EPD Doroport®TB – Holcim Romania

ISO 14020; ISO 14025; ISO 14040; ISO 14044; EN 15804; EN 16908; ISO 21930
Edition 1; Revision 0: July 2022
Environmental Product Declaration in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019

1. Programme information

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EPD Registration number	S-P-06631
Publication Date	2022-08-18
Version Date	2022-08-18
Valid Until	2027-08-17

Product group classification: UN CPC 3744 CEMENT
Product category rules (PCR): *CEN Standard EN 15804:2012+A2:2019 served as the core PCR. PCR 2019:14-c-PCR-001 c-PCR-001 Cement and building lime (EN 16908) (2022-05-18)*
PCR review was conducted by: The Technical Committee of the International EPD System. Chair: Massimo Marino. Contact via *info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: **Dr Hüdai Kara PhD** Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025

2. Company Information

This cradle-to gate environmental product declaration is for 1 tonne of average Doroport®TB special road binder production from the locations fully owned and operated by Holcim in Romania, as follows:

Alesd Cement Plant
Street Viitorului, No.2, Postal code 417022
Chistag Village, Bihor County, Romania

Pitesti Road Binder Plant
Postal code 110138, Str. Depozitelor 10,
Pitesti, Romania

Holcim Romania is the study commissioner and EPD owner.

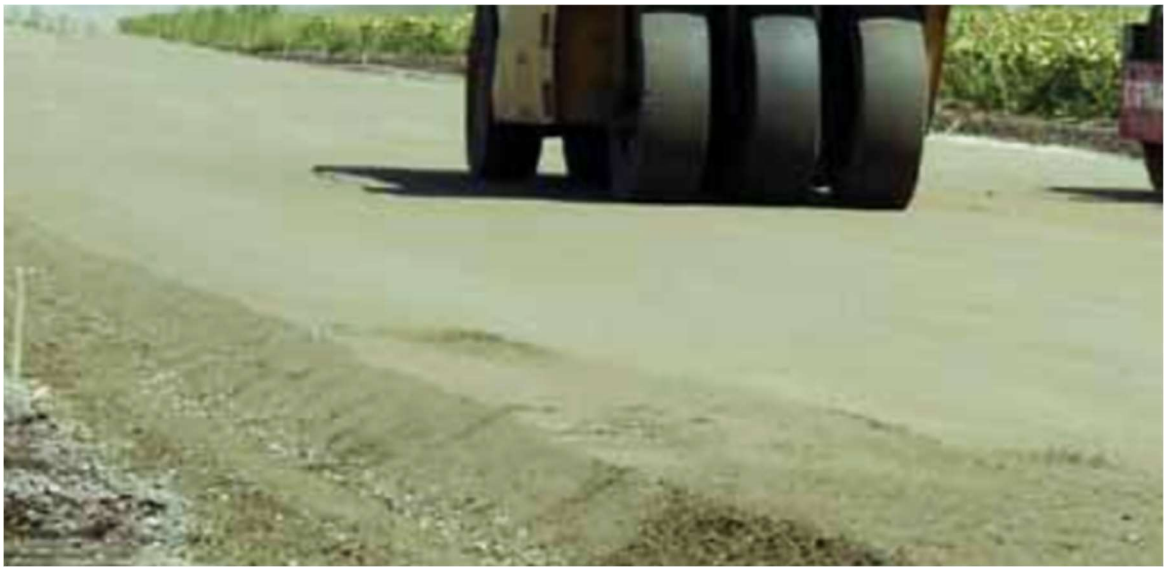
To respect the principles of sustainable development, the company implemented, maintained and continuously improves an effective integrated management system, in accordance with the applicable reference standards: SR EN ISO 9001:2015, SR EN ISO 14001:2015, SR ISO 45001:2018; BES 6001:2016.

Sustainability strategy
Holcim Romania sustainability strategy is governed by Holcim Group commitment of becoming a NET ZERO company and spearheading the transition towards low-carbon construction, while promoting a circular economy, from alternative fuels to concrete recycling.

Doroport ®TB is one of Holcim Romania's hydraulic road binders. Further information is publicly available on https://econcept.holcim.ro/sustenabilitate

3. Product Information

This EPD provides information concerning Doroport®TB special road binder produced by Holcim in Romania as detailed in Table 1.



DOROPORT®TB is Holcim Romania range of hydraulic road binders consisting of a combination of hydraulic compounds, Portland cement clinker and other minor constituents, in accordance with SR EN 13282-1: 2013.

The geographical scope of this EPD is Romanian.

3.1 Technical Specification of Product

Aspect	Details
Usage	DOROPORT®TB is used to stabilize the materials used in the execution of road layers, especially the foundation layers and the base layers that are part of the rigid and non-rigid road systems.
Identification	DOROPORT®TB road binder range includes several products depending on the strength class (SR EN 13282-1: 2013): ○ DOROPORT®TB 15 (type HRB E2) ○ DOROPORT®TB 25 (type HRB E3) DOROPORT®TB 35 (type HRB E4)
Technical and Functional Characteristics	As given by SR EN 13282-1: 2013 Hydraulic road binders: Rapid hardening hydraulic road binders - Composition, specifications and conformity criteria.
Intended Application	• Execution of foundation layers and base layers in the composition of non-rigid and rigid road systems • Execution of bituminous coatings through cold recycling technology, Expanding existing foundations, construction of platforms and parking spaces • Strengthen parking lanes, framing lanes and sidewalks Execution of clothing for local roads or low-traffic streets as well as bituminous coatings using cold recycling technology.

Table 1: Technical specification and usage

3.2 Content declaration

Material	Contribution (%)
Cement	72 – 74%
Fly ash	20%
Bypass dust	6 – 8%
Calcined clay	< 1%

Table 2: DOROPORT®TB composition

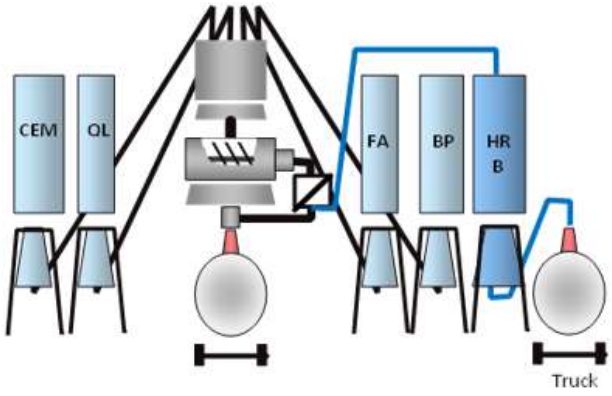
The product composition for the product is provided in the Tables below. The binder does not meet the criteria for PBT (Persistent, Bio-accumulative and Toxic) or vPvV (very Persistent and very Bio-accumulative) in accordance with Annex XIII of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Furthermore, cement/cementitious binders are a mixture, and it is exempted from REACH registration.

3.3 Manufacturing Process

The main steps in the binder manufacturing process are as follows, and illustrated in Figure 1:

- Quarrying and raw material preparation
- Clinker production
- Cement grinding and distribution.
- Binder production

Figure 1: Process flow diagram



CEM – cement

QL - Quicklime

FA – Fly Ash

BP- Bypass dust

Quarrying

Natural raw materials used for the clinker manufacture are calcareous materials like limestone or marl, and argillaceous materials like clay. These materials are extracted using drilling and blasting techniques.

Crusher
The quarried material is then reduced in size by compression and / or impact in various mechanical crushers. Crushed rock is reduced in size from 120 cm to between 1.2 and 8 ca. Drying of raw material may also be necessary for efficient crushing and pre-blending.

Conveyor
Raw material is then transported from the quarry to the plant using conveyors.

Mixing bed
The crushed limestone and clay are homogenized by stacking and reclaiming in a long-layered stockpile. This material is then ready for milling and drying in the kiln.

Raw Mill
The raw materials are milled and dried in a vertical roller mill in Campulung Plant and in a horizontal ball mill in the Alesd Plant. In the case of the vertical roller mill, heavy rollers are held over a rotating table, and in the horizontal ball mill, balls are rolled over until the coarse material is milled fine enough to be carried by air to a homogenizing silo.

Preheater
Cyclone preheaters enable the raw material of cement production to be preheated before entry into the kiln. This increases the energy efficiency of the kiln as the material is about 20-40% calcined at the point of entry into the kiln. Additionally, calciners are integrated in both plants kiln systems, further increasing the efficiency of the process.

Kiln
The kiln is designed to maximise the efficiency of heat transfer from fuel burning to the raw material. In the preheater tower the raw materials are heated rapidly to a temperature of about 1000^{o}C, where the limestone forms burnt lime. In the rotating kiln, the temperature reaches up to 2000^{o}C. At this high temperature, minerals fuse together to form predominantly calcium silicate crystals – cement clinker.

Binder Production
The cement is mixed with other minor constituents in the road binder plants of Holcim Romania. The cement produced in Alesd is mixed with additional constituents on site and the cement produced at Campulung is transported to Pitesti for mixing.

No packaging is associated with DOROPORT®TB. The products are delivered only in bulk, with cement trucks.

3.4 Additional Information

More information about binders' environmental stewardship and occupational health and safety aspects are detailed within the SDS made publicly available on Holcim Romania portal https://www.holcim.ro/ro/produse-si-servicii/produse . All SDS have been developed by Holcim Romania in compliance with the requirements of Regulation (EU) 2020/878 amending the annex II of Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and according to Regulation (EC) No 1272/2008 on the Classification, Labelling and Packaging of substances and mixtures (CLP).

4. LCA Information

4.1 Goal of Study

The goal of this study was to generate an environmental profile of DOROPORT®TB binder produced and delivered from the locations fully owned and operated by Holcim Romania, to better understand the associated lifecycle environmental impacts and to allow a Type III EPD to be generated and made public via the International EPD System.

4.2 Declared Unit

The declared unit of the EPD is 1 tonne of DOROPORT®TB produced and delivered from the locations fully owned and operated by Holcim Romania. This EPD is established for the weighted average product of theses manufacturing plants. The average is based on the mass of binder produced at each plant.

4.3 System Boundary

System boundaries determine the unit processes to be included in the LCA study and which data as “input” and/or “output” to/from the system can be omitted.

This EPD covers the cradle to gate stage (A1 to A3), because other life cycle stages are dependent on scenarios and are better developed for specific building or construction works.

System boundaries are according to the modular approach and the cradle to gate stage is divided into the upstream (A1) and core (A2 and A3) phases, as outlined in Figure 2. Life cycle stage that are not covered by the EPD are indicated as MND (Module Not Declared).

Life cycle stages	Information modules	Type of EPD			
		a) Cradle to gate with module C1-C4 and module D [1]	b) Cradle to gate with module C1-C4, module D and optional modules [2]	c) Cradle to grave and module D	f) Construction service EPD: Cradle to gate with modules A1-A5 and optional modules
A1-A3 Product stage	A1) Raw material supply	Mandatory	Mandatory	Mandatory	Mandatory
	A2) Transport				
	A3) Manufacturing				
A4-A5 Construction process stage	A4) Transport	—	Optional for goods Mandatory for services (see alternative f)	Mandatory	Mandatory
	A5) Construction installation		*Recommended if a default scenario can be defined*		
B Use stage	B1) Use	—	Optional	Mandatory	Optional
	B2) Maintenance				
	B3) Repair				
	B4) Replacement				
	B5) Refurbishment				
	B6) Operational energy use				
	B7) Operational water use				
C End of life stage	C1) Deconstruction, demolition	Mandatory	Mandatory	Mandatory	Optional
	C2) Transport				
	C3) Waste processing				
	C4) Disposal				
D Benefits and loads beyond the system boundary	D) Reuse, recovery, recycling, potential	Mandatory	Mandatory	Mandatory	—
Declared or functional unit		Declared unit	Declared unit	Functional unit	Declared unit
Inclusion of reference service life (RSL)		Optional	Mandatory if any module in B is included	Mandatory	—

Figure 2: Modules included in the DOROPORT®TB LCA

4.4 Data sources and quality

The geographical system boundary of the LCA is Romania. All processes are valid for the production sites in Romania. The two cement plants account for 100% of total DOROPORT®TB produced by Holcim in Romania.

All material flows of the processes are based on company and site-specific data gathered for one year of operation, for the period 1st January 2021 – 30th September 2021.

Modelling of the life cycle of Holcim Romania DOROPORT®TB binder was performed using SimaPro v.9.1 LCA software from PRé.

All relevant background LCI datasets are taken from the EcoInvent database v3.8 (cut-off) released in 2021.

The foreground data has been collected on site and validated based on mass balances. The background data is based on reviewed data from life cycle inventories. As all datasets are validated, the data quality for the entire study can be judged as very good.

4.5 Allocation

The foreground data has been collected on site and validated based on mass balances. The allocation is performed according to the basic rules from EN15804:2012+A2:2019. As no co-products are produced, the flow of materials and energy and the associated release of substances and energy into the environment is therefore related exclusively to the binder produced.

All data is included based on measured data for each plant. To ensure high representativeness for calculation of the DOROPORT®TB this specific data has been weighted based on the production mass of each plant, as follows:

Output of Doroport®TB	**Alesd**	**Campulung**
Mass (tonne)	31,448.26	30,324.29
Total production of Doroport®TB (tonne)	61,772.55	
Percentage (%)	51%	49%

Table 3: Holcim Romania – DOROPORT®TB Production

4.6 Cut-off Criteria and assumptions

In the process of building an LCI it is typical to exclude items considered to have a negligible (aka relatively inconsequential or immaterial) contribution to results. To do this in a consistent and robust manner there must be confidence that the exclusion is fair and reasonable. To this end, cut-off criteria were defined in this study, which allow items to be neglected if they meet the criteria. In accordance with EN15804, exclusions could be made if they were expected to be within the below criteria and the total neglected input flows per module do not exceed 5% of energy usage and mass:

- Mass: when using mass as a cut-off criterion, it is appropriate to require the inclusion in the study of all inputs that cumulatively contribute more than a defined percentage to the mass input of the product system being modelled.

- Energy: similarly, an appropriate decision, when using energy as a criterion, is to require the inclusion in the study of those inputs that cumulatively contribute more than a defined percentage of the product system's energy inputs.

- Environmental significance: decisions on cut-off criteria should be made to include inputs that contribute more than an additional defined amount of the estimated quantity of individual data of the product system that are specially selected because of environmental relevance.

The production of the materials that have been excluded from the product system under study are listed in Table 4. These materials are either waste derived or excluded due to their low economic value. While the production of these materials is excluded the material masses are part of the calculation and they are considered as secondary materials.

Material	Considered as
Alternative Raw Material (slag / fly ash)	Secondary Material
By-bass dust	Secondary Material
Fly ash / acidic fly ash (ARSN)	Secondary Material
Granulated blast furnace slag	Secondary Material

Table 4: Secondary materials excluded from the product system

The clinker production process uses non-renewable secondary fuels (Table 6). According to the PCR, secondary fuels are modelled to enter the studied system free of environmental loads. They are displayed as a resource use and all emissions occurring during the production process are allocated to the produced products.

Fuel	Considered as
Mixed industrial waste	Non-Renewable Secondary fuel
Petroleum sludges	Non-Renewable Secondary fuel
Used / Waste oils	Non-Renewable Secondary fuel
Other biomass	Non-Renewable Secondary fuel
Sewage sludge	Non-Renewable Secondary fuel
Fresh saw dust	Non-Renewable Secondary fuel
Used tyres	Non-Renewable Secondary fuel

Table 5: Secondary fuels excluded from the product system

In addition to the above, during the LCA several assumptions were made, which have been documented below for transparency:

- No waste is produced during the clinker production process.
- There is a difference between the mass of the raw meal consumed and the clinker produced which is due to the water (remaining humidity of raw materials) that evaporates and mainly CO_2 that is released from decarbonation.

4.7 Comparability

EPDs within the same product category but from different programmes may not be comparable.
EPDs of construction products may not be comparable if they do not comply with EN 15804.

5. Environmental Performance

The environmental impacts are declared and reported using the parameters and units shown in the Tables below. Baseline characterisation factors are taken from EF 3.0 methodology (dated November 2019)

The impact categories presented in the following table refer to 1 tonne of DOROPORT®TB produced from the locations fully owned and operated by Holcim in Romania.

Parameter	Unit	A1	A2	A3	A1-A3
Parameters describing environmental impacts					
GWP-total: Global Warming Potential total[1]	kg CO2 eq.	76.4	8.75	248	333
GWP - GHG	kg CO2 eq.	75.3	8.62	248	331
GWP – Fossil: Global Warming Potential fossil fuels	kg CO2 eq.	76.5	8.72	248	334
GWP-biogenic: Global Warming Potential biogenic	kg CO2 eq.	-2.78E-02	2.02E-02	-8.51E-02	-9.28E-02
GWP-luluc: Global Warming Potential land use and land use change[2]	kg CO2 eq.	4.06E-03	5.45E-03	1.07E-02	2.02E-02
ODP: Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	1.74E-06	1.81E-06	4.84E-06	8.39E-06
AP: Acidification potential	mol H+ eq.	0.113	0.0444	0.386	0.544
EP-freshwater: Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq	1.80E-02	1.23E-03	7.78E-02	9.70E-02
EP-marine: Eutrophication potential, fraction of nutrients reaching marine end compartment	kg N eq.	6.32E-02	1.42E-02	2.01E-01	2.79E-01
EP-terrestrial: Eutrophication potential, Accumulated Exceedance	mol N eq.	0.267	0.154	0.781	1.20
POCP: Formation potential of tropospheric ozone	kg NMVOC eq.	0.196	0.0466	0.604	0.846

[1] The total global warming potential (GWP-total) is the sum of
— GWP-fossil
— GWP-biogenic
— GWP-luluc

[2] It is permitted to omit GWP-luluc as separate information if its contribution is < 5 % of GWP-total over the declared modules excluding module D.

Parameter	Unit	A1	A2	A3	A1-A3
ADP – minerals & metals: Abiotic depletion potential for non-fossil resources [3] [4]	kg Sb eq.	2.64E-05	2.48E-05	5.92E-05	1.10E-04
ADP-fossil: Abiotic depletion for fossil resources potential [3]	MJ, net calorific value	399	132	1270	1800
WDP: Water (user) deprivation potential, deprivation-weighted water consumption	m3 world eq. deprived	4.29	0.674	11.7	16.7
Parameters describing use of resources					
PERE: Renewable primary energy used as energy carrier (fuel)	MJ	22.6	3.64	113	139
PERM: Renewable primary resources with energy content used as material	MJ	1.37	0.558	4.66	6.59
PERT: Total renewable primary resources	MJ	23.9	4.19	118	146
PENRE: Non-renewable primary resources used as an energy carrier (fuel)	MJ	498	135	1590	2230
PENRM: Non-renewable primary resources with energy content used as material	MJ	0	0	0	0
PENRT: Total non-renewable primary resources	MJ	498	135	1590	2230
SM: Secondary materials	kg	346	0	0	346
RSF: Renewable secondary fuels	MJ	0.0872	0	0.281	0.369
NRSF: Non-renewable secondary fuels	MJ	0.129	0	0.416	0.545
FW: Use of net freshwater resources	m^3	0.151	0.02	0.573	0.744
Parameters describing waste production					
HWD: Hazardous waste disposed	kg	1.89E-03	1.17E-03	8.10E-03	1.12E-02

[3] The abiotic depletion potential is calculated and declared in two different indicators:
— ADP-minerals&metals include all non-renewable, abiotic material resources (i.e. excepting fossil resources);
— ADP-fossil include all fossil resources and includes uranium.

[4] ultimate reserve model of the ADP-minerals&metals model

Parameter	Unit	A1	A2	A3	A1-A3
NHWD: Non-hazardous waste disposed	kg	0.871	10.1	3.19	14.2
RWD: Radioactive waste disposal	kg	1.76E-03	8.58E-04	7.75E-03	1.04E-02
Parameters describing outputs flows					
CRU: Components for reuse	kg	0	0	0	0
MR: Material for recycling	kg	0	0	0.264	0.264
MER: Materials for energy recovery	kg	0	0	0	0
EEE: Exported energy, electrical	MJ	0	0	0	0
EET: Exported energy, thermal	MJ	0	0	0	0

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