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ECO PLATFORM EPD EN 15804 VERIFIED

Owner: Carlo F. Christensen A/S
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3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**

Owner of declaration
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Programme operator
Danish Technological Institute
www.dti.dk

Programme
EPD Danmark
www.epddanmark.dk

Declared product
Thatched roof, including reed material, fireproofing membrane and fastening system

Production site
Kastbjergvej 15
DK-8585 Glesborg
Denmark

Products use
The thatched roof is used as roof covering on pitched roofs.

Declared unit
1 m^2

Functional unit
1 m^2 of thatched roof with a reference service life (RSL) of 50 years, including special fastening system and fireproofing

Issued: 25-04-2017
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Basis of calculation
This EPD is developed in accordance with the European standard EN 15804.

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

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:

David Palm

Mathias Høeg
EPD Danmark

Life cycle stages and modules (MND = module not declared; MNR = module not relevant)																
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	X	X	X	X	X	MNR	MNR	X	X	X	X	X

Product information

Product description

The declared product covers the complete system for mounting a thatched roof. This includes the reed material as well as a fireproofing membrane and a fixing system. The fireproofing membrane is a glass fibre product with the trade name Sepatec. The fixing system consists of steel screws for thatching and steel rods. The product components and packaging materials are shown in the tables below.

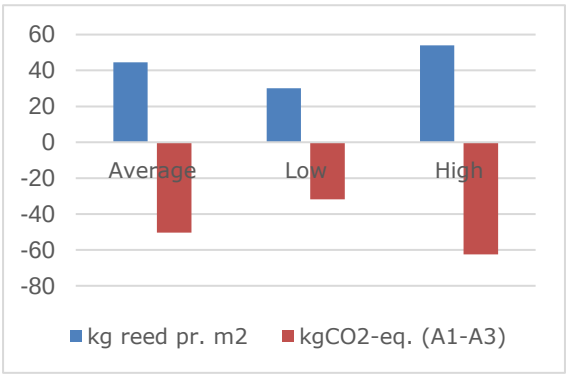
Material	Weight-% of declared product
Reed material	97,3
Sepatec fireproofing membrane	1,6
Thatching screws	0,3
Steel rod	0,8
TOTAL	**100**

Packaging	Weight-% of packaging
Nylon string	19,4
Wood pallets	3,6
Steel band	76,5
PE-film	0,5
TOTAL	**100**

Representativeness

This declaration, including data collection, the modelled foreground system and the results, represents 1 m^2 of thatched roof on the production site located in Glesborg, Denmark. Product specific data are based on average values collected from 2015.

The LCA results represents an average mass of reed and number of screws per functional unit. This is due to different practices among the thatchers during the installation. Reed averages has been calculated based on data collected from 16 different thatchers, ranging from 30 to 54 kg/m^2. The graph below shows the natural change in GWP as a result of a change in reed mass per m^2, due to the biogenic carbon content in the reed, which makes up over 97 mass-% of the functional unit.



Screws average has been calculated based on data collected from 20 different thatchers, ranging from 11 to 18 screws per m^2.

Background data are based on GaBi databases, supplemented with data from Ecoinvent in one exception. Generally, the used background datasets are of high quality and most of the datasets are less than 10

years old. However, one dataset is more than 10 years old and one dataset have expired. These are still considered valid in this study though, since it has been maintained in the GaBi database, it comes from reliable sources and because the processes have not changed significantly.

Dangerous substances

Thatched roofs 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)

Thatched roofs are not covered by the scope of any harmonized technical specifications (hEN or EAD) according to the construction products regulation (EU regulation 305/2011). Therefore, no essential characteristics are given.

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

www.carlofchristensen.dk

Reference Service Life (RSL)

50 years.

RSL is based on guidelines published by the industry association, Danish Thatcher Guild, and represents Scandinavian practices and climate conditions.

50 years is the technical lifetime of a correctly installed roof according to the described technical guidelines. These are based on the detailed experience, which the industry has collected and systemically processed over the last several decades.

LCA background

Declared unit

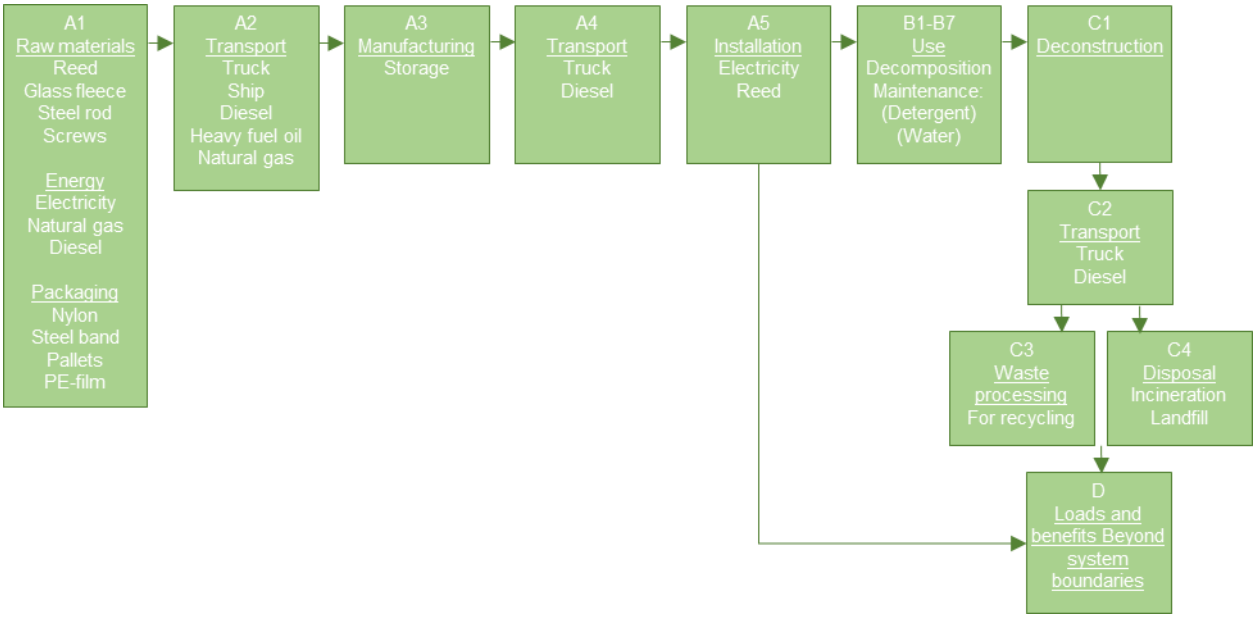
The LCI and LCIA results in this EPD relates to 1 m^2 of thatched roof, including special fastening system and fireproofing

Name	Value	Unit
Declared unit	1	m^2
Density	45,8	kg/m^2
Conversion factor to 1 kg.	0,0218	-

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804.

Flow diagram



System boundaries

This EPD is based on a cradle-to-grave LCA, in which 100 weight-% has been accounted for. All relevant processes during the life cycle of the product has been accounted for and no life cycle stages has been omitted, in which significant environmental impacts are taking place. B6 and B7 is assessed to be not relevant.

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.

The manufacturer stores, sometimes re-pack and then sells the individual materials, which are then assembled at the construction site. As such, the product is declared as installed in the building

Construction process stage (A4-A5) includes:

The construction process stage includes:

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

This includes the provision of all materials, products and energy, as well as waste processing up to the end-of-waste state or disposal of final residues during the construction process stage. These information modules also include all impacts and aspects related to any losses during this construction process stage.

Use stage (B1-B7) includes:
The use stage, related to the building fabric includes:

B1 - use or application of the installed product
B2 - maintenance
B3 - repair
B4 - replacement
B5 – refurbishment

The use stage related to the operation of the building includes:

B6 - operational energy use
B7 - operational water use

These information modules include provision and transport of all materials, products, as well as energy and water provisions, waste processing up to the end-of-waste state or disposal of final residues during this part of the use stage.

End-of-life stage (C1-C4 + D)
The end-of-life stage includes:

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

Module D includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.

LCA results

ENVIRONMENTAL IMPACTS PER M^2														
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP	[kg CO_2-eq.]	-50,4	0,555	0,809	38,4	0,00415	0	0	0	0	0,134	0	40,5	-15,2
ODP	[kg CFC11-eq.]	3,97E-009	4,52E-013	6,31E-013	0	4,66E-010	0	0	0	0	1,09E-013	0	8,81E-012	-1,62E-011
AP	[kg SO_2-eq.]	0,42	0,00239	0,00423	0	6,81E-005	0	0	0	0	0,000575	0	0,00413	-0,02
EP	[kg PO_4^{3-}-eq.]	-0,882	0,000595	-0,00862	0,349	6,78E-005	0	0	0	0	0,000143	0	0,000843	-0,00249
POCP	[kg ethene-eq.]	0,00395	-0,00087	2,4E-005	0	1,61E-005	0	0	0	0	-0,00021	0	0,000334	-0,0021
ADPE	[kg Sb-eq.]	0,000125	5,02E-008	4,55E-007	-1,51E-005	5,33E-008	0	0	0	0	1,21E-008	0	3,83E-007	-2,88E-006
ADPF	[MJ]	327	7,66	3,34	0	0,066	0	0	0	0	1,85	0	7,41	-201
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 M^2														
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	262	-	-	-	-	-	-	-	-	-	-	-	-
PERM	[MJ]	741	-	-	-	-	-	-	-	-	-	-	-	-
PERT	[MJ]	1E003	0,395	9,87	0	0,274	0	0	0	0	0,0954	0	1,31	-59,9
PENRE	[MJ]	330	-	-	-	-	-	-	-	-	-	-	-	-
PENRM	[MJ]	6	-	-	-	-	-	-	-	-	-	-	-	-
PENRT	[MJ]	336	7,7	3,45	-0,619	0,07	0	0	0	0	1,86	0	8,81	-208
SM	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m^3]	0,0953	0,000732	0,00408	0	0,00159	0	0	0	0	0,000176	0	0,0983	-0,0284
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 = Use of net fresh water													

WASTE CATEGORIES AND OUTPUT FLOWS PER M²														
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	5,2E-006	4,01E-007	5,9E-008	0	4,51E-011	0	0	0	0	9,68E-008	0	7,5E-009	-1E-007
NHWD	[kg]	0,241	0,000609	0,0448	0	6,11E-005	0	0	0	0	0,000147	0	0,81	-0,207
RWD	[kg]	0,00277	1,59E-005	3,96E-005	0	2,46E-008	0	0	0	0	3,84E-006	0	0,000556	-0,00307
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0	0	0,691	0	0	0	0	0	0	0	0,513	0	0
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0	0	0,943	0	0	0	0	0	0	0	0	50,6	0
EET	[MJ]	0	0	2,17	0	0	0	0	0	0	0	0	118	0
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	-
Truck type	Euro 4, 20 - 26t gross weight / 17,3t payload capacity	-
Transport distance	200	km
Capacity utilisation (including empty runs)	0,85	%

Installation of the product in the building (A5)

Parameter	Value	Unit
Electricity for hand tools	0,03	MJ
Reed (substituting waste materials)	0,446	kg
Waste materials		
• Reed for incineration	0,446	kg
• Steel for recycling	0,691	kg
• Pallets and PE-film for incineration	0,212	kg

Use (B1-B2)

Parameter	Value	Unit
B1		
Decomposition of reed material	22,3	kg
B2		
Detergent	0,005	kg
Water	0,495	kg

Reference service life

Reference service Life	50 years
Assumed quality of work	Following the 2017 technical guidelines published by the industry: "Veludført stråtag"

End of life (C1-C4)

Parameter	Value	Unit
Collected separately	23,528	kg
Steel for recycling	0,513	kg
For final disposal		
• Glass fleece for landfill	0,715	kg
• Reed material for incineration	22,3	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.*
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 Kongsvang Allé 29 DK-8000 Aarhus C http://www.teknologisk.dk
LCA-practitioner	Danish Technological Institute Kongsvang Allé 29 DK-8000 Aarhus C http://www.teknologisk.dk
LCA software /background data	GaBi ts, compilation 7.3.3.153 GaBi ts database, version 6.115 Ecoinvent, version 3.3.
3rd party verifier	David Palm, Ramböll Sverige AB

General programme instructions
Version 1.8
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"

"Veludført Stråtag"
Technical guidelines published in 2017 by the Danish Thatcher Guild.