



## General information

### Product

Spiling bolt

### Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway  
The Norwegian EPD Foundation  
Phone: +47 23 08 80 00  
web: post@epd-norge.no

### Declaration number:

)%Bk:Pmmp:bmCC:%)

### This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR  
NPCR 013:2019 Part B for Steel and aluminium construction products

### Statement of liability:

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

### Declared unit:

1 kg Spiling bolt

### Declared unit with option:

A1-A3,A4,C1,C2,C3,C4,D

### Functional unit:

Unthreaded rebar ø25/32 PC Coat

### General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Individual third party verification of each EPD is not required when the EPD tool is i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPDNorway, and iii) the process is reviewed annually. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools.

### Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Alexander Borg, Asplan Viak  
(no signature required)

### Owner of the declaration:

Pretec Norge AS  
Contact person: Fredrik Eggertsen  
Phone: (+47 69 10 24 60  
e-mail: post@pretec.no

### Manufacturer:

Pretec Norge AS  
Kampenesmosen 3, 1739 Borgenhaugen  
Norway

### Place of production:

Pretec China  
1-1 1-1 Danmei Road, Haining City, Zhejiang Province  
China

### Management system:

ISO 14001 and ISO 9001, AAA Certification AB, sert no 794 - EN 1090-1, AAA Certification AB, sert no 2296

### Organisation no:

NO 980 429 245 MVA

### Issue date:

ssDss.2022

### Valid to:

ssDss.2027

### Year of study:

2021

### Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

### Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.


Developer of EPD:

Fredrik Eggertsen

Reviewer of company-specific input data and EPD:

Lars Rune Aasberg

### Approved:



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

Bolts for full length cementitious mortar grouting, typically around tunnel portals (before first blast) or as pre-support by installation ahead of the tunnel face when entering into very poor rock quality.

### Product specification

Pc-Coat duplex coating. Provides optimum corrosion protection for steel using three different processes  
 Hot-dip galvanizing  
 Zinc-manganese phosphating  
 Powder coating

CE marked according to NS EN 1090-1

Materials	kg	%
Metal - Zinc	0,02	2,00
Powder coating	0,01	0,60
Reinforcement	0,97	97,40
Total	1,00	

### Technical data:

Material: HRB500E according to GB 1499.2-2018.  
 Unthreaded. Bolt with beveled end. Weight: 3,85 kg/m (Ø25) 6.31 kg/m (Ø32)  
 Tension area (As mm<sup>2</sup>): Ø25mm 491; ø32mm 804.  
 Yield Strength: (ReH) 500 N/mm<sup>2</sup> Tensile Strength: (Rm) 600 N/mm<sup>2</sup>  
 Ductility, AGT min 8 %

### Market:

Worldwide

### Reference service life, product

120 years

### Reference service life, building or construction works

## LCA: Calculation rules

### Declared unit:

1 kg Spiling bolt

### Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

### 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 is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

### Data quality:

Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

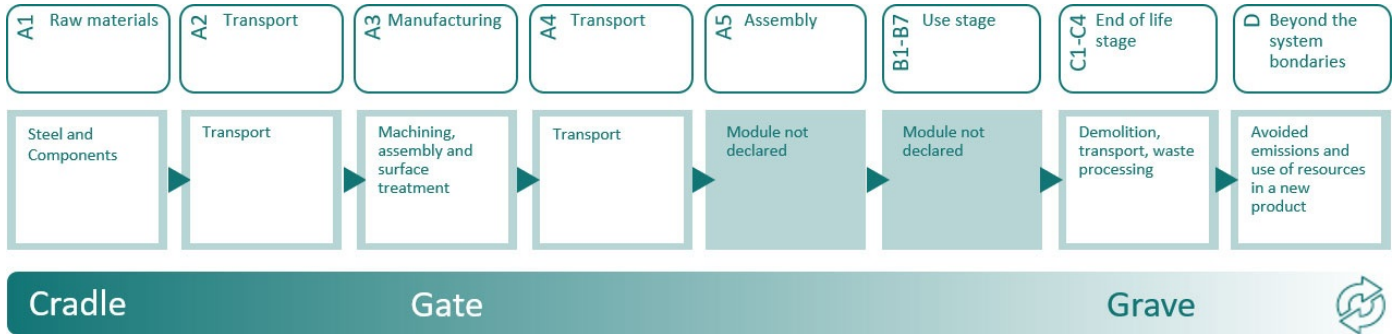
Materials	Source	Data quality	Year
Metal - Zinc	ecoinvent 3.6	Database	2019
Powder coating	Ecoinvent 3.6	Database	2019
Reinforcement	Ecoinvent 3.6	Database	2019

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

Product stage			Construction installation stage	Use stage									End of life stage				Beyond the system boundaries
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	

**System boundary:**

This EPD is a "cradle-to-gate with options" EPD. The system boundary for this LCA report is from A1 to A4, C1-C4 and D



**Additional technical information:**

Recommended borehole: 45-50 mm with grouting.

## LCA: Scenarios and additional technical information














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

Module C "End of life stage" is a generic scenario for decommissioning of construction. Subject to project specific conditions. Grade of recycling for different steel grades is based on statistics obtained from Norsk Stålforbund.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Ship, Freight, Transoceanic, 194.000DWT (kgkm)	65,0 %	20300		l/tkm	
Truck, over 32 tonnes, EURO 6 (km)	53,3 %	300	0,023	l/tkm	6,90
Ship, Coastal Barge (km)	71,0 %	110	0,011	l/tkm	1,21
Truck, over 32 tonnes, EURO 4 (km)	53,3 %	60	0,023	l/tkm	1,38
De-construction demolition (C1)		Unit	Value		
Diesel, burned (MJ)		MJ/DU	0,63		
Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, over 32 tonnes, EURO 6 (km)	53,3 %	300	0,023	l/tkm	6,90
Waste processing (C3)		Unit	Value		
Materials to recycling (kg)		kg	0,67		
Waste, scrap steel, for incineration (kg)		kg	0,00		
Disposal (C4)		Unit	Value		
Waste, scrap steel, to landfill (kg)		kg	0,32		
Benefits and loads beyond the system boundaries (D)		Unit	Value		
Substitution of primary steel with net scrap (kg)		kg	0,33		

## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact			A1-A3	A4	C1	C2	C3	C4	D
	Parameter	Unit							
	GWP-total	kg CO <sub>2</sub> -eq	2,51E+00	1,58E-01	5,73E-02	2,61E-02	2,38E-05	1,39E-03	-3,67E-01
	GWP-fossil	kg CO <sub>2</sub> -eq	2,51E+00	1,58E-01	5,73E-02	2,61E-02	2,36E-05	1,38E-03	-3,66E-01
	GWP-biogenic	kg CO <sub>2</sub> -eq	2,79E-03	6,08E-05	1,07E-05	1,12E-05	2,08E-07	1,18E-06	-2,02E-04
	GWP-luluc	kg CO <sub>2</sub> -eq	1,97E-03	1,44E-04	4,52E-06	7,96E-06	7,10E-09	2,72E-07	-1,64E-04
	ODP	kg CFC11 -eq	1,55E-07	2,87E-08	1,24E-08	6,30E-09	5,00E-12	6,74E-10	-1,16E-08
	AP	mol H+ -eq	1,17E-02	4,03E-03	6,00E-04	8,41E-05	1,71E-07	1,35E-05	-1,82E-03
	EP-FreshWater	kg P -eq	1,13E-04	9,84E-07	2,09E-07	2,08E-07	4,53E-10	1,03E-08	-2,25E-05
	EP-Marine	kg N -eq	2,37E-03	9,99E-04	2,65E-04	1,84E-05	6,24E-08	5,07E-06	-3,77E-04
	EP-Terrestrial	mol N eq	2,58E-02	1,11E-02	2,90E-03	2,05E-04	6,86E-07	5,58E-05	-3,85E-03
	POCP	kg NMVOC -eq	1,14E-02	2,93E-03	7,98E-04	8,07E-05	2,03E-07	1,60E-05	-1,84E-03
	ADP-minerals&metals <sup>1</sup>	Kg Sb-eq	1,57E-03	1,94E-06	8,80E-08	4,66E-07	3,17E-10	1,23E-08	-6,32E-06
	ADP-fossil <sup>1</sup>	MJ	2,78E+01	2,12E+00	7,89E-01	4,24E-01	4,30E-04	4,47E-02	-3,08E+00
	WDP <sup>1</sup>	m <sup>3</sup>	1,72E+01	8,49E-01	1,68E-01	3,25E-01	9,44E-04	9,41E-02	1,90E+01

GWP total Global Warming Potential total; GWP fossil Global Warming Potential fossil fuels; GWP biogenic Global Warming Potential biogenic; GWP luluc Global Warming Potential 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; ADPE Abiotic Depletion Potential minerals and metals; ADPf Abiotic Depletion Potential fossil fuels;







"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

1. 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

### Remarks to environmental impacts

**Additional environmental impact indicators**

Parameter		Unit	A1-A3	A4	C1	C2	C3	C4	D
	PM	Disease incidence	1,93E-07	2,99E-09	1,59E-08	2,40E-09	5,00E-12	2,88E-10	-3,04E-08
	IRP <sup>2</sup>	kgBq U235 eq.	5,67E-02	9,11E-03	3,38E-03	1,85E-03	1,61E-06	1,94E-04	1,32E-03
	ETP-fw <sup>1</sup>	CTUe	7,74E+01	1,42E+00	4,31E-01	3,10E-01	9,54E-04	2,21E-02	-2,04E+01
	HTP-c <sup>1</sup>	CTUh	1,27E-08	0,00E+00	1,70E-11	0,00E+00	0,00E+00	1,00E-12	-1,76E-09
	HTP-nc <sup>1</sup>	CTUh	1,25E-07	3,60E-10	3,96E-10	3,00E-10	1,00E-12	1,30E-11	3,83E-08
	SQP <sup>1</sup>	Pt	7,04E+00	8,39E-01	1,00E-01	4,87E-01	7,45E-04	1,63E-01	-2,31E-01

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)

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

1. 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
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									
Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D	
 PERE	MJ	1,48E+00	2,19E-02	4,27E-03	5,34E-03	1,07E-05	6,88E-04	-2,50E-01	
 PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	1,48E+00	2,19E-02	4,27E-03	5,34E-03	1,07E-05	6,88E-04	-2,50E-01	
 PENRE	MJ	2,78E+01	2,12E+00	7,89E-01	4,24E-01	4,30E-04	4,47E-02	-3,08E+00	
 PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PENRT	MJ	2,78E+01	2,12E+00	7,89E-01	4,24E-01	4,30E-04	4,47E-02	-3,08E+00	
 SM	kg	3,39E-01	9,93E-04	3,87E-04	0,00E+00	9,02E-04	1,18E-05	1,73E-01	
 RSF	MJ	2,15E-02	6,34E-04	1,05E-04	1,87E-04	2,50E-07	1,42E-05	1,32E-02	
 NRSF	MJ	1,72E+00	-4,20E-03	1,54E-03	6,26E-04	3,95E-06	4,09E-05	3,85E-01	
 FW	m <sup>3</sup>	2,18E-02	1,81E-04	4,06E-05	4,83E-05	4,00E-07	5,32E-05	-7,71E-04	

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 materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; FW Use of net fresh water

\*Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed








End of life - Waste									
Parameter		Unit	A1-A3	A4	C1	C2	C3	C4	D
	HWD	kg	6,31E-03	1,14E-04	2,32E-05	2,32E-05	1,32E-03	1,35E-06	-1,90E-03
	NHWD	kg	5,64E-01	4,96E-02	9,34E-04	3,69E-02	1,24E-05	3,23E-01	-1,50E-01
	RWD	kg	5,50E-05	1,45E-05	5,48E-06	2,90E-06	2,40E-09	3,04E-07	1,01E-06

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed;

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

End of life - Output flow									
Parameter		Unit	A1-A3	A4	C1	C2	C3	C4	D
	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	3,36E-01	1,24E-03	3,80E-04	0,00E+00	6,72E-01	1,09E-05	1,74E-01
	MER	kg	3,01E-04	3,39E-06	1,18E-06	0,00E+00	2,71E-09	1,41E-07	1,10E-04
	EEE	MJ	2,39E-03	2,58E-05	4,04E-06	0,00E+00	5,55E-05	1,03E-06	-1,26E-04
	EET	MJ	3,62E-02	3,90E-04	6,12E-05	0,00E+00	8,39E-04	1,56E-05	-1,91E-03

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported energy Thermal

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

Biogenic Carbon Content		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

## Additional Norwegian requirements

### Greenhouse gas emissions 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 process (A3).

Electricity mix	Data source	Amount	Unit
Electricity, China, Zhejiang, high voltage (kWh)	ecoinvent 3.6	865,26	g CO <sub>2</sub> -eq/kWh

### Dangerous substances

The product contains no substances given by the REACH Candidate list or the Norwegian priority list.

### Indoor environment

For outdoor use only






## Additional Environmental Information

Environmental impact indicators EN 15804+A1 and NPCR Part A v2.0								
Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP	kg CO <sub>2</sub> -eq	2,40E+00	1,57E-01	5,67E-02	2,59E-02	2,29E-05	1,36E-03	-3,43E-01
ODP	kg CFC11 -eq	1,54E-07	2,72E-08	9,82E-09	5,10E-09	4,00E-12	5,36E-10	-1,18E-08
POCP	kg C <sub>2</sub> H <sub>4</sub> -eq	1,31E-03	8,63E-05	8,72E-06	3,20E-06	1,05E-08	3,34E-07	-2,27E-04
AP	kg SO <sub>2</sub> -eq	8,73E-03	3,19E-03	8,37E-05	5,45E-05	8,28E-08	4,01E-06	-1,37E-03
EP	kg PO <sub>4</sub> <sup>3-</sup> -eq	1,12E-03	3,46E-04	9,31E-06	5,91E-06	1,39E-08	4,77E-07	-2,04E-04
ADPM	kg Sb -eq	1,57E-03	1,94E-06	8,80E-08	4,66E-07	3,17E-10	1,23E-08	-6,32E-06
ADPE	MJ	2,62E+01	2,10E+00	7,89E-01	4,16E-01	4,17E-04	4,40E-02	-3,35E+00
GWPIOBC	kg CO <sub>2</sub> -eq	4,07E-01	1,58E-01	5,67E-02	2,61E-02	0,00E+00	0,00E+00	-5,49E-01

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources; GWP-IOBC/GHG Global warming potential calculated according to the principle of instantaneous oxidation (except emissions and uptake of biogenic carbon)

## 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 Environmental product declaration - Core rules for the product category of construction products.  
 ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.  
 ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.  
 Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no Report number: 07.21  
 Graafland and Iversen, (2022) EPD generator for EPD generator for NPCR 013 Part B for Steel and Aluminum, Background information for EPD generator application and LCA data, LCA.no report number: 08.22  
 NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.  
 NPCR 013 Part B for Steel and Aluminium Construction Products , Ver. 4.0, 06.10.2021, EPD Norway.

 <b>epd-norway</b> <small>Global Program Operator</small>	<b>Program operator and publisher</b> The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo, Norway	Phone: +47 23 08 80 00 e-mail: post@epd-norge.no web: www.epd-norge.no
 <small>Let's connect</small>	<b>Owner of the declaration:</b> Pretec Norge AS Kampenesmosen 3, 1739 Borgenhaugen	Phone: (+47) 69 10 24 60 e-mail: post@pretec.no web: www.pretec.no
	<b>Author of the Life Cycle Assessment</b> LCA.no AS Dokka 6B, 1671	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
	<b>Developer of EPD generator</b> LCA.no AS Dokka 6B, 1671 Kråkerøy	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
	ECO Platform ECO Portal	Web: www.eco-platform.org Web: ECO Portal

# **EPD for the best environmental decision**

The Norwegian EPD Foundation  
[www.epd-norge.no](http://www.epd-norge.no)

