# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

| | |
|---|---|
| Owner of the Declaration | Corbin Russwin - an ASSA ABLOY Group company |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-ASA-20150133-IBA1-EN |
| Issue date | 18.05.2015 |
| Valid to | 17.05.2020 |

IN120 WiFi Electronic Access Control Mortise Lock

## Corbin Russwin,
## an ASSA ABLOY Group company

Institut Bauen und Umwelt e.V.

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

# 1. General Information

## Corbin Russwin

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

**Declaration number**
EPD-ASA-20150133-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)

## IN120 Electronic Access Control Mortise Lock

**Owner of the Declaration**
Corbin Russwin
225 Episcopal Rd
Berlin, CT 06037 USA

**Declared product / Declared unit**
The declaration represents 1 mortise lock of the following types:
- IN120 WiFi Mortise lock

inclusive of lock body, credential reader, communication module, latches, levers, roses, strikes and all mounting hardware.

**Scope:**
This EPD is based on the full lifecycle of 1 Corbin Russwin IN120 Electromechanical Wifi Mortise Lock. Data was collected from the lock case manufacturer in Berlin, 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 Norm 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
The Corbin Russwin IN120 WiFi mortise lock, is an ANSI/BHMA A156.13 Series 1000 Grade 1 mechanical mortise lock. It has a reversible stainless steel latch, independent non-handed stainless steel deadlatch.

The IN120 is an intelligent Wifi Access control mortise lock with integrated credential reader.

### 2.2 Application
The locks are designed for single or double leaf doors with mullions. The locks are typically installed in commercial buildings, such as
- Commercial campuses
- Colleges
- Detention centers
- Dormitories
- Hospitals
- Warehouses
- Psychiatric wards

### 2.3 Technical Data
The table presents the technical properties of Corbin Russwin IN120 WiFi mortise lock:

| Item | Value |
|---|---|
| Backset | 2-3⁄4" (70mm) |
| Door Thickness | 1-3⁄4" (44mm) thick standard |
| Bevel | Front adjustable at any angle from flat to bevelled 1⁄8" (3mm) in 2" (51mm) |
| Door prep | ANSI/BHMA A156.115 or A156.115W modified per template |
| Handing | field reversible |
| Keying | Can be masterkeyed or grand masterkeyed. |
| Power Consupmtion | Battery Powered |

### 2.4 Placing on the market / Application rules
The products are subject to UL marking. Relevant norms are: ANSI/BHMA A156.13 American Standard for Mortise locks

### 2.5 Delivery status
Delivered as a complete unit, inclusive of lockbody, trim, strike and fasteners or as separate lock case. Delivered in a box size 19.5" x 11.75" x 5" (495 x 298 x 127 mm).

### 2.6 Base materials / Ancillary materials
The average composition of the Corbin Russwin IN120 is as following:

| Component | Percentage in mass (%) |
|---|---|
| Steel | 40.2 |
| Brass | 27.7 |
| Stainless Steel | 14.3 |
| Plastics | 5.5 |
| Zinc | 2.4 |
| Electronic and Electro-mechanics | 4.6 |
| Others | 5.3 |
| **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.
• The Berlin facility complies the requirements of the Code of Federal Requirements (CFR) 29 part 1910 General Industry and are under the oversight of the United States Department of Labor and the Occupational Safety and Health Administration.
• The Berlin facility is currently certified to ISO 9001-2008. Upgrading to 9001-2014 in 2015. Lab Certification audit to ISO 17025 in Dec 2014. Working towards ISO 14000 with current goal of 1st qtr 2015.
• Any waste metals (chips) during machining are separated and recycled.
• Waste cleaners and rinses are processed internally in our Waste Water Treatment facility.
• Waste solids are packaged and shipped offsite for treatment by a CT DEEP approved waste handler.

### 2.9 Product processing/Installation
Corbin Russwin IN120 mortise locks 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
All packaging is fully recyclable. The packaging material is composed by cardboard (app. 70%) and plastic foil (app. 30%).

| Material | Value (%) |
|---|---|
| Cardboard/paper | 98.9 |
| Plastic | 1.1 |
| **Total** | **100.0** |

### 2.11 Condition of use
Locks require 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 Corbin Russwin IN120 lock as a security lock 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 1,000,000 cycles in accordance with ANSI/BHMA A156.13
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.

**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. In the End-of-Life phase the lock can either be sent back to Corbin Russwin for recycling or to a professional recycling service provider. The majority, by weight of components are stainless steel, steel, brass and zinc which can be recycled. The plastic components can be used for energy recovery in an incineration process.

### 2.16 Disposal
The product can be mechanically dissembled to separate the different materials. 96.51% of the materials used are recyclable. The rest is disposed as a construction waste for landfill.

### 2.17 Further information
Corbin Russwin
225 Episcopal Rd
Berlin, CT 06037 USA
Tel 800-543-3568
www.corbinrusswin.com

## 3. LCA: Calculation rules

### 3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of Corbin Russwin IN120 WiFi mortise lock as specified in Part B requirements on the EPD for Doors, windows, shutters, and related products /IBU PCR Part B/.

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | piece of motor lock |
| Mass | 3.12 | kg |
| Conversion factor to 1 kg | 0.321 | - |

### 3.2 System boundary

Type of the EPD: cradle to gate - with options.
The following life cycle phases were considered for Motor Lock:

A1-A3 Production stage:

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

A4-A5 Construction stage:

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

The use stage:

- B2 - Maintenance (greasing of the locks)

End-of-life stage:

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

These information modules include provision and transport of all materials, products, as well as energy and water provisions, 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

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 WIP is adapted according to the material composition and heating value of the combusted material. Following specific life cycle inventories for the WIP are considered:

- Waste incineration of plastic
- Waste incineration of paper
- Waste incineration of electronic scrap

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 Packaging (paper) | 1.19 | kg |
| Output substances following waste treatment on site Packaging (plastics) | 0.01 | kg |

**Maintenance (B2)**

| Name | Value | Unit |
|---|---|---|
| Water for cleaning | 1.0 | kg/a |
| Other resources detergents | 0.1 | kg/a |

**Reference service life**

| Name | Value | Unit |
|---|---|---|
| Reference service life | 30 | a |

**End of life (C1-C4)**

| Name | Value | Unit |
|---|---|---|
| Collected separately Steel, stainless steel, zinc, electronic | 2.964 | kg |
| Collected as mixed construction waste Construction waste for landfilling | 0.151 | kg |
| Recycling Steel | 1.253 | kg |
| Recycling Stainless steel | 0.444 | kg |
| Recycling Aluminum | 0.004 | kg |
| Recycling Brass | 0.863 | kg |
| Recycling Zinc | 0.074 | kg |
| Recycling Copper | 0.011 | kg |
| Recycling Electronic and Electro-mechanics | 0.144 | kg |
| Reuse Plastic parts | 0.171 | kg |
| Landfilling Construction waste for landfilling | 0.151 | kg |

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

| Name | Value | Unit |
|---|---|---|
| Collected separately waste Corbin Russwin Lock (including packaging) | 4.319 | kg |
| Recycling Steel | 29.01 | % |
| Recycling  Stainless steel | 10.28 | % |
| Recycling Zinc | 1.72 | % |
| Recycling Aluminium | 0.09 | % |
| Recycling Brass | 19.98 | % |
| Recycling/Reuse Electronic (PWB) | 3.34 | % |
| Recycling Copper | 0.26 | % |
| Reuse Plastic parts | 3.96 | % |
| Reuse Paper packaging (from A5) | 27.56 | % |
| Reuse Plastic packaging (from A5) | 0.31 | % |
| Loss Construction waste for landfilling (no recycling potential) | 3.49 | % |

## 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 | X | MND | MND | MND | MND | MND | MND | X | X | X | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP | Global warming potential | [kg $CO_2$-Eq.] | 3.23E+01 | 1.23E-01 | 1.72E+00 | -2.06E+00 | 1.03E-01 | 2.28E-02 | 4.90E-01 | -2.41E+00 |
| ODP | Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 5.09E-09 | 5.90E-13 | 7.81E-12 | 6.81E-11 | 4.92E-13 | 1.56E-11 | 1.47E-12 | -2.38E-10 |
| AP | Acidification potential of land and water | [kg $SO_2$-Eq.] | 1.87E-01 | 5.64E-04 | 3.93E-04 | 4.83E-02 | 4.70E-04 | 1.07E-04 | 1.39E-04 | -2.96E-02 |
| EP | Eutrophication potential | [kg $(PO_4)^{3-}$-Eq.] | 1.47E-02 | 1.29E-04 | 6.77E-05 | 2.88E-02 | 1.07E-04 | 6.05E-06 | 1.50E-05 | -1.48E-03 |
| POCP | Formation potential of tropospheric ozone photochemical oxidants | [kg Ethen Eq.] | 1.23E-02 | -1.82E-04 | 2.77E-05 | 9.53E-04 | -1.52E-04 | 6.39E-06 | 7.57E-06 | -1.38E-03 |
| ADPE | Abiotic depletion potential for non fossil resources | [kg Sb Eq.] | 6.00E-03 | 4.65E-09 | 3.26E-08 | 1.00E-06 | 3.87E-09 | 3.16E-09 | 4.59E-08 | 4.56E-04 |
| ADPF | Abiotic depletion potential for fossil resources | [MJ] | 4.27E+02 | 1.70E+00 | 4.86E-01 | 5.91E+01 | 1.42E+00 | 2.59E-01 | 2.32E-01 | -2.57E+01 |

**RESULTS OF THE LCA - RESOURCE USE: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PERE | Renewable primary energy as energy carrier | [MJ] | 6.54E+01 | - | - | - | - | - | - | - |
| PERM | Renewable primary energy resources as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PERT | Total use of renewable primary energy resources | [MJ] | 6.54E+01 | 6.70E-02 | 4.51E-02 | 1.18E+02 | 5.58E-02 | 7.41E-02 | 1.98E-02 | -3.78E-01 |
| PENRE | Non renewable primary energy as energy carrier | [MJ] | 4.82E+02 | - | - | - | - | - | - | - |
| PENRM | Non renewable primary energy as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PENRT | Total use of non renewable primary energy resources | [MJ] | 4.82E+02 | 1.71E+00 | 5.69E-01 | 6.26E+01 | 1.42E+00 | 4.06E-01 | 2.62E-01 | -2.75E+01 |
| SM | Use of secondary material | [kg] | 4.31E+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 | [$m^3$] | 1.96E-01 | 4.73E-05 | 4.99E-03 | 6.30E-02 | 3.94E-05 | 1.83E-04 | 1.33E-03 | -4.66E-03 |

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HWD | Hazardous waste disposed | [kg] | 2.08E-02 | 3.89E-06 | 3.92E-05 | 3.67E-03 | 3.24E-06 | 5.62E-05 | 2.36E-05 | 8.50E-04 |
| NHWD | Non hazardous waste disposed | [kg] | 1.70E+00 | 2.15E-04 | 4.55E-02 | 4.37E-01 | 1.79E-04 | 1.31E-04 | 7.74E-02 | -9.09E-01 |
| RWD | Radioactive waste disposed | [kg] | 2.18E-02 | 2.23E-06 | 3.30E-05 | 1.40E-03 | 1.86E-06 | 5.84E-05 | 1.17E-05 | -7.03E-04 |
| 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 | 1.19E+00 | 0.00E+00 | 0.00E+00 | 2.70E+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 | 2.20E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.33E-01 | - |
| EET | Exported thermal energy | [MJ] | 0.00E+00 | 0.00E+00 | 6.19E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.29E+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 phase (modules A1-A3) contributes between 77% 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. 32%.

Within the production phase, the main contribution for all the impact categories is the production of steel, with app. 77%, mainly due to the energy consumption on this process. Steel and brass account in total with app. 67% 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 (66%) 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

**IBU PCR Part A**
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**
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 9001:2008**
ISO 9001:2008: Quality management systems - Requirements (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

**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/

**ANSI A117.1 (2009):** Accessible and Usable Buildings and Facilities. American National Standards Institute.

**ANSI/BHMA A156.13 - 2012 Mortise Locks**
ANSI/BHMA A156 Series Standards of Builders hardware manufacturers association.

**IEEE 802.11**
IEEE 802.11 Wireless LAN

**ISO/IEC 14443**
ISO/IEC 14443: Identification cards - Contactless integrated circuit cards - Proximity cards

**ISO/IEC 15693**
ISO/IEC 15693: Identification cards - Contactless integrated circuit cards - Vicinity cards

**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.

# 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 | X | X | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP | Global warming potential | [kg CO2-Eq.] | 3.23E+01 | 1.23E-01 | 1.72E+00 | -2.06E+00 | 1.03E-01 | 2.28E-02 | 4.90E-01 | -2.41E+00 |
| ODP | Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 5.52E-09 | 6.28E-13 | 8.31E-12 | 7.23E-11 | 5.23E-13 | 1.66E-11 | 1.56E-12 | -3.21E-10 |
| AP | Acidification potential of land and water | [kg SO2-Eq.] | 1.85E-01 | 7.37E-04 | 4.76E-04 | 5.67E-02 | 6.14E-04 | 1.02E-04 | 1.66E-04 | -2.83E-02 |
| EP | Eutrophication potential | [kg N-eq.] | 1.16E-02 | 5.21E-05 | 2.71E-05 | 4.48E-02 | 4.34E-05 | 4.33E-06 | 6.93E-06 | -6.15E-04 |
| Smog | Ground-level smog formation potential | [kg O3-eq.] | 2.35E+00 | 1.52E-02 | 1.09E-02 | 2.40E-01 | 1.26E-02 | 9.21E-04 | 2.14E-03 | -3.15E-01 |
| Resources | Resources – Fossil resources | [MJ] | 3.81E+01 | 2.45E-01 | 5.69E-02 | 7.67E+00 | 2.04E-01 | 1.84E-02 | 2.37E-02 | -1.01E+00 |

**RESULTS OF THE LCA - RESOURCE USE: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PERE | Renewable primary energy as energy carrier | [MJ] | 6.54E+01 | - | - | - | - | - | - | - |
| PERM | Renewable primary energy resources as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PERT | Total use of renewable primary energy resources | [MJ] | 6.54E+01 | 6.70E-02 | 4.51E-02 | 1.18E+02 | 5.58E-02 | 7.41E-02 | 1.98E-02 | -3.78E-01 |
| PENRE | Non renewable primary energy as energy carrier | [MJ] | 4.82E+02 | - | - | - | - | - | - | - |
| PENRM | Non renewable primary energy as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PENRT | Total use of non renewable primary energy resources | [MJ] | 4.82E+02 | 1.71E+00 | 5.69E-01 | 6.26E+01 | 1.42E+00 | 4.06E-01 | 2.62E-01 | -2.75E+01 |
| SM | Use of secondary material | [kg] | 4.31E+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 | [m³] | 1.96E-01 | 4.73E-05 | 4.99E-03 | 6.30E-02 | 3.94E-05 | 1.83E-04 | 1.33E-03 | -4.66E-03 |

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of Corbin Russwin IN120 WiFi mortise lock**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B2 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HWD | Hazardous waste disposed | [kg] | 2.08E-02 | 3.89E-06 | 3.92E-05 | 3.67E-03 | 3.24E-06 | 5.62E-05 | 2.36E-05 | 8.50E-04 |
| NHWD | Non hazardous waste disposed | [kg] | 1.70E+00 | 2.15E-04 | 4.55E-02 | 4.37E-01 | 1.79E-04 | 1.31E-04 | 7.74E-02 | -9.09E-01 |
| RWD | Radioactive waste disposed | [kg] | 2.18E-02 | 2.23E-06 | 3.30E-05 | 1.40E-03 | 1.86E-06 | 5.84E-05 | 1.17E-05 | -7.03E-04 |
| 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 | 1.19E+00 | 0.00E+00 | 0.00E+00 | 2.70E+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 | 2.20E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.33E-01 | - |
| EET | Exported thermal energy | [MJ] | 0.00E+00 | 0.00E+00 | 6.19E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.29E+00 | - |


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