

## Statement of Verification

BREG EN EPD No.: 000279

Issue 01

This is to verify that the

### Environmental Product Declaration

provided by:

**Saudi Readymix Concrete Co Ltd**

is in accordance with the requirements of:

**EN 15804:2012+A1:2013**

and

**BRE Global Scheme Document SD207**

This declaration is for:

**C60 Readymix Concrete**



### Company Address

PO Box 31839  
Al Khobar 31952  
Saudi Arabia



*Signature here*

Signed for BRE Global Ltd

Operator

16 December 2019

Date of this Issue

16 December 2019

Date of First Issue

15 December 2022

Expiry Date



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## Environmental Product Declaration

EPD Number: 000279

### General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	LCA consultant/Tool
Saudi Readymix Concrete Co Ltd PO Box 31839 Al Khobar 31952 Saudi Arabia	BRE LINA v2.0
Declared/Functional Unit	Applicability/Coverage
1 m <sup>3</sup> of C60 Readymix Concrete	Manufacturer specific product.
EPD Type	Background database
Cradle to Gate with options	ecoinvent v3.2

#### Demonstration of Verification

CEN standard EN 15804 serves as the core PCR <sup>a</sup>

Independent verification of the declaration and data according to EN ISO 14025:2010

Internal  External

(Where appropriate <sup>b</sup>)Third party verifier:  
Jane Anderson

a: Product category rules

b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

#### Comparability

Environmental product declarations from different programmes may not be 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+A1:2013 for further guidance

### Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Note: Ticks indicate the Information Modules declared.

### Manufacturing sites

33 production sites within the Kingdom of Saudi-Arabia.

See additional information section for details.

### Construction Product

#### Product Description

Ready mixed concrete products are produced in different grades from C8 to C80 (Mpa). The lower class mixes (C8 to C25) are used for non-structural applications and higher grades (> C30) for structural applications as well as for special purposes.

#### Technical Information

Property	Value, Unit
Typical Density	2475 kg/m <sup>3</sup>
Compressive Strength	60 MPa



## Main Product Contents

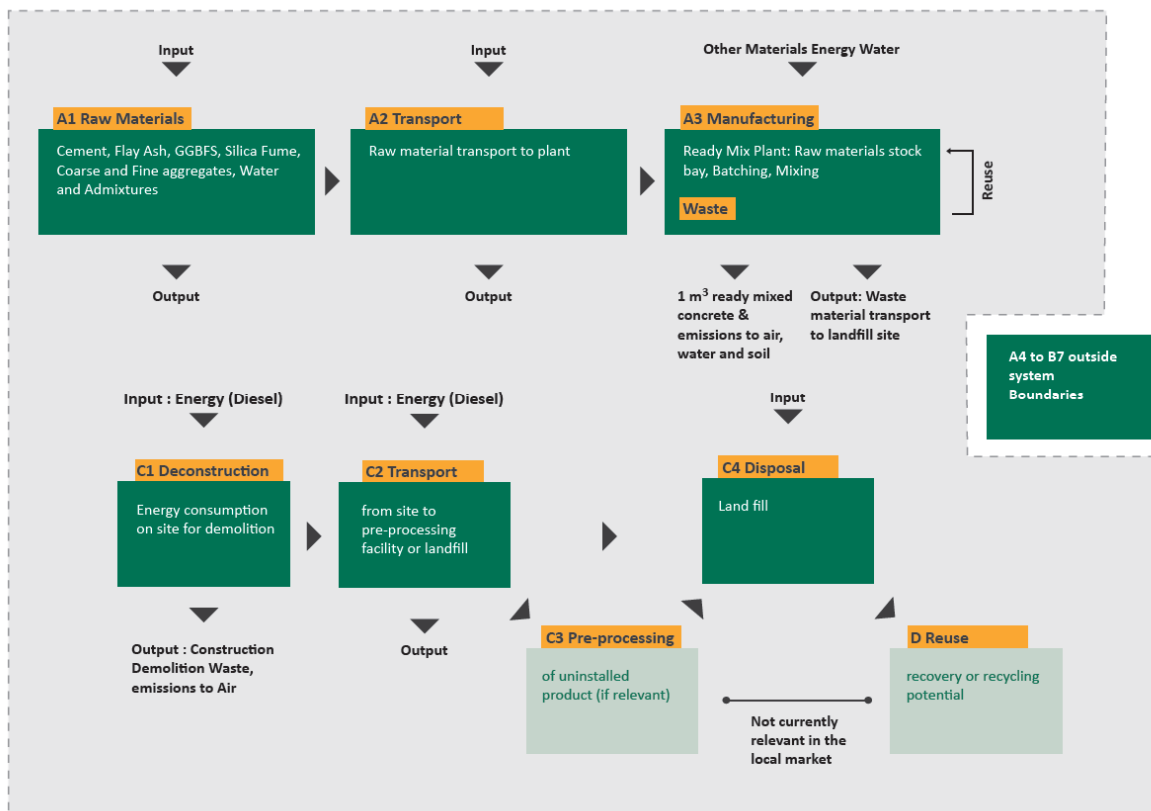
Material/Chemical Input	Kg/m <sup>3</sup>
Course aggregate	1100
Sand	672
Water	154
Admixture	19
Cement	329
Micro silica	42
Ground granulated blast furnace slag	159
TOTAL	2475

## Manufacturing Process

Saudi Readymix Concrete Co Ltd operates 33 factories, distributed throughout the Kingdom of Saudi Arabia covering all major inhabited areas in the eastern, central, western and southern regions. Based on national & international standards, the main component of concrete (cement, additives, chemical admixtures, water, coarse and fine aggregates) are mixed in a batching plant. Each factory has 2-3 batching plants.

## Process flow diagram

System Boundaries



## Construction Installation

Readymix concrete is transported to site in a concrete truck mixer and poured on site. On site wastage of readymix concrete is assumed to be 5%.

## End of Life

At end-of-life, 100% of readymix concrete is assumed to be sent to landfill. Transport to landfill is also included.

## Life Cycle Assessment Calculation Rules

### Declared unit description

1 cubic metre (m<sup>3</sup>) of C60 readymix concrete.

### System boundary

This is a cradle to gate with options EPD covering modules A1 to A3, A4, A5, C2 and C4.

### Data sources, quality and allocation

Data collected by Saudi Readymix for the production of C60 concrete at 33 concrete production sites for the calendar year of 2018 has been used for this EPD as a 'worst case scenario' to represent other products (C15, C20, C25, C30, C35, C40, C45 and C50). The rest of Saudi Readymix concrete production will demonstrate better values. The C60 product forms 1% of the total Saudi Readymix production. All products represented form 97% of total production. Figures for the input materials were calculated from the standard mix design based on the density of the C60 product multiplied by the total production of C60 over 33 production sites. Allocation of energy, water, emissions and waste has been done according to the provisions of the BRE PCR PN514 and EN 15804. Energy and water figures are calculated from invoices over the 33 sites.

Secondary data has been drawn from the BRE LINA database v2.0.61 and the background LCI datasets are based on ecoinvent v3.2 (2015). The dataset for type 1 Portland cement was used and Micro Silica (silicon dioxide) was represented by the silicone products dataset which is a polymer of silicon dioxide.

### Cut-off criteria

All raw materials and energy input to the manufacturing process have been included. The inventory process in this LCA includes all data related to raw material, packaging material and consumable items, and the associated transport to the manufacturing site. Process energy and water use and direct production waste are included.

## LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO <sub>2</sub> equiv.	kg CFC 11 equiv.	kg SO <sub>2</sub> equiv.	kg (PO <sub>4</sub> ) <sup>3-</sup> equiv.	kg C <sub>2</sub> H <sub>4</sub> equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	6.58E+02	1.21E-04	2.16E+00	8.37E-01	3.18E-01	5.14E-03	6.77E+03
Construction process stage	Transport	A4	1.45E+01	2.67E-06	4.84E-02	1.28E-02	8.45E-03	3.81E-05	2.19E+02
	Construction	A5	3.78E+01	7.06E-06	1.43E-01	5.05E-02	2.19E-02	2.61E-04	4.20E+02
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND	MND
	Transport	C2	4.51E+00	8.58E-07	1.55E-02	4.07E-03	3.20E-03	7.56E-06	7.03E+01
	Waste processing	C3	MND	MND	MND	MND	MND	MND	MND
	Disposal	C4	1.28E+01	4.43E-06	9.90E-02	2.44E-02	1.71E-02	1.39E-05	3.73E+02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

GWP = Global Warming Potential;  
 ODP = Ozone Depletion Potential;  
 AP = Acidification Potential for Soil and Water;  
 EP = Eutrophication Potential;

POCP = Formation potential of tropospheric Ozone;  
 ADPE = Abiotic Depletion Potential – Elements;  
 ADPF = Abiotic Depletion Potential – Fossil Fuels;

## LCA Results (continued)

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	3.66E+02	8.16E-03	3.66E+02	7.07E+03	0.00E+00	7.07E+03
Construction process stage	Transport	A4	2.90E+00	1.08E-05	2.90E+00	2.17E+02	0.00E+00	2.17E+02
	Construction	A5	1.92E+01	4.10E-04	1.92E+01	4.34E+02	0.00E+00	4.34E+02
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND
	Transport	C2	1.06E+00	2.65E-06	1.06E+00	6.99E+01	0.00E+00	6.99E+01
	Waste processing	C3	MND	MND	MND	MND	MND	MND
	Disposal	C4	9.64E+00	1.46E-05	9.64E+00	3.70E+02	0.00E+00	3.70E+02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

## LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m <sup>3</sup>
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	9.43E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	4.74E-02
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	5.04E-01
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.63E-02
	Waste processing	C3	MND	MND	MND	MND
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	4.26E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

SM = Use of secondary material;  
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;  
FW = Net use of fresh water



## LCA Results (continued)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	6.73E+00	2.23E+02	2.66E-02
Construction process stage	Transport	A4	9.17E-02	1.02E+01	1.51E-03
	Construction	A5	3.80E-01	1.36E+02	1.90E-03
End of life	Deconstruction, demolition	C1	MND	MND	MND
	Transport	C2	2.64E-02	6.00E+00	4.88E-04
	Waste processing	C3	MND	MND	MND
	Disposal	C4	1.34E-01	2.48E+03	2.52E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND

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

## LCA Results (continued)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	5.18E-04	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	2.59E-05	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	MND	MND	MND	MND
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

CRU = Components for reuse;  
MFR = Materials for recycling

MER = Materials for energy recovery;  
EE = Exported Energy

## Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Transport to site distance assumed as 35km, diesel consumption of concrete mixer vehicle assumed as 0.35 l/km		
	Fuel type / Vehicle type	l/km	0.35
	Distance:	km	35
	Capacity utilisation (incl. empty returns)	%	95
	Bulk density of transported products	kg/m <sup>3</sup>	2475
A5 – Installation in the building	Energy use of concrete pump assumed to be 1 litre/m <sup>3</sup> of diesel. 5% wastage of product is assumed at installation		
	Energy use of concrete pump	l/m <sup>3</sup>	1.0
	Wastage at installation	%	5
C2 and C4 End of life,	100% of waste from deconstruction goes to landfill. Maximum distance to disposal site 20km. Fuel consumption of lorry 0.5 litres/km.		
	End of life disposal of 1 m <sup>3</sup> of concrete to landfill	kg	2475
	Fuel type / Vehicle type	l/km	0.5
	Distance:	km	20

## Summary, comments and additional information

### Comparison of C60 Results to Production-Weighted Average

Table 1 shows a comparison of C60 LCA results for selected indicators to the results for a production-weighted average of 97% of Saudi Readymix total production. The C60 product was chosen to represent the other products as a 'worst-case scenario'.

Indicator	Unit	C60 product	Production weighted average
		A1-A3	A1-A3
GWP	kg CO2 eq.	6.58E+02	4.88E+02
ODP	kg CFC 11 eq.	1.21E-04	4.24E-05
AP	kg SO2 eq.	2.16E+00	1.31E+00
EP	kg (PO4)3- eq.	8.37E-01	5.86E-01
POCP	kg C2H4 eq.	3.18E-01	1.90E-01
ADPE	kg Sb eq.	5.14E-03	4.37E-04
ADPF	MJ eq.	6.77E+03	3.70E+03

### List of Saudi Readymix Production Sites

This list of production sites is current at the compilation of the EPD:

RM01 Jubail  
 RM03 Khafji  
 RM05 Saihat  
 RM29 Aziziyah  
 RM44 2nd Industrial DAMMAM  
 RM39 Ras Al Khair  
 RM86 Ras AlKhair Maritime Project  
 RM53 Hofuf 2nd Location  
 RM80 Al Fadhili Gas Project  
 RM87 Harad Project  
 RM89 Marjan Gas Project  
 RM08 Riyadh New Sulay  
 RM54 Riyadh North Second Location  
 RM58 New Al Imam Univ. Project (On-Site)  
 RM59 CAP2 Project : El Seif  
 RM64 ABV MOI - (Ministry of Interior Medical City)  
 RM74 GAC-AL FOUZAN  
 RM35 Al-Kharj New Location  
 RM46 AL Qaseem Factory  
 RM85 - SHARMA  
 RM22 Jeddah South  
 RM61 New Jeddah North-Binladin HAMDANIAH  
 RM67 New Makkah Factory  
 RM81 KAAR (King Abdul Aziz Road) Project  
 RM16 Madina  
 RM12 Rabigh  
 RM60 New On-site (Thowal)

Continued...

RM76 New KAP-(King Abdullah Port)  
RM32 Yanbu  
RM84 Al Taief – Project Wade Al Marj  
RM88 KFNB  
RM90 Red Sea Project  
RM57 Jizan Refinery Project -SPR

## References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

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ASTM C94/C94M Standard Specification for Ready-Mixed Concrete, Revision 19A, August 15, 2019, USA