Environmental Product Declaration (EPD) for Manufactured Concrete and Concrete Masonry Products

Midwest Block & Brick | Segmental Retaining Wall Unit

ENVIRONMENTAL PRODUCT DECLARATION VERIFICATION

NSF Certified Environmental Product Declaration www.nsf.org

Midwest Block & Brick

Midwest Block & Brick manufactures and distributes concrete block, retaining walls, pavers, brick, stone, and other masonry and landscape products.

We operate in seven states and have 21 locations. Our client base includes architects, engineers, masons, landscape contractors, and homeowners. We sell both to the trade and public.

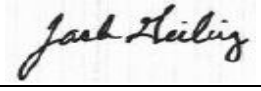
Midwest Block & Brick is an active member of state and local organizations, as well as the National Concrete Masonry Association.

Midwest Block & Brick's total commitment to product excellence and customer satisfaction continue to help us maintain our position as an industry leader. Today, Midwest Block & Brick is one of the largest and most efficient masonry and landscape companies in the United States

201 Rock Industrial Drive
Bridgeton, MO 63044-2485
Telephone: (314) 291-3200
www.midwestblock.com

Environmental Product Declaration (EPD) for Manufactured Concrete and Concrete Masonry Products

ENVIRONMENTAL PRODUCT DECLARATION VERIFICATION

EPD Information			
Program Operator		NSF International	
Declaration Holder		Midwest Block & Brick	
Product: Segmental Retaining Wall Unit	Date of Issue June 7, 2018	Period of Validity 5 years	Declaration Number EPD10150
This EPD was independently verified by NSF International in accordance with ISO 14025 and ISO 21930: ☐ Internal ☒ External		 Jenny Oorbeck joorbeck@nsf.org	
This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR:		 Jack Geibig Ecoform, LLC jgeibig@ecoform.com	
LCA Information			
Basis LCA		Life Cycle Assessment Manager for Concrete Products February, 2015	
LCA Preparer		David.R.Green BASF Corporation 216-839-7803	
This life cycle assessment was critically reviewed in accordance with ISO 14044 by:		Jack Geibig Ecoform, LLC jgeibig@ecoform.com	
PCR Information			
Program Operator		ASTM International	
Reference PCR		Manufactured Concrete and Concrete Masonry Products (UN CPC 3755)	
Date of Issue		December 2014	
PCR review was conducted by:		Nicholas Santero (Chairperson) PE International ASTM International http://www.astm.org	

Environmental Product Declaration for Manufactured Concrete and Concrete Masonry Products

Declared Unit: 1 m^3 of concrete

TOTAL PRIMARY ENERGY CONSUMPTION	*Midwest Block and Brick*
Nonrenewable fossil, nuclear	1,050 MJ
Renewable (solar, wind, hydroelectric, and geothermal)	16.5 MJ
Renewable (biomass)	0 MJ
TOTAL MATERIAL RESOURCE CONSUMPTION	
Nonrenewable material resources	2,215 kg
Renewable material resources	3.6 kg
Net fresh water	6,451 l
Non-hazardous generated	391 kg
Hazardous waste generated	8.1E-006 kg
LIFE CYCLE IMPACT CATEGORY INDICATOR	
Global warming potential	205 kg CO2 eq.
Acidification potential	1.08 kg SO2 eq.
Eutrophication potential	0.03 kg N eq.
Smog creation potential	13.4 kg O3 eq.
Ozone depletion potential	6.9E-07 kg CFC-11 eq

*Results based on TRACI 2.1 Characterization Factors

EPD Program Operator
NSF International
789 N. Dixboro Rd.
Ann Arbor MI 48105 USA
www.nsfsustainability.org

Date of Issue: June 7, 2018
Period of Validity: 5 years
Declaration#: EPD10150

NSF Sustainability℠
Sustainability Assured

Environmental Product Declaration (EPD) for Manufactured Concrete and Concrete Masonry Products

ENVIRONMENTAL PRODUCT DECLARATION: DETAILED VERSION

Product Description

The Midwest Block & Brick Segmantal Retaining Wall Units represented by this cradle-to-gate EPD and produced at 201 Rock Industrial Park Drive, Bridgeton, MO 63044 are produced under ASTM C1372 specification for dry-stacked earth retaining walls. The segmental retaining wall units have an average minimum 28 day compressive strength of 3,000 psi.

Declared Unit

The ASTM PCR for manufactured concrete and concrete masonry products only covers the cradle-to-gate life-cycle stages. Therefore, the declared unit for this EPD is one (1) m^3 of concrete formed into manufactured concrete and concrete masonry products. The data may be presented additionally per one (1) yd^3 of concrete.

System Boundaries

Based on the ASTM PCR, the system boundaries are defined as the modules for raw material supply, transportation of inbound materials and the manufacturing process (the Product Stage). This stage includes extraction and processing of raw materials (raw material supply), the average or specific transportation of raw materials from extraction site or source to the manufacturing site including empty backhauls (transportation of inbound materials) and the manufacturing of the product including the batching and mixing of the concrete, forming of the units, curing of the units and the applicable post-production finishing of the units which includes the packaging with associated transportation and waste disposal in preparing the product for shipment. (manufacturing process).

Waste Management

Hazardous and non-hazardous waste generated within the system boundaries and transported outside of the plant facility are reported in the EPD per declared unit.

Certification Other Standards/Additional Testing Requirements

Each product presented in this EPD conforms to the appropriate ASTM and/or CSA specification which provides detailed descriptions and specifications for each of the products.

Allocation Rules

A production process that generates more than one type of product may require the allocation of environmental flows from the process to the different products to get product-based inventory data. If allocation is necessary, the requirements and guidance of ISO 14044, Section 4.3.4 are followed.

EPD Program Operator
NSF International
789 N. Dixboro Rd.
Ann Arbor MI 48105 USA
www.nsfsustainability.org

Date of Issue: June 7, 2018
Period of Validity: 5 years
Declaration#: EPD10150

NSF Sustainability℠
Sustainability Assured

i. Recycled and recovered materials are considered raw materials. Only the materials, water, energy, emissions and other elemental flows associated with reprocessing, handling, sorting and transportation from the point of the generating industrial process to their use in the production process was considered.
ii. Slag, fly ash and silica fume are considered recovered materials, not co-products. iii. Allocation related to the transporation of materials is based on the mass of the transported material or product.
iv. Emissions from the downstram recycling or combustion of a product after the end-of-waste state is allocated to the new downstream product(s). Incineration of wastes for energy production at the primary production site are allocated to the building product unless the energy is exported.
v. Concrete that is crushed for recycling and used as a substitute for aggregate for the production of manufactured concrete and concrete masonry products is treated as closed-loop recycling. The flows and impacts associated with the recovery and crushing of the recycled concrete is taken into account and allocation is not necessary as the use of secondary material displaces the use of primary materials.
vi. A deviation of greater than 20% where different allocation options are relevant requires a sensitivity analysis. If applied, the different allocation approaches and data sets are documented within this EPD.

Units and Quantities

The standard SI unit is used for reporting results. IP units reported are converted using the following conversion factors.

Multiply	By	To convert to
Square meter (m^2)	10.76391	Square foot (ft^2)
Kilogram (kg)	2.204622	Pound (lb)
Megajoule (MJ)	947.8170	British Thermal Unit (BTU)
Degree Celsius (°C)	(°C*9/5)+32	Degree fahrenheit (°F)
Cubic meter (m^3)	35.31466	Cubic foot (ft^3)
Meter (m)	3.281	Foot (ft)
Metric tonne (t)	1.102	Ton
m^2K/W	5.6783	ft^2Fhr/Btu

Calculation Rules and Data Quality Requirements

Calculations

All inputs and outputs of a unit process for which data is reasonably available are included in the calculations. Any application of the criteria for the exclusion of inputs and outputs is documented. Data gaps that have been filled with conservative assumtions with average or generic data is documented.

The cutoff criteria for the consideration of flows is as follows:

Mass – a flow less than 1% of the cumulative mass of the unit process may be excluded if its environmental relevance is minor.

Energy – a flow less than 1% of the cumulative energy of the system model may be excluded if its environmental relevance is minor.

Environmental relevance – material and energy flows that are known or expected to have potentially relevant emissions to air, water or soil relative to the indicators noted in the PCR are included.

At least 95% of the energy usage and mass flow are included. The life cycle impact data includes at least 95% of all elementary flows that contribute to each of the declared category indicators.

Data Quality

- The data used in the generation of this EPD is representative according to the temporal, geographical and technological requirements of the PCR.
- The information representing the manufacturing process uses annual average values.
- The average background data is less than ten years for industry average data and five years for producer specific data.
- The owner of the EPD that is not the owner of all upstream processes contacted their suppliers within the system boundary for upstream data. The best available data from literature was used when upstream data was not provided. The literature based data meets the data quality requirements of the PCR.

Product Characteristics

This EPD represents the specific environmental impacts associated with the production of segmental retaining wall units suitable for the construction of dry-stacked earth retaining walls and complies with ASTM C1372.

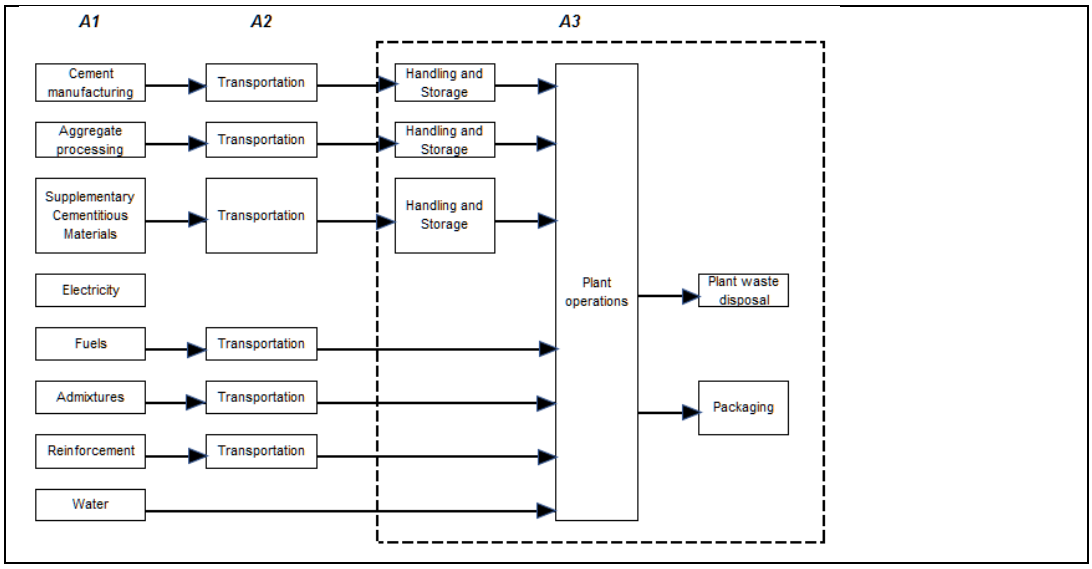
Material Content/Base Materials

The materials for the production of Midwest Block & Brick solid concrete interlocking paving units are listed here by mass (kg/m^3).

Ingredient	Mass
Cement	125 - 150
Fly Ash	20 - 30
Fine Aggregate	1,000 – 1,250
Course Aggregate	500 – 600
Water	20 – 30
MasterPel 240	0 - 1
MasterCast 900S	0 - 1

Production/Manufacturing

The product manufacturing phase includes the extraction and processing of raw materials, the average or specific transportation of raw materials from extraction site or source to the manufacturing site including empty backhauls and the manufacturing of the product including the batching and mixing of the concrete, forming of the units, curing of the units and the applicable post production finishing of the units.



Life Cycle Assessment Stages

The life-cycle stages and individual modules included within the LCA system boundaries are shown here. The EPD that are based on this PCR include modules A1-A3. The results of these modules may be reported as one aggregated module A1-A3.

Product Stage			Construction Process Stage		Use Stage							End of Life Stage			
Raw Material Supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4

Life-cycle Stages and Modules - highlighted area is included in the EPD Manager

EPD Program Operator
NSF International
789 N. Dixboro Rd.
Ann Arbor MI 48105 USA
www.nsfsustainability.org

Date of Issue: June 7, 2018
Period of Validity: 5 years
Declaration#: EPD10150

NSF Sustainability℠
Sustainability Assured

Life Cycle Assessment (LCA)

The data used for the generation of EPD are representative according to temporal, geographical and technological requirements per the PCR. Additional details are provided in the EPD Project Report. The impact categories of the life-cycle assessment include characterization factors specified in TRACI version 2.1.

Temporal: The information obtained from the manufacturing process is based on annual values generated within the past twelve-month period. Any average background data greater than ten years old is noted in the EPD Project Report and accompanied by a statement attesting to the validity of the data.

Geographical: The geographic region for the relevant life-cycle stages included in the calculation of representative data is documented in the EPD Project Report.

Technological: All of the data is representative of current technology in use.

LCI	Data Source	Version	Year (Updated)	Region	Technology
Portland Cement	GaBi	8.5.0.79	2016	United States	Current
Fly Ash	GaBi	8.5.0.79	2017	United States	Current
Sand	GaBi	8.5.0.79	2015	United States	Current
Course Aggregate	GaBi	8.5.0.79	2015	United States	Current
Water	GaBi	8.5.0.79	2016	United States	Current
Wood	GaBi	8.5.0.79	2017	United States	Current
Cardboard	GaBi	8.5.0.79	2015	United States	Current
Plastic	GaBi	8.5.0.79	2017	Regional average	Current
Electricity	GaBi	8.5.0.79	2017	United States	Current
Diesel	GaBi	8.5.0.79	2017	United States	Current
Natural Gas	GaBi	8.5.0.79	2017	United States	Current
MasterPel 240	BASF/GaBi	8.5.0.79	2016	United States	Current
MasterCast 900S	BASF/GaBi	8.5.0.79	2016	United States	Current
Truck Transport	GaBi	8.5.0.79	2015	United States	Current
Rail Transport	GaBi	8.5.0.79	2015	United States	Current
Sea Transport	GaBi	8.5.0.79	2015	United States	Current

Parameters to be Declared in the EPD

The information declared in this EPD is based on the requirements of the PCR. The results are presented on page 3 of this document and include the declaration of environmental category indicators, the use of resources and the generation of waste. The results presented are based on the specific product description for this EPD. 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. EPD that are created using different PCR may not be compatible. Additional information and explanatory materials can be requested through NSF International. In the event that this EPD represents an average performance for the products depicted, the EPD will represent an average performance.

EPD Program Operator
NSF International
789 N. Dixboro Rd.
Ann Arbor MI 48105 USA
www.nsfsustainability.org

Date of Issue: June 7, 2018
Period of Validity: 5 years
Declaration#: EPD10150

NSF Sustainability℠
Sustainability Assured

References

1. ASTM International Product Category Rules (PCR) for Manufactured Concrete and Concrete Masonry Products (UN CPC 3755), December 2014.
2. Saling, P., A. Kicherer, B. Dittrich-Kraemer, R. Wittlinger, W. Zombik, I. Schmidt, W. Schrott, and S. Schmidt. 2002. Eco-efficiency Analysis by BASF: The Method. Int. J. Life Cycle Assess., 7 (4): 203.
3. Shonnard, D.; Kicherer, A; and Saling, P. Industrial Applications Using BASF Eco-Efficiency Analysis: Perspectives on Green Engineering Principles. Environ. Sci. Technol. 2003, 37, 5340-5348.
4. ISO, International Organization for Standardization. Environmental Management-Life Cycle Assessment-Principles and Framework; ISO 14040:2006; ISO 14044:2006. ISO, Geneva, Switzerland, www.iso.org (2006)
5. ISO, International Organization for Standardization. Environmental Management- Eco-efficiency assessment of product systems -- Principles, requirements and guidelines; ISO 14045. ISO, Geneva, Switzerland, www.iso.org (2012)
6. Thinkstep AG, Leinfelden-Echterdingen GaBi Software-System and Database for Life Cycle Engineering 1992-2018 © thinkstep AG. All rights reserved.

EPD Program Operator
NSF International
789 N. Dixboro Rd.
Ann Arbor MI 48105 USA
www.nsfsustainability.org

Date of Issue: June 7, 2018
Period of Validity: 5 years
Declaration#: EPD10150

NSF Sustainability℠
Sustainability Assured