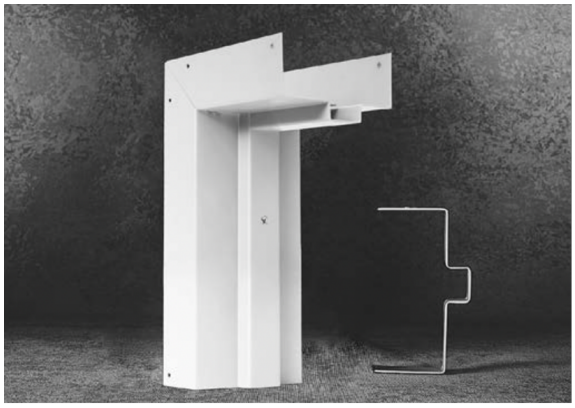
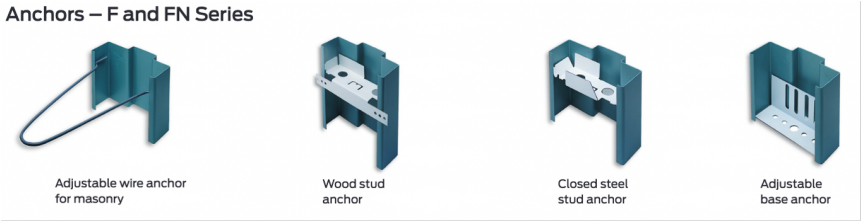
Environmental Product Declaration

C16 & F16 Steelcraft Door Frames



C16 Steelcraft Frame



F16 Steelcraft Frame

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

Allegion plc
C16 & F16 Steelcraft Door Frames

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

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611 https://www.ul.com/ https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.5 March 2020
MANUFACTURER NAME AND ADDRESS	Allegion plc 9017 Blue Ash Rd, Blue Ash, OH 45242
DECLARATION NUMBER	4789828313.102.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	C16 & F16 Steelcraft Door Frames; 1 installed commercial three-sided steel door frame that can fit a door with nominal dimension of 3-feet x 7-feet
REFERENCE PCR AND VERSION NUMBER	UL PCR Part A, version 3.2 2018 UL Part B Commercial Steel Doors and Frames, version 2.0 2020
DESCRIPTION OF PRODUCT APPLICATION/USE	Installed to provide support for a 3-feet x 7-feet door. Designed for both commercial and residential applications.
PRODUCT RSL DESCRIPTION (IF APPL.)	25 Years
MARKETS OF APPLICABILITY	North America, Europe, Global
DATE OF ISSUE	July 1, 2021
PERIOD OF VALIDITY	5 Year
EPD TYPE	Product-Specific
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Grave
YEAR(S) OF REPORTED PRIMARY DATA	2019
LCA SOFTWARE & VERSION NUMBER	GaBi ts Version 10.0.0.71
LCI DATABASE(S) & VERSION NUMBER	GaBi Content Version 2020.2
LCIA METHODOLOGY & VERSION NUMBER	CML 2001-Jan 2016 and TRACI 2.1

This PCR review was conducted by:	UL Environment PCR Review Panel epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a 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

Both the C16 and the F16 frames are steel door frames.

Steelcraft's C16 drywall frames are designed for light to maximum duty applications in both commercial and institutional buildings. They are installed in virtually all types of buildings for drywall applications where there is a desire to add custom architectural trim casing. These frames do not have backbends and have nail/screw attachment holes in the face. The C16 frames are typically welded and installed as part of the wall framing sequence using wood or steel stud anchors, building the wall up to the frame. C16 frames are made primarily of cold rolled steel.

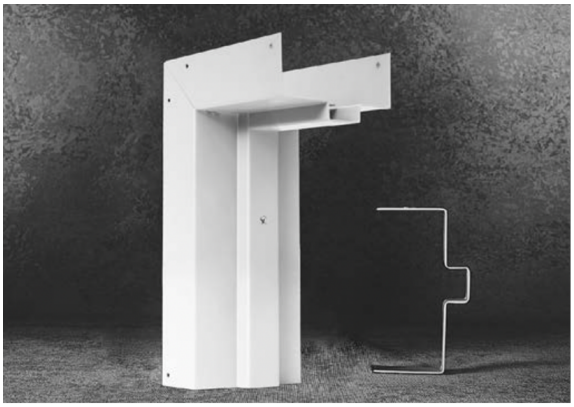


Figure 1: C16 Steelcraft Frame

The F16 three-sided flush frames are designed to be installed as part of the wall framing sequence for exterior and interior walls of wood stud, steel stud and masonry construction. Frames are manufactured from 16-gauge commercial-quality carbon steel in cold-rolled, A60 galvannealed and G90 galvanized steel. Flush frame corners in 16 gauge may lock together by bending over four integral tabs and may also be welded and ground smooth.

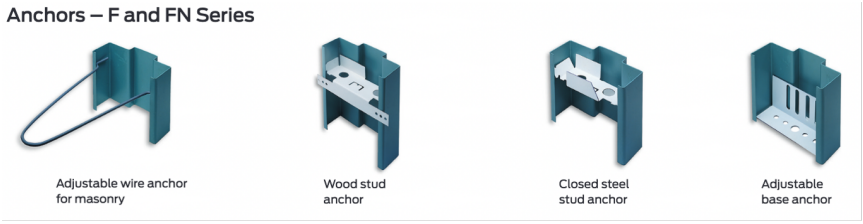


Figure 2: F16 Steelcraft Frames

Table 1: Technical Details

PARAMETER	VALUE	UNIT
Declared product properties	ANSI A250.8-2017 (SDI 100)	-
Fire Rating	ASTM E152, UL 10B, UL 10C	Compliant

The EPD presents product specific results for C16 and F16 steel door frames. Since this is a product specific EPD, there was no averaging method applied.

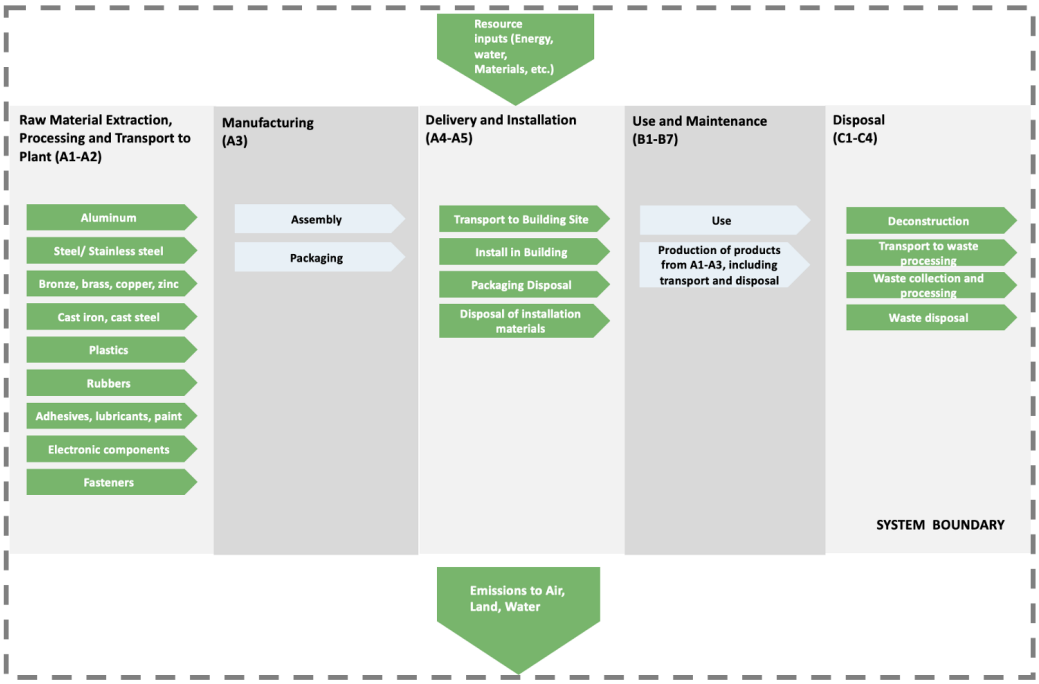
1.3. Application

Allegion's products can be used in both commercial and residential applications.

1.4. 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 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.



1.5. Material Composition

The materials that make up the F16 and C16 door frames are indicated in Table 2.

Table 2: Material Composition

MATERIAL	F16 FRAME	C16 FRAME
Paint	**1.10%**	**1.34%**
Stainless Steel	**0.04%**	**0.05%**
Steel	**98.86%**	**98.61%**

1.6. Properties of Declared Product as Delivered

Allegion's Steelcraft frames products are packaged with a variety of packaging materials including cardboard, paper (for labels and instructions), and polyethylene film. Exact weight and type of packaging per product are provided by the product engineering team.

1.7. Manufacturing

C16 and F16 Steelcraft door frames are manufactured at Allegion's Blue Ash, OH 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.

1.8. Packaging

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

Table 3: Packaging

MATERIAL	F16 AND C16 FRAME	UNIT	DISPOSAL PATHWAY
Cardboard	3.95E-01	kg	Landfilled (20%), Incinerated (5%), Recycled (75%)
LLDPE Film	2.23E-01	kg	Landfilled (68%), Incinerated (17%), Recycled (15%)
Paper	1.81E+00	kg	Landfilled (20%), Incinerated (5%), Recycled (75%)

1.9. Transportation

It is assumed that all raw materials are distributed by truck and ship, based on global region. An average distance using this information was calculated and used in the model.

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.

1.10. 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 *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment. 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.

1.11. Reuse, Recycling, and Energy Recovery

The F16 and the C16 steel door frames may be recycled or resued 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.

1.12. 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.

2. Life Cycle Assessment Background Information

2.1. Functional Unit

The functional unit for door frames is 1 installed commerical three-sided steel door frame that can fit a door with nominal dimension of 3'x7', installed in a North American standard building with an Estimate Service Life of 75 years, as indicated in Table 4.

Table 4: Functional Unit Details

Name	F16 Frame	C16 Frame	Unit
Functional Unit	One unit of product for 75 years		
Mass per functional unit, including fasteners	6.34E+01	5.51E+01	kg
Reference Service Life (RSL)	25	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 5.

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 frame products is 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.

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
- 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 Blue Ash, Ohio. 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 each supplemental 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 consider 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.

3. Life Cycle Assessment Scenarios[1]

Table 6: Transport to the building site (A4)

NAME	F16 FRAME	C16 FRAME	UNIT
Fuel type	Diesel	Diesel	-
Liters of fuel	38.43	38.43	l/100km
Vehicle type	Truck – Trailer, basic enclosed/ 50,000 lb. payload	Truck – Trailer, basic enclosed/ 50,000 lb. payload	-
Transport distance	1.26E+03	1.26E+03	km
Capacity utilization	65	65	%
Weight of products transported	3.38E+02	1.71E+02	kg
Volume of products transported	113.56	113.56	m^3
Capacity utilization volume factor	1	1	-

Table 7: Installation into the building (A5)

NAME	F16 FRAME	C16 FRAME	UNIT
Fasteners	The fasteners for installation are accounted for in A1-A3.		
Waste material at the construction site before waste processing, generated by production installation	2.43E+00	2.43E+00	kg
Pulp Recycling (75%)	1.65E+00	1.65E+00	kg
Pulp Landfilling (20%)	4.40E-01	4.40E-01	kg
Pulp Incineration (5%)	1.10E-01	1.10E-01	kg
Total Pulp Packaging Waste	2.20E+00	2.20E+00	kg
Plastic Recycling (75%)	3.34E-02	3.34E-02	kg
Plastic Landfilling (20%)	1.51E-01	1.51E-01	kg
Plastic Incineration (5%)	3.79E-02	3.79E-02	kg
Total Plastic Packaging Waste	2.23E-01	2.23E-01	kg
Biogenic carbon contained in packaging	3.96	3.96	kg CO_2

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

NAME	F16 FRAME	C16 FRAME	UNIT
VOC emission	N/A	N/A	µg/m^3

Table 8: Reference Service Life

NAME	F16 FRAME	C16 FRAME	
RSL	25 years	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	F16 FRAME	C16 FRAME	UNIT
Reference Service Life	25	25	Years
Replacement cycles ((ESL/RSL)-1)	2	2	#
Replacement of worn parts	N/A	N/A	kg
Further assumptions for scenario development	N/A	N/A	-

Table 10: End of life (C1-C4)

NAME		F16 FRAME	C16 FRAME	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	2.36E+01	2.08E+01	kg
Recovery	Non-metal Landfilling – 100%	2.66E+00	2.68E+00	kg
Recovery	Metal Waste Recycling (85%)	1.78E+01	1.54E+01	kg
	Metal Waste Landfilling (15%)	3.13E+00	2.72E+01	kg
Disposal	Product or material for final deposition	5.79E+00	5.40E+00	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. F16 Frame 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]	8.85E+01	3.98E+00	6.28E-01	0.00E+00	0.00E+00	0.00E+00	1.87E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-01	0.00E+00	1.38E-01	MND
ODP [kg CFC 11 eq]	5.20E-09	5.12E-16	1.02E-16	0.00E+00	0.00E+00	0.00E+00	1.04E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-17	0.00E+00	4.73E-16	MND
AP [kg SO2 eq]	1.78E-01	5.73E-03	6.26E-04	0.00E+00	0.00E+00	0.00E+00	3.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.86E-04	0.00E+00	5.84E-04	MND
EP [kg Phosphate eq]	1.84E-02	1.54E-03	3.77E-04	0.00E+00	0.00E+00	0.00E+00	4.13E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-04	0.00E+00	1.87E-04	MND
POCP [kg Ethene eq]	2.74E-02	-1.34E-03	2.07E-04	0.00E+00	0.00E+00	0.00E+00	5.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.93E-04	0.00E+00	6.86E-05	MND
ADP-elements [kg Sb eq]	1.51E-04	6.80E-07	1.20E-08	0.00E+00	0.00E+00	0.00E+00	3.04E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-08	0.00E+00	2.94E-08	MND
ADP-fossil fuel [MJ]	8.31E+02	5.12E+01	7.27E-01	0.00E+00	0.00E+00	0.00E+00	1.78E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E+00	0.00E+00	1.72E+00	MND
	TRACI Impacts (North America)														
AP [kg SO2 eq]	1.92E-01	7.51E-03	1.42E-03	0.00E+00	0.00E+00	0.00E+00	4.04E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.89E-04	0.00E+00	8.88E-04	MND
EP [kg N eq]	1.43E-02	1.10E-03	2.93E-04	0.00E+00	0.00E+00	0.00E+00	3.18E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-05	0.00E+00	1.49E-04	MND
GWP [kg CO2 eq]	8.85E+01	3.98E+00	6.28E-01	0.00E+00	0.00E+00	0.00E+00	1.87E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-01	0.00E+00	1.38E-01	MND
ODP [kg CFC 11 eq]	5.91E-09	5.12E-16	1.02E-16	0.00E+00	0.00E+00	0.00E+00	1.18E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-17	0.00E+00	4.73E-16	MND
Resources [MJ]	7.23E+01	7.55E+00	1.17E-01	0.00E+00	0.00E+00	0.00E+00	1.62E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-01	0.00E+00	2.86E-01	MND
POCP [kg O3 eq]	2.99E+00	1.65E-01	8.48E-03	0.00E+00	0.00E+00	0.00E+00	6.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-02	0.00E+00	1.17E-02	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]	7.35E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+01	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	9.00E-01	0.00E+00	0.00E+00	0.00E+00	1.80E+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]	2.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-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]	9.97E+01	2.39E+00	5.57E-02	0.00E+00	0.00E+00	0.00E+00	2.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-01	0.00E+00	1.82E-01	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]	9.97E+01	2.39E+00	5.57E-02	0.00E+00	0.00E+00	0.00E+00	2.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-01	0.00E+00	1.82E-01	MND
$NRPR_E$ [MJ]	1.15E+03	5.67E+01	9.24E-01	0.00E+00	0.00E+00	0.00E+00	2.43E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E+00	0.00E+00	2.25E+00	MND
$NRPR_M$ [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
$NRPR_T$ [MJ]	1.15E+03	5.67E+01	9.24E-01	0.00E+00	0.00E+00	0.00E+00	2.43E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E+00	0.00E+00	2.25E+00	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]	3.94E-01	1.07E-02	6.71E-04	0.00E+00	0.00E+00	0.00E+00	8.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.12E-04	0.00E+00	3.20E-04	MND
	Output Flows and Waste Categories														
HWD [kg]	3.54E-05	9.70E-07	9.85E-09	0.00E+00	0.00E+00	0.00E+00	7.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.49E-08	0.00E+00	1.51E-08	MND
NHWD [kg]	5.20E+00	4.07E-03	5.09E-01	0.00E+00	0.00E+00	0.00E+00	1.82E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-04	0.00E+00	3.37E+00	MND
HLRW [kg]	2.64E-05	1.54E-07	8.36E-09	0.00E+00	0.00E+00	0.00E+00	5.32E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-08	0.00E+00	2.22E-08	MND
ILLRW [kg]	2.23E-02	1.28E-04	7.08E-06	0.00E+00	0.00E+00	0.00E+00	4.49E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-06	0.00E+00	1.91E-05	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]	2.33E-01	0.00E+00	1.69E+00	0.00E+00	0.00E+00	0.00E+00	3.94E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E+01	0.00E+00	MND
MER [kg]	1.06E-01	0.00E+00	1.48E-01	0.00E+00	0.00E+00	0.00E+00	5.10E-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]	5.64E-01	0.00E+00	5.57E-01	0.00E+00	0.00E+00	0.00E+00	2.24E+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]	2.27E-01	0.00E+00	1.95E-01	0.00E+00	0.00E+00	0.00E+00	8.42E-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}	7.91E-01	0.00E+00	8.39E-02	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

4.2. C16 Frame 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]	8.01E+01	3.51E+00	6.28E-01	0.00E+00	0.00E+00	0.00E+00	1.69E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-01	0.00E+00	1.21E-01	MND
ODP [kg CFC 11 eq]	5.35E-09	4.52E-16	1.02E-16	0.00E+00	0.00E+00	0.00E+00	1.07E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-17	0.00E+00	4.16E-16	MND
AP [kg SO2 eq]	1.59E-01	5.05E-03	6.26E-04	0.00E+00	0.00E+00	0.00E+00	3.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.09E-04	0.00E+00	5.14E-04	MND
EP [kg Phosphate eq]	1.68E-02	1.36E-03	3.77E-04	0.00E+00	0.00E+00	0.00E+00	3.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	1.74E-04	MND
POCP [kg Ethene eq]	2.42E-02	-1.19E-03	2.07E-04	0.00E+00	0.00E+00	0.00E+00	4.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.67E-04	0.00E+00	7.12E-05	MND
ADP-elements [kg Sb eq]	1.37E-04	6.00E-07	1.20E-08	0.00E+00	0.00E+00	0.00E+00	2.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-08	0.00E+00	2.59E-08	MND
ADP-fossil fuel [MJ]	7.47E+02	4.52E+01	7.27E-01	0.00E+00	0.00E+00	0.00E+00	1.59E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E+00	0.00E+00	1.51E+00	MND
	TRACI Impacts (North America)														
AP [kg SO2 eq]	1.72E-01	6.63E-03	1.42E-03	0.00E+00	0.00E+00	0.00E+00	3.63E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-04	0.00E+00	8.00E-04	MND
EP [kg N eq]	1.30E-02	9.72E-04	2.93E-04	0.00E+00	0.00E+00	0.00E+00	2.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-05	0.00E+00	1.41E-04	MND
GWP [kg CO2 eq]	8.01E+01	3.51E+00	6.28E-01	0.00E+00	0.00E+00	0.00E+00	1.69E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-01	0.00E+00	1.21E-01	MND
ODP [kg CFC 11 eq]	6.09E-09	4.52E-16	1.02E-16	0.00E+00	0.00E+00	0.00E+00	1.22E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-17	0.00E+00	4.16E-16	MND
Resources [MJ]	6.94E+01	6.66E+00	1.17E-01	0.00E+00	0.00E+00	0.00E+00	1.54E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-01	0.00E+00	2.52E-01	MND
POCP [kg O3 eq]	2.70E+00	1.46E-01	8.48E-03	0.00E+00	0.00E+00	0.00E+00	5.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-02	0.00E+00	1.04E-02	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]	7.35E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+01	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	9.00E-01	0.00E+00	0.00E+00	0.00E+00	1.80E+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]	2.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-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]	9.75E+01	2.11E+00	5.57E-02	0.00E+00	0.00E+00	0.00E+00	2.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-01	0.00E+00	1.60E-01	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]	9.75E+01	2.11E+00	5.57E-02	0.00E+00	0.00E+00	0.00E+00	2.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-01	0.00E+00	1.60E-01	MND
$NRPR_E$ [MJ]	1.06E+03	5.01E+01	9.24E-01	0.00E+00	0.00E+00	0.00E+00	2.23E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E+00	0.00E+00	1.98E+00	MND
$NRPR_M$ [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
$NRPR_T$ [MJ]	1.06E+03	5.01E+01	9.24E-01	0.00E+00	0.00E+00	0.00E+00	2.23E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E+00	0.00E+00	1.98E+00	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]	3.54E-01	9.40E-03	6.71E-04	0.00E+00	0.00E+00	0.00E+00	7.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-04	0.00E+00	2.82E-04	MND
	Output Flows and Waste Categories														
HWD [kg]	3.53E-05	8.57E-07	9.85E-09	0.00E+00	0.00E+00	0.00E+00	7.25E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-08	0.00E+00	1.33E-08	MND
NHWD [kg]	4.64E+00	3.59E-03	5.09E-01	0.00E+00	0.00E+00	0.00E+00	1.62E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-04	0.00E+00	2.97E+00	MND
HLRW [kg]	2.62E-05	1.36E-07	8.36E-09	0.00E+00	0.00E+00	0.00E+00	5.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.96E-09	0.00E+00	1.96E-08	MND
ILLRW [kg]	2.21E-02	1.13E-04	7.08E-06	0.00E+00	0.00E+00	0.00E+00	4.45E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.42E-06	0.00E+00	1.68E-05	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]	2.33E-01	0.00E+00	1.69E+00	0.00E+00	0.00E+00	0.00E+00	3.46E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E+01	0.00E+00	MND
MER [kg]	1.06E-01	0.00E+00	1.48E-01	0.00E+00	0.00E+00	0.00E+00	5.10E-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]	5.64E-01	0.00E+00	5.57E-01	0.00E+00	0.00E+00	0.00E+00	2.24E+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]	2.27E-01	0.00E+00	1.95E-01	0.00E+00	0.00E+00	0.00E+00	8.42E-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}	7.91E-01	0.00E+00	8.39E-02	0.00E+00	0.00E+00	0.00E+00	1.75E+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 the frame's impacts are found in B4. This follows the fact that with an RSL of 25 years, there are two replacements that need to occur during the 75 years of building operation. This includes raw material extraction, manufacturing, distribution, install and end of life (for replaced product) for every replacement. In terms of raw materials, steel being energy intensive causes the largest environmental impact.

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

F16 and C16 frames meet the broadest fire rating requirements. They are listed for installations requiring compliance to both neutral pressure testing (ASTM E152 and UL-10B) and positive pressure standards (UL-10C). Steelcraft frames are available and can carry a UL, WH or FM label. The type of fire label (UL, WH or FM) is dictated by the specifications and local building code.

1. Frames are available in the ratings: 3 hours and 1.5 hour.
2. Frame and/or door series, wall and hardware applications affect the hourly rating of the opening.
3. Refer to the specific label type solution/entity for approved sizes.

Water

Should the product become flooded, the water should be removed by means of extraction and drying and the product should behave as originally intended. There are no environmental impacts associated with the product being flooded.

Mechanical Destruction

If the product is mechanically destroyed, it should be disposed 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

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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.
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