ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Holcim UK Ltd
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	IBU-HOL-HOL-2501001-GB2025000049-ISUE001-EN
Issue date	01/07/2025
Valid to	30/06/2030

Star Performer 100 10.4N produced in plant Telford

Mix code RMCBP421 12/11/2024, EPD version 1.0

Building block

EN 771-3

Holcim UK Ltd

www.ibu-epd.com | https://epd-online.com

1 General Information

Holcim UK Ltd

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Hegelplatz 1
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Germany

Declaration number
IBU-HOL-HOL-2501001-GB2025000049-ISUE001-EN

This declaration is based on the product category rules:
Lightweight concrete, 08/2024 (PCR checked and approved by the SRV)

Issue date
01/07/2025

Valid to
30/06/2030

Hans Peters
(Chairman Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.))

Star Performer 100 10.4N

Owner of the declaration
Holcim UK
Bardon Hill
LE67 1TL Coalville
United Kingdom

Declared product / Declared unit
1 m² of Star Performer 100 10.4N

Scope:
This document refers to the production of Star Performer 100 10.4N precast product, mix code RMCBP421 12/11/2024, produced in the plant of Telford of Holcim UK Ltd in United Kingdom for use in building construction and civil engineering.

The EPD was calculated with the pre-verified software EN 15804 EPD Generator - Precast of Holcim.

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

The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard is simply referred to as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Matthias Schulz
(Independent verifier)

2 Product

2.1 Product description/Product definition

The declared product is a precast concrete building block, delivered to the job site in packs. The colour of the product is natural and the finish is standard.

To calculate the life cycle assessment of Star Performer 100 10.4N precast product in plant Telford, the production data from mix code RMCBP421 12/11/2024 were used.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration BS EN 771-3:2011+A1:2015, Specification for masonry units. Aggregate concrete masonry units (Dense and lightweight aggregates) and the CE-marking.

For the application and use the respective national provisions apply.

2.2 Application

This precast concrete product is used for load bearing and non load bearing walls, foundation walls and block and beam flooring.

2.3 Technical data

Star Performer 100 10.4N precast product has the following technical properties:

Technical data

Name	Value	Unit
Gross oven-dry density (EN 772-13)	1528	kg/m^3
Thermal conductivity (tabulated $\lambda_{10,dry,mat}$, EN 1745)	0.64	W/(m K)
Compressive strength (EN 772-1)	10.4	N/mm^2
Compressive strength description (EN 772-1)	mean compressive strength, load perpendicular to the faces, category II	-
Dimensional tolerance (EN 771-3)	D1	-
Group (EN 1996-1-1 (EC6))	Group 1	-
Moisture movement (EN 772-14)	< 0.7	mm/m
Shear bond strength (EN 998-2 Annex C)	0.15	N/mm^2
Water vapour permeability (EN ISO 12572)	5/15	-
Durability against freeze/thaw (PD 6697)	Frost resistant	-
Emission of asbestos (EN 771-3)	None	-
Breaking strength (Annex F of EN 771-3)	None	-
Slip/skid resistance (Annex I of EN 771-3)	None	-
Durability (EN 771-3)	None	-

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to BS EN 771-3:2011+A1:2015, Specification for masonry units. Aggregate concrete masonry units (Dense and lightweight aggregates).

Additional technical data are not relevant for the declared product.

2.4 Delivery status

This product is delivered in packs of 90 units. Each unit has the following dimensions: 440 x 215 x 100 mm.

2.5 Base materials/Ancillary materials

Name	Value	Unit
Cement	ca. 10-17%	M.%
Aggregate	ca. 70-90%	M.%
Cementitious	ca. <1%	M.%
Reinforcement	ca. <1%	M.%
Admixtures + pigments	ca. <1%	M.%

The mix design above does not include water.

This product contains substances listed in the candidate list (date: 21/01/2025) exceeding 0.1 percentage by mass: no

This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no

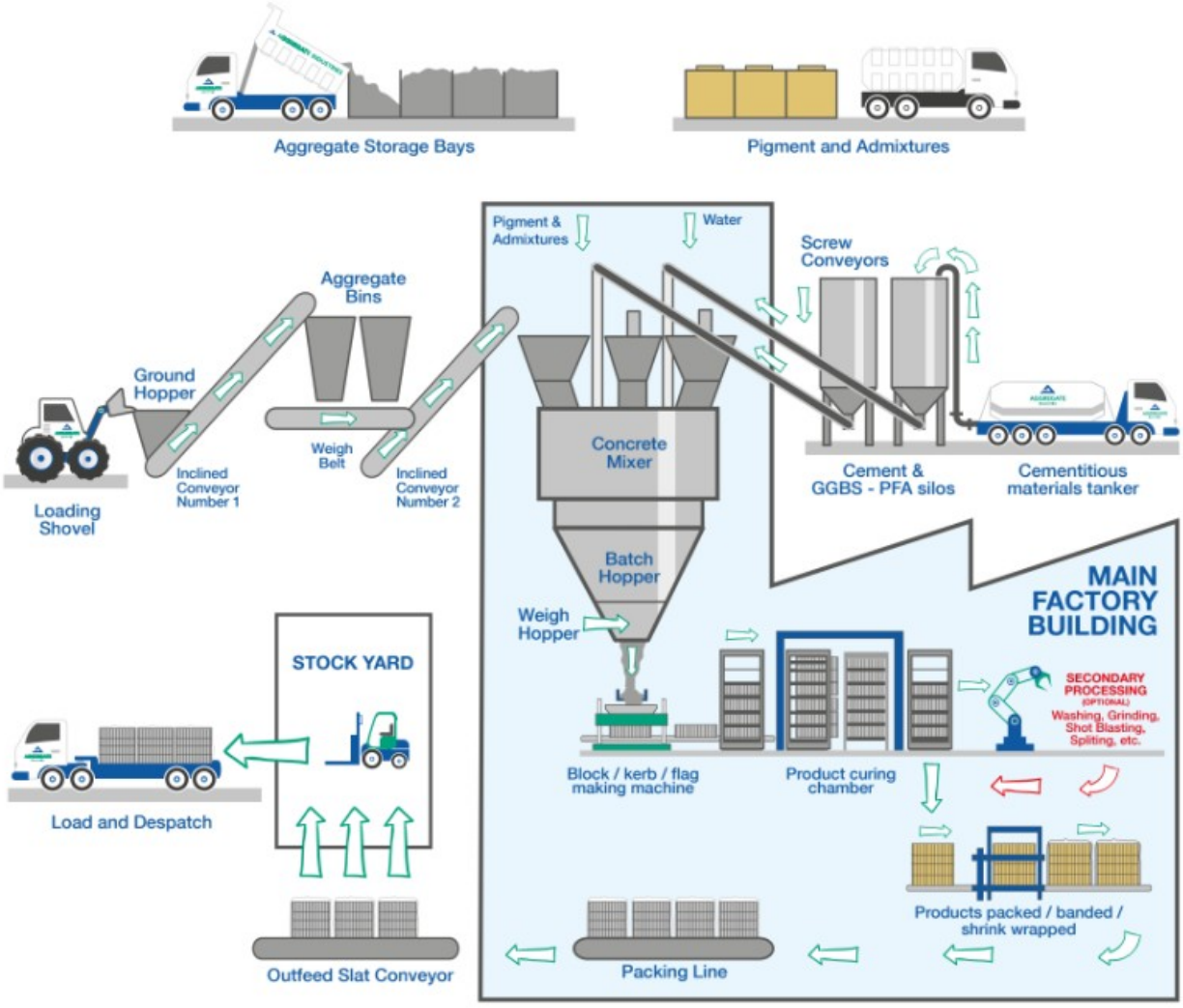
Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no

2.6 Manufacture

The aggregates are first premixed with cement as a binding agent and other additives. The mixture is mixed with water to form a plastically deformable fresh concrete. The concrete is poured into moulds, pressed (semi-dry technology) and the concrete products are stored in curing chambers. Finally, the products are packed and stored in the yard, waiting for the dispatch to retailer or final customer.

A quality management system according to

ISO 9001 is installed in Telford plant.



Note: Secondary processing is an optional step and that does not necessarily apply to this precast product

2.7 Environment and health during manufacturing

Fresh concrete contains a strongly alkaline solution that is created when cement is mixed with water and can cause skin and eye irritation. The chromate content of the cement can also cause the development of allergic chromate dermatititis. The use of closed and fully automated processes limits exposure to these risks during the manufacturing process.

Furthermore, respirable dust (that may contain respirable crystalline silica) may be generated during the production process of precast products. Therefore, measures are taken to protect workers from potential exposure to dust or respirable crystalline silica dust in accordance with the European social agreement *Negotiation Platform on Silica* (NEPSI).

Further information can be found in the safety data sheets.
https://www.aggregate.com/news-and-resources/technical-information/safety-data-sheets

2.8 Product processing/Installation

In general, precast products are transported to the construction site with trucks and lifted in place using appropriate lifting equipment (e.g. crane). No ancillary materials are considered during product installation as they vary across projects.

2.9 Packaging

The following packaging materials are used when the product is sold in packs of 90 units:
- 6.04E-02 kg/m² of polyethylene terephthalate bands

2.10 Condition of use

The composition of the hardened precast product does not fundamentally change when it is used.

2.11 Environment and health during use

The natural ionizing radiation from hardened concrete is low and harmless to health. The environmental compatibility of concrete is ensured by the fact that only standardized starting materials may be used that are a priori regarded as harmless or for which the environmental compatibility has been proven by a general building authority approval.

2.12 Reference service life

A reference service of 60.0 years is used for modelling the use phase.

2.13 Extraordinary effects

Fire

According to *EN 13501-1*, precast products meet the requirements of building material class A1, "non-

flammable". In the event of fire, no toxic gases and vapors can arise, and burning concrete components do not drip or fall off.

Fire protection

Name	Value
Building material class	A1 "not combustible"

Water
When exposed to water (e.g. floods), precast products are largely inert. No substances are washed out in quantities that could be hazardous to water.

Mechanical destruction
The mechanical destruction of precast concrete products, e.g. by demolition, does not produce any substances that are hazardous to the environment or health.

2.14 Re-use phase
Components made of concrete can be dismantled. The concrete is first crushed and separated into individual grain fractions and used in road construction or in small proportions as recycled aggregate for the production of fresh concrete. If steel reinforcement is included in the precast product, it is separated at the sorting facility (after demolition) and reused as scrap. The re-use of precast concrete products is also possible, after that auxiliary materials (e.g. mortar) are cleaned from the surface. However, the re-use scenario is not considered for the end-of-life scenarios of the EPD, due to its limited implementation in the market.

2.15 Disposal
For construction waste made of concrete, the waste codes 17 01 01 (concrete) and 17 04 05 (steel reinforcement) apply in accordance with the European list of waste (*WCO*).

2.16 Further information
Further information: www.aggregate.com

3 LCA: Calculation rules

3.1 Declared unit

1 m² of Star Performer 100 10.4N.

Declared unit

Designation	Value	unit
Declared unit	1	m²
Conversion factor	155	kg/m²

To calculate the life cycle assessment of Star Performer 100 10.4N precast product in plant Telford, the production data from mix code RMCBP421 12/11/2024 were used.

3.2 System boundary

Type of EPD: cradle to gate with options, modules C1–C4, and module D (A1–A3 + C + D and additional modules A4, A5 and B1)

The selected system boundaries include the production of the concrete including the extraction of raw materials through to the installation, use and end of life of the finished product.

Material production and placement

Module A1: Extraction and processing of the raw materials used in the production of the precast product

Module A2: Transport of the raw materials to the plant

Module A3: Manufacture of precast product in the plant (including production of packaging and auxiliary materials) and waste treatment

Module A4: Transport to the construction site

Module A5: Includes all processes associated with placing the precast product (e.g. installation by crane) as well as the production, transport and treatment of unused precast products. The waste treatment of packaging materials is also included

Use phase

Module B1: Carbonation during the use phase

Module B2-B7: For precast concrete components, maintenance, repair refurbishment or replacement measures are not usually required during the reference service life. Therefore, no environmental burden is considered in these modules

End of life

Module C1: Dismantling / demolition of precast products

Module C2: Transport of dismantled or demolished precast products for processing

Module C3: Precast concrete waste processing

Module D

Module D: Benefits and loads for the use of precast concrete demolition waste (concrete and reinforcement) as replacement for primary materials. Module D also models the net benefit of recycling plastic packaging and the net benefit of wood packaging incineration (with energy recovery) to replace heat and electricity

3.3 Estimates and assumptions

No estimates or assumptions were made that would be relevant for the interpretation of the life cycle assessment results.

3.4 Cut-off criteria

All raw materials for the production of the precast concrete product, all transport as well as all energy and water consumption for production, mixing, installation and waste treatment of the precast concrete product were taken into account.

The environmental impacts from the production and the use of minor consumables and formwork in the manufacturing process of the precast product were neglected. With the usual frequency of use of these products, the mass of resources and primary energy used is less than 1% of the total values for precast concrete production.

3.5 Background data

The data on which the life cycle assessment is based comes from data collection at Telford plant. Information on the use of material and energy resources as well as transport distances was provided by Holcim UK Ltd.

The life cycle modelling was carried out using the Holcim EN 15804 EPD Generator – Precast version 1.0.0 dated 12.06.2025. Datasets from the background database Ecoinvent (version 3.9.1) were used for the calculation.

3.6 Data quality

The data basis for this EPD is the continuous data acquisition in Telford plant. The data was collected for the period 01/06/2022 to 31/05/2023 by Holcim UK Ltd and checked for plausibility by Holcim Innovation Center. The data quality can be rated as very good.

Any gaps in the collected data were filled in with conservative proxy data. The background datasets are on average less than 5 years old and their quality is rated as good or very good.

3.7 Period under review
For the life cycle assessment of the Star Performer 100 10.4N, data from the period 01/06/2022 to 31/05/2023 were used.

3.8 Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: United Kingdom

3.9 Allocation
Cementitious products such as fly ash, blast furnace slag, copper slag or silica fume are considered co-products and economic allocation is used.

The alternative fuels used for the production of the cements used are classified either as secondary fuels or as waste. Emissions from secondary fuels are included in the impact assessment results while emissions from waste fuels are reported as additional information according to the *IBU Cement PCR*. The waste status of the fuels concerned was verified using their waste codes. The exclusion of the impact due to the combustion of combustible waste was only applied to CO_2 emissions, as other emissions (eg, NO_x, SO_x, etc.) were not easily differentiated from the different types of fuels.

The total energy and auxiliary materials used in the Telford plant were allocated to the Star Performer 100 10.4N precast product based on the individual manufacturing processes used in its production. Within each step of these manufacturing process, the total energy and auxiliary materials used were allocated based on mass (e.g. casting or curing) or product surface area (e.g. secondary processing).

Finally, the use of recycled and/or secondary raw materials is allocated to each individual precast product based on their actual composition.

3.10 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The background database Ecoinvent (version 3.9.1) is used.

4 LCA: Scenarios and additional technical information

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic Carbon Content in product	0	kg C/m²
Biogenic Carbon Content in accompanying packaging	0	kg C/m²

Note: 1 kg biogenic Carbon is equivalent to 44/12 kg of CO_2

Module A3: Manufacturing
The carbon intensity of electricity used in manufacturing is 0.43 $kgCO_2eq/kWh$.

Module A4: Transport to jobsite
The following table shows the data used in the modelling of product transport to the jobsite:

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	35.6 (from plant to retailer) 26.1 (from retailer to customer)	lt diesel eq./100km
Transport distance	56 (from plant to retailer) 30 (from retailer to customer)	km
Capacity utilisation (including empty runs)	40% (from plant to retailer) 45% (from retailer to customer)	%
Gross density of products transported	1546	kg/m^3
Capacity utilisation volume factor	0.80 (from plant to retailer) 0.45 (from retailer to customer)	-

Module A5: Installation
The following table shows the data used in the modelling of product installation:

Installation into the building (A5)

Name	Value	Unit
Electricity consumption	0	kWh/m²
Other energy carriers	0.16	MJ/m²
Material loss	7.73	kg/m²

Module B1: Carbonation
Through carbonation, concrete components absorb carbon dioxide from the air during their useful life. This can be expressed as a negative global warming potential in module B1 and is calculated according to *EN 16757* using the following data.

Carbonation during use

Name	Value	Unit
Structure type and exposure condition	Buildings Interior With Cover	-
Compressive strength cylinder	25-35	MPa
Service life	60.0	yr

Area for carbonation	1.00	m^2/m^2

Carbonation results for alternative scenarios can be calculated using the following formula (CO_2uptake is in kg CO_2/m^2)

$$CO_2 uptake = \frac{K_K * k * \sqrt{t}}{1000} * A_i * D_c * C_{factor}$$

where

k = k-factor sourced from *EN 16757* standard depending on structure type, exposure condition and concrete strength class [$mm/year^{0,5}$]
K_K = correction for the k-factor for mineral additions (limestone, silica fume, fly ash, blast furnace slag) in cement or added at precast plant, sourced from *EN 16757*. As a conservative approach, as per *EN 16757*, only one addition is considered
t = service life (yr)
A_i = area of concrete element exposed to carbonation (m^2/m^2)
D_c = degree of carbonation sourced from *EN 16757* standard depending on structure type and exposure condition (%)

C_{factor} = 73.4 (kg CO_2/m^3). It is calculated as per *EN 16757* standard based on the precast concrete composition

Module B2-B7:
No maintenance or repair is usually required for concrete during its reference service life. In addition, no energy or water are consumed during its use.

Module C1-C4:
According to the current state of the art, structures made of blocks are mainly dismantled with long-front excavators equipped with demolition claws.

Name	Value	Unit
Diesel consumption for demolition process	0.16	lt/m²
Demolition waste collected	155	kg/m²

The demolished precast concrete product is then transported to the crushing plant according to the following details.

Name	Value	Unit
Truck	25.0	km

The processing of concrete rubble is usually carried out using jaw or impact crushers, which, in addition to pure breaking, also perform a pre-screening and metal separation.

Approximately 93% of concrete waste is recycled or reused for backfilling while less than 7% ending up in landfills (DEFRA). Therefore, one scenario for 100% recycling is considered in this life cycle assessment.

The carbonation of concrete rubble during the end of life phase is modelled according to the guidelines of *EN 16757* standard.

Module D: Benefits and loads beyond the system boundary
The output at the end of the crushing process can replace the primary materials sand / gravel and crushed stone as secondary material. Potentially recovered steel reinforcement can be used for the production of new steel products. Recovered plastic packaging can be used to replace virgin plastic granulates. Recovered wood packaging sent to incineration is used to replace primary electricity and heat.

The benefits in the LCA results for the replacement of primary raw materials and primary energy are shown in module D.

5 LCA: Results

The table below contains the life cycle assessment results for a declared unit of 1 m² of Star Performer 100 10.4N.

The characterization factors of the "Environmental Footprint reference Package 3.1" were used to determine the LCA results.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

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	x	ND	MNR	MNR	MNR	ND	ND	x	x	x	x	x

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² of Star Performer 100 10.4N

Core Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	14.5	2.06	0.88	-1.05	0.55	0.40	-0.17	0	-0.26
GWP-fossil	[kg CO_2-Eq.]	14.5	2.06	0.87	-1.05	0.55	0.40	-0.18	0	-0.26
GWP-biogenic	[kg CO_2-Eq.]	0.02	6.01E-4	0.01	0	7.66E-5	1.29E-4	4.03E-5	0	-7.53E-4
GWP-luluc	[kg CO_2-Eq.]	3.09E-3	8.74E-4	2.29E-4	0	6.32E-5	1.91E-4	3.36E-5	0	-2.44E-4
ODP	[kg CFC11-Eq.]	2.93E-7	4.59E-8	1.84E-8	0	8.80E-9	8.80E-9	1.02E-8	0	-4.00E-10
AP	[mol H^+-Eq.]	0.04	0.01	2.61E-3	0	0.01	1.35E-3	1.66E-3	0	-2.69E-3
EP-freshwater	[kg P-Eq.]	1.28E-3	1.48E-5	6.57E-5	0	1.99E-6	3.24E-6	3.72E-6	0	-7.34E-6
EP-marine	[kg N-Eq.]	0.01	1.65E-3	9.52E-4	0	2.36E-3	4.64E-4	7.00E-4	0	-7.42E-4
EP-terrestrial	[mol N-Eq.]	0.17	0.02	0.01	0	0.03	4.94E-3	0.01	0	-0.01
POCP	[kg NMVOC-Eq.]	0.04	0.01	3.19E-3	0	0.01	2.10E-3	2.30E-3	0	-2.65E-3
ADPE	[kg Sb-Eq.]	1.43E-5	5.42E-6	1.14E-6	0	2.00E-7	1.11E-6	2.75E-7	0	-5.29E-6
ADPF	[MJ]	95.0	30.0	7.27	0	7.21	5.87	5.34	0	-1.88
WDP	[m^3 world-Eq deprived]	1.66	0.12	0.09	0	0.02	0.03	0.01	0	-2.47

Legend	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP =Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² of Star Performer 100 10.4N

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	[MJ]	46.8	0.40	2.38	0	0.04	0.09	0.12	0	-0.37
PERM	[MJ]	0	0	0	0	0	0	0	0	0
PERT	[MJ]	46.8	0.40	2.38	0	0.04	0.09	0.12	0	-0.37
PENRE	[MJ]	96.6	30.0	7.35	0	7.21	5.87	5.34	0	-1.88
PENRM	[MJ]	0.05	0	-0.05	0	0	0	0	0	0
PENRT	[MJ]	96.6	30.0	7.30	0	7.21	5.87	5.34	0	-1.88
SM	[kg]	1.00	0	0.05	0	0	0	0	0	161
RSF	[MJ]	11.4	0	0.57	0	0	0	0	0	0
NRSF	[MJ]	18.0	0	0.90	0	0	0	0	0	0
FW	[m^3]	0.08	4.06E-3	4.47E-3	0	5.64E-4	9.20E-4	6.84E-4	0	-0.08

Legend	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 nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials; PENRM = Use of nonrenewable primary energy resources used as raw materials; PENRT = Total use of nonrenewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of nonrenewable secondary fuels; FW = Use of net freshwater

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² of Star Performer 100 10.4N

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	[kg]	0.14	0.03	0.01	0	0.01	0.01	2.97E-3	0	-0.03
NHWD	[kg]	2.86	1.96	0.29	0	0.03	0.56	0.02	0	-0.27

RWD	[kg]	2.93E-4	8.47E-6	1.64E-5	0	7.90E-7	1.79E-6	2.19E-5	0	1.14E-5
CRU	[kg]	0	0	0	0	0	0	0	0	0
MFR	[kg]	0.72	0	7.82	0	0	0	155	0	0
MER	[kg]	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0	0	0	0	0	0	0	0	0
EET	[MJ]	0	0	0	0	0	0	0	0	0

Legend	HWD = Hazardous waste disposed; NHWD = Nonhazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2: 1 1 m² of Star Performer 100 10.4N

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PM	[Disease Incidence]	1.40E-6	1.59E-7	8.84E-8	0	1.29E-6	4.06E-8	3.88E-8	0	-6.02E-8
IRP	[kBq U235-Eq.]	0.83	0.01	0.05	0	1.47E-3	2.83E-3	0.05	0	0.03
ETP-fw	[CTUe]	48.2	14.4	3.60	0	3.45	2.82	1.12	0	-2.36
HTP-c	[CTUh]	4.00E-9	8.00E-10	3.00E-10	0	2.00E-10	2.00E-10	1.00E-10	0	-7.00E-10
HTP-nc	[CTUh]	2.46E-7	1.88E-8	1.38E-8	0	1.20E-9	4.20E-9	8.00E-10	0	-5.30E-9
SQP	[-]	248	21.0	14.0	0	0.49	5.96	0.60	0	-17.3

Legend	PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; ETPfw = Potential comparative Toxic Unit for ecosystems; HTPc = Potential comparative Toxic Unit for humans (cancerogenic); HTPnc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Tipps

2.51e2 = 2.51 x 10^2 = 251 4.25e-3 = 4.25 x $\frac{1}{10^3}$ = 0.00425

On Global Warming Potential (GWP):
Net values are declared for all GWP indicators in A1 – A3. The waste status of the (waste-based) fuels has been verified. Gross emissions (i.e. including CO_2 from incineration of waste) are 16.1 kg CO2-eq. / t (GWP-total), 16.1 kg CO2-eq. / t (GWP fossil), 0.02 kg CO2 eq. / t (GWP-biogenic).

For wastes with biogenic carbon content, gross CO_2 emissions correspond to the uptake of biogenic CO2 during the biomass growth phase.

Disclaimer 1 – for the indicator "potential Human exposure efficiency relative to U235". 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 radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 –for the indicators: "abiotic depletion potential for fossil resources", "abiotic depletion potential for non-fossil resources", "water (user) deprivation potential", "deprivation-weighted water consumption", "potential comparative toxic unit for ecosystems", "potential comparative toxic unit for humans - cancer effects", "potential comparative toxic unit for humans – non-cancer effects", "potential soil quality index". 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 experience with the indicator.

6 LCA: Interpretation

The following table shows the most important influencing factors on important indicators of the impact and life cycle inventory analysis.

Category	GWP_{total}	AP	$EP_{terrestrial}$	POCP	PERT	PENRT	ADPE	FW	PM
Cement	80.8 %	63.9 %	65.1 %	59.6 %	1.37 %	56.2 %	19.8 %	12.1 %	21.6 %
Aggregate	4.56 %	10.7 %	9.76 %	9.79 %	1.59 %	10.5 %	43.5 %	75.1 %	6.11 %
Cementitious	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Reinforcement	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Admixtures + pigments	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Other materials and processes	14.7 %	25.4 %	25.2 %	30.6 %	97.0 %	33.3 %	36.7 %	12.9 %	72.3 %
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Legend	**Cement:** Includes the impacts for the production of all cements used. **Aggregate:** Includes the impacts for the production of sand and gravel. **Cementitious:** Includes the impacts for the production of all cementitious materials used such as slag, fly ash or limestone. **Reinforcement:** Includes the impacts for the production of reinforcement. **Admixtures + pigments:** Includes the impacts for the production of concrete admixtures such as plasticisiers or retarders, as well as pigments used in the mix. **Other materials and processes:** Includes the impacts of materials or production processes not covered by the above categories.

In the production of precast concrete products, cement production dominates many of the impact categories. This applies in particular to the global warming potential (GWP). Another major influencing factor is the extraction/production and transport of the raw materials. The contribution of utilities used at the plant (electricity and fuels) is also important, both for casting (for all products) and for curing/secondary processing (if applicable).

7 Requisite evidence

7.1 Radioactivity

Measurements of the specific activity (gamma spectrometry) in Europe resulted in the following typical values for concrete (*Radiation Protection 112*) (in Bq/kg).

Element	Typical values
RA226	40 (240)
Th232	30 (190)
K40	400 (1600)

Radiation exposure in an apartment block made of concrete with the above average activity concentrations will equate to an annual effective dose of about 0.25 mSv (excess to the dose received outdoors) (*Radiation Protection 112*).

In United Kingdom there are currently no statutory limit values for assessing the radioactivity of building materials.

7.2 VOC emissions and leaching

The environmental compatibility of precast concrete is ensured by the fact that only standardized starting materials may be used that are a priori regarded as harmless. Therefore, no tests are normally carried out for VOC emissions and leaching of concrete.

8 References

Standards

EN 771-3
BS EN 771-3:2011+A1:2015, Specification for masonry units. Aggregate concrete masonry units (Dense and lightweight aggregates)

EN 13501-1
EN 13501-1:2018, Fire classification of construction products and building elements - Classification using data from reaction to fire tests

ISO 9001
ISO 9001, Quality management systems — Requirements

EN ISO 14025
EN ISO 14025:2011, Environmental labels and declarations. Type III environmental declarations. Principles and procedures

EN 15804
EN 15804:2012+A2+AC:2021, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products

EN 16757
EN 16757:2022. Sustainability of construction works. Environmental product declarations. Product Category Rules for concrete and concrete elements

EN 772-13
EN 772-13:2000, Methods of test for masonry units — Part 13: Determination of net and gross dry density of masonry units (except for natural stone)

EN 1745
EN 1745:2020, Masonry and masonry products. Methods for determining thermal properties

EN 772-1
EN 772-1+A1:2015, Methods of test for masonry units — Part 1: Determination of compressive strength

EN 1996-1-1 (EC6)
EN 1996-1-1 (EC6):2022, Eurocode 6: Design of masonry structures — Part 1-1: General rules for reinforced and unreinforced masonry structures

EN 772-14
EN 772-14:2001, Methods of test for masonry units — Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units

EN 998-2
EN 998-2:2016, Specification for mortar for masonry — Part 2: Masonry mortar

EN ISO 12572
EN ISO 12572:2016, Hygrothermal performance of building materials and products - Determination of water vapour transmission properties - Cup method

PD 6697
PD 6697:2019, Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2

Other literature

ECHA
European Chemicals Agency (ECHA): Candidate List of Substances of Very High Concern for Authorization. https://echa.europa.eu/

CPR
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Establishing harmonized conditions for the marketing of construction products, (EU) No. 305/2011, March 09, 2011.

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version 1.0.0 dated 12.06.2025

Ecoinvent
Ecoinvent (version 3.9.1)

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Environmental Footprint, ref package 3.1, July 2022 (European Platform on Life Cycle Assessment (EPLCA))

Negotiation Platform on Silica
Negotiation Platform on Silica (NePSi) ‘Agreement on workers’ health protection through the good handling and use of crystalline silica and products containing it’.

IBU 2022
Institut Bauen und Umwelt e.V.: General instructions for the EPD program of Institut Bauen und Umwelt e.V. Version 2., Berlin: Institut Bauen und Umwelt e.V., 2022. www.ibu-epd.com

No 528/2012
Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products

DEFRA
Department for Environment Food & Rural Affairs (DEFRA), UK statistics on waste, June 2023

Radiation Protection 112
European Commission, Directorate-General for Environment, Radiological protection principles concerning the natural radioactivity of building materials, Publications Office, 2000

WCO
Waste Catalog Ordinance (WCO), December 10th 2001

PCR Part A
Product category rules for building related products and services. Part A: Calculation rules for the life cycle assessment and requirements for the project report according to EN 15804+A2:2021 (v1.4). Berlin: Institut Bauen und Umwelt e.V., 15/04/2024

PCR Cement

Product category rules for building related products and services. Part B: Requirements for the EPD for cement, version 11 Berlin: Institut Bauen und Umwelt e.V. (ed.), 01/08/2024.
www.ibu-epd.com

PCR Part B Lightweight concrete
Product category rules for building related products and services. Part B: Requirements for the EPD for Lightweight concrete, version 11 Berlin: Institut Bauen und Umwelt e.V. (ed.), 01/08/2024.

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