

Owner: Gamle Mursten ApS
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Issued first time: 30-06-2023
Issued: 11-08-2023
Valid to: 30-06-2028

3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



Owner of declaration
Gamle Mursten ApS
Skotlandsvej 16, 5700 Svendborg
CVR: 10134412



Issued:
11-08-2023

Valid to:
30-06-2028

Programme
EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Basis of calculation

This EPD is developed in accordance with the European standard EN 15804+A2 and PCR from Tiles and Bricks Europe (2020).

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type

- Cradle-to-gate with modules C1-C4 and D
- Cradle-to-gate with options, modules C1-C4 and D
- Cradle-to-grave and module D
- Cradle-to-gate
- Cradle-to-gate with options

Declared product(s)

Reused bricks (whole and half)

Number of declared datasets/product variations: 1

Production site

Skotlandsvej 16
5700 Svendborg
Denmark

Product(s) use

The reused bricks are used in brick walls, columns and partitions both in new building projects and in renovation work.

Declared/ Functional Unit

1 tonne of reused bricks (whole and half)

Year of production site data (A3)

1/11-2021 – 31/10-2022

EPD version

Version 2, 11.08.2023: Recalculated with energy source based on GoO.

CEN standard EN 15804 serves as the core PCR
Independent verification of the declaration and data, according to EN ISO 14025
<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier: Linda Høiby

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life			Beyond the system boundary	
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Product information

Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
Reused bricks	100

Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below.

Material	kg pr. declared unit	Weight-% of total packaging
Wooden pallets	3.11	82.83
Plastic film	0.63	16.78
Tape	0.015	0.40

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of one tonne of reused bricks (whole and half) at the production site located in Svendborg. Product specific data is based on average values collected in the period between 1/11-2021 & 31/10-2022. Background data is based on the ecoinvent 3.9.1 database (2022) and is less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

The EPD is representative for the Danish market but not limited to it.

Hazardous substances

Gamle Mursten's bricks do not contain substances under 0.1% as listed on the "Candidate List of Substances of Very High Concern for authorisation".

(<http://echa.europa.eu/candidate-list-table>)

Essential characteristics

The used bricks are covered by CE marking.

Further technical information is stated on Gamle Mursten's website (<http://gamlemursten.dk/>) or can be obtained by contacting Gamle Mursten.

Picture of product



LCA background

Declared unit

The LCI and LCIA results in this EPD relate to one tonne of reused bricks (whole and half).

Name	Value	Unit
Declared unit	1	tonne
Density	1650	kg/m ³
Conversion factor to 1 kg.	0.001	-

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804+A2 and the PCR by Tiles & Bricks Europe (2020) for clay construction products.

Guarantee of Origin – certificates

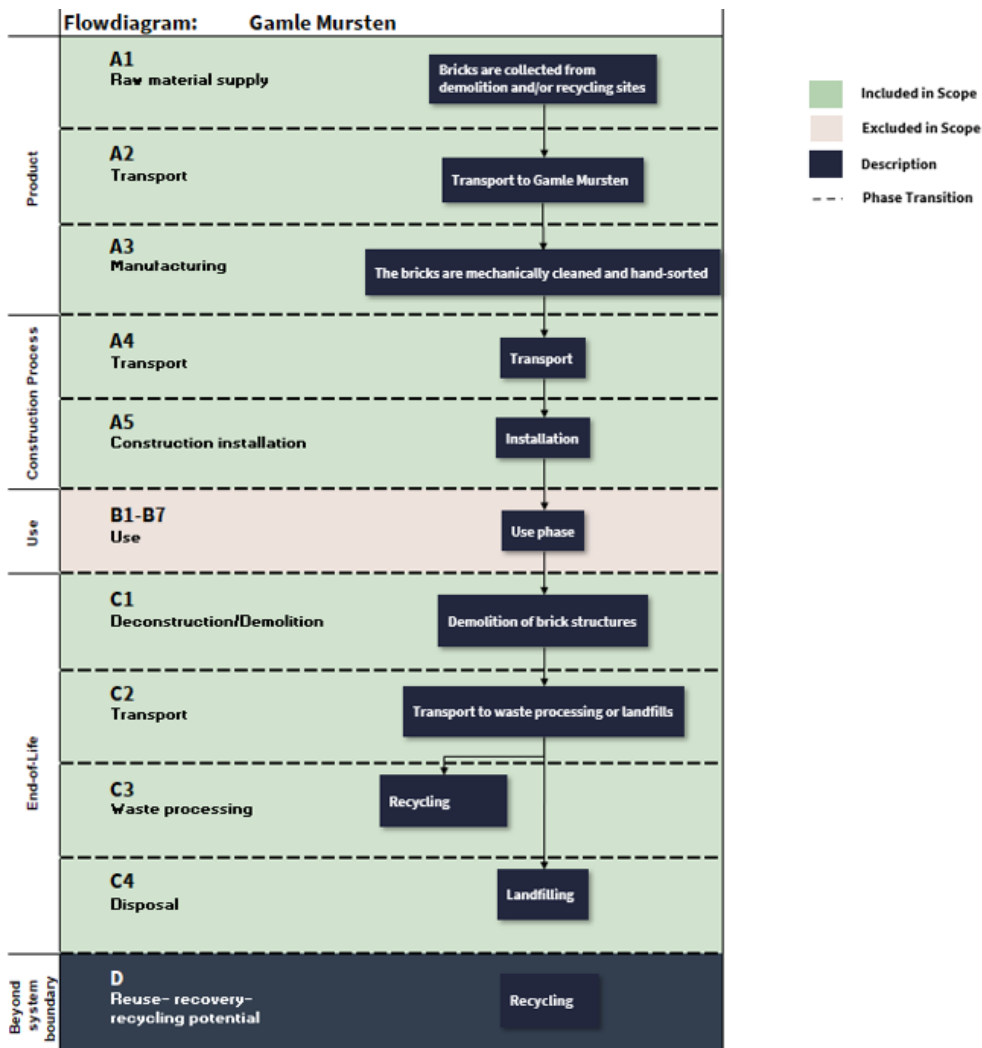
Foreground system:

Gamle Mursten have obtained guarantee of origin, why module A3 is modelled based on 100% renewable energy sourced from Danish wind turbines.

Background system:

Upstream processes are modelled using a grid mix. Downstream processes are also modelled using a grid mix.

Flowdiagram



System boundary

This EPD is based on a cradle-to-gate LCA with options and modules C1-C4 and D, in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follow the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes. If there is a lack of input data or gaps in the data for unit processes, the cut-off for exclusion should be set at 1% of the renewable and non-renewable primary energy usage, as well as 1% of the total mass input for that specific unit process in accordance with EN 15804:2012+A2:2019, 6.3.6.

The reused bricks originate from demolition waste and recycling sites. In this EPD, the environmental impacts of the original bricks with regard to production have not been included in accordance with EN 15804. The residual fraction (demolition waste) and its treatment are part of the previous product system. The waste handling processes up to the "end of waste" stage is considered within the product system it came from, according to EN15804+A2:2019, sections 6.3.5.5 and 6.4.3.2.

Environmental impacts have been physically allocated between the reused bricks and the brick shells. The latter is another product from the recycling process at Gamle Mursten ApS. This allocation is in accordance with EN 15804.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

Used bricks are transported from demolition and/or recycling sites to Gamle Mursten either directly to the company's production site in Svendborg or through their deposit site in Roskilde. A weighting of the transportation in A2 has been conducted to account for inputs from specific recycling sites throughout Denmark. At Gamle Mursten's production site, the used bricks are mechanically cleaned and hand sorted after which they are stacked on pallets (estimated to be reused 9 times) and wrapped with plastic film and tape. This is how customers receive products from Gamle Mursten ApS. The reused bricks have an expected lifetime of 50 years as stated in EAD 170005-00-0305.

Construction process stage (A4-A5) includes:

The reused bricks are mainly sold to building projects in Denmark, why a national scenario for the distance is included for A4. The distance from production site to building site is based on the transportation value given by Miljøministeriet (2013).

The process of installing the reused bricks in a building is mainly done manually, hence no energy is required. According to the PCR by TBE (2020), the environmental impacts emitted in the construction module depends on each specific building and how the bricks are installed. Module A5 focuses on waste management of the packaging from the product and an assumed 10% wastage of bricks at the building site and does not consider the installation of the reused bricks in a building.

End of Life (C1-C4) includes:

The PCR by Tiles and Bricks Europe (2020) provides an End-of-Life scenario for Denmark with regard to clay construction products. This scenario is used in this EPD and is stated in the table below.

End-of-Life Scenario, Denmark	Proportion of declared product (%)
Recycling	99
Landfilling	1

The PCR by Tiles and Bricks Europe (2020) states that environmental impacts attributed to C1 are very low and can be ignored with regard to clay construction products.

Transport to waste processing (C2) is also based on the PCR by Tiles and Bricks Europe (2020).

Re-use, recovery and recycling potential (D) includes:

It is assumed that the reused bricks are crushed after use and that they substitute gravel made from virgin stone materials.

LCA results

ENVIRONMENTAL IMPACTS PER TONNE OF REUSED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ eq.]	8.28E+00	3.25E+01	5.23E+01	0.00E+00	9.12E+00	3.53E+00	1.31E-01	-5.79E+00
GWP-fossil	[kg CO ₂ eq.]	5.96E+01	3.25E+01	9.58E-01	0.00E+00	9.11E+00	3.53E+00	1.31E-01	-5.59E+00
GWP-biogenic	[kg CO ₂ eq.]	-5.13E+01	2.97E-02	5.13E+01	0.00E+00	7.05E-03	8.09E-04	9.93E-05	-1.85E-01
GWP-luluc	[kg CO ₂ eq.]	2.60E-02	1.60E-02	2.43E-04	0.00E+00	4.19E-03	3.97E-04	1.58E-04	-8.52E-03
ODP	[kg CFC 11 eq.]	1.18E-06	7.07E-07	2.06E-08	0.00E+00	1.99E-07	5.61E-08	2.90E-09	-9.24E-08
AP	[mol H ⁺ eq.]	2.70E-01	7.09E-02	4.70E-03	0.00E+00	1.88E-02	3.27E-02	9.78E-04	-3.84E-02
EP-freshwater	[kg P eq.]	4.33E-03	2.31E-03	5.55E-05	0.00E+00	6.30E-04	1.08E-04	9.75E-06	-2.44E-03
EP-marine	[kg N eq.]	9.63E-02	1.79E-02	1.89E-03	0.00E+00	4.68E-03	1.52E-02	4.02E-04	-1.04E-02
EP-terrestrial	[mol N eq.]	1.02E+00	1.82E-01	2.11E-02	0.00E+00	4.74E-02	1.65E-01	4.32E-03	-1.35E-01
POCP	[kg NMVOC eq.]	3.74E-01	1.10E-01	7.24E-03	0.00E+00	2.94E-02	4.88E-02	1.40E-03	-3.56E-02
ADPm ¹	[kg Sb eq.]	1.62E-04	1.06E-04	1.75E-06	0.00E+00	2.92E-05	1.23E-06	2.01E-07	-5.90E-05
ADPf ¹	[MJ]	8.56E+02	4.61E+02	1.31E+01	0.00E+00	1.28E+02	4.62E+01	2.46E+00	-7.31E+01
WDP ¹	[m ³ world eq. deprived]	4.01E-01	1.90E+00	9.78E-03	0.00E+00	4.87E-01	9.95E-02	7.07E-02	-1.38E+01
Caption	GWP-total = Global Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water depletion potential								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimer	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								

ADDITIONAL ENVIRONMENTAL IMPACTS PER TONNE OF REUSED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease incidence]	8.59E-06	2.42E-06	8.54E-07	0.00E+00	5.71E-07	8.27E-06	9.72E-08	-6.53E-07
IRP ²	[kBq U235 eq.]	1.16E+00	6.24E-01	1.39E-02	0.00E+00	2.08E-01	2.19E-02	1.77E-03	-7.79E-01
ETP-fw ¹	[CTUe]	8.01E+02	4.56E+02	1.31E+01	0.00E+00	1.30E+02	4.41E+01	2.57E+00	-6.35E+01
HTP-c ¹	[CTUh]	5.17E-08	2.96E-08	4.07E-10	0.00E+00	7.56E-09	2.16E-09	1.15E-10	-1.57E-08
HTP-nc ¹	[CTUh]	9.80E-07	6.54E-07	2.37E-08	0.00E+00	1.70E-07	1.50E-08	1.56E-09	-1.67E-07
SQP ¹	-	INA	INA	INA	INA	INA	INA	INA	INA
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimers	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								
	² This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.								

RESOURCE USE PER TONNE OF REUSED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	8.69E+01	7.26E+00	1.03E-01	0.00E+00	2.25E+00	2.63E-01	2.52E-02	-3.26E+01
PERM	[MJ]	4.03E+02	0.00E+00	4.03E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	4.90E+02	7.26E+00	4.03E+02	0.00E+00	2.25E+00	2.63E-01	2.52E-02	-3.26E+01
PENRE	[MJ]	8.56E+02	4.61E+02	1.31E+01	0.00E+00	1.28E+02	4.62E+01	2.46E+00	-7.31E+01
PENRM	[MJ]	2.73E+01	0.00E+00	2.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	8.83E+02	4.61E+02	4.04E+01	0.00E+00	1.28E+02	4.62E+01	2.46E+00	-7.31E+01
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m ³]	1.13E-01	6.64E-02	4.88E-04	0.00E+00	1.86E-02	3.63E-03	1.77E-03	-3.77E-01
Caption	<p>PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water</p> <p>The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10² or 195, while 1,12E-11 is the same as 1,12*10⁻¹¹ or 0,0000000000112.</p>								

WASTE CATEGORIES AND OUTPUT FLOWS PER TONNE OF REUSED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	5.17E-03	2.93E-03	9.08E-05	0.00E+00	8.16E-04	3.11E-04	1.42E-05	-3.85E-04
NHWD	[kg]	3.03E+01	2.29E+01	4.52E-01	0.00E+00	5.30E+00	6.61E-02	1.00E+01	-1.92E+00
RWD	[kg]	2.83E-04	1.52E-04	3.37E-06	0.00E+00	5.10E-05	5.06E-06	4.18E-07	-1.84E-04

CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	2.33E+02	0.00E+00	1.01E+02	0.00E+00	0.00E+00	9.90E+02	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	5.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	1.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Caption	<p>HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy</p> <p>The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10² or 195, while 1,12E-11 is the same as 1,12*10⁻¹¹ or 0,0000000000112.</p>								

BIOGENIC CARBON CONTENT PER TONNE OF REUSED BRICKS		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0.00
Biogenic carbon content in accompanying packaging	[kg C]	14.00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂	

Additional information

Technical information on scenarios

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately		kg
Collected with mixed waste		kg
For reuse		kg
For recycling	990	kg
For energy recovery		kg
For final disposal	10	kg
Assumptions for scenario development		As appropriate

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Crushed bricks (used as gravel)	990	kg

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

Publisher	 www.epddanmark.dk <small>Template version 2022.2</small>
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Kristine Hølse Hansen, Julie Skov, and Emma Ekebjærg Transition ApS Mariane Thomsens Gade 2F 8000 Aarhus C e-mail: ksh@transition.nu
LCA software / background data	SimaPro 9.5 / Ecoinvent v.3.9.1 Database
3rd party verifier	Linda Høibye Life Cycle Assessment Consulting e-mail: hoeibye@gmail.com

General programme instructions

General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

EN 15804

DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

PCR

Tiles & Bricks Europe (2020) PCR for Clay Construction Products – "Guidance document for developing an EPD"

EN 15942

DS/EN 15942:2011 – "Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025

DS/EN ISO 14025:2010 – "Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040

DS/EN ISO 14040:2008 – "Environmental management – Life cycle assessment – Principles and framework"

ISO 14044

DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"

EAD 170005-00-0305

European assessment document for "Re-cycled clay masonry units", 2017

Miljøministeriet

LCA af genbrug af mursten. Miljøprojekt nr. 1512, 2013. Miljøministeriet, 2013.