ENVIRONMENTAL PRODUCT DECLARATION

HAGER COMPANIES

PULLS

At Hager Companies, we know all about the importance of adding the finishing touches to your building projects. That's why we're proud to offer a wide range of trim & auxiliary door hardware products and protection plates in a variety of designs, sizes, and finishes that not only look great, but also provide long-lasting wear in any application.

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

Hager Companies – Pulls and Cylinder Pulls

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

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	4788587918.101.1
DECLARED PRODUCT	Pulls and Cylinder Pulls
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	September 25, 2018 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

ENVIRONMENTAL PRODUCT DECLARATION

Hager Companies – Pulls and Cylinder Pulls

According to ISO 14025

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. That's why we're proud to offer a wide range of trim & auxiliary door hardware products in a variety of designs, sizes, and finishes that not only look great, but also provide long-lasting wear in any application. Hager Companies delivers custom door pulls made to customer specifications, or can be chosen from a collection of pull designs. Hager's comprehensive selection of door pull hardware includes standard push/pull bars or multiple push bar combinations with center-to-centers made to order. These push/ pulls bars enable the opening/ closing of doors in a single direction or both as required. These trim and auxiliary devices are available in various base materials and finishes as well.

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

Functional unit: One trim and auxiliary product per standard 3'0" x 7'0" door.

Application

Hager's trim and auxiliary products are available for many types of door applications, including commercial application such as offices, retail spaces and educational institutions.

Delivery Status

For shipping, all pulls are packaged individually in polyethylene film. In general, packaging for Hager cylinder pulls and pulls 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	% of Final Product
Stainless steel/ Brass	54.27-73.10%
Brass Fasteners	1.66-2.51%
Cardboard	24.81-43.19%
Paper	0.04-0.43%

Manufacture

Hager trim and auxiliary products are manufactured at Hager's Montgomery, Alabama plant. Hager receives extruded metal and plastic parts from 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, brass screws. 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.
- A wastewater pre-treatment facility at our Montgomery, Alabama, manufacturing plant that removes 98.5 percent of the soluble metals created during the manufacturing process and significantly reduces water consumption.
- 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/initiatives

Packaging

For shipping, all pulls are packaged individually in polyethylene film. In general, packaging for Hager cylinder pulls and pulls 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 pull 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
- A wastewater pre-treatment facility at our Montgomery, Alabama, manufacturing plant that removes 98.5 percent of the soluble metals created during the manufacturing process and significantly reduces water consumption
- 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	Cylinder Pull	Pulls (Brass Option)	Pulls (Steel Option)	Unit
Pull (piece)	1	1	1	piece
Weight per Declared Unit, excluding fasteners (kg)	0.137	0.589	1.201	kg
Fasteners (kg)	0	0.027	0.027	kg
Declared Unit (kg)	0.137	0.616	1.228	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	No inputs required for use.
B2	Use Stage: Maintenance	Annual greasing recommended, however impacts not addressed in study.
B3	Use Stage: Repair	Product typically not repaired. Replacement more likely.
B4	Use Stage: Replacement	Replacement will occur, however replacement cycle is not defined.
B5	Use Stage: Refurbishment	Product is typically not refurbished.
B6	Use Stage: Operational Energy Use	Electricity not utilized during use phase.
B7	Use Stage: Operational Water Use	Water not utilized during use phase.
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. Any optional topical finish on the product was excluded from the study. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the declared unit.

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 Montgomery, Alabama. 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 and 2018. 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 pulls and cylinder pulls. 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 Brass Pulls

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.]	1.35E+00	5.74E-02	2.32E-01	0.00E+00	4.86E-03	0.00E+00	1.66E-02	-6.05E-01
Ozone Depletion Air	[kg CFC 11-Equiv.]	2.21E-12	1.98E-15	3.87E-14	0.00E+00	1.66E-16	0.00E+00	3.05E-15	4.28E-09
Acidification	[kg SO2-Equiv.]	5.68E-03	2.31E-04	1.07E-03	0.00E+00	1.94E-05	0.00E+00	9.29E-05	-1.19E-03
Eutrophication	[kg N-Equiv.]	6.53E-04	1.95E-05	2.60E-04	0.00E+00	1.64E-06	0.00E+00	1.03E-05	-4.82E-05
Smog Air	[kg O3-Equiv.]	6.98E-02	7.54E-03	7.26E-03	0.00E+00	6.35E-04	0.00E+00	1.52E-03	-1.68E-02
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.62E+00	1.09E-01	9.41E-02	0.00E+00	9.18E-03	0.00E+00	3.32E-02	9.70E-02

Table 2: North American Impact Assessment Results for Steel Pulls

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.]	2.50E+00	1.52E-01	3.83E-01	0.00E+00	1.58E-02	0.00E+00	5.40E-02	-1.97E+00
Ozone Depletion Air	[kg CFC 11-Equiv.]	2.26E-07	5.21E-15	7.30E-14	0.00E+00	5.43E-16	0.00E+00	9.94E-15	1.40E-08
Acidification	[kg SO2-Equiv.]	3.04E-02	6.09E-04	1.60E-03	0.00E+00	6.34E-05	0.00E+00	3.03E-04	-3.87E-03
Eutrophication	[kg N-Equiv.]	5.42E-03	5.12E-05	3.57E-04	0.00E+00	5.34E-06	0.00E+00	3.38E-05	-1.57E-04
Smog Air	[kg O3-Equiv.]	1.29E-01	1.98E-02	1.01E-02	0.00E+00	2.07E-03	0.00E+00	4.96E-03	-5.48E-02
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.39E+00	2.87E-01	1.29E-01	0.00E+00	2.99E-02	0.00E+00	1.08E-01	3.16E-01

Table 3: North American Impact Assessment Results for Bronze Pulls

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.]	1.40E+01	2.43E-01	1.32E-01	0.00E+00	3.28E-02	0.00E+00	1.12E-01	0.00E+00
Ozone Depletion Air	[kg CFC 11-Equiv.]	4.29E-07	8.35E-15	1.12E-11	1.00E+00	1.13E-15	0.00E+00	2.06E-14	0.00E+00
Acidification	[kg SO2-Equiv.]	4.51E-02	9.76E-04	7.56E-04	0.00E+00	1.32E-04	0.00E+00	6.28E-04	0.00E+00
Eutrophication	[kg N-Equiv.]	3.02E-03	8.21E-05	1.84E-04	1.00E+00	1.11E-05	0.00E+00	7.00E-05	0.00E+00
Smog Air	[kg O3-Equiv.]	8.88E-01	3.18E-02	6.19E-03	0.00E+00	4.29E-03	0.00E+00	1.03E-02	0.00E+00
Abiotic Depletion for fossil resources	[MJ surplus energy]	3.52E+01	4.60E-01	9.43E-02	0.00E+00	6.21E-02	0.00E+00	2.24E-01	0.00E+00

CML 2001 - Jan 2016

Table 4: EU Impact Assessment Results for Brass Pulls

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.]	1.37E+00	5.80E-02	2.47E-01	0.00E+00	4.86E-03	0.00E+00	1.67E-02	-6.10E-01
Ozone Layer Depletion Potential	[kg R11-Equiv.]	2.22E-12	1.98E-15	3.87E-14	0.00E+00	1.66E-16	0.00E+00	3.05E-15	3.38E-09
Acidification Potential	[kg SO2-Equiv.]	5.59E-03	1.73E-04	7.71E-04	0.00E+00	1.46E-05	0.00E+00	7.10E-05	-1.19E-03
Eutrophication Potential	[kg Phosphate-Equiv.]	7.53E-04	4.67E-05	3.09E-04	0.00E+00	3.93E-06	0.00E+00	1.60E-05	-8.87E-05
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	3.71E-04	1.76E-05	2.42E-04	0.00E+00	1.48E-06	0.00E+00	6.29E-06	-2.80E-04
Abiotic Depletion	[kg Sb-Equiv.]	2.16E-04	1.05E-08	8.11E-06	0.00E+00	8.87E-10	0.00E+00	7.16E-09	-1.75E-06
Abiotic Depleletion for fossil resources	[MJ surplus energy]	2.49E+01	8.15E-01	7.74E-01	0.00E+00	6.85E-02	0.00E+00	2.59E-01	-5.88E+00

Table 5: EU Impact Assessment Results for Steel Pulls

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+00	1.52E-01	4.09E-01	0.00E+00	1.58E-02	0.00E+00	5.43E-02	-1.99E+00
Ozone Layer Depletion Potential	[kg R11-Equiv.]	2.07E-07	5.21E-15	7.30E-14	0.00E+00	5.43E-16	0.00E+00	9.94E-15	1.10E-08
Acidification Potential	[kg SO2-Equiv.]	3.43E-02	4.56E-04	1.13E-03	0.00E+00	4.75E-05	0.00E+00	2.32E-04	-3.88E-03
Eutrophication Potential	[kg Phosphate-Equiv.]	1.31E-03	1.23E-04	4.37E-04	0.00E+00	1.28E-05	0.00E+00	5.21E-05	-2.89E-04
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	2.35E-03	4.63E-05	3.22E-04	0.00E+00	4.82E-06	0.00E+00	2.04E-05	-9.11E-04
Abiotic Depletion	[kg Sb-Equiv.]	4.00E-05	2.77E-08	1.62E-05	0.00E+00	2.89E-09	0.00E+00	2.34E-08	-5.70E-06
Abiotic Depleletion for fossil resources	[MJ surplus energy]	2.20E+01	2.14E+00	1.09E+00	0.00E+00	2.23E-01	0.00E+00	8.43E-01	-1.92E+01

Table 6: EU Impact Assessment Results for Bronze Pulls

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.]	1.41E+01	2.44E-01	1.39E-01	0.00E+00	3.29E-02	0.00E+00	1.13E-01	0.00E+00
Ozone Layer Depletion Potential	[kg R11-Equiv.]	3.94E-07	8.35E-15	1.03E-11	1.00E+00	1.13E-15	1.00E+00	2.06E-14	0.00E+00
Acidification Potential	[kg SO2-Equiv.]	4.03E-02	7.31E-04	6.14E-04	0.00E+00	9.86E-05	0.00E+00	4.81E-04	0.00E+00
Eutrophication Potential	[kg Phosphate-Equiv.]	5.74E-03	1.97E-04	2.11E-04	1.00E+00	2.66E-05	1.00E+00	1.08E-04	0.00E+00
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	3.72E-03	7.42E-05	1.82E-04	0.00E+00	1.00E-05	0.00E+00	4.24E-05	0.00E+00
Abiotic Depletion	[kg Sb-Equiv.]	5.04E-06	4.44E-08	1.62E-05	0.00E+00	5.99E-09	0.00E+00	4.85E-08	0.00E+00
Abiotic Depleletion for fossil resources	[MJ surplus energy]	2.60E+02	3.43E+00	8.20E-01	1.00E+00	4.63E-01	0.00E+00	1.75E+00	0.00E+00

Resource Use

Table 7: Resource Use for Brass Pulls

Results of the LCA - Resource Use									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	8.87E+00	2.03E-02	9.74E-02	0.00E+00	1.71E-03	0.00E+00	1.87E-02	3.90E-01
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	8.87E+00	2.03E-02	9.74E-02	0.00E+00	1.71E-03	0.00E+00	1.87E-02	3.90E-01
PENRE	MJ, net calorific value	2.96E+01	8.20E-01	8.44E-01	0.00E+00	6.91E-02	0.00E+00	2.65E-01	-5.67E+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	2.96E+01	8.20E-01	8.44E-01	0.00E+00	6.91E-02	0.00E+00	2.65E-01	-5.67E+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	8.86E-03	9.87E-05	2.19E-04	0.00E+00	8.31E-06	0.00E+00	3.22E-05	8.13E-04

Table 8: Resource Use for Steel Pulls

Results of the LCA - Resource Use									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	2.12E+01	5.33E-02	1.66E-01	0.00E+00	5.55E-03	0.00E+00	6.10E-02	1.27E+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	2.12E+01	5.33E-02	1.66E-01	0.00E+00	5.55E-03	0.00E+00	6.10E-02	1.27E+00
PENRE	MJ, net calorific value	3.26E+01	2.15E+00	1.22E+00	0.00E+00	2.24E-01	0.00E+00	8.65E-01	-1.85E+01
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	3.26E+01	2.15E+00	1.22E+00	0.00E+00	2.24E-01	0.00E+00	8.65E-01	-1.85E+01
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	4.44E-02	2.59E-04	3.77E-04	0.00E+00	2.70E-05	0.00E+00	1.05E-04	2.65E-03

Table 9: Resource Use for Bronze Pulls

Results of the LCA - Resource Use									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	1.07E+01	8.54E-02	1.49E-01	0.00E+00	1.15E-02	0.00E+00	1.27E-01	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+01	8.54E-02	1.49E-01	0.00E+00	1.15E-02	0.00E+00	1.27E-01	0.00E+00
PENRE	MJ, net calorific value	2.70E+02	3.45E+00	9.46E-01	0.00E+00	4.65E-01	0.00E+00	1.79E+00	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	2.70E+02	3.45E+00	9.46E-01	0.00E+00	4.65E-01	0.00E+00	1.79E+00	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	1.12E-01	4.15E-04	3.17E-04	0.00E+00	5.60E-05	0.00E+00	2.17E-04	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 10: Waste and Output Flow for Brass Pulls

Results of the LCA - Waste and Output Flows									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	3.25E-08	6.37E-09	3.13E-09	0.00E+00	5.36E-10	0.00E+00	9.12E-10	-3.96E-07
NHWD	Kg	1.84E-01	3.07E-05	6.52E-01	0.00E+00	2.59E-06	0.00E+00	3.78E-01	6.49E-02
RWD	Kg	1.85E-03	1.80E-06	2.81E-05	0.00E+00	1.52E-07	0.00E+00	2.73E-06	1.95E-07
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	0.00E+00	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	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 11: Waste and Output Flow for Steel Pulls

Results of the LCA - Waste and Output Flows									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	2.45E-08	1.67E-08	4.26E-09	0.00E+00	1.75E-09	0.00E+00	2.98E-09	-1.29E-06
NHWD	Kg	2.34E-01	8.09E-05	7.90E-01	0.00E+00	8.43E-06	0.00E+00	1.23E+00	2.12E-01
RWD	Kg	1.32E-03	4.73E-06	5.21E-05	0.00E+00	4.93E-07	0.00E+00	8.88E-06	6.35E-07
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	0.00E+00	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	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 12: Waste and Output Flow for Bronze Pulls

Results of the LCA - Waste and Output Flows									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	2.19E-05	2.69E-08	3.07E-09	0.00E+00	3.62E-09	0.00E+00	6.18E-09	0.00E+00
NHWD	Kg	1.35E-01	1.30E-04	5.45E-01	0.00E+00	1.75E-05	0.00E+00	2.55E+00	0.00E+00
RWD	Kg	3.87E-03	7.59E-06	4.98E-05	0.00E+00	1.02E-06	0.00E+00	1.84E-05	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	0.00E+00	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	0.00E+00	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	0.00E+00	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 TRACI and CML results. Module D was excluded from the Dominance Analysis.

Table 13: Dominance Analysis - Cylinder Pulls

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.]	95%	1%	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.]	87%	1%	10%	MND	0%	0%	0%	1%
Eutrophication Potential	[kg Phosphate-Equiv.]	62%	3%	34%	MND	0%	0%	0%	1%
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	57%	1%	40%	MND	0%	0%	0%	1%
Abiotic Depletion	[kg Sb-Equiv.]	100%	0%	0%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	96%	1%	2%	MND	0%	0%	0%	0%

Table 14: Dominance Analysis - Pulls - Brass Option

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.]	71%	5%	22%	MND	0%	0%	0%	1%
Ozone Layer Depletion Potential	[kg R11-Equiv.]	97%	0%	3%	MND	0%	0%	0%	0%
Acidification Potential	[kg SO2-Equiv.]	84%	3%	12%	MND	0%	0%	0%	1%
Eutrophication Potential	[kg Phosphate-Equiv.]	68%	4%	26%	MND	0%	0%	0%	1%
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	58%	3%	37%	MND	0%	0%	0%	1%
Abiotic Depletion	[kg Sb-Equiv.]	96%	0%	4%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	91%	4%	3%	MND	0%	0%	0%	1%

Table 15: Dominance Analysis - Pulls - Steel Option

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.]	80%	5%	13%	MND	0%	1%	0%	2%
Ozone Layer Depletion Potential	[kg R11-Equiv.]	100%	0%	0%	MND	0%	0%	0%	0%
Acidification Potential	[kg SO2-Equiv.]	95%	1%	3%	MND	0%	0%	0%	1%
Eutrophication Potential	[kg Phosphate-Equiv.]	68%	6%	23%	MND	0%	1%	0%	3%
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	86%	2%	12%	MND	0%	0%	0%	1%
Abiotic Depletion	[kg Sb-Equiv.]	71%	0%	29%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	84%	8%	4%	MND	0%	1%	0%	3%

Table 16: Dominance Analysis - Pulls - Bronze Option

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.]	96%	2%	1%	MND	0%	0%	0%	1%
Ozone Layer Depletion Potential	[kg R11-Equiv.]	0%	0%	0%	MND	50%	0%	50%	0%
Acidification Potential	[kg SO2-Equiv.]	95%	2%	1%	MND	0%	0%	0%	1%
Eutrophication Potential	[kg Phosphate-Equiv.]	0%	0%	0%	MND	50%	0%	50%	0%
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	92%	2%	5%	MND	0%	0%	0%	1%
Abiotic Depletion	[kg Sb-Equiv.]	24%	0%	76%	MND	0%	0%	0%	0%
Abiotic Depletion for fossil resources	[MJ surplus energy]	97%	1%	0%	MND	0%	0%	0%	1%

The dominance analysis shows that the manufacturing stage (A1-A3) of the life cycle is responsible for the majority of impacts (95-97%, on average) across all impact categories. A1-A3 includes the extraction, processing and sourcing of all materials. The installation phase (A5) is the second most impactful stage mainly due to the brass screws used to install the pulls. However, the installation phase impacts are very minimal.

References

1. Life Cycle Assessment, Hager, LCA Report for Hager Trim and Auxiliary Door Hardware. WAP Sustainability Consulting. September 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)