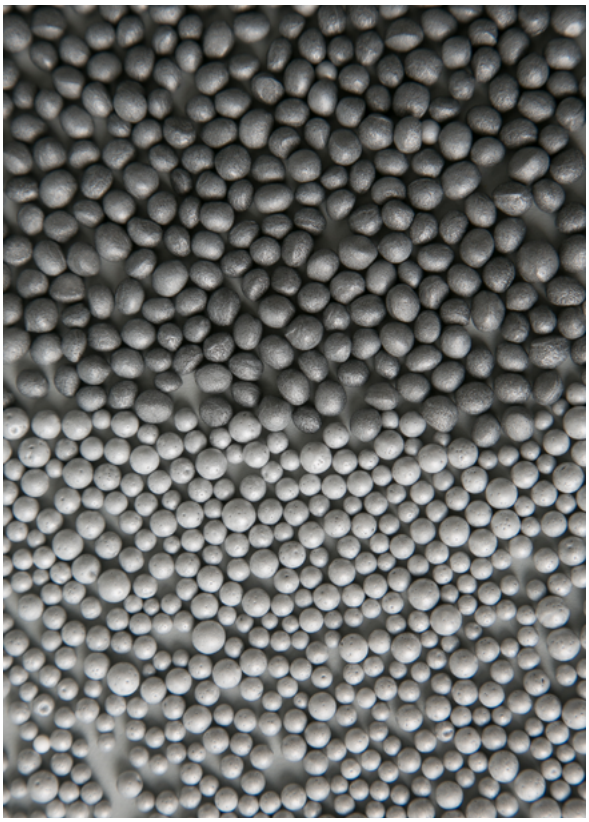
EN 15804+A2 EPD



ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2.
Owner of the Declaration – KORE Insulation

Declaration number: EPDIE-23-113
Issue date 19th December 2023
Valid to 18th December 2028

EPD Programme - EPD Ireland
Programme Operator - Irish Green Building Council
www.epdireland.org

KORE INSULATION

KORE Fill Bonded Beads

KORE Fill Diamond cavity wall loose beads, black

KORE Fill Original cavity wall loose beads, silver

1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council 19 Mountjoy Square, Dublin D01 E8P5 info@igbc.ie	KORE Insulation Airpacks Ltd, The Green, Kilnaleck, Co. Cavan A82 T291, Ireland +049 433 6998, www.kore-system.com, info@koresystem.com
DECLARATION NUMBER	**PRODUCTION SITE**
EPDIE-23-113	KORE Insulation Airpacks Ltd, The Green, Kilnaleck, Co. Cavan A82 T291
ECO PLATFORM EPD	**DECLARED UNIT**
Yes	1 kg of installed loose EPD beads
APPLICABLE PRODUCT CATEGORY RULES	**DECLARED PRODUCT**
1. EN 15804:2012+A2:2019 2. Product Category Rules : Part A Implementation and use of I.S. EN 15804:2012+A1 and + A2, and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations (issued 05.03.2022), Version 2.1. 3. EN 16783:2017 Thermal Insulation Products - Product Category Rules (PCR) for Factory Made and In-situ Formed Products	1 kg of installed loose EPD beads, black, R-value 3.030 m^2 K/W 1 kg of installed loose EPD beads, silver, R-value 2.857 m^2 K/W
DATE OF ISSUE	**SCOPE OF EPD**
19th December 2023	Cradle to gate with options, modules C1–C4, and module D
DATE OF EXPIRY	**LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA**
18th December 2028	Ecoreview, Kilkenny, Ireland. +353 (087) 258 9783 www.ecoreview.ie
TYPE OF EPD: SINGLE OR MULTI PRODUCT	**LCA SOFTWARE AND DEVELOPER IF APPLICABLE**
Multi product EPD	Ecochain Helix version 3.5.63
PRODUCT CLASSIFICATION OR NACE CODE	**NAME AND VERSION OF INVENTORY USED**
NACE Code 326140	Ecoinvent version 3.6
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	
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	

Internally ☐ Externally ×

SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council  IGBC IRISH GREEN BUILDING COUNCIL	Marcel Gómez Ferrer - Marcel Gómez Consultoria Ambiental  MARCEL GÓMEZ consultoría ambiental

2. Scope and Type of EPD

Scope

This EPD is cradle to gate with options, modules C1–C4, and module D. The Modules that are declared are shown in the table below.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	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	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
MDT	MDT	MDT	OP	OP	OP	OP	OP	OP	OP	OP	OP	MDT	MDT	MDT	MDT	MDT

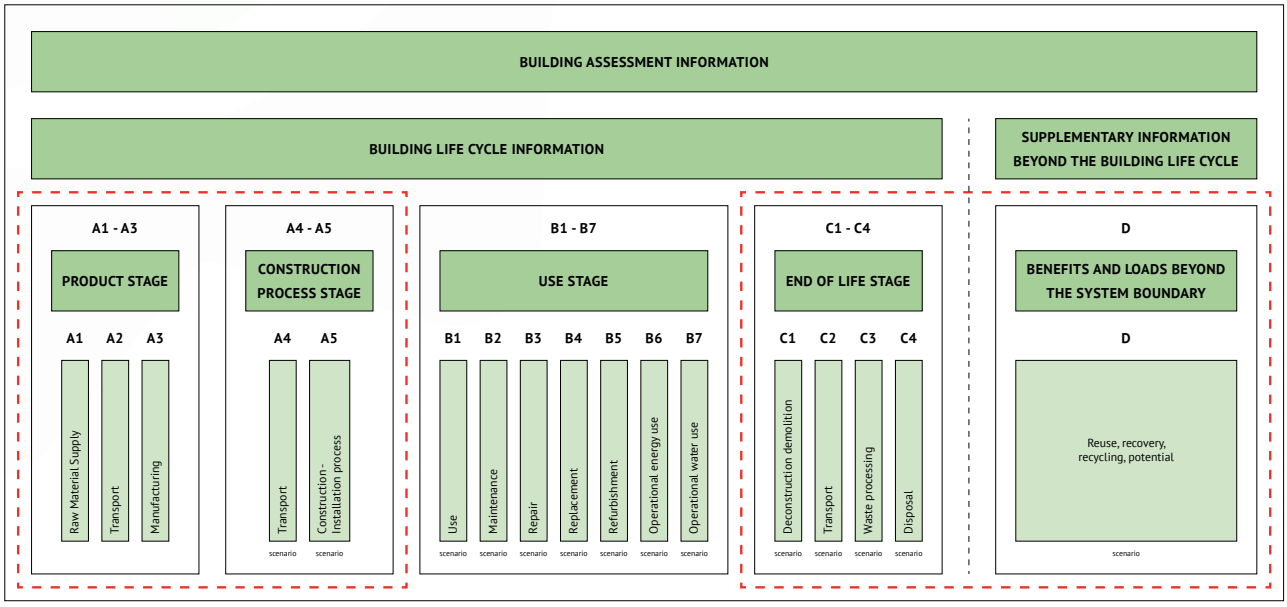
X = Module declared; ND = Module not declared; MDT = Mandatory; OP = Optional.

Declared Functional Unit

1 kg of installed EPS loose beads (black or silver); weight of declared unit = 1.0 kg

System Boundaries

This LCA covers the Product (A1 - A3), Construction Process (A4 - A5), end of Life (C1 - C4), and benefits and loads beyond the system boundary (D).



3. Detailed product description

The insulation products are made entirely from expandable polystyrene (EPS) beads. The raw materials for all the insulation products are the same (expandable polystyrene beads) but some come from different manufacturers, however the finished product is the same, differing only in thermal resistance. The EPS beads are made in both black and silver versions. The table below lists the finished insulation products, and their specific technical properties. The insulation is manufactured to IS EN 13163:2012+A2:2016.

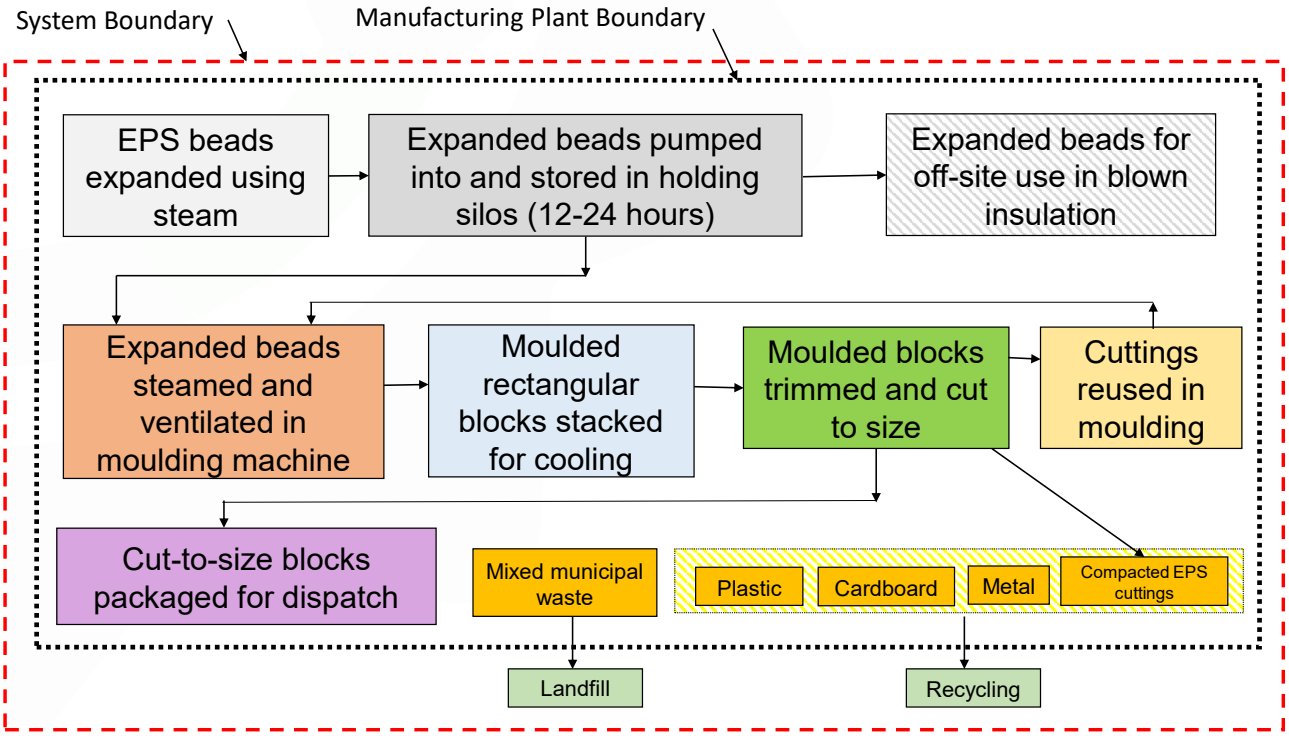
	Thickness [m]	Thermal conductivity, λ [W/mK]	Thermal resistance, R [m²K/W]	Area [m²]	Volume [m³]	Density [kg/m³]	Mass per DU [kg]
KORE Fill Bonded Bead Diamond Black	N/A	0.033	3.030	N/A	N/A	12 (loose)	1
KORE Fill Bonded Bead Original Silver	N/A	0.035	2.857	N/A	N/A	12 (loose)	1

The geographic area for which this EPD is representative is Europe.

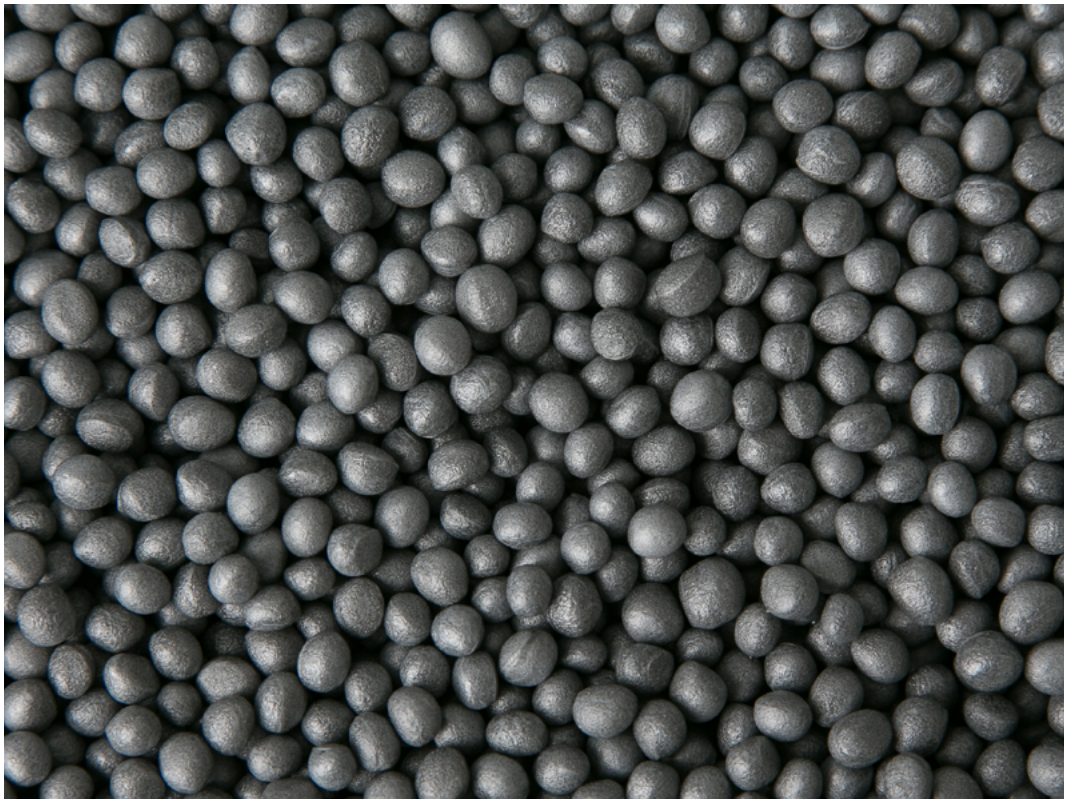
3.1 Manufacturing Process Description

Raw beads (selected for a particular finished product) are transferred to a steam chamber where they are heated by steam, and expanded. The expanded beads are then stored in holding bags, for a period of 12 to 24 hours, depending on intended end use. The expanded beads are then stored seperately at the factory prior to supply for use in blown insulation in structures. Waste materials such as plastic, cardboard and metals are recycled, and municipal solid wastes are sent to landfill.

The general manufacturing processes (also including block moulding) is shown below:



KORE Fill Diamond Cavity Wall Loose Beads Black



4.1.A. LCA results - KORE Fill Diamond cavity wall loose beads, black

Core Environmental impact per 1kg of loose beads black

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	2.46E+00	3.72E-02	2.63E-01	2.76E+00	3.27E-02	3.44E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.09E-02	0.00E+00	3.15E+00	-9.05E-01
GWP-fossil	[kg CO_2 eq.]	2.46E+00	3.71E-02	2.58E-01	2.75E+00	3.27E-02	3.43E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.08E-02	0.00E+00	3.15E+00	-8.89E-01
GWP-biogenic	[kg CO_2 eq.]	1.00E-02	3.77E-05	4.90E-03	1.50E-02	1.76E-05	1.67E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.20E-05	0.00E+00	6.64E-05	-1.60E-02
GWP-luluc	[kg CO_2 eq.]	2.30E-04	4.34E-05	2.17E-05	2.95E-04	1.16E-05	2.75E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.45E-05	0.00E+00	5.98E-06	-8.49E-04
ODP	[kg CFC-11 eq.]	5.24E-11	7.31E-09	5.39E-08	6.12E-08	7.43E-09	7.15E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.29E-09	0.00E+00	2.84E-09	-4.77E-08
AP	[mol H+ eq.]	4.36E-03	5.42E-04	2.64E-03	7.54E-03	9.38E-05	3.49E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.17E-04	0.00E+00	3.96E-04	-2.92E-03
EP-freshwater[1]	[kg P eq.]	3.82E-06	4.77E-07	9.68E-07	5.26E-06	2.61E-07	1.23E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.26E-07	0.00E+00	3.08E-07	-1.40E-05
EP-marine	[kg N eq.]	1.15E-03	1.39E-04	1.16E-03	2.44E-03	1.86E-05	1.53E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.32E-05	0.00E+00	1.86E-04	-4.80E-04
EP-terrestrial	[mol N eq.]	1.25E-02	1.55E-03	1.26E-02	2.67E-02	2.08E-04	1.68E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.60E-04	0.00E+00	1.99E-03	-5.51E-03
POCP	[kg NMVOC eq.]	4.80E-03	4.13E-04	2.94E-02	3.46E-02	7.96E-05	4.76E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.95E-05	0.00E+00	4.80E-04	-1.46E-03
ADP-minerals&metals[2]	[kg Sb eq.]	7.90E+01	3.55E-07	4.78E-07	7.90E+01	9.02E-07	3.95E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.13E-06	0.00E+00	5.02E-07	-6.94E-06
ADP-fossils[2]	[MJ] ncv	4.07E+00	5.14E-01	3.58E+00	8.17E+00	4.94E-01	4.58E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.17E-01	0.00E+00	2.81E-01	-1.38E+01
WDP[2]	m^3 world eq. deprived	9.36E-02	2.80E-03	7.41E-02	1.70E-01	1.40E-03	6.93E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.75E-03	0.00E+00	2.27E-02	-1.13E-01

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels (GWP-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; 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-fossils = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

[2]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.

ND = Module not declared; INA = Indicator not assessed.

4.1.B. LCA results - KORE Fill Diamond cavity wall loose beads, black

Resource use per 1kg of loose beads black

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	7.45E-01	1.06E-02	5.96E-02	8.15E-01	7.07E-03	2.86E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.84E-03	0.00E+00	6.42E-03	-3.30E+00
PERM	[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
PERT	[MJ]	7.45E-01	1.06E-02	5.96E-02	8.15E-01	7.07E-03	2.86E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.84E-03	0.00E+00	6.42E-03	-3.30E+00
PENRE	[MJ]	3.83E+01	5.46E-01	3.81E+00	4.27E+01	5.24E-01	5.03E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.56E-01	0.00E+00	3.06E-01	-1.48E+01
PENRM	[MJ]	4.50E+01	0.00E+00	0.00E+00	4.50E+01	0.00E+00	2.25E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	8.33E+01	5.46E-01	3.81E+00	8.77E+01	5.24E-01	5.26E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.56E-01	0.00E+00	3.06E-01	-1.48E+01
SM	[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
RSF	[MJ]	4.50E-17	0.00E+00	0.00E+00	4.50E-17	0.00E+00	2.25E-19	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	6.10E-16	0.00E+00	0.00E+00	6.10E-16	0.00E+00	3.05E-18	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	6.28E-03	8.40E-05	1.80E-03	8.17E-03	5.28E-05	2.74E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.60E-05	0.00E+00	8.03E-04	-1.90E-03

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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.1.C. LCA results - KORE Fill Diamond cavity wall loose beads, black

Output flows and waste categories per 1kg of loose beads black

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	7.91E-09	9.33E-07	9.21E-06	1.02E-05	1.29E-06	1.24E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.62E-06	0.00E+00	1.17E-06	-3.16E-06
NHWD	[kg]	1.33E-02	7.22E-03	9.62E-03	3.01E-02	2.40E-02	5.52E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.00E-02	0.00E+00	3.20E-02	-5.10E-02
RWD	[kg]	2.50E-04	3.41E-06	2.36E-05	2.77E-04	3.36E-06	3.29E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.21E-06	0.00E+00	5.93E-07	-7.60E-05
CRU	[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
MFR	[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
MER	[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
EEE	[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
EET	[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

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.1.D. LCA results - KORE Fill Diamond cavity wall loose beads, black

Additonal Environmental impact per 1kg of loose beads black

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.17E-08	1.30E-09	6.78E-08	1.01E-07	2.08E-09	9.17E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.60E-09	0.00E+00	1.81E-09	-8.29E-09
IRP[1]	kBq U235 eq	4.10E-02	2.28E-03	1.46E-02	5.79E-02	2.16E-03	1.97E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.70E-03	0.00E+00	4.47E-04	-5.97E-02
ETP-fw[2]	CTUe	4.10E+01	3.96E-01	2.16E+00	4.36E+01	3.98E-01	2.95E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.97E-01	0.00E+00	1.62E+01	-7.24E+00
HTP-c[2]	CTUe	9.42E-10	1.51E-11	7.51E-11	1.03E-09	1.11E-11	1.01E-10	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.38E-11	0.00E+00	2.03E-10	-2.72E-10
HTP-nc[2]	CTUe	4.02E-08	3.29E-10	1.86E-09	4.23E-08	4.19E-10	2.56E-09	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.24E-10	0.00E+00	8.01E-09	-7.78E-09
SQP[2]	dimensionless	9.21E-01	2.67E-01	4.57E-01	1.65E+00	3.46E-01	5.89E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.32E-01	0.00E+00	9.01E-02	-2.11E+00

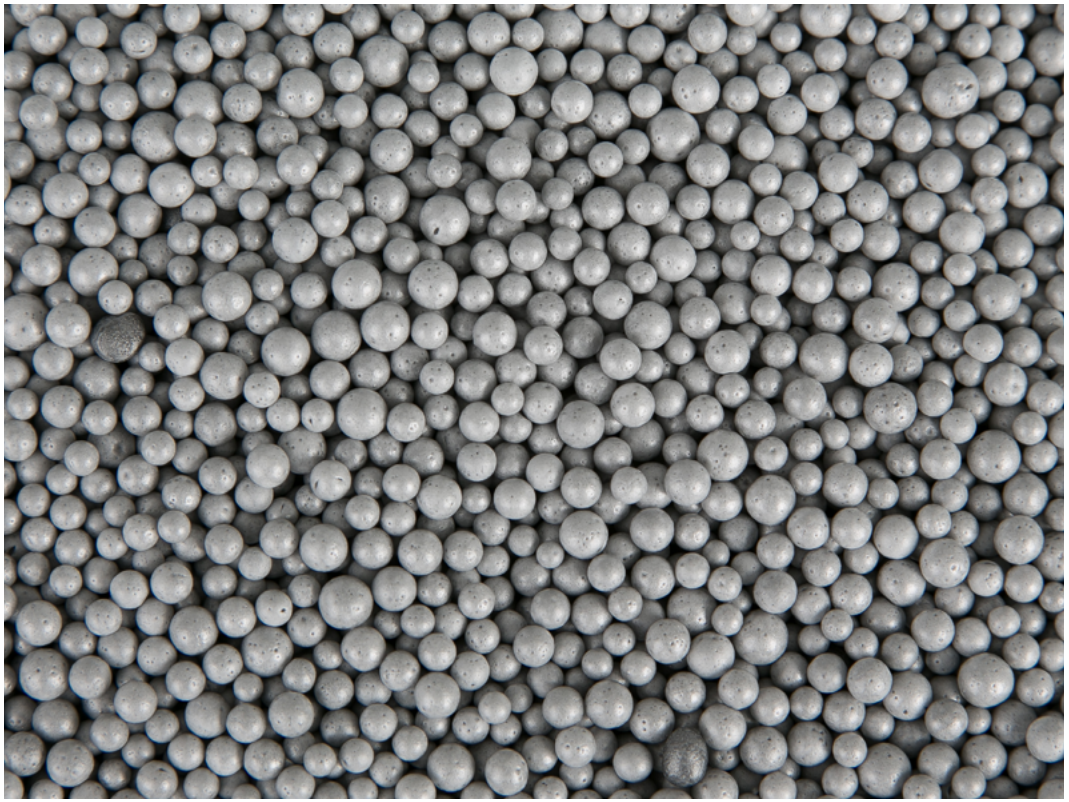
PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c:Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[2] 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.

ND = Module not declared; INA = Indicator not assessed.

KORE Fill Original Cavity Wall Loose Beads Silver



4.2.A. LCA results - KORE Fill Original cavity wall loose beads, silver

Core Environmental impact per 1kg of loose beads silver

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	2.66E+00	3.72E-02	2.63E-01	2.96E+00	3.27E-02	3.44E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.09E-02	0.00E+00	3.15E+00	-9.05E-01
GWP-fossil	[kg CO_2 eq.]	2.66E+00	3.71E-02	2.58E-01	2.95E+00	3.27E-02	3.44E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.08E-02	0.00E+00	3.15E+00	-8.89E-01
GWP-biogenic	[kg CO_2 eq.]	9.03E-03	3.77E-05	4.90E-03	1.40E-02	1.76E-05	1.61E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.20E-05	0.00E+00	6.64E-05	-1.60E-02
GWP-luluc	[kg CO_2 eq.]	4.00E-04	4.34E-05	2.17E-05	4.65E-04	1.16E-05	2.81E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.45E-05	0.00E+00	5.98E-06	-8.49E-04
ODP	[kg CFC-11 eq.]	2.42E-09	7.31E-09	5.39E-08	6.36E-08	7.43E-09	7.15E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.29E-09	0.00E+00	2.84E-09	-4.77E-08
AP	[mol H+ eq.]	4.76E-03	5.42E-04	2.64E-03	7.94E-03	9.38E-05	3.48E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.17E-04	0.00E+00	3.96E-04	-2.92E-03
EP-freshwater[1]	[kg P eq.]	2.50E-05	4.77E-07	9.68E-07	2.65E-05	2.61E-07	1.33E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.26E-07	0.00E+00	3.08E-07	-1.40E-05
EP-marine	[kg N eq.]	1.15E-03	1.39E-04	1.16E-03	2.44E-03	1.86E-05	1.53E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.32E-05	0.00E+00	1.86E-04	-4.80E-04
EP-terrestrial	[mol N eq.]	1.25E-02	1.55E-03	1.26E-02	2.67E-02	2.08E-04	1.68E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.60E-04	0.00E+00	1.99E-03	-5.51E-03
POCP	[kg NMVOC eq.]	4.70E-03	4.13E-04	2.94E-02	3.45E-02	7.96E-05	4.76E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.95E-05	0.00E+00	4.80E-04	-1.46E-03
ADP-minerals&metals[2]	[kg Sb eq.]	8.31E-07	3.55E-07	4.78E-07	1.66E-06	9.02E-07	5.12E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.13E-06	0.00E+00	5.02E-07	-6.94E-06
ADP-fossils[2]	[MJ] ncv	8.31E+01	5.14E-01	3.58E+00	8.72E+01	4.94E-01	4.97E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.17E-01	0.00E+00	2.81E-01	-1.38E+01
WDP[2]	m^3 world eq. deprived	1.24E-01	2.80E-03	7.41E-02	2.00E-01	1.40E-03	7.07E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.75E-03	0.00E+00	2.27E-02	-1.13E-01

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels (GWP-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; 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-fossils = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

[2]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.

ND = Module not declared; INA = Indicator not assessed.

4.2.B. LCA results - KORE Fill Original cavity wall loose beads, silver

Resource use per 1kg of loose beads silver

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.01E+00	1.06E-02	5.96E-02	1.08E+00	7.07E-03	2.99E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.84E-03	0.00E+00	6.42E-03	-3.30E+00
PERM	[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
PERT	[MJ]	1.01E+00	1.06E-02	5.96E-02	1.08E+00	7.07E-03	2.99E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.84E-03	0.00E+00	6.42E-03	-3.30E+00
PENRE	[MJ]	3.93E+01	5.46E-01	3.81E+00	4.37E+01	5.24E-01	5.03E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.56E-01	0.00E+00	3.06E-01	-1.48E+01
PENRM	[MJ]	4.40E+01	0.00E+00	0.00E+00	4.40E+01	0.00E+00	2.20E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	8.33E+01	5.46E-01	3.81E+00	8.77E+01	5.24E-01	5.25E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.56E-01	0.00E+00	3.06E-01	-1.48E+01
SM	[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
RSF	[MJ]	4.30E-17	0.00E+00	0.00E+00	4.30E-17	0.00E+00	2.15E-19	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	5.90E-16	0.00E+00	0.00E+00	5.90E-16	0.00E+00	2.95E-18	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	8.48E-03	8.40E-05	1.80E-03	1.04E-02	5.28E-05	2.85E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.60E-05	0.00E+00	8.03E-04	-1.90E-03

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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.2.C. LCA results - KORE Fill Original cavity wall loose beads, silver

Output flows and waste categories per 1kg of loose beads silver

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	1.70E-06	9.33E-07	9.21E-06	1.18E-05	1.29E-06	1.24E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.62E-06	0.00E+00	1.17E-06	-3.16E-06
NHWD	[kg]	1.33E-02	7.22E-03	9.62E-03	3.01E-02	2.40E-02	5.49E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.00E-02	0.00E+00	3.20E-02	-5.10E-02
RWD	[kg]	3.20E-04	3.41E-06	2.36E-05	3.47E-04	3.36E-06	3.32E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.21E-06	0.00E+00	5.93E-07	-7.60E-05
CRU	[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
MFR	[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
MER	[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
EEE	[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
EET	[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

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.2.D. LCA results - KORE Fill Original cavity wall loose beads, silver white

Additonal Environmental impact per 1kg of loose beads silver

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.67E-08	1.30E-09	6.78E-08	1.06E-07	2.08E-09	9.17E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.60E-09	0.00E+00	1.81E-09	-8.29E-09
IRP[1]	kBq U235 eq	5.40E-02	2.28E-03	1.46E-02	7.09E-02	2.16E-03	1.98E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.70E-03	0.00E+00	4.47E-04	-5.97E-02
ETP-fw[2]	CTUe	4.10E+01	3.96E-01	2.16E+00	4.36E+01	3.98E-01	2.95E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.97E-01	0.00E+00	1.62E+01	-7.24E+00
HTP-c[2]	CTUe	8.92E-10	1.51E-11	7.51E-11	9.82E-10	1.11E-11	1.00E-10	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.38E-11	0.00E+00	2.03E-10	-2.72E-10
HTP-nc[2]	CTUe	4.32E-08	3.29E-10	1.86E-09	4.53E-08	4.19E-10	2.57E-09	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.24E-10	0.00E+00	8.01E-09	-7.78E-09
SQP[2]	dimensionless	1.80E+00	2.67E-01	4.57E-01	2.53E+00	3.46E-01	5.92E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.32E-01	0.00E+00	9.01E-02	-2.11E+00

PM = Potential incidence of disease due to PM emissions, 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, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[2] 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.

ND = Module not declared; INA = Indicator not assessed.

5. Calculation rules

The measurement of environmental impacts in this EPD are those recommended for EF 3.0 and implemented in the EN 15804 Reference Package.

The process descriptions and input quantities detailed and used in this study are a true representation of the actual processes and quantities used in the manufacturing and use of the products. The references of all sources, both primary and public sources and literature, have been documented in the LCA report. The 'polluter pays' and 'modularity' principles have been followed.

In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated which can be accessed via the LCA tool. This data portfolio contains a summary of all the data used in this LCA.

Allocations of impacts to products have been made on a mass basis.

Cut-off criteria

The cut-off criteria of section 6.3.6 of EN15804:2012+A2:2019 have been followed, where 99% of the total energy and materials are included, and the total neglected input flows for the modules reported on in the LCA are less than 5% of the energy usage and mass.

Data Quality

The dataset is representative for the production processes used in 2021, in the country of production, Republic of Ireland. The data Quality Level, according to Table E.1 of EN 15804 +A2, Annex E, is as follows:

- Geographical representativeness: Very Good.
- Technical representativeness: Very Good.
- Time representativeness: Very Good.

6. Scenarios and additional technical information

A4. Transport to site

The transport to market is based on the transport from the production site in Co. Cavan, by a distance of 200km (road) to a construction site on the island of Ireland.

Parameter	Value / Description
Road transport	Transport, freight, lorry 16-32 metric ton, EURO6 engine
Distance, road	200 km
Capacity utilisation, road freight	46%
Bulk density transported goods	12 kg/m^3

A5. Installation on site

Installation losses are assumed ot be 5%. There are no other impacts in the installation process.

C. End of Life Stages

The end of life scenarios for the loose beads are:

- 99% of beads go to incineration.
- 1% of beads go to landfill.

C1. De-construction demolition

It is assumed that beads are removed from the structure manually. Thus no energy or other materials are required for deconstruction C1, and the impacts are assumed to be zero in C1.

C2. Transport

In the transport phase C2, it is assumed that the removed materials travel 50km to landfill/recycling, and 250 km to incineration.

C3. Waste processing

As the thermal efficiency of the Waste-to-Energy incineration is assumed to be less than 60%, the incineration process is considered a disposal process, and the impacts are assigned to C4 (disposal).

C4. Disposal

Disposal comprises incineration (99% of beads), and landfill (1% of beads).

D. Reuse – Recovery – Recycling potential

In Module D, benefits/loads beyond the system, 99 % of beads are incinerated in a waste to energy facility, with 25% of the mass converted to electrical energy.

Declaration of biogenic carbon content at the production gate

BIOGENIC CARBON PER DELCARED UNIT	PRODUCT	QUANTITY
Biogenic carbon content in product (kg C per kg)	KORE Fill Bonded Bead Diamond Black	2.70E-02
Biogenic carbon content in product (kg C per kg)	KORE Fill Bonded Bead Original Silver	2.42E-02
Biogenic carbon content in packaging	Packaging (< 5% of mass of DU)	N/A

Additional Technical Information

N/A.

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

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 threshold with the European Chemicals Agency.

8. Other optional additional environmental information

N/A.

9. References

[1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[4] I.S. EN 15804:2012+A2:2019,: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A2:2019.

[5] EcoChain, 2022, web: http://app.ecochain.com.

[6] Product Category Rules : Part A Version 2.1 Implementation and use of I.S. EN 15804:2012 and CEN TR 16970:2016 in Ireland. Product Category Rules: Part A, version 2.1.

[7] https://milieudatabase.nl/wp-content/uploads/2022/05/Forfaitaire_waarden_mei_2022.pdf

[8] Ministerie van Verkeer en Waterstaat, 8 maart 2004, Toxiciteit heeft z'n prijs, Schaduwprijzen voor (eco-) toxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc.

[9] I.S. EN 16783:2017 Thermal Insulation Products - Product Category Rules (pcr) for Factory Made and In-situ Formed Products for Preparing Environmental Product Declarations.

[10] PEF methodology final draft.pdf (europa.eu)

[11] https://zerowasteeurope.eu/wp-content/uploads/2023/01/Debunking-Efficient-Recovery-Full-Report-EN.docx.pdf

[12] LCA Background report on KORE Insulation Products, EcoReview Ireland, 2023

10. Annex

N/A.