EUKLIDES

MILJØDOKUMENTASJON

WINKEL W227 PIN

W+



Sammendrag fra Euklides og originaldokumentene fra produsent og sertifiseringsorgan, samlet i én fil.

SAMLET 29. OKTOBER 2026
EUKLIDES.NO/PRODUKTER/WINKEL-W227-PIN

Kort fortalt

HVA SOM GJELDER

Sammendraget er laget av Euklides for oversikt. Ved prosjektdokumentasjon og anbud er det originaldokumentene i denne filen som gjelder.

Dokumentene

DOKUMENT	UTSTEDT AV	GYLDIG TIL	SIDE
Miljødeklarasjon (EPD) EPD-IES-0027109	EPD International AB (The International EPD System)	02.12.2030	4

FINN DOKUMENTENE SELV

Miljødeklarasjon (EPD)
wastberg.com/pim/WASTBERG-/01_Table_Table/WINKEL_PIN_W227P/31e2546011d2efe3e024187f5434a469ba83a61818a9b1f3d5e656e765a6560f_WASTBERG-___26_03_WINKEL_PIN_W227P_227P22030_EPD-Certificate.pdf

OM PRODUSENTEN

Spørsmål om dokumentasjonen: post@euklides.no

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:

WINKEL
W227

Including multiple products of WINKEL collection. Included products are specified on page 4.

Programme	The International EPD® System www.environdec.com
Programme operator	EPD International AB
EPD Registration number	EPD-IES-0027109:001
Version date	2026-04-07
Validity date	2030-12-02

Wastberg+
T +46 10 16 15 010
info@wastberg.com
wastberg.com

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

Programme information

Programme
The International EPD® System

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 eview was conducted by
The Technical Committee of the International EPD® System.
See www.environdec.com for a list of members.

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:

Rubén Carnerero
IK INGENIERIA
Avd. Cervantes, 51 - 5º - Dpto 7
48970 Basauri (Bizkaia)
r.carnerero@ik-ingenieria.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.



Owner of the EPD
Wastberg+
Box 5085
200 71 Malmö
Sweden

Contact
epd@wastberg.com

Description of the organisation
We create well-being through good light.

Working closely with leading architects and designers, we develop holistic lighting for humans and spaces.

Name and location of production site: The production site is located in Dongguan, Guangdong, China.

More information:
wastberg.com



Product Name
Winkel

Product Identification
This EPD covers multiple products of the Winkel collection:

– Winkel Base W227B - raw tumbled (reference product)
– Winkel Base W227B - black | white
– Winkel Pin W227P - including all colour variants

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

This EPD covers multiple variants of the Winkel collection:



WINKEL
BASE
W227B



WINKEL
PIN
W227P

PRODUCT DESCRIPTION

Winkel was created to redefine high-end task lighting – and in this, it truly excels. Innovative engineering and precision optics come together in an elegantly constructed system. The result is a generous sweep of exceptionally even, dimmable, high-quality illumination across a large working surface.
Winkel's design is driven by a simple goal: to get more out of less. Slim aluminium arms and joints minimise material use while maximising flexibility, with concealed cables and springs contributing to a cleaner form and extended movement range.

Design: Dirk Winkel, 2022

TECHNICAL SPECIFICATIONS	**WINKEL** BASE W227B	**WINKEL** PIN W227P
Inset power	8.2 W	8.2 W
Luminous efficiency	Up to 60 lm/W	Up to 60 lm/W
Colour temperature	3000 K	3000 K
Mounting	Base	Pin
Physical	Length 530 mm Width 365 mm Height 143 mm	Length 530 mm Width 365 mm Height 143 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 PER DECLARED UNIT

PRODUCT COMPONENTS	WEIGHT, KG	WEIGHT-% (VERSUS TOTAL WEIGHT)	POST-CONSUMER MATERIAL, WEIGHT-%	BIOGENIC MATERIAL, WEIGHT-% / DECLARED UNIT	BIOGENIC MATERIAL, KG C / DECLARED UNIT
Steel	2.35	71.07	0.00	0.00	0.00
Aluminum	0.76	22.97	0.00	0.00	0.00
Ethylenepropylenedienepolym. (EPDM)	0.04	1.24	0.00	0.00	0.00
Polycarbonate	0.04	1.21	0.00	0.00	0.00
Epoxy-Resin	0.04	1.06	0.00	0.00	0.00
Others (<1%)	0.08	2.45	0.00	0.00	0.00
TOTAL	**3.31**	**100.00**	**0.00**	**0.00**	**0.00**

PACKAGING MATERIALS*	WEIGHT, KG	WEIGHT-% (VERSUS THE PRODUCT)	WEIGHT BIOGENIC CARBON, KG C / DECLARED UNIT
Paper	0.19	5.64	0.10
Cardboard	1.89	57.07	0.95
Total	**2.08**	**62.71**	**1.05**

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

The products do not contain any REACH and RoHS SVHC substances in amounts greater than 0.1 % (1 000 ppm).

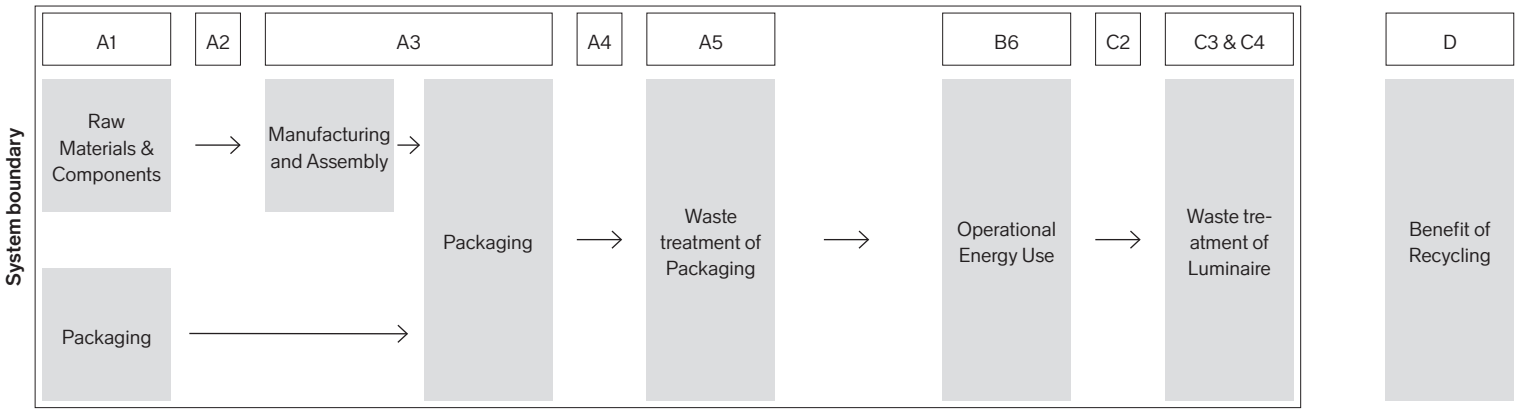
Declared unit
The declared unit is one piece of Winkel Base raw tumbled. This product has been chosen as the reference due to the highest share of sales. The weight of the product per declared unit is 3.308 kg.

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. This reference value is proposed by the PEP Category rules (PSR-0014-ed2.0-EN-2023 07 13). The conversion factors are available under "Additional environmental information".

The principles of "Modularity" and "polluter pay" have been followed.

Reference service live
14.8 years
Time representativeness
2024
Database and LCA software used
LCA for Experts 10.9.1.19
System boundaries
Cradle to gate with options, modules C1-C4, module D and with optional modules

System diagram



Allocation
Allocation by sales shares was done to identify the associated quantity of flows that are common for the factory: electricity and natural gas for general factory needs and packaging, use of packaging materials and packaging waste from delivered 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 10.9.1.19. The final assembly of the luminaire is done in Dongguan, China. Products are then transported to Belgium and from there sold to costumers. The corresponding electricity mix and natural gas have been used for manufacturing. Production losses are close to zero and therefore not included in the LCA. Transportation of all the components is incorporated. For components manufactured in China, it is assumed that 24% are delivered by plane and 76% are delivered by ship route to Belgium. Packaging for the components has been accounted for using a worst-case approach.

Transport to building (A4)
The transport is calculated from Brussel, Belgium to the capitals of the countries with sales shares >4% (Berlin, Stockholm, Copenhagen). The product market includes countries all over the world.

Weighted distance	1095 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.

Packagingwaste incl. transport packaging:

Material	Weight (kg)
Cardboard	0.233
Paper	0.015

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 – restaurant (30%), hotel (30%), office (25%), retail (15%) with an average lifetime of 12 years. Geography of the electricity mix is modelled by expected sales shares and is representative for European countries (96% - EU-28) and rest of world countries (4%). For the rest of world countries, an electricity mix for China is used following a worst-case approach.

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

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

SCENARIO	**WINKEL** BASE W227B raw tumbled	**UNIT**
Electricity use (14.8 years)	342.84	kWh
Active power	8.2	W
Total active time	41810.00	hours
Total passive time	87838.00	hours

End-of-life stage (C1-C4)
The product is presumed to be decomposed manually; therefore, no emissions should occur in C1. For the corresponding waste destinations, the following distances are used:

– 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	WINKEL BASE W227B raw tumbled	UNIT
Collected separately	3.308	kg
Collected with mixed (construction) waste	-	kg
For reuse	-	kg
For recycling	2.959	kg
For energy recovery	0.127	kg
For final disposal	0.216	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 and landfilling. In Module D also the benefits from the product packaging waste are included.

SCENARIO	WINKEL BASE W227B raw tumbled	UNIT
Materials for recycling	4.827	kg
Materials for export of secondary fuels	-	kg
Materials for incineration	0.353	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.

The following modules have been excluded:

– B1: For the use stage (B1), no energy and material inputs, or emissions are involved.
– B2-B5: During the reference service life no maintenance (B2), repair (B3), replacement (B4) or refurbishment (B5) is expected.
– B7: The use of the product does not require water consumption (B7).

Data quality
Based on site specific information, this LCA study reflects the production for 2024. Components are supplied by external vendors, therefore manufacturing processes are modelled using LCA for Experts, with the best fitting representative geographical conditions and applications. Data quality is very good / good.

Electricity grid
For the manufacturing in Dongguan, China, the corresponding electricity grid mix as stated on the invoice is used: Hard coal (39.7 %), Hydro (27.6 %), Photovoltaic (12.2 %), Wind (11.4 %), Nuclear (4.7 %), other RE (4.4 %).

ENVIRONMENTAL IMPACT OF THE ELECTRICITY USED IN CN	
CO_2 eq. [kg/kWh]	0.435

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	ND	ND	ND	ND	ND	x	ND	x	x	x	x	x
Geography	GLO	GLO	AUT, SLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Share of primary data	27.31%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-58%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acronyms	GLO = Global, CN = China, BEL = Belgium																

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
Transport of raw materials to manufacturing site	Collected Data	EPD Owner, Suppliers	2024-2025	Primary data	20.19%
Others (<10% each)	Collected Data	EPD Owner	2024-2025	Primary data	7.12%
Total share of primary data of GWP-GHG results for A1-A3					27.31%

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. Usage of results from A1-A3 without considering the results of module C is not encouraged.

MANDATORY IMPACT CATEGORY INDICATORS ACCORDING TO EN 15804+A2 (BASED ON EF 3.1)

		Results per declared unit								
Indicator	**Unit**	**A1 – A3**	**A4**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – fossil	kg CO_2 eq.	3.92E+01	6.63E-01	4.63E-02	1.14E+02	0.00E+00	2.80E-02	3.28E-01	4.01E-03	-1.12E+01
GWP – biogenic	kg CO_2 eq.	-4.32E+00	0.00E+00	4.32E+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.	2.09E-02	1.68E-02	2.49E-04	3.75E-01	0.00E+00	2.99E-04	7.85E-06	1.23E-05	-1.34E-02
GWP – total	**kg CO_2 eq.**	**3.49E+01**	**6.79E-01**	**4.36E+00**	**1.14E+02**	**0.00E+00**	**2.83E-02**	**3.28E-01**	**4.02E-03**	**-1.12E+01**
ODP	kg CFC 11 eq.	2.34E-09	1.83E-13	8.25E-14	2.43E-09	0.00E+00	3.42E-15	1.15E-13	1.28E-14	-9.05E-11
AP	mol H+ eq.	2.40E-01	1.01E-03	2.05E-04	2.63E-01	0.00E+00	4.54E-05	5.82E-05	2.53E-05	-3.37E-02
EP – freshwater	kg P eq.	4.59E-04	1.24E-06	1.91E-06	2.28E-04	0.00E+00	7.83E-08	2.55E-08	5.75E-09	2.82E-06
EP – marine	kg N eq.	4.67E-02	4.10E-04	9.54E-05	6.23E-02	0.00E+00	1.85E-05	1.33E-05	6.18E-06	-7.37E-03
EP – terrestrial	mol N eq.	5.03E-01	4.56E-03	8.52E-04	6.96E-01	0.00E+00	1.97E-04	2.68E-04	6.74E-05	-7.86E-02
POCP	kg NMVOC eq.	1.35E-01	9.62E-04	2.91E-04	1.58E-01	0.00E+00	3.93E-05	3.67E-05	1.91E-05	-1.99E-02
ADP – minerals & metals*	kg Sb eq.	3.98E-04	8.76E-08	2.66E-09	2.23E-05	0.00E+00	1.92E-09	2.52E-09	2.82E-10	-3.61E-05
ADP – fossil*	MJ	4.54E+02	8.48E+00	6.10E-01	2.23E+03	0.00E+00	3.70E-01	1.56E-01	6.49E-02	-1.17E+02
WDP*	m^3	8.20E+00	2.50E-03	4.10E-02	2.91E+01	0.00E+00	1.16E-04	3.10E-02	4.67E-04	-6.21E-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.

MANDATORY AND VOLUNTARY IMPACT CATEGORY INDICATORS

		Results per declared unit								
Indicator	**Unit**	**A1 – A3**	**A4**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – GHG1	kg CO_2 eq.	3.92E+01	6.79E-01	4.65E-02	1.14E+02	0.00E+00	2.83E-02	3.28E-01	4.02E-03	-1.12E+01
PM	disease inc.	3.59E-06	1.01E-08	1.60E-09	2.37E-06	0.00E+00	4.33E-10	6.59E-10	2.92E-10	-4.65E-07
IRP – HE**	kg U235-eq	7.96E-01	1.21E-03	1.34E-03	5.55E+01	0.00E+00	6.74E-05	8.22E-04	1.19E-04	-2.93E-01
ETP – fw*	CTUe	2.26E+02	9.39E+00	5.78E-01	3.74E+02	0.00E+00	4.79E-01	5.91E-02	4.86E-02	-2.76E+01
HTP – c*	CTUh	2.81E-08	1.34E-10	1.09E-11	3.59E-08	0.00E+00	6.45E-12	5.12E-12	1.08E-12	1.19E-08
HTP – nc*	CTUh	2.76E-07	5.20E-09	7.22E-10	7.46E-07	0.00E+00	3.64E-10	4.04E-10	5.34E-11	-4.61E-08
SQP	dimensionless	2.27E+02	4.44E+00	1.71E-01	8.68E+02	0.00E+00	1.64E-01	4.83E-02	1.09E-02	3.67E+02

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.

RESOURCE USE INDICATORS

		Results per declared unit								
Indicator	Unit	A1 – A3	A4	A5	B6	C1	C2	C3	C4	D
PERE	MJ	1.65E+02	7.31E-01	7.31E-02	1.49E+03	0.00E+00	2.72E-02	5.64E-02	1.05E-02	1.40E+01
PERM	MJ	4.12E+01	0.00E+00	-4.12E+01	0.00E+00	0.00E+00	0.00E+00	-1.39E-03	0.00E+00	0.00E+00
PERT	MJ	2.06E+02	7.31E-01	-4.11E+01	1.49E+03	0.00E+00	2.72E-02	5.50E-02	1.05E-02	1.40E+01
PENRE	MJ	4.54E+02	8.48E+00	6.10E-01	2.23E+03	0.00E+00	3.70E-01	1.56E-01	6.49E-02	-1.17E+02
PENRM	MJ	1.77E+00	0.00E+00	-7.44E-02	0.00E+00	0.00E+00	0.00E+00	-1.70E+00	0.00E+00	0.00E+00
PENRT	MJ	4.56E+02	8.48E+00	5.35E-01	2.23E+03	0.00E+00	3.70E-01	-1.54E+00	6.49E-02	-1.17E+02
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	1.52E-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
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
FW	m^3	2.02E-01	5.21E-04	9.80E-04	1.20E+00	0.00E+00	1.31E-05	7.45E-04	1.38E-05	-3.64E-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 declared unit								
Indicator	Unit	A1 – A3	A4	A5	B6	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.98E-07	4.42E-10	1.82E-10	2.86E-06	0.00E+00	1.34E-11	2.91E-11	1.35E-11	2.83E-05
Non-hazardous waste disposed	kg	4.75E+00	1.26E-03	1.80E-01	1.70E+00	0.00E+00	4.86E-05	3.27E-02	1.94E-01	-1.77E+00
Radioactive waste disposed	kg	6.34E-03	1.23E-05	8.73E-06	3.38E-01	0.00E+00	4.86E-07	7.09E-06	8.90E-07	-3.04E-03

OUTPUT FLOW INDICATORS

		Results per declared unit								
Indicator	Unit	A1 – A3	A4	A5	B6	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
Material for recycling	kg	8.27E-01	0.00E+00	2.26E-01	0.00E+00	0.00E+00	0.00E+00	2.94E+00	0.00E+00	3.13E-02
Materials for energy recovery	kg	0.00E+00	0.00E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-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
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

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)

		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.	8.56E-02	5.43E-02	0.00E+00	-1.27E+01	1.71E-02	6.41E-01	0.00E+00	-1.75E+00	3.42E-02	0.00E+00	7.10E-02	-6.05E-01
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.	9.13E-04	7.93E-05	0.00E+00	-1.58E-02	1.83E-04	9.27E-05	0.00E+00	-1.83E-03	3.65E-04	0.00E+00	2.21E-04	-4.07E-04
GWP – total	kg CO_2 eq.	8.65E-02	5.44E-02	0.00E+00	-1.28E+01	1.73E-02	6.41E-01	0.00E+00	-1.76E+00	3.46E-02	0.00E+00	7.12E-02	-6.05E-01
GWP-GHG	kg CFC 11 eq.	8.65E-02	5.44E-02	0.00E+00	-1.28E+01	1.73E-02	6.41E-01	0.00E+00	-1.76E+00	3.46E-02	0.00E+00	7.12E-02	-6.05E-01
ODP	kg CFC 11 eq.	1.05E-14	5.28E-13	0.00E+00	-1.11E-10	2.09E-15	-8.01E-12	0.00E+00	-1.38E-11	4.18E-15	0.00E+00	2.30E-13	-4.15E-12
AP	mol H+ eq.	1.39E-04	6.51E-05	0.00E+00	-4.07E-02	2.77E-05	4.36E-04	0.00E+00	-3.80E-03	5.55E-05	0.00E+00	4.43E-04	-2.53E-03
EP – freshwater	kg P eq.	2.39E-07	3.13E-07	0.00E+00	-1.47E-06	4.79E-08	-4.01E-07	0.00E+00	-1.17E-06	9.58E-08	0.00E+00	2.24E-06	-2.25E-07
EP – marine	kg N eq.	5.66E-05	1.74E-05	0.00E+00	-8.61E-03	1.13E-05	2.43E-04	0.00E+00	-8.47E-04	2.26E-05	0.00E+00	1.07E-04	-4.71E-04
EP – terrestrial	mol N eq.	6.02E-04	1.99E-04	0.00E+00	-9.18E-02	1.20E-04	2.83E-03	0.00E+00	-9.34E-03	2.41E-04	0.00E+00	1.17E-03	-5.13E-03
POCP	kg NMVOC eq.	1.20E-04	4.44E-05	0.00E+00	-2.31E-02	2.40E-05	6.34E-04	0.00E+00	-2.43E-03	4.80E-05	0.00E+00	3.33E-04	-1.40E-03
ADP – minerals & metals*	kg Sb eq.	5.88E-09	9.07E-09	0.00E+00	-6.42E-05	1.18E-09	-7.43E-08	0.00E+00	-1.43E-07	2.35E-09	0.00E+00	4.86E-09	-3.89E-08
ADP – fossil*	MJ	1.13E+00	5.41E-01	0.00E+00	-1.40E+02	2.26E-01	4.01E+00	0.00E+00	-2.65E+01	4.52E-01	0.00E+00	1.16E+00	-6.46E+00
WDP*	m^3	3.55E-04	9.37E-03	0.00E+00	-8.98E-01	7.10E-05	4.32E-01	0.00E+00	-2.13E-01	1.42E-04	0.00E+00	8.32E-03	-1.06E-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.

Scaling factors for other variants
The different variants of CAST are very similar but show some differences in their construction. Those differences have been accounted for in the LCA. The results of the GWP-GHG above can be scaled to the corresponding variants with the following conversion factors:

VARIANT	MOUNTING	A1 – A3	A4	A5	B6	C1-C4	D
Winkel Pin W227P	Pin	0.42	0.47	0.88	1.00	0.66	0.31
Winkel Base W227B black | white	Base	0.75	0.95	1.00	1.00	1.04	0.73
Winkel Base W227B raw tumbled	Base	1.00	1.00	1.00	1.00	1.00	1.00

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.

VARIANT (3000 K)	MOUNTING	A1-A3	A4	A5	B6	C1-C4	D
Winkel Pin W227P	Pin	2.01	2.01	2.01	1.52	2.01	2.01
Winkel Base W227B black | white	Base	2.01	2.01	2.01	1.52	2.01	2.01
Winkel Base W227B raw tumbled	Base	2.01	2.01	2.01	1.52	2.01	2.01

Information related to the sectorial EPD
This EPD is not sectoral.

Version History
1st version published 2025-12-03
2nd version published 2026-04-07
– Product name "WINKEL alu" changed to "WINKEL"
– Overall layout changed to new W+ corporate design

ADPE – Abiotic depletion potential non-fossil resources
ADPF – Abiotic depletion potential fossil resources
AP – Acidification potential, accumulated exceedance
BEL – Belgium
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
EPDM – Ethylene-propylene-diene terpolymer
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
PMMA – Polymethylmetacrylate
POCP – Photochemical ozone creation potential
PSR – Product Specific Rules
RE – Renewable Energy
RSF – Use of renewable secondary fuels
RWD – Radioactive waste disposed
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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ISO 14044:2021 Environmental management — Life cycle assessment — Requirements and guidelines

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