ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and
EN 15804:2012+A2:2019/AC:2021

OYAK CEMENT

Super White
(CEM I 52.5R)

OYAK ÇİMENTO FABRİKALARI A.Ş.

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

Programme Operator:
EPD International AB

Licensee:
EPD Türkiye

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Türkiye

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To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

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How to read this EPD?

An Environmental Product Declaration (EPD) is an ISO Type III Environmental Declaration based on the ISO 14025 standard. An EPD transparently reports the environmental performance of products or services from a lifecycle perspective. The preparation of an EPD includes different stages, from acquiring raw materials to the end of life of the final product/service. EPDs are based on international standards and consider the entire value chain. Additionally, EPD is a third-party verified document. This EPD includes several sections described below.

1. General And Program Information

The first part of an EPD has information about the name of the manufacturer and product/service, as well as other general information such as the validity and expiration dates of the document, the name of the program operator, geographical scope, etc. The second page states the standards followed and gives information about the program operator, third-party verifier, etc. The following Product Category Rule (PCR) is indicated on the second page.

2. Company / Product Information

Information about the company and the investigated product is given in this section. It summarizes the characteristics of the product provided by the manufacturer. It also includes information about the product, such as product composition and packaging.

3. LCA Information

LCA information is one of the most important parts of the EPD as it describes the functional/declared unit, time representativeness of the study, database(s), and LCA software, along with system boundaries. The table presented in this part has columns for each stage in the life cycle. The considered stages are marked 'X', whereas the ones that are not declared are labeled as 'ND'. Not all EPDs consider the full life cycle assessment for a product's entire life stages. The 'System Boundary' page is also the place where one can find detailed information about the stages and the assumptions made.

4. LCA Results

The results of the Life Cycle Assessment analysis are presented in table format. The first column in each table indicates the name of the impact category and their measurement units are presented in the second column. These tables show an amount at each life cycle stage to see the impact of different indicators on different stages. Each impact can be understood as what is released through the production of the declared unit of the material—in this case, one mixer, The benefits of reuse/recycling of the declared product are reflected in this section. The first impact in the table is global warming potential (GWP), which shows how much CO_2 is released at each stage. Other impacts include eutrophication potential, acidification potential, ozone layer depletion, land use-related impacts, etc. The second table provides results for resource use and the third table is about the waste produced during the production. The fourth and final table shows the results for the GWP-GHG indicator, which is almost equivalent to the GWP-Total indicator mentioned previously. The only difference is that this indicator excludes the biogenic carbon content by following a certain methodology.

Program Information

CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR):

PCR 2019:14 Construction products, version 1.3.4, Construction EN 15804:2012+A2:2019/AC:2021 Sustainability of Construction Works & c-PCR-001 Cement and building lime (EN 16908) (2024-04-30)

UN CPC Code: 3744
"Portland cement, aluminous cement, slag cement, and similar hydraulic cement, except in the form of clinkers."

PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via

EPD verification through an individual EPD verification

Third-party individual verifier: Stephen Forson, ViridisPride Ltd.

Approved by: The International EPD® System

The procedure for follow-up of data during EPD validity involves third-party verifier:

Yes No [X]

LCA practitioner: Yıldıray Yılmaz & Işıl Atalay Sırt -- Metsims Sustainability Consulting

EPDs within the same product category but registered in different EPD programs 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 characterization factors); have equivalent content declarations; and be valid at the time of comparison. The EPD owner has the sole ownership, liability, and responsibility for the EPD.

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About OYAK Cement

Owner of the EPD: OYAK Çimento Fabrikaları A.Ş.

Head Office: Çukurambar Mahallesi 1480. Sokak No: 2A/56 Çankaya/ ANKARA

Production Plant: İncirlik Cumhuriyet Mahallesi Çimento Bulvarı No: 39/A Yüreğir/ADANA

Leading Türkiye's Cement Industry with Innovation and Sustainability

OYAK Cement, the largest and most environmentally friendly cement brand, includes "Türkiye's first cement factory," Aslan Cement, Adana Cement, Ankara Cement, Bolu Cement, Denizli Cement, Ünye Cement, and Mardin Cement. OYAK Cement comprises 7 integrated plants and 3 grinding and packing facilities, alongside OYAK Beton, a leading concrete production and marketing player. As the capacity and market leader of the Turkish cement industry, OYAK Cement continues its operations in seven geographical regions through seven integrated cement production plants. The first cement company in Türkiye to make a 'Net-Zero' commitment, OYAK Cement also pioneers the sector globally with its calcined clay technology, which has a low carbon footprint.

OYAK Cement is the first cement company in Türkiye to set both short-term and Net-Zero targets under the Science Based Targets initiative (SBTi) and to have these targets officially validated by the SBTi. This ambitious pledge involves adopting stringent science-based targets to curb global warming, aiming to limit the temperature rise to 1.5°C by 2030.

OYAK Cement continues striving toward becoming a widely respected company that plays a significant role in the national market and contributes to developing cement application areas in line with its productivity, creativity, and profit-orientation principles.

About the Product

Product Name
Super White (CEM I 52.5R)

Recommended Applications

Super White CEM I 52.5 R is a high-performance ordinary white Portland cement (OPC) characterized by its bright white color and high early strength. It is produced by mixing ordinary white cement clinker with white gypsum and additional materials with confirming EN 197-1:2011 standard. The product investigated in this EPD is Oyak Cement Company's white Portland cement manufactured at the company's production facilities in Adana and İskenderun, Türkiye. Adana facility is an integrated cement facility where white clinkers are also produced at the site.

Standards
The cement composition complies with the EN 197-Part 1: Composition, specifications, and conformity criteria for common cements.
EN 196-1: Methods of testing cement - Part 1: Determination of strength. - Part 2: Chemical analysis of cement.- Part 3: determination of setting time and soundness.

Chemical Requirements

Loss of Ignition < 5 %
Insoluble Matter < 5 %
SO_3 < 4.0 %
Cl < 0.10 %

Mechanical Requirements

Compressive Strength Development
Minimum Values
2 days: 30.0 Mpa
28 days: 52.5 Mpa

Physical Requirements

Initial setting time (min.) ≥ 45
Soundness (mm) < 10
Whiteness ≥ 85%

Advantages

- High early strength/high final strength
- Short molding time
- Minimum 85 % whiteness value
- Stable color tone
- Suitable open time period
- High workability

Availability and Delivery

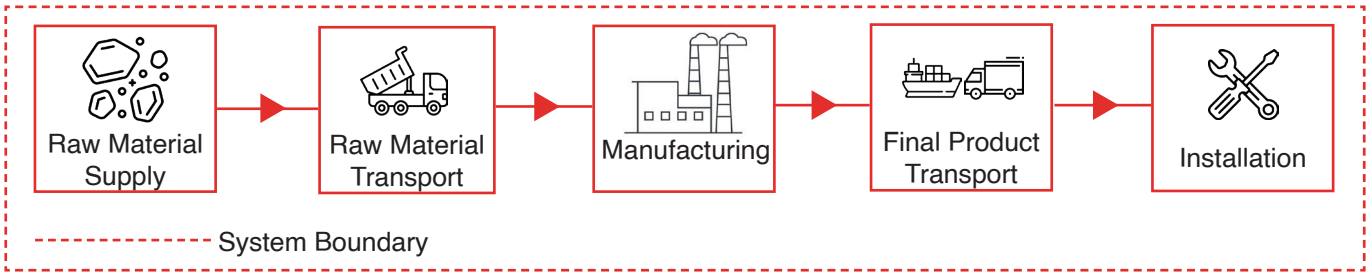
-Bagged (25 kg, 50 kg)
-Palletised (25 kg/1,4 Ton - 50 kg/1,5 Ton)
-Bigbag (1 Ton/1,2 Ton - 1,25 Ton/1,5 Ton)
-Slingbag (50 kg/1,5 Ton - 25 kg/1,25 Ton - 25 kg/ 1,5 Ton)
-Bulk

The table below lists the required materials for producing the final product and its associated packaging. OYAK's Adana Plant is an entegrated cement facility where the main input for the final product (clinker) is also produced at site.

Product Components	Weight, %*	Post-consumer material weight - %	Biogenic material kg C / declared unit
White clinker	90 - 91	0	0
White gypsum	4 - 5	0	0
White limestone	4 - 5	0	0
TOTAL	**100**	**0**	**0**
Packaging Materials	**Weight, kg**	**Weight, % (versus the product)**	**Biogenic material kg C / declared unit**
Bigbag	2.08	0.21	0
Pallet	2.07	0.21	0.73
Kraft Paper	1.49	0.15	0.59
Nylon	0.48	0.05	0
TOTAL	**6.12**	**0.61**	**1.32**

**Product composition is presented as percentages rather than specific weights to maintain confidentiality while transparently communicating the relative proportions of each component.*

System Boundary



A1- Raw Material Supply

This stage includes raw materials extraction and pre-treatment processes before production. Clinker is used as the main raw material of cement. Since clinker is also produced at site, its impacts are calculated seperately. Gypsum and mosaic materials are utilized material inputs in cement making. At this stage, the upstream impacts of the fuels are also taken into account.

A2 - Raw Material Transport

Raw material transports from suppliers to manufacturing site are considered at this stage. The distances and routes are calculated accordingly with the primary data. Depending on the manufacturer, locally supplied materials are transported via trucks, and some supplied through seaway.

Transport Mode	Type
Road	Vehicle: Lorry, Size class: >32 metric ton, Emission standard: Euro6, Fuel Type: Diesel
Sea	Vehicle: Bulk carrier, DWT (Load capacity): 50000 tonnes, Fuel Type: Heavy fuel oil

A3 - Manufacturing

The production of cement involves a detailed procedure starting from the extraction of raw materials like limestone and clay, which are then finely ground into a substance known as raw meal. This meal is subjected to high temperatures, reaching up to 1450 °C in a cement kiln, leading to a transformation where the chemical structures of the materials are altered and reformed into new compounds. This transformation produces clinker, small spherical particles ranging in size from 1 mm to 25 mm. Following this, the clinker is finely ground in a cement mill and combined with gypsum to produce cement.

A4 - Final Product Transport

This phase involves transporting the finished cement to distribution points, construction sites, or storages. The environmental impact depends on the transportation method (trucks, rail, or ships), distance, and fuel consumption. Road transport generally has higher emissions per ton-kilometer compared to rail or sea transportation. All the production shipment routes are considered seperately.

Transport Mode	Type
Road	Vehicle: Lorry, Size class: >32 metric ton, Emission standard: Euro6, Fuel Type: Diesel
Sea	Vehicle: Bulk carrier, DWT (Load capacity): 50000 tonnes, Fuel Type: Heavy fuel oil

A5 - Installation

This phase includes any possible installation related impacts at site. Since installation impacts are highly dependent on the scope of work and the project, in this study only impacts attributed to the end-of-life of packaging materials are considered.

LCA Information

Declared Unit
1 tonne of Super White (CEM I 52.5R) cement.

System Boundary
Cradle to gate with options (A1–A3 + A4 + A5).

Cut-Off Rules
The criteria for exclusion were set so that individual input flows of less than 1% of the total, with a cumulative limit of less than 5%, could be omitted. This was contingent upon confirming that these excluded flows did not significantly alter the reported data, with “significant” defined as affecting the total by less than 5%.

	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
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	X	ND											
Geography	GLO	GLO	TR	GLO	GLO	-											
Specific Data Used	97%			-													
Variation - Products	0%			-													
Variation - Sites	0%			-													

(X = Module declared, ND = Not declared, TR = Türkiye, GLO = Global)

LCA Information

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).

Background Data
For all LCA modelling and calculation, Ecoinvent database (v3.10) and SimaPro (v9.6) LCA software were used. Characterization factors of EN 15804 reference package based on EF 3.1 are utilized. Impact of infrastructure and capital goods are excluded from the analysis.

LCA Modelling, Calculation and Data Quality
The results of the LCA with the indicators as per EPD requirements are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while freshwater 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 regional energy datasets were used for all energy calculations.

Period Under Review
The data used for LCA study concerns the year 2023.

Source of Electricity
The modeled electricity data for the manufacturing of the investigated product is taken from ecoinvent 3.10 database which has carbon density of 0.575 kg CO_2 eq. / kWh for medium voltage electricity production. The selected electricity data consists of around 35% electricity production from hard coal and lignite, 29.2% hydro, 19.4% natural gas, 9.4% wind, 3.5% geothermal, 1.2% co-generation from natural gas, 1.1% biogas and around 1.2% from various other sources.

Allocations
Energy consumption and raw material transportation were weighted according to 2023 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the total waste generation in 2023.

Assumptions
Upstream and downstream road transportation are assumed to be carried out with Euro6 motor vehicles with a size class of > 32 metric tonnes where distances acquired through Google Maps.

LCA Results

The LCA results provided below are for 1 tonne of Super White (CEM I 52.5R) cement. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Core environmental impact indicators (Mandatory)

Indicator	Unit	A1-A3	A4	A5
GWP - Total	kg CO_2 eq.	1.14E+03	1.35E+02	5.18E+00
GWP - Fossil	kg CO_2 eq.	1.14E+03	1.35E+02	3.18E-01
GWP - Biogenic	kg CO_2 eq.	-4.56E+00	2.41E-02	4.86E+00
GWP - Luluc	kg CO_2 eq.	8.56E-01	7.32E-02	1.22E-05
ODP	kg CFC 11 eq.	7.53E-06	2.04E-06	1.48E-09
AP	mol H* eq.	2.65E+00	2.09E+00	5.95E-04
EP - freshwater	kg P eq.	1.06E-02	9.11E-04	1.23E-05
EP marine	kg N eq.	6.32E-01	4.79E-01	8.44E-04
EP terrestrial	mol N eq.	7.26E+00	5.34E+00	2.84E-03
POCP	kg NMVOC eq.	2.46E+00	1.60E+00	8.81E-04
*ADPE	kg Sb eq.	4.52E-04	2.60E-04	1.31E-07
*ADPF	MJ	9.30E+02	1.36E+02	9.81E-02
*WDP	m^3	8.75E+01	7.11E+00	-5.21E-03

Additional environmental impact indicators (Mandatory)

Indicator	Unit	A1-A3	A4	A5
**GWP - GHG	kg CO_2 eq.	1.14E+03	1.35E+02	3.22E-01

Additional environmental impact indicators (Optional)

Indicator	Unit	A1-A3	A4	A5
PM	disease inc.	1.60E-05	8.17E-06	7.45E-09
***IR	kBq U-235 eq.	3.74E+00	5.06E-01	1.84E-03
ETP-FW	CTUe	8.11E+02	3.98E+02	1.06E+00
*HTP-C	CTUh	8.30E-07	6.81E-07	6.25E-10
*HTP-NC	CTUh	5.50E-06	8.22E-07	4.70E-09
*SQP	Pt	1.52E+03	1.00E+03	1.59E+00
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, A4: Transport, A5: Installation			

Indicators describing resource use (Mandatory)

Indicator	Unit	A1-A3	A4	A5
PERE	MJ	4.92E+02	2.02E+01	4.89E+01
PERM	MJ	4.89E+01	0.00E+00	-4.89E+01
PERT	MJ	5.41E+02	2.02E+01	3.05E-02
PENRE	MJ	8.42E+02	1.36E+02	8.87E+01
PENRM	MJ	8.86E+01	0.00E+00	-8.86E+01
PENRT	MJ	9.30E+02	1.36E+02	9.81E-02
SM	kg	0.00E+00	0.00E+00	0.00E+00
RSF	kg	0.00E+00	0.00E+00	0.00E+00
NRSF	kg	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.59E+00	2.47E-01	1.69E-03
Acronyms	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 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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water			

Environmental information describing waste categories (Mandatory)

Indicator	Unit	A1-A3	A4	A5
HWD	kg	1.25E-01	4.03E-02	1.54E-01
NHWD	kg	4.82E+01	8.00E+01	6.12E+00
RWD	kg	2.82E-03	3.18E-04	4.50E-07

Environmental information describing output flow (Mandatory)

Indicator	Unit	A1-A3	A4	A5
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE (Electric)	MJ	0.00E+00	0.00E+00	0.00E+00
EE (Thermal)	MJ	0.00E+00	0.00E+00	0.00E+00
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.			
*Disclaimer 1	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 2	GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013			
***Disclaimer 3	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.			

References

Ecoinvent. Ecoinvent Centre. www.ecoinvent.org.

EN 15804: 2012+A2:2019. Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products.

European Committee for Standardization (CEN). (2011). EN 197-1: Cement – Part 1: Composition, specifications, and conformity criteria for common cements. Brussels: CEN.
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EN 196-2: Methods of testing cement- Part 2: Chemical analysis of cement.
EN 196-3: Methods of testing cement-part 3: determination of setting time and soundness.

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.

ISO 9001. Quality Management System.

ISO 14001. Environmental Management System.

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 (ISO 14040:2006) and Requirements and Guidelines (ISO 14044:2006).

ISO 45001. Occupational Health and Management System.

ISO 50001. Energy Management System.

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PCR for Construction Products and 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 1.3.4.

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

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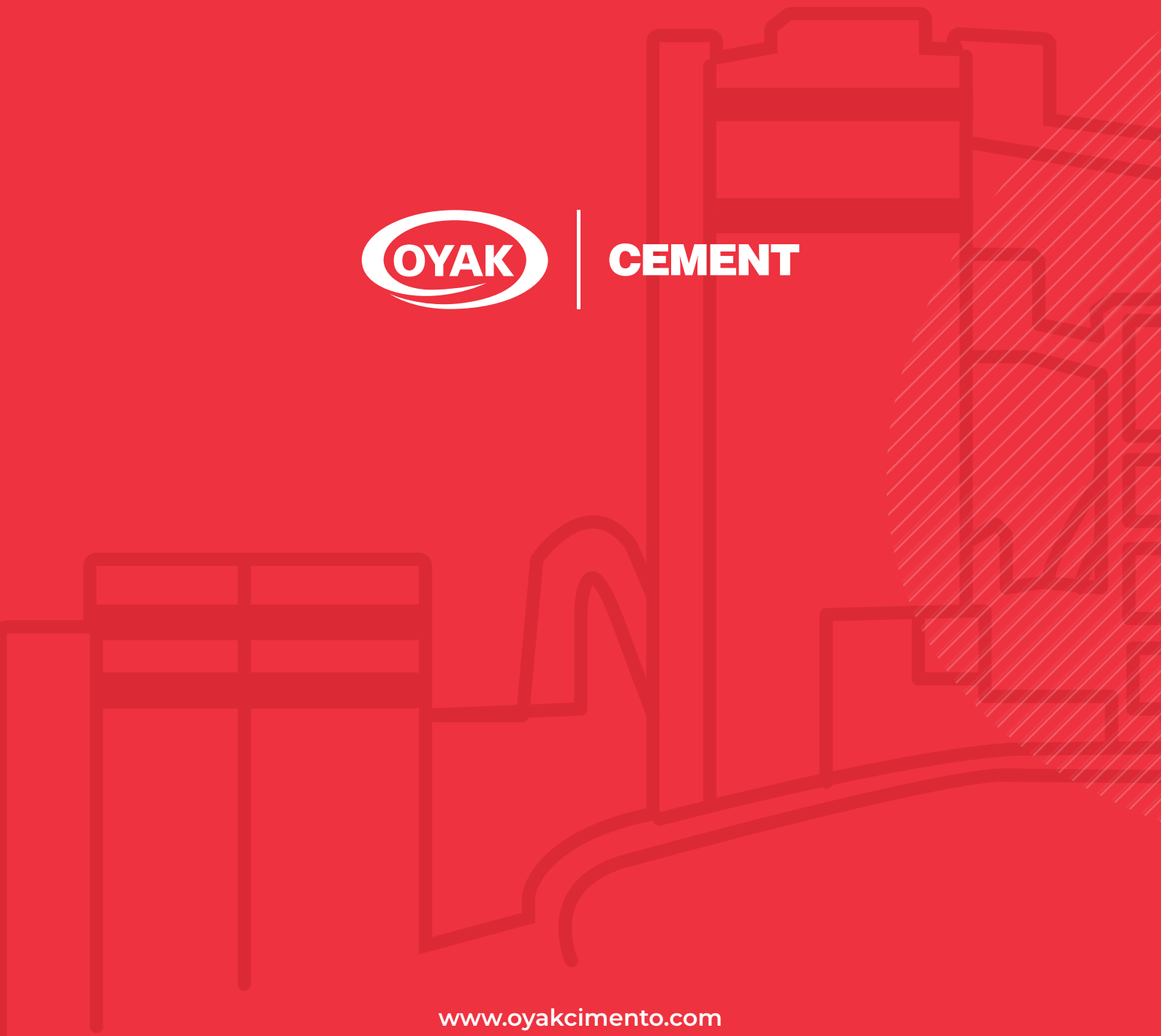

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