

## ENVIRONMENTAL PRODUCT DECLARATION

# LCN 4040XP/4040XPT SERIES DOOR CLOSERS



LCN 4040XP Series Door Closer

This EPD was created using a UL-verified EPD generator for Allegion's full product portfolio. For additional product specific EPDs, please contact Allegion at [Tim.Weller@allegion.com](mailto:Tim.Weller@allegion.com).



**ALLEGION™**

Allegion is pioneering safety by protecting people where they live and work – and protecting our environment at the same time. We promote the health and safety of our employees, customers and local community members worldwide through our commitment to conducting business in a safe and environmentally responsible manner.

Additionally, Allegion recognizes the value of the Leadership in Energy and Environmental Design (LEED) rating system to building environmentally safe and sustainable structures. By using Life Cycle Assessment and Environmental Product Declarations, we aim to provide our customers with the information they need to make decisions regarding their own sustainable building concepts and green solutions.

At Allegion, we value the importance of a cleaner world and are committed to being a responsible member of our global communities.



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According to ISO 14025,  
EN 15804, and ISO21930:2017

|  |   |  |
|--|---|--|
| PROGRAM OPERATOR   | UL Environment<br>333 Pfingsten Road Northbrook, IL 60611                   | <a href="https://www.ul.com/">https://www.ul.com/</a><br><a href="https://spot.ul.com">https://spot.ul.com</a> |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER  | General Program Instructions v.2.5 March 2020                               |  |
| MANUFACTURER NAME AND ADDRESS  | Allegion plc<br>121 W Railroad Ave, Princeton, IL 61356                     |  |
| DECLARATION NUMBER   | 4789828313.117.1  |  |
| DECLARED PRODUCT & FUNCTIONAL UNIT   | 1 average LCN 4040XP/4040XPT Series Door Closer                             |  |
| REFERENCE PCR AND VERSION NUMBER   | UL PCR Part A - Version 3.2<br>UL Part B Builders Hardware EPD Requirements |  |
| DESCRIPTION OF PRODUCT'S INTENDED APPLICATION AND USE  | Installed on a door to facilitate controlled closure of the door            |  |
| PRODUCT RSL DESCRIPTION  | 25 Years  |  |
| MARKETS OF APPLIABILITY  | Americas  |  |
| DATE OF ISSUE  | February 1, 2022  |  |
| PERIOD OF VALIDITY   | 5 Years   |  |
| EPD TYPE   | Product-specific  |  |
| EPD SCOPE  | Cradle to grave   |  |
| YEAR OF REPORTED MANUFACTURER PRIMARY DATA   | 2019  |  |
| LCA SOFTWARE & VERSION NUMBER  | GaBi ts Version 10.6.0.110  |  |
| LCI DATABASE & VERSION NUMBER  | GaBi Content Version 2020.2   |  |
| LCIA METHODOLOGY & VERSION NUMBER  | CML 2001-Jan 2016 and TRACI 2.1   |  |
| The sub-category PCR review was conducted by:  | UL Environment  |  |
|  | PCR Review Panel  |  |
|  | epd@ulenvironment.com   |  |
| This declaration was independently verified in accordance with ISO 14025:2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v3.2 (Dec 2018), based on ISO 21930:2017, serves as the core PR, with additional considerations from CEN Norm EN 15804 (2013) and the USGBC/UL Environment Part A Enhancement (2017)<br><input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL   |   |  |
|  | Cooper McCollum, UL Environment   |  |
| This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:  | WAP Sustainability Consulting   |  |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:   | Thomas P. Gloria, Industrial Ecology Consultants                            |  |
| <p><b>LIMITATIONS</b><br/>Environmental declarations from different programs (ISO 14025) may not be comparable.</p> <p>Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR.</p> <p>Full conformance with this PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.</p> |   |  |

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## 1. Product Definition and Information

### 1.1. Description of Company

Allegion Plc is a publicly traded global company that manufactures security door products.

More than 25 global brands included under the Allegion parent company umbrella are sold in 120 different countries. Among these brands are Schlage (locks), Von Duprin (exit devices), Ives (hinges, stops and miscellaneous builders' hardware), Falcon (locks, exit devices and closers), Glynn Johnson (holders/ stops and push/pull latches), and Steelcraft (steel door and frames).

Allegion operates plants across the United States and internationally.

### 1.2. Product Description

The 4040XP/4040XPT Series is LCN's most durable surface-mounted heavy-duty closer, designed for the most demanding high-use-and-abuse applications. It meets ANSI/BHMA A156.4 Grade 1 standards and ADA reduced opening force requirements. This closer is UL listed for self-closing doors without hold-open and boasts a 30-year limited warranty.

The 4040XP/4040XPT Series features include standard non-handed plastic cover, with optional plated finish available for cover, arm and fasteners. Materials include high-strength cast-iron cylinder, forged steel arm, double heat-treated steel pinion and full complement, low friction bearing for rugged reliability in high-traffic installations. The product is manufactured at Allegion's Princeton, Illinois plant. Specifically, this product is an average product from a single manufacturing plant.

The LCA for this EPD is based on LCN 4040XP. The LCN 4040XP and 4040XPT Series Door Closers environmental impacts are within  $\pm 10\%$  of each other. This EPD is representative of manufacturing in the US.



Figure 1: LCN 4040XP Door Closer



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## 1.3. Technical Requirements

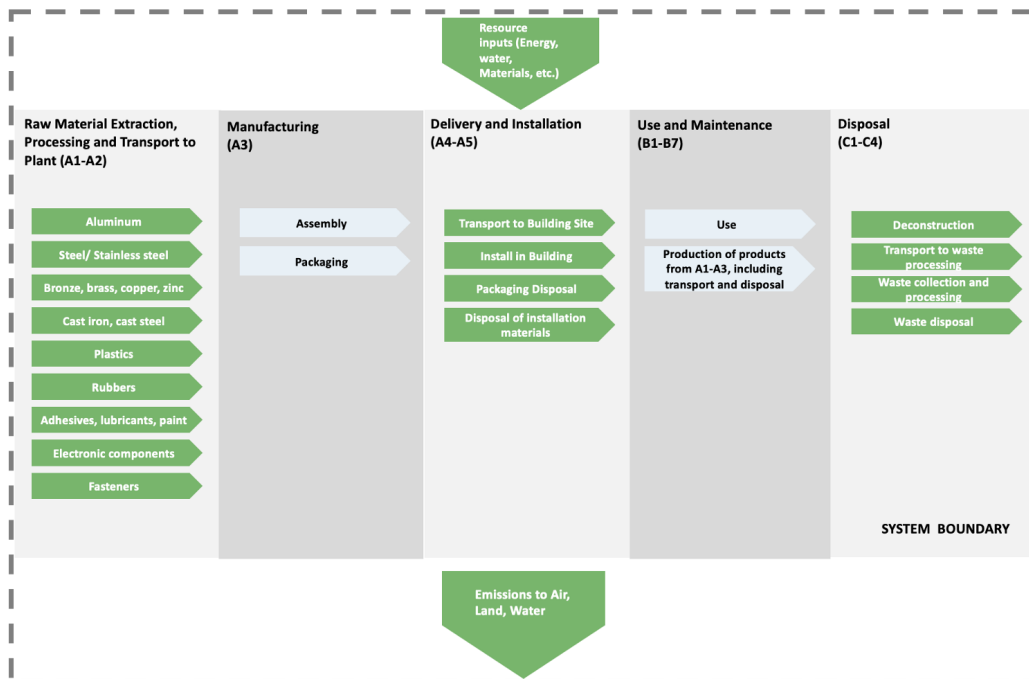
| PARAMETER                | VALUE     | UNIT |
|--------------------------|-----------|------|
| ANSI A156.4              | Grade 1   | -    |
| UL 10C                   | Compliant | -    |
| 100-hour Salt Spray Test | Compliant | -    |
| Buy American Act         | Compliant | -    |
| ADA                      | Compliant | -    |

## 1.4. Application

These products can be used in commercial and multi-family applications.

## 1.5. Declaration of Methodological Framework

This EPD is cradle-to-grave, as represented by the flow diagram below. A summary of the life cycle stages can be found in Table 4. The reference service life (RSL) is outlined in Table 7. The cut-off criteria are described in Cut-off Rules, and the allocation procedures are described in the Allocation section. No known flows are deliberately excluded from this EPD. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impacts in all impact categories required by the PCR.



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## 1.6. Material Composition

The materials that make up the LCN 4040XP Door Closers are indicated in Table 1.

**Table 1: Material Composition**

| MATERIAL                               | LCN 4040XP DOOR CLOSER |
|--|------------------------|
| Steel                                  | 53.4%                  |
| Cast Iron                              | 35.7%                  |
| Hydraulic Fluid                        | 3.7%                   |
| Polypropylene                          | 3.9%                   |
| PET                                    | 1.8%                   |
| Nylon and Glass-fiber Reinforced Nylon | 0.3%                   |
| Rubber                                 | 0.2%                   |
| Aluminum                               | <0.1%                  |

## 1.7. Properties of Declared Product as Shipped

Allegion’s LCN 4040XP Door Closers are packaged with a variety of packaging materials including cardboard, paper (for labels and instructions). Exact weight and type of packaging per product are provided by the product engineering team.

## 1.8. Manufacturing

LCN 4040XP Door Closers are manufactured at Allegion’s Princeton, IL facility. Raw materials are mined and processed by the supply chain and partly by Allegion. Manufacturing begins at receiving bays where the sub-components are delivered. These components are then assembled, finished and packaged to create a final product. For some components whose manufacturing process could not be determined, stamping was used as a default due to its versatility to form various types of components.

Energy resources used in the manufacturing process include electricity, natural gas and water. Manufacturing waste is also generated throughout each step as the products are formed and assembled. All waste is assumed to be landfilled.

## 1.9. Packaging

Packaging utilized in the shipment of the product is described in Table 2.

**Table 2: Packaging**

| MATERIAL   | LCN 4040XP DOOR CLOSER | UNIT | DISPOSAL PATHWAY                                    |
|------------|------------------------|------|---|
| Cardboard  | 1.48E-01               | kg   | Landfilled (20%), Incinerated (5%), Recycled (75%)  |
| LLDPE Film | 6.50E-03               | kg   | Landfilled (68%), Incinerated (17%), Recycled (15%) |



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| MATERIAL | LCN 4040XP DOOR CLOSER | UNIT | DISPOSAL PATHWAY                                   |
|----------|------------------------|------|--|
| Paper    | 3.76E-02               | kg   | Landfilled (20%), Incinerated (5%), Recycled (75%) |

## 1.10. Transportation

It is assumed that all raw materials are distributed by truck and ship, based on global region. Distances were calculated based on the address of the major supplier of each material.

The transport distance to the end customers was calculated based on sales data for the year 2019. The transportation distance for all waste flows is assumed to be 200 km. Both distances are provided in the sub-category PCR in Section 3.12.

## 1.11. Product Installation

Detailed installation instructions are provided online at [Allegion.com](http://Allegion.com). Installation equipment is required though not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible. Packaging waste is generated and disposed of in this stage. Packaging and installation waste disposal have been modeled as per guidelines in section 2.8.5 of PCR Part A. Packaging installation waste are either landfilled, incinerated, or recycled.

Product should be installed by a professional and is subject to commercial building codes. Proper equipment, including protective equipment, should be used. Allegion products must be installed in full compliance with manufacturer's written instructions, which are included with each product.

## 1.12. Reuse, Recycling, and Energy Recovery

LCN 4040XP Door Closers may be recycled or reused at the end of life. The LCA that this EPD is created from takes the conservative approach by assuming that all products are disposed of within the system boundary.

## 1.13. Disposal

Disposal pathways in the EPD are modeled in accordance with disposal routes and waste classification referenced in Sections 2.8.5 and 2.8.6 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment. This indicates an end-of-life split amongst landfill, recycling, and incineration pathways. For metals disposed in the United States, 85% is recycled and 15% is landfilled. All plastics are landfilled in the United States.



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## 2. Life Cycle Assessment Background Information

### 2.1. Functional Unit

The functional unit according to the PCR varies according to the type of product but can be summarized as the amount of product required for one average LCN 4040XP Door Closer, installed in a North American standard building with an Estimated Service Life of 75 years as indicated in Table 3.

**Table 3: Functional Unit Details**

| NAME  | LCN 4040XP DOOR CLOSER           | UNIT  |
|---|----------------------------------|-------|
| Functional Unit                               | One unit of product for 75 years |       |
| Mass per functional unit, including fasteners | 20.03                            | kg    |
| Reference Service Life (RSL)                  | 25                               | years |

The fasteners needed for installation are supplied by the manufacturer with the product and therefore are accounted for together with the product.

### 2.2. System Boundary

The type of EPD is cradle-to-grave. All LCA modules are included and are summarized in Table 4.

**Table 4: Summary of Included Life Cycle Stages**

| MODULE NAME | DESCRIPTION                              | ANALYSIS PERIOD | SUMMARY OF INCLUDED ELEMENTS  |
|-------------|--|-----------------|---|
| A1          | Product Stage: Raw Material Supply       | 2019            | Raw Material sourcing and processing as defined by secondary data.  |
| A2          | Product Stage: Transport                 | 2019            | Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and estimated distance.                              |
| A3          | Product Stage: Manufacturing             | 2019            | Energy, water and material inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well. |
| A4          | Construction Process Stage: Transport    | 2019            | Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distances.                            |
| A5          | Construction Process Stage: Installation | 2019            | Installation materials, installation waste and packaging material waste.  |
| B1          | Use Stage: Use                           | 2019            | The usage of this product does not result in direct material impacts or emissions.  |
| B2          | Use Stage: Maintenance                   | 2019            | The maintenance of the products does not involve any consumption of energy or resources.  |
| B3          | Use Stage: Repair                        | 2019            | The product does not require repairing once installed.  |
| B4          | Use Stage: Replacement                   | 2019            | Total materials and energy required to manufacture the replacements needed to meet the functional unit.   |
| B5          | Use Stage: Refurbishment                 | 2019            | The products do not require refurbishment once installed.   |
| B6          | Operational Energy Use                   | 2019            | Operational energy consumption for door products are assumed per Part B Steel doors PCR.  |
| B7          | Operational Water Use                    | 2019            | The use of the products does not impact the operational water use of the building.  |



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| MODULE NAME | DESCRIPTION            | ANALYSIS PERIOD | SUMMARY OF INCLUDED ELEMENTS   |
|-------------|------------------------|-----------------|--|
| C1          | EOL: Deconstruction    | 2019            | No inputs required for deconstruction.   |
| C2          | EOL: Transport         | 2019            | Shipping from project site to landfill. Distance assumed to be 200 km from installation site to landfill.  |
| C3          | EOL: Waste Processing  | 2019            | Waste processing not required. All waste can be processed as is.   |
| C4          | EOL: Disposal          | 2019            | The disposal process of the product varies with the material type as per Part A Section 2.8.5. The impacts from landfilling and recycling are modeled based on secondary data. |
| D           | Benefits beyond system | N/A             | Module not declared  |

### 2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the LCA, the usage information was divided by the production in pieces to create an energy and water use per declared unit, i.e., one unit of product. Other assumptions are listed below:

- It is assumed that there is a 10% scrap loss rate of the input raw material while manufacturing all of Allegion’s products.
- It is assumed stamping is the manufacturing process of the upstream metal part when either the appropriate process wasn’t available or was unknown.
- Several proxies were chosen from materials within the model due to the lack of appropriate secondary data and have been described in the raw materials section.
- The use and selection of secondary datasets from GaBi – The selection of which generic dataset to use to represent an aspect of a supply chain is a significant value choice. Collaboration between LCA practitioners, Allegion associates and GaBi data experts was valuable in determining best-case scenarios in the selection of data. However, no generic data can be a perfect fit. Improved supply chain specific data would improve the accuracy of results, however budgetary and time constraints have to be taken into account.
- The installation tools are used enough times that the per unit of product impacts are negligible.

### 2.4. Cut-off Criteria

All inputs in which data was available were included. Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit.

There is no excluded material or energy input or output, except as noted below:

- Finishes which forms below 1% by mass of the total product weight per declared unit
- Loctite Threadlocker – 0.03%



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- As the tools used during the installation of the product are multi-use tools and can be reused after each installation, the per-functional unit impacts are considered negligible and therefore are not included. However, the electricity used to drill holes for installation has been included.
- Some material inputs may have been excluded within the secondary GaBi datasets used for this project. All GaBi datasets have been critically reviewed and conform to the exclusion requirements of the PCR.

## 2.5. Data Sources

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Primary data were collected by facility personnel and from utility bills and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production was utilized from GaBi 10.6.0.110, GaBi Database Version 2020.2.

## 2.6. Data Quality

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### Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Princeton, IL. This EPD uses country specific energy datasets that take into account US eGrid specific energy and transportation mixes. Overall geographic data quality is considered good.

### Time Coverage

Primary data were provided by Allegion associates and represent calendar year 2019. Using 2019 data meets the PCR requirement that manufacturer specific data be within the last 5 years. Time coverage of this data is considered very good. Data necessary to model cradle-to-gate unit processes was sourced from Sphera LCI datasets. All the datasets used in the model are within 5 years old except seven used for background modeling (six within 10 years and one of 11 years). All datasets rely on at least one 1-year average data. Overall time coverage of the datasets is considered good and meets the requirement of the PCR that all data be updated within a 10-year period. The specific time coverage of secondary datasets can be referenced in the dataset references table in the background LCA report.

### Technological Coverage

Primary data provided by Allegion are specific to the technology that the company uses in manufacturing their product. It is site specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process only energy and water use from the total energy use. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-grave unit processes was sourced from Sphera LCI datasets (GaBi). Technological coverage of the datasets is considered good relative to the actual supply chain of Allegion. While improved life cycle data from suppliers would improve technological coverage, the use of lower quality generic datasets does meet the goal of this EPD.

### Completeness

The data included is considered complete. The LCA model included all known material and energy flows, with the exception of what is listed in Section 2.4. As pointed out in that section, no known flows above 1% were excluded and the sum of all excluded flows totals less than 5%.



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## 2.7. Period under Review

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The period under review is calendar year 2019.

## 2.8. Allocation

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General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. To derive a per-unit value for manufacturing inputs such as electricity, thermal energy, and water, allocation based on total production in pieces was adopted. Discussions with Allegion staff divulged this was a more representative way to allocate the manufacturing inputs based on the manufacturing processes used and the types of products created. There are several other products that are assembled and packaged within the same facility. It is assumed that energy used for these purposes are the same across different products. Regarding secondary datasets, as a default, GaBi datasets use a physical mass basis for allocation.



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## 3. Life Cycle Assessment Scenarios<sup>1</sup>

**Table 5: Transport to the building site (A4)**

| NAME                               | LCN 4040XP DOOR CLOSER                               | UNIT           |
|------------------------------------|--|----------------|
| Fuel type                          | Diesel   | -              |
| Liters of fuel                     | 38.43  | l/100km        |
| Vehicle type                       | Truck – Trailer, basic enclosed / 50,000 lb. payload | -              |
| Transport distance                 | 1231   | km             |
| Capacity utilization               | 65   | %              |
| Weight of products transported     | 5.12   | kg             |
| Volume of products transported     | 113.56   | m <sup>3</sup> |
| Capacity utilization volume factor | 1  | -              |

**Table 6: Installation into the building (A5)**

| NAME  | LCN 4040XP DOOR CLOSER                                     | UNIT               |
|---|--|--------------------|
| Fasteners   | The fasteners for installation are accounted for in A1-A3. | kg                 |
| Waste material at the construction site before waste processing, generated by production installation | 1.92E-01   | kg                 |
| Plastic Recycling (15%)   | 9.75E-04   | kg                 |
| Plastic Landfilling (68%)   | 4.42E-03   | kg                 |
| Plastic Incineration (17%)  | 1.11E-03   | kg                 |
| Total Plastic Packaging Waste   | 6.50E-03   | kg                 |
| Pulp Recycling (75%)  | 1.39E-01   | kg                 |
| Pulp Landfilling (20%)  | 3.71E-02   | kg                 |
| Pulp Incineration (5%)  | 9.28E-03   | kg                 |
| Total Pulp Packaging Waste  | 1.86E-01   | kg                 |
| Biogenic carbon contained in packaging  | 3.03E-01   | kg CO <sub>2</sub> |
| Direct Emission to ambient air, soil, and water   | 0  | kg                 |
| VOC emission  | N/A  | µg/m <sup>3</sup>  |

<sup>1</sup> The tables for B1, B2, B3, B5, B6, and B7 are not included as these stages do not involve any flow input or output.



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**Table 7: Reference Service Life**

| NAME                          | LCN 4040XP DOOR CLOSER                          |       |
|-------------------------------|---|-------|
| RSL                           | 25 years  | years |
| Design application parameters | Installation per recommendation by manufacturer | -     |
| An assumed quality of work    | Accepted industry standard                      | -     |
| Indoor environment            | Normal building operating conditions            | -     |
| Use conditions                | Normal use conditions                           | -     |
| Maintenance                   | None required                                   | -     |

**Table 8: Replacement (B4)**

| NAME   | LCN 4040XP DOOR CLOSER | UNIT  |
|--|------------------------|-------|
| Reference Service Life                       | 25                     | Years |
| Replacement cycles ((ESL/RSL)-1)             | 2                      | #     |
| Replacement of worn parts                    | N/A                    | kg    |
| Further assumptions for scenario development | N/A                    | -     |

**Table 9: End of life (C1-C4)**

| NAME                                 | LCN 4040XP DOOR CLOSER   | UNIT        |
|--------------------------------------|--|-------------|
| Assumptions for scenario development | As per PCR Par B, the deconstruction of the hardware is manual. The deconstructed product is collected with mixed construction waste. As required by the PCR Par A, the waste classification is based on the RCRA for North American region, and the non-metal waste is 100% landfilled, while the metal waste is 85% recycled and 15% landfilled. |             |
| Collection process                   | Collected with mixed construction waste  | 4.93 kg     |
| Recovery                             | Non-Metal Landfilling (100%)   | 1.17 kg     |
|                                      | Metal Waste Recycling (85%)  | 3.19 kg     |
|                                      | Metal Waste Landfilling (15%)  | 5.64E-01 kg |
| Disposal                             | Product or material for final deposition   | 4.93 kg     |



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## 4. Life Cycle Assessment Results

Table 10: Description of the system boundary modules

|   | PRODUCT STAGE       |           |               | CONSTRUCTION PROCESS STAGE  |                  | USE STAGE |             |        |             |               |  |   | END OF LIFE STAGE |           |                  |          | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY |
|---|---------------------|-----------|---------------|-----------------------------|------------------|-----------|-------------|--------|-------------|---------------|--|---|-------------------|-----------|------------------|----------|---|
|   | A1                  | A2        | A3            | A4                          | A5               | B1        | B2          | B3     | B4          | B5            | B6   | B7  | C1                | C2        | C3               | C4       | D   |
|   | Raw material supply | Transport | Manufacturing | Transport from gate to site | Assembly/Install | Use       | Maintenance | Repair | Replacement | Refurbishment | Building Operational Energy Use During Product Use | Building Operational Water Use During Product Use | Deconstruction    | Transport | Waste processing | Disposal | Reuse, Recovery, Recycling Potential          |
| <b>Cradle to Grave</b>                    | X                   |           |               | X                           | X                | X         | X           | X      | X           | X             | X  | X   | X                 | X         | X                | X        | MND   |
| X = Included<br>MND = Module not declared |                     |           |               |                             |                  |           |             |        |             |               |  |   |                   |           |                  |          |   |



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## 4.1. LCN 4040XP Door Closers

The LCN 4040XP Series and 4040XPT Series Door Closers environmental impact indicators are within  $\pm 10\%$  of each other. The results for LCN 4040XP is reported as a representative.

| Impact Category                            | A1-A3    | A4        | A5       | B1       | B2       | B3       | B4       | B5       | B6       | B7       | C1       | C2        | C3       | C4       | D   |
|--|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|----------|-----|
| <b>CML Impacts (Europe, Rest of World)</b> |          |           |          |          |          |          |          |          |          |          |          |           |          |          |     |
| <b>GWP [kg CO2 eq]</b>                     | 1.71E+01 | 8.38E-01  | 4.71E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.62E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.21E-02  | 0.00E+00 | 4.89E-02 | MND |
| <b>ODP [kg CFC 11 eq]</b>                  | 7.76E-10 | 1.08E-16  | 7.12E-18 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.55E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.99E-18  | 0.00E+00 | 1.68E-16 | MND |
| <b>AP [kg SO2 eq]</b>                      | 3.02E-02 | 1.21E-03  | 5.02E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.35E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.37E-04  | 0.00E+00 | 2.07E-04 | MND |
| <b>EP [kg Phosphate eq]</b>                | 3.61E-03 | 3.25E-04  | 2.92E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.33E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.66E-05  | 0.00E+00 | 1.70E-04 | MND |
| <b>POCP [kg Ethene eq]</b>                 | 3.31E-03 | -2.83E-04 | 1.52E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.29E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -4.50E-05 | 0.00E+00 | 1.43E-04 | MND |
| <b>ADP-elements [kg Sb eq]</b>             | 4.66E-05 | 1.43E-07  | 8.72E-10 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.36E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.06E-08  | 0.00E+00 | 1.04E-08 | MND |
| <b>ADP-fossil fuel [MJ]</b>                | 1.79E+02 | 1.08E+01  | 5.35E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.83E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.99E-01  | 0.00E+00 | 6.09E-01 | MND |
| <b>TRACI Impacts (North America)</b>       |          |           |          |          |          |          |          |          |          |          |          |           |          |          |     |
| <b>AP [kg SO2 eq]</b>                      | 3.33E-02 | 1.58E-03  | 1.11E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.14E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.84E-04  | 0.00E+00 | 5.18E-04 | MND |
| <b>EP [kg N eq]</b>                        | 2.93E-03 | 2.32E-04  | 2.23E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.74E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.15E-05  | 0.00E+00 | 1.60E-04 | MND |
| <b>GWP [kg CO2 eq]</b>                     | 1.71E+01 | 8.38E-01  | 4.71E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.62E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.21E-02  | 0.00E+00 | 4.89E-02 | MND |
| <b>ODP [kg CFC 11 eq]</b>                  | 8.95E-10 | 1.08E-16  | 7.12E-18 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.79E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.99E-18  | 0.00E+00 | 1.68E-16 | MND |
| <b>Resources [MJ]</b>                      | 1.80E+01 | 1.59E+00  | 8.61E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.96E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.18E-01  | 0.00E+00 | 1.01E-01 | MND |
| <b>POCP [kg O3 eq]</b>                     | 5.13E-01 | 3.48E-02  | 6.47E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.12E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.14E-03  | 0.00E+00 | 4.96E-03 | MND |
| <b>Carbon Emissions and Uptake</b>         |          |           |          |          |          |          |          |          |          |          |          |           |          |          |     |
| <b>BCRP [kg CO2]</b>                       | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>BCEP [kg CO2]</b>                       | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>BCRK [kg CO2]</b>                       | 6.97E-01 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.39E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>BCEK [kg CO2]</b>                       | 0.00E+00 | 0.00E+00  | 7.56E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>BCEW [kg CO2]</b>                       | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>CCE [kg CO2]</b>                        | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>CCR [kg CO2]</b>                        | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |
| <b>CWNR [kg CO2]</b>                       | 1.13E-01 | 0.00E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.27E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00 | MND |

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| Impact Category                          | A1-A3    | A4       | A5       | B1       | B2       | B3       | B4       | B5       | B6       | B7       | C1       | C2       | C3       | C4       | D   |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----|
| <b>Resource Use Indicators</b>           |          |          |          |          |          |          |          |          |          |          |          |          |          |          |     |
| <b>RPR<sub>E</sub> [MJ]</b>              | 3.95E+01 | 5.04E-01 | 4.03E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.02E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.74E-02 | 0.00E+00 | 6.47E-02 | MND |
| <b>RPR<sub>M</sub> [MJ]</b>              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>RPR<sub>T</sub> [MJ]</b>              | 3.95E+01 | 5.04E-01 | 4.03E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.02E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.74E-02 | 0.00E+00 | 6.47E-02 | MND |
| <b>NRPR<sub>E</sub> [MJ]</b>             | 2.29E+02 | 1.19E+01 | 6.73E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.85E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.85E-01 | 0.00E+00 | 7.99E-01 | MND |
| <b>NRPR<sub>M</sub> [MJ]</b>             | 2.06E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.13E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>NRPR<sub>T</sub> [MJ]</b>             | 2.49E+02 | 1.19E+01 | 6.73E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.26E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.85E-01 | 0.00E+00 | 7.99E-01 | MND |
| <b>SM [kg]</b>                           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>RSF [MJ]</b>                          | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>NRSF [MJ]</b>                         | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>RE [MJ]</b>                           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>FW [m3]</b>                           | 8.37E-02 | 2.24E-03 | 4.59E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.73E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.66E-04 | 0.00E+00 | 1.13E-04 | MND |
| <b>Output Flows and Waste Categories</b> |          |          |          |          |          |          |          |          |          |          |          |          |          |          |     |
| <b>HWD [kg]</b>                          | 6.66E-04 | 2.04E-07 | 7.50E-10 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.33E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-08 | 0.00E+00 | 5.34E-09 | MND |
| <b>NHWD [kg]</b>                         | 5.98E-01 | 8.56E-04 | 3.39E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.65E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.34E-05 | 0.00E+00 | 1.19E+00 | MND |
| <b>HLRW [kg]</b>                         | 1.11E-05 | 3.25E-08 | 5.89E-10 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.22E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.41E-09 | 0.00E+00 | 7.89E-09 | MND |
| <b>ILLRW [kg]</b>                        | 9.38E-03 | 2.69E-05 | 4.98E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.88E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.99E-06 | 0.00E+00 | 6.76E-06 | MND |
| <b>CRU [kg]</b>                          | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>MR [kg]</b>                           | 2.99E-02 | 0.00E+00 | 1.40E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.81E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.74E+00 | 0.00E+00 | MND |
| <b>MER [kg]</b>                          | 4.61E-02 | 0.00E+00 | 1.04E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.13E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>EEE [MJ]</b>                          | 2.44E-01 | 0.00E+00 | 3.57E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.60E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>EET [MJ]</b>                          | 9.81E-02 | 0.00E+00 | 1.19E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.20E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |
| <b>EE [MJ]</b>                           | 3.43E-01 | 0.00E+00 | 4.76E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.80E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND |

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According to ISO 14025,  
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## 5. LCA Interpretation

Overall, the vast majority of impacts are found in B4, specifically due to the replacement requirements over the service life of a building. This follows the fact that with an RSL of 25 years, there are 2 replacements that need to occur during the 75 years of building operation. If the impacts from B4 are set aside to observe impacts from other phases, the Production Stage (A1-A3) emerges as a major contributor. This includes raw material extraction, raw material transportation, and product manufacturing.

## 6. Additional Environmental Information

### 6.1. Environment and Health During Manufacturing

Allegion meets all federal and state standards related to the Environment and Health during manufacturing. Beyond what is regulated, there are no additional environment and health considerations during the production of goods.

### 6.2. Environment and Health During Installation

The installation instruction that can be found on Allegion’s website should be referred to and followed to have proper and safe installation.

### 6.3. Environment and Health During Use

There are no environmental or health considerations during the use of the product.

### 6.4. Extraordinary Effects

Fire

LCN closers have been certified for three hours by UL to be in compliance with UL 10 C. Contact LCN for specific details on door closer fire ratings.

Mechanical Destruction

If the product is mechanically destroyed, it should be disposed of using standard procedures and replaced promptly.



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## 7. Supporting Documentation

The full text of the acronyms found in Section 4 are found in Table 11.

**Table 11: Acronym Key**

| ACRONYM        | TEXT  | ACRONYM   | TEXT  |
|----------------|---|-----------|---|
| LCA Indicators |   |           |   |
| ADP-elements   | Abiotic depletion potential for non-fossil resources  | GWP       | Global warming potential  |
| ADP-fossil     | Abiotic depletion potential for fossil resources  | OPD       | Depletion of stratospheric ozone layer  |
| AP             | Acidification potential of soil and water   | POCP      | Photochemical ozone creation potential  |
| EP             | Eutrophication potential  | Resources | Depletion of non-renewable fossil fuels   |
| LCI Indicators |   |           |   |
| PERE           | Use of renewable primary energy excluding renewable primary energy resources used as raw materials                  | PENRT     | Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) |
| PERM           | Use of renewable primary energy resources used as raw materials   | SM        | Use of secondary materials  |
| PERT           | Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) | RSF       | Use of renewable secondary fuels  |
| PENRE          | Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials          | NRSF      | Use of non-renewable secondary fuels  |
| PENRM          | Use of non-renewable primary energy resources used as raw materials   | FW        | Net use of fresh water  |
| HWD            | Disposed-of-hazardous waste   | MFR       | Materials for recycling   |
| NHWD           | Disposed-of non-hazardous waste   | MET       | Materials for energy recovery   |
| RWD            | Disposed-of Radioactive waste   | EEE       | Exported electrical energy  |
| CRU            | Components for reuse  | EET       | Exported thermal energy   |
|                |   | EE        | Exported energy   |



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LCN 4040XP/4040XPT Series Door Closers

According to ISO 14025,  
EN 15804 and ISO 21930:2017

## 8. References

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3. Product Category Rule Guidance for Building-Related Products and Services Part B: Builders Hardware EPD Requirements UL 10010-13 Version 1.0. UL Environment. 2019.
4. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
6. ISO 14044: 2006/ Amd 1:2017 Environmental Management – Life cycle assessment – Requirements and Guidelines – Amendment 1.
7. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
8. UL Environment General Program Instructions, March 2020, version 2.5.
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