Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Grey & Ductile Iron Manhole with Cover

from

ERKON DÖKÜM İNŞAAT TUR. TİC.ve SAN. A.Ş.

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System	**Licencee:** EPD Türkiye
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Construction products, 2019:04, version 1.3.4. Date: 2024-04-30, UN CPC code: 412 “Products of iron or steel”
PCR review was conducted by: *The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile*
Life Cycle Assessment (LCA)
LCA accountability: Ayşegül Bahar Aral, Greenlife Danışmanlık
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Sunil Kumar Approved by: The International EPD® System
OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by accredited certification body Third-party verification: *<name, organisation>* is an approved certification body accountable for the third-party verification The certification body is accredited by: *<name of accreditation body & accreditation number, where applicable>*
OR

Independent third-party verification of the declaration and data, according to ISO 14025:2006 via:

☐ EPD verification by EPD Process Certification*

Internal auditor: *<name, organisation>*

Third-party verification: *<name, organisation>* is an approved certification body accountable for third-party verification

Third-party verifier is accredited by: *<name of accreditation body & accreditation number, where applicable>*

*For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI.

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: ERKON DÖKÜM İNŞAAT TUR. TİC. ve SAN. A.Ş.

Contact: omer@erkondokum.com.tr

Description of the organisation:

Established in 1999, Erkon Döküm has become one of Turkey's leading manufacturers of essential infrastructure components, including manhole covers, drainage grates, and sewer covers, which play a crucial role in urban development. Over time, the company has expanded its production capabilities beyond this sector, diversifying its product range to include cast iron products for parks, gardens, and home decoration, as well as tractor and automotive spare parts.

Operating from a 30,000 m² facility in the Konya 3rd Organized Industrial Zone, the company maintains a strong commitment to quality at every stage of production, from raw material intake to final product delivery. All products are manufactured in compliance with Turkish Standards (TSE) and European Standards EN 124-1 and EN 124-2. Additionally, the management system is reinforced through TS EN ISO 9001, 14001, 45001, and 50001 certifications, reflecting a dedication to quality management, environmental responsibility, occupational health and safety, and energy efficiency. With a focus on high standards, innovation, and reliability, Erkon Döküm remains committed to delivering durable and high-performance casting solutions to both domestic and international markets.

Address of EPD Owner: Büyükkayacık OSB, Konya Organize Sanayi Bölgesi, 20. Sk. No:9, 42300 Selçuklu/Konya

Product-related or management system-related certifications:
European Standards EN 124-1 and EN 124-2
TS EN ISO 9001, 14001, 45001, and 50001 certifications

Name and location of production site(s): Büyükkayacık OSB, Konya Organize Sanayi Bölgesi, 20. Sk. No:9, 42300 Selçuklu/Konya

Figure 1. Erkon Döküm Production Facility

Product information

Product name: Grey & Ductile Iron Manhole with Cover

Product identification: Grey & Ductile Iron Manhole with Cover

Product description: Grey & Ductile Iron Manhole with Cover is removable cover and frame forming a plate placed over a drainage or sewer opening that can be opened and closed, allowing human access.

Figure 2. Grey & Ductile Iron Manhole with Cover

UN CPC code: 412 products of iron or steel

Geographical scope: Türkiye

Production Process:
The manufacturing process of Grey & Ductile Iron Manhole with Cover and its frame requires molds and molten metal. The metal is melted in casting furnaces and poured into sand-based molds. As a result, the product is classified as a cast component, and its production involves a casting process. Following the casting process, several subsequent operations are performed, including cooling, mold removal, separation of gating systems, and cleaning with granular shot blasting. The separated gating and feeder systems are recycled as raw materials for further use. Afterward, grinding is applied to remove burrs, and depending on the product requirements, machining operations such as gasket groove cutting on a lathe may be conducted. Once the product is prepared for painting, it undergoes a coating process in the painting line, followed by assembly. Final quality inspections are carried out before the products are packaged and dispatched for shipment.

LCA information

Declared unit: 1 tonne of Grey & Ductile Iron Manhole with Cover

Reference service life: Not applicable

Time representativeness: Data is representative for 2023 production year. Primary production data for the year 2023 was used in the LCA.

Database(s) and LCA software used: Ecoinvent 3.10 database and SimaPro software

Calcukation Method: EN 15804+A2 method according to EF 3.1. reference

Description of system boundaries:
Cradle to gate with modules A4, C1-C4 and module D (A1-A3 + A4 + C + D).

Raw Material Supply (A1):
Raw material supply covers supply of raw materials and other auxiliary materials.

Transportation (A2):
Raw material and packaging transport data the environmental impact was calculated using the weighted average of the transport of raw materials purchased in 2023. The raw material and packaging transportation is provided by road transportation.

Manufacturing (A3):
At the manufacturing stage, the impact of fuels and electricity usage throughout the production process, and water consumption are considered. Also, wastewater treatment was included in manufacturing. Additionally, packaging is included in this module.

Details of electricity data used in LCA model
Country: Türkiye
Source Type: 100% Grid
Energy Sources: Coal: 62.7%
Oil: 0.7%
Natural gas: 36.6%
Electricity Data: Residual mix is calculated from "Electricity, medium voltage {TR}| market for electricity, medium voltage | Cut-off, S" by excluding renewable energy generation
Electricity Emission Factor: 0.904 kg CO_2eq/kWh

Product Transport (A4):
Product transport module covers the environmental impacts related to transportation of the product to the customers. The products were transported by road, sea and air transportation.

De-Construction Demolition (C1):
De-construction of the product is assumed to be done via human power. Therefore, there is not an observable environmental impact at this stage.

Waste Transportation (C2):
Distance for the transport of the product as a waste after utilised was assumed as 100 km.

Waste Processing (C3), Disposal (C4):
In the waste processing module, the Grey & Ductile Iron Manhole with Cover does not go through any process before disposal. Therefore, there is no impact due to waste processing. At the disposal module, the waste Grey & Ductile Iron Manhole with Cover goes through recycling with the assumption of 85% of the waste will be recycled. According to this scenario, the rest 15% waste Grey & Ductile Iron Manhole with Cover will send to landfill. It is also assuemd that the packaging material is send o landfill.

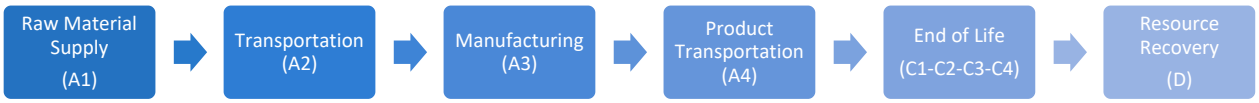
Resource Recovery Stage (D):
Stage D covers benefits and loads form the net flow that leaves the system that have passed the end of life waste state in the form of reuse, recovery and/or recycling potentials. Potential environmental benefits are accounted for the net steel scrap generated at the end of a final product's lifecycle.

Net scrap = Amount of iron recycled at end-of-life – Scrap input from previous product life cycles

The amount of iron for prevented production (650 kg) is calculated by the difference between recycled scrap (850 kg) and scrap input to production (290 kg)

Starting with the supply of raw materials, the transport of raw materials to the production site and the manufacturing process, all processes except fuel and waste transport are included in the LCA modelling.

System diagram:



Cut-off Rule: The maximum cut-off criteria is 1% of all material and energy flows to a single unit process and 5% of total inflows.

Allocation: In this LCA study mass allocation has been applied to address the scrap use in the raw materials in production of Grey & Ductile Iron Manhole with Cover. The material flow is associated with the Grey & Ductile Iron Manhole with Cover produced.

The included scenarios are currently in use and they are representative for one of the most probable alternatives.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	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
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X*	X	X	X	MND**	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	GLO	GLO	TR	GLO									GLO	GLO	GLO	GLO	GLO
Specific data used	60%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

*X: Declared Module, **MND: Module Not Declared

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Iron	903	45%	-
Mg	15	-	-
C	15	-	
Si	23	-	
Cu	2	-	
Coal Dust	41	-	
TOTAL	1000	45%	
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wood Pallets	37	4%	0,47
TOTAL	37	4%	0,47

No substances that are listed in the “Candidate List of Substances of very high concern for authorization” are contained in the declared unit.

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	2.39E+03	7.45E+01	0.00E+00	1.92E+01	0.00E+00	6.48E+01	-5.45E+02
GWP-fossil	kg CO_2 eq.	2.45E+03	7.45E+01	0.00E+00	1.92E+01	0.00E+00	1.59E+00	-5.45E+02
GWP-biogenic	kg CO_2 eq.	-6.32E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.32E+01	0.00E+00
GWP-luluc	kg CO_2 eq.	4.02E-01	3.13E-02	0.00E+00	7.78E-03	0.00E+00	5.14E-04	-2.21E-01
ODP	kg CFC 11 eq.	1.40E-05	1.37E-06	0.00E+00	2.84E-07	0.00E+00	1.52E-08	-2.80E-06
AP	mol H^+ eq.	1.39E+01	9.55E-01	0.00E+00	4.39E-02	0.00E+00	6.12E-03	-2.02E+00
EP-freshwater	kg P eq.	2.04E+00	4.13E-03	0.00E+00	1.52E-03	0.00E+00	2.07E-03	-2.21E-01
EP-marine	kg N eq.	2.61E+00	2.39E-01	0.00E+00	1.02E-02	0.00E+00	3.92E-02	-4.62E-01
EP-terrestrial	mol N eq.	2.49E+01	2.65E+00	0.00E+00	1.10E-01	0.00E+00	2.06E-02	-5.04E+00
POCP	kg NMVOC eq.	7.65E+00	8.22E-01	0.00E+00	6.15E-02	0.00E+00	1.13E-02	-1.61E+00
ADP-minerals&metals*	kg Sb eq.	2.74E-03	1.55E-04	0.00E+00	6.26E-05	0.00E+00	1.31E-06	-1.41E-03
ADP-fossil*	MJ	2.74E+04	1.04E+03	0.00E+00	2.69E+02	0.00E+00	1.38E+01	-5.80E+03
WDP*	m^3	1.79E+02	4.07E+00	0.00E+00	1.23E+00	0.00E+00	-4.34E+00	-5.22E+01
Acronyms	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; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2.45E+03*	7.47E+01	0.00E+00	1.92E+01	0.00E+00	1.53E+01	-5.47E+02

**Contribution from the scrap iron is less than 10%*

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Resource use indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.63E+03	1.30E+01	0.00E+00	3.44E+00	0.00E+00	3.16E-01	-1.06E+03
PERM	MJ	6.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.30E+03	1.30E+01	0.00E+00	3.44E+00	0.00E+00	3.16E-01	-1.06E+03
PENRE	MJ	2.74E+04	1.04E+03	0.00E+00	2.69E+02	0.00E+00	1.38E+01	-5.80E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.74E+04	1.04E+03	0.00E+00	2.69E+02	0.00E+00	1.38E+01	-5.80E+03
SM	kg	2.91E+02	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
FW	m^3	1.79E+02	4.09E+00	0.00E+00	1.23E+00	0.00E+00	-4.34E+00	-5.33E+01
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Waste indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1.47E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+02	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

GPI / General Programme Instructions of the International EPD® System. Version 4.0.

EN ISO 14001 / Environmental Management Systems - Requirements

ISO 14020:2000 / Environmental Labels and Declarations - General Principles

EN 15804:2012+A2:2019 / AC: 2021 Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products

ISO 14025 / DIN EN ISO 14025:2009-11: Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures

ISO 14040/44 / DIN EN ISO 14040: 2006-10, Environmental Management - Life Cycle Assessment - Principles and Framework (ISO14040:2006) and Requirements and Guidelines (ISO 14044:2006)

PCR for Construction Products The International EPD System, 2019:14 Version 1.3.4.

The International EPD® System / The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro / SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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