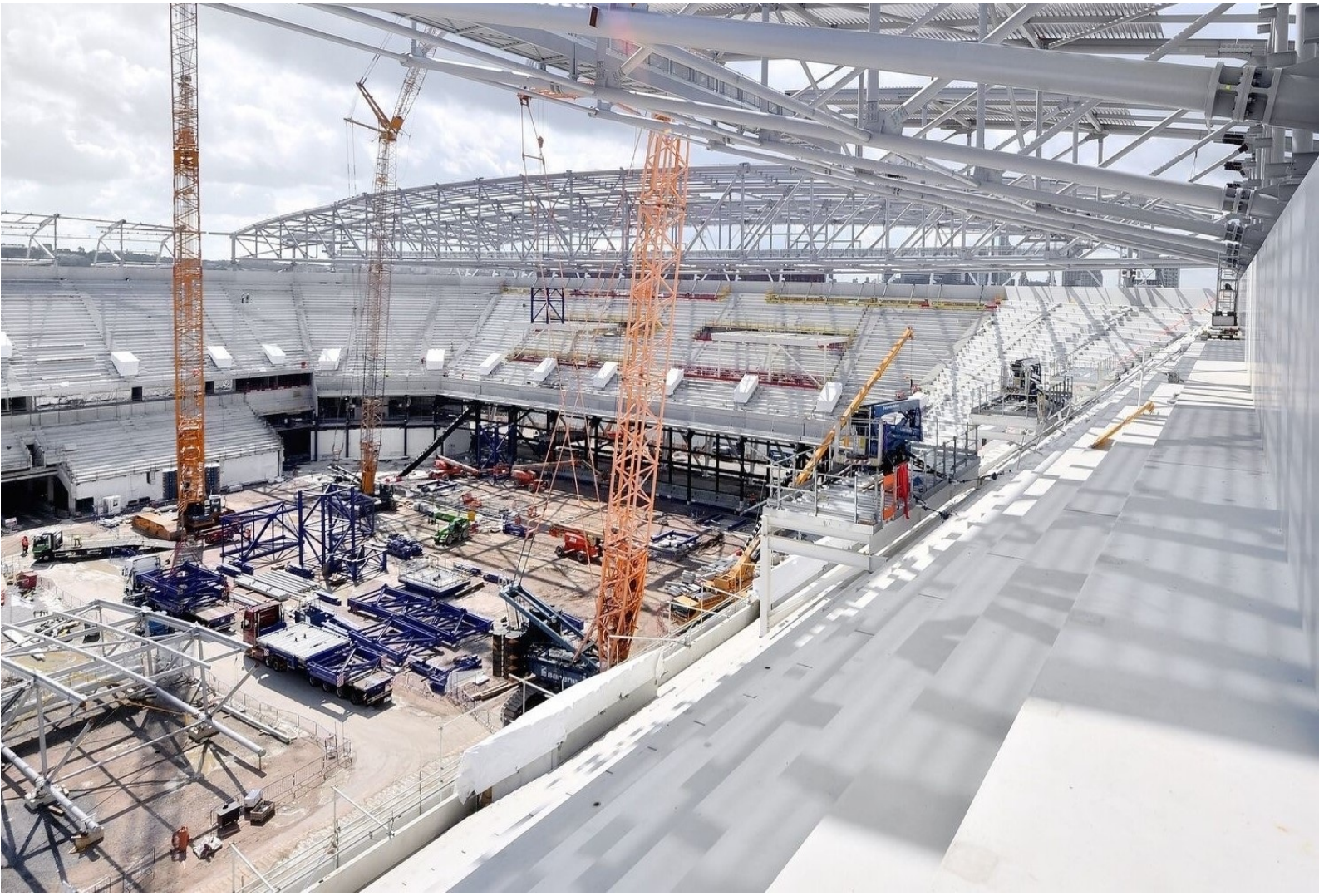
ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN15804+A2

Stadium / Stand Double Step Terracing Unit



Owner of the declaration:
Banagher Precast Concrete Ltd

Product:
Stadium / Stand Double Step Terracing Unit

Declared unit:
1 pcs

This declaration is based on Product Category Rules:
EN 15804:2012+A2:2019, EPD Ireland PCR Part A, Version 2.1, 2022
I.S. EN 16757:2022, PCR for concrete and concrete elements.

Program operator:
EPD Ireland - Irish Green Building Council

Declaration number:
EPDIE-24-158

Issue date:
28.11.2024

Valid to:
27.11.2029

General information

Product

Stadium / Stand Double Step Terracing Unit

Owner of the declaration:

Banagher Precast Concrete Ltd
Contact person: Ciaran Ennis
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e-mail: info@bancrete.com

Program operator:

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Phone: +353 (01) 6815862
web: https://www.igbc.ie/epd-home/

Manufacturer:

Banagher Precast Concrete Ltd
www.banagherprecast.com, Queen Street
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Declaration number:

EPDIE-24-158

Place of production:

Banagher Precast Concrete Ltd
Queen Street
R42 WA21 Banagher, Co. Offaly, Ireland

This declaration is based on Product Category Rules:

EN 15804:2012+A2:2019, EPD Ireland PCR Part A, Version 2.1, 2022
I.S. EN 16757:2022, PCR for concrete and concrete elements.

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. The EPD Program operator shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Type of EPD

Specific product EPD

Issue date:

28.11.2024

Declared unit:

1 pcs Stadium / Stand Double Step Terracing Unit

Valid to:

27.11.2029

Scope of the EPD:

A1-A3, B1, C1, C2, C3, C4, D

Year of study:

2023

Functional unit:

One double step terrace unit, 7020x1650mm, weight 5426 kg

Comparability:

Environmental Product Declarations from different programmes may not be directly 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

LCA consultant or person responsible for LCA: .
EcoReview, Peter Seymour

Verification:

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

Third party verifier:
Callum Hill

Approved:

SIGNATURE OF PROGRAMME OPERATOR

Pat Barry, CEO - Irish Green Building Council

Product

Product description:

The Banagher Double-step terracing unit for stadia, spectator stands and auditoriums is an innovative carbon-efficient precast unit which offers several benefits over traditional single-step units: it provides thinner section properties and the lighter, stiffer section enhances performance in terms of strength, deflection and frequency analysis. It incorporates the recycled material Ground Granulated Blastfurnace Slag (GGBS), and its reinforcing steel has a recycled content of 92%. Its lighter section reduces transport and installation energy requirements, as well as jointing mastic usage.

Product specification:

Terrace unit complies with I.S. EN 13369 Common rules for precast concrete. products.
Concrete complies with I.S. EN 206 :2013 -Concrete Specification, Performance, Production and Conformity.

Technical data:

Mean density of concrete: 2,524 kg/m3

Market/Geographical Area:

Republic of Ireland, Northern Ireland and Great Britain.

Reference service life, product

50 years

Reference service life, building or construction works

LCA: Calculation rules

Declared unit:

1 pcs Stadium / Stand Double Step Terracing Unit

kg per Declared unit 5.426

Cut-off criteria:

All relevant inputs and outputs - like emissions, energy and materials - have been taken into account in this LCA, and in accordance with EN15804+A2:2019. The study covers at least 95% of the materials and energy per module and at least 99% of the total use of materials and energy of each unit process. Long term emissions have been excluded from the study.

Allocation:

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF 3.1. In this EPD, the waste processes are allocated in the relevant module. In the case of the use of secondary materials or energy recovered from secondary fuels, the system boundary between the system under study and the previous system (providing the secondary materials) is set where outputs of the previous system, e.g. materials, products, building elements or energy, reach the end-of-waste state. The modularity and the polluter payer principles have been followed.

Data quality:

Time Representativeness: In this LCA the data relating to the usages, emissions and materials, and the data relating to the bespoke background processes for environmental impacts are less than 2 years apart, and also the Ecoinvent database version 3.9.1.. Time Representativeness is considered to be Very good.

Geographical Representativeness: The processes used in the production of the concrete products are geographically representative, insofar as the production location (Ireland) lies within the region for which the relevant Ecoinvent (version 3.9.1) environmental records have been selected. The dataset is up-to-date and representative for the current technology used in the processes of manufacturing the products. Geographical Representativeness is considered to be Very good.

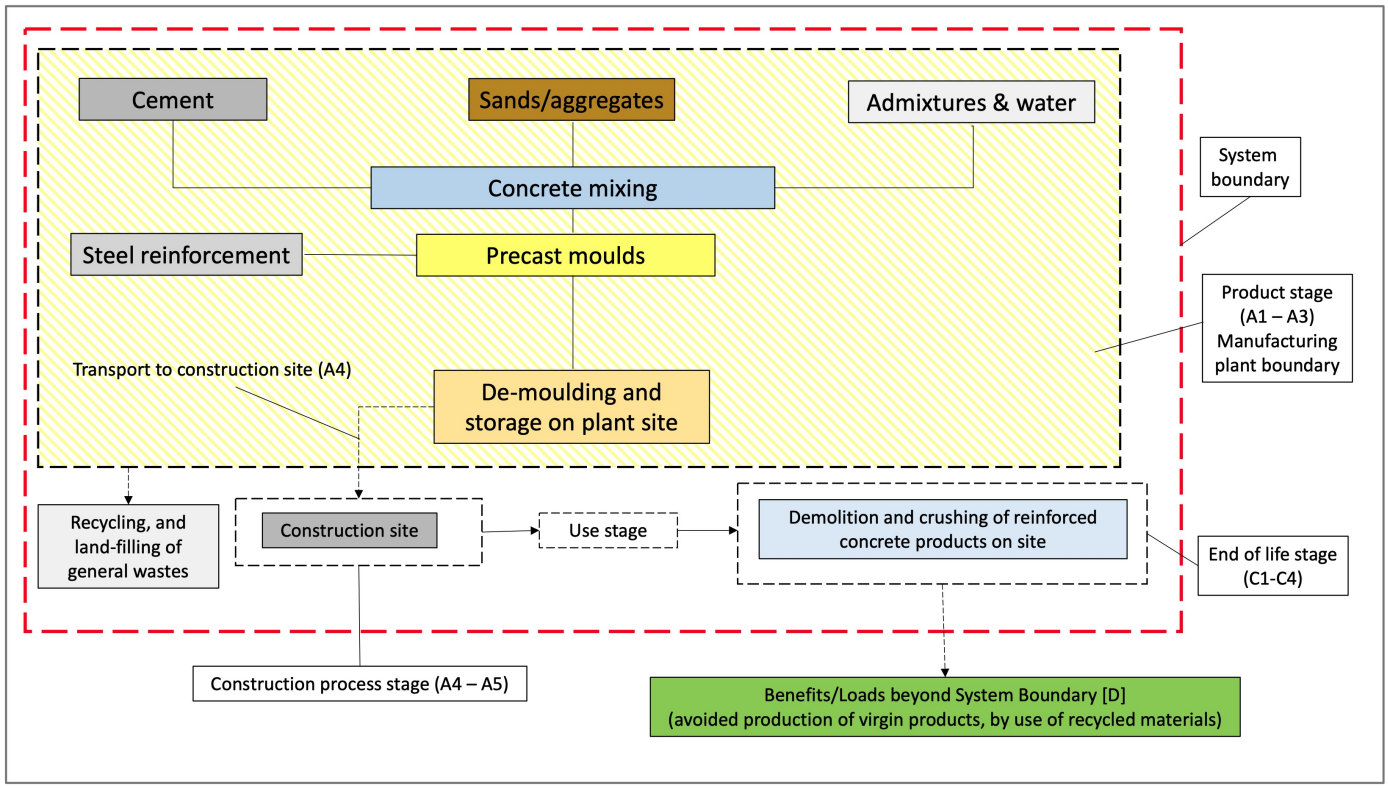
Technical Representativeness: Processes and energies used in the process have been modelled exactly as described by Banagher Precast, and are based directly on the production data supplied by Banagher Precast, in relation to processes, fuels used and emissions, and without any significant need for improvement. Technical Representativeness is considered to be Very good.

Scope and type of EPD (X = Module declared; ND = Module not declared)

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

System boundary:

This LCA covers the Product (A1, A2 and A3), Use (B1), End of Life (C1 to C4) and Benefits/loads beyond the system boundary (D) Stages, as indicated above. This is termed: "Cradle to gate with options, modules C1 to C4, and module D". A schematic of these stages is presented in the flow diagram below.



Additional technical information:

Electricity modelling
This LCA assumes that the reference for electricity used for 2023 is the average mix for Ireland. The CO2 intensity of the electricity is 0.388 kg CO2 eq per kWh.

LCA: Scenarios and additional technical information

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

B. Use Stage
B1. Use
In the Use phase, it is assumed that carbonation occurs. Carbonation for the Terrace unit is calculated to be 44.4 kg CO2-eq per unit.

There are no direct use phase factors in modules B2 – B7.

C. End of Life Stage
C1. De-construction demolition
This stage covers demolition of the concrete structure and crushing the demolished concrete on site. Diesel is used for these processes and is calculated to be 11.0 litres per Terrace unit.

C2. Transport
Transport of waste materials from site to recycling processing is assumed to be 50km.

C3. Waste processing
Waste processing is the treatment at the waste recycling plant of the waste concrete that has been demolished and crushed on site, and treatment of the waste steel for steel recycling.

C4. Disposal
It is assumed that no disposal of materials occurs, and 100% of materials are recovered and recycled.

D. Reuse, Recovery, Recycling potential
Beyond the system, after the precast concrete products has passed beyond the end-of-waste stage, it is assumed that 100% of the aggregates replace the production of virgin aggregates, and 8% of the steel replaces the production of virgin steel (as 92% of the steel in the reinforcement is already recycled). The quantities are: 3,526 kg virgin aggregate replaced and 21.2 kg virgin steel replaced, per declared unit.

Biogenic Carbon
These is no Biogenic Carbon in the product.

Database used: Ecoinvent v 3.9.1

LCA tool used: Ecochain Helix v 4.3.1

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact									
Indicator		Unit	A1-A3	B1	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	8.69E+02	-4.44E+01	4.03E+01	4.90E+01	4.20E+01	0.00E+00	-4.84E+01
	GWP-fossil	kg CO_2 -eq	8.62E+02	-4.44E+01	4.02E+01	4.89E+01	4.20E+01	0.00E+00	-4.84E+01
	GWP-biogenic	kg CO_2 -eq	7.14E+00	0.00E+00	1.05E-02	4.85E-02	1.09E-02	0.00E+00	6.31E-02
	GWP-luluc	kg CO_2 -eq	5.36E-01	0.00E+00	4.45E-03	2.37E-02	4.64E-03	0.00E+00	-1.64E-02
	ODP	kg CFC11 -eq	3.27E-05	0.00E+00	6.25E-07	1.04E-06	6.52E-07	0.00E+00	-9.17E-07
	AP	mol H+ -eq	2.84E+00	0.00E+00	3.64E-01	1.04E-01	3.80E-01	0.00E+00	-3.41E-01
	EP-FreshWater	kg P -eq	2.86E-02	0.00E+00	1.42E-04	3.87E-04	1.48E-04	0.00E+00	-1.84E-03
	EP-Marine	kg N -eq	5.83E-01	0.00E+00	1.69E-01	2.57E-02	1.76E-01	0.00E+00	-1.03E-01
	EP-Terrestial	mol N -eq	8.69E+00	0.00E+00	1.84E+00	2.67E-01	1.91E+00	0.00E+00	-1.36E+00
	POCP	kg NMVOC -eq	2.70E+00	0.00E+00	5.43E-01	1.62E-01	5.67E-01	0.00E+00	-4.08E-01
	ADP-minerals&metals[1]	kg Sb-eq	2.42E-03	0.00E+00	1.37E-05	1.56E-04	1.43E-05	0.00E+00	-5.84E-05
	ADP-fossil[1]	MJ	7.02E+03	0.00E+00	5.15E+02	6.77E+02	5.36E+02	0.00E+00	-4.97E+02
	WDP[1]	m^3	4.70E+02	0.00E+00	1.12E+00	2.80E+00	1.17E+00	0.00E+00	-1.97E+01

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment: EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts

Additional environmental impact indicators

Indicator		Unit	A1-A3	B1	C1	C2	C3	C4	D
	PM	Disease incidence	2.18E+02	0.00E+00	1.02E-05	3.54E-06	4.86E-05	0.00E+00	-5.74E-06
	IRP[2]	kgBq U235 -eq	2.49E+01	0.00E+00	1.05E-01	3.43E-01	1.10E-01	0.00E+00	-4.66E-01
	ETP-fw[1]	CTUe	8.04E+03	0.00E+00	4.40E+02	6.60E+02	4.58E+02	0.00E+00	-9.45E+03
	HTP-c[1]	CTUh	8.17E-06	0.00E+00	1.21E-08	2.18E-08	1.26E-08	0.00E+00	-2.30E-07
	HTP-nc[1]	CTUh	8.04E-06	0.00E+00	2.65E-07	6.12E-07	2.76E-07	0.00E+00	-9.81E-07
	SQP[1]	dimensionless	2.22E+03	0.00E+00	3.52E+01	4.12E+02	3.66E+01	0.00E+00	-4.87E+02

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use									
Indicator		Unit	A1-A3	B1	C1	C2	C3	C4	D
	PERE	MJ	5.42E+02	0.00E+00	2.93E+00	1.06E+01	3.05E+00	0.00E+00	-2.17E+01
	PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	5.42E+02	0.00E+00	2.93E+00	1.06E+01	3.05E+00	0.00E+00	-2.17E+01
	PENRE	MJ	5.29E+03	0.00E+00	5.47E+02	7.20E+02	5.70E+02	0.00E+00	-5.25E+02
	PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	5.29E+03	0.00E+00	5.47E+02	7.20E+02	5.70E+02	0.00E+00	-5.25E+02
	SM	kg	1.26E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RSF	MJ	7.52E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NRSF	MJ	2.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m^3	1.88E+02	0.00E+00	3.62E-02	9.09E-02	3.77E-02	0.00E+00	-4.85E-01

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Waste

Indicator		Unit	A1-A3	B1	C1	C2	C3	C4	D
	HWD	kg	3.53E-01	0.00E+00	3.46E-03	4.31E-03	3.61E-03	0.00E+00	-4.46E-03
	NHWD	kg	1.96E+02	0.00E+00	7.36E-01	3.36E+01	7.68E-01	0.00E+00	-6.60E+00
	RWD	kg	2.08E-02	0.00E+00	5.64E-05	2.23E-04	5.88E-05	0.00E+00	-3.38E-04

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Indicator		Unit	A1-A3	B1	C1	C2	C3	C4	D
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+03	0.00E+00	0.00E+00
	MER	kg	3.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EEE	MJ	4.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EET	MJ	4.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Biogenic Carbon Content

Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2

Additional requirements

Dangerous substances

None of the substances contained in the product are listed in the “Candidate List of Substances of Very High Concern for authorisation”, or they do not exceed the limit for registration with the European Chemicals Agency.

Mandatory additional information on release of dangerous substances to indoor air, soil and water.

Bibliography

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[9] https://www.rubblemaster.com/en/rm-120go/#technical_specification
[10] PEF methodology final draft.pdf (europa.eu).

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