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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:	SSAB Europe Oy
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-475-331-EN
Issue date:	07.07.2016
Valid to:	07.07.2021

Structural hollow sections, precision tubes, line pipes, steel sections and piles

SSAB Europe Oy

www.epd-norge.no

General information

Product:

Cold-fomed tube products, steel sections and piles.

This environmental product declaration contains several steel products for many applications. The results of the environmental indicators stated in this declaration are average values for these products. The products all follow a similar production route with no deviation between

Program operator:

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Declaration number:

NEPD-475-331-EN

ECO Platform reference number:

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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)

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 :

-

Declared unit with option (A1-A3 + A4, including D):

1 kg tube products

Functional unit:

-

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:

Marti Reenaas

(Independent verifier approved by EPD Norway)

Owner of the declaration:

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Place of production:

Tube mills in Hämeenlinna, Lappohja, Toijala, Oulainen and Pulkkila (Finland) and Virsbo (Sweden)

Management system:

ISO 14001
ISO 9001

Organisation no. (Finland):

FI2389445-7

Issue date:

07.07.2016

Valid to:

07.07.2021

Year of study:

2012

Comparability:

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

The EPD has been worked out by:

Asta Soininen

SSAB

Norwegian specific additions have been worked out by Michael M. Jenssen and Annik M. Fet (Global & Local AS)

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Structural hollow sections, precision tubes, line pipes, steel sections and steel piles are used in an extensive range of applications in, for example, foundations, steel construction, passenger cars, transport and agricultural equipment, and in the furniture industry.

The strength properties and good weldability of structural hollow sections, steel profiles and steel piles make them light and long-lasting. These products are mostly used in construction and many engineering applications. Applications for the use of precision tubes can be found in the automotive industry, furniture, cycles and numerous other products within the light engineering sector. Precision tubes combine high strength, corrosion resistance, excellent machinability and good surface quality. Welded steel line pipes are suitable for the transmission of materials, heat and energy at both low and high operating temperatures.

From a production point-of-view, these products follow a similar production route. The amount of scrap steel used varies between around 20–30 % of the steel charge depending on the steel grade and method of manufacture. In 2012, the average value was 20%. Use of energy and raw materials has been optimised in steel production.

Technical description:

Structural hollow sections, steel profiles and steel piles are made from hot- rolled steel strip by cold forming and welding at SSAB's sites in Hämeenlinna, Lappohja, Toijala, Oulainen and Pulkkila (Finland), or by cold forming, welding and hot stretch reducing at the Virsbo site (Sweden). The hot-rolled steel is manufactured at SSAB's steel mill in Raahe (Finland). Choice of production site is determined according to, for example, product requirements and construction site location. Depending on their application, precision tubes can be manufactured from galvanized, cold-rolled or hot-rolled pickled steel.

Steel plates, tubes or sections are first cut by flame cutting or sawing to the required length and then welded together, shot blasted and coated with paint. Surface treatment causes volatile organic compounds (VOC) emissions of approximately 5 kg per tonne produced. VOC emissions per tonne depend, however, on the weight of the structure and the chosen painting system.

Some of SSAB's structural hollow sections, steel profiles and steel piles are subject to compulsory CE marking to indicate that the product concerned conforms to the requirements of harmonized standards or to the requirements of European technical assessment. By affixing the CE mark on a product, a manufacturer declares conformity with all relevant legal requirements and in particular those ensuring health, safety and environmental protection.

Detailed information about our various tube products, steel profiles and steel piles, including their properties and dimensions, can be found on our website at www.ssab.com.

The products are produced according to the standards EN 10219-2:2006, EN 10217-1 + A1:2005 (Pressure pipes) and EN 1090-2:2008 +A1:2011 (Pile accessories).

Market:

Norway, Sweden

Product specification and composition:

Steel is an alloy of mainly iron and carbon, with small amounts of elements used as alloying elements. These elements improve the chemical and physical properties of steel such as strength, durability and corrosion resistance. The alloying elements of steel are closely linked to its chemical matrix. The steel used in steel structures meets the quality criteria for steel according to EN standards. Welding consumables and coatings are the other raw materials used in the manufacture of steel structures.

Measures are done to a level of 0,02 µg/g (0,00000002%). Concentrations below this degree of measuring accuracy cannot be determined.

Example of the composition of a structural hollow section made of SSAB double grade (S355J2H, S420MH) steel.

Material	Name if ingredient	Maximum part content, % (w/w)	CAS number	Risk and hazard phrases and other data on the ingredient
S420MH/S355J2 steel	Iron (Fe)	>97,0	7439-89-6	-
	Alloy:			-
	Manganese (Mn)	1,6	7439-96-5	-
	Silicon (Si)	0,25	7440-21-3	-
	Carbon (C)	0,16	7440-44-0	-
	Phosphorus (P)	0,02	7440-47-3	-
	Sulphur (S)	0,012	7440-02-0	-

Packaging:

Products are labeled so as to be easily and permanently identifiable and traceable. Tube products and profiles are delivered in bundles and fastened with straps where no other way of pack- aging has been specified. Upgraded tube products such as cut-to-length tubes are delivered on an appropriate pallet or in boxes suitable for that purpose. Other possible ways of pack- aging and materials are agreed when ordering. For more information about the labeling and packaging of tube products, steel profiles and steel piles, visit www.ssab.com.

Recycling and waste processing:

Steel is a fully-recyclable material and scrap steel has a strong market position: steel recovered from structures and end-products at the end of their lifecycle is efficiently re-used to make new steel. The maximum waste from steel piles used at a construction site is around 3-5%. No hazardous waste is formed from end products and steel does not harm the environment. According to the European Waste Catalogue, the waste code for steel products manufactured by SSAB after their useful life is 17 04 05 (iron and steel). All packaging materials for steel products can be recycled.

Reference service life, product:

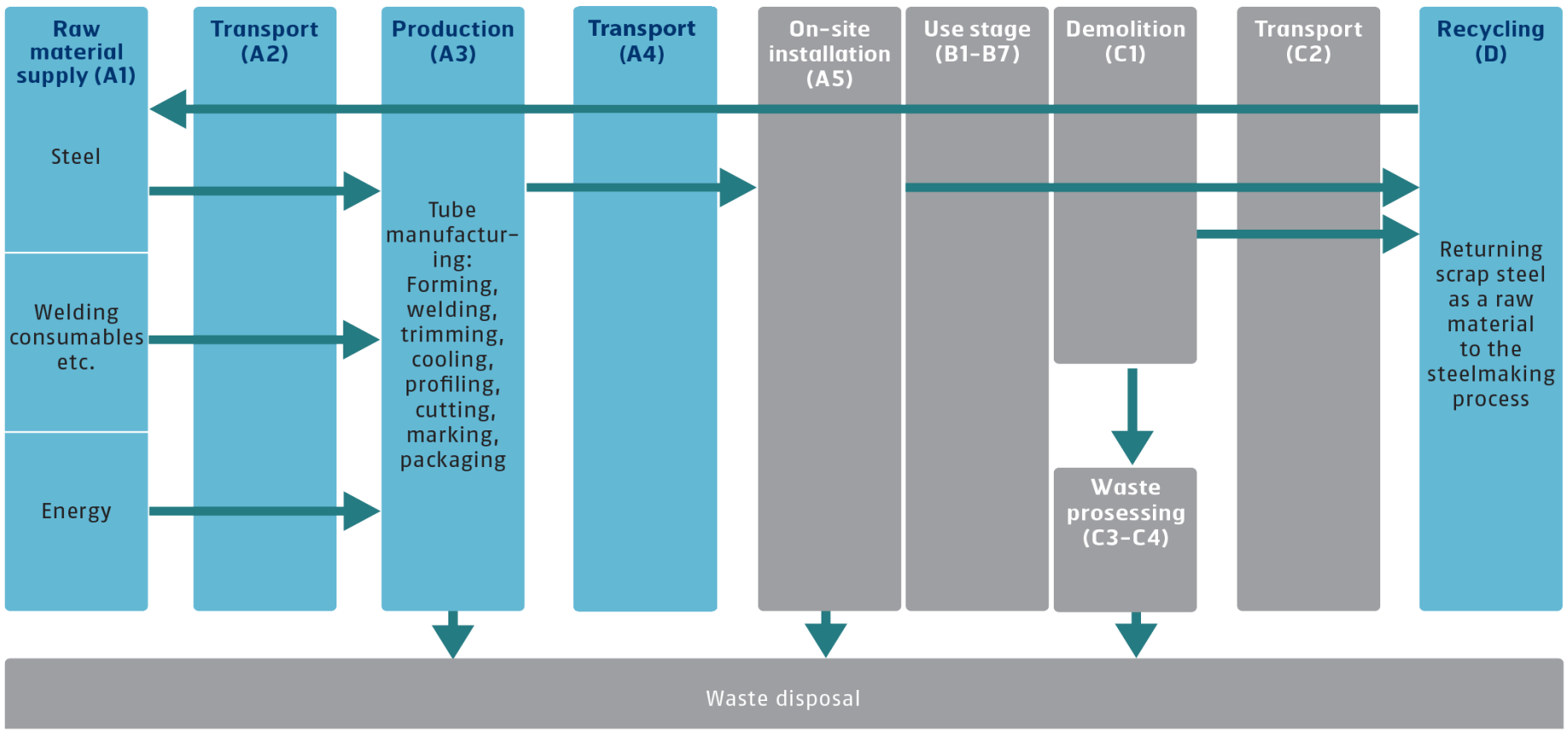
Reference service life, building:

100 years (*NPCR 013 Rev 1 - Steel as Construction Material 08/13).*
Not relevant for cradle-to-gate.

LCA: Calculation rules

Declared unit:
1 kg tube products

System boundary:
Cradle to gate (A1-A3), including transport to gate in Norway (A4) and the recycling of steel (D). The chart describes the lifecycle stages of steel structures. Lifecycle assessment excludes the lifecycle stages in a grey background.



This environmental product declaration covers the lifecycle of the product from cradle to factory gate, i.e. information modules A1, A2, A3, including an end-of-life recycling rate of 90% for steel, i.e. the external lifecycle impacts from information module D ("cradle to gate with options"). This means that a burden is allocated for the steel scrap that is used as an input to the steel making process, and a credit for the end-of-life (EoL) steel that is recycled. The lifecycle assessment in the environmental production declaration includes transport to Norway (A4), but does not include the rest of the information in the building stage (A5), the use and operational stage (B1 – B5; B6 – B7) nor the demolition stage (C1 – C4).

The impact of recycling has been calculated using worldsteel's (World Steel Association) LCA data so that the compensation is the difference between the primary and secondary production of a steel slab perceived with the acquisition of the recycling process. 1.092 kg of recycled steel is needed to produce 1 kg of steel in secondary production. On average, 20% scrap steel is used in the steel production. The benefits and loads of the scrap steel are accounted for in module D in accordance with worldsteel's lifecycle model. To avoid double calculation, these are not reported separately as use of secondary material in accordance with standard EN 15804 + A1: 2013.

The lifecycle benefits of the by-products originating in steel production have been allocated to steel production in accordance with worldsteel's lifecycle model so that the benefits are seen in the lifecycle information for Raw material supply (A1). Allocation of by-products is calculated as reducing environmental impacts in the production of hot-rolled steel by 5-10%, and an average of 8%.

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, clause 6.3.6 and 6.3.7. The data is representative according to temporal, geographical and technological requirements. Raw material data for steel production is generic data from Worldsteel GaBi 6.106 database, and the data has been collected with the Worldsteel SoFi 4.2 data collection tool. Steel production and manufacturing data is company specific data from SSAB Finnish steel factories and works. Transportation data distances are based on actual distances. The best fit selection of SoFi and GaBi transportation models are used for the different types of transportation.

Temporal:

All specific data is based on annual measurement or estimation on production or manufacturing site. The SSAB specific data is from year 2012. Generic data used is max. 10 years old.

Geographical:

The LCA analysis is made based on two plants (50/50 Hämeenlinna and Pulkkila) because their manufacturing is estimated to be equal with the other three production sites, as the manufacturing process is equal as well as the raw materials are. The hot rolled coil used in both plants comes from the SSAB Raahe steel factory.

SSAB uses Nordic electricity mix in production in Finland. Electricity mix used for modeling the production is Finnish to meet the additional Norwegian requirements, stating that the mix used in modelling shall be based on the mix of primary fuels used in the country where the product is manufactured. Therefore, it does not necessarily represent the actual electricity mix utilized in SSAB production.

Technological:

Data represent the technology in use. SSAB uses the best available technology in all production and manufacturing sites. SSAB holds valid environmental permits in all units.

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

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.

LCA: Scenarios and additional technical information

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

An average distance is calculated from SSAB's plants in Finland and Sweden to central warehouse in Oslo. Trucks (EURO5) are used from **Hämeenlinna, Lappohja, Toijala, Oulainen and Pulkkila to Nantaali (Finland)**, from where the products typically are carried by boat to **Kappelskär (Sweden)**, to **Oslo (Norway)**. Transport from **Virsbo (Sweden)** to Oslo is incorporated in this latter part.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	100	EUR5 28t payload	315	0,014 l/tkm	4,315
Boat	48	Boat, 13500 DWT	210	0,004 l/tkm	0,775

Benefits and loads beyond the system boundaries (D)

Parameter	Unit	Value
Net new scrap (Avg.)	kg	0,70

On average, 20% scrap steel is used in the steel production, with a 90% recycling rate.

LCA: Results

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	X

Environmental impact

Parameter	Unit	A1-A3	A4*	D					
GWP	kg CO_2 -eqv	2,49	1,52E-02	-1,36					
ODP	kg CFC11-eqv	1,04E-08	9,69E-14	4,31E-08					
POCP	kg C_2H_4 -eqv	4,06E-04	-5,78E-06	-6,75E-04					
AP	kg SO_2 -eqv	5,01E-03	2,22E-05	-2,10E-03					
EP	kg PO_4^{3-}-eqv	5,12E-04	1,75E-01	-9,20E-05					
ADPM	kg Sb-eqv	2,56E-05	3,16E-05	-1,37E-05					
ADPE	MJ	24,84	3,37E-02	-14,37					

*There is inherent flaw in the POCP results in the GaBi software when datasets for trucks have been used with CML 2001. Negative impact results in this category essentially means that the use of transport will in effect clear smog formation. See www.gabi-software.com/international/support/gabi-faq/ for a more thorough explanation.

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; **INA** Indicator not assessed

Resource use

Parameter	Unit	A1-A3	A4	D					
RPEE	MJ	0,60	9,90E-03	0,79					
RPEM	MJ	0	1,51E-14	0					
TPE	MJ	0,60	9,90E-03	0,79					
NRPE	MJ	13,16	0,21	-1,10					
NRPM	MJ	12,01	4,51E-04	-12					
TRPE	MJ	25,90	0,21	-12,80					
SM*	kg	INA	INA	INA					
RSF	MJ	INA	INA	INA					
NRSF	MJ	INA	INA	INA					
W	m^3	0,03	1,03E-03	-3,53E-03					

***** Average for Finnish steelworks is 0,20, but no specific number has here been calculated.

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									
Parameter	**Unit**	**A1-A3**	**A4**	**D**					
HW	kg	0,08	8,35E-08	0,01					
NHW	kg	2,39E-03	2,52E-05	3,69E-02					
RW	kg	5,34E-02	3,66E-07	4,61E-04					

HW Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste dispose; **INA** Indicator not assessed

End of life - Output flow									
Parameter	**Unit**	**A1-A3**	**A4**	**D**					
CR	kg	INA	INA	INA					
MR	kg	INA	INA	INA					
MER	kg	INA	INA	INA					
EEE	MJ	0,04*	INA	INA					
ETE	MJ	INA	INA	INA					

*Total exported energy.

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energ; **INA** Indicator not assessed

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 (FI) 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: 2012

Data source	Amount	Unit
GaBi 7 - Electricity grid mix (FI)	0,227	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.

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

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+A1:2013	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
Fet, A.M., M.M. Jenssen	*Life Cycle Assessment Report: preface by Global & Local AS (28/06/2016)*
Soininen, A., Koivula, H., Kautonen, P.	*Life Cycle Assessment Report: Welded and coated steel structures made of hot-rolled plates, sheets and coils, and cold-formed tubes and sections (2015)*
NPCR 013 Rev 1	*Steel as construction material (08/13)*
World Steel Association	*Life cycle assessment methodology report (2011)*
SSAB Europe Oy	*EPD - Structural hollow sections, precision tubes, line pipes, steel sections and piles (28/11/2014)*

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