

# Environmental Product Declaration

In accordance with ISO 14025 and EN 15804+A2

## Steel piles



**FerROMETALL**

The Norwegian  
EPD Foundation

**Owner of the declaration:**  
Ferrometall AS

**Product name:**  
Steel piles

**Declared unit:**  
1 kg of steel piles

**Product category /PCR:**  
EN 15804:2012+A2:2019 serves as core PCR.  
NPCR 013:2019 Part B for Steel and Aluminium  
for Construction Products, version 4.0, issued  
06.10.2021

**Program holder and publisher:**  
The Norwegian EPD foundation

**Declaration number:**  
NEPD-4793-4044-EN

**Registration Number:**  
NEPD-4793-4044-EN

**Issue date:**  
21.08.2023

**Valid to:**  
21.08.2028

## General information

# FeRROMETALL

### Product:

Steel piles

### Program Operator:

The Norwegian EPD Foundation  
Post Box 5250 Majorstuen, 0303 Oslo, Norway  
Tlf: +47 23 08 80 00  
e-mail: post@epd-norge.no

### Declaration Number:

NEPD-4793-4044-EN

### This declaration is based on Product Category Rules:

EN 15804:2012+A2:2019 serves as core PCR  
NPCR 013:2019 Part B for Steel and Aluminium  
Construction Products. Version 4.0.

### Statements:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

### Declared unit:

1 kg of steel piles

### Declared unit with option:

1 kg of steel piles, cradle-to-gate A1-A3, with options A4, C1-C4, D

### Functional unit:

-

### Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal  external

Sign



Ole M. K. Iversen

Independent verifier approved by EPD Norway

### Owner of the declaration:

Ferrometall AS  
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### Manufacturer:

Ferrometall AS  
Gyldenløves plass 1, 3044 Drammen  
Phone: +47 32 89 10 30  
e-mail: info@ferrometall.no

### Place of production:

Klaipeda, Lithuania

### Management system:

EN ISO 9001, EN ISO 14001, BS/EN 1090

### Organisation no:

995 727 064

### Issue date:

21.08.2023

### Valid to:

21.08.2028

### Year of study:

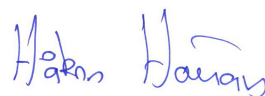
2023

### Comparability:

EPDs from other programmes than EPD Norge may not be comparable.

### The EPD has been worked out by:

Dan André Johansen, Asplan Viak AS



Approved (Manager of EPD Norway)

## Product

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### Product description:

Threaded steel core piles is a typical construction material for buildings and infrastructure. Steel core piles are round bars of solid steel that are drilled into the ground, and may be used alone, or in combination with steel tubes. If used together with steel tubes, the tube casing and steel core will be rammed into place, and the space between the core and the casings may be filled with concrete. Steel core piles may be delivered with tapered threads, which are CNC machined, and the bars are cut at exact lengths according to the intended use. Splicing is done by threads or welding.

Products start out as pre-produced steel components from round rolled steel produced at various destinations in Europe. The steel components are drilled/turned for production of threaded steel core piles for use in piling applications. Products will vary in size and shape and are produced in accordance with specific project needs.

### Product specification:

Materials	kg	%
Steel with alloys	1,00	100

### Technical data:

Standard dimensions: Ø50 mm–300 mm, 6-8-12 meter lengths and steel grades S355J2. DNV-GL documentation of capacity from Ø70–Ø230 mm. Recycled content in the final product is calculated to be approximately 37,4%.

### Market:

Norway and Scandinavia

### Reference service life, product:

60 years

### Reference service life, building:

60 years

## LCA: Calculation rules

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### Declared unit:

1 kg of steel piles, cradle-to-gate A1-A3 with options A4, C1-C4 and D.d

### Data quality:

General requirements and guidelines concerning the use of generic and specific data and the quality of those are as described in EN 15804: 2012+A2:2019, clause 6.3.7 and 6.3.8., including ISO14044:2006, 4.2.3.6. The data is representative according to temporal, geographical and technological requirements. Generic data is from LCA databases such as ecoinvent v3.8, Agri-footprint 5 and World Steel Association LCI data which is found in the Industry data 2.0

ecoinvent extension (See also Worldsteel, 2017). Calculations have been carried out using Simapro v9. Characterization factors from EN15804:2012 + A2:2019.

## Allocation:

The allocation is made in accordance with the provisions of EN 15804. Production activities, energy, 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.

## System boundary:

Modules are declared according to NPCR 013 Part B. Declared modules are shown in Figure 1. Gray boxes denote modules not declared.

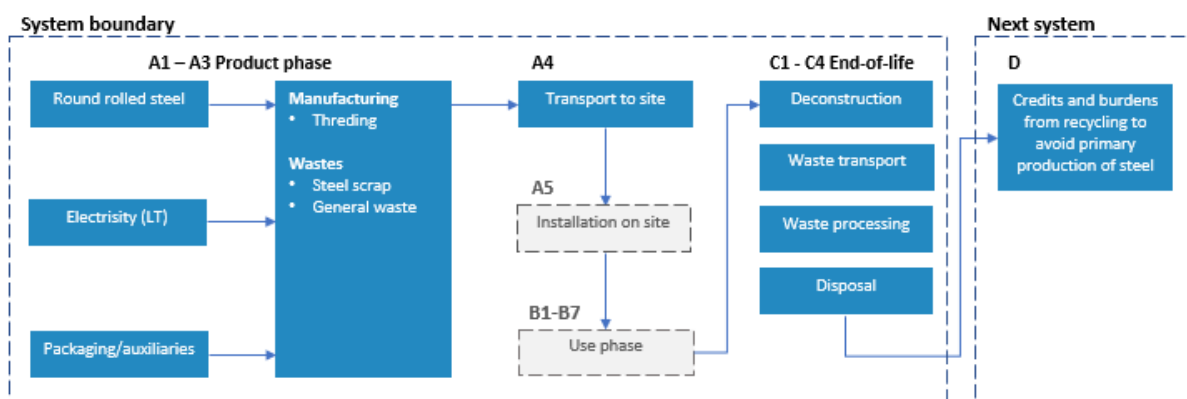


Figure 1: System boundaries

## 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% energy, mass, impact) 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.

Transport from Klaipeda, Lithuania to Horten, Norway, and transport by truck to the user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	value (kg/t)
Ship	80%	5000 DWT	922	0,014 kg/tkm	12,9
Truck	80 %	Unspecified, EURO6	47	0,025 kg/tkm	1,2
Truck	80%	Lorry>32t, EURO6	300	0,025 kg/tkm	7,5

Scenario for distance to building site according to NPCR 013 Part B. The steel comes from two different suppliers, and the scenario above represents the average transport of the steel arriving at the customer in Norway.

## End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	0
Reuse	kg	0
Recycling	kg	0,95
Energy recovery	kg	0
To landfill	kg	0,05

Net new scrap is calculated by subtracting the scrap content of outgoing steel from the recycling rate. The scrap content is 37,4 % from suppliers. Note that outgoing scrap and the parameter for Secondary Material content (SM) differ, wherein the latter accounts for the total amount of scrap needed in the system to fulfill the declared unit.

A 95% recovery rate is assumed, wherein 5% is assumed landfilled - in effect providing a 95% recycling rate. Reuse is not included in this scenario.

## Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Waste collection	50 %	Lorry 21t	19	0,4	7,4
Truck	26 %	Lorry 16-32t EURO5	278	0,04	12,2

To provide a plausible scenario for transportation to waste processing, a study of Norwegian waste treatment was used as proxy data (Raadal et al., 2009).

## Benefits and loads beyond the system boundaries (D)

	Unit	Value
Steel waste	kg	- 0,0576

Module D is calculated as net scrap \* LCI for scrap, where the scrap LCI is calculated as the credit for avoided primary production of steel, minus the burden of recycling steel scrap to make new steel, multiplied by the process yield. LCI for scrap has been provided by worldsteel (Eurofer, 2019; Worldsteel, 2017).

## Additional technical information

Not relevant.

## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document. Impact assessment results are presented with core and additional impact indicators presented in EN15804+A2. Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009

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

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
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	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

### Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	2,00E+00	8,48E-02	2,14E-02	6,99E-02	2,12E-04	2,64E-04	-9,77E-01
GWP-fossil	kg CO2 eq.	1,98E+00	8,47E-02	2,14E-02	6,97E-02	2,00E-04	2,63E-04	-9,76E-01
GWP-biogenic	kg CO2 eq.	1,58E-02	7,85E-05	1,85E-05	1,46E-04	1,21E-05	9,28E-07	-6,32E-04
GWP-LULUC	kg CO2 eq.	8,80E-04	1,30E-05	2,14E-06	2,02E-05	5,41E-07	2,49E-07	1,41E-04
ODP	kg CFC11 eq.	1,40E-07	9,57E-09	4,58E-09	1,58E-08	2,13E-11	1,07E-10	-5,31E-16
AP	mol H <sup>+</sup> eq.	8,57E-03	1,28E-03	2,23E-04	3,30E-04	1,63E-06	2,48E-06	-1,75E-03
EP-freshwater	kg P eq.	9,16E-05	2,59E-07	7,10E-08	3,64E-07	6,73E-09	2,76E-09	-2,00E-07
EP-marine	kg N eq.	1,62E-03	3,71E-04	9,85E-05	1,17E-04	4,45E-07	8,56E-07	-2,61E-04
EP-terrestrial	mol N eq.	1,87E-02	4,07E-03	1,08E-03	1,29E-03	5,02E-06	9,42E-06	-2,55E-03
POCP	kg NMVOC eq.	7,75E-03	1,05E-03	2,97E-04	4,24E-04	1,44E-06	2,74E-06	-1,34E-03
ADP-M&M	kg Sb eq.	2,31E-05	8,89E-08	1,10E-08	1,81E-07	1,22E-08	6,01E-10	-2,07E-06
ADP-fossil	MJ	2,20E+01	1,16E+00	2,94E-01	1,01E+00	2,90E-03	7,35E-03	8,50E+00
WDP	m <sup>3</sup>	3,63E-01	1,91E-03	4,19E-04	2,17E-03	1,05E-04	3,30E-04	-1,11E-01

**GWP-total:** Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer;

**AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

## Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
PM	Disease incidence	1,27E-07	1,10E-08	5,90E-09	6,39E-09	2,73E-11	4,85E-11	-2,96E-08
IRP	kBq U235 eq.	4,88E-02	2,75E-03	1,25E-03	4,38E-03	3,80E-05	3,01E-05	2,56E-02
ETP-fw	CTUe	4,86E+01	4,90E-01	1,72E-01	7,14E-01	6,68E-03	4,64E-03	3,72E-02
HTP-c	CTUh	1,63E-08	3,30E-11	6,65E-12	2,06E-11	8,30E-13	1,18E-13	2,92E-10
HTP-nc	CTUh	4,13E-08	7,51E-10	1,25E-10	6,91E-10	8,45E-12	3,05E-12	-1,31E-08
SQP	Dimensionless	9,17E+00	5,86E-01	3,74E-02	5,36E-01	1,73E-02	1,54E-02	2,15E-01

**PM:** Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

## Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
ILCD type / level 2	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

**Disclaimer 1** – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

**Disclaimer 2** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

## Resource use

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
RPEE	MJ	1,72E+00	7,70E-03	1,65E-03	1,15E-02	1,52E-02	6,27E-05	7,00E-02
RPEM	MJ	7,22E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	1,73E+00	7,70E-03	1,65E-03	1,15E-02	1,52E-02	6,27E-05	7,00E-02
NRPE	MJ	2,21E+01	1,16E+00	2,94E-01	1,01E+00	2,90E-03	7,36E-03	-8,50E+00
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	2,21E+01	1,16E+00	2,94E-01	1,01E+00	2,90E-03	7,36E-03	-8,50E+00
SM	kg	3,83E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m <sup>3</sup>	1,52E-02	6,25E-05	1,48E-05	1,09E-04	1,11E-04	7,83E-06	-4,30E-03

*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*

## End of life - Waste

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HW	kg	6,44E-03	3,13E-05	8,57E-06	4,48E-05	9,39E-07	5,73E-07	0,00E+00
NHW	kg	1,03E+00	4,68E-02	3,92E-04	3,75E-02	1,04E-04	5,00E-02	0,00E+00
RW	kg	6,43E-05	4,18E-06	2,03E-06	6,90E-06	2,35E-08	4,82E-08	0,00E+00

*HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed*

## End of life – output flow

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	1,80E-02	0,00E+00	0,00E+00	0,00E+00	9,50E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

*CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy*



## Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in the accompanying packaging	kg C	0,00E+00

## Additional Norwegian requirements

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

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing proress(A3).

National electricity grid	Unit	Value
Ecoinvent v3.8- Lithuania	kg CO2 -eq/kWh	0,548

### Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantanious oxidation. GWP-IOBC is also reffered to as GWP-GHG in context to Swedish public procurement legislation.

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	2,00E+00	8,48E-02	2,14E-02	6,99E-02	2,12E-04	2,64E-04	-9,77E-01

**GWP-IOBC** Global warming potential calculated according to the principle of instantanious oxidation.

### Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- 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 (Avfallsforskitfen, 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.

## Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products. Issued 12.01.2019
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
Johansen (2023)	Life cycle assessment (LCA) report for steel core piles. Ferrometall AS
NPCR PART A	Construction Products and Services. Version 2.0, issued 24.03.2021, EPD Norway
NPCR 013	Part B for Steel and Aluminium products. Version 4.0, issued 06.10.2021, EPD Norway
Raadal et al. (2009)	Klimaregnskap for avfallshåndtering. Fase I og II: Glasseballasje, metallemballasje, papir, papp, plastemballasje, våtorganisk avfall, treavfall og restavfall fra husholdninger. ISBN: 82- 8035-073-X.

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# EPD for the best environmental decision



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