ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

CEM I 52.5 N Portland Cement

ARTOVA PLANT

ADOÇİM®

Programme:
The International EPD® System
www.environdec.com

S-P Code:
S-P-04133

Programme Operator:
EPD International AB

Publication Date:
23-12-2021

Local Operator:
EPD Turkey

Validity Date:
22-12-2026

TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

Programme Information

Programme

EPD Turkey, managed and run by:

SÜRATAM
Turkish Centre for Sustainable Production
Research & Design, www.suratam.org

Nef 09 B Blok No:7/15 34415
Kagıthane/Istanbul, Turkey

www.epdturkey.org
info@epdturkey.org

The International EPD® System

EPD International AB
Box 210 60 SE-100 31
Stockholm, Sweden

www.environdec.com
info@environdec.com

Product Category Rules (PCR): 2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification EPD verification ☑

Third party verifier: Prof. Vladimír Kočí

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.

About The Company

ADOÇİM CEMENT, started cement production in 1995, is a group company of TITAN CEMENT since 2008. TITAN Cement Group's roots are backed in 1902 and operates in cement, ready-mix concrete and aggregate fields in more than 15 countries.

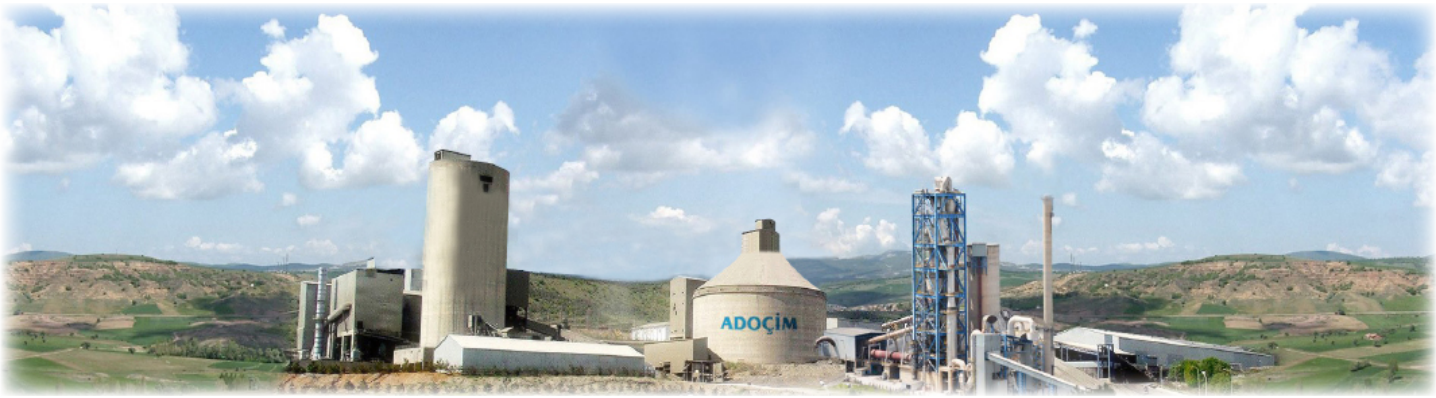
ADOÇİM has Integrated Cement Plant in Tokat/Artova, Ready–Mixed Concrete Facilities in Artova, Sivas, Tokat and Çorum in Turkey.

ADOÇİM has a production capacity of 1.300.000 tons/year of clinker and 1.782.000 tons/year of cement production in their integrated cement factory located in Tokat/Artova. The raw material needs of our facility is met by ADOÇİM's own quarries.

Since its foundation, ADOÇİM has maintained a professional approach on eco-friendliness, frugality, worker and occupational safety, quality control and sustainability, and continues to do so today at all its plants. ADOÇİM clinker and cement productions are absolutely guaranteed by continuous quality control activities.

Moreover, ADOÇİM controls its environmental impacts through continuous and observable systems. The company has been worked on Non-Hazardous Waste Recycling and Incineration and also has started to use alternative fuels from disposing of wastes of various industries. ADOÇİM operates according to Turkish Environmental Legislations and also European Union Environmental Policies and Legislation. In ADOÇİM, all key operations carry out within the ISO 14001 framework.

The Artova plant has Environmental Permit and License certificate and continues its activities in a sustainable life cycle to achieve its neutral-carbon target. In addition, with its ISO 9001, ISO 45001 and ISO 50001 management systems certificates, it has a perspective that prioritizes quality, environmentalism, energy efficiency and prioritizes the safety of its employees and all other stakeholders.



About the Product

Product Name and Identification: CEM I 52.5 N; Compressive Strength of 28 days (MPa): ≥ 52.5

Product Description: Cement, one of the most important building materials, is a binding agent that sets and hardens to adhere to building units such as stones, bricks, tiles, etc. Setting and hardening result from hydration, which is a chemical combination of the cement compounds with water that yields submicroscopic crystals or a gel-like material with a high surface area. Cement hardens both in the air and under water, and remains in its hardened state once reached. Portland cement is made up of clinker and gypsum. Due to its high clinker content, the strength gain is fast and the durability is high. It is intended for general use and suitable for both prefabricated applications and conditions where early stripping is required.

The declared product is CEM I 52.5 N which compiles with the requirements of EN197-1. The product investigated in this EPD is a special cement type produced at the Artova plant, by ADOÇİM.

Areas of Applications

- Concrete and Reinforced Concrete Pipes
- Briquette and Tile Production
- Multi-Storey and High Reinforced Concrete Buildings
- Production of Prefabricated Building Elements
- Foundation Concrete
- Railway Sleepers
- All kinds of constructions for general use

Composition

Clinker : 95 - 100 %
Minor additive compound : 0 - 5 %

Technical features according to EN 197-1		CEM I 52.5 N
Mechanical properties	Compressive Strength 2 days (MPa)	≥ 20,0
	Compressive Strength 28 days (MPa)	≥ 52,5
Chemical properties	Chloride content (Cl, % w/w)	≤ 0,1
	Sulfate content (SO_3 % w/w)	≤ 4,0
Physical properties	Initial setting time (min)	≥ 45,0
	Soundness (mm)	≤ 10,0

LCA Information

Declared Unit	1 tonne CEM I 52.5 N Portland Cement
Time Representativeness	2020
Database(s) and LCA Software Used	Ecoinvent 3.5, SimaPro 9.0

The inventory for the LCA study is based on the 2020 production figures for ADOÇiM CEM I 52.5 N Portland Cement produced in plant in Tokat, Turkey.

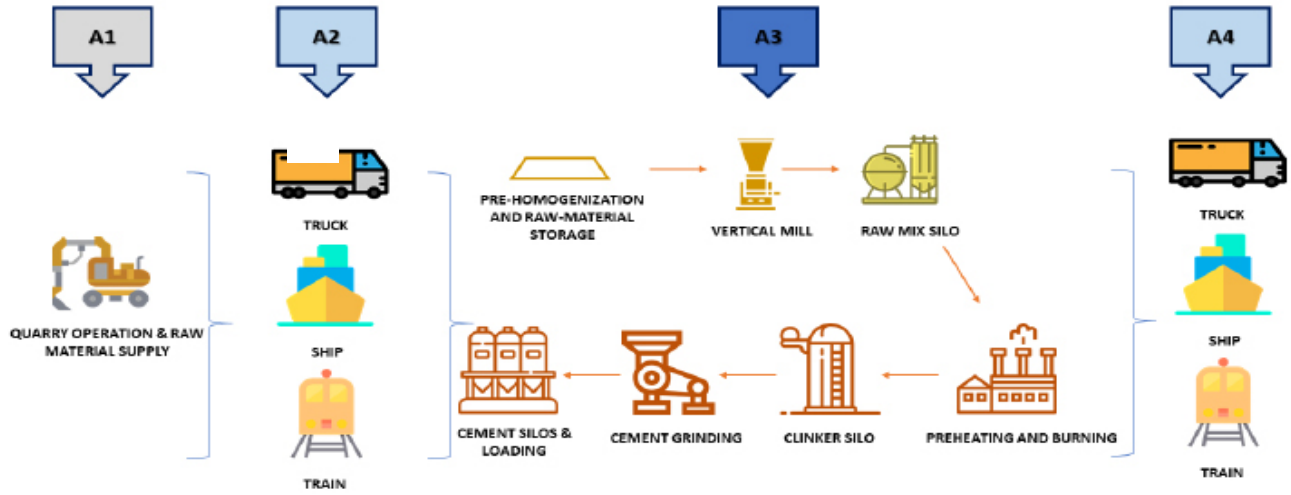
This EPD's system boundary is cradle to gate including to transport to site. The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3), and construction process stage (A4). According to EN s15804+A2:2019 standard, if the product or material is physically integrated with other products during installation then they cannot be physically separated at the end of life stage. For this reason, modules C1-C4 and Module D are excluded.

The system boundaries in tabular form for all modules are shown in the table below.

Product Stage			**Construction Process Stage**		**Use Stage**							**End of Life Stage**				**Benefits and Loads**
Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

X = Included in LCA, ND = Not Declared

System Boundary



A1: Raw Material Supply
Production for each product starts with locally sourced but some transported materials from other parts of the world. 'Raw material supply' includes raw material extraction and pretreatment processes before production.

A2: Transport of Raw Materials
Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production site is taken as the weight average values for transport from raw materials supplier in 2020.

A3: Manufacturing
Cement production starts with quarry operation. After the crushing and homogenization process, raw materials are sent to the mills. Production continue with burning and cooling. Finally, additional raw materials are added to the mixture, mixed and ready for use.

A4: Transport to Site
Transport of final product to construction site is taken as the weight average values for transport to customers in 2020. The product shipment distance is calculated according to the domestic and international sales rates over the assumed distances. It has been accepted as an average of 250 km by road.

More Information

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2020 production figures. In addition, hazardous and nonhazardous waste amounts were also allocated from the 2020 total waste generation.

Cut-Off Criteria

1% cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The SimaPro 9.0 LCA software and the Ecoinvent 3.5 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

Geographical Scope

The geographical scope of this EPD is global.

LCA Results

Environmental Impacts for 1 tonne of CEM I 52.5 N Portland Cement			
Impact Category	Unit	A1-A3	A4
GWP - Fossil	kg CO_2 eq	928	5.89
GWP - Biogenic	kg CO_2 eq	14.6	0.003
GWP - Luluc	kg CO_2 eq	0.620	0.002
GWP - Total	kg CO_2 eq	943	5.90
ODP	kg CFC-11 eq	29.2E-6	1.33E-6
AP	mol H+ eq	2.44	0.071
*EP - Freshwater	kg P eq	0.135	366E-6
EP - Freshwater	kg $(PO_4)^{-3}$ eq	0.413	0.001
EP - Marine	kg N eq	0.607	0.018
EP - Terrestrial	mol N eq	6.77	0.203
POCP	kg NMVOC	1.77	0.056
ADPE	kg Sb eq	0.001	84.9E-6
ADPF	MJ	3926	87.2
WDP	m^3 depriv.	82.5	0.246
PM	disease inc.	12.9E-6	437E-9
IR	kBq U-235 eq	26.3	0.432
ETP - FW	CTUe	6257	66.3
HTTP - C	CTUh	237E-9	2.22E-9
HTTP - NC	CTUh	6.38E-6	71.1E-9
SQP	Pt	789	79.0
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.		
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site.		
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.		
*Disclaimer 3	EP-freshwater: This indicator is calculated both in kg PO_4 eq and kg P eq as required in the charactarizati-on model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)		

Resource use for 1 tonne of CEM I 52.5 N Portland Cement			
Impact Category	Unit	A1-A3	A4
PERE	MJ	295	0.977
PERM	MJ	0	0
PERT	MJ	295	0.977
PENRE	MJ	3925	87.2
PENRM	MJ	0	0
PENRT	MJ	3925	87.2
SM	kg	0	0
RSF	MJ	0	0
NRSF	MJ	0	0
FW	m^3	5.12	0.016
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.		
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site.		

Waste&Output Flows for 1 tonne of CEM I 52.5 N Portland Cement			
Impact Category	Unit	A1-A3	A4
HWD	kg	0.008	0
NHWD	kg	0.015	0
RWD	kg	0	0
CRU	kg	0	0
MFR	kg	0	0
MER	kg	0	0
EE (Electrical)	MJ	0	0
EE (Thermal)	MJ	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.		
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site.		

References

/GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

/EN ISO 9001/ Quality Management Systems - Requirements

/EN ISO 14001/ Environmental Management Systems - Requirements

/EN ISO 50001/ Energy Management Systems - Requirements

/ISO 14020:2000/ Environmental Labels and Declarations — General principles

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.11 DATE 2019-12-20

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

Contact Information

Programme	EPD registered through fully aligned regional programme: EPD Turkey: www.epdturkey.org TURKEY EPD® ENVIRONMENTAL PRODUCT DECLARATIONS	The International EPD® System www.environdec.com EPD® THE INTERNATIONAL EPD® SYSTEM
Programme operator	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15, 34415 Kağıthane / Istanbul, TURKEY www.epdturkey.org info@epdturkey.org	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden www.environdec.com info@environdec.com
Owner of the declaration	ADOÇİM Dereboyu Cad. Meydan Sok. Beybi Giz Plaza No:1 Kat:13 Maslak/İstanbul	Contact: Esra Görgün Phone: (+90) 212 286 69 82 Fax: (+90) 212 286 69 85 www.adocim.com info@adocim.com
LCA practitioner	metsims Sustainability Consulting Turkey: Lalegül Sok. No:7/18 Kağıthane 34415 4. Levent – Istanbul, Turkey +90 212 281 13 33	The United Kingdom: 4 Clear Water Place Oxford OX2 7NL, UK 0 800 722 0185 www.metsims.com info@metims.com
3rd party verifier	LCA studio Prof. Ing. Vladimír Kočí, Ph.D., MBA	LCA Studio Šárecká 5,16000 Prague 6 - Czech Republic www.lcastudio.cz

ADOÇİM®

www.adocim.com