

AIR VOL BLOCK, INC.



Environmental Product Declaration



Concrete Masonry Units

Air Vol Block Environmental Product Declaration

General Information

Environmental Product Declaration

This document is a product-specific Type III environmental product declaration (EPD) for 14 concrete masonry unit (CMU) mixes manufactured by Air Vol Block, Inc. into a variety of shape and size configurations. This declaration has been prepared in accordance with ISO 14025, ISO 21930, and ASTM International's EPD program operator rules.

PCR review was conducted by:

Nicholas Santero, PE International (Chairperson)

The PCR peer review report is available upon request: cert@astm.org

Independent verification of the declaration and data, according to ISO 14025: internal external

Third-party verifier:

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Product Category Rule:

ASTM International PCR005: Product Category Rules for Preparing an Environmental Product Declaration for Manufactured Concrete and Concrete Masonry Products, issued December 2014

Declared Unit:

1 m³ of concrete formed into manufactured concrete and concrete masonry products

Program Operator:

ASTM International

<http://www.astm.org/EPDs.htm>



EPD Owner:

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Date of Issue:

August 17, 2015 (valid for 5 years until August 17, 2020)

ASTM Declaration Number: EPD-015

Company

Air Vol Block of San Luis Obispo, California is a manufacturer of quality concrete masonry units, Allan Block mortarless retaining wall systems, and interlocking concrete pavers.

Products

The 14 CMU mixes covered in this EPD are given in Table 1 and descriptions of each mix and their application are provided below. Images and configurations of block shapes and sizes produced from these 14 mixes are defined in Figures 1 & 2.

Table1: CMU mixes covered in this study.

name	abbreviation
LEED ¹ Slump	Slump
Normal Weight LEED 2000 PSI	NW -2000
Normal Weight LEED 2800 PSI	NW-2800
Normal Weight LEED 3750 PSI	NW-3750
Medium Weight LEED 2000 PSI	MW-2000
Medium Weight LEED 2800 PSI	MW-2800
Medium Weight LEED 3750 PSI	MW- 3750
Lightweight LEED 2000 PSI	LW-2000
Lightweight LEED 2800 PSI	LW-2800
Lightweight LEED 3750 PSI	LW-3750
Lightweight LEED w/ pumice	LW-p
Standard Normal Weight 2000 PSI	NW-Standard
Standard Medium Weight 2000PSI	MW-Standard
Standard Lightweight 2000PSI	LW-Standard

LEED Slump: A slightly rounded, random distortion with the look of rustic adobe. Configurations for structural and veneer applications. This product is manufactured with recycled concrete which could affect appearance.

Normal Weight LEED: A CMU typically used in architectural masonry, with normal weight aggregate. Configurations for structural and veneer applications. This product is manufactured with recycled concrete which may affect appearance.

Medium Weight LEED: A CMU typically used in architectural masonry, with both normal weight and lightweight aggregates. Configurations for structural and veneer applications. This product is manufactured with recycled concrete which could affect appearance.

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Lightweight LEED: A CMU typically used in structural masonry, with lightweight aggregates (and optionally pumice for aesthetic effect). Configurations for structural and veneer applications. This product is manufactured with recycled concrete which may affect appearance.

Standard Normal Weight: A CMU typically used in architectural masonry, with normal weight aggregate. Configurations for structural and veneer applications.

Standard Medium Weight: A CMU typically used in architectural masonry, with both normal weight and lightweight aggregates. Configurations for structural and veneer applications.

Standard Lightweight: A CMU typically used in structural masonry, with lightweight aggregates (and optionally pumice for aesthetic effect). Configurations for structural and veneer applications.

These products are compliant to the following standards and specifications:

ASTM C90: Loadbearing Concrete Masonry Units

CSI Specification Section 04 22 00: Concrete Masonry Units

UNSPSC 30131502: Concrete blocks

¹ LEED, Leadership in Energy & Environmental Design, US Green Building Council.

Each of the fourteen different mixes covered in this EPD can be formed into a variety of different CMU sizes and shapes as depicted in Figures 1 & 2.


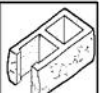









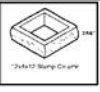




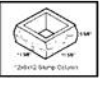










	12*4*16 SLUMP BOND BEAM		8*6*16 SLUMP OPEN END STANDARD		12*6*8 SLUMP HALF		6*6*14 SLUMP CORNER		8*6*8 SLUMP HALF
	12*4*16 SLUMP STANDARD		12*4*8 SLUMP HALF		16*4*16 SLUMP COLUMN		6*6*16 SLUMP BOND BEAM		8*6*16 SLUMP BOND BEAM
	6*4*16 SLUMP STANDARD		12*4*12 SLUMP COLUMN		16*6*16 SLUMP COLUMN		6*6*16 SLUMP STANDARD		8*6*16 SLUMP STANDARD
	6*4*16 SLUMP BOND BEAM		12*6*12 SLUMP COLUMN		4*4*12 SLUMP CORNER		6*6*8 SLUMP HALF		
	8*4*8 SLUMP HALF		12*6*16 SLUMP BOND BEAM		4*4*16 SLUMP STANDARD		8*4*16 SLUMP BOND BEAM		
	8*6*16 SLUMP OPEN END BOND BEAM		12*6*16 SLUMP STANDARD		4*4*8 SLUMP HALF		8*4*16 SLUMP STANDARD		

Figure 1: Size and shape configurations of Slump LEED mix.

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






























































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	10*8*16 DOUBLE OPEN BOND BEAM		16*8*16 DOUBLE OPEN BOND BEAM		6*8*8 OPEN END HALF		8*8*16 NO WEB BOX CAR		6*8*16 BB CE S1S		8*8*16 FLUTE CE S1S1E
	10*8*16 OPEN END BOND BEAM		16*8*16 COLUMN		8*2*16 CAP		8*8*16 OPEN END STANDARD		6*8*16 STD CE S1S		8*8*16 S1S2E CALT
	10*8*16 OPEN END STANDARD		16*8*16 OPEN END PILASTER		8*4*16 OPEN END STANDARD		8*8*16 U-BEAM		6*8*16 STD CE S2S		8*8*16 STD CE S2S
	10*8*8 HALF		4*8*12 CORNER		8*4*16 OPEN END BOND BEAM		8*8*8 HALF		8*3*8 ST1E		8*8*16 STD CE S2S1E
	12*4*16 BOND BEAM		4*8*16 STANDARD		8*4*8 HALF		8*8*8 U_INTEL		8*3*8 ST2E		8*8*16 STD OE S1S
	12*4*16 STANDARD		4*8*8 HALF		8*6*16 DOUBLE OPEN BOND BEAM		10*8*16 BB DOE S1S		8*8*16 BB CE S1S FLUTE		8*8*8 HALF CE S1S
	12*8*12 COLUMN		6*2*16 CAP		8*6*16 OPEN END BOND BEAM		10*8*16 OPEN END STD S1S		8*8*16 BB CE S2S		8*8*8 HALF CE S1S1E
	12*8*16 BOND BEAM		6*4*16 STANDARD		8*6*16 OPEN END STANDARD		12*8*16 BB OE S1S		8*8*16 BB DOE S1S		8*8*8 HALF CE S2S
	12*8*16 DOUBLE OPEN BOND BEAM		6*4*16 BOND BEAM		8*8*16 BOND BEAM		12*8*16 STD CE S1S		8*8*16 S1S OE BB		
	12*8*16 OPEN END BOND BEAM		6*8*16 BOND BEAM		8*8*16 DOUBLE OPEN BOND BEAM		12*8*16 STD CE S1S1E		8*8*16 BBOE S1S 4 SCORE		
	12*8*16 SPEED BLOCK		6*8*16 MW STANDARD		8*8*16 KNOCK-OUT BOND BEAM		12*8*16 STD OE S1S		8*8*16 BB OE S2S		
	12*8*16 STANDARD		6*8*16 DOUBLE OPEN BOND BEAM		8*8*16 OPEN END BOND BEAM		12*8*8 HALF CE S1S		8*8*16 S1S STD CE		

Figure 2: Size and shape configurations of Normal, Medium, and Lightweight LEED mixes and Normal, Medium and Lightweight Standard mixes.

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Material Composition

The material composition of each product is listed in Table 2 below. Products are indicated using the mix abbreviations from Table 1. Materials are ordered by descending weight.

Table 2: Material composition of mixes, ordered by descending weight.

CMU Mix	Material Composition
Slump	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
NW -2000	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
NW-2800	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
NW-3750	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
MW-2000	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
MW-2800	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
MW- 3750	natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
LW-2000	lightweight aggregate, natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
LW-2800	lightweight aggregate, natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
LW-3750	lightweight aggregate, natural aggregate, portland cement, recycled aggregate, batch water, pigment, admixture.
LW-p	pumice, natural aggregate, portland cement, lightweight aggregate, recycled aggregate, batch water, pigment, admixture.
NW-Standard	natural aggregate, portland cement, batch water, pigment, admixture.
MW-Standard	natural aggregate, portland cement, batch water, pigment, admixture.
LW-Standard	natural aggregate, pumice, lightweight aggregate, portland cement, batch water, pigment, admixture.

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Study

The impact results are based on a cradle-to-gate life cycle assessment (LCA) study covering the following phases of the life cycle:

- A1 - raw material acquisition;
- A2 - upstream transportation; and
- A3 - manufacturing processes.

A flow diagram illustrating the main unit processes by life cycle stage is provided below in Figure 3.

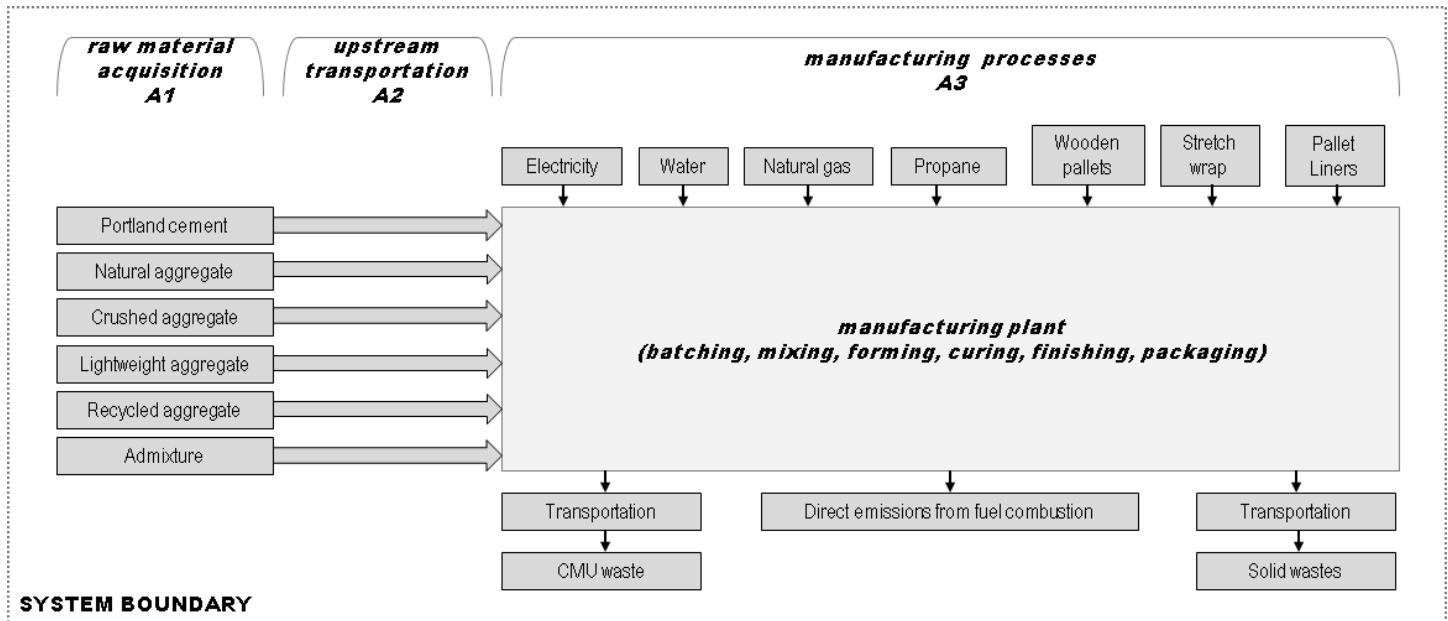


Figure 3: System boundary of study.

The following cradle-to-gate life cycle stages are excluded from the primary product stages:

1. Production, manufacture, and construction of manufacturing capital goods and infrastructure.
2. Production and manufacture of production equipment, delivery vehicles, and laboratory equipment.
3. Personnel-related activities (travel, furniture, office supplies).
4. Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

This EPD covers only the cradle-to-gate impacts of manufactured concrete and concrete masonry products using a declared unit, and the results cannot be used to compare between products. Only EPDs prepared from cradle-to-grave life cycle results and based on the same function and reference service life (RSL), quantified by the same functional unit, and meeting all the conditions in ISO 14025, Section 7.2.2 can be used to assist purchasers and users in making informed comparisons between products.

EPDs from different programs (using different PCR) may not be comparable.

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Declared Impacts

Product mix specific impact results per m3 of concrete formed are displayed in Table 3.

Table 3: Impact results for Air Vol Block mixes, per m3 of concrete formed into concrete masonry units (CMU).

Concrete Mix															
Impact category	Unit	Slump	LW-p	LW-2000	LW-2800	LW-3750	MW-2000	MW-2800	MW-3750	NW-2000	NW-2800	NW-3750	LW-Standard	MW-Standard	NW-Standard
Global warming potential	kg CO2 eq	454	566	740	776	805	506	533	575	478	505	547	597	507	497
Acidification potential	kg SO2 eq	1.97	2.37	3.44	3.60	3.74	2.06	2.19	2.38	2.01	2.13	2.33	2.51	2.06	2.10
Eutrophication potential	kg N eq	0.229	0.271	0.395	0.409	0.422	0.238	0.249	0.266	0.240	0.251	0.268	0.282	0.236	0.245
Smog creation potential	kg O3 eq	28.1	35.0	43.1	45.4	47.2	31.9	33.6	36.2	29.9	31.6	34.3	37.0	32.0	31.1
Ozone depletion	kg CFC-11 eq	4.01E-05	5.37E-05	8.01E-05	8.06E-05	8.10E-05	5.00E-05	5.03E-05	5.09E-05	4.95E-05	4.99E-05	5.04E-05	5.41E-05	5.00E-05	4.97E-05
Nonrenewable, fossil	MJ	2,450	3,607	6,110	6,255	6,376	2,825	2,935	3,107	2,677	2,788	2,960	3,735	2,829	2,732
Non-renewable, nuclear	MJ	187	194	269	282	293	181	191	206	193	203	218	203	177	197
Renewable, biomass	MJ	117	125	158	159	160	116	117	119	117	118	119	126	116	117
Renewable, wind, solar, geothermal	MJ	8.11	8.37	10.87	11.31	11.68	7.92	8.26	8.79	8.34	8.67	9.20	8.66	7.80	8.45
Nonrenewable material resources	kg	1,498	1,632	1,275	1,309	1,336	1,941	1,967	2,007	1,845	1,871	1,910	1,791	2,111	1,939
Renewable material resources	kg	6.46	6.94	8.77	8.84	8.89	6.43	6.49	6.56	6.45	6.50	6.58	6.99	6.43	6.49
Net fresh water	m3	325	331	393	406	416	320	330	344	331	341	355	339	317	335
Non-hazardous waste generated	kg	19.64	19.79	19.30	20.36	21.24	21.01	21.81	23.07	20.96	21.76	23.02	20.68	21.00	21.70
Hazardous waste generated	kg	5.43	4.89	4.35	4.90	5.35	5.29	5.71	6.35	5.29	5.71	6.35	5.36	5.29	5.71
Reclaimed Concrete Masonry Products	kg	141	124	120	122	124	163	165	167	184	185	188	0	0	0

Calculated impact results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.