





## Product

### Product description:

Steel tube piles are tubes made from hot rolled steel sections. The tube piles are rammed into place, either with a driving shoe or plug or with an open end. After ramming, tubes are normally emptied and reinforced using steel and concrete. Typical applications are foundations for dwellings, offices and commercial buildings as well as refurbishing existing foundations and lastly for civil infrastructure.

Standard dimensions are Ø 17mm-323.9mm, 1,2mm-16mm thickness with steel grades S355J2/S355J0. Produced according to NS-EN 10025, tolerances according to NS-EN 10060 and certificates in accordance with NS-EN 100204-3.1.

The product is produced entirely from scrap, and comparable steel data with similar material composition and production method is used to model for the steel input. The recycled content given from the background data is >99%. The actual product has a reported scrap content of 97,82%, taking alloys into account.

### Product specification:

Typical product composition for hot rolled steel is given below:

| Materials         | kg   | %      |
|-------------------|------|--------|
| Steel with alloys | 1,00 | 100,00 |

### Market:

Norway/Nordics

### Reference service life, product:

Not relevant for cradle to gate.

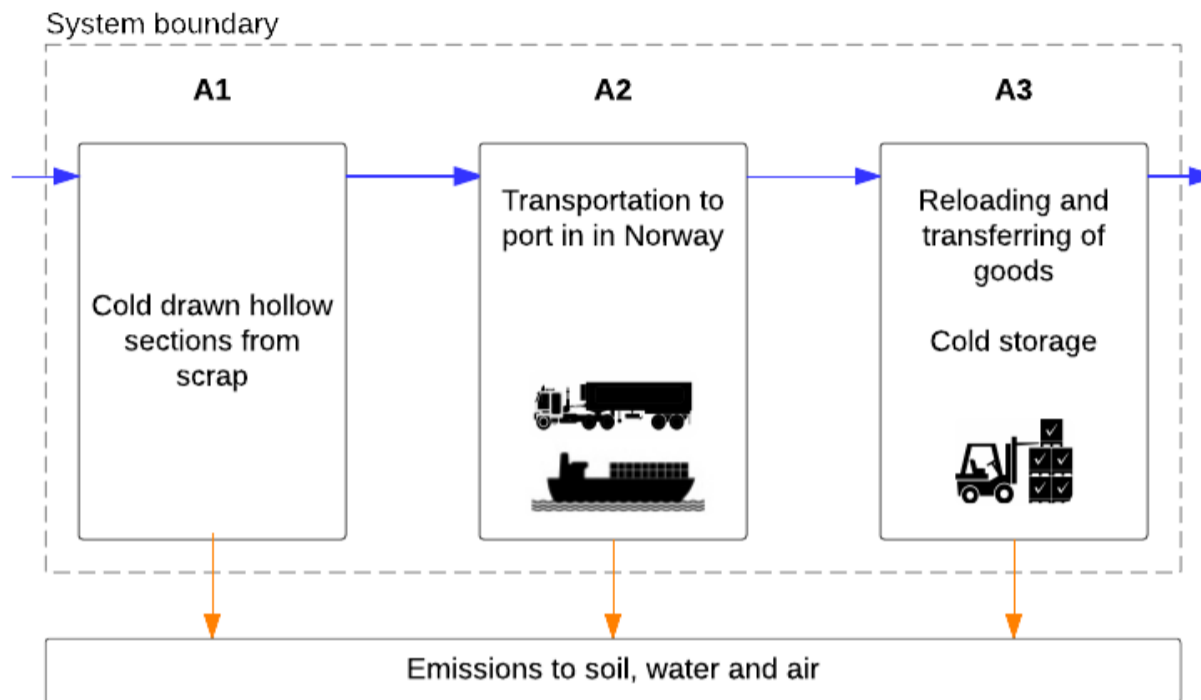
**LCA: Calculation rules**

**Declared unit:**

Per kg steel

**System boundary:**

Cradle to gate (A1-A3) . System boundaries are shown in the flowchart.



**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.

**Temporal:**

Data for use in module A3 is supplied by the manufacturer and consists of the recorded amount of specific material and energy consumption for the product studied. Specific data has been collected for 2014. Generic data has been created or updated within the last 10 years.

**Geographical:**

The geographic region of the production sites included in the calculation is Norway (A3). Data for A1 represents Europe.

**Technological:**

Data represents technology in use.

Data for module A1 consists of specific transportation data and comparable steel data from environmental product declarations for the steel input. For calculation and all other LCI data, GaBi 6.4 was used.

**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.

**Allocation:**

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste produced in-house is allocated equally among all products through mass allocation if applicable.

**LCA: Scenarios and additional technical information**

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

The scenario for transport distances and transportation modes from suppliers to manufacturer represents both recorded and calculated routes and distances from factory gate from supplier in Europe to port in Norway.

**Transport from suppliers to producer (A2)**

| Type       | Capacity utilisation (incl. return) % | Type of vehicle     | Distance km | Fuel/Energy consumption | Value (l/t) |
|------------|---------------------------------------|---------------------|-------------|-------------------------|-------------|
| Truck      | 85                                    | Euro 5, 27t payload | 118         | 0,016 l/tkm             | 1,856       |
| Ro-ro ship | N/A                                   | EU LFO              | 179         | 0,014 l/tkm             | 2,5         |
| Truck      | 85                                    | Euro 5, 24t payload | 520         | 0,017 l/tkm             | 8,9         |
| Rail       | 40                                    | N/A                 | 1216        | Electricity, N/A        | N/A         |

Transport in A2 describes shipping of products from steelwork in Europe to Norway.

Transport from Ferrometall to customer/site is not taken into account in this environmental product declaration. For an estimation of impacts in A4, please refer to the fuel consumption information on module A1 and use a suiting characterization factor to convert fuel consumption to environmental impact for a specified distance.

**LCA: Results**

The results shows that the most significant impacts comes from the production of steel, given in A1. The steel is shipped from Europe to port in Norway, giving a moderate impact in A2. Module A3 includes deloading and expediting of goods from a forklift, cold storage and heating of offices as well as deloading with a crane.

**System boundaries (X=included, MND= module not declared, MNR=module not relevant)**

| Product stage |           |               | Assembly 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             | MND            | MND      | MND       | MND         | MND    | MND         | MND           | MND                    | MND                   | MND                        | MND       | MND              | MND      | MND                                |

**Environmental impact**

| Parameter         | Unit                                  | A1-A3    |  |  |  |  |  |  |  |
|-------------------|---------------------------------------|----------|--|--|--|--|--|--|--|
| GWP               | kg CO <sub>2</sub> -eqv               | 3,68E-01 |  |  |  |  |  |  |  |
| ODP               | kg CFC11-eqv                          | 7,98E-08 |  |  |  |  |  |  |  |
| POCP <sup>1</sup> | kg C <sub>2</sub> H <sub>4</sub> -eqv | 9,00E-05 |  |  |  |  |  |  |  |
| AP                | kg SO <sub>2</sub> -eqv               | 1,12E-03 |  |  |  |  |  |  |  |
| EP                | kg PO <sub>4</sub> <sup>3-</sup> -eqv | 1,71E-04 |  |  |  |  |  |  |  |
| ADPM              | kg Sb-eqv                             | 1,15E-07 |  |  |  |  |  |  |  |
| ADPE              | MJ                                    | 5,64E+00 |  |  |  |  |  |  |  |

<sup>1</sup>There is inherent flaw in the POCP results in the GaBi 6.4 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.

**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

Resource use

| Parameter | Unit           | A1-A3    |  |  |  |  |  |  |  |
|-----------|----------------|----------|--|--|--|--|--|--|--|
| RPEE      | MJ             | 1,91E+00 |  |  |  |  |  |  |  |
| RPEM      | MJ             | 9,99E-09 |  |  |  |  |  |  |  |
| TPE       | MJ             | 1,91E+00 |  |  |  |  |  |  |  |
| NRPE      | MJ             | 7,83E+00 |  |  |  |  |  |  |  |
| NRPM      | MJ             | 4,06E-05 |  |  |  |  |  |  |  |
| TRPE      | MJ             | 7,83E+00 |  |  |  |  |  |  |  |
| SM        | kg             | 9,78E-01 |  |  |  |  |  |  |  |
| RSF       | MJ             | INA      |  |  |  |  |  |  |  |
| NRSF      | MJ             | INA      |  |  |  |  |  |  |  |
| W         | m <sup>3</sup> | 1,74E-01 |  |  |  |  |  |  |  |

**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<sup>1</sup>

| Parameter | Unit | A1-A3    |  |  |  |  |  |  |
|-----------|------|----------|--|--|--|--|--|--|
| HW        | kg   | 3,84E-02 |  |  |  |  |  |  |
| NHW       | kg   | 7,87E-03 |  |  |  |  |  |  |
| RW        | kg   | 9,51E-04 |  |  |  |  |  |  |

<sup>1</sup> Hazardous and radioactive waste is calculated from deposited goods from background processes. Non-hazardous waste are specific recorded waste from the manufacturer, and deposited goods.

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

## End of life - Output flow

| Parameter | Unit | A1-A3 |  |  |  |  |  |  |
|-----------|------|-------|--|--|--|--|--|--|
| CR        | kg   | INA   |  |  |  |  |  |  |
| MR        | kg   | INA   |  |  |  |  |  |  |
| MER       | kg   | INA   |  |  |  |  |  |  |
| EEE       | MJ   | INA   |  |  |  |  |  |  |
| ETE       | MJ   | INA   |  |  |  |  |  |  |

**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<sup>-3</sup> = 0,009

## Additional Norwegian requirements

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

The electricity mixes 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: 2011

| Data source | Module | Amount      | Unit                        |
|-------------|--------|-------------|-----------------------------|
| GaBi 6.4.   | A1     | 0,0465 (NO) | kg CO <sub>2</sub> -eqv/kWh |
| GaBi 6.4.   | A1, A2 | 0,509 (IT)  | kg CO <sub>2</sub> -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 (Avfallsforskiten, Annex III), see table.

| Name | CAS no. | Amount |
|------|---------|--------|
|      |         |        |
|      |         |        |

### 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                            | <i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>                                 |
| ISO 14044:2006                            | <i>Environmental management - Life cycle assessment - Requirements and guidelines</i>  |
| EN 15804:2012+A1:2013                     | <i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i> |
| ISO 21930:2007                            | <i>Sustainability in building construction - Environmental declaration of building products</i>  |
| LCA Report                                | <i>Life Cycle Assessment Report:<br/>Threaded steel core piles and welded steel tubes</i>  |
| NPCR 013-2013                             | Product Category Rules Steel as Construction Material  |
| Environdec EPD no.:<br>S-P-00306 (2012)   | Celsa Steel Service AS:<br>Steel reinforcement products for concrete (Norway)  |
| ift Rosenheim GmbH<br>EPD-BMG-10.1 (2013) | Baustahlgewebe GmbH:<br>Betonstahlmatten und Gitterträger  |
| ift Rosenheim GmbH<br>EPD-BS-10.0 (2013)  | Badische Stahlwerke GmbH:<br>Betonstahl zur Bewehrung von Beton  |

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