BASALITE CONCRETE PRODUCTS

ENVIRONMENTAL PRODUCT DECLARATION

CMU: 900000719 • Carson City Plant

This Environmental Product Declaration (EPD) reports the impacts for 1 m^3 of concrete formed into manufactured concrete and masonry products meeting the following specifications:

- ASTM C90, Concrete Masonry Unit, Load-Bearing

PRODUCT DESCRIPTION

Lightweight block:
A lightweight Basalite CMU with a natural pozzolan cementitious supplement and locally sourced aggregates. Sizes, shapes and colors are available for architectural, structural, veneer and site walls. Minimum compressive strength 1900 PSI.

ENVIRONMENTAL IMPACTS

Declared Product:

CMU: 900000719 • Carson City Plant
Density Factor: 1605 kg / m^3
Compressive strength: 24 MPa

Declared Unit: 1 m^3 of concrete formed into manufactured concrete masonry product (CMU)

Global Warming Potential (kg CO_2-eq)	**287**
Acidification Potential (kg SO_2-eq)	**0.98**
Eutrophication Potential (kg N-eq)	**0.43**
Smog Creation Potential (kg O_3-eq)	**18.6**
Ozone Depletion Potential (kg CFC-11-eq)	**7.98E-6**

Material Composition: Aggregate (crushed), Portland cement, Batch water, Admixture (plasticizing)

Additional detail and impacts are reported on page five of this EPD

PROGRAM OPERATOR

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428

DATE OF ISSUE

08/31/2021 **(valid for 5 years until 08/31/2026)**

General Program Instructions	ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions. Version 8.0, revised April 29, 2020.
Reference PCR	Part B: Concrete Masonry and Segmental Concrete Paving Product EPD Requirements, November 11 2020. V1.0
The sub-category PCR review was conducted by:	Jack Geibig, Ecoform, LLC, Terrie Boguski, Harmony Environmental, LLC, Christine Subasic, P.E., LEED AP, Consulting Architectural Engineer
Product RSL	n/a
Markets of Applicability	North America
EPD Type	Product Specific
Declared Unit	One cubic meter (m3) of concrete formed into manufactured concrete products
Dataset Variability	n/a
EPD Scope	Cradle to Gate
Year(s) of Reported Manufacturer Primary Data	1/3/2020 - 1/2/2021
LCA Software	CarbonCLARITY Suite, Concrete Block EPD Generator ■ Verification
LCI Database(s)	Ecoinvent, USLCI, US-EI
LCIA Methodology	TRACI 2.1 v1.04
This declaration was independently verified in accordance with ISO 14025:2006. The UL Environment “Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report,” v3.2 (December 2018), in conformance with ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL environment Part A Enhancement (2017). ☐ internal ☑ external	Thomas P. Gloria (t.gloria@industrial-ecology.com) Industrial Ecology Consultants
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Climate Earth (support@climateearth.com)
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria (t.gloria@industrial-ecology.com) Industrial Ecology Consultants

Limitations

Environmental declarations from different programs (ISO 14025) may not be comparable. EPDs are comparable only if they use the same PCR (or sub-category PCR where applicable), include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works. This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. However, variations and deviations are possible. Example of variations: different LCA software and background LCI datasets may lead to different results for the life cycle stages declared.

LIFE CYCLE ASSESSMENT

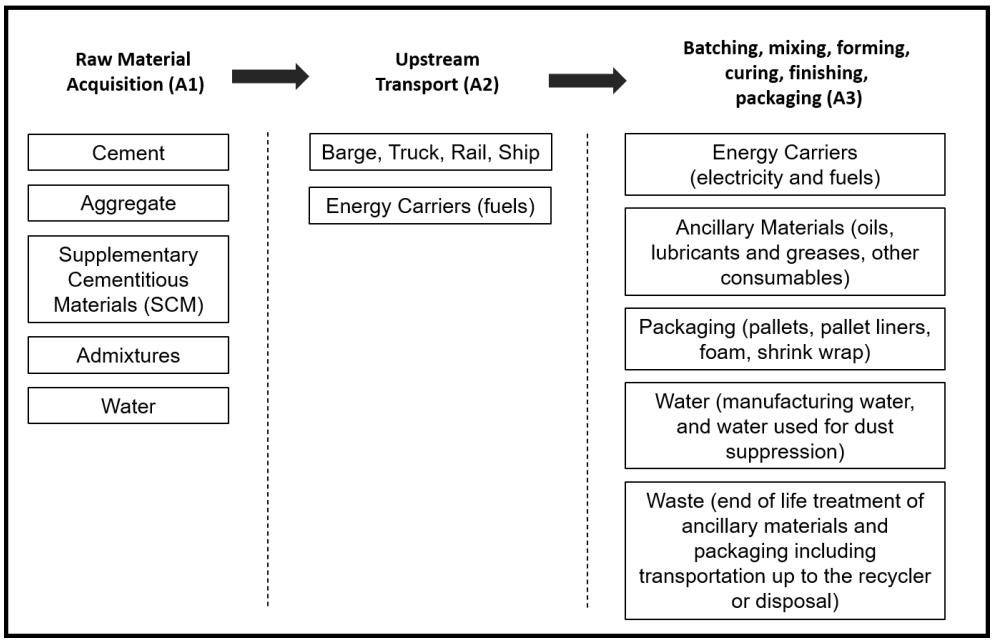
SYSTEM BOUNDARY

This EPD is a cradle-to-gate EPD covering the product stages (A1-A3) only

PRODUCTION Stage (*Mandatory*)			CONSTRUCTION Stage		USE Stage					END-OF-LIFE Stage			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	De-construction/ Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note: MND = module not declared; x = module included.

The production stages and primary unit processes included in the study by product stage are:



Relevant Information for product stages not included in system boundary (A4-C4):

Other products not included in assessment needed for the product to serve intended function in the construction work can include mortar, grout, and reinforcement for concrete masonry product;

Product packaging waste per declared unit include: 15.17 kg pallet waste, 0.21 kg stretch wrap waste, 0 kg foam waste;

Typical end of life treatment is unknown but can include landfill or crushing and then re-use as a recycled aggregate or as road base; The reference service life for concrete masonry is 75 years and for segmental concrete paving is 50 years.

CUT-OFF

Items excluded from system boundary include: production, manufacture, and construction of manufacturing capital goods and infrastructure; production and manufacture of production equipment, delivery vehicles, and laboratory equipment; personnel-related activities (travel, furniture, and office supplies); and energy and water use related to company management and sales activities that may be located either within the factory site or at another location. No known flows were deliberately excluded from this EPD.

ALLOCATION PROCEDURE

Allocation follows the requirements and guidance Part A: Life Cycle Assessment Calculation Rules and Report Requirements, section 3.3.
The product category rules for this EPD recognize fly ash, silica fume and slag as waste products recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a concrete material input.

PRIMARY SOURCES OF LCI DATA

- **Admixture (plasticizing)**: EFCA EPD, 2015
- **Aggregate (crushed)**: US-EI (2020): “Gravel, crushed, at mine/US”, 2001
- **Cleaning Chemicals**: Ecoinvent 3.4: 50% Citric acid and 50% Phosphoric acid, industrial grade, without water, in 70% solution state, market for/GLO, 2017
- **Diesel**: USLCI (2015): “Diesel, combusted in industrial equipment/NREL/US”, 2007
- **Electricity (WECC)**: Ecoinvent 3.4: “ Electricity, medium voltage, market for, cut-off”, 2015
- **Municipal Water**: US-EI (2020): “Tap water, at user/US”, 2000
- **Natural gas**: USLCI (2015): “Natural gas, combusted in industrial boiler/NREL/US”, 2007
- **Non-Hazardous Solid Waste**: US-EI (2016): Disposal, municipal solid waste, 2008
- **Oils, Lubricants and Greases**: Ecoinvent 3.5: Lubricating oil, GLO, market for, cut-off, 2011
- **Portland cement**: Portland Concrete Association, Industry Average EPD, 2016
- **Propane**: USLCI (2015): “Liquefied petroleum gas, at refinery/NREL/US, 2007
- **Truck transport**: USLCI (2015):"Transport, combination truck, long-haul, diesel powered/tkm/RNA", 2010
- **Truck transport**: USLCI (2015):"Transport, combination truck, short-haul, diesel powered/tkm/RNA", 2010
- Electricity on-site solar

INTERPRETATION

The material extraction (A1) product stage dominates most of the potential environmental impacts with cement contributing the greatest percentage of impacts in this stage. This EPD was calculated using industry average cement data. Cement LCIA impacts can vary depending upon manufacturing process, efficiency, and fuel source by as much as 50% for some environmental impact categories. Cement accounts for as much as 78% of impact across the LCIA results of the concrete mixes included in this EPD and thus manufacturer-specific cement impacts could result in variation of as much as 39%.

Life cycle impact assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks (ISO 14044, ISO 14040). EPDs are comparable only if they comply with ISO 21930 (2017), use the same, sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

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BASALITE® Concrete Products

DECLARATION OF ENVIRONMENTAL INDICATORS DERIVED FROM LCA

Impact Assessment	Unit	A1	A2	A3	Total
Global warming potential	kg CO_2-eq	2.34E+02	1.11E+01	4.17E+01	2.87E+02
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11-eq	6.34E-06	4.7E-10	1.63E-06	7.98E-06
Eutrophication potential	kg N-eq	2.82E-01	7.8E-03	1.44E-01	4.34E-01
Acidification potential of soil and water sources (AP)	kg SO_2-eq	5.97E-01	1.3E-01	2.51E-01	9.79E-01
Formation potential of tropospheric ozone (POCP)	kg O_3-eq	1.13E+01	3.3E+00	4.04E+00	1.86E+01
Resource Use					
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb-eq	2.32E-06	-	3.62E-06	5.94E-06
Abiotic depletion potential for fossil resources (ADPfossil)	MJ	1.38E+02	1.59E+02	5.29E+02	8.26E+02
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ	7.31E+01	0E+00	3.81E+02	4.54E+02
Renewable primary resources as material, (RPRM)*	MJ	0E+00	-	0E+00	0E+00
Non-renewable primary resources as energy (fuel), (NRPRE)*	MJ	1.38E+03	1.59E+02	5.78E+02	2.11E+03
Non-renewable primary resources as material (NRPRM)*	MJ	1.55E+00	-	0E+00	1.55E+00
Consumption of fresh water	m^3	2.16E+00	-	3.3E-01	2.49E+00
Secondary Material, Fuel and Recovered Energy					
Secondary Materials, (SM)*	kg	-	-	0E+00	0E+00
Renewable secondary fuels, (RSF)*	MJ	-	-	0E+00	0E+00
Non-renewable secondary fuels (NRSF)*	MJ	-	-	0E+00	0E+00
Recovered energy, (RE)*	MJ	-	-	0E+00	0E+00
Waste & Output Flows					
Hazardous waste disposed*	kg	1.11E-02	-	0E+00	1.11E-02
Non-hazardous waste disposed*	kg	1.94E+00	-	1.56E-01	2.09E+00
High-level radioactive waste*	m^3	2.9E-04	-	2.56E-08	2.9E-04
Intermediate and low-level radioactive waste*	m^3	1.07E-07	-	2.3E-07	3.38E-07
Components for reuse*	kg	-	-	0E+00	0E+00
Materials for recycling*	kg	-	-	9.29E-01	9.29E-01
Materials for energy recovery*	kg	-	-	5.37E-02	5.37E-02
Recovered energy exported from the product system*	MJ	-	-	0E+00	0E+00
Additional Inventory Parameters for Transparency					
Emissions from calcination and uptake from carbonation*	kg CO_2-eq	1.04E+02	0E+00	0E+00	1.04E+02

* Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.

- Not all LCA datasets for upstream materials include these impact categories and thus results may be incomplete. Use caution when interpreting data in these categories

No substances required to be reported as hazardous are associated with the production of this product.

REFERENCES

- ISO 14025: 2006 – Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 14040: 2006 – Environmental management – Life cycle assessment – Principles and framework
- ISO 14044: 2006/Amd 2:2020 – Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
- Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (December 2018, version 3.2)
- Part B: Concrete Masonry and Segmental Concrete Paving Product EPD Requirements UL Environment (November 2020, v1.0)

BASALITE CONCRETE PRODUCTS
605 Industrial Way
Dixon, CA 95602

CARSON CITY
2500 Boeing Way
Carson City, NV 89706