Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

Steel Pipe Piles

UAB Scandia Steel Baltic

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01158
Issue date:	2017-12-12
Valid until:	2022-12-04
Revision date:	2017-12-04
Geographical scope:	Europe

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.

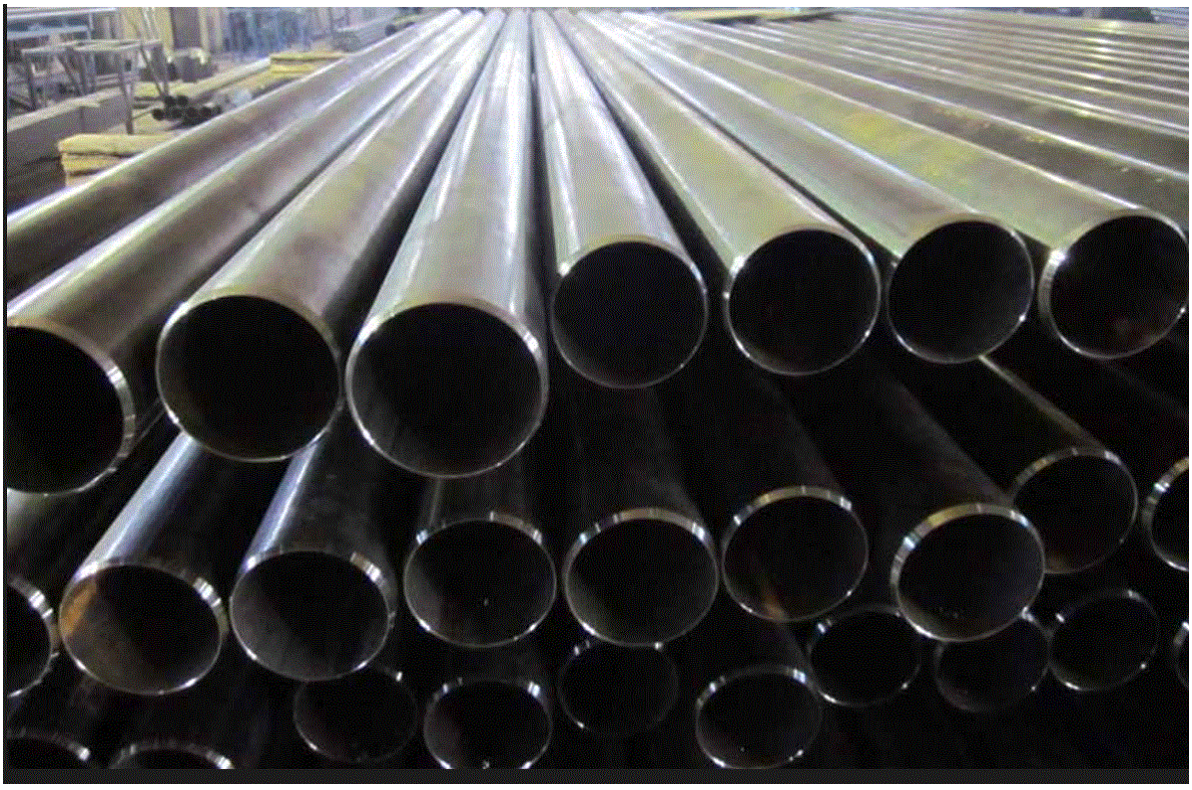
UAB Scandia Steel Baltic
Upplandsgatan 7
111 23 Stockholm
Sweden
Phone: +46 702 95 04 06
Homepage: www.scandiasteel.se

Product

A steel pipe pile is a steel tube with a bevelled end with a top plate. The Steel Pipe Piles is offered in sizes from 70mm to 230mm. A picture of the finished product can be seen below.

The steel pipe piles consist of 100% steel. The steel grade used for the Steel Pipe Piles are S460MH and S550J2H

The steel pipe 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.

The raw material for the steel pipe 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 for all three steel manufactures. 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 steel pipe 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 steel pipe 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 Steel Pipe Piles hot rolling technique is used. To produce on tone of Steel Pipe Piles 1091kg of steel is needed, the steel waste from the production process is reused at the plant.

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

All finishes raw material will be transported to Kretinga, Lithuania. The distance will be divided according to the same ratio as the production part of 2016. From Arvedi and Stalprodukt the raw material will be stransported only with lorry, the distance from Arvedi is 2029km, the distance from Stalprodukt is 617km. From the Turkish steelwork the raw material will first be transported with cargo ship from the port of Gemlik in Turkey 7462km to Klaieeda, Lithuania. From Klaieeda the final 29km will be done with lorry.

In Kretinga a thin chamfering is done at the end of the pipe and the top plate is cut to the preferred size. The chamfering and cutting requires 1,5kWh per tonne steel that is processed. The energy in Kretinga comes to 90% from renewable sources as wind and solar, the other 10% comes from natural gas. A certificate of the renewable energy has been delivered.
Other consumables are 0,5l lubricating oil per ton processed. (Eriksson, CEO, Scandia Steel Förvaltning AB, 2017)

0,5kg waste is generated per processed ton. This waste is recycled by an external company that comes to the facility in Kretinga to fetch the waste.

The finished steel pipe piles are offered in several different dimensions. Table 1 show weight per Declared Unit of 6m. (Eriksson, CEO, Scandia Steel Förvaltning AB, 2017)

Table 1, show weight of different dimensions of the Steel Pipe Piles.

Outer and inner diameter mm	Weight kg per 6m	Factor difference between dimension 88,9*6,3	Meter per tone
88,9*6,3	79,7	-	78
168,3*10	246,1	3,1	25
323,9*12,5	614,4	7,7	10

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

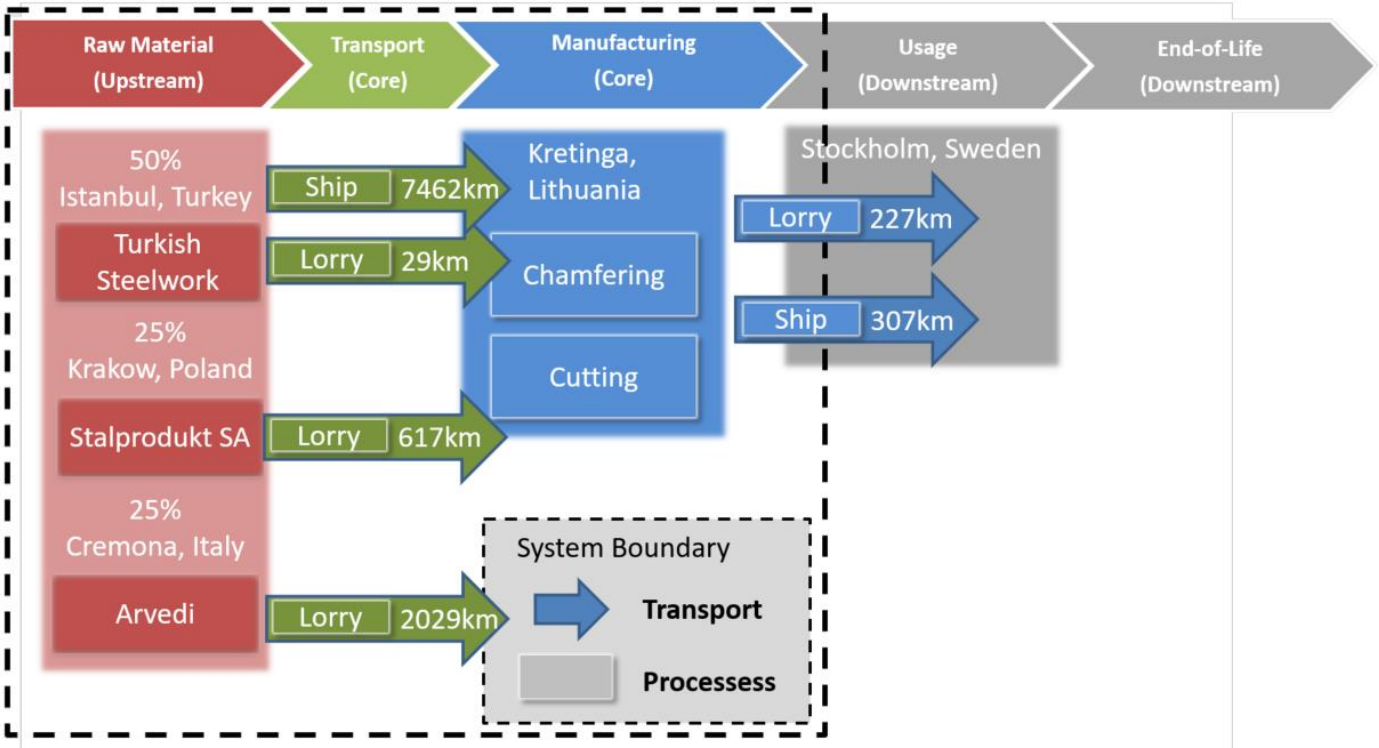
The end market is assumed to be Stockholm, Sweden. From Kretinga, Lithuania the finished product is transported with lorry 169km to Ventspils, Latvia. From Ventspils it is loaded on a cargo ship and transported 307km to Nynäshamn, Sweden. From Nynäshamn the lorry continues 58km to Stockholm.

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 Steel pipe 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 Steel Pipe 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 of 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 1.

Non-renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4, DOWNSTREAM	TOTAL
Non-Renewable primary resources: energy						
Total		MJ	1 161	203	64	1 428
Energy	Hard Coal	MJ	427	0	0	427
	Petroleum	MJ	136	0	0	136
Non-Renewable primary resources: raw material						
Total		MJ	0	0	0	0
Total use of non-renewable primary energy						
		MJ	1 161	203	64	1 428

Renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4, DOWNSTREAM	TOTAL
Renewable primary resources: energy						
Total		MJ	72,9	3,0	1,3	77,2
Renewable primary resources: raw material						
Total		MJ	0	0	0	0
Total use of renewable primary energy						
		MJ	72,9	3,0	1,3	77,2

Waste

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Hazardous Waste disposed					
Total	kg	0,1	0,1	0,01	0,21
Non-Hazardous Waste disposed					
Total	kg	0,75	0,01	0,01	0,77
Radioactive Waste disposed					
	kg	0,02	0,01	0,001	0,031

Secondary Material

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Secondary material used: Scrap metal					
Total	kg	56,9	0	0	56,9

Use of net fresh water

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Net fresh Water					
Total	m^3	0,182	0,011	0,003	0,197

Potential Environmental Impact Cradle to Gate life cycle 6m of Steel Pipe Piles

	UNIT	TOTAL	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM
Global warming potential	kg CO2-e	105,84	89,49	12,28	4,07
Acidification potential	kg SO2-e	0,51	0,39	0,10	0,02
Eutrophication potential	kg PO43-e	0,14	0,13	0,01	0,00
Photochemical oxidant creation potential	kg C2H4-e	0,05	0,05	0,00	0,00
Ozone depletion,	kg CFC 11-e	0,00	0,00	0,00	0,00
depletion of abiotic resources (elements),	kg Sb-e	0,00	0,00	0,00	0,00
depletion of abiotic resources (fossil),	MJ	1257,19	1001,84	193,40	61,95

Contact information:

EPD owner	**UAB Scandia Steel Baltic** **Upplandsgatan 7** **111 23 Stockholm** **Sweden** www.scandiasteel.se
LCA and EPD Author	**Miljögiraff AB** Pär Lindman Södra Larmgatan 6, 411 16, Göteborg, Sweden www.miljogiraff.se
Programme operator	**The International EPD System** EPD International AB 100 31 Stockholm Box 210 60 Sweden http://www.environdec.com
Third Party Verifier	**Extracon AB** Göran Brohammer Hulanvägen 14 427 38 Billdal Sweden www.extracon.se

References

Ambrazaitis, N. (2016, 05). Production Manager, UAB Scandia Steel, Tel: +370 62 08 22 74, E-post: nerijus@scandiasteel.se. (P. Lindman, Interviewer)

Battocletti, N. (2016, 05). Quality manager Arvedi Tubi Acciaio S.p.A. (P. Lindman, Interviewer)

Bauer, C., Althaus, H.-J., Weidema , B., & Hirschier, R. (2009). *Code of practice. Ecoinvent report No. 2.* St. Gallen: Swiss Centre for Life Cycle Inventories.

Baumann, H., & Tillman, A. (2004). *Liftarens guide till LCA.* Lund, Sweden: Studentlitteratur ISBN: 91-44-02364-2.

Carlsson, R., & Pålsson, A.-C. (2011). *Livscykelanalys – ringar på vattnet. .* SIS Förlag 978-91-7162-652-3.

ecoinvent, Hirschier, R., Weidema , B., Althaus , H.-J., Bauer , C., Doka , G., . . . Wernet , G. (2009). *Code of practice. ecoinvent report No. 2.* St. Gallen: Swiss Centre for Life Cycle Inventories.

EPD®, T. I. (2016-03-09). *PCR 2012:01 v. 2.2 Construction products and construction services.* The International EPD® System.

Eurostat. (2016, 05 23). Retrieved from Eurostat: http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdpc240&language=en

Goedkoop, M., Heijungs, R., Huijbregts, M., Schryver, A., Struijs, J., & Zelm, R. v. (2009). *ReCiPe 2008-A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level.* Holland.

Guinée, J., Gorrée, M., Heijungs, R., Huppes, G., Kleijn, R., Koning, A. d., . . . Sleeswijk, A. (2004). *Handbook on Life Cycle Assessment - Operational Guide to the ISO Standards.* Kluwer Academic Publications.

ISO 14040. (2006). *Environmental Management – Life cycle assessment – Principles and framework (SS-EN ISO 14040:2006).* Stockholm, Sweden.: Swedish Standards Institute (SIS förlag AB).

ISO 14044. (n.d.). *Environmental Management – Life cycle assessment – Requirements and guidelines (SS-EN ISO 14044:2006).* Stockholm, Sweden: Swedish Standards Institute (SIS förlag AB).

Lindman, P. (2017-11-29). *Life Cycle Assessment Steel pipe piles, SS Piles and SSdr Piles Miljögiraff Report 103.* Kalmar: Miljögiraff AB.

Łyczak, Ł. (2016, May). Sales Department Stalprodukt AS.

Marcus Eriksson. (2016, 05 25). Miljö och kvalitéansvarig, Mob. +46 708 990 941 E-mail: marcus@scandiasteel.se. (P. Lindman, Interviewer)

Melnikov, A. (2016, 05). Deputy Chief of Sales Department BMZ. (P. Lindman, Interviewer)

The International EPD® System. (2015-02-19). *2011:14 PCR Absorbent hygiene products 2.0.* The International EPD® System.

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