

ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Kalzip® - Aluminium FC Facade System
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Aluminium FC Facade System Kalzip®

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1. General Information

<p>Kalzip®</p> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-KAL-20160283-IBC1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Aluminium roofing and cladding systems, 07.2014 (PCR tested and approved by the SVR)</p> <hr/> <p>Issue date 09.03.2017</p> <hr/> <p>Valid to 08.03.2023</p>	<p>Aluminium FC Facade System</p> <hr/> <p>Owner of the Declaration Kalzip GmbH August-Horch-Str. 20-22 45070 Koblenz Germany</p> <hr/> <p>Declared product / Declared unit Open-joint, flat, curtain-type and rear-ventilated facade system made of aluminium. This EPD refers to 1m² facade system comprising 1 mm facade panels made of aluminium and an integrated modular aluminium click rail for non-penetrative installation (suspend and click) of the Panels.</p> <hr/> <p>Scope: This EPD refers to the manufacture, transport and disposal of a representative product with its maximum environmental impacts (<i>worst-case scenario</i>) for a range of products (aluminium FC facade system) offered by Kalzip. The various technical characteristics are depicted in section 2.3. The product is manufactured in Koblenz, Germany, from where the products are directly supplied to customer construction sites. The owner of the Declaration shall be liable for the underlying information and evidence; IBU shall not be liable with respect to manufacturer information, LCA data and evidence. This document is translated from the German Environmental Product Declaration into English. It is based on the German original version EPD-KAL-20160283-IBC1-DE. The verifier has no influence on the quality of the translation. 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.</p> <hr/> <p>Verification The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ <input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <hr/> <p> Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p> Dr. Burkhard Lehmann (Managing Director IBU)</p>
	<p> Angela Schindler (Independent verifier appointed by SVR)</p>

2. Product

2.1 Product description / Product definition

The Kalzip FC facade system is a fast-mounting curtain-type and rear-ventilated facade cladding comprising thin-walled, cold-formed profiled sheets (panels) with open joints. Several sheet width profiles are available for complying with the various draft specifications and demands on scope. Furthermore, a choice of material surfaces and surface treatments is available. The Kalzip FC facade system is supplied with an integrated supporting system in the form of modular click rails of various design or, as an alternative, with mono-click holders for non-penetrative

installation (clicking) of the FC panels. The rails and mono-click holders are mounted on site on conventional supporting constructions, on concrete or sandwich elements, or other sub-surfaces. The system under review (sheet aluminium with galvanised surface and modular click rail with mono-click holders) represents the system with the greatest environmental impacts to enable this EPD to cover the range of possible variants manufactured by Kalzip.

Directive (EU) No. 305/2011 (CPR) applies for placing the product on the market in the EU/EFTA (with the



exception of Switzerland). The product requires a Declaration of Performance taking consideration of /EN 14782:2006/ Self-supporting metal sheet for roofing, external cladding and internal lining. Use is governed by the respective national regulations.

2.2 Application

The FC facade panels made of aluminium are used for the formation of an open-jointed, flat and rear-ventilated facade for FC facades installed horizontally and vertically in new buildings or refurbishment projects. The panels are mounted on a level supporting construction using individual holders or modular click rails which are included in the scope of supply. Roll-formed panels are used in a variety of construction applications. Typical applications include facades, internal linings and ceilings.

2.3 Technical Data

Structural data

Name	Value	Unit
Used alloys for the skin	/EN AW 3004/, /3005/, /6025/	-

Product performance values in line with the Declaration of Performance in terms of its essential properties in accordance with /EN 14782:2006/ Self-supporting metal sheet for roofing, external cladding and internal lining – Product specification and requirements and /EN 14783:2013/ Fully-supported metal sheet and strip for roofing, external cladding and internal lining – Product specification and requirements, and CE marking.

2.4 Delivery status

The declared panel is supplied as long sheets in project-based dimensions in lengths of up to 8000 mm, widths of up to 800 mm, and usually with a thickness of 1 mm.

2.5 Base materials / Ancillary materials

Average mass percentages of the Kalzip *worst-case* facade System:

Product component	% by mass
Aluminium	92.2%
Zinc	5.5%
Polyamide	2.3%

2.6 Manufacture

The aluminium sheets are profiled in-plant at the production facility in Koblenz (electronically-controlled process). 0.121 MJ electricity and 0.015 kg lubricants are required per 1 m² during profiling. The modular click rails are supplied as extruded sections and assembled with the inlays.

2.7 Environment and health during manufacturing

The company is certified in accordance with /DIN ISO 9001:2008/, /DIN ISO 14001:2004/ and /BS OHSAS 18001:2007/, and strictly observes the Tata Steel /Health & Safety Management System/ (THSMS).

2.8 Product processing/Installation

The panels are installed by a network of qualified installation companies in accordance with the Assembly Directive.

2.9 Packaging

The FC facade panels are packed in wooden packaging with plastic lining for safe transport. The modular click rails are packed using basic wooden straps. Both are loaded onto trucks and transported.

2.10 Condition of use

No changes during the use phase compared to the manufacturing state.

2.11 Environment and health during use

No changes during the use phase compared to the manufacturing state.

2.12 Reference service life

The facade system has an assumed reference service life of 50 years. A reference service life (RSL) taking consideration of ISO 15686 could not be established with the result that a useful life was applied from the BBSR Table "Useful life of components for life cycle assessments in accordance with the Sustainable Building assessment system (BNB)".

2.13 Extraordinary effects

Fire

The aluminium FC facade system is non-flammable.

Fire resistance class: to /EN 13501-1/ = A1

/L 235/19/ Profiled sheets made of aluminium or aluminium alloys are classified by the European Commission as products which satisfy the requirements of "external fire performance" without further Analysis.

Water

Water does not have any negative impacts on the Product.

Mechanical destruction

Owing to its lightweight design, there is no risk in the event of an earthquake. Furthermore, the system was tested and calculated for projects in regions at risk of hurricanes.

2.14 Re-use phase

The following possibilities arise in terms of material composition:

Material recycling

The facade system can be fully recycled. The materials suitable for material recycling involve aluminium from the facade elements and the modular click rails.

Energy recovery

The materials suitable for energy recovery exclusively comprise the plastic and wood materials contained in the packaging.

2.15 Disposal

The waste key codes in accordance with the European Waste Catalogue and the List of Wastes Directive



/AVV/ are listed below for the individual product components.

Packaging waste

The following packaging waste incurred through installation in the building is directed towards energy recovery:

/EWC 15 01 02/ Plastic packaging
/EWC 15 01 03/ Wooden packaging

Product waste

All materials are directed to an energy recovery or metallurgical recycling process.

/EWC 17 02 03/ Plastic
/EWC 17 04 02/ Aluminium
/EWC 17 04 04/ Zinc

2.16 Further information

Contact data is available on the back of this Declaration. More detailed product information is available online: www.kalzip.de

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit for the facade system under review is one square metre.

Details on declared unit

Name	Value	Unit
Declared unit	1	m ²
Weight unpacked	4.25	kg
Packaging	0.744	kg
Total weight	4.99	kg
Conversion factor to 1 kg	0.24	-

3.2 System boundary

Type of EPD: Cradle to gate – with options

Modules A1-A3

The product stage involves production of the requisite raw materials including all of the upstream chains as well as the requisite procurement transport. Production of the declared unit also took consideration of the requisite auxiliaries and consumables as well as their upstream chains. For the product, this means that the environmental impacts of zinc-alloyed aluminium (profiled panels, modular click rails) and polyamide (eclips) are attributed to the declared product. The manufacture of packaging material (wood and plastic foil), electricity (German power mix) and lubricants for in-plant production are also included.

Module A4

This module considers the ecological impact of transporting the declared unit from the plant gate to the construction site.

Module A5

No efforts associated with installation were taken into consideration. The environmental impacts of combustion of the plastic and wood packaging materials are indicated.

Module C2

This module includes transport to waste treatment or disposal.

Module C3

This module includes the environmental impacts of waste treatment (recycling or energy recovery) of the product at the *End of Life*. The aluminium is melted and re-used.

Module D

This module comprises the efforts associated with recycling and the avoidable environmental impacts of aluminium contained in the product.

The energy generation loads avoided are also indicated resulting from energy recovery from the combustible materials (packaging and wood).

3.3 Estimates and assumptions

The effort associated with galvanising the aluminium (energy and chemicals) was covered by assessing the energy effort and added to the environmental impacts of the requisite volume of zinc.

The zinc from the alloy and the plastic contained in the modular click rail are not recycled separately but rather melted along with the aluminium and not recovered. Where available, the manufacturer's data was used for calculating the secondary share of aluminium used. A value of 20% secondary aluminium was assumed for the manufacturers for whom no secondary share is available. When multiplied by the volumes used, this results in secondary shares of 33% aluminium for the facade.

3.4 Cut-off criteria

In accordance with the operating data records, no flows were excluded and the cut-off criteria were observed in connection with the use of generic background data as per /EN 15804/. The declaration for Module B was excluded as the product does not cause any environmental impacts during its service life.

3.5 Background data

Primary data was made available by Kalzip. Background data originates from the Gabi data base /GaBi 7.3/.

3.6 Data quality

Where possible, operating data for all products manufactured by Kalzip was applied. Average country-specific background data sets were applied for other components (rails). The data was collated under consistent methodical and boundary conditions. All of the background data sets from the GaBi data bases used for the LCA are no more than 10 years old.

3.7 Period under review

The data refers to the manufacturing processes of 2015.

3.8 Allocation

Zinc-alloyed aluminium clippings are incurred in Modules A1-A3, which are sold. This is followed by an economic allocation of the loads in accordance with the clippings price and the theoretical price of aluminium after the process stage.

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. The data base used involves the GaBi data base, version 7.3..

4. LCA: Scenarios and additional technical information

Procurement transport (A2)

Procurement transport is by truck (total weight of 40 tonnes, max. payload of 27 tonnes; EURO 0 to EURO 4) and a capacity utilisation of 85% including empty runs.

The transport distance is 5,577.66 km.

All of the suppliers were recorded disproportionately in establishing the transport distance.

Transport to construction site (A4)

Procurement transport is by truck (total weight of 34-40 tonnes / payload of 27 tonnes; EURO 4) and a capacity utilisation of 85% including empty runs. The average transport distance is 450 km.

Comprehensive distribution throughout Germany was assumed when calculating the transport Distance.

Construction installation process (A5)

Transport for waste treatment is by truck (total weight of 20-26 tonnes / payload of 17.3 tonnes; EURO 3) and a capacity utilisation of 50% including empty runs. The transport distance to the disposal company is 75 km.

Transport to EoL (C2)

Transport for waste treatment is by truck (total weight of 20-26 tonnes / payload of 17.3 tonnes; EURO 3) and a capacity utilisation of 50% including empty runs. The transport distance to the disposal company is 75 km.

Transport to the building site (A4)

Name	Value	Unit
Transport distance	450	km
Capacity utilisation (including empty runs)	85	%

Reference service life

Name	Value	Unit
Reference service life	50	a

End of life (C1-C4)

Name	Value	Unit
Recycling	4.25	kg

Re-use, recovery and recycling potential (D), relevant scenario specifications

Module D includes the efforts associated with recycling the primary aluminium as well as the environmental impacts avoided during the manufacture of primary aluminium. This is supplemented by the loads avoided in the generation of electricity and heat to the sum of the energy volumes generated from packaging waste in Module A5.

5. LCA: Results

The environmental impacts were calculated using CML 2001, version April 2013.

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 BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	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	MNR	MNR	MNR	MND	MND	MND	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1m² Aluminium FC facade system

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Global warming potential	[kg CO ₂ -Eq.]	2.80E+1	1.06E-1	1.37E+0	2.91E-2	5.92E-2	-2.07E+1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.82E-8	4.87E-13	7.02E-11	7.36E-14	4.20E-11	1.10E-8
Acidification potential of land and water	[kg SO ₂ -Eq.]	1.26E-1	4.61E-4	1.38E-4	1.81E-4	1.65E-4	-1.05E-1
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	8.30E-3	1.13E-4	2.80E-5	4.65E-5	1.47E-5	-5.96E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	7.26E-3	-1.58E-4	1.25E-5	-7.72E-5	1.14E-5	-6.16E-3
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	9.48E-4	7.06E-9	1.22E-8	2.26E-9	1.93E-8	-9.20E-6
Abiotic depletion potential for fossil resources	[MJ]	3.30E+2	1.46E+0	2.50E-1	3.97E-1	6.41E-1	-2.20E+2

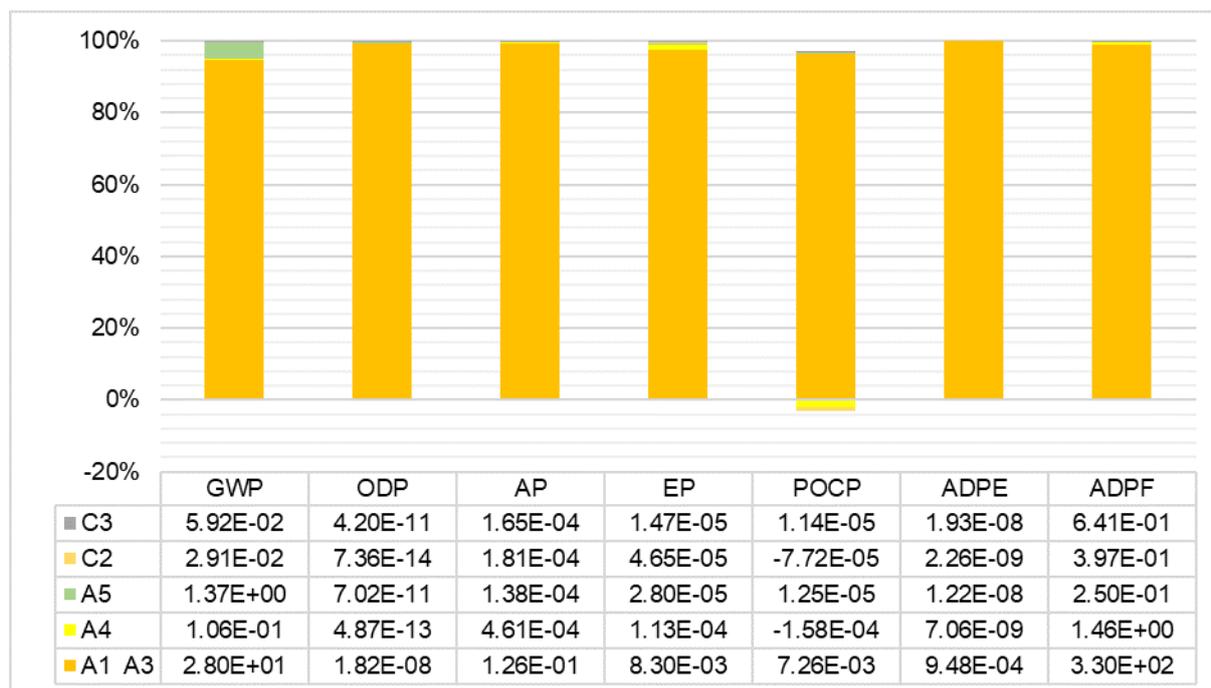
RESULTS OF THE LCA - RESOURCE USE: 1m² Aluminium FC facade system

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Renewable primary energy as energy carrier	[MJ]	1.56E+2	8.30E-2	1.32E+1	2.74E-2	2.89E-1	-1.19E+2
Renewable primary energy resources as material utilization	[MJ]	1.32E+1	0.00E+0	-1.32E+1	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	1.69E+2	8.30E-2	3.63E-2	2.74E-2	2.89E-1	-1.19E+2
Non-renewable primary energy as energy carrier	[MJ]	4.07E+2	1.47E+0	6.96E-1	3.99E-1	3.81E+0	-2.64E+2
Non-renewable primary energy as material utilization	[MJ]	3.48E+0	0.00E+0	-6.96E-1	0.00E+0	-2.78E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.10E+2	1.47E+0	2.98E-1	3.99E-1	1.03E+0	-2.64E+2
Use of secondary material	[kg]	1.48E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.53E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	3.77E-1	2.08E-4	3.23E-3	4.06E-5	4.46E-4	-3.10E-1

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1m² Aluminium FC facade system

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Hazardous waste disposed	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-hazardous waste disposed	[kg]	7.13E+0	1.23E-4	3.00E-3	5.03E-5	6.23E-4	-5.90E+0
Radioactive waste disposed	[kg]	2.69E-2	2.10E-6	1.89E-5	6.90E-7	1.56E-4	-1.74E-2
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	3.37E-1	0.00E+0	0.00E+0	0.00E+0	4.01E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.60E-2	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	1.77E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	4.14E+0	0.00E+0	0.00E+0	0.00E+0

6. LCA: Interpretation



The result is almost entirely dominated by the product stage (Modules A1-A3). Disposal and transport modules are practically irrelevant.

The primary cause of environmental impacts in all impact categories is usually in the upstream processes. This concerns, in particular, the manufacture of aluminium which displays the highest absolute and relative share in all impact categories while the other materials have a comparably low impact.

Module A5 involves the combustion of packaging material made of wood and plastic. This is particularly evident with regard to the global warming potential,

whereby it must be noted that combusted wood is responsible for absorption of CO₂ in the data inventory of Modules A1-A3 on account of the bound atmospheric carbon during the growth phase.

Compared to Modules A1-A3, waste treatment in Module C3 is of barely any significance. This is due to the fact that aluminium recycling is allocated to Modules A1-A3 and not C3.

This involves a worst-case configuration of the aluminium FC facade system. It can be assumed that the environmental impacts are lower for other possible configurations.

7. Requisite evidence

No further evidence is of relevance for this Product.

8. References

BS OHSAS 18001:2007

Occupational health and safety – Management systems – Requirements

PCR Aluminium Roofing and Facade Systems

Institut Bauen und Umwelt e.V., Berlin (pub.): Rules for Environmental Product Declarations, Aluminium Roofing and Facade Systems, July 2014

GaBi 7.3

GaBi 7.3: Software and data base for comprehensive analysis, LBP [Lehrstuhl für Bauphysik] University of Stuttgart and Thinkstep AG, Leinfelden-Echterdingen, 1992 – 2015

EWC 15 01 02

Plastic packaging

EWC 15 01 03

Wooden packaging

EWC 17 02 03

Plastics

EWC 17 04 02

Aluminium

EWC 17 04 04

Zinc

EN 13501

DIN EN 13501-1:2010-01

Fire classification of construction products and building elements – Part 1: Classification with the results of tests on reaction to fire of construction products

EN 14782

DIN EN 14782:2006-03: Self-supporting metal sheets and strips for roofing, external cladding and internal lining – Product specification and requirements

EN 14783

EN 14783:2013: Fully-supported metal sheet and strip for roofing, external cladding and internal lining – Product specification and requirements

EN AW-3004

EN AW-3004:2011-07: Aluminium material data sheet EN AW-3004, EN AW-AI Mn1Mg1

EN AW-3005

EN AW-3005:2011-07: Aluminium material data sheet EN AW-3005, EN AW-AI Mn1Mg0.5

EN AW-6025

Aluminium material data sheet EN AW-6025, EN AW-AIMg2.5SiMnCu

ISO 9001

ISO 9001:2015-09
Quality management systems – Requirements (ISO 9001:2015)

ISO 14001

ISO 14001:2009-11: Environmental management systems – Requirements with guidance for use

ISO 14040

DIN EN ISO 14040:2009-11: Environmental management – Life cycle assessment – Principles and framework conditions

ISO 14044

DIN EN ISO 14044:2006-10: Environmental management – Life cycle assessment – Requirements and guidelines

L 235/19

Commission decision of 6 September 2000 implementing the Council Directive 89/106/EEC as regards the external fire performance of roof coverings.

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin(pub.);
Generation of Environmental Product Declarations (EPDs);

General Principles

for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013/04
www.ibu-epd.de

/ISO 14025/

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

/EN 15804/

/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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