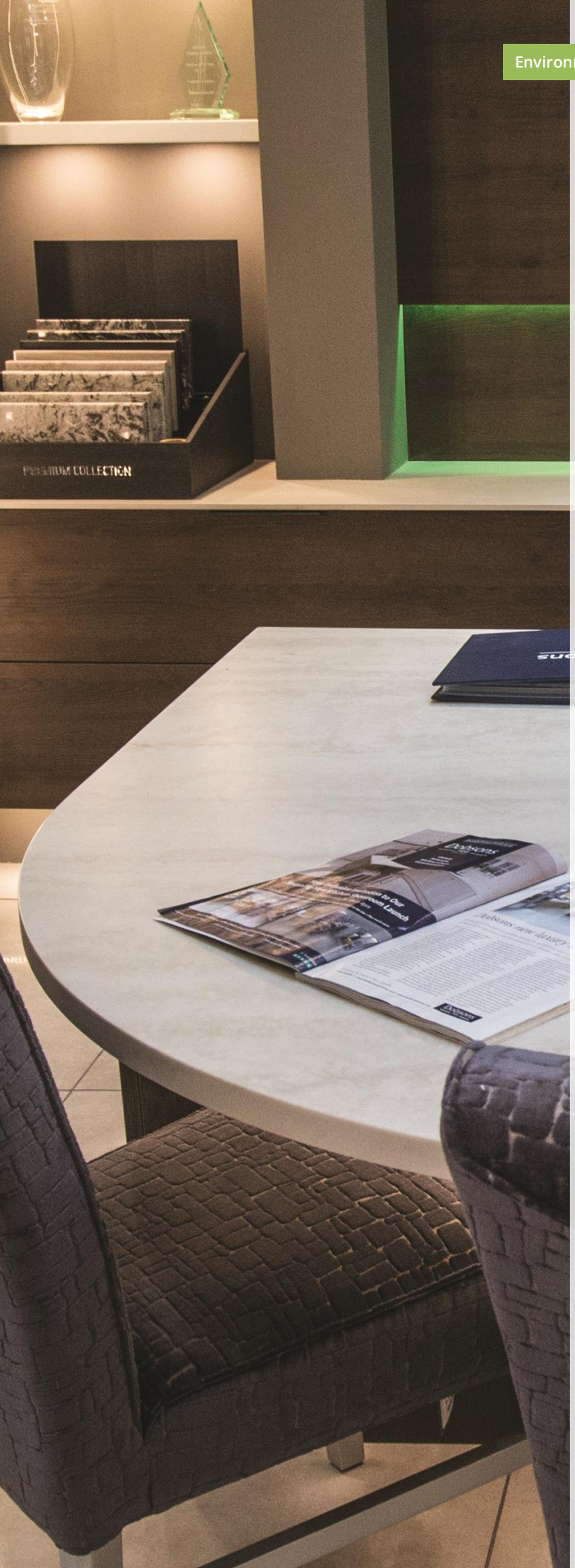


AVONITE SURFACES
A Brand of Aristech Surfaces LLC

ARISTECH SURFACES

VERIFIED by SCS GLOBAL SERVICES
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner

Aristech Surfaces LLC
7350 Empire Drive, Florence, Kentucky 41042
+1.800.354.9858
info@aristechsurfaces.com
www.aristechsurfaces.com/avonite

Product Line

Avonite Surfaces® Movement Collection Solid Surface

Functional Unit

The functional unit is one square meter of countertop provided and maintained for a period of 10 years in use.

EPD Number and Period of Validity

SCS-EPD-06201
EPD Valid June 16, 2020 through June 15, 2025

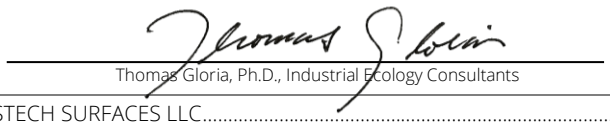
Product Category Rule

Product Category Rule for Environmental Product Declarations: *PCR for Residential Countertops*. NSF International. Valid through September 2020.

Program Operator

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

SCSglobal SERVICES

Declaration Owner:	Aristech Surfaces LLC
Address:	7350 Empire Drive, Florence, Kentucky 41042 USA
Declaration Number:	SCS-EPD-06201
Declaration Validity Period:	June 16, 2020 through June 15, 2025
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Aditi Suresh
LCA Software:	openLCA v1.9 and Ecoinvent v3.5 database
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
Product Category Rule:	Product Category Rule for Environmental Product Declarations: PCR for Residential Countertops. NSF International. Valid through September 2020.
PCR Review conducted by:	Evan Griffing, Ph.D., Environmental Clarity; Thomas P. Gloria, Ph.D., Industrial Ecology Consultants; Jack Geibig, EcoForm, LLC.
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
Declaration Contents:	

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

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.*

ABOUT ARISTECH SURFACES LLC

Aristech Surfaces LLC (ASLLC) produces and internationally markets its flagship brands: Avonite Surfaces® solid surface, STUDIO Collection® design resin and ASLLC Acrylics® acrylic sheet. Aristech Surfaces LLC provides quality, environmentally responsible, high-end aesthetic solutions sought by architects, designers, fabricators, OEMs and building owners around the globe. We continually strive to improve our energy and water efficiency, landfill diversion, and air quality, using performance metrics we measure and report. Recent and ongoing environmental initiatives include conversion to LED lighting at our plants and offices, proactive recycling of office and industrial materials, high-efficiency motor upgrades to machine drives, industrial water filtration and recycling systems and thermal oxidizing units with heat recovery to reduce VOC emissions. Aristech Surfaces LLC is a member of the U.S. Green Building Council, and the American Chemistry Council's Responsible Care®, pledged to improve and report our progress on the health and safety of our employees, our communities and our environment.

PRODUCT DESCRIPTION

Avonite Surfaces® is a global leading brand of solid surface products for the architecture and design community. The Movement Collection offers a broad palette of colors and designs for commercial and institutional projects. It can be used in vertical or horizontal applications, applied in straight or curved lines, or thermoformed into a myriad of shapes for countertops, wet walls, divider panels, sinks and showers, furniture, interior architectural features, and many other uses your imagination can conceive. In accordance with the PCR, the product is classified in this EPD as polymeric solid surface countertop. The manufacturer warrants for a period of 15 years from the date of purchase, or 10 years for exterior applications.

The Movement Collection products are available in a popular 12 mm thickness. Sheets are available in the industry standard 36 in x 144 in (91 x 366 cm) and packaged 15 sheets per pallet.

PRODUCT CHARACTERISTICS AND PERFORMANCE

Table 1. *Product characteristics for the Movement Collection.*

Characteristic	Nominal Value	Unit
Sheet thickness	12 (0.50)	mm (inch)
Sheet length	3,658 (144)	mm (inch)
Sheet width	914 (36.0)	mm (inch)
Sheet weight	22 (4.5)	kg/m^2 (lb/ft^2)

Table 2. *Product performance test results for the Movement Collection.*

Properties	Unit	Results	Test Method
General			
Nominal Thickness	mm	12	-
Density	g/cm^3	1.73	ASTM D-792
Test Results			
Impact Test	--	No damage	ANSI Z124.6-2007
Chemical Resistance Test	--	No visible change under any conditions	ANSI Z124.6-2007
Absorption and Bulk Specific Gravity	% g/cm^3	Water absorption: 0.08% Bulk specific gravity: 1.75	ASTM C97/C97M-15
Modulus of Rupture	MPa	Dry: 50.6 Wet: 56.2	ASTM C97/C97M-15
Flexural Strength	MPa	Dry: 60.9 Wet: 57.0	ASTM C880/C880-15
Barcol Hardness	--	54	ASTM D2583-13a
Deflection Temperature under Load	°C	102.9	ASTM D648-16 Method B
Izod Notched Impact Strength	J/m	3.4 C (complete break)	ASTM D 256-10 Method C
Tensile Test	Tensile Strength (MPa) Elongation at Break (%)	48.8 0.78%	ASTM D638-14

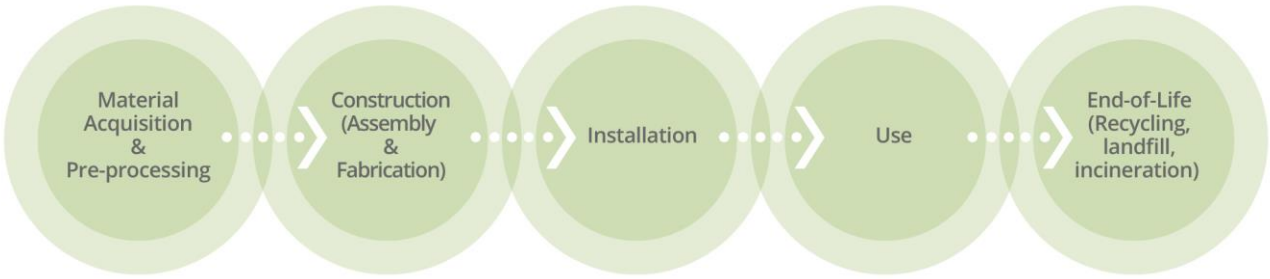
MATERIAL COMPOSITION

Table 3. *Material composition of the Movement Collection in kilograms per functional unit and in percentage of total weight.*

Material	Amount in Final Product (kg/m^2)	Percent of Total (%)	Material Resources Type
Product			
Aluminum hydroxide	14	65%	Virgin non-renewable
Color pigments	0.16	0.72%	Virgin non-renewable
Acrylic resin	7.54	34%	Virgin non-renewable
Total	**22**	**100%**	**-**
Packaging			
Wood pallet	1.8	100%	Virgin renewable
Total	**1.8**	**100%**	

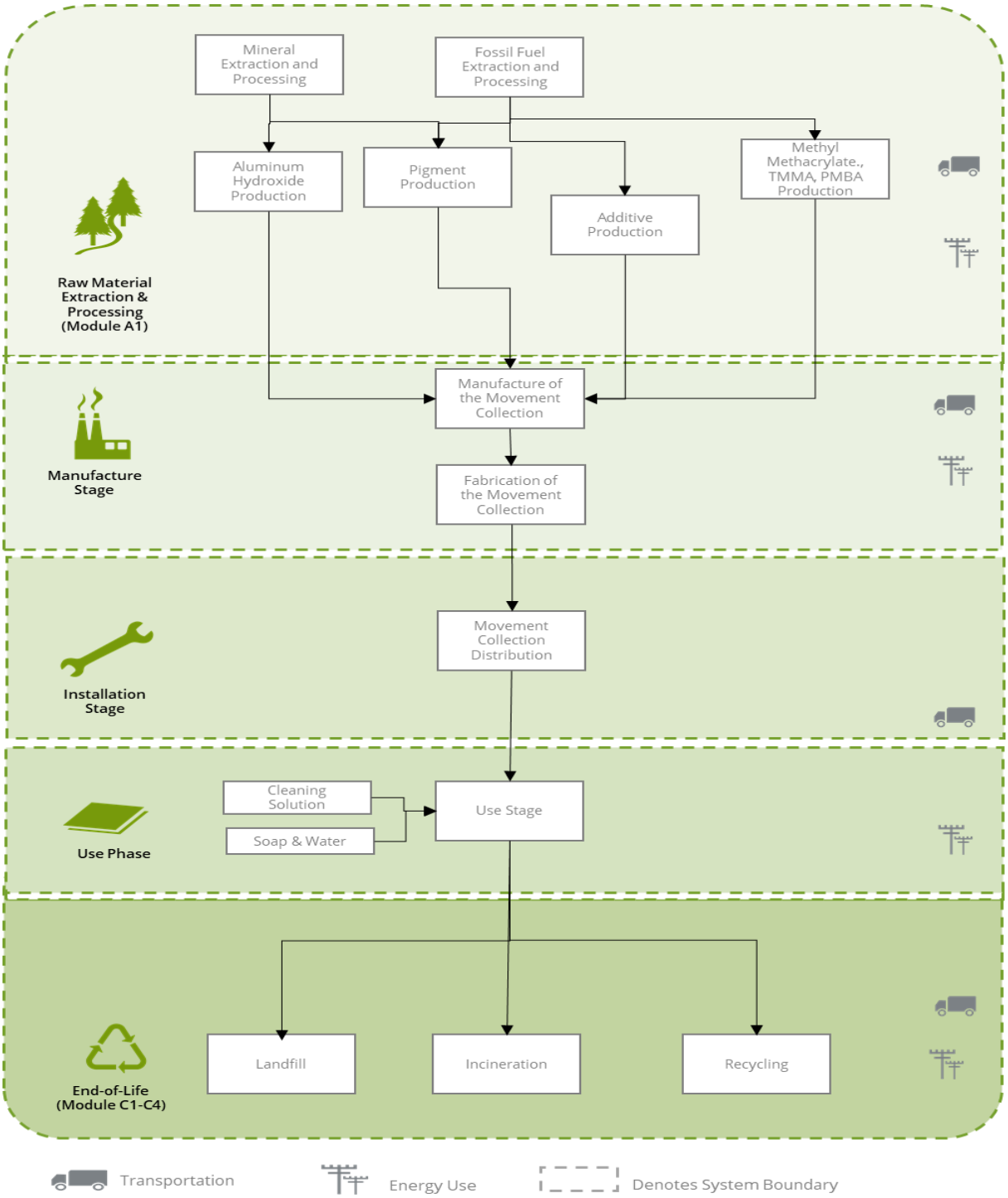
LIFE CYCLE ASSESSMENT STAGES

A cradle-to-grave life cycle assessment (LCA) was completed for this product in accordance with ISO 14040, ISO 14044, and the Product Category Rule for Environmental Product Declarations: *PCR for Residential Countertops*. The diagram below illustrates the life cycle stages included in this EPD.



PRODUCT LIFE CYCLE FLOW DIAGRAM

The diagram below is a representation of the most significant contributions to the life cycle of he Movement Collection by ASLLC. This includes material acquisition and pre-processing, construction (assembly and fabrication), installation, use, and end-of-life.



LIFE CYCLE INVENTORY

The life cycle inventory (LCI) flows for the EPD are shown in Table 4 in accordance with the requirements of the PCR. Water usage from electricity generation is included. Results are rounded to two significant figures.

Table 4. *Life cycle inventory flows for 1 m^2 the Movement Collection provided and maintained for a period of 10 years.*

Parameter	Total	Material Acquisition & Pre-processing	Construction	Installation	Use	End-of-Life
Emissions to Air (kg)						
SO_X	0.36	0.31	0.055	$5.9x10^{-5}$	$1.0x10^{-4}$	$1.7x10^{-4}$
NO_X	0.28	0.17	0.11	$1.8x10^{-4}$	$1.3x10^{-4}$	$3.6x10^{-4}$
CO_2	80	68	12	0.040	0.083	0.076
Methane	0.46	0.41	0.041	$3.1x10^{-5}$	$1.5x10^{-4}$	$8.9 x10^{-3}$
N_2O	$9.3x10^{-4}$	$5.6x10^{-4}$	$3.3x10^{-4}$	$8.7x10^{-7}$	$1.9x10^{-5}$	$1.6x10^{-5}$
CO	0.13	0.097	0.036	$8.3x10^{-5}$	$9.5x10^{-5}$	$7.4x10^{-5}$
Water Usage and Emission to Water (kg)						
Water Consumption	2.3	1.9	0.37	$4.1x10^{-4}$	0.011	0.0021
Phosphates	0.046	0.039	$7.0x10^{-3}$	$9.9x10^{-6}$	$4.8x10^{-5}$	$6.0x10^{-5}$
Nitrates	0.013	$7.9x10^{-3}$	$3.9x10^{-3}$	$3.0 x10^{-6}$	$1.3x10^{-3}$	$4.6 x10^{-4}$
Dioxin	0	0	0	0	0	0
Arsenic	$5.3x10^{-4}$	$5.0x10^{-4}$	$2.6x10^{-5}$	$3.6x10^{-8}$	$1.7x10^{-7}$	$2.1x10^{-6}$
Lead	$6.7x10^{-4}$	$2.2 x10^{-4}$	$3.3x10^{-4}$	$4.2x10^{-8}$	$1.8 x10^{-7}$	$1.2 x10^{-4}$
Mercury	$5.5x10^{-6}$	$2.8 x10^{-6}$	$1.4 x10^{-6}$	$7.7 x10^{-10}$	$4.0 x10^{-9}$	$1.2 x10^{-6}$
Cadmium	$2.8x10^{-5}$	$1.4 x10^{-5}$	$1.4 x10^{-5}$	$1.2x10^{-8}$	$6.7 x10^{-8}$	$8.3 x10^{-7}$
Chromium	$2.9x10^{-3}$	$2.9 x10^{-3}$	$7.2x10^{-5}$	$1.0x10^{-7}$	$2.9x10^{-7}$	$5.0 x10^{-7}$
Energy Type and Usages (MJ)						
Primary energy demand	1100	780	280	1.2	0.84	1.7
Fossil fuels	860	700	150	0.62	0.52	1.6
Nuclear	69	63	6.5	0.010	0.053	0.044
Renewable*	140	13	120	0.56	0.19	0.027
Waste Management (kg)						
Incineration with energy recovery	INA	INA	INA	INA	INA	INA
Incineration without energy recovery	INA	INA	INA	INA	INA	INA
Landfill (Non-hazardous waste)	29	17	3.5	0.57	0.0083	8.7
Hazardous waste	$3.4x10^{-4}$	$1.4x10^{-4}$	$2.0x10^{-4}$	$3.9x10^{-7}$	$7.7x10^{-7}$	$1.6x10^{-6}$
Landfill avoidance (recycling)	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

*Solar, wind, hydro, biomass

INA = Indicator not assessed

LIFE CYCLE IMPACT ASSESSMENT

The life cycle impact assessment (LCIA) for the EPD is conducted in accordance with requirements of the PCR. All impact category indicators are estimated using TRACI 2.1, with the exception of abiotic depletion elements (elements and fossil fuels), which are estimated using CML-IA. The LCIA results are calculated using openLCA 1.9 software. Results are rounded to two significant figures.

Table 5. *LCIA results for 1 m^2 Movement Collection provided and maintained for a period of 10 years.*

Impact Category	Units	Total	Material Acquisition & Pre-processing	Construction	Installation	Use	End-of-Life
Global warming potential	kg CO_2 eq	94	79	14	0.042	0.11	1.8
		100%	83%	15%	0.044%	0.12%	1.9%
Acidification potential	kg SO_2 eq	0.58	0.45	0.13	$1.9x10^{-4}$	$2.9x10^{-4}$	$4.9x10^{-4}$
		100%	77%	22%	0.033%	0.050%	0.085%
Photochemical ozone creation potential	kg O_3 eq	6.9	4.3	2.6	$4.5x10^{-3}$	$3.3x10^{-3}$	$9.0x10^{-3}$
		100%	62%	37%	0.066%	0.048%	0.13%
Eutrophication potential	kg N eq	0.21	0.15	0.029	$4.7x10^{-5}$	$5.1x10^{-4}$	$2.8x10^{-2}$
		100%	72%	14%	0.023%	0.24%	13%
Ozone depletion potential	kg CFC-11 eq	$4.7x10^{-6}$	$2.7x10^{-6}$	$2.0x10^{-6}$	$1.1x10^{-8}$	$3.9x10^{-9}$	$2.6x10^{-8}$
		100%	57%	42%	0.23%	0.082%	0.56%
Abiotic depletion potential (elements)*	kg Sb eq	$1.0x10^{-4}$	$8.6x10^{-5}$	$1.4x10^{-5}$	$7.9x10^{-8}$	$2.5x10^{-7}$	$2.1x10^{-7}$
		100%	85%	14%	0.078%	0.25%	0.20%
Abiotic depletion potential (fossil fuels)	MJ	1300	1100	170	0.66	0.72	1.8
		100%	91%	8.3%	0.055%	0.060%	0.15%

* This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources.

ADDITIONAL ENVIRONMENTAL INFORMATION

The Avonite Surfaces® Movement Collection is certified NSF/ANSI 51 by NSF International (Certificate #02930-02). which establishes the minimum health and sanitation requirements for materials used in the making of commercial food equipment. The product line materials were assessed for use only as a table or countertop, to not contaminate all food contact types with a maximum temperature of 248°F.

The Movement Collection is under the certification process through SCS Global Services for Health Product Declarations (HPDs). HPDs provide a full disclosure of the potential chemicals of concern in products by comparing product ingredients to a set of priority "hazard" lists based on the GreenScreen for Safer Chemicals and additional lists from other government agencies. HPDs qualify for numerous green building schemes, including LEED v4, WELL, Google Portico, and Living Product Challenge.

For more information and to access all certifications and sustainability initiatives, please visit:
http://www.aristechsurfaces.com/about-us/sustainability

SUPPORTING TECHNICAL INFORMATION

Unit processes are developed with openLCA 1.9 software, drawing upon data from multiple sources. Primary data were provided by the contract production facility for their manufacturing, upstream transport, and distribution processes. The primary sources of secondary LCI data are from Ecoinvent.

Table 6. *LCI datasets and associated databases used to model the Movement Collection product system.*

Flow	Dataset	Data Source	Publication Date
Product Materials			
Aluminium hydroxide	aluminium hydroxide production | aluminium hydroxide | Cutoff, U - CN	Ecoinvent 3.5	2018
Color pigments	market for chemical, organic | chemical, organic | Cutoff, U - GLO	Ecoinvent 3.5	2018
PMMA (HP202)	polymethyl methacrylate production, beads - RER	PlasticsEurope	2014
MMA	market for methyl methacrylate | methyl methacrylate | Cutoff, U - RoW	Ecoinvent 3.5	2018
TBMA	market for methyl methacrylate | methyl methacrylate | Cutoff, U - RoW	Ecoinvent 3.5	2018
Packaging			
Wooden Pallet	EUR-flat pallet {RoW}| production | Alloc Rec, U	Ecoinvent 3.5	2018
Electricity /Resources for Manufacturing			
Electricity	electricity voltage transformation from high to medium voltage | electricity, medium voltage | Cutoff, U - SGCC	Ecoinvent 3.5	2018
Water	tap water production, conventional treatment | tap water | Cutoff, U - RoW	Ecoinvent 3.5	2018
Fabrication			
Electricity	market group for electricity, low voltage | electricity, low voltage | Cutoff, U - CN	Ecoinvent 3.5	2018
Adhesive	market for acrylic binder, without water, in 34% solution state | acrylic binder, without water, in 34% solution state | Cutoff, U - RoW	Ecoinvent 3.5	2018
Use			
Surface Cleaner	market for non-ionic surfactant | non-ionic surfactant | Cutoff, U - GLO	Ecoinvent 3.5	2018
Soap	market for soap | soap | Cutoff, U - GLO	Ecoinvent 3.5	2018
Water	market for tap water | tap water | Cutoff, U - CA-QC	Ecoinvent 3.5	2018
Transportation			
Road	transport, freight, lorry >32 metric ton, EURO4 | transport, freight, lorry >32 metric ton, EURO4 | Cutoff, U - RoW	Ecoinvent 3.5	2018
Ship	market for transport, freight, sea, transoceanic ship | transport, freight, sea, transoceanic ship | Cutoff, U - GLO	Ecoinvent 3.5	2018
Rail	transport, freight train, diesel | transport, freight train | Cutoff, U - US	Ecoinvent 3.5	2018

Data Quality

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	Manufacturer data (primary data) are based on 2018 annual production. Representative datasets (secondary data) used for upstream and background processes are generally less than 10 years old. All of the data used represented an average of at least one year's worth of data collection.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Representative data used in the assessment are representative of US, Europe, Global, or "Rest-of-World" (average for all countries in the world with uncertainty adjusted). Datasets chosen are considered sufficiently similar to actual processes.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one year and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	Except where noted, the LCA model included all known mass and energy flows. In some instances, surrogate data used to represent upstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 10% of the total environmental impact for each indicator are excluded. In total, these missing data represent less than 5% of the mass or energy flows.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	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. Some proxy datasets are used to represent materials due to the lack of data available.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent data where available. Different portions of the product life cycle are equally considered.
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	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.
Sources of the Data: Description of all primary and secondary data sources	For manufacturing and packaging, primary data were provided by the contract production facility. Similarly, the upstream transport of materials is based on primary data provided by the contract production facility. The fabrication process was derived from a fabrication manual provided by Aristech to derive key parameters for calculations. Where primary data were unavailable, secondary data were used. The principal source of secondary LCI data is Ecoinvent and PlasticsEurope.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to the product materials and packaging is low. Data for upstream operations relied upon use of existing representative datasets. These datasets contained relatively recent data (<10 years), but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact methods required by the PCR include impact potentials, which lack characterization of providing and receiving environments or tipping points.

Allocation

Resource use at the contract production facility (e.g., water and energy) was allocated to the product based on the product weight as a fraction of the total facility production.

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

System boundaries

The system boundaries of the life cycle assessment for the countertop is cradle-to-grave. A description of the system boundaries for this EPD are as follows:

- **Material acquisition and pre-processing stage** – This stage includes extraction of virgin materials and reclamation of non-virgin feedstock. Resource use, emissions, and generated wastes associated with extraction and processing of the raw materials are included. All upstream transportation, including transportation to the manufacturing facility, is included.
- **Manufacturing stage** – This stage includes all the relevant manufacturing and fabrication processes. Resource use, emissions, and generated wastes associated with these processes are included. Transport of semi-finished products between facilities and materials used in packaging of the product are included. Production of capital goods, infrastructure, production of manufacturing equipment, and personnel related activities are excluded.
- **Installation stage** – This stage includes the delivery of the countertop to the point of installation, and energy and ancillary materials used during installation. Waste generated during countertop installation is included. Sinks, plumbing fixtures, and cook tops are excluded.
- **Use stage** – The use stage includes the cleaning of the countertop during its lifetime, as well as extraction, manufacturing and transport of all sundry material for cleaning. In accordance with the PCR, maintenance and repair of the countertop is generally insignificant and is excluded from this stage. The reference service life for the countertop in this EPD is 10 years.
- **End-of-life stage** – The end-of-life stage includes the transport of the countertop and its original packaging to end-of-life processes including landfill, incineration, and recycling.

Cut-off criteria

According to the PCR, mass and energy flows that consist of less than 1% may be omitted from the inventory analysis. Cumulative omitted mass or energy flows shall not exceed 5%. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

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