STRUCTURAL HOLLOW SECTIONS, PRECISION TUBES, LINE PIPES, STEEL SECTIONS AND PILES

Environmental product declaration EN 15804, ISO 14025

SSAB

General information

Owner of environmental product declaration	**SSAB Europe** **Suolakivenkatu 1, 00810 Helsinki, Finland** **tel.+358 20 5911**
Product	**Cold-formed tube products, steel sections and piles**
Producer	**SSAB**
Production sites	Tube mills in Hämeenlinna, Lappohja, Toijala, Oulainen, and Pulkkila (Finland) and Virsbo (Sweden).
Declared unit	1 kg tube products
Date declaration was issued	28 November 2014
Valid until	28 November 2019

This environmental product declaration contains several different steel products for many applications. The results of environmental indicators stated in this declaration are average values for these products. The EPD of construction products may not be comparable if they do not comply with the standard EN 15804 and EN ISO 14025.

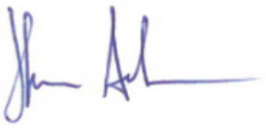
The information in this environmental product declaration is based on production data for 2012.

CEN standard EN 15804 serves as the core PCR. Any EPD program has not been used for creating the environmental product declaration.

Independent verification of the declaration, according to EN ISO 14025:2010

◉ **External** ☐ **Internal**

Third party verifier:



Thomas Andersson, Insinööritoimisto Ecobio Oy

This environmental product declaration provides information about the products referred to. The declaration is based in the requirements of standards EN 15804+A1:2014, ISO 14025:2010 and ISO 14040:2006. An environmental product declaration contains information about the raw materials, energy consumption, emissions originating during production, and about product recyclability. Unless otherwise stated, the product information is based on steel manufactured at SSAB's steel mill in Raahe (Finland).

SSAB specializes in steel and steel construction. SSAB's corporate responsibility is defined in the company's vision, strategy, values Code of Ethics, policies and management system. SSAB's production sites operate in conformance with certified ISO 14001 environmental management and ISO 9001 quality management systems. SSAB aims at continuous improvement and energy efficiency in all operations and customer solutions.

Product

APPLICATION

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

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The excellent 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.

TECHNICAL INFORMATION

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).

Depending on their application, precision tubes can be manufactured from galvanized, cold-rolled or hot-rolled pickled steel.

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.

SSAB's product portfolio of tubes, hollow sections and steel piles contains:

- circular, rectangular and square hollow sections, which are supplied in accordance with EN 10219 and which are CE marked.
- high-strength Optim MH and Raex tubes.
- circular, flat oval, oval, rectangular and square precision tubes manufactured in accordance with EN 10305 and the more demanding +CR2 classification.
- circular welded steel tubes, which are supplied in accordance with EN 10217 for pressure purposes, in accordance with EN 10296 for mechanical and general engineering purposes and in accordance with EN 10255 for welding or threading.
- standard and special steel sections, guard rails and VU profiles.
- impact-driven RR® micropiles and large-diameter piles, drilled RD® micropiles and large-diameter piles, and pile walls of RD and RR piles, shaft-grouted RR micropiles and RD drilled piles for building foundations, strengthening foundations and for transport infrastructure, rail and harbor construction.
- eRR® and eRD® energy piles based on steel pipe piles and a separate heat collection system for building foundations.

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.

Product materials 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.

A zinc coating (Z) 100 – 600 g/m^2 provides a good level of corrosion resistance for normal applications. Z600 coating (42 µm on both sides) can achieve a lifespan as much as 80 years. A normal zinc coating is lead free and has a minimum zinc content of 99%. Coating options are a normal zinc coating, zinc-aluminum alloy coating (Galfan) and galvanealed zinc-iron alloy coating. Galvannealed coating (ZF) is produced on a continuously operating line, where the zinc coating is annealed to a zinc-iron alloy with an iron content of approximately 10%. Metal-coated steels are available in thicknesses of up to 3 mm. The steel surface is normally protected by oil to prevent it from damage during transportation and storage.

For more information about different coating options, visit www.ssab.com.

PRODUCT COMPOSITION

SSAB actively tracks and anticipates future changes in environmental, safety and chemical legislation and complies with valid EU chemical regulations, such as REACH (1907/2006/EC) and CLP (1272/2008/EC). Communication and cooperation throughout the supply chain plays an important role and SSAB requires full REACH compliance from its subcontractors. SSAB tracks the list of Substances of Very High Concern (SVHC) and other legislative requirements to ensure products meet legal and customer requirements. In addition, SSAB observes and complies with the requests and recommendations of many customers to withdraw products containing hazardous substances in the construction sector.

Table 1 shows examples of the typical chemical composition of a typical hot-rolled steel (SSAB double grade 355J2H, S420 MH) in normal production (excluding packaging). This grade of steel is used in structural hollow sections. The exact composition of steel, however, varies depending on the material standards and customer requirements. The information given is based on steel produced at the Raahe steel mill (Finland). Production of these steel grades is based on the use of iron ore and scrap steel.

Where the concentration % (w/w) in a product of substances restricted under the EU's chemical regulation (REACH) and recommendations phasing out hazardous substances in the building sector such as the requirements of BASTA (2014: A2) and Byggvarubedömningen (Building Material Assessment, BVB, 2013) in Sweden and the priority list in Norway exceeds or corresponds to the limits referred to above, this is stated in Table 1. The

Table 1. Example of the composition of a structural hollow section made of SSAB double grade (S355J2H, S420MH) steel.

MATERIAL	NAME OF 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)	1,60	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	–

Comments
Physical state: solid
Odor: odorless
Color: metalic gray
Boiling point: 2750 °C
Melting point: 1450 – 1520 °C
Steel density: 7850 kg/m^3

More detailed information about the composition of different steels is available from national and international standards as well as from SSAB's website, at www.ssab.com. The values provided are based on European Standards EN 10219-1, EN 10305, EN 10217, EN 10225, EN 10296 requirements on maximum concentrations.

Measurements are done to a level of 0.02 µg/g (0.00000002%). Concentrations below this degree of measuring accuracy cannot be determined. The concentrations of chemical elements - such as zirconium (Zr), magnesium (Mg), cobalt (Co), arsenic (As), cadmium (Cd), zinc (Z), lead (Pb), antimony (Sb) and tin (Sn) - appearing as impurities in steel are very small. None of the constituent substances within the whole product exceeds the limits of the EU's chemical regulation (REACH) and recommendations phasing out hazardous substances in the building sector such as the requirements of BASTA (2014: A2) and Byggvarubedömningen (Building Material Assessment, BVB, 2013), Swedish Building Product Declarations (Föreningen för Byggvarudeklarationer, BPD 3, 2007) and the priority list in Norway. No product contains substances restricted under REACH or included on the candidate list (SVHC).

guidelines for Swedish building product declarations (Föreningen för Byggvarudeklarationer, BVD 3, 2007) have been taken into account with regard to the substances disclosed.

Steel contains very small amounts of impurities originating from natural raw materials and not added during the steel production process. The amount of impurities in the steels is minimal and, based on knowledge of the toxicity of these substances and their metallurgical bond in the steel matrix, does not pose a risk to the environment or human health.

More information about the chemical composition of tube products, steel profiles and steel piles can be found at www.ssab.com

Production

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.

When scrap steel is used instead of virgin raw materials in iron production, the carbon dioxide emissions originating in steel production decrease accordingly. Steelmaking at SSAB Raahe production uses scrap material from SSAB's own production processes and material sourced from the scrap steel market. For reasons of process technology, the content of scrap steel in blast-furnace-based steel production cannot exceed around 30%. In addition, the amount of scrap steel in steel production is limited due to its availability. Once steel has been made, it can be recycled endlessly without weakening its properties.

SSAB's steel production is among the world's most efficient in terms of carbon dioxide emissions, coal and energy consumption. Coal and energy consumption are at almost the minimum possible using current technology. SSAB is actively involved in developing new ways to further reduce emissions.

Most of the energy used in ore-based steel production comes from coal, which is used as a reducing agent in iron-making. The mineral products formed in iron and steel production processes and the by-products generated in the coking process are recycled as industrial raw material or material to replace virgin resources. A high percentage of the dust originating in various processes is returned to the process to reduce waste and improve material efficiency.

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 packaging has been specified. Upgraded tube products such as cut-to-length

Table 2. Occupational exposure limits valid in Finland.

ELEMENT	OCCUPATIONAL EXPOSURE LIMITS (OEL), 8 h (mg/m³)
Iron oxide, vapor	5
Manganese (Mn)	0.5
Chromium (II)	0.5
Nickel (Ni), metal	1
Silicon oxide, amorphous	5
Aluminum, welding fume	1.5
Sulfur dioxide	5
Phosphorus, white and yellow	0.1

tubes are delivered on an appropriate pallet or in boxes suitable for that purpose. Other possible ways of packaging 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.

SOURCING AND TRANSPORTATION

The general terms and conditions of all sourcing contracts require compliance with SSAB's Code of Business Ethics. Also ethical values, environmental concerns and energy efficiency are weighed up when choosing suppliers. As regards the main raw materials used in steel production at Raahe (Finland), limestone is shipped from Sweden, coal from North America and Australia, iron ore pellets are shipped from Sweden or come by rail from Russia. Finished products are transported by sea, road or rail combined. The company's own logistics unit is responsible for most of SSAB's transportation of raw materials and products.

SSAB's environmental concerns in respect of logistics are managed through a certified environmental management system. The aim is to increase the share of logistics contracts with partners who have signed up for energy efficiency agreements in the logistics and transport sector. Around 85% of SSAB's land transportations per tonne of products are carried by a partner signatory to energy efficiency agreements. Logistics companies outside an energy efficiency agreement are regularly encouraged to sign up to one. SSAB's international partners have certified environmental management systems. Logistics aims to optimize transport and maximize payloads and to combine transport as efficiently as possible.

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 Ruukki after their useful life is 17 04 05 (iron and steel). All packaging materials for steel products can be recycled.

Information about safe installation and use

Steel poses no hazards to the environment in the forms supplied. Some grades of steel contain alloying elements such as manganese, chromium, nickel, copper and silicon. None of these substances is released under normal or reasonably foreseeable conditions of use.

Dust and vapors may form when steel is melted, welded, cut or ground (or heated to very high temperatures). Long-term exposure to high dust and vapor concentrations may affect the health, especially the lungs. The composition of dust and vapor depends on the steel grade and method employed.

Welding must be left to trained people. Personal protective equipment must be used and sufficient ventilation must be ensured in compliance with safety legislation. Instructions on the welding of metals and metal alloys can be found on the website of, for example, the European Steel Association www.eurofer.org.

The use and handling of steel does not endanger people or the environment and there are no specific exposure limits in place for this reason. Neither have any first aid measures, measures in the event of fire or unintentional emission, or measures as regards the handling and storage of steel been specified. However, some occupational exposure limits have been specified for steel alloys and compounds. Exposure is minor when total dust concentration is below 5 mg/m³. The table below shows the occupational exposure limits valid in Finland.

Normal precautions should be taken to avoid physical injuries caused mainly by heavy products or sharp edges. Personal protective equipment such as special gloves and eye protection must be worn.

Hot-rolled steel is not classified as dangerous under the EU's chemical regulation (REACH) and so Safety Data Sheet or hazardous packaging, marking or transport rules and regulations are not required.

SAFETY

- Always wear gloves and protective clothing when handling steel products.
- Be careful of sharp edges and corners.
- Always use official lifting equipment when moving steel products.
- Always use binding straps to lift a product.
- Straps under tension may cause injury when cut and the outer ring of a coil may rebound outwards.
- Never go under the steel products when they are being moved.
- Make sure the securing straps are sufficiently strong and firmly attached.
- Always follow the industrial safety provisions in force and find out whether the installation site is subject to any particular requirements regarding safety before beginning installation work.

Environmental profile

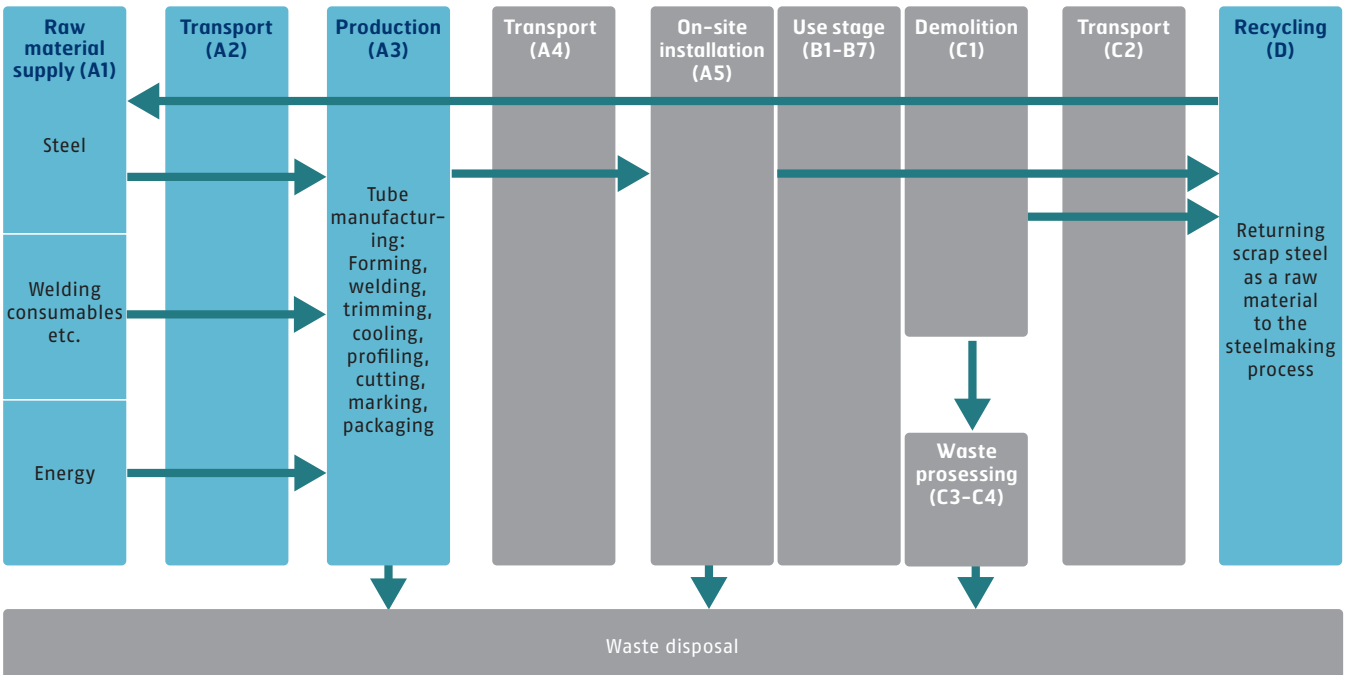
This environmental product declaration covers the lifecycle of the product from cradle to factory gate, i.e. information modules A1, A2, A3, including an end-of-life recycling rate of 90% for steel, i.e. the external lifecycle impacts from information module D ("cradle to gate with options"). This means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

The impact of recycling has been calculated based on worldsteel's (World Steel Association) LCA model 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 1kg of steel in secondary production.
The lifecycle benefits of the by-products originating in steel production have been allocated to steel production in accordance with worldsteel's lifecycle model.

The benefits and loads of the scrap steel used by a steel mill are accounted inside the worldsteel's life cycle model system boundary. To avoid double calculation, these are not reported again separately as use of secondary material in accordance with standard EN 15804. 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%.'

All values apply to 1 kg of hot-rolled steel produced at the Raahe site. The tables below show the environmental indicators based on the lifecycle assessment of tube products, steel profiles and steel piles.

Figure 1. System boundaries of lifecycle assessment.



The chart describes the lifecycle stages of steel structures. Lifecycle assessment excludes the lifecycle stages in a grey background.

TABLE 3. ENVIRONMENTAL PROFILE OF TUBE PRODUCTS, STEEL PROFILES AND STEEL PILES

PARAMETER	UNIT	PRODUCT STAGE TOTAL A1 - A3 RAW MATERIAL SUPPLY AND MANUFACTURE OF STEEL PRODUCT	BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY D RE-USE, RECOVERY, RECYCLING POTENTIAL
PARAMETERS DESCRIBING ENVIRONMENTAL IMPACTS			
GWP Global warming potential	kg CO_2 equiv.	2.47	-1.36
ODP Depletion potential of the stratospheric ozone layer	kg CFC^{-11} equiv	1.04×10^{-08}	4.31×10^{-08}
AP Acidification potential of soil and water sources	kg SO_2 equiv	4.96×10^{-03}	-2.10×10^{-03}
EP Eutrophication potential	kg $(PO4)^{-3}$ equiv	5.09×10^{-04}	-9.20×10^{-05}
POCP Formation potential of tropospheric ozone	kg ethene equiv	4.03×10^{-04}	-6.75×10^{-04}
ADP-elements Abiotic depletion potential	kg SB equiv	2.56×10^{-05}	-1.37×10^{-05}
ADP-fossil fuels Abiotic depletion potential	MJ, net calorific value	24.67	-14.37
PARAMETERS DESCRIBING RESOURCE USE AND PRIMARY ENERGY			
Use of renewable primary energy used as energy carrier	MJ, net calorific value	0.72	0.79
Use of renewable primary energy resources used as raw material	MJ, net calorific value	0.00	0.00
Total use of renewable primary energy resources	MJ, net calorific value	0.72	0.79
Use of non-renewable primary energy used as energy carrier	MJ, net calorific value	13.8	-1.1
Use of non-renewable primary energy used as raw material	MJ, net calorific value	12.01	-11.7
Total use of non-renewable primary energy resources	MJ, net calorific value	25.8	-12.8
Use of secondary material	kg	–	–
Use of renewable secondary fuels	MJ, net calorific value	–	–
Use of non-renewable secondary fuels	MJ, net calorific value	–	–
Net use of fresh water	m^3	0.03	-3.53×10^{-03}
OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES			
Hazardous waste disposed	kg	0.08	0.01
Non-hazardous waste disposed	kg	1.91×10^{-03}	3.69×10^{-02}
Radioactive waste disposed	kg	5.34×10^{-02}	4.61×10^{-04}
OTHER ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS			
Parameter	Unit	Product stage total	
Components for re-use	kg	–	
Materials for recycling	kg	–	
Materials for energy recovery	kg	–	
Exported energy	MJ per energy carrier	0.04	

SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperaBon with its customers to create a stronger, lighter and more sustainable world. SSAB has employees in over 50 countries. SSAB has producBon faciliBes in Sweden, Finland and the US. SSAB is listed on the Nasdaq OMX Nordic Exchange in Stockholm and has a secondary lisBng on the Nasdaq OMX in Helsinki. **www.ssab.com**

02/2015

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