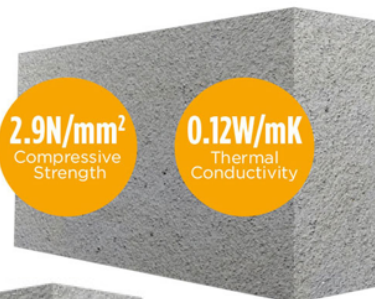




Super

2.9N/mm<sup>2</sup>  
Compressive  
Strength

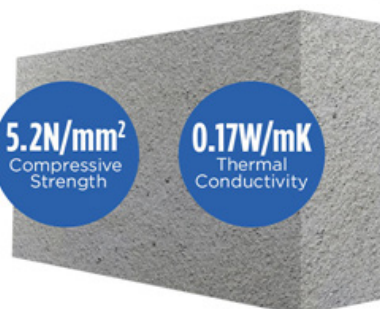
0.12W/mK  
Thermal  
Conductivity



Standard

5.2N/mm<sup>2</sup>  
Compressive  
Strength

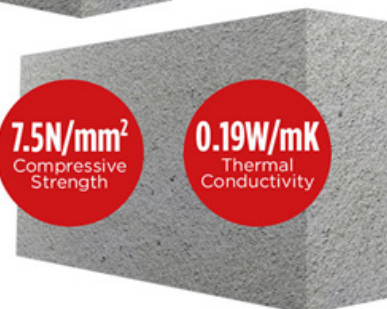
0.17W/mK  
Thermal  
Conductivity



Seven

7.5N/mm<sup>2</sup>  
Compressive  
Strength

0.19W/mK  
Thermal  
Conductivity



## Aircrete Blocks

Super  
Standard  
Seven

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804 + A1

Owner of the Declaration – Mannok

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Declaration number EPDIE-18-10




Issue date 18th Sept 2018

Valid to 18th Sept 2023

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EPD Programme - EPD Ireland  
Programme Operator - Irish Green Building Council

## 1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council, 19 Mountjoy Square, Dublin D01 E8P5.	Mannok, 187 Ballyconnell Road, Derrylin, Co. Fermanagh, BT92 9GP.
DECLARATION NUMBER	PRODUCTION SITE
EPDIE-18-10	Mannok Aircrete block plant, Gortmullan, Co. Fermanagh, Northern Ireland.
ECOPLATFORM EPD	DECLARED UNIT
Yes	The declared unit is defined as 1 kg weight of the block. The gross dry density of the Super block is 480 kg/m <sup>3</sup> , the Standard is 650 kg/m <sup>3</sup> and the Seven is 760 kg/m <sup>3</sup>
APPLICABLE PRODUCT CATEGORY RULES	DECLARED PRODUCT
Part A -29.06.2018	Super Block
DATE OF ISSUE	SCOPE OF EPD
18.09.2018 Reissue: 05.02.2021 Change in EPD owner name, logo and branding from Quinn Building Products to Mannok.	Manufacturer specific product
DATE OF EXPIRY	LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA
18.09.2023	EcoReview, Kilkenny, Co. Kilkenny, Ireland, +353 87 258 9783 / +31 646 264 9327 info@ecoreview.ie / www.ecoreview.eu
LCA SOFTWARE AND DEVELOPER	NAME AND VERSION OF INVENTORY USED
Ecochain	EcoInvent 3.4
COMPARABILITY	
Environmental Product Declarations from different programmes may not be directly comparable if not compliant with EN 15804:2012+A1:2013. 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+2012+A4:2013	
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	
Internally <input type="checkbox"/> Externally <input checked="" type="checkbox"/>	
SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council   	Jane Anderson  

## 2. Scope and Type of EPD:

The Modules that are declared are shown in the table below. This is a Cradle to Gate EPD with options.

All relevant inputs and outputs such as emissions, energy and materials, have been taken into account in this LCA. In accordance with I.S. EN 15804, the total neglected input flows per module do not exceed 5% of energy usage and mass. The EcoChain tool incorporates the Ecolnvent background database. Thus the Ecoinvent boundary approach is relevant.

The system boundary defines the stages of the life of the construction product included in the study. This LCA covers the Product Stage (modules A1 to A3) as illustrated in the figure bellow.

PRODUCT STAGE			CONSTRUCTION ON 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
<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A5</b>	<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>	<b>B6</b>	<b>B7</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND - Module not declared

### 3. Detailed product description

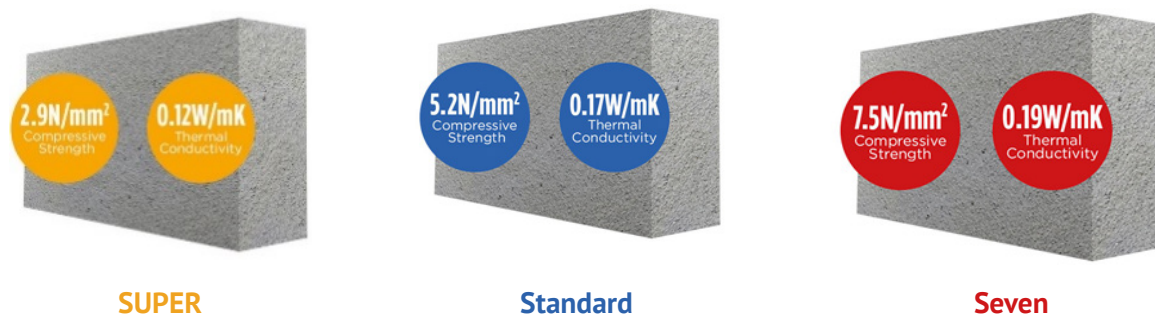
This LCA is carried out for Mannok Aircrete blocks. The constituent materials of the block comprises water, sand, cement, silt, lime, PFA, and aluminium. These are combined to form a solid microcellular matrix with very light weight and exceptional thermal performance properties. There are three product variations of the Mannok Aircrete block which are covered on this EPD; Super block, Standard block and Seven block. The gross dry density of the Super block is 480 kg/m<sup>3</sup>, the Standard block is 650 kg/m<sup>3</sup> and the Seven block is 760 kg/m<sup>3</sup>.

These light weight and high insulating value blocks are used to improve thermal performance of buildings. They are designed for use in external walls, rising foundation walls, internal partition walls and party walls between dwellings. The blocks are manufactured and tested in accordance with BS EN 771-4:2011+A1:2015 “Specification for masonry units. Autoclaved aerated concrete masonry units”. The strength and thermal conductivity values given in this EPD are those that are reported in the BBA certificates for the Super, Standard and Seven which can be downloaded at the following pages:

<https://www.mannokbuild.com/aircrete-thermal-blocks/mannok-aircrete-super/>

<https://www.mannokbuild.com/aircrete-thermal-blocks/mannok-aircrete-standard/>

<https://www.mannokbuild.com/aircrete-thermal-blocks/mannok-aircrete-seven/>

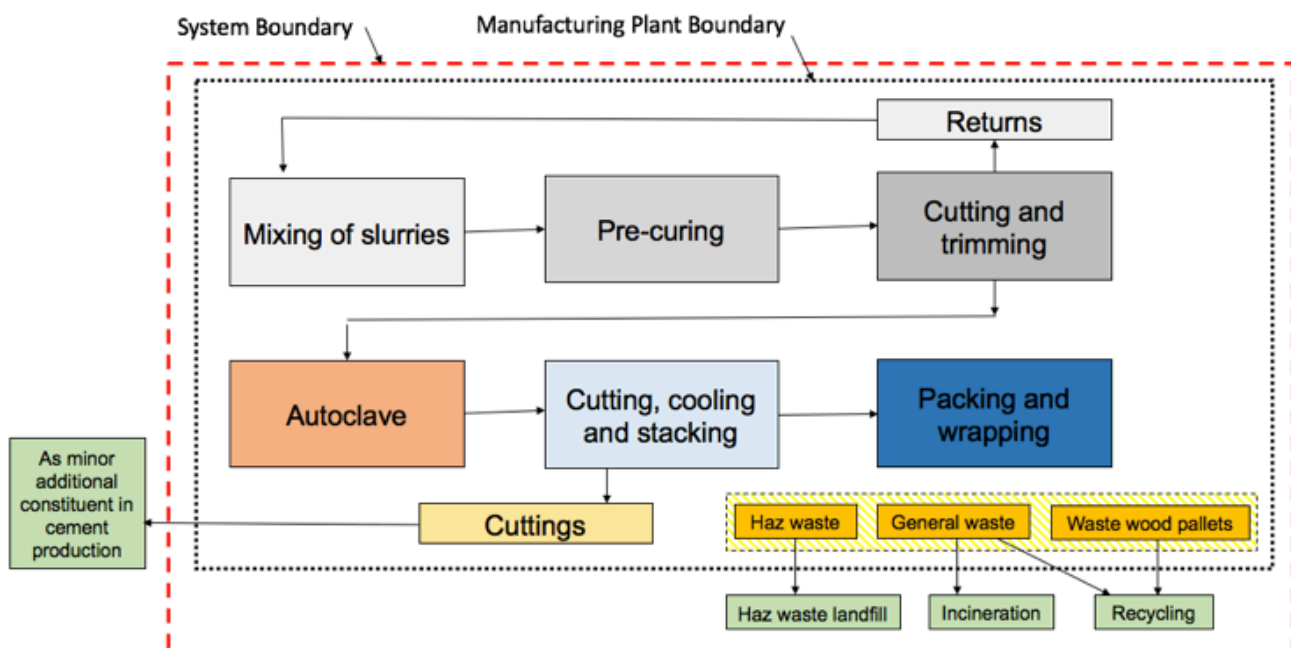


#### Process description

The raw materials used in production include sand, cement, lime, aluminium and water. These raw materials are poured into a mould in a slurry form. They are then transferred to the pre-cure room. The small amount of aluminium in the slurry reacts with the water and lime and forms hydrogen gas bubbles. The liberated gas forms extremely small bubbles within the mass, causing the mixture to expand within the mould to twice its original height. Once the material has reached the correct sufficient height and hardness in the pre-curing room, it is ready for cutting. It is now referred to as a cake. The amount of expansion is variable, and cannot be precisely controlled as it is dependent on environmental factors such as ambient temperature and humidity. The cakes are trimmed to size and cut both horizontally, and vertically into the required block size, using piano wires. The cakes now cut to block size are fed into autoclaves where they are steam cured. There are six autoclaves on the site. During the autoclaving process, further reactions take place with the formation of calcium silicate hydrates, which gives strength to the blocks. After autoclaving the blocks are separated without dismantling. Colour-coded straps are then placed around the pack of blocks, depending on their strength; Super, Standard and Seven. The blocks are then wrapped for delivery to site.

### 3. Detailed product description

Cuttings from the blocks prior to blocks entering the autoclave, are recycled as “returns” and re-mixed in with the slurries. Cuttings from the blocks after the autoclave, are re-used in the nearby Mannok cement plant as minor additional constituents in the production of Portland cement. In doing so, they leave the system boundary of this LCA, having passed beyond the end-of-waste stage. The cuttings are now a raw material input in an external manufacturing process for another product, and have zero impact in relation to the LCA for the Mannok Aircrete blocks.





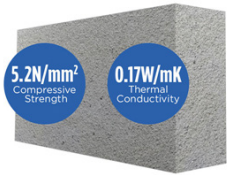
#### 4. LCA results - Super - Mandatory impact and LCI indicators

The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required. Additional information about biogenic carbon is optional.

#### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWP	[kg CO2-Eq.]	4.10E-01	8.92E-03	2.39E-02	4.43E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	2.19E-08	1.62E-09	6.41E-10	2.42E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	9.87E-04	2.23E-05	1.17E-04	1.13E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.10E-04	2.83E-06	8.87E-06	1.22E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	6.82E-05	1.39E-06	5.26E-06	7.48E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	9.84E-04	6.49E-05	7.73E-07	1.05E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	1.99E+00	1.42E-01	3.11E-01	2.45E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.



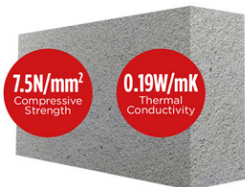
## 4. LCA results - Standard - Mandatory impact and LCI indicators

The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required. Additional information about biogenic carbon is optional.

### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO2-Eq.]	3.74E-01	9.56E-03	2.39E-02	4.07E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	2.01E-08	1.73E-09	6.41E-10	2.24E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	8.70E-04	2.36E-05	1.17E-04	1.01E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	9.81E-05	3.01E-06	8.87E-06	1.10E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	6.23E-05	1.48E-06	5.26E-06	6.90E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	9.04E-04	6.95E-05	7.73E-07	9.74E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	1.84E+00	1.52E-01	3.11E-01	2.31E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.



## 4. LCA results - Seven - Mandatory impact and LCI indicators

The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required. Additional information about biogenic carbon is optional.

### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
GWP	[kg CO2-Eq.]	3.85E-01	7.23E-03	2.39E-02	4.16E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
ODP	[kg CFC11-Eq.]	2.05E-08	1.31E-09	6.41E-10	2.25E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	9.06E-04	1.78E-05	1.17E-04	1.04E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.03E-04	2.28E-06	8.87E-06	1.14E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	6.25E-05	1.12E-06	5.26E-06	6.88E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	9.21E-04	5.26E-05	7.73E-07	9.74E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	1.88E+00	1.15E-01	3.11E-01	2.30E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.

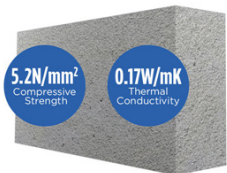




## Super - Resource use per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	7.24E-01	1.75E-03	9.60E-02	8.21E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	7.24E-01	1.75E-03	9.60E-02	8.21E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.21E+00	1.44E-01	2.64E-01	2.62E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	2.21E+00	1.44E-01	2.64E-01	2.62E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m³]	3.88E-04	7.78E-06	8.08E-05	4.77E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

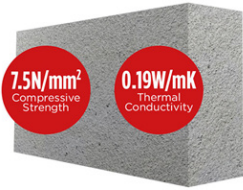
PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable 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. INA = Indicator not assessed. MND = Module not declared.



## Standard - Resource use per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
PERE	[MJ]	6.99E-01	1.87E-03	9.60E-02	7.97E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	6.99E-01	1.87E-03	9.60E-02	7.97E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.02E+00	1.54E-01	2.64E-01	2.44E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	2.02E+00	1.54E-01	2.64E-01	2.44E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m³]	3.47E-04	8.33E-06	8.08E-05	4.36E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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. INA = Indicator not assessed. MND = Module not declared.



## Seven - Resource use per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	6.88E-01	1.41E-03	9.60E-02	7.86E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	6.88E-01	1.41E-03	9.60E-02	7.86E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.05E+00	1.17E-01	2.64E-01	2.43E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	2.05E+00	1.17E-01	2.64E-01	2.43E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m³]	3.53E-04	6.31E-06	8.08E-05	4.40E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

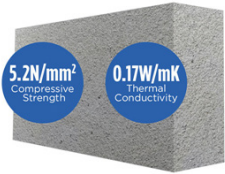
PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable 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. INA = Indicator not assessed. MND = Module not declared.



## Super - Output flows and waste categories per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
HWD	[kg]	6.08E-06	9.96E-07	9.41E-07	8.01E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
NHWD	[kg]	2.29E-01	6.49E-03	1.38E-03	2.37E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	5.52E-06	9.15E-07	8.87E-07	7.32E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

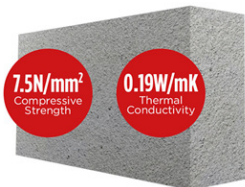
HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy. INA = Indicator not assessed. MND = Module not declared.



## Standard - Output flows and waste categories per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	5.98E-06	1.07E-06	9.41E-07	7.99E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.96E-01	6.96E-03	1.38E-03	2.05E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	5.38E-06	9.80E-07	8.87E-07	7.25E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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. INA = Indicator not assessed. MND = Module not declared.



## Seven - Output flows and waste categories per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	5.58E-06	8.08E-07	9.41E-07	7.33E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	2.12E-01	5.27E-03	1.38E-03	2.19E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	5.04E-06	7.42E-07	8.87E-07	6.66E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	INA	INA	INA	INA	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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. INA = Indicator not assessed. MND = Module not declared.

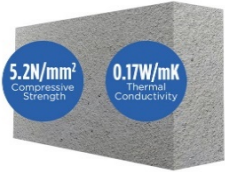


## 5. LCA results – Super - Additional impact indicators

### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	8.58E-02	3.60E-03	4.41E-03	9.38E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.59E-03	1.15E-04	8.41E-05	1.79E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	2.42E+02	1.71E+00	5.51E-01	2.45E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	6.63E-04	1.95E-05	1.45E-04	8.27E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND = Module not declared.



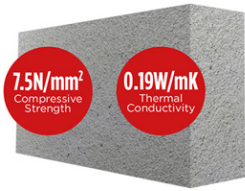
## 5. LCA results – Standard - Additional impact indicators

### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Human toxicity potential	kg 1,4-DB-eq	6.39E-02	3.85E-03	4.41E-03	7.22E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.59E-03	1.23E-04	8.41E-05	1.80E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.47E+02	1.83E+00	5.51E-01	1.50E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	6.24E-04	2.09E-05	1.45E-04	7.90E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND = Module not declared.





## 5. LCA results – Seven - Additional impact indicators

### Environmental Impact per kg

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
Human toxicity potential	kg 1,4-DB-eq	5.42E-02	2.92E-03	4.41E-03	6.15E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.51E-03	9.30E-05	8.41E-05	1.68E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.06E+02	1.39E+00	5.51E-01	1.08E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	6.16E-04	1.58E-05	1.45E-04	7.76E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND = Module not declared.

## 7. Calculation rules:

### Methodology and reproducibility

The process descriptions and quantities in this study are reproducible in accordance to the reference standards that have been used. The references of all sources, both primary and public sources and literature, have been documented in the LCA report. In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated which can be accessed via the EcoChain tool. This data portfolio contains a summary of all the data used in this LCA, and correspondingly, in the Mannok Aircrete blocks EcoChain account.

### Data quality

Data flows have been modeled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources.

Data collection period

The dataset is representative for the production processes used in 2017

## 8. Scenarios and additional technical information

### A1. Raw materials supply

This module considers the extraction and processing of all raw materials and energy which occur upstream to the Mannok Aircrete blocks manufacturing process, as well as waste processing up to the end-of waste state.

### A2. Transport of raw materials to manufacturer

This includes the transport distance of the raw materials to the manufacturing facility via road, boat and/or train.

### A3. Manufacturing

This module covers the manufacturing of Mannok Aircrete blocks and includes all processes linked to production such as extrusion, mixing, packing and internal transportation. Use of electricity, fuels and auxiliary materials in fiber production is taken into account as well.

## 9. 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.



## 10. Other optional additional environmental information

No additional information.

## 11. References

- EN 15804:2012+A1:2013 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products, of 11/2013.
- ISO 14040/14044 Environmental management -- Life cycle assessment -- Requirements and guidelines
- PRODUCT CATEGORY RULES: PART A Implementation and use of IS 15804:2012 and CEN TR 16970 in Ireland for the development of Environmental Product Declarations, IGBC, 29-06-2018