epd-norway
Global Program Operator

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2

Owner of the declaration:
Kebony AS

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-3513-2106-EN

Registration number:
NEPD-3513-2106-EN

Issue date: 25.05.2022
Valid to: 25.05.2027

ver2-211222

Kebony Character (Scots Pine) Cladding
Product description/ information

Manufacturer
Kebony AS

The Norwegian EPD Foundation

General information

Product:
Kebony Character (Scots Pine) Cladding

Program Operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
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Declaration number:
NEPD-3513-2106-EN

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR supplied with the PCR NPCR 015 rev4, EPD Norway

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit:
1 m^3 of Kebony Character (Scots Pine) Cladding

Declared unit with option:

Functional unit:
1 m^3 of Kebony Character (Scots Pine) Cladding, planed, installed and maintained over 60 years

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☒

[Silvia Vilčeková]
Independent verifier approved by EPD Norway

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Place of production:
Skien, Norway

Organisation no:
979 446 276

Issue date:
25.05.2022

Valid to:
25.05.2027

Year of study:
2020

Comparability:
EPDs of construction products may not be comparable if they are not compliant with EN 15804:A2 and not seen in a building context

The EPD has been worked out by:
Trebostad, M. & Johansen, B. H.
Energiråd AS

Approved (Manager of EPD Norway)

Product

Product description:

Kebony Character (Scots Pine) is produced from sustainably managed Scots Pine from Sweden, which is treated with bio-based, renewable chemicals, giving the wood an outstanding durability and an exclusive appearance. Kebony Character (Scots Pine) is produced in Kebony's production facilities located in Skien, Norway.

Product specification:

Kebony Character (Scots Pine) Decking is available in different size profiles. The material overview below corresponds to the content in the final product and not the input quantities required to produce 1 FU of the product.

Materials	kg / m^3	%
Scots pine	490	86
Bio-based chemicals	80	14
Total	570	
Plastic foil packaging	1,65	

Technical data:

Durability class (EN-350) : 1-2.
Hardness: brinell 20 - 30 N/mm^2.
Maximum swelling (dry to wet, tangential direction): 6%.
Density: 570 kg/m^3.
Technical data sheets for all Kebony Character (Scots Pine) Decking profiles are available on www.kebony.com

Market:

Europe, North America, Japan, Australia

Reference service life, product:

60 years as per EN15804

Reference service life, building:

Reference service life on building level is 60 years as per EN15804

LCA: Calculation rules

Declared unit:

1 m^3 of Kebony Character (Scots Pine) Cladding

Data quality:

Upstream;
Specific data was acquired by using measurable consumption and emission data from Kebony's facilities for 2020. The yearly averages for 2020 are referred to. Only specific data was used to analyse the core process of the LCA.

Downstream:
Scenarios were developed and generic data was used.

Conversion to process flows and LCI:
Conversion to primary flows and environmental effects were carried out via OpenLCA (version 1.10.13), which uses datasets from to EcoInvent v3.8. Datasets were selected according to their technological, geographical and time related representativeness for the process assessed.

Impact assessment:
Open LCA software (version 1.10.13) was used to carry out the impact assessment of this LCA, the later refers to the LCIA characterization models, factors and methods as given by EN15804:2012+A2:2019 explicitly labeled "EN 15804 + A2 Method" in Open LCA.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis..

System boundary:

The scope of the study is "cradle to gate with options", described as A1-A5, B4, C1-C4 and D. The study takes into consideration the life cycle stages from the extraction of raw materials, production, installation, use and disposal, including all transport stages. The flowchart (Figure 1) illustrates the different stages of the product's life cycle considered. Module D: energy under the form of heat and electricity is generated from the incineration of Kebony Character (Scots Pine) at end-of-life and is associated to the substitution of heat production from primary energy sources in Norway and Europe.

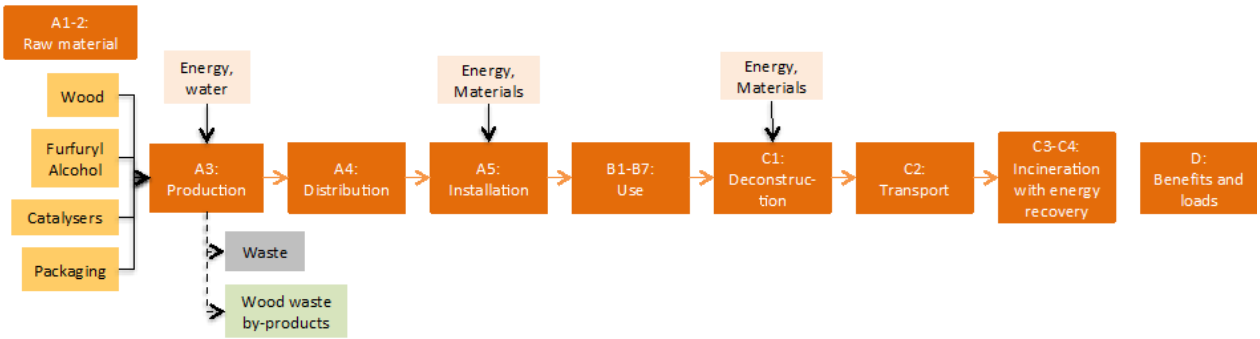

Figure 1: Life cycle stages of Kebony Character

Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

The transport scenario considered for Kebony Character (Scots Pine) Decking is based on the distribution of sales in 2020 and corresponding transport data. Datasets from Ecoinvent were referred to.

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	53%	lorry >32 metric ton, EURO6	681,8	0,02285 l/t.km Diesel	15,579
Boat	70%	container ship	589,5	0,00026 l/t.km HFO	0,155
Ferry	50%	ferry	30,5	0,00309 l/t.km HFO	0,094

Assembly (A5)

Installation will require the use of an electric saw to adjust the size of the planks to the size of the deck desired and an electric hand drill to fasten the screws/fasteners. The use of a hand drill and electric saw is considered negligible, <1% of the cumulative energy of the system model. Screws/fasteners are denominated as “Auxiliary”.

	Unit	Value
Auxiliary	Kg	0,506
Water consumption	m3	-
Electricity consumption	kWh	2,3
Other energy carriers	MJ	-
Material loss	Kg	-
Output materials from waste treatment	Kg	-
Dust in the air	kg	-

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	Kg	-
Collected as mixed construction waste	Kg	-
Reuse	Kg	-
Recycling	Kg	-
Energy recovery	Kg	570
To landfill	Kg	-

According to NPCR015 energy recovery is to be assumed in life cycle stage C3.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	37%	lorry 16-32 metric ton, EURO5	85	0,045 l/t.km Diesel	3,791

Transport distance according to Raadal (2009)

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substituted heat from municipal waste burning, Norway	MJ	2779
Substituted heat from natural gas, Europe	MJ	1095
Substituted heat from other than natural gas, Europe	MJ	1812
Substituted heat from wood chips, Norway	MJ	1405
Substituted heat from electricity, Norway	MJ	606

Given that Kebony is utilized for energy recovery beyond system boundaries it replaces heat energy according to distribution of Kebonys' markets and their respective soruces of heating.

LCA: Results

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-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	X	X	X	X	X	X	X

The production process is identical for all Kebony Character (Scots Pine) and are all produced in Kebony's facilities located in Skien, Norway. Kebony Character is sold under different profiles, all profiling is carried out in sawmills that supply raw material to Kebony, no profiling is carried out in the company's facilities. The scenarios for modules beyond the factory gate (A4, C and D), are based on recommended practices for installation and maintenance as well as expected service life and guidelines for waste treatment from NCPR 015. Only B4, replacement is included in the use-phase as per provisions of NCPR 015 for the given sub-category of wood products.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	B1 – B5	B6 – B7
GWP-total	kg CO2 eq.	-7,15E+02	3,87E+01	2,75E+00	0,00E+00	0,00E+00
GWP-fossil	kg CO2 eq.	3,28E+02	3,86E+01	2,66E+00	0,00E+00	0,00E+00
GWP-biogenic	kg CO2 eq.	-1,05E+03	5,39E-02	9,07E-02	0,00E+00	0,00E+00
GWP-LULUC	kg CO2 eq.	7,16E+00	1,62E-02	2,94E-03	0,00E+00	0,00E+00
ODP	kg CFC11 eq.	4,55E-05	9,38E-06	1,21E-07	0,00E+00	0,00E+00
AP	mol H^+ eq.	1,98E+00	2,71E-01	1,55E-02	0,00E+00	0,00E+00
EP-freshwater	kg P eq.	4,82E-02	2,36E-03	1,02E-03	0,00E+00	0,00E+00
EP-marine	kg N eq.	5,21E-01	6,47E-02	2,60E-03	0,00E+00	0,00E+00
EP-terrestial	mol N eq.	5,60E+00	7,13E-01	2,76E-02	0,00E+00	0,00E+00
POCP	kg NMVOC eq.	1,45E+00	2,17E-01	8,47E-03	0,00E+00	0,00E+00
ADP-M&M	kg Sb eq.	3,43E-03	8,38E-05	7,77E-05	0,00E+00	0,00E+00
ADP-fossil	MJ	1,02E+03	4,48E+01	2,33E+01	0,00E+00	0,00E+00
WDP	m^3	5,62E+02	2,95E+00	4,06E+00	0,00E+00	0,00E+00

Indicator	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	6,56E-02	7,84E+00	1,06E+03	9,77E-02	-6,92E+02
GWP-fossil	kg CO2 eq.	5,88E-02	7,82E+00	1,28E+01	5,61E-02	-3,30E+02
GWP-biogenic	kg CO2 eq.	6,48E-03	1,39E-02	1,05E+03	4,15E-02	-3,61E+02
GWP-LULUC	kg CO2 eq.	3,19E-04	3,13E-03	9,07E-03	5,81E-05	-8,01E-02
ODP	kg CFC11 eq.	2,31E-09	1,81E-06	3,32E-07	1,60E-08	-1,75E-05
AP	mol H^+ eq.	4,33E-04	2,22E-02	1,41E+00	8,42E-04	-1,55E+00
EP-freshwater	kg P eq.	3,95E-05	5,16E-04	2,67E-03	3,83E-04	-6,05E-02
EP-marine	kg N eq.	5,45E-05	4,52E-03	6,81E-01	1,54E-04	-3,56E-01
EP-terrestial	mol N eq.	6,19E-04	4,91E-02	7,67E+00	1,68E-03	-3,82E+00
POCP	kg NMVOC eq.	1,65E-04	1,84E-02	1,85E+00	5,08E-04	-9,88E-01
ADP-M&M	kg Sb eq.	6,53E-06	2,66E-05	1,93E-04	2,22E-07	-4,80E-04
ADP-fossil	MJ	3,44E-01	9,04E+00	4,54E+01	2,01E-01	-1,23E+03
WDP	m^3	2,96E+00	5,76E-01	3,14E+00	5,72E-02	-2,11E+02

GWP-total: *Global Warming Potential;* ***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:*** *Depletion potential of the stratospheric ozone layer;* ***AP:*** *Acidification potential, Accumulated Exceedance;* ***EP-freshwater:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water counsumption*

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	B1-B5	B6-B7
PM	Disease incidence	5,86E+03	2,38E+01	1,53E+00	0,00E+00	0,00E+00
IRP	kBq U235 eq.	4,09E-07	1,26E-08	5,77E-08	0,00E+00	0,00E+00
ETP-fw	CTUe	1,73E-05	6,61E-07	1,64E-07	0,00E+00	0,00E+00
HTP-c	CTUh	4,79E+01	3,06E+00	2,88E-01	0,00E+00	0,00E+00
HTP-nc	CTUh	1,64E+03	8,26E+02	7,83E+00	0,00E+00	0,00E+00
SQP	Dimensionless	3,09E-05	3,09E-06	1,96E-07	0,00E+00	0,00E+00

Indicator	Unit	C1	C2	C3	C4	D
PM	Disease incidence	8,81E-02	3,97E+00	1,29E+01	6,63E-02	-2,61E+01
IRP	kBq U235 eq.	1,70E-10	2,52E-09	1,11E-07	7,74E-11	-1,20E-07
ETP-fw	CTUe	1,33E-08	1,47E-07	1,46E-06	8,55E-09	1,16E-05
HTP-c	CTUh	4,25E-02	6,11E-01	5,84E-01	6,96E-03	-7,31E+00
HTP-nc	CTUh	1,93E-01	1,01E+02	2,47E+01	4,27E+00	-2,17E+02
SQP	Dimensionless	3,20E-09	4,95E-07	5,52E-05	8,80E-09	-1,62E-05

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality*

Classification of disclaimers to the declaration of impact indicators

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
ILCD type / level 2	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Resource use

Parameter	Unit	A1-A3	A4	A5	B1-B5	B6-B7
RPEE	MJ	1,34E+03	5,69E+00	1,54E+01	0,00E+00	0,00E+00
RPEM	MJ	2,02E+04	1,68E+00	1,31E+00	0,00E+00	0,00E+00
TPE	MJ	2,16E+04	7,37E+00	1,68E+01	0,00E+00	0,00E+00
NRPE	MJ	1,57E+03	5,54E+01	2,76E+01	0,00E+00	0,00E+00
NRPM	MJ	4,10E+03	5,59E+02	1,22E+01	0,00E+00	0,00E+00
TRPE	MJ	5,67E+03	6,14E+02	3,98E+01	0,00E+00	0,00E+00
SM	kg	1,06E+02	5,25E-01	5,28E-01	0,00E+00	0,00E+00
RSF	MJ	2,05E+00	1,39E-01	4,78E-02	0,00E+00	0,00E+00
NRSF	MJ	1,18E+01	4,19E-01	9,94E-02	0,00E+00	0,00E+00
W	m^3	1,41E+01	7,03E-02	9,55E-02	0,00E+00	0,00E+00

Parameter	Unit	C1	C2	C3	C4	D
RPEE	MJ	9,31E+00	1,27E+00	7,65E+00	2,35E-02	-5,08E+02
RPEM	MJ	8,79E-02	4,18E-01	1,38E+00	8,40E-03	-7,88E+02
TPE	MJ	9,40E+00	1,69E+00	9,03E+00	3,19E-02	-1,30E+03
NRPE	MJ	9,12E-01	1,15E+01	5,41E+01	2,51E-01	-1,31E+03
NRPM	MJ	1,88E-01	1,08E+02	2,76E+01	1,07E+00	-1,60E+03
TRPE	MJ	1,10E+00	1,19E+02	8,17E+01	1,33E+00	-2,91E+03
SM	kg	2,00E-02	1,21E-01	9,27E-01	3,07E-03	-4,01E+00
RSF	MJ	4,95E-03	3,62E-02	1,05E-01	7,79E-04	-7,44E-01
NRSF	MJ	3,14E-02	1,47E-01	1,42E-01	2,46E-03	-2,48E+02
W	m^3	6,89E-02	1,37E-02	7,49E-02	1,38E-03	-4,92E+00

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	B1-B5	B6-B7
HW	KG	2,05E+02	1,19E+01	8,49E+00	0,00E+00	0,00E+00
NHW	KG	3,78E+02	5,10E+01	3,96E-01	0,00E+00	0,00E+00
RW	KG	3,50E-01	1,09E-02	2,71E-03	0,00E+00	0,00E+00

Parameter	Unit	C1	C2	C3	C4	D
HW	KG	2,62E-01	2,66E+00	1,52E+01	5,30E-02	-2,31E+02
NHW	KG	5,55E-02	6,15E+00	1,17E+01	4,82E+00	-2,78E+02
RW	KG	3,54E-04	2,38E-03	5,47E-03	3,69E-05	-3,55E-02

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	B1-B5	B6-B7
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	9,56E+01	4,17E-01	9,26E-02	0,00E+00	0,00E+00
MER	kg	1,46E+00	1,43E-01	4,80E-03	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Parameter	Unit	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	9,07E-03	1,01E-01	0,00E+00	1,66E-03	-4,55E+00
MER	kg	6,46E-04	2,78E-02	5,70E+02	3,51E-04	-3,27E-01
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = 9,0*10-3 = 0,009

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	1048,85
Biogenic carbon content in the accompanying packaging	kg C	0

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing prosess(A3).

National electricity grid	Unit	Value
Norwegian mix (market for electricity, ecoinvent 3.8)	kg CO2 -eq/kWh	0,01713

Additional environmental impact indicators required in NPCR Part

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator for GWP is also given as GWP-IOBC, being climate impacts calculated according to the principle of instantanious oxidation of biogenic carbon..

Indicator	Unit	A1-A3	A4	A5	B1-B5	B6-B7
GWP-IOBC	kg CO2 eq.	3,35E+02	3,87E+01	2,75E+00	0,00E+00	0,00E+00

Indicator	Unit	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	6,56E-02	7,84E+00	6,45E-01	9,77E-02	-6,91E+02

GWP-IOBC *Global warming potential calculated according to the principle of instantanious oxidation.*

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ■ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- □ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- □ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- □ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Indoor environment

Not relevant for outdoor products.

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products

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