

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Signify - TCAT65 12S/840 PSU HWB T102 WH481

Signify N.V.



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	PILA, POLAND
Place(s) of raw material origin	EU, APAC
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	Signify - TCAT65 12S/840 PSU HWB T102 WH481
Product number / reference	910771147805 / Accent Track D65
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	6.65

PRODUCT DESCRIPTION

Accent Track D65 is a sustainable lighting projector that comes with a sleek and subtle design, featuring a diameter size of 65mm. This versatile lighting solution is highly energy efficient and offers various color and texture options, making it an ideal choice for fashion retail, hospitality or residential applications. The 3D printed housing is crafted from at least 55% recycled or bio-circular materials, while the heatsink is made from 85% recycled aluminum. Because of its circular design, the luminaire is upgradable, reusable, serviceable, and recyclable, making it a true game-changer in the world of lighting design.

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)	20
Impact resistance index (IK)	2
Luminous flux, Lumens	1461
Electrical power, Watt	9.7
Luminous efficiency, Lm/W	151
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	53.86	EU , APAC
Minerals	0.13	APAC
Fossil materials	45.5	EU , APAC
Bio-based materials	0.51	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0.001
Biogenic carbon content in packaging, kg C	0.059

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	0.389
Mass of packaging, kg	0.15
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)	10
Assigned lifetime (hours)	50000
GWP-total, A1-A3 (kg CO ₂ e)	4.89
GWP-fossil, A1-A3 (kg CO ₂ e)	5.09
Secondary material, inputs (%)	29.9
Secondary material, outputs (%)	38.2
Total energy use, A1-A3 (kWh)	19.5
Net freshwater use, A1-A3 (m ³)	4.22E-02

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

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

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

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)

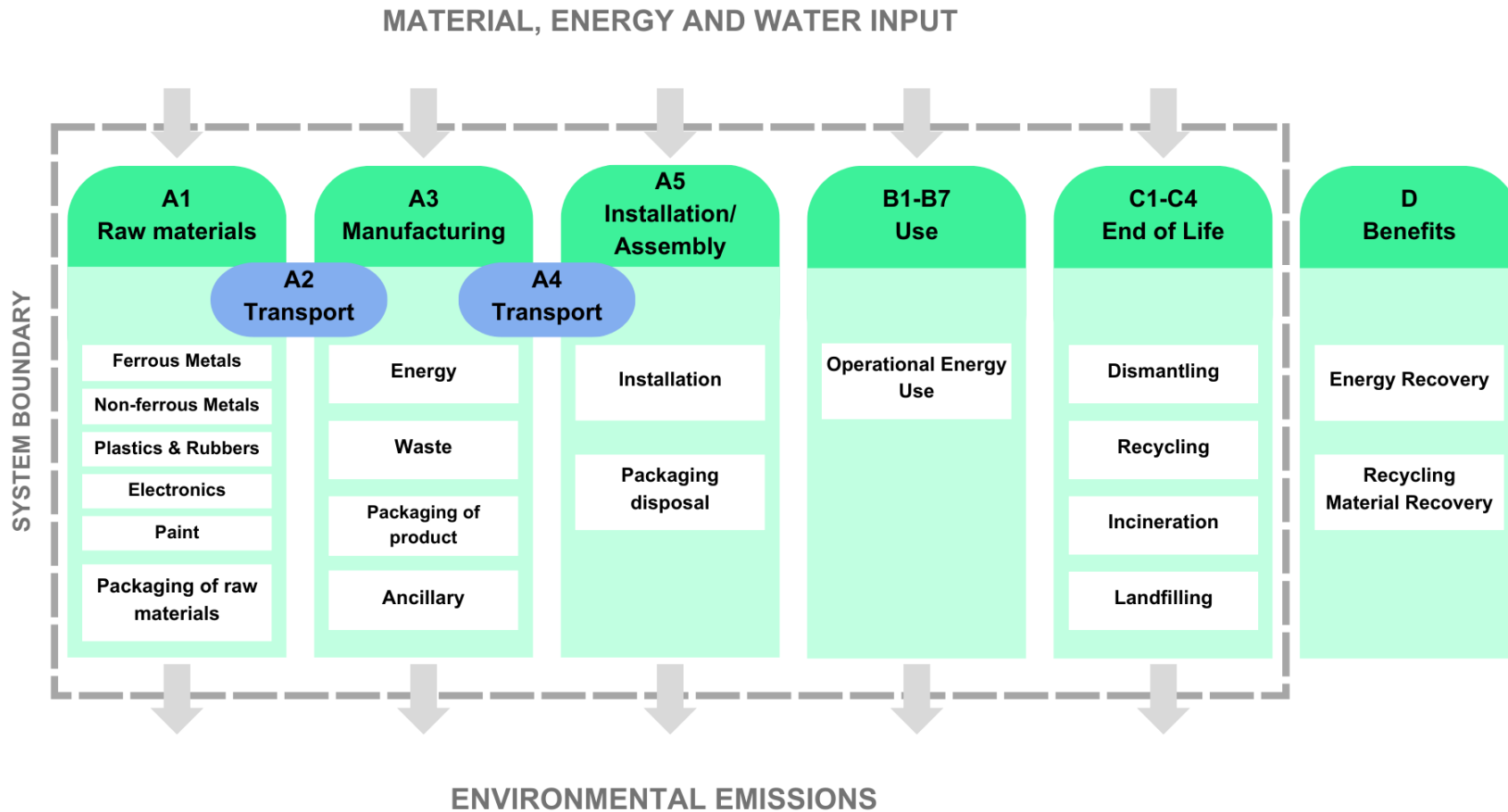
During the use phase, the product consumes electricity (B6), which is calculated multiplying the Wattage x Assigned lifetime (hours) x Country energy mix factor. To know which Country energy mix was used in this EPD, please refer to Annex 2.

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 depollution, 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 ₂ e	4.84E+00	5.03E-02	2.80E-04	4.89E+00	2.31E-02	2.26E-01	ND	ND	ND	ND	ND	1.60E+02	ND	0.00E+00	1.14E-02	1.32E-01	6.94E-02	-6.95E-01
GWP – fossil	kg CO ₂ e	4.83E+00	5.02E-02	2.09E-01	5.09E+00	2.30E-02	9.40E-03	ND	ND	ND	ND	ND	1.59E+02	ND	0.00E+00	1.14E-02	1.32E-01	6.94E-02	-6.94E-01
GWP – biogenic	kg CO ₂ e	4.26E-03	9.38E-06	-2.14E-01	-2.09E-01	5.22E-06	2.17E-01	ND	ND	ND	ND	ND	3.56E-01	ND	0.00E+00	2.49E-06	-4.77E-05	-1.06E-05	-3.31E-04
GWP – LULUC	kg CO ₂ e	7.39E-03	2.51E-05	4.90E-03	1.23E-02	1.03E-05	3.47E-06	ND	ND	ND	ND	ND	4.87E-01	ND	0.00E+00	5.06E-06	1.64E-05	3.75E-06	-5.02E-04
Ozone depletion pot.	kg CFC-11e	8.52E-08	7.30E-10	5.36E-09	9.13E-08	3.40E-10	1.29E-10	ND	ND	ND	ND	ND	2.93E-06	ND	0.00E+00	1.60E-10	1.26E-10	7.71E-11	-3.27E-09
Acidification potential	mol H ⁺ e	4.23E-02	9.06E-04	1.05E-03	4.43E-02	7.86E-05	5.59E-05	ND	ND	ND	ND	ND	9.33E-01	ND	0.00E+00	3.81E-05	1.01E-04	3.19E-05	-1.24E-02
EP-freshwater ²⁾	kg Pe	3.23E-03	2.60E-06	9.13E-05	3.32E-03	1.79E-06	9.44E-07	ND	ND	ND	ND	ND	1.48E-01	ND	0.00E+00	8.88E-07	5.06E-06	5.66E-07	-6.85E-04
EP-marine	kg Ne	5.62E-03	2.32E-04	5.08E-04	6.36E-03	2.58E-05	2.61E-05	ND	ND	ND	ND	ND	1.46E-01	ND	0.00E+00	1.23E-05	3.16E-05	1.48E-04	-1.01E-03
EP-terrestrial	mol Ne	6.04E-02	2.57E-03	3.12E-03	6.61E-02	2.81E-04	2.38E-04	ND	ND	ND	ND	ND	1.31E+00	ND	0.00E+00	1.34E-04	3.03E-04	1.42E-04	-1.14E-02
POCP (“smog”) ³⁾	kg NMVOCe	2.25E-02	7.33E-04	9.90E-04	2.43E-02	1.16E-04	6.77E-05	ND	ND	ND	ND	ND	4.32E-01	ND	0.00E+00	5.30E-05	8.28E-05	4.23E-05	-3.44E-03
ADP-minerals & metals ⁴⁾	kg Sbe	4.81E-04	8.87E-08	7.08E-07	4.82E-04	6.43E-08	2.80E-08	ND	ND	ND	ND	ND	2.14E-03	ND	0.00E+00	3.75E-08	2.93E-07	1.11E-08	-1.12E-04
ADP-fossil resources	MJ	6.44E+01	6.65E-01	2.85E+00	6.79E+01	3.35E-01	9.72E-02	ND	ND	ND	ND	ND	3.69E+03	ND	0.00E+00	1.60E-01	1.41E-01	6.00E-02	-7.65E+00
Water use ⁵⁾	m ³ e depr.	1.73E+00	2.54E-03	6.90E-02	1.80E+00	1.65E-03	1.13E-02	ND	ND	ND	ND	ND	1.01E+02	ND	0.00E+00	7.43E-04	1.02E-02	4.67E-03	-1.20E-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	3.19E-07	3.03E-09	2.05E-08	3.43E-07	2.31E-09	6.96E-10	ND	ND	ND	ND	ND	3.33E-06	ND	0.00E+00	9.07E-10	1.05E-09	4.44E-10	-4.68E-08
Ionizing radiation ⁶⁾	kBq U235e	3.65E-01	4.33E-04	1.06E-02	3.76E-01	2.91E-04	1.18E-04	ND	ND	ND	ND	ND	1.02E+02	ND	0.00E+00	1.30E-04	9.13E-04	8.17E-05	-5.14E-02
Ecotoxicity (freshwater)	CTUe	8.10E+01	7.05E-02	1.10E+00	8.21E+01	4.73E-02	2.69E-01	ND	ND	ND	ND	ND	5.63E+02	ND	0.00E+00	2.53E-02	2.88E-01	4.74E+00	-7.42E+00
Human toxicity, cancer	CTUh	4.55E-09	9.62E-12	1.17E-10	4.68E-09	3.80E-12	1.30E-11	ND	ND	ND	ND	ND	5.37E-08	ND	0.00E+00	1.94E-12	1.60E-11	1.16E-11	-1.11E-09
Human tox. non-cancer	CTUh	2.07E-07	2.90E-10	2.97E-09	2.11E-07	2.17E-10	5.29E-10	ND	ND	ND	ND	ND	2.78E-06	ND	0.00E+00	1.00E-10	7.39E-10	6.31E-10	-1.02E-07
SQP ⁷⁾	-	1.96E+01	3.47E-01	1.14E+01	3.13E+01	3.37E-01	4.76E-02	ND	ND	ND	ND	ND	8.22E+02	ND	0.00E+00	9.57E-02	1.20E-01	9.00E-02	-3.69E+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	6.58E+00	7.01E-03	2.67E-01	6.85E+00	4.58E-03	-2.66E+00	ND	ND	ND	ND	ND	1.01E+03	ND	0.00E+00	2.20E-03	1.82E-02	-3.41E-02	-5.59E-01
Renew. PER as material	MJ	5.94E-02	0.00E+00	1.88E+00	1.94E+00	0.00E+00	-1.91E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.09E-04	-2.77E-02	0.00E+00
Total use of renew. PER	MJ	6.64E+00	7.01E-03	2.15E+00	8.80E+00	4.58E-03	-4.58E+00	ND	ND	ND	ND	ND	1.01E+03	ND	0.00E+00	2.20E-03	1.81E-02	-6.18E-02	-5.59E-01
Non-re. PER as energy	MJ	5.99E+01	6.65E-01	2.83E+00	6.34E+01	3.35E-01	9.72E-02	ND	ND	ND	ND	ND	3.69E+03	ND	0.00E+00	1.60E-01	-1.88E+00	-3.34E+00	-7.54E+00
Non-re. PER as material	MJ	4.48E+00	0.00E+00	6.62E-03	4.49E+00	0.00E+00	-1.55E-02	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-2.29E+00	-2.18E+00	0.00E+00
Total use of non-re. PER	MJ	6.44E+01	6.65E-01	2.83E+00	6.79E+01	3.35E-01	8.17E-02	ND	ND	ND	ND	ND	3.69E+03	ND	0.00E+00	1.60E-01	-4.17E+00	-5.52E+00	-7.54E+00
Secondary materials	kg	1.16E-01	0.00E+00	0.00E+00	1.16E-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	2.57E-03	2.08E-06	1.65E-02	1.90E-02	1.81E-06	1.21E-06	ND	ND	ND	ND	ND	4.88E-03	ND	0.00E+00	9.17E-07	6.33E-06	9.09E-07	-5.48E-05
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	4.06E-02	7.06E-05	1.52E-03	4.22E-02	4.95E-05	1.82E-04	ND	ND	ND	ND	ND	3.19E+00	ND	0.00E+00	2.12E-05	1.97E-04	-2.57E-04	-5.18E-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	6.86E-01	9.98E-04	1.21E-02	6.99E-01	5.67E-04	2.96E-03	ND	ND	ND	ND	ND	9.35E+00	ND	0.00E+00	2.79E-04	3.00E-03	1.33E-02	-1.36E-01
Non-hazardous waste	kg	1.69E+01	1.62E-02	4.41E-01	1.74E+01	1.05E-02	1.60E-01	ND	ND	ND	ND	ND	7.23E+02	ND	0.00E+00	5.24E-03	7.99E-02	5.75E-01	-3.54E+00
Radioactive waste	kg	9.14E-05	1.06E-07	2.51E-06	9.40E-05	7.13E-08	2.95E-08	ND	ND	ND	ND	ND	2.62E-02	ND	0.00E+00	3.18E-08	2.24E-07	2.02E-08	-1.26E-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	2.36E-03	2.36E-03	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.49E-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	6.00E-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	2.53E-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	3.47E-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 ₂ e	4.81E+00	5.00E-02	2.30E-01	5.09E+00	2.29E-02	9.32E-03	ND	ND	ND	ND	ND	1.59E+02	ND	0.00E+00	1.14E-02	1.32E-01	6.91E-02	-6.90E-01
Ozone depletion Pot.	kg CFC-11e	7.88E-08	5.81E-10	5.56E-09	8.49E-08	2.72E-10	1.10E-10	ND	ND	ND	ND	ND	2.44E-06	ND	0.00E+00	1.28E-10	1.08E-10	6.39E-11	-2.91E-09
Acidification	kg SO ₂ e	3.59E-02	7.21E-04	7.08E-04	3.74E-02	6.00E-05	4.10E-05	ND	ND	ND	ND	ND	7.95E-01	ND	0.00E+00	2.92E-05	7.91E-05	2.31E-05	-1.08E-02
Eutrophication	kg PO ₄ ³ e	1.02E-02	8.68E-05	5.11E-04	1.08E-02	1.46E-05	1.27E-05	ND	ND	ND	ND	ND	1.03E-01	ND	0.00E+00	7.09E-06	1.55E-05	1.46E-05	-6.73E-04
POCP ("smog")	kg C ₂ H ₄ e	3.19E-03	3.80E-05	8.00E-05	3.31E-03	5.35E-06	3.13E-06	ND	ND	ND	ND	ND	4.33E-02	ND	0.00E+00	2.61E-06	4.81E-06	2.68E-06	-5.29E-04
ADP-elements	kg Sbe	4.80E-04	8.69E-08	6.95E-07	4.80E-04	6.27E-08	2.34E-08	ND	ND	ND	ND	ND	2.14E-03	ND	0.00E+00	3.66E-08	2.89E-07	9.41E-09	-1.12E-04
ADP-fossil	MJ	5.85E+01	6.58E-01	2.67E+00	6.19E+01	3.30E-01	9.53E-02	ND	ND	ND	ND	ND	1.90E+03	ND	0.00E+00	1.58E-01	1.27E-01	5.87E-02	-6.82E+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 ₂ e	4.84E+00	5.03E-02	2.14E-01	5.10E+00	2.31E-02	9.40E-03	ND	ND	ND	ND	ND	1.59E+02	ND	0.00E+00	1.14E-02	1.32E-01	6.94E-02	-6.94E-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	2.32E+00	2.41E-02	1.34E-04	2.34E+00	1.11E-02	1.08E-01	ND	ND	ND	ND	ND	7.65E+01	ND	0.00E+00	5.48E-03	6.32E-02	3.32E-02	-3.33E-01
GWP – fossil	kg CO ₂ éq/FU	2.32E+00	2.41E-02	1.00E-01	2.44E+00	1.10E-02	4.50E-03	ND	ND	ND	ND	ND	7.61E+01	ND	0.00E+00	5.47E-03	6.32E-02	3.32E-02	-3.33E-01
GWP – biogenic	kg CO ₂ éq/FU	2.04E-03	4.49E-06	-1.02E-01	-1.00E-01	2.50E-06	1.04E-01	ND	ND	ND	ND	ND	1.71E-01	ND	0.00E+00	1.20E-06	-2.28E-05	-5.10E-06	-1.58E-04
GWP – LULUC	kg CO ₂ éq/FU	3.54E-03	1.20E-05	2.35E-03	5.90E-03	4.94E-06	1.66E-06	ND	ND	ND	ND	ND	2.33E-01	ND	0.00E+00	2.42E-06	7.88E-06	1.80E-06	-2.40E-04
Ozone depletion pot.	kg CFC ₁₁ e/FU	4.08E-08	3.50E-10	2.57E-09	4.37E-08	1.63E-10	6.19E-11	ND	ND	ND	ND	ND	1.40E-06	ND	0.00E+00	7.65E-11	6.02E-11	3.70E-11	-1.57E-09
Acidification potential	mole H ⁺ e/FU	2.03E-02	4.34E-04	5.01E-04	2.12E-02	3.77E-05	2.68E-05	ND	ND	ND	ND	ND	4.47E-01	ND	0.00E+00	1.82E-05	4.83E-05	1.53E-05	-5.94E-03
EP-freshwater ²⁾	kg Pe/FU	1.55E-03	1.24E-06	4.38E-05	1.59E-03	8.60E-07	4.52E-07	ND	ND	ND	ND	ND	7.08E-02	ND	0.00E+00	4.26E-07	2.42E-06	2.71E-07	-3.28E-04
EP-marine	kg Ne/FU	2.69E-03	1.11E-04	2.43E-04	3.05E-03	1.24E-05	1.25E-05	ND	ND	ND	ND	ND	7.02E-02	ND	0.00E+00	5.91E-06	1.51E-05	7.10E-05	-4.83E-04
EP-terrestrial	mol Ne/FU	2.89E-02	1.23E-03	1.49E-03	3.17E-02	1.35E-04	1.14E-04	ND	ND	ND	ND	ND	6.29E-01	ND	0.00E+00	6.43E-05	1.45E-04	6.82E-05	-5.47E-03
POCP (“smog”) ³⁾	kg NMVOCe/	1.08E-02	3.51E-04	4.74E-04	1.16E-02	5.55E-05	3.24E-05	ND	ND	ND	ND	ND	2.07E-01	ND	0.00E+00	2.54E-05	3.97E-05	2.03E-05	-1.65E-03
ADP-minerals & metals ⁴⁾	kg Sbe/FU	2.30E-04	4.25E-08	3.39E-07	2.31E-04	3.08E-08	1.34E-08	ND	ND	ND	ND	ND	1.03E-03	ND	0.00E+00	1.80E-08	1.40E-07	5.30E-09	-5.38E-05
ADP-fossil resources	MJ/FU	3.09E+01	3.18E-01	1.36E+00	3.25E+01	1.60E-01	4.66E-02	ND	ND	ND	ND	ND	1.77E+03	ND	0.00E+00	7.68E-02	6.76E-02	2.87E-02	-3.66E+00
Water use ⁵⁾	m ³ e priv. /FU	8.27E-01	1.22E-03	3.31E-02	8.61E-01	7.92E-04	5.39E-03	ND	ND	ND	ND	ND	4.82E+01	ND	0.00E+00	3.56E-04	4.88E-03	2.24E-03	-5.76E-02

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	1.53E-07	1.45E-09	9.83E-09	1.64E-07	1.11E-09	3.34E-10	ND	ND	ND	ND	ND	1.60E-06	ND	0.00E+00	4.34E-10	5.01E-10	2.13E-10	-2.24E-08
Ionizing radiation ⁶⁾	kBq U235e/FU	1.75E-01	2.07E-04	5.10E-03	1.80E-01	1.40E-04	5.64E-05	ND	ND	ND	ND	ND	4.89E+01	ND	0.00E+00	6.21E-05	4.38E-04	3.92E-05	-2.46E-02
Ecotoxicity (freshwater)	CTUe/FU	3.88E+01	3.38E-02	5.26E-01	3.94E+01	2.27E-02	1.29E-01	ND	ND	ND	ND	ND	2.70E+02	ND	0.00E+00	1.21E-02	1.38E-01	2.27E+00	-3.56E+00
Human toxicity, cancer	CTUh/FU	2.18E-09	4.61E-12	5.62E-11	2.24E-09	1.82E-12	6.21E-12	ND	ND	ND	ND	ND	2.57E-08	ND	0.00E+00	9.31E-13	7.68E-12	5.53E-12	-5.32E-10
Human tox. non-cancer	CTUh/FU	9.94E-08	1.39E-10	1.42E-09	1.01E-07	1.04E-10	2.53E-10	ND	ND	ND	ND	ND	1.33E-06	ND	0.00E+00	4.81E-11	3.54E-10	3.03E-10	-4.90E-08
SQP ⁷⁾	-/FU	9.38E+00	1.66E-01	5.48E+00	1.50E+01	1.61E-01	2.28E-02	ND	ND	ND	ND	ND	3.94E+02	ND	0.00E+00	4.59E-02	5.75E-02	4.31E-02	-1.77E+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	3.15E+00	3.36E-03	1.28E-01	3.28E+00	2.20E-03	-1.28E+00	ND	ND	ND	ND	ND	4.86E+02	ND	0.00E+00	1.05E-03	8.74E-03	-1.63E-02	-2.68E-01
Renew. PER as material	MJ/FU	2.85E-02	0.00E+00	9.02E-01	9.30E-01	0.00E+00	-9.17E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-5.21E-05	-1.33E-02	0.00E+00
Total use of renew. PER	MJ/FU	3.18E+00	3.36E-03	1.03E+00	4.21E+00	2.20E-03	-2.19E+00	ND	ND	ND	ND	ND	4.86E+02	ND	0.00E+00	1.05E-03	8.69E-03	-2.96E-02	-2.68E-01
Non-re. PER as energy	MJ/FU	2.87E+01	3.18E-01	1.35E+00	3.04E+01	1.60E-01	4.66E-02	ND	ND	ND	ND	ND	1.77E+03	ND	0.00E+00	7.68E-02	-9.03E-01	-1.60E+00	-3.61E+00
Non-re. PER as material	MJ/FU	2.15E+00	0.00E+00	3.17E-03	2.15E+00	0.00E+00	-7.44E-03	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.10E+00	-1.05E+00	0.00E+00
Total use of non-re. PER	MJ/FU	3.08E+01	3.18E-01	1.36E+00	3.25E+01	1.60E-01	3.91E-02	ND	ND	ND	ND	ND	1.77E+03	ND	0.00E+00	7.68E-02	-2.00E+00	-2.64E+00	-3.61E+00
Secondary materials	kg/FU	5.57E-02	0.00E+00	0.00E+00	5.57E-02	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	1.23E-03	9.96E-07	7.88E-03	9.12E-03	8.67E-07	5.80E-07	ND	ND	ND	ND	ND	2.34E-03	ND	0.00E+00	4.39E-07	3.04E-06	4.36E-07	-2.63E-05
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	1.94E-02	3.38E-05	7.29E-04	2.02E-02	2.37E-05	8.74E-05	ND	ND	ND	ND	ND	1.53E+00	ND	0.00E+00	1.02E-05	9.43E-05	-1.23E-04	-2.48E-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	3.29E-01	4.78E-04	5.78E-03	3.35E-01	2.72E-04	1.42E-03	ND	ND	ND	ND	ND	4.48E+00	ND	0.00E+00	1.34E-04	1.44E-03	6.36E-03	-6.51E-02
Non-hazardous waste	kg/FU	8.10E+00	7.75E-03	2.11E-01	8.32E+00	5.02E-03	7.68E-02	ND	ND	ND	ND	ND	3.46E+02	ND	0.00E+00	2.51E-03	3.83E-02	2.76E-01	-1.69E+00
Radioactive waste	kg/FU	4.38E-05	5.07E-08	1.20E-06	4.51E-05	3.42E-08	1.41E-08	ND	ND	ND	ND	ND	1.26E-02	ND	0.00E+00	1.52E-08	1.07E-07	9.69E-09	-6.02E-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	1.13E-03	1.13E-03	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	7.13E-02	0.00E+00	0.00E+00
Materials for energy rec	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	2.87E-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	1.21E-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	1.66E-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 ₂ eq./FU	2.31E+00	2.39E-02	1.10E-01	2.44E+00	1.10E-02	4.47E-03	ND	ND	ND	ND	ND	7.61E+01	ND	0.00E+00	5.44E-03	6.32E-02	3.31E-02	-3.31E-01
Ozone depletion Pot.	kg CFC ₁₁ e/FU	3.78E-08	2.78E-10	2.66E-09	4.07E-08	1.30E-10	5.26E-11	ND	ND	ND	ND	ND	1.17E-06	ND	0.00E+00	6.11E-11	5.17E-11	3.06E-11	-1.39E-09
Acidification	kg SO ₂ e/FU	1.72E-02	3.46E-04	3.39E-04	1.79E-02	2.88E-05	1.97E-05	ND	ND	ND	ND	ND	3.81E-01	ND	0.00E+00	1.40E-05	3.79E-05	1.11E-05	-5.18E-03
Eutrophication	kg PO ₄ ³ e/FU	4.91E-03	4.16E-05	2.45E-04	5.20E-03	7.01E-06	6.11E-06	ND	ND	ND	ND	ND	4.93E-02	ND	0.00E+00	3.40E-06	7.43E-06	6.98E-06	-3.22E-04
POCP ("smog")	kg C ₂ H ₄ e/FU	1.53E-03	1.82E-05	3.83E-05	1.58E-03	2.56E-06	1.50E-06	ND	ND	ND	ND	ND	2.08E-02	ND	0.00E+00	1.25E-06	2.30E-06	1.28E-06	-2.53E-04
ADP-elements	kg Sbe/FU	2.30E-04	4.16E-08	3.33E-07	2.30E-04	3.00E-08	1.12E-08	ND	ND	ND	ND	ND	1.02E-03	ND	0.00E+00	1.75E-08	1.39E-07	4.51E-09	-5.37E-05
ADP-fossil	MJ/FU	2.80E+01	3.15E-01	1.28E+00	2.96E+01	1.58E-01	4.57E-02	ND	ND	ND	ND	ND	9.08E+02	ND	0.00E+00	7.58E-02	6.07E-02	2.81E-02	-3.27E+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 ₂ e/FU	2.32E+00	2.41E-02	1.02E-01	2.45E+00	1.10E-02	4.50E-03	ND	ND	ND	ND	ND	7.63E+01	ND	0.00E+00	5.48E-03	6.32E-02	3.32E-02	-3.33E-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, wind, Electricity production, wind, 1-3MW turbine, onshore, Poland,ecoinvent 3.10.1, 0.0176 kgCO₂e/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 kgCO₂e/MJ
3. Construction, specialized activities, demolition and site preparation, Market for diesel, burned in building machine, World,ecoinvent 3.10.1, 0.10 kgCO₂e/MJ

Transport scenario documentation - A4

1. Transport, freight, lorry >32 metric ton, EURO5, 397.32 km
2. Transport, freight, sea, container ship, 0.0 km

Installation scenario documentation - A5 (Waste materials data source)

1. Market for corrugated board box, 0.15 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, 485.0 kWh

TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m ³	8.69E+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	9.7
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	0.389
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	1.49E-01
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	1.69E-01
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	163.0	41.87
Copper	4.32	1.11
Other Mineral	0.5	0.13
Other Plastics	91.21	23.43
Printing Paper	2.0	0.51
PCB Copper	17.51	4.5
PCB Iron	18.2	4.68
PCB Support	67.25	17.27
PCB Tin	1.04	0.27
PP / PS-High Impact PS / ABS	18.68	4.8
Steel	5.6	1.44

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 ⁽¹⁾	kg CO ₂ 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

- 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	TCAT65	TCAT65 17S/830 DIA CLM15	1756	16.0	109.8	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
2	TCAT65	TCAT65 17S/830 DIA CLM24/CLM32/CLM54	1756	16.0	109.8	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
3	TCAT65	TCAT65 17S/830 DIA HMB/HVB/HVWB	1679	13.3	126.2	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
4	TCAT65	TCAT65 17S/830 DIA HNB	1776	16.0	111.0	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
5	TCAT65	TCAT65 17S/840 DIA CLM15	1807	16.0	112.9	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
6	TCAT65	TCAT65 17S/840 DIA CLM24/CLM32/CLM54	1807	16.0	112.9	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
7	TCAT65	TCAT65 17S/840 DIA HMB/HVB/HVWB	1727	13.3	129.9	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
8	TCAT65	TCAT65 17S/840 DIA HNB	1828	16.0	114.2	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
9	TCAT65	TCAT65 17S/PW930 DIA CLM15	1661	16.0	103.8	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
10	TCAT65	TCAT65 17S/PW930 DIA CLM24/CLM32/CLM54	1661	16.0	103.8	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7

11	TCAT65	TCAT65 17S/PW930 DIA HMB/HVB/HVWB	1602	13.3	120.5	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
12	TCAT65	TCAT65 17S/PW930 DIA HNB	1680	16.0	105.0	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
13	TCAT65	TCAT65 17S/PW940 DIA CLM15	1711	16.0	106.9	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
14	TCAT65	TCAT65 17S/PW940 DIA CLM24/CLM32/CLM54	1711	16.0	106.9	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
15	TCAT65	TCAT65 17S/PW940 DIA HMB/HVB/HVWB	1651	13.3	124.1	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
16	TCAT65	TCAT65 17S/PW940 DIA HNB	1730	16.0	108.1	1.649	1.649	1.237	1.237	0.907	263.1	197.4	197.4	144.7
17	TCAT65	TCAT65 20S/PC930 DIA CLM15	2045	22.5	90.9	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
18	TCAT65	TCAT65 20S/PC930 DIA CLM24/CLM32/CLM54	2045	22.5	90.9	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
19	TCAT65	TCAT65 20S/PC930 DIA HMB/HVB/HVWB	2127	19.3	110.2	1.99	1.99	1.492	1.492	1.095	317.5	238.1	238.1	174.7
20	TCAT65	TCAT65 20S/PC930 DIA HNB	2068	22.5	91.9	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
21	TCAT65	TCAT65 22S/830 DIA CLM15	2326	22.5	103.4	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
22	TCAT65	TCAT65 22S/830 DIA CLM24/CLM32/CLM54	2326	22.5	103.4	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
23	TCAT65	TCAT65 22S/830 DIA HMB/HVB/HVWB	2396	19.3	124.2	1.99	1.99	1.492	1.492	1.095	317.5	238.1	238.1	174.7
24	TCAT65	TCAT65 22S/830 DIA HNB	2353	22.5	104.6	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6

25	TCAT65	TCAT65 22S/840 DIA CLM15	2394	22.5	106.4	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
26	TCAT65	TCAT65 22S/840 DIA CLM24/CLM32/CLM54	2394	22.5	106.4	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
27	TCAT65	TCAT65 22S/840 DIA HMB/HVB/HVWB	2466	19.3	127.8	1.99	1.99	1.492	1.492	1.095	317.5	238.1	238.1	174.7
28	TCAT65	TCAT65 22S/840 DIA HNB	2422	22.5	107.6	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
29	TCAT65	TCAT65 22S/PC930 DIA HMB/HVB/HVWB	2320	21.3	108.9	2.196	2.196	1.647	1.647	1.208	350.4	262.8	262.8	192.8
30	TCAT65	TCAT65 22S/PW930 DIA CLM15	2201	22.5	97.8	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
31	TCAT65	TCAT65 22S/PW930 DIA CLM24/CLM32/CLM54	2201	22.5	97.8	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
32	TCAT65	TCAT65 22S/PW930 DIA HMB/HVB/HVWB	2288	19.3	118.5	1.99	1.99	1.492	1.492	1.095	317.5	238.1	238.1	174.7
33	TCAT65	TCAT65 22S/PW930 DIA HNB	2226	22.5	98.9	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
34	TCAT65	TCAT65 22S/PW940 DIA CLM15	2267	22.5	100.8	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
35	TCAT65	TCAT65 22S/PW940 DIA CLM24/CLM32/CLM54	2267	22.5	100.8	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
36	TCAT65	TCAT65 22S/PW940 DIA HMB/HVB/HVWB	2357	19.3	122.1	1.99	1.99	1.492	1.492	1.095	317.5	238.1	238.1	174.7
37	TCAT65	TCAT65 22S/PW940 DIA HNB	2293	22.5	101.9	2.32	2.32	1.74	1.74	1.276	370.2	277.6	277.6	203.6
38	TCAT65	TCAT65 27S/830 DIA HMB/HVB/HVWB	2821	23.4	120.5	2.412	2.412	1.809	1.809	1.327	384.9	288.7	288.7	211.7

39	TCAT65	TCAT65 27S/840 DIA HMB/HVB/HVWB	2903	23.4	124.1	2.412	2.412	1.809	1.809	1.327	384.9	288.7	288.7	211.7
40	TCAT65	TCAT65 27S/PW930 DIA HMB/HVB/HVWB	2693	23.4	115.1	2.412	2.412	1.809	1.809	1.327	384.9	288.7	288.7	211.7
41	TCAT65	TCAT65 27S/PW940 DIA HMB/HVB/HVWB	2775	23.4	118.6	2.412	2.412	1.809	1.809	1.327	384.9	288.7	288.7	211.7
42	TCAT65	TCAT65 12S/830 PSU CLM15	1315	10.1	130.2	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
43	TCAT65	TCAT65 12S/830 PSU CLM24/CLM32/CLM54	1315	10.1	130.2	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
44	TCAT65	TCAT65 12S/830 PSU HMB/HVB/HVWB	1420	9.7	146.4	1.0	1.0	0.75	0.75	0.55	159.6	119.7	119.7	87.8
45	TCAT65	TCAT65 12S/830 PSU HNB	1330	10.1	131.7	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
46	TCAT65	TCAT65 12S/840 PSU CLM15	1353	10.1	134.0	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
47	TCAT65	TCAT65 12S/840 PSU CLM24/CLM32/CLM54	1353	10.1	134.0	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
48	TCAT65	TCAT65 12S/840 PSU HMB/HVB/HVWB	1461	9.7	150.6	1.0	1.0	0.75	0.75	0.55	159.6	119.7	119.7	87.8
49	TCAT65	TCAT65 12S/840 PSU HNB	1369	10.1	135.5	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
50	TCAT65	TCAT65 12S/PC930 PSU CLM15	1156	10.1	114.5	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
51	TCAT65	TCAT65 12S/PC930 PSU CLM24/CLM32/CLM54	1156	10.1	114.5	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
52	TCAT65	TCAT65 12S/PC930 PSU HMB/HVB/HVWB	1260	9.7	129.9	1.0	1.0	0.75	0.75	0.55	159.6	119.7	119.7	87.8

53	TCAT65	TCAT65 12S/PC930 PSU HNB	1169	10.1	115.8	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
54	TCAT65	TCAT65 12S/PW930 PSU CLM15	1244	10.1	123.2	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
55	TCAT65	TCAT65 12S/PW930 PSU CLM24/CLM32/CLM54	1244	10.1	123.2	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
56	TCAT65	TCAT65 12S/PW930 PSU HMB/HVB/HVWB	1356	9.7	139.7	1.0	1.0	0.75	0.75	0.55	159.6	119.7	119.7	87.8
57	TCAT65	TCAT65 12S/PW930 PSU HNB	1258	10.1	124.6	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
58	TCAT65	TCAT65 12S/PW940 PSU CLM15	1281	10.1	126.8	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
59	TCAT65	TCAT65 12S/PW940 PSU CLM24/CLM32/CLM54	1281	10.1	126.8	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
60	TCAT65	TCAT65 12S/PW940 PSU HMB/HVB/HVWB	1396	9.7	143.9	1.0	1.0	0.75	0.75	0.55	159.6	119.7	119.7	87.8
61	TCAT65	TCAT65 12S/PW940 PSU HNB	1296	10.1	128.3	1.041	1.041	0.781	0.781	0.573	166.1	124.6	124.6	91.4
62	TCAT65	TCAT65 17S/830 PSU CLM15	1756	14.3	122.8	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
63	TCAT65	TCAT65 17S/830 PSU CLM24/CLM32/CLM54	1756	14.3	122.8	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
64	TCAT65	TCAT65 17S/830 PSU HMB/HVB/HVWB	1679	11.7	143.5	1.206	1.206	0.904	0.904	0.663	192.4	144.2	144.2	105.8
65	TCAT65	TCAT65 17S/830 PSU HNB	1776	14.3	124.2	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
66	TCAT65	TCAT65 17S/840 PSU CLM15	1807	14.3	126.3	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4

67	TCAT65	TCAT65 17S/840 PSU CLM24/CLM32/CLM54	1807	14.3	126.3	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
68	TCAT65	TCAT65 17S/840 PSU HMB/HVB/HVWB	1727	11.7	147.6	1.206	1.206	0.904	0.904	0.663	192.4	144.2	144.2	105.8
69	TCAT65	TCAT65 17S/840 PSU HNB	1828	14.3	127.8	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
70	TCAT65	TCAT65 17S/PW930 PSU CLM15	1661	14.3	116.2	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
71	TCAT65	TCAT65 17S/PW930 PSU CLM24/CLM32/CLM54	1661	14.3	116.2	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
72	TCAT65	TCAT65 17S/PW930 PSU HMB/HVB/HVWB	1602	11.7	137.0	1.206	1.206	0.904	0.904	0.663	192.4	144.2	144.2	105.8
73	TCAT65	TCAT65 17S/PW930 PSU HNB	1680	14.3	117.5	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
74	TCAT65	TCAT65 17S/PW940 PSU CLM15	1711	14.3	119.6	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
75	TCAT65	TCAT65 17S/PW940 PSU CLM24/CLM32/CLM54	1711	14.3	119.6	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
76	TCAT65	TCAT65 17S/PW940 PSU HMB/HVB/HVWB	1651	11.7	141.1	1.206	1.206	0.904	0.904	0.663	192.4	144.2	144.2	105.8
77	TCAT65	TCAT65 17S/PW940 PSU HNB	1730	14.3	121.0	1.474	1.474	1.105	1.105	0.811	235.2	176.3	176.3	129.4
78	TCAT65	TCAT65 20S/PC930 PSU CLM15	2045	19.8	103.3	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
79	TCAT65	TCAT65 20S/PC930 PSU CLM24/CLM32/CLM54	2045	19.8	103.3	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
80	TCAT65	TCAT65 20S/PC930 PSU HMB/HVB/HVWB	2127	16.8	126.6	1.732	1.732	1.299	1.299	0.953	276.4	207.3	207.3	152.1

81	TCAT65	TCAT65 20S/PC930 PSU HNB	2068	19.8	104.4	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
82	TCAT65	TCAT65 22S/830 PSU CLM15	2326	19.8	117.5	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
83	TCAT65	TCAT65 22S/830 PSU CLM24/CLM32/CLM54	2326	19.8	117.5	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
84	TCAT65	TCAT65 22S/830 PSU HMB/HVB/HVWB	2396	16.8	142.6	1.732	1.732	1.299	1.299	0.953	276.4	207.3	207.3	152.1
85	TCAT65	TCAT65 22S/830 PSU HNB	2353	19.8	118.8	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
86	TCAT65	TCAT65 22S/840 PSU CLM15	2394	19.8	120.9	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
87	TCAT65	TCAT65 22S/840 PSU CLM24/CLM32/CLM54	2394	19.8	120.9	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
88	TCAT65	TCAT65 22S/840 PSU HMB/HVB/HVWB	2466	16.8	146.8	1.732	1.732	1.299	1.299	0.953	276.4	207.3	207.3	152.1
89	TCAT65	TCAT65 22S/840 PSU HNB	2422	19.8	122.3	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
90	TCAT65	TCAT65 22S/PC930 PSU HMB/HVB/HVWB	2320	18.8	123.4	1.938	1.938	1.454	1.454	1.066	309.2	232.0	232.0	170.1
91	TCAT65	TCAT65 22S/PW930 PSU CLM15	2201	19.8	111.1	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
92	TCAT65	TCAT65 22S/PW930 PSU CLM24/CLM32/CLM54	2201	19.8	111.1	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
93	TCAT65	TCAT65 22S/PW930 PSU HMB/HVB/HVWB	2288	16.8	136.2	1.732	1.732	1.299	1.299	0.953	276.4	207.3	207.3	152.1
94	TCAT65	TCAT65 22S/PW930 PSU HNB	2226	19.8	112.4	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2

95	TCAT65	TCAT65 22S/PW940 PSU CLM15	2267	19.8	114.5	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
96	TCAT65	TCAT65 22S/PW940 PSU CLM24/CLM32/CLM54	2267	19.8	114.5	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
97	TCAT65	TCAT65 22S/PW940 PSU HMB/HVB/HVWB	2357	16.8	140.3	1.732	1.732	1.299	1.299	0.953	276.4	207.3	207.3	152.1
98	TCAT65	TCAT65 22S/PW940 PSU HNB	2293	19.8	115.8	2.041	2.041	1.531	1.531	1.123	325.7	244.3	244.3	179.2
99	TCAT65	TCAT65 27S/830 PSU HMB/HVB/HVWB	2821	20.7	136.3	2.134	2.134	1.6	1.6	1.174	340.5	255.3	255.3	187.3
100	TCAT65	TCAT65 27S/840 PSU HMB/HVB/HVWB	2903	20.7	140.2	2.134	2.134	1.6	1.6	1.174	340.5	255.3	255.3	187.3
101	TCAT65	TCAT65 27S/PW930 PSU HMB/HVB/HVWB	2693	20.7	130.1	2.134	2.134	1.6	1.6	1.174	340.5	255.3	255.3	187.3
102	TCAT65	TCAT65 27S/PW940 PSU HMB/HVB/HVWB	2775	20.7	134.0	2.134	2.134	1.6	1.6	1.174	340.5	255.3	255.3	187.3
103	TCAT65	TCAT65 12S/830 WIA CLM15	1315	11.8	111.5	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
104	TCAT65	TCAT65 12S/830 WIA CLM24/CLM32/CLM54	1315	11.8	111.5	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
105	TCAT65	TCAT65 12S/830 WIA HMB/HVB/HVWB	1420	11.3	125.7	1.165	1.165	0.874	0.874	0.641	185.9	139.5	139.5	102.3
106	TCAT65	TCAT65 12S/830 WIA HNB	1330	11.8	112.7	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
107	TCAT65	TCAT65 12S/840 WIA CLM15	1353	11.8	114.7	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
108	TCAT65	TCAT65 12S/840 WIA CLM24/CLM32/CLM54	1353	11.8	114.7	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7

109	TCAT65	TCAT65 12S/840 WIA HMB/HVB/HVWB	1461	11.3	129.3	1.165	1.165	0.874	0.874	0.641	185.9	139.5	139.5	102.3
110	TCAT65	TCAT65 12S/840 WIA HNB	1369	11.8	116.0	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
111	TCAT65	TCAT65 12S/PC930 WIA CLM15	1156	11.8	98.0	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
112	TCAT65	TCAT65 12S/PC930 WIA CLM24/CLM32/CLM54	1156	11.8	98.0	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
113	TCAT65	TCAT65 12S/PC930 WIA HMB/HVB/HVWB	1260	11.3	111.5	1.165	1.165	0.874	0.874	0.641	185.9	139.5	139.5	102.3
114	TCAT65	TCAT65 12S/PC930 WIA HNB	1169	11.8	99.1	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
115	TCAT65	TCAT65 12S/PW930 WIA CLM15	1244	11.8	105.4	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
116	TCAT65	TCAT65 12S/PW930 WIA CLM24/CLM32/CLM54	1244	11.8	105.4	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
117	TCAT65	TCAT65 12S/PW930 WIA HMB/HVB/HVWB	1356	11.3	120.0	1.165	1.165	0.874	0.874	0.641	185.9	139.5	139.5	102.3
118	TCAT65	TCAT65 12S/PW930 WIA HNB	1258	11.8	106.6	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
119	TCAT65	TCAT65 12S/PW940 WIA CLM15	1281	11.8	108.6	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
120	TCAT65	TCAT65 12S/PW940 WIA CLM24/CLM32/CLM54	1281	11.8	108.6	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7
121	TCAT65	TCAT65 12S/PW940 WIA HMB/HVB/HVWB	1396	11.3	123.6	1.165	1.165	0.874	0.874	0.641	185.9	139.5	139.5	102.3
122	TCAT65	TCAT65 12S/PW940 WIA HNB	1296	11.8	109.8	1.216	1.216	0.912	0.912	0.669	194.0	145.5	145.5	106.7

123	TCAT65	TCAT65 17S/830 WIA CLM15	1756	16.2	108.4	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
124	TCAT65	TCAT65 17S/830 WIA CLM24/CLM32/CLM54	1756	16.2	108.4	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
125	TCAT65	TCAT65 17S/830 WIA HMB/HVB/HVWB	1679	13.3	126.2	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
126	TCAT65	TCAT65 17S/830 WIA HNB	1776	16.2	109.6	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
127	TCAT65	TCAT65 17S/840 WIA CLM15	1807	16.2	111.5	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
128	TCAT65	TCAT65 17S/840 WIA CLM24/CLM32/CLM54	1807	16.2	111.5	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
129	TCAT65	TCAT65 17S/840 WIA HMB/HVB/HVWB	1727	13.3	129.9	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
130	TCAT65	TCAT65 17S/840 WIA HNB	1828	16.2	112.8	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
131	TCAT65	TCAT65 17S/PW930 WIA CLM15	1661	16.2	102.5	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
132	TCAT65	TCAT65 17S/PW930 WIA CLM24/CLM32/CLM54	1661	16.2	102.5	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
133	TCAT65	TCAT65 17S/PW930 WIA HMB/HVB/HVWB	1602	13.3	120.5	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
134	TCAT65	TCAT65 17S/PW930 WIA HNB	1680	16.2	103.7	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
135	TCAT65	TCAT65 17S/PW940 WIA CLM15	1711	16.2	105.6	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
136	TCAT65	TCAT65 17S/PW940 WIA CLM24/CLM32/CLM54	1711	16.2	105.6	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5

137	TCAT65	TCAT65 17S/PW940 WIA HMB/HVB/HVWB	1651	13.3	124.1	1.371	1.371	1.028	1.028	0.754	218.8	164.0	164.0	120.3
138	TCAT65	TCAT65 17S/PW940 WIA HNB	1730	16.2	106.8	1.67	1.67	1.252	1.252	0.918	266.5	199.8	199.8	146.5
139	TCAT65	TCAT65 20S/PC930 WIA CLM15	2045	23.3	87.7	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
140	TCAT65	TCAT65 20S/PC930 WIA CLM24/CLM32/CLM54	2045	23.3	87.7	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
141	TCAT65	TCAT65 20S/PC930 WIA HMB/HVB/HVWB	2127	20.3	104.8	2.093	2.093	1.57	1.57	1.151	334.0	250.5	250.5	183.7
142	TCAT65	TCAT65 20S/PC930 WIA HNB	2068	23.3	88.8	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
143	TCAT65	TCAT65 22S/830 WIA CLM15	2326	23.3	99.8	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
144	TCAT65	TCAT65 22S/830 WIA CLM24/CLM32/CLM54	2326	23.3	99.8	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
145	TCAT65	TCAT65 22S/830 WIA HMB/HVB/HVWB	2396	20.3	118.0	2.093	2.093	1.57	1.57	1.151	334.0	250.5	250.5	183.7
146	TCAT65	TCAT65 22S/830 WIA HNB	2353	23.3	101.0	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
147	TCAT65	TCAT65 22S/840 WIA CLM15	2394	23.3	102.8	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
148	TCAT65	TCAT65 22S/840 WIA CLM24/CLM32/CLM54	2394	23.3	102.8	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
149	TCAT65	TCAT65 22S/840 WIA HMB/HVB/HVWB	2466	20.3	121.5	2.093	2.093	1.57	1.57	1.151	334.0	250.5	250.5	183.7
150	TCAT65	TCAT65 22S/840 WIA HNB	2422	23.3	103.9	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8

151	TCAT65	TCAT65 22S/PC930 WIA HMB/HVB/HVWB	2320	22.2	104.5	2.289	2.289	1.717	1.717	1.259	365.2	274.0	274.0	200.9
152	TCAT65	TCAT65 22S/PW930 WIA CLM15	2201	23.3	94.5	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
153	TCAT65	TCAT65 22S/PW930 WIA CLM24/CLM32/CLM54	2201	23.3	94.5	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
154	TCAT65	TCAT65 22S/PW930 WIA HMB/HVB/HVWB	2288	20.3	112.7	2.093	2.093	1.57	1.57	1.151	334.0	250.5	250.5	183.7
155	TCAT65	TCAT65 22S/PW930 WIA HNB	2226	23.3	95.5	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
156	TCAT65	TCAT65 22S/PW940 WIA CLM15	2267	23.3	97.3	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
157	TCAT65	TCAT65 22S/PW940 WIA CLM24/CLM32/CLM54	2267	23.3	97.3	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
158	TCAT65	TCAT65 22S/PW940 WIA HMB/HVB/HVWB	2357	20.3	116.1	2.093	2.093	1.57	1.57	1.151	334.0	250.5	250.5	183.7
159	TCAT65	TCAT65 22S/PW940 WIA HNB	2293	23.3	98.4	2.402	2.402	1.802	1.802	1.321	383.3	287.5	287.5	210.8
160	TCAT65	TCAT65 27S/830 WIA HMB/HVB/HVWB	2821	24.0	117.5	2.474	2.474	1.856	1.856	1.361	394.8	296.2	296.2	217.2
161	TCAT65	TCAT65 27S/840 WIA HMB/HVB/HVWB	2903	24.0	121.0	2.474	2.474	1.856	1.856	1.361	394.8	296.2	296.2	217.2
162	TCAT65	TCAT65 27S/PW930 WIA HMB/HVB/HVWB	2693	24.0	112.2	2.474	2.474	1.856	1.856	1.361	394.8	296.2	296.2	217.2
163	TCAT65	TCAT65 27S/PW940 WIA HMB/HVB/HVWB	2775	24.0	115.6	2.474	2.474	1.856	1.856	1.361	394.8	296.2	296.2	217.2

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.

$$PGSF = PSF * GSF$$

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	TCAT65	TCAT65 17S/830 DIA CLM15	1756	16.0	109.8	1.649	0.658	0.494	0.494	0.362	105.0	78.8	78.8	57.8
2	TCAT65	TCAT65 17S/830 DIA CLM24/CLM32/CLM54	1756	16.0	109.8	1.649	0.658	0.494	0.494	0.362	105.0	78.8	78.8	57.8
3	TCAT65	TCAT65 17S/830 DIA HMB/HVB/HVWB	1679	13.3	126.2	1.371	0.572	0.429	0.429	0.315	91.3	68.5	68.5	50.3
4	TCAT65	TCAT65 17S/830 DIA HNB	1776	16.0	111.0	1.649	0.65	0.488	0.488	0.358	103.7	77.9	77.9	57.1
5	TCAT65	TCAT65 17S/840 DIA CLM15	1807	16.0	112.9	1.649	0.638	0.479	0.479	0.351	101.8	76.4	76.4	56.0
6	TCAT65	TCAT65 17S/840 DIA CLM24/CLM32/CLM54	1807	16.0	112.9	1.649	0.638	0.479	0.479	0.351	101.8	76.4	76.4	56.0
7	TCAT65	TCAT65 17S/840 DIA HMB/HVB/HVWB	1727	13.3	129.9	1.371	0.555	0.416	0.416	0.305	88.6	66.4	66.4	48.7
8	TCAT65	TCAT65 17S/840 DIA HNB	1828	16.0	114.2	1.649	0.632	0.474	0.474	0.348	100.8	75.6	75.6	55.5
9	TCAT65	TCAT65 17S/PW930 DIA CLM15	1661	16.0	103.8	1.649	0.694	0.52	0.52	0.382	110.7	83.0	83.0	61.0
10	TCAT65	TCAT65 17S/PW930 DIA CLM24/CLM32/CLM54	1661	16.0	103.8	1.649	0.694	0.52	0.52	0.382	110.7	83.0	83.0	61.0
11	TCAT65	TCAT65 17S/PW930 DIA HMB/HVB/HVWB	1602	13.3	120.5	1.371	0.599	0.449	0.449	0.329	95.6	71.6	71.6	52.5
12	TCAT65	TCAT65 17S/PW930 DIA HNB	1680	16.0	105.0	1.649	0.688	0.516	0.516	0.378	109.8	82.3	82.3	60.3

13	TCAT65	TCAT65 17S/PW940 DIA CLM15	1711	16.0	106.9	1.649	0.674	0.506	0.506	0.371	107.5	80.7	80.7	59.2
14	TCAT65	TCAT65 17S/PW940 DIA CLM24/CLM32/CLM54	1711	16.0	106.9	1.649	0.674	0.506	0.506	0.371	107.5	80.7	80.7	59.2
15	TCAT65	TCAT65 17S/PW940 DIA HMB/HVB/HVWB	1651	13.3	124.1	1.371	0.581	0.436	0.436	0.32	92.7	69.6	69.6	51.1
16	TCAT65	TCAT65 17S/PW940 DIA HNB	1730	16.0	108.1	1.649	0.668	0.501	0.501	0.367	106.6	79.9	79.9	58.6
17	TCAT65	TCAT65 20S/PC930 DIA CLM15	2045	22.5	90.9	2.32	0.793	0.595	0.595	0.436	126.5	94.9	94.9	69.6
18	TCAT65	TCAT65 20S/PC930 DIA CLM24/CLM32/CLM54	2045	22.5	90.9	2.32	0.793	0.595	0.595	0.436	126.5	94.9	94.9	69.6
19	TCAT65	TCAT65 20S/PC930 DIA HMB/HVB/HVWB	2127	19.3	110.2	1.99	0.655	0.491	0.491	0.36	104.5	78.3	78.3	57.4
20	TCAT65	TCAT65 20S/PC930 DIA HNB	2068	22.5	91.9	2.32	0.784	0.588	0.588	0.431	125.1	93.8	93.8	68.8
21	TCAT65	TCAT65 22S/830 DIA CLM15	2326	22.5	103.4	2.32	0.698	0.523	0.523	0.384	111.4	83.5	83.5	61.3
22	TCAT65	TCAT65 22S/830 DIA CLM24/CLM32/CLM54	2326	22.5	103.4	2.32	0.698	0.523	0.523	0.384	111.4	83.5	83.5	61.3
23	TCAT65	TCAT65 22S/830 DIA HMB/HVB/HVWB	2396	19.3	124.2	1.99	0.581	0.436	0.436	0.32	92.7	69.6	69.6	51.1
24	TCAT65	TCAT65 22S/830 DIA HNB	2353	22.5	104.6	2.32	0.689	0.517	0.517	0.379	109.9	82.5	82.5	60.5
25	TCAT65	TCAT65 22S/840 DIA CLM15	2394	22.5	106.4	2.32	0.677	0.508	0.508	0.372	108.0	81.1	81.1	59.4
26	TCAT65	TCAT65 22S/840 DIA CLM24/CLM32/CLM54	2394	22.5	106.4	2.32	0.677	0.508	0.508	0.372	108.0	81.1	81.1	59.4

27	TCAT65	TCAT65 22S/840 DIA HMB/HVB/HVWB	2466	19.3	127.8	1.99	0.565	0.424	0.424	0.311	90.2	67.7	67.7	49.6
28	TCAT65	TCAT65 22S/840 DIA HNB	2422	22.5	107.6	2.32	0.67	0.503	0.503	0.369	106.9	80.3	80.3	58.9
29	TCAT65	TCAT65 22S/PC930 DIA HMB/HVB/HVWB	2320	21.3	108.9	2.196	0.663	0.497	0.497	0.365	105.8	79.3	79.3	58.2
30	TCAT65	TCAT65 22S/PW930 DIA CLM15	2201	22.5	97.8	2.32	0.738	0.553	0.553	0.406	117.8	88.2	88.2	64.8
31	TCAT65	TCAT65 22S/PW930 DIA CLM24/CLM32/CLM54	2201	22.5	97.8	2.32	0.738	0.553	0.553	0.406	117.8	88.2	88.2	64.8
32	TCAT65	TCAT65 22S/PW930 DIA HMB/HVB/HVWB	2288	19.3	118.5	1.99	0.609	0.457	0.457	0.335	97.2	72.9	72.9	53.5
33	TCAT65	TCAT65 22S/PW930 DIA HNB	2226	22.5	98.9	2.32	0.728	0.546	0.546	0.4	116.2	87.1	87.1	63.8
34	TCAT65	TCAT65 22S/PW940 DIA CLM15	2267	22.5	100.8	2.32	0.717	0.538	0.538	0.394	114.4	85.8	85.8	62.9
35	TCAT65	TCAT65 22S/PW940 DIA CLM24/CLM32/CLM54	2267	22.5	100.8	2.32	0.717	0.538	0.538	0.394	114.4	85.8	85.8	62.9
36	TCAT65	TCAT65 22S/PW940 DIA HMB/HVB/HVWB	2357	19.3	122.1	1.99	0.591	0.443	0.443	0.325	94.3	70.7	70.7	51.9
37	TCAT65	TCAT65 22S/PW940 DIA HNB	2293	22.5	101.9	2.32	0.708	0.531	0.531	0.389	113.0	84.7	84.7	62.1
38	TCAT65	TCAT65 27S/830 DIA HMB/HVB/HVWB	2821	23.4	120.5	2.412	0.598	0.449	0.449	0.329	95.4	71.6	71.6	52.5
39	TCAT65	TCAT65 27S/840 DIA HMB/HVB/HVWB	2903	23.4	124.1	2.412	0.581	0.436	0.436	0.32	92.7	69.6	69.6	51.1
40	TCAT65	TCAT65 27S/PW930 DIA HMB/HVB/HVWB	2693	23.4	115.1	2.412	0.627	0.47	0.47	0.345	100.0	75.0	75.0	55.0

41	TCAT65	TCAT65 27S/PW940 DIA HMB/HVB/HVWB	2775	23.4	118.6	2.412	0.608	0.456	0.456	0.334	97.0	72.8	72.8	53.3
42	TCAT65	TCAT65 12S/830 PSU CLM15	1315	10.1	130.2	1.041	0.554	0.416	0.416	0.305	88.4	66.4	66.4	48.7
43	TCAT65	TCAT65 12S/830 PSU CLM24/CLM32/CLM54	1315	10.1	130.2	1.041	0.554	0.416	0.416	0.305	88.4	66.4	66.4	48.7
44	TCAT65	TCAT65 12S/830 PSU HMB/HVB/HVWB	1420	9.7	146.4	1.0	0.493	0.37	0.37	0.271	78.7	59.0	59.0	43.2
45	TCAT65	TCAT65 12S/830 PSU HNB	1330	10.1	131.7	1.041	0.548	0.411	0.411	0.301	87.4	65.6	65.6	48.0
46	TCAT65	TCAT65 12S/840 PSU CLM15	1353	10.1	134.0	1.041	0.538	0.404	0.404	0.296	85.8	64.5	64.5	47.2
47	TCAT65	TCAT65 12S/840 PSU CLM24/CLM32/CLM54	1353	10.1	134.0	1.041	0.538	0.404	0.404	0.296	85.8	64.5	64.5	47.2
48	TCAT65	TCAT65 12S/840 PSU HMB/HVB/HVWB	1461	9.7	150.6	1.0	0.479	0.359	0.359	0.263	76.4	57.3	57.3	42.0
49	TCAT65	TCAT65 12S/840 PSU HNB	1369	10.1	135.5	1.041	0.532	0.399	0.399	0.293	84.9	63.7	63.7	46.8
50	TCAT65	TCAT65 12S/PC930 PSU CLM15	1156	10.1	114.5	1.041	0.63	0.473	0.473	0.347	100.5	75.5	75.5	55.4
51	TCAT65	TCAT65 12S/PC930 PSU CLM24/CLM32/CLM54	1156	10.1	114.5	1.041	0.63	0.473	0.473	0.347	100.5	75.5	75.5	55.4
52	TCAT65	TCAT65 12S/PC930 PSU HMB/HVB/HVWB	1260	9.7	129.9	1.0	0.555	0.416	0.416	0.305	88.6	66.4	66.4	48.7
53	TCAT65	TCAT65 12S/PC930 PSU HNB	1169	10.1	115.8	1.041	0.624	0.468	0.468	0.343	99.6	74.7	74.7	54.7
54	TCAT65	TCAT65 12S/PW930 PSU CLM15	1244	10.1	123.2	1.041	0.586	0.44	0.44	0.322	93.5	70.2	70.2	51.4

55	TCAT65	TCAT65 12S/PW930 PSU CLM24/CLM32/CLM54	1244	10.1	123.2	1.041	0.586	0.44	0.44	0.322	93.5	70.2	70.2	51.4
56	TCAT65	TCAT65 12S/PW930 PSU HMB/HVB/HVWB	1356	9.7	139.7	1.0	0.516	0.387	0.387	0.284	82.3	61.8	61.8	45.3
57	TCAT65	TCAT65 12S/PW930 PSU HNB	1258	10.1	124.6	1.041	0.579	0.434	0.434	0.318	92.4	69.3	69.3	50.7
58	TCAT65	TCAT65 12S/PW940 PSU CLM15	1281	10.1	126.8	1.041	0.568	0.426	0.426	0.312	90.6	68.0	68.0	49.8
59	TCAT65	TCAT65 12S/PW940 PSU CLM24/CLM32/CLM54	1281	10.1	126.8	1.041	0.568	0.426	0.426	0.312	90.6	68.0	68.0	49.8
60	TCAT65	TCAT65 12S/PW940 PSU HMB/HVB/HVWB	1396	9.7	143.9	1.0	0.501	0.376	0.376	0.276	79.9	60.0	60.0	44.0
61	TCAT65	TCAT65 12S/PW940 PSU HNB	1296	10.1	128.3	1.041	0.562	0.422	0.422	0.309	89.7	67.3	67.3	49.3
62	TCAT65	TCAT65 17S/830 PSU CLM15	1756	14.3	122.8	1.474	0.588	0.441	0.441	0.323	93.8	70.4	70.4	51.5
63	TCAT65	TCAT65 17S/830 PSU CLM24/CLM32/CLM54	1756	14.3	122.8	1.474	0.588	0.441	0.441	0.323	93.8	70.4	70.4	51.5
64	TCAT65	TCAT65 17S/830 PSU HMB/HVB/HVWB	1679	11.7	143.5	1.206	0.503	0.377	0.377	0.277	80.3	60.2	60.2	44.2
65	TCAT65	TCAT65 17S/830 PSU HNB	1776	14.3	124.2	1.474	0.581	0.436	0.436	0.32	92.7	69.6	69.6	51.1
66	TCAT65	TCAT65 17S/840 PSU CLM15	1807	14.3	126.3	1.474	0.57	0.427	0.427	0.314	91.0	68.1	68.1	50.1
67	TCAT65	TCAT65 17S/840 PSU CLM24/CLM32/CLM54	1807	14.3	126.3	1.474	0.57	0.427	0.427	0.314	91.0	68.1	68.1	50.1
68	TCAT65	TCAT65 17S/840 PSU HMB/HVB/HVWB	1727	11.7	147.6	1.206	0.488	0.366	0.366	0.268	77.9	58.4	58.4	42.8

69	TCAT65	TCAT65 17S/840 PSU HNB	1828	14.3	127.8	1.474	0.565	0.424	0.424	0.311	90.2	67.7	67.7	49.6
70	TCAT65	TCAT65 17S/PW930 PSU CLM15	1661	14.3	116.2	1.474	0.621	0.466	0.466	0.342	99.1	74.4	74.4	54.6
71	TCAT65	TCAT65 17S/PW930 PSU CLM24/CLM32/CLM54	1661	14.3	116.2	1.474	0.621	0.466	0.466	0.342	99.1	74.4	74.4	54.6
72	TCAT65	TCAT65 17S/PW930 PSU HMB/HVB/HVWB	1602	11.7	137.0	1.206	0.527	0.395	0.395	0.29	84.1	63.0	63.0	46.3
73	TCAT65	TCAT65 17S/PW930 PSU HNB	1680	14.3	117.5	1.474	0.615	0.461	0.461	0.338	98.1	73.6	73.6	53.9
74	TCAT65	TCAT65 17S/PW940 PSU CLM15	1711	14.3	119.6	1.474	0.603	0.452	0.452	0.332	96.2	72.1	72.1	53.0
75	TCAT65	TCAT65 17S/PW940 PSU CLM24/CLM32/CLM54	1711	14.3	119.6	1.474	0.603	0.452	0.452	0.332	96.2	72.1	72.1	53.0
76	TCAT65	TCAT65 17S/PW940 PSU HMB/HVB/HVWB	1651	11.7	141.1	1.206	0.511	0.383	0.383	0.281	81.5	61.1	61.1	44.8
77	TCAT65	TCAT65 17S/PW940 PSU HNB	1730	14.3	121.0	1.474	0.597	0.448	0.448	0.328	95.3	71.5	71.5	52.3
78	TCAT65	TCAT65 20S/PC930 PSU CLM15	2045	19.8	103.3	2.041	0.698	0.523	0.523	0.384	111.4	83.5	83.5	61.3
79	TCAT65	TCAT65 20S/PC930 PSU CLM24/CLM32/CLM54	2045	19.8	103.3	2.041	0.698	0.523	0.523	0.384	111.4	83.5	83.5	61.3
80	TCAT65	TCAT65 20S/PC930 PSU HMB/HVB/HVWB	2127	16.8	126.6	1.732	0.57	0.427	0.427	0.314	91.0	68.1	68.1	50.1
81	TCAT65	TCAT65 20S/PC930 PSU HNB	2068	19.8	104.4	2.041	0.69	0.517	0.517	0.38	110.1	82.5	82.5	60.6
82	TCAT65	TCAT65 22S/830 PSU CLM15	2326	19.8	117.5	2.041	0.614	0.461	0.461	0.338	98.0	73.6	73.6	53.9

83	TCAT65	TCAT65 22S/830 PSU CLM24/CLM32/CLM54	2326	19.8	117.5	2.041	0.614	0.461	0.461	0.338	98.0	73.6	73.6	53.9
84	TCAT65	TCAT65 22S/830 PSU HMB/HVB/HVWB	2396	16.8	142.6	1.732	0.506	0.38	0.38	0.278	80.7	60.6	60.6	44.4
85	TCAT65	TCAT65 22S/830 PSU HNB	2353	19.8	118.8	2.041	0.606	0.455	0.455	0.333	96.7	72.6	72.6	53.1
86	TCAT65	TCAT65 22S/840 PSU CLM15	2394	19.8	120.9	2.041	0.596	0.447	0.447	0.328	95.1	71.3	71.3	52.3
87	TCAT65	TCAT65 22S/840 PSU CLM24/CLM32/CLM54	2394	19.8	120.9	2.041	0.596	0.447	0.447	0.328	95.1	71.3	71.3	52.3
88	TCAT65	TCAT65 22S/840 PSU HMB/HVB/HVWB	2466	16.8	146.8	1.732	0.492	0.369	0.369	0.271	78.5	58.9	58.9	43.2
89	TCAT65	TCAT65 22S/840 PSU HNB	2422	19.8	122.3	2.041	0.59	0.443	0.443	0.325	94.1	70.7	70.7	51.9
90	TCAT65	TCAT65 22S/PC930 PSU HMB/HVB/HVWB	2320	18.8	123.4	1.938	0.585	0.439	0.439	0.322	93.3	70.0	70.0	51.4
91	TCAT65	TCAT65 22S/PW930 PSU CLM15	2201	19.8	111.1	2.041	0.649	0.487	0.487	0.357	103.6	77.7	77.7	57.0
92	TCAT65	TCAT65 22S/PW930 PSU CLM24/CLM32/CLM54	2201	19.8	111.1	2.041	0.649	0.487	0.487	0.357	103.6	77.7	77.7	57.0
93	TCAT65	TCAT65 22S/PW930 PSU HMB/HVB/HVWB	2288	16.8	136.2	1.732	0.53	0.398	0.398	0.292	84.6	63.5	63.5	46.6
94	TCAT65	TCAT65 22S/PW930 PSU HNB	2226	19.8	112.4	2.041	0.641	0.481	0.481	0.353	102.3	76.8	76.8	56.3
95	TCAT65	TCAT65 22S/PW940 PSU CLM15	2267	19.8	114.5	2.041	0.631	0.473	0.473	0.347	100.7	75.5	75.5	55.4
96	TCAT65	TCAT65 22S/PW940 PSU CLM24/CLM32/CLM54	2267	19.8	114.5	2.041	0.631	0.473	0.473	0.347	100.7	75.5	75.5	55.4

97	TCAT65	TCAT65 22S/PW940 PSU HMB/HVB/HVWB	2357	16.8	140.3	1.732	0.514	0.386	0.386	0.283	82.0	61.6	61.6	45.2
98	TCAT65	TCAT65 22S/PW940 PSU HNB	2293	19.8	115.8	2.041	0.623	0.467	0.467	0.343	99.4	74.5	74.5	54.7
99	TCAT65	TCAT65 27S/830 PSU HMB/HVB/HVWB	2821	20.7	136.3	2.134	0.529	0.397	0.397	0.291	84.4	63.3	63.3	46.4
100	TCAT65	TCAT65 27S/840 PSU HMB/HVB/HVWB	2903	20.7	140.2	2.134	0.514	0.386	0.386	0.283	82.0	61.6	61.6	45.2
101	TCAT65	TCAT65 27S/PW930 PSU HMB/HVB/HVWB	2693	20.7	130.1	2.134	0.555	0.416	0.416	0.305	88.6	66.4	66.4	48.7
102	TCAT65	TCAT65 27S/PW940 PSU HMB/HVB/HVWB	2775	20.7	134.0	2.134	0.538	0.404	0.404	0.296	85.8	64.5	64.5	47.2
103	TCAT65	TCAT65 12S/830 WIA CLM15	1315	11.8	111.5	1.216	0.647	0.485	0.485	0.356	103.2	77.4	77.4	56.8
104	TCAT65	TCAT65 12S/830 WIA CLM24/CLM32/CLM54	1315	11.8	111.5	1.216	0.647	0.485	0.485	0.356	103.2	77.4	77.4	56.8
105	TCAT65	TCAT65 12S/830 WIA HMB/HVB/HVWB	1420	11.3	125.7	1.165	0.574	0.43	0.43	0.316	91.6	68.6	68.6	50.4
106	TCAT65	TCAT65 12S/830 WIA HNB	1330	11.8	112.7	1.216	0.64	0.48	0.48	0.352	102.1	76.6	76.6	56.2
107	TCAT65	TCAT65 12S/840 WIA CLM15	1353	11.8	114.7	1.216	0.629	0.472	0.472	0.346	100.4	75.3	75.3	55.2
108	TCAT65	TCAT65 12S/840 WIA CLM24/CLM32/CLM54	1353	11.8	114.7	1.216	0.629	0.472	0.472	0.346	100.4	75.3	75.3	55.2
109	TCAT65	TCAT65 12S/840 WIA HMB/HVB/HVWB	1461	11.3	129.3	1.165	0.558	0.419	0.419	0.307	89.0	66.9	66.9	49.0
110	TCAT65	TCAT65 12S/840 WIA HNB	1369	11.8	116.0	1.216	0.621	0.466	0.466	0.342	99.1	74.4	74.4	54.6

111	TCAT65	TCAT65 12S/PC930 WIA CLM15	1156	11.8	98.0	1.216	0.736	0.552	0.552	0.405	117.4	88.1	88.1	64.6
112	TCAT65	TCAT65 12S/PC930 WIA CLM24/CLM32/CLM54	1156	11.8	98.0	1.216	0.736	0.552	0.552	0.405	117.4	88.1	88.1	64.6
113	TCAT65	TCAT65 12S/PC930 WIA HMB/HVB/HVWB	1260	11.3	111.5	1.165	0.647	0.485	0.485	0.356	103.2	77.4	77.4	56.8
114	TCAT65	TCAT65 12S/PC930 WIA HNB	1169	11.8	99.1	1.216	0.728	0.546	0.546	0.4	116.2	87.1	87.1	63.8
115	TCAT65	TCAT65 12S/PW930 WIA CLM15	1244	11.8	105.4	1.216	0.685	0.514	0.514	0.377	109.3	82.0	82.0	60.2
116	TCAT65	TCAT65 12S/PW930 WIA CLM24/CLM32/CLM54	1244	11.8	105.4	1.216	0.685	0.514	0.514	0.377	109.3	82.0	82.0	60.2
117	TCAT65	TCAT65 12S/PW930 WIA HMB/HVB/HVWB	1356	11.3	120.0	1.165	0.601	0.451	0.451	0.331	95.9	72.0	72.0	52.8
118	TCAT65	TCAT65 12S/PW930 WIA HNB	1258	11.8	106.6	1.216	0.676	0.507	0.507	0.372	107.9	80.9	80.9	59.4
119	TCAT65	TCAT65 12S/PW940 WIA CLM15	1281	11.8	108.6	1.216	0.664	0.498	0.498	0.365	106.0	79.5	79.5	58.2
120	TCAT65	TCAT65 12S/PW940 WIA CLM24/CLM32/CLM54	1281	11.8	108.6	1.216	0.664	0.498	0.498	0.365	106.0	79.5	79.5	58.2
121	TCAT65	TCAT65 12S/PW940 WIA HMB/HVB/HVWB	1396	11.3	123.6	1.165	0.584	0.438	0.438	0.321	93.2	69.9	69.9	51.2
122	TCAT65	TCAT65 12S/PW940 WIA HNB	1296	11.8	109.8	1.216	0.657	0.493	0.493	0.361	104.8	78.7	78.7	57.6
123	TCAT65	TCAT65 17S/830 WIA CLM15	1756	16.2	108.4	1.67	0.666	0.5	0.5	0.366	106.3	79.8	79.8	58.4
124	TCAT65	TCAT65 17S/830 WIA CLM24/CLM32/CLM54	1756	16.2	108.4	1.67	0.666	0.5	0.5	0.366	106.3	79.8	79.8	58.4

125	TCAT65	TCAT65 17S/830 WIA HMB/HVB/HVWB	1679	13.3	126.2	1.371	0.572	0.429	0.429	0.315	91.3	68.5	68.5	50.3
126	TCAT65	TCAT65 17S/830 WIA HNB	1776	16.2	109.6	1.67	0.658	0.494	0.494	0.362	105.0	78.8	78.8	57.8
127	TCAT65	TCAT65 17S/840WIA CLM15	1807	16.2	111.5	1.67	0.646	0.485	0.485	0.355	103.1	77.4	77.4	56.6
128	TCAT65	TCAT65 17S/840 WIA CLM24/CLM32/CLM54	1807	16.2	111.5	1.67	0.646	0.485	0.485	0.355	103.1	77.4	77.4	56.6
129	TCAT65	TCAT65 17S/840 WIA HMB/HVB/HVWB	1727	13.3	129.9	1.371	0.555	0.416	0.416	0.305	88.6	66.4	66.4	48.7
130	TCAT65	TCAT65 17S/840 WIA HNB	1828	16.2	112.8	1.67	0.64	0.48	0.48	0.352	102.1	76.6	76.6	56.2
131	TCAT65	TCAT65 17S/PW930 WIA CLM15	1661	16.2	102.5	1.67	0.703	0.527	0.527	0.387	112.2	84.1	84.1	61.8
132	TCAT65	TCAT65 17S/PW930 WIA CLM24/CLM32/CLM54	1661	16.2	102.5	1.67	0.703	0.527	0.527	0.387	112.2	84.1	84.1	61.8
133	TCAT65	TCAT65 17S/PW930 WIA HMB/HVB/HVWB	1602	13.3	120.5	1.371	0.599	0.449	0.449	0.329	95.6	71.6	71.6	52.5
134	TCAT65	TCAT65 17S/PW930 WIA HNB	1680	16.2	103.7	1.67	0.696	0.522	0.522	0.383	111.1	83.3	83.3	61.1
135	TCAT65	TCAT65 17S/PW940 WIA CLM15	1711	16.2	105.6	1.67	0.683	0.512	0.512	0.376	109.0	81.7	81.7	60.0
136	TCAT65	TCAT65 17S/PW940 WIA CLM24/CLM32/CLM54	1711	16.2	105.6	1.67	0.683	0.512	0.512	0.376	109.0	81.7	81.7	60.0
137	TCAT65	TCAT65 17S/PW940 WIA HMB/HVB/HVWB	1651	13.3	124.1	1.371	0.581	0.436	0.436	0.32	92.7	69.6	69.6	51.1
138	TCAT65	TCAT65 17S/PW940 WIA HNB	1730	16.2	106.8	1.67	0.676	0.507	0.507	0.372	107.9	80.9	80.9	59.4

139	TCAT65	TCAT65 20S/PC930 WIA CLM15	2045	23.3	87.7	2.402	0.821	0.616	0.616	0.452	131.0	98.3	98.3	72.1
140	TCAT65	TCAT65 20S/PC930 WIA CLM24/CLM32/CLM54	2045	23.3	87.7	2.402	0.821	0.616	0.616	0.452	131.0	98.3	98.3	72.1
141	TCAT65	TCAT65 20S/PC930 WIA HMB/HVB/HVWB	2127	20.3	104.8	2.093	0.689	0.517	0.517	0.379	109.9	82.5	82.5	60.5
142	TCAT65	TCAT65 20S/PC930 WIA HNB	2068	23.3	88.8	2.402	0.812	0.609	0.609	0.447	129.6	97.2	97.2	71.3
143	TCAT65	TCAT65 22S/830 WIA CLM15	2326	23.3	99.8	2.402	0.723	0.542	0.542	0.398	115.4	86.5	86.5	63.5
144	TCAT65	TCAT65 22S/830 WIA CLM24/CLM32/CLM54	2326	23.3	99.8	2.402	0.723	0.542	0.542	0.398	115.4	86.5	86.5	63.5
145	TCAT65	TCAT65 22S/830 WIA HMB/HVB/HVWB	2396	20.3	118.0	2.093	0.611	0.458	0.458	0.336	97.5	73.1	73.1	53.6
146	TCAT65	TCAT65 22S/830 WIA HNB	2353	23.3	101.0	2.402	0.713	0.535	0.535	0.392	113.8	85.4	85.4	62.5
147	TCAT65	TCAT65 22S/840 WIA CLM15	2394	23.3	102.8	2.402	0.701	0.526	0.526	0.386	111.9	83.9	83.9	61.6
148	TCAT65	TCAT65 22S/840 WIA CLM24/CLM32/CLM54	2394	23.3	102.8	2.402	0.701	0.526	0.526	0.386	111.9	83.9	83.9	61.6
149	TCAT65	TCAT65 22S/840 WIA HMB/HVB/HVWB	2466	20.3	121.5	2.093	0.594	0.446	0.446	0.327	94.8	71.2	71.2	52.2
150	TCAT65	TCAT65 22S/840 WIA HNB	2422	23.3	103.9	2.402	0.694	0.52	0.52	0.382	110.7	83.0	83.0	61.0
151	TCAT65	TCAT65 22S/PC930 WIA HMB/HVB/HVWB	2320	22.2	104.5	2.289	0.691	0.518	0.518	0.38	110.3	82.7	82.7	60.6
152	TCAT65	TCAT65 22S/PW930 WIA CLM15	2201	23.3	94.5	2.402	0.764	0.573	0.573	0.42	121.9	91.4	91.4	67.0

153	TCAT65	TCAT65 22S/PW930 WIA CLM24/CLM32/CLM54	2201	23.3	94.5	2.402	0.764	0.573	0.573	0.42	121.9	91.4	91.4	67.0
154	TCAT65	TCAT65 22S/PW930 WIA HMB/HVB/HVWB	2288	20.3	112.7	2.093	0.64	0.48	0.48	0.352	102.1	76.6	76.6	56.2
155	TCAT65	TCAT65 22S/PW930 WIA HNB	2226	23.3	95.5	2.402	0.754	0.566	0.566	0.415	120.3	90.3	90.3	66.2
156	TCAT65	TCAT65 22S/PW940 WIA CLM15	2267	23.3	97.3	2.402	0.742	0.556	0.556	0.408	118.4	88.7	88.7	65.1
157	TCAT65	TCAT65 22S/PW940 WIA CLM24/CLM32/CLM54	2267	23.3	97.3	2.402	0.742	0.556	0.556	0.408	118.4	88.7	88.7	65.1
158	TCAT65	TCAT65 22S/PW940 WIA HMB/HVB/HVWB	2357	20.3	116.1	2.093	0.622	0.467	0.467	0.342	99.2	74.5	74.5	54.6
159	TCAT65	TCAT65 22S/PW940 WIA HNB	2293	23.3	98.4	2.402	0.733	0.55	0.55	0.403	117.0	87.8	87.8	64.3
160	TCAT65	TCAT65 27S/830 WIA HMB/HVB/HVWB	2821	24.0	117.5	2.474	0.614	0.461	0.461	0.338	98.0	73.6	73.6	53.9
161	TCAT65	TCAT65 27S/840 WIA HMB/HVB/HVWB	2903	24.0	121.0	2.474	0.596	0.447	0.447	0.328	95.1	71.3	71.3	52.3
162	TCAT65	TCAT65 27S/PW930 WIA HMB/HVB/HVWB	2693	24.0	112.2	2.474	0.643	0.482	0.482	0.354	102.6	76.9	76.9	56.5
163	TCAT65	TCAT65 27S/PW940 WIA HMB/HVB/HVWB	2775	24.0	115.6	2.474	0.623	0.467	0.467	0.343	99.4	74.5	74.5	54.7