Environmental Product Declaration

in accordance with ISO 14025 and EN 15804

COOL-FIT 4.0 for refrigeration

Declaration	
Declaration owner	Georg Fischer Piping Systems Ltd.
Program	The International EPD® System, www.environdec.com
Program operator	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
EPD registration number	S-P-06020
Published	2022-07-25
Valid until	2027-07-01
Geographical scope	Global
EPD-Type	Cradle to gate with options
Data calculated by	Swiss Climate AG
Third-party verifier	Dr. Nikolay Minkov, greenzero.me GmbH
Life Cycle Inventory (LCI) source for generic background processes	Ecoinvent 3.7
Software	SimaPro (Version 9.2.0.2)

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1. Declaration of general information

1.1 Introduction

GF Piping Systems is one of the three division of Georg Fischer AG with its headquarters in Schaffhausen, Switzerland. GF Piping Systems is a leading provider of plastic and metal piping systems with a global presence, enabling the safe and sustainable transport of fluids. The company specializes in plastic piping systems and solutions as well as services in all project phases. The product portfolio includes pipes, fittings, valves and the corresponding automation and jointing technology for industry, building technology as well as water and gas utilities. GF Piping Systems proactively incorporates its environmental responsibility into its everyday business activities. Because we view environmental awareness as one of the corporation's core values, internal structures and processes are geared towards sustainability. Within this context, we increasingly utilize Life Cycle Assessments (LCA) to gain insight into the environmental footprint of our piping systems or products across its different life cycle phases.

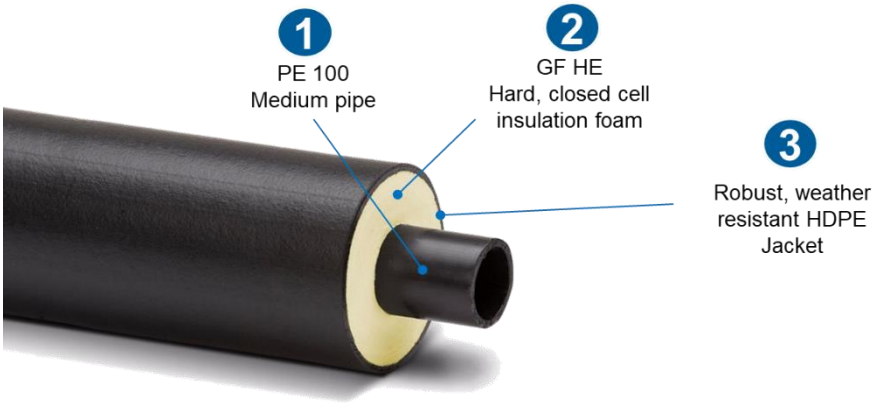
This EPD is based on a detailed background report written by Swiss Climate AG. The report is in line with EN 15804:2012+A2:2019 "Sustainability of construction works – environmental product declarations – Core rules for the product category of construction products" and the Product Category Rule (PCR) for Construction Goods (PCR 2019:14 by the International EPD System). Data regarding the production of the COOL-FIT 4.0 piping systems for the refrigeration application is company specific and was provided by GF Piping Systems.

1.2 System

Product system description

The GF Piping Systems' COOL-FIT 4.0 is a pre-insulated, corrosion and condensation-free solution designed for secondary cooling with brine, glycol, ethanol and chilled water, responding the needs of many cooling applications. The COOL-FIT 4.0 system includes pre-insulated pipes as well as pre-insulated fittings, valves, flexible hoses, relevant jointing technology and tools.

COOL-FIT 4.0 products feature a 3-layer structure. COOL-FIT 4.0 has a PE100 inner pipe, GF HE insulation and a HDPE weather resistant outer jacket. The single components are firmly connected with each other. It has a dimension range from d32/D90 mm up to d450/D630 mm and the nominal insulation is 40 mm.
COOL-FIT 4.0 is suitable for indoor and outdoor cooling applications with cooling agent temperatures below 0°C, from -50 °C to 60°C. Typical applications are industrial and commercial refrigeration such as breweries, food processing, cold stores, supermarkets or diaries.

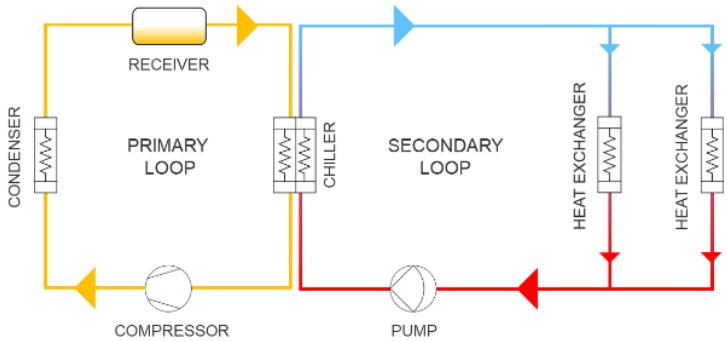


Pre-insulated 3-in-1 layered structure of a COOL-FIT 4.0 pipe

Functionality and use

The piping system considered comprises mainly COOL-FIT 4.0 products used for refrigeration of a cold store. In a cold store foodstuffs (vegetables, dairies or meat) and beverages are kept at a cold and controlled temperature. Temperatures for this application typically vary from -25 °C to +5 °C.

The cooling of the refrigerant liquid circulating in the COOL-FIT 4.0 piping system is achieved via primary and secondary closed loops as schematically shown below. The primary loop is short, it contains a small amount of HFC liquid and it is used to cool down the larger secondary loop containing a water based HFC free liquid. The secondary loop distributes the cooling liquid to the utilities. COOL-FIT 4.0 System's products are used in the secondary loop, that is the system under consideration.



Top: typical COOL-FIT 4.0 installation for refrigeration in a cold store.

Bottom: Primary (yellow) and secondary (red/blue) cooling loops.

Materials

The material of the main pipe system components (pipes and fittings) is PE100 (HDPE). The whole system consists of the materials as listed below:

Material	Weight (kg)
HDPE, GF-HE and other plastics	753
Ferrous metals	63
Non-ferrous metals	6
Fibre reinforced polyamide	5

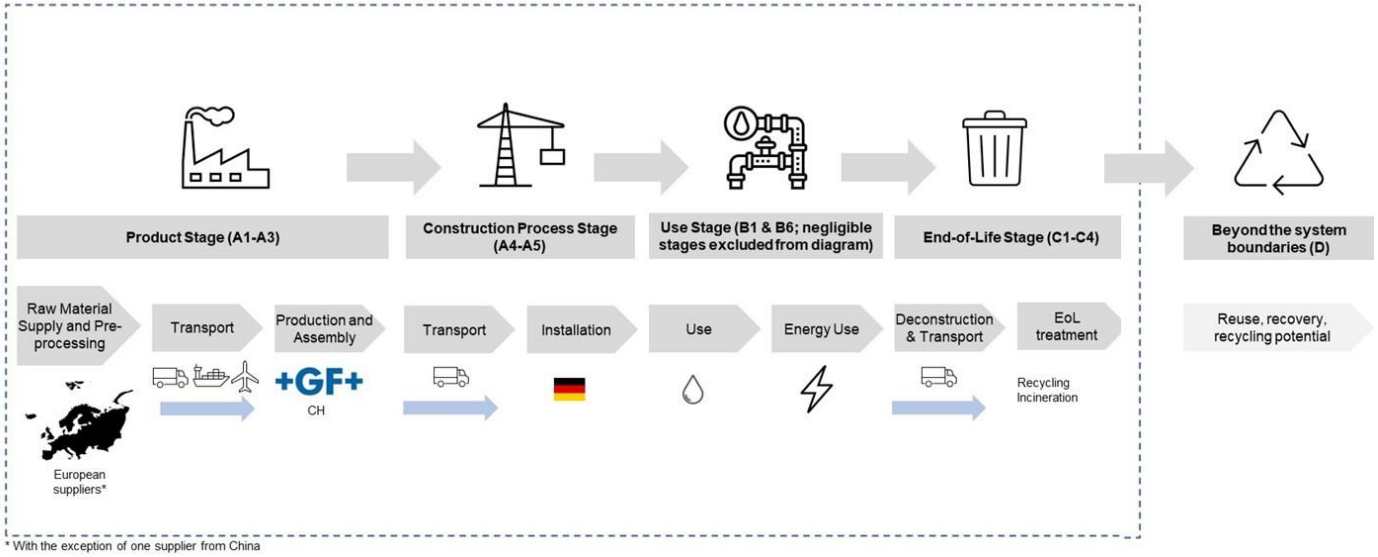
Reference service life

The results are evaluated for a reference service life of 25 years.

Declared Unit (DU)

In accordance with the PCR 2019:14 the declared unit is defined as 1 meter of COOL-FIT 4.0. In order to express the environmental impacts per meter piping, the conversion factor 316 was used, corresponding to the piping length of one COOL-FIT 4.0 system.

COOL-FIT – System Boundaries



* With the exception of one supplier from China

1.3 Components of the system

The system mainly consists of GF Piping Systems components. However, to complete the system also external components (Ext.) which are not produced by GF Piping Systems are necessary. The calculation of the environmental impact of these products is based on publicly available data and assumptions.

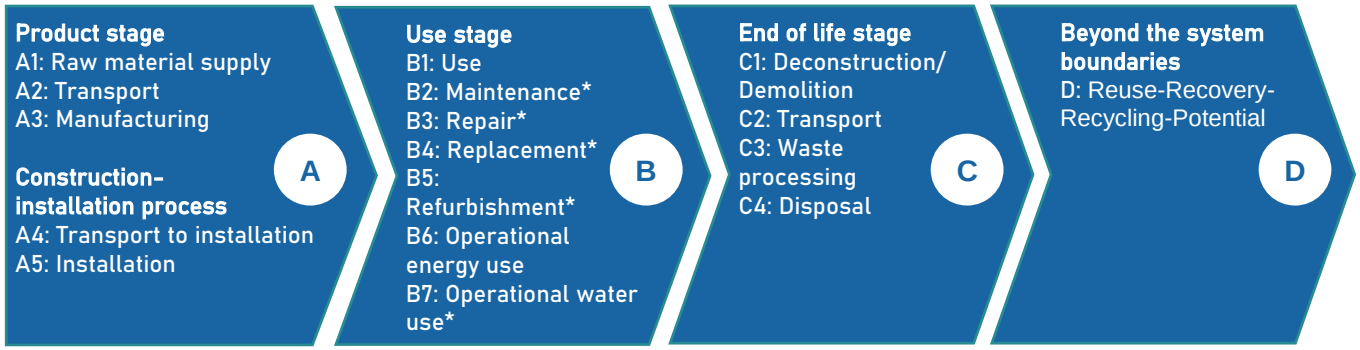
System Components	Product Code	Pieces or meter	Main Material
Pipes			
COOL-FIT 4.0 Pipe d32/D90	738 173 108	152 m	HDPE and GF-HE
COOL-FIT 4.0 Pipe d40/D110	738 173 109	68 m	HDPE and GF-HE
COOL-FIT 4.0 Pipe d50/D110	738 173 110	30 m	HDPE and GF-HE
COOL-FIT 4.0 Pipe d63/D125	738 173 111	66 m	HDPE and GF-HE
Fittings			
COOL-FIT 4.0 T90 equal d32/D90	738 203 108	8	HDPE and GF-HE
COOL-FIT 4.0 T90 equal d40/D110	738 203 109	8	HDPE and GF-HE
COOL-FIT 4.0 T90 equal d50/D110	738 203 110	6	HDPE and GF-HE
COOL-FIT 4.0 T90 equal d63/D125	738 203 111	4	HDPE and GF-HE
COOL-FIT 4.0 Reducer d40/110 - d32/90	738 903 206	10	HDPE and GF-HE
COOL-FIT 4.0 Reducer d50/110 - 32/90	738 903 209	6	HDPE and GF-HE
COOL-FIT 4.0 Reducer d50/110 - 40/110	738 903 210	2	HDPE and GF-HE
COOL-FIT 4.0 Reducer d63/125 - 32/90	738 903 212	2	HDPE and GF-HE
COOL-FIT 4.0 Reducer d63/125 - d40/110	738 903 213	2	HDPE and GF-HE
COOL-FIT 4.0 Reducer d63/125 - d50/110	738 903 214	2	HDPE and GF-HE
COOL-FIT 4.0 Coupler d32/D90	738 913 108	22	HDPE and GF-HE
COOL-FIT 4.0 Coupler d40/D110	738 913 109	6	HDPE and GF-HE
COOL-FIT 4.0 Coupler d50/D110	738 913 110	4	HDPE and GF-HE
COOL-FIT 4.0 Coupler d63/D125	738 913 111	4	HDPE and GF-HE
COOL-FIT 4.0 Coupler d75/D140	738 913 112	2	HDPE and GF-HE
COOL-FIT 4.0 Bend 90° d32/D90	738 103 108	42	HDPE and GF-HE
COOL-FIT 4.0 Bend 90° d40/D110	738 103 109	8	HDPE and GF-HE
COOL-FIT 4.0 Bend 90° d50/D110	738 103 110	6	HDPE and GF-HE
COOL-FIT 4.0 Bend 90° d63/D125	738 103 111	8	HDPE and GF-HE
COOL-FIT Flange adaptor PE d 63	738 710 011	2	HDPE and GF-HE
Backing flange PP-Steel PN10 d63	727 700 211	6	Ferrous metals / other plastics
Adaptor Fitting PE/Brass with male thread R 32/1"	738 954 528	28	Non-Ferrous metals / HDPE and GF-HE
ELGEF Plus Flange adaptor PE100 SDR11 d63	753 800 011	4	HDPE
Screws in steel	n/a	8	Ferrous metals
Valves			
COOL-FIT 4.0 Ball Valve 546 ABS/EPDM d32	138 546 108	36	Other plastics
COOL-FIT 4.0 Ball Valve 546 ABS/EPDM d50	138 546 110	4	Other plastics
COOL-FIT 4.0 Ball Valve 546 ABS/EPDM d63	138 546 111	2	Other plastics
Butterfly Valve 565 d63	199 565 000	2	Other plastics
Pump	n/a	1	Ferrous metals
Clamps	n/a	169	Ferrous metals

1.4 Comparability

EPDs of construction products may not be comparable if they do not comply with the EN 15804:2012+A2:2019.

2. Declaration of environmental parameters derived from LCA

2.1 Flow diagram of the processes included in the LCA



* Stage is negligible. Please refer to chapter 2.4 for details.

2.2 Core environmental impact indicators

Parameters describing core environmental impacts		Product stage				Construction process stage		Use stage		End of life			Beyond the system boundaries
		Raw material supply	Transport	Manufacturing	Total (of product stage)	Transport	Construction installation	Use	Operational Energy Use	Deconstruction	Transport	Waste processing	Reuse-Recovery-Recycling-Potential
		A1	A3	A3	A1-3	A4	A5	B1	B6	C1	C2	C3	D
Climate change - Total	kg CO_2 eq	7,94E+00	8,06E-02	1,57E+00	9,59E+00	2,25E-01	3,79E+00	1,44E+00	3,40E+02	4,33E-02	1,05E-02	3,62E+00	-2,50E+00
Climate change - Fossil	kg CO_2 eq	7,84E+00	8,04E-02	1,47E+00	9,39E+00	2,25E-01	4,03E+00	1,42E+00	3,10E+02	4,32E-02	1,05E-02	3,62E+00	-2,45E+00
Climate change - Biogenic	kg CO_2 eq	1,01E-01	1,83E-04	9,49E-02	1,96E-01	5,35E-04	-2,50E-01	1,82E-02	2,92E+01	1,30E-04	2,50E-05	7,55E-04	-5,41E-02
Climate change - Land use and LU change	kg CO_2 eq	3,31E-03	2,81E-05	1,19E-03	4,53E-03	7,47E-05	4,95E-03	1,55E-03	4,11E-01	1,90E-05	3,50E-06	1,71E-05	-1,44E-03
Ozone depletion	kg CFC11 eq	5,37E-07	1,83E-08	2,26E-07	7,81E-07	5,14E-08	1,22E-06	5,64E-07	8,55E-06	7,79E-09	2,41E-09	8,98E-09	-3,34E-08
Acidification	mol H+ eq	3,67E-02	4,32E-04	5,58E-03	4,27E-02	9,08E-04	1,63E-02	6,38E-03	7,23E-01	1,69E-04	4,25E-05	1,14E-03	-6,98E-03
Eutrophication freshwater	kg P eq	2,27E-03	5,44E-06	6,64E-04	2,94E-03	1,56E-05	1,44E-03	6,19E-04	4,55E-01	7,66E-06	7,30E-07	1,11E-05	-1,75E-03
Eutrophication aquatic marine	kg N eq	8,62E-03	1,25E-04	1,31E-03	1,01E-02	2,77E-04	3,55E-03	1,32E-03	2,29E-01	4,05E-05	1,29E-05	8,21E-04	-1,41E-03
Eutrophication terrestrial	mol N eq	7,19E-02	1,37E-03	1,33E-02	8,66E-02	3,02E-03	3,51E-02	1,29E-02	1,66E+00	4,34E-04	1,41E-04	5,86E-03	-1,39E-02
Photochemical ozone formation	kg NMVOC eq	2,93E-02	4,10E-04	5,42E-03	3,51E-02	9,47E-04	1,84E-02	4,80E-03	4,17E-01	1,49E-04	4,43E-05	1,41E-03	-6,31E-03
Depletion of abiotic resources - minerals and metals	kg Sb eq	2,34E-04	2,61E-07	8,99E-05	3,24E-04	7,51E-07	5,16E-05	2,23E-05	2,63E-03	5,71E-07	3,52E-08	2,28E-07	-1,91E-05
Depletion of abiotic resources - fossil fuels	MJ	2,11E+02	1,22E+00	1,68E+01	2,29E+02	3,44E+00	7,30E+01	2,97E+01	4,20E+03	5,91E-01	1,61E-01	8,97E-01	-7,45E+01
Water use	m^3 depriv.	6,36E+00	3,76E-03	1,25E+00	7,61E+00	1,08E-02	3,01E+00	1,39E+00	1,82E+01	3,91E-03	5,06E-04	1,50E-03	-1,46E+00

2.3 Additional environmental impact indicators

Parameters describing additional environmental impact indicators		Product stage				Construction process stage		Use stage		End of life			Beyond the system boundaries
		Raw material supply	Transport	Manufacturing	Total (of product stage)	Transport	Construction installation	Use	Operational Energy Use	Deconstruction	Transport	Waste processing	Reuse-Recovery-Recycling-Potential
		A1	A3	A3	A1-3	A4	A5	B1	B6	C1	C2	C3	D
Particulate Matter emissions	disease inc.	4,35E-07	5,99E-09	6,48E-08	5,05E-07	1,72E-08	1,46E-07	4,78E-08	2,99E-06	2,10E-09	8,06E-10	5,08E-09	-4,10E-08
Ionizing radiation, human health	kBq U-235 eq	5,54E-01	6,35E-03	3,40E-01	9,00E-01	1,80E-02	5,46E-01	2,37E-01	5,28E+01	3,05E-03	8,41E-04	2,34E-03	-1,96E-01
Eco-toxicity (freshwater)	CTUe	3,35E+02	9,38E-01	6,49E+01	4,01E+02	2,66E+00	2,97E+02	1,41E+02	3,28E+03	8,05E-01	1,25E-01	4,47E+00	-1,14E+01
Human toxicity, cancer effects	CTUh	4,76E-08	3,41E-11	2,94E-09	5,05E-08	9,26E-11	4,17E-09	1,57E-09	9,47E-08	4,42E-11	4,33E-12	1,99E-10	-2,35E-10
Human toxicity, non-cancer effects	CTUh	4,23E-07	9,56E-10	3,26E-08	4,57E-07	2,75E-09	2,97E-07	1,43E-07	2,71E-06	5,52E-10	1,29E-10	7,02E-09	-1,26E-08
Land use related impacts / Soil quality	Pt	1,59E+01	1,04E+00	2,92E+00	1,98E+01	3,02E+00	7,19E+01	4,15E+00	8,73E+02	2,47E-01	1,41E-01	3,37E-01	-6,93E-01

2.4 Scenarios and additional technical information

The investigated product system is the COOL-FIT 4.0 comprising of a system of components listed in 1.3, designed for air conditioning and manufactured across various locations in Switzerland.

Product stage	
A1	The production of the raw material was modeled using generic European data (source: ecoinvent) and complemented by specific data from GF Piping Systems to consider the company specific combination of raw materials.
A2	Wherever possible, the specific transport distances were taken into account. Data from ecoinvent with the respective parameters was used to model the transportation of raw materials and pre-products, including all packaging materials, to GF manufacturing sites in Switzerland. Data of an average lorry (EURO5) and average load factor from ecoinvent was selected. For sea freight, the average container ship was selected.
A3	In the module A3, the COOL-FIT 4.0 is manufactured across a number of locations in Switzerland. Pipes are produced by an external manufacturer located in Switzerland. Fittings are produced in Schaffhausen, Switzerland. For a certain portion of the electricity consumption, a guarantee of origin allowed for a calculation of electricity using the exact source (hydropower). Where the energy source was not known, the average medium voltage electricity mix for Switzerland was used. Disposal of waste which was incurred during manufacturing (including production scraps and to some extent packaging) was calculated according to specific scenarios estimated by production specialists at GF Piping systems. The production of components purchased from external suppliers was modeled using generic ecoinvent data for the process in question.

Construction process	
A4	After the manufacturing process the pipes are first sent to a distribution center in Schaffhausen, Switzerland, where the fittings are produced. From there, these components are transported to a retailer in Reinsdorf, Germany. It is assumed that other components are transported directly from the production site to the retailer in Reinsdorf, Germany and finally to the installation site in Oelsnitz, Germany. The mode of transportation is truck, whereby an average lorry (EURO5) and average load factor from ecoinvent were used for the calculation.
A5	At the installation site in Oelsnitz, Germany, the COOL-FIT 4.0 is installed into the reference building. Installation waste and waste from packaging is disposed of in this stage. Average data relating to disposal scenarios in Germany were used (scenarios listed under C3). This stage also involves the introduction of a refrigerant into the system where specific information is available for the consumption thereof. Some energy is required for welding activities whereby the average medium voltage electricity mix for Germany is used. Estimations made by an internal installation expert were used to derive estimates for the transportation requirements for construction staff. For the transportation of construction staff, an average passenger vehicle was used for the calculation.

Use stage	
B1	Environmental impacts in the use phase are derived from the need for replacement of 2 % of the refrigerant solution per annum over the 25 year reference life. Specific information is used to account for the liquid refrigerant lost each year as well as the emissions to air that are caused through this loss.

B2-B5	The system is designed to be operated without repair, maintenance, replacement or refurbishment during the reference service life. This is subject to the condition that the system is operated according to the specifications given by GF Piping Systems. Therefore this stage is considered as not relevant.
B6	Operational energy use represents a significant process within the use stage. Here, electricity is consumed on the one hand through circulating pumps which are required to circulate the refrigerant throughout the system. On the other hand, another minimal amount of electricity is consumed through chillers that are required to compensate for heat lost through the system during the 25 years of reference service life. The circulating pump requires significant electricity consumption, as the refrigerant fluid is circulated 24 hours per day for the entire 25 years of reference service life. As the exact electricity mix during the use phase is unknown, the average medium voltage electricity mix for Germany, where the system is installed, was used.
B7	No operational water use is necessary for the system. Therefore, this stage is considered as not relevant.

End of life stage	
C1	Deconstruction of the system is mainly manual work. Estimations made by an internal installation expert were used to derive estimates for the transportation requirements for construction staff. For the transportation of construction staff, an average passenger vehicle was used for the calculation. A minimal amount of energy input is also required to cut the pipes.
C2	An average distance of 20 km was assumed as a conservative estimate of the distance required to transport the materials to an appropriate disposal site within the city of Oelsnitz, Germany. The mode of transportation is truck, whereby an average lorry (EURO5) and average load factor from ecoinvent were used for the calculation.
C3	The following table summarizes End-of-Life scenarios for different material categories included in the COOL-FIT 4.0 system. Calculations are based on average data for Germany for each of the processes (i.e. recycling and incineration of the respective material categories).
C4	It is assumed that materials are recycled or incinerated according to the scenarios defined under C3. Therefore module C4 is not relevant.

Material category	**Scenarios**
Ferrous and non-ferrous metals	100 % recycling
HDPE, GF-HE and other plastics	40 % recycling 60 % incineration

2.5 Parameters describing resource use

Parameters describing resource use		Product stage				Construction process stage		Use stage		End of life			Beyond the system boundaries
		Raw material supply	Transport	Manufacturing	Total (of product stage)	Transport	Construction installation	Use	Operational Energy Use	Deconstruction	Transport	Waste processing	Reuse-Recovery-Recycling-Potential
		A1	**A2**	**A3**	**A1-3**	**A4**	**A5**	**B1**	**B6**	**C1**	**C2**	**C3**	**D**
Primary energy resources – Renewable: Use as energy carrier	MJ, net calorific value	7.43E+00	1.63E-02	1.97E+02	2.04E+02	4.68E-02	2.10E+01	1.96E+00	8.88E+02	1.59E-02	2.19E-03	2.00E-02	-3.49E+00
Primary energy resources – Renewable: Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary energy resources – Renewable: Total	MJ, net calorific value	7.43E+00	1.63E-02	1.97E+02	2.04E+02	4.68E-02	2.10E+01	1.96E+00	8.88E+02	1.59E-02	2.19E-03	2.00E-02	-3.49E+00
Primary energy resources – Non-renewable: Use as energy carrier	MJ, net calorific value	2.26E+02	1.30E+00	1.76E+01	2.45E+02	3.65E+00	7.80E+01	3.17E+01	4.51E+03	6.29E-01	1.71E-01	9.74E-01	-8.01E+01
Primary energy resources – Non-renewable: Used as raw materials	MJ, net calorific value	3.59E-01	0.00E+00	5.83E-02	4.18E-01	1.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary energy resources – Non-renewable: Total	MJ, net calorific value	2.27E+02	1.30E+00	1.77E+01	2.46E+02	3.65E+00	7.80E+01	3.17E+01	4.51E+03	6.29E-01	1.71E-01	9.74E-01	-8.01E+01
Secondary material	kg	2.60E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	M3	1.12E-01	1.26E-04	5.23E-01	6.35E-01	3.60E-04	6.67E-02	3.03E-02	6.71E-01	1.37E-04	1.69E-05	1.29E-03	-1.97E-02

2.6 Parameters describing waste production

Parameters describing waste production		Product stage				Construction process stage		Use stage		End of life			Beyond the system boundaries
		Raw material supply	Transport	Manufacturing	Total (of product stage)	Transport	Construction installation	Use	Operational Energy Use	Deconstruction	Transport	Waste processing	Reuse-Recovery-Recycling-Potential
		A1	A3	A3	A1-3	A4	A5	B1	B6	C1	C2	C3	D
Hazardous waste disposed	kg	1,95E-04	3,01E-06	7,36E-05	2,72E-04	8,69E-06	8,63E-05	2,88E-05	5,75E-03	2,59E-06	4,07E-07	4,31E-06	-2,06E-05
Non-hazardous waste disposed	kg	1,08E+00	7,54E-02	9,03E-01	2,06E+00	2,21E-01	5,62E-01	1,80E-01	1,99E+01	1,49E-02	1,03E-02	1,08E-01	8,91E-02
Radioactive waste disposed	kg	2,02E-04	8,34E-06	9,83E-05	3,09E-04	2,35E-05	1,98E-04	7,54E-05	1,64E-02	3,51E-06	1,10E-06	2,22E-06	-5,80E-05

2.7 Parameters describing output flows

Parameters describing output flows		Product stage				Construction process stage		Use stage		End of life		
		Raw material supply	Transport	Manufacturing	Total (of product stage)	Transport	Construction installation	Use	Operational Energy Use	Deconstruction	Transport	Waste processing
		A1	A3	A3	A1-3	A4	A5	B1	B6	C1	C2	C3
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material recycling	kg	0.00E+00	0.00E+00	2.42E-02	2.42E-02	0.00E+00	1.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	1.63E-01	1.63E-01	0.00E+00	8.48E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	6.19E-01	6.19E-01	0.00E+00	2.35E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	1.62E+00	1.62E+00	0.00E+00	6.15E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+01

References

CEN. (2019). DIN EN 15804:2020-03, Nachhaltigkeit von Bauwerken- Umweltproduktdeklarationen- Grundregeln für die Produktkategorie Bauprodukte; Deutsche Fassung EN_15804:2012+A2:2019. Beuth Verlag GmbH.

EPD International. (2019). Product Category Rules (PCR) – Construction Products.

Panda, Achyut K., et al. "Thermolysis of Waste Plastics to Liquid FuelA Suitable Method for Plastic Waste Management and Manufacture of Value Added Products—A World Prospective." Renewable and Sustainable Energy Reviews, no. 1, Elsevier BV, Jan. 2010, pp. 233–48. Crossref, doi:10.1016/j.rser.2009.07.005.

Umweltbundesamt. "THE ROLE OF WASTE INCINERATION IN GERMANY". 2008, https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/3872.pdf.

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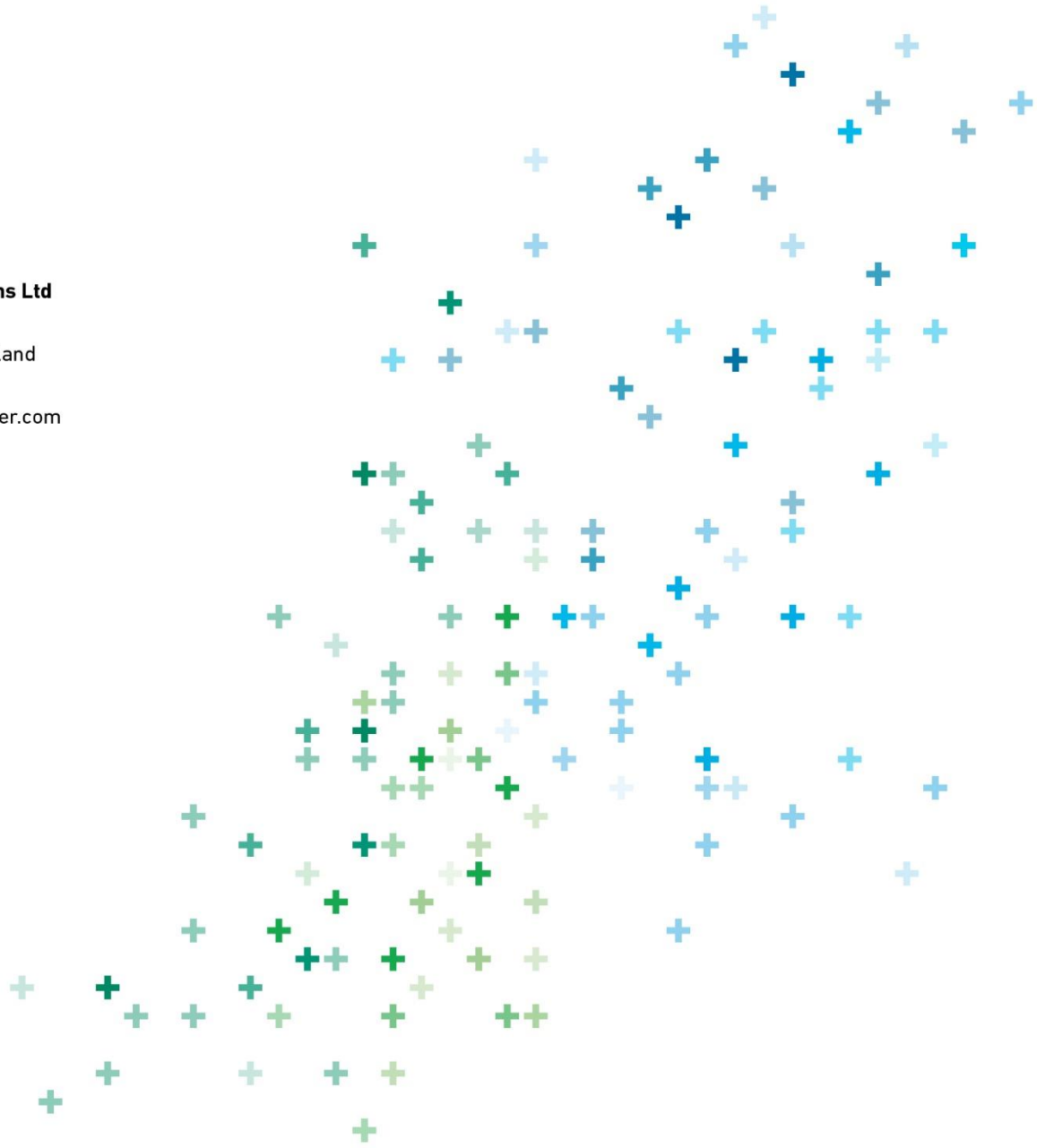

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