Environmental Product Declaration

In accordance with EN 15804+A2 & ISO 14025 / ISO 21930

CAST IRON DRAINAGE SYSTEM

GUSTAVSBERG RÖRSYSTEM AB

Programme:	Programme operator:	EPD registration number:	Publication date:	Revision date:	Valid until:	Geographical scope:
The International EPD® System, www.environdec.com	EPD International AB	S-P-08616	2023-04-01	2023-12-28	2028-03-31	Sweden and Norway

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

MANUFACTURER INFORMATION

Manufacturer	Gustavsberg Rörsystem AB
Address	Svetsaregatan 19, 302 50 HALMSTAD, Sweden
Contact details	support@gustavsberg-ror.se
Website	https://www.gustavsberg-ror.se/

PRODUCT IDENTIFICATION

Product name	Cast Iron Wastewater Drainage System
Additional label(s)	MA-SYSTEM®, MA-SYSTEM® PLUS, KJ-MA SYSTEM®, SUPER KJ-MA®
Product number / reference	5100; 5101; 5105; 5110; 5111; 5112; 5115; 5120 and 5130
Place(s) of production	Halmstad, Sweden
CPC code	412

THE INTERNATIONAL EPD SYSTEM

EPDs within the same product category but from different programmes may not be comparable. 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.

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	The International EPD System
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.11 (2021-02-05) is used.
EPD author	Georg Eriksson
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☑ External covering ☐ Internal ☐ EPD Process certification ☑ EPD verification
EPD verification	Procedure for follow-up during EPD validity involves third party verifier: ☐ Yes ☑ No
Third party verifier	Bárbara M Civit
EPD number	S-P-08616
Publishing date	2023-04-01
EPD valid until	2028-03-31

Product description

This EPD is representative for the labels MA-SYSTEM®, MA-SYSTEM PLUS®, KJ-MA SYSTEM® and SUPER KJ-MA® including all system components. The systems are made of grey iron, more than 90% scrap iron, and installed into a building to transport sanitary water and wastewater. The pipe system is internally and externally applied with protective epoxy coating. A complete system includes pipes, couplings, and fittings. The use of fittings and couplings is dependent on the technical properties of the building.

PRODUCT APPLICATION

Drainage of wastewater and rainwater from buildings.

TECHNICAL SPECIFICATIONS

Dimensions range from:

Length 1500 - 3000 mm
DN 50 - 300 mm

Fire reaction: A2 s1, d0 comply with Standard NF EN 13501-1+A1 :2013. Acoustic properties: Structural noise LscA < 5dB(A) (results from IBP laboratory in Stuttgart, for a flow rate of 2 l/s). For more information about technical properties see our webpage https://www.gustavsberg-ror.se/.

PRODUCT STANDARDS

Pipes, fittings, and couplings are compliant with EN877.

PHYSICAL PROPERTIES OF THE PRODUCT

Fire resistance is tested according to EN13501-1:2007 and complies with classification A2-s1, d0 for the MA-SYSTEM®. Read more about the MA-SYSTEM® here: https://www.gustavsberg-ror.se/storage/15F1F8D3AE957C2263D3A73B19EA4E9459A162EAF6E0A5903B2008446D462267/6e1ce81db81a4f4598961a766dc7c839/pdf/media/65c99f2958c742c5bda19a0c85c56f62/MA_Produktkatalog%202021_SVE_21.1.pdf

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at our website:
https://www.gustavsberg-ror.se/.

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Weight, kg	Post-consumer %	Renewable %	Country Region of origin
Cast Iron	6,62	91%	0%	GLO
Rubber	0,12	0%	0%	EU
Metal	0,27	20%	0%	EU
Epoxy coating	0,04	0%	0%	EU
Total Product	**7,05**	**86%**	**0%**	-
Packaging				
Wooden pallets	0,28	0%	100%	*Nordic
Polyethylene	0,001	0%	0%	EU
Polyester straps	0,0003	0%	0%	EU
Cardboard	0,001	0%	100%	*Nordic
Total Packaging	**0,28**	**0%**	**99%**	**-**

*The Nordic refers to Sweden, Finland, Denmark, and Norway.

SUBSTANCES, REACH - VERY HIGH CONCERN

Products do not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

Product life-cycle

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

The end-of-life stage C1-C4 & D includes:

- Deconstruction/demolition (C1)
- Transport to waste management facility (C2)
- Waste processing for reuse, recovery and/or recycling (C3)
- Waste disposal (C4)
- Waste processing and disposal credits are assigned to module D.
- Module D includes reuse, recovery and/or recycling potentials conveyed as benefits and net impacts.

MANUFACTURING PROCESS

Pipes are ordered from a supplier in Europe and fittings and couplings from various suppliers in both Europe and Asia. The materials are delivered to the facility in Halmstad, Sweden. Quality controls are made on all the products that arrive at the factory. At the goods reception, we check that the products are free from defects and maintain the right quality level.

Pipes and couplings are directly distributed while fittings are raw when they arrive to the factory. The fittings get blasted and cleaned, then we apply a protective epoxy coating to give the fittings its rightful properties. After the coating process the fittings also go through a cooling process before they get stored at our warehouse, together with pipes and couplings, until delivery.

At the facility in Halmstad we use 100% renewable electricity, which is guaranteed from the energy supplier.

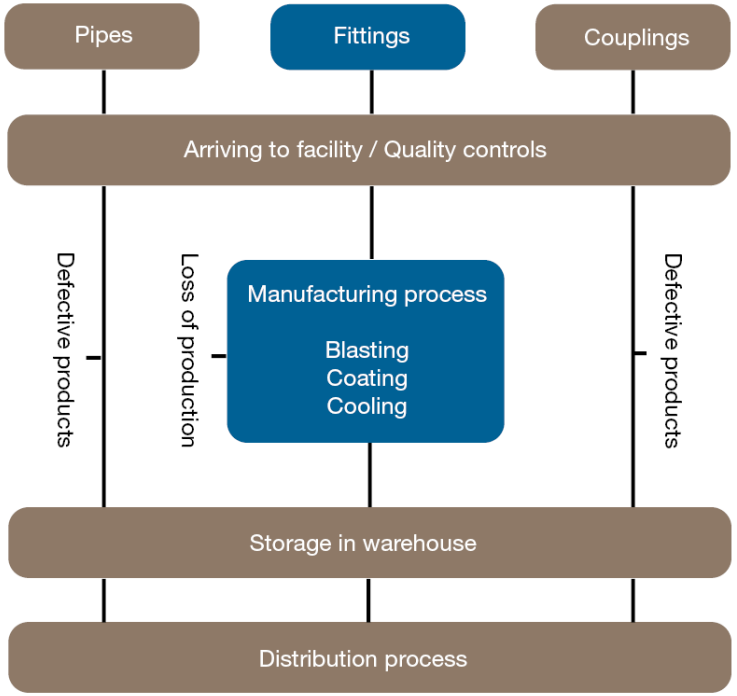


Figure 1, The manufacturing process
The manufacturing process is the companys most energy consuming process.

Life-cycle assessment

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2021

DECLARED UNIT

Declared unit	1 m
Mass per declared unit	7,05 kg
Reference service life	+50 years

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,52

SYSTEM BOUNDARY

The system boundaries are described in the system diagram and in the table in the section additional LCA information. The Environmental Product Declaration (EPD) shows the environmental performance of the product through its life cycle stages from cradle to gate to end of life. The life cycle stages are product stage (A1-A3), construction process stage (A4-A5), end-of-life stage (C1-C4) and benefits and loads beyond the system boundary (D). According to the EN 15804 standard all life cycle stages are included in the LCA, assuming that there is no maintenance needed over the reference service life.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	X	X
GLO		SE	SE	SE	-	-	-	-	-	-	-	SE	SE	SE	SE	SE		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Figure 2, The System Boundary
Modules not declared = ND. The analysed system is the complete life cycle of 1 linear meter cast Iron Pipe System used to drain wastewater from buildings.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND AVERAGES

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology ‘allocation, cut-off by classification’. This methodology is in line with the requirements of the EN 15804 standard.

Distances for manufacturing waste (A3), Construction waste (A5) and end-of-life (C2) waste transportation are average distances based on literature since detailed information was not available.

Installation resources and installation waste (A5) are estimated based on literature since detailed specific data was unavailable. Estimates were further made for disassembly in module C1. Transportation in module A4 is based on an average distance to main distribution centres since the manufacturer does not deliver to construction sites directly.

Since the manufacturer purchases fittings and couplings form different suppliers in Europe and Asia, mass allocation was necessary to reflect production settings, such as local energy mix, and transportation. This was reflected in the LCA model using different datapoints for European suppliers and Asian suppliers and transportation was added separately for the respective legs.

All estimates and averages have an overall quality impact on the study. This EPD is described as a system EPD of three main components for drainage of water from a building. The components are Cast Iron pipes, Cast Iron Fittings and Steel couplings. All components are necessary for the function of the product to drain water from a building. The declared unit is one meter of cast iron drainage system. This EPD is also representative for different labels of drainage system as declared on page 2. The purpose of multiple labelling is market penetration in different geographies.

The mass calculation is based on the inventory for the reference year. Total weight in kilo of components was derived from management systems at the production facility. Each components individual measurements were summarized either direct from management system, if data was available, or directly measured in warehouse by staff.

The mass will vary due to installation scenario. Hence, the 7,05 kg/m declared mass represents an average installation scenario of the drainage system. However, an explanation of how to convert and apply the result to separate parts of the system is given in ANNEX 4, on page 21.

ASSUMPTIONS AND VARIABILITY

Site-specific data from the reference year acted as the primary source of collection. If inputs or outputs were unknown or unavailable, industry-based and/or similar product EPD datasets were utilized for full compliance with EN 15804 +A1 and +A2. Site variability is not relevant since there is only one production site.

Modelling of data was primarily based on product specific EPDs. If manufacturer specific data was missing, generic data from Ecoinvent was used. Generic data is mostly used due to lack of supplier specific data for EN15804+A2 datasets. When generic data was used, a systematic assessment was carried out.

The utilization rate of the vehicle capacity is assumed to be 70% where this capacity utilization includes returns. Large truck (EURO 6, 16–32 tons) has been adopted within all transport modules in the analysis. The waste fractions are assumed to go directly to the nearest facility for final disposal, which is assumed to 15 km as a representative distance in Sweden according to Saxton (2013).

Variation between +A1 impact results and +A2 is 7,5% which is below the 10% limit according to the programme operator. Since specific data was unavailable, it is generally assumed that material yield for module D is 100% for recycled steel and cast iron. No energy recovery has been applied due to landfill in module D as it is assumed to be negligible.

REVISION OF THE EPD

This EPD was revised on 2023-12-28 for editorial changes only. An updated logo was added, and an informative page covering the recyclability of cast iron was attached as an appendix on page 20. No changes have however been made to the verified data.

ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP[1] – total	kg CO_2eq	1,08E+01	8,7E-01	-6,97E-01	1,09E+01	5,05E-01	1,20E+00	ND	ND	ND	ND	ND	ND	ND	8,24E-04	1,05E-01	7,42E-01	1,77E-01	7,14E-02
GWP – fossil	kg CO_2eq	1,08E+01	8,69E-01	1,24E-01	1,18E+01	5,10E-01	6,74E-01	ND	ND	ND	ND	ND	ND	ND	8,24E-04	1,05E-01	7,52E-01	1,74E-01	-3,44E-01
GWP – biogenic	kg CO_2eq	-1,41E-02	5,08E-04	-8,47E-01	-8,6E-01	2,74E-04	5,22E-01	ND	ND	ND	ND	ND	ND	ND	2,29E-07	5,58E-05	-9,81E-03	2,64E-03	4,16E-01
GWP – LULUC	kg CO_2eq	5,68E-03	3,25E-04	2,66E-02	3,26E-02	1,84E-04	7,46E-05	ND	ND	ND	ND	ND	ND	ND	6,96E-08	3,71E-05	3,24E-04	3,46E-05	-5,02E-04
Ozone depletion potential	kg CFC_{-11}eq	7,07E-07	2,07E-07	1,79E-08	9,32E-07	1,16E-07	1,45E-07	ND	ND	ND	ND	ND	ND	ND	1,78E-10	2,37E-08	6,39E-08	1,04E-08	-1,80E-08
Acidification potential	mol H^+eq	5,74E-02	6,87E-03	1,05E-03	6,53E-02	1,46E-03	6,95E-03	ND	ND	ND	ND	ND	ND	ND	8,62E-06	4,27E-04	3,55E-03	4,91E-04	-4,15E-03
EP-freshwater[3]	kg Peq	5,78E-04	6,82E-06	1,36E-05	5,99E-04	4,33E-06	3,09E-06	ND	ND	ND	ND	ND	ND	ND	3,33E-09	8,74E-07	1,25E-05	2,43E-06	-3,45E-05
EP[1] -marine	kg Neq	1,01E-02	1,63E-03	2,92E-04	1,20E-02	2,91E-04	3,06E-03	ND	ND	ND	ND	ND	ND	ND	3,81E-06	1,27E-04	9,83E-04	1,32E-04	-5,85E-04
EP-terrestrial	mol Neq	1,39E-01	1,81E-02	3,75E-03	1,61E-01	3,24E-03	3,36E-02	ND	ND	ND	ND	ND	ND	ND	4,18E-05	1,40E-03	1,10E-02	1,53E-03	-6,59E-03
POCP[1] ("smog")	kg NMVOCeq	5,26E-02	5,45E-03	1,12E-03	5,92E-02	1,24E-03	9,23E-03	ND	ND	ND	ND	ND	ND	ND	1,15E-05	4,29E-04	3,04E-03	4,02E-04	-3,34E-03
ADP[1] -minerals & metals	kg Sbeq	1,18E-03	5,32E-06	3,25E-06	1,19E-03	1,41E-05	1,29E-06	ND	ND	ND	ND	ND	ND	ND	1,26E-09	2,83E-06	1,26E-05	8,92E-07	-4,75E-06
ADP-fossil resources	MJ	1,49E+02	5,54E+00	2,12E+00	1,57E+02	7,70E+00	9,30E+00	ND	ND	ND	ND	ND	ND	ND	1,13E-02	1,58E+00	5,12E+00	9,94E-01	-5,56E00
Water use[2]	m^3eq depr.	1,95E+00	4,76E-02	1,25E-01	2,12E+00	2,52E-02	1,89E-02	ND	ND	ND	ND	ND	ND	ND	2,12E-05	5,07E-03	5,49E-02	2,21E-02	-1,24E-01

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use, the results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicators mentioned (Frischknecht et al., 2000). 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e. ND = Not Declared

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO2e	1,08E+01	8,69E-01	1,24E-01	1,18E+01	5,10E-01	6,74E-01	ND	ND	ND	ND	ND	ND	ND	8,24E-04	1,05E-01	7,52E-01	1,74E-01	-3,44E-01

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renewable PER[4] as energy	MJ	7,01E+00	5,97E-02	9,40E+00	1,65E+01	1,10E-01	6,86E-02	ND	ND	ND	ND	ND	ND	ND	6,14E-05	2,22E-02	3,45E-01	4,65E-02	-1,28E+00
Renewable PER as material	MJ	1,68E+00	0,00E+00	6,98E+00	8,66E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable PER	MJ	8,69E+00	5,97E-02	1,64E+01	2,51E+01	1,10E-01	6,86E-02	ND	ND	ND	ND	ND	ND	ND	6,14E-05	2,22E-02	3,45E-01	4,65E-02	-1,28E+00
Non-renewable PER as energy	MJ	1,50E+02	5,54E+00	2,08E+00	1,58E+02	7,70E+00	9,30E+00	ND	ND	ND	ND	ND	ND	ND	1,13E-02	1,58E+00	5,12E+00	9,94E-01	-5,56E+00
Non-renewable PER as material	MJ	4,20E+00	0,00E+00	4,30E-02	4,24E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable. PER	MJ	1,54E+02	5,54E+00	2,12E+00	1,62E+02	7,70E+00	9,30E+00	ND	ND	ND	ND	ND	ND	ND	1,13E-02	1,58E+00	5,12E+00	9,94E-01	-5,56E+00
Secondary materials	kg	6,20E+00	0,00E+00	4,02E-05	6,20E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,58E-01
Renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,36E-01	9,42E-04	9,02E-04	1,38E-01	1,33E-03	8,56E-04	ND	ND	ND	ND	ND	ND	ND	1,00E-06	2,69E-04	2,08E-03	1,22E-03	-3,02E-03

4) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,14E-01	5,74E-03	8,55E-03	4,28E-01	7,93E-03	1,03E-02	ND	ND	ND	ND	ND	ND	ND	1,22E-05	1,60E-03	0,00E+00	4,65E-01	-1,19E-01
Non-hazardous waste	kg	5,51E+00	4,22E-01	2,22E-01	6,15E+00	5,46E-01	1,32E-01	ND	ND	ND	ND	ND	ND	ND	1,30E-04	1,10E-01	0,00E+00	1,09E-01	-1,13E+00
Radioactive waste	kg	1,51E-04	3,83E-05	8,11E-06	1,97E-04	5,28E-05	6,51E-05	ND	ND	ND	ND	ND	ND	ND	7,94E-08	1,08E-05	0,00E+00	5,56E-06	-5,95E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	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	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	7,96E-01	0,00E+00	3,00E-02	8,26E-01	0,00E+00	4,00E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	6,15E+00	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	4,41E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,20E-01	0,00E+00	0,00E+00
Exported energy	MJ	1,01E-06	0,00E+00	0,00E+00	1,01E0-6	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

SCENARIO DOCUMENTATION

MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Scenario parameter	Value
Electricity data source and quality	LCA inventory energy for 26% wind, 60% hydro, 0,16% photovoltaic and 13% biofuel energy (OneClickLCA 2016)
Electricity kg CO2e / kWh	0,03
District heating data source and quality	Not applicable
District heating CO2e / kWh	Not applicable

BIBLIOGRAPHY

B., Saxton, 2013, Swedish national and international road good transport 2012, Trafikanalys; Table 7a, Stockholm

Cast Iron Drainage System LCA background report 2023-04-01

Ecoinvent database v3.6 (2019) and One Click LCA database.

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

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

Int'l EPD System PCR 2019:14 Construction products, version 1.11 (2021-02-05)

R., Frischknecht, A., Braunschweig, P., Hofstetter, and P., Suter, 2000, Human health damages due to ionising radiation in life cycle impact assessment, Environmental Impact Assessment Review, Vol 20(2), pp. 159-189

ABOUT THE MANUFACTURER

Gustavsberg Rörsystem AB has created and developed drainage systems and pressure pipe systems since 1947. The product range also includes cast iron floor drains, light coverings and hand pumps. The combination of well-developed systems and the company's competent organization together with fast and secure deliveries means that the company can guide customers to solutions that make a difference. Gustavsberg Rörsystem AB has its main office, warehouse, and production site in Halmstad, Sweden, and a sales office in Bromma, Stockholm Sweden.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Gustavsberg Rörsystem AB
EPD author	Georg Eriksson, Gidås Sustainability Agency
EPD verifier	Bárbara M Civit
EPD program operator	The International EPD® System
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Bárbara M Civit
EPD verification started on	2023-04-01
EPD verification completed on	2028-04-01
Supply-chain specific data %	100 %
Approver of the EPD verifier	The International EPD System
Author & tool verification	**Answer**
EPD author	Georg Eriksson, Gidås
EPD author training completion	2021-04-30
EPD Generator module	Construction products
Independent software verifier	Ugo Pretato, Studio Fieschi & soci
Software verification date	2021-05-11

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of:

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present.

With respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Verification and registration (environdec)

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
PCR	PCR 2019:14 Construction products, version 1.11
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Third party verifier	Bárbara M Civit
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up during EPD validity involves third party verifier	☐ Yes ☑ No

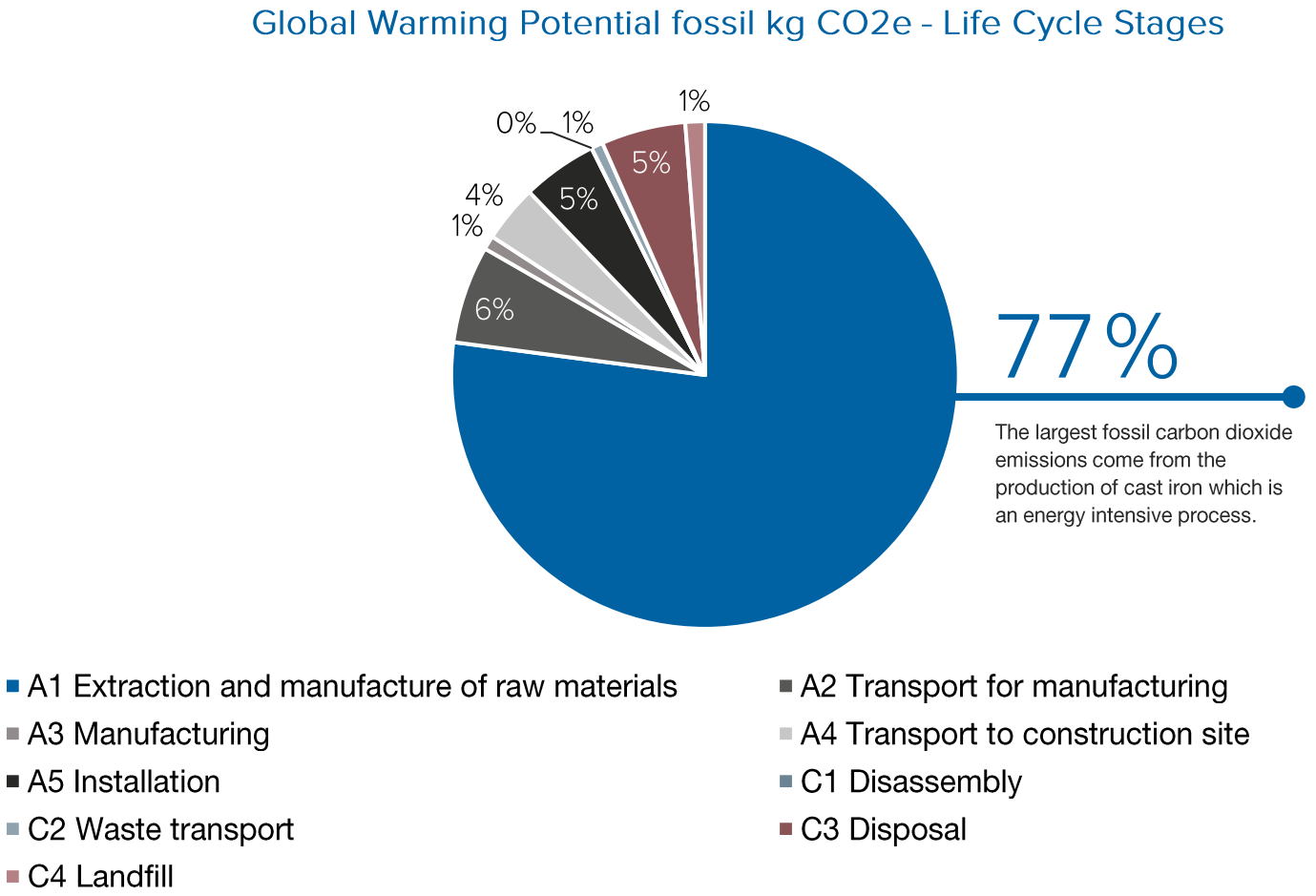
THE INTERNATIONAL EPD® SYSTEM

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com

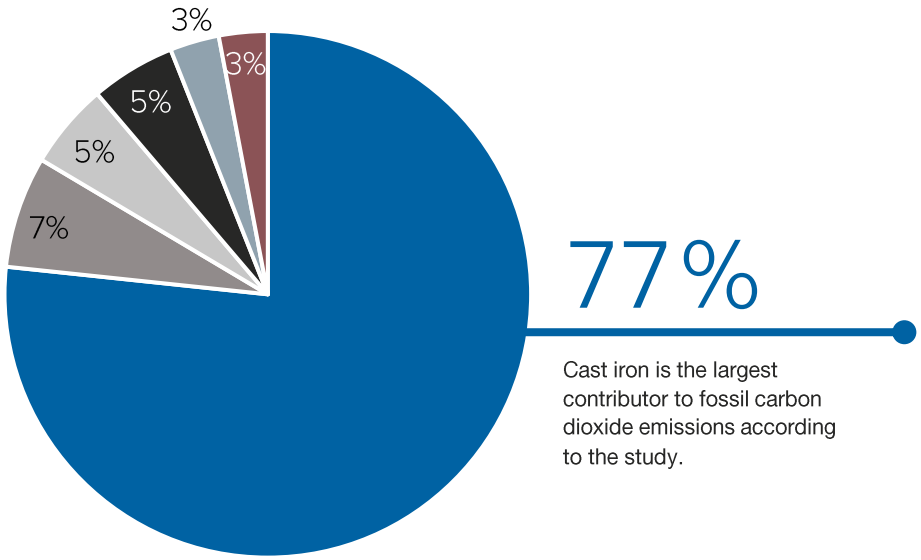
Annex 1: Environmental Impacts – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Potential	kg CO_2eq	1,02E+01	3,69E-01	1,49E-01	1,07E+01	5,05E-01	6,69E-01	ND	ND	ND	ND	ND	ND	ND	8,18E-04	1,04E-01	7,46E-01	1,72E-01	-3,11E-01
Ozone depletion Potential	kg CFC_{-11}eq	4,87E-07	6,73E-08	1,52E-08	5,70E-07	9,22E-08	1,15E-07	ND	ND	ND	ND	ND	ND	ND	1,41E-10	1,89E-08	5,17E-08	8,54E-09	-1,68E-08
Acidification	kg SO_2eq	4,99E-02	4,11E-03	7,15E-04	5,47E-02	1,03E-03	1,01E-03	ND	ND	ND	ND	ND	ND	ND	1,22E-06	2,10E-04	2,31E-03	3,51E-04	-3,62E-03
Eutrophication	kg PO_4^3eq	9,23E-03	5,02E-04	2,61E-04	1,00E-02	2,13E-04	1,91E-04	ND	ND	ND	ND	ND	ND	ND	2,14E-07	4,31E-05	7,21E-04	6,35E-03	-1,25E-03
POCP (“smog”)	kg C_2H_4eq	7,43E-03	1,23E-04	6,30E-05	7,62E-03	6,15E-05	1,02E-04	ND	ND	ND	ND	ND	ND	ND	1,25E-07	1,38E-05	9,38E-05	1,51E-05	-4,48E-04
ADP-elements	kg Sbeq	1,18E-03	5,32E-06	3,25E-06	1,19E-03	1,41E-05	1,29E-06	ND	ND	ND	ND	ND	ND	ND	1,26E-09	2,83E-06	1,26E-05	8,92E-07	-4,75E-06
ADP-fossil	MJ	1,49E+02	5,54E+00	2,12E+00	1,57E+02	7,70E+00	9,30E+00	ND	ND	ND	ND	ND	ND	ND	1,13E-02	1,58E+00	5,12E+00	9,94E-01	-5,56E+00

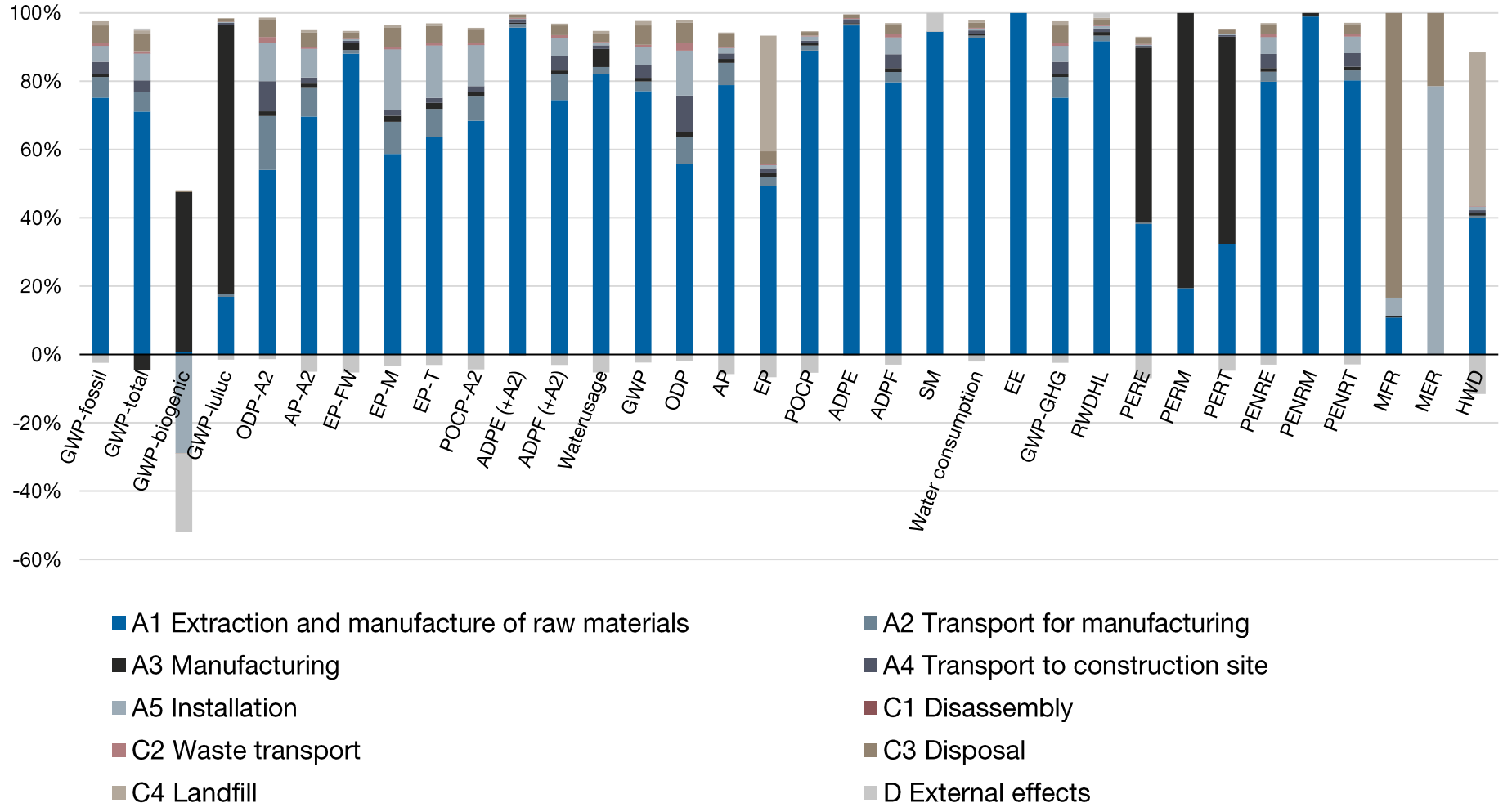
Annex 2: Life-Cycle Assessment Result Visualizations



Global Warming Potential fossil kg CO2e - Classifications



CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF



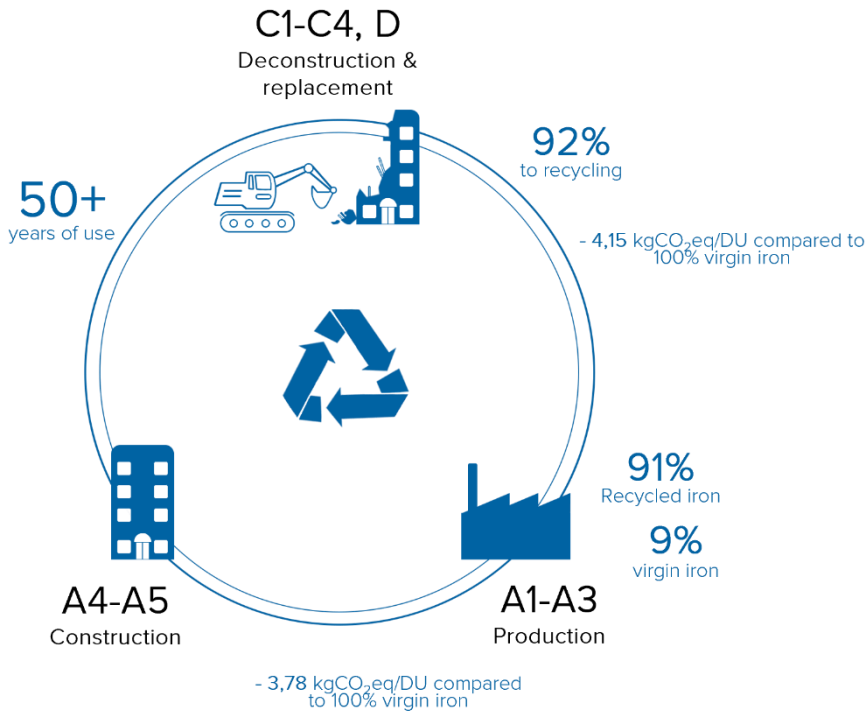
Annex 3: Environmental benefits of cast iron recycling

Cast iron and steel have excellent recycling capabilities which enables a high use of recycled input in products and close to full recycling at the end of life. Cast iron does not lose its properties during recycling, and approximately 90% of the cast iron in Europe is based on post-consumer waste. Gustavsberg Rörsystem AB utilize this by making drainage systems which are based on 91% recycled iron. Manufacturing processes produce only 0,03kg (0,4%) of waste cast iron per declared unit, making it very efficient. Furthermore, at the end of life, 92% of the cast iron is recycled which enables manufacturing of new products with low input of virgin material.

As cast iron is 100% recyclable, it can at the end-of-life form products with the same standard and quality as the original material. This means that the material can be recycled again and again, leading to an ever-increasing amount of secondary cast iron in the system. This, in combination with a high life expectancy of 50+ years makes cast iron drainage systems a sustainable choice.

However, the EPD result does not entirely show the benefits of the high recycling rate (92%). This is because the modular structure of EPD results does not consider any benefits from the recycling of post consumer material to avoid double counting. This means that only recycling of cast iron based on virgin material (9%) is attributed with recycling benefits, such as reduction of energy use and GHG-emissions. Whereas the recycling of iron based on secondary (recycled) iron will not have any benefits as they are accounted for in the previous life cycle. Therefore, the reduction of GWP total in module D is only 0,311 kg CO2eq per declared unit. Hypothetically, if all the recycled iron would replace an equal amount of primary iron it would reduce the GWP total with 4,15 kg CO2eq per declared unit. Which clearly shows the benefits from using recycled iron as well as waste treatment systems which ensure a high recycling rate at the end-of-life.

A similar situation applies to the use and recycling of steel which constitutes a smaller share but still a very important part of Gustavsberg Rörsystems' drainage systems. The share of steel based on recycled post-consumer waste in Gustavsberg Rörsystems' products is about 20%, which means a higher impact from the production phase but at the same time larger benefits from the recycling.



Annex 4: Explanation of conversion to alternative dimensions

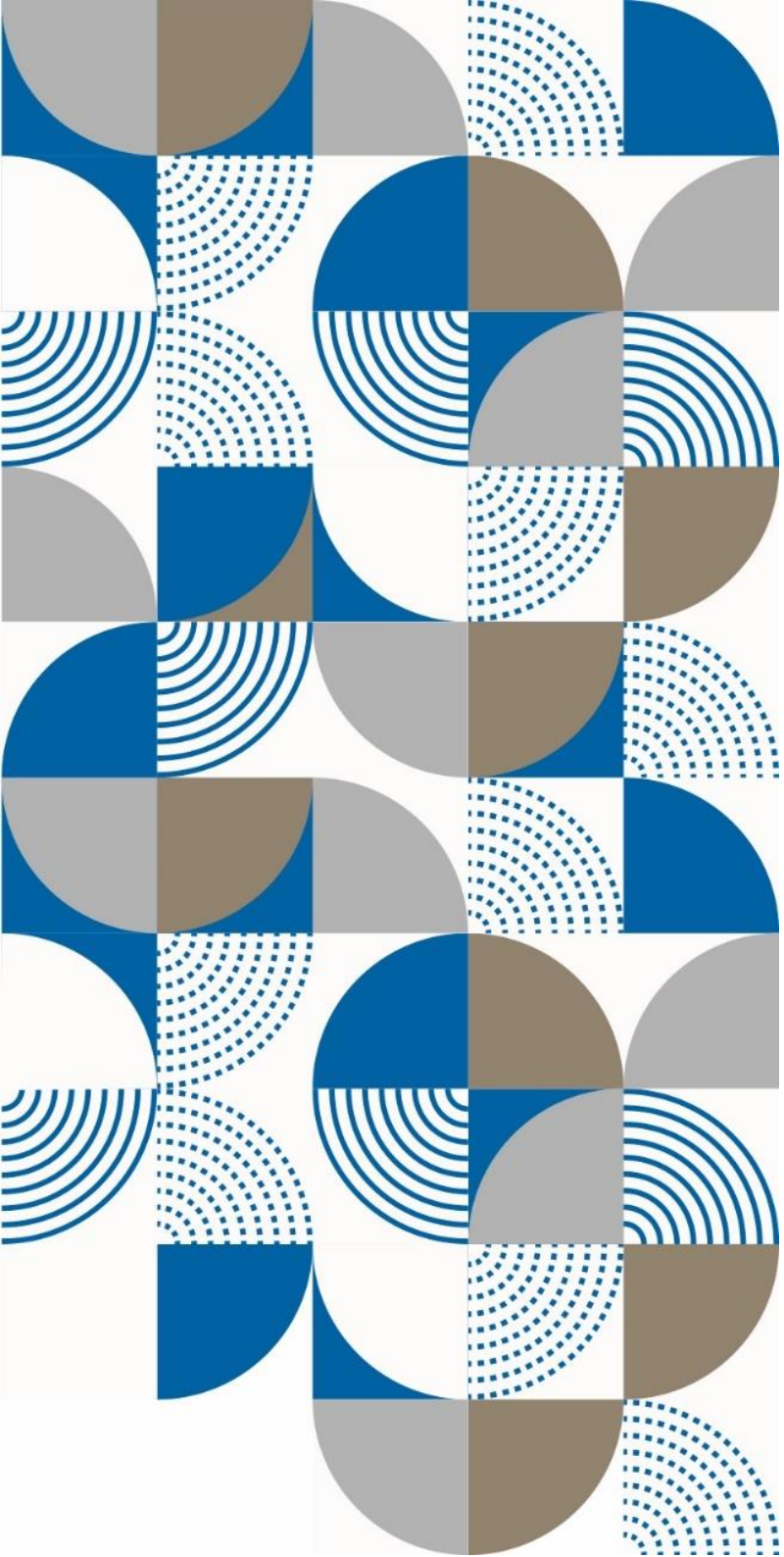
Since this EPD concerns an entire system of components, it represents an installation scenario of these. However, an explanation of how to convert and apply the result to separate parts of such a system is given here.

As the declared unit of the system is 1 meter, the total impact of whichever parts of this system are used can be calculated by multiplying the impacts presented in this EPD by the total number of meters used, regardless of which components from the system are included in the specific instance. This is because, as mentioned above, the result of the LCA presented in this EPD is based on average values of all components included in the cast iron wastewater drainage system for the studied reference year.

The table in Annex 4 shows a fictional array of components and their individual lengths. In the “Total” row, the length of each component has been multiplied by its quantity, after which all lengths have been summarised to 15,180 m.

It is now possible to multiply the results presented in this EPD by 15,180 in order to calculate the total impacts for the specific system described in the environmental impact tables in this EPD.

Name	Length per comp. [m]	Quantity
Component 1	0,275	8
Component 2	0,025	24
Component 3	0,680	4
Component 4	1,165	4
Component 5	0,500	10
Total	**15,180**	**50**



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