epddanmark

ECO PLATFORM EPD VERIFIED

Owner: Knauf A/S
No.: MD-23090-EN
Issued: 21-04-2022
Valid to: 11-02-2027

3rd PARTY **VERIFIED**

EPD

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

Owner of declaration
Knauf A/S
Kløvermarksvej 6
DK-9500 Hobro
CVR: 5405 0313

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)

Perforated Knauf Corridor.
Number of declared datasets/product variations: 1

The perforated Knauf Corridor is a glass fiber reinforced gypsum plasterboard with square, beveled, or special edges with perforated surface. The perforation can variate in different types of patterns and perforated percentage. The back side on the perforated boards is covered by an acoustic felt and the frontside have paint finish.

The EPD is valid for all perforated variations carrying the Knauf Corridor name.
The calculations cover similar products (variation <5%) and are based on the product with the highest environmental impact within the product group (article number 3143).

Production site
Knauf's production site in Hobro; Kløvermarksvej 6, DK-9500 Hobro, Denmark

Product use
The product is used for general indoor building construction of ceilings. The product is mounted on ceiling using the designed metal grid system.

Declared/ functional unit
1 m^2, 12 mm thickness

Year of data
2019

Issued: 21-04-2023
Valid to: 11-02-2027

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.

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

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:

Ninkie Bendtsen
Niras

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	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Product information

Product description

The main product components and packaging are shown in the tables below.

Material	Weight-% of declared product
Stucco	82%
Fibre glass	<0.1%
Paper	4%
Additives	1%
Glue	<1%
Water	12%

Packaging	Weight-%
Ceiling_board	89%
PE_Film	11%

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of gypsum board on the production site located in Hobro. Product specific data are based on average values collected in the period 2019. Background data are based on the GaBi 2021.2 database and are less than 10 years old except for two detergents <0.05% (w/w). Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

Hazardous substances

Knauf Danoline boards do 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

The product is made and controlled in accordance with EN 14190:2014 "Plasterboards form reprocessing".

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

www.knauf.dk or www.knaufdanoline.com

Reference Service Life (RSL)

The RSL is defined as 60 years according to NPCR 010 version 3.0.

Picture of product(s)

LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1 m2, 12 mm thickness.

Name	Value	Unit
Declared unit	1	m^2
Area density	10,0	kg/m^2
Conversion factor to 1 kg.	0,100	-

Functional unit

Not defined.

PCR

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

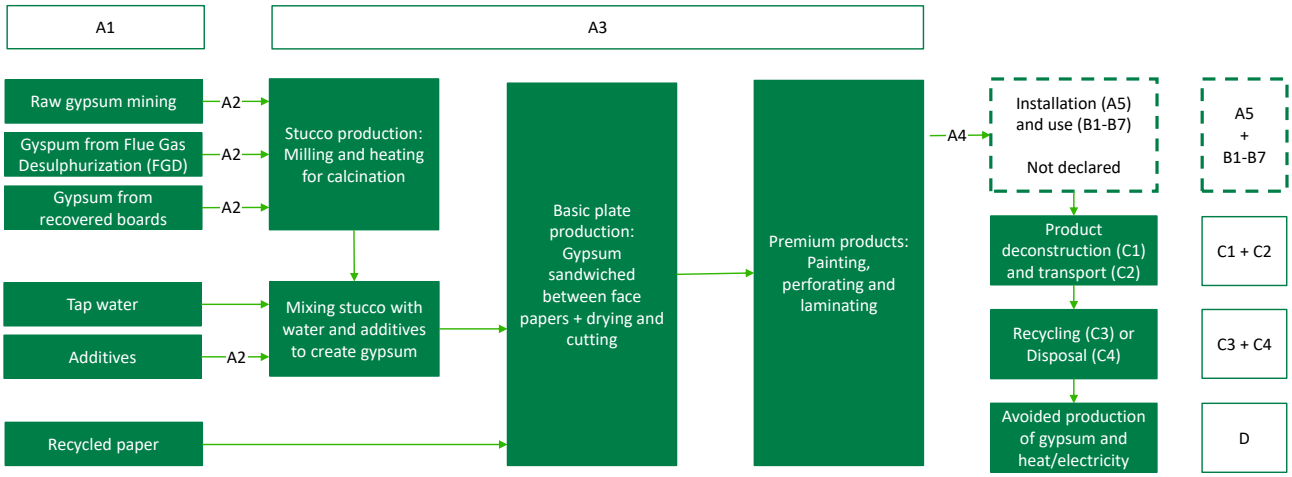
Guarantee of Origin – certificates

Foreground:
There are no "Guarantee of Origin" certificates used in the production. Consumption of electricity and heat is modelled with residual-mix for electricity and natural gas for heating.

Background:
Other processes upstream and downstream from the production is modelled with processes from the GaBi background database that is based on average data.

Flowdiagram

The diagram below shows the system boundaries of the EPD. A detailed illustration of A3 is shown later.



System boundary

This EPD is based on an LCA including cradle-to-gate with options, modules C1-C4, and module D. 100 % (w/w) of the product has been accounted for.
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.

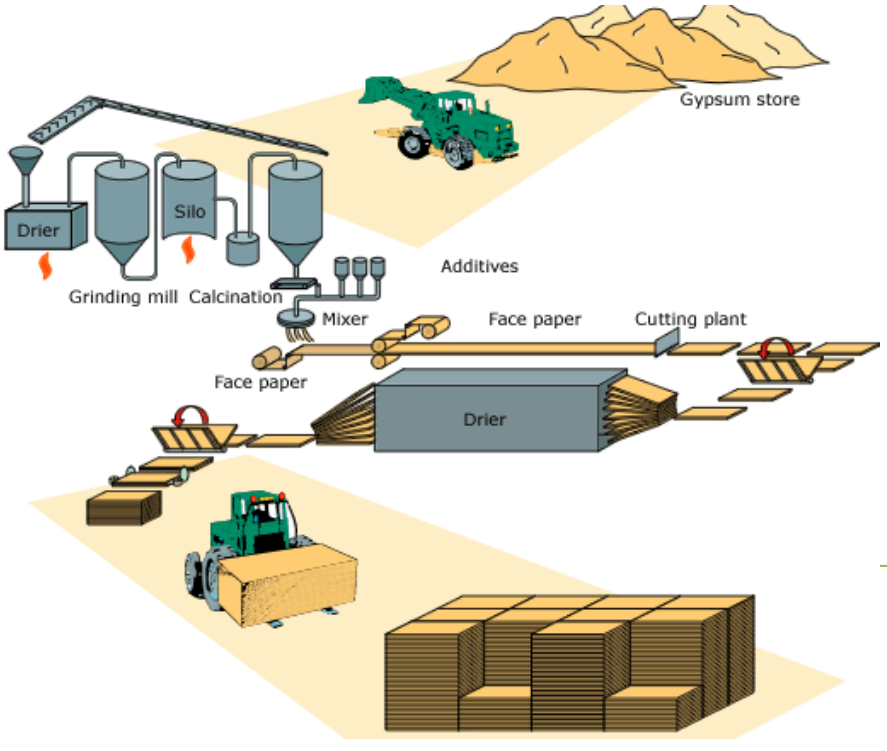
Product stage (A1-A3) includes:
The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.
A1 – Extraction and processing of raw materials
The raw gypsum is mined in Spain. All other raw materials are produced mainly in Northern Europe.
A2 – Transport to the production site
The inbound transport includes all incoming material from suppliers. This includes the transport of Flue-Gas Desulfurization (FGD) from coal-based power plants, as well as transport of raw natural gypsum from Spain.
A3 – Manufacturing processes
The natural, recycled or FGD based gypsum is heated/calcinated to bring the gypsum to the hemihydrate state known as stucco. The stucco is mixed with water and other additives and sandwiched between the front and back liner. After initial hardening, the plates are cut into shape and heated in the curing oven.
From the curing oven the plates are perforated, fitted with acoustic felt, painted, cut into final shape, and fitted with metal brackets.

Construction process stage (A4-A5) includes:
A weighted average for the transport distance of 237 km is included for the average Danish market situation.
The installation phase (A5) is not included.

Use stage (B1-B7) includes:
Not included

End of Life (C1-C4) includes:
The board is dismantled by hand (C1) and transported to municipal collection facilities, and from here to a recycling company (C2).
The gypsum part of the plate (gypsum and additives) is split from the paper liners using electricity-based machinery (C3). The paper part is assumed incinerated with energy recovery (C3). The metal brackets are assumed recycled.

Re-use, recovery and recycling potential (D) includes:
The gypsum part of the product is recycled as gypsum and avoids mining and production of natural gypsum. This can be done at Knauf and recycled in new Knauf boards.
The recovered energy from incineration of paper avoids the production of primary heat or electricity at power plants.
The recycling of metal avoids production of primary steel.



LCA results

The LCIA results are calculate using GaBi 10.6 with database version 2021.2, and using the characterization model defined in GaBi as EN15804+A2 for classifying and characterizing input and output flows.

ENVIRONMENTAL EFFECTS PER M2								
Parameter	**Enhed**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	2,73E+00	1,87E-01	0,00E+00	1,55E-01	1,09E+00	0,00E+00	-3,35E-01
GWP-fossil	[kg CO_2 eq.]	3,70E+00	1,83E-01	0,00E+00	1,52E-01	5,11E-01	0,00E+00	-3,33E-01
GWP-bio	[kg CO_2 eq.]	-9,69E-01	1,98E-03	0,00E+00	1,64E-03	5,76E-01	0,00E+00	-1,65E-03
GWP-luluc	[kg CO_2 eq.]	3,78E-03	1,52E-03	0,00E+00	1,26E-03	9,02E-05	0,00E+00	-2,51E-04
ODP	[kg CFC 11 eq.]	2,62E-08	3,67E-17	0,00E+00	3,03E-17	1,30E-15	0,00E+00	-3,79E-15
AP	[mol H^+ eq.]	1,10E-02	2,01E-04	0,00E+00	1,66E-04	4,92E-04	0,00E+00	-4,70E-04
EP-fw	[kg PO_4 eq.]	1,62E-04	5,52E-07	0,00E+00	4,57E-07	1,82E-07	0,00E+00	-4,41E-07
EP-mar	[kg N eq.]	3,34E-03	6,51E-05	0,00E+00	5,38E-05	1,73E-04	0,00E+00	-1,42E-04
EP-ter	[mol N eq.]	3,54E-02	7,70E-04	0,00E+00	6,37E-04	2,02E-03	0,00E+00	-1,54E-03
POCP	[kg NMVOC eq.]	9,15E-03	1,75E-04	0,00E+00	1,45E-04	4,58E-04	0,00E+00	-3,99E-04
ADP-mm[1]	[kg Sb eq.]	4,91E-06	1,65E-08	0,00E+00	1,36E-08	1,67E-08	0,00E+00	-5,54E-08
ADP-fos[1]	[MJ]	6,45E+01	2,47E+00	0,00E+00	2,05E+00	1,20E+00	0,00E+00	-5,75E+00
WDP[1]	[m^3]	7,51E-01	1,72E-03	0,00E+00	1,43E-03	1,36E-01	0,00E+00	-2,50E-02
Caption	GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-bio = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidifcation; 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							
Disclaimer	[1] 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.							

ADDITIONAL ENVIRONMENTAL EFFECTS PER M2								
Parameter	**Enhed**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	1,49E-07	1,36E-09	0,00E+00	1,13E-09	3,30E-09	0,00E+00	-4,21E-08
IRP2	[kBq U235 eq.]	3,06E-01	6,59E-04	0,00E+00	5,45E-04	2,21E-02	0,00E+00	-6,74E-02
ETP-fw1	[CTUe]	2,50E+01	1,84E+00	0,00E+00	1,52E+00	5,40E-01	0,00E+00	-1,23E+00
HTP-c1	[CTUh]	1,48E-09	3,71E-11	0,00E+00	3,07E-11	2,26E-11	0,00E+00	-5,51E-11
HTP-nc1	[CTUh]	4,40E-08	1,93E-09	0,00E+00	1,60E-09	1,34E-09	0,00E+00	-2,20E-09
SQP1	-	1,47E+01	8,50E-01	0,00E+00	7,04E-01	3,50E-01	0,00E+00	-9,28E-01
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 (dimensionless)							
Disclaimers	[1] 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.							
	[2] 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.							

RESSOURCE CONSUMPTION PER M2								
Parameter	**Enhed**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	6,16E+00	1,42E-01	0,00E+00	1,18E-01	4,38E-01	0,00E+00	-1,30E+00
PERM	[MJ]	7,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	1,35E+01	1,42E-01	0,00E+00	1,18E-01	4,38E-01	0,00E+00	-1,30E+00
PENRE	[MJ]	6,03E+01	2,48E+00	0,00E+00	2,05E+00	1,20E+00	0,00E+00	-5,75E+00
PENRM	[MJ]	4,18E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	6,45E+01	2,48E+00	0,00E+00	2,05E+00	1,20E+00	0,00E+00	-5,75E+00
SM	[kg]	6,82E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	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]	2,57E-02	1,63E-04	0,00E+00	1,35E-04	3,41E-03	0,00E+00	-1,26E-03
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 M2								
Parameter	**Enhed**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	3,89E-06	1,31E-10	0,00E+00	1,08E-10	2,84E-10	0,00E+00	-1,29E-09
NHWD	[kg]	3,63E-02	3,89E-04	0,00E+00	3,22E-04	8,07E-02	0,00E+00	-2,68E-03
RWD	[kg]	2,43E-03	4,50E-06	0,00E+00	3,73E-06	1,36E-04	0,00E+00	-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]	1,46E-01	0,00E+00	0,00E+00	0,00E+00	9,27E+00	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	0,00E+00	0,00E+00	1,40E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,56E+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							

BIOGENIC CARBON CONTENT PER PER M2		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	kg C	2,53E-01
Biogenic carbon content in accompanying packaging	kg C	4,97E-03

Additional information

LCA interpretation

The table below gives an outline of the processes of highest contribution of the LCA results.
The impacts GWP total, GWP fossil, and ADP fossil have the highest impact from the combustion of natural gas for calcination and plate drying.
The GWP-bio impact is mainly related to the paper use, with an uptake during production and a release later in paper incineration. The land use related impact is from the crop growing for the biogenic content in diesel.
EP marine and terrestrial, and POCP, is linked to transport of gypsum from Spain to Denmark by ship.
AP and EP-fw, as well as ADP mm is the production of titanium dioxide for the paint.
WDP is related to water consumption during production

Impact Category	Unit	Total	Dominant	% of category	Process
GWP-total	[kg CO2 eq.]	3,8	1,4	37%	Thermal energy from natural gas
GWP-fossil	[kg CO2 eq.]	4,2	1,4	34%	
GWP-bio emission	[kg CO2 eq.]	-0,39	0,58	-148%	Paper in waste incineration
GWP-bio uptake	[kg CO2 eq.]	-0,39	-0,82	211%	Paper production
GWP-luluc	[kg CO2 eq.]	0,0064	0,0015	24%	A4 Transport
ODP	[kg CFC 11 eq.]	2,62E-08	1,81E-08	69%	Paint production
AP	[mol H+ eq.]	0,011	0,004	33%	
EP-fw	[kg PO4 eq.]	0,00016	0,00007	44%	
EP-mar	[kg N eq.]	0,0035	0,0014	41%	Transport Gypsum natural
EP-ter	[mol N eq.]	0,037	0,016	42%	
POCP	[kg NMVOC eq.]	0,010	0,004	40%	
ADP-mm1	[kg Sb eq.]	4,90E-06	2,32E-06	47%	Paint production
ADP-fos1	[MJ]	64	24	37%	Thermal energy from natural gas
WDP1	[m3]	0,87	0,29	33%	Tap water in production

Technical information on scenarios

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	Truck, Euro 6, 28 - 32t gross weight / 22t payload capacity	-
Transport distance	237	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	752	kg/m^3
Capacity utilisation volume factor	1	-

Reference service life

RSL information	Unit
Reference service Life	60 years
Declared product properties	Information on the technical characteristics, design and construction guidelines, as well as conditions during use can be found on the website of Knauf at www.knauf.dk
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	10.0	kg
Collected with mixed waste	0	kg
For reuse	0	kg
For recycling	9.3	kg
For energy recovery	0.8	kg
For final disposal	0	kg
Assumptions for scenario development	Assumed recycled, recovering gypsum part and incinerating paper part	

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Gypsum	9.3	kg
Electric energy	1.4	MJ
Thermal energy	2.6	MJ

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.

The board is covered by the Danish Indoor Climate Labelling, Certificates no. 007 and 008.

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	www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA software /background data	Thinkstep GaBi 10.6 Database version 2021.2 www.gabi-software.com
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 + A2:2019 - "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"