



## ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

MileWide LED gen2 large BRP436/BPP436

Signify N.V.



**EPD HUB, HUB-4473**

Published on 05.01.2026, last updated on 05.01.2026, valid until 05.01.2031

## 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	KETRZYN, POLAND
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: <input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification
EPD verifier	Haiha Nguyen as an authorized verifier for EPD Hub

## PRODUCT SPECIFICATION

Product name	MileWide LED gen2 large BRP436/BPP436
Product number / reference	910770225282 / BRP436 LED125-/740 I DM11 SI DDF2 SRG10
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	5.63

## PRODUCT DESCRIPTION

MileWide LED Gen2, developed together with Holscher Design, is the latest generation of our highly popular MileWide lighting family that features a range of dedicated masts and brackets. The pure, clean design of MileWide LED Gen2 integrates perfectly with the cityscapes of today and tomorrow. Available in two sizes, BPP435 (small) and BPP436 (large), this MileWide pole light will bring a touch of elegance and fluidity to any urban application (side entry versions: BRP435 and BRP436). Thanks to its advanced LED engine, and use of application-tailored optics, MileWide LED Gen2 delivers outstanding quality of light and light performance, enabling significant energy savings, yet still providing perfectly uniform light on the road. The luminaire is available with one or two Zhaga-D4i (ZD4i) System Ready (SR) sockets, which makes the luminaire future ready. This means MileWide LED Gen2 is ready to pair with advanced controls and lighting software applications such as Interact, or sensors such as the Outdoor Sensor Bundle (OSB). Furthermore, each MileWide LED Gen2 luminaire is uniquely identifiable, thanks to the Signify Service tag app. By simply scanning a QR code, placed inside the door of the mast or directly on the luminaire, you can instantly access the configuration of the luminaire. This makes maintenance and programming operations faster and easier, and enables you to create a digital library of lighting assets and spare parts.

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	4000
Protection index for water and dust (IP)	66
Impact resistance index (IK)	8
Luminous flux, Lumens	10750
Electrical power, Watt	70
Luminous efficiency, Lm/W	154
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	67.71	APAC , EU
Minerals	21.94	APAC , EU
Fossil materials	10.35	APAC , EU
Bio-based materials	0	EU

### 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	0.474

### ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	8.741
Mass of packaging, kg	1.207
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 <sub>2</sub> e)	68.7
GWP-fossil, A1-A3 (kg CO <sub>2</sub> e)	69.9
Secondary material, inputs (%)	45.4
Secondary material, outputs (%)	57.1
Total energy use, A1-A3 (kWh)	235
Net freshwater use, A1-A3 (m <sup>3</sup> )	3.29E-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

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

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### 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 green 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 <sup>1)</sup>	kg CO <sub>2</sub> e	6.54E+01	1.57E+00	1.78E+00	6.87E+01	3.25E-01	1.83E+00	ND	ND	ND	ND	ND	2.30E+03	ND	0.00E+00	2.56E-01	7.50E-01	2.97E-02	-1.40E+00
GWP – fossil	kg CO <sub>2</sub> e	6.57E+01	1.57E+00	2.57E+00	6.99E+01	3.25E-01	1.01E-01	ND	ND	ND	ND	ND	2.29E+03	ND	0.00E+00	2.56E-01	7.51E-01	4.23E-01	-1.40E+00
GWP – biogenic	kg CO <sub>2</sub> e	-4.48E-01	3.40E-04	-8.32E-01	-1.28E+00	7.37E-05	1.73E+00	ND	ND	ND	ND	ND	5.14E+00	ND	0.00E+00	5.58E-05	-3.99E-04	-3.93E-01	-1.50E-03
GWP – LULUC	kg CO <sub>2</sub> e	9.76E-02	7.22E-04	3.92E-02	1.38E-01	1.46E-04	2.80E-05	ND	ND	ND	ND	ND	7.03E+00	ND	0.00E+00	1.13E-04	1.72E-04	1.07E-04	-1.99E-03
Ozone depletion pot.	kg CFC-11e	6.60E-07	2.31E-08	7.49E-08	7.58E-07	4.80E-09	1.04E-09	ND	ND	ND	ND	ND	4.22E-05	ND	0.00E+00	3.57E-09	1.58E-09	1.48E-09	-7.72E-09
Acidification potential	mol H <sup>+</sup> e	4.90E-01	1.09E-02	9.18E-03	5.10E-01	1.11E-03	4.53E-04	ND	ND	ND	ND	ND	1.35E+01	ND	0.00E+00	8.52E-04	1.39E-03	5.81E-04	-1.82E-02
EP-freshwater <sup>2)</sup>	kg Pe	2.84E-02	1.12E-04	7.79E-04	2.92E-02	2.53E-05	7.63E-06	ND	ND	ND	ND	ND	2.13E+00	ND	0.00E+00	1.99E-05	6.79E-05	7.01E-05	-1.13E-03
EP-marine	kg Ne	7.47E-02	3.08E-03	4.31E-03	8.21E-02	3.64E-04	2.12E-04	ND	ND	ND	ND	ND	2.11E+00	ND	0.00E+00	2.76E-04	3.61E-04	1.63E-03	-1.73E-03
EP-terrestrial	mol Ne	7.85E-01	3.39E-02	2.71E-02	8.46E-01	3.97E-03	1.93E-03	ND	ND	ND	ND	ND	1.89E+01	ND	0.00E+00	3.00E-03	3.82E-03	2.33E-03	-1.94E-02
POCP (“smog”) <sup>3)</sup>	kg NMVOCe	2.57E-01	1.15E-02	9.51E-03	2.78E-01	1.63E-03	5.48E-04	ND	ND	ND	ND	ND	6.24E+00	ND	0.00E+00	1.19E-03	1.10E-03	8.51E-04	-5.78E-03
ADP-minerals & metals <sup>4)</sup>	kg Sbe	2.73E-03	3.99E-06	7.43E-06	2.74E-03	9.07E-07	2.26E-07	ND	ND	ND	ND	ND	3.09E-02	ND	0.00E+00	8.39E-07	6.46E-06	2.09E-07	-1.64E-04
ADP-fossil resources	MJ	7.55E+02	2.23E+01	3.12E+01	8.08E+02	4.72E+00	7.85E-01	ND	ND	ND	ND	ND	5.33E+04	ND	0.00E+00	3.59E+00	1.64E+00	1.30E+00	-1.64E+01
Water use <sup>5)</sup>	m <sup>3</sup> e depr.	1.94E+01	1.04E-01	6.92E-01	2.02E+01	2.33E-02	9.15E-02	ND	ND	ND	ND	ND	1.45E+03	ND	0.00E+00	1.66E-02	6.46E-02	3.71E-02	-3.02E-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	5.06E-06	1.42E-07	1.65E-07	5.37E-06	3.26E-08	5.61E-09	ND	ND	ND	ND	ND	4.81E-05	ND	0.00E+00	2.03E-08	1.81E-08	1.01E-08	-9.84E-08
Ionizing radiation <sup>6)</sup>	kBq U235e	3.10E+00	1.83E-02	9.25E-02	3.21E+00	4.11E-03	9.52E-04	ND	ND	ND	ND	ND	1.47E+03	ND	0.00E+00	2.90E-03	6.30E-03	2.11E-03	-1.41E-01
Ecotoxicity (freshwater)	CTUe	4.70E+02	2.98E+00	1.09E+01	4.84E+02	6.68E-01	2.20E+00	ND	ND	ND	ND	ND	8.12E+03	ND	0.00E+00	5.67E-01	2.06E+00	1.56E+02	-1.20E+01
Human toxicity, cancer	CTUh	5.31E-08	2.69E-10	1.09E-09	5.44E-08	5.37E-11	1.06E-10	ND	ND	ND	ND	ND	7.74E-07	ND	0.00E+00	4.35E-11	1.45E-10	8.81E-11	-1.58E-09
Human tox. non-cancer	CTUh	1.61E-06	1.34E-08	2.85E-08	1.65E-06	3.06E-09	4.30E-09	ND	ND	ND	ND	ND	4.02E-05	ND	0.00E+00	2.24E-09	7.73E-09	8.81E-09	-1.48E-07
SQP <sup>7)</sup>	-	3.32E+02	2.00E+01	9.20E+01	4.44E+02	4.75E+00	3.83E-01	ND	ND	ND	ND	ND	1.19E+04	ND	0.00E+00	2.14E+00	2.61E+00	1.92E+00	-7.09E+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 <sup>8)</sup>	MJ	7.95E+01	2.90E-01	9.64E-03	7.98E+01	6.47E-02	-2.12E+01	ND	ND	ND	ND	ND	1.46E+04	ND	0.00E+00	4.92E-02	2.24E-01	-7.26E+00	-2.06E+00
Renew. PER as material	MJ	8.45E+00	0.00E+00	6.86E+00	1.53E+01	0.00E+00	-1.53E+01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.59E-02	-2.59E-02	0.00E+00
Total use of renew. PER	MJ	8.80E+01	2.90E-01	6.87E+00	9.51E+01	6.47E-02	-3.65E+01	ND	ND	ND	ND	ND	1.46E+04	ND	0.00E+00	4.92E-02	2.08E-01	-7.29E+00	-2.06E+00
Non-re. PER as energy	MJ	7.22E+02	2.23E+01	2.36E+01	7.68E+02	4.72E+00	3.85E-01	ND	ND	ND	ND	ND	5.33E+04	ND	0.00E+00	3.59E+00	-7.99E+00	-1.37E+01	-1.64E+01
Non-re. PER as material	MJ	3.05E+01	0.00E+00	-6.47E+00	2.40E+01	0.00E+00	-5.93E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-7.80E+00	-1.56E+01	0.00E+00
Total use of non-re. PER	MJ	7.52E+02	2.23E+01	1.72E+01	7.92E+02	4.72E+00	-2.08E-01	ND	ND	ND	ND	ND	5.33E+04	ND	0.00E+00	3.59E+00	-1.58E+01	-2.93E+01	-1.64E+01
Secondary materials	kg	3.97E+00	0.00E+00	0.00E+00	3.97E+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	1.30E-01	1.09E-04	1.31E-01	2.61E-01	2.55E-05	9.82E-06	ND	ND	ND	ND	ND	7.04E-02	ND	0.00E+00	2.05E-05	7.58E-05	1.77E-05	-1.83E-04
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 <sup>3</sup>	3.11E-01	3.09E-03	1.51E-02	3.29E-01	6.98E-04	1.48E-03	ND	ND	ND	ND	ND	4.61E+01	ND	0.00E+00	4.75E-04	8.71E-04	-7.25E-03	-1.21E-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	1.09E+01	3.68E-02	1.27E-01	1.10E+01	8.00E-03	2.40E-02	ND	ND	ND	ND	ND	1.35E+02	ND	0.00E+00	6.25E-03	2.19E-02	2.22E-02	-2.00E-01
Non-hazardous waste	kg	2.35E+02	6.63E-01	6.48E+00	2.42E+02	1.48E-01	1.29E+00	ND	ND	ND	ND	ND	1.04E+04	ND	0.00E+00	1.17E-01	1.24E+00	1.37E+01	-5.38E+00
Radioactive waste	kg	7.70E-04	4.48E-06	2.19E-05	7.96E-04	1.01E-06	2.38E-07	ND	ND	ND	ND	ND	3.78E-01	ND	0.00E+00	7.11E-07	1.55E-06	5.18E-07	-3.45E-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	7.41E-02	7.41E-02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	4.99E+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	3.00E+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	1.26E+00	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	1.74E+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 <sub>2</sub> e	6.58E+01	1.56E+00	2.73E+00	7.01E+01	3.23E-01	1.01E-01	ND	ND	ND	ND	ND	2.29E+03	ND	0.00E+00	2.54E-01	7.50E-01	8.28E-01	-1.39E+00
Ozone depletion Pot.	kg CFC-11e	6.22E-07	1.84E-08	7.19E-08	7.12E-07	3.83E-09	8.88E-10	ND	ND	ND	ND	ND	3.53E-05	ND	0.00E+00	2.86E-09	1.32E-09	1.20E-09	-6.62E-09
Acidification	kg SO <sub>2</sub> e	4.12E-01	8.54E-03	6.32E-03	4.27E-01	8.47E-04	3.32E-04	ND	ND	ND	ND	ND	1.15E+01	ND	0.00E+00	6.53E-04	1.10E-03	4.28E-04	-1.58E-02
Eutrophication	kg PO <sub>4</sub> <sup>3</sup> e	8.07E-02	1.41E-03	4.76E-03	8.69E-02	2.06E-04	1.03E-04	ND	ND	ND	ND	ND	1.48E+00	ND	0.00E+00	1.59E-04	1.83E-04	8.49E-04	-1.06E-03
POCP (“smog”)	kg C <sub>2</sub> H <sub>4</sub> e	3.03E-02	5.63E-04	7.33E-04	3.16E-02	7.55E-05	2.53E-05	ND	ND	ND	ND	ND	6.26E-01	ND	0.00E+00	5.84E-05	6.64E-05	1.27E-04	-7.78E-04
ADP-elements	kg Sbe	2.72E-03	3.89E-06	7.25E-06	2.73E-03	8.85E-07	1.89E-07	ND	ND	ND	ND	ND	3.08E-02	ND	0.00E+00	8.19E-07	6.42E-06	1.95E-07	-1.64E-04
ADP-fossil	MJ	7.01E+02	2.20E+01	2.97E+01	7.52E+02	4.66E+00	7.69E-01	ND	ND	ND	ND	ND	2.74E+04	ND	0.00E+00	3.54E+00	1.54E+00	1.27E+00	-1.42E+01

**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 <sub>2</sub> e	6.58E+01	1.57E+00	2.61E+00	7.00E+01	3.25E-01	1.01E-01	ND	ND	ND	ND	ND	2.30E+03	ND	0.00E+00	2.56E-01	7.51E-01	4.23E-01	-1.40E+00

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 - CH<sub>4</sub> fossil, CH<sub>4</sub> 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 CO<sub>2</sub> 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 <sup>1)</sup>	kg CO <sub>2</sub> éq/FU	2.13E+00	5.11E-02	5.78E-02	2.24E+00	1.06E-02	5.96E-02	ND	ND	ND	ND	ND	7.50E+01	ND	0.00E+00	8.33E-03	2.44E-02	9.68E-04	-4.56E-02
GWP – fossil	kg CO <sub>2</sub> éq/FU	2.14E+00	5.11E-02	8.37E-02	2.27E+00	1.06E-02	3.30E-03	ND	ND	ND	ND	ND	7.46E+01	ND	0.00E+00	8.32E-03	2.44E-02	1.38E-02	-4.55E-02
GWP – biogenic	kg CO <sub>2</sub> éq/FU	-1.46E-02	1.11E-05	-2.71E-02	-4.17E-02	2.40E-06	5.63E-02	ND	ND	ND	ND	ND	1.67E-01	ND	0.00E+00	1.82E-06	-1.30E-05	-1.28E-02	-4.88E-05
GWP – LULUC	kg CO <sub>2</sub> éq/FU	3.18E-03	2.35E-05	1.28E-03	4.48E-03	4.74E-06	9.11E-07	ND	ND	ND	ND	ND	2.29E-01	ND	0.00E+00	3.68E-06	5.60E-06	3.49E-06	-6.47E-05
Ozone depletion pot.	kg CFC-11e/FU	2.15E-08	7.51E-10	2.44E-09	2.47E-08	1.56E-10	3.40E-11	ND	ND	ND	ND	ND	1.38E-06	ND	0.00E+00	1.16E-10	5.14E-11	4.83E-11	-2.51E-10
Acidification potential	mole H <sup>+</sup> e/FU	1.59E-02	3.55E-04	2.99E-04	1.66E-02	3.61E-05	1.47E-05	ND	ND	ND	ND	ND	4.39E-01	ND	0.00E+00	2.77E-05	4.53E-05	1.89E-05	-5.94E-04
EP-freshwater <sup>2)</sup>	kg Pe/FU	9.23E-04	3.65E-06	2.54E-05	9.52E-04	8.24E-07	2.49E-07	ND	ND	ND	ND	ND	6.94E-02	ND	0.00E+00	6.47E-07	2.21E-06	2.28E-06	-3.68E-05
EP-marine	kg Ne/FU	2.43E-03	1.00E-04	1.40E-04	2.67E-03	1.19E-05	6.89E-06	ND	ND	ND	ND	ND	6.88E-02	ND	0.00E+00	8.99E-06	1.17E-05	5.32E-05	-5.62E-05
EP-terrestrial	mol Ne/FU	2.56E-02	1.10E-03	8.81E-04	2.75E-02	1.29E-04	6.28E-05	ND	ND	ND	ND	ND	6.17E-01	ND	0.00E+00	9.78E-05	1.25E-04	7.60E-05	-6.32E-04
POCP (“smog”) <sup>3)</sup>	kg NMVOCe/	8.38E-03	3.75E-04	3.10E-04	9.06E-03	5.32E-05	1.79E-05	ND	ND	ND	ND	ND	2.03E-01	ND	0.00E+00	3.86E-05	3.59E-05	2.77E-05	-1.88E-04
ADP-minerals & metals <sup>4)</sup>	kg Sbe/FU	8.88E-05	1.30E-07	2.42E-07	8.92E-05	2.95E-08	7.35E-09	ND	ND	ND	ND	ND	1.01E-03	ND	0.00E+00	2.73E-08	2.10E-07	6.81E-09	-5.35E-06
ADP-fossil resources	MJ/FU	2.46E+01	7.26E-01	1.02E+00	2.63E+01	1.54E-01	2.55E-02	ND	ND	ND	ND	ND	1.74E+03	ND	0.00E+00	1.17E-01	5.33E-02	4.24E-02	-5.35E-01
Water use <sup>5)</sup>	m <sup>3</sup> e priv./FU	6.32E-01	3.40E-03	2.25E-02	6.58E-01	7.59E-04	2.98E-03	ND	ND	ND	ND	ND	4.73E+01	ND	0.00E+00	5.42E-04	2.10E-03	1.21E-03	-9.84E-03

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	1.65E-07	4.62E-09	5.36E-09	1.75E-07	1.06E-09	1.83E-10	ND	ND	ND	ND	ND	1.56E-06	ND	0.00E+00	6.60E-10	5.88E-10	3.28E-10	-3.20E-09
Ionizing radiation <sup>6)</sup>	kBq U235e/FU	1.01E-01	5.96E-04	3.01E-03	1.05E-01	1.34E-04	3.10E-05	ND	ND	ND	ND	ND	4.80E+01	ND	0.00E+00	9.45E-05	2.05E-04	6.87E-05	-4.58E-03
Ecotoxicity (freshwater)	CTUe/FU	1.53E+01	9.69E-02	3.55E-01	1.57E+01	2.17E-02	7.15E-02	ND	ND	ND	ND	ND	2.65E+02	ND	0.00E+00	1.85E-02	6.70E-02	5.07E+00	-3.91E-01
Human toxicity, cancer	CTUh/FU	1.73E-09	8.76E-12	3.54E-11	1.77E-09	1.75E-12	3.44E-12	ND	ND	ND	ND	ND	2.52E-08	ND	0.00E+00	1.41E-12	4.71E-12	2.87E-12	-5.13E-11
Human tox. non-cancer	CTUh/FU	5.23E-08	4.35E-10	9.27E-10	5.37E-08	9.95E-11	1.40E-10	ND	ND	ND	ND	ND	1.31E-06	ND	0.00E+00	7.31E-11	2.52E-10	2.87E-10	-4.81E-09
SQP <sup>7)</sup>	-/FU	1.08E+01	6.52E-01	2.99E+00	1.44E+01	1.55E-01	1.25E-02	ND	ND	ND	ND	ND	3.86E+02	ND	0.00E+00	6.97E-02	8.49E-02	6.25E-02	-2.31E-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 <sup>8)</sup>	MJ/FU	2.59E+00	9.43E-03	3.14E-04	2.60E+00	2.11E-03	-6.91E-01	ND	ND	ND	ND	ND	4.76E+02	ND	0.00E+00	1.60E-03	7.30E-03	-2.36E-01	-6.72E-02
Renew. PER as material	MJ/FU	2.75E-01	0.00E+00	2.23E-01	4.98E-01	0.00E+00	-4.97E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-5.19E-04	-8.42E-04	0.00E+00
Total use of renew. PER	MJ/FU	2.86E+00	9.43E-03	2.24E-01	3.10E+00	2.11E-03	-1.19E+00	ND	ND	ND	ND	ND	4.76E+02	ND	0.00E+00	1.60E-03	6.78E-03	-2.37E-01	-6.72E-02
Non-re. PER as energy	MJ/FU	2.35E+01	7.26E-01	7.69E-01	2.50E+01	1.54E-01	1.25E-02	ND	ND	ND	ND	ND	1.74E+03	ND	0.00E+00	1.17E-01	-2.60E-01	-4.46E-01	-5.34E-01
Non-re. PER as material	MJ/FU	9.92E-01	0.00E+00	-2.11E-01	7.81E-01	0.00E+00	-1.93E-02	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-2.54E-01	-5.08E-01	0.00E+00
Total use of non-re. PER	MJ/FU	2.45E+01	7.26E-01	5.59E-01	2.58E+01	1.54E-01	-6.76E-03	ND	ND	ND	ND	ND	1.74E+03	ND	0.00E+00	1.17E-01	-5.14E-01	-9.53E-01	-5.34E-01
Secondary materials	kg/FU	1.29E-01	0.00E+00	0.00E+00	1.29E-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	4.23E-03	3.55E-06	4.26E-03	8.50E-03	8.31E-07	3.20E-07	ND	ND	ND	ND	ND	2.29E-03	ND	0.00E+00	6.68E-07	2.47E-06	5.75E-07	-5.96E-06
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 <sup>3</sup> /FU	1.01E-02	1.00E-04	4.90E-04	1.07E-02	2.27E-05	4.83E-05	ND	ND	ND	ND	ND	1.50E+00	ND	0.00E+00	1.55E-05	2.83E-05	-2.36E-04	-3.94E-04

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	3.53E-01	1.20E-03	4.15E-03	3.59E-01	2.60E-04	7.83E-04	ND	ND	ND	ND	ND	4.39E+00	ND	0.00E+00	2.04E-04	7.14E-04	7.21E-04	-6.50E-03
Non-hazardous waste	kg/FU	7.65E+00	2.16E-02	2.11E-01	7.88E+00	4.82E-03	4.20E-02	ND	ND	ND	ND	ND	3.40E+02	ND	0.00E+00	3.82E-03	4.03E-02	4.45E-01	-1.75E-01
Radioactive waste	kg/FU	2.51E-05	1.46E-07	7.13E-07	2.59E-05	3.28E-08	7.76E-09	ND	ND	ND	ND	ND	1.23E-02	ND	0.00E+00	2.31E-08	5.05E-08	1.69E-08	-1.12E-06

### 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	2.41E-03	2.41E-03	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.62E-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	9.77E-02	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	4.12E-02	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	5.66E-02	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 <sub>2</sub> eq./FU	2.14E+00	5.08E-02	8.90E-02	2.28E+00	1.05E-02	3.28E-03	ND	ND	ND	ND	ND	7.46E+01	ND	0.00E+00	8.28E-03	2.44E-02	2.69E-02	-4.53E-02
Ozone depletion Pot.	kg CFC <sub>11</sub> /FU	2.02E-08	5.99E-10	2.34E-09	2.32E-08	1.25E-10	2.89E-11	ND	ND	ND	ND	ND	1.15E-06	ND	0.00E+00	9.30E-11	4.30E-11	3.91E-11	-2.15E-10
Acidification	kg SO <sub>2</sub> e/FU	1.34E-02	2.78E-04	2.06E-04	1.39E-02	2.76E-05	1.08E-05	ND	ND	ND	ND	ND	3.74E-01	ND	0.00E+00	2.12E-05	3.60E-05	1.39E-05	-5.15E-04
Eutrophication	kg PO <sub>4</sub> <sup>3</sup> e/FU	2.63E-03	4.59E-05	1.55E-04	2.83E-03	6.72E-06	3.36E-06	ND	ND	ND	ND	ND	4.83E-02	ND	0.00E+00	5.17E-06	5.95E-06	2.76E-05	-3.46E-05
POCP (“smog”)	kg C <sub>2</sub> H <sub>4</sub> e/FU	9.87E-04	1.83E-05	2.39E-05	1.03E-03	2.46E-06	8.23E-07	ND	ND	ND	ND	ND	2.04E-02	ND	0.00E+00	1.90E-06	2.16E-06	4.14E-06	-2.53E-05
ADP-elements	kg Sbe/FU	8.84E-05	1.27E-07	2.36E-07	8.88E-05	2.88E-08	6.14E-09	ND	ND	ND	ND	ND	1.00E-03	ND	0.00E+00	2.67E-08	2.09E-07	6.35E-09	-5.35E-06
ADP-fossil	MJ/FU	2.28E+01	7.16E-01	9.66E-01	2.45E+01	1.52E-01	2.51E-02	ND	ND	ND	ND	ND	8.91E+02	ND	0.00E+00	1.15E-01	5.01E-02	4.14E-02	-4.62E-01

### 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 <sup>9)</sup>	kg CO <sub>2</sub> e/FU	2.14E+00	5.11E-02	8.49E-02	2.28E+00	1.06E-02	3.30E-03	ND	ND	ND	ND	ND	7.48E+01	ND	0.00E+00	8.33E-03	2.44E-02	1.38E-02	-4.55E-02

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 - CH<sub>4</sub> fossil, CH<sub>4</sub> 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 CO<sub>2</sub> is set to zero.

## SCENARIO DOCUMENTATION

### DATA SOURCES

#### Manufacturing energy scenario documentation – A3 (Energy data source)

1. Energy supply, electricity production, wind, Electricity production, wind, 1-3MW turbine, onshore, Poland,ecoinvent 3.10.1, 0.0176 kgCO<sub>2</sub>e/kWh
2. Energy supply, electricity production, co-generation oil and gas, Heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical, Poland,ecoinvent 3.10.1, 0.0295 kgCO<sub>2</sub>e/MJ
3. Construction, specialized activities, demolition and site preparation, Market for diesel, burned in building machine, World,ecoinvent 3.10.1, 0.10 kgCO<sub>2</sub>e/MJ

#### Transport scenario documentation - A4

1. Transport, freight, sea, container ship, 0.0 km
2. Transport, freight, lorry >32 metric ton, EURO5, 303.77 km

#### Installation scenario documentation - A5 (Waste materials data source)

1. Market for packaging film, low density polyethylene, 0.011 kg
2. Market for printed paper, offset, 0.006 kg
3. Market for corrugated board box, 1.19 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, 7000.0 kWh

## TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m <sup>3</sup>	1.16E+02
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 <sup>3</sup>	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 <sup>3</sup>	0
Power output of equipment / kW	70
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	8.741
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	4.99E+00
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	3.46E+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	5360.6	61.33
Brass	5.84	0.07
Copper	17.94	0.21
Glass	1680.0	19.22
Other Plastics	630.93	7.22
Paint	103.0	1.18
PCB Alu	84.81	0.97
PCB Copper	137.84	1.58
PCB Iron	119.0	1.36
PCB Non-ferrous metal	0.73	0.01
PCB Support	161.02	1.84
PCB Tin	10.0	0.11

PP / PS-High Impact PS / ABS	9.38	0.11
Silica Sand	238.0	2.72
Steel	180.67	2.07
Tin	0.84	0.01

## 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 energy country 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 highlighted 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 <sup>1)</sup>	kg CO <sub>2</sub> e	4.44E-01	4.75E-03	2.34E-02	4.72E-01	9.50E-04	8.13E-03	ND	ND	ND	ND	ND	4.06E-02	ND	0.00E+00	5.50E-04	2.23E-03	7.33E-04	-2.82E-02

Divide that value according to the EU value from the following table (EU = 3.30E-01) and then multiplying 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	GERMANY	3.90E-01
APAC	9.50E-01	INDIA	1.50E+00
AUSTRALIA	8.40E-01	ITALY	3.50E-01
AUSTRIA	2.30E-01	LATAM	3.90E-01
BELGIUM	2.00E-01	NAM	4.50E-01
CHINA	1.02E+00	NETHERLANDS	3.90E-01
DENMARK	1.60E-01	NORWAY	4.50E-02
EU	3.30E-01	ROW	7.30E-01
FINLAND	1.54E-01	SPAIN	2.10E-01
FRANCE	8.70E-02	SWEDEN	3.70E-02
		UK	2.60E-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 family.

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.

$$\text{Scaled Impact} = \text{GWP}_{\text{case}} * \text{TSF}$$

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	BRP436/BPP436	BRP436/BPP436 LED80-4S/722	6946	58	118.9	0.834	0.834	0.625	0.625	0.459	1920.7	1439.4	1439.4	1057.1
2	BRP436/BPP436	BRP436/BPP436 LED90-4S/722	7790	66	118.8	0.937	0.937	0.703	0.703	0.515	2157.9	1619.0	1619.0	1186.0
3	BRP436/BPP436	BRP436/BPP436 LED100-4S/722	8630	73	118.1	1.044	1.044	0.783	0.783	0.574	2404.3	1803.2	1803.2	1321.9
4	BRP436/BPP436	BRP436/BPP436 LED110-4S/722	9464	81	117.3	1.153	1.153	0.865	0.865	0.634	2655.4	1992.1	1992.1	1460.1
5	BRP436/BPP436	BRP436/BPP436 LED120-4S/722	10293	88	116.4	1.263	1.263	0.947	0.947	0.695	2908.7	2180.9	2180.9	1600.6
6	BRP436/BPP436	BRP436/BPP436 LED130-4S/722	11116	96	115.6	1.374	1.374	1.03	1.03	0.756	3164.3	2372.1	2372.1	1741.1
7	BRP436/BPP436	BRP436/BPP436 LED140-4S/722	11922	104	114.4	1.489	1.489	1.117	1.117	0.819	3429.2	2572.5	2572.5	1886.2
8	BRP436/BPP436	BRP436/BPP436 LED150-4S/722	12708	112	113.1	1.606	1.606	1.205	1.205	0.883	3698.6	2775.1	2775.1	2033.5
9	BRP436/BPP436	BRP436/BPP436 LED160-4S/722	13486	121	111.7	1.724	1.724	1.293	1.293	0.948	3970.4	2977.8	2977.8	2183.2
10	BRP436/BPP436	BRP436/BPP436 LED80-4S/730	6974	47	149.0	0.669	0.669	0.502	0.502	0.368	1540.7	1156.1	1156.1	847.5

11	BRP436/BPP436	BRP436/BPP436 LED90-4S/730	7830	53	148.3	0.754	0.754	0.566	0.566	0.415	1736.5	1303.5	1303.5	955.7
12	BRP436/BPP436	BRP436/BPP436 LED100-4S/730	8691	59	148.1	0.839	0.839	0.629	0.629	0.461	1932.2	1448.6	1448.6	1061.7
13	BRP436/BPP436	BRP436/BPP436 LED110-4S/730	9541	65	147.5	0.924	0.924	0.693	0.693	0.508	2128.0	1596.0	1596.0	1169.9
14	BRP436/BPP436	BRP436/BPP436 LED120-4S/730	10387	71	146.9	1.01	1.01	0.758	0.758	0.556	2326.0	1745.7	1745.7	1280.5
15	BRP436/BPP436	BRP436/BPP436 LED130-4S/730	11230	77	146.0	1.099	1.099	0.824	0.824	0.604	2531.0	1897.7	1897.7	1391.0
16	BRP436/BPP436	BRP436/BPP436 LED140-4S/730	12057	83	145.1	1.187	1.187	0.89	0.89	0.653	2733.7	2049.7	2049.7	1503.9
17	BRP436/BPP436	BRP436/BPP436 LED150-4S/730	12879	90	143.9	1.279	1.279	0.959	0.959	0.703	2945.5	2208.6	2208.6	1619.0
18	BRP436/BPP436	BRP436/BPP436 LED160-4S/730	13696	96	142.8	1.37	1.37	1.028	1.028	0.754	3155.1	2367.5	2367.5	1736.5
19	BRP436/BPP436	BRP436/BPP436 LED170-4S/730	14507	102	141.5	1.464	1.464	1.098	1.098	0.805	3371.6	2528.7	2528.7	1853.9
20	BRP436/BPP436	BRP436/BPP436 LED180-4S/730	15297	109	140.1	1.56	1.56	1.17	1.17	0.858	3592.7	2694.5	2694.5	1976.0
21	BRP436/BPP436	BRP436/BPP436 LED190-4S/730	16081	116	138.5	1.659	1.659	1.244	1.244	0.912	3820.7	2864.9	2864.9	2100.3
22	BRP436/BPP436	BRP436/BPP436 LED80-4S/740	6974	44	158.5	0.629	0.629	0.472	0.472	0.346	1448.6	1087.0	1087.0	796.8
23	BRP436/BPP436	BRP436/BPP436 LED90-4S/740	7838	50	158.0	0.709	0.709	0.532	0.532	0.39	1632.8	1225.2	1225.2	898.2
24	BRP436/BPP436	BRP436/BPP436 LED100-4S/740	8700	55	157.3	0.79	0.79	0.593	0.593	0.435	1819.4	1365.7	1365.7	1001.8

25	BRP436/BPP436	BRP436/BPP436 LED110-4S/740	9551	61	156.8	0.87	0.87	0.652	0.652	0.479	2003.6	1501.6	1501.6	1103.1
26	BRP436/BPP436	BRP436/BPP436 LED120-4S/740	10398	66	156.4	0.95	0.95	0.712	0.712	0.522	2187.8	1639.7	1639.7	1202.2
27	BRP436/BPP436	BRP436/BPP436 LED130-4S/740	11242	72	155.7	1.031	1.031	0.773	0.773	0.567	2374.4	1780.2	1780.2	1305.8
28	BRP436/BPP436	BRP436/BPP436 LED140-4S/740	12082	78	154.9	1.114	1.114	0.836	0.836	0.613	2565.5	1925.3	1925.3	1411.7
29	BRP436/BPP436	BRP436/BPP436 LED150-4S/740	12919	84	154.0	1.199	1.199	0.899	0.899	0.659	2761.3	2070.4	2070.4	1517.7
30	BRP436/BPP436	BRP436/BPP436 LED160-4S/740	13738	90	152.6	1.286	1.286	0.965	0.965	0.707	2961.7	2222.4	2222.4	1628.2
31	BRP436/BPP436	BRP436/BPP436 LED170-4S/740	14552	96	151.6	1.371	1.371	1.028	1.028	0.754	3157.4	2367.5	2367.5	1736.5
32	BRP436/BPP436	BRP436/BPP436 LED180-4S/740	15360	102	150.3	1.46	1.46	1.095	1.095	0.803	3362.4	2521.8	2521.8	1849.3
33	BRP436/BPP436	BRP436/BPP436 LED190-4S/740	16164	108	149.0	1.55	1.55	1.163	1.163	0.853	3569.7	2678.4	2678.4	1964.5
34	BRP436/BPP436	BRP436/BPP436 LED80-4S/827	6946	56	123.4	0.804	0.804	0.603	0.603	0.442	1851.6	1388.7	1388.7	1017.9
35	BRP436/BPP436	BRP436/BPP436 LED90-4S/827	7798	63	123.2	0.904	0.904	0.678	0.678	0.497	2081.9	1561.4	1561.4	1144.6
36	BRP436/BPP436	BRP436/BPP436 LED100-4S/827	8639	70	122.7	1.006	1.006	0.754	0.754	0.553	2316.8	1736.5	1736.5	1273.6
37	BRP436/BPP436	BRP436/BPP436 LED110-4S/827	9483	78	122.0	1.11	1.11	0.833	0.833	0.611	2556.3	1918.4	1918.4	1407.1
38	BRP436/BPP436	BRP436/BPP436 LED120-4S/827	10314	85	121.2	1.216	1.216	0.912	0.912	0.669	2800.4	2100.3	2100.3	1540.7

39	BRP436/BPP436	BRP436/BPP436 LED130-4S/827	11128	93	120.2	1.323	1.323	0.992	0.992	0.728	3046.9	2284.6	2284.6	1676.6
40	BRP436/BPP436	BRP436/BPP436 LED140-4S/827	11935	100	119.1	1.431	1.431	1.073	1.073	0.787	3295.6	2471.1	2471.1	1812.5
41	BRP436/BPP436	BRP436/BPP436 LED150-4S/827	12735	108	117.9	1.543	1.543	1.157	1.157	0.849	3553.5	2664.6	2664.6	1955.2
42	BRP436/BPP436	BRP436/BPP436 LED160-4S/827	13528	116	116.6	1.657	1.657	1.243	1.243	0.911	3816.1	2862.6	2862.6	2098.0
43	BRP436/BPP436	BRP436/BPP436 LED170-4S/827	14299	124	115.3	1.771	1.771	1.328	1.328	0.974	4078.6	3058.4	3058.4	2243.1
44	BRP436/BPP436	BRP436/BPP436 LED80-4S/830	6953	54	130.0	0.764	0.764	0.573	0.573	0.42	1759.5	1319.6	1319.6	967.3
45	BRP436/BPP436	BRP436/BPP436 LED90-4S/830	7806	60	129.7	0.86	0.86	0.645	0.645	0.473	1980.6	1485.4	1485.4	1089.3
46	BRP436/BPP436	BRP436/BPP436 LED100-4S/830	8656	67	129.4	0.956	0.956	0.717	0.717	0.526	2201.7	1651.3	1651.3	1211.4
47	BRP436/BPP436	BRP436/BPP436 LED110-4S/830	9493	74	128.8	1.053	1.053	0.79	0.79	0.579	2425.1	1819.4	1819.4	1333.4
48	BRP436/BPP436	BRP436/BPP436 LED120-4S/830	10324	81	127.9	1.153	1.153	0.865	0.865	0.634	2655.4	1992.1	1992.1	1460.1
49	BRP436/BPP436	BRP436/BPP436 LED130-4S/830	11151	88	127.1	1.253	1.253	0.94	0.94	0.689	2885.7	2164.8	2164.8	1586.8
50	BRP436/BPP436	BRP436/BPP436 LED140-4S/830	11971	95	126.1	1.356	1.356	1.017	1.017	0.746	3122.9	2342.2	2342.2	1718.0
51	BRP436/BPP436	BRP436/BPP436 LED150-4S/830	12774	102	125.1	1.459	1.459	1.094	1.094	0.802	3360.1	2519.5	2519.5	1847.0
52	BRP436/BPP436	BRP436/BPP436 LED160-4S/830	13570	110	123.8	1.566	1.566	1.175	1.175	0.861	3606.5	2706.0	2706.0	1982.9

53	BRP436/BPP436	BRP436/BPP436 LED170-4S/830	14358	117	122.5	1.674	1.674	1.256	1.256	0.921	3855.2	2892.6	2892.6	2121.1
54	BRP436/BPP436	BRP436/BPP436 LED180-4S/830	15124	125	121.2	1.783	1.783	1.337	1.337	0.981	4106.2	3079.1	3079.1	2259.2
55	BRP436/BPP436	BRP436/BPP436 LED80-4S/840	6960	50	138.9	0.716	0.716	0.537	0.537	0.394	1648.9	1236.7	1236.7	907.4
56	BRP436/BPP436	BRP436/BPP436 LED90-4S/840	7814	56	138.5	0.806	0.806	0.605	0.605	0.443	1856.2	1393.3	1393.3	1020.2
57	BRP436/BPP436	BRP436/BPP436 LED100-4S/840	8665	63	138.2	0.896	0.896	0.672	0.672	0.493	2063.5	1547.6	1547.6	1135.4
58	BRP436/BPP436	BRP436/BPP436 LED110-4S/840	9512	69	138.1	0.984	0.984	0.738	0.738	0.541	2266.2	1699.6	1699.6	1245.9
59	BRP436/BPP436	BRP436/BPP436 LED120-4S/840	10345	75	137.2	1.077	1.077	0.808	0.808	0.592	2480.3	1860.8	1860.8	1363.4
60	BRP436/BPP436	BRP436/BPP436 LED130-4S/840	11185	82	136.4	1.171	1.171	0.878	0.878	0.644	2696.8	2022.0	2022.0	1483.1
61	BRP436/BPP436	BRP436/BPP436 LED140-4S/840	12008	89	135.5	1.266	1.266	0.95	0.95	0.696	2915.6	2187.8	2187.8	1602.9
62	BRP436/BPP436	BRP436/BPP436 LED150-4S/840	12827	95	134.6	1.361	1.361	1.021	1.021	0.749	3134.4	2351.4	2351.4	1724.9
63	BRP436/BPP436	BRP436/BPP436 LED160-4S/840	13626	102	133.5	1.459	1.459	1.094	1.094	0.802	3360.1	2519.5	2519.5	1847.0
64	BRP436/BPP436	BRP436/BPP436 LED170-4S/840	14418	109	132.2	1.559	1.559	1.169	1.169	0.857	3590.4	2692.2	2692.2	1973.7
65	BRP436/BPP436	BRP436/BPP436 LED180-4S/840	15203	116	130.8	1.66	1.66	1.245	1.245	0.913	3823.0	2867.2	2867.2	2102.6
66	BRP436/BPP436	BRP436/BPP436 LED190-4S/840	15981	123	129.5	1.763	1.763	1.322	1.322	0.97	4060.2	3044.6	3044.6	2233.9

67	BRP436/BPP436	BRP436/BPP436 LED80-4S/727	6953	52	134.5	0.739	0.739	0.554	0.554	0.406	1701.9	1275.9	1275.9	935.0
68	BRP436/BPP436	BRP436/BPP436 LED90-4S/727	7806	58	134.1	0.831	0.831	0.623	0.623	0.457	1913.8	1434.8	1434.8	1052.5
69	BRP436/BPP436	BRP436/BPP436 LED100-4S/727	8656	65	133.8	0.924	0.924	0.693	0.693	0.508	2128.0	1596.0	1596.0	1169.9
70	BRP436/BPP436	BRP436/BPP436 LED110-4S/727	9502	71	133.5	1.017	1.017	0.763	0.763	0.559	2342.2	1757.2	1757.2	1287.4
71	BRP436/BPP436	BRP436/BPP436 LED120-4S/727	10335	78	132.5	1.114	1.114	0.836	0.836	0.613	2565.5	1925.3	1925.3	1411.7
72	BRP436/BPP436	BRP436/BPP436 LED130-4S/727	11173	85	131.8	1.211	1.211	0.908	0.908	0.666	2788.9	2091.1	2091.1	1533.8
73	BRP436/BPP436	BRP436/BPP436 LED140-4S/727	11984	92	130.7	1.31	1.31	0.983	0.983	0.721	3016.9	2263.8	2263.8	1660.5
74	BRP436/BPP436	BRP436/BPP436 LED150-4S/727	12800	99	129.8	1.409	1.409	1.057	1.057	0.775	3244.9	2434.3	2434.3	1784.8
75	BRP436/BPP436	BRP436/BPP436 LED160-4S/727	13598	106	128.6	1.51	1.51	1.133	1.133	0.831	3477.5	2609.3	2609.3	1913.8
76	BRP436/BPP436	BRP436/BPP436 LED170-4S/727	14388	113	127.3	1.614	1.614	1.211	1.211	0.888	3717.0	2788.9	2788.9	2045.1
77	BRP436/BPP436	BRP436/BPP436 LED180-4S/727	15171	120	126.0	1.72	1.72	1.29	1.29	0.946	3961.2	2970.9	2970.9	2178.6
78	BRP436/BPP436	BRP436/BPP436 LED190-4S/727	15931	128	124.7	1.826	1.826	1.369	1.369	1.004	4205.3	3152.8	3152.8	2312.2

## 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 reference 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 family.

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 ( $O_{lum}$ ) and reference service lifetime ( $RSL$ ) of the product to estimate the final environmental impact. The scaled impact ( $SI_{pep}$ ) 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 ( $PGSF$ ), by multiplying the PSF by the GSF.

$$PGSF = PSF * GSF$$

- 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

- 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	BRP436/BPP436	BRP436/BPP436 LED80-4S/722	6946	58	118.9	0.834	0.042	0.032	0.032	0.023	96.7	73.7	73.7	53.0
2	BRP436/BPP436	BRP436/BPP436 LED90-4S/722	7790	66	118.8	0.937	0.042	0.032	0.032	0.023	96.7	73.7	73.7	53.0
3	BRP436/BPP436	BRP436/BPP436 LED100-4S/722	8630	73	118.1	1.044	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
4	BRP436/BPP436	BRP436/BPP436 LED110-4S/722	9464	81	117.3	1.153	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
5	BRP436/BPP436	BRP436/BPP436 LED120-4S/722	10293	88	116.4	1.263	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
6	BRP436/BPP436	BRP436/BPP436 LED130-4S/722	11116	96	115.6	1.374	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
7	BRP436/BPP436	BRP436/BPP436 LED140-4S/722	11922	104	114.4	1.489	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
8	BRP436/BPP436	BRP436/BPP436 LED150-4S/722	12708	112	113.1	1.606	0.045	0.034	0.034	0.025	103.6	78.3	78.3	57.6
9	BRP436/BPP436	BRP436/BPP436 LED160-4S/722	13486	121	111.7	1.724	0.045	0.034	0.034	0.025	103.6	78.3	78.3	57.6
10	BRP436/BPP436	BRP436/BPP436 LED80-4S/730	6974	47	149.0	0.669	0.033	0.025	0.025	0.018	76.0	57.6	57.6	41.5
11	BRP436/BPP436	BRP436/BPP436 LED90-4S/730	7830	53	148.3	0.754	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
12	BRP436/BPP436	BRP436/BPP436 LED100-4S/730	8691	59	148.1	0.839	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8

13	BRP436/BPP436	BRP436/BPP436 LED110-4S/730	9541	65	147.5	0.924	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
14	BRP436/BPP436	BRP436/BPP436 LED120-4S/730	10387	71	146.9	1.01	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
15	BRP436/BPP436	BRP436/BPP436 LED130-4S/730	11230	77	146.0	1.099	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
16	BRP436/BPP436	BRP436/BPP436 LED140-4S/730	12057	83	145.1	1.187	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
17	BRP436/BPP436	BRP436/BPP436 LED150-4S/730	12879	90	143.9	1.279	0.035	0.026	0.026	0.019	80.6	59.9	59.9	43.8
18	BRP436/BPP436	BRP436/BPP436 LED160-4S/730	13696	96	142.8	1.37	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
19	BRP436/BPP436	BRP436/BPP436 LED170-4S/730	14507	102	141.5	1.464	0.035	0.026	0.026	0.019	80.6	59.9	59.9	43.8
20	BRP436/BPP436	BRP436/BPP436 LED180-4S/730	15297	109	140.1	1.56	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
21	BRP436/BPP436	BRP436/BPP436 LED190-4S/730	16081	116	138.5	1.659	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
22	BRP436/BPP436	BRP436/BPP436 LED80-4S/740	6974	44	158.5	0.629	0.031	0.023	0.023	0.017	71.4	53.0	53.0	39.2
23	BRP436/BPP436	BRP436/BPP436 LED90-4S/740	7838	50	158.0	0.709	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
24	BRP436/BPP436	BRP436/BPP436 LED100-4S/740	8700	55	157.3	0.79	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
25	BRP436/BPP436	BRP436/BPP436 LED110-4S/740	9551	61	156.8	0.87	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
26	BRP436/BPP436	BRP436/BPP436 LED120-4S/740	10398	66	156.4	0.95	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5

27	BRP436/BPP436	BRP436/BPP436 LED130-4S/740	11242	72	155.7	1.031	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
28	BRP436/BPP436	BRP436/BPP436 LED140-4S/740	12082	78	154.9	1.114	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
29	BRP436/BPP436	BRP436/BPP436 LED150-4S/740	12919	84	154.0	1.199	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
30	BRP436/BPP436	BRP436/BPP436 LED160-4S/740	13738	90	152.6	1.286	0.032	0.024	0.024	0.018	73.7	55.3	55.3	41.5
31	BRP436/BPP436	BRP436/BPP436 LED170-4S/740	14552	96	151.6	1.371	0.033	0.025	0.025	0.018	76.0	57.6	57.6	41.5
32	BRP436/BPP436	BRP436/BPP436 LED180-4S/740	15360	102	150.3	1.46	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
33	BRP436/BPP436	BRP436/BPP436 LED190-4S/740	16164	108	149.0	1.55	0.034	0.026	0.026	0.019	78.3	59.9	59.9	43.8
34	BRP436/BPP436	BRP436/BPP436 LED80-4S/827	6946	56	123.4	0.804	0.04	0.03	0.03	0.022	92.1	69.1	69.1	50.7
35	BRP436/BPP436	BRP436/BPP436 LED90-4S/827	7798	63	123.2	0.904	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
36	BRP436/BPP436	BRP436/BPP436 LED100-4S/827	8639	70	122.7	1.006	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
37	BRP436/BPP436	BRP436/BPP436 LED110-4S/827	9483	78	122.0	1.11	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
38	BRP436/BPP436	BRP436/BPP436 LED120-4S/827	10314	85	121.2	1.216	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
39	BRP436/BPP436	BRP436/BPP436 LED130-4S/827	11128	93	120.2	1.323	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
40	BRP436/BPP436	BRP436/BPP436 LED140-4S/827	11935	100	119.1	1.431	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0

41	BRP436/BPP436	BRP436/BPP436 LED150-4S/827	12735	108	117.9	1.543	0.042	0.032	0.032	0.023	96.7	73.7	73.7	53.0
42	BRP436/BPP436	BRP436/BPP436 LED160-4S/827	13528	116	116.6	1.657	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
43	BRP436/BPP436	BRP436/BPP436 LED170-4S/827	14299	124	115.3	1.771	0.043	0.032	0.032	0.024	99.0	73.7	73.7	55.3
44	BRP436/BPP436	BRP436/BPP436 LED80-4S/830	6953	54	130.0	0.764	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
45	BRP436/BPP436	BRP436/BPP436 LED90-4S/830	7806	60	129.7	0.86	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
46	BRP436/BPP436	BRP436/BPP436 LED100-4S/830	8656	67	129.4	0.956	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
47	BRP436/BPP436	BRP436/BPP436 LED110-4S/830	9493	74	128.8	1.053	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
48	BRP436/BPP436	BRP436/BPP436 LED120-4S/830	10324	81	127.9	1.153	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
49	BRP436/BPP436	BRP436/BPP436 LED130-4S/830	11151	88	127.1	1.253	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
50	BRP436/BPP436	BRP436/BPP436 LED140-4S/830	11971	95	126.1	1.356	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
51	BRP436/BPP436	BRP436/BPP436 LED150-4S/830	12774	102	125.1	1.459	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
52	BRP436/BPP436	BRP436/BPP436 LED160-4S/830	13570	110	123.8	1.566	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0
53	BRP436/BPP436	BRP436/BPP436 LED170-4S/830	14358	117	122.5	1.674	0.04	0.03	0.03	0.022	92.1	69.1	69.1	50.7
54	BRP436/BPP436	BRP436/BPP436 LED180-4S/830	15124	125	121.2	1.783	0.041	0.031	0.031	0.023	94.4	71.4	71.4	53.0

55	BRP436/BPP436	BRP436/BPP436 LED80-4S/840	6960	50	138.9	0.716	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
56	BRP436/BPP436	BRP436/BPP436 LED90-4S/840	7814	56	138.5	0.806	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
57	BRP436/BPP436	BRP436/BPP436 LED100-4S/840	8665	63	138.2	0.896	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
58	BRP436/BPP436	BRP436/BPP436 LED110-4S/840	9512	69	138.1	0.984	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
59	BRP436/BPP436	BRP436/BPP436 LED120-4S/840	10345	75	137.2	1.077	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
60	BRP436/BPP436	BRP436/BPP436 LED130-4S/840	11185	82	136.4	1.171	0.036	0.027	0.027	0.02	82.9	62.2	62.2	46.1
61	BRP436/BPP436	BRP436/BPP436 LED140-4S/840	12008	89	135.5	1.266	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
62	BRP436/BPP436	BRP436/BPP436 LED150-4S/840	12827	95	134.6	1.361	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
63	BRP436/BPP436	BRP436/BPP436 LED160-4S/840	13626	102	133.5	1.459	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
64	BRP436/BPP436	BRP436/BPP436 LED170-4S/840	14418	109	132.2	1.559	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
65	BRP436/BPP436	BRP436/BPP436 LED180-4S/840	15203	116	130.8	1.66	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
66	BRP436/BPP436	BRP436/BPP436 LED190-4S/840	15981	123	129.5	1.763	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
67	BRP436/BPP436	BRP436/BPP436 LED80-4S/727	6953	52	134.5	0.739	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
68	BRP436/BPP436	BRP436/BPP436 LED90-4S/727	7806	58	134.1	0.831	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1

69	BRP436/BPP436	BRP436/BPP436 LED100-4S/727	8656	65	133.8	0.924	0.037	0.028	0.028	0.02	85.2	64.5	64.5	46.1
70	BRP436/BPP436	BRP436/BPP436 LED110-4S/727	9502	71	133.5	1.017	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
71	BRP436/BPP436	BRP436/BPP436 LED120-4S/727	10335	78	132.5	1.114	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
72	BRP436/BPP436	BRP436/BPP436 LED130-4S/727	11173	85	131.8	1.211	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
73	BRP436/BPP436	BRP436/BPP436 LED140-4S/727	11984	92	130.7	1.31	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
74	BRP436/BPP436	BRP436/BPP436 LED150-4S/727	12800	99	129.8	1.409	0.038	0.028	0.028	0.021	87.5	64.5	64.5	48.4
75	BRP436/BPP436	BRP436/BPP436 LED160-4S/727	13598	106	128.6	1.51	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
76	BRP436/BPP436	BRP436/BPP436 LED170-4S/727	14388	113	127.3	1.614	0.039	0.029	0.029	0.021	89.8	66.8	66.8	48.4
77	BRP436/BPP436	BRP436/BPP436 LED180-4S/727	15171	120	126.0	1.72	0.04	0.03	0.03	0.022	92.1	69.1	69.1	50.7
78	BRP436/BPP436	BRP436/BPP436 LED190-4S/727	15931	128	124.7	1.826	0.04	0.03	0.03	0.022	92.1	69.1	69.1	50.7