

Owner: Strøjer Tegl  
No.: MD-21045-EN  
Issued: 25-02-2022  
Valid to: 25-02-2027

3<sup>rd</sup> 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 'red' bricks based on Danish red-firing clay.

Product number of declared datasets/product variations: 200 - serie, B420, B422, B520, B541, B840, B241, B207-1, B208-1, B221-1, B222-1, B224-1, B276-1, B420-1

**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 'red' bricks based on Danish red-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 type="checkbox"/> external   |
| Third party verifier:<br><br>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  |
| <b>X</b>  | <b>X</b>  | <b>X</b>      | <b>X</b>             | <b>X</b>             | MND | MND         | MND    | MND         | MND           | MND                    | MND                   | MND                        | <b>X</b>  | <b>X</b>         | <b>X</b> | <b>X</b>                                 |

# Product information

## Product description

The EPD contains brick based on red firing clay produces at Vedstaarup Teglværk. To achieve the different colors of bricks, clay powder (Engobe) is applied and different incinerations techniques are used. Stonewool powder is a upcycled waste product from Rockwool production. It is used to regulate the consistency of the raw material.

The main product components are shown in the table below.

| Material         | Weight-% of declared product |
|------------------|------------------------------|
| Red clay         | 87 %                         |
| Sand             | 9 %                          |
| Stonewool powder | 2 %                          |
| Manganese oxide  | <0.3 %                       |
| Barium carbonate | <0.1 %                       |
| Clay powder      | <0.1 %                       |
| Water            | <2 %                         |
| <b>Total</b>     | <b>100 %</b>                 |

| Material                        | Weight-% of packaging |
|---------------------------------|-----------------------|
| Packaging film                  | 2 %                   |
| Packaging paper                 | <0.1 %                |
| Pallet including return pallets | 98 %                  |
| <b>Total</b>                    | <b>100 %</b>          |

## Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of 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 data 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:

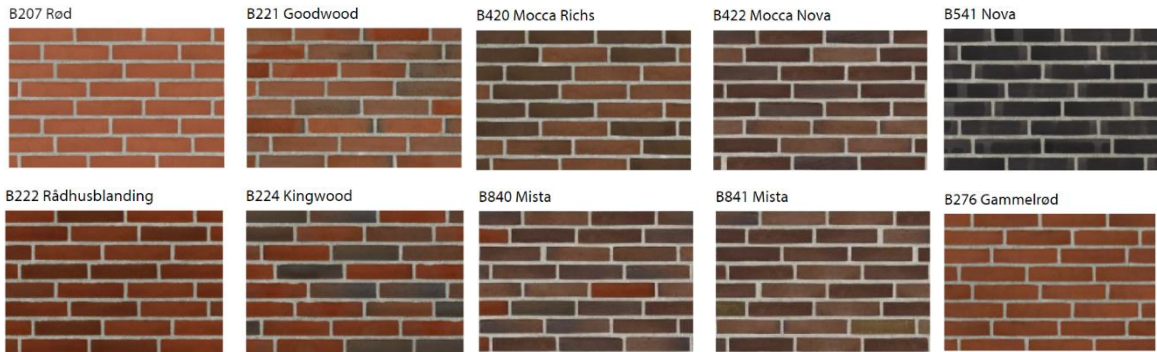
<https://www.strojertegl.dk/>

**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.

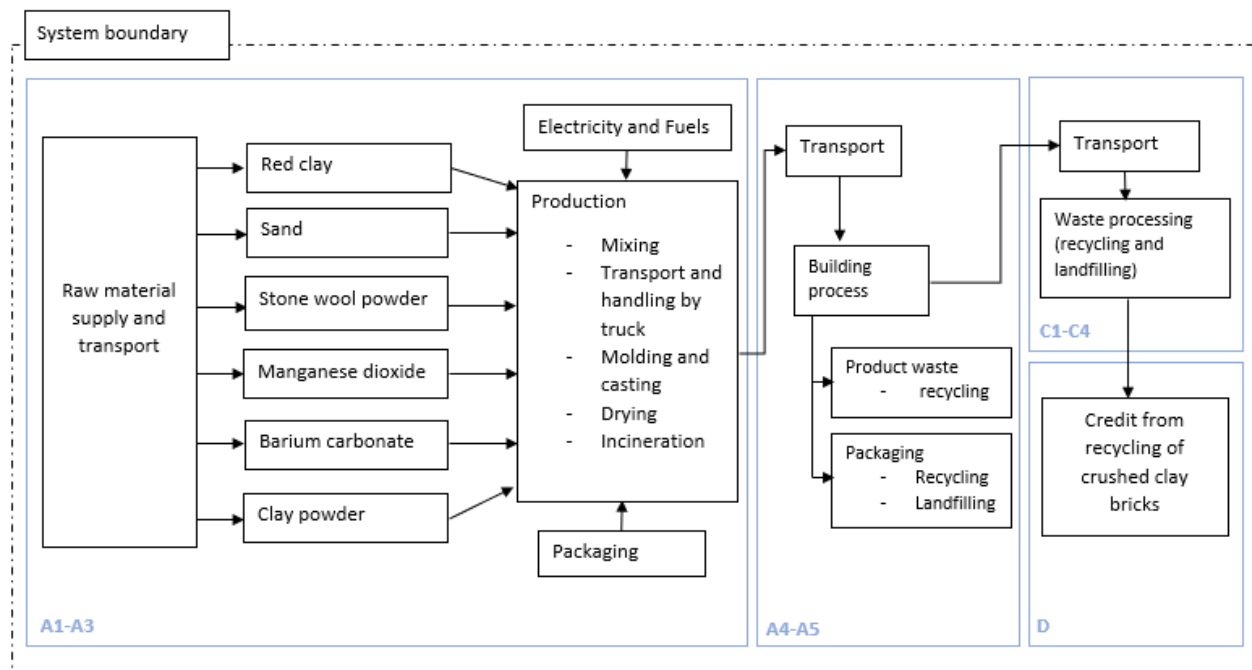
| Name                       | Value | Unit              |
|----------------------------|-------|-------------------|
| Declared unit              | 1     | ton               |
| Density                    | 1,800 | kg/m <sup>3</sup> |
| Conversion factor to 1 kg. | 0.001 | -                 |

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 purpose is to eliminate excess moisture 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. To protect the brick, it is packed with recycled paper.

**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 setup 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 <sub>2</sub> eq.]  | 1.29E+02 | 5.11E+00 | 1.71E+00 | 1.65E+01 | 3.12E+00 | 1.38E-01 | -6.27E+00 |
| ODP                                     | [kg CFC 11 eq.]   | 7.34E-06 | 1.01E-06 | 3.75E-08 | 3.03E-06 | 5.41E-07 | 3.21E-08 | -7.05E-07 |
| AP                                      | [kg SO <sub>2</sub> eq.]  | 2.87E+00 | 1.41E-02 | 7.00E-04 | 5.97E-02 | 3.03E-02 | 7.47E-03 | -5.64E-02 |
| EP                                      | [kg PO <sub>4</sub> <sup>3</sup> eq.]   | 1.73E-01 | 2.92E-03 | 2.33E-04 | 1.22E-02 | 5.49E-03 | 2.40E-04 | -1.70E-02 |
| POCP                                    | [kg ethene-eq.]   | 9.17E-02 | 6.41E-04 | 2.54E-05 | 2.23E-03 | 5.23E-04 | 3.21E-05 | -2.32E-03 |
| ADPe                                    | [kg Sb eq.]   | 2.07E-03 | 9.17E-05 | 3.53E-06 | 4.52E-04 | 4.84E-06 | 2.10E-06 | -1.37E-03 |
| ADPf                                    | [MJ]  | 1.96E+03 | 8.21E+01 | 3.09E+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]  | 2.15E+02 | 7.65E-01 | 2.97E-02 | 2.43E+00 | 1.77E-01 | 3.51E-02 | -5.29E+00 |
| PERM                           | [MJ]  | 1.83E+01 | 2.88E-01 | 1.13E-02 | 1.12E+00 | 5.74E-02 | 1.25E-02 | -2.76E+00 |
| PERT                           | [MJ]  | 2.33E+02 | 1.05E+00 | 4.10E-02 | 3.55E+00 | 2.35E-01 | 4.76E-02 | -8.05E+00 |
| PENRE                          | [MJ]  | 1.98E+03 | 8.37E+01 | 3.15E+00 | 2.52E+02 | 4.36E+01 | 2.96E+00 | -7.91E+01 |
| PENRM                          | [MJ]  | 1.32E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| PENRT                          | [MJ]  | 1.98E+03 | 8.37E+01 | 3.15E+00 | 2.52E+02 | 4.36E+01 | 2.96E+00 | -7.91E+01 |
| SM                             | [kg]  | 8.70E+03 | 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 <sup>3</sup> ]   | 4.75E-01 | 9.52E-03 | 5.27E-04 | 2.65E-02 | 2.41E-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]  | 2.76E-03 | 2.03E-04 | 8.83E-06 | 6.60E-04 | 1.18E-04 | 5.15E-06 | -4.21E-04 |
| NHWD  | [kg]  | 1.19E+01 | 7.28E+00 | 2.76E-01 | 1.20E+01 | 5.14E-02 | 9.75E+00 | -1.71E+00 |
| RWD   | [kg]  | 1.51E-03 | 5.72E-04 | 2.08E-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]  | 3.40E+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 | 3.32E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| EET   | [MJ]  | 0.00E+00 | 0.00E+00 | 1,33E+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       | 1,800                                | kg/m <sup>3</sup> |
| 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)              | 0.55  | 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: <a href="https://www.strojertegl.dk/">https://www.strojertegl.dk/</a>   |
| Outdoor environment           | <a href="https://www.strojertegl.dk/praksis-og-veiledninger/leveringsguide/">https://www.strojertegl.dk/praksis-og-veiledninger/leveringsguide/</a> |
| Indoor environment            | <a href="https://bygitegl.dk/">https://bygitegl.dk/</a>   |
| Usage conditions              | <a href="https://www.strojertegl.dk/downloads/ydeevnedeklarationer/">https://www.strojertegl.dk/downloads/ydeevnedeklarationer/</a>                 |
| 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             | 0.51  | kg   |
| Paper          | 0.04  | 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

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

### General programme instructions

Version 2.0

[www.epddanmark.dk](http://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