ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**ASSA ABLOY Entrance Systems AB**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASAB-20151117-IBA1-EN
Issue date	18.05.2015
Valid to	17.05.2021

ASSA ABLOY RD3L, Revolving door

ASSA ABLOY Entrance Systems AB

Institut Bauen und Umwelt e.V.

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

ASSA ABLOY

1. General Information

ASSA ABLOY Entrance Systems AB

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

Declaration number
EPD-ASAB-20151117-IBA1-EN

This Declaration is based on the Product Category Rules:
IBU: PCR Automatic doors, automatic gates, and revolving door systems (door systems)
(PCR tested and approved by the independent expert committee)

Issue date
18.05.2015

Valid to
17.05.2021

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

Dr.-Ing. Burkhart Lehmann
(Managing Director IBU)

ASSA ABLOY RD3L, Revolving door

Owner of the Declaration
ASSA ABLOY Entrance Systems AB
Lodjursgatan 10
SE-261 44 Landskrona
Sweden

Declared product / Declared unit
This declaration represents 1 revolving door consisting of 3 door leaves and surrounding frame with internal diameter of 6.2 m and internal height of 2.2 m

Scope:
This declaration and its LCA study is relevant to the revolving door ASSA ABLOY RD3L. The final assembly and production stage occurs in Ostrov u Stribra, Czech Republic at ASSA ABLOY ES Production s.r.o at: D5 Logistic Park 34901 Ostrov u Stribra, Czech Republic. Components are sourced from international tier one suppliers. ASSA ABLOY RD3L door sizes vary according to project requirements; a door with internal diameter of 6.2 m and 3 leaves is used in this declaration. 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 Standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025
☐ internally ☒ externally

Dr. Wolfram Trinius
(Independent verifier appointed by SVA)

2. Product

2.1 Product description

Product name: ASSA ABLOY RD3L
Product characteristic:
Three-wing high capacity revolving door
Pedestrian automatic revolving doors are installations that serve to automatically regulate the flow of people in residential and non-residential buildings while providing high thermal performance.
- Automatic revolving doors are made up of various assemblies mainly consisting of a support structure, glazing, drive unit, controller and safety equipment.
- Revolving doors also feature elements that are designed to simplify their installation, operation, and maintenance.
- Revolving doors are typically made of metal, plastic and glass and are available in several designs for a range of requirements in diverse building types.

The ASSA ABLOY RD3L range of large three-wing automatic revolving doors has been designed to achieve high pedestrian traffic flow whilst maintaining high standard of safety for the user. The door is designed so that operation is not affected or interrupted by winds or by users pushing the door wings. However, in emergency situations, the doors are released immediately to facilitate escape. The large-sized compartments, which are always accessible due to the 3-wing configuration, make the ASSA ABLOY RD3L an ideal solution for continuous high-volume pedestrian traffic, while comfortably accommodating wheeled traffic such as shopping carts, luggage trolleys and wheelchairs.
The door has 4 primary parts:
1) Door leafs
2) Frame
3) Floor track
4) Operating system

The ASSA ABLOY RD3L has been designed to meet operational and safety requirements in the European Directives and the standards issued by the European Standardization Committee (CEN).

2.2 Application

The ASSA ABLOY RD3L is an automatic revolving door developed to provide draught free access to buildings. The door is designed to offer continuous use, a high degree of safety and maximum lifetime. The system is self-adjusting to the effects caused by normal variations in the weather conditions and to

minor friction changes caused by e.g. dust and dirt. The door can be used indoors or outdoors.

Automatic revolving doors are utilized to provide entrance and exit capabilities for many different building types. Typical revolving door applications are in:
- Commercial buildings
- Office facilities
- Hospitality facilities
- Transportation
- Healthcare
- Sporting Venues

2.3 Technical Data

The table presents the technical properties of the ASSA ABLOY RD3L revolving door:

Technical data

Name	Value	Unit
Burglar protection class acc. to EN 1627 - EN 1630	yes	-
Power input "Standby"	30	W
Power input "Operation"	170	W

Features:
The declared door has a size (W x H) 6200 x 2600 mm (Internal height)
Outer wall and night closing doors (optional): clear laminated safety glass 4+0.76+4mm (/EN 12600/ 1B1)
Door leaves: standard -clear laminated safety glass 3+0.38+3mm (/EN 12600/ 2B2)
Door sections: aluminum profiles Optional: Powder-coated finish (RAL colours), Stainless steel cladding
Ceiling: white laminated panels, dust protection
To meet the standards of burglar protection, additional equipments has to be added.

2.4 Placing on the market / Application rules

For the placing on the market in the EEA, Switzerland and Turkey the following European directives apply to the ASSA ABLOY RD3L:
2004/108/EC Electromagnetic Compatibility Directive (EMCD)
2006/42/EC Machinery Directive (MD)
These directives provides for CE marking of the product and issuing a Declaration of Conformity.

Harmonized European standards, which have been applied:
EN 60335-1 Household and similar electrical appliances -Safety -Part 1: General requirements
EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3 Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments
EN ISO 13849-1 Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
EN 16005 Power operated pedestrian doorsets - Safety in use -Requirements and test methods.

Other standards or technical specifications, which have been applied:
DIN 18650-1 Powered pedestrian doors - Part 1: Product requirements and test methods
DIN 18650-2 Powered pedestrian doors - Part 2: Safety at powered pedestrian doors
EN 60335-2-103 Household and similar electrical appliances -Safety -Part 2: Particular requirements for drives for gates, doors and windows
IEC 600335-1 Household and similar electrical appliances -Safety -Part 1: General requirements
IEC 60335-2-103 Household and similar electrical appliances Safety Part 2-103: Particular requirements for drives for gates, doors and windows.
Disposal of the product is subject to the WEEE Directive within Europe, Directive 2012/19/EU

For the application and use the respective national provisions apply.

2.5 Delivery status

Revolving door unit with internal diameter of 6.2 m, internal height of 2.2 m and external height 2.54 m, is delivered ready for installation.

2.6 Base materials / Ancillary materials

The average composition for ASSA ABLOY RD3L is as following:

Component	Percentage in mass (%)
Glass	41.78
Aluminium	22.28
Particle Board	11.47
Steel	17.40
Plastics	5.01
Stainless steel	1.04
Electronic	0.10
Electro-mechanics	0.71
Others	0.21
Total	**100**

2.7 Manufacture

Profiles are provided by tier one supplier SAPA and are delivered to the factory in Ostrov, Czech Republic. The profiles are bended and machined. The products are surface treated; either anodized (externally) or powder coated (internally). Other parts as electronics, glass, etc. arrives from tier one suppliers or the factory in China and a basic assembly is done in Ostrov. The parts are encased in pine crates and forwarded on a standard wooden pallet to on-site installation. The certified quality management system, /EN ISO 9001:2008/, ensures high standards.
Offcuts and scraps during the manufacturing process are directed to a recycling unit. Waste is sent for disposal.
Waste codes according to European Waste Catalogue (/EWC/) and Hazardous Waste List - Valid from 1 January 2002:
/EWC/ 12 01 01 Ferrous metal filings and turnings
/EWC/ 12 01 03 Non-ferrous metal filings and turnings
/EWC/ 08 02 01 Waste coating powders
/EWC/ 12 01 05 plastics.

2.8 Environment and health during manufacturing

ASSA ABLOY Entrance Systems AB is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.
• Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews

are conducted periodically to ensure that applicable standards are met and environment management program effectiveness is evaluated.
- Code of Conduct covers human rights, labor practices and decent work. ASSA ABLOY Entrance Systems ABs' management is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.
- Preparation conditions (including the process of power coating) in the factory of Ostrov do not require special health and safety measures. Standard health and safety measures (work gloves, hearing protection, safety shoes, dust mask when sanding and milling, dust extraction, etc.) are observed where appropriate.
- Water and soil contamination does not occur and all production related waste is processed internally in the appropriate manner.

2.9 Product processing/Installation

The revolving door components are supplied ready for installation. The frame as well as the door leaves and central column are assembled and installed on-site. The components are assembled using simple tools including drills and hand tools. The installation is performed by certified installation technicians.

2.10 Packaging

Packaging exists for the purpose of protection during transportation. ASSA ABLOY RD3L revolving door components are initially packaged in plastic tarpaulin, polystyrene and corrugated cardboard. Finally, a revolving door is placed on a standard wooden pallet and encased in a pine crate. All of these packaging components are standard industry types and while the cardboard is recyclable. The pallets are available for immediate reuse upon delivery.

Material	Value (%)
Cardboard/ Paper	1.04
Plastics	0.34
Wood	98.62
Total	**100.0**

All materials incurred during installation are directed to a recycling unit.
Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002:
/EWC/ 15 01 01 paper and cardboard packaging
/EWC/ 15 01 02 plastic packaging
/EWC/ 15 01 03 wooden packaging

2.11 Condition of use

The best way to remove dust and dirt from the ASSA ABLOY RD3L and to maintain the quality of the enamel layer is to clean the surfaces three times/year with gentle (pH 5-9), non-polishing detergent and water. Use a soft non-abrasive sponge. The cleaning should be documented.
To avoid damages to the profiles the brushes must be vacuum-cleaned weekly. Regular inspections by a trained and qualified person is recommended a minimum of two visits per year.
- Do not expose doors or profiles to alkalis. Both aluminum and glass are sensitive to alkalis.
- Do not clean with high-pressure water. Operator, programme selector and sensor may be damaged and water may enter the profiles.
- Do not use detergents or abrasive additives.
- Do not scrub with materials like Scotch-brite, as this will cause mechanical damage.

2.12 Environment and health during use

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product. Monitored pressure sensitive safety sensors on both entrance post and door leafs. Monitored touchless sensor on vertical entrance post and top of door leaf. If an obstacle prohibits the rotation of the door (the resistance is higher than the pre-set value) the rotation will cease. Compressible vertical safety switches placed on the drum edges. To prevent injury, the drum edges are equipped with soft safety edges.

2.13 Reference service life

The product has reference service life of 10.000.000 cycles, which complies for 15 years of standard daily use (with the recommended service check). For this EPD the lifetime of 15 years was considered.

2.14 Extraordinary effects

Fire
Not applicable

Water
Contain no substances that have any impact on water in case of flood. Electric operation of the device will be influenced negative.

Mechanical destruction
No danger to the environment can be anticipated during mechanical destruction.

2.15 Re-use phase

The product is possible to re-use during the reference service life and be moved from one door to another. All materials are directed to a recycling unit. The components made of aluminum alloy, steel can be recycled. The plastic components can be used for energy recovery within a waste incineration process.
/EWC/ 16 02 13* discarded equipment containing hazardous components (2) other than those mentioned in 16 02 09 to 16 02 12
/EWC/ 17 02 01 wood
/EWC/ 17 02 03 plastic
/EWC/ 17 04 01 copper, bronze, brass
/EWC/ 17 04 02 aluminium
/EWC/ 17 04 05 iron and steel
/EWC/ 17 04 11 Cables with the exception of those outlined in 17 04 10
Note: Disposal of the motor is subject to the WEEE Directive within Europe, Directive /2012/19/EU/.

2.16 Disposal

The requirements on waste disposal and recycling listed in the European Waste Catalogue (EWC) should be followed. The requirements on waste disposal and recycling listed in the European Waste Catalogue (EWC) should be followed. As the product contains no substances harmful to the environment or human health, the entire system can be safely placed in a landfill site in cases where no waste recycling technologies are available.

In this EPD product parts made of glass were treated as a waste for landfill:
EWC 17 02 02 glass.

2.17 Further information

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Sweden
www.assaabloyentrance.com

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of revolving door ASSA ABLOY RD3L as specified in Part B requirements on the EPD for PCR Automatic doors, automatic gates, and revolving door systems (door systems).

Declared unit

Name	Value	Unit
Declared unit for automatic doors and gates*	42.85	m²
Mass (with out packaging)	2096.62	kg
Mass packaging (wood, paper and plastics)	563.78	kg
Conversion factor to 1 kg	0.0005	-
Declared unit for revolving door systems (dimensions acc. to this PCR)	1	piece

*The areas for the Revolving doors are represented by the lateral area i.e. the outer wall cylinder area surrounding the revolving door leafs.

3.2 System boundary

Type of the EPD: cradle to gate - with Options
The following life cycle phases were considered:

Production stage:

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

Construction stage:

- A4 - Transport from the gate to the site
- A5 – Packaging waste processing

Use stage related to the operation of the building includes:

- B6 – Operational energy use (Energy consumption for ASSA ABLOY RD3L operation)

C1-C4 End-of-life stage:

- C2 – Transport to waste processing,
- C3 – Waste processing for recycling and
- C4 – Disposal (landfill, waste for incineration).

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.
Module D:

- Declaration of all benefits or recycling potential from EOL and A5.

3.3 Estimates and assumptions

Use phase:

For the use phase, it is assumed that the revolving door is used in the European Union, thus an European electricity grid mix is considered within this stage.

EoL:
In the End-of-Life phase, for all the materials which can be recycled, a recycling scenario with 100% collection rate was assumed.

3.4 Cut-off criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available). In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts.

Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

3.5 Background data

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by PE INTERNATIONAL AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation /GaBi 6 2013D/.
To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the /IBU PCR Part A/.
PE INTERNATIONAL performed a variety of tests and checks during the entire project to ensure high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used.
The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs.
All relevant background datasets are taken from the GaBi 6 software database. The last revision of the used background data has taken place not longer than 10 years ago.

3.7 Period under review

The period under review is 2013/14 (12 month average).

3.8 Allocation

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the

combusted material. In this EPD, the following specific life cycle inventories for the WIP are considered for:

- Waste incineration of plastic
- Waste incineration of paper
- Waste incineration of electronic scraps (PWBs)
- Waste incineration of wood

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the GaBi dataset documentation.

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 technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	5.86	kg
Output substances following waste treatment on site (Plastic packaging)	1.92	kg
Output substances following waste treatment on site (Wood packaging)	556.00	kg

Reference service life

Name	Value	Unit
Reference service life	15	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption per RSL (15 years)	8307	kWh

End of life (C1-C4)

Name	Value	Unit
Collected separately Aluminium, stainless steel, steel, zinc, electronic, particle board, plastic parts	1202.79	kg
Collected as mixed construction waste – glass, other construction waste for landfilling	893.84	kg
Reuse plastic parts, particle board	345.46	kg
Recycling Aluminium, stainless steel, steel, zinc, copper, electronic	857.32	kg
Landfilling – glass, other construction waste for landfilling	893.84	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Collected separately waste type ASSA ABLOY RD3L (including packaging)	2660.59	kg
Recycling Aluminium	17.56	%
Recycling Stainless steel	0.82	%
Recycling Steel	13.71	%
Recycling Electronic and electronics (PWBs, copper)	0.64	%
Reuse Particle board	9.04	%
Reuse Plastic parts	3.95	%
Reuse packaging (paper, plastics and wood) (from A5)	21.19	%
Loss Glass, constructions waste for landfilling (no recycling potential)	33.09	%

5. LCA: Results

Results shown below were calculated using CML 2001 – Apr. 2013 Methodology.

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	MND	MND	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	[kg CO_2-eq.]	7.37E+03	1.06E+02	9.17E+02	3.95E+03	6.33E+01	1.16E-01	6.96E+02	-5.20E+03
ODP	[kg CFC11-eq.]	8.98E-07	5.06E-10	3.63E-09	2.70E-06	3.03E-10	7.97E-11	2.98E-09	1.90E-06
AP	[kg SO_2-eq.]	5.06E+01	4.84E-01	1.29E-01	1.86E+01	2.90E-01	5.49E-04	2.60E-01	-2.75E+01
EP	[kg PO_4^{3-}-eq.]	3.36E+00	1.10E-01	1.98E-02	1.05E+00	6.61E-02	3.09E-05	2.96E-02	-1.33E+00
POCP	[kg ethene-eq.]	3.22E+00	-1.56E-01	1.05E-02	1.11E+00	-9.34E-02	3.26E-05	2.11E-02	-1.57E+00
ADPE	[kg Sb-eq.]	3.78E-01	3.98E-06	1.25E-05	5.46E-04	2.38E-06	1.61E-08	3.61E-05	-6.56E-02
ADPF	[MJ]	9.84E+04	1.46E+03	2.03E+02	4.48E+04	8.73E+02	1.32E+00	6.60E+02	-5.30E+04
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources								

RESULTS OF THE LCA - RESOURCE USE: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
PERE	[MJ]	3.99E+04	-	-	-	-	-	-	-
PERM	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	[MJ]	3.99E+04	5.75E+01	2.00E+01	1.28E+04	3.44E+01	3.79E-01	3.90E+01	-1.97E+04
PENRE	[MJ]	1.14E+05	-	-	-	-	-	-	-
PENRM	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	[MJ]	1.14E+05	1.46E+03	2.41E+02	7.02E+04	8.76E+02	2.07E+00	7.04E+02	-6.64E+04
SM	[kg]	6.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	6.03E+01	4.05E-02	2.37E+00	3.17E+01	2.43E-02	9.34E-04	2.42E-01	-5.21E+01
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: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
HWD	[kg]	1.01E+01	3.33E-03	1.69E-02	9.73E+00	2.00E-03	2.87E-04	2.84E-02	-1.16E+00
NHWD	[kg]	9.00E+02	1.84E-01	1.35E+01	2.27E+01	1.10E-01	6.69E-04	6.92E+02	-7.50E+02
RWD	[kg]	6.28E+00	1.92E-03	1.49E-02	1.01E+01	1.15E-03	2.98E-04	1.74E-02	-5.30E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	[kg]	0.00E+00	0.00E+00	5.85E+00	0.00E+00	0.00E+00	2.53E+03	0.00E+00	-

MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
EEE	[MJ]	0.00E+00	0.00E+00	1.07E+03	0.00E+00	0.00E+00	0.00E+00	9.59E+02	-
EET	[MJ]	0.00E+00	0.00E+00	3.01E+03	0.00E+00	0.00E+00	0.00E+00	2.66E+03	-
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; EET = Exported thermal energy								

6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

The production phase (modules A1-A3) contributes between 56% and 99% to the overall results for all the environmental impact assessment categories hereby considered, except for the depletion potential of the stratospheric ozone layer (ODP), for which the contribution from the production phase accounts for app. 25%. Glass, aluminum and steel accounts in total with app. 90% to the overall mass of the product, therefore, the impacts are in line with the mass composition of the product. The environmental impacts for the transport (A2) have a negligible impact within this stage.

To reflect the use phase (module B6), the energy consumption was included and it has a major contribution for all the impact assessment categories considered - between 0.1% and 30%, with the exception of ODP (75%). In calculating the ozone depletion potential, the anthropogenically released halogenated hydrocarbons, which can destroy many ozone molecules, are recorded first, therefore, as expected, the impact is higher during the use phase of the product (B6). This is a result of long operation hours in on mode almost every day in a year.

In the end-of-life phase, there are loads and benefits (module D, negative values) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution) stated in this EPD, energy consumption was considered and has a major contribution for each impact assessment category between 22% and 75%, with exception of ADPE (less than 1%).

In module D the benefits (negative values) and loads beyond the system boundary are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution) within A5.

7. Requisite evidence

Not applicable in this EPD.

8. References

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.bau-umwelt.de

IBU PCR Part A
Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013
www.bau-umwelt.de

IBU PCR Part B
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EN 61000-6-2:2005: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3
EN 61000-6-3:2001: Quality management systems - Requirements (EN ISO 9001:2008)

EN ISO 13849-1
EN ISO 13849-1:2008: Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design

EN 12600
Glass in building - Pendulum tests - Impact test method and classification for flat glass

EN ISO 9001
EN ISO 9001:2008: Quality management systems - Requirements (ISO 9001:2008)

GaBi 6 2013
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GaBi 6 2013D
GaBi 6 2013D: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, PE INTERNATIONAL AG, Leinfelden-Echterdingen, 1992-2013.
http://documentation.gabi-software.com/

WEEE
Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)

EWC
European Waste Catalog

9. Annex

Results shown below were calculated using TRACI Methodology.

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	MND	MND	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	[kg CO_2-eq.]	7.37E+03	1.06E+02	9.17E+02	3.95E+03	6.33E+01	1.16E-01	6.96E+02	-5.20E+03
ODP	[kg CFC11-eq.]	9.71E-07	5.38E-10	3.86E-09	2.87E-06	3.22E-10	8.47E-11	3.17E-09	2.03E-06
AP	[kg SO_2-eq.]	5.02E+01	6.32E-01	1.49E-01	1.76E+01	3.78E-01	5.20E-04	2.89E-01	-2.58E+01
EP	[kg N-eq.]	2.39E+00	4.47E-02	8.12E-03	7.50E-01	2.67E-02	2.21E-05	2.60E-02	-6.62E-01
Smog	[kg O_3-eq.]	5.64E+02	1.30E+01	2.82E+00	1.59E+02	7.79E+00	4.70E-03	4.57E+00	-2.35E+02
Resources	[MJ]	8.60E+03	2.10E+02	2.35E+01	3.19E+03	1.26E+02	9.41E-02	8.10E+01	-4.87E+03
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential; EP = Eutrophication potential; Smog = Smog, air; Resources = Resources, fossil fuels								

RESULTS OF THE LCA - RESOURCE USE: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
PERE	[MJ]	3.99E+04	-	-	-	-	-	-	-
PERM	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	[MJ]	3.99E+04	5.75E+01	2.00E+01	1.28E+04	3.44E+01	3.79E-01	3.90E+01	-1.97E+04
PENRE	[MJ]	1.14E+05	-	-	-	-	-	-	-
PENRM	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	[MJ]	1.14E+05	1.46E+03	2.41E+02	7.02E+04	8.76E+02	2.07E+00	7.04E+02	-6.64E+04
SM	[kg]	6.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	6.03E+01	4.05E-02	2.37E+00	3.17E+01	2.43E-02	9.34E-04	2.42E-01	-5.21E+01
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: One piece of ASSA ABLOY RD3L, Revolving door

Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
HWD	[kg]	1.01E+01	3.33E-03	1.69E-02	9.73E+00	2.00E-03	2.87E-04	2.84E-02	-1.16E+00
NHWD	[kg]	9.00E+02	1.84E-01	1.35E+01	2.27E+01	1.10E-01	6.69E-04	6.92E+02	-7.50E+02
RWD	[kg]	6.28E+00	1.92E-03	1.49E-02	1.01E+01	1.15E-03	2.98E-04	1.74E-02	-5.30E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	[kg]	0.00E+00	0.00E+00	5.85E+00	0.00E+00	0.00E+00	2.53E+03	0.00E+00	-
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-

EEE	[MJ]	0.00E+00	0.00E+00	1.07E+03	0.00E+00	0.00E+00	0.00E+00	9.59E+02	-
EET	[MJ]	0.00E+00	0.00E+00	3.01E+03	0.00E+00	0.00E+00	0.00E+00	2.66E+03	-
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; EET = Exported thermal energy								

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