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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Norsk Stål AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-348-237-EN
Issue date:	09.09.2015
Valid to:	09.09.2020

Wire mesh reinforcement steel

Norsk Stål AS

NORSK STÅL

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General information

Product:
Wire mesh reinforcement bars made from prefabricated steel from European manufacturers.

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Declaration number:
NEPD-348-237-EN

Place of production:
Norway

ECO Platform reference number:
-

Management system:
NS-EN ISO 14001:2004
NS-EN 10080:2005
NS-EN 1090-1:2009 + A1:2011
Startbank ID: 138341

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
NPCR 013 Steel as Construction Material Rev 1 (08/2013)

Organisation no:
NO 959493715 MVA

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.

Issue date:
09.09.2015

Valid to:
09.09.2020

Declared unit:
-

Year of study:
2015

Declared unit with option (A1-A3 + A4):
Per kg steel

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

Functional unit:
-

The EPD has been worked out by:
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Verification:
The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

☐ internal ☑ external

Third party verifier:
Helene Sedal, Rambøll Norge AS
(Independent verifier approved by EPD Norway)

Approved
Dagfinn Malnes
Managing Director of EPD-Norway

Product

Product description:

The product studied is pre-welded steel wire mesh, often called welded wire mesh, welded wire fabric, wire mesh reinforcement or mesh reinforcement (Norwegian: armeringsnett). Wire mesh is a common application of reinforcement steel, where prefabricated welded steel bars forms a reinforcing mesh that supports the concrete slab. Reinforcement bars (rebar, Norwegian: armeringsjern) are steel rods that are used as a tension device in concrete reinforcement. The bars may have protruding features and indentations to better bond with the concrete, commonly in the form of ribs. When embedded into concrete, the steel is able to alleviate the tension that is imposed on the concrete by distributing the tension evenly over a large area, and typical applications are in the construction of buildings and civil structures.

Technical information:

Steel products may contain many types of alloys, depending on the intended performance characteristic of the steel product. For reinforcement steel, a typical material composition is given the table below.

Scrap content is reported to be 100% [7][8][9]

Product specification:

Materials	kg	%
Fe - Iron	0,98-0,99	98-99
C - Carbon	0,005-0,002	0,05-0,02
Si - Silicon	0,02	0,2
Mn - Manganese	0,03-0,07	0,3-0,7

Market:

Norway

Reference service life, product:

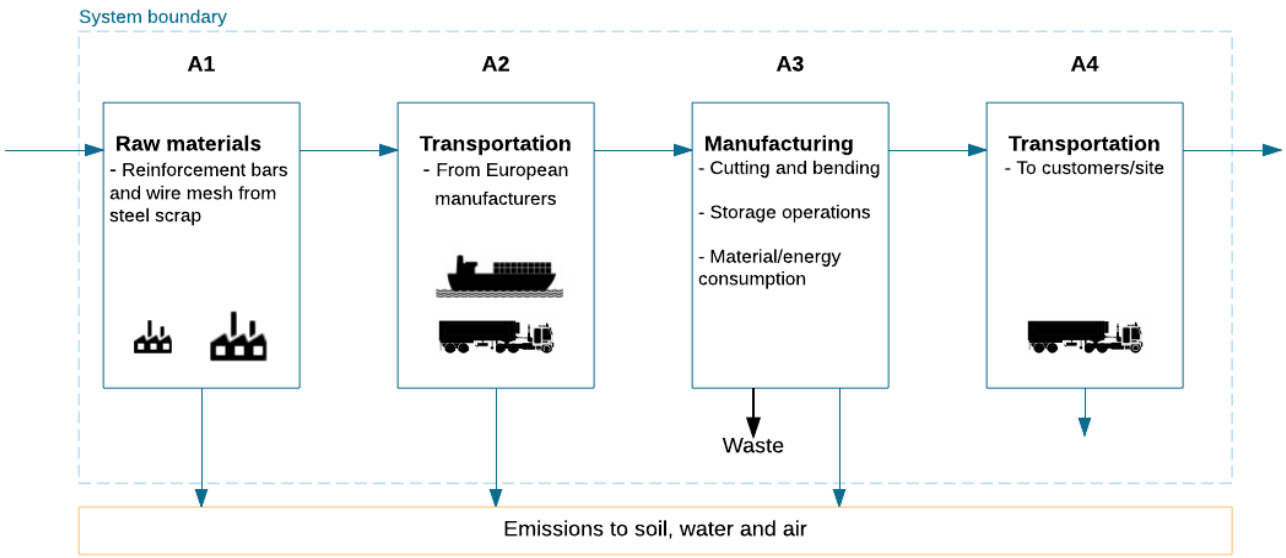
Not relevant.

A construction worker sprays concrete ("shotcrete") over welded wire mesh reinforcement. Photo: Raimond Spekking (CC BY-SA 3.0.).

LCA: Calculation rules

Declared unit:
Per kg steel

System boundary:
Cradle to gate (A1-A3) including transport from manufacturer to customer (A4). System boundaries are shown in the flowchart.



Data quality:
General requirements and guidelines concerning use of generic and specific data and the quality of those are as described in EN 15804: 2012 +A1:2013, clause 6.3.6 and 6.3.7. The data is representative according to temporal, geographical and technological requirements.

Temporal:
Data for use in module A3 is supplied by the manufacturer and consists of the recorded amount of specific material and energy consumption for the product studied. Specific data has been collected for 2014. Generic data has been created or updated within the last 10 years.

Geographical:
The geographic region of the production sites included in the calculation is Norway (A3). Data for A1 represents European manufacturers (Norway included).

Production sites included are in Klepp, Søgne and Skien. Warehouse operations in Larvik and Strømmen are included in the study.

Technological:
Data represents technology in use.

Data for module A1 consists of specific data derived from suppliers for reinforcement steel [7][8][9]. All other data are aqcuired from, and calculated in GaBi 7 [10].

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. This cut-off rule does not apply for hazardous materials and substances.

Allocation:
The allocation is made in accordance with the provisions of EN 15804: 2012 + A1:2013. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation if applicable.

LCA: Scenarios and additional technical information

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

The scenarios for transport distances and transportation modes from suppliers to manufacturer represents both recorded and calculated routes and distances from factory gates in Europe to Norway. Transport scenarios for waste handling and transport to sites/customers are based on assumptions and recorded averages respectively.

Transport from suppliers to producer (A2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Container vessel	48	27500 DWT	1154	0,005 l/tkm	5,30
River freight ship	65	Downstream barge	700	0,002 l/tkm	1,12
Truck	85	Euro 0-5mix, 27t payl.	175,3	0,044 l/tkm	7,72

Transport in A2 describes the transports of steel products for further manufacturing, expedition or storage at manufacturer.

Waste transportation (A3)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	85	Euro 6, 27t payl.	50	0,795 l/tkm	0,02

Transport in A3 describes shipping transportation of waste to waste collection points or waste disposal plants.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	85	Euro 6, 27t payl.	64	0,016 l/tkm	1,02

Transport in A4 represents an average of actual distances recorded in 2014.

LCA: Results

The results shows that the most significant impacts comes from the production of steel. The steel is shipped from European manufacturers to ports in Norway, giving a moderate impact in A2. Module A3 includes deloading and expediting of goods from a forklift, storage and office maintenance, and has a relatively low impact. Module A4 gives transport to customers/sites, with a low impact relative to module A1.

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

Product stage			Assemby 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental impact

Parameter	Unit	A1-A3	A4						
GWP	kg CO_2 -eqv	3,31E-01	5,05E-04						
ODP	kg CFC11-eqv	6,87E-08	3,41E-15						
POCP	kg C_2H_4 -eqv	1,01E-03	2,21E-08						
AP	kg SO_2 -eqv	2,46E-04	6,12E-07						
EP	kg PO_4^{3-}-eqv	1,31E-04	1,44E-07						
ADPM	kg Sb-eqv	1,42E-07	2,30E-11						
ADPE	MJ	5,19E+00	6,85E-03						

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

Resource use

Parameter	Unit	A1-A3	A4						
RPEE	MJ	2,20E+00	3,87E-04						
RPEM	MJ	6,46E-06	5,37E-16						
TPE	MJ	2,20E+00	3,87E-04						
NRPE	MJ	6,61E+00	6,88E-03						
NRPM	MJ	4,06E-05	2,00E-15						
TRPE	MJ	6,61E+00	6,88E-03						
SM	kg	2,86E-04	INA						
RSF	MJ	2,78E-05	INA						
NRSF	MJ	2,58E-04	INA						
W	m^3	7,45E-02	3,72E-05						

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.
INA = Indicator not assessed

End of life - Waste[1]

Parameter	Unit	A1-A3	A4						
HW	kg	2,91E-02	3,269E-09						
NHW	kg	1,33E-02	INA						
RW	kg	7,61E-04	1,432E-08						

[1] Hazardous and radioactive waste is calculated from deposited goods from background processes. Non-hazardous waste are specific recorded waste from the manufacturer.

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

End of life - Output flow

Parameter	Unit	A1-A3	A4						
CR	kg	INA	INA						
MR	kg	3,57E-02	INA						
MER	kg	1,10E-03	INA						
EEE	MJ	INA	INA						
ETE	MJ	INA	INA						

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

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase
The elecricity mix (NO) represents the average country or region specific electricity supply for final consumers, including electricity own consumption, transmission/distribution losses and electricity imports from neighboring countries.
Reference year: 2011

Data source	Amount	Unit
GaBi 6.4.	0,0465	kg CO_2-eqv/kWh

Dangerous substances

- ☑ 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.

Name	CAS no.	Amount

Indoor environment
No tests have been carried out on the product concerning indoor climate - Not relevant

Carbon footprint
Carbon footprint has not been worked out for the product.

Bibliography

[1] ISO 14025:2010 — *Environmental labels and declarations - Type III environmental declarations - Principles and procedures*

[2] ISO 14044:2006 — *Environmental management - Life cycle assessment - Requirements and guidelines*

[3] EN 15804:2012+A1:2013 — *Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*

[4] ISO 21930:2007 — *Sustainability in building construction - Environmental declaration of building products*

[5] LCA Report — *Life Cycle Assessment Report: Ribbed reinforcement bars and wire mesh reinforcement (NTNU SISVI Report 2015-04)*

[6] NPCR 013-2013 — Product Category Rules Steel as Construction Material

[7] Environdec EPD no.: S-P-00306 (2012) — Celsa Steel Service AS: Steel reinforcement products for concrete (Norway)

[8] ift Rosenheim GmbH EPD-BMG-10.1 (2013) — Baustahlgewebe GmbH: Betonstahlmatten und Gitterträger

[9] ift Rosenheim GmbH EPD-BS-10.0 (2013) — Badische Stahlwerke GmbH: Betonstahl zur Bewehrung von Beton

[10] GaBi 7 LCA software DB version 6.110 — GaBi database documentation can be viewed at URL: http://www.gabi-software.com/databases/

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