



MASONITE
ARCHITECTURAL



Declaration Owner

Masonite Architectural

One Tampa City Center
201 North Franklin Street, Suite 300
Tampa, Florida 33602
www.masonitearchitectural.com/ | 866.996.7454

Products

Thermal Fused Wood Door
Serenity Wood Door

UNSPSC Code 30171504
CSI Code 08 14 00

Declared Unit

The declared unit is one wood door leaf, measuring 21 ft² (1.95 m²) at a nominal 1-3/4 inch (44.45 mm) thickness.

EPD Number and Period of Validity

SCS-EPD-06392
EPD Valid September 9, 2020 through September 8, 2025

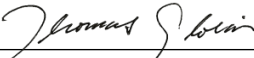

Product Category Rule

Product Category Rule for Preparing an Environmental Product Declaration for Interior Architectural Wood Door Leaves (March 2015).

Program Operator

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com



Declaration Owner:	Masonite Architectural
Address:	One Tampa City Center, 201 North Franklin Street, Suite 300, Tampa, Florida 33602
Declaration Number:	SCS-EPD-06392
Declaration Validity Period:	EPD Valid September 9, 2020 through September 8, 2025
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, SCS Global Services
LCA Software:	openLCA v1.10 and ecoinvent v3.6 database
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
LCA Reviewer:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
Product Category Rule:	Product Category Rule for Preparing an Environmental Product Declaration for Interior Architectural Wood Door Leaves (March 2015).
PCR Review conducted by:	Jamie Meil, Athena Sustainable Materials Institute (Review Chair) Email: jamie.meil@athenasmi.org
Independent verification of the declaration and data, according to ISO 14025 and the PCR	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
EPD Verifier:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
Declaration Contents:	<p>Masonite Architectural 3</p> <p>Product 3</p> <p>Life Cycle Assessment Stages and Reported EPD Information 5</p> <p>Life Cycle Inventory 6</p> <p>Life Cycle Impact Assessment 8</p> <p>Supporting Technical Information 9</p> <p>Additional Environmental Information 11</p> <p>References 12</p>

Disclaimers: This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930:2007.

Scope of Results Reported: The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.

Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.

Comparability: The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

Masonite Architectural

In the world of architectural and commercial wood doors, Masonite Architectural offers the complete portfolio of products, unmatched expertise and extensive support services to provide unlimited choices for your interior door needs. Masonite Architectural serves a wide range of architectural and commercial applications including health care and hospitality, education, public spaces and government, military, office and mixed use/multi-family. Masonite Architectural combines manufacturing scale, industry-leading innovation and expertise to deliver complete door solutions to our customers and the markets we serve.

Product

PRODUCT DESCRIPTION

The product system includes the cradle-to-gate impacts of Masonite's wood door leave products, described in Table 1, including packaging.

The wood door leaves are constructed from a variety of materials, including various engineered and solid woods, various adhesives, surfaces (i.e., wood veneers, plastic laminates), and coatings (e.g., paints, stain). Technical specifications of the products can be found on the manufacturer's website (<https://architectural.masonite.com/technical-resources/>).

Table 1. Product description and manufacturing facility location.

Product	Description	Manufacturing Facility
Thermal Fuse Wood Doors	Door face surface is comprised of resin saturated decorative paper thermally fused. This product is comprised of particle board or mineral core. Material is edge-banded with a PVC edge, machined and shipped.	Springfield, MO (#119)
Serenity Wood Doors	Veneer doors made from wood composite core construction with high acoustic performance characteristics used in conjunction with perimeter seals and gaskets.	Springfield, MO (#120) Mason City, IA

The Masonite wood door products are manufactured at two separate facilities in the United States using similar material components from multiple suppliers. In general, door leaf manufacturing processes at each facility are similar, encompassing primarily the assembly of the door cores, stile and rails, with the surfacing materials applied using a variety of adhesives. The doors are finished with various coatings and stains, packaged and palletized for shipment. It is assumed the processes are the same at each of the Masonite production facilities and independent of the specific door leaf model. Manufacturing data, including electricity and resource use, at each production facility were provided for calendar year 2019. Impact assessment results are reported as a production-weighted average across the facilities.

PRODUCT CHARACTERISTICS

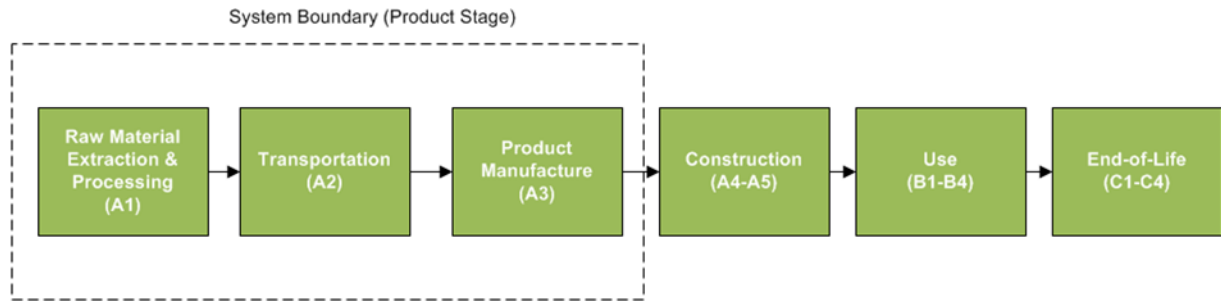
The Masonite wood door products meet ANSI A208.1 standards for particleboard.

PRODUCT APPLICATION

Masonite Architectural serves a wide range of architectural and commercial applications including health care and hospitality, education, public spaces and government, military, office and mixed use/multi-family.

PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.



MATERIAL CONTENT

Table 2. Material component summary for the Masonite wood door leave products by mass (per declared unit) and as a percentage of total mass.

Material	Thermal Fused	Serenity (SLC) - Springfield	Serenity (M2) - Springfield	Serenity - Mason City
Product				
Particle board	58.5	44.9	49.0	64.4
	95%	66%	68%	79%
Wood	4.54x10 ⁻²	22.7	22.7	16.4
	0.07%	33%	32%	20%
PVC	2.27	0.00	0.00	0.00
	3.7%	0%	0%	0%
Other	0.476	0.227	0.227	0.392
	0.78%	0.33%	0.32%	0.48%
Total Product	61.3	67.9	71.9	81.2
	100%	100%	100%	100%
Packaging				
Cardboard	0.200	0.200	0.200	0.200
	32%	32%	32%	32%
Plastic	4.30x10 ⁻²	4.30x10 ⁻²	4.30x10 ⁻²	4.30x10 ⁻²
	6.8%	6.8%	6.8%	6.8%
Wood	0.390	0.390	0.390	0.390
	62%	62%	62%	62%
Total Packaging	0.633	0.633	0.633	0.633
	100%	100%	100%	100%

Product materials were reviewed for the presence of any toxic or hazardous chemicals. Based on a review of the product components provided by the manufacturer, no regulated chemicals were identified in the product or product components.

Life Cycle Assessment Stages and Reported EPD Information

The EPD represents the potential environmental impacts from the production of the wood door leaf (i.e., cradle-to-gate).

The production stage of the product life cycle includes:

- **A1** – The extraction and processing of raw materials and the manufacture of material components (e.g., particleboard, wood veneer).
- **A2** – The transportation of raw materials from source to manufacturing site.
- **A3** – The manufacturing of wood door leaves. Packaging is included in this module.

An overview of the life cycle stages included is shown in the figure below. Product installation, use, maintenance, and disposal are not included.

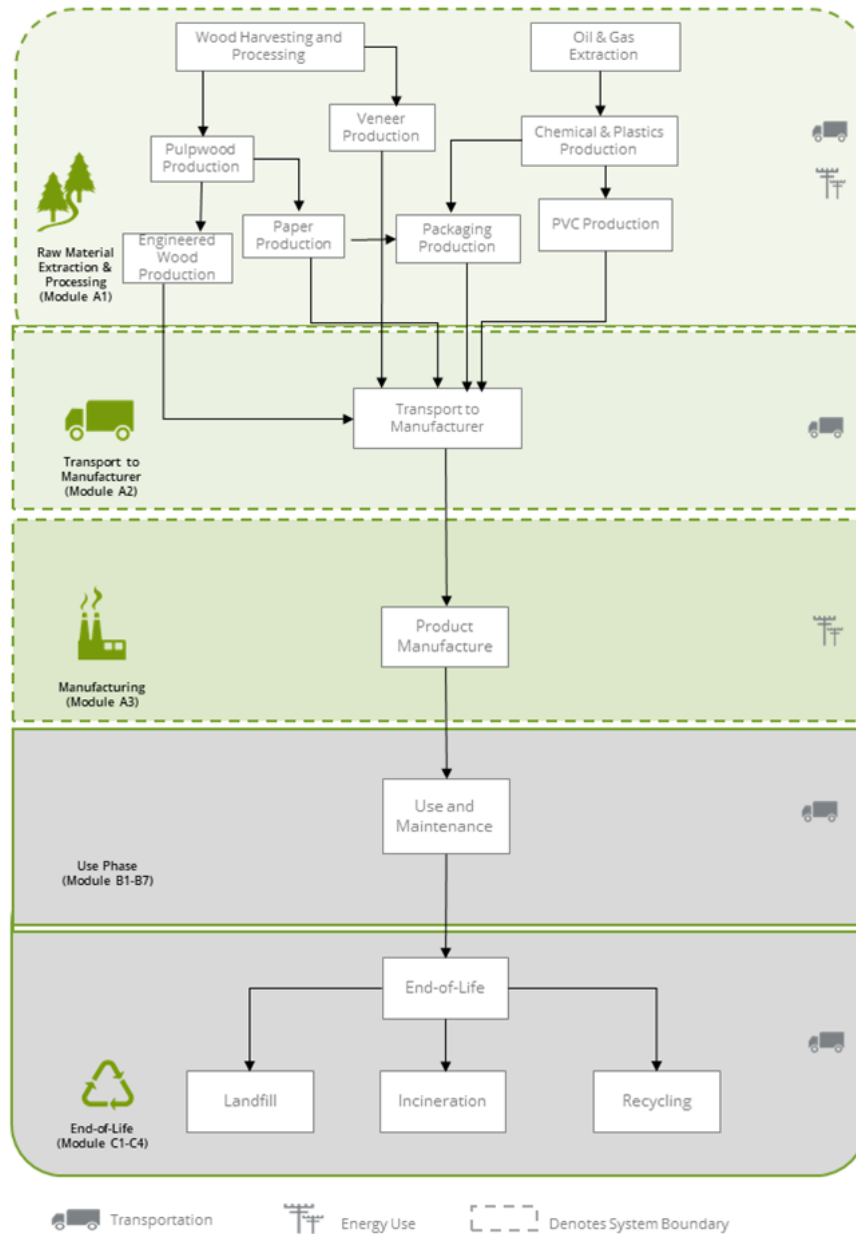


Figure 1. Flow diagram representing the major processes in the production stage of wood door leaves. Processes within the dotted lines are included in the system boundaries. A1, A2, and A3 are within the LCA system boundaries.

Life Cycle Inventory

In accordance with the PCR, the following aggregated inventory flows are included in the LCA:

- Primary energy consumption
- Use of renewable and nonrenewable material resources
- Consumption of freshwater
- Hazardous Waste
- Non-hazardous Waste

All results are calculated using the OpenLCA v1.10 model using primary and secondary inventory data. Classification for *Use of Renewable Material Resources* is based on review of elementary flows and resources considered renewable on a human time scale. Elementary flows related to use of minerals, and land occupation were not included. Water consumption is also not included as this is reported separately.

Table 3. Results for resource use, wastes, and output flows for the declared unit for Thermal Fused wood door leaves.

Impact Category	Units	Raw Material Extraction and Processing	Transportation of Raw Materials	Manufacturing of the Product	Total
		A1	A2	A3	A1-A3
Primary Energy Consumption					
Total Primary Energy	MJ	930	86.7	1,350	2,360
	%	39%	3.7%	57%	100%
Non-renewable, fossil	MJ	407	84.5	1,040	1,530
	%	27%	5.5%	68%	100%
Non-renewable, nuclear	MJ	44.3	1.18	261	306
	%	14%	0.39%	85%	100%
Renewable	MJ	20.9	0.720	27.5	49.1
	%	43%	1.5%	56%	100%
Renewable, biomass	MJ	458	0.279	20.4	478
	%	96%	0.06%	4.3%	100%
Material resources					
Non-renewable materials	kg	38.0	8.18	144	191
	%	20%	4.3%	76%	100%
Renewable materials	kg	24.2	1.26x10 ⁻²	1.04	25.2
	%	96%	0.05%	4.1%	100%
Fresh water	m ³	3.52	6.54x10 ⁻²	10.2	13.7
	%	26%	0.48%	74%	100%
Waste Flows					
Hazardous waste	kg	2.95x10 ⁻³	8.41x10 ⁻⁴	1.55x10 ⁻²	1.93x10 ⁻²
	%	15%	4.4%	80%	100%
Non-hazardous waste	kg	8.22	4.31	13.7	26.2
	%	31%	16%	52%	100%

Table 4. Results for resource use, wastes, and output flows for the declared unit for Serenity wood door leaves.

Impact Category	Units	Raw Material Extraction and Processing	Transportation of Raw Materials	Manufacturing of the Product	Total
		A1	A2	A3	A1-A3
Primary Energy Consumption					
Total Primary Energy	MJ	1,340	223	3,980	5,540
	%	24%	4.0%	72%	100%
Non-renewable, fossil	MJ	381	217	3,760	4,360
	%	8.7%	5.0%	86%	100%
Non-renewable, nuclear	MJ	40.6	3.04	129	173
	%	23%	1.8%	75%	100%
Renewable	MJ	19.6	1.85	69.0	90.5
	%	22%	2.0%	76%	100%
Renewable, biomass	MJ	895	0.716	26.3	922
	%	97%	0.08%	2.9%	100%
Material resources					
Non-renewable materials	kg	39.0	21.0	160	220
	%	18%	9.5%	73%	100%
Renewable materials	kg	46.6	3.24×10^{-2}	1.35	48.0
	%	97%	0.07%	2.8%	100%
Fresh water	m ³	3.30	0.168	4.13	7.60
	%	43%	2.2%	54%	100%
Waste Flows					
Hazardous waste	kg	3.27×10^{-3}	2.16×10^{-3}	4.02×10^{-2}	4.56×10^{-2}
	%	7.2%	4.7%	88%	100%
Non-hazardous waste	kg	9.07	11.1	19.5	39.6
	%	23%	28%	49%	100%

Life Cycle Impact Assessment

Life cycle impact assessment is the process of converting the life cycle inventory results into a representation of environmental and human health impacts. For example, emissions such as carbon dioxide, methane, and nitrous oxide (inventory) together contribute to climate change (impact assessment). The impact assessment for the EPD is conducted in accordance with requirements of the PCR. Impact category indicators are estimated using the Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI version 2.1). The LCIA and inventory flow results are calculated using OpenLCA v1.10 software.

Table 5. Production weighted average Life Cycle Impact Assessment (LCIA) results for the Thermal Fused wood door leaves. Percent contribution of each information module to the total cradle-to-gate life cycle result for each impact category also shown. Values may not sum to the exact totals due to rounding.

Impact Category	Unit	Raw Material Extraction and Processing	Transportation of Raw Materials	Manufacturing of the Product	Total
Global Warming Potential	kg CO ₂ eq	38.3	6.08	170	214
	%	18%	2.8%	79%	100%
Ozone Depletion Potential	kg CFC-11 eq	7.73x10 ⁻⁶	1.42x10 ⁻⁶	1.29x10 ⁻⁵	2.20x10 ⁻⁵
	%	35%	6.5%	58%	100%
Acidification Potential	kg SO ₂ eq	0.215	2.80x10 ⁻²	0.854	1.10
	%	20%	2.6%	78%	100%
Eutrophication Potential	kg N eq	0.108	7.12x10 ⁻³	0.692	0.807
	%	13%	0.88%	86%	100%
Smog Creation Potential	kg O ₃ eq	3.20	0.667	9.03	12.9
	%	25%	5.2%	70%	100%

Table 6. Production weighted average Life Cycle Impact Assessment (LCIA) results for the Serenity wood door leaves. Percent contribution of each information module to the total cradle-to-gate life cycle result for each impact category also shown. Values may not sum to the exact totals due to rounding.

Impact Category	Unit	Raw Material Extraction and Processing	Transportation of Raw Materials	Manufacturing of the Product	Total
Global Warming Potential	kg CO ₂ eq	37.2	15.6	122	174
	%	21%	8.9%	70%	100%
Ozone Depletion Potential	kg CFC-11 eq	5.78x10 ⁻⁶	3.66x10 ⁻⁶	6.33x10 ⁻⁵	7.28x10 ⁻⁵
	%	7.9%	5.0%	87%	100%
Acidification Potential	kg SO ₂ eq	0.217	7.20x10 ⁻²	0.863	1.15
	%	19%	6.2%	75%	100%
Eutrophication Potential	kg N eq	0.104	1.83x10 ⁻²	0.509	0.631
	%	16%	2.9%	81%	100%
Smog Creation Potential	kg O ₃ eq	3.39	1.71	9.88	15.0
	%	23%	11%	66%	100%

Supporting Technical Information

Data sources

Unit processes are developed with OpenLCA v1.10 software, drawing upon data from multiple sources. Primary data were provided by Masonite for their manufacturing processes. The primary sources of secondary LCI data are from the Ecoinvent v3.6 Life-Cycle Inventory Database.

Table 7. Data sources used for the LCA.

Component	Dataset	Data Source	Publication Date
PRODUCT			
Particle board	market for particleboard, uncoated particleboard, uncoated Cutoff, S/GLO	EI v3.6	2019
SCL core	market for sawnwood, hardwood, raw sawnwood, hardwood, raw Cutoff, S/GLO	EI v3.6	2019
Wood/lumber	market for sawnwood, softwood, raw sawnwood, softwood, raw Cutoff, S/GLO	EI v3.6	2019
PVC edge banding	market for polyvinylchloride, bulk polymerised polyvinylchloride, bulk polymerised Cutoff, S/GLO	EI v3.6	2019
Glue	market for acrylic binder, without water, in 34% solution state acrylic binder, without water, in 34% solution state Cutoff, S/RoW	EI v3.6	2019
Paper covering	market for kraft paper, unbleached kraft paper, unbleached Cutoff, S/GLO	EI v3.6	2019
Coating/Sealer	market for chemical, organic chemical, organic Cutoff, S/GLO	EI v3.6	2019
PACKAGING			
Plastic	market for packaging film, low density polyethylene packaging film, low density polyethylene Cutoff, S/GLO	EI v3.6	2019
Cardboard	market for corrugated board box corrugated board box Cutoff, S/RoW	EI v3.6	2019
Wood	market for EUR-flat pallet EUR-flat pallet Cutoff, S/GLO	EI v3.6	2019
TRANSPORT			
Road transport	market for transport, freight, lorry 16-32 metric ton, EURO4 transport, freight, lorry 16-32 metric ton, EURO4 Cutoff, S/RoW	EI v3.6	2019
RESOURCES			
Grid electricity	Electricity, medium voltage, per kWh - SRMW/SMRW; Electricity, medium voltage, per kWh - MROW/MROW	EI v3.6	2019
Heat – Natural gas	market group for heat, district or industrial, natural gas heat, district or industrial, natural gas Cutoff, S/GLO	EI v3.6	2019
Heat – Propane	market for propane propane Cutoff, S/GLO	EI v3.6	2019

Data Quality

Table 8. Data quality assessment of Life Cycle Inventory.

Data Quality Parameter	Data Quality Discussion
<p>Time-Related Coverage: Age of data and the minimum length of time over which data is collected</p>	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old (typically 2016). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annual production for 2019.
<p>Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study</p>	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily North American. Surrogate data used in the assessment are representative of North American or European operations. Data representative of European operations are considered sufficiently similar to actual processes
<p>Technology Coverage: Specific technology or technology mix</p>	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
<p>Precision: Measure of the variability of the data values for each data expressed</p>	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
<p>Completeness: Percentage of flow that is measured or estimated</p>	The LCA model included all known mass and energy flows for production of the wood door leave products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
<p>Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest</p>	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
<p>Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis</p>	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.6 data where available. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product packaging is based on assumptions of current average practices in the United States.
<p>Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study</p>	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
<p>Sources of the Data: Description of all primary and secondary data sources</p>	Data representing energy use at the Masonite manufacturing facilities represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data the Ecoinvent LCI databases are used.
<p>Uncertainty of the Information: Uncertainty related to data, models, and assumptions</p>	Uncertainty related to materials in the Masonite products and packaging is low. Primary data for upstream processes were not available; as such, the study relied upon use of existing representative datasets for these cases. These representative datasets contained relatively recent data (~10 years, or more recent), but in some instances lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are relatively high. The impact assessment method includes impact potentials that lack characterization of providing and receiving environments or tipping points.

Allocation

Annual facility-level electricity, natural gas and water use data were provided by the manufacturer for calendar year 2019 for their facilities in Springfield, MO and Mason City, IA. Resource use was allocated to the products based on area of product as a fraction of the total facility production volume as provided by the manufacturer.

Impacts from transportation were allocated based on the mass of material and distance transported.

Cut-off criteria

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact must be included in the inventory. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

Additional Environmental Information



Serenity and Thermal Fused Wood Doors are certified Greenguard Gold, for meeting *UL 2818 - 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings*

Declare labels are available for the Serenity and Thermal Fused Wood Doors.



Documentation for the Greenguard Gold certification and Declare labels may be downloaded from the manufacturer's website: <https://architectural.masonite.com/technical-resources/sustainability/>

References

1. Life Cycle Assessment of Serenity and Thermal Fused Architectural Wood Door Leaves. May 2020.
2. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
3. ISO 14040: 2006 Environmental Management – Life cycle assessment – Principles and Framework
4. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
5. Preparing an Environmental Product Declaration for Interior Architectural Wood Door Leaves. ASTM International. March 2015
6. SCS Type III Environmental Declaration Program: Program Operator Manual. V10.0 April 2019. SCS Global Services.
7. Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI). Dr. Bare, J., <http://www.epa.gov/nrmrl/std/traci/traci.html>
8. Ecoinvent Centre (2015) ecoinvent data from v3.8. Swiss Center for Life Cycle Inventories, Dübendorf, 2019, <http://www.ecoinvent.org>.





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For more information, contact:

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One Tampa City Center
201 North Franklin Street, Suite 300
Tampa, Florida 33602

<http://www.masonitearchitectural.com/> | 866.996.7454



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2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Main +1.510.452.8000 | fax +1.510.452.8001