Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

SSdr Piles

UAB Scandia Steel Baltic

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Company

Scandia Steel is a leading supplier of steel piling pipes. Our piles are supplied to the Scandinavian building industry and used by well-known construction companies.

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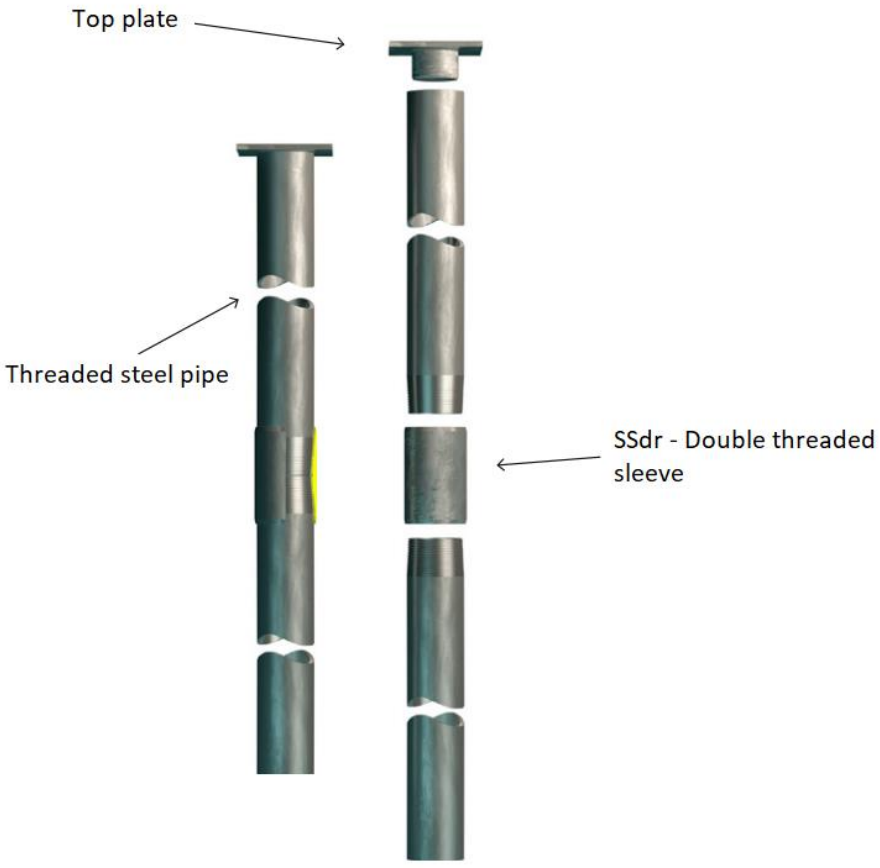
Product

SSdr Pile is a straight steel tube with a top plate, sleeve and a threading at the end. A picture of the different components of the SS pile can be seen in the figure below.

The SSdr Piles consist of 100% steel. The steel grade used for the SSdr Piles is S460MH.

The SSdr piles are either drilled or rammed into place, either with a driving shoe or a ring set. After ramming tubes are normally emptied and reinforced using steel and concrete. Typical applications are foundations for (houses) dwellings, offices and commercial buildings as well as refurbishing existing foundations and for infrastructure.



Product Life Cycle

This study goes from cradle-to-gate. That means that all processes needed for raw material extraction, transport to manufacturing and manufacturing is included in the study.

According to the PCR the life cycle should be divided into two different life cycle stages:

Upstream processes (from cradle-to-gate). Includes life cycle stage referred to as A1 Raw Material Supply. In this case extraction and processing of steel raw material.

Raw material Steel pipe
The raw material for the SSdr Piles comes from three steelworks in Europe. One of these supplier that 2016 stood for 25% of the raw material supply is called Arvedi Tubi Acciaio S.p.A and the plant Arvedi Steel and are located in Cremona, in northern Italy. Specific data from this steelwork concerning processing technology and recycled content will be representative in the LCA model. The second producer, that stood for 25% of the supply 2016, is Stalprodukt SA and are located in Poland. The third producer, that stood for 50% of the supply 2016, is a Turkish steelwork plant that also uses EAF technique.

The steelworks produce the raw material for the SSdr Piles using Electric Arc Furnace (EAF). For the EAF a high amount of recycled steel scrap, >65%, can be used as input material. As an average 2014 came 65% of the raw material for the SSdr Piles produced from recycled steel scrap. (Battocletti, 2016)

At the steel work the tube piles are formed by cold rolling steel sheet raw material to a circular form and then welded together and cut to the preferred sizes. The raw material for the top plate is a long steel sheet that can be cut to the preferred size at the manufacturing site.

To manufacture the round form of the SSdr Piles hot rolling technique is used. To produce on tone of SSdr Piles 1091kg of steel is needed, the steel waste from the production process is reused at the plant.

Raw material Threaded Sleeve
The conical threaded sleeve is used to attach steel pipes together, so one sleeve is made for connecting two steel pipes. With the FU of 6m only half the conical sleeve weight will be calculated with. The sleeve is made 35% in TMK steelwork in Romania, 15% in Arvedi Steelwork in Italy and 50% in Monravia, Czech Republic.

The steelwork BMZ produces the raw material for the conical sleeve using Electric Arc Furnace (EAF) technology. For the EAF a high amount of recycled steel scrap can be used as input material. In this case 93% of the raw material comes from recycles steel scrap. The specific site data for BMZ will be used to represent all the suppliers of raw material for the conical sleeve. (Melnikov, 2016)

To produce on tone of conical sleeves 1091kg of steel is needed, the steel waste from the production process is reused at the plant. (Melnikov, 2016)

The steel quality is S355J2.

Raw material Top Plate
The top plate is attached at the upper end of the connected SSdr piles. The raw material to the top plate is made 100% in Monrovia, Czech Republic.

The steel quality is S355J2 which is the same as for the steel pipes and the same data for representation will be used.

Core processes (from gate-to-gate). Includes life cycle stages referred to as A2 Transport and A3 Manufacturing.

All finishes raw material is transported with lorry to Kretinga Lithuania.

The finished steel pipes are transported 2029km from Arvedi, the distance from Stalprodukt is 617km and the distance from the Turkish steelwork is 2820km.

The finished conical sleeve is transported 2237km from TMK, Romania, 2029km from Arvedi, Italy and 1300km from Monrovia, Czech Republic.

The finished raw material to the top plate is transported 1300km from Monrovia, Czech Republic.

In Scandia Steels facility in Kretinga the raw material is processed. The steel pipes are cut to the preferred length and then given a thread at the bottom of the pile. Also the sleeve is given a threading that is opposite to the end of the pipe.

The cutting and threading is done using lathing technique. The length of the threading depends of the size of the pile, but an average is 12cm. (Eriksson, 2017).
Depending on the dimensions the energy demand for the processing is different, the energy demand for 1 declared unit for three dimensions can be seen in Table 1.

Table 1, show the energy demand for manufacturing in kWh based on the different dimensions.

Dimensions Outer diameter and thickness	Energy in kWh
88,9*6,3mm	13,1
168,3*10mm	19,0
323,9*12,5mm	32,1

For the manufacturing process 2 litres of coolant are used and 32kg waste are generated per processed tone. (Eriksson, 2017) This waste is recycled by an external company that comes to the facility in Kretinga to fetch the waste.

The finished SSdr piles are offered in several different dimensions. Table 2 show the weight per declared unit i.e. 6m of the finished product and its components in different dimensions. (Eriksson, 2017)

Table 2, show the weight for different dimensions of SSdr piles.

Dimensions Outer diameter and thickness	Total weight in kg	Steel pipe	Top plate	Conical Sleeve	Factor difference between dimension 88,9*6,3	Meter per tone
88,9*6,3mm	114,2	104,3	2,90	7,0	-	72
168,3*10mm	264,1	240	12,1	12,0	2,3	24
323,9*12,5mm	656,4	590	38,4	28,0	5,7	10

Downstream processes. Includes only the transport to construction site A4.

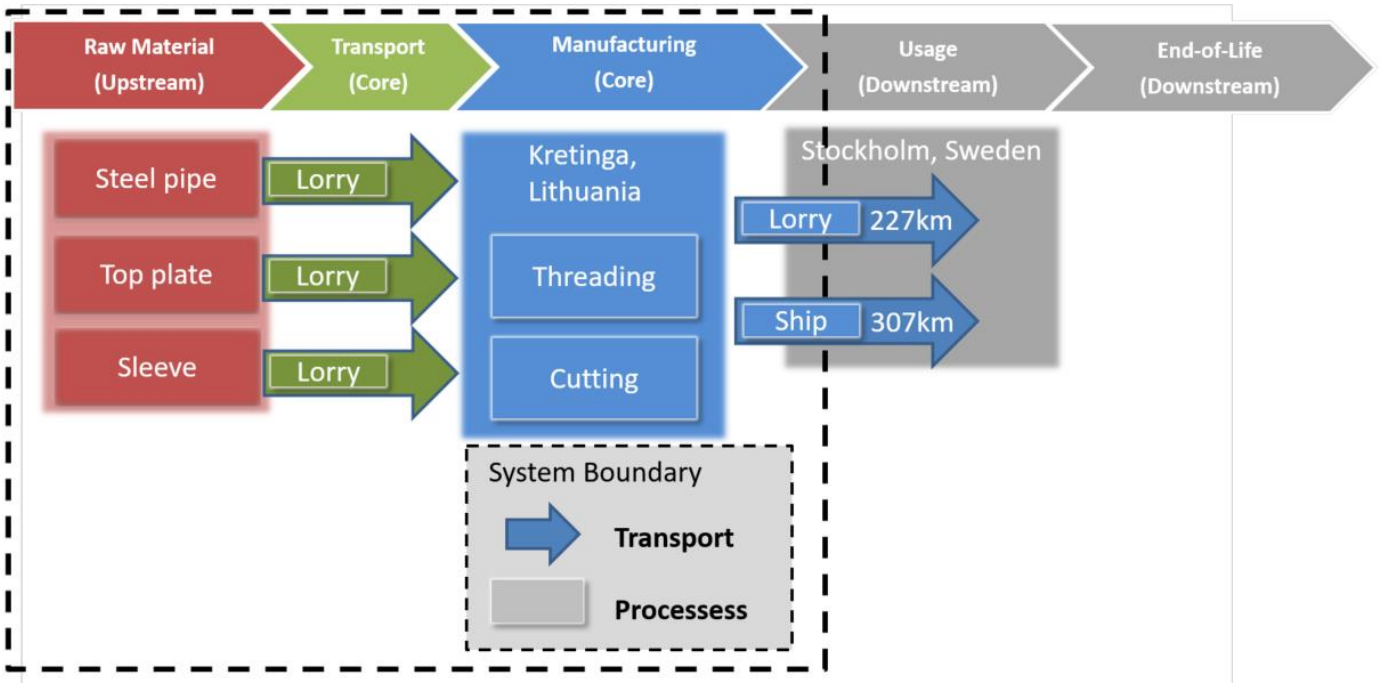
The end market is assumed to be Stockholm, Sweden. From Kretinga, Lithuania the finished product is transported with lorry 169km to Ventspils, Latvia. From Ventspils it is loaded on a cargo ship and transported 307km to Nynäshamn, Sweden. From Nynäshamn the lorry continues 58km to Stockholm.

The figure below shows an overview of the included and accounted modules and life cycle phases.

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction installation	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

X = Module is accounted for
MND = Module Not Declared

An overview of the life cycle for SSdr Piles from Scandia Steel and the included processes can be seen in the figure below.



After the completeness check all materials and processes are found to be included and represented in a full life cycle Cradle to Grave perspective.

Environmental Product Declaration SSdr Piles

In accordance with ISO 14025 and EN 15804

Declared Unit	The declared unit is 6m of finished product
Product group classification	UN CPC 41244
Goal and Scope	The result will be used to understand where the environmental burden for the products occurs during the life cycle and aims to lay a road map for development to decrease this burden. The intended use is also to optimize the choice of steel pipes and steel cores during a construction from an environmental perspective. The audience is in first hand construction companies and contractors but also producers of similar steel products.
Manufacturing Site	UAB Scandia Steel Baltic Vytauto 151 97133 Kretinga Lithuania
Geographical Area	Europe
Compliant with	This EPD follow the “Book-keeping“ LCA approach which is defined as attributional LCA in the ISO 14040 standard. In accordance with ISO 14025 and EN 15804 This EPD follow the PCR 2012:01 version 2.2 Construction products and construction services
Cut-Off Rules	For this LCA study a 1 % cut off rule was applied.
Background Data	Every generic LCI data comes from ecoinvent 3.3
Reference year for data	For specific data 2016 is the reference year. The background data from ecoinvent are from 2012-2016
Allocations	Polluter Pays / Allocation by Classification There are no co-products in the production and therefore no need for co-product allocation.
Impact Assessment methods	Total use of renewable and non-renewable resources was calculated with Cumulative Energy Demand 1.09 method. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100 year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method.
Based on LCA Report	Miljögiraff LCA Report 103 Scandia Steel
Software	SimaPro 8.4

EPDs within the same product category but from different programmes may not be comparable.
EPDs of construction products may not be comparable if they do not comply with EN 15804.

Product contain no substances in the REACH Candidate list. Product contain no substances in the Norwegian priority list.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Environmental performance

The tables below show the renewable and non-renewable resources, the quantities of waste generated, the amount of secondary material used and the consumption of net fresh water in the production of 1 declared unit i.e. 6m of finished product with the dimensions 88,9*6,3mm. To get the result also for different dimension multiple the result with the factor stated in Table 2.

Non-renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4, DOWNSTREAM	TOTAL
Non-Renewable primary resources: energy						
Total		MJ	1 583	804	91,7	2 479
Energy	Hard Coal	MJ	744	35	5,6	785
	Petroleum	MJ	419	48	4,8	472
Non-Renewable primary resources: raw material						
Total		MJ	0	0	0	0
Total use of non-renewable primary energy						
		MJ	1 583	804	91,7	2 479

Renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4, DOWNSTREAM	TOTAL
Renewable primary resources: energy						
Total		MJ	108	15,4	1,32	124
Renewable primary resources: raw material						
Total		MJ	0	0	0	0
Total use of renewable primary energy						
		MJ	108	15,4	1,32	124

Waste

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Hazardous Waste disposed					
Total	kg	0	0,1	0,01	0,11
Non-Hazardous Waste disposed					
Total	kg	1,0	3,65	0	3,02
Radioactive Waste disposed					
	kg	0,1	0,1	0,01	0,21

Secondary Material

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Secondary material used: Scrap metal					
Total	kg	86,3	0	0	86,3

Use of net fresh water

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Net fresh Water					
Total	m^3	0,51	0,10	0,01	0,62

Potential Environmental Impact Cradle to Gate life cycle for 6m of SSdr Piles

	UNIT	TOTAL	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM
Global warming potential	kg CO2-e	160,4	128,6	26,0	5,8
Acidification potential	kg SO2-e	0,8	0,6	0,2	0,0
Eutrophication potential	kg PO43-e	0,2	0,2	0,0	0,0
Photochemical oxidant creation potential	kg C2H4-e	0,1	0,1	0,0	0,0
Ozone depletion,	kg CFC 11-e	0,0	0,0	0,0	0,0
depletion of abiotic resources (elements),	kg Sb-e	0,0	0,0	0,0	0,0
depletion of abiotic resources (fossil),	MJ	2318,7	1446,4	782,8	89,4

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Programme-related information and verification

This EPD follow the PCR 2012:01 v. 2.2 Construction products and construction services.
Product Category Rules review was conducted by: The Technical Committee of the International EPD® System. Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006: ☐ EPD Process Certification (internal) ☑ EPD Verification (external)
Third party verifier: Göran Brohammer, Extracon AB Approved by the International EPD System