

ENVIRONMENTAL PRODUCT DECLARATION

According ISO 14025 and EN 15804

Owner of the Declaration	Save Plastics
Publisher	NIBE Research bv
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Issue date	01-11-2018
Valid until	01-11-2023

Nature-line Black

Save Plastics

www.epdnibe.com



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1. GENERAL

1.1 COMPANY INFORMATION / DECLARATION OWNER



Manufacturer: Save Plastics
Production Location: Save Plastics Germany
Address: Westervoortsedijk 73-FC
NL-6827 AV Arnhem
E-mail: info@saveplastics.nl
Website: www.saveplastics.nl

1.2 EPD INFORMATION

EPD for: Nature-line Black
Calculation number: EPD-NIBE-20181031-3171
Date of issue: 01-11-2018
End of validity: 01-11-2023
Version NIBE's EPD Application: 1.0
Version Environmental Profile database: v2.73 (2018-10-30)
PCR: SBK bepalingmethode v2.0 incl. Wijzigingsblad overgang naar EcolInvent v3.3 of 1th June 2017

1.3 SCOPE OF DECLARATION

This is a cradle to grave with options EPD. The life cycle stages included are as shown below:
(X = included, MND = module not declared)

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	MND	MND	MND	MND	X	X	X	X	X

1.4 VERIFICATION OF THE DECLARATION

CEN standard EN 15804:2012 serves as the core PCR
Independent verification of the declaration. according to EN ISO 14025:2010. ☐ Internal ☐ External

De methodologie en dataverzameling zoals beschreven in dit rapport voldoet aan de eisen van normen ISO 14040/44, ISO 21930 en tevens aan de eisen van de "Bepalingmethode Milieuprestatie Gebouwen en GWW-werken versie 2.0 van november 2014, inclusief wijziging 1 juni 2017"

Daarmee wordt voldaan aan de eisen uit toetsingsprotocol versie 2.0 van november 2014, inclusief wijziging 1 juni 2017.

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A handwritten signature in black ink that reads 'Jansen'.

Third party verifier: Kamiel Jansen [reviewer], NIBE

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2. PRODUCT

2.1 PRODUCT DESCRIPTION

Nature-line products for urban constructions. The Nature-line is made from Post-Consumer waste plastics, produced into products for Light poles, sheetpiling, timbering, cladding, marina decks, jetty's and parkbenches. The Nature-Line products are an alternative for wood, steel or concrete products.

2.2 DESCRIPTION OF THE MANUFACTURING PROCESS

Production

Preparation Process of Save Plastics

The raw material is delivered to HK in the shape of cuboid pressed bales.

At first, the bales, both film, and mixed plastics run through a shredder, where the material gets reduced to small pieces. The raw material which is used is a waste product which has a negative value.

Due to a band-conveyor, the crushed plastics pass a magnetic separator on their way to the wind sifter. At this point, the first two waste streams arise – metal and heavy plastics.

The remaining good material is carried to a dryer by air. A heating machine that is run by natural gas delivers a warm airflow into the dryer. Having humidity eliminated paper parts are the next to be removed. A so-called Mechanical-dry-Cleaner, equipped with a certain kind of paddles, whips the plastic pieces. Paper fabrics, which sit on the plastics, fray and disengage themselves from the plastics.

The dry and clean plastic shreds now arrive at the pelletizer, where they become plastic pellets. These pellets can be fed into an extruder to produce a variety of end products

Based on economic allocation the cut-off is determined. The impacts of the production process are partially allocated to the waste processing of the plastic in the previous life cycle and partially onto the life cycle of the Nature-line products based on economic allocation.

Contruction

Nature-line products are usually installed outside like bridging, flood management, jetty's and park benches. Normal tooling equipment is required.

Transport to the construction stage consists the following:

Transport conveyance	Distance	Weight x distance
Lorry (Truck), unspecified (default)	509 km	0.51 tkm

3. CALCULATION RULES

3.1 DECLARED UNIT

1 kg of gerecyclede kunststoffen voor de openbare ruimte

Wordt toegepast in verschillende toepassingen zoals: palen, planken, balken en meubilair voor de openbare ruimte

3.2 ENVIRONMENTAL PROFILE AND RATINGS REPRESENTATIVE

The input data are representative for Nature-line Black, a product of Save Plastics. The data are representative for Netherlands.

3.3 CUT-OFF CRITERIA

In the Life cycle assessment the following is included in this study:

Product stage (A1-A3)

The production phase consists of the extraction of raw materials, transportation of the raw materials, processing the raw materials into materials and the production of the product. The required energy for production, external treatments, ancillary materials, packaging material and production emissions are included.

Construction process stage (A4-A5)

This stage consists of the transport of the product from production gate to the construction site. It also includes wastage of construction products (additional production processes to compensate for the loss of wastage of products) and waste processing of the waste from product packaging and product wastage during the construction processes up to the end-of-waste state or disposal of final residues. The installation of the product into the building including manufacture and transportation of ancillary materials and any energy or water required for installation or operation of the construction site are taken into account. It also includes on-site operations to the product.

Use stage (B1-B3)

This stage consists of the impacts arising from components of the building and construction works during their use. The stage also covers the combination of all planned technical and associated administrative maintenance actions during the service life to maintain the product installed in a building, in a construction works or its parts in a state in which it can perform its required functional and technical performance, as well as preserve the aesthetic qualities of the product. This will include preventative and regular maintenance activities.

End of life stage (C1-C4)

When the end of the life of the building is reached, the de-construction/demolition begins. The de-construction/demolition is not included in the system boundaries, because they go beyond the responsibility of the producer. This EPD does include the necessary transport (C2) from the demolition site to the sorting location and final disposal. In addition, the prescribed waste scenarios from the SBK Bepalingsmethode v2.0 have been used for the various materials in the product. The end of life stage includes the disposal to landfill and incineration. Recycling, re-use and exported energy are part of 'supplementary information' beyond the building life cycle.

Supplementary information outside the building life cycle (D)

This stage contains the environmental costs and benefits of recycling and re-use of material released during demolition, and the environmental benefits of recycled or re-used materials used as raw material in the product. In addition, the environmental benefits of saving energy due to incineration where energy is generated, are granted at this stage. The amount of avoid energy is based on the Lower Heating Values of the materials and the efficiencies of the incinerators as mentioned in the SBK Bepalingsmethode v2.0

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3.4 ALLOCATION

Environmental profile	Explanation of used allocation method
plastics (via residue) - D	Allocation based on economic values. The output side is assumed to be 5% recycling. The Ecolnvent process 'Polyethene, low density, granulate {RER} production Alloc Rec, U' is assumed to be the avoided environmental impact. Emissions, fresh water use, Shredding, sorting, separation metal, cyclone, agglomerator, extrusion, purification and granulating are included. A lost of 10% is included
Save Plastics C3+C4	Economic allocation is used. 25% of energy use is allocated to C3 Waste Processing
Secondary raw material, Economic allocation = 0	Waste material has no economic value and therefore economic allocation is €0,00

3.5 SOURCE OF BACKGROUND DATA

Environmental profile	Source	Comments
plastics (via residue) - C4	NMD/NIBE/Ecolnvent 3.3	
plastics (via residue) - D	NMD/NIBE/Ecolnvent 3.3	
Polyethylene, LDPE, granulate	NIBE/Ecolnvent 3.3	
Save Plastics C3+C4	EcoReview	0,133 MJ 'heat production, natural gas, at industrial furnace >100kW' and 0,175652kWh Electricity, low voltage DE
Save Plastics D	EcoReview	100% sec. material and therefore no benefits are applicable
Carbon black	NIBE/Ecolnvent 3.3	
Secondary raw material, Economic allocation = 0	NIBE	
Electricity (DE) - low voltage	Ecolnvent 3.3	
Heat production, natural gas, at industrial furnace >100kW (Europe)	Ecolnvent 3.3	

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4. RESULTS

4.1 DECLARED UNIT

Impact category	Unit	Total Amount
Depletion of abiotic resources-elements	Kg Sb	8.37E-7
Depletion of abiotic resources-fossil fuels	Kg Sb	5.19E-3
Global warming	Kg CO2 Equiv.	6.93E-1
Ozone layer depletion	Kg CFC-11 Equiv.	5.34E-8
Photochemical oxidants creation	Kg Ethene Equiv.	2.05E-4
Acidification of soil and water	Kg SO2 Equiv.	1.47E-3
Eutrophication	Kg PO43- Equiv.	3.64E-4
Human toxicity	kg 1.4 DB	1.21E-1
Ecotoxicity, fresh water	kg 1.4 DB	3.51E-3
Ecotoxicity, marine water (MAETP)	kg 1.4 DB	1.28E+1
Ecotoxicity, terrestrial	kg 1.4 DB	3.47E-3
Parameter	Unit	Total Amount
renewable primary energy ex. raw materials	MJ	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0
renewable primary energy total	MJ	8.96E-1
non-renewable primary energy ex. raw materials	MJ	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0
non-renewable primary energy total	MJ	1.13E+1
use of secondary material	Kg	9.99E-1
use of renewable secondary fuels	MJ	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0
use of net fresh water	M3	0.00E+0
hazardous waste disposed	Kg	6.28E-5
non hazardous waste disposed	Kg	1.08E-1
radioactive waste disposed	Kg	3.97E-5
Components for re-use	Kg	0.00E+0
Materials for recycling	Kg	1.00E+0
Materials for energy recovery	Kg	0.00E+0
Exported energy	MJ	2.32E-1

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4.2 PRODUCT STAGE (A1 - 3)

- A1. raw material extraction and processing, processing of secondary material input (e.g. recycling processes)
- A2. transport to the manufacturer
- A3. manufacturing

Impact category	Unit	A1	A2	A3
Depletion of abiotic resources-elements	Kg Sb	2.87E-8	2.57E-8	4.10E-7
Depletion of abiotic resources-fossil fuels	Kg Sb	1.03E-3	6.71E-5	2.68E-3
Global warming	Kg CO2 Equiv.	6.49E-2	9.06E-3	3.72E-1
Ozone layer depletion	Kg CFC-11 Equiv.	5.45E-9	1.70E-9	2.37E-8
Photochemical oxidants creation	Kg Ethene Equiv.	7.34E-5	5.48E-6	5.83E-5
Acidification of soil and water	Kg SO2 Equiv.	2.54E-4	4.01E-5	6.14E-4
Eutrophication	Kg PO43- Equiv.	1.96E-5	7.88E-6	1.99E-4
Human toxicity	kg 1.4 DB	6.46E-3	3.93E-3	5.56E-2
Ecotoxicity, fresh water	kg 1.4 DB	2.18E-4	1.16E-4	1.48E-3
Ecotoxicity, marine water (MAETP)	kg 1.4 DB	6.33E-1	4.39E-1	5.57E+0
Ecotoxicity, terrestrial	kg 1.4 DB	4.46E-5	3.14E-5	2.30E-3
Parameter	Unit	A1	A2	A3
renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
renewable primary energy total	MJ	3.52E-2	1.93E-3	6.61E-1
non-renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
non-renewable primary energy total	MJ	2.44E+0	1.50E-1	5.62E+0
use of secondary material	Kg	9.70E-1	0.00E+0	0.00E+0
use of renewable secondary fuels	MJ	0.00E+0	0.00E+0	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0	0.00E+0	0.00E+0
use of net fresh water	M3	0.00E+0	0.00E+0	0.00E+0
hazardous waste disposed	Kg	3.18E-6	1.05E-6	3.72E-5
non hazardous waste disposed	Kg	9.88E-4	8.55E-3	1.51E-2
radioactive waste disposed	Kg	3.06E-6	9.64E-7	2.05E-5
Components for re-use	Kg	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	Kg	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	Kg	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	0.00E+0	0.00E+0	0.00E+0

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4.3 CONSTRUCTION PROCES STAGE (A4 - 5)

- A4. transport to the building site
- A5. installation into the building

Impact category	Unit	A4	A5
Depletion of abiotic resources-elements	Kg Sb	1.90E-7	2.44E-8
Depletion of abiotic resources-fossil fuels	Kg Sb	4.95E-4	1.51E-4
Global warming	Kg CO2 Equiv.	6.69E-2	2.02E-2
Ozone layer depletion	Kg CFC-11 Equiv.	1.25E-8	1.55E-9
Photochemical oxidants creation	Kg Ethene Equiv.	4.05E-5	5.97E-6
Acidification of soil and water	Kg SO2 Equiv.	2.96E-4	4.28E-5
Eutrophication	Kg PO43- Equiv.	5.82E-5	1.06E-5
Human toxicity	kg 1.4 DB	2.90E-2	3.52E-3
Ecotoxicity. fresh water	kg 1.4 DB	8.54E-4	1.02E-4
Ecotoxicity. marine water (MAETP)	kg 1.4 DB	3.24E+0	3.73E-1
Ecotoxicity. terrestrial	kg 1.4 DB	2.32E-4	1.01E-4
Parameter	Unit	A4	A5
renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0
renewable primary energy total	MJ	1.43E-2	2.61E-2
non-renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0
non-renewable primary energy total	MJ	1.11E+0	3.28E-1
use of secondary material	Kg	0.00E+0	2.91E-2
use of renewable secondary fuels	MJ	0.00E+0	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0	0.00E+0
use of net fresh water	M3	0.00E+0	0.00E+0
hazardous waste disposed	Kg	7.74E-6	1.83E-6
non hazardous waste disposed	Kg	6.31E-2	3.14E-3
radioactive waste disposed	Kg	7.12E-6	1.16E-6
Components for re-use	Kg	0.00E+0	0.00E+0
Materials for recycling	Kg	0.00E+0	2.93E-2
Materials for energy recovery	Kg	0.00E+0	0.00E+0
Exported energy	MJ	0.00E+0	6.76E-3

A4. transport to the building site

Parameter	Unit / functional unit
Fuel type and consumption of vehicle – or – vehicle type used for transport	not available Lorry (Truck), unspecified (default)
Distance	509 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

A5. installation of the product in the building

Parameter	Unit / functional unit
Ancillary materials, water use and energy use for installation	
Waste materials on the building site before waste processing generated by the product's installation	
Output materials as result of waste processing at the building site	3% of Nature-line Black

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4.4 USE STAGE (B1 - 7)

- B1, use or application of the installed product
- B2, maintenance
- B3, repair
- B4, replacement (m.n.d.)
- B5, refurbishment (m.n.d.)
- B6, operational energy use (m.n.d.)
- B7, operational water use (m.n.d.)

Impact category	Unit	B1	B2	B3
Depletion of abiotic resources-elements	Kg Sb	0.00E+0	0.00E+0	0.00E+0
Depletion of abiotic resources-fossil fuels	Kg Sb	0.00E+0	0.00E+0	0.00E+0
Global warming	Kg CO2 Equiv.	0.00E+0	0.00E+0	0.00E+0
Ozone layer depletion	Kg CFC-11 Equiv.	0.00E+0	0.00E+0	0.00E+0
Photochemical oxidants creation	Kg Ethene Equiv.	0.00E+0	0.00E+0	0.00E+0
Acidification of soil and water	Kg SO2 Equiv.	0.00E+0	0.00E+0	0.00E+0
Eutrophication	Kg PO43- Equiv.	0.00E+0	0.00E+0	0.00E+0
Human toxicity	kg 1.4 DB	0.00E+0	0.00E+0	0.00E+0
Ecotoxicity. fresh water	kg 1.4 DB	0.00E+0	0.00E+0	0.00E+0
Ecotoxicity. marine water (MAETP)	kg 1.4 DB	0.00E+0	0.00E+0	0.00E+0
Ecotoxicity. terrestrial	kg 1.4 DB	0.00E+0	0.00E+0	0.00E+0
Parameter	Unit	B1	B2	B3
renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
renewable primary energy total	MJ	0.00E+0	0.00E+0	0.00E+0
non-renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0	0.00E+0
non-renewable primary energy total	MJ	0.00E+0	0.00E+0	0.00E+0
use of secondary material	Kg	0.00E+0	0.00E+0	0.00E+0
use of renewable secondary fuels	MJ	0.00E+0	0.00E+0	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0	0.00E+0	0.00E+0
use of net fresh water	M3	0.00E+0	0.00E+0	0.00E+0
hazardous waste disposed	Kg	0.00E+0	0.00E+0	0.00E+0
non hazardous waste disposed	Kg	0.00E+0	0.00E+0	0.00E+0
radioactive waste disposed	Kg	0.00E+0	0.00E+0	0.00E+0
Components for re-use	Kg	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	Kg	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	Kg	0.00E+0	0.00E+0	0.00E+0
Exported energy	MJ	0.00E+0	0.00E+0	0.00E+0

B2 Maintenance

Parameter	Unit / functional unit
Maintenance process and cycle	
Ancillary materials and energy input for maintenance	

B3 Repair

Parameter	Unit / functional unit
Repair process	Repair of the parts;
Repair cycle	Amount for product reference service life of 40 years;
Waste materials resulting from repair	Amount for product reference service life of 40 years;

Reference Service Life

Parameter	RSL
Product: Nature-line Black	40 years
Polyethylene, LDPE, granulate	50 years
Carbon black	50 years
Recycled Plastic Secondary raw material, Economic allocation = 0	50 years

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4.5 END OF LIFE STAGE (C1 - 4)

- C1. de-construction. Demolition (m.n.d.)
- C2. transport to waste processing
- C3. waste processing for reuse, recovery and/or recycling (m.n.d.)
- C4. disposal

Impact category	Unit	C2	C1+c3+c4
Depletion of abiotic resources-elements	Kg Sb	1.95E-8	1.45E-7
Depletion of abiotic resources-fossil fuels	Kg Sb	5.08E-5	8.92E-4
Global warming	Kg CO2 Equiv.	6.87E-3	1.75E-1
Ozone layer depletion	Kg CFC-11 Equiv.	1.28E-9	9.22E-9
Photochemical oxidants creation	Kg Ethene Equiv.	4.15E-6	2.09E-5
Acidification of soil and water	Kg SO2 Equiv.	3.04E-5	2.20E-4
Eutrophication	Kg PO43- Equiv.	5.97E-6	6.80E-5
Human toxicity	kg 1.4 DB	2.98E-3	2.16E-2
Ecotoxicity, fresh water	kg 1.4 DB	8.77E-5	7.12E-4
Ecotoxicity, marine water (MAETP)	kg 1.4 DB	3.33E-1	2.48E+0
Ecotoxicity, terrestrial	kg 1.4 DB	2.38E-5	7.80E-4
Parameter	Unit	C2	C1+c3+c4
renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0
renewable primary energy total	MJ	1.47E-3	2.19E-1
non-renewable primary energy ex. raw materials	MJ	0.00E+0	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0	0.00E+0
non-renewable primary energy total	MJ	1.14E-1	1.87E+0
use of secondary material	Kg	0.00E+0	0.00E+0
use of renewable secondary fuels	MJ	0.00E+0	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0	0.00E+0
use of net fresh water	M3	0.00E+0	0.00E+0
hazardous waste disposed	Kg	7.94E-7	1.24E-5
non hazardous waste disposed	Kg	6.47E-3	1.10E-2
radioactive waste disposed	Kg	7.31E-7	6.82E-6
Components for re-use	Kg	0.00E+0	0.00E+0
Materials for recycling	Kg	0.00E+0	0.00E+0
Materials for energy recovery	Kg	0.00E+0	0.00E+0
Exported energy	MJ	0.00E+0	0.00E+0

End - of - life

Processes	Unit / functional unit
Recovery system	0.00 kg for re - use 0.97 kg for recycling 0.02 kg for energy recovery
Disposal	0.01 kg of materials used in the product

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4.6 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

Impact category	Unit	D
Depletion of abiotic resources-elements	Kg Sb	-5.66E-9
Depletion of abiotic resources-fossil fuels	Kg Sb	-1.80E-4
Global warming	Kg CO2 Equiv.	-2.18E-2
Ozone layer depletion	Kg CFC-11 Equiv.	-2.02E-9
Photochemical oxidants creation	Kg Ethene Equiv.	-3.73E-6
Acidification of soil and water	Kg SO2 Equiv.	-2.88E-5
Eutrophication	Kg PO43- Equiv.	-5.20E-6
Human toxicity	kg 1.4 DB	-2.21E-3
Ecotoxicity. fresh water	kg 1.4 DB	-6.15E-5
Ecotoxicity. marine water (MAETP)	kg 1.4 DB	-2.54E-1
Ecotoxicity. terrestric	kg 1.4 DB	-3.85E-5
Parameter	Unit	D
renewable primary energy ex. raw materials	MJ	0.00E+0
renewable primary energy used as raw materials	MJ	0.00E+0
renewable primary energy total	MJ	-6.30E-2
non-renewable primary energy ex. raw materials	MJ	0.00E+0
non-renewable primary energy used as raw materials	MJ	0.00E+0
non-renewable primary energy total	MJ	-3.68E-1
use of secondary material	Kg	0.00E+0
use of renewable secondary fuels	MJ	0.00E+0
use of non-renewable secondary fuels	MJ	0.00E+0
use of net fresh water	M3	0.00E+0
hazardous waste disposed	Kg	-1.36E-6
non hazardous waste disposed	Kg	-6.67E-4
radioactive waste disposed	Kg	-6.79E-7
Components for re-use	Kg	0.00E+0
Materials for recycling	Kg	9.75E-1
Materials for energy recovery	Kg	0.00E+0
Exported energy	MJ	2.25E-1

5. REFERENCES

ISO 14040

DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025

DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804

EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

SBK-verification protocol

SBK-verification protocol – inclusion data in the Dutch environmental database, Final Version 2.0, November 2014, SBK

SBK-Assessment Method

Assessment Method Environmental Performance Construction and Civil Engineering Works (GWW), Version 2.0 Definitive November 2014, SBK

Protocol EPD-online

25011.16.03.015 - Protocol EPD online - NMD, version 1.2, November 2016, NIBE