

Environmental Product Declaration

according to ISO 14025 and EN 15804



This declaration is for:
Phoenix Portland cement CEM I 42,5 R

Provided by:
**Phoenix Zementwerke Krogbeumker
GmbH & Co. KG**



program operator
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PROGRAM OPERATOR

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COMPANY INFORMATION



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SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Ulbert Hofstra, SGS Intron**.
 The LCA study has been done by **Jochen Reiners, VDZ gGmbH**.
 The certificate is based on an LCA-dossier according to ISO14025 and NEN-EN15804+A1. It is verified according to the 'EPD-MRPI® verification protocol May 2017.v3.1'. EPDs of construction products may not be comparable if they do not comply with NEN-EN15804+A1. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

VISUAL PRODUCT



PRODUCT

Phoenix Portland cement CEM I 42,5 R

MRPI® REGISTRATION

1.1.00107.2020

EPD REGISTRATION

00001159

DATE OF ISSUE

12-03-2020

EXPIRY DATE

12-03-2025

DECLARED UNIT/FUNCTIONAL UNIT

1 ton

DESCRIPTION OF PRODUCT

The cement declared in this EPD is a portland cement according to EN 197-1, i.e. portland cement clinker is the only "main constituent".

MORE INFORMATION

www.phoenix-zement.de

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR[a]

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

internal: external: X

(where appropriate[b]) Third party verifier:

Ulbert Hofstra, SGS Intron B.V.

[a] Product Category Rules [b] Optional for B-to-B communication,
 mandatory for B-to-C communication (see EN ISO 14025:2010, 9.4).

DETAILED PRODUCT DESCRIPTION

The main constituent of CEM I 42,5 R is Portland cement clinker. It is produced from limestone which is crushed and sintered in a rotary kiln at a temperature of 1450°C. Portland cement is produced by intergrinding Portland cement clinker and gypsum from flue gas desulfurisation (setting time regulator). Also, a small amount of fly ash, production dust from the clinker production process and low amounts of additives (chromate reduction agent and grinding aid) are added.

COMPONENT (> 1%)	[kg / %]
Portland cement clinker	90%
Calcium sulfate	5%
Minor additional constituents	5%

(*) > 1% of total mass

SCOPE AND TYPE

The cement in this EPD is produced at the Phoenix cement plant in Beckum, Germany. Cement is a hydraulic binder, mainly used for concrete, mortar and cement screed. Since cement is an intermediate product, only the production phase is included in the LCA. The LCA was developed using the "Bepalingsmethode Milieuprestatie Gebouwen en GWW werken" (January 2019), Ecoinvent 3.4 for background processes and the GaBi Software (version 9.1). The environmental indicators have been calculated with the characterisation factors "SBK Bepalingsmethode, version 25 May 2018"

PRODUCT STAGE	CONSTRUCTION					USE STAGE							END OF LIFE			BENEFITS AND	
	PROCESS												STAGE			LOADS BEYOND THE	
	STAGE															SYSTEM BOUNDARIES	
Raw material supply	Transport	Manufacturing	Transport gate to 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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	

X = Module assessed

MNA = Module not assessed

REPRESENTATIVENESS

Not applicable, in this study a specific product is considered produced at a specific production site.



ENVIRONMENTAL IMPACT per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb-eq.	2.30 E -5	1.78 E -5	7.06 E -7	4.15 E -5	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
ADPF	MJ	3.70 E +3	9.70 E +1	3.06 E +1	3.83 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
GWP	kg CO2-eq.	8.89 E +1	5.79 E +0	7.55 E +2	8.50 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
ODP	kg CFC11-eq.	3.51 E -6	1.15 E -6	3.86 E -7	5.05 E -6	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
POCP	kg ethene-eq.	1.54 E -2	3.68 E -3	4.08 E -2	5.99 E -2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
AP	kg SO2-eq.	2.17 E -1	2.67 E -2	7.47 E -1	9.91 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
EP	kg (PO4)3--eq.	7.07 E -2	5.41 E -3	6.69 E -2	1.43 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Toxicity indicators (Dutch market)																			
HTP	kg DCB-eq.	6.24 E +0	2.49 E +0	2.83 E +1	3.70 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
FAETP	kg DCB-eq.	3.15 E -1	7.21 E -2	4.36 E -2	4.31 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
MAETP	kg DCB-eq.	1.27 E +3	2.65 E +2	3.33 E +2	1.87 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
TETP	kg DCB-eq.	5.85 E -2	8.76 E -3	3.91 E -1	4.58 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Environmental Cost Indicator (Dutch market)																			
ECI	Euro	7.02 E +0	7.13 E -1	4.40 E +1	5.17 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

INA = Indicator Not Assessed

ADPE = Abiotic Depletion Potential for non-fossil resources

ADPF = Abiotic Depletion Potential for fossil resources

GWP = Global Warming Potential

ODP = Depletion potential of the stratospheric ozone layer

POCP = Formation potential of tropospheric ozone photochemical oxidants

AP = Acidification Potential of land and water

EP = Eutrophication Potential

HTP = Human Toxicity Potential

FAETP = Fresh water aquatic ecotoxicity potential

MAETP = Marine aquatic ecotoxicity potential

TETP = Terrestrial ecotoxicity potential

ECI = Environmental Cost Indicator



RESOURCE USE per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1.19 E +2	1.25 E +0	1.61 E -1	1.20 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERM	MJ	0.00	0.00	0.00	0.00	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERT	MJ	1.19 E +2	1.25 E +0	1.61 E -1	1.20 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRE	MJ	2.88 E +3	1.03 E +2	3.38 E +1	3.02 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRM	MJ	0.00	0.00	0.00	0.00	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRT	MJ	2.88 E +3	1.03 E +2	3.38 E +1	3.02 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
SM	kg	0.00	0.00	0.00	0.00	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
RSF	MJ	6.60 E +2	0.00	0.00	6.60 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
NRSF	MJ	1.44 E +3	0.00	0.00	1.44 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
FW	m3	1.42 E +0	1.58 E -2	7.57 E -2	1.51 E +0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

INA = Indicator Not Assessed

PERE = Use of renewable energy excluding renewable primary energy resources

PERM = Use of renewable energy resources used as raw materials

PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials

PENRM = Use of non-renewable primary energy resources used as raw materials

SM = Use of secondary materials

NRSF = Use of non renewable secondary fuels

PERT = Total use of renewable primary energy resources

PENRT = Total use of non-renewable primary energy resources

RSF = Use of renewable secondary fuels

FW = Use of net fresh water

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	2.47 E -2	6.06 E -4	1.33 E -3	2.66 E -2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
NHWD	kg	1.05 E +1	5.04 E +0	8.19 E -1	1.64 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
RWD	kg	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
CRU	kg	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
MFR	kg	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
MER	kg	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
EEE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
ETE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

INA = Indicator Not Assessed

HWD = Hazardous Waste Disposed

RWD = Radioactive Waste Disposed

MFR = Materials for recycling

EEE = Exported Electrical Energy

NHWD = Non Hazardous Waste Disposed

CRU = Components for reuse

MER = Materials for energy recovery

ETE = Exported Thermal Energy



CALCULATION RULES

No materials or processes have been excluded from the study. The LCA is based on data for the year 2018. The emissions from the incineration of waste have been allocated to the cement production. Biogenic CO₂ emissions are not included. Infrastructure processes in Ecoinvent processes have been included. Longterm emissions in Ecoinvent processes have been excluded from the LCA calculations.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Module A1:

This module includes the supply of raw materials and fuels.

Module A2:

This module includes the transport of raw materials and fuels to the cement plant.

Module A3:

This module includes the grinding of the raw materials, the production of the clinker and the processing and blending of the cement constituents.

DECLARATION OF SVHC

No substances that are listed in the latest "Candidate List of Substances of Very High Concern for authorisation" are included in the product that exceeds the limit for registration.

REFERENCES

- Bepalingsmethode Milieuprestatie Gebouwen en GWW werken (January 2019)

REMARKS

The abiotic depletion potential (fuel), expressed in kg Sb. eq., of the production of 1 ton of this cement (A1-A3) is: 1.84E+00

