

Owner: [Genbrugssten ApS]  
No.: MD-23007-EN  
Issued: 31-03-2023  
Valid to: 31-03-2028

3<sup>rd</sup> PARTY VERIFIED

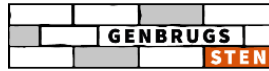
**EPD**

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



**Owner of declaration**

Genbrugssten ApS  
 Agdrupvej 3  
 9700 Brønderslev  
 39098741


**Issued:**

31-03-2023

**Valid to:**

31-03-2028

**Programme**

EPD Danmark  
[www.epddanmark.dk](http://www.epddanmark.dk)



- Industry EPD  
 Product EPD

**Basis of calculation**

This EPD is developed in accordance with the European standard EN 15804+A2.

**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.

**Declared product(s)**

Used bricks (whole and half)

Number of declared datasets/product variations: 1

**Production site**

Agdrupvej 3, Brønderslev, Denmark

**Product(s) use**

The used bricks that are sorted by color consist of both cellular and solid bricks. The used bricks are used in new buildings and renovations in brick-built walls, columns and partition walls.

**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/ functional unit**

1 tonne used bricks (whole or half brick)

**Year of production site data (A3)**

01.08.2021 – 31.07.2022

**EPD version**

[1], [March 2023]

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

- internal  external

Third party verifier:

Linda Højbye

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
Used bricks	100

## Product packaging:

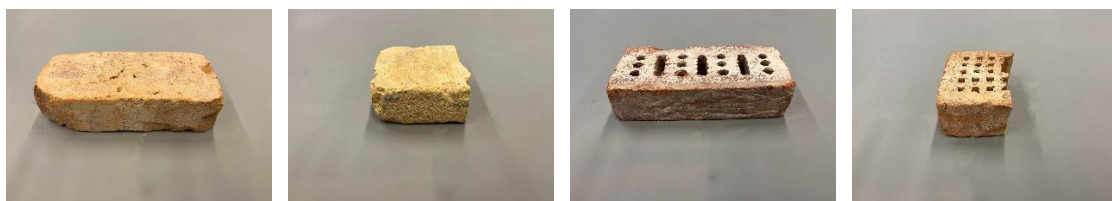
The composition of the sales- and transport packaging of the product is shown in the table below.

Material	Kg pr. declared unit
Small wooden pallets	2.28
Large wooden pallets	2.85
Plastic film (LDPE)	0.5
Paper	0.01

## Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of 1 tonne used bricks (whole and half) on the production site located in Brønderslev. Product specific data are based on average values collected in the period 01.08.2021-31.07.2022 and provided by Genbrugssten. Background data are based on the database ecoinvent 3.8 (2021) and are 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.

## Picture of product(s)



## Hazardous substances

The product does not contain substances listed on the "Candidate List of Substances of Very High Concern for authorisation"

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

## Essential characteristics

The products from Genbrugssten are certified after the technical specification in EAD 170005-00-0305, which covers re-cycled clay masonry units. The EAD is a harmonised technical specification and provides manufacturers with a way to CE marking for construction products that are not or not fully covered by a harmonised European standard.

Further technical information can be obtained by contacting the manufacturer or on the manufacturers website:

<https://genbrugssten.dk/>

## Reference Service Life (RSL)

According to the EAD 170005-00-0305 a working life of the re-cycled clay masonry units for the intended use of 50 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

# LCA background

## Declared unit

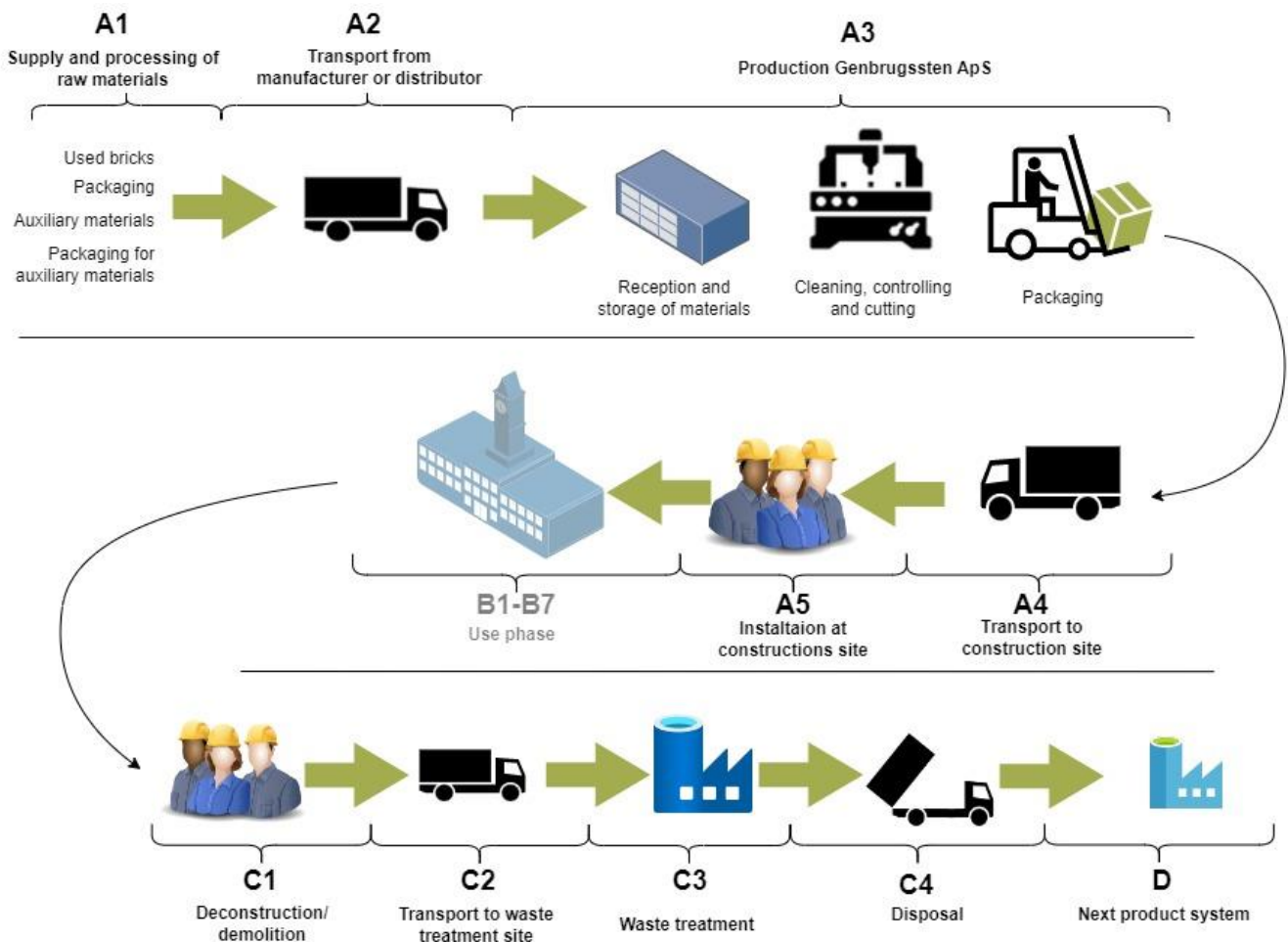
The declared unit is 1 tonne of used bricks (whole or half brick)

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

## PCR

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

## Flowdiagram



## System boundary

This EPD is based on a cradle-to-gate LCA with options (A4+A5), modules C1-C4 and module D, in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements specified in EN 15804:2012+A2:2019, section 6.3.6, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of renewable and non-renewable primary energy usage and mass for unit processes. In addition, particular care has been taken to include materials and flows known to have the potential to cause significant emissions into air, water and soil related to the environmental indicators assessed in this study. In this respect, conservative assumptions in combination with plausibility considerations and expert judgement has been used to demonstrate compliance with this criterion.

### Product stage (A1-A3) includes:

A1 – Extraction, supply and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes. Waste handling of packaging from incoming products.

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.

The bricks are sorted at the demolition sites as a part of the waste treatment from a demolition project. They are either transported directly to Genbrugssten ApS from the demolition projects or transported to recycling stations located at different places in Denmark and subsequently transported to Genbrugssten ApS. The transportation in A2 includes both the transportation directly from the demolition sites and from the recycling stations to Genbrugssten ApS.

The used bricks are cleaned and controlled at Genbrugssten’s production site in Brønderslev

after which the final product is subsequently shipped on pallets and wrapped in plastic film.

### Construction process stage (A4+A5) includes:

Genbrugssten ApS delivers used bricks to customers all round in Denmark. Module A4 is based on their sale in the period of data collection. The installation in the building of the used bricks is primarily performed manual and no energy is therefore needed in the installation process. As stated in the PCR by Tiles & Bricks Europe (2020) for clay construction products the environmental impacts of the construction phase are building specific rather than product specific and will vary depending on the construction and the use of the used bricks. Therefore, this module (A5) only includes the waste treatment of the product packaging and not the installation of the used bricks into a building.

### End of Life (C1-C4) includes:

The deconstruction of the products is assumed to be done by an excavator where the construction is demolished, and the bricks are sorted. According to the PCR the deconstruction and demolition stages (C1) enables reuse and recycling. However, the deconstruction and demolition stage has very low environmental impacts and can therefore be ignored as stated in the PCR by Tiles & Bricks Europe (2020) for clay construction products.

The demolished bricks are subsequently transported to waste treatment. It should be recognized that it might be possible to reuse the bricks again after their second use phase, but it depends on different factors such as the use of lime mortar and whether the demolition process is performed selective. Therefore, a conservative assumption of recycling of the bricks is used for this study.

The PCR by Tiles & Bricks Europe (2020) for clay construction products provides an EOL scenario for Denmark, which is applied in this study:

End-of-life scenario Denmark	Proportion (%)
Crushing	100
Recycling	99
Landfilling	1

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

Once the bricks are crushed, they are assumed to be used as gravel e.g. for road filling purposes. Despite the bricks are secondary

materials, the burdens of processing the bricks (e.g. the demolishing, cutting processes) are allocated to this product system. The crushed bricks are assumed to substitute gravel made of virgin stone material.

## LCA results

ENVIRONMENTAL IMPACTS PER 1 TON OF USED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	1.75E+01	1.95E+01	7.01E+00	0.00E+00	5.12E+00	2.97E-01	2.69E-02	-5.65E+00
GWP-fossil	[kg CO <sub>2</sub> eq.]	2.38E+01	1.95E+01	3.99E-01	0.00E+00	5.11E+00	2.88E-01	2.69E-02	-5.54E+00
GWP-biogenic	[kg CO <sub>2</sub> eq.]	-6.28E+00	1.95E-02	6.61E+00	0.00E+00	4.82E-03	9.12E-03	1.13E-05	-1.06E-01
GWP-luluc	[kg CO <sub>2</sub> eq.]	2.69E-02	7.13E-03	4.01E-04	0.00E+00	1.95E-03	6.58E-04	2.82E-06	-1.06E-02
ODP	[kg CFC 11 eq.]	3.61E-06	4.64E-06	3.40E-08	0.00E+00	1.20E-06	1.46E-08	5.35E-09	-3.47E-08
AP	[mol H <sup>+</sup> eq.]	1.17E-01	8.11E-02	1.68E-03	0.00E+00	2.10E-02	1.54E-03	2.68E-04	-4.19E-02
EP-freshwater	[kg P eq.]	6.91E-03	1.22E-03	1.49E-04	0.00E+00	3.25E-04	2.79E-04	1.39E-06	-4.30E-03
EP-marine	[kg N eq.]	3.72E-02	2.47E-02	5.37E-04	0.00E+00	6.34E-03	2.69E-04	1.15E-04	-8.86E-03
EP-terrestrial	[mol N eq.]	4.07E-01	2.70E-01	4.79E-03	0.00E+00	6.93E-02	2.37E-03	1.26E-03	-1.10E-01
POCP	[kg NMVOC eq.]	1.19E-01	8.61E-02	1.37E-03	0.00E+00	2.16E-02	6.81E-04	3.53E-04	-2.64E-02
ADPm <sup>1</sup>	[kg Sb eq.]	8.34E-05	4.87E-05	1.34E-06	0.00E+00	1.56E-05	7.83E-07	1.38E-08	-6.97E-05
ADPf <sup>1</sup>	[MJ]	3.77E+02	3.03E+02	5.37E+00	0.00E+00	7.82E+01	6.03E+00	3.56E-01	-8.00E+01
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	8.78E+00	1.02E+00	1.12E-01	0.00E+00	2.47E-01	6.72E-02	5.93E-04	-1.44E+01
Caption	GWP-total = Globale 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 use The numbers are declared in scientific notation, e.g 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.								
Disclaimer	<sup>1</sup> 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.								

ENVIRONMENTAL IMPACTS PER 1 TON OF USED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease incidence]	2.25E-06	2.19E-06	2.14E-08	0.00E+00	5.00E-07	5.69E-09	7.07E-09	-4.01E-07
IRP <sup>2</sup>	[kBq U235 eq.]	3.13E+00	1.53E+00	7.73E-02	0.00E+00	3.99E-01	1.61E-01	1.56E-03	-1.66E+00
ETP-fw <sup>1</sup>	[CTUe]	3.53E+02	2.36E+02	4.19E+00	0.00E+00	6.10E+01	3.44E+00	2.69E-01	-1.08E+02
HTP-c <sup>1</sup>	[CTUh]	1.71E-08	6.72E-09	3.63E-10	0.00E+00	1.87E-09	2.58E-10	8.50E-12	-7.16E-09
HTP-nc <sup>1</sup>	[CTUh]	2.76E-07	2.57E-07	7.10E-09	0.00E+00	6.50E-08	4.90E-09	2.87E-10	-1.13E-07
SQP <sup>1</sup>	-	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								

Disclaimer	<p><sup>1</sup> 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.</p> <p><sup>2</sup> 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.</p>
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ENVIRONMENTAL IMPACTS PER 1 TON OF USED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	9.67E+01	3.92E+00	9.98E+01	0.00E+00	1.06E+00	1.05E+00	2.93E-03	-1.14E+01
PERM	[MJ]	9.92E+01	0.00E+00	-9.92E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.96E+02	3.92E+00	5.67E-01	0.00E+00	1.06E+00	1.05E+00	2.93E-03	-1.14E+01
PENRE	[MJ]	3.54E+02	3.03E+02	2.74E+01	0.00E+00	7.82E+01	6.02E+00	3.56E-01	-1.21E+02
PENRM	[MJ]	2.29E+01	0.00E+00	-2.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	3.77E+02	3.03E+02	5.36E+00	0.00E+00	7.82E+01	6.02E+00	3.56E-01	-1.21E+02
SM	[kg]	4.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	2.14E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	3.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m <sup>3</sup> ]	4.58E-01	3.56E-02	4.61E-03	0.00E+00	8.93E-03	5.06E-03	2.14E-05	-3.73E-01
Caption	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								
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.								

ENVIRONMENTAL IMPACTS PER 1 TON OF USED BRICKS									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	6.43E-04	7.42E-04	9.85E-06	0.00E+00	1.99E-04	3.10E-06	9.41E-07	-2.50E-04
NHWD	[kg]	1.24E+01	2.62E+01	1.47E-01	0.00E+00	5.25E+00	2.23E-02	9.99E+00	-1.99E+00
RWD	[kg]	1.99E-03	2.05E-03	2.90E-05	0.00E+00	5.29E-04	4.36E-05	2.37E-06	-6.17E-04
CRU	[kg]	00E+00	00E+00	00E+00	00E+00	00E+00	00E+00	00E+00	00E+00
MFR	[kg]	2.16E-02	00E+00	3.75E+00	00E+00	00E+00	9.90E+02	00E+00	00E+00
MER	[kg]	00E+00	00E+00	2.00E+00	00E+00	00E+00	00E+00	00E+00	00E+00
EEE	[MJ]	00E+00	00E+00	4.79E+00	00E+00	00E+00	00E+00	00E+00	00E+00
EET	[MJ]	00E+00	00E+00	2.04E+01	00E+00	00E+00	00E+00	00E+00	00E+00
Caption	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								
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.								

BIOGENIC CARBON CONTENT PER 1 TON OF USED BRICKS	
Parameter	Unit
Biogenic carbon	[kg C]
At the factory gate	
0	

content in product		
Biogenic carbon content in accompanying packaging	[kg C]	2.31
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

#### 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

<b>Publisher</b>	 <a href="http://www.epddanmark.dk">www.epddanmark.dk</a>
<b>Programme operator</b>	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup <a href="http://www.teknologisk.dk">www.teknologisk.dk</a>
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<b>QA/internal review</b>	Jesper Jakobsen NIRAS A/S Sortemosevej 19, 3450 Allerød E-mail: <a href="mailto:jeja@niras.dk">jeja@niras.dk</a>
<b>LCA software / background data</b>	SimaPro 9.3 / ecoinvent 3.8
<b>3<sup>rd</sup> party verifier</b>	Linda Høiby, Life Cycle Assessment Consulting

### General programme instructions

General Programme Instructions, version 2.0, spring 2020  
[www.epddanmark.dk](http://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 de-veloping 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