MRPI-EPD+ STICHTING MRPI

PROGRAMME OPERATOR
Stichting MRPI
Kingsfordweg 151
1043GR
Amsterdam

COMPANY INFORMATION

Dyckerhoff GmbH – Werk Lengerich
Lienener Straße 89
49525
Lengerich

www.dyckerhoff.com

PRODUCT
Cement: CEM I 52.5 R

MRPI-REGISTRATION
1.1.00033.2019

EPD-REGISTRATION
00000809

DATE OF ISSUE
1/21/2019

DATE OF EXPIRY
1/21/2024

DECLARED UNIT /FUNCTIONAL UNIT
The production of 1 metric ton of cement

SCOPE OF DECLARATION
This MRPI-EPD+ certificate is verified by **Ecochain**
The LCA study has been done by **SGS INTRON**
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'. EPD 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

DESCRIPTION OF PRODUCT
Portland cement: CEM I 52.5 R

MORE INFORMATION
www.dyckerhoff.com

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: Niels Jonkers, Ecochain
[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

Cement is produced by intergrinding Portland cement clinker and other constituents. The main constituents of this cement are mentioned in the table below. In this EPD only the production of bulk products is considered. Packaging materials are not included.

COMPONENT (*)	[%]
Portland cement clinker	95
Blast furnace slag	-
Minor additional constituents	0-5

(*) > 1% of total weight

SCOPE AND TYPE

The cement in this EPD is produced at the production location of Dyckerhoff in Lengerich.

Cement is a hydraulic binder, mainly used for concrete, mortar and cement screed. Since cement is a semi-finished product, only the production of the cement is included in the LCA.

The LCA is compiled using the “Bepalingsmethode milieuprestaties gebouwen en GWW werken v2.0” as PCR, Ecoinvent v3.4 for background processes, SimaPro 8.5 LCA software. The main impact categories have been calculated with the characterization factors in “SBK Bepalingsmethode version May 25th 2018”

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE 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 (IF AVERAGE)

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.	4.72 E -5	9.26 E -6	4.03 E -5	9.68 E -5	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
ADPF	MJ	7.30 E +1	4.95 E +1	2.45 E +3	2.58 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
GWP	kg CO2-eq.	4.53 E +0	3.26 E +0	8.40 E +2	8.48 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
ODP	kg CFC11-eq.	2.26 E -7	6.01 E -7	5.99 E -6	6.82 E -6	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
POCP	kg Ethene-eq.	2.77 E -3	1.93 E -3	6.63 E -2	7.10 E -2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
AP	kg SO2-eq.	1.93 E -2	1.43 E -2	1.37 E +0	1.41 E +0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
EP	kg (PO4)3--eq	3.20 E -3	2.84 E -3	3.61 E -1	3.67 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Toxicity indicators (only for Dutch market)																			
HTP	kg DCB-eq.	3.61 E +0	1.31 E +0	2.04 E +1	2.53 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
FAETP	kg DCB-eq.	1.92 E -1	3.83 E -2	7.30 E -1	9.61 E -1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
MAETP	kg DCB-eq.	2.11 E +2	1.38 E +2	2.63 E +3	2.98 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
TETP	kg DCB-eq.	1.75 E -2	4.63 E -3	4.80 E -1	5.02 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.

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	2.70 E -4	3.71 E -4	1.35 E -2	1.41 E -2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
NHWD	kg	6.66 E -1	3.08 E +0	6.06 E +0	9.80 E +0	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;
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;
ETE = Exported thermal energy.

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	5.18 E +0	6.88 E -1	1.83 E +2	1.89 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERM	MJ	1.52 E +0	2.48 E -1	5.68 E +1	5.86 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PERT	MJ	5.21 E +0	6.94 E -1	1.84 E +2	1.89 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRE	MJ	9.00 E +1	5.37 E +1	3.24 E +3	3.39 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRM	MJ	0.00 E +0	0.00 E +0	0.00 E +0	0.00 E +0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
PENRT	MJ	8.78 E +1	5.05 E +1	3.24 E +3	3.38 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
SM	kg	6.30 E +1	0.00 E +0	0.00 E +0	6.30 E +1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
RSF	MJ	0.00 E +0	0.00 E +0	5.41 E +2	5.41 E +2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
NRSF	MJ	0.00 E +0	0.00 E +0	1.48 E +3	1.48 E +3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
FW	m3	2.73 E -2	9.65 E -3	1.31 E +0	1.34 E +0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

INA = Indicator Not Assessed
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 resources excluding non renewable primary energy resources used as materials;
PENRM = Use of non-renewable primary energy used as raw materials; PENRT = Total use of non-renewable primary energy resources;
SM = Use of secondary materials; RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

CALCULATION RULES

Virtually no materials or processes have been excluded from the study (cut-of rule is well below 1%).

Data collected in 2018 from base year 2013.

The “production” of secondary fuels and materials is allocated to the previous life cycle. Only transportation to the production site of Dyckerhoff is allocated to the production of cement. The emissions from the combustion of secondary fuels in the clinker kiln is allocated to cement production. Biogenic CO2 emissions are not included.

Infrastructure processes in Ecoinvent processes have been included, long term emissions in Ecoinventprocesses have been excluded from the LCA calculations.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Natural raw materials (mainly limestone) is quarried, crushed and ground into raw meal. The raw meal is fed into the clinker kiln together with primary and secondary raw materials and fuels. In the kiln the raw materials are calcinated and sintered into Portland cement clinker.

The second step is the production of cement. Portland cement is produced by intergrinding Portland cement clinker, limestone and gypsum (setting time regulator), both natural- and flue gas desulfurization (FGD) gypsum are used. Also, a small amount of production dust from the clinker production process is added, and low amounts of additives (chromate reduction agent and grinding aid). Blast furnace slag cements are produced in a similar way. Blast furnace slag is dried and intergrinded with Portland cement clinker and the other 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

Stichting Bouwkwaliteit, Bepalingsmethode Milieuprestatie Gebouwen en GWW Werken.
B. Roijen, “MRPI-EPDs FOR DYCKERHOFF CEMENT GERMANY, Lengerich, Neuwied, Deuna & Neuss”, SGS INTRON report: A897280/R20180402, 01-09-2019

REMARKS

Regarding the Dutch National Environmental Database one impact category and the milieukostenindicator (MKI) is added:
- The abiotic depletion potential (non fuel), expressed in kg Sb. eq. of the production of 1 ton of this cement (A1-3) is: 1.88E+00.
- The value of the milieukostenindicator (MKI) of the production of 1 ton of this cement (A1-3) is: € 54.39, -.