non-hazardous waste	kg	4.03E+02	9.51E-01	1.19E+01	4.16E+02	1.69E+00	1.61E-01	ND	ND	ND	ND	ND	5.96E+03	ND	0.00E+00	1.67E-01	3.32E+00	1.67E+01	-6.78E+01
Radioactive waste	kg	1.44E-03	6.45E-06	1.21E-05	1.46E-03	1.15E-05	2.97E-08	ND	ND	ND	ND	ND	2.16E-01	ND	0.00E+00	1.01E-06	2.74E-06	7.05E-07	-3.35E-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	ND	ND	ND	ND	ND	0.00E+00	ND	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	1.49E-01	1.49E-01	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	4.56E+00	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	ND	ND	ND	ND	ND	0.00E+00	ND	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	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	3.02E+01	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.27E+01	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.75E+01	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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	1.02E+02	2.15E+00	2.01E+00	1.06E+02	3.69E+00	9.39E-03	ND	ND	ND	ND	ND	1.31E+03	ND	0.00E+00	3.62E-01	6.44E+00	3.57E+00	-1.23E+01
Ozone depletion Pot.	kg CFC_{-11}e	1.87E-05	2.55E-08	4.30E-08	1.88E-05	4.37E-08	1.11E-10	ND	ND	ND	ND	ND	2.02E-05	ND	0.00E+00	4.07E-09	3.33E-09	2.18E-09	-6.25E-08
Acidification	kg SO_2e	7.59E-01	8.67E-03	4.12E-03	7.72E-01	9.66E-03	4.13E-05	ND	ND	ND	ND	ND	6.56E+00	ND	0.00E+00	9.29E-04	2.21E-03	8.72E-04	-1.81E-01
Eutrophication	kg PO_4^3e	2.09E-01	1.66E-03	1.96E-03	2.13E-01	2.35E-03	1.28E-05	ND	ND	ND	ND	ND	8.48E-01	ND	0.00E+00	2.26E-04	5.33E-04	4.83E-04	-1.10E-02
POCP (“smog”)	kg C_2H_4e	5.36E-02	6.38E-04	4.22E-04	5.47E-02	8.61E-04	3.15E-06	ND	ND	ND	ND	ND	3.57E-01	ND	0.00E+00	8.32E-05	1.37E-04	8.57E-05	-8.27E-03
ADP-elements	kg Sbe	5.98E-03	5.64E-06	1.38E-05	6.00E-03	1.01E-05	2.35E-08	ND	ND	ND	ND	ND	1.76E-02	ND	0.00E+00	1.17E-06	7.84E-06	3.36E-07	-2.23E-03
ADP-fossil	MJ	1.32E+03	3.07E+01	2.59E+01	1.37E+03	5.31E+01	9.60E-02	ND	ND	ND	ND	ND	1.56E+04	ND	0.00E+00	5.04E+00	2.87E+00	1.84E+00	-1.27E+02

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG 9)	kg CO2e	1.02E+02	2.17E+00	2.01E+00	1.07E+02	3.71E+00	9.46E-03	ND	ND	ND	ND	ND	1.31E+03	ND	0.00E+00	3.64E-01	6.45E+00	3.58E+00	-1.24E+01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows - CH4 fossil, CH4 biogenic and Dinitrogen monoxide - were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO2 is set to zero.

ENVIRONMENTAL IMPACT DATA, RESULTS PER FUNCTIONAL UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

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_2 éq/FU	7.57E+00	1.60E-01	1.59E-01	7.89E+00	2.74E-01	1.70E-02	ND	ND	ND	ND	ND	9.72E+01	ND	0.00E+00	2.69E-02	4.76E-01	2.64E-01	-9.16E-01
GWP – fossil	kg CO_2 éq/FU	7.55E+00	1.60E-01	1.48E-01	7.86E+00	2.74E-01	6.99E-04	ND	ND	ND	ND	ND	9.67E+01	ND	0.00E+00	2.69E-02	4.76E-01	2.64E-01	-9.14E-01
GWP – biogenic	kg CO_2 éq/FU	1.22E-02	3.55E-05	1.12E-02	2.34E-02	6.20E-05	1.63E-02	ND	ND	ND	ND	ND	2.17E-01	ND	0.00E+00	5.87E-06	-3.76E-05	-2.79E-05	-1.26E-03
GWP – LULUC	kg CO_2 éq/FU	1.10E-02	7.25E-05	4.19E-04	1.15E-02	1.23E-04	2.58E-07	ND	ND	ND	ND	ND	2.97E-01	ND	0.00E+00	1.19E-05	1.83E-05	8.74E-06	-1.49E-03
Ozone depletion pot.	kg CFC_{-11}e/FU	2.03E-06	2.36E-09	3.53E-09	2.04E-06	4.04E-09	9.60E-12	ND	ND	ND	ND	ND	1.78E-06	ND	0.00E+00	3.76E-10	2.84E-10	1.91E-10	-5.44E-09
Acidification potential	mole H^+e/FU	6.57E-02	8.24E-04	3.86E-04	6.69E-02	9.34E-04	4.15E-06	ND	ND	ND	ND	ND	5.68E-01	ND	0.00E+00	8.96E-05	2.15E-04	8.96E-05	-1.53E-02
EP-freshwater[2)]	kg Pe/FU	3.90E-03	1.20E-05	2.61E-05	3.93E-03	2.13E-05	7.02E-08	ND	ND	ND	ND	ND	9.00E-02	ND	0.00E+00	2.09E-06	7.35E-06	1.59E-06	-1.00E-03
EP-marine	kg Ne/FU	8.21E-03	2.45E-04	1.16E-04	8.57E-03	3.07E-04	1.94E-06	ND	ND	ND	ND	ND	8.92E-02	ND	0.00E+00	2.90E-05	8.41E-05	3.00E-04	-1.26E-03
EP-terrestrial	mol Ne/FU	8.72E-02	2.69E-03	9.55E-04	9.08E-02	3.34E-03	1.77E-05	ND	ND	ND	ND	ND	7.99E-01	ND	0.00E+00	3.16E-04	7.81E-04	4.11E-04	-1.47E-02
POCP ("smog")[3)]	kg NMVOCe/	3.27E-02	9.86E-04	6.11E-04	3.43E-02	1.38E-03	5.03E-06	ND	ND	ND	ND	ND	2.63E-01	ND	0.00E+00	1.25E-04	2.08E-04	1.15E-04	-4.32E-03
ADP-minerals & metals[4)]	kg Sbe/FU	4.44E-04	4.27E-07	1.04E-06	4.46E-04	7.64E-07	2.08E-09	ND	ND	ND	ND	ND	1.30E-03	ND	0.00E+00	8.83E-08	5.91E-07	3.05E-08	-1.65E-04
ADP-fossil resources	MJ/FU	1.04E+02	2.30E+00	1.97E+00	1.08E+02	3.97E+00	7.22E-03	ND	ND	ND	ND	ND	2.25E+03	ND	0.00E+00	3.77E-01	2.25E-01	1.39E-01	-1.10E+01
Water use[5)]	m^3e priv. /FU	2.61E+00	1.11E-02	5.12E-02	2.67E+00	1.96E-02	8.36E-04	ND	ND	ND	ND	ND	6.13E+01	ND	0.00E+00	1.75E-03	3.28E-02	1.67E-02	-2.46E-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, EF 3.1

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 /FU	5.23E-07	1.53E-08	5.08E-09	5.43E-07	2.74E-08	5.18E-11	ND	ND	ND	ND	ND	2.03E-06	ND	0.00E+00	2.13E-09	2.02E-09	9.96E-10	-7.04E-08
Ionizing radiation[6)]	kBq U235e/FU	4.21E-01	1.94E-03	3.62E-03	4.27E-01	3.46E-03	8.75E-06	ND	ND	ND	ND	ND	6.22E+01	ND	0.00E+00	3.05E-04	8.18E-04	2.09E-04	-1.01E-01
Ecotoxicity (freshwater)	CTUe/FU	1.13E+02	3.16E-01	4.44E-01	1.14E+02	5.62E-01	2.00E-02	ND	ND	ND	ND	ND	3.43E+02	ND	0.00E+00	5.96E-02	9.83E-01	1.25E+01	-1.30E+01
Human toxicity, cancer	CTUh/FU	7.22E-09	2.69E-11	4.00E-11	7.29E-09	4.52E-11	9.63E-13	ND	ND	ND	ND	ND	3.27E-08	ND	0.00E+00	4.57E-12	4.77E-11	4.83E-11	-1.47E-09
Human tox. non-cancer	CTUh/FU	3.10E-07	1.43E-09	1.34E-09	3.13E-07	2.57E-09	3.93E-11	ND	ND	ND	ND	ND	1.69E-06	ND	0.00E+00	2.36E-10	1.92E-09	1.48E-09	-1.44E-07
SQP[7)]	-/FU	3.27E+01	2.19E+00	4.04E+00	3.89E+01	4.00E+00	3.54E-03	ND	ND	ND	ND	ND	5.00E+02	ND	0.00E+00	2.25E-01	2.38E-01	1.71E-01	-5.87E+00

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/FU	9.57E+00	3.07E-02	9.05E-01	1.05E+01	5.45E-02	-1.98E-01	ND	ND	ND	ND	ND	6.17E+02	ND	0.00E+00	5.17E-03	2.43E-02	3.89E-03	-1.56E+00
Renew. PER as material	MJ/FU	2.69E-01	0.00E+00	-1.23E-01	1.46E-01	0.00E+00	-1.46E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER	MJ/FU	9.84E+00	3.07E-02	7.83E-01	1.07E+01	5.45E-02	-3.44E-01	ND	ND	ND	ND	ND	6.17E+02	ND	0.00E+00	5.17E-03	2.43E-02	3.89E-03	-1.56E+00
Non-re. PER as energy	MJ/FU	9.36E+01	2.30E+00	1.11E+00	9.70E+01	3.97E+00	7.23E-03	ND	ND	ND	ND	ND	2.25E+03	ND	0.00E+00	3.77E-01	-6.88E+00	-7.95E+00	-1.10E+01
Non-re. PER as material	MJ/FU	1.03E+01	0.00E+00	-2.07E-01	1.01E+01	0.00E+00	-2.11E-03	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-5.05E+00	-5.06E+00	0.00E+00
Total use of non-re. PER	MJ/FU	1.04E+02	2.30E+00	9.01E-01	1.07E+02	3.97E+00	5.12E-03	ND	ND	ND	ND	ND	2.25E+03	ND	0.00E+00	3.77E-01	-1.19E+01	-1.30E+01	-1.10E+01
Secondary materials	kg/FU	3.28E-01	0.00E+00	0.00E+00	3.28E-01	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. secondary fuels	MJ/FU	6.08E-03	1.18E-05	8.70E-04	6.97E-03	2.15E-05	8.99E-08	ND	ND	ND	ND	ND	2.97E-03	ND	0.00E+00	2.16E-06	9.56E-06	2.44E-06	-1.37E-04
Non-ren. secondary fuels	MJ/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3/FU	5.19E-02	3.29E-04	1.21E-03	5.35E-02	5.88E-04	1.36E-05	ND	ND	ND	ND	ND	1.94E+00	ND	0.00E+00	5.00E-05	5.86E-04	-4.15E-04	-8.86E-03

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/FU	1.08E+00	3.84E-03	6.34E-03	1.09E+00	6.73E-03	2.20E-04	ND	ND	ND	ND	ND	5.69E+00	ND	0.00E+00	6.57E-04	9.03E-03	1.55E-02	-1.21E-01
Non-hazardous waste	kg/FU	2.97E+01	7.02E-02	8.78E-01	3.07E+01	1.25E-01	1.19E-02	ND	ND	ND	ND	ND	4.40E+02	ND	0.00E+00	1.23E-02	2.45E-01	1.23E+00	-5.00E+00
Radioactive waste	kg/FU	1.06E-04	4.76E-07	8.90E-07	1.08E-04	8.47E-07	2.19E-09	ND	ND	ND	ND	ND	1.60E-02	ND	0.00E+00	7.48E-08	2.02E-07	5.20E-08	-2.48E-05

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	ND	ND	ND	ND	ND	0.00E+00	ND	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	1.10E-02	1.10E-02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	3.37E-01	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	ND	ND	ND	ND	ND	0.00E+00	ND	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	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	2.23E+00	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	9.38E-01	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.29E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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_2 éq./FU	7.54E+00	1.59E-01	1.49E-01	7.84E+00	2.72E-01	6.93E-04	ND	ND	ND	ND	ND	9.67E+01	ND	0.00E+00	2.67E-02	4.76E-01	2.64E-01	-9.10E-01
Ozone depletion Pot.	kg CFC-$_{11}$e/FU	1.38E-06	1.88E-09	3.17E-09	1.39E-06	3.23E-09	8.16E-12	ND	ND	ND	ND	ND	1.49E-06	ND	0.00E+00	3.00E-10	2.46E-10	1.61E-10	-4.61E-09
Acidification	kg SO_2e/FU	5.61E-02	6.40E-04	3.05E-04	5.70E-02	7.13E-04	3.05E-06	ND	ND	ND	ND	ND	4.84E-01	ND	0.00E+00	6.86E-05	1.63E-04	6.44E-05	-1.34E-02
Eutrophication	kg PO_4^3e/FU	1.55E-02	1.22E-04	1.45E-04	1.57E-02	1.74E-04	9.47E-07	ND	ND	ND	ND	ND	6.26E-02	ND	0.00E+00	1.67E-05	3.93E-05	3.56E-05	-8.12E-04
POCP (“smog”)	kg C_2H_4e/FU	3.96E-03	4.71E-05	3.11E-05	4.04E-03	6.36E-05	2.32E-07	ND	ND	ND	ND	ND	2.64E-02	ND	0.00E+00	6.15E-06	1.01E-05	6.33E-06	-6.11E-04
ADP-elements	kg Sbe/FU	4.41E-04	4.16E-07	1.02E-06	4.43E-04	7.45E-07	1.74E-09	ND	ND	ND	ND	ND	1.30E-03	ND	0.00E+00	8.62E-08	5.79E-07	2.48E-08	-1.65E-04
ADP-fossil	MJ/FU	9.71E+01	2.27E+00	1.91E+00	1.01E+02	3.92E+00	7.09E-03	ND	ND	ND	ND	ND	1.15E+03	ND	0.00E+00	3.72E-01	2.12E-01	1.36E-01	-9.38E+00

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG [9)]	kg CO_2e/FU	7.56E+00	1.60E-01	1.48E-01	7.87E+00	2.74E-01	6.99E-04	ND	ND	ND	ND	ND	9.70E+01	ND	0.00E+00	2.69E-02	4.76E-01	2.64E-01	-9.15E-01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows - CH4 fossil, CH4 biogenic and Dinitrogen monoxide - were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO2 is set to zero.

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation – A3 (Energy data source)

1. Energy supply, electricity production, co-generation oil and gas, Heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical, Spain, ecoinvent 3.10.1, 0.0249 kgCO2e/MJ
2. Energy supply, electricity production, solar photovoltaic, Electricity production, photovoltaic, 570kWp open ground installation, multi-Si, Spain, ecoinvent 3.10.1, 0.0673 kgCO2e/kWh

Transport scenario documentation - A4

1. Transport, freight, lorry >32 metric ton, EURO5, 2760.17 km
2. Transport, freight, sea, container ship, 0.0 km

Installation scenario documentation - A5 (Waste materials data source)

1. Market for corrugated board box, 0.1 kg
2. Market for printed paper, offset, 0.051 kg

Use stages scenario documentation - B6-B7 (Energy data source)

1. Energy supply, electricity transformation and distribution, distribution low voltage, Market group for electricity, low voltage, Europe, 4000.0 kWh

TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m3	7.28E+01
Volume capacity utilization factor (factor: =1 or <1 or ≥1 for compressed or nested packaged products)	1

INSTALLATION SCENARIO DOCUMENTATION - A5

Scenario parameter	Value
Ancillary materials for installation (specified by material) / kg or other units as appropriate	0
Water use / m^3	0
Other resource use / kg	0
Direct emissions to ambient air, soil and water / kg	0

USE STAGES SCENARIO DOCUMENTATION - B6-B7 USE OF ENERGY AND WATER

Scenario information	Value
Ancillary materials specified by material / kg or units as appropriate	Not applicable
Net fresh water consumption / m^3	0
Power output of equipment / kW	40
Characteristic performance, e.g., energy efficiency, emissions, variation of performance with capacity utilization, etc. / Units as appropriate	For more details see product classification table and product description.
Further assumptions for scenario development, e.g., frequency and period of use, number of occupants / Units as appropriate	For more details see product classification table and product description.

END OF LIFE SCENARIO DOCUMENTATION

Scenario information	Value
Collection process – kg collected separately	12.333
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	4.56E+00
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	5.05E+00
Scenario assumptions e.g. transportation	Lorry, 16-32 metric ton, EURO5; 150 km

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

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.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

Program assistant: Xinyuan Zhang

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools
Tool verifier: Hai Ha Nguyen
Tool verification validity: 28 March 2025 - 27 March 2028

APPENDIX 1

MATERIAL COMPOSITION

The product material composition is illustrated in the table below. The material weight is given in grams and in percentage on total product weight.

Table 1: Material composition

Material	Weight (g)	Weight-%
Aluminium	5793.67	46.98
Brass	340.98	2.76
Copper	206.86	1.68
Other Plastics	5139.26	41.67
Paint	262.33	2.13
PCB Copper	106.43	0.86
PCB Iron	106.35	0.86
PCB Non-ferrous metal	0.03	0
PCB Support	136.12	1.1
PCB Tin	6.98	0.06
Silica Sand	204	1.65
Stainless Steel	6	0.05
Steel	23.9	0.19

APPENDIX 2

USE PHASE (B6) VALUES FOR DIFFERENT COUNTRY MIX

In this EPD the B6 impact has been calculated using the energy mix of EU. The table in this appendix is useful for conversion and comparison of B6 values with other country energy mix. The Global Warming Potential Total (GWP tot) value is illustrated for each country. The value refers to 1 kwh.

Example on how to use the table:

If for example this EPD was done according to EU energy mix and you want to see how the GWP total changes according to a Finland country energy mix, you can take the original value in the results table here highlighed in yellow:

ENVIRONMENTAL IMPACT DATA, RESULTS PER DECLARED UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[3]	kg CO_2e	1.08E+01	2.33E-01	5.06E-01	1.15E+01	3.27E+00	1.68E+00	ND	ND	ND	ND	ND	4.06E-02	ND	0.00E+00	2.88E-02	5.13E-01	2.80E-01	-9.88E-01

Divide that value according to the EU value from the following table (EU = 3.30E-01) and then multilplying for the Finland value from the same table (FINLAND = 1.54E-01).

Thus, the calculation of this example would be:

New B6 GWP tot for Finland = (4.06E-02 / 3.30E-01) x 1.54E-01 = 1.89E-02.

Country	GWP tot (kg CO2 eq. per kwh)		
AFRICA	7.30E-01	INDIA	1.50E+00
APAC	9.50E-01	ITALY	3.50E-01
AUSTRALIA	8.40E-01	LATAM	3.90E-01
AUSTRIA	2.30E-01	NAM	4.50E-01
BELGIUM	2.00E-01	NETHERLANDS	3.90E-01
CHINA	1.02E+00	NORWAY	4.50E-02
DENMARK	1.60E-01	ROW	7.30E-01
EU	3.30E-01	SPAIN	2.10E-01
FINLAND	1.54E-01	SWEDEN	3.70E-02
FRANCE	8.70E-02	UK	2.60E-01
		GERMANY	3.90E-01

Source Ecoinvent 3.10.1

APPENDIX 3 - EPD HUB ALIGNED

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a reference variant of a product family, based on various light management scenarios and power inputs of the luminaires within the same product familiy.

To calculate the Scaled Impact (*SI*), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions P_{in} and the power input of the base variant P_{base}.

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system). The presented controls factors values in Table A1 are based on BS EN 15193-1:2017. Please refer to this publication or contact Signify directly for more information.

$$TSF = PSF * CSF$$

Table 1: Light management function (PEP EcoPassport aligned)

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

3. Lastly, the GWP of the base variant is then scaled by the TSF.

$$Scaled\ Impact = GWP_{case} * TSF$$

The following list of product configurations is not exhaustive. Please use the formula defined in point 1 above to calculate the exact power scaling factor (PSF) for any specific configuration.

Table 2: GWP per scaling factor (EPD Hub aligned)

	12NC or Product Family Code	Description	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
							NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
1	BDS491	LED10-4S/740	800	6.6	121.2	0.165	0.165	0.124	0.124	0.091	217.1	162.9	162.9	119.4
2	BDS491	LED15-4S/740	1200	9.6	125.0	0.240	0.240	0.180	0.180	0.132	315.8	236.9	236.9	173.7
3	BDS491	LED20-4S/740	1600	12.8	125.0	0.320	0.320	0.240	0.240	0.176	421.1	315.8	315.8	231.6
4	BDS491	LED25-4S/740	2000	16.2	123.5	0.405	0.405	0.304	0.304	0.223	533.0	399.7	399.7	293.1
5	BDS491	LED30-4S/740	2370	17.8	133.1	0.445	0.445	0.334	0.334	0.245	585.6	439.2	439.2	322.1
6	BDS491	LED40-4S/740	3160	24.0	131.7	0.600	0.600	0.450	0.450	0.330	789.6	592.2	592.2	434.3
7	BDS491	LED50-4S/740	3950	30.0	131.7	0.750	0.750	0.563	0.563	0.413	987.0	740.3	740.3	542.9
8	BDS491	LED60-4S/740	4740	33.5	141.5	0.838	0.838	0.628	0.628	0.461	1102.2	826.6	826.6	606.2
9	BDS491	LED70-4S/740	5530	39.5	140.0	0.988	0.988	0.741	0.741	0.543	1299.6	974.7	974.7	714.8
10	BDS491	LED80-4S/740	6320	45.0	140.4	1.125	1.125	0.844	0.844	0.619	1480.5	1110.4	1110.4	814.3
11	BDS491	LED90-4S/740	7110	51.0	139.4	1.275	1.275	0.956	0.956	0.701	1677.9	1258.4	1258.4	922.8
12	BDS491	LED100-4S/740	7900	58.0	136.2	1.450	1.450	1.088	1.088	0.798	1908.2	1431.2	1431.2	1049.5
13	BDS491	LED10-4S/830	800	7.8	102.6	0.195	0.195	0.146	0.146	0.107	256.6	192.5	192.5	141.1
14	BDS491	LED15-4S/830	1200	11.4	105.3	0.285	0.285	0.214	0.214	0.157	375.1	281.3	281.3	206.3
15	BDS491	LED20-4S/830	1600	15.4	103.9	0.385	0.385	0.289	0.289	0.212	506.7	380.0	380.0	278.7
16	BDS491	LED25-4S/830	1975	17.6	112.2	0.440	0.440	0.330	0.330	0.242	579.0	434.3	434.3	318.5

17	BDS491	LED30-4S/830	2370	21.0	112.9	0.525	0.525	0.394	0.394	0.289	690.9	518.2	518.2	380.0
18	BDS491	LED40-4S/830	3160	28.5	110.9	0.713	0.713	0.534	0.534	0.392	937.7	703.2	703.2	515.7
19	BDS491	LED50-4S/830	3900	36.5	106.8	0.913	0.913	0.684	0.684	0.502	1200.9	900.6	900.6	660.5
20	BDS491	LED60-4S/830	4740	40.0	118.5	1.000	1.000	0.750	0.750	0.550	1316.0	987.0	987.0	723.8
21	BDS491	LED70-4S/830	5530	47.0	117.7	1.175	1.175	0.881	0.881	0.646	1546.3	1159.7	1159.7	850.5
22	BDS491	LED80-4S/830	6320	55.0	114.9	1.375	1.375	1.031	1.031	0.756	1809.5	1357.1	1357.1	995.2
23	BDS491	LED90-4S/830	7020	62.0	113.2	1.550	1.550	1.163	1.163	0.853	2039.8	1529.9	1529.9	1121.9
24	BDS491	LED100-4S/830	7800	70.0	111.4	1.750	1.750	1.313	1.313	0.963	2303.0	1727.3	1727.3	1266.7
25	BDS491	LED10-4S/722	800	8.6	93.0	0.215	0.215	0.161	0.161	0.118	282.9	212.2	212.2	155.6
26	BDS491	LED15-4S/722	1200	12.8	93.8	0.320	0.320	0.240	0.240	0.176	421.1	315.8	315.8	231.6
27	BDS491	LED20-4S/722	1580	15.8	100.0	0.395	0.395	0.296	0.296	0.217	519.8	389.9	389.9	285.9
28	BDS491	LED25-4S/722	1975	19.8	99.7	0.495	0.495	0.371	0.371	0.272	651.4	488.6	488.6	358.3
29	BDS491	LED30-4S/722	2370	23.5	100.9	0.588	0.588	0.441	0.441	0.323	773.2	579.9	579.9	425.2
30	BDS491	LED40-4S/722	3120	32.0	97.5	0.800	0.800	0.600	0.600	0.440	1052.8	789.6	789.6	579.0
31	BDS491	LED50-4S/722	3950	37.0	106.8	0.925	0.925	0.694	0.694	0.509	1217.3	913.0	913.0	669.5
32	BDS491	LED60-4S/722	4740	45.0	105.3	1.125	1.125	0.844	0.844	0.619	1480.5	1110.4	1110.4	814.3
33	BDS491	LED70-4S/722	5530	53.0	104.3	1.325	1.325	0.994	0.994	0.729	1743.7	1307.8	1307.8	959.0
34	BDS491	LED80-4S/722	6240	62.0	100.6	1.550	1.550	1.163	1.163	0.853	2039.8	1529.9	1529.9	1121.9
35	BDS491	LED90-4S/722	7020	70.0	100.3	1.750	1.750	1.313	1.313	0.963	2303.0	1727.3	1727.3	1266.7
36	BDS491	LED100-4S/722	7700	80.0	96.3	2.000	2.000	1.500	1.500	1.100	2632.0	1974.0	1974.0	1447.6
37	BDS491	LED10-4S/727	800	7.8	102.6	0.195	0.195	0.146	0.146	0.107	256.6	192.5	192.5	141.1
38	BDS491	LED15-4S/727	1200	11.4	105.3	0.285	0.285	0.214	0.214	0.157	375.1	281.3	281.3	206.3
39	BDS491	LED20-4S/727	1600	15.4	103.9	0.385	0.385	0.289	0.289	0.212	506.7	380.0	380.0	278.7
40	BDS491	LED25-4S/727	1975	17.6	112.2	0.440	0.440	0.330	0.330	0.242	579.0	434.3	434.3	318.5
41	BDS491	LED30-4S/727	2370	21.0	112.9	0.525	0.525	0.394	0.394	0.289	690.9	518.2	518.2	380.0
42	BDS491	LED40-4S/727	3160	28.5	110.9	0.713	0.713	0.534	0.534	0.392	937.7	703.2	703.2	515.7
43	BDS491	LED50-4S/727	3900	36.5	106.8	0.913	0.913	0.684	0.684	0.502	1200.9	900.6	900.6	660.5
44	BDS491	LED60-4S/727	4740	40.0	118.5	1.000	1.000	0.750	0.750	0.550	1316.0	987.0	987.0	723.8

45	BDS491	LED70-4S/727	5530	47.0	117.7	1.175	1.175	0.881	0.881	0.646	1546.3	1159.7	1159.7	850.5
46	BDS491	LED80-4S/727	6320	55.0	114.9	1.375	1.375	1.031	1.031	0.756	1809.5	1357.1	1357.1	995.2
47	BDS491	LED90-4S/727	7020	62.0	113.2	1.550	1.550	1.163	1.163	0.853	2039.8	1529.9	1529.9	1121.9
48	BDS491	LED100-4S/727	7800	70.0	111.4	1.750	1.750	1.313	1.313	0.963	2303.0	1727.3	1727.3	1266.7
49	BDS491	LED10-4S/730	800	7.0	114.3	0.175	0.175	0.131	0.131	0.096	230.3	172.7	172.7	126.7
50	BDS491	LED15-4S/730	1200	10.2	117.6	0.255	0.255	0.191	0.191	0.140	335.6	251.7	251.7	184.6
51	BDS491	LED20-4S/730	1600	13.6	117.6	0.340	0.340	0.255	0.255	0.187	447.4	335.6	335.6	246.1
52	BDS491	LED25-4S/730	1975	15.8	125.0	0.395	0.395	0.296	0.296	0.217	519.8	389.9	389.9	285.9
53	BDS491	LED30-4S/730	2370	19.0	124.7	0.475	0.475	0.356	0.356	0.261	625.1	468.8	468.8	343.8
54	BDS491	LED40-4S/730	3160	25.5	123.9	0.638	0.638	0.478	0.478	0.351	839.0	629.2	629.2	461.4
55	BDS491	LED50-4S/730	3900	32.0	121.9	0.800	0.800	0.600	0.600	0.440	1052.8	789.6	789.6	579.0
56	BDS491	LED60-4S/730	4740	35.5	133.5	0.888	0.888	0.666	0.666	0.488	1168.0	876.0	876.0	642.4
57	BDS491	LED70-4S/730	5530	41.5	133.3	1.038	1.038	0.778	0.778	0.571	1365.4	1024.0	1024.0	750.9
58	BDS491	LED80-4S/730	6320	48.0	131.7	1.200	1.200	0.900	0.900	0.660	1579.2	1184.4	1184.4	868.6
59	BDS491	LED90-4S/730	7110	55.0	129.3	1.375	1.375	1.031	1.031	0.756	1809.5	1357.1	1357.1	995.2
60	BDS491	LED100-4S/730	7800	62.0	125.8	1.550	1.550	1.163	1.163	0.853	2039.8	1529.9	1529.9	1121.9
61	BDS491	LED10-4S/827	800	8.3	96.4	0.208	0.208	0.156	0.156	0.114	273.1	204.8	204.8	150.2
62	BDS491	LED15-4S/827	1200	12.2	98.4	0.305	0.305	0.229	0.229	0.168	401.4	301.0	301.0	220.8
63	BDS491	LED20-4S/827	1580	15.2	103.9	0.380	0.380	0.285	0.285	0.209	500.1	375.1	375.1	275.0
64	BDS491	LED25-4S/827	1975	19.0	103.9	0.475	0.475	0.356	0.356	0.261	625.1	468.8	468.8	343.8
65	BDS491	LED30-4S/827	2370	22.5	105.3	0.563	0.563	0.422	0.422	0.309	740.3	555.2	555.2	407.1
66	BDS491	LED40-4S/827	3120	31.0	100.6	0.775	0.775	0.581	0.581	0.426	1019.9	764.9	764.9	560.9
67	BDS491	LED50-4S/827	3950	36.0	109.7	0.900	0.900	0.675	0.675	0.495	1184.4	888.3	888.3	651.4
68	BDS491	LED60-4S/827	4740	43.0	110.2	1.075	1.075	0.806	0.806	0.591	1414.7	1061.0	1061.0	778.1
69	BDS491	LED70-4S/827	5530	51.0	108.4	1.275	1.275	0.956	0.956	0.701	1677.9	1258.4	1258.4	922.8
70	BDS491	LED80-4S/827	6240	59.0	105.8	1.475	1.475	1.106	1.106	0.811	1941.1	1455.8	1455.8	1067.6
71	BDS491	LED90-4S/827	7020	67.0	104.8	1.675	1.675	1.256	1.256	0.921	2204.3	1653.2	1653.2	1212.4
72	BDS491	LED100-4S/827	7800	76.0	102.6	1.900	1.900	1.425	1.425	1.045	2500.4	1875.3	1875.3	1375.2

73	BDS491	LED10-4S/840	800	7.6	105.3	0.190	0.190	0.143	0.143	0.105	250.0	187.5	187.5	137.5
74	BDS491	LED15-4S/840	1200	11.0	109.1	0.275	0.275	0.206	0.206	0.151	361.9	271.4	271.4	199.0
75	BDS491	LED20-4S/840	1600	14.8	108.1	0.370	0.370	0.278	0.278	0.204	486.9	365.2	365.2	267.8
76	BDS491	LED25-4S/840	1975	17.2	114.8	0.430	0.430	0.323	0.323	0.237	565.9	424.4	424.4	311.2
77	BDS491	LED30-4S/840	2370	20.5	115.6	0.513	0.513	0.384	0.384	0.282	674.5	505.8	505.8	370.9
78	BDS491	LED40-4S/840	3160	27.5	114.9	0.688	0.688	0.516	0.516	0.378	904.8	678.6	678.6	497.6
79	BDS491	LED50-4S/840	3900	35.0	111.4	0.875	0.875	0.656	0.656	0.481	1151.5	863.6	863.6	633.3
80	BDS491	LED60-4S/840	4740	39.0	121.5	0.975	0.975	0.731	0.731	0.536	1283.1	962.3	962.3	705.7
81	BDS491	LED70-4S/840	5530	45.5	121.5	1.138	1.138	0.853	0.853	0.626	1497.0	1122.7	1122.7	823.3
82	BDS491	LED80-4S/840	6320	53.0	119.2	1.325	1.325	0.994	0.994	0.729	1743.7	1307.8	1307.8	959.0
83	BDS491	LED90-4S/840	7020	60.0	117.0	1.500	1.500	1.125	1.125	0.825	1974.0	1480.5	1480.5	1085.7
84	BDS491	LED100-4S/840	7800	68.0	114.7	1.700	1.700	1.275	1.275	0.935	2237.2	1677.9	1677.9	1230.5

PEP ECOPASSPORT ALIGNED

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a refernce variant of a product family, based on various light management functions, the lumen output (O_{lum}) and reference service life (*RSL*) of each product within the same product familiy.

To calculate the Scaled Impact (SI_{pep}), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions P_{in} and the power input of the base variant P_{base}.

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Using this scaled GWP, we then can apply the PEP Ecopassport method for calculating the environmental impact of the functional unit for a luminary (1000 lumens over 35000 hours), applied to B6, where the Functional Unit application considers the lumen output (Olum) and reference service lifetime (RSL) of the product to estimate the final environmental impact. The scaled impact (SIpep) is presented in Table A4.

$$GSF = \frac{FU_{pep}}{FU_p} = \frac{1{,}000}{O_{lum}} * \frac{35{,}000}{RSL}$$

3. Calculate the GWP scaling factor (P*GSF*), by multiplying the PSF by the GSF.

$$PGSF = PSF * GSF$$

4. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system), as presented in Table A1.

$$TSF = PGSF * CSF$$

Table 3: Light management functions (PEP EcoPassport aligned)

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

5. Lastly, the GWP of the base variant is then scaled by the TSF.

$$Scaled\ GWP = GWP_{case} * TSF$$

Table 4: Impact per scaling factor (PEP EcoPassport aligned)

	12NC or Product Family Code	Description	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
							NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
1	BDS491	LED10-4S/740	800	6.6	121.2	0.165	0.072	0.054	0.054	0.040	95.0	71.2	71.2	52.2
2	BDS491	LED15-4S/740	1200	9.6	125.0	0.240	0.070	0.053	0.053	0.039	92.1	69.1	69.1	50.7
3	BDS491	LED20-4S/740	1600	12.8	125.0	0.320	0.070	0.053	0.053	0.039	92.1	69.1	69.1	50.7
4	BDS491	LED25-4S/740	2000	16.2	123.5	0.405	0.071	0.053	0.053	0.039	93.3	70.0	70.0	51.3
5	BDS491	LED30-4S/740	2370	17.8	133.1	0.445	0.066	0.049	0.049	0.036	86.5	64.9	64.9	47.6
6	BDS491	LED40-4S/740	3160	24.0	131.7	0.600	0.066	0.050	0.050	0.037	87.5	65.6	65.6	48.1
7	BDS491	LED50-4S/740	3950	30.0	131.7	0.750	0.066	0.050	0.050	0.037	87.5	65.6	65.6	48.1
8	BDS491	LED60-4S/740	4740	33.5	141.5	0.838	0.062	0.046	0.046	0.034	81.4	61.0	61.0	44.8
9	BDS491	LED70-4S/740	5530	39.5	140.0	0.988	0.063	0.047	0.047	0.034	82.3	61.7	61.7	45.2
10	BDS491	LED80-4S/740	6320	45.0	140.4	1.125	0.062	0.047	0.047	0.034	82.0	61.5	61.5	45.1
11	BDS491	LED90-4S/740	7110	51.0	139.4	1.275	0.063	0.047	0.047	0.035	82.6	61.9	61.9	45.4
12	BDS491	LED100-4S/740	7900	58.0	136.2	1.450	0.064	0.048	0.048	0.035	84.5	63.4	63.4	46.5
13	BDS491	LED10-4S/830	800	7.8	102.6	0.195	0.085	0.064	0.064	0.047	112.3	84.2	84.2	61.7
14	BDS491	LED15-4S/830	1200	11.4	105.3	0.285	0.083	0.062	0.062	0.046	109.4	82.0	82.0	60.2
15	BDS491	LED20-4S/830	1600	15.4	103.9	0.385	0.084	0.063	0.063	0.046	110.8	83.1	83.1	61.0
16	BDS491	LED25-4S/830	1975	17.6	112.2	0.440	0.078	0.058	0.058	0.043	102.6	77.0	77.0	56.4
17	BDS491	LED30-4S/830	2370	21.0	112.9	0.525	0.078	0.058	0.058	0.043	102.0	76.5	76.5	56.1
18	BDS491	LED40-4S/830	3160	28.5	110.9	0.713	0.079	0.059	0.059	0.043	103.9	77.9	77.9	57.1
19	BDS491	LED50-4S/830	3900	36.5	106.8	0.913	0.082	0.061	0.061	0.045	107.8	80.8	80.8	59.3
20	BDS491	LED60-4S/830	4740	40.0	118.5	1.000	0.074	0.055	0.055	0.041	97.2	72.9	72.9	53.4
21	BDS491	LED70-4S/830	5530	47.0	117.7	1.175	0.074	0.056	0.056	0.041	97.9	73.4	73.4	53.8
22	BDS491	LED80-4S/830	6320	55.0	114.9	1.375	0.076	0.057	0.057	0.042	100.2	75.2	75.2	55.1
23	BDS491	LED90-4S/830	7020	62.0	113.2	1.550	0.077	0.058	0.058	0.043	101.7	76.3	76.3	55.9

24	BDS491	LED100-4S/830	7800	70.0	111.4	1.750	0.079	0.059	0.059	0.043	103.3	77.5	77.5	56.8
25	BDS491	LED10-4S/722	800	8.6	93.0	0.215	0.094	0.071	0.071	0.052	123.8	92.8	92.8	68.1
26	BDS491	LED15-4S/722	1200	12.8	93.8	0.320	0.093	0.070	0.070	0.051	122.8	92.1	92.1	67.6
27	BDS491	LED20-4S/722	1580	15.8	100.0	0.395	0.088	0.066	0.066	0.048	115.2	86.4	86.4	63.3
28	BDS491	LED25-4S/722	1975	19.8	99.7	0.495	0.088	0.066	0.066	0.048	115.4	86.6	86.6	63.5
29	BDS491	LED30-4S/722	2370	23.5	100.9	0.588	0.087	0.065	0.065	0.048	114.2	85.6	85.6	62.8
30	BDS491	LED40-4S/722	3120	32.0	97.5	0.800	0.090	0.067	0.067	0.049	118.1	88.6	88.6	65.0
31	BDS491	LED50-4S/722	3950	37.0	106.8	0.925	0.082	0.061	0.061	0.045	107.9	80.9	80.9	59.3
32	BDS491	LED60-4S/722	4740	45.0	105.3	1.125	0.083	0.062	0.062	0.046	109.3	82.0	82.0	60.1
33	BDS491	LED70-4S/722	5530	53.0	104.3	1.325	0.084	0.063	0.063	0.046	110.4	82.8	82.8	60.7
34	BDS491	LED80-4S/722	6240	62.0	100.6	1.550	0.087	0.065	0.065	0.048	114.4	85.8	85.8	62.9
35	BDS491	LED90-4S/722	7020	70.0	100.3	1.750	0.087	0.065	0.065	0.048	114.8	86.1	86.1	63.2
36	BDS491	LED100-4S/722	7700	80.0	96.3	2.000	0.091	0.068	0.068	0.050	119.6	89.7	89.7	65.8
37	BDS491	LED10-4S/727	800	7.8	102.6	0.195	0.085	0.064	0.064	0.047	112.3	84.2	84.2	61.7
38	BDS491	LED15-4S/727	1200	11.4	105.3	0.285	0.083	0.062	0.062	0.046	109.4	82.0	82.0	60.2
39	BDS491	LED20-4S/727	1600	15.4	103.9	0.385	0.084	0.063	0.063	0.046	110.8	83.1	83.1	61.0
40	BDS491	LED25-4S/727	1975	17.6	112.2	0.440	0.078	0.058	0.058	0.043	102.6	77.0	77.0	56.4
41	BDS491	LED30-4S/727	2370	21.0	112.9	0.525	0.078	0.058	0.058	0.043	102.0	76.5	76.5	56.1
42	BDS491	LED40-4S/727	3160	28.5	110.9	0.713	0.079	0.059	0.059	0.043	103.9	77.9	77.9	57.1
43	BDS491	LED50-4S/727	3900	36.5	106.8	0.913	0.082	0.061	0.061	0.045	107.8	80.8	80.8	59.3
44	BDS491	LED60-4S/727	4740	40.0	118.5	1.000	0.074	0.055	0.055	0.041	97.2	72.9	72.9	53.4
45	BDS491	LED70-4S/727	5530	47.0	117.7	1.175	0.074	0.056	0.056	0.041	97.9	73.4	73.4	53.8
46	BDS491	LED80-4S/727	6320	55.0	114.9	1.375	0.076	0.057	0.057	0.042	100.2	75.2	75.2	55.1
47	BDS491	LED90-4S/727	7020	62.0	113.2	1.550	0.077	0.058	0.058	0.043	101.7	76.3	76.3	55.9
48	BDS491	LED100-4S/727	7800	70.0	111.4	1.750	0.079	0.059	0.059	0.043	103.3	77.5	77.5	56.8
49	BDS491	LED10-4S/730	800	7.0	114.3	0.175	0.077	0.057	0.057	0.042	100.8	75.6	75.6	55.4
50	BDS491	LED15-4S/730	1200	10.2	117.6	0.255	0.074	0.056	0.056	0.041	97.9	73.4	73.4	53.8
51	BDS491	LED20-4S/730	1600	13.6	117.6	0.340	0.074	0.056	0.056	0.041	97.9	73.4	73.4	53.8

52	BDS491	LED25-4S/730	1975	15.8	125.0	0.395	0.070	0.053	0.053	0.039	92.1	69.1	69.1	50.7
53	BDS491	LED30-4S/730	2370	19.0	124.7	0.475	0.070	0.053	0.053	0.039	92.3	69.2	69.2	50.8
54	BDS491	LED40-4S/730	3160	25.5	123.9	0.638	0.071	0.053	0.053	0.039	92.9	69.7	69.7	51.1
55	BDS491	LED50-4S/730	3900	32.0	121.9	0.800	0.072	0.054	0.054	0.039	94.5	70.9	70.9	52.0
56	BDS491	LED60-4S/730	4740	35.5	133.5	0.888	0.066	0.049	0.049	0.036	86.2	64.7	64.7	47.4
57	BDS491	LED70-4S/730	5530	41.5	133.3	1.038	0.066	0.049	0.049	0.036	86.4	64.8	64.8	47.5
58	BDS491	LED80-4S/730	6320	48.0	131.7	1.200	0.066	0.050	0.050	0.037	87.5	65.6	65.6	48.1
59	BDS491	LED90-4S/730	7110	55.0	129.3	1.375	0.068	0.051	0.051	0.037	89.1	66.8	66.8	49.0
60	BDS491	LED100-4S/730	7800	62.0	125.8	1.550	0.070	0.052	0.052	0.038	91.5	68.6	68.6	50.3
61	BDS491	LED10-4S/827	800	8.3	96.4	0.208	0.091	0.068	0.068	0.050	119.5	89.6	89.6	65.7
62	BDS491	LED15-4S/827	1200	12.2	98.4	0.305	0.089	0.067	0.067	0.049	117.1	87.8	87.8	64.4
63	BDS491	LED20-4S/827	1580	15.2	103.9	0.380	0.084	0.063	0.063	0.046	110.8	83.1	83.1	60.9
64	BDS491	LED25-4S/827	1975	19.0	103.9	0.475	0.084	0.063	0.063	0.046	110.8	83.1	83.1	60.9
65	BDS491	LED30-4S/827	2370	22.5	105.3	0.563	0.083	0.062	0.062	0.046	109.3	82.0	82.0	60.1
66	BDS491	LED40-4S/827	3120	31.0	100.6	0.775	0.087	0.065	0.065	0.048	114.4	85.8	85.8	62.9
67	BDS491	LED50-4S/827	3950	36.0	109.7	0.900	0.080	0.060	0.060	0.044	104.9	78.7	78.7	57.7
68	BDS491	LED60-4S/827	4740	43.0	110.2	1.075	0.079	0.060	0.060	0.044	104.5	78.3	78.3	57.5
69	BDS491	LED70-4S/827	5530	51.0	108.4	1.275	0.081	0.061	0.061	0.044	106.2	79.6	79.6	58.4
70	BDS491	LED80-4S/827	6240	59.0	105.8	1.475	0.083	0.062	0.062	0.046	108.9	81.7	81.7	59.9
71	BDS491	LED90-4S/827	7020	67.0	104.8	1.675	0.084	0.063	0.063	0.046	109.9	82.4	82.4	60.4
72	BDS491	LED100-4S/827	7800	76.0	102.6	1.900	0.085	0.064	0.064	0.047	112.2	84.1	84.1	61.7
73	BDS491	LED10-4S/840	800	7.6	105.3	0.190	0.083	0.062	0.062	0.046	109.4	82.0	82.0	60.2
74	BDS491	LED15-4S/840	1200	11.0	109.1	0.275	0.080	0.060	0.060	0.044	105.6	79.2	79.2	58.1
75	BDS491	LED20-4S/840	1600	14.8	108.1	0.370	0.081	0.061	0.061	0.045	106.5	79.9	79.9	58.6
76	BDS491	LED25-4S/840	1975	17.2	114.8	0.430	0.076	0.057	0.057	0.042	100.3	75.2	75.2	55.2
77	BDS491	LED30-4S/840	2370	20.5	115.6	0.513	0.076	0.057	0.057	0.042	99.6	74.7	74.7	54.8
78	BDS491	LED40-4S/840	3160	27.5	114.9	0.688	0.076	0.057	0.057	0.042	100.2	75.2	75.2	55.1
79	BDS491	LED50-4S/840	3900	35.0	111.4	0.875	0.079	0.059	0.059	0.043	103.3	77.5	77.5	56.8

80	BDS491	LED60-4S/840	4740	39.0	121.5	0.975	0.072	0.054	0.054	0.040	94.7	71.1	71.1	52.1
81	BDS491	LED70-4S/840	5530	45.5	121.5	1.138	0.072	0.054	0.054	0.040	94.7	71.1	71.1	52.1
82	BDS491	LED80-4S/840	6320	53.0	119.2	1.325	0.073	0.055	0.055	0.040	96.6	72.4	72.4	53.1
83	BDS491	LED90-4S/840	7020	60.0	117.0	1.500	0.075	0.056	0.056	0.041	98.4	73.8	73.8	54.1
84	BDS491	LED100-4S/840	7800	68.0	114.7	1.700	0.076	0.057	0.057	0.042	100.4	75.3	75.3	55.2