ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	ARGE; European Federation of Associations of Lock and Builders Hardware Manufacturers
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ARG-20160154-IBG1-EN
ECO EPD Ref. No.	ECO-00000403
Issue date	05.09.2016
Valid to	04.09.2021

Locks

ARGE; European Federation of Associations of Lock and Builders Hardware Manufacturers

(This EPD is valid for ARGE associations´ member companies only)

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com

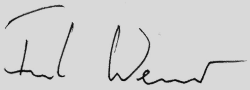
ECO PLATFORM EPD EN 15804 VERIFIED

ASSA ABLOY Opening Solutions

ASSA ABLOY Opening Solutions Sweden AB
BOX. 371
631 05 ESKILSTUNA
heldesk.se.openingsolutions@assaabloy.se
Telefon: 0771-640 640

SEM GROUP

1. General Information

ARGE	Locks
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the Declaration** ARGE; European Federation of Associations of Lock and Builders Hardware Manufacturers Offerstraße 12, 42551 Velbert Germany
Declaration number EPD-ARG-20160154-IBG1-EN	**Declared product / Declared unit** 1 kg locks
This Declaration is based on the Product Category Rules: Building Hardware products, 02.2016 (PCR tested and approved by the SVR)	**Scope:** This Association EPD covers locks and security devices used in buildings. The reference product used to calculate the impacts for this group of products was selected as the product has the highest impact regarding its sustainability characteristics of the sample group. A validity scope analysis has been carried out to determine the limiting factors for locks eligible to be covered by this ARGE industry representing EPD. The LCA assessment is based on a high-security night-latch mainly made of steel, zinc and brass. In a preliminary study (simplified LCA), it turned out, that this EPD represents the worst case approach in order to cover all the Locks manufactured in Europe by ARGE's member companies. Among the product group it is the one with the highest impact for 1 kg of product.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.
Issue date 05/09/2016	
Valid to 04/09/2021	**Verification** The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ ☐ internally ☒ externally
 Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	
 Dr. Burkhart Lehmann (Managing Director IBU)	 Dr. Frank Werner (Independent verifier appointed by SVR)

2. Product

2.1 Product description

This EPD refers to mechanical locks, latches and security devices to be used in buildings. The sample group used to calculate the LCA data for this Association EPD includes sash locks, multipoint locks and night latches.

2.2 Application

These products are designed to be integrated into door assemblies of varying materials and applications. Their purpose is to assure the fastening of the door, window or shutter in the closed position. They can be used for either interior or exterior doors.

2.3 Technical Data

According to /EN 12209/ - Locks and latches – Mechanically operated locks, latches and locking plates (see 8. References)

Locks acc. to the classification in EN 12209

Name	Value	Unit
Required technical characteristic	-	
Category of use	1 - 3	Grade
Durability	A,B,C,L,M, R,S,W,X	Grade
door mass and closing force	0 - 9	Grade
Suitability for use in fire resisting and/or smoke control door sets	0,A,B,N	Grade
Safety	0	Grade
Corrosion resistance	0,A,C,D,F, G	Grade
Security - burglar resistance	0 - 7	Grade
Key identification of lever locks	0,A,B,C,D, E,F,G,H	Grade

The quoted standard defines the requirements of the product and the associated test methods. As construction hardware products are part of a set of a construction component (doorset, shutter, window), European application standards for locks themselves

do not exist. Locks are mainly put on the market as "b to b" products. Instead, the application might ruled by means of manufacturers guidelines on the national level.

2.4 Application rules

For the placing on the market in the EU/EFTA (with the exception of Switzerland) the Regulation (EU) No 305/2011 “Construction products regulation” applies. The products need a Declaration of Performance taking into consideration
/EN 12209:2003/ Building hardware – Locks and latches – Mechanically operated locks, latches and locking plates – Requirements and test methods / and the CE-marking.
For the application and use, the respective additional national provisions apply.

2.5 Delivery status

The products are sold by unit. Deliveries of a single unit might be possible but will be an exception. Regular deliveries will cover a larger amount of locks as they are put on the market as "b to b" product and not for a single customer.

2.6 Base materials / Ancillary materials

Of the product analysed for this EPD:
The values are given for the product analysed for this EPD, ranges of the values for each material for the validity scope are given in brackets in this table.

Name	Value	Unit
Zamak (0% - 63,73%)	64	%
Steel (20,96% - 91,25%)	21	%
Brass (3,31% - 9,21%)	9	%
Nickel Silver (0% - 5,49%)	6	%
Bronze (0% - 0,44%)	0	%

Nylon 66 and Acetal as ancillary material.
The product contains no substances cited on the REACH list of hazardous substances.
Zamak is an alloy of four separate metals: zinc, aluminium, magnesium and copper. Subcomponents of the lock, which are made from zamak, are diecast.
Steel is produced by combining iron with carbon as well as other elements depending on the desired characteristics. The subcomponents made of steel are formed by stamping.
Brass is an alloy of zinc and copper. Subcomponents made of brass are made by forging.
Nickel silver is an alloy of copper (~60%) with nickel (~20%) and zinc (~20%). Subcomponents made of nickel silver are formed by stamping.
Nylon 66 is a polyamide produced by the polycondensation of hexamethylenediamine and adipic acid in equal parts. This can then be combined with glass fibres to improve its mechanical properties. Subcomponents made of nylon are formed by injection moulding.
Acetal, or polyoxymethylene, is produced via polymerisation of anhydrous formaldehyde. Subcomponents made of acetal are formed also by injection moulding.

2.7 Manufacture

The production of a lock regullary follows a 3 step procedure:
1. Prefabrication of the semi finished products (usually by stamp punching or laser cutting) This step might include a surface treatment on factory site or by external manufacturers.
2. Preassembly of assembly modules (onsite factory)
3. Final assembly (onsite factory)

2.8 Environment and health during manufacturing

Regular measurements of air quality and noise levels are performed by ARGE members manufacturers. The results are within the compulsory safety levels. In areas where employees are exposed to chemical products, prescribed safety clothes and technical safety devices are provided. Regular health checks are mandatory for employees of production sites.

2.9 Product processing/Installation

The installation of the product could vary depending on the type of door and the specific situation but products do not require energy consumption for installation.

2.10 Packaging

Normally each single product is packaged in paper. Bigger amounts of 12 to 50 locks are then packed in a paperboard box and then get stacked on wooden pallets for transport to the customer (Door or window fabricant). Wastes of product packaging are collected separately for waste valorisation including recycling.

2.11 Condition of use

Once installed, the products require no servicing during their expected service lives. There is no consumption of water or energy linked to their use, and they do not cause any emissions.

2.12 Environment and health during use

No environmental damage or health risks are expected within the normal conditions of use of the product.

2.13 Reference service life

The Reference Service Life for this product is 30 years. This is based on mechanical endurance tests as specified in the EN 12209. The product is guaranteed to maintain its performance for at least 100 000 cycles of use.

2.14 Extraordinary effects

Fire
The product is suitable for use in fire resisting and/or smoke control door set according to 1 of the classes 0,A,B,N.

Water
The declared product is foreseen to be used in regular conditions of a building indoor or outdoor use. A lock is composed mainly of metal or plastic components and does not eluate hazardous ingredients in case of a unforeseen flooding.

Mechanical destruction
In case of mechanical destruction of the declared product, it does not perform any impact on the environment or alter its substantial composition.

2.15 Re-use phase

Used components of a lock are materials of high quality. After use stage, they can be recycled. In case of the disassembly of a lock, no impacts on the environment are to be concerned. As a rule a re-use of

the lock as hardware device as a whole will not be an economical procedure.

2.16 Disposal

In case of the disassembly of a door or window the lock might be removed and disposed separately. Caused by this being a simple procedure the locks might get recycled completely. The waste code in accordance with the /European Waste Code/ is 17 04 07.

2.17 Further information

Builders hardware locks are manufactured in several different designs and construction types in general. Variations are subject to different types, sizes and requirements of the door/window. In general, the same product types might be suitable for wooden, steel or plastic based doors.
Details to be shown on the manufacturers' websites listed on http://arge.org/members/members-directory.htm

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit for locks covered in this Association EPD is 1 kg. As single lock units of the same production type can be custom made for an application situation and the weight of those variations of the same product type can be considerable, it is more appropriate to declare the weight of the product and the weight of the representative product rather than a piece of product.

An evaluation of 9 samples of characteristic product individuals based on sales figures was made for the feasibility study. The worst case product has been chosen for the result of this EPD, described in 5.

Declared unit

Name	Value	Unit
Declared unit mass	1	kg
Mass of declared Product	1.64	kg

3.2 System boundary

The type of the EPD is cradle to grave".
The analysis of the product life cycle includes the production and transport of the raw materials, manufacture of the product and the packaging materials which are declared in modules A1-A3. Losses during production are considered as waste and are sent to recycling. No recycling processes are taken into account except transport and an electricity consumption for grinding the metals. When recycled metals are used as raw material only their transformation process is taken into account and not the extraction of the raw material.
A4 module represents the transport of the finished Locks to the installation site.
There is no waste associated with the installation of the product. The A5 module therefore represents only the disposal of the product packaging.
For the RSL considered for this study, there are no inputs or outputs for the stages B1-B7.
The End-of-Life (EoL) stages are also considered. The transportation to the EoL disposal site is taken into account in module C2. Module C4 covers the disposal of the locks. Module C3 covers the recycling of the individual elements according to European averages, with the remaining waste divided between incineration and landfill. The same assumption as for waste to recycling in A3 is used here.
For end of life modules (C1 to C4) the system boundaries from the XP P01-064/CN standard have been followed, see annex H.2 and H.6 of this document for figures and further details.

In practice, the end of life has been modeled as follow:
- When a material is sent to recycling generic transport and electric consumption of a shredder is taken into account (corresponding to the process "Grinding, metals"). Only then, the material is considered to have attained the "end of waste" state.
- Each type of waste is modeled as a transport to the treatment site with a distance of 30 km (source: FD P01-015). Parts sent to recycling include an electricity consumption (grinding) and a flow ("Materials for recycling, unspecified").

Four scenarios for the end of life of the products have been declared for this EPD:
- one with 100% of the product going in landfill
- one with 100% of the product going in incineration
- one with 100% of the product going in recycling
- one mixed scenario consisting of the previous three scenarios, values depending of the amount of waste going to recycling.

Module D has not been declared.

3.3 Estimates and assumptions

The LCA data of the declared lock has been calculated using the production data of 9 members companies of the ARGE associations. These companies have been chosen by ARGE as being representative by means of their production processes and their market shares. The lock chosen as representative for this calculation follows the "worst case" principle as explained under 6. LCA interpretation.

3.4 Cut-off criteria

The cut -off criteria considered are 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows per module amount to a maximum of 5% of energy usage and mass.
For this study, all input and output flows have been considered at 100%, including raw materials as per the product composition provided by the manufacturer and packaging of raw materials as well as the final product. Energy and water consumptions have also been considered at 100% according to the data provided.
With the approach chosen, no significant environmental impacts are known to have been cut-off.

3.5 Background data

For life cycle modeling of the considered product, all relevant background datasets are taken from /ecoinvent 3.1 – Alloc Rec/ database. The life cycle analysis software used is SimaPro (V8.0.5), developed by PRé Consulting.

3.6 Data quality

The objective of this evaluation is to evaluate the environmental impacts generated by the products throughout their entire life cycles. To this end, ISO

14040, ISO 14044 and EN 15804 have been met regarding the quality of data on different following criteria:
The time factor, the life cycle inventory data used comes from:
Data collected specifically for this study on the ARGE manufacturers' sites. Data sets are based on 1 year averaged data (time period: January 2013 to December 2013).
In the absence of collected data, generic data from the /ecoinvent V3 database/. This is updated regularly and is representative of current processes (the entire database having been updated in 2014).
Geography:
Data comes from production sites of the ARGE manufacturers.
The generic data comes from the ecoinvent database, representative of the European processes.
Technology - material shaping technologies are based on:
European technology in the case of use of generic data.

3.7 Period under review

The data of the LCA is based on the annual production data of a member company of ARGE Associations from 2013. Other values , e.g. for the processing of the base materials, are taken from the ecoinvent v3.1 Alloc Rec where dataset age vary for each dataset, see ecoinvent documentation for more information.

3.8 Allocation

The products are produced in numerous production sites. All data were provided by the manufacturers of the products per unit, and then divided by the mass of the product to give a value per kg of product produced. The assumptions relating to the EoL of the product and waste during its life cycle are described in the section System Boundaries. Metal losses during production (stage A3) are considered as waste.

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

The following information is the basis of the declared modules within the LCA in this EPD. Additional information which have not been used for the declared modules (MND) can nevertheless be used for further calculations like developing specific scenarios in the context of a building assessment.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	45	l/100km
Transport distance	350	km
Capacity utilisation (including empty runs)	36	%

Installation into the building (A5)

Name	Value	Unit
Material loss	0	kg
Output substances following waste treatment on site	0.135	kg

Repair (B3)
No repairs are required during the RSL.

Replacement (B4) / Refurbishment (B5)
No replacement is required during the RSL.

Operational energy use (B6) and Operational water use (B7)
No operational energy and water are needed during the RSL.

Reference service life

Name	Value	Unit
Reference service life (condition of use : see §2.13)	30	a

End of life (C1-C4)

Name	Value	Unit
Collected separately (Mixed scenario)	1	kg
Recycling (Mixed scenario)	0.281	kg
Energy recovery (Mixed scenario)	0.331	kg
Landfilling (Mixed scenario)	0.388	kg
Incineration (100% incineration scenario) Scenario 1	1	kg
Landfilling (Landfill scenario) Scenario 2	1	kg
Recycling (100% recycling scenario) Scenario 3	1	kg

An assumption of a 16-32 tons truck transport of the product over 30 km between the dismantling site and the next treatment site is made (source : FD P01-015).

Reuse, recovery and/or recycling potentials (D), relevant scenario information
As Module D has not been declared, materials destined for recycling have been accounted for in the indicator "Materials for recycling" however, no benefit has been allocated.

5. LCA: Results

In Table 1 "Description of the system boundary", the declared modules are indicated with an "X"; all modules that are not declared within the EPD but where additional data are available are indicated with "MND". Those data can also be used for building assessment scenarios. The values are declared with three valid digits in exponential form.

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	MND	MND	MND	MND	MND	X	X	X	X	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg / locks

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C2/2	C2/3	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3
GWP	[kg CO_2-Eq.]	5.40E+0	5.89E-1	6.01E-3	0.00E+0	5.05E-3	5.05E-3	5.05E-3	5.05E-3	3.95E-3	0.00E+0	0.00E+0	8.66E-3	3.10E-2	5.23E-1	4.97E-1	0.00E+0
ODP	[kg CFC11-Eq.]	3.47E-7	1.08E-7	3.40E-10	0.00E+0	9.26E-10	9.26E-10	9.26E-10	9.26E-10	4.24E-10	0.00E+0	0.00E+0	9.30E-10	2.26E-10	4.02E-9	3.43E-9	0.00E+0
AP	[kg SO_2-Eq.]	1.19E-1	2.39E-3	1.69E-5	0.00E+0	2.05E-5	2.05E-5	2.05E-5	2.05E-5	1.64E-5	0.00E+0	0.00E+0	3.60E-5	1.13E-5	2.58E-4	1.24E-4	0.00E+0
EP	[kg $(PO_4)^{3-}$-Eq.]	1.72E-2	4.06E-4	5.19E-6	0.00E+0	3.48E-6	3.48E-6	3.48E-6	3.48E-6	1.84E-6	0.00E+0	0.00E+0	4.04E-6	2.17E-5	7.52E-5	5.94E-4	0.00E+0
POCP	[kg ethene-Eq.]	6.26E-3	2.68E-4	3.27E-6	0.00E+0	2.30E-6	2.30E-6	2.30E-6	2.30E-6	9.05E-7	0.00E+0	0.00E+0	1.98E-6	5.08E-6	1.60E-5	1.41E-4	0.00E+0
ADPE	[kg Sb-Eq.]	5.55E-3	1.95E-6	4.09E-9	0.00E+0	1.67E-8	1.67E-8	1.67E-8	1.67E-8	1.61E-9	0.00E+0	0.00E+0	3.53E-9	2.13E-9	4.69E-8	2.47E-8	0.00E+0
ADPF	[MJ]	7.25E+1	8.97E+0	3.34E-2	0.00E+0	7.69E-2	7.69E-2	7.69E-2	7.69E-2	6.06E-2	0.00E+0	0.00E+0	1.33E-1	1.97E-2	3.73E-1	2.80E-1	0.00E+0

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: 1 kg / locks

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C2/2	C2/3	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3
PERE	[MJ]	8.96E+0	1.12E-1	1.43E-3	0.00E+0	9.61E-4	9.61E-4	9.61E-4	9.61E-4	7.84E-3	0.00E+0	0.00E+0	1.72E-2	1.01E-3	1.14E-2	2.11E-2	0.00E+0
PERM	[MJ]	2.49E+0	0.00E+0	-7.20E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	1.15E+1	1.12E-1	-7.19E-1	0.00E+0	9.61E-4	9.61E-4	9.61E-4	9.61E-4	7.84E-3	0.00E+0	0.00E+0	1.72E-2	1.01E-3	1.14E-2	2.11E-2	0.00E+0
PENRE	[MJ]	7.58E+1	9.13E+0	3.72E-2	0.00E+0	7.82E-2	7.82E-2	7.82E-2	7.82E-2	8.89E-2	0.00E+0	0.00E+0	1.95E-1	2.25E-2	3.86E-1	3.53E-1	0.00E+0
PENRM	[MJ]	2.06E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	7.60E+1	9.13E+0	3.72E-2	0.00E+0	7.82E-2	7.82E-2	7.82E-2	7.82E-2	8.89E-2	0.00E+0	0.00E+0	1.95E-1	2.25E-2	3.86E-1	3.53E-1	0.00E+0
SM	[kg]	1.59E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m³]	7.48E-2	1.72E-3	3.64E-5	0.00E+0	1.48E-5	1.48E-5	1.48E-5	1.48E-5	2.98E-5	0.00E+0	0.00E+0	6.54E-5	4.40E-5	1.17E-3	3.42E-4	0.00E+0

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: 1 kg / locks

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C2/2	C2/3	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3
HWD	[kg]	9.08E-1	5.64E-3	3.64E-4	0.00E+0	4.83E-5	4.83E-5	4.83E-5	4.83E-5	2.80E-4	0.00E+0	0.00E+0	6.14E-4	7.49E-3	2.66E-1	1.24E-3	0.00E+0
NHWD	[kg]	7.47E+0	4.68E-1	4.58E-2	0.00E+0	4.01E-3	4.01E-3	4.01E-3	4.01E-3	1.26E-3	0.00E+0	0.00E+0	2.77E-3	3.35E-2	1.45E-2	1.00E+0	0.00E+0
RWD	[kg]	1.61E-4	6.13E-5	2.06E-7	0.00E+0	5.25E-7	5.25E-7	5.25E-7	5.25E-7	4.80E-7	0.00E+0	0.00E+0	1.05E-6	1.25E-7	1.35E-6	2.65E-6	0.00E+0
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	1.11E-1	0.00E+0	5.28E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.56E-1	0.00E+0	0.00E+0	1.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	1.36E-3	0.00E+0	4.96E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.90E-2	1.39E+0	0.00E+0	0.00E+0
EET	[MJ]	2.75E-3	0.00E+0	1.05E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.99E-2	2.85E+0	0.00E+0	0.00E+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

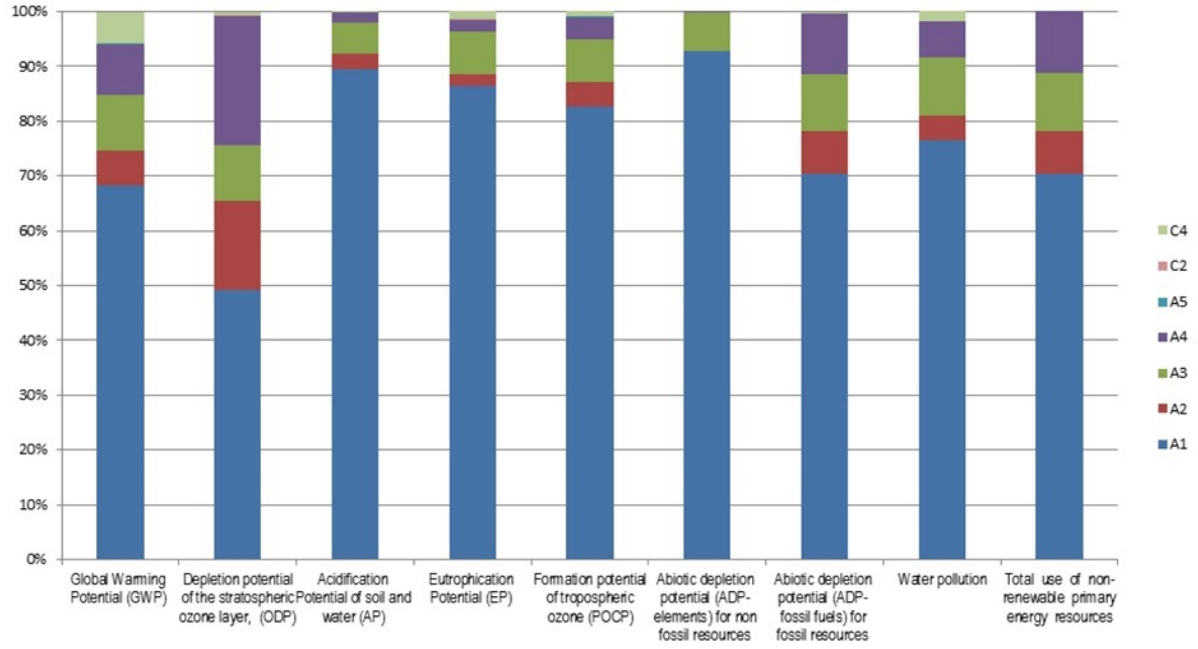
Other end of life scenarios have been calculated in order to build specific end of life scenario at the building level:
- scenario 1: the product is considered to be 100% incinerated

- scenario 2: the product is considered to be 100% landfilled
- scenario 3: the product is considered to be 100% recycled

6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. The table below represents the distribution of the impacts throughout the life cycle (module D excluded and steps with 0 impacts not shown).
Raw material extraction phase (A1) contributes to the majority of the impacts where Zamak is the main contributor. The transport stages (A2 and A4) have a non-negligible impact on the indicator **ODP** (Depletion potential of the stratospheric ozone layer). Other life cycle phases have no major impact on all indicators.

The results are conservative as complying with the composition given in clause 2.6.



7. Requisite evidence

No testing results are required by the PCR part B.

8. References

ISO 14040
ISO 14040:2006-10, Environmental management – Life cycle assessment – Principles and framework (ISO 14040:2006).” German and English version EN ISO 14040:2006.

DIN EN ISO 14044
DIN EN ISO 14044:2006-10, Environmental Management – Life Cycle Assessment Requirements and Instructions (ISO 14044:2006); German and English version EN ISO 14044:2006

CEN/TR 15941
CEN/TR 15941:2010-03, Sustainability of construction works – Environmental Product Declarations – Methodology for selection and use of generic data; German version CEN/TR 15941:2010

EN 12209
EN 12209:2009, Locks and Latches – Mechanically operated locks , latches and locking plates – Requirements and test methods. Corrigendun 1 to English version of DIN EN 12209:2004-03

European Waste Code
epa – European Waste Catalogue and Hazardous Waste List – 01-2002.

Ecoinvent 3.1
Ecoinvent 3.1 – Allocation Recycling database.

IBU PCR part A
Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project report, 2016-08.

IBU PCR part B
Part B: Requirements on the EPD for Building Hardware products, 2016-02.

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

Publisher
Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

Programme holder
Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

Author of the Life Cycle Assessment
Olivier COLLEAUX
rue de la Presse 7
42952 Saint-Etienne cedex 1
France

Tel 0033477794042
Fax 0033477794107
Mail olivier.colleaux@cetim.fr
Web **www.cetim.fr**

Owner of the Declaration
ARGE
Offertsraße 12 12
42551 Velbert
Germany

Tel +492051950636
Fax +492051950613
Mail j.kieker@arge.org
Web **www.arge.org**