

ENVIRONMENTAL PRODUCT DECLARATION

HAGER COMPANIES

COMMERCIAL HINGES – FULL MORTISE



Hager's commercial hinge product line offers one of the widest varieties in sizes, shapes and finishes in today's market. Our time-tested durability and superior performance is backed by our legendary quality.



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 12 of our product lines. This document is a result of that dedication.



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According to ISO 14025

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	4788145243.101.1
DECLARED PRODUCT	Commercial Hinges - Full Mortise
REFERENCE PCR	Product Category Rule (PCR) for preparing an Environmental Product Declaration (EPD) for Product Group, Builders Hardware UL9004. Version: April 3 rd , 2014
DATE OF ISSUE	November 16, 2017
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	<ul style="list-style-type: none"> 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:	Panel Review
	Panel Chair: Dr. Lindita Bushi
	epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	
	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Thomas Gloria, Industrial Ecology Consultants

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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

Hager commercial hinges are available in a variety of sizes and finishes. Hinges are available in several base materials including: steel, stainless steel, and brass. Average weights for the products disclosed in this EPD are provided in the Declared Unit section below. The standard application is three hinges per standard 3'0" x 7'0" door leaf. This EPD presents results for this application.

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 are dependent on the size of the customer's order. No ancillary materials are necessary for installation or use.

Technical Information

Functional unit: Three hinges per standard 3'0" x 7'0" door.

Application

Products are designed for commercial applications and fall under the product standard category of ANSI/BHMA A156. 1-2016.

Delivery Status

For shipping, all hinges are packaged in cardboard packaging that contains 3 units wrapped in paper. Customers have the option of bulk packaging, if order is large enough.



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Base Materials

Base materials include:

Material	% of Final Product
Steel	95.9%
Cardboard	4%
Paper	0.1%
Total	100%

Manufacture

Hager commercial hinges are manufactured at Hager's Montgomery Alabama plant. Hinge blanks are punched from extruded steel. Once blanks are punched out, the blanks are loaded onto a machine that curls the knuckles. A non-removable pin is then added along with bearings and a bottom pin. Lubrication is added in this process. The four-knuckle hinge side is combined with the three-knuckle side in a final step that forms the final hinge. Metal waste is created through the process. This 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).



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Packaging

For shipping, all hinges are packaged individually. Packaging varies slightly based on hinge type. In general, packaging for Hager hinges includes cardboard box, paper labels and included fasteners. Box and paper labels are recyclable in most municipal recycling systems. Large orders may be bulk packaged prior to shipping.

Product Installation

Detail installation instructions are provided here: <http://www.hagerco.com/DocumentationIndex.aspx>

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

It is assumed that all products are landfilled at the end of their life. The distance waste is transported to the landfill is assumed to be 100 miles.

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.



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Life Cycle Assessment

Declared Unit

Hager Full Mortise Hinge

Weights below combine the weight of three individual hinges necessary to hang a standard 3'0" x 7'0" door.

Name	Value (Standard Units)	Value (Metric Units)
Unit	3 Hinges	3 Hinges
Weight per Functional Unit, excluding fasteners	3.19 lbs.	1.44 kg
Fasteners (pieces x weight/piece)	.24 lbs.	.11 kg
Functional Unit	3.43 lbs.	1.54 kg



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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.



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Estimates and Assumptions

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 were available were included.

Material inputs greater than 1% (based on total mass of the individual components of the 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.

List of excluded materials and energy inputs include:

Some material and energy inputs may have been excluded within the GaBi datasets used for this project. All GaBi datasets have been critically reviewed and conform to the exclusion requirement of the PCR.

No hazardous and toxic releases, which are mandatory to be monitored and reported to the U.S TRI, are released from the facility.

Background Data

All background data was sourced from GaBi databases. GaBi version 8 was used to complete the assessment.



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Data Quality

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Montgomery, Alabama. This LCA uses country specific energy datasets that take into account US specific energy and transportation mixes. Overall, the geographic coverage of primary data is considered good.

Time Coverage

Primary data were provided by Hager associates at the Montgomery, Alabama facility and represent calendar year 2016. Calendar year 2016 was the most recently completed 12-month period year at the beginning of the study. Using 2016 data meets the PCR requirement that manufacturer specific data be within the last 5 years. Time coverage of this data is considered excellent.

Data necessary to model cradle-to-gate unit processes was sourced from Thinkstep LCI datasets. Time coverage of the GaBi datasets varies from approximately 2009 to present. Additionally, all data was included in the most recent 2017 GaBi database update. 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 background data be updated within a 10-year period. The specific time coverage of secondary datasets can be referenced in the dataset references table in this report.

Technological Coverage

The technological coverage of the data is considered excellent. The manufacture of commercial hinge products is a relatively simple process. As such, LCA practitioners were able to capture relevant manufacturing processes data. Additionally, background data from metal sourcing and processing was confirmed to be equivalent to the process employed by Hager suppliers.

Allocation Procedures

General principles of allocation were based on ISO14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis.



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LCA Results

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

TRACI 2.1

Results of the LCA - Environmental Impact, TRACI 2.1										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global Warming Air, incl. biogenic carbon	[kg CO ₂ -Equiv.]	3.46E+00	1.42E-01	4.58E-01	MND	MND	2.00E-02	MND	6.80E-02	-2.35E+00
Ozone Depletion Air	[kg CFC 11-Equiv.]	1.87E-07	1.25E-12	5.91E-12	MND	MND	1.76E-13	MND	1.06E-12	8.18E-08
Acidification	[kg SO ₂ -Equiv.]	2.73E-02	5.69E-04	2.55E-03	MND	MND	8.02E-05	MND	3.85E-04	-5.69E-03
Eutrophication	[kg N-Equiv.]	4.19E-03	4.85E-05	1.12E-04	MND	MND	6.83E-06	MND	4.28E-05	-4.14E-05
Smog Air	[kg O ₃ -Equiv.]	1.50E-01	1.86E-02	2.52E-02	MND	MND	2.62E-03	MND	6.28E-03	-5.52E-02
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.25E+00	2.68E-01	2.99E-01	MND	MND	3.78E-02	MND	1.36E-01	-1.50E-02



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CML 2001-April 2013

Results of the LCA - Environmental Impact, CML2001 - Apr. 2013										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global Warming Potential	[kg CO2-Equiv.]	3.48E+00	1.42E-01	4.63E-01	MND	MND	2.00E-02	MND	6.84E-02	-2.37E+00
Ozone Layer Depletion Potential	[kg R11-Equiv.]	1.72E-07	1.17E-12	5.57E-12	MND	MND	1.65E-13	MND	9.99E-13	7.51E-08
Acidification Potential	[kg SO2-Equiv.]	3.04E-02	4.26E-04	2.61E-03	MND	MND	6.00E-05	MND	2.96E-04	-5.61E-03
Eutrophication Potential	[kg Phosphate-Equiv.]	9.87E-04	1.15E-04	1.89E-04	MND	MND	1.62E-05	MND	6.59E-05	-1.55E-04
Photochem. Ozone Creation Potential	[kg Ethene-Equiv.]	2.33E-03	4.43E-05	1.69E-04	MND	MND	6.25E-06	MND	2.65E-05	-1.20E-03
Abiotic Depletion	[kg Sb-Equiv.]	3.26E-05	2.42E-08	8.37E-05	MND	MND	3.40E-09	MND	2.83E-08	-9.83E-07
Abiotic Depletion for fossil resources	[MJ surplus energy]	2.78E+01	1.99E+00	4.62E+00	MND	MND	2.81E-01	MND	1.06E+00	-1.76E-01



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Resource Use

Results of the LCA - Resource Use										
Parameter	Unit	A1- A3	A4	A5	B1 - B7	C1	C2	C3	C4	D
PERE	MJ, net calorific value	1.04E+01	4.98E-02	8.13E-01	MND	MND	7.01E-03	MND	7.47E-02	1.28E+00
PERM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
PERT	MJ, net calorific value	1.04E+01	4.98E-02	8.13E-01	MND	MND	7.01E-03	MND	7.47E-02	1.28E+00
PENRE	MJ, net calorific value	3.66E+01	2.00E+00	5.04E+00	MND	MND	2.82E-01	MND	1.09E+00	2.48E+00
PENRM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	3.66E+01	2.00E+00	5.04E+00	MND	MND	2.82E-01	MND	1.09E+00	2.48E+00
SM	Kg	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
RSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
NRSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
FW	M3	4.57E-01	5.94E-03	5.86E-01	MND	MND	8.36E-04	MND	3.50E-02	-4.28E-03

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



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Outputs and Waste

Results of the LCA - Waste and Output Flows										
	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	Kg	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
NHWD	Kg	1.03E+01	2.02E-02	5.65E+00	MND	MND	2.84E-03	MND	1.65E+00	-6.28E+00
RWD	Kg	1.09E-03	4.39E-06	1.65E-04	MND	MND	6.19E-07	MND	1.09E-05	-7.95E-04
CRU	Kg	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
MFR	Kg	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
MET	Kg	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
EEE	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	0.00E+00	0.00E+00
EET	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	MND	MND	0.00E+00	MND	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



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Comparability of EPDs

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.

Dominance Analysis - Environmental Impact, TRACI 2.1										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global Warming Air, incl. biogenic carbon	[kg CO2-Equiv.]	83%	3%	11%	MND	MND	0%	MND	2%	N/A
Ozone Depletion Air	[kg CFC 11-Equiv.]	100%	0%	0%	MND	MND	0%	MND	0%	N/A
Acidification	[kg SO2-Equiv.]	88%	2%	8%	MND	MND	0%	MND	1%	N/A
Eutrophication	[kg N-Equiv.]	95%	1%	3%	MND	MND	0%	MND	1%	N/A
Smog Air	[kg O3-Equiv.]	74%	9%	12%	MND	MND	1%	MND	3%	N/A
Abiotic Depletion for fossil resources	[MJ surplus energy]	75%	9%	10%	MND	MND	1%	MND	5%	N/A

The dominance analysis shows that the Production Stage (A1-A3) of the life cycle is responsible for the majority of impacts (70-80%, on average) across all impact categories. A1-A3 includes the extraction, processing and sourcing of all materials. The Transportation phase (A4) is the second most impactful stage.

References

1. Life Cycle Assessment, Hager, LCA Report for Hager Commercial Hinges. WAP Sustainability Consulting. Aug. 2017.
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.

