

# ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Mineral Products Association (MPA) UK
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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UK Average Portland Cement  
Mineral Products Association (MPA) UK

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## General Information

<b>MPA UK</b> <b>Programme holder</b> IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	<b>UK Average Portland Cement</b> <b>Owner of the Declaration</b> MPA UK Gillingham House 38-44 Gillingham Street SW1V 1HU, London
<b>Declaration number</b> EPD-MPA-20170159-CAG1-EN	<b>Declared product / Declared unit</b> UK average factory made Portland Cement/ 1 tonne
<b>This Declaration is based on the Product Category Rules:</b> Cement, 07.2014 (PCR tested and approved by the SVR)	<b>Scope:</b> This average UK Portland cement EPD is based on 2016 data collected from the following sites: Lafarge Cement (Cauldon & Cookstown), Breedon Cement (Hope), CEMEX UK (Rugby, South Ferriby & Tilbury), Hanson UK (Ketton, Padeswood & Ribblesdale) and Tarmac (Aberthaw, Dunbar, Tunstead, Barnstone, Celtic Ash, Northfleet, Seaham, ScotAsh and West Thurrock). This EPD is an average covering all production of cement in Great Britain by all clinker and cement manufacturing sites plus MPA Cement member sites in Northern Ireland. 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.
<b>Issue date</b> 14/11/2017	<b>Verification</b> The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ <input type="checkbox"/> internally <input checked="" type="checkbox"/> externally
<b>Valid to</b> 13/11/2022	 Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)
 Dr. Burkhard Lehmann (Managing Director IBU)	 Prof. Dr. Birgit Grahl (Independent verifier appointed by SVR)

## Product

### Product description / Product definition

Cement is a hydraulic binder. It is a finely ground inorganic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes. After hardening, it retains its strength and stability even under water. The declared cement is an average of all Portland cement manufactured in GB and MPA member sites in Northern Ireland.

### Application

The applications of cement as an intermediate material are numerous but its main application is in the production of concrete.

### Technical Data

The Average UK Portland cement covered by this declaration is composed of a number of different cement types that meet standard BS EN 197-1. These cements have strength typically in the range of 32.5 – 52.5 N/mm<sup>2</sup>.

### Constructional data

Name	Value	Unit
Strength class acc. to BS EN 197-1	32.5 - 52.5	N/mm <sup>2</sup>

Performance data of the product in accordance with the Declaration of Performance with respect to its Essential Characteristics according to BS EN 197-1: 2011 Cement: Composition, specifications and conformity criteria for common cements.

### Base materials / Ancillary materials

Average UK Portland cement consists primarily of clinker and other cementitious materials. Portland cement produced by all MPA members complies with the Chromium (VI) legislation (clause 47 in Annex XVII of the REACH Regulation) by adding chemical reducing agents (typically, ferrous sulfate or stannous sulfate) in insignificant albeit sufficient quantities to reduce, on addition of mixing water, chromium (VI) to a level in the cement below 2 ppm. The list of significant inputs for the production of 1 tonne of Average UK Portland Cement is as follows:  
 Clinker: 86.1%



[Clinker is produced by crushing and heating limestone or chalk with small amounts of other natural materials, such as clay or shale, in a rotating kiln to a temperature of 1450° Celsius. The components of clinker are mainly calcium oxide (CaO) and silica (SiO<sub>2</sub>), and small amounts of aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) and iron oxide (Fe<sub>2</sub>O<sub>3</sub>)]

Gypsum: 4.8%

[Gypsum is added to control the setting time of the cement. 0.05% of gypsum was waste material arising from the flue gas desulphurisation]

Fly ash: 3.4%

[Fly ash is ash resulting from the combustion of coal. Most fly ash is sourced from coal fired power stations and is composed of silicon dioxide and calcium oxide]

Limestone: 5.1%

Ground Granulated Blast furnace Slag (GGBS): 0.04%

[GGBS is a by-product of iron and steel-making which is obtained by quenching molten iron slag from a blast

furnace in water or steam. Granulated blast furnace slag is slightly cementitious on its own but in order to optimise its performance it is ground to a controlled fineness]

#### Reference service life

The documentation for the reference service life is not required for this EPD since the entire life cycle is not declared here; instead limited to the manufacturing stage only (modules A1-A3). In addition, due to the wide range of potential applications for Portland cement, no single reference service lifetime can be established.

## LCA: Calculation rules

### Declared Unit

The declared unit used in this study is 1 tonne of Average UK Portland cement (which includes packaging where used). The weighted average has been calculated based on the total production volume of all Portland cement types produced by MPA Cement members.

### Declared unit

Name	Value	Unit
Declared unit	1	t

### System boundary

This is a cradle to gate EPD, where use of the product in construction applications is not considered and no reference service life is specified.

The system boundary of the EPD follows the modular structure in line with EN 15804. For the scope of this cradle to gate EPD, the assessment is up to the point at which the Average UK Portland cement is manufactured and so modules A1-A3 are the only ones considered here.

This means that in the case of Average UK Portland cement, the following processes have been considered

- Extraction of raw materials and energy sources from the environment where applicable)
- Transport of raw materials, additives and fuels from point of extraction through to manufacturer's production plant, i.e. for both

clinker production as well as cement manufacture

- Production and manufacturing processes associated with raw materials, additives and fuels
- Treatment and processing of any secondary materials or fuels used in the process from the "end-of-waste" state
- Transportation of secondary materials to manufacturer's production plant
- Production of clinker within the kiln
- Treatment and/or disposal of any wastes until they reach the "end-of waste" state
- Grinding of clinker and subsequent blending to produce the cement product
- Production of packaging materials (where applicable)
- Transport of packaging material to manufacturer's production plant (where applicable)

### 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.

## LCA: Scenarios and additional technical information

The background database used to produce this EPD was the GaBi Software-System and Database for Life Cycle Engineering version 8.0.0.247.

As this EPD focuses on the manufacturing stage of Average UK Portland cement only (modules A1-A3), it has not been necessary to develop product level scenarios for this cradle to gate assessment. Thus, no information on modules A4, B1-B7, C1-C4 & D is provided in this section of the EPD.



## LCA: Results

The tables below give the LCA results for environmental impacts, resource use as well as output flows & wastes categories for the modules that are declared in this study.

### DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: UK Average Portland Cement/ 1 tonne

Parameter	Unit	A1-A3
Global warming potential	[kg CO <sub>2</sub> -Eq.]	830.00
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	7.22E-6
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	1.73
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3</sup> -Eq.]	0.21
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	0.17
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.97E-3
Abiotic depletion potential for fossil resources	[MJ]	3200.00

### RESULTS OF THE LCA - RESOURCE USE: UK Average Portland Cement/ 1 tonne

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	103.00
Renewable primary energy resources as material utilization	[MJ]	0.00
Total use of renewable primary energy resources	[MJ]	103.00
Non-renewable primary energy as energy carrier	[MJ]	3450.00
Non-renewable primary energy as material utilization	[MJ]	0.00
Total use of non-renewable primary energy resources	[MJ]	3450.00
Use of secondary material	[kg]	17.90
Use of renewable secondary fuels	[MJ]	149.00
Use of non-renewable secondary fuels	[MJ]	1070.00
Use of net fresh water	[m <sup>3</sup> ]	0.37

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: UK Average Portland Cement/ 1 tonne

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	0.12
Non-hazardous waste disposed	[kg]	7.79
Radioactive waste disposed	[kg]	0.10
Components for re-use	[kg]	0.00
Materials for recycling	[kg]	0.00
Materials for energy recovery	[kg]	0.00
Exported electrical energy	[MJ]	0.00
Exported thermal energy	[MJ]	0.00

## References

### BS EN 197-1

BS EN 197-1:2011: Cement composition, specifications and conformity criteria for common cements. September 2011

### EC Regulation No 552/2009 - REACH, Annex XVII

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No552/2009 as regards Annex XVII. June 2009

### PCR 2013, Part A

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation rules for

the life cycle assessment and requirements on the project report. April 2013  
www.ibu-epd.com

### PCR 2014, Part B

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part B: Requirements on the EPD for Cement. July 2014  
www.ibu-epd.com

### Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);



**General Principles**

for the EPD range of Institut Bauen und Umwelt e.V.  
(IBU), 2013/04  
[www.ibu-epd.de](http://www.ibu-epd.de)

**/ISO 14025/**

DIN EN /ISO 14025:2011-10/, Environmental labels  
and declarations — Type III environmental  
declarations — Principles and procedures

**/EN 15804/**

/EN 15804:2012-04+A1 2013/, Sustainability of  
construction works — Environmental Product  
Declarations — Core rules for the product category of  
construction products



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