ENVIRONMENTAL PRODUCT DECLARATION

ARROW Lock & Door Hardware

7800/7900 SERIES SWINGING DOOR OPERATOR

The Arrow 7800/7900 Series low energy operator is designed for quick install and consists of three basic components: inverter, motor, and Arrow's 5016N closer body.

ASSA ABLOY is committed to providing products and services that are environmentally sound throughout the entire production process and the product lifecycle. Our unconditional aim is to make sustainability a central part of our business philosophy and culture, but even more important is the job of integrating sustainability into our business strategy. The employment of EPDs will help architects, designers, and LEED-APs select environmentally preferable door openings. The Arrow 7800 / 7900 Series Swinging Door Operator EPD provides detailed requirements with which to evaluate the environmental and human health impacts related to producing our door openings. ASSA ABLOY will continue our efforts to protect the environment and health of our customers/end users and will utilize the EPD as one means to document those efforts.

ENVIRONMENTAL PRODUCT DECLARATION

According to EN 15804 and ISO 14025
Dual Recognition by UL Environment and Institut Bauen und Umwelt e.V.

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	ASSA ABLOY / ARROW Lock & Door Hardware
ULE DECLARATION NUMBER	4786545067.156.1
IBU DECLRATION NUMBER	EPD-ASA-20150266-IBA1-EN
DECLARED PRODUCT	Swinging Door Operator – Arrow 7800 / 7900 Series
REFERENCE PCR	Automatic doors, automatic gates, and revolving door systems (door systems), 07.2014
DATE OF ISSUE	September 20, 2015
PERIOD OF VALIDITY	5 years

CONTENTS OF THE DECLARATION	General information Product / Product description LCA calculation rules LCA scenarios and further technical information LCA results References
The PCR review was conducted by:	IBU – Institut Bauen und Umwelt e.V. PCR was approved by the Independent Expert Committee (SRV)
The CEN Norm EN 15804 serves as the core PCR. This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	 Wade Stout
This life cycle assessment was independently verified in accordance with EN 15804 and the reference PCR by:	IBU – Institut Bauen und Umwelt e.V.

Environment

1. General Information

ASSA ABLOY

Swinging door operator – Arrow 7800 / 7900 Series

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

Owner of the Declaration
ARROW Lock & Door Hardware
P.O. Box 3075
Salem, VA 24153
USA

Declaration number
EPD-ASA-20150266-IBA1-EN

Declared product / Declared unit
The declaration represents 1 Arrow 7800 / 7900 Series low energy swinging door operator, consisting of the following items:
- an operator assembly
- arm or track assembly
- accessories (instruction sheets, signage, mounting hardware, etc.)

This Declaration is based on the Product Category Rules:
PCR Automatic doors, automatic gates, and revolving door systems (door systems), 07.2014

(PCR tested and approved by the independent expert committee (SVR))

Scope:
This declaration and its LCA study is relevant to Arrow 7800 / 7900 series low energy door operator.
The primary manufacturing processes are made by external suppliers and the final manufacturing processes and assembly for all door closer components occur at our manufacturing factory in Monroe, NC USA. 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
20.09.2015

Valid to
19.09.2020

Verification

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

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

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

Dr. Wolfram Trinius
(Independent verifier appointed by SVR)

2. Product

2.1 Product description

Product name: Arrow 7800 / 7900 Series swinging door operator

Product characteristics: The 7800 / 7900 series low energy operator is designed for quick install and consists of three basic components: inverter, motor and Arrow's 5016N closer body. The 7800 / 7900 has the ability to function as a standard door closer. When the door is opened manually, there is little resistance and the drive train and motor are not engaged. The 5016N closer, not the motor, controls the closing cycle. Since the door closer does not back-drive the motor during the closing cycle, there is no loss of closer efficiency. In the event of a power outage, the door can be manually opened and will close via the door closer's spring force. Other characteristics:

- has US and Canadian patents

- application versatility and ease of adjustment
  - non-handed units
  - push or pull side mounting
- operation activation options include:
  - wall switches
  - radio frequency devices

- Operates as a mechanical surface closer during closer cycle, when opened manually, or power is off:
  - quiet operation
  - spring force provides the feel of a normal manual door closer
  - door can be opened manually if desired
- Arrow 7800 / 7900 series door closer
  - adjustable spring power
  - adjustable back check
  - adjustable sweep and latch
- adjustable hold open from 0 to 30 seconds
- adjustable obstruction detection during opening cycle
- push-and-close allows operator to skip the hold open time when it is not necessary
- optional power cord

2.2 Application

Based on its dual functionality, the Arrow 7800 / 7900 operates as a standard door closer or a low energy operator. This operator can be activated via wall switch or radio frequency device and is ideal for doctor's offices, retirement facilities, schools or churches.

2.3 Technical Data

The table presents the technical properties of swing door operator Arrow 7800 / 7900 series:

Parameter	Value
Power Supply	120VAC +10%/-15%, 60Hz, 0.6A current draw
Auxiliary output power	24VDC @ .9A
Door Opening	5710 (pull side - track arm) - up to 110 degrees 5730 (push side - std arm) - up to 170 degrees
Door Weight	250 lbs. (113 kg) max.
Door Swing Directions	Non-handed (left or right hand mounted)
Hold open option:	adjustable from 0 to 30 seconds
Obstruction Detection	adjustable from 0 to 5 seconds
Adjustable Motor Startup delay	adjustable from 0 to 5 seconds
Overload safety shut-off:	after two minutes of receiving a activation signal, unit will time out
Single pole double throw relay output	
Push and Go option for manually pushing door	

2.4 Placing on the market / Application rules

The standards that can be applied for operators and relevant accessories are:

- UL tested to ANSI/UL standard 325 for automatic closing doors
- Complies with Americans with Disabilities Act (ADA)
- Tested to ANSI/BHMA A156.19 for door operators
- Meets requirements of ANSI/BHMA A156.4 for door closers
- Meets requirements of UL10C for positive pressure

2.5 Delivery status

Operator units are delivered ready for installation in separate a single packages. The operator unit including the packaging has the following dimensions: 184 mm x 216 mm x 895 mm.

2.6 Base materials / Ancillary materials

The average composition of Arrow 7800 / 7900 is as follows: is as follows:

Component	Percentage in mass (%)
Aluminum	41.78
Steel	26.03
Plastics	0.56
Zinc	2.02
Electronics	3.96
Electro mechanics	23.84
others	1.81
Total	100.0

2.7 Manufacture

The primary manufacturing processes are made by Tier 1 suppliers located in China, Taiwan, Mexico, and across USA and some primary and the final manufacturing processes for operator units occur at in factory Monroe, NC USA. Electronic component manufacturing processes are made by suppliers located in China, Japan, and USA.

Manufacturing of the operator unit consists of machining, die casting, component manufacturing (springs, bearings, o-rings). Final manufacturing process includes assembly, testing, painting, and packing of the door operator.

The factory of Monroe, NC USA has certification of Quality Management system in accordance with ISO 9001:2008.

2.8 Environmental and health during manufacturing

ASSA ABLOY and ARROW Lock & Door Hardware are 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. Management of ASSA ABLOY and ARROW Lock & Door Hardware are aware of their environmental roles and responsibilities, providing appropriate training,

supporting accountability and recognizing outstanding performance.

- Any waste metals during machining are separated and recycled. The waste from the water-based painting process is delivered to waste treatment plant.
- The factory of Monroe, NC USA has certification of Environmental Management system in accordance with ISO 14001:2004.

2.9 Product processing/installation

Arrow 7800 / 7900 operators are sold through various distributors and wholesalers and are recommended to be installed by trained installation technicians such as locksmiths, carpenters, etc. adhering to local / national standards and requirements, but can also be installed by non-skilled laborers. In any case the installation must be done in line with instructions provided by the manufacturer.

2.10 Packaging

Arrow 7800 / 7900 operators are packed in cardboard packaging. Packaging includes two paper sheets (installation instruction and drilling template) – all of which are fully recyclable.

Material	Value (%)
Cardboard/paper	99.4
Plastic	0.6
Total	100.0

2.11 Condition of use

Annual inspection is recommended in order to guarantee correct functionality of the product and the door leaf. The inspection includes: checking, fixing screws to ensure they are properly tight, correct adjustments (closing speeds, force) and compliance with local legal inspection standards.

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.

2.13 Reference service life

Arrow 7800 / 7900 was developed to comply with ANSI/BHMA A156.19 standard and quality requirements. The typical life time of an Arrow 7800 / 7900 is 10 years, dependent on frequency of cycles. In this EPD lifetime of 3 years was analyzed.

2.14 Extraordinary effects

Fire

Arrow 7800 / 7900 is tested for usage in fire and smoke protection doors per UL10C, UL/ULc standards and CSA C22.2 No. 247.

Water

Operators include hydraulic oil and are designed for traditional locations and are not intended for flood protection. Unforeseeable flooding conditions will increase the potential for developing surface rust.

Mechanical destruction

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

2.15 Re-use stage

The product is possible to reuse during the reference service life and be moved from one door to another. The majority, by weight, of components are aluminum and steel which can be recycled. The plastic components can be used for energy recovery within a waste incineration process.

2.16 Disposal

Waste management at the Monroe, NC USA factory is in accordance with the plant's ISO9001 and ISO14001 standards:

Manufacturing:

- Office paper / cardboard recycling – covered under Solid Waste Recycling Program
- Plant paper / cardboard recycling – covered under Solid Waste Recycling Program
- General trash – covered under Solid Waste Recycling Program
- Comingled recyclables – covered under Solid Waste Recycling Program
- Metals recycling – metal chips and dust – covered under Solid Waste Recycling Program
- Wood pallets – covered under Solid Waste Recycling Program

Packaging:
All materials incurred during installation on their end of life should be recycled per local codes for:

- paper and cardboard packaging
- plastic packaging (recycling code 4 or 5)

End of Life:
Materials or product parts that can be recycled (such as aluminum, steel and other metals) are assumed to be recycled. Plastics are assumed to be send to incineration (with energy recovery). Components or parts that cannot be clearly separated or recycled are assumed to be disposed in landfill.

2.17 Further information

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Salem, VA 24153 USA
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3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of Arrow 7800 / 7900 Series Operator as specified in Part B requirements on the EPD for Doors, windows, shutters, and related products/IBU PCR Part B/.(PCR Automatic doors, automatic gates, and revolving door systems (door systems).

Declared unit

Name	Value	Unit
Declared unit	1	piece of operator
Mass (without packaging)	10.96	kg
Conversion factor to 1 kg	0.091	-

3.2 System boundary

Type of the EPD: cradle to gate - with options
The following life cycle stages were considered for Door Closer:

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

End-of-life stage:

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

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.

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

3.3 Estimates and assumptions

In the End-of-Life stage a scenario with collection rate of 100% for all the recyclable materials 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 thinkstep 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/.
thinkstep AG 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:
• Waste incineration of plastic
• Waste incineration of paper
• Waste incineration of electronic wastes.

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)	3.07	kg
Output substances following waste treatment on site (Plastic packaging)	0.02	kg

Reference service life

Name	Value	Unit
Reference service life	3	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	326.31	kWh
Days per year in use	365	d
Hours per day in on mode	2	h
Power consumption in on mode in W	72	W
Hours per day in stand-by mode	22	h
Power consumption in stand-by mode in W	7	W

End of life (C2-C4)

Name	Value	Unit
Collected separately Aluminum, Zinc, Steel, Plastic, Electro mechanics, Electronics	10.76	kg
Collected as mixed construction waste for landfilling	0.20	kg
Reuse plastic parts	0.06	kg
Recycling Aluminum, Zinc, Steel, Plastic, Electro mechanics, Electronics	10.70	kg
Landfilling of construction waste	0.20	kg

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

Name	Value	Unit
Collected separately waste type Operator (including packaging)	14.05	kg
Recycling Aluminum	32.60	%
Recycling Zinc	1.57	%
Recycling Steel	20.31	%
Recycling Plastic	0.44	%
Recycling Electronics	3.09	%
Recycling Electro mechanics	18.60	%
Reuse Packaging (paper) (from A5)	21.85	%
Reuse Packaging (plastic) (from A5)	0.12	%
Loss Construction waste for landfilling (no recycling potential)	1.42	%

5. LCA: Results

Results shown below were calculated using CML 2000 – 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: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.05E+02	4.01E-01	4.41E+00	2.19E+02	4.01E-01	1.91E-02	9.34E-01	-5.63E+01
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.79E-07	1.92E-12	2.01E-11	7.58E-08	1.92E-12	1.31E-11	2.21E-12	2.22E-08
AP	Acidification potential of land and water	[kg SO_2-Eq.]	5.22E-01	1.83E-03	1.01E-03	7.41E-01	1.83E-03	9.02E-05	2.55E-04	-3.20E-01
EP	Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	3.60E-02	4.19E-04	1.74E-04	3.96E-02	4.19E-04	5.08E-06	2.65E-05	-1.50E-02
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	3.68E-02	-5.92E-04	7.11E-05	4.53E-02	-5.92E-04	5.36E-06	1.40E-05	-1.92E-02
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	6.59E-03	1.51E-08	8.23E-08	2.89E-05	1.51E-08	2.65E-09	1.08E-07	-2.50E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	1.16E+03	5.53E+00	1.24E+00	2.53E+03	5.53E+00	2.17E-01	4.43E-01	-5.49E+02

RESULTS OF THE LCA - RESOURCE USE: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	3.43E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	3.43E+02	2.18E-01	1.15E-01	2.47E+02	2.18E-01	6.22E-02	4.14E-02	-2.10E+02
PENRE	Non renewable primary energy as energy carrier	[MJ]	1.39E+03	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	1.39E+03	5.55E+00	1.45E+00	3.20E+03	5.55E+00	3.41E-01	5.02E-01	-6.76E+02
SM	Use of secondary material	[kg]	2.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[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	Use of non renewable secondary fuels	[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	Use of net fresh water	[m^3]	8.34E-01	1.54E-04	1.28E-02	1.13E+00	1.54E-04	1.54E-04	2.52E-03	-5.65E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	3.06E-02	1.26E-05	1.00E-04	2.49E-03	1.26E-05	4.72E-05	5.34E-05	-1.06E-02
NHWD	Non hazardous waste disposed	[kg]	1.05E+01	6.98E-04	1.15E-01	1.02E+00	6.98E-04	1.10E-04	1.09E-01	-8.34E+00
RWD	Radioactive waste disposed	[kg]	9.40E-02	7.27E-06	8.46E-05	2.63E-01	7.27E-06	4.91E-05	2.36E-05	-5.06E-02
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	3.07E+00	0.00E+00	0.00E+00	7.59E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	5.61E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	1.58E+01	0.00E+00	0.00E+00	0.00E+00	2.75E+00	0.00E+00

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 stage (modules A1-A3) contributes between 31% and 70% to the overall results for all the environmental impact assessment categories hereby considered, except for the abiotic depletion potential (ADPE), for which the contribution from the production stage accounts for almost. 99% - this impact category describes the reduction of the global amount of non-renewable raw materials, therefore, as expected, it is mainly related with the extraction of raw materials (A1). Within the production stage, the main contribution for all the impact categories is the production of steel mainly due to the energy consumption on this process. Aluminum, steel and electro mechanics accounts with almost 96% 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.

The negative contribution of transports to installation side (module A4) to POCP impact categories is explained in following. The most important substance contributing to the ozone forming process is nitrogen dioxide (NO2), which is cleaved under the influence of sunlight. This produces nitric oxide (NO) and ozone (O3). Conversely, nitrogen monoxide and ozone form NO2 and O2. Ozone formation and ozone depletion are in equilibrium, the ozone concentration depend on the ratio of NO2 and NO emissions to air and the solar radiation.

Therefore NO has a negative and NO2 a positive characterization factor according to CML. NO is mainly emitted from internal combustion engines (ICE) while the fuel combustion. This leads to a negative overall value for the POCP for transports (using ICE) according to CML methodology.

To reflect the use stage (module B6), the energy consumption was included and it has a major contribution for all the impact assessment categories considered - between 30% and 68%, with the exception of ADPE (1%). This is a result of 2 hours of operation in on mode and 22 hours of operation in stand-by mode per day per 365 days in a year.

In the end-of-life stage, 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).

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
IBU PCR Part A: Institut Bauen und Umwelt e.V., Königswinter (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
IBU PCR Part B: PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD for Automatic doors, automatic gates, and revolving door systems (door systems), www.bau-umwelt.com

ADA Compliant
ADA Compliant: Americans with Disabilities Act 2010 Standard for Accessible Design

ANSI/BHMA A156.19
ANSI/BHMA A156.19-2013: Power Assist and Lower Energy Operated Doors

CSA C22.2 No. 247
CSA C22.2 No. 247: Canadian Standards Association standard for Operators and Systems of Doors, Gates, Draperies, and Louvers

ISO 9001
ISO 9001:2008: Quality management systems - Requirements; Trilingual version EN ISO 9001:2008

ISO 14001
ISO 14001: Environmental management systems - Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009)

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

EN 15804
EN 15804:2012+A1:2014: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

ETL tested to UL325
Tested to / Compliant with UL325 Door, Drapery, Gage, Louver, and Window Operators and Systems

GaBi 6 2013
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UL10C
UL10C Positive Pressure Fire Test of Door Assemblies

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: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.05E+02	4.01E-01	4.41E+00	2.19E+02	4.01E-01	1.91E-02	9.34E-01	-5.63E+01
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.90E-07	2.04E-12	2.13E-11	8.07E-08	2.04E-12	1.39E-11	2.35E-12	2.37E-08
AP	Acidification potential of land and water	[kg SO_2-Eq.]	5.08E-01	2.40E-03	1.22E-03	6.92E-01	2.40E-03	8.54E-05	3.04E-04	-3.00E-01
EP	Eutrophication potential	[kg N-eq.]	2.63E-02	1.69E-04	6.97E-05	3.40E-02	1.69E-04	3.64E-06	1.25E-05	-7.83E-03
Smog	Ground-level smog formation potential	[kg O_3-eq.]	5.80E+00	4.94E-02	2.82E-02	5.90E+00	4.94E-02	7.74E-04	3.70E-03	-2.62E+00
Resources	Resources – fossil resources	[MJ]	9.54E+01	7.96E-01	1.45E-01	1.49E+02	7.96E-01	1.55E-02	4.37E-02	-4.41E+01

RESULTS OF THE LCA - RESOURCE USE: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	3.43E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	3.43E+02	2.18E-01	1.15E-01	2.47E+02	2.18E-01	6.22E-02	4.14E-02	-2.10E+02
PENRE	Non renewable primary energy as energy carrier	[MJ]	1.39E+03	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	1.39E+03	5.55E+00	1.45E+00	3.20E+03	5.55E+00	3.41E-01	5.02E-01	-6.76E+02
SM	Use of secondary material	[kg]	2.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[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	Use of non renewable secondary fuels	[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	Use of net fresh water	[m^3]	8.34E-01	1.54E-04	1.28E-02	1.13E+00	1.54E-04	1.54E-04	2.52E-03	-5.65E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of swinging door operator Norton 5700

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	3.06E-02	1.26E-05	1.00E-04	2.49E-03	1.26E-05	4.72E-05	5.34E-05	-1.06E-02
NHWD	Non hazardous waste disposed	[kg]	1.05E+01	6.98E-04	1.15E-01	1.02E+00	6.98E-04	1.10E-04	1.09E-01	-8.34E+00
RWD	Radioactive waste disposed	[kg]	9.40E-02	7.27E-06	8.46E-05	2.63E-01	7.27E-06	4.91E-05	2.36E-05	-5.06E-02
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	3.07E+00	0.00E+00	0.00E+00	7.59E+00	0.00E+00	-
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	5.61E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	1.58E+01	0.00E+00	0.00E+00	0.00E+00	2.75E+00	-

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