



Environmental Product Declaration

A cradle-to-gate EPD according to ISO 14025 and ISO 21930

Concrete Masonry Products as
Manufactured by Hard Block Factory



ASTM
INTERNATIONAL

About Hard Block Factory

Hard Block Factory is a proud subsidiary of ASGC Construction Group, a sister company to Hard Precast Building Systems and Emirates Beton that affiliates to Concrete Industries Complex.



HBF is an elite manufacturing conglomerate established in UAE to meet the increasing demand for quality products in the booming construction market.

HBF is one of the largest and most advanced (fully computerized) manufacturer of all kinds of masonry & Hourdi blocks, Paving blocks and Sholin blocks for the construction industry in the region. HBF has been chosen to represent the United Arab Emirates, and given The International Award for Technology & Quality in Geneva, Switzerland.



ASTM International Certified EPD

This is a business-to-business Type III environmental product declaration (EPD) for concrete masonry products as manufactured by Hard Block Factory. This declaration has been prepared in accordance with ISO 14025 and ISO 21930, and the ASTM product category rules (PCR) and EPD program operator rules.

The intent of this document is to further the development of environmentally compatible and more sustainable construction products by providing comprehensive environmental information related to potential impacts of concrete masonry products available in the UAE in accordance with international standards.

Program Operator



ASTM International
Environmental Product Declarations
100 Barr Harbor Drive,
West Conshohocken,
PA 19428-2959
www.astm.org

Owner of the EPD



Hard Block Factory
Jebel Ali Industrial Area 3
P.O. Box 37642
Dubai - United Arab Emirates
hardblock.com

Concrete Consultant



Grey Matters Consultancy
P.O. Box: 283079
Dubai Investment Park
Dubai - UAE
www.greymatters.ws

EPD Information

Product Names

Concrete masonry units, concrete pavers, concrete roof tiles

Product Definition

Manufactured masonry unit made of concrete in which the binder is a combination of water and cementitious materials

Declared Unit

1 m³ concrete masonry product

Declaration Number

EPD 082

Declaration Type

A “cradle-to-gate” EPD - activity stages or information modules covered include production (modules A1 to A3). The declaration is intended for use in Business-to-Business (B-to-B) communication. This EPD of concrete masonry products (UN CPC 3755) is applicable to those manufactured at the Hard Block Factory facility.

Content of the Declaration

The declaration follows Section 11, Content of the EPD, ASTM International, Product Category Rules For Preparing an Environmental Product Declaration For Manufactured Concrete and Concrete Masonry Products.

EPD Information

Declaration Comparability Limitation Statement

The following ISO statement indicates the EPD comparability limitations and intent to avoid any market distortions or misinterpretation of EPDs based on the ASTM's PCR: 2014:

- EPDs from different programs (using different PCR) may not be comparable.
- Declarations based on the ASTM PCR are not comparative assertions; that is, no claim of environmental superiority may be inferred or implied.

Applicable Countries

United Arab Emirates

Date of Issue

June 22 2018

Period of Validity

5 years

EPD Prepared by



Athena
Sustainable Materials
Institute

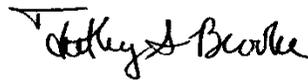
Matt Bowick, Athena Sustainable Materials Institute
119 Ross Avenue, Suite 100
Ottawa, Ontario, K1Y 0N6, Canada
matt.bowick@athenasmi.org

This EPD was independently verified
by ASTM in accordance with ISO 14025:

Internal

External

X



Timothy Brooke, ASTM International
100 Barr Harbor Dr.
West Conshohocken, PA 19428
cert@astm.org

EPD Project Report Information

EPD Project Report

A Cradle-to-Gate Life Cycle Assessment of Concrete Masonry Products Manufactured by Hard Block Factory LLC in the Emirate of Dubai, UAE, April 2018.

The report is available upon request at cert@astm.org.

EPD Project Prepared by



Athena
Sustainable Materials
Institute

Matt Bowick, Athena Sustainable Materials Institute
119 Ross Avenue, Suite 100
Ottawa, Ontario, K1Y 0N6, Canada
matt.bowick@athenasmi.org

This EPD and EPD project report were independently
verified by in accordance with ISO 14025 and the
reference PCR:

Thomas Gloria, Ph.D. (LCACP ID: 2008-03)
Industrial Ecology Consultants
Email: info@industrial-ecology.com

PCR Information

Reference PCR

ASTM International, Product Category Rules For Preparing an
Environmental Product Declaration For Manufactured Concrete and
Concrete Masonry Products

Date of Issue

December 2014

PCR review was conducted by:

Nicholas Santero, PE International (Chairperson)
Christine Subasic, Consulting Architectural Engineer
Juan Tejada, ORCO Block Company

Contact information available upon request at cert@astm.org.

1. PRODUCT IDENTIFICATION

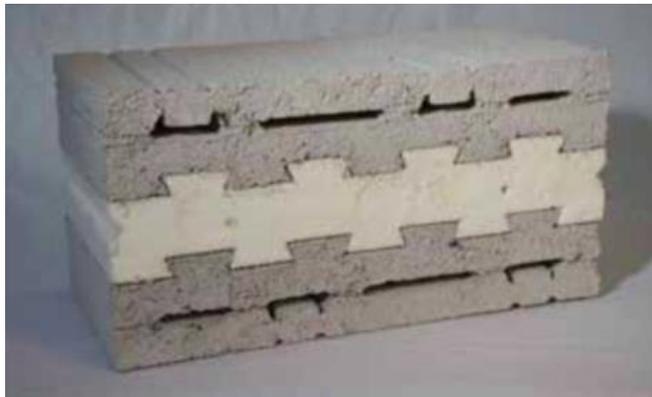
This EPD reports environmental information for the six concrete masonry products shown in Figure 1 below, produced by Hard Block Factory in Dubai, United Arab Emirates.



200mm Hollow Concrete Masonry Unit (400x200x200)



200mm Solid Concrete Masonry Unit (400x200x200)



250mm Thermal Concrete Masonry Unit (400x250x200)



200mm Hourdi Concrete Masonry Unit (420/380x200x200)



80mm Grey Rectangular Pavers (200x100x80)



50mm Grey Roof Tiles (400x400x50)

Figure 1: Hard Block Factory Concrete Masonry Products (all dimensions mm)

Concrete masonry units (CMUs) are typically used in load-bearing and partition wall construction. The blocks are laid in horizontal rows; successive rows are bound by mortar beds and optionally reinforced with steel reinforcing and/or concrete grout. CMUs are also used in masonry column and beam construction.

Concrete pavers and roof tiles are for exterior use where a hard, smooth surface is desired.

2. DECLARED UNIT

The declared unit is 1 m³ of concrete masonry product.

3. MATERIAL CONTENT

Table 2 below presents the material content by input material for the six concrete masonry products, as provided by Hard Block Factory.

Table 1: Material Content of Concrete Masonry Products

Material	200mm Hollow CMU	200mm Solid CMU	250mm Thermal CMU	200mm Hourdi CMU	80mm Grey Rectangular Pavers	50mm Grey Roof Tiles
Water	146	120	94	149	136	108
Portland Cement	250	140	137	270	422	424
Crushed Coarse Aggregate	1,000	850	334	960	782	790
Crushed Fine Aggregate	1,150	1,410	988	1,200	843	841
Natural Fine Aggregate	250	250	198	240	0	0
EPS insulation	0	0	12	0	0	0
Total	2,796	2,770	1,763	2,819	2,183	2,163

4. SYSTEM BOUNDARY

As per the ASTM PCR, the system boundary is the product stage, which includes the following modules:

- A1 Raw material supply;
- A2 Transport (to the manufacturer); and
- A3 Manufacturing.

Figure 2 shows the production stage system boundary for concrete masonry products.

Table 2: LCA results – 200mm Hollow CMU, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	271	50	32	353
Acidification potential	kg SO ₂ eq.	0.83	0.25	0.11	1.19
Eutrophication potential	kg N eq.	0.362	0.038	0.036	0.437
Smog creation potential	kg O ₃ eq.	12.1	6.7	1.6	20.3
Ozone depletion potential	kg CFC-11 eq.	9.38E-05	1.29E-05	8.39E-06	1.15E-04
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	2,383	803	572	3,758
Non-renewable nuclear	MJ (HHV)	26.5	5.4	12.7	44.6
Renewable (non-biomass)	MJ (HHV)	18.4	2.4	5.8	26.6
Renewable (biomass)	MJ (HHV)	2	2	575	579
Material resources consumption					
Non-renewable material resources	kg	2,924	3	1	2,929
Renewable material resources	kg	0.2	0.1	26.9	27.2
Net fresh water	l	1,967	104	139	2,209
Waste generated					
Non-hazardous waste generated	kg	1.4	0.0	60.6	62.0
Hazardous waste generated	kg	0.006	0.000	0.126	0.132

Table 3: LCA results – 200mm Solid CMU, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	170	51	32	253
Acidification potential	kg SO ₂ eq.	0.54	0.25	0.11	0.91
Eutrophication potential	kg N eq.	0.222	0.039	0.036	0.297
Smog creation potential	kg O ₃ eq.	8.1	6.8	1.5	16.4
Ozone depletion potential	kg CFC-11 eq.	8.90E-05	1.31E-05	8.32E-06	1.10E-04
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	1,653	817	568	3,039
Non-renewable nuclear	MJ (HHV)	27.5	5.5	12.6	45.6
Renewable (non-biomass)	MJ (HHV)	13.0	2.4	5.7	21.2
Renewable (biomass)	MJ (HHV)	2	2	575	579
Material resources consumption					
Non-renewable material resources	kg	2,862	3	1	2,867
Renewable material resources	kg	0.2	0.1	26.9	27.2
Net fresh water	l	1,176	105	138	1,420
Waste generated					
Non-hazardous waste generated	kg	1.4	0.0	60.6	62.0
Hazardous waste generated	kg	0.006	0.000	0.126	0.132

Table 4: LCA results – 250mm Thermal CMU, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	199	32	23	254
Acidification potential	kg SO ₂ eq.	0.64	0.16	0.09	0.89
Eutrophication potential	kg N eq.	0.250	0.024	0.031	0.305
Smog creation potential	kg O ₃ eq.	9.1	4.2	1.3	14.6
Ozone depletion potential	kg CFC-11 eq.	5.98E-05	8.14E-06	5.69E-06	7.37E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	2,409	509	414	3,332
Non-renewable nuclear	MJ (HHV)	74.1	3.4	11.2	88.7
Renewable (non-biomass)	MJ (HHV)	20.4	1.5	5.0	26.9
Renewable (biomass)	MJ (HHV)	10	1	575	585
Material resources consumption					
Non-renewable material resources	kg	1,820	2	1	1,823
Renewable material resources	kg	0.4	0.1	26.9	27.3
Net fresh water	l	1,857	66	119	2,042
Waste generated					
Non-hazardous waste generated	kg	0.9	0.0	60.6	61.5
Hazardous waste generated	kg	0.004	0.000	0.126	0.130

Table 5: LCA results – 200mm Hourdi CMU, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	290	51	32	373
Acidification potential	kg SO ₂ eq.	0.88	0.25	0.11	1.24
Eutrophication potential	kg N eq.	0.388	0.039	0.036	0.463
Smog creation potential	kg O ₃ eq.	12.9	6.7	1.6	21.2
Ozone depletion potential	kg CFC-11 eq.	9.52E-05	1.30E-05	8.45E-06	1.17E-04
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	2,522	814	576	3,911
Non-renewable nuclear	MJ (HHV)	26.6	5.5	12.7	44.8
Renewable (non-biomass)	MJ (HHV)	19.4	2.4	5.8	27.7
Renewable (biomass)	MJ (HHV)	2	2	575	579
Material resources consumption					
Non-renewable material resources	kg	2,956	3	1	2,961
Renewable material resources	kg	0.2	0.1	26.9	27.2
Net fresh water	l	2,112	105	139	2,356
Waste generated					
Non-hazardous waste generated	kg	1.4	0.0	60.6	62.0
Hazardous waste generated	kg	0.006	0.000	0.126	0.132

Table 6: LCA results – 80mm Grey Rectangular Pavers, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	420	41	27	488
Acidification potential	kg SO ₂ eq.	1.23	0.20	0.10	1.53
Eutrophication potential	kg N eq.	0.573	0.031	0.033	0.637
Smog creation potential	kg O ₃ eq.	17.8	5.4	1.4	24.7
Ozone depletion potential	kg CFC-11 eq.	8.07E-05	1.05E-05	6.79E-06	9.80E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	3,375	656	479	4,509
Non-renewable nuclear	MJ (HHV)	18.1	4.4	11.8	34.3
Renewable (non-biomass)	MJ (HHV)	25.5	2.0	5.3	32.8
Renewable (biomass)	MJ (HHV)	2	2	575	578
Material resources consumption					
Non-renewable material resources	kg	2,387	3	1	2,391
Renewable material resources	kg	0.3	0.1	26.9	27.3
Net fresh water	l	3,166	85	127	3,378
Waste generated					
Non-hazardous waste generated	kg	1.0	0.0	60.6	61.6
Hazardous waste generated	kg	0.004	0.000	0.126	0.130

Table 7: LCA results – 50mm Grey Roof Tiles, per m³

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufacturing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO ₂ eq.	422	41	27	489
Acidification potential	kg SO ₂ eq.	1.23	0.21	0.10	1.53
Eutrophication potential	kg N eq.	0.576	0.031	0.033	0.640
Smog creation potential	kg O ₃ eq.	17.9	5.5	1.4	24.8
Ozone depletion potential	kg CFC-11 eq.	8.04E-05	1.05E-05	6.73E-06	9.76E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	3,387	658	476	4,521
Non-renewable nuclear	MJ (HHV)	18.0	4.4	11.8	34.2
Renewable (non-biomass)	MJ (HHV)	25.6	2.0	5.3	32.8
Renewable (biomass)	MJ (HHV)	2	2	575	578
Material resources consumption					
Non-renewable material resources	kg	2,396	3	1	2,400
Renewable material resources	kg	0.3	0.1	26.9	27.3
Net fresh water	l	3,180	85	127	3,392
Waste generated					
Non-hazardous waste generated	kg	1.0	0.0	60.6	61.6
Hazardous waste generated	kg	0.004	0.000	0.126	0.130