Statement of Verification

BREG EN EPD No.: 000709 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Wrekin Products Ltd

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1 kg of Street ironwork covers and frames (Standard range)

Company Address

Wrekin Products Ltd
Europa Way,
Britannia Enterprise Park,
Lichfield
WS14 9TZ

WREKIN
MAKE EVERY DAY BETTER

Signed for BRE Global Ltd	Hayley Thomson Scheme Operator	17 June 2025 Date of this Issue
17 June 2025 Date of First Issue		16 June 2030 Expiry Date

BRE Global Verified EPD

BRE Global Ltd., Garston, Watford WD25 9XX.
T: +44 (0)333 321 8811 F: +44 (0)1923 664603 E: Enquiries@breglobal.com

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: **000709**

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE 2023 Product Category Rules (PN 514 Rev 3.1) for Type III environmental product declaration of construction products to EN 15804:2012+A2:2019
Commissioner of LCA study	**LCA consultant/Tool**
Wrekin Products Ltd Europa Way, Britannia Enterprise Park, Lichfield WS14 9TZ	LCA Tool: BRE LINA A2 LCA Consultant: Bala Subramanian
Functional Unit	**Applicability/Coverage**
1 kg of Street ironwork covers and frames (Standard range)	Other (please specify). Product specific
EPD Type	**Background database**
Cradle to Grave	Ecoinvent 3.8

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Jiacheng (Francis) Yu
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Manufactured at Mamara region of north western Turkey

Distribution facility:
Wrekin Products Ltd
Europa Way,
Britannia Enterprise Park,
Lichfield
WS14 9TZ

Construction Product:

Product Description

Street ironwork covers and frames are products made from iron, used to cover holes in the ground surface leading to infrastructure below. They support the loads from traffic or people on the ground surface. For ease of access and function most of them are sited in roads or footways. They typically comprise an openable cover or grate, which sits in a frame that transfers loads to the structure beneath. The standard range of products comply with the minimum requirements of the appropriate European and British standards, some with enhancements to match the requirements of various end users.

The standard ironwork covers and frames are available in various dimensions and weights and its available in the following product families such as Access covers, Gully gratings, and D400 surface boxes.
However, since the manufacturing process and composition are the same across different types, this EPD models 1 kg of Street ironwork covers and frames (Standard range).

Note: Please refer to the end user guidance note at the end of this EPD.

Technical Information

Most street ironwork covers and frames are made from ductile iron (spheroidal graphite cast iron) but a few products in the lower load classes are made from cast grey iron. One benefit of casting iron is that thicknesses can easily be varied across a component to make provision for different loads that will arise at different locations within the structure which they form. Typically, the minimum thickness of iron that can be reliably cast is 5mm, so the lowest loaded parts may be as thin as this. Elsewhere the thicknesses will be greater, and it can be difficult to determine whether local thickening to incorporate ribs or seatings should be considered to be matters of thickness or profile.

Manhole covers and gully grates comply with:

Property	Standard
Gully tops and manhole tops for vehicular and pedestrian areas Part 1: Definitions, classification, general principles of design, performance requirements and test methods.	BSEN124-1:2015
Gully tops and manhole tops for vehicular and pedestrian areas Part 2: Gully tops and manhole tops made of cast iron.	BSEN 124-2:2015
Surface boxes comply with:	
Surface boxes, guards and underground chambers for the purposes of utilities Part 2: Specification for surface boxes	BS5834:2011
Fire hydrants comply with:	
Specification for underground fire hydrants and surface box frames and covers	BS750:2023
The products have been manufactured in spheroidal graphite iron in accordance with the designation EN-GJS-500-7, as defined in European Standard EN 1563: 2018. Testing has verified that the required minimum tensile strength of 500Nmm-2, and minimum elongation of 7% has been achieved.	
Iron is a very dense material and has a density of 7.86 g/cm^3.	

Note: The technical properties are the same for all standard range street ironwork covers and frames and is taken from the Wrekin products technical data sheet. For more information, please contact the Wrekin Products technical team and please visit https://www.wrekinproducts.com/

Main Product Contents

Material/Chemical Input	%
Pig Iron	38
Scrap Steel	55
Others	7

Note: The above product content is same for all the standard range street ironwork covers and frames.

Manufacturing Process

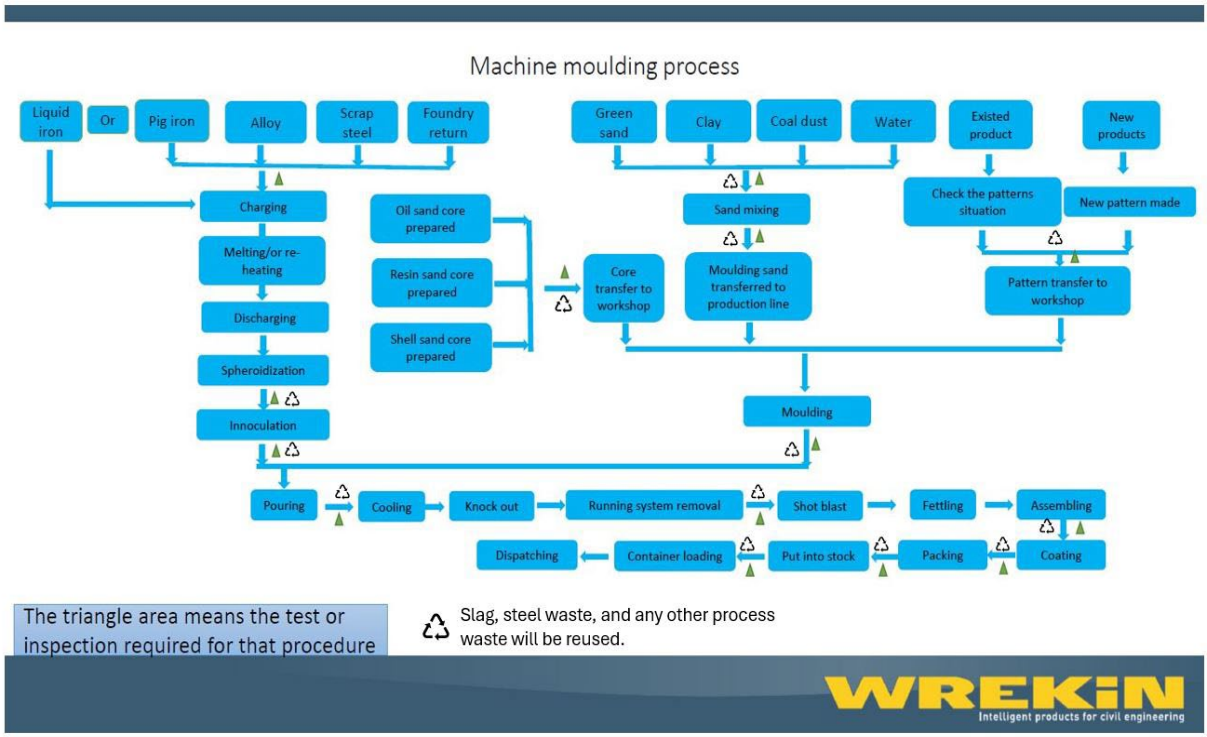
The main raw materials used in the production of the cast iron are steel scrap and iron ore or pig iron. In the spheroidal graphite process, magnesium is added to change the carbon in the iron from a flake form to spheroidal structure. The metal is melted either in a blast furnace, cupola or by electric furnace.

Electric furnaces are used as follows. The raw material is weighed and charged into the furnaces from the top. It is heated to melting point as it descends to form iron and slag. Iron is discharged from the furnace and collected in a ladle. Slag is separated from the iron. If necessary, carburisers are added to increase the carbon content of the iron. The Melting furnace slag from the process will be reused.

Moulding is done using sand, which is consolidated around a permanent metal pattern in a moulding flask at high pressure so that it supports itself once the mould is removed. The resulting cavity is filled with iron to provide a replica. Once solidified and cooled, the casting is retrieved from the sand, which is reused internally. The castings are treated with shot blast and may then be painted.

Note: For the manufacturing the National grid electricity has been used and any slag produced during the melting process has no market value, it is sent to authorised material recycling companies for use as an infill material for road construction.

Process flow diagram



Construction Installation

Iron chamber covers and gully gratings can be considered as either part of the road surface construction or as part of the construction of the chamber beneath. If a cover or grating fails, only the cover and bedding are renewed but some surfacing material is also needed. The aspect which is common to all these is the placement of the iron unit on a mortar bed.

End of Life

Selected and installed properly, the end of life should be about 100 years in the future, as the typical service life on average should be extremely long based on case studies of 20-year-old products and their evident stability and low wear. The circumstances that far ahead are difficult to predict but for those outlier products where earlier

failures may occur, the iron can be completely recycled and a recycling industry for iron and steel is already well established. Therefore, the products which reached their end-of-life will be removed from the deconstruction sector by using the power tools. The fuel used to remove the frames from the deconstruction sector is included in this module. Removed frames will be sent to the disposal unit along with any attached substrate or asphalt pavement. The asphalt waste will be sent to landfill at the deconstruction site, while the waste street ironwork covers and frames will be sent to a waste processing facility for further processing. It is assumed that there is 100% recovery for the standard range product. The end-of-life recycling reference taken from BRE PCR EN15804 A2.

Life Cycle Assessment Calculation Rules

Functional unit description

1 kg of Street ironwork covers and frames (Standard range)

System boundary

This is a Cradle to Grave LCA, reporting all production life cycle stages of modules A1 to A3 and A4 and A5 (transportation and installation), B1-B7 (Use Stage), and end of life stages C1-C4, and D in accordance with EN 15804:2012+A2:2019 and BRE Environmental Profiles 2023 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.1.

Data sources, quality and allocation

The quantity used in the data collection for this EPD is the total quantity of Street ironwork covers and frames (Standard range) manufactured as a proportion of the total manufactured during the data collection period (01/01/21-30/11/21), that was calculated at 78.9% by mass. Generally, Wrekin Products Ltd receives the product from their manufacturing partners. The data used for the LCA modelling is the original data completed by the foundry which is considered to be a contractor to Wrekin in the production of the products given the design and extensive quality control provided by Wrekin. Due to the availability of the resources and information the manufacturer has shared the 11months of production data which is also acceptable according to the EN 15804. Other products are manufactured in addition to the Street ironwork covers and frames (Standard range), therefore, the allocation of electricity and water consumption and discharge are required, and this has been done by “mass” according to the provisions of the BRE PCR PN514 and EN 15804. Emission to air was recorded and reported in the manufacturers’ site and the values has been included in the LCA analysis. The secondary scrap metal is used as an input material during the foundry process

Once the product is manufactured in the foundry, it will be transported to the Wrekin distribution sector which is located in the UK. The transportation used to deliver the products from Turkey to the UK via roadways and waterways has been included in this LCA analysis. In the UK distribution sector, the product will be packed and delivered to the customer site. Therefore, the quantities used in the distribution sector, such as packaging, electricity, natural gas, and water, have been covered. The Wrekin distribution sector distributes another product in addition to the standard range. Therefore, allocation is required, and this has been done based on the percentage of standard range products distributed, which has been calculated at 93.9% by mass. In other words, by using the “mass” allocation. Furthermore, during additional processing at the UK distribution site, it has been confirmed that no product wastage has been recorded, except for packaging waste such as wood and metal waste. Non-production waste has been allocated as a percentage of the product processed in a year.

In the foundry, other products are produced in addition to the Standard range therefore the allocation to water, fuel, packaging, waste, non-production waste, water consumption and discharge is required, and it has been allocated by using the “mass” allocation. The manufacturer has confirmed that the any slag produced during the melting process has no market value, it is sent to authorised material recycling companies for use as an infill material for road construction.

The functional unit used for this LCA modelling is 1 kg of street ironwork covers and frames (Standard range) this is to allow the end-user of this EPD to enable the impacts to a range of products with the different weight. The original data collection form has been used while doing an LCA analysis and there was a no uplift in the given data. The manufacture has used FeSi in the raw material input but there are no suitable datasets in the Ecoinvent 3.8 therefore the suitable proxy has been used to complete the LCA analysis.

Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e., raw material production) from the ecoinvent 3.8 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804. During the foundry process, the manufacturer confirmed that scrap metal is used as an input material; therefore, the scrap metal dataset from ecoinvent has been used.

ISO14044 guidance. **Quality Level**	**Geographical representativeness**	**Technical representativeness**	**Time representativeness**
Very Good	Data from area under study.	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e., identical technology).	There is approximately 1-2 years between the Ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

Specific European datasets have been selected from the ecoinvent LCI for this LCA. Manufacturing unit and the distribution unit uses the national grid electricity so therefore the national grid electricity dataset has been used for the LCA modelling (Ecoinvent 3.8) i.e., Electricity, Turkey consumption mix (kWh) used for the manufacturing and Electricity, UK consumption mix (kWh) used for the UK distribution.

The GWP carbon footprint for using 1 kWh of electricity, Turkey is 0.6572 in kgCO2e/kWh and for 1 kWh of electricity, UK is 0.3122 in kgCO2e/kWh.

The manufacturer and distributor also used the Natural gas for office heating, so therefore the emission factor for Natural gas (EU), which is used at turkey manufacturing unit for using 1kWh of natural gas is 0.2564 and for the UK natural gas emission factor is 0.232 kgCO2e/kWh.

The quality level of time representativeness is also Very Good as the background LCI datasets are based on ecoinvent v3.8 which was compiled in 2021. Therefore, there is less than 5 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Cut-off criteria

All raw materials and energy input to the manufacturing process have been included, except for direct emissions to water and soil, which are not measured. The inventory process in this LCA includes all data related to raw material, packaging material and consumable items.

In the UK distribution unit, the energy, water, and packaging involved in product distribution are included. No ancillary materials are used in the distribution facility, as there is some additional packaging involved, and the packaging quantity is accounted for in the analysis. No direct product waste has been recorded, and there are no emissions to air, water, or soil.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	1.04E+00	1.04E+00	4.97E-05	6.56E-04	8.62E-08	4.52E-03	4.22E-04
	Transport	A2	1.89E-01	1.89E-01	1.06E-04	9.37E-05	4.18E-08	2.40E-03	1.04E-05
	Manufacturing	A3	1.16E+00	1.20E+00	-4.80E-02	7.51E-03	3.15E-08	7.13E-03	1.13E-03
	Total	A1-3	2.39E+00	2.43E+00	-4.78E-02	8.26E-03	1.60E-07	1.41E-02	1.56E-03
Construction process stage	Transport	A4	3.31E-02	3.31E-02	2.82E-05	1.30E-05	7.65E-09	1.34E-04	2.13E-06
	Construction	A5	2.08E-03	2.08E-03	-3.04E-06	1.27E-06	1.87E-10	7.22E-06	2.49E-07
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)									
End of life	Deconstruction, demolition	C1	3.26E-01	3.25E-01	1.16E-04	3.43E-05	7.00E-08	3.38E-03	1.02E-05
	Transport	C2	1.66E-02	1.66E-02	1.42E-05	6.53E-06	3.85E-09	6.75E-05	1.07E-06
	Waste Processing	C3	6.70E-02	3.09E-02	3.47E-02	2.27E-05	3.03E-09	1.53E-04	9.42E-06
	Disposal	C4	2.64E-04	2.63E-04	2.61E-07	2.49E-07	1.07E-10	2.48E-06	2.41E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.23E-01	-6.25E-01	1.96E-03	-1.77E-04	-2.50E-08	-2.27E-03	-2.47E-04

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			EP-marine	EP-terrestrial	POCP	ADP-mineral &metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	9.78E-04	1.03E-02	4.82E-03	1.13E-05	1.34E+01	1.53E-01	2.53E-07
	Transport	A2	6.20E-04	6.86E-03	1.86E-03	5.46E-07	2.72E+00	1.07E-02	1.32E-08
	Manufacturing	A3	1.21E-03	1.10E-02	3.03E-03	1.54E-06	1.51E+01	3.53E-01	3.19E-08
	Total (Consumption grid)	A1-3	2.81E-03	2.82E-02	9.71E-03	1.34E-05	3.12E+01	5.17E-01	2.98E-07
Construction process stage	Transport	A4	4.04E-05	4.42E-04	1.35E-04	1.15E-07	5.00E-01	2.25E-03	2.85E-09
	Construction	A5	2.77E-06	2.50E-05	7.99E-06	8.80E-09	2.41E-02	1.49E-03	1.48E-10
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)									
End of life	Deconstruction, demolition	C1	1.50E-03	1.64E-02	4.51E-03	1.71E-07	4.49E+00	1.29E-02	9.04E-08
	Transport	C2	2.03E-05	2.22E-04	6.80E-05	5.78E-08	2.51E-01	1.13E-03	1.43E-09
	Waste processing	C3	6.90E-05	4.64E-04	1.31E-04	7.19E-07	2.99E-01	6.54E-03	2.65E-09
	Disposal	C4	8.61E-07	9.42E-06	2.74E-06	6.01E-10	7.35E-03	3.37E-04	4.99E-11
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.38E-04	-5.71E-03	-3.14E-03	-4.71E-07	-6.32E+00	-4.48E-02	-4.18E-08

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts							
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	6.67E-02	3.04E+01	4.97E-09	1.91E-08	3.04E+00
	Transport	A2	1.35E-02	2.00E+00	8.59E-11	1.92E-09	1.46E+00
	Manufacturing	A3	3.43E-02	1.35E+01	4.34E-10	3.52E-08	7.28E+00
	Total (Consumption grid)	A1-3	1.15E-01	4.58E+01	5.49E-09	5.62E-08	1.18E+01
Construction process stage	Transport	A4	2.57E-03	3.90E-01	1.26E-11	4.09E-10	3.44E-01
	Construction	A5	2.52E-04	2.02E-02	2.06E-12	2.01E-11	1.47E-02
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)							
End of life	Deconstruction, demolition	C1	2.02E-02	2.63E+00	1.01E-10	1.91E-09	6.88E-01
	Transport	C2	1.29E-03	1.96E-01	6.35E-12	2.06E-10	1.73E-01
	Waste processing	C3	3.37E-03	2.86E+00	5.04E-11	8.44E-10	9.56E-01
	Disposal	C4	3.27E-05	4.64E-03	1.18E-13	3.05E-12	1.54E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.12E-02	-1.87E+01	-3.34E-09	-1.29E-08	-1.23E+00

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	5.75E-01	0.00E+00	5.75E-01	1.21E+01	8.76E-01	1.30E+01
	Transport	A2	3.31E-02	0.00E+00	3.31E-02	2.67E+00	0.00E+00	2.67E+00
	Manufacturing	A3	2.93E+00	6.17E-01	3.55E+00	1.58E+01	3.20E-02	1.58E+01
	Total (Consumption grid)	A1-3	3.54E+00	6.17E-01	4.16E+00	3.05E+01	9.08E-01	3.14E+01
Construction process stage	Transport	A4	7.04E-03	0.00E+00	7.04E-03	4.91E-01	0.00E+00	4.91E-01
	Construction	A5	-8.35E-02	8.47E-02	1.16E-03	-1.76E-01	1.87E-01	1.11E-02
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)								
End of life	Deconstruction, demolition	C1	2.54E-02	0.00E+00	2.54E-02	4.41E+00	0.00E+00	4.41E+00
	Transport	C2	3.54E-03	0.00E+00	3.54E-03	2.47E-01	0.00E+00	2.47E-01
	Waste processing	C3	2.56E-02	0.00E+00	2.56E-02	1.58E-01	0.00E+00	1.58E-01
	Disposal	C4	6.27E-05	0.00E+00	6.27E-05	7.22E-03	0.00E+00	7.22E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.30E-01	0.00E+00	-1.30E-01	-6.26E+00	0.00E+00	-6.26E+00

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	1.69E-03	0.00E+00	0.00E+00	3.98E-03
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	2.65E-04
	Manufacturing	A3	3.82E-03	1.01E-07	0.00E+00	9.47E-03
	Total (Consumption grid)	A1-3	5.51E-03	1.01E-07	0.00E+00	1.37E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	5.57E-05
	Construction	A5	1.48E-05	0.00E+00	0.00E+00	3.51E-05
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)						
End of life	Deconstruction, demolition	C1	1.70E-03	0.00E+00	0.00E+00	3.16E-04
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	2.80E-05
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	1.61E-04
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-7.47E-04	0.00E+00	0.00E+00	-1.09E-03

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.02E-01	1.93E+00	3.31E-05
	Transport	A2	3.19E-03	4.72E-02	8.13E-02
	Manufacturing	A3	9.87E-02	5.23E+00	2.37E-05
	Total (Consumption grid)	A1-3	2.04E-01	7.22E+00	8.14E-02
Construction process stage	Transport	A4	5.51E-04	9.79E-03	3.38E-06
	Construction	A5	7.39E-05	1.15E-03	7.84E-08
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)					
End of life	Deconstruction, demolition	C1	5.90E-03	4.17E-02	3.10E-05
	Transport	C2	2.77E-04	4.92E-03	1.70E-06
	Waste processing	C3	2.06E-03	6.59E-02	9.21E-07
	Disposal	C4	7.65E-06	1.08E-04	4.82E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.77E-02	-1.19E+00	-6.70E-06

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	2.23E-03	6.16E-09	1.99E-04	0.00E+00	-1.81E-02
	Total (Consumption grid)	A1-3	0.00E+00	2.23E-03	6.16E-09	1.99E-04	0.00E+00	-1.81E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	1.57E-02	2.00E-10	0.00E+00	0.00E+00	2.69E-03
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
95% Recycling and 5% Landfill (Company scenario)								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Products are manufactured in Turkey and then transported to the UK warehouse for final distribution. When dispatching from the three warehouses in mainland Britain, records are kept of the customer site address and the quantity of ironwork ordered. The postcodes to which goods were dispatched from the three warehouse sites, along with the weight of the product, and the straight-line distance from the warehouse to the grid coordinates of the postcode are recorded. A modification factor of 1.29 is applied to the straight-line distance to derive the estimated road distance. This factor was derived by comparing straight-line distances with the road route distance using Google Maps for 1% of all journeys.		
	Road transport (Warehouse to construction site)	Lorry 16-32 metric ton	199 km
	Capacity utilisation (incl. empty returns)	%	26
	Bulk density of transported products	kg/m^3	915.9
A5 – Installation in the building	Iron chamber covers and gully gratings can be considered either as part of the road surface construction or as part of the chamber construction beneath. If a cover or grating fails, only the cover and bedding are renewed, though some surfacing material may also be required. The common factor in all these cases is the placement of the iron unit on a mortar bed. The Street ironwork covers and frames will be installed by using machinery. In this LCA analysis, the energy used by the machines is included in the analysis and the sand, mortar, and water quantities used to install the product are not included, as they are not provided by Wrekin products. To calculate the installation impacts, please refer to the relevant product EPD. The quantity used to pack the product in the factory is considered as a waste during the installation and it's reported in the A5 waste section.		
	Electricity	kWh	0.0005
	Water for mixing mortar	kg	0.025
Reference service life	Type	Installation life expectations	Notes
	Gully gratings	60-120 years	depending upon the policy of the road owner
	Manhole covers	60-110 years	depending upon the policy of the cover owner (highway authorities operate fewer than utilities)
	Surface boxes	>100 years	
Use stage (B1-B7)	There won't be any activities on site once the product is installed, therefore no impacts in use stage (B1-B7).		
End of life	At the end of life, manholes are removed from the pavements and will be sent to recycling unit. The end-of-life stage starts when the product is replaced, dismantled, and does not provide any further function.		

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C1- Deconstruction	Selected and installed properly, the end of life should be about 100 years in the future, as the typical service life on average should be extremely long based on case studies of 20-year-old products and their evident stability and low wear. The circumstances that far ahead are difficult to predict but for those outlier products where earlier failures may occur, the iron can be completely recycled and a recycling industry for iron and steel is already well established. Therefore, the products which reached their end-of-life will be removed from the deconstruction sector by using power tools. The fuel used to remove the frames from the deconstruction sector is mentioned below. Removed cover and frame will be sent to the disposal unit, along with any attached substrate or asphalt pavement. At the deconstruction site, its assumed as 100% recovery for the product.		
	Diesel used to remove paving and old bedding material	0.092	Litres
Waste	Road paving materials (Broken tarmac, concrete and mortar) to recycling	kg	0.4
C2 – Transport	100km by road has been modelled for module C2 as a typical distance from the demolition site to the disposal unit. However, end-users of the EPD can use this information to calculate the impacts of a bespoke transport distance for module C2 if required.		
	Recovered product taken to the recycling unit	Road transport	16–32-ton
	Distance: Deconstruction unit to pre-processing unit	Km	100
C3 - Waste processing	The street ironwork covers and frames are manufactured using a moulding process. During this process, iron and scrap steel are mixed with certain chemicals to produce the final product, which is considered the finished ironwork cover. According to the BRE PCR EN 15804 3.1, 95% of the steel product will be recycled, while the remaining 5% is treated as a natural loss during the recycling process and sent to landfill.		
	Waste ironwork covers and frames to recycling	%	95
	Iron waste to recycling	Kg	0.95
C4 – Disposal	95% of iron are recycled at the End of life and it is assumed as 5% as Landfill	kg	0.05
Module D	“Benefits and loads beyond the system boundary” (module D) accounts for the environmental benefits and loads resulting from Iron and steel that is used as raw material in the EAF or BOF and that is collected for recycling at end of life. These benefits and loads are calculated by excluding the pre-existing recycled steel that is used in the primary process. 1 kg of the product at the end of its working life, becomes 0.95 kg of scrap iron as a small percentage will have been lost due to wear, this 95% of the product will be recycled. In order to calculate the benefits of the product at Module D, the pre-existing recycled content will be excluded, i.e., 0.58kg arising from the original input of scrap steel should be avoided, and the amount recovered from the original input of pig iron recovered at C1, i.e., 0.37, should be considered in Module D. Therefore, the benefits of recycling pig iron have been accounted for in Module D. In line with this, 0.37 kg of Iron recovered from the demolition sites can be used to offset the impacts of 0.37 kg of virgin iron material in A1, and it is assumed that there is a 100% recycling yield from the recycling process. Benefits due to recycling of Pig Iron – 0.37 kg		

End user guidance:

EN15804 A2 EPD Standard product of access covers and gully gratings and D400 surface boxes from Wrekin Products Limited defined by their clear opening and depth of frame with the following features:

- At least one cover element manufactured from spheroidal cast iron
- A largely rectangular or circular frame aperture
- Where present, frame side walls are near vertical
- Where present, frame flanges are horizontal to interface with surrounding paving
- Either or both lifting keyways and/or prising features to aid cover removal
- Either or both raised chequer or grill features to increase traction
- Cover security features comprising either a hinge or depth of insertion not less than 25mm
- Assemblies over 50kg feature frame lifting features
- Where hinged, hinges open to 100 degrees or lock out
- A minimum weight of 2.5kg
- A maximum weight of 600kg

The full list of product families is,

Access Covers

- Safeseal single piece access covers
- Highway double triangular access covers
- Highway Halo hinged double triangular access covers
- Tristar circular and double triangular access covers
- Hercules double triangular access covers
- Vault hinged double triangular access covers
- Force single piece circular access covers
- Cargo double triangular access covers
- Pulse double triangular access covers

Gully Gratings

- Tristar hinged gully gratings
- Highway hinged double triangular gully gratings
- Highway Halo hinged double triangular gully gratings
- H2Go kerb drainage unit

Surface Boxes

- Tristar double triangular surface boxes
- Tristar single piece surface boxes
- Highway double triangular surface boxes

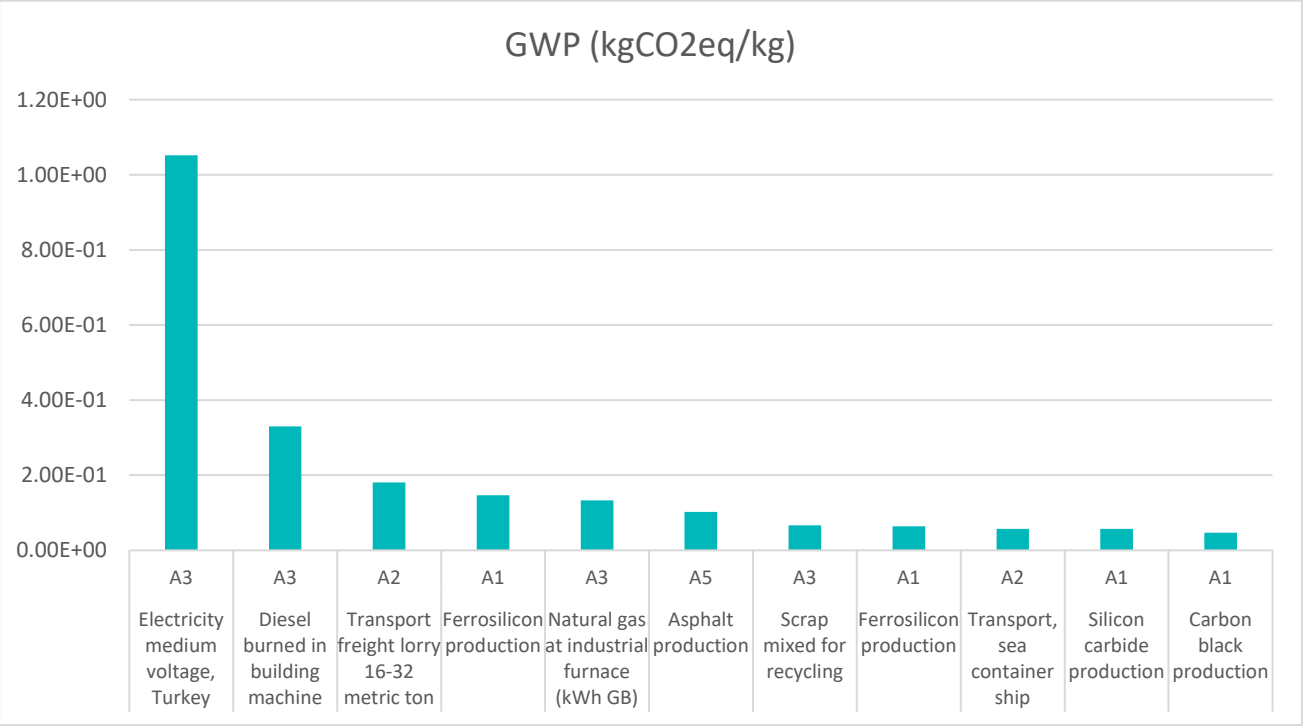
Note: To know more about the individual product name, dimension and code, please contact Wrekin products technical team.

How to use the results of this EPD:

The GWP total of 1 kg of street ironwork covers and frames (standard range) is 2.43E+00 kgCO2eq (A1 to A3). Therefore, the end user of this EPD can multiply the weight of the manhole product by this value to calculate the bespoke impact.

Interpretation of results

The bulk of the environmental impacts are attributed to the manufacturing of Street ironwork covers and frames (Standard range) covered by information modules A1-A3 of EN15804:2012+A2:2019. The bar chart illustrates the Global Warming Potential (GWP) in kg CO_2-equivalent per kg for various processes, with "Electricity medium voltage, Turkey" (A3) showing the highest impact. This indicates that electricity generation in Turkey has a significant carbon footprint, likely due to fossil fuel reliance. "Diesel burned in building machines" (A3) follows as another major contributor, emphasising the environmental impact of fuel combustion in construction. Transportation, particularly freight lorries (A2) and sea container ships (A2), also contributes notably but at lower levels. Industrial processes such as "Ferrosilicon production," "Asphalt production (A5)," "Silicon carbide production," and "Carbon black production" (A1) exhibit relatively lower emissions. The data suggests that transitioning to cleaner electricity sources, improving fuel efficiency, and optimizing industrial processes could significantly reduce GWP



References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.

BS EN 124-1:2015 - Gully tops and manhole tops for vehicular and pedestrian areas - Definitions, classification, general principles of design, performance requirements and test methods

BSEN 124-2:2015 - Gully tops and manhole tops for vehicular and pedestrian areas Part 2: Gully tops and manhole tops made of cast iron.

BS 5834-2:2011 - Surface boxes, guards, and underground chambers for the purposes of utilities - Specification for utility chambers

BS 750:2012 - Specification for underground fire hydrants and surface box frames and covers

BS EN 1563 - Founding. Spheroidal graphite cast irons.