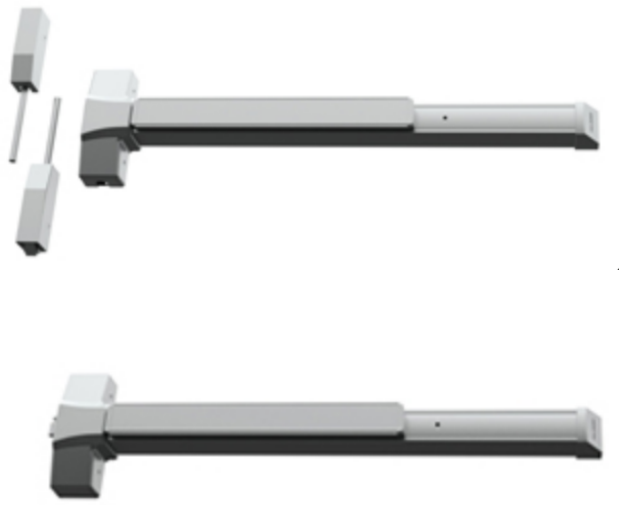
ENVIRONMENTAL PRODUCT DECLARATION

HAGER COMPANIES

EXIT DEVICES – 4500 SERIES



Extruded aluminum construction, stainless steel push bar cover, die cast caps ar
covers, and dead locking stainless steel Pullman type latchbolts provide premiur
security and performance at value pricing.

At Hager® we are concerned about how our company and products affect the environment. As a result, we've taken steps to minimize our footprint throughout the production process and product lifecycle.
These steps include reducing transportation through consolidation manufacturing and distribution, implementing scrap metal and corrugated product recycling efforts, emphasizing recycled content and working together with local communities to provide a clean environment.

Furthermore, Life Cycle Assessment (LCA) disclosure through Environmental Product Declarations (EPD) is a key element of our environmental impact reduction strategy.
LCA allows us to better understand the true burden of our products and EPDs allow us to share our results with our customers. As such, we are dedicated to completing LCAs and EPDs for all 13 of our product lines.
This document is a result of that dedication.

ENVIRONMENTAL PRODUCT DECLARATION

HAGER COMPANIES

According to ISO 14025, ISO 21930:2007 & EN 15804 to ISO 14025

Hager Companies – Exit Devices – 4500 Series

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Hager Companies
DECLARATION NUMBER	4788757275.103.1
DECLARED PRODUCT	Exit Devices-4500 Series
REFERENCE PCR	PCR for Product Group, Builders Hardware UL9004. Version: April 23rd, 2014
REFERENCE PCR STANDARD	☒ EN 15804 (2012) ☒ ISO 21930 (2007) ☐ ISO 21930 (2017)
DATE OF ISSUE PERIOD OF VALIDITY	January 1, 2019 5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications

The PCR review was conducted by:	PCR Peer Review Panel Chair: Dr. Lindita Bushi epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ 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 Gloria Thomas Gloria, Industrial Ecology Consultants

Product Description

Company

Founded in 1849, St. Louis-based Hager Companies offers more than 6,000 full-line quality door hardware products under one brand name. With 13 product lines including, commercial hinges, residential hinges, Roton® continuous geared hinges, stainless steel continuous hinges, exit devices, locks, door controls, auxiliary and trim, threshold and weather stripping, sliding door hardware, access control products, electrified solutions and Euroline, our European hardware line. Hager focuses on architectural hardware that exceeds today's building standards that are built to last. For additional information, visit www.hagerco.com.

Product

At Hager Companies, we know all about the importance of adding the finishing touches to your building projects. Hager 4500 Series Exit Devices are ideal for use in heavy duty commercial applications including office buildings, medical facilities, schools, and hospitality structures. The Hager 4500 Series is designed and engineered to provide a lifetime of superior performance on doors in heavy duty commercial applications. Properly applied and maintained Hager 4500 Series Exit Devices and Trim are backed by a lifetime warranty, providing peace of mind from distributor to building owner. Go to www.hagerco.com for specific warranty conditions. Hager 4500 Series Exit Devices are BHMA certified Grade 1 and meet Life Safety codes and Fire Safety requirements. The 4500 Series Rim and Surface Vertical Rod devices meet ANSI requirements to be listed as Severe Windstorm Components and are approved for High Velocity Hurricane Zone areas. Extruded aluminum construction, stainless steel push bar cover, die cast caps and covers, and dead locking stainless steel Pullman type latch bolts provide premium security and performance at value pricing.

Product Characterization

This product can be ordered from the manufacturer via phone, fax, email or online ordering. Product is shipped directly to customers or jobsites in packaging material that includes cardboard box, shipping labels and plastic materials. The amount of packaging materials is dependent on the size of the customer's order. No ancillary materials are necessary for installation or use.

Technical Information

Declared unit: One exit device per standard 3'0" x 7'0" door.

Application

The commercial applications ideal for these exit devices include schools, medical facilities, institutions and hospitals as well as office buildings and any entrance door with high foot traffic.

Delivery Status

For shipping, all exit devices are packaged individually in polyethylene film. In general, packaging for exit devices includes cardboard box, paper labels and fasteners. Box and paper labels are recyclable in most municipal recycling systems. Large orders may be bulk packaged prior to shipping.

Environment

Base Materials

Base materials include:

Material	Rim (% of Final Product)	SVR (% of Final Product)
Steel	47.00%	55.78%
Zinc Alloy	17.15%	12.68%
Aluminum	35.85%	31.26%
HDPE	0%	0.27%
Total	100%	100%

Manufacture

Hager's exit devices are manufactured in China. Hager's suppliers receives extruded metal and plastic parts from their suppliers. Subsequently, the extruded metal is cut and hole punched at the facility. These processes are automated within the plant. After this, the product undergoes deburring and edging manually. It is then packaged with fasteners, in this case, galvanized steel screws to be shipped to the US for transport to customer. The packaging includes a corrugated cardboard box and two labels. Any waste in the cutting process is captured and sold to recycler. Electricity, natural gas and some water is used in the process.

Environment and Health During Manufacturing

Hager meets all federal and state standards related to the Environment and Health during manufacturing. Additionally, Hager has taken further steps to reduce the environmental and health impacts of our manufacturing process. These steps include:

- Consolidated manufacturing and distribution efforts to reduce transportation (consuming less fuel and producing less emissions) and reducing inventory space (reducing our physical footprint).
- Implementing recycling efforts for scrap metals and corrugated products.
- Implemented a corporate headquarters recycling program that single streams the recycling of paper, plastic, glass, metal, and other materials (diverting such waste from the landfill)
- Further information is available here: https://www.hagerco.com/leed-green/initiative.

Packaging

For shipping, all exit devices are packaged individually in polyethylene film. In general, packaging for exit devices includes cardboard box, paper labels and fasteners. Box and paper labels are recyclable in most municipal recycling systems. Large orders may be bulk packaged prior to shipping.

Product Installation

Detailed installation instructions can be found online. While installation equipment is required to install the exit device product, it is not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible. All waste generated during installation, including packaging waste, is disposed of according to the tables found in Section 2.8.5 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment.

Environment and Health During Use

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

Re-use Stage

Hager products 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*.

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.

Further Information

At Hager, we are concerned about how our company and products affect the environment. As a result, we've taken steps to minimize our footprint throughout the production process and product lifecycle.

Hager's green initiatives include:

- Consolidated manufacturing and distribution efforts to reduce transportation (consuming less fuel and producing less emissions) and reducing inventory space (reducing our physical footprint)
- Implementing recycling efforts for scrap metals and corrugated products
- Using materials in the production of our products that are made of both pre- and post-consumer materials, enabling our customers to qualify for LEED® credits
- Work together with the communities in which it operates to provide a clean environment and support and provide positive contributions to the people and community
- Implemented a corporate headquarters recycling program that single streams the recycling of paper, plastic, glass, metal, and other materials (diverting such waste from the landfill)

We will continue to pursue and adopt procedures and processes to protect the health of our employees, customers/end users and the environment.

Life Cycle Assessment

Declared Unit

All values shown in the table below are for a standard North American 3'x7' door.

Name	4500 Series (Rim)	4500 Series (SVR)	Unit
Exit Device (piece)	1	1	piece
Weight per Declared Unit, excluding fasteners (kg)	4.946	6.688	kg
Fasteners (kg)	0.11	0.226	kg
Declared Unit (kg)	5.064	6.915	kg

System Boundary

An LCA for products in which a functional life is not declared can be one of three options. These options include a Cradle to Shipping Gate LCA, a Cradle to Building LCA or a Cradle to Building-with EOL Stage LCA.

This particular LCA is a Cradle to Building with EOL stage LCA.

A summary of the life cycle stages included in this LCA is presented in the following table.

Module Name	Description	Summary of Included Elements
A1	Product Stage: Raw Material Supply	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and mapped distance.
A3	Product Stage: Manufacturing	Energy, water and material inputs required for manufacturing from raw materials. Packaging Materials included as well.
A4	Construction Process Stage: Transport	Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distance.
A5	Construction Process Stage: Installation	Installation and packaging material waste.
B1	Use Stage: Use	Use stage impacts are not assessed in this study.
B2	Use Stage: Maintenance	Use stage impacts are not assessed in this study.
B3	Use Stage: Repair	Use stage impacts are not assessed in this study.
B4	Use Stage: Replacement	Use stage impacts are not assessed in this study.
B5	Use Stage: Refurbishment	Use stage impacts are not assessed in this study.
B6	Use Stage: Operational Energy Use	Use stage impacts are not assessed in this study.
B7	Use Stage: Operational Water Use	Use stage impacts are not assessed in this study.
C1	EOL: Deconstruction	No inputs required for deconstruction.
C2	EOL: Transport	Shipping from project site to landfill. Fuel use requirements estimated based on product weight and estimated distance.
C3	EOL: Waste Processing	Waste processing not required. All waste can be processed as is.
C4	EOL: Disposal	Assumes all products are sent to landfill. Landfill impacts modeled based on secondary data.
D	Benefits beyond system	Accounts for the avoided burden beyond the system boundary associated with sourcing raw steel and aluminum. Subtracted from these benefits are the impacts outside the system boundary associated with processing the recycled content prior to use.

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 to create an energy and water use per unit of product. As there are different products produced at this facility, it is assumed all products are using the same amount of energy. Another assumption is that the installation tools are used enough times that the per declared unit impacts are negligible.

Recycled content – Hager products may contain recycled content, most notably recycled steel and aluminum, which are two of the most recycled materials throughout the globe. The specific amount of recycled content may vary based on the availability of materials to suppliers at the time of sourcing. Data sets sourced from GaBi include assumptions based on typical aluminum and steel recycled content and have been calculated based on expert evaluation and critical review. It was determined appropriate and a conservative approach to use default recycled content values in the GaBi aluminum and steel datasets.

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 declared unit.
The excluded materials include:

- Any optional topical finish on the product was excluded from the study

Background Data

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 Database Version 8.7, Service Pack 36.

Data Quality

The geographical scope of the manufacturing portion of the life cycle is China. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represent all information for calendar year 2017. Using this data meets the PCR requirements. Time coverage of this data is considered very good. Primary data provided by the manufacturer is specific to the technology that Hager 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 would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets. Improved life cycle data from suppliers would improve technological coverage.

Allocation Procedures

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis. Allocation was most prevalent in the secondary GaBi datasets used to represent upstream processes. As a default, GaBi datasets use a physical mass basis for allocation.

LCA Results

The following tables disclose the life cycle results for exit devices. Impact categories were determined through reference to the BHMA Product Category Rules for Builders Hardware (UL9004).

Description of the System Boundary (X=included in LCA; MND=module not declared)

Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational Water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X			X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

TRACI 2.1

Table 1: North American Impact Assessment Results for Rim Exit Devices (4500 Series)

Results of the LCA - Environmental Impact, TRACI 2.1									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Air, incl. biogenic carbon	[kg CO2-Equiv.]	1.98E+01	1.67E+00	6.77E-01	0.00E+00	3.18E-02	0.00E+00	3.40E-02	0.00E+00
Ozone Depletion Air	[kg CFC 11-Equiv.]	7.89E-10	5.07E-14	2.18E-13	0.00E+00	2.26E-16	0.00E+00	6.26E-15	0.00E+00
Acidification	[kg SO2-Equiv.]	9.81E-02	2.17E-02	2.69E-03	0.00E+00	6.12E-05	0.00E+00	1.91E-04	0.00E+00
Eutrophication	[kg N-Equiv.]	4.15E-03	9.34E-04	2.36E-04	0.00E+00	3.22E-06	0.00E+00	2.13E-05	0.00E+00
Smog Air	[kg O3-Equiv.]	1.02E+00	4.59E-01	2.17E-02	0.00E+00	6.11E-02	0.00E+00	6.82E-02	0.00E+00
Abiotic Depletion for fossil resources	[MJ surplus energy]	1.72E+01	3.04E+00	3.38E-01	0.00E+00	6.11E-02	0.00E+00	6.82E-02	0.00E+00

Table 2: North American Impact Assessment Results for SVR Exit Devices (4500 Series)

Results of the LCA - Environmental Impact, TRACI 2.1									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Air, incl. biogenic carbon	[kg CO2-Equiv.]	2.52E+01	2.17E+00	1.06E+00	0.00E+00	4.33E-02	0.00E+00	4.62E-02	0.00E+00
Ozone Depletion Air	[kg CFC 11-Equiv.]	9.29E-10	6.57E-14	4.39E-13	0.00E+00	3.07E-16	0.00E+00	8.50E-15	0.00E+00
Acidification	[kg SO2-Equiv.]	1.18E-01	2.82E-02	4.99E-03	0.00E+00	8.31E-05	0.00E+00	2.59E-04	0.00E+00
Eutrophication	[kg N-Equiv.]	4.70E-03	1.21E-03	3.12E-04	0.00E+00	4.38E-06	0.00E+00	2.89E-05	0.00E+00
Smog Air	[kg O3-Equiv.]	1.25E+00	5.95E-01	4.42E-02	0.00E+00	1.61E-03	0.00E+00	4.24E-03	0.00E+00
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.01E+01	3.94E+00	6.40E-01	0.00E+00	8.30E-02	0.00E+00	9.26E-02	0.00E+00

CML 2001 - Jan 2016

Table 3: EU Impact Assessment Results for Rim Exit Devices (4500 Series)

Results of the LCA - Environmental Impact, CML 2001 - Jan 2016									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	[kg CO2-Equiv.]	1.98E+01	1.67E+00	6.88E-01	0.00E+00	3.19E-02	0.00E+00	3.42E-02	0.00E+00
Ozone Layer Depletion Potential	[kg R11-Equiv.]	7.42E-10	5.07E-14	2.18E-13	0.00E+00	2.26E-16	0.00E+00	6.26E-15	0.00E+00
Acidification Potential	[kg SO2-Equiv.]	1.02E-01	1.98E-02	2.61E-03	0.00E+00	5.08E-05	0.00E+00	1.46E-04	0.00E+00
Eutrophication Potential	[kg Phosphate-Equiv.]	7.16E-03	2.58E-03	3.16E-04	0.00E+00	9.26E-06	0.00E+00	3.28E-05	0.00E+00
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	8.12E-03	1.18E-03	2.36E-04	0.00E+00	-9.96E-06	0.00E+00	1.29E-05	0.00E+00
Abiotic Depletion	[kg Sb-Equiv.]	3.32E-03	2.75E-07	2.31E-05	0.00E+00	1.13E-09	0.00E+00	1.47E-08	0.00E+00
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.28E+02	2.26E+01	4.03E+00	0.00E+00	4.31E-01	0.00E+00	5.31E-01	0.00E+00

Table 4: EU Impact Assessment Results for SVR Exit Devices (4500 Series)

Results of the LCA - Environmental Impact, CML 2001 - Jan 2016									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	[kg CO2-Equiv.]	2.52E+01	2.17E+00	1.08E+00	0.00E+00	4.33E-02	0.00E+00	4.65E-02	0.00E+00
Ozone Layer Depletion Potential	[kg R11-Equiv.]	8.74E-10	6.57E-14	4.40E-13	0.00E+00	3.07E-16	0.00E+00	8.50E-15	0.00E+00
Acidification Potential	[kg SO2-Equiv.]	1.23E-01	2.56E-02	5.04E-03	0.00E+00	6.91E-05	0.00E+00	1.98E-04	0.00E+00
Eutrophication Potential	[kg Phosphate-Equiv.]	8.51E-03	3.34E-03	4.53E-04	0.00E+00	1.26E-05	0.00E+00	4.46E-05	0.00E+00
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	9.83E-03	1.53E-03	3.57E-04	0.00E+00	-1.35E-05	0.00E+00	1.75E-05	0.00E+00
Abiotic Depletion	[kg Sb-Equiv.]	3.32E-03	3.56E-07	4.44E-05	0.00E+00	1.54E-09	0.00E+00	2.00E-08	0.00E+00
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.80E+02	2.93E+01	8.63E+00	0.00E+00	5.85E-01	0.00E+00	7.21E-01	0.00E+00

Table 5: Resource Use for Rim Exit Devices (4500 Series)

Results of the LCA - Resource Use									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	9.56E+01	3.92E-01	8.20E-01	0.00E+00	2.38E-03	0.00E+00	3.84E-02	0.00E+00
PERM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ, net calorific value	9.56E+01	3.92E-01	8.20E-01	0.00E+00	2.38E-03	0.00E+00	3.84E-02	0.00E+00
PENRE	MJ, net calorific value	2.46E+02	2.27E+01	4.50E+00	0.00E+00	4.31E-01	0.00E+00	5.45E-01	0.00E+00
PENRM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	2.46E+02	2.27E+01	4.50E+00	0.00E+00	4.31E-01	0.00E+00	5.45E-01	0.00E+00
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
RSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	3.11E-01	1.87E-03	2.51E-03	0.00E+00	8.32E-06	0.00E+00	6.59E-05	0.00E+00

Table 6: Resource Use for SVR Exit Devices (4500 Series)

Results of the LCA - Resource Use									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	1.07E+02	5.09E-01	1.71E+00	0.00E+00	3.23E-03	0.00E+00	5.22E-02	0.00E+00
PERM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ, net calorific value	1.07E+02	5.09E-01	1.71E+00	0.00E+00	3.23E-03	0.00E+00	5.22E-02	0.00E+00
PENRE	MJ, net calorific value	2.99E+02	2.94E+01	9.54E+00	0.00E+00	5.86E-01	0.00E+00	7.40E-01	0.00E+00
PENRM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	2.99E+02	2.94E+01	9.54E+00	0.00E+00	5.86E-01	0.00E+00	7.40E-01	0.00E+00
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
RSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	3.58E-01	2.43E-03	5.28E-03	0.00E+00	1.13E-05	0.00E+00	8.96E-05	0.00E+00

Key			
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

Outputs and Waste

Table 7: Waste and Output Flow for Rim Exit Devices (4500 Series)

Results of the LCA - Waste and Output Flows									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	4.02E-02	4.32E-08	1.63E-08	0.00E+00	5.05E-09	0.00E+00	1.29E-09	0.00E+00
NHWD	Kg	6.64E+00	2.09E-04	4.87E-01	0.00E+00	2.44E-05	0.00E+00	5.35E-01	0.00E+00
RWD	Kg	4.99E-03	1.22E-05	3.78E-05	0.00E+00	1.43E-06	0.00E+00	3.85E-06	0.00E+00
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
MFR	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
MET	Kg	0.00E+00	0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ, net calorific value	0.00E+00	0.00E+00	1.58E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ, net calorific value	0.00E+00	0.00E+00	1.58E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 8: Waste and Output Flow for SVR Exit Devices (4500 Series)

Results of the LCA - Waste and Output Flows									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	2.50E-02	1.47E-07	3.36E-08	0.00E+00	8.19E-11	0.00E+00	2.55E-09	0.00E+00
NHWD	Kg	4.50E+00	8.48E-04	5.60E-01	0.00E+00	5.25E-06	0.00E+00	1.05E+00	0.00E+00
RWD	Kg	7.75E-03	5.96E-05	3.56E-04	0.00E+00	1.81E-07	0.00E+00	7.60E-06	0.00E+00
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
MFR	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
MET	Kg	0.00E+00	0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ, net calorific value	0.00E+00	0.00E+00	1.58E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ, net calorific value	0.00E+00	0.00E+00	1.58E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Key			
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

Comparability of EPDs

The comparison of the environmental performance of Builder's Hardware using the EPD information shall be based on the product's use in and it's impacts on or within the building, and shall consider the complete life cycle with all information modules.

Results presented in this EPD are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks. Results are not intended to be used to determine superiority of one product over another. Environmental declarations from different programs may not be comparable.

Life Cycle Assessment Interpretation

A Dominance Analysis evaluates each life cycle stage and compares the impacts from that stage to the sum of the impacts calculated for all declared modules. A Dominance Analysis was completed for the CML results. Module D was excluded from the Dominance Analysis.

Table 9: Dominance Analysis – Rim Exit Devices (4500 Series)

Dominance Analysis - Environmental Impact, CML 2001 - Jan 2016									
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
Global Warming Potential	[kg CO2-Equiv.]	89%	8%	3%	MND	0%	0%	0%	0%
Ozone Layer Depletion Potential	[kg R11-Equiv.]	100%	0%	0%	MND	0%	0%	0%	0%
Acidification Potential	[kg SO2-Equiv.]	82%	16%	2%	MND	0%	0%	0%	0%
Eutrophication Potential	[kg Phosphate-Equiv.]	71%	26%	3%	MND	0%	0%	0%	0%
Photochemical Ozone Creation Potential	[kg Ethene-Equiv.]	85%	12%	2%	MND	0%	0%	0%	0%
Abiotic Depletion	[kg Sb-Equiv.]	99%	0%	1%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	89%	9%	2%	MND	0%	0%	0%	0%

Table 10: Dominance Analysis – SVR Exit Devices (4500 Series)

Dominance Analysis - Environmental Impact, CML 2001 - Jan 2016									
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
Global Warming Potential	[kg CO2-Equiv.]	88%	8%	4%	MND	0%	0%	0%	0%
Ozone Layer Depletion Potential	[kg R11-Equiv.]	100%	0%	0%	MND	0%	0%	0%	0%
Acidification Potential	[kg SO2-Equiv.]	80%	17%	3%	MND	0%	0%	0%	0%
Eutrophication Potential	[kg Phosphate-Equiv.]	69%	27%	4%	MND	0%	0%	0%	0%
Photochemical Ozone Creation Potential	[kg Ethene-Equiv.]	84%	13%	3%	MND	0%	0%	0%	0%
Abiotic Depletion	[kg Sb-Equiv.]	99%	0%	1%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	88%	9%	3%	MND	0%	0%	0%	0%

The dominance analysis shows that the manufacturing stage (A1-A3) of the life cycle is responsible for the majority of impacts (87%, on average) across all impact categories. A1-A3 includes the extraction, processing a nd sourcing of all materials. The second most impactful stage is transportation to customer (A4). This is mainly due to the manufacturing being done overseas in China and then being transported to customers in the US. In the sourcing, extraction and manufacturing stage, steel and aluminum contributes to around 21-27% and 46-50% of the overall GWP impacts respectively in both product groups. Apart from manufacturing inputs, shipping to customer and fasteners at installation contribute 7.4% and 1.8-2.8% respectively of total impacts for both product groups.

References

1. Life Cycle Assessment, Hager, LCA Report for Hager Exit Devices. WAP Sustainability Consulting. December 2018.
2. Product Category Rule (PCR) for preparing an Environmental Product Declaration (EPD) for Product Group, Builders Hardware UL9004. Version: April 3rd, 2014.
3. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
4. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
5. ISO 21930:2007 Sustainability in building construction -- Environmental declaration of building products.
6. Hager's Green Initiatives. (2018, July 24). Retrieved from https://www.hagerco.com/leed-green/initiatives
7. European Standard DIN EN 15804: 2012.04+A1 2013. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products (includes Amendment A1:2013)