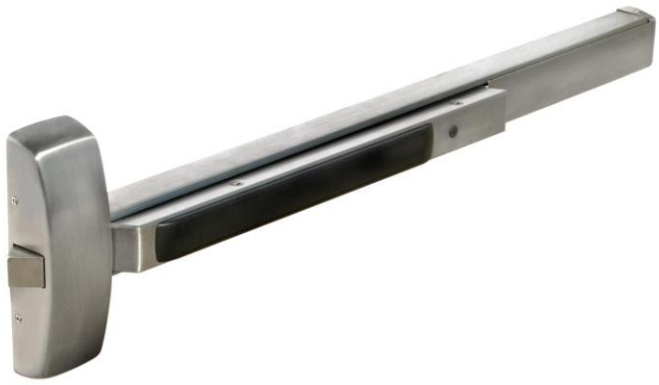
ENVIRONMENTAL PRODUCT DECLARATION

SARGENT

80 SERIES MECHANICAL PANIC EXIT DEVICE



A slight individual or collective push on the activating bar, which is perpendicular to the door, triggers the opening of the Emergency Exit.

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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 SARGENT 80 Series Mechanical Panic Exit Device 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.

Institut Bauen und Umwelt e.V.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

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SARGENT Manufacturing Company
80 Series Mechanical Panic Exit Device

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.

CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	SARGENT Manufacturing Company an ASSA ABLOY Group Company
ULE DECLARATION NUMBER	4786545067.131.1
IBU DECLRATION NUMBER	EPD-ASA-20150141-IBA1-EN
DECLARED PRODUCT	80 Series Electromechanical Exit Device
REFERENCE PCR	IBU: PCR Locks and fittings (mechanical & electromechanical locks & fittings), 07-2014

DATE OF ISSUE	May 18, 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 (SVA)
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.

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1. General Information

SARGENT Manufacturing Company

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

Declaration number
EPD-ASA-20150141-IBA1-EN

This Declaration is based on the Product Category Rules:
Locks and fittings , 07.2014
(PCR tested and approved by the independent expert committee (SVA))

Issue date
18.05.2015

Valid to
17.05.2020

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

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

80 Series Electromechanical Exit Device

Owner of the Declaration
SARGENT Manufacturing Company
100 Sargent Drive,
New Haven, CT 06511 USA

Declared product / Declared unit
The declaration represents 1 electromechanical panic exit device – 80 series electromechanical Exit consisting of the following items: rim exit device with electric latch retraction and lever trim

Scope:
This EPD is based on the full lifecycle of 1 SARGENT 80 series electromechanical rim panic device. Data was collected from the exit device manufacturer in New Haven, Connecticut (US). 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 according to ISO 14025
☐ internally ☒ externally

Dr. Wolfram Trinius
(Independent verifier appointed by SVA)

2. Product

2.1 Product description

Product name: 80 series electromechanical
Product characteristic: electromechanical panic exit device

A slight individual or collective push on the activating bar, which is perpendicular to the door, triggers the opening of the Emergency Exit, in any circumstances. SARGENT 80 Series exits are available in multiple locking arrangements including Rim, Mortise Surface Vertical Rod, and Concealed Vertical rod with narrow and wide stile options in both panic and fire rated versions.
The 80 series rim device is available in 4 standard lengths, with multiple mechanical and electrified options for both exit and trim.

2.2 Application

In compliance with security regulations against fire in public places (art. C045) designed to equip:

- Emergency exit doors
- Frequently used communicating doors
- Types of doors
- Metal or wooden doors
- Metal, aluminum or PVC framed doors with a narrow stile
- Single or double leaf doors (separate or with rebated edge)
- Designed for all types of public, particularly children, the elderly and the disabled.

2.3 Technical Data

The table presents the technical properties of Electromechanical panic exit devices – SARGENT 80 Series:

Technical data

Parameter	Value
Door types	Door types Wood or metal 1-3/4" (44 mm) minimum thickness standard

	Doors thickness 1-3/4" to 2-1/4" optional
Rail size	Rails are available in 4 sizes, use door width to determine size needed. • E Rail for 24" to 32" door widths, No cutting required for 32" door • F Rail for 33" to 36" door widths, No cutting required for 36" door • J Rail for 37" to 42" door widths, No cutting required for 42" door • G Rail for 43" to 48" door widths, No cutting required for 48" door
Center Case Dimensions	8- 3/8" (213 mm) x 2- 5/8" (67 mm)
Projection	Pushbar Neutral – 3" (76 mm) Pushbar Depressed – 2- 1/8" (54 mm)
Device centerline from finished floor	Device Centerline from 41" (1041 mm) for Standard Applications Finished Floor

2.4 Placing on the market / Application rules

The products are subject to UL marking. Relevant norms are:
ANSI/BHMA A156.3 American Standard for Exit Devices.

2.5 Delivery status

Delivered as a complete unit, inclusive of exit device, trim, strike and fasteners. Delivered in a box size 38.5" x 7.5" x6" (978 x 191 x 152mm).

2.6 Base materials / Ancillary materials

The average composition for 80 series electromechanical is as following:

Component	Percentage in mass (%)
Brass	18.00
Stainless Steel	45.40
Steel	13.52
Zinc	16.00
Electro mechanics	4.67
Plastics	1.95
Other	0.46
Total	**100.0**

2.7 Manufacture

Products are manufactured and assembled in the United States and are supported by tier-1 supplier in Mexico. Electronics are produced in Asia. The components come from processes such as stamped steel, zinc and steel casting.

2.8 Environment and health during manufacturing

ASSA ABLOY is committed to integrating our sustainability efforts across the organization. Our priorities are to: reduce resource and energy consumption; reduce carbon emissions; improve water and waste management; improve health and safety performance in operations; improve sustainability performance within our supply chain and enhance the sustainability performance in ASSA ABLOY's supply of door opening solutions. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and environmental management systems are evaluated.
Our Code of Conduct covers business ethics, workers' rights, human rights, environment and health & safety, consumer interests and community outreach. It provides the framework for ASSA ABLOY's daily operations.

- Sargent Manufacturing is in the process of certification of both ISO 9001:2008 and ISO 14001:2004, expected certification date 1/2015
- Any waste metals during machining are separated and recycled. The waste water is delivered to waste treatment plant.

2.9 Product processing/Installation

SARGENT 80 Series Exit Devices are distributed through, and installed by trained technicians, such as locksmiths or security technicians. Preparation of doors and frames are conducted at the door manufacturer's production site.

2.10 Packaging

80 series electromechanical panic exit devices are packed in a cardboard box with corrugated carton inlays. The packaging is fully recyclable.

Material	Value (%)
Cardboard/paper	99.7
Plastic	0.3
Total	100.0

2.11 Condition of use

Exit device requires no maintenance.

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

The reference service life of 30 years is based on a typical installation of a SARGENT 80 Series Exit Device, operated when the facilities are to be closed or opened. If operations per day exceeds that typical wear the locks are exposed to the life time is limited to 500,000 cycles in accordance with ANSI/BHMA A156.3.
Influences on ageing when applied in accordance with the rules of technology.

2.14 Extraordinary effects

Fire

Suitable for use in fire and smoke doors (listed by Underwriters Laboratories).

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 to one door to another. The majority, of components is stainless steel, steel, brass and zinc, which can be recycled. The locks can be mechanically dissembled to separate the different materials. The plastic components can be used for energy recovery in an incineration plant.

2.16 Disposal
The product can be mechanically dissembled to separate the different materials. 99.63% of the materials used are recyclable. The rest is disposed as a construction waste for landfill.

2.17 Further information
SARGENT Manufacturing Company
100 Sargent Drive,
New Haven, CT 06511 USA
Tel 800-727-5477
www.sargentlock.com

3. LCA: Calculation rules

3.1 Declared Unit
The declaration refers to the functional unit of 1 piece of SARGENT 80 Series electromechanical panic exit device as specified in Part B requirements on the EPD for PCR Locks and fittings: (mechanical & electromechanical locks & fittings).

Declared unit

Name	Value	Unit
Declared unit	1	1 piece of electrified panic exit device
Mass (without packaging)	6.96	kg
Conversion factor to 1 kg	0.144	-

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

The use stage:
- B2 - Maintenance (cleaning of the exit device)
- B6 - Operational energy use

End-of-life stage:
- C2 – Transport to waste processing
- 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
Use phase:
For the use phase, it is assumed that the lock is used in the United States of America, thus an US 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

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)	1.62	kg
Output substances following waste treatment on site (Plastic packaging)	0.01	kg

Maintenance (B2)

Name	Value	Unit
Other resources – detergents	0.1	kg/a
Water for cleaning	0.1	kg/a

Reference service life

Name	Value	Unit
Reference service life	30	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	8.4	kWh
Days per year in use	365	d
Hours per day in on mode	0.04	h
Power consumption in on mode in W	18.48	W

End of life (C1-C4)

Name	Value	Unit
Collected separately Brass, stainless steel, steel. zinc, electro mechanics, plastics	6.96	kg
Collected as mixed construction waste – construction waste for landfilling	0.03	kg
Reuse Plastics	0.14	kg
Recycling Brass, stainless steel, steel. zinc, electro mechanics	6.82	kg
Landfilling - Construction waste for landfilling	0.14	kg

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

Name	Value	Unit
Collected separately waste type (including packaging)	8.59	kg
Recycling Brass	14.59	%
Recycling Steel	11.95	%
Recycling Stainless steel	36.80	%
Recycling Zinc	12.97	%
Recycling Electro mechanics	3.78	%
Reuse Plastics	1.60	%
Reuse Paper packaging (from A5)	18.88	%
Reuse Plastic packaging (from A5)	0.06	%
Loss Construction waste for landfilling (no recycling potential)	0.37	%

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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	X	MND	MND	MND	X	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	6.18E+01	2.45E-01	2.31E+00	-2.06E+00	5.67E+00	2.04E-01	3.53E-01	-9.85E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.20E-08	1.17E-12	1.06E-11	6.81E-11	1.96E-09	9.78E-13	1.06E-12	-1.64E-09
AP	Acidification potential of land and water	[kg SO_2-Eq.]	2.99E-01	1.12E-03	5.27E-04	4.83E-02	1.91E-02	9.35E-04	8.99E-05	-5.85E-02
EP	Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.96E-02	2.56E-04	9.17E-05	2.88E-02	1.02E-03	2.14E-04	6.80E-06	-3.34E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.88E-02	-3.62E-04	3.73E-05	9.53E-04	1.17E-03	-3.02E-04	4.37E-06	-3.69E-03
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.64E-02	9.24E-09	4.24E-08	1.00E-06	7.48E-07	7.70E-09	2.33E-08	-8.90E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	7.61E+02	3.38E+00	6.49E-01	5.91E+01	6.53E+01	2.82E+00	1.49E-01	-1.18E+02

RESULTS OF THE LCA - RESOURCE USE: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.22E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.22E+02	1.33E-01	6.05E-02	1.18E+02	6.39E+00	1.11E-01	1.09E-02	-2.52E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	8.95E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	8.95E+02	3.39E+00	7.61E-01	6.26E+01	8.27E+01	2.83E+00	1.66E-01	-1.42E+02
SM	Use of secondary material	[kg]	6.68E+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]	3.75E-01	9.41E-05	6.72E-03	6.30E-02	2.91E-02	7.84E-05	8.62E-04	-1.04E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
HWD	Hazardous waste disposed	[kg]	3.23E-02	7.73E-06	5.23E-05	3.67E-03	6.44E-05	6.44E-06	1.16E-05	-1.01E-02
NHWD	Non hazardous waste disposed	[kg]	6.45E+00	4.27E-04	5.90E-02	4.37E-01	2.64E-02	3.56E-04	3.29E-02	-1.10E+00
RWD	Radioactive waste disposed	[kg]	5.30E-02	4.44E-06	4.44E-05	1.40E-03	6.81E-03	3.70E-06	6.61E-06	-9.87E-03
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	1.48E+00	0.00E+00	0.00E+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	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	2.93E+00	0.00E+00	0.00E+00	0.00E+00	6.75E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	8.27E+00	0.00E+00	0.00E+00	0.00E+00	1.85E+00	-

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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 84% and 99% to the overall results for all the environmental impact assessment categories hereby considered, except for the eutrophication potential (EP), for which the contribution from the production phase accounts for app. 40%.
Within the production phase, the main contribution for all the impact categories is the production of steel mainly due to the energy consumption on this process. Zinc, steel and stainless steel account in total with app. 76% 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.
Relatively high impact on EP (57%) during the maintenance phase (module B2) is a result of generated waste water during maintenance of the product. Eutrophication is the enrichment of nutrients in a certain place and it can be aquatic or terrestrial. Waste water contributes to eutrophication therefore, as expected, it is mainly related with the maintenance of the product (B2).
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).

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

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 Locks and fittings.
www.bau-umwelt.com

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

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

ANSI/BHMA A156.3-2008 Exit Devices
Standard ANSI/BHMA A156.3-2008 establishes requirements for exit devices and trim, automatic and self-latching flush bolts, removable mullions, coordinators, and carry-open bars. Functions and types are described and numbered.

A117.1 Accessibility Code
Standard for Accessible and Usable Buildings and Facilities as mandated by law and incorporated by reference by the States and Municipalities, including Ohio in the Ohio Administrative Code 4401:8-44-01.

GaBi 6 2013
GaBi 6 2013: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013.

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

UL and ULc Standards
ULC Standards develops and publishes standards and specifications for products having a bearing on fire, life safety and security, crime prevention, energy efficiency, environmental safety, security of assets and facilities, live working and workplace safety and other areas. ULC Standards is accredited by the Standards Council of Canada as a consensus based Standards Development Organization under the National Standards System of Canada.

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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	X	MND	MND	MND	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	6.18E+01	2.45E-01	2.31E+00	-2.06E+00	5.67E+00	2.04E-01	3.53E-01	-9.85E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.28E-08	1.25E-12	1.12E-11	7.23E-11	2.08E-09	1.04E-12	1.13E-12	-1.74E-09
AP	Acidification potential of land and water	[kg SO_2-Eq.]	2.87E-01	1.47E-03	6.39E-04	5.67E-02	1.79E-02	1.22E-03	1.05E-04	-5.55E-02
EP	Eutrophication potential	[kg N-eq.]	1.39E-02	1.04E-04	3.67E-05	4.48E-02	8.79E-04	8.63E-05	3.21E-06	-1.82E-03
Smog	Ground-level smog formation potential	[kg O_3-eq.]	3.03E+00	3.02E-02	1.48E-02	2.40E-01	1.52E-01	2.51E-02	8.28E-04	-5.55E-01
Resources	Resources	[MJ]	5.99E+01	4.87E-01	7.61E-02	7.67E+00	3.85E+00	4.05E-01	1.54E-02	-9.65E+00

RESULTS OF THE LCA - RESOURCE USE: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.22E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.22E+02	1.33E-01	6.05E-02	1.18E+02	6.39E+00	1.11E-01	1.09E-02	-2.52E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	8.95E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	8.95E+02	3.39E+00	7.61E-01	6.26E+01	8.27E+01	2.83E+00	1.66E-01	-1.42E+02
SM	Use of secondary material	[kg]	6.68E+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]	3.75E-01	9.41E-05	6.72E-03	6.30E-02	2.91E-02	7.84E-05	8.62E-04	-1.04E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of 80 Series Electromechanical Exit Device

Parameter	Parameter	Unit	A1 - A3	A4	A5	B2	B6	C2	C4	D
HWD	Hazardous waste disposed	[kg]	3.23E-02	7.73E-06	5.23E-05	3.67E-03	6.44E-05	6.44E-06	1.16E-05	-1.01E-02
NHWD	Non hazardous waste disposed	[kg]	6.45E+00	4.27E-04	5.90E-02	4.37E-01	2.64E-02	3.56E-04	3.29E-02	-1.10E+00
RWD	Radioactive waste disposed	[kg]	5.30E-02	4.44E-06	4.44E-05	1.40E-03	6.81E-03	3.70E-06	6.61E-06	-9.87E-03
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	1.48E+00	0.00E+00	0.00E+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	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	2.93E+00	0.00E+00	0.00E+00	0.00E+00	6.75E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	8.27E+00	0.00E+00	0.00E+00	0.00E+00	1.85E+00	-

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