ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**WE-EF LEUCHTEN GmbH & Co. KG**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-WEE-20130214-IBC1-EN
Issue date	11.10.2013
Valid to	10.10.2018

RFL530 (S60)

WE-EF LEUCHTEN GmbH & Co. KG

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com



1. General Information

WE-EF LEUCHTEN GmbH & Co. KG

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
D-10178 Berlin

Declaration number
EPD-WEE-20130214-IBC1-EN

This Declaration is based on the Product Category Rules:
Luminaires, lamps and components for luminaires, 07-2012
(PCR tested and approved by the independent expert committee)

Issue date
11.10.2013

Valid to
10.10.2018

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(Chairman of SVA)

RFL530 (S60)

Owner of the Declaration
WE-EF LEUCHTEN GmbH & Co. KG
Toepinger Straße 19
29646 Bispingen

Declared product / Declared unit
RFL530 (S60) / 1 luminaire

Scope:
RFL530 (S60) luminaire with streetlighting purpose. Data were collected from the high-pressure aluminium die-casting plants in Neundorf, Germany and from the assembly and packaging operations in Bispingen, Germany. Manufacturing and assembling plants are operated by WE-EF. The EPD refers to the declaration tape 1a) Declaration of a specific product from a manufacturer's plant /IBU 07-2012 Part B/. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The CEN Norm EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025
☐ internally ☒ externally

Prof. Dr. Birgit Grahl
(Independent tester appointed by SVA)

2. Product

2.1 Product description
This EPD is for the RFL530 (S60) luminaire which is a post mounted luminaire with street lighting distribution.

2.2 Application
The designated application for the product is for street lighting and application specific data is sourced from WE-EF LEUCHTEN GmbH & Co. KG. The RFL530 (S60) is in accordance with the definition in the Energy using Product (/EuP 2005/) directive for street lighting (lot 9) and /EN 13201/ Classification ME3-ME6 main and minor road street lighting and Class S1-S6.

2.3 Technical Data
The RFL530 (S60) has the following technical features:
Anodised aluminium reflector, for beam efficiency and glare control according to /EN 12464-1/.
Lamp Source: HIT-CE 70W/c/830 G12.
Frame and housing made from LM6 marine grade die cast aluminium alloy.
5CE superior corrosion protection including PCS hardware.
Safety glass lens. Control gear on hinged and 'no tool' removable gear tray.
'No tool' lamp replacement.
180°C rated silicone Controlled Compression Gasket.
(CCG®) for Internal Protection rating IP66, Class 1 and IK08 resistance against impacts of up to 5 J. SKI electrical protection.

Constructional data

Name	Value	Unit
Diameter	460	mm
Luminous flux	7300	lm
Luminous efficiency	86	lm/W
Colour temperature	3000	K

2.4 Placing on the market / Application rules
/EN 13201/ for main and minor road street lighting with Classification ME3-ME6 and Class S1-S6.

2.5 Delivery status
7.16 kg luminaire with 1.55 kg packaging (1.50 kg cardboard and 0.05 kg EPS).

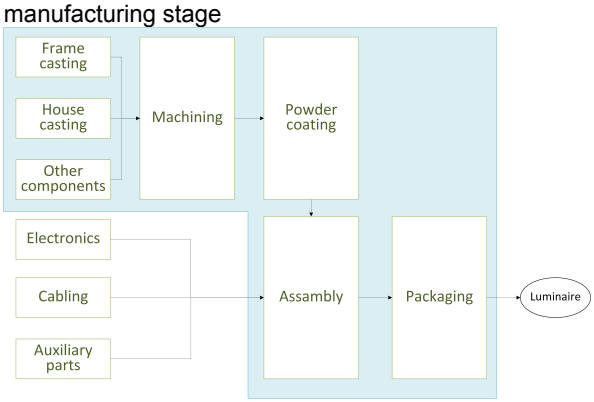
2.6 Base materials / Ancillary materials

Name	Value	Unit
Main body Aluminium frame	1.72	kg
Main body Aluminium housing	3.30	kg
Main body Aluminium cover plate for housing	0.05	kg
Main body Steel chassis	0.45	kg
Main body Holder plate (steel)	0.01	kg
Main body Silicon seal	0.09	kg

Lamp Metal halide lamp a=0.33kg	0.33	kg
Lamp Glass cover	0.44	kg
Lamp Aluminium reflector	0.19	kg
Electronics Power supply control gear	0.08	kg
Electronics PWB housing	0.03	kg
Electronics Cabling	0.22	kg
Fasteners &small components Miscellaneous (e.g. screws, plugs, labels etc.)	0.10	kg
Coating powder coat system (on main body)	0.16	kg
Packaging Cardboard	1.50	kg
Packaging Expanded polystyrene	0.05	kg
Total w/o packaging	7.16	kg
Total with packaging	8.71	kg

2.7 Manufacture

The gate to gate unit processes involved in manufacturing are shown in the blue box in the Figure below and are based on primary data. The production of inputs that supply these processes are mapped outside the blue box and the production is based on GaBi 6 datasets.
Figure: Cradle to gate flow diagram of the manufacturing stage



The frame and house are the main 'body' of the RFL530 (S60) and are made from marine grade aluminium LM6 through high-pressure die-casting processes in Neundorf, Germany.
Metal parts (frame, house, chassis, holder plate) are machined and powder coated (5CE system) in Bispingen, Germany ready for assembly and packaging.
All other parts are supplied to WE-EF LEUCHTEN GmbH & Co. KG for product assembly. Assembly and packaging is in Bispingen, Germany.

2.8 Environment and health during manufacturing

Legal requirements are followed.

2.9 Product processing/Installation

Installation materials of the luminaire on a pole are excluded.

2.10 Packaging

Packaging materials are a cardboard folding box (1.45 kg) and slotted plate (0.05 kg) with expanded polystyrene (0.05 kg) corners.

2.11 Condition of use

No special features of contents to be reported for the period of use.

2.12 Environment and health during use

No content of harmful substances or emissions for the period of use.

2.13 Reference service life

The reference service life (RSL) is 20 years or 73,000 hours operation. This RSL is provided by WE-EF LEUCHTEN GmbH & Co. KG and is in line with the default RSL for street lighting provided in the PCR for luminaires.
Metal halide lamps are replaced 6 times every 12,000 hours of operation. Electronic control gear is replaced once after 50,000 hours of operation.

2.14 Extraordinary effects

Fire
Dense black smoke occurs during fire. Inhaling hazardous decomposing products can cause serious health damage.
Coating powders should not be allowed to enter drains or waterways or to be disposed of, because they can influence ground or surface water.
Do not allow water used to extinguish fire to enter drains, ground or waterways. Treat runoff as hazardous.
Water
No known hazards from unforeseeable influence of water, e.g. flooding.

Mechanical destruction
No known hazards from mechanical destruction.

2.15 Re-use phase

The product is disassembled at end of life where metals and PWBs are recycled.

2.16 Disposal

For final disposal and energy recovery plastics, including EPS packaging, are incinerated

2.17 Further information

www.we-ef.com

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is one RFL530 (S60) luminaire operated for 20 years in Germany with a total weight of 7.16 kg excluding packaging.

3.2 System boundary

Type of EPD: Cradle to grave.
Module A1-A3 includes: raw material extraction, processing, transportation, energy and materials; manufacture of product parts and packaging materials; and assembly and packaging.
The following scenarios are also included and are presented below in order of occurrence in the life cycle:

- Transport to installation (A4);
- Disposal of packaging materials (A5)
- Replacement of control gear

PWBs and lamps and recycling of replaced PWBs(B4);

- Operational energy use (B6);

- Transport to end-of-life (C2);
- Incineration of plastic parts for final disposal (C4) and energy recovery (D); and
Recycling of metals and PWBs (D).

3.3 Estimates and assumptions
No estimates or assumptions require specific reporting.

3.4 Cut-off criteria
Items that represented less than 1% and summed to less than 5% of the total input of mandatory modules (A1-A3) were excluded. No excluded flows were of any known particular environmental concern.

3.5 Background data
All background data are sourced from /GaBi 6/ databases.

3.6 Data quality
Data is robust and of good quality. Background data is less than 10 years old.

3.7 Period under review
Results and primary data collected represent the year 2011.

3.8 Allocation
Recycling of metals is considered and resulting credits are shown in separate columns (module D) of the result tables.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

Transport to the building site (A4)

Name	Value	Unit
Transport distance	1000	km
Capacity utilisation (including empty runs)	85	%

Installation into the building (A5)

Name	Value	Unit
EPS packaging	0.05	kg
Cardboard packaging	1.5	kg

Replacement (B4) / Refurbishment (B5)

Name	Value	Unit
Replacement of control gear PWBs	1	Number/RSL
Replacement of metal halide lamp	6	Number/RSL
Disposal of replaced components	2.06	kg

Reference service life (RSL)

Name	Value	Unit
Reference service life	20	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption (RSL)	4964	kWh

End of life (C1-C4)

Name	Value	Unit
Recycling	6.05	kg
Energy recovery	0.26	kg
Landfilling	0.33	kg

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement[1)]	Refurbishment[1)]	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	X	MND	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: RFL530 (S60) one luminaire

Parameter	Unit	A1 - A3	A4	A5	B4	B6	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	9.45E+1	7.28E-1	1.26E-1	2.08E+1	3.02E+3	1.99E-2	3.17E+0	4.5E-2	-4.82E+1
ODP	[kg CFC11-Eq.]	5.64E-6	1.52E-11	1.82E-12	4.56E-10	1.75E-6	4.15E-13	1.22E-7	8.38E-12	-4.83E-6
AP	[kg SO_2-Eq.]	3.45E-1	4.57E-3	3.05E-5	1.18E-1	5.45E+0	1.25E-4	5.79E-3	6.67E-5	-2.33E-1
EP	[kg $(PO_4)^{3-}$- Eq.]	2.03E-2	1.13E-3	2.38E-6	7.51E-3	5.91E-1	3.09E-5	4.32E-4	1.02E-5	-9.79E-3
POCP	[kg Ethen Eq.]	2.35E-2	-1.91E-3	1.73E-6	1.63E-2	3.83E-1	-5.2E-5	4.26E-4	1.73E-5	-1.34E-2
ADPE	[kg Sb Eq.]	1.69E-3	3.36E-8	1.81E-8	5.17E-3	4.75E-4	9.16E-10	1.16E-6	3.92E-9	-7.25E-4
ADPF	[MJ]	1.03E+3	1.16E+1	5.93E-2	2.579E+2	2.2E+4	3.28E-1	3.87E+1	5.14E-3	-5.98E+2

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - RESOURCE USE: RFL530 (S60) one luminaire

Parameter	Unit	A1 - A3	A4	A5	B4	B6	C2	C3	C4	D
PERE	[MJ]	2.83E+2	5.91E-1	5.67E-3	2.1E+1	8.46E+3	1.61E-2	1.53E+0	1.14E-2	-1.99E+2
PERM	[MJ]	-	-	-	-	-	-	-	-	-
PERT	[MJ]	2.83E+2	5.91E-1	5.67E-3	2.1E+1	8.46E+3	1.61E-2	1.53E+0	1.14E-2	-1.99E+2
PENRE	[MJ]	1.3E+3	9.99E+0	6.72E-2	2.821E+2	4.29E+4	2.72E-1	3.69E+1	1.53E-1	-6.35E+2
PENRM	[MJ]	3.47E+0	-	-	9.1E-1	-	-	-	-	-
PENRT	[MJ]	1.3E+3	9.99E+0	6.72E-2	2.83E+2	4.29E+4	2.72E-1	3.69E+1	1.53E-1	-6.35E+2
SM	[kg]	-	-	-	-	-	-	-	-	-
RSF	[MJ]	4.09E-3	7.43E-5	8.3E-7	1.55E-2	7.93E-1	2.03E-6	1.55E-5	2.68E-4	-4.17E-4
NRSF	[MJ]	3.93E-2	7.77E-4	8.68E-6	1.44E-1	8.3E+0	2.12E-5	1.29E-4	6.35E-4	-3.6E-3
FW	[m^3]	-	-	-	-	-	-	-	-	-

Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: RFL530 (S60) one luminaire

Parameter	Unit	A1 - A3	A4	A5	B4	B6	C2	C3	C4	D
HWD	[kg]	-	-	-	-	-	-	-	-	-
NHWD	[kg]	-	-	-	-	-	-	-	-	-
RWD	[kg]	-	-	-	-	-	-	-	-	-
CRU	[kg]	-	-	-	-	-	-	-	-	-
MFR	[kg]	-	-	-	8.0E-2	-	-	6.05E+0	-	-
MER	[kg]	-	-	-	-	-	-	2.61E-1	-	-
EEE	[MJ]	-	-	2.44E-1	-	-	-	1.31E+0	-	-
EET	[MJ]	-	-	5.86E-1	-	-	-	3.15E+0	-	-

Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

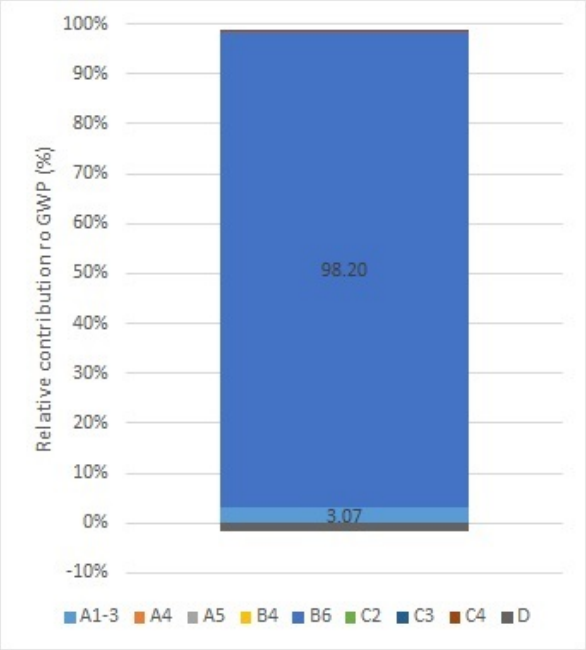
For: "FW, HWD, NHWD, RWD, CRU": The EAA Association inventories (Aluminium ingot mix (2005)) do not support the methodological approach for the declaration of water and waste indicators. The material amounts, displayed with these inventories contribute to >90% to the production of the analysed product. This is significant, as > 3% (referring to the mass of the declared unit). The indicators are not declared (decision of IBU advisory board 2013-01-07).

6. LCA: Interpretation

The operation phase (module B6) dominates all impact categories (apart from ODP). ODP is dominated by the production phase.

The following figure illustrates the relative contribution of the modules A1-D. For the GWP, 3.07% of the emissions are associated with the production phase

(module A1-A3). Most of these are associated with the aluminium ingot production. The operation phase (module B6) is associated with 98.20% (sum > 100 due to credit from module D). Electricity consumption during use is the dominant factor.
The relative use in the life cycle modules of non-renewable energy and the use of renewable are dominated by the use phase (B6). A1-A3 are associated with 3% of the renewable and none-renewable energy use.



7. Requisite evidence

No requisite evidence required.

8. References

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DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804
EN 15804:2012-04: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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