Environmental Product Declaration

EPD of multiple products, based on a representative product in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/ AC:2021 for:

ENVIVA direct / indirect suspended

from XAL GmbH

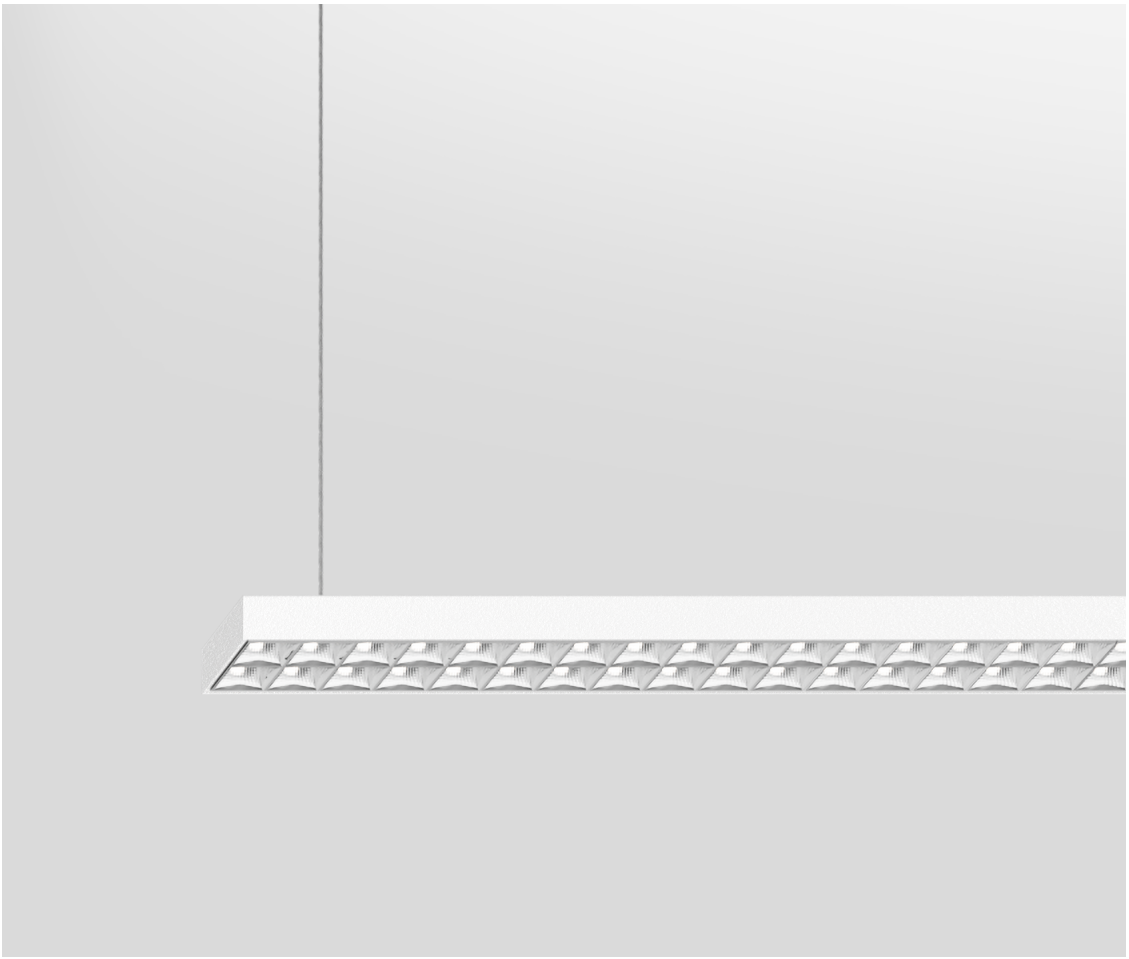
Including all variants of ENVIVA direct / indirect suspended
Included products are specified on page 4

Products recently / not yet on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty.

Programme
The International EPD® System
www.environdec.com

Programme operator
EPD International AB

EPD registration number	EPD-IES-0025201:001
Version date	2025-11-26
Validity date	2030-08-26



This EPD follows additional requirements for construction products considered as Electronic or Electric Equipment. An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

EPD INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED

General information

Programme information

Programme System	The International EPD®
Address	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website	www.environdec.com
E-mail	support@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR)
PCR 2019:14 Construction products version 2.0.1, 2025-06-05
UN CPC code(s): 4653 (Ver. 2.1) Lighting Equipment

PCR review was conducted by
The Technical Committee of the International EPD® System
Review Chair: Rob Rouwette (chair), Noa Meron (co-chair)
The review panel may be contacted via support@environdec.com.

Life Cycle Assessment (LCA) accountability
XAL GmbH, Auer-Welsbach-Gasse 36, 8055 Graz, Austria

Individual EPD verification without a pre-verified LCA/EPD tool
Third-party verifier:

Marcel Gómez
Marcel Gómez Consultoria Ambiental
C/Navarra 66 Edificio B Bajos 3ª
08320 El Masnou (Barcelona)
www.marcelgomez.com

Procedure for follow-up of data during EPD validity involves third-party verifier:
☐Yes ☒No

Approved by
The International EPD® System

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

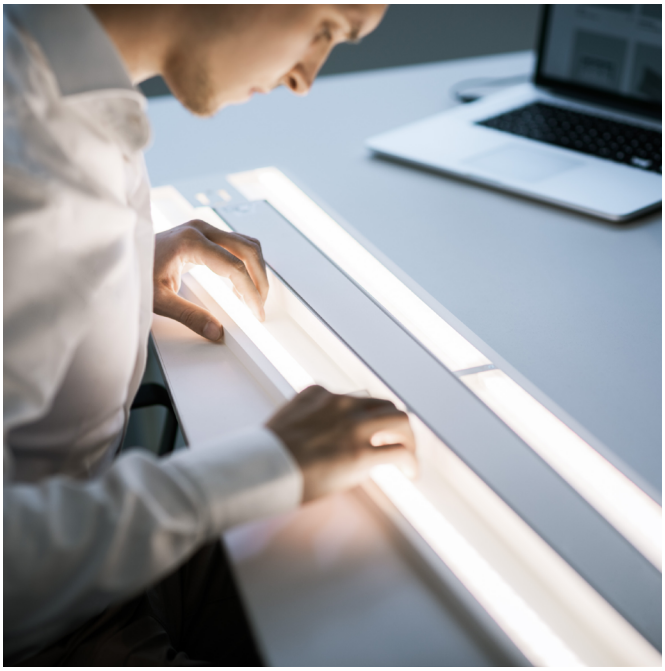
EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD

XAL GmbH
Auer-Welsbach-Gasse 36
8055 Graz
AUSTRIA

epd@xal.com



Description of the organisation

XAL is an internationally operating manufacturer of high-end luminaires and lighting solutions for shop, office, hotel and residential lighting. For 30 years, XAL has been working with lighting designers, architects and planners to develop custom luminaires of the highest technical standard, with a focus on style and aesthetics. While XAL mainly targets B2B costumers, we also provide our standard portfolio to B2C costumers.

With its headquarters in Graz, Austria, the XAL Group currently employs 1300 people worldwide and has 30 international subsidiaries. We are continuously working on further improving our products – whether in terms of durability, efficiency, the carbon footprint, or also with regard to the replaceability and reusability of components and materials.

Product-related or management system-related certifications

XAL is certified according to several management and CSR standards.

- **ISO 9001** – Quality management systems
- **ISO 14001** – Environmental management systems
- **ISO 45001** – Occupational health and safety management systems
- **Ecovadis** – regular evaluation of our corporate social responsibility based on objective criteria with a focus on the environment, labour and human rights, ethics and responsible procurement.
- **UN Global Compact initiative** – our interactions with each other and our stakeholders, our supply chain management and our resource strategies are guided by the principles of the UN Global compact.

Name and location of production site(s)
The production sites are located in Murska Sobota (XAL Svetila d.o.o., Slovenia) and in Graz (XAL GmbH, Austria).

The production facilities operate in a complementary manner, with each product passing through both facilities.

More information
xal.com

Product information

Product name

ENVIVA direct / indirect suspended

Product identification

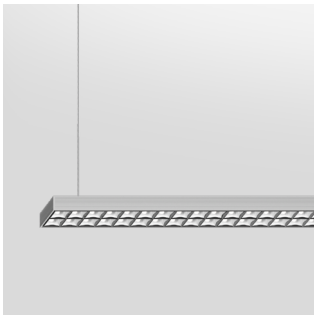
Suspended linear luminaire available in different sizes.
This EPD covers multiple products:

- ENVIVA d/i suspended 1204 mm – product not yet on market
- ENVIVA d/i suspended 1504 mm (reference product) – product recently on market
- ENVIVA d/i suspended 1245 mm – product not yet on market
- ENVIVA d/i suspended 1545 mm – product not yet on market

All variants are available with CRI ≥ 80 and CRI ≥ 90. Optic louver or spotline. Available with raw aluminium or powder coated surface in different colours. 1245 mm and 1545 mm variants include an optical sensor for energy-efficient lighting.

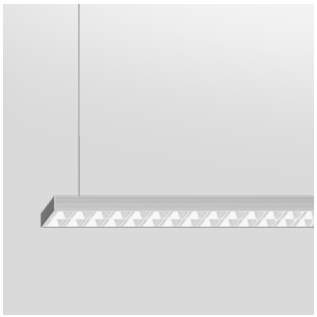
Scaling factors for all variants can be found in the Annex of the EPD.

This EPD covers multiple variants of the ENVIVA d/i suspended, e.g.:

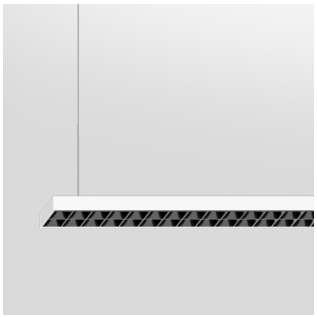


aluminium raw,
louver black reflector inset

jet black,
louver chrome reflector inset



aluminium raw,
spotline traffic white inset



traffic white,
spotline jet black inset

Product information

Product description

Luminaire housing from extruded aluminium profile, direct/indirect light distribution; optionally with sensor angular design; extremely slim design; no visible screws; surface raw or powder coated; pendant fitting with cable suspension; can be adjusted to any height; incl. feeder cable; linear light inset made of plastic; fitted with single LED light points; good glare reduction due to recessed light point plane; despite this increased efficiency through special lens technology; inserted lenses with wide flood radiation characteristic; or high quality reflector with micro-faceted, aluminum-vaporised surface.

Technical specifications

Specification	**ENVIVA d/i suspended 1204 mm**	**ENVIVA d/i suspended 1245 mm**	**ENVIVA d/i suspended 1504 mm** (reference product)	**ENVIVA d/i suspended 1545 mm**
System power	41 W, 43 W	41 W, 43 W	41 W, 43 W	41 W, 43 W
Luminous efficacy	up to 174 lm/W	up to 174 lm/W	up to 176 lm/W	up to 176 lm/W
Colour temperature	3000 K, 4000 K	3000 K, 4000 K	3000 K, 4000 K	3000 K, 4000 K
Electrical	DALI-2	DALI-2 essential sensor	DALI-2	DALI-2 essential sensor
Physical	Length 1204 mm Witdh 45 mm Height 15.4 mm	Length 1245mm Witdh 45 mm Height 15.4 mm	Length 1504 mm Witdh 45 mm Height 15.4 mm	Length 1545 mm Witdh 45 mm Height 15.4 mm

Technical data was tested in house according to following standards:
- EN 13032-1: 2004 +A1: 2012
- EN 13032-4: 2015 +A1: 2019
- CIE S 025/E: 2015
- IES LM-79-19: 2019

UN CPC code(s):
- 4653 (Ver. 2.1) Lighting Equipment

Content declaration

Content declaration

Product components	Weight. kg	Weight-% (versus total weight)	Post-consumer material. weight-%	Biogenic material. weight-% / declared unit	Biogenic material. kg C / declared unit
Polycarbonate	0.48	36.19	0.00	0.00	0.00
Aluminum	0.41	30.86	0.00	0.00	0.00
Epoxy resin	0.12	9.30	0.00	0.00	0.00
Glass fibers	0.10	7.78	0.00	0.00	0.00
Copper	0.06	4.22	0.00	0.00	0.00
Polymethylmethacrylate (PMMA)	0.03	2.58	0.00	0.00	0.00
Steel	0.03	1.99	0.00	0.00	0.00
Others (<1%)	0.09	7.07	0.00	0.00	0.00
TOTAL	**1.32**	**100.00**	**0.00**	**0.00**	**0.00**

Packaging materials*	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C / declared unit
Paper	0.044	3.37	0.023
Cardboard	0.165	12.55	0.084
TOTAL	**0.210**	**15.92**	**0.107**

The products do not contain any REACH and RoHS SVHC substances in amounts greater than 0.1 % (1000 ppm).

* Disclaimer: The packaging material table includes only product packaging. Transport packaging also included in the LCA.

LCA information

Declared unit

The declared unit is one piece of ENVIVA louver direct / indirect suspended 1504 mm including the Canopy. The weight of the product per declared unit is 1.32 kg.

For better comparison with other types of luminaires, conversion factors are also available to convert the results to 1000 lumens during a reference lifetime of 35000 hours. The conversion factors are available under “Additional environmental information“.

The principles of “modularity” and “polluter pays” have been followed.

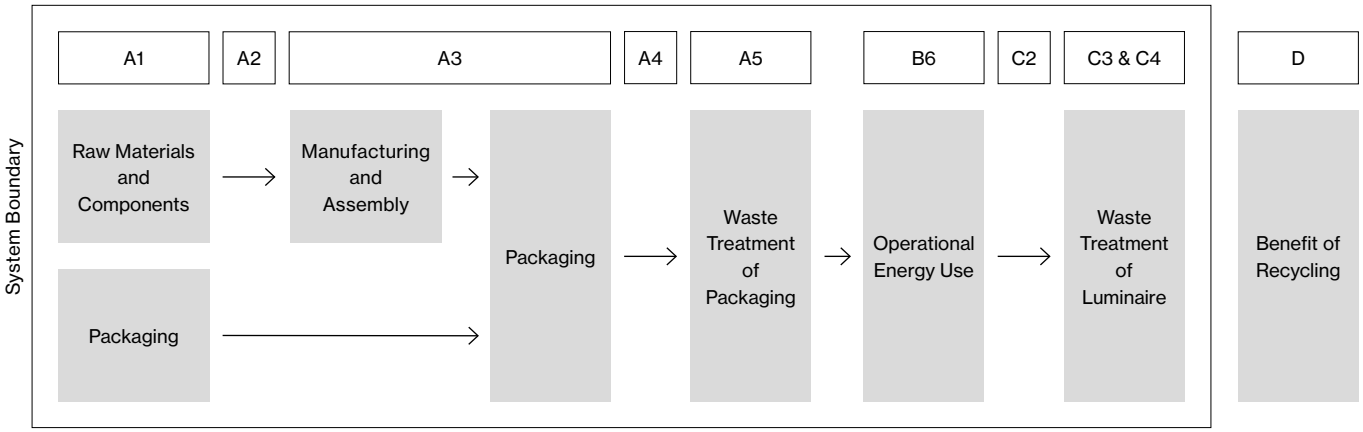
Reference service life
15 years

Time representativeness
2024

Database(s) and LCA software used
LCA for Experts 10.9.1.17

Description of system boundaries
Cradle to gate with options, modules C1-C4, module D and with optional modules

System Diagram



Allocation

Allocation was performed to determine the quantities of flows commonly associated with the factory, including electricity for general operations and packaging, the use of packaging materials (such as wooden pallets and polyethylene film), and packaging waste from purchased components.

Product stage (A1 – A3)

Raw materials are found in the components used for the luminaire production. The raw materials and the necessary process steps have been modelled using LCA for Experts. Population of the PCB is done in Graz, Austria. Milling and powder coating of the profile, production of the endcaps and lens as well as the final assembly of the luminaire is done in Murska Sobota, Slovenia. The corresponding electricity mix has been used for all manufacturing steps. Transportation of all the components is incorporated. For the components which are delivered from China, aggregated data has been used, since transportation involved various routes and transport vehicles. Packaging for the components has been accounted for using a worst-case approach.

Transport to building (A4)

The transport is calculated from Graz, Austria to the capitals of the countries with sales shares >4% (Berlin, Vienna, Zurich, Rome, Paris, Copenhagen). The product market includes countries all over the world.

Weighted distance	732 km
Truck used	Class EURO 6, 26-28 t
Fuel type	Diesel (0.00287 l/100 kkm)

Installation into building (A5)

No emissions occur during the installation. This module includes the waste treatment of the packaging. For the transport-packaging. the euro pallet is reused 28 times. therefore only 1/28 of the weight is taken into account for the production and the end of life of the pallet. This is an assumption derived from the PEP Eco Passport rules (PSR-0014-ed2.0-EN-2023 07 13). Packaging waste incl. transport packaging:

Material	Weight (kg)
Cardboard	0.174
Wooden Pallet	0.002
Paper	0.023

Use, maintenance, repair, replacement and refurbishment (B1, B2, B3, B4, B5)

These stages include the use, maintenance, repair, replacement and refurbishment of the product, which do not contribute to the environmental impacts of the products functional unit.

Operational Energy Use (B6)

Electricity consumption during the use stage is modelled based on the technical parameters of the luminaires and is representative for a weighted average of the following applications – office (90%), hotel (10%) with an average lifetime of 15 years. Geography of the electricity mix is modelled by sales shares and is representative for European countries (99% - EU-28) and rest of world countries (1%). For the rest of world countries, an electricity mix for China is used following a worst-case approach. For variants with optical light sensors, the energy consumption has been adjusted as recommended in the guidelines of PSR-0014-ed2.0-EN-2023 07 13.

The energy consumption is calculated using the formula from EN 15193:2007: **Energy consumption [kWh] = {Pa × FCP × FO × (FD × tD + FN × tN) + Pp × ty} × 1/1.000 × a**

The results and additional Use Phase Information is presented in the table below:

Scenario	ENVIVA louver d/i suspended 1504 mm	Unit
Electricity use (15 years)	1813.2	kWh
Active power	41	W
Total active time	41250	hours
Total passive time	90150	hours
Dimmable	DALI-2	-
Presence control	No	-

Operational water use (B7)

No water is consumed during the use stage. Therefore this stage does not contribute to the environmental impacts of the products functional unit.

End-of-life stage (C1 – C4)

The product is presumed to be decomposed manually; therefore, no emissions should occur in C1. In accordance with PCR 2.0.1, the following transport distances are used for end-of-life waste treatment:

- Waste not destined for incineration: 80 km
- Waste destined for incineration: 130 km

Based on official statistics and literature, waste treatment options are taken into account for Europe and rest of the world countries.

Scenario	ENVIVA louver d/i suspended 1504 mm	Unit
Collected separately	1.32	kg
Collected with mixed (construction) waste	-	kg
For reuse	-	kg
For recycling	0.49	kg
For energy recovery	0.49	kg
For final disposal	0.33	kg

Module D

According to the guidelines of EN 15804+A2 and the PCR from EPD International, calculations are made for Module D. The loads and benefits result from the export of secondary materials and the energy which comes from incineration. In Module D also the benefits from the product packaging waste are included.

Scenario (contributing materials, incl. packaging)	ENVIVA louver d/i suspended 1504 mm	Unit
Materials for recycling	0.81	kg
Materials for export of secondary fuels	-	kg
Materials for incineration	0.54	kg

Cut-off rules

Consistent with the PCR, a minimum of 95% of total inflows (mass and energy) are included. In addition, materials and processes with insignificant contributions of less than 1% are also included. For the use and end-of-life stage, scenarios are used, factoring in geographical conditions (such as electricity mix) and applications (waste treatment practices).

The following processes have been excluded:
- Manufacture of equipment used in production, buildings or any other capital goods;
- The transportation of personnel to the plant;
- Transportation of personnel within the plant;
- Research and development activities;
- Long-term emissions.

Data quality

This LCA study reflects the production for 2025, while overhead electricity consumption is based on 2024 data. Components are sourced from external suppliers, and their manufacturing processes are modeled using LCA for Experts, applying the most suitable representative geographical conditions and applications. Geographical representativeness is global, mainly Europe. Since the included products are either recently or not yet on the market, LCI data is not based on a full year of production. Results of this EPD shall be used with care. Besides production data, data quality is very good / good.

Electricity grid

For the manufacturing in Graz, Austria, the corresponding electricity grid mix as stated on the invoice is used: Biomass (65.64%), Solar (25.28%) other RE (9.08%).

For Murska Sobota, Slovenia, the corresponding electricity grid mix is: Hydro Power (57.86%), Solar (42.14%).

Environmental impact of the electricity used in	AUT	SLO
CO_2 eq. [kg/kWh]	0.031	0.015

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Geography	GLO	GLO	AUT, SLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Primary data used	17.3%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-12% / +4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acronyms	GLO = Global, AUT = Austria, SLO = Slovenia																

Primary data used

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

Calculation of primary data used for module A1-A3:

Process	Source Type	Source	Reference Year	Data Category	Share of primary data of GWP-GHG results for A1-A3
Production of Aluminium	EPD	EPD-IES-0011442:002	2024	Primary data, Secondary data	9.32%
Others	Collected data	EPD Owner	2024	Primary data	7.98%
Total share of primary data of GWP-GHG results for A1-A3					**17.3%**

Results of the environmental performance indicators

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

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Mandatory impact category indicators according to EN 15804 + A2 (based on EF 3.1)

Results per piece of ENVIVA louver direct / indirect suspended 1504 mm

Indicator	Unit	A1 – A3	A4	A5	B1 – B5	B6	B7	C1	C2	C3	C4	D
GWP – fossil	kg CO_2 eq.	2.06E+01	1.40E-01	2.02E-02	0.00E+00	5.33E+02	0.00E+00	0.00E+00	2.26E-02	1.72E+00	1.20E-02	-5.25E+00
GWP – biogenic	kg CO_2 eq.	-7.29E-01	0.00E+00	7.29E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP – luluc	kg CO_2 eq.	4.38E-02	1.49E-03	1.01E-04	0.00E+00	1.75E+00	0.00E+00	0.00E+00	2.41E-04	1.95E-04	2.46E-05	-1.37E-02
GWP – total	**kg CO_2 eq.**	**1.99E+01**	**1.41E-01**	**7.49E-01**	**0.00E+00**	**5.35E+02**	**0.00E+00**	**0.00E+00**	**2.28E-02**	**1.72E+00**	**1.20E-02**	**-5.26E+00**
ODP	kg CFC 11 eq.	2.26E-07	1.71E-14	2.77E-14	0.00E+00	1.19E-08	0.00E+00	0.00E+00	2.76E-15	1.38E-12	3.01E-14	-8.25E-11
AP	mol H+ eq.	9.11E-02	2.26E-04	4.94E-05	0.00E+00	1.18E+00	0.00E+00	0.00E+00	3.66E-05	4.88E-04	8.47E-05	-2.58E-02
EP – freshwater	kg P eq.	2.78E-04	3.91E-07	3.72E-07	0.00E+00	1.12E-03	0.00E+00	0.00E+00	6.32E-08	2.24E-07	2.01E-08	-2.77E-06
EP – marine	kg N eq.	1.78E-02	9.23E-05	2.20E-05	0.00E+00	2.83E-01	0.00E+00	0.00E+00	1.49E-05	1.47E-04	2.15E-05	-4.22E-03
EP – terrestrial	mol N eq.	1.90E-01	9.83E-04	2.10E-04	0.00E+00	3.17E+00	0.00E+00	0.00E+00	1.59E-04	2.23E-03	2.36E-04	-4.59E-02
POCP	kg NMVOC eq.	5.18E-02	1.96E-04	6.28E-05	0.00E+00	7.06E-01	0.00E+00	0.00E+00	3.17E-05	3.88E-04	6.56E-05	-1.25E-02
ADP – minerals & metals*	kg Sb eq.	1.14E-03	9.60E-09	1.03E-09	0.00E+00	1.09E-04	0.00E+00	0.00E+00	1.55E-09	1.94E-08	1.19E-09	-4.71E-04
ADP – fossil*	MJ	2.67E+02	1.84E+00	1.90E-01	0.00E+00	1.07E+04	0.00E+00	0.00E+00	2.98E-01	1.58E+00	1.65E-01	-7.35E+01
WDP*	m^3	4.96E+00	5.79E-04	8.54E-03	0.00E+00	1.32E+02	0.00E+00	0.00E+00	9.38E-05	1.92E-01	1.34E-03	-7.22E-01

Acronyms: GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Additional mandatory and voluntary impact category indicators

Results per piece of ENVIVA louver direct / indirect suspended 1504 mm

Indicator	Unit	A1 – A3	A4	A5	B1 – B5	B6	B7	C1	C2	C3	C4	D
GWP – GHG[1]	kg CO_2 eq.	2.06E+01	1.41E-01	2.03E-02	0.00E+00	5.35E+02	0.00E+00	0.00E+00	2.28E-02	1.72E+00	1.20E-02	-5.26E+00
PM	disease inc.	1.07E-06	2.16E-09	3.87E-10	0.00E+00	1.00E-05	0.00E+00	0.00E+00	3.49E-10	5.38E-09	1.03E-09	-3.04E-07
IRP – HE**	kg U235-eq	1.07E+00	3.36E-04	5.17E-04	0.00E+00	2.75E+02	0.00E+00	0.00E+00	5.44E-05	2.24E-02	2.21E-04	-3.29E-01
ETP – fw*	CTUe	2.40E+02	2.39E+00	1.95E-01	0.00E+00	1.81E+03	0.00E+00	0.00E+00	3.87E-01	4.70E-01	9.75E-02	-2.43E+01
HTP – c*	CTUh	1.70E-08	3.22E-11	3.40E-12	0.00E+00	1.71E-07	0.00E+00	0.00E+00	5.21E-12	4.57E-11	1.21E-11	-3.18E-09
HTP – nc*	CTUh	2.45E-07	1.81E-09	2.03E-10	0.00E+00	3.60E-06	0.00E+00	0.00E+00	2.94E-10	2.75E-09	1.26E-09	-4.96E-08
SQP	dimension-less	6.81E+01	8.18E-01	6.52E-02	0.00E+00	4.28E+03	0.00E+00	0.00E+00	1.32E-01	5.62E-01	3.31E-02	7.84E+01

Acronyms: PM = particulate matter emissions. IRP-HE = ionizing radiation potential-human exposure. ETP-fw = ecotoxicity (freshwater). HTP-c = human toxicity potential. cancer effects. HTP-nc = human toxicity potential. non-cancer effects. SQP = land use related impacts.

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Results of the environmental performance indicators

Resource use indicators

Results per piece of ENVIVA louver direct / indirect suspended 1504 mm

Indicator	Unit	A1 – A3	A4	A5	B1 – B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1.31E+02	1.36E-01	2.54E-02	0.00E+00	7.28E+03	0.00E+00	0.00E+00	2.19E-02	7.97E-01	2.51E-02	-2.02E+01
PERM	MJ	6.94E+00	0.00E+00	-6.93E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.08E-02	0.00E+00	0.00E+00
PERT	MJ	1.38E+02	1.36E-01	-6.90E+00	0.00E+00	7.28E+03	0.00E+00	0.00E+00	2.19E-02	7.86E-01	2.51E-02	-2.02E+01
PENRE	MJ	2.67E+02	1.84E+00	1.90E-01	0.00E+00	1.07E+04	0.00E+00	0.00E+00	2.98E-01	1.58E+00	1.65E-01	-7.35E+01
PENRM	MJ	2.03E+01	0.00E+00	-3.05E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.00E+01	0.00E+00	0.00E+00
PENRT	MJ	2.87E+02	1.84E+00	-1.15E-01	0.00E+00	1.07E+04	0.00E+00	0.00E+00	2.98E-01	-1.85E+01	1.65E-01	-7.35E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-01
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.43E-01	6.54E-05	2.08E-04	0.00E+00	5.69E+00	0.00E+00	0.00E+00	1.06E-05	4.75E-03	4.06E-05	-3.28E-02

Acronyms: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste indicators

Results per piece of ENVIVA louver direct / indirect suspended 1504 mm

Indicator	Unit	A1 – A3	A4	A5	B1 – B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.88E-07	6.67E-11	3.71E-10	0.00E+00	1.39E-05	0.00E+00	0.00E+00	1.08E-11	1.18E-09	1.30E-11	-1.57E-08
Non-hazardous waste disposed	kg	8.93E-01	2.43E-04	3.30E-02	0.00E+00	8.28E+00	0.00E+00	0.00E+00	3.92E-05	1.93E-01	7.81E-01	-1.20E+00
Radioactive waste disposed	kg	8.54E-03	2.43E-06	3.28E-06	0.00E+00	1.67E+00	0.00E+00	0.00E+00	3.93E-07	1.48E-04	1.91E-06	-2.92E-03

Output flow indicators

Results per piece of ENVIVA louver direct / indirect suspended 1504 mm

Indicator	Unit	A1 – A3	A4	A5	B1 – B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	3.29E-01	0.00E+00	4.13E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-01	0.00E+00	7.26E-02
Materials for energy recovery	kg	0.00E+00	0.00E+00	3.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.66E-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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy. thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional LCA results

Results for additional scenarios for End-of-Life modules

Mandatory impact category indicators according to EN 15804 + A2 (based on EF 3.1)

Results per piece of ENVIVA louver d/i suspended 1504 mm

		100% Recycling				100% Incineration				100% Landfill			
Indicator	**Unit**	**C2**	**C3**	**C4**	**D**	**C2**	**C3**	**C4**	**D**	**C2**	**C3**	**C4**	**D**
GWP – fossil	kg CO_2 eq.	3.41E-02	1.32E+00	0.00E+00	-7.35E+00	6.81E-03	1.80E+00	0.00E+00	-1.92E+00	1.36E-02	2.53E-03	2.97E-02	-1.21E+00
GWP – biogenic	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP – luluc	kg CO_2 eq.	3.63E-04	7.22E-04	0.00E+00	-1.65E-02	7.27E-05	9.61E-05	0.00E+00	-6.37E-03	1.45E-04	4.20E-08	7.96E-05	-5.36E-03
GWP – total	**kg CO_2 eq.**	**3.44E-02**	**1.32E+00**	**0.00E+00**	**-7.37E+00**	**6.89E-03**	**1.80E+00**	**0.00E+00**	**-1.92E+00**	**1.38E-02**	**2.53E-03**	**2.98E-02**	**-1.21E+00**
GWP-GHG	kg CO_2 eq.	3.44E-02	1.32E+00	0.00E+00	-7.37E+00	6.89E-03	1.80E+00	0.00E+00	-1.92E+00	1.38E-02	2.53E-03	2.98E-02	-1.21E+00
ODP	kg CFC 11 eq.	4.16E-15	4.40E-12	0.00E+00	-1.37E-10	8.32E-16	-5.49E-13	0.00E+00	-1.34E-11	1.66E-15	7.86E-16	9.36E-14	-6.53E-12
AP	mol H+ eq.	5.52E-05	9.10E-04	0.00E+00	-4.62E-02	1.10E-05	4.61E-04	0.00E+00	-4.72E-03	2.21E-05	4.28E-07	1.87E-04	-3.87E-03
EP – freshwater	kg P eq.	9.53E-08	1.53E-06	0.00E+00	-2.53E-05	1.91E-08	8.71E-08	0.00E+00	-5.25E-07	3.81E-08	1.85E-10	8.34E-06	1.44E-07
EP – marine	kg N eq.	2.25E-05	3.07E-04	0.00E+00	-6.49E-03	4.50E-06	1.57E-04	0.00E+00	-1.05E-03	9.00E-06	9.48E-08	4.37E-05	-8.01E-04
EP – terrestrial	mol N eq.	2.40E-04	3.75E-03	0.00E+00	-7.05E-02	4.80E-05	2.32E-03	0.00E+00	-1.11E-02	9.59E-05	1.98E-06	4.77E-04	-8.39E-03
POCP	kg NMVOC eq.	4.77E-05	7.87E-04	0.00E+00	-2.04E-02	9.54E-06	4.20E-04	0.00E+00	-3.02E-03	1.91E-05	2.63E-07	1.36E-04	-2.36E-03
ADP – minerals & metals*	kg Sb eq.	2.34E-09	5.94E-08	0.00E+00	-1.18E-03	4.68E-10	1.57E-09	0.00E+00	-2.98E-07	9.36E-10	1.86E-11	2.24E-09	-2.26E-07
ADP – fossil*	MJ	4.50E-01	4.54E+00	0.00E+00	-1.19E+02	8.99E-02	1.41E+00	0.00E+00	-3.42E+01	1.80E-01	1.10E-03	4.70E-01	-2.16E+01
WDP*	m^3	1.41E-04	2.15E-01	0.00E+00	-1.72E+00	2.83E-05	2.45E-01	0.00E+00	-2.58E-01	5.65E-05	2.36E-04	3.53E-03	-1.82E-01

Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Additional environmental information

Scaling Factors for other variants

The different versions of ENVIVA direct/indirect suspended are very similar but show some differences in their construction and size. Those differences are accounted for in the LCA model. Scaling factors:

Length [mm]	Optic	A1-A3	A4	A5	B6	C1-C4	D
1204	Spotline	0.88	0.83	0.66	1.05	0.81	0.80
1204	Louver	0.88	0.83	0.66	1.00	0.81	0.80
1504	Spotline	1.00	1.00	1.00	1.05	1.00	1.00
1504	Louver	1.00	1.00	1.00	1.00	1.00	1.00
1245	Spotline	0.92	0.85	0.66	0.52	0.83	0.81
1245	Louver	0.92	0.85	0.66	0.50	0.83	0.81
1545	Spotline	1.04	1.02	1.01	0.52	1.03	1.01
1545	Louver	1.04	1.02	1.01	0.50	1.03	1.01

Results for 1000 lumens during a reference life of 35000 hours

(As per reference of PEP-ECO Passport PSR-0014-ed2.0-EN-2023 07 13).

A conversion factor can be used for converting the results to 1000 lumens during a reference life of 35000 hours.

Length [mm]	Optic	Colour Temp. [K]	CRI	A1-A3	A4	A5	B6	C1-C4	D
1204	Louver	3000	≥ 90	0.19	0.19	0.19	0.14	0.19	0.19
1204	Louver	3000	≥ 80	0.16	0.16	0.16	0.12	0.16	0.16
1245	Louver	3000	≥ 90	0.19	0.19	0.19	0.14	0.19	0.19
1245	Louver	3000	≥ 80	0.16	0.16	0.16	0.12	0.16	0.16
1504	Louver	3000	≥ 90	0.18	0.18	0.18	0.14	0.18	0.18
1504	Louver	3000	≥ 80	0.16	0.16	0.16	0.12	0.16	0.16
1545	Louver	3000	≥ 90	0.18	0.18	0.18	0.14	0.18	0.18
1545	Louver	3000	≥ 80	0.16	0.16	0.16	0.12	0.16	0.16
1545	Spotline	3000	≥ 90	0.18	0.18	0.18	0.13	0.18	0.18
1545	Spotline	3000	≥ 80	0.15	0.15	0.15	0.11	0.15	0.15
1504	Spotline	3000	≥ 90	0.18	0.18	0.18	0.13	0.18	0.18
1504	Spotline	3000	≥ 80	0.15	0.15	0.15	0.11	0.15	0.15
1204	Louver	4000	≥ 90	0.17	0.17	0.17	0.13	0.17	0.17
1204	Louver	4000	≥ 80	0.14	0.14	0.14	0.10	0.14	0.14
1245	Louver	4000	≥ 90	0.17	0.17	0.17	0.13	0.17	0.17
1245	Louver	4000	≥ 80	0.14	0.14	0.14	0.10	0.14	0.14
1504	Louver	4000	≥ 90	0.17	0.17	0.17	0.13	0.17	0.17
1504	Louver	4000	≥ 80	0.14	0.14	0.14	0.10	0.14	0.14
1545	Louver	4000	≥ 90	0.17	0.17	0.17	0.13	0.17	0.17
1545	Louver	4000	≥ 80	0.14	0.14	0.14	0.10	0.14	0.14
1545	Spotline	4000	≥ 90	0.16	0.16	0.16	0.12	0.16	0.16
1545	Spotline	4000	≥ 80	0.13	0.13	0.13	0.10	0.13	0.13
1504	Spotline	4000	≥ 90	0.16	0.16	0.16	0.12	0.16	0.16
1504	Spotline	4000	≥ 80	0.13	0.13	0.13	0.10	0.13	0.13

Additional environmental information

Additional information on Tier 1 suppliers

Location of Tier 1 suppliers	Number of suppliers
Austria	14
China	4
Germany	6
Slovenia	1
UK	1
USA	2
France	1
Total	**29**

Information related to the sectorial EPD

This EPD is not sectoral.

Version History

1st version published 2025-08-27
2nd version published 2025-11-26
- p. 4 changed product picture
- p. 14 added additional information on Tier 1 suppliers

Abbreviations

ADPE – Abiotic depletion potential non-fossil resources
ADPF – Abiotic depletion potential fossil resources
AP – Acidification potential, accumulated exceedance
AUT – Austria
CB – Certification Body
CRU – Components for re-use
d/i – direct / indirect
DALI – Digital Adressable Lighting Interface
EEE – Exported electrical energy
EET – Exported thermal energy
EPD – Environmental Product Declaration
EP-freshwater – Eutrophication potential freshwater
EP-marine – Eutrophication potential marine
EP-terrestrial – Eutrophication potential terrestrial
ETP-fw – Eco toxicity freshwater
FW – Net use of fresh water
GLO – Global
GWP-biogenic – Global warming potential biogenic
GWP-fossil – Global warming potential fossil fuels
GWP-GHG – Global warming potential
GWP-luluc – Global warming potential land use and land use change
GWP-total – Global warming potential total
HTTP-c – Human toxicity, cancer effect
HTTP-nc – Human toxicity, non-cancer effects
HWD – Hazardous waste disposed
IRP – Ionizing radiation, human health
LCA – Life Cycle Assessment
MER – Materials for energy recovery
MFR – Materials for recycling
NHWD – Non–harzardous waste disposed
NRSF – Use of non–renewable secondary fuels
ODP – Depletion potential of the stratospheric ozone layer
PCR – Product Category Rules
PENRE – Use of non renewable primary energy as energy carrier
PENRM – Use of non renewable primary energy resources used as raw materials
PENRT – Total use of non renewable primary energy resource
PERE – Use of renewable primary energy as energy carrier
PERM – Use of renewable primary energy resources used as raw materials
PERT – Total use of renewable primary energy
PM – Particulate matter emissions
POCP – Photochemical ozone creation potential
PSR – Product Specific Rules
RE – Renewable Energy
RSF – Use of renewable secondary fuels
RWD – Radioactive waste disposed
SLO – Slovenia
SM – Use of secondary material
SQP – Land use related impacts/Soil quality
UN CPC – United Nations Central Product Classification
WDP – Water (user) deprivation potential

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