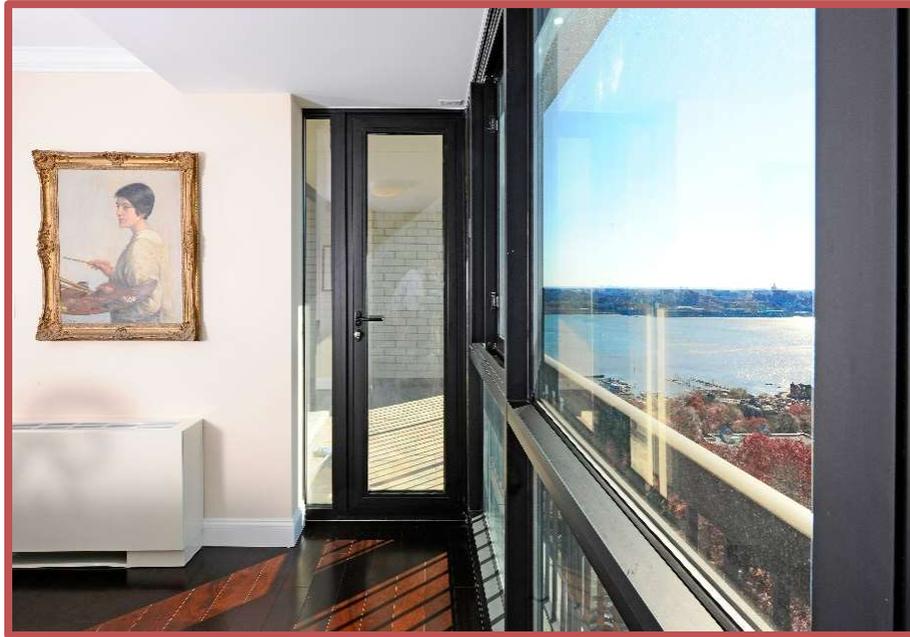




## Swing and Terrace Doors



## Environmental Product Declaration

Conducted in accordance with ISO 14025 and ISO 21930

This EPD covers only the cradle-to-gate impacts of Doors and uses only a declared unit. Therefore the EPD results cannot be used to compare products. An EPD is informational and does not warrant performance.



## EPD SUMMARY

<b>Product Name</b>	Arcadia Swing and Terrace Doors
<b>EPD Scope</b>	Cradle-to-Gate
<b>Declaration Holder</b>	Arcadia Inc.
<b>Declaration Number</b>	202
<b>Date of Issuance</b>	April 12, 2021
<b>Valid through</b>	April 11, 2026
<b>Program Operator</b>	ASTM International
<b>Reference PCR</b>	ASTM International, "Power-Operated Pedestrian Doors and Revolving Doors". September 22, 2016, v.1, PCR 012
<b>PCR Reviewed by</b>	Thomas P. Gloria, Industrial Ecology Consultants, Chair; James Salazar, Coldstream Consulting; Joseph R. Hetzel, American Association of Automatic Door Manufacturers
<b>LCA conducted by</b>	Four Elements Consulting, LLC
<b>Third Party Review</b>	Independent verification of the declaration and LCA data, according to ISO 14044:2006/AMD 2:2020, ISO 14025:2006 and ISO 21930:2007 internal    X external
<b>Review Conducted by</b>	
<b>Name</b>	Thomas P. Gloria, LCACP
<b>Organization</b>	Industrial Ecology Consultants
<b>Signature</b>	
<b>For more information</b>	Contact Anne Greig, <a href="mailto:anne@fourelementslc.com">anne@fourelementslc.com</a>

## Arcadia Inc.

Since 1930, Arcadia Inc. has helped the architectural community complete successful projects by providing high performance windows and doors that stand the test of time. Arcadia offers custom window and door solutions that successfully tackle the most challenging design concepts. Arcadia's projects help to reduce liabilities, achieve costs savings, and deliver a better end product for clients. Arcadia has enjoyed decades-long relationships with customers and partners who cite high quality and personal service as key reasons why they prefer Arcadia.

## Product Description and Declaration Summary



Arcadia's swing door products function as interior and exterior entrance systems. The swing doors, which include residential terrace doors, open and close on hinges. The EPD covers doors with narrow, medium, and wide stiles, both thermally and non-thermally improved. In addition to providing an attractive entrance to a building, the doors optimize natural light.

### Cradle-to-Gate Results Summary

Declared unit: 1 m<sup>2</sup>

Mass per m<sup>2</sup>: 27 kg

Impact Results		
Global Warming Potential	kg CO <sub>2</sub> -eq	134
Acidification Potential	kg SO <sub>2</sub> -eq	1.4
Eutrophication Potential	kg N-eq	0.08
Smog Formation Potential	kg O <sub>3</sub> -eq	8.7
Ozone Depletion Potential	kg CFC11-eq	3.5 E-6
Primary Energy		
Non-renewable Energy	MJ	1,617
Renewable Energy	MJ	382
Resources Consumed		
Non-renewable Materials	kg	168
Renewable Materials	kg	0.7
Net Fresh Water	L	1,734
Non-hazardous Waste	kg	0.02
Hazardous Waste	kg	0.01
Other Declarations		
Recyclable content: aluminum 37%, glass 59%		
Hazardous materials in >0.1% of window: none		

Arcadia's swing and terrace doors include the following products, presented in Table 1.

- ❖ NS212
- ❖ MS362
- ❖ WS512
- ❖ MS362T
- ❖ WS512T
- ❖ TD400

**Table 1 Swing and Terrace Door Specifications**

	NS212 Series	MS362 Series	WS512 Series	MS362T Series	WS512T Series	TD400 Series
<b>Short Description</b>	Narrow Stile Entrance Door	Medium Stile Entrance Door	Wide Stile Entrance Door	Medium Stile Thermal Entrance Door	Wide Stile Thermal Entrance Door	Terrace Hinged Swing Door
<b>Height</b>	Average 7-8', can go up to 10'					
<b>Width</b>	Average 3', can go up to 4'					
<b>Finish</b>	Anodized plus varying shades Champagne, varying shades of Bronze, and Black					
<b>Vertical stiles</b>	2"	3-1/2"	5"	3-1/2"	5"	Sill = 2-3/8" Frame & sash = 5-1/4"
<b>Top rail</b>	2-1/16"	3-5/8"	5-1/8"	3-5/8"	4-1/2"	
<b>Bottom rail</b>	10/12"	10/12"	10/12"	10"	10-1/4"	
<b>Locking</b>	Maximum security hooklock, deadbolt; Auxiliary Locks: two-point, three-point, flushbolts.					Multi-point type, incl. adjust. rolling pins, dead bolt & latch

## Life Cycle Assessment Overview

A cradle-to-grave Life Cycle Assessment (LCA) was completed on the swing and terrace doors in accordance with ISO 14040 / ISO 14044, and the study was reviewed for conformance with ISO 14044 and the PCR. These different products were assessed on a weighted average basis, based on the total volume produced.

### System Boundaries

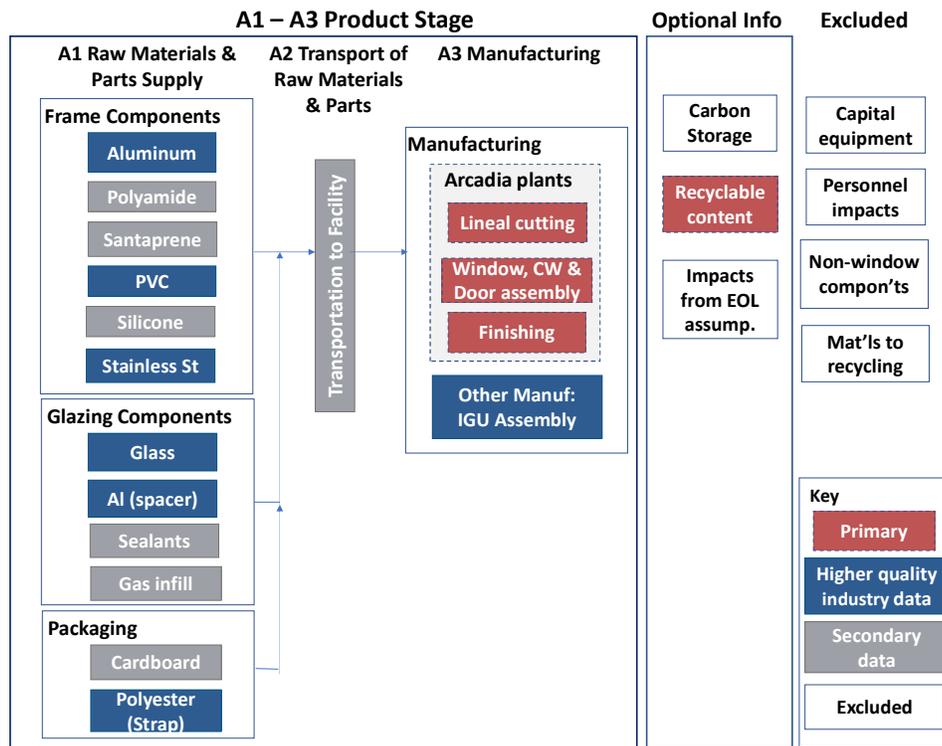
The LCA evaluated the cradle to gate of the door. This includes: raw material extraction and processing (A1), transportation of the materials to fabrication plants (A2), and manufacturing or fabrication (A3). This is depicted below in the context of the full life cycle as defined in EN 15804, Section 5.2.

**Table 2 EPD System Boundary Modules**

Product Stage			Construction Process		Use Stage								End-of-Life Stage				Bens/Loads Beyond SB
Raw Material Supply	Transport	Manufacturing	Transport	Construction-installation process	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	MND	MND	MND	MND	MND	MND	MND	

MND = "module not declared"

Figure 1 presents A1-A3 as they pertain to Arcadia and additionally provides aspects of the life cycle that are excluded from the study.



**Figure 1 Arcadia Doors System Boundary and Data**

### Declared Unit

The declared unit is one square meter (1 m<sup>2</sup>) of a door. A functional unit is not reported since the product system boundaries are cradle-to-gate, and no use phase over a reference service life has been modeled. Therefore, these EPD results cannot be used to compare products.

### A1 Raw Material Extraction and Processing

Module A1 accounts for the extraction of materials and production of door parts and components and packaging components. Table 3 presents the general material make-up of the door and its packaging.

**Table 3 Material Resources**

Component	Material	Mass %	Availability		Origin of Materials
			Renewable	Nonrenew.	
Frame	Virgin Aluminum	17.9%	Mineral, abundant		North American
	Recycled Aluminum	21.2%	Mineral, abundant		North American
	Thermoplastics	3.5%		Fossil, limited	Global

	Silicone	0.2%	Mineral, abundant	Global
	Steel	0.1%	Mineral, abundant	North American
<b>IGU</b>	Glass	56.5%	Mineral, abundant	North American
	Aluminum	0.4%	Mineral, abundant	North American
	Sealants (rubber, silicone)	0.1%	Fossil, limited	Global
<b>Total</b>		<b>100%</b>		
<b>Packaging</b>	Cardboard	97.7%	Abundant	Global
	Polyester strapping	2.3%	Fossil, limited	Global
<b>Total</b>		<b>100.0%</b>		

## A2 Transportation to Manufacturing

Module A2 models transportation of raw materials to the Arcadia door manufacturing plants in Vernon, CA, Sacramento, CA, Kent, WA, Las Vegas, NV, Phoenix, AZ, Dallas, TX, O’Ahu, HI, and Stamford, CT. The distances of each material to the plants by heavy duty diesel truck and ship were weighted on a facility production basis of these doors.

## A3 Manufacturing

Module A3 includes fabrication activities at Arcadia’s facilities, which include cutting of extruded aluminum lineals, assembly of framing parts, and preparation and assembly of doors and windows up until insertion and sealing of insulated glass units (IGUs). 2019 energy use, emissions, and waste management were included in the model. Regional electricity grids were used to account for different geographical locations. CA, NV, WA, and AZ facilities were modeled using the Western Electricity Coordinating Council (WECC) grid. The TX facility uses the Texas Regional Entity (TRE) grid, the CT facility uses NE Power Coordinating Council (NPCC), and the HI facility uses the Hawaiian Islands Coordinating Council (HICC).

### Cut-off Criteria

The cut-off goal of at least 95% of all mass and energy used in the system was exceeded since all materials and energy involved in the materials systems were included.

### Allocation

Arcadia’s facilities produce windows, doors, and sunshade products. Data were provided on a total facility basis since there was no clear-cut way to accurately measure process inputs and outputs for one type of product. Thus, an allocation was made on a total mass basis, basing the allocation on the number of units of windows, doors, and sunshades made at each facility.

### Software and Data Used

The SimaPro LCA software was used to model the door. Data came from sources appropriate for North America and with the highest data quality in mind. Secondary data came from U.S. LCI

database, DATASMART, EcoInvent, and pertinent cradle-to-gate production EPDs whose data on anodized, extruded aluminum were deemed appropriate for use in this EPD. The data sets from EcoInvent were customized to North American conditions.

### Data Quality

The data applied to this study represent current Arcadia products and practices. Arcadia's manufacturing facilities supplied 2019 process data, which were aggregated into weighted averages based on facility production output. Energy and transportation data are based on the late 2010's, and production data for materials are based on mid 2010's through 2020. Data for energy and transportation are North American based. Data for materials and processes are based on a combination of North American and European sources which, where possible, were customized to North American conditions. Technological coverage for the upstream materials and processes are generally industry average, and in some instances, it is typical technology.

## Results and Contribution Analysis

The Life Cycle Impact Assessment (LCIA) results were calculated using the North American impact assessment methodology, Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) v.2.1. All results are presented for the total of A1 through A3 and the percentage of A1, A2, and A3 to the total.

**Table 4 Impact Assessment and Inventory Results – 1 m2 Swing and Terrace Door**

Impact Category Indicator	Abbrev	Unit	Total	A1 Raw Mat'ls Prod'n	A2 Transp. to Plant	A3 Manuf- acturing
Global warming potential	GWP	kg CO2-eq	<b>125.07</b>	94%	0.9%	5.1%
Acidification potential - soil & water	AP	kg SO2-eq	<b>0.82</b>	96%	1.8%	1.8%
Eutrophication potential	EP	kg N-eq	<b>0.12</b>	52%	0.8%	47%
Smog formation pot'l (tropospheric ozone)	SFP	kg O3-eq	<b>8.63</b>	93%	4.5%	2.3%
Stratospheric ozone layer depletion pot'l	ODP	kg CFC11-eq	<b>4.52E-06</b>	89%	0%	11%
<b>Total primary energy consumption</b>						
Nonrenewable fossil	NRF	MJ (HHV)	<b>1301.62</b>	95%	1.2%	3.6%
Nonrenewable nuclear	NRN	MJ (HHV)	<b>315.29</b>	97%	0%	3.1%
Renewable (solar, wind, hydro, geo)	RSWHG	MJ (HHV)	<b>340.68</b>	100%	0%	0%
Renewable (biomass)	RB	MJ (HHV)	<b>41.38</b>	97%	0%	3.4%
<b>Material resources consumption</b>						
Nonrenewable material resources	NRMR	kg	<b>168.12</b>	100%	0%	0.2%
Renewable material resources	RMR	kg	<b>0.68</b>	91%	0%	8.6%
Net fresh water (inputs minus outputs)	NFW	L	<b>1733.55</b>	99%	0%	1.0%
Non-hazardous waste generated	NHW	kg	<b>0.02</b>	100%	0%	0%
Hazardous waste generated	HW	kg	<b>0.01</b>	100%	0%	0%

Notes: Results may not add to 100% due to rounding. 0% implies less than 0.1%.

## Performance Standards & Certifications

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Arcadia's products are tested, certified and labeled for the following performance standards.<sup>see note</sup>

- ❖ AAMA/WDMA/CSA 101/IS2/A440 (NAFS-North American Fenestration Standard/Specification for windows, doors, and skylights)
- ❖ ASTM E283, AAMA 501 and NFRC 400 Air Leakage
- ❖ ASTM E331 and AAMA 501 Water Penetration
- ❖ ASTM E330 and AAMA 501 Static Structural Performance
- ❖ AAMA 1503, AAMA 507 and NFRC 100 Thermal Transmittance – U-Factors
- ❖ AAMA 1503, CSA A440.2 and NFRC 500 Condensation Resistance (CRF,I,CR)
- ❖ AAMA 507 and NFRC 200 Overall Solar Heat Gain Coefficient and Visible Transmittance (SHGC) & (VT)
- ❖ AAMA 1801, ASTM E90 and ASTM E1425 Sound Transmission (STC, OITC)

Note: testing varies by product type, glazing specified, and specific products tested.

## Other Environmental Information

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At end of life of the door, the aluminum and glass, which make up 37% and 59% of the total mass, respectively, are recyclable. Arcadia's aluminum extrusions have 40% to 50% recycled content.

Through their sustainability and waste reduction initiatives, Arcadia strives to help their environment and enhance the value of their products for architects and building professionals. Arcadia's environmental management activities include:

- ❖ Recycling up to 50% of the water consumed in the aluminum anodizing process
- ❖ Keeping 1,350 tons of solid anodizing waste out of landfills each year
- ❖ Replacing potentially hazardous chemicals with environmentally-friendly products

In the building realm:

- ❖ Arcadia's core products comply with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
- ❖ By providing high performance products and applying sustainable design principles to every project, Arcadia is committed to helping the American Institute of Architects (AIA) hit its goal of carbon-neutrality by 2030.
- ❖ Arcadia's products achieve and exceed standards set by the U.S. Green Building Council; the American Society of Heating, Refrigerating and Air-Conditioning Engineers; the International Green Construction Code; CALGreen

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