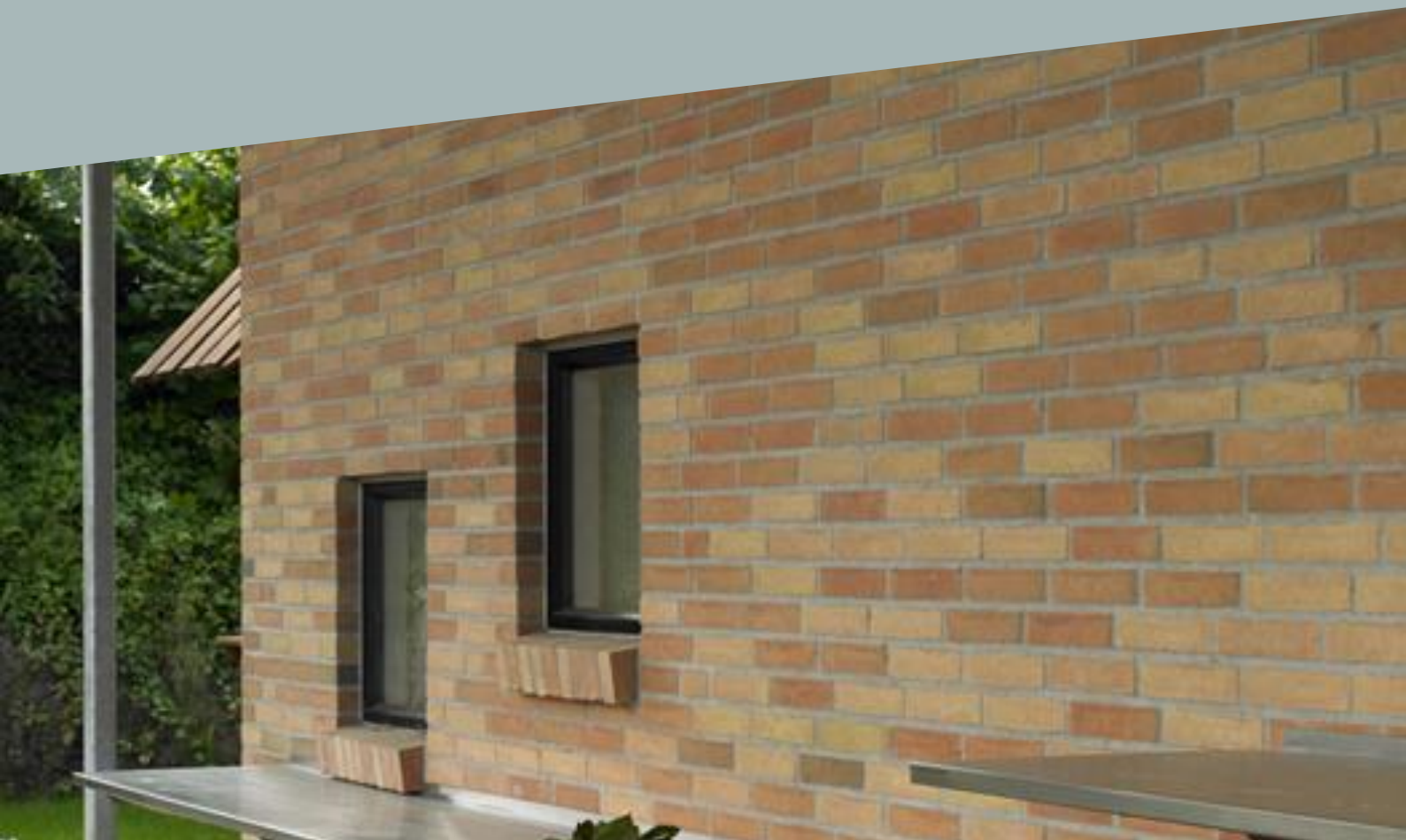


Owner: Strøjer Tegl
No.: MD-21049-EN
Issued: 25-02-2022
Valid to: 25-02-2027

3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



Owner of declaration

Strøjer Tegl
Bogyden 12, 5610 Assens
CVR: 48791018



Issued:
25-02-2022

Valid to:
25-02-2027

Programme

EPD Danmark
www.epddanmark.dk



Basis of calculation

This EPD is developed in accordance with the European standard EN 15804+A1.

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
- Cradle-to-gate with options
- Cradle-to-grave

Declared products

1 tonne of 'yellow-red/rosé' bricks based on Danish red- and blue-firing clay.

Number of declared datasets/product variations:

B121, B331, B333, B338, B340, B430, B432, B434, B542, B543, B544, B545, B546, B547, B121-1, B331-1, B333-1, B338-1, B340-1, B430-1, B432-1, B434-1

Production site

Vedstaarup Teglværk A/S
Bogyden 14
5610 Assens

Products use

Bricks are used build wall, pillars, and partitions.

Declared unit

1 tonne of 'yellow-red/rosé' bricks based on Danish red- and blue-firing clay and produced at Vedstaarup Teglværk. Certified green electricity is used at production site. Expected average service life of 150 years.

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:  Ninkie Bendtsen


 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	MND	X	X	X	X

Product information

Product description

The EPD contains brick based on red- and blue-firing clay produces at Vedstaarup Teglværk. To achieve the different colors of bricks, clay powder (Engobe) is applied and different incineration techniques are used. Additive as Barium carbonate and Manganese dioxide is to enhance specifications of the Yellow-red brick.

The main product components are shown in the table below.

Material	Weight-% of declared product
Red clay	44 %
Blue clay	41 %
Sand	12 %
Barium carbonate	<0.2 %
Manganese oxide	<0.9 %
Clay powder	<0.1 %
Water	<2 %
Total	100 %

Material	Weight-% of packaging
Packaging film	2 %
Packaging paper	<1 %
Pallet including return pallets	97 %
Total	100 %

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of yellow-red clay bricks on the production site located in Assens, Denmark. Product specific data are based on average values collected full 2020 production data.

Background data are based on Ecoinvent 3.6 cut-off 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.

This EPD follows Danish scenario described in TBE PCR and therefore also EoL for a Danish market.

Dangerous substances

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

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

Essential characteristics (CE)

The clay products are covered by harmonised technical specification EN 1304. Declaration of performance according to EU regulation 305/2011 is available for all declared product variations.

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

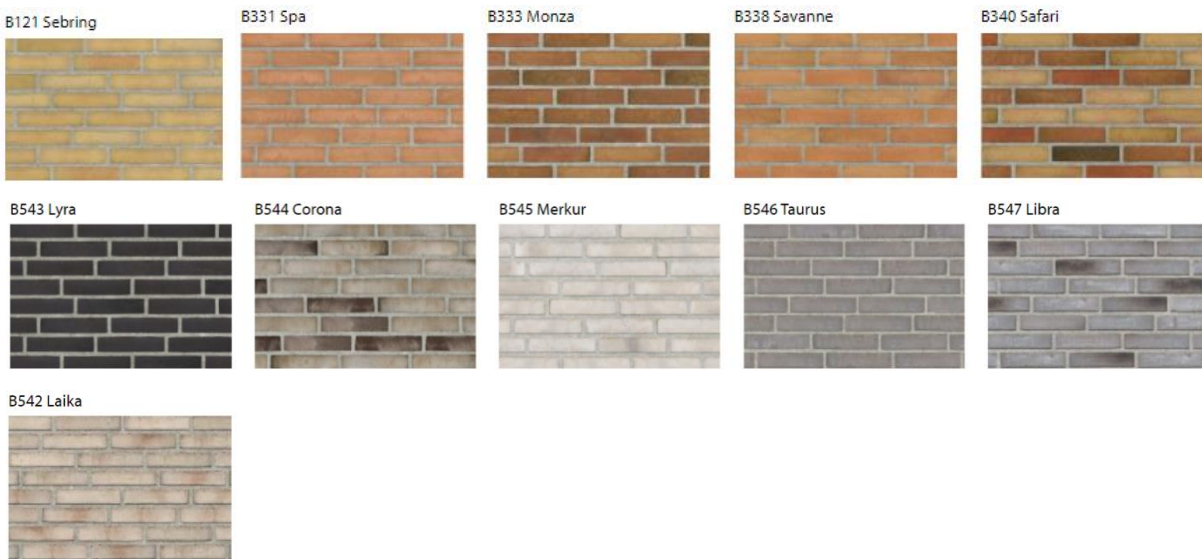
<https://www.strojertegl.dk/>

Reference Service Life (RSL)

150 years (in accordance with the PCR document issued by the European Brick and Tile Industry Association /TBE/):

"For clay construction products, the RSL is 150 years. Studies have shown that clay construction products stand out with their high durability and prevail with no maintenance and a life span of 150 years and more".

Product illustrations:



LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1 tonne of clay bricks with an expected average reference service life of 150 years in accordance with the TBE PCR for clay products for use in Denmark.

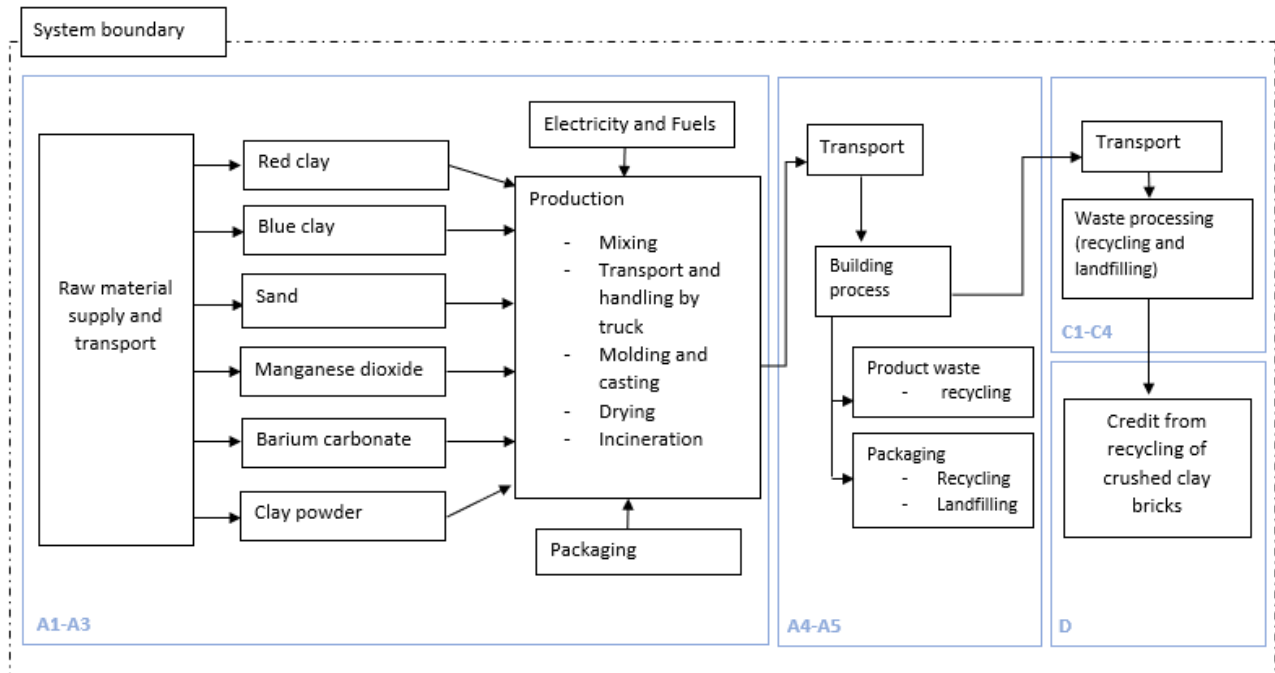
Name	Value	Unit
Declared unit	1	ton
Density	1,750	kg/m ³
Conversion factor to 1 kg.	0.001	-

The declared unit is defined as: 1 tonne of bricks based on firing clay with an expected average reference service life of 150 years

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804+A1:2013, and the product specific PCR "TBE PCR for clay construction products2 (2014).

Flow diagram



System boundary

This EPD is based on a “cradle-to-gate with options “modules A4-A5, module C2-C4 and module D”.

The general rules for the exclusion of inputs and outputs follows 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.

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.

Clay and other minerals are extracted from earth using mining equipment powered by diesel. The clay is then transported to a storage at the production facility. Preparing the clay for brick production consists of maturation and mixing of the clay. The mixture is grided and casted. In the casted form the treated clay is treated with a drying process before it is incinerated. The drying process is so excess mature is extracted from the clay.

The bricks are fired with natural gas and wood in a tunnel kiln and then cooled. Almost all processes in the production are automatic and therefore manual work is minimal. All electricity consumed in the production is certified green energy from wind turbines. The cooled product is stacked on EU pallets (wood) and wrapped in very thin plastic film (polyethylene) to hold them together and prevent accidents during transport.

Construction process stage (A4-A5) includes:

A4 – transport to the building site
A5 – installation into the building

Average transport for module A4 is set as national default distance at 50 km, according to the PCR. The set up in this model is empty return.

Loss of materials during the installation phase on the building (module A5) site is set to 3 % in mass. Packaging is incinerated according to national scenario with energy recovery where the credit is declared in module D.

Use stage (B1-B7) includes:

B1 – use or application of the installed product
B2 – maintenance
B3 – repair
B4 – replacement
B5 – refurbishment
B6 – operational energy use
B7 – operational water use

Modules B1- B7 are neglected, hence these modules in general do not generate relevant environmental impact according to TBE PCR.

End of Life (C1- C4) includes:

C1 – deconstruction, demolition
C2 – transport to waste processing
C3 – waste processing for reuse, recovery and/or recycling
C4 – disposal

In general, the environmental impact from C1 is very low and can therefore be ignored and are not declared. Module C2 default scenario from the TBE PCR is used. The national scenario for C4 is 1 % of bricks landfilled.

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

Module D includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits. This includes the substitution of clay from the recycling of crushed bricks.

According to EN15804+A1 section 6.4.3.3, the benefit potential in module D is calculated from the net output flow. Thus, it is only the primary material content in the bricks that are calculated as recycled with a substitution of clay.

The assumption of module D is as follows: the amount of recycled material mitigates 75 % of clay material. In this case all the clay material will

substitute clay used for clay bricks production. The rest mitigates gravel in road construction.

LCA results

ENVIRONMENTAL IMPACTS PER 1 tonne brick								
Indicator	Unit	A1-A3	A4	A5	C2	C3	C4	D
GWP	[kg CO ₂ eq.]	2.00E+02	5.11E+00	1.76E+00	1.65E+01	3.12E+00	1.38E-01	-6.27E+00
ODP	[kg CFC 11 eq.]	9.52E-06	1.01E-06	3.82E-08	3.03E-06	5.41E-07	3.21E-08	-7.05E-07
AP	[kg SO ₂ eq.]	3.16E+00	1.41E-02	7.49E-04	5.97E-02	3.03E-02	7.47E-03	-5.64E-02
EP	[kg PO ₄ ³⁻ eq.]	2.13E-01	2.92E-03	2.61E-04	1.22E-02	5.49E-03	2.40E-04	-1.70E-02
POCP	[kg ethene- eq.]	1.00E-01	6.41E-04	2.67E-05	2.23E-03	5.23E-04	3.21E-05	-2.32E-03
ADPe	[kg Sb eq.]	2.45E-03	9.17E-05	3.63E-06	4.52E-04	4.84E-06	2.10E-06	-1.37E-03
ADPf	[MJ]	2.35E+03	8.21E+01	3.15E+00	2.47E+02	4.32E+01	2.90E+00	-7.23E+01
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources							

RESOURCE USE PER 1 tonne brick								
Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
PERE	[MJ]	5.19E+01	7.65E-01	3.09E-02	2.43E+00	1.77E-01	3.51E-02	-5.29E+00
PERM	[MJ]	3.28E+01	2.88E-01	1.18E-02	1.12E+00	5.83E-02	1.25E-02	-2.76E+00
PERT	[MJ]	8.47E+01	1.05E+00	4.27E-02	3.55E+00	2.35E-01	4.76E-02	-8.05E+00
PENRE	[MJ]	2.40E+03	8.37E+01	3.21E+00	2.52E+02	4.34E+01	2.96E+00	-7.91E+01
PENRM	[MJ]	2.27E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	2.40E+03	8.37E+01	3.21E+00	2.52E+02	4.34E+01	2.96E+00	-7.91E+01
SM	[kg]	3.85E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	5.19E-02	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
FW	[m ³]	8.89E-01	9.52E-03	7.24E-04	2.65E-02	2.24E-03	2.58E-03	-1.25E-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							

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 tonne brick								
Parameter	Unit	A1-A3	A4	A5	C2	C3	C4	D
HWD	[kg]	3.20E-03	2.03E-04	9.00E-06	6.60E-04	1.18E-04	5.15E-06	-4.21E-04
NHWD	[kg]	1.99E+01	7.28E+00	2.82E-01	1.20E+01	5.14E-02	9.75E+00	-1.71E+00
RWD	[kg]	2.63E-03	5.72E-04	2.11E-05	1.72E-03	3.02E-04	1.82E-05	-4.12E-04

CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	3.56E+00	0.00E+00	3.00E+01	0.00E+00	9.60E+02	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	3.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	1.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+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

Additional information

Technical information on scenarios

Transport to the building site (A4)

Parameter	Value	Unit
Fuel type	Diesel	-
Vehicle type	Euro6, freight, lorry >32 metric ton	-
Transport distance	50	Km
Capacity utilisation (including empty runs)	50	%
Gross density of products transported	1,750	kg/m ³
Capacity utilisation volume factor	1	-

Installation of the product in the building (A5)

Parameter	Value	Unit
Waste material (bricks) 3%	30	kg
Waste material (packaging)	0.71	kg
Direct emissions to air, soil and waste	0	kg

Use (B1-B7)

Parameter	Value	Unit
Not relevant		

Reference service life

Navn	
Reference service Life	150 years
Declared product properties	DoP
Design application parameters	DoP
Assumed quality of work	Supplier: https://www.strojertegl.dk/
Outdoor environment	https://www.strojertegl.dk/praksis-og-veiledninger/leveringsguide/
Indoor environment	https://bygitegl.dk/
Usage conditions	https://www.strojertegl.dk/downloads/ydeevnedeklarationer/
Maintenance	Construction Clay products, TBE 2014

End of life (C1-C4)

Parameter	Value	Unit
Collected separately	970	kg
Collected with mixed waste	0	kg
For reuse	0	kg
For recycling	960.3	kg
For energy recovery	0	kg
For landfilling	9.7	kg

Reuse, recovery and/or recycling potential (D)

Parameter	Value	Unit
PE	0.52	kg
Paper	0.19	kg
Crushed bricks	990.3	kg

Indoor air


The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

There are no hazardous components in the brick components and hence no predictable indoor climate relevant components. However, there are no available measurements on indoor air emissions.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

References

Publisher	 epddanmark http://www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup http://www.teknologisk.dk
LCA-practitioner	Rie Winther Rusbjerg Energysolution A/S True Møllevej 1 DK – 8381 Tilst E-mail: rru@energysolution.dk
LCA software / background data	Simapro 9.1.1.1 Generic data is based on data from Ecoinvent 3.6 allocation, cut-off classification
3rd party verifier	Ninkie Bendtsen NIRAS A/S Sortemosevej 19 DK-3450 Allerød www.niras.dk

General programme instructions

Version 2.0

www.epddanmark.dk

EN 15804

DS/EN 15804 + A1:2013 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

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"

TBE PCR for clay construction products

Guidance document for developing an EPD, 2014