epd-norway
Global Program Operator

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2

One tonne of ductile cast iron produced by Furnes Jernstøperi AS

FURNES JERNSTØPERI AS

Owner of the declaration:
Furnes Jernstøperi AS

Product name:
Ductile cast iron

Declared unit:
One tonne of ductile cast iron produced by Furnes Jernstøperi AS

Product category /PCR:
CEN Standard EN 15804 serves as core PCR
NPCR Construction product and services – Part A

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-9786-9710

Registration Number:
NEPD-9786-9710

Issue date: 15.04.2025

Valid to: 15.04.2030

The Norwegian
EPD Foundation

General information

Product:
Finished product of ductile cast iron produced by Furnes.

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

Declaration Number:
NEPD-9786-9710

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
NPCR Construction product and services – Part A

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:

Declared unit with option:
1 tonne of finished product of grey cast iron produced by Furnes Jernstøperi AS

Functional unit:
N/A

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

internal ☐ external ☑

Julie Lyslo Skullestad

Julie Lyslo Skullestad
Independent verifier approved by EPD Norway

Owner of the declaration:
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Manufacturer:
Furnes Jernstøperi AS

Place of production:
Furnes Jernstøperi AS
Uthusveien 8, 2335 Stange, Norge

Management system:
NS-EN ISO 9001:2015, NS-EN ISO 14001:2015, NS-EN 124-1, NS-EN 124-2

Organisation no:
979 459 548

Issue date:
15.04.2025

Valid to:
15.04.2030

Year of study:
2024

Comparability:
EPDs from other programmes than EPD Norway may not be comparable.

The EPD has been worked out by:
Alexander Borg, Asplan Viak AS

Approved

Manager of EPD Norway

FURNES JERNSTØPERI AS

Product

Product description:

Product of ductile cast iron in different forms. The products are typically used as street goods and can be fully recycled.

Product specification:

The declaration is valid for all products of ductile cast iron.

Materials	kg	%
Scrap iron	940	94,0%
Pig iron	27	2,7%
Ferrosilicon-magnesium	12	1,2 %
Ferrosilicon	15	1,5%
Graphite	29	2,9%
Alloy	2	0,2%
Sum product	1000	100%
Packaging, Wooden pallet	13,5	
Packaging, Wooden boards	14,2	
Packaging, Fibreboards	7,7	
Sum incl. packaging	1035,4	

Technical data:

The products of ductile cast iron is produced in compliance with NS-EN 1563. The products are fully recyclable, and don't emit gases or contain any damaging elements towards nature. The density of ductile cast iron is around 7000 kg/m^3.

Market:

Nordic countries

Reference service life:

In general, a product of ductile cast iron is a 100% recyclable, and can always be remelted. The reference service life of street goods is around 4-10 years, depending on traffic load, and over 10 years if there is no traffic load.

LCA: Calculation rules

Declared unit:

1 tonne of finished product of ductile cast iron produced by Furnes Jernstøperi AS

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:

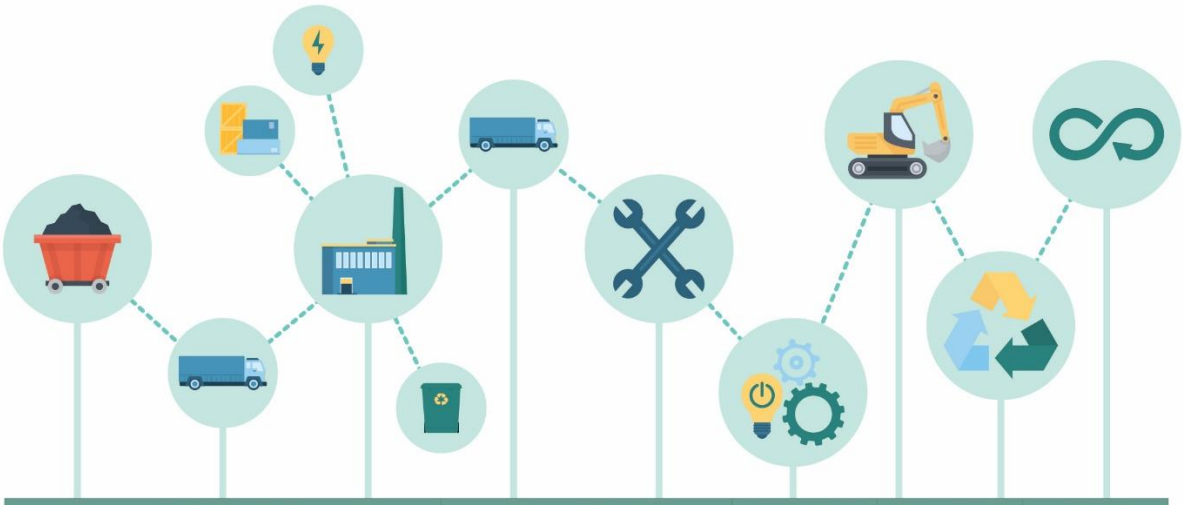
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production inhouse is allocated equally among all products through mass allocation. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

Specific data for the product composition and production are provided by the manufacturer and are based on the production year 2024. The background data is taken from ecoinvent's database v. 3.10. For truck transportation (A4) background data is taken from the database Agri-footprint 4.0.

System boundary:

The system boundary is illustrated below. The analysis has been performed for modules A1-A5, C1-C4 and D, according to NS-EN 15804.



PRODUCT STAGE			ASSEMBLY STAGE		USE STAGE	END OF LIFE	REUSE
A1	A2	A3	A4	A5	B1-B7	C1-C5	D
X	X	X	X	X	MND	X	X
Raw materials	Transport	Manufacturing	Transport	Assembly	Use stage	End of life stage	Reuse
Scrap iron Pig iron Ferrosilicon Ferrosilicon magnesium (ductile iron only) Graphite Inoculant	Transport of raw materials and additional products	Electricity Packaging Additional products (propane, nitrogen, CO2, coal dust, bentonite, binders, sand) Production Waste	Transport of finished product	Construction Assembly Energy use Waste processing	Use Maintenance Repair Replacement Refurbishment Operational energy use Operational water use	De-construction demolition Transport Waste processing Disposal	After end of life Reuse Recovery Recycling potential

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

LCA: Scenarios and additional technical information

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

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (kg/t)
Truck	80 %	Transport, truck >20t, EURO5,	267	0,0194	5,18
Boat	80 %	Transport, freight, sea, ferry	90	0,000427	0,038

The transport scenario is an average of the deliveries to local storage and customers in Norway, Sweden and Denmark.

Assembly (A5)

	Unit	Value
Materials to waste treatment	kg	24,7

Declared unit does not require energy or material consumption for installation. Only incineration of packaging is included in this phase.

End of Life (C1, C3, C4)

	Unit	Value
Recycling	kg	1000

The product is assumed to have manual demolition, and sent to recycling. In C3, there is assumed processing in a central sorting facility for metal waste as pre-treatment to recycling.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	36,7	16-32 ton EURO 6	267	0,043	12,9

Distance to waste treatment is assumed equal to transport with truck for A4.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Recycling of primary iron	kg	27
Incineration of packaging	kg	24,6

Recycling of primary iron is net scrap metal, which is equal to the amount of pig iron in the product. Additionally, substitution of heat and electricity from incineration of packaging is included in module D.

LCA: Results

All results are calculated using SimaPro v.9 (2019). Ecoinvent v3.10 is the database used for calculating the environmental indicators and as a source for generic data. Results are shown per declared unit, one tonne ductile cast iron.

System boundaries (X=included, MID=module not declared, MIR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Beyond 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	X	X	MID	MID	MID	MID	MID	MID	MID	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2-ekv	2.13E+02	5.72E+01	5.85E+01	0	5.37E+01	2.58E-01	0	-3.62E+01
GWP-fossil	kg CO_2-ekv	2.70E+02	5.72E+01	5.58E-01	0	5.36E+01	2.41E-01	0	-3.70E+01
GWP-biogenic	kg CO_2-ekv	-5.70E+01	-9.56E-03	5.80E+01	0	3.71E-02	1.63E-02	0	7.51E-01
GWP-luluc	kg CO_2-ekv	3.75E-01	5.08E-03	3.71E-04	0	1.78E-02	8.63E-04	0	-1.48E-02
ODP	kg CFC11-ekv	4.29E-06	2.27E-07	2.95E-09	0	1.07E-06	5.58E-09	0	-2.09E-07
AP	mol H+-ekv	1.20E+00	6.13E-01	5.09E-03	0	1.12E-01	2.23E-03	0	-2.04E-01
EP-freshwater	kg P-ekv	1.23E-01	3.28E-04	6.19E-05	0	3.63E-03	1.33E-04	0	-2.42E-02
EP-marine	kg N-ekv	2.87E-01	2.19E-01	1.29E-02	0	2.68E-02	5.08E-04	0	-4.52E-02
EP-terrestrial	mol N-ekv	2.98E+00	2.41E+00	3.09E-02	0	2.89E-01	5.64E-03	0	-4.13E-01
POCP	kg NMVOC-eq	1.16E+00	6.11E-01	8.64E-03	0	1.85E-01	1.74E-03	0	-1.55E-01
ADP-mi&m	kg Sb-ekv	2.73E-03	1.13E-05	4.70E-07	0	1.74E-04	1.46E-05	0	-2.03E-05
ADP-fossil	MJ, net calorific value	4.74E+03	7.93E+02	2.43E+00	0	7.54E+02	3.79E+00	0	-5.48E+02
WDP	m^3 world eq. deprived	1.26E+02	4.61E-01	-2.84E-02	0	3.13E+00	1.15E-01	0	-4.94E-02

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 counsumption*

Reading example: 9,0 E-03 = 9,0*10^{-3} = 0,009

Resource use

Para meter	Unit	A1-A3	A4	A5	A5	C1	C2	C3	C4	D
RPEE	MJ	7.71E+03	1.73E+00	4.24E+02	1.25E+01	0	1.25E+01	1.50E+01	0	4.00E+02
RPEM	MJ	8.46E+02	0.00E+00	-4.24E+02	0.00E+00	0	0.00E+00	0.00E+00	0	-4.22E+02
TPE	MJ	8.56E+03	1.73E+00	3.83E-02	1.25E+01	0	1.25E+01	1.50E+01	0	-2.15E+01
NRPE	MJ	4.74E+03	7.93E+02	2.43E+00	7.54E+02	0	7.54E+02	3.79E+00	0	-5.44E+02
NRPM	MJ	3.04E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0	-3.04E+00
TRPE	MJ	4.74E+03	7.93E+02	2.43E+00	7.54E+02	0	7.54E+02	3.79E+00	0	-5.48E+02
SM	kg	9.73E+02	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0	0.00E+00
W	m^3	5.38E+01	1.32E-02	-4.46E-04	1.04E-01	0	1.04E-01	1.06E-01	0	-3.41E-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*

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	1.81E-02	6.74E-04	1.64E-05	0.00E+00	5.08E-03	5.26E-04	0.00E+00	-5.61E-04
NHW	kg	3.71E+02	1.85E-01	4.65E-01	0.00E+00	3.64E+01	1.17E-01	0.00E+00	-1.02E+01
RW	kg	2.76E-03	1.31E-05	5.86E-07	0.00E+00	2.43E-04	2.27E-05	0.00E+00	-1.39E-04

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

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	1.98E+01	0.00E+00	1.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	1.11E+01	0.00E+00	7.66E+00	0.00E+00	0.00E+00	2.70E+01	0.00E+00	0.00E+00
MER	kg	4.61E-02	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	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	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	1,58E+1

Additional requirements

Market based electricity mix from the use of electricity in manufacturing

The manufacturer uses Guarantees of Origin (GoO's) for its production facilities (A3). GWP total per functional unit is given in the table below. Documentation of valid Guarantees of Origin is available on request from the manufacturer.

National electricity grid	Data source	Foreground / core [kWh]	GWP_{total} [kg CO2 - eq/kWh]	SUM [kg CO2 - eq]
Electricity, medium voltage, hydro, reservoir, alpine region	Ecoinvent 3.10	1 538,4	0,00911	14,0148

Location based electricity mix from the use of electricity in manufacturing

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 prosess (foreground/core) per functional unit.

National electricity grid	Data source	Foreground / core [kWh]	GWP_{total} [kg CO2 - eq/kWh]	SUM [kg CO2 - eq]
Electricity, Norway	Ecoinvent 3.10	1 538,4	0,031947	49,147

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 for GWP has been sub-divided into the following:

GWP-IOBC Climate impacts calculated according to the principle of instantaneous oxidation
GWP-BC Climate impacts from the net uptake and emission of biogenic carbon from each module.

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	2.71E+02	5.72E+01	5.58E-01	0.00E+00	5.37E+01	2.58E-01	0.00E+00	-3.62E+01
GWP-BC	kg CO2 eq.	-5.80E+01	0.00E+00	5.80E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP	kg CO2 eq.	2.13E+02	5.72E+01	5.85E+01	0.00E+00	5.37E+01	2.58E-01	0.00E+00	-3.62E+01

GWP-IOBC *Global warming potential calculated according to the principle of instantaneous oxidation.* ***GWP-BC*** *Global warming potential from net uptake and emissions of biogenic carbon from the materials in each module.* ***GWP*** *Global warming potential*

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 (Avfallsforskiften, Annex III), see table.

Name	CAS no.	Amount
Chromium	7440-47-3	<0,1 weight%

Indoor environment

N/A

Carbon footprint

While a carbon footprint analysis has not been conducted for the product separately, the results section does include an evaluation of Global Warming Potential (GWP) with such an analysis. The GWP total results presented in this EPD document represents the carbon footprint of the product studied.

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
NS-EN 15804:2012+A2 2019	Sustainability of construction works – Environmental product declaration – Core rules for the product category of construction products
NS-EN 1561:2011	Founding – Spherodial graphite cast irons (Støperteknikk – kulegrafittjern)
ISO 21930:2007	Sustainability in building construction – Environmental declaration of building products
Cowi (2024)	Background report for update of EPDs for one tonne of grey cast iron and ductile cast iron.
Asplan Viak (2025)	Appendix - Modifications to LCA model and report during verification.
NPCR Part A	NPCR Construction products and services – Part A
Kiwa Teknologisk Institutt	Management system certificate, NS-EN ISO 14001:2015, NS-EN ISO 9001:2015
Kontrollrådet	Certificate NS-EN 124-1 and 124-2

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