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)

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Lock cylinders

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

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General Information

ARGE Lock cylinders Owner of the Declaration Programme holder ARGE; European Federation of Associations of Lock IBU - Institut Bauen und Umwelt e.V. and Builders Hardware Manufacturers Panoramastr. 1 Offerstraße 12, 42551 Velbert 10178 Berlin Germany Germany **Declaration number** Declared product / Declared unit FPD-ARG-20160189-IBG1-FN 1 kg of lock cylinder Scope: This Declaration is based on the Product **Category Rules:** This ARGE EPD covers cylinders, used to operate locks by means of a key. Building Hardware products, 02.2016 (PCR tested and approved by the SVR) The reference product used to calculate the impact this product group has on the environment is a lock cylinder composed primarily of brass, zinc-based alloy Issue date and steel, and has been selected for the LCA (Life 14.09.2016 Cycle Assessment) because it is the product with the highest impact for 1 kg of product. A validity scope Valid to analysis has also been carried out to determine the 13.09.2022 limiting factors for lock cylinders covered by this EPD. In a preliminary study (simplified LCA), it has been confirmed that this EPD represents the worst case condition and it can therefore be used to cover all lock cylinders manufactured in Europe by ARGE member companies. The owner of the declaration shall be liable for the underlying information and evidence, but the ARGE programme holder (IBU) cannot be held responsible for manufacturer's information, life cycle assessment data or evidence Verification Wermanes The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ Prof. Dr.-Ing. Horst J. Bossenmayer externally internally

(President of Institut Bauen und Umwelt e.V.)

Dr. Burkhart Lehmann (Managing Director IBU)

Dr. Frank Werner (Independent verifier appointed by SVR)

Product

2.1 **Product description**

This EPD refers to cylinders used to operate, by means of a key, the bolt throwing mechanism within a lock. It covers lock cylinders with varying material compositions and security grades.

Application

These products are designed to be mounted in lock assemblies of varying materials intended for use on interior or exterior doors.

2.3 **Technical Data**

Ideally, products should comply with a suitable technical specification. /EN 1303/ - Cylinders for locks is an example of such a specification and some

products will comply with this. The relevant grading structure is shown in the following table

Name	Value	Unit
Category of use	1	Grade
Durability	4 - 6	Grade
door mass	0	Grade
Suitability for use in fire resisting and/or smoke control doors	0, A, B	Grade
Safety	0	Grade
Corrosion resistance and temperature	0, A, B	Grade
Key related security	1 - 6	Grade
Attack resistance	0, A, B, D	Grade



2.4 Application rules

Since /EN 1303/ is not a harmonized standard, it is not subject to the terms of the CPR and compliance with the standard is purely voluntary. National provisions however (e.g. Building Regulations) may 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 "B2B" products and not for a final customer.

2.6 Base materials / Ancillary materials

Composition of products analysed for this EPD:

The values are given for the product analysed for this EPD. Ranges of values for other products covered by the validity scope analysis are shown in brackets

Name	Value	Unit
Brass (24.88% – 92.61%)	67.62	%
Zinc-based alloy (0.00% – 39.98%)	19.71	%
Steel (4.15% – 41.48%)	10.34	%
Sintered iron (0.00% – 2.81%)	2.25	%
Nickel (0.00% – 0.75%)	0	%
Nickel silver (0.00% – 11.19%)	0	%
Bronze (0.00% – 0.75%)	0	%
Stainless steel (0.00% – 11.44%)	0	%
Iron (0.00% – 3.03%)	0	%
Nylon 6 (0.00% – 5.15%)	0	%

Nylon 66 and Acetal as ancillary material.

The product contains no substances cited on the REACH list of hazardous substances.

Zinc-based alloy is an alloy of four separate metals: zinc, aluminium, magnesium and copper.

Subcomponents of the lock cylinder, which are made from zinc-based alloy 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 also formed by injection moulding.

2.7 Manufacture

The production of a lock cylinder regularly follows a 3 step procedure:

- 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 member manufacturers. The results are within compulsory safety limits. 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 shall not require energy consumption for installation.

2.10 Packaging

Normally each single product is packaged in paper. Larger amounts of 12 to 50 packaged products are then packed in a cardboard box and stacked on wooden pallets for transport to the customer (Door or window manufacturers).

Waste from product packaging is collected separately for waste disposal (including recycling).

2.11 Condition of use

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

2.12 Environment and health during use

No environmental damage or health risks are to be expected during normal conditions of use.

2.13 Reference service life

The Reference Service Life is 10 years under normal working conditions. This corresponds to passing a mechanical endurance test of 50.000 cycles as specified in the /EN 1303/. The Reference Service Life is dependent on the actual frequency of use and environmental conditions. It is required that installation, as well as maintenance of the product, must be done in line with instructions provided by the manufacturer.

2.14 Extraordinary effects

Fire

Fire resistance claims would be by manufacturer's declaration only, since there are no fire resistance requirements in /EN 1303/.

Water

The declared product is intended to be used in buildings under normal conditions (indoor or outdoor). It shall not emit hazardous substances in the event of flooding.

Mechanical destruction

Mechanical destruction of the declared product shall not materially alter its composition, or have any adverse effect on the environment.

2.15 Re-use phase

Removal of the cylinder (for re-cycling or re-use) shall have no adverse effect on the environment.



2.16 Disposal

Lock cylinder components should be re-cycled wherever possible, providing that there is no adverse effect on the environment. The waste code in accordance with the /European Waste Code/ is 17 04 07.

2.17 Further information

Details of all types and variants are 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 all products covered by ARGE EPD is 1 kg (of product). Since individual products will rarely weigh exactly 1 kg it is necessary to establish the exact weight of the product then use this as a correction factor to determine the true values for 1 kg of product in the tables (Section 5)

A total of 8 typical products (based on sales figures) have been evaluated, and the worst case results are used in the tables

Correction factor		
Name	Value	Unit
Declared unit mass	1	Kg
Mass of declared product	0.294	Kg
Correction factor	Divide b	y 0.294

3.2 System boundary

This type of the EPD covers "cradle-to-grave" requirements.

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 raw material.

A4 module represents the transport of the finished product 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 lock cylinders. 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 the standard document cited previously for figures and further details.

In practice the end-of-life has been modelled as follows:

- When 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 is the material considered to have attained the "end-of-waste" state.

- Each type of waste is modelled as a transport to the treatment site over 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:

- 1. 100% of the product going to landfill
- 2. 100% of the product going to incineration
- 3. 100% of the product going to recycling
- 4. 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 cylinder has been calculated from the production data of in total 4 ARGE member companies, representing 8 different products. These companies had been chosen by ARGE as being representative by means of their production processes and their market shares. The product chosen as representative for this calculation follows the "worst case" principle as explained in section 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 shall be 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 modelling of the considered product, all relevant background datasets are taken from the 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 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).

3.7 Period under review

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

3.8 Allocation

The products are produced in numerous production sites. All data was 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 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. The used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment for Modules Not Declared (MND).

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0045	l/100km
Transport distance	3500	km
Capacity utilisation (including empty runs)	36	%

Installation into the building (A5)

Name	Value	Unit
Material loss	0.137	kg

The scope of this study does not cover the installation of the product, which varies depending on the type of door and the specific situation. The disposal of the product packaging has been taken into account. End of life packaging is a mix between recycling, landfill and incineration according to French ADEME statistics.

No re-use of packaging is considered in this study.

Reference service life

Name	Value	Unit
Reference service life (condition of use : see §2.13)	10	а

End of life (C1-C4)

Name	Value	Unit
Collected separately (All scenarii)	1	kg
Recycling (Mixed scenario)	0.458	kg
Energy recovery (Mixed scenario)	0.249	kg
Landfilling (Mixed scenario)	0.293	kg
Incineration (100% incineration	1	kg
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Landfilling (Landfill scenario)	-1	kg
Scenario 2	ı	Ng
Recyling (100% recycling	4	kg
scenario) Scenario 3	ı	ĸy

it is assumed that a 16-32 ton truck is used to transport the product over the (up to) 30 km distance between the dismantling site and the next treatment site (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

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PERION PERION PERION PENER PENER PENER PENER PENER PENER PENER SM RSF	eter RE RM RT RT I	Unit [M]	HE LC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 3.98E-1 0.00E+0 0.00E+0	A - RE A4 1.12E-1 0.00E+0 1.12E-1 0.13E+0 0.00E+0 0.13E+0 0.00E+0 0.00E+0 0.00E+0	A5 1.90E-3 1.1.43E+0 0.1.43E+0 0.3.62E-2 0.00E+0 0.00E	ce US C2 9.61E-4 0.00E+0 (0 9.61E-4 7.82E-2 0.00E+0 (0 7.82E-2 0.00E+0 (0 0.00E+0 (0	tential of urces; Al E: 1 I 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 7.82E-2 0.00E+0 0.00E+0	troposph DPF = Abi Q of Io C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0	eric ozoniotic deploiotic deploio	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 8.94E-2 0.00E+0 0.00E+0	C3/1 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	C3/2 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	ADPE = ources C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 3.53E-1 0.00E+0 0.00E+0	C4/3 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0
PERIUPERIUPERIUPERIUPERIUPERIUPERIUPERIU	eter EE M ET RE RM RT RT I F F F F F F F F F F F F	Unit [M]	HE LC/ A1-A3 1.86E+1 : 2.18E+0 [0.2.08E+1 : 1.57E+2 § 0.00E+0 [0.00E+0 [0.00E+0] (0.00E+0 [0.00E+0] (0.00E+0)	A - RE A4 1.12E-1 0.00E+0 1.12E-1 0.13E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0	A5 1.90E-3 1.1.43E+0 1.43E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0	nation poi ssil resou CE US 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0	tential of tential of turces; Alb E: 1 b C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0	rtoposph DPF = Abi cg of Ic C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0	eric ozoniotic deple ock cyl C2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 0.00E+0	C3/1 0.00E+0 0	C3/2 0.00E+0	ADPE = ources C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 0.00E+0	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0	C4/3 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
PERION PERION PERION PENER PENER PENER PENER PENER PENER PENER SM RSF	eter EE M ET RE RM RT RT I F F F F F F F F F F F F	Unit [M]	HELC/ A1-A3 1.86E+1 2.18E+0 (2.08E+1) 1.57E+2 (9.00E+0 (1.57E+2) 3.98E+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 (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) (0.00E+0) (0.00E+0) (0.00E+0 (0.00E+0) (0.0	A - RE A4 1.12E-1 1.00E+0 1.13E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.172E-3	A5 1.90E-3 1.43E+0 1.43E+0 0.00E+0	nation poi ssil resou CE US 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5	c2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5	rtoposph DPF = Abi G of I o C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5	eric ozoniotic deple ock cyl C2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 3.00E-5	C3/1 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	C3/2 0.00E+0	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 6.54E-5	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.69E-5	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.17E-3	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 3.42E-4	C4/3 0.00E+0
PERIUPERIUPERIUPERIUPERIUPERIUPERIUPERIU	eter EE M ET RE RE RE RE RE RE RE RE RE	Witrophica OF T Unit [M] [M] [M] [M] [M] [M] [M] [M	HE LC/ A1-A3 1.86E+1 : 2.18E+0 [0.2.08E+1 : 1.57E+2 § 0.00E+0 [0.00E+0 [0.00E+0] (0.00E+0 [0.00E+0] (0.00E+0)	A - RE A4 1.12E-1 .0.00E+0 1.12E-1 .0.13E+0 0.00E+0 0.00E+0 1.00E+0 1.72E-3 enewab	A5 1.90E-3 1.1.43E+0 0.1.43E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+5	nation poi ssil resou CE US C2 9.61E-4 0.00E+0 9.61E-4 7.82E-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	tential of urces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5 / exclud	rtoposph DPF = Abi Cg of Ic C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 ing renev	eric ozoniotic deple ock cyl c2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 vable pri	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 3.00E-5 mary en	C3/1 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	C3/2 0.00E+0	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 5.54E-5 sed as r	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 3.42E-4 RM = Us	C4/3 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
Parame PERI PERI PERI PENE PENE PENE PENE SM RSF NRSI FW	eter EE M ET RE RM RT I F F F F F F F F F F F F F F F F F F	Unit Unit [M]	HELC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 1.70E-1 = Use of reprimary enewable persons	A - RE A4 1.12E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.72E-3 energy re brimary e	A5 1.90E-3 1.1.43E+0 1.1.43E+0 3.62E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 2.36E-5 le primar	nation poissil resort C2 9.61E-4 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5 1.4	tential of urces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 7.82E-2 0.00E+0 0.00E+0 1.48E-5 1	rtoposph DPF = Abi cg of lo C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 1.48E-5 ewable p	eric ozoniotic deple ock cyl C2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 vable pri ERT = T	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 0.00E+0 3.00E-5 mary en otal use nergy reserved.	C3/1 0.00E+0	C3/2 0.00E+0 unused as	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r. mary en raw maty	Abiotic d C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy reseterials; P	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rirals; PE ources; ENRM =	C4/2 2.11E-2 0.00E+0 3.53E-1 0.00E+0 0.00E+0 0.00E+0 4.00E+0 0.00E+0 0	C4/3 0.00E+0
PERIU PARAME PERI PERI PENR PENR PENR PENR SM RSF	EUULTS eter M TT TERE TER	Unit [M] [M] [M] [M] [M] [M] [M] [M] [M] [M	HE LC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 1.70E-1 = Use of r	A - RE A4 1.12E-1 00E+0 1.12E-1 0.00E+0 000E+0 000E+0 000E+0 1.72E-3 enewab energy re energy re	A5 1.90E-3 1.1.43E-40 1.4.3E-40 1.4.	C2 9.61E-4 0.00E-0 0.00E-0 0.00E-0 0.00E-0 1.48E-5 y energy used as scluding used as	tential of troes; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 / exclud raw ma non-ren s raw ma	troposph DPF = Abi Q of Ic 2/2 9.61E-4 0.00E+01 9.61E-4 7.82E-2 0.00E+01 0.00E+01 0.00E+01 1.48E-5 ing renew tterials; P ewable p aterials; P	eric ozoniotic deple CZ/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 0.00E+0 3.00E-5 mary en orangy reserved to the control of the control o	C3/1 0.00E+0 0	C3/2 0.00E+0	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r mary en raw mai able prim	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy resterials; Plary ener	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE ources; I ENRM = gy resou	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 4.2E-4 RM = Us PENRE : Use of urces; SN	C4/3 0.00E+0 M = Use of
PERI PERI PENI PENI PENI PENI PENI PENI PENI PEN	ren ren of s	Unit [M] [M] [M] [M] [M] [M] [M] [M	HE LC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 1.70E-1 Use of reprimary equivalents of the primary	A - RE A4 1.12E-1 0.00E+0 1.12E-1 0.13E+0 0.00E+0 0.00E+0 1.72E-3 enewab energy real; RSF	A5 1.90E-3 1.1.43E+0 1.1.43E+0 1.1.43E+0 1.0.00E+0 0.00E+0 0.0	CE US C2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 1.48E-5 y energy used as renewal	cential of turces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 7 exclud raw manon-ren so raw mas ble second	rtroposph DPF = Abi Q of Ic C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 ing renevaterials; Pewable paterials; Fondary fue	eric ozoniotic deple ock cyl c2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 1.48E-5 vable pri ERT = Trimary e Pels; NRS wate	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 3.00E-5 mary en otal use nergy restrola user nergy restrola user nergy restrolations.	C3/1 0.00E+0 0	C3/2 0.00E+0 used as an-renewale enewable	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r mary en raw mai able prim	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy resterials; Plary ener	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE ources; I ENRM = gy resou	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 4.2E-4 RM = Us PENRE : Use of urces; SN	C4/3 0.00E+0 M = Use of
PERI PERI PENI PENI PENI PENI PENI PENI PENI PEN	EUULTS BELL BELL	Unit [M] [M] [M] [M] [M] [M] [M] [M	HE LC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.70E-1 = Use of reprimary enewable programmer is surprimary enewable programmer is surpri	A - RE A4 1.12E-1 0.00E+0 1.12E-1 0.13E+0 0.00E+0 0.00E+0 1.72E-3 enewab energy real; RSF	A5 1.90E-3 1.1.43E+0 1.1.43E+0 1.1.43E+0 1.0.00E+0 0.00E+0 0.0	CE US C2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 1.48E-5 y energy used as renewal	cential of turces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 7 exclud raw manon-ren so raw mas ble second	rtroposph DPF = Abi Q of Ic C2/2 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 ing renevaterials; Pewable paterials; Fondary fue	eric ozoniotic deple ock cyl c2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 1.48E-5 vable pri ERT = Trimary e Pels; NRS wate	e photocetion pot inder C3 7.88E-3 0.00E+0 7.88E-3 8.94E-2 0.00E+0 0.00E+0 3.00E-5 mary en otal use nergy restrola user nergy restrola user nergy restrolations.	C3/1 0.00E+0 0	C3/2 0.00E+0 used as an-renewale enewable	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r mary en raw mai able prim	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy resterials; Plary ener	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE ources; I ENRM = gy resou	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 4.2E-4 RM = Us PENRE : Use of urces; SN	C4/3 0.00E+0 M = Use of
PERIPERING PERIPERING PENER PE	Ten ren rer of s	Introphica OF T Unit [M] [M] [M] [M] [M] [M] [M] [M	HE LC/ A1-A3 1.86E+1 2.18E+0 2.208E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.70E-1 = Use of reprimary elewable poprimary elemable poprimary el	A - RE A4 1.12E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.72E-3 energy rearring	P = Form fo: SOUR A5 1.90E-3 1.1.43E+0 1.1.43E+0 3.62E-2 0.00E+0 0.00E+0 0.00E+0 1.2.36E-5 le primar esources energy exesources = Use of	CE US C2 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 y energy used as accluding a used as renewal	tential of turces; Al C2/1 9.61E-4 9.61E-4 9.61E-4 7.82E-2 0.00E+0 7.82E-2 0.00E+0 0.00E+0 1.48E-5 7 exclud raw manon-rens raw mable seconds and the seconds are considered as a con	rtoposph DPF = Ab G of Ic C2/2 9.61E-4 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5 ing renewaterials; Pewable paterials; Fondary fue	eric ozoniotic deple ock cyl C2/3 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5 vable pri ERT = Trimary e PENRT = Pels; NRS wate	e photocetion pot inder C3 7.88E-3 7.88E-3 7.88E-3 8.94E-2 0.00E+0 8.94E-2 0.00E+0 3.00E-5 mary en otal use nergy reserved as a constant of the cons	C3/1 0.00E+0	C3/2 0.00E+0	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r mary en raw mat able prime e second	Abiotic d C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy resterials; Pary enerdary fuel	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PEources; IENRM = gy resous; FW =	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 3.42E-4 RM = Us PENRE : Use of r Use of r	C4/3 0.00E+0 V = Use of non- V = Use tresh
PERIPERING PERIPERING PENER PE	PULTS SEE WHITE TEN TEN TEN TEN TEN TEN TEN	Unit [M] [M] [M] [M] [M] [M] [M] [M] [M] [M	HE LC A1-A3 1.86E+1 2.18E+0 2.08E+1 1.57E+2 0.00E+0 0.00E+0 0.00E+0 1.70E-1 = Use of reprimary equals primary equals	A - RE A4 1.12E-1 1.0.00E+0 1.12E-1 2.13E+0 1.0.00E+0 1.0.00E+0 1.0.00E+0 1.0.00E+0 1.72E-3 enewab energy re rimary e energy re strimary se energy re A - Ol A4 5.64E-3	P = Form fo: SOUR A5 1.90E-3 1.143E-40 1.43E+0 1.43E+0 1.00E+0 1.00	C2 9.61E-4 0.00E+0 0 9.61E-4 7.82E-2 0.00E+0 0 0.00E+0 0.00E+0 0 0.00E+0 0 0.00E+0 0 0.00E+0 0 0.00E+0 0 0	tential of urces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00	troposph DPF = Abi Q of I o C2/2 9.61E-4 0.00E+0i 9.61E-4 7.82E-2 0.00E+0i 0.00E+0i 0.00E+0i 0.00E+0i 1.48E-5 ing renevable per paterials; Pewable petaterials; Periodary fue	eric ozoniotic deple ock cyl C2/3 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 1.48E-5 vable pri ERT = Trimary e PENRT = els; NRS wate C2/3 4.83E-5	r C3 2.81E-4	C3/1 0.00E+0	C3/2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.00E+0 1.00E+	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 d.00E+0 0.00E+0 c.3/3 C3/3 6.14E-4	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy resterials; Person arry energials; Person arry fuel	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE ources; I ENRM = gy resource; FW =	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 Use of r	C4/3 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 V = Use energy fresh
PERIOR PERIOR PENER PENE	PULTS Seter SEE M TT TERE FEF FOR TO SEE TO S	Unit [M] [M] [M] [M] [M] [M] [M] [M] [M] [M	HE LC A1-A3 1.86E+1 2.18E+0 (2.08E+1) 1.57E+2 0.00E+0 (0.00E+0 (0.00E+0) 1.70E-1 = Use of reprinary equal to primary equal to primary equal to primary equal to the control of the	A - RE A4 1.12E-1 1.0.00E+0 1.12E-1 0.13E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.72E-3 energy reprint ary separate and are sep	P = Form fo: SOUR A5 1.90E-3 1 1.43E-40 1.43E	CE US C2 9.61E-4 0.00E+010 9.61E-4 7.82E-2 0.00E+010 0.00E+010 0.00E+010 0.00E+010 1.48E-5 y energy used as renewals FLOV C2 4.83E-5 4.01E-3	tential of urces; Al C2/1 9.61E-4 0.00E+0 9.61E-4 7.82E-2 0.00E+0 0.00E+0 0.00E+0 0.00E+0 1.48E-5 / exclud raw manon-rens of executive seconds of the second of the seconds of the second of the secon	rtoposph DPF = Abi Q of Io C2/2 9.61E-4 0.00E+01 9.61E-4 7.82E-2 0.00E+01 0.00E+01 0.00E+01 0.00E+01 1.48E-5 ing renewable p aterials; P ewable p aterials; P ewable p aterials; P ewable p aterials; P	eric ozoniotic depleiotic depleio	r ATEG 2.81E-4 1.27E-3	C3/1 0.00E+0	C3/2 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 1.00E+0	C3/3 1.72E-2 0.00E+0 1.72E-2 1.95E-1 0.00E+0 0.00E+0 0.00E+0 0.00E+0 6.54E-5 sed as r. mary en raw mar hable prime e second C3/3 6.14E-4 2.77E-3	C4 3.90E-4 0.00E+0 3.90E-4 8.64E-3 0.00E+0 0.00E+0 0.00E+0 1.69E-5 aw mate ergy res terials; P tary ener dary fuel C4 2.88E-3 1.29E-2	C4/1 1.14E-2 0.00E+0 1.14E-2 3.86E-1 0.00E+0 0.00E+0 0.00E+0 1.17E-3 rials; PE gy resolute; FW = C4/1 2.66E-1 1.45E-2	C4/2 2.11E-2 0.00E+0 2.11E-2 3.53E-1 0.00E+0 0.00E+0 0.00E+0 3.42E-4 RM = Us PM = Us Use of r C4/2 1.24E-3 1.00E+0	C4/3 0.00E+0 C4/3 C4/3 0.00E+0 0.00E+0
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thermal energy Other end of life scenarios have been calculated in order to build specific end of life scenario at the building level:

0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 0.00E+0 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

- 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

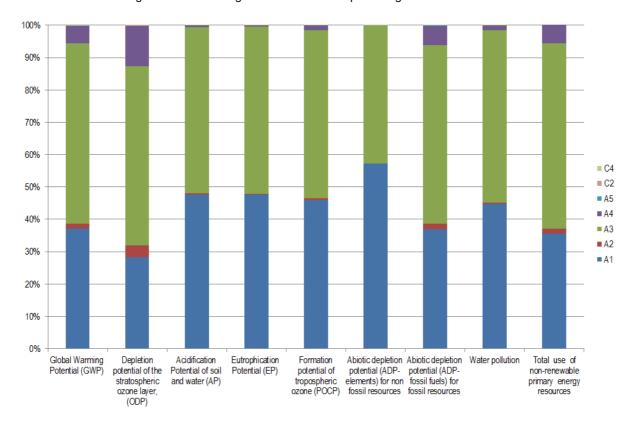


6. LCA: Interpretation

Production stages (A1 and A3) are the main contributors to all environment indicators. A1 impacts are mainly due to brass and zinc extraction and production. A3 impacts come from the turning process and brass losses during the manufacturing of the

product. Transport stage A4 has a non-negligible impact on ODP.

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



Requisite evidence

No testing results are required by the PCR part B.

8. References

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EN 1303:2015, Cylinders for locks- Requirements and test methods.

FD P01-015

FD P01-015: 2006, Environmental quality of construction products - Energy and transport data sheet

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Ecoinvent 3.1

Ecoinvent 3.1 - Allocation Recycling database.

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Institut Bauen und Umwelt

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

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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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