Environmental Product Declaration

IVES – Aluminum Geared Continuous Hinges

IVES Aluminum Geared Continuous Hinge

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.

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.

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

ALLEGION

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

Allegion plc
IVES Aluminum Geared Continuous Hinges

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

PROGRAM OPERATOR	UL Environment 333 Pfingsten Road Northbrook, IL 60611
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.5 March 2020
MANUFACTURER NAME AND ADDRESS	Allegion plc 2720 Tobey Dr, Indianapolis, IN 46219
DECLARATION NUMBER	4789828313.119.1
DECLARED PRODUCT & FUNCTIONAL UNIT	One average Aluminum Geared Continuous hinge installed on a 3'x7' standard door for 75 years
REFERENCE PCR AND VERSION NUMBER	UL PCR Part A - Version 3.2 UL Part B Builders Hardware EPD Requirements
DESCRIPTION OF PRODUCT'S INTENDED APPLICATION AND USE	Installed on a door and a frame to connect the two components together and permit the door to swing
PRODUCT RSL DESCRIPTION	25 Years
MARKETS OF APPLIABILITY	Americas
DATE OF ISSUE	April 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 10.0.0.71
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@ul.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) ☐ INTERNAL ☒ EXTERNAL	Cooper McC 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

LIMITATIONS
Environmental declarations from different programs (ISO 14025) may not be comparable.

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.

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.

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

IVES offers a variety of Aluminum Geared Continuous hinges that will cover any need in commercial applications while also exceeding code requirements. Geared continuous hinges utilize a single gear section for the leaf and a separate gear section for the frame side of the door. The two are held in place together by a full-length cover channel and rotate on a series of bearings. It is important to consider the door width, thickness, weight, and clearance when choosing a hinge. With tested durability and consistent superior performance, IVES Aluminum Geared Continuous hinges get the job done. The products covered in the EPD include aluminum hinges with length ranging from 83" to 120". We've taken the approach to present results for the lightest and heaviest products in the IVES Aluminum Geared Continuous Hinge product line. Moreover, impacts from aluminum far exceed that of plastics such as polyethylene in this case. Results presented in the following sections represent worst case scenario in terms of impacts.

The products are manufactured at Indianapolis, IN facility in the US. It also accounts for international supply chains where relevant.

Figure 1: IVES Aluminum Geared Continuous Hinge

1.3. Technical Requirements

Table 1: Technical Details

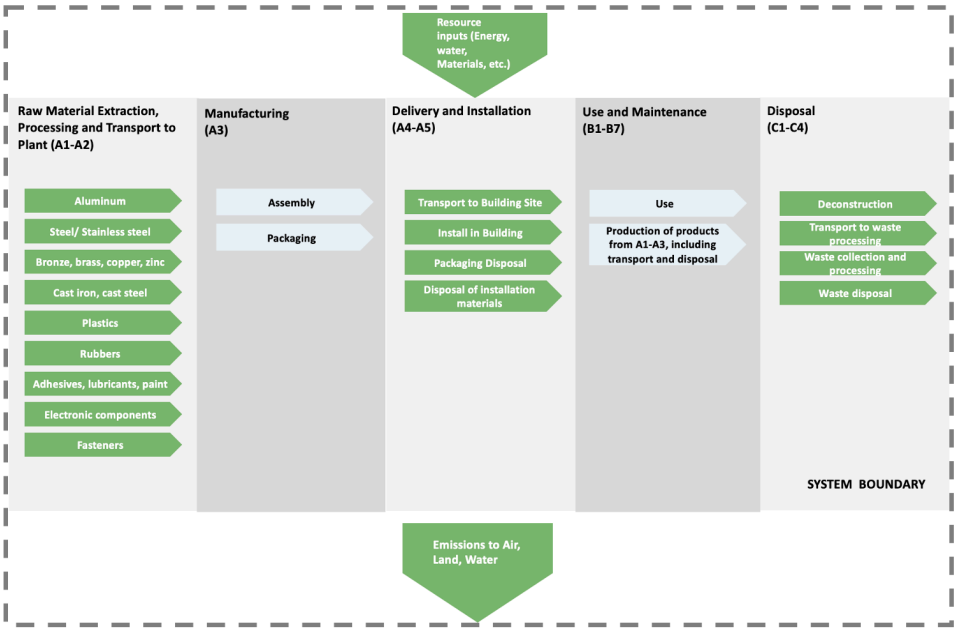
PARAMETER	ALUMINUM GEARED CONTINUOUS HINGES	UNIT
ANSI	A156.26, Grade 1	-

1.4. Application

These products can be used in commercial and residential 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 5. The reference service life (RSL) is outlined in Table 8. The cut-off criteria are described in 2.4 Cut-off Criteria, and the allocation procedures are described in 2.8 Allocation. 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.



1.6. Material Composition

The materials that make up one average IVES Aluminum Geared Continuous hinge are indicated in Table 1.

Table 2: Material Composition

Material	Aluminum Geared Continuous Hinges
Aluminum	97%
Polyethylene	3%
Total	**100%**

1.7. Properties of Declared Product as Shipped

For shipping, three hinges are packaged in an inner box and then packaged in cardboard cartons that each contains 8 inner boxes. These cartons then palletized (if order is sufficiently large enough) and shipped via UPS, FedEx, or a common carrier. Exact weight and type of packaging per product are provided by the product engineering team.

1.8. Manufacturing

IVES Aluminum Geared Continuous Hinges are manufactured in their entirety in Indianapolis, IN. Manufacturing includes extruding, machining, and anodizing of the aluminum to form the hinge design. Holes are then pressed out of the product so that screws can be used to fasten the product to the door and doorjamb. Plastic bearings are inserted into the gear sections and aluminum covers are used to secure the assembly. This plastic bearing is the only non-metal part. Products are shipped with material for mounting, including machine screws and mounting instructions.

1.9. Packaging

Packaging utilized in the shipment of the product is described in Table 3.

Table 3: Packaging

Material	Aluminum Geared Continuous Hinges	Unit	Disposal Pathway
Cardboard	8.89E-01	kg	Landfilled (20%), Incinerated (5%), Recycled (75%)
LLDPE	2.60E-02	kg	Landfilled (68%), Incinerated (17%), Recycled (15%)
Paper	1.70E-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. 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

IVES Aluminum Geared Continuous Hinges 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. However, potential recycling is calculated in Module D – Benefits Beyond 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.

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 architectural hinge along the entire length of the door, installed in a North American standard building with an Estimated Service Life of 75 years as indicated in Table 3.

Table 4: Functional Unit Details

NAME	ALUMINUM GEARED CONTINUOUS HINGES	UNIT
Functional Unit	One unit of product for 75 years	
Mass per functional unit, including fasteners	10.05	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.

Material	Aluminum Geared Hinge	Unit
Functional Unit	One Unit of Product for 75 years	kg
Mass per functional unit, including fasteners	2.39E+00	kg
Reference Service Life	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 5: 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.
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 impacts per unit of product 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.
- 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

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 10.0.0.71, GaBi Database Version 2020.2.

2.6. Data Quality

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Indianapolis, Indiana, USA. 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%.

2.7. Period under Review

The period under review is calendar year 2019.

2.8. Allocation

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.

Of relevance to the defined system boundary is the method in which recycled materials were handled. Throughout the study recycled materials were accounted for via the cut-off method. Under this method, impacts and benefits associated with the previous life of a raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at end of life are also excluded (i.e. production into a third

life or energy generation from the incineration plant). The study does include the impacts associated with reprocessing and preparation of recycled materials that are part of the bill of materials of the products under study.

3. Life Cycle Assessment Scenarios[1]

Table 6: Transport to the building site (A4)

Name	Aluminum Geared Continuous Hinges	Unit
Fuel type	Diesel	-
Liters of fuel	38.43	l/100km
Vehicle type	Truck – Trailer, basic enclosed / 50,000 lb. payload	-
Transport distance	1207	km
Capacity utilization	65	%
Weight of products transported	3.35E+00	kg
Volume of products transported	113.56	m^3
Capacity utilization volume factor	1	-

Table 7: Installation into the building (A5)

Name	Aluminum Geared Continuous Hinges	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	9.32E-01	kg
Pulp Recycling (75%)	6.79E-01	kg
Pulp Landfilling (20%)	1.81E-01	kg
Pulp Incineration (5%)	4.53E-02	kg
Total Pulp Packaging Waste	9.06E-01	kg
Biogenic carbon contained in packaging	1.48E+00	kg CO_2
Direct Emission to ambient air, soil, and water	0.00E+00	kg
VOC emission	N/A	$\mu g/m^3$

[1] The tables for B1, B2, B3, and B5 are not included as these stages do not involve any flow input or output.

Table 8: Reference Service Life

NAME	ALUMINUM GEARED CONTINUOUS HINGES	UNIT
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 9: Replacement (B4)

NAME	ALUMINUM GEARED CONTINUOUS HINGES	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 10: End of life (C1-C4)

NAME		ALUMINUM GEARED CONTINUOUS HINGES	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	2.42E+00	kg
Recovery	Non-Metal Landfilling (100%)	2.20E-01	kg
	Metal Waste Recycling (85%)	1.87E+00	kg
	Metal Waste Landfilling (15%)	3.30E-01	kg

4. Life Cycle Assessment Results

Table 11: Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION 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
Cradle to Grave	X			X	X	X	X	X	X	X	X	X	X	X	X	X	MND

X = Included
MND = Module not declared

4.1. LCA Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	CML Impacts (Europe, Rest of World)														
GWP [kg CO2 eq]	2.33E+01	5.44E-01	2.39E-01	0.00E+00	0.00E+00	0.00E+00	4.82E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-02	0.00E+00	1.85E-02	MND
ODP [kg CFC 11 eq]	2.11E-09	6.99E-17	3.41E-17	0.00E+00	0.00E+00	0.00E+00	4.22E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-18	0.00E+00	6.29E-17	MND
AP [kg SO2 eq]	1.38E-01	7.84E-04	3.41E-04	0.00E+00	0.00E+00	0.00E+00	2.79E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-05	0.00E+00	1.21E-04	MND
EP [kg Phosphate eq]	9.55E-03	2.55E-04	1.43E-04	0.00E+00	0.00E+00	0.00E+00	2.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-05	0.00E+00	4.15E-05	MND
POCP [kg Ethene eq]	7.48E-03	-1.83E-04	7.34E-05	0.00E+00	0.00E+00	0.00E+00	1.47E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.21E-05	0.00E+00	2.72E-05	MND
ADP-elements [kg Sb eq]	1.56E-05	9.87E-08	6.42E-09	0.00E+00	0.00E+00	0.00E+00	3.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-09	0.00E+00	7.33E-09	MND
ADP-fossil fuel [MJ]	2.83E+02	7.69E+00	3.17E-01	0.00E+00	0.00E+00	0.00E+00	5.83E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-01	0.00E+00	2.93E-01	MND
	TRACI Impacts (North America)														
AP [kg SO2 eq]	1.32E-01	1.03E-03	5.40E-04	0.00E+00	0.00E+00	0.00E+00	2.68E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.04E-05	0.00E+00	1.49E-04	MND
EP [kg N eq]	4.98E-03	1.50E-04	1.08E-04	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-05	0.00E+00	3.62E-05	MND
GWP [kg CO2 eq]	2.33E+01	5.43E-01	2.27E-01	0.00E+00	0.00E+00	0.00E+00	4.82E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-02	0.00E+00	1.84E-02	MND
ODP [kg CFC 11 eq]	2.27E-09	6.99E-17	3.41E-17	0.00E+00	0.00E+00	0.00E+00	4.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-18	0.00E+00	6.29E-17	MND
Resources [MJ]	2.59E+01	1.03E+00	4.14E-02	0.00E+00	0.00E+00	0.00E+00	5.41E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.78E-02	0.00E+00	3.80E-02	MND
POCP [kg O3 eq]	1.36E+00	2.25E-02	3.13E-03	0.00E+00	0.00E+00	0.00E+00	2.79E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-03	0.00E+00	1.68E-03	MND
	Carbon Emissions and Uptake														
BCRP [kg CO2]	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
BCEP [kg CO2]	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
BCRK [kg CO2]	3.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.03E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEK [kg CO2]	0.00E+00	0.00E+00	7.38E-01	0.00E+00	0.00E+00	0.00E+00	1.48E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEW [kg CO2]	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
CCE [kg CO2]	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
CCR [kg CO2]	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
CWNR [kg CO2]	4.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Resource Use Indicators														
RPR$_E$ [MJ]	1.12E+02	3.27E-01	1.94E-02	0.00E+00	0.00E+00	0.00E+00	2.24E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-02	0.00E+00	2.42E-02	MND
RPR$_M$ [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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RPR$_T$ [MJ]	1.12E+02	3.27E-01	1.94E-02	0.00E+00	0.00E+00	0.00E+00	2.24E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-02	0.00E+00	2.42E-02	MND
NRPR$_E$ [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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR$_M$ [MJ]	4.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR$_T$ [MJ]	3.07E+02	7.74E+00	3.23E-01	0.00E+00	0.00E+00	0.00E+00	6.32E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-01	0.00E+00	3.00E-01	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m3]	3.91E-01	1.45E-03	2.19E-04	0.00E+00	0.00E+00	0.00E+00	7.85E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-05	0.00E+00	4.26E-05	MND
	Output Flows and Waste Categories														
HWD [kg]	1.85E-03	1.32E-07	3.62E-09	0.00E+00	0.00E+00	0.00E+00	3.71E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.43E-09	0.00E+00	2.00E-09	MND
NHWD [kg]	4.90E+00	5.55E-04	1.61E-01	0.00E+00	0.00E+00	0.00E+00	1.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-05	0.00E+00	4.48E-01	MND
HLRW [kg]	1.15E-05	2.10E-08	2.82E-09	0.00E+00	0.00E+00	0.00E+00	2.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-09	0.00E+00	2.96E-09	MND
ILLRW [kg]	9.52E-03	1.74E-05	2.39E-06	0.00E+00	0.00E+00	0.00E+00	1.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.78E-07	0.00E+00	2.54E-06	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MR [kg]	1.57E-01	0.00E+00	6.83E-01	0.00E+00	0.00E+00	0.00E+00	5.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E+00	0.00E+00	MND
MER [kg]	1.89E-01	0.00E+00	4.97E-02	0.00E+00	0.00E+00	0.00E+00	4.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	1.00E+00	0.00E+00	1.69E-01	0.00E+00	0.00E+00	0.00E+00	2.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	4.03E-01	0.00E+00	5.60E-02	0.00E+00	0.00E+00	0.00E+00	9.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EE {MJ}	1.41E+00	0.00E+00	2.25E-01	0.00E+00	0.00E+00	0.00E+00	3.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

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 instructions 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

Allegion's Ives hinges are tested and approved to be UL 10C (3hr).

Mechanical Destruction

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

7. Supporting Documentation

The full text of the acronyms found in Section 4 are found in Table 12.

Table 12: 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

8. References

1. Life Cycle Assessment, Allegion, LCA for EPD Generation Tool Report for Allegion Builder's Hardware. WAP Sustainability Consulting. March 2021.
2. Product Category Rules for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL – 10010 Version 3.2. UL Environment. 2019.
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.
9. CML-IA Characterization Factors. 5 September 2016. https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterization-factors
10. Bare, J.C., G.A. Norris, D.W. Pennington, and T. McKone (2003). TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Journal of Industrial Ecology 6(3), pp. 49-78.
11. Bare, J., TRACI 2.0: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts 2.0. Clean Technologies and Environmental Policy 2011, 13, (5).
12. US Department of Energy, 2003. Energy Use in Selected Metalcasting Facilities. https://www.energy.gov/sites/prod/files/2013/11/f4/energyuseinselectedmetalcasting_5_2 8_04.pdf