

READY- MIXED CONCRETE PRODUCED BY: ALAMO CONCRETE




FACILITY:

STRENGTH:

MIX NAME:

IMPACT INDICATOR	PER YD3	PER M3
Global Warming Potential	kg CO2e	
Ozone Depletion	kg CFC11e	
Acidification	kg SO2e	
Eutrophication	kg Ne	
SFP (Smog)	kg O3e	
Non-renew. energy	MJ, NCV	

GENERAL INFORMATION	
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Declared Product	Ready - Mixed Concrete produced by Alamo Concrete	
Date of Issue and EPD Number		
Period of Validity	5 years;	
EPD Holder	Alamo Concrete 6055 W. Green Mountain Rd San Antonio, TX 78266	
Program Operator	ASTM International 100 Bar Harbor Drive West Conshohocken, PA 19428-2959, USA	
LCA and EPD Developer	WAP Sustainability Consulting 1701 Market Street Chattanooga, TN 37408 www.wapsustainability.com	
Core PCR	ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products	
Sub-category PCR	NSF International Product Category Rule (PCR) for Concrete Version 2.2 (December 2022), Verified by Thomas P. Gloria, Ph.D., Industrial Ecology Consultants	
Independent LCA Reviewer and EPD Verifier	Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006	
	<input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	
For Additional Explanatory Material	Manufacture Representative: Michelle Ferguson (Michelle.Ferguson@buzziunicemusa.com) Software Tool: Theta by WAP Sustainability Consulting V.1.0.	

The declared product meets the following product specifications:

- ACI 211: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- ACI 318: Building Code Requirements for Structural Concrete.
- ASTM C94 Standard Specification for Ready-Mixed Concrete.
- CSA A23.1/A23.2: Concrete Materials and Methods of Concrete Construction
- CSI Masterformat Division 03-30-00: Cast-in-Place Concrete.
- UNSPSC Code 30111500: Ready Mix

Disclaimer:

EPDs are comparable only if they comply with this document, use the same sub-category PCR where applicable, include all relevant information modules, use the same functional unit and are based on equivalent scenarios with respect to the context of construction works. This EPD is intended for business-to-business communications.

ALLOCATION

The allocation of co-products or secondary flows cross the system boundary conforms with the ISO 21930: 2017 Section 7.2.4. Specifically, the allocation criteria were applied as follows:

- Allocation was not applied to any of the gate-to-gate production facilities.
- For Secondary Data sources, the NSF PCR default allocation selection (i.e., “Cut-off” or “Alloc Rec”) was applied.
- The product category rules for this EPD recognize fly ash, silica fume and slag as 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.
- A portion (30%) of the reported fleet energy use for truck mixing plants was allocated to the mixing facility.

CALCULATED RESULTS A1- A3

CORE MANDATORY IMPACT INDICATOR			PER YD3	PER M3
Global warming potential	GWP	kg CO2e		
Depletion potential of the stratospheric ozone layer	ODP	kg CFC11e		
Acidification potential of soil and water sources	AP	kg SO2e		
Eutrophication potential	EP	kg Ne		
Formation potential of tropospheric ozone	SFP	kg O3e		
Abiotic depletion potential for fossil resources	ADP _f	MJ, NCV		
Abiotic depletion potential for non-fossil mineral resources *	ADP _e	kg Sbe		
Fossil fuel depletion	FFD	MJ Surplus		
USE OF PRIMARY RESOURCES				
Renewable primary energy carrier used as energy*	RPRE	MJ, NCV		
Renewable primary energy carrier used as material *	RPRM	MJ, NCV	0.00	0.00
Non-renewable primary energy carrier used as energy *	NRPRE	MJ, NCV		
Non-renewable primary energy carrier used as material *	NRPRM	MJ, NCV	0.00	0.00
SECONDARY MATERIAL, SECONDARY FUEL AND RECOVERED ENERGY				
Secondary material*	SM	kg	0.00	0.00
Renewable secondary fuel*	RSF	MJ, NCV	0.00	0.00
Non-renewable secondary fuel*	NRSF	MJ, NCV		
Recovered energy *	RE	MJ, NCV	0.00	0.00
MANDATORY INVENTORY PARAMETERS				
Consumption of freshwater resources	FW	m3		
Calcination and carbonation emissions	CCE	kg CO2e		
INDICATORS DESCRIBING WASTE				
Hazardous waste disposed *	HWD	kg		
Non-hazardous waste disposed *	NHWD	kg		
High-level radioactive waste, conditioned, to final repository *	HLRW	m3		
Intermediate- and low-level radioactive waste, to final repository*	ILLRW	m3		
Components for re-use *	CRU	kg	0.00	0.00
Materials for recycling *	MR	kg	0.00	0.00
Materials for energy recovery *	MER	kg	0.00	0.00
Recovered energy exported from the product system *	EE	MJ, NCV	0.00	0.00

*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.

DATA SOURCES

This EPD is based on foreground LCI data collected from the participating company's production facilities for the calendar year 2022. All upstream material, resource and energy carrier inputs have been sourced from various industry-average datasets and literature. Many of these data sets are defaulted to those specified for use in the NSF PCR 2022. The following Table describes each LCI data source and includes the data quality assessment.

MATERIALS	LCI DATA SOURCE	YEAR	GEOGRAPHY	DATA QUALITY ASSESSMENT
Portland Cement and Limestone Cement, ASTM C595, AASHTO M240, or CSA A3001		2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Slag Cement, ASTM C989	Slag Cement Association EPD of North America Slag Cement (2021)	2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Fly Ash, ASTM C618	None, no incoming burden, only inbound transport is considered*	N/A	N/A	N/A
Silica Fume, ASTM C1240	None, no incoming burden, only inbound transport is considered*	N/A	N/A	N/A
Crushed Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, crushed {RoW} production Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Natural Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, round {RoW} gravel and sand quarry operation Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Manufactured Lightweight Aggregates, ASTM C330	ecoinvent 3.4: Expanded clay {RoW} production Cut-off, U (2018), modified with US average electricity	2000	World/US	Technology: good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Admixtures, ASTM C494	EFCA EPDs for Air Entrainers, Plasticisers and superplasticisers, Hardening Accelerators, Set Accelerators, Water Resisting Admixtures, and Retarders (2015)	2015	North America	Technology: very good, Time: very good, Geography: fair, Completeness: very good, Reliability: very good
Batch and Wash Water, ASTM C1602	ecoinvent 3.4: Tap water {RoW} market for Cut-off, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: fair, Completeness: very good, Reliability: very good
Road Transport	USLCI 2014: Transport, combination truck, short-haul, diesel powered/tkm/RNA (2014) Adjusted for Back-hauls per NSF PCR 7.1.7.2	2010	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Rail Transport	USLCI 2014: Transport, train, diesel powered /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: good, Reliability: very good
Ocean Transport	USLCI 2014: Transport, ocean freighter, average fuel mix/US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Electricity	ecoinvent 3.4: Electricity, low voltage {XX} market for Cut-off, U (2018)	2015	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Diesel	USLCI 2014: Diesel, combusted in industrial boiler / US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Gasoline	USLCI 2014: Gasoline, combusted in equipment/ US "U" (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Liquefied Propane Gas	USLCI 2014: Liquefied petroleum gas, combusted in industrial boiler /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Hazardous Solid Waste	ecoinvent 3.4: Hazardous waste, for incineration {RoW} treatment of hazardous waste,hazardous waste incineration Alloc, Rec, U (2018), modified with US electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Non-Hazardous Solid Waste	ecoinvent 3.4: Inert waste {RoW} treatment of, sanitary landfill Alloc Rec, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good

* The product category rules for this EPD recognize fly ash, silica fume and slag as 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.

REFERENCES

- American Concrete Institute (2009) ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- American Concrete Institute (2008) ACI 318: Building Code Requirements for Structural Concrete.
- Bare, J. (2012) Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) v2.1.
- European Federation of Concrete Admixture Associations (2015). EFCA Environmental Declarations for Admixtures.
- International Organization for Standardization (2017) ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
- National Renewable Energy Laboratory (2019) U.S. Life Cycle Inventory Database <http://www.nrel.gov/lci/>
- NSF International (2022) Product Category Rule for Concrete, Version 2.2
- Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016) The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, 21, 1218–1230.
- American Concrete Institute (2009) ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete
- ASTM International (2018) ASTM C94: Standard Specification for Ready-Mixed Concrete.
- Construction Specifications Institute (CSI) MasterFormat Division 03-30-00 Cast-in- Place Concrete
- CSA Group (2014) CSA A23.1-09/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
- EN 15804:2012 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- ISO 14044:2006/AMD 1:2017/ AMD 2:2020 Environmental Management – Life cycle assessment – Requirements and guidelines
- ISO 14040:2006 Environmental Management - Life cycle assessment - Principles and framework
- ASTM International General Program Instructions (2020) v8.0