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-formed 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:
-

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:

Owner of the declaration:
SSAB Europe Oy
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Manufacturer:
SSAB Europe Oy
Harvialantie 420, 13300 Hämeenlinna, Finland
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e-mail: jan.andreassen@ssab.com

Place of production:
Tube mills in Hämeenlinna, Lappohja, Toijala, Öulainen 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

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 Raahage (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.


**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/l (0.000000002%). 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.**

<table>
<thead>
<tr>
<th>Material</th>
<th>Name if ingredient</th>
<th>Maximum part content, % (w/w)</th>
<th>CAS number</th>
<th>Risk and hazard phrases and other data on the ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>S420MH+S355J2 steel</td>
<td>Iron (Fe)</td>
<td>&gt;97.0</td>
<td>7439-89-6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Alloy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manganese (Mn)</td>
<td>1.6</td>
<td>7439-96-5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Silicon (Si)</td>
<td>0.25</td>
<td>7440-21-3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Carbon (C)</td>
<td>0.16</td>
<td>7440-44-0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Phosphorus (P)</td>
<td>0.02</td>
<td>7440-47-3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sulphur (S)</td>
<td>0.012</td>
<td>7440-02-0</td>
<td>-</td>
</tr>
</tbody>
</table>

**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:**
100 years (NPCR 013 Rev 1 - Steel as Construction Material 08/13).

**Reference service life, building:**
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 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%.

Cradle to gate (A1-A3), including transport to gate in Norway (A4) and the recycling of steel (D).
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 Raase 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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity utilisation (incl. return) %</th>
<th>Type of vehicle</th>
<th>Distance km</th>
<th>Fuel/Energy consumption (l/t/km)</th>
<th>Value (l/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>100</td>
<td>EUR5 28t payload</td>
<td>315</td>
<td>0.014</td>
<td>4.315</td>
</tr>
<tr>
<td>Boat</td>
<td>48</td>
<td>Boat, 13500 DWT</td>
<td>210</td>
<td>0.004</td>
<td>0.775</td>
</tr>
</tbody>
</table>

Benefits and loads beyond the system boundaries (D)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net new scrap</td>
<td>kg</td>
<td>0.70</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Product stage</th>
<th>Assembly stage</th>
<th>Use stage</th>
<th>End of life stage</th>
<th>Beyond the system boundaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw materials</td>
<td>Transport</td>
<td>Manufacturing</td>
<td>Transport</td>
<td>Assembly</td>
</tr>
<tr>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
<td>A5</td>
</tr>
</tbody>
</table>

### Environmental impact

**Parameter**

- **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

**Unit**

- kg CO₂-eqv  
- kg CFC11-eqv  
- kg C₃H₇-eqv  
- kg SO₂-eqv  
- kg PO₄³⁻-eqv  
- kg Sb-eqv  
- MJ  
- kg  
- kg  
- kg  
- kg  
- kg  
- m³

**Parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A4*</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWP</td>
<td>kg CO₂-eqv</td>
<td>2.49</td>
<td>1,52E-02</td>
<td>-1.36</td>
</tr>
<tr>
<td>ODP</td>
<td>kg CFC11-eqv</td>
<td>1,04E-08</td>
<td>9,69E-14</td>
<td>4,31E-08</td>
</tr>
<tr>
<td>POCP</td>
<td>kg C₃H₇-eqv</td>
<td>4,06E-04</td>
<td>-5,76E-06</td>
<td>-6,75E-04</td>
</tr>
<tr>
<td>AP</td>
<td>kg SO₂-eqv</td>
<td>5,01E-03</td>
<td>2,22E-05</td>
<td>-2,10E-03</td>
</tr>
<tr>
<td>EP</td>
<td>kg PO₄³⁻-eqv</td>
<td>5,12E-04</td>
<td>1,75E-01</td>
<td>-9,20E-05</td>
</tr>
<tr>
<td>ADPM</td>
<td>kg Sb-eqv</td>
<td>2,56E-05</td>
<td>3,16E-05</td>
<td>-1,37E-05</td>
</tr>
<tr>
<td>ADPE</td>
<td>MJ</td>
<td>24,84</td>
<td>3,37E-02</td>
<td>-14,37</td>
</tr>
</tbody>
</table>

*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.

### Resource use

**Parameter**

- **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

**Unit**

- MJ  
- kg  
- kg  
- kg  
- kg  
- kg  
- kg  
- kg  
- m³  

**Parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A4</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPEE</td>
<td>MJ</td>
<td>0,60</td>
<td>9,90E-03</td>
<td>0,79</td>
</tr>
<tr>
<td>RPEM</td>
<td>MJ</td>
<td>0</td>
<td>1,51E-14</td>
<td>0</td>
</tr>
<tr>
<td>TPE</td>
<td>MJ</td>
<td>0,60</td>
<td>9,90E-03</td>
<td>0,79</td>
</tr>
<tr>
<td>NRPE</td>
<td>MJ</td>
<td>13,16</td>
<td>0,21</td>
<td>-1,10</td>
</tr>
<tr>
<td>NRPM</td>
<td>MJ</td>
<td>12,01</td>
<td>4,51E-04</td>
<td>-12</td>
</tr>
<tr>
<td>TRPE</td>
<td>MJ</td>
<td>25,90</td>
<td>0,21</td>
<td>-12,80</td>
</tr>
<tr>
<td>SM</td>
<td>kg</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>RSF</td>
<td>MJ</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>NRSF</td>
<td>MJ</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>W</td>
<td>m³</td>
<td>0,03</td>
<td>1,03E-03</td>
<td>-3,53E-03</td>
</tr>
</tbody>
</table>

* Average for Finnish steelworks is 0,20, but no specific number has here been calculated.
End of life - Waste

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A4</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW</td>
<td>kg</td>
<td>0.08</td>
<td>8.35E-08</td>
<td>0.01</td>
</tr>
<tr>
<td>NHW</td>
<td>kg</td>
<td>2.39E-03</td>
<td>2.52E-05</td>
<td>3.69E-02</td>
</tr>
<tr>
<td>RW</td>
<td>kg</td>
<td>5.34E-02</td>
<td>3.66E-07</td>
<td>4.61E-04</td>
</tr>
</tbody>
</table>

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

End of life - Output flow

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A4</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>kg</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>MR</td>
<td>kg</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>MER</td>
<td>kg</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>EEE</td>
<td>MJ</td>
<td>0.04*</td>
<td>INA</td>
<td>INA</td>
</tr>
<tr>
<td>ETE</td>
<td>MJ</td>
<td>INA</td>
<td>INA</td>
<td>INA</td>
</tr>
</tbody>
</table>

*Total exported energy.

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

Reading example: 9,0 E-03 = 9.0*10^-3 = 0.009

Additional Norwegian requirements

Greenhouse gas emission from the use of electricity in the manufacturing phase
The electricity 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

<table>
<thead>
<tr>
<th>Data source</th>
<th>Amount</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>GaBi 7 - Electricity grid mix (FI)</td>
<td>0,227</td>
<td>kg CO2-eqv/kWh</td>
</tr>
</tbody>
</table>

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 contains dangerous substances, more than 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.