

Environmental Product Declaration

Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge (Grade 1)

Continuous Geared Hinge



The Pemko Full Mortise Continuous Geared Hinge runs the entire length of the door which allows the door weight to be distributed evenly along the length of the hinge to avoid common issues like door sag and binding while providing smooth operation every time the door is cycled.

ASSA ABLOY

ASSA ABLOY is committed to providing products and services that are environmentally sound throughout the entire production process and the product lifecycle. Our unconditional aim is to make sustainability a central part of our business philosophy and culture, but even more important is the job of integrating sustainability into our business strategy. The employment of EPDs will help architects, designers and LEED-APs select environmentally preferable door openings.

ASSA ABLOY will continue our efforts to protect the environment and health of our customers/end users and will utilize the EPD as one means to document those efforts.



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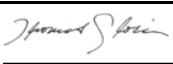
Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge (Grade 1)
Door Hardware

ASSA ABLOY



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	ASSA ABLOY	
DECLARATION NUMBER	478714321.132.1	
DECLARED PRODUCT	Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge (Grade 1)	
REFERENCE PCR	Builders Hardware PCR UL 9004	
DATE OF ISSUE	June 19, 2017	
PERIOD OF VALIDITY	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 manufacturing Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by	The Independent Expert Committee, SVR	
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 P. Gloria, Industrial Ecology Consultants	

¹ **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.



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Product Definition and Information

Product Description

Product name: Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge (Grade 1)

Product characteristic: Geared Hinge

The Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge has one leaf mounted to the edge of a door and the other leaf mounted on the frame rabbet, so that the hinge cap is the only hardware visible when the door is in the closed position. Additional features include:

- Elimination of typical alignment problems (i.e. door sag, binding, etc)
- Uniform distribution of the load stress along the full length of the door and frame.
- Provides a high layer of security by sealing the common gap between the door and frame.
- UHMW-PE bearings provide smooth and consistent operation and eliminates premature wear
- Heavy Duty Grade 1 hinges are guaranteed for the life of the opening
- Available with a hospital tip for ease of cleaning or for behavioral health applications
- Available with preps for electrical modifications for openings that have automatic operating hardware
- Fire rated
- Product contains several small screws for installation, as well as paper instructions. Otherwise, no other accessory materials are required for installation or use.

Application

The Pemko Full Mortise Anodized Aluminum Heavy Duty Continuous Geared Hinge is ideal for a wide range of applications, including but not limited to high traffic areas, offices, public buildings, hospitals, institutions, educational facilities, and retail spaces.

Technical Data

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard:

Technical Data	
Length	83", (85", 95", and 120" also available)
Maximum Door Weight	600 lb
Maximum Door Width	48" (for fire rating)
Maximum Door Height	120" (for fire rating)
Finish	Clear Anodized, Dark Bronze Anodized are standard finish options; Painted White, Champagne, and Gold Anodized are available custom options



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Placing on the Market / Application Rules

The standards that can be applied for the Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge are:

- ANSI/BHMA A156.26 Standard for Continuous Hinges Grade 1
- Americans with Disabilities Act (ADA)
- Accessibility Guidelines for Buildings and Facilities (ADAAG), 2004.
- BS 476 Fire Tests on Building Materials and Structures.
- NFPA 80 Standard for Fire Doors and Other Opening Protectives
- UBC 7-2 Fire Test of Door Assemblies (Positive Pressure).
- UL 10B Fire Tests of Door Assemblies.
- UL 10C Positive Pressure Fire Tests of Door Assemblies.

Delivery Status

Shipments of Pemko products are delivered in a cardboard box with each product individually shrinkwrapped

Base Materials / Ancillary Materials

Material	Percentage in mass (%)
Brass	0.00%
Stainless Steel	0.00%
Steel	1.70%
Aluminum	96.56%
Electronics/Mechanics	0.00%
Plastics	1.74%
Other	0.00%
Total	100.00%

Manufacture

The primary manufacturing processes are made by Tier 1 suppliers and the final manufacturing processes occur in Memphis, TN and Ventura, CA. The components come from processes like stamped steel, turning, and aluminum extrusion.

Environmental and Health During Manufacturing

ASSA ABLOY is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.

- Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and environment management program effectiveness is evaluated.
- Code of Conduct covers human rights, labor practices and decent work. Management of ASSA ABLOY is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.
- Any waste metals during machining are separated and recycled. The waste from the water-based painting process is delivered to waste treatment plant.
- The factories in Memphis, TN and Ventura, CA have certification of Environmental Management to ISO 14001:2004 and Occupational Health and Safety to OHSAS 18001:2007.

Product Processing / Installation

Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinges are distributed through and installed by trained installation technicians, such as locksmiths, carpenters etc. adhering to local/national standards and requirements.

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Packaging

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Material	Quantity (% By Weight)
Cardboard	96%
Other	4%
Total	100%

Conditions of Use

It may be desired to periodically wipe the hinge with warm soapy water using mild detergent to clear any dirt or grime that has accumulated from normal traffic.

Environmental and Health During Use

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Reference Service Life

The reference service life is 25 years, and the product is guaranteed for the life of the opening.

Extraordinary Effects

Fire

No negative environmental impact will result from exposure to fire.

Water

Contains no substances that have any impact on water in case of flood.

Mechanical Destruction

No danger to the environment can be anticipated during mechanical destruction.

Re-use Phase

The product can be moved from one door to another during the reference service life, thus enabling re-use.

Disposal

The product can be mechanically disassembled to separate the different materials. 100% of the materials used are recyclable. The remainder of components are disposed of according to standard municipal solid waste deposition.

Further Information

ASSA ABLOY Architectural Door Accessories
5535 Distribution Drive
Memphis, TN 38141

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Life Cycle Assessment

Declared Unit

The declaration refers to the functional unit of 1 unit (or piece) of the Pemko Full Mortise Aluminum Heavy Duty Continuous Geared Hinge (Grade 1), as specified in the Builders Hardware PCR

Name	Value	Unit
Declared unit	1	unit of hinge
Mass	2.945	kg
Conversion factor to 1 kg	0.340	-

System Boundary

This is a cradle to gate with options Environmental Product Declaration. The following life cycle phases were considered:

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 gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /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	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

Description of the System Boundary Stages Corresponding to the PCR

(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Estimates and Assumptions

End of Life

In the End of Life phase, for all the materials which can be recycled, a recycling scenario with 100% collection rate was assumed.

Cut-off Criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available). In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts. Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

Background data

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by thinkstep, is used GaBi 6 2013. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation GaBi 6 2013D. To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.



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Data Quality

The data sources used are complete and representative of North America in terms of the geographic and technological coverage and are a recent vintage (i.e. less than ten years old). The data used for primary data are based on direct information sources of the manufacturer. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty.

Period Under Review

The period under review is the full calendar year of 2015.

Allocation

Allocation was determined on a per unit basis.

Comparability

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. Full conformance with the PCR for North American Builders Hardware products allows EPD comparability only when all stages of a Builders Hardware product's life cycle have been considered. However, variations and deviations are possible.

LCA: Modeling Scenarios and Additional Technical Information

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared.

Installation into the building (A5)		
Name	Value	Unit
Auxiliary	-	kg
Water consumption	-	m ³
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Output substance following waste treatment on-site	0.13	kg
Dust in the air	-	kg
VOC in the air	-	kg

Reference Service Life		
Name	Value	Unit
Reference Service Life	25	years

End of life (C1-C4)		
Name	Value	Unit
Collected separately	2.8935	kg
Collected as mixed construction waste	0.0511	kg
Reuse	0.0511	kg
Recycling	2.8067	kg
Energy recovery	-	kg
Landfilling	0.0511	kg



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LCA Results

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment									
Parameter	Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
GWP	Global warming potential	kg CO ₂ -Eq.	1.9E+01	2.2E-01	2.5E-02	1.4E-02	3.2E-03	4.7E-03	-3.6E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.3E-09	8.3E-12	5.7E-14	5.2E-13	1.1E-13	5.5E-15	1.2E-07
AP Air	Acidification potential for air emissions	kg SO ₂ -Eq.	1.1E-01	1.3E-03	1.3E-04	8.2E-05	2.0E-05	2.1E-05	-8.5E-03
EP	Eutrophication potential	kg N-Eq.	2.2E-03	7.3E-05	2.3E-05	4.5E-06	9.6E-07	7.9E-06	-6.5E-05
SP	Smog formation potential	kg O ₃ -Eq.	9.9E-01	3.6E-02	1.2E-03	2.3E-03	4.8E-04	8.4E-05	-8.3E-02
FFD	Fossil Fuel Depletion	MJ-surplus	1.8E+01	3.9E-01	8.0E-03	2.4E-02	5.3E-03	7.1E-04	5.2E-01

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment									
Parameter	Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
GWP	Global warming potential	kg CO ₂ -Eq.	1.9E+01	2.2E-01	1.4E-01	1.4E-02	3.2E-03	5.3E-03	-3.5E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.2E-09	8.2E-12	5.5E-14	5.2E-13	1.1E-13	5.2E-15	1.1E-07
AP Air	Acidification potential for air emissions	kg SO ₂ -Eq.	1.2E-01	1.1E-03	8.8E-05	6.7E-05	1.7E-05	8.2E-06	-8.4E-03
EP	Eutrophication potential	kg(PO ₄) ³ -Eq.	5.7E-03	1.9E-04	3.2E-05	1.2E-05	2.5E-06	8.9E-06	-2.4E-04
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	6.5E-03	1.3E-04	1.9E-05	7.9E-06	2.0E-06	2.2E-06	-1.8E-03
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.1E-05	9.1E-11	4.6E-09	5.7E-12	5.6E-12	2.2E-10	-3.6E-05
ADPF	Abiotic depletion potential for fossil resources	MJ	2.1E+02	2.8E+00	6.8E-02	1.7E-01	4.2E-02	5.7E-03	-3.7E+01

Results below contain the resource use throughout the life cycle of the product.

Resource Use									
Parameter	Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	MJ	8.9E+01	0.0E+00	8.8E-03	0.0E+00	0.0E+00	4.8E-04	1.9E+00
PERM	Renewable primary energy resources as material utilization	MJ	2.4E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PERT	Total use of renewable primary energy resources	MJ	9.1E+01	0.0E+00	8.8E-03	0.0E+00	0.0E+00	4.8E-04	1.9E+00
PENRE	Nonrenewable primary energy as energy carrier	MJ	2.1E+02	2.8E+00	7.3E-02	1.7E-01	4.3E-02	5.9E-03	-3.3E+01
PENRM	Nonrenewable primary energy as material utilization	MJ	2.4E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PENRT	Total use of nonrenewable primary energy resources	MJ	2.1E+02	2.8E+00	7.3E-02	1.7E-01	4.3E-02	5.9E-03	-3.3E+01
SM	Use of secondary material	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	m ³	9.9E+01	0.0E+00	4.6E-03	0.0E+00	0.0E+00	2.6E-04	-7.3E-03



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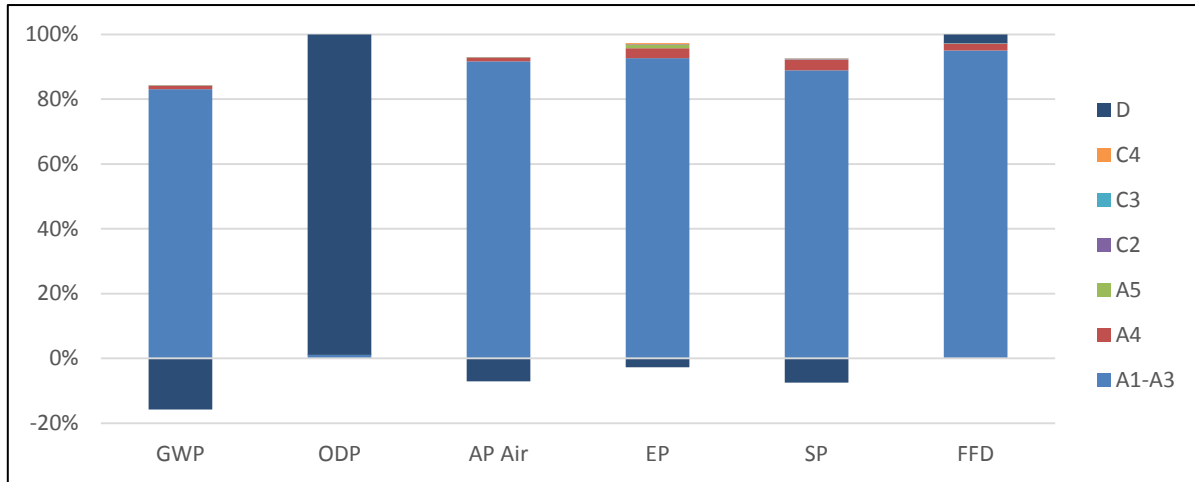


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Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories									
Parameter	Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
HWD	Hazardous waste disposed	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-1.9E-03
NHWD	Non-hazardous waste disposed	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.8E-02
RWD	Radioactive waste disposed	kg	3.1E-03	0.0E+00	1.7E-06	0.0E+00	0.0E+00	1.0E-07	1.2E-03
CRU	Components for re-use	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MFR	Materials for recycling	kg	1.2E+00	0.0E+00	1.3E-01	0.0E+00	3.2E-02	0.0E+00	1.8E-02
MER	Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported electrical energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported thermal energy	MJ	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	1.7E-03	0.0E+00

The production life cycle stage (A1-A3) dominates the impacts across all impact categories, with the exception of ozone depletion. This is due to the upstream production of metals used in the product, along with electricity use in the manufacturing of the product. Potential benefits in the global warming, acidification, eutrophication, and smog impact categories are due to the potential avoided burden of recycled materials after disposal.



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References

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- UL 10(b) Standards for Fire Tests for Door Assemblies
- UL 10(c) Standards for Positive Pressure Fire Tests for Door Assemblies
- UBC 7-2 Fire Test of Door Assemblies (Positive Pressure).
- BS 476 Fire Tests on Building Materials and Structures
- NFPA 80 Standard for Fire Doors and Other Opening Protectives

