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3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



Owner of declaration

Plastmo A/S
Odinsvej 9-11
4100 Ringsted
Denmark
CVR-nr.: 33 05 16 62



Issued:
03-03-2023

Valid to:
20-12-2027

Programme

EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Declared product

Steel Plus and Black Steel Rain Gutter System

Number of declared datasets/product variations: 1

Table with conversion factors included under additional information for other sizes.

Production site

Odinsvej 9-11
4100 Ringsted
Denmark

Product use

Rain gutters for buildings

Declared/ functional unit

30 meter Steel Plus Rain Gutter System

Year of production site data (A3)

2021

EPD version

No. 2, first revision 03-03-2023: B modules with value 0 had been added instead of 'MNR' for clarification.

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

Linda Højbye
Third party verifier

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = 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	x	x	x	x	x	x	x

Product information

Product description

Steel Plus and Black Steel Rain gutters are produced in 0.7 mm quality steel. The surface is coated with a combination of zinc, aluminum and magnesium, this coating means that the surface looks like a zinc rain gutter. Inside the material has a painted layer, which ensures that no zinc particles are discharged to the groundwater. Available in both a quarter and half round dimension and in several sizes, and in the colors black and steel. The environmental impact result in this EPD is related to the Steel plus Rain Gutter System No. 11/ ø75. The number e.g. "No. 11" indicates the shape which for example can be half round or a quarter round. Ø75/Ø90 indicates the diameter, which can be 75mm or 90mm.

Conversion factors to other sizes can be found under additional information. Suitable for modern building design.

Since a gutter system consists of different parts, an average scenario has been chosen as functional unit for which components normally is used for 30 meter roof on a one story building and includes all parts e.g. rain gutter, down pipe etc. In case of another scenario, the environmental impacts can be calculated based on weight.

Steel Plus rain gutters are the perfect combination of the strength of the steel and the beautiful surface as known from patinated zinc. The surface of Steel Plus is so comparable to the original zinc look that it is indistinguishable to the naked eye.

The main product components are shown in the table below.

Material	Weight-% of declared product
Primary Steel	75%
Scrap Steel	25%

Product packaging:

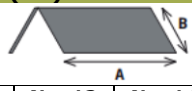
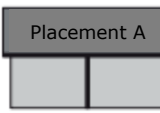
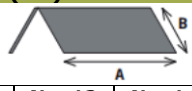

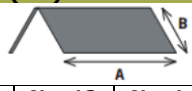
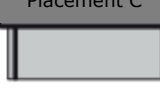
The composition of the sales- and transport packaging of the product is shown in the table below.

Material	Weight-% of packaging
LDPE folie	5-10 %
Cardboard	<1 %
EUR Pallet	90-95 %

Essential characteristics

Normally a gutter system consists of different parts depending on the building. Therefore, an average scenario has been chosen as functional unit for which components normally is used for 30 meter roof on a one story building.

The system sizes are adapted to different house types. A size 10 gutter is installed on smaller buildings, such as holiday homes and terrace. Str. 11 is used for traditional house types, and size 12 is installed on larger buildings, such as rental properties as well as warehouse and industrial premises. To ensure that you have sufficient drainage capacity, you should calculate the roof area and decide on the placement of the down pipe. The drainage area for the different types of Steel Plus rain gutters (No. 10, 11, 12 and 14) depends on the placement of the down pipe.

Rain gutter Placing	Drainage area (m ²)			
	No. 10	No. 11	No. 12	No. 14
A  	128	200	295	365
B  	85	128	195	262
C  	64	95	148	197

Further technical information about installation, use and disposal can be obtained by contacting the manufacturer or on the manufacturer's website: www.plastmo.dk

Reference Service Life (RSL)

The reference service life is 25 years, which is set according to the guarantee Plastmo A/S gives on the product.

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of 30 meter Steel Plus Gutter System on the production site located in Denmark. Product specific data are based on average values collected in the period January to December 2021 and delivered by Plastmo and their suppliers. Background data are based on the GaBi database, EcoInvent and an EPD on steel delivered to Plastmo and are less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

Picture of product



Hazardous substances

The Steel Plus Rain Gutter System does not contain substances listed on the "Candidate List of Substances of Very High Concern for authorization"

(<http://echa.europa.eu/candidate-list-table>)

LCA background

Declared unit

The LCI and LCIA results in this EPD relates to one item of "30 meter Steel Plus Rain Gutter System".

Name	Value	Unit
Declared unit	1	item
Density	67.2	kg/item
Conversion factor to 1 kg.	0.0149	-

Functional unit

30 meter Steel Plus Rain Gutter System.

PCR

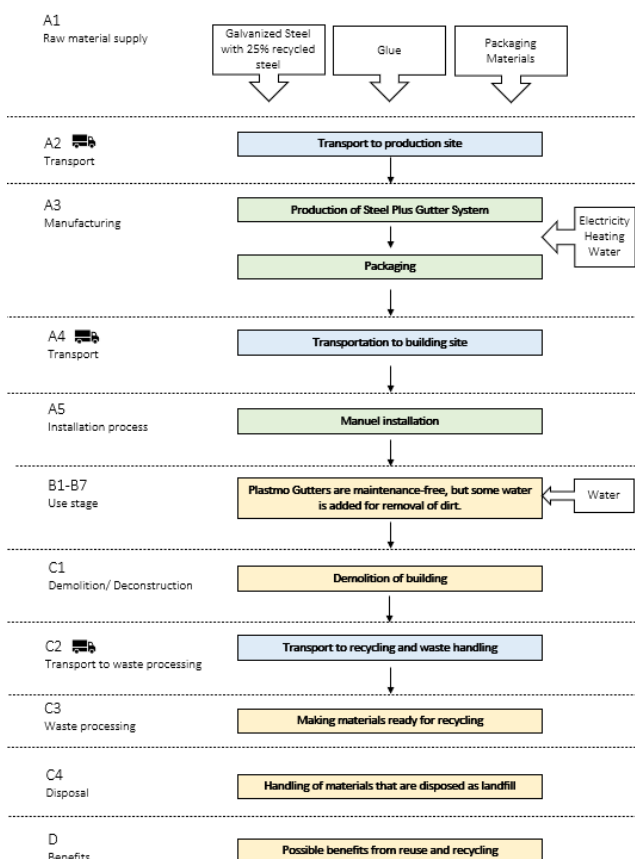
This EPD is developed according to the core rules for the product category of construction products in PCR EN 15804:2012+A2:2019.

Geographical area

The geographical area is EU.

Flow diagram

FLOW CHART



The flow diagram with the system boundaries of the entire life cycle of the Steel Plus Rain Gutter System is divided into the relevant modules with the following color coding; White: inputs to the system, blue: transport, green: production and installation (A modules), yellow: modules after installation (B, C and D modules)

System boundary

This EPD is based on a cradle-to-gate with options LCA, in which 100 weight-% of the product has been accounted for.

The cut-off criteria, which are 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

To produce the Steel Plus Rain Gutter System, Plastmo A/S buy steel from their Danish and Norwegian suppliers, where all surface treatments are done before the steel is delivered at Plastmo A/S's production site. The average scrap content in the delivered steel is 25% and is based on cold-rolled steel manufactured via the primary route (blast furnace, BOF basic oxygen furnace) and hot dip galvanized. When Plastmo A/S receives the galvanized steel, it is pruned and shaped at Plastmo A/S's production site in Ringsted, Denmark. After production of the Steel Plus Rain Gutter System, it is packed and distributed. The product stage A1-A3 comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing.

Module A1 comprise impacts from extraction and processing of raw materials and production of the steel pre-product that are delivered to Plastmo A/S.

Module A2 comprise the impacts from transportation of raw materials to Plastmo A/S' production site, which includes extraction and

production of the fuel as well as the combustion of the fuel during the transport. The capacity utilization (including empty runs) is 61%.

Module A3 comprise the impacts related to the production that takes place at Plastmo A/S' production site including impacts related to production of electricity and natural gas used at the production site which are allocated to the product based on weight and total production at the site. 1% steel waste is sold as scrap steel. Module A3 also includes raw materials for packaging.

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.

Construction process stage (A4-A5) includes:

Module A4 includes impacts from transportation of the finished product to an assumed installation site in Denmark. The module includes extraction of the fuels and the combustion of the fuel during the transport. The capacity utilization (including empty runs) is 61%.

The Steel Plus Rain Gutter System is manually installed, so no inputs are included in Module A5. Module A5 also includes the end-of-life treatment of packaging including the benefits from recycling of packaging materials. Cardboard and LDPE folie are assumed to be recycled, whereas 1/20 of an EUR pallet is assumed sent to municipal waste incineration, from where energy and heat credit are reported in module D. The recycling of the EUR pallet is not reported to avoid double crediting, since 19/20 of the input for the EUR pallet is set to be secondary material due to the assumed 20-time reuse.

Use stage (B1-B7) includes:

The Steel Plus Rain Gutter System is maintenance free. If dirt and leaves accumulate in the gutter, it can be manually removed with a brush. Dirt on the outside of the rain gutters can for sight's sake be removed with water on a cloth. It is assumed that the rain gutters are washed every 5 year and 10L of water is used each time, given 50L of water over a 25 year period.

The municipal wastewater treatment of the water is also included in B2.

End of Life (C1-C4) includes:

No impacts from dismantling have been included in module C1 since it is done manually.

Module C2 comprise the impacts from transportation of waste from the deconstructed product after end-of-life to the waste handling site. An estimate of 50 km with truck are used.

Module C3 comprise the impacts from waste handling. It is assumed that 95% of the product are recycled.

The substitution potential of primary steel by a recycling scenario is declared in D. 95% of the product are assumed to be recycled.

Module C4 comprise of the impacts related to landfill. The 5% of the product that is not assumed recycled is assumed to be disposed as landfill.

Re-use, recovery and recycling potential (D) includes:

In module D potential benefits from re-use, recovery and recycling of steel and packaging is modeled.

LCA results

Environmental Impacts

ENVIRONMENTAL IMPACTS PER [30 meter Steel Plus Rain Gutter System]											
Parameter	Unit	A1-A3	A4	A5	B2	B1, B3-B7	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ eq.]	1.93E+02	6.04E-01	2.35E+00	5.41E-02	0	0	4.82E-01	0	1.61E-01	-1.09E+02
GWP-fossil	[kg CO ₂ eq.]	1.95E+02	6.06E-01	1.23E-01	2.74E-02	0	0	4.80E-01	0	1.62E-01	-1.09E+02
GWP-biogenic	[kg CO ₂ eq.]	-2.31E+00	-5.94E-03	2.23E+00	2.67E-02	0	0	-1.26E-03	0	-1.70E-03	1.81E-01
GWP-luluc	[kg CO ₂ eq.]	9.79E-02	4.10E-03	4.78E-06	5.97E-06	0	0	3.27E-03	0	9.77E-05	-3.24E-03
ODP	[kg CFC 11 eq.]	1.00E-08	5.97E-14	1.85E-13	1.51E-13	0	0	4.76E-14	0	2.14E-13	-4.40E-08
AP	[mol H ⁺ eq.]	4.21E-01	6.82E-04	5.66E-04	6.56E-05	0	0	1.72E-03	0	5.12E-04	-2.36E-01
EP-freshwater	[kg P eq.]	2.11E-04	2.17E-06	4.53E-08	3.15E-05	0	0	1.73E-06	0	1.25E-07	-1.78E-04
EP-marine	[kg N eq.]	9.67E-02	2.20E-04	2.22E-04	1.36E-04	0	0	7.93E-04	0	1.25E-04	-4.21E-02
EP-terrestrial	[mol N eq.]	1.03E+00	2.63E-03	2.81E-03	1.94E-04	0	0	8.87E-03	0	1.37E-03	-3.74E-01
POCP	[kg NMVOC eq.]	3.26E-01	5.87E-04	5.83E-04	4.92E-05	0	0	1.55E-03	0	3.95E-04	-1.75E-01
ADPm ¹	[kg Sb eq.]	9.88E-04	6.13E-08	4.62E-09	3.28E-09	0	0	4.89E-08	0	1.13E-08	-2.63E-04
ADPF ¹	[MJ]	2.23E+03	7.98E+00	5.42E-01	2.62E-01	0	0	6.36E+00	0	2.30E+00	-1.09E+03
WDP ¹	[m ³ world eq. deprived]	5.54E+01	6.80E-03	2.46E-01	1.03E-02	0	0	5.42E-03	0	-1.53E-03	-2.34E+01
Caption	GWP-total = Globale Warming Potential - total; 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 = Ozone Depletion; AP = Acidification; 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 Depletion Potential										
	The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 ² or 195, while 1.12E-11 is the same as 1.12*10 ⁻¹¹ or 0.0000000000112.										
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 Impacts

ADDITIONAL ENVIRONMENTAL IMPACTS PER [30 meter Steel Plus Rain Gutter System]											
Parameter	Unit	A1-A3	A4	A5	B2	B1, B3-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	5.28E-06	4.68E-09	2.27E-09	6.84E-10	0	0	9.96E-09	0	5.48E-09	-3.30E-06
IRP ²	[kBq U235 eq.]	1.58E+00	2.25E-03	4.77E-03	0.00395	0	0	1.79E-03	0	4.10E-03	-1.52E+02
ETP-fw ¹	[CTUe]	3.94E+02	5.65E+00	2.27E-01	4.24	0	0	4.51E+00	0	6.83E-01	-9.71E+01
HTP-c ¹	[CTUh]	9.06E-08	1.17E-10	2.24E-11	1.46E-10	0	0	9.29E-11	0	8.10E-11	-7.93E-08
HTP-nc ¹	[CTUh]	2.72E-06	6.34E-09	1.42E-09	1.5E-08	0	0	5.82E-09	0	8.19E-09	-1.45E-06
SQP ¹	-	8.07E+02	3.38E+00	1.47E-01	0.0712	0	0	2.69E+00	0	1.79E-01	-2.24E+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)										
	The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 ² or 195, while 1.12E-11 is the same as 1.12*10 ⁻¹¹ or 0.0000000000112.										
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.										

Resource Use

RESOURCE USE PER [30 meter Steel Plus Rain Gutter System]											
Parameter	Unit	A1-A3	A4	A5	B2	B1, B3-B7	C1	C2	C3	C4	D
PERE	[MJ]	1.20E+02	5.53E-01	1.17E-01	9.65E-02	0	0	4.41E-01	0	1.88E-01	4.87E+01
PERM	[MJ]	2.17E+01	0	0	0	0	0	0	0	0	0
PERT	[MJ]	1.42E+02	5.53E-01	1.17E-01	9.65E-02	0	0	4.41E-01	0	1.88E-01	4.87E+01
PENRE	[MJ]	2.23E+03	8.01E+00	5.42E-01	2.62E-01	0	0	6.39E+00	0	2.30E+00	-1.09E+03
PENRM	[MJ]	4.76E+01	0	0	0	0	0	0	0	0	0
PENRT	[MJ]	2.28E+03	8.01E+00	5.42E-01	2.62E-01	0	0	6.39E+00	0	2.30E+00	-1.09E+03
SM	[kg]	3.78E+01	0	0	0	0	0	0	0	0	0
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0
FW	[m ³]	1.37E+00	6.39E-04	5.79E-03	2.83E-04	0	0	5.09E-04	0	3.23E-05	-5.33E-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										
	The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 ² or 195, while 1.12E-11 is the same as 1.12*10 ⁻¹¹ or 0.0000000000112.										

Waste Categories and Output Flows

WASTE CATEGORIES AND OUTPUT FLOWS PER [30 meter Steel Plus Rain Gutter System]											
Parameter	Unit	A1-A3	A4	A5	B2	B1, B3-B7	C1	C2	C3	C4	D
HWD	[kg]	7.42E-06	4.24E-11	5.64E-11	2.19E-11	0	0	3.38E-11	0	3.48E-10	-8.94E-09
NHWD	[kg]	7.34E+00	1.31E-03	1.88E-02	4.83E-02	0	0	1.04E-03	0	3.37E+00	1.46E+01
RWD	[kg]	2.18E-03	1.49E-05	2.93E-05	2.42E-05	0	0	1.19E-05	0	2.78E-05	-8.80E-04
CRU	[kg]	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	6.72E-01	0	2.25E+01	0	0	0	0	6.39E+01	0	0
MER	[kg]	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0	0	3.50E+00	0	0	0	0	0	0	0
EET	[MJ]	0	0	6.29E+00	0	0	0	0	0	0	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										
	The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 ² or 195, while 1.12E-11 is the same as 1.12*10 ⁻¹¹ or 0.0000000000112.										

Biogenic Carbon Content

BIOGENIC CARBON CONTENT PER [30 meter Steel Plus Rain Gutter System]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	0.5
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂		

Additional information

LCA interpretation

The results in this EPD relate to 30 meter Steel Plus Rain Gutter System, produces with an average scrap content of 25% scrap steel. The calculated environmental impacts clearly reflect the environmental impacts from the production of primary steel in module A1 as the dominant source to impact.

Conversion to other Steel Plus Rain Gutter Systems

The results are related to the rain gutter system size No.11/ø75. If other system sizes is used, the EPD results can be used by multiplying the environmental impact results with the conversion factor below.

Rain gutter system size	Quantity (kg)	Conversion factor
No. 10 / ø75	60.9	0.91
No. 11 / ø75	67.2	1
No. 11 / ø90	69.2	1.03
No. 12 / ø75	77.1	1.15
No. 12 / ø90	79.1	1.18
No. 14 / ø90	93.9	1.4

Technical information on scenarios

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	EURO 6 truck, 20-26t gross weight with 17.3t payload capacity	-
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%
Bulk density of transported products	67.2	Kg/item
Volumen capacity utilization factor	1	-

Installation of the product in the building (A5)

Scenario information	Value	Unit
Ancillary materials	<0.3 (glue and wipes)	kg
Water use	0	m ³
Other resource use	0	kg
Energy type and consumption	0	kWh
Waste materials	23.6 (packaging)	kg
Output materials	0	kg
Direct emissions to air, soil or water	0	kg

Reference service life

RSL information		Unit
Reference service Life	25	Years
Declared product properties	30 meter Steel Plus Rain Gutter System	-
Assumed quality of work	Instruction are available at www.plastmo.dk	-

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	67.2	kg
Collected with mixed waste	0	kg
For reuse	0	kg
For recycling	63.9	kg
For energy recovery	0	kg
For final disposal	3.36	kg
Assumptions for scenario development	50 km with a EURO 6 truck to waste handling.	-

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Product sent for recycling from module C3: The input I A1 added as burden free is removed before module D	60.7	kg
Packaging sent for recycling from module A5: Cardboard and LDPE film	1.59	kg
Incineration of the 1/10 pallet that reach end of life from module A5	1.1	kg
Incineration of wipes from module A5	0.2	kg

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A2 chapter 7.4.1.

Soil and water

Regarding the claim of no release of Zinc to groundwater, the Danish Technological Institute have done test on Zinc release to groundwater from the Steel Plus Rain Gutter System. For more information, contact Plastmo A/S.

Besides that, the EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A2 chapter 7.4.2.

References

Publisher	 epddanmark www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	<i>Rikke Zuwa Kempf Bernberg, Freja Jeppesen and Cinzia Giampieriand</i> <i>COWI A/S Parallelsvej 2 2800 Kgs. Lyngby</i>
LCA software / background data	<i>GaBi Professional 2022 and ecoinvent 3.8</i>
3rd party verifier	<i>Linda Højbye Life Cycle Assessment Consulting</i>

General programme instructions

General Programme Instructions, version 2.0, spring 2020
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"

GaBi Professional

GaBi 2022 Professional Database, version 2022.2 <http://www.gabi-software.com/nw-eu-danish/databases/gabi-databases/professional/>

EcoInvent

Ecoinvent version 3.8