



# Brampton Brick Ltd.

## Clay Brick Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017



## About this EPD

This is a Type III environmental product declaration (EPD) for clay face brick as produced by Brampton Brick Ltd. (Brampton Brick) at its facility located in Brampton, Ontario. The results of the underlying LCA are computed using SimaPro version 9.5.0.2 [1].

This EPD is certified by ASTM to conform to NSF's sub-Product Category Rule (PCR) for Clay Brick, Clay Brick Pavers, and Structural Clay Tiles [2], as well as to the requirements of ISO 14025 [3], ISO 21930:2017 [4] and ASTM International's General Program Instructions [5]. This EPD is intended for business-to-business audiences.

## General Summary

### EPD Commissioner and Owner



### Brampton Brick Ltd.

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Brampton, Ontario. L7A 1E9  
<https://bramptonbrick.com>

Brampton Brick company personnel provided both LCI and meta data for raw shale extraction and clay brick manufacturing for the 2022 reference year in support of this EPD.

*The owner of the declaration is liable for the underlying information and evidence.*

### Product Group and Name

*Clay Brick, UN CPC 37310 & 37350.*

### Product Definition

**Clay Brick** is a construction product manufactured by mixing raw clay and/or shale with additives, forming the material into rectangular prisms, and firing the material in a high temperature kiln. Clay bricks are used in a wide variety of applications, such as load-bearing, exterior cladding, or paving applications.

### Product Category Rules (PCR)

NSF International PCR for Clay Brick, Clay Brick Pavers, and Structural Clay Tiles (UNCPC 3731 and 3735). Extended 12 months per PCRExt 2023-106 – valid until June 30, 2024. [2].

### Date of Issue & Validity Period

June 30<sup>th</sup> 2024 – valid for 5 years

### Declared Unit

1 m<sup>3</sup> of clay brick



## EPD and Project Report Information

Program Operator	ASTM International	
Declaration Number	EPD #733	
Declaration Type	Cradle-to-gate (modules A1 to A3). Facility and product-specific.	
Applicable Countries	Canada and US	
Product Applicability	Clay bricks products are primarily utilized for exterior cladding of buildings and paving applications, and also satisfies a wide array of other building and civil engineering applications.	
Content of the Declaration	This declaration follows <i>Section 11: Content of the EPD</i> , NSF International PCR for Clay Brick, Clay Brick Pavers, and Structural Clay Tiles (UNCPC 3731 and 3735). Extended 12 months per PCRExt 2023-106 – valid until June 30, 2024. [2].	
This EPD was independently verified by ASTM in accordance with ISO 14025 and the reference PCR:	<p>Tim Brooke ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken PA 19428-2959, USA <a href="mailto:cert@astm.org">cert@astm.org</a></p>	<p>Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Road Newton, MA 02459-1728</p>
	<p><b>Internal</b></p>	<p><b><u>External</u></b> X</p>

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## PCR Information

Program Operator	NSF International
Reference PCR	NSF International, Product Category Rules for Preparing an Environmental Product Declaration for Clay Bricks, Clay Brick Pavers, and Structural Clay Tile, V4.0, August 2023 [2].
PCR review was conducted by:	<p>Christopher Koffler, PhD – thinkstep, Inc. John P. Sanders, PhD, PE – The National Brick Research Center Christine A. Subasic, PE – Consulting Architectural Engineer</p>

## Company Description

With its roots dating back to 1871, Brampton Brick Ltd. has evolved to become a leading North American manufacturer of masonry and hardscape products for the construction and renovation industry. The Brampton, Ontario facility sells directly to leading builders and developers, as well as through a North American dealer network. The company has separated itself from the competition by combining its immense clay brick experience with concrete expertise to establish itself as the ONE Trusted Source for masonry brick, stone, block and concrete hardscape products.

## Product Description

This EPD reports environmental transparency information for clay brick produced at the Brampton Brick clay production facility in Brampton, Ontario. Brampton Brick produces clay brick in a wide variety of colours, including black, brown, buff, burgundy, cream, grey, red, tan, and white. Figure 1 provides visual representations of clay bricks in a variety of colours produced at Brampton Brick's facility. The formulation for the different colours of clay brick products are nearly identical, except for minor variance in additives. Therefore, this EPD provides results for clay brick product that is representative of all the various colour types.

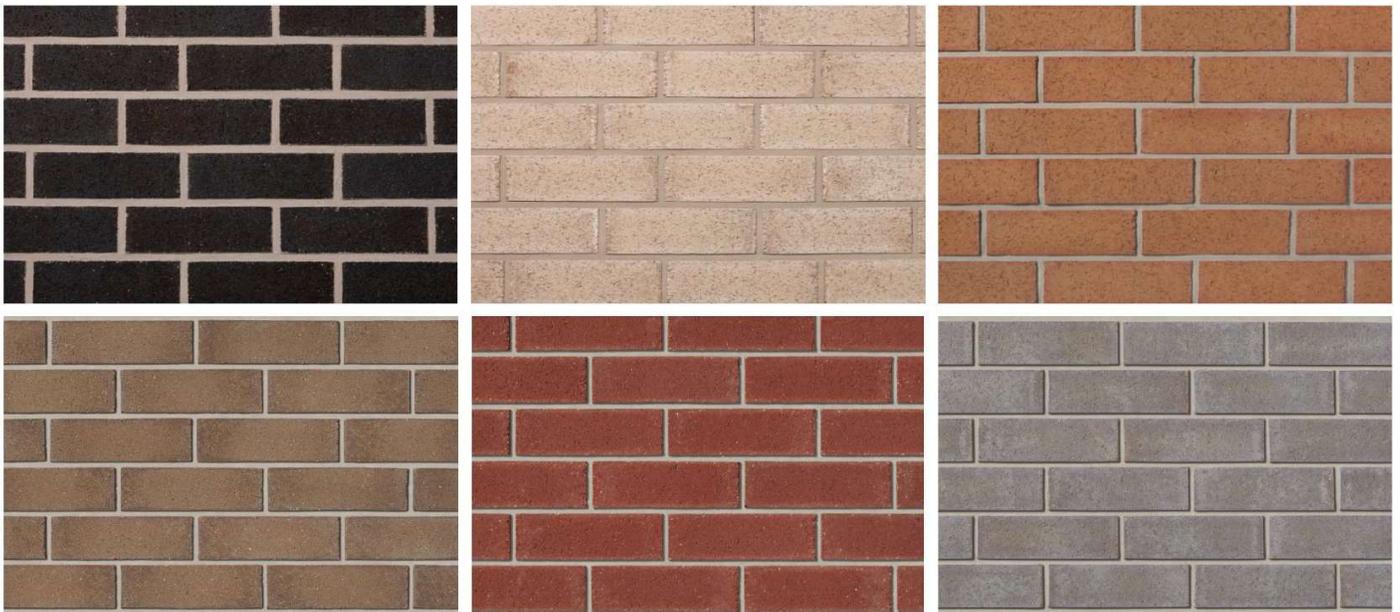


Figure 1: Brampton Brick's clay brick products in various colours.

## Products and Standards

The applicable Canadian standard clay face brick products is CSA A82 *Fired masonry brick made from clay or shale*.

The applicable American standard for clay face brick products is ASTM C216 *Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)*

Table 1 below presents the percent composition of Brampton Brick's clay brick product by input material as derived from facility LCI data for the 2022 reference year.

**Table 1: Material content for Brampton Brick’s clay brick product (in %)**

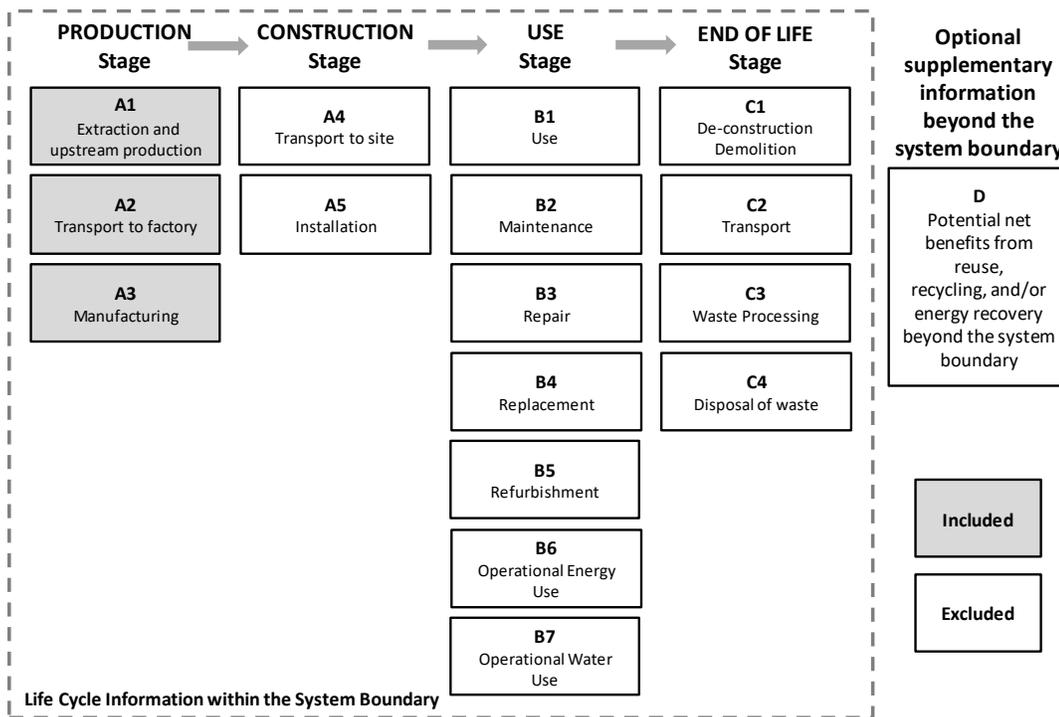
Inputs	Clay Brick
Raw Shale	97.8%
Sand	1.9%
Other Additives	0.3%
<b>Total</b>	<b>100%</b>

## Declared Unit

The declared unit is one meter cubed (m<sup>3</sup>) of clay brick.

## System Boundary

This is a cradle-to-gate EPD covering the production stage (A1-A3) as depicted in the figure below. The production stage includes extraction of raw materials (cradle) through the manufacture and transport of clay brick ready for shipment (gate).



The production stage includes the following processes:

**A1 Extraction and Upstream Production:** Extraction, handling, and processing of input materials.

**A2 Transportation to Factory:** Transportation of all input materials from the suppliers to the gate of the manufacturing facility.

**A3 Manufacturing:** The preparation processes of Brampton Brick’s manufacturing facility. This phase also includes the operation of the manufacturing facility and all process emissions that occur at the production facility.



## Items excluded from the 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, office operations and 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.

## Cut-off Criteria

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO 14044:2006 [6] and section 7.2 of the governing PCR [2]. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data is available is included in the calculated effects. No collected core process data is excluded.
- A one-percent cut-off is considered for renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process. The sum of the total neglected flows does not exceed 5% of all energy consumption and mass of inputs.
- All flows known to contribute a significant impact or to uncertainty are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle flow inventory.

Cut-off rules were applied to several additives as no applicable secondary datasets were available. Each individual flow was less than 1% of the cumulative mass of the system model, the cumulative mass of the flows was below 5% of the cumulative mass of the system model, and none of the flows are expected to significantly contribute to the environmental impact of the product system.

## Data Collection

Life cycle inventory data and production meta data for raw shale extraction and brick manufacturing was collected from Brampton Brick for the 2022 reference year. For accuracy, the LCA team individually validated these gate-to-gate input and output data.

## Allocation Rules

Primary data was collected from Brampton Brick specific to clay brick production, and no co-products or by-products as defined by ISO 21930:2017 are produced within the clay brick product system. Allocation between products was not required.

## Data Quality Requirements and Assessment

Data Quality Requirements	Description
<b>Technology Coverage</b>	Data represents the prevailing technology in use at Brampton Brick’s clay brick manufacturing facility. Whenever available, for all upstream and core material and processes, North American typical or average industry LCI datasets were utilized. <i>Technological representativeness is characterized as “high”.</i>
<b>Geographic Coverage</b>	The geographic region considered is U.S. and Canada <i>Geographical representativeness is characterized as “high”.</i>
<b>Time Coverage</b>	Primary activity data are representative of the 2022 calendar year (12 months). Generic data: The most appropriate LCI datasets were used as found in the ecoinvent 3.9.1 and US LCI databases. <i>Temporal representativeness is characterized as “high”.</i>



<b>Completeness</b>	<p>All relevant, specific processes, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume) were considered and modeled to complete production profile for Brampton Brick’s clay brick production.</p> <p>The relevant background materials and processes were taken from the US LCI Database and ecoinvent v 3.9.1 LCI database for US and modeled in SimaPro software v.9.5.0.2. The completeness of the cradle-to-gate process chain in terms of process steps has been rigorously assessed for the clay brick product system.</p>
<b>Reproducibility</b>	<p>Internal reproducibility is possible since the data and the models are stored and available in Athena’s SimaPro database. A high level of transparency is provided throughout the background report as the LCI profile is presented for the declared product as well as major upstream inputs. Key primary (manufacturer specific) and secondary (generic) LCI data sources are also summarized in the background report. External reproducibility is not possible as the background report is confidential.</p>
<b>Transparency</b>	<p>Activity and LCI datasets are disclosed in the project report, including all data sources.</p>
<b>Uncertainty</b>	<p>A <i>sensitivity check</i> was conducted to assess the reliability of the EPD results and conclusions by determining how they are affected by uncertainties in the data or assumptions on calculation of LCIA and energy indicator results.</p>

## Life Cycle Impact Assessment Results: Brampton Brick

This section summarizes the production stage life cycle impact assessment (LCIA) results including resource use and waste generated metrics based on the cradle-to-gate life cycle inventory inputs and outputs analysis. The results are calculated based on 1 meter cubed (m<sup>3</sup>) of clay brick as manufactured by Brampton Brick with impact categories and inventory metrics specified in the NSF PCR. For supplementary results according to ISO 21930:2017 impact categories and inventory metrics refer to Appendix A.

It should be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks [6], [7]. Further, many LCA impact categories and inventory items are still under development and have high levels of uncertainty. These impact categories and inventory items are marked with an asterisk “\*\*”.

### Limitations on comparability

*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.*



Table 2: Product Stage (A1-A3) EPD Results – NSF PCR Impact Category and Inventory Indicators – 1 cubic meter of clay brick as manufactured by Brampton Brick

Impact category and inventory indicators NSF PCR for Clay Brick, Clay Brick Pavers, and Structural Clay Tiles	Source of Method	Unit	A1-A3 Total
<b>Environmental impacts</b>			
Global warming potential	TRACI V2.1, with IPCC 2013 AR5 GWP-100	kg CO <sub>2</sub> eq.	<b>559</b>
Acidification potential	TRACI V2.1	kg CO <sub>2</sub> eq.	<b>3.30</b>
Eutrophication potential	TRACI V2.1	kg CFC-11 eq.	<b>8.18E-2</b>
Photochemical oxidant creation potential	TRACI V2.1	kg N eq.	<b>13.58</b>
Ozone depletion potential	TRACI V2.1	kg SO <sub>2</sub> eq.	<b>3.53E-7</b>
<b>Total Primary Energy Consumption</b>			
Non-renewable fossil*	CED V1.11	MJ (HHV)	<b>6,132</b>
Non-renewable nuclear*	CED V1.11	MJ (HHV)	<b>1,514</b>
Renewable (Solar, wind, hydroelectric, and geothermal)*	CED V1.11	MJ (HHV)	<b>255</b>
Renewable (Biomass)*	CED V1.11	MJ (HHV)	<b>644</b>
<b>Material Resource Consumption</b>			
Non-renewable material resources*	Inventory	kg	<b>1,983.05</b>
Renewable material resources*	Inventory	kg	<b>17.26</b>
Net fresh water (inputs minus outputs)*	Inventory	L	<b>180.47</b>
<b>Total Waste Generation</b>			
Non-hazardous waste generated*	Inventory	kg	<b>3.28</b>
Hazardous waste generated*	Inventory	kg	<b>4.82E-02</b>

Table Notes:

\* Use caution when interpreting results for these categories

## LCA Interpretation

The Manufacturing Module (A3) is the main contributor to the potential environmental impacts. The potential environmental impacts associated with Module A3 are predominantly driven by the combustion of natural gas for heating the kiln, and by the calcination of limestone content within the raw shale when fired in the kiln, resulting in carbon dioxide process emissions.

## Additional Environmental Information

No additional environmental information is reported.



### References

- [1] PRé 2023. SimaPro LCA Software v9.5.0.2. <https://simapro.com/> accessed 04-2024.
- [2] NSF International PCR for Clay Brick, Clay Brick Pavers, and Structural Clay Tiles (UNCPC 3731 and 3735). Extended 12 months per PCRExt 2023-106 – valid until June 30, 2024.
- [3] ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
- [4] ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
- [5] ASTM General Program Instructions. V.8.0, April 29, 2020.
- [6] ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.
- [7] ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework.
- [8] ISO 14021:2016 Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling).
- [9] ISO 14048:2002. Environmental management — Life cycle assessment — Data documentation format.
- [10] ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment. May, 2019. <https://aclca.org/aclca-iso-21930-guidance/>  
<https://aclca.org/wp-content/uploads/ISO-21930-Final.pdf>
- [11] U.S. Environmental Protection Agency (2012). Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) TRACI version 2.1. <https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf>
- [12] ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products.



## Appendix A: Life Cycle Impact Assessment Results – ISO 21930:2017

**Table 3: Product Stage (A1-A3) EPD Results – ISO 21930:2017 Impact Category and Inventory Indicators – 1 cubic meter of clay brick as manufactured by Brampton Brick**

Impact category and inventory indicators ISO 21930:2017	Source of Method	Unit	A1-A3 Total
<b>Environmental impacts</b>			
Global warming potential	TRACI V2.1 with IPCC AR5 GWP-100	kg CO <sub>2</sub> eq.	<b>559</b>
Global warming potential, biogenic	TRACI V2.1	kg CO <sub>2</sub> eq.	<b>3.35</b>
Acidification potential	TRACI V2.1	kg SO <sub>2</sub> eq.	<b>3.30</b>
Eutrophication potential	TRACI V2.1	kg N eq.	<b>8.18E-2</b>
Photochemical oxidant creation potential	TRACI V2.1	kg O <sub>3</sub> eq.	<b>13.58</b>
Ozone depletion potential	TRACI V2.1	kg CFC-11 eq.	<b>3.53E-7</b>
<b>Abiotic Depletion Potential</b>			
Abiotic depletion potential for non-fossil mineral resources*	CML-baseline, V3.02	kg Sb eq.	<b>1.61E-4</b>
Abiotic depletion potential for fossil resources*	CML-baseline, V3.02	MJ (LHV)	<b>5541</b>
<b>Use of Primary Resources</b>			
Renewable primary resources used as an energy carrier (fuel)*	Cumulative Energy Demand (CED) V1.0	MJ (LHV)	<b>900</b>
Renewable primary resources with energy content used as material*	CED V1.0	MJ (LHV)	<b>0</b>
Non-renewable primary resources used as an energy carrier (fuel)*	CML-baseline, V3.02	MJ (LHV)	<b>7073</b>
Non-renewable primary resources with energy content used as material*	CML-baseline, V3.02	MJ (LHV)	<b>0</b>
<b>Use of Secondary Resources</b>			
Secondary materials*	Inventory	kg	<b>0</b>
Renewable secondary fuels*	Inventory	MJ (LHV)	<b>0</b>
Non-renewable secondary fuels*	Inventory	MJ (LHV)	<b>0</b>
<b>Consumption of Freshwater Resources</b>			
Consumption of freshwater*	Inventory	m <sup>3</sup>	<b>0.180</b>
<b>Waste and Output Flows</b>			
Hazardous waste disposed*	Inventory	kg	<b>4.82E-2</b>
Non-hazardous waste disposed*	Inventory	kg	<b>3.28</b>
High-level radioactive waste, conditioned, to final repository*	Inventory	m <sup>3</sup>	<b>5.96E-6</b>
Intermediate and low-level radioactive waste, conditioned, to final repository*	Inventory	m <sup>3</sup>	<b>7.64E-6</b>
Components for reuse*	Inventory	kg	<b>0</b>
Materials for recycling*	Inventory	kg	<b>5.17E-4</b>
Materials for energy recovery*	Inventory	kg	<b>0</b>
Recovered energy exported from the product system*	Inventory	MJ, per energy carrier	<b>0</b>
<b>Additional Inventory Parameters for Transparency</b>			
Emissions from calcination and removals from carbonation*	Inventory	kg CO <sub>2</sub> eq	<b>172</b>
Removals and emissions associated with biogenic carbon content of bio-based packaging*	IPCC 2013, AR5 GWP-100	kg CO <sub>2</sub> eq	<b>-31.64</b>

Note: Some of the impact and inventory items included in ISO 21930:2017 are under development and have high levels of uncertainty. These impact categories and inventory items are marked with an asterisk “\*”.