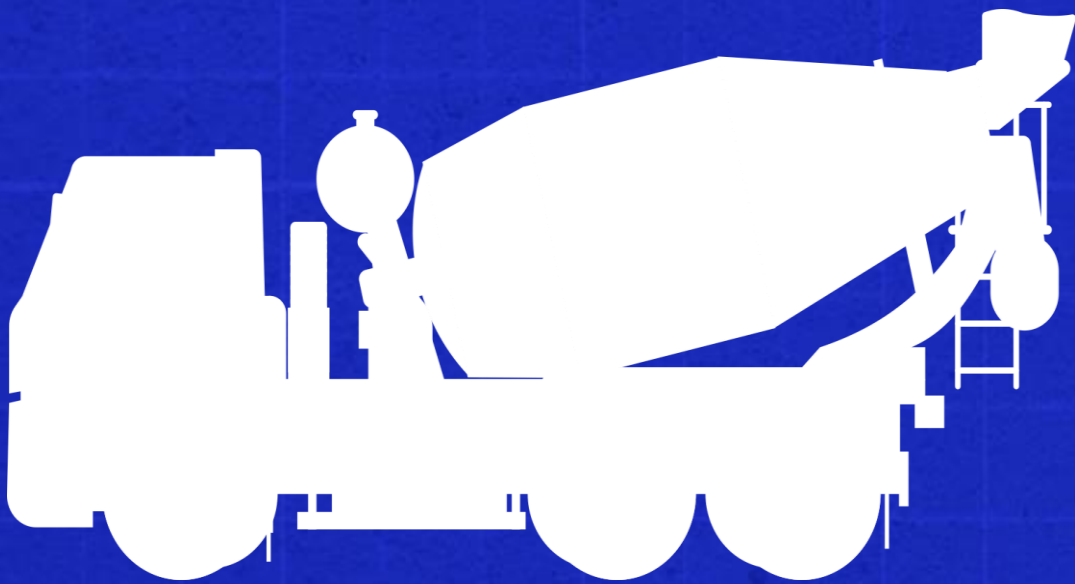




ENVIRONMENTAL PRODUCT DECLARATION



Environmental Product Declaration for ready mix concrete products produced by CEMEX México at their MX-PD0481 PACHUCA facility in Hidalgo, México.

**FUTURE IN
ACTION**



ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers ready mix concrete products produced by CEMEX Concretos S.A. de C.V. Declared unit: 1 m3 of concrete
Declaration Owner:	CEMEX Concretos S.A. de C.V./ CEMEX S.A.B. de C.V.
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Program Operator:	Labeling Sustainability
	Address, 11670 W Sunset Blvd.
	Los Angeles, CA
	www.labelingsustainability.com
Product Category Rule:	Core PCR: ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services SubPCR: NSF International (March 2020). Product Category Rule (PCR) for Environmental Product Declarations (EPD) PCR for Concrete, v2.1
	Sub PCR Program Operator: NSF International
	Sub-category PCR review was conducted by: Thomas P. Gloria, Ph. D. of Industrial Ecology Consultants: 35 Bracebridge, Rd., Newton, MA 02459-1728, t.gloria@industrial-ecology.com . Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, mrovercash@earthlink.net . Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, bstough@sustainableresearchgroup.com . Mr. Jack Geilbig, EcoForm: 2624 Abelia Way, Suite 611, Knoxville, TN 37931, jgeilbig@ecoform.com .
Independent LCA Reviewer and EPD Verifier:	This EPD was independently verified in accordance with ISO 14025 and ISO 21930. The life cycle assessment was independently reviewed in accordance ISO 14044 and the referenced PCR.
	Independent verification of the declaration, according to ISO 14025:2006
	External
	Third Party Verifier
	Geoffrey Guest, Certified 3rd Party Verifier under the International EPD Program (www.environdec.com), CSA Group (www.csaregistrries.ca)
Date of Issue:	30 August 2024
Period of Validity:	5 years; valid until 30 August 2029
EPD Number:	32b3eb35-b8d6-425e-a6f6-04d2af56bbc2



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COMPANY DESCRIPTION

CEMEX Concretos S.A. de C.V./ CEMEX S.A.B. de C.V. (CEMEX) is a global building materials company dedicated to building a better future through sustainable products and solutions. CEMEX is committed to achieving carbon neutrality through constant innovation and industry leadership in research and development. CEMEX is at the front of the circular economy within the construction value chain and promotes innovative processes with the use of advanced technologies to increase the use of waste as raw materials and alternative fuels in its operations. CEMEX provides cement, ready-mix concrete, aggregates, and urban solutions in fast-growing markets around the world, powered by a multinational workforce focused on delivering superior customer experience, using digital technologies.

STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, <http://labelingsustainability.com/>. This level of study is in accordance with EPD Product Category Rule (PCR) for Ready Mix Concrete published by NSF International (2019) and is a sub-PCR of International Standards Organization (ISO) 21930:2017 Sustainability in buildings and civil works - Core rules for EPDs of construction products and services; International Standards Organization (ISO) 14025:2006 Environmental labels and declarations, Type III environmental declarations-Principles and procedures; ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines; and ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework. It is also aligned to the Guidelines for Providing Product Sustainability Information from United Nations Environmental Program. The performance of this study and its subsequent publishing is in alignment with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is intended to be disclosed to the public.

This project report was commissioned to offer customers information to help them make informed product decisions; improve the environmental performance of CEMEX Concretos S.A. de C.V. / CEMEX S.A.B. de C.V. by continuously measuring, controlling and reducing the environmental impacts of their products; help project facilitators working on Leadership in Energy and Environmental Design (LEED) projects achieve their credit goal among other certification rating systems; and to strengthen CEMEX's license to operate in the community. The intended audience for this LCA report is CEMEX Concretos S.A. de C.V.'s employees, their suppliers, project specifiers of their products, architects, and engineers. The EPD report is also available for policy makers, government officials interested in sustainability, academic professors, and LCA professionals. This LCA report does not include product comparisons from other facilities.

DESCRIPTION OF PRODUCT AND SCOPE

This EPD reports on 70 concrete mixes manufactured at the CEMEX MX-PD0481 PACHUCA concrete facility at Calle B Lote 22 S/N, Fraccionamiento Industrial Canacin, Pachuca De Soto, Hidalgo, México.

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-gate study, and therefore, stages extending beyond the plant gate are not included in this LCA. Transportation from the plant to the jobsite, Module A4, was hand



calculated using the proportion of diesel allotted to that stage from primary CEMEX records and diesel the emissions factor. Excluded stages include on-site construction processes and components; building (infrastructure) use and maintenance; and "end-of-life" effects.

READY MIX CONCRETE DESIGN SUMMARY

The following tables provide a list of the ready-mix concrete products considered in this EPD along with key performance parameters.

Mix Designs: 0 to 15 MPa

Table 1: Declared products with Mix designs: 0 to 15MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
1	Convencional - 100 - 28 días	9.81 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	9.81	28	1.24	Clásico
2	Convencional - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	1.02	Clásico
3	Convencional - 150 - 7 días	14.71 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	14.71	7	0.87	Clásico
4	Ligero - 100 - 28 días	9.81 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	9.81	28	0.38	
5	Mortero - 125 - 28 días	12.26 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	12.26	28	1.24	Clásico
6	Mortero estabilizado - 125 - 28 días	12.26 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	12.26	28	1.24	Clásico
7	Relleno fluido - 25 - 28 días	2.45 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	2.45	28	1.77	Plus

8	Vertua Materiales Reciclados - 050 - 28 días	4.90 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	4.90	28	1.18	Plus
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Mix Designs: 15 to 20 MPa

Table 2 Declared products with Mix designs: 15 to 20MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H ₂ O to cement ratio	Level of vertua lower carbon
9	Acelerado - 200 - 3 días	19.61 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	19.61	3	0.65	Clásico
10	Antibacteriano - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.83	Clásico
11	Antihongo antiialga - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.83	Clásico
12	Antitermita - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.83	Clásico
13	Convencional - 200 - 14 días	19.61 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	19.61	14	0.83	Clásico
14	Convencional - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.88	Clásico
15	Convencional - 200 - 7 días	19.61 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	19.61	7	0.77	Clásico
16	Materiales Reciclados Llanta - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.81	Clásico



17	Materiales Reciclados Pet - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.81	Clásico
18	Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.81	Clásico
19	Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.89	Clásico

Mix Designs: 21 to 25 MPa

Table 3: Declared products with Mix designs: 21 to 25MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive Strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
20	Acelerado - 250 - 3 días	24.52 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.57	Clásico
21	Acelerado - 250 - 3 días, trab ext 3 horas	24.52 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.55	Clásico
22	Aparentia - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.69	
23	Autocompactable - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.52	
24	Baja contracción - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.55	
25	Convencional - 250 - 14 días	24.52 MPa 14d strength	Ready Mix Concrete	24.52	14	0.73	Clásico



		Ready Mix Concrete					
26	Convencional - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.79	Clásico
27	Convencional - 250 - 7 días	24.52 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.70	Clásico
28	Duramax Autosellante - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.50	
29	Estructural - 250 - 14 días	24.52 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	24.52	14	0.77	Clásico
30	Estructural - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.81	Clásico
31	Estructural - 250 - 7 días	24.52 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.72	Clásico
32	Hidratium - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.73	Clásico
33	Impercem - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.79	Clásico
34	Pavicrete - MR 36 - 28 días	22.06 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	22.06	28	0.63	Clásico
35	Pavicrete - MR 38 - 28 días	24.58 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.58	28	0.62	Clásico



36	Pervia - MR 36 - 28 días	22.06 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	22.06	28	0.29	
37	Reducrack - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.78	Clásico
38	Reducrack Sin malla - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.78	Clásico
39	Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.78	Clásico
40	Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.84	Clásico

Mix Designs: 26 to 30 MPa

Table 4: Declared products with Mix designs: 26 to 30MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
41	Acelerado - 300 - 3 días	29.42 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	29.42	3	0.53	Clásico
42	Baja contracción - MR 40 - 28 días	27.24 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	27.24	28	0.55	Clásico
43	Convencional - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.69	Clásico
44	Estructural - 300 - 14 días	29.42 MPa 14d strength	Ready Mix Concrete	29.42	14	0.66	Clásico



		Ready Mix Concrete					
45	Estructural - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.70	Clásico
46	Estructural - 300 - 7 días	29.42 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	29.42	7	0.63	Clásico
47	Estructural - 300 - 80% a 1 día	29.42 MPa 1d strength Ready Mix Concrete	Ready Mix Concrete	29.42	1	0.47	Clásico
48	Lanzado - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.49	Clásico
49	Pavicrete - MR 40 - 28 días	27.24 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	27.24	28	0.60	Clásico
50	Pavicrete - MR 40 - 3 días	27.24 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	27.24	3	0.46	Clásico
51	Pavicrete - MR 40 - 80% a 1 día	27.24 MPa 1d strength Ready Mix Concrete	Ready Mix Concrete	27.24	1	0.42	
52	Pesado - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.49	

Mix Designs: 31 to 35 MPa

Table 5: Declared products with Mix designs: 31 to 35MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
53	Acelerado - MR 45 - 3 días	34.48 MPa 3d strength	Ready Mix Concrete	34.48	3	0.41	Clásico



		Ready Mix Concrete					
54	Antideslave - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.46	
55	Baja contracción - MR 45 - 28 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	28	0.49	Clásico
56	Contracción compensada - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.56	Clásico
57	Duramax - 350 - 14 días	34.32 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	34.32	14	0.48	
58	Estructural - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.62	Clásico
59	Estructural - 350 - 7 días	34.32 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	34.32	7	0.56	Clásico
60	Grout premezclado - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.42	
61	Hidratium - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.56	Clásico
62	Pavicrete - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.58	Clásico
63	Pavicrete - MR 42 - 80% a 3 días	30.03 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	30.03	3	0.51	Clásico



64	Pavicrete - MR 45 - 28 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	28	0.57	Clásico
65	Pavicrete - MR 45 - 7 días	34.48 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	34.48	7	0.50	Clásico
66	Revenimiento total - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.49	Clásico

Mix Designs: 36 to 40 MPa

Table 6: Declared products with Mix designs: 36 to 40MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
67	Alta resistencia - 400 - 28 días	39.23 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	39.23	28	0.43	Clásico
68	Pavicrete - MR 48 - 28 días	39.23 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	39.23	28	0.55	Clásico
69	Pavicrete - MR 48 - 7 días	39.23 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	39.23	7	0.49	Clásico

Mix Designs: 41 to 45 MPa

Table 7: Declared products with Mix designs: 41 to 45MPa considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	Compressive strength MPa	Day compressive strength	H2O to cement ratio	Level of vertua lower carbon
70	Relleno fluido - MR 50 - 28 días	42.56 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	42.56	28	1.26	Plus





READY MIX CONCRETE DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each ready mix concrete design considered. Please note that the presented breakdown has been randomly altered by +/-10%, and is therefore only an approximation; this manipulation is to ensure confidentiality.

Table 8: Ready mix concrete composition.

Product Components	Product Components
Cement	Proprietary
Aggregates	30–60.00
Others	0.01–5.00
Total	100.00

SYSTEM BOUNDARIES

The following figure depicts the cradle-to-gate system boundary considered in this study.

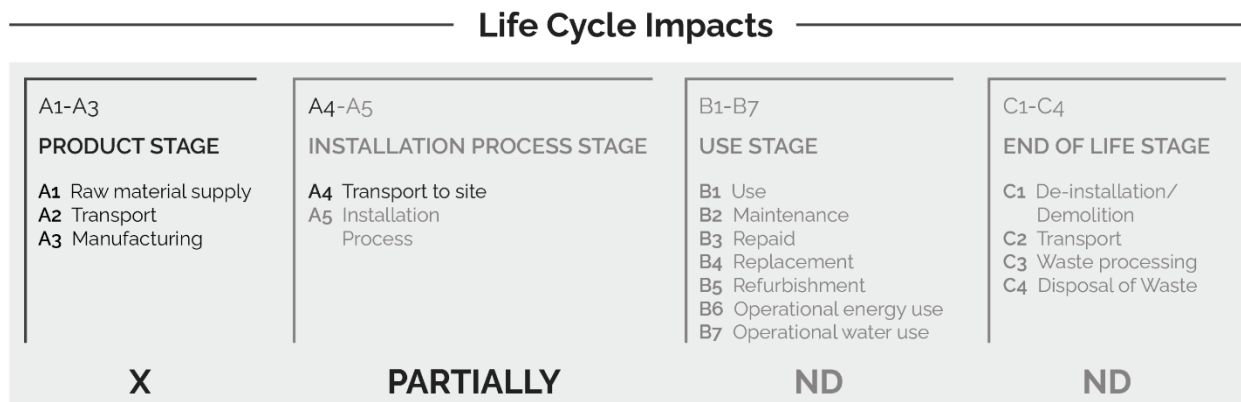


Figure 1: General life cycle phases for consideration in a construction works system

This is a Cradle-to-gate life cycle assessment and the following life cycle stages are included in the study:

- A1: Raw material supply (upstream processes) - Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.
- A2: Transportation - Transportation of A1 materials from the supplier to the “gate” of the manufacturing facility (i.e., A3).
- A3: Manufacturing (core processes)- The energy and other utility inputs used to store, move, and manufacture the declared products and to operate the facility.
- A4: Concrete mixing and delivery to the job site

According to the PCR, the following figure illustrates the general activities and input requirements for producing ready mix concrete products and is not necessarily exhaustive.



System Boundary

Raw Material Supply (A1)	Transport (A2)	Manufacturing (A3)	Transport (A4)
Cements & SCMs Aggregates Admixtures Batch Water Fibers & Pigments	Truck, Rail, Ship Energy Carriers (fuels)	Energy Carriers (electricity and fuels) Ancillary Materials (lubricants, motor oil, cleaning chemicals, other consumables) Water (manufacturing water, including wash water for cement trucks, but excluding batch water) Waste (end of life treatment of ancillary materials and any packaging) 30% total fleet energy transit mix plants only	Truck Energy carriers (diesel and natural gas)

Figure 2: General system inputs considered in the product system and categorized by modules in scope

In addition, as according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture and construction of A3 building/capital goods and infrastructure;
- Production and manufacture of steel production equipment, steel delivery vehicles, earth-moving equipment, and laboratory equipment;
- Personnel-related activities (travel, furniture, office supplies);
- Energy use related to company management and sales activities.

For this LCA the manufacturing plant, owned and operated by CEMEX is located at their MX-PD0481 Pachuca facility in México. All operating data is formulated using the actual data from CEMEX's plant at the above location, including water, energy consumption and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a spreadsheet and was then input into an RStudio environment where pre-calculated LCIA results for relevant products/activities stemming from the ecoinvent v3.10 database and a local EPD database in combination with primary data from CEMEX were utilized. Explanations of the contribution of each data source to this study are outlined in the section 'Data Sources and Quality'. Further LCI details for each declared product are provided in the sections 'Detailed LCI tables' and 'Transport tables' of the detailed LCA report. A parameter uncertainty analysis was also performed where key statistical results (e.g., min/mean/max etc.) are provided in the detailed LCA report.

CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.



DATA SOURCES AND DATA QUALITY ASSESSMENT

Raw material transport: A combination of actual mode/distance combinations were assumed for key bulk materials whereas ecoinvent default multi-modal market mix distances were assumed for other inputs where no original data could be provided.

Electricity: Electricity consumption values are for Cemex in calendar year 2023. These values were direct reported from Cemex records. The unit process "market for electricity, medium voltage/electricity, medium voltage/MX/kWh" was used to represent the Mexico grid electricity used by the concrete plant. 92% is the wind energy.

Process/space heating: No fuel is used for space heating at this plant.

Fuel required for machinery: Machinery-related fuel requirements were determined from direct CEMEX information for the reference year 2023.

Waste generation: Not applicable

Recovered energy: There was no recovered energy on-site.

Recycled/reused material/components: The amount of returned concrete is based on CEMEX primary data for the reference year, 2023.

Module A1 material losses: Due to lack of data, default loss factors were assumed.

Direct A3 emissions accounting: Direct emissions are modeled using fuel and technology appropriate ecoinvent activities. See LCI input tables for details.

Waste transport requirements: Transportation distances are using estimated values. The waste hauler cannot guarantee the exact distances traveled due to the variation of route and actual location of disposal. Most waste disposal sites are near the plant therefore the 25 km distance is a representative estimate.

Product transport requirements: Truck-related fuel requirements were determined from direct CEMEX information for the reference year 2023. The PCR states that 30% of the truck's fuel is used to mix the material and should be allocated to A3. CEMEX operations conducted several tests on their equipment to find the actual amount of fuel used for mixing the materials. The "worst scenario" produced a fuel consumption of 16.9934% of the total fuel used for mixing the material. The truck used 15.3 liters of diesel per 60 minutes at the highest mixing speed, 14 RPMs. In those 60 minutes, the mixing used 2.6 liters of fuel. As a result, 16.99% of the total fuel consumption has been used instead of the 30% as described in the PCR for concrete.

The following tables depict a list of assumed life cycle inventory utilized in the LCA modeling to generate the impact results across the life cycle modules in scope. An assessment of the quality of each LCI activities utilized from various sources is also provided.

Table 9: LCI inputs assumed for module A1 (i.e., raw material supply) *Data Quality Assessment Key Fair=1, Good=2, Very Good =3.*

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Micro silica	silica sand production/silica sand/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Chihuahua	2024	2	3	1	3	3
Andesite gravel	basalt quarry operation/basalt/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Hidalgo	2024	2	3	1	3	3
Water	tap water production, conventional treatment/tap water/RoW/kg	ecoinvent v3.10 in 2024	Hidalgo	2024	2	3	1	3	3
Limestone Gravel	limestone quarry operation/limestone, unprocessed/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Hidalgo	2024	2	3	1	3	3
Additives	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	Edo. Mex.	2024	2	3	1	3	3
Hidratium	chemical production, inorganic/chemical, inorganic/GLO/kg	ecoinvent v3.10 in 2024	Hidalgo	2024	3	3	3	3	3
Polystyrene perlite	polystyrene production, general purpose/polystyrene, general purpose/RoW/kg	ecoinvent v3.10 in 2024	Edo. Mex.	2024	2	3	1	3	3
Fiber Metal	aluminium alloy production, Metallic Matrix Composite/aluminium alloy, metal matrix composite/RoW/kg	ecoinvent v3.10 in 2024	Edo. Mex.	2024	2	3	1	3	3
Cement	Gris CPC40	Program Operator: Labeling Sustainability - EPD ID: ce509726-abc4-4437-	Hidalgo	01 February 2023	3	3	3	3	3





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River Sand	sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Hidalgo	2024	2	3	1	3	3
Recycled aggregates	Waste input produced off-site	See A3 inputs	Hidalgo	See A3 inputs	2	A3	1	A3	A3

DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

Precision: Through measurement and calculation, the manufacturers collected and provided primary data on their annual production. For accuracy, the LCA practitioner and 3rd Party Verifier validated the plant gate-to-gate data.

Completeness: All relevant specific processes, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume) were considered and modeled to represent the specified and declared products. Most relevant background materials and processes were taken from ecoinvent v3.10 LCI datasets where relatively recent region-specific electricity inputs were utilized. The most relevant EPDs requiring key A1 inputs were also utilized where readily available.

Consistency: To ensure consistency, the same modeling structure across the respective product systems was utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product, and co-products outputs, returned and recovered Ready mix concrete materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent v3.10 database were used across all product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process levels to maintain a high level of consistency.

Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in a machine-readable project file for all foreground and background processes, and in Labeling Sustainability's proprietary Ready Mix Concrete LCA calculator* for all production facility and product-specific calculations. A considerable level of transparency is provided throughout the detailed LCA report as the specifications and material quantity make-up for the declared products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to reasons of confidentiality.



*Labeling Sustainability has developed a proprietary tool that allows the calculation of PCR-compliant LCA results for ready mix concrete product designs. The tool auto-calculates results by scaling base-unit technosphere inputs (i.e., 1 kg sand, 1 kWh electricity, etc.) to replicate the reference flow conversions that take place in any typical LCA software like openLCA or SimaPro. The tool was tested against several LCAs performed in openLCA and the tool generated identical results to those realized in openLCA across every impact category and inventory metric (where comparisons could be readily made).

Representativeness: The representativeness of the data is summarized as follows.

- Time related coverage of the manufacturing processes' primary collected data from 2023-01-01 to 2023-12-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted ecoinvent v3.10 database.
- Geographical coverage for inputs required by the A3 facility(ies) is representative of its region of focus; other upstream and background processes are based on US, North American, or global average data and adjusted to regional electricity mixes when relevant.
- Technological coverage is typical or average and specific to the participating facilities for all primary data.

ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment indicators and inventory metrics as listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized as they provide a North American context for the mandatory category indicators to be included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators.

Table 10: Life cycle impact categories and life cycle inventory metrics

ID	LCIA.indicators	Abbreviations	Units
1	Climate change: global warming potential (GWP100)	GWP100	kg CO ₂ -eq
2	Ozone depletion: ozone depletion potential (ODP)	ODP	kg CFC-11-eq
3	Acidification: acidification potential (AP)	AP	kg SO ₂ -eq
4	Eutrophication: eutrophication potential	EP	kg N-eq
5	Smog formation potential	SFP	kg O ₃ -eq
6	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADP _{fossil}	MJ
Inventory metrics			
7	Inventory indicators ISO21930: Cumulative Energy Demand - renewable energy resources	RPRE	MJ
8	Inventory indicators ISO21930: Renewable primary resources with energy content used as material (i.e., PERM)	PRM	MJ
9	Inventory indicators ISO21930: Cumulative Energy Demand - non-renewable energy resources	NRPRE	MJ
10	Inventory indicators ISO21930: Non-renewable primary resources with energy content used as material (i.e., PENRM)	NRPRM	kg



11	Inventory indicators ISO21930: use of secondary material	SM	MJ
12	Inventory indicators ISO21930: use of renewable secondary fuels	RSF	MJ
13	Inventory indicators ISO21930: recovered energy	RE	MJ
14	Inventory indicators ISO21930: use of net fresh water	FW	m3
15	Inventory indicators ISO21930: hazardous waste disposed	HWD	kg
16	Inventory indicators ISO21930: non-hazardous waste disposed	NHWD	kg
17	Inventory indicators ISO21930: high-level radioactive waste disposed	HLRW	kg
18	Inventory indicators ISO21930: intermediate and low-level radioactive waste disposed	ILLRW	kg
19	Inventory indicators ISO21930: materials for recycling	MR	kg
20	Inventory indicators ISO21930: materials for energy recovery	MER	kg

It should be noted that emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in any of the following categories.

- Renewable primary energy resources as energy (fuel);
- Renewable primary resources as material;
- Non-renewable primary resources as energy (fuel);
- Non-renewable primary resources as material;
- Secondary Materials;
- Renewable secondary fuels;
- Non-renewable secondary fuels;
- Recovered energy;
- Abiotic depletion potential for non-fossil mineral resources.
- Land use related impacts, for example on biodiversity and/or soil fertility;
- Toxicological aspects;
- Emissions from land use change [GWP 100 (land-use change)];
- Hazardous waste disposed;
- Non-hazardous waste disposed;
- High-level radioactive waste;
- Intermediate and low-level radioactive waste;
- Components for reuse;
- Materials for recycling;
- Materials for energy recovery;
- Recovered energy exported from the product system.

LIMITATIONS

This EPD is a declaration of potential environmental impact and does not support or provide definitive comparisons of the environmental performance of specific products. Only EPDs prepared from cradle-to-grave life cycle results and based on the same function and reference service life and quantified by

the same functional unit can be used to assist purchasers and users in making informed comparisons between products.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Further, LCA offers a wide array of environmental impact indicators, and this EPD reports a collection of those, as specified by the PCR.

In addition to the impact results, this EPD provides several metrics related to resource consumption and waste generation. While these data may be informational in other ways, they do not provide a measure of impact on the environment.

TOTAL IMPACT SUMMARY

The following table reports the total LCA results for each product produced at the given ready mix concrete facility on a per 1m³ of concrete basis.

Table 11: **Total life cycle (across modules in scope) impact results for all mix designs, assuming the geometric mean point values on a per 1 m³ of concrete basis.**

a) Midpoint Impact Categories:

Indicator/LCI Metric	GWP100	ODP	AP	EP	SFP	ADP _{fossil}
Unit	kg CO ₂ -eq	kg CFC-11-eq	kg SO ₂ -eq	kg N-eq	kg O ₃ -eq	MJ
Acelerado - 200 - 3 días	356	2.57E-06	0.396	0.199	7.63	2090
Acelerado - 250 - 3 días	380	2.76E-06	0.417	0.22	7.96	2230
Acelerado - 250 - 3 días, trab ext 3 horas	383	2.89E-06	0.429	0.271	8.14	2300
Acelerado - 300 - 3 días	433	3.19E-06	0.438	0.231	8.13	2560
Acelerado - MR 45 - 3 días	529	4.04E-06	0.495	0.305	8.98	3180
Alta resistencia - 400 - 28 días	462	3.48E-06	0.472	0.283	8.66	2760
Antibacteriano - 200 - 28 días	263	1.96E-06	0.341	0.171	6.83	1610
Antideslave - 350 - 28 días	451	3.49E-06	0.479	0.307	8.83	2770
Antihongo antialga - 200 - 28 días	268	2.18E-06	0.361	0.26	7.11	1730
Antitermita - 200 - 28 días	263	1.96E-06	0.341	0.171	6.83	1610
Aparentia - 250 - 28 días	385	4.57E-06	0.574	1.07	10	3170
Autocompactable - 250 - 28 días	387	2.93E-06	0.429	0.278	8.1	2320
Baja contracción - 250 - 28 días	364	2.95E-06	0.39	0.235	7.51	2340
Baja contracción - MR 40 - 28 días	359	2.77E-06	0.376	0.17	7.29	2230
Baja contracción - MR 45 - 28 días	395	3.09E-06	0.405	0.219	7.71	2460



Contracción compensada - MR 42 - 28 días	386	3.10E-06	0.411	0.241	7.79	2460
Convencional - 100 - 28 días	185	1.43E-06	0.289	0.136	6.06	1190
Convencional - 150 - 28 días	221	1.67E-06	0.313	0.151	6.41	1380
Convencional - 150 - 7 días	266	1.98E-06	0.34	0.17	6.8	1620
Convencional - 200 - 14 días	282	2.09E-06	0.35	0.177	6.94	1700
Convencional - 200 - 28 días	252	1.89E-06	0.333	0.165	6.71	1550
Convencional - 200 - 7 días	302	2.22E-06	0.363	0.185	7.14	1810
Convencional - 250 - 14 días	301	2.22E-06	0.364	0.185	7.18	1810
Convencional - 250 - 28 días	281	2.08E-06	0.351	0.177	6.98	1700
Convencional - 250 - 7 días	329	2.41E-06	0.381	0.197	7.4	1950
Convencional - 300 - 28 días	351	2.56E-06	0.393	0.206	7.55	2070
Duramax - 350 - 14 días	453	3.40E-06	0.463	0.277	8.56	2700
Duramax Autosellante - 250 - 28 días	424	3.59E-06	0.449	0.375	8.33	2770
Estructural - 250 - 14 días	306	2.32E-06	0.356	0.177	6.92	1870
Estructural - 250 - 28 días	279	2.15E-06	0.338	0.164	6.64	1740
Estructural - 250 - 7 días	326	2.45E-06	0.369	0.185	7.11	1980
Estructural - 300 - 14 días	354	2.65E-06	0.386	0.197	7.36	2130
Estructural - 300 - 28 días	348	2.62E-06	0.378	0.192	7.19	2110
Estructural - 300 - 7 días	374	2.78E-06	0.399	0.206	7.56	2240
Estructural - 300 - 80% a 1 día	500	3.58E-06	0.47	0.216	8.57	2880
Estructural - 350 - 28 días	377	2.82E-06	0.399	0.205	7.51	2270
Estructural - 350 - 7 días	418	3.09E-06	0.428	0.224	7.98	2480
Grout premezclado - 350 - 28 días	659	5.15E-06	0.606	0.415	10.7	4070
Hidratium - 250 - 28 días	347	3.49E-06	0.466	0.619	8.45	2550
Hidratium - 350 - 28 días	450	4.48E-06	0.558	0.8	9.76	3250
Impercem - 250 - 28 días	296	2.39E-06	0.381	0.28	7.4	1890
Lanzado - 300 - 28 días	435	3.33E-06	0.437	0.242	8.29	2650
Ligero - 100 - 28 días	549	3.76E-06	0.545	0.275	9.14	3640



Materiales Reciclados Llanta - 200 - 28 días	268	2.02E-06	0.347	0.18	6.93	1650
Materiales Reciclados Pet - 200 - 28 días	268	2.01E-06	0.346	0.18	6.92	1640
Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días	271	2.06E-06	0.352	0.183	7.03	1680
Mortero - 125 - 28 días	251	1.95E-06	0.312	0.2	6.09	1560
Mortero estabilizado - 125 - 28 días	256	2.12E-06	0.328	0.271	6.3	1660
Pavicrete - MR 36 - 28 días	331	2.47E-06	0.368	0.163	7.1	2000
Pavicrete - MR 38 - 28 días	341	2.54E-06	0.374	0.167	7.19	2060
Pavicrete - MR 40 - 28 días	350	2.60E-06	0.38	0.17	7.28	2110
Pavicrete - MR 40 - 3 días	461	3.46E-06	0.507	0.267	8.96	2820
Pavicrete - MR 40 - 80% a 1 día	520	3.73E-06	0.483	0.222	8.77	2990
Pavicrete - MR 42 - 28 días	360	2.67E-06	0.386	0.174	7.37	2160
Pavicrete - MR 42 - 80% a 3 días	401	2.96E-06	0.419	0.197	7.86	2380
Pavicrete - MR 45 - 28 días	380	2.80E-06	0.397	0.18	7.52	2260
Pavicrete - MR 45 - 7 días	415	3.04E-06	0.421	0.193	7.87	2450
Pavicrete - MR 48 - 28 días	395	2.91E-06	0.41	0.187	7.68	2350
Pavicrete - MR 48 - 7 días	435	3.18E-06	0.435	0.201	8.05	2560
Pervia - MR 36 - 28 días	443	3.44E-06	0.431	0.292	7.65	2690
Pesado - 300 - 28 días	435	3.57E-06	0.533	0.329	10.3	2880
Reducrack - 250 - 28 días	291	2.21E-06	0.343	0.161	6.72	1800
Reducrack Sin malla - 250 - 28 días	291	2.22E-06	0.347	0.163	6.75	1800
Relleno fluido - 25 - 28 días	138	1.04E-06	0.228	0.0894	4.87	889
Relleno fluido - MR 50 - 28 días	191	1.38E-06	0.263	0.102	5.42	1160
Revenimiento total - 350 - 28 días	426	3.18E-06	0.46	0.287	8.64	2530
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	262	2.02E-06	0.344	0.202	6.84	1630
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	283	2.17E-06	0.36	0.214	7.1	1750



Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	286	2.21E-06	0.36	0.222	7.06	1770
Vertua Materiales Reciclados - 050 - 28 días	200	1.43E-06	0.257	0.102	5.2	1190

b) Resource Inventory Metrics:

Indicator/LCI Metric	RPRE	PRM	NRPRE	NRPRM	SM	RSF	RE	FW
Unit	MJ	MJ	MJ	kg	MJ	MJ	MJ	m3
Acelerado - 200 - 3 días	88.6	1.35	89.4	976	0.402	0.0039	0.215	0.453
Acelerado - 250 - 3 días	93.8	1.35	94.7	1050	0.426	0.00408	0.229	0.456
Acelerado - 250 - 3 días, trab ext 3 horas	95.7	1.35	96.6	1070	0.44	0.0042	0.255	0.479
Acelerado - 300 - 3 días	99.7	1.35	101	1200	0.512	0.00491	0.239	0.51
Acelerado - MR 45 - 3 días	115	1.35	116	1470	0.664	0.00637	0.291	0.695
Alta resistencia - 400 - 28 días	107	1.35	107	1290	0.553	0.00532	0.289	0.526
Antibacteriano - 200 - 28 días	70.8	1.35	71.4	699	0.326	0.00347	0.193	0.396
Antideslave - 350 - 28 días	106	1.35	107	1240	0.574	0.00595	0.318	0.565
Antihongo antialga - 200 - 28 días	73.9	1.35	74.5	736	0.347	0.00366	0.238	0.446
Antitermita - 200 - 28 días	70.8	1.35	71.4	699	0.326	0.00347	0.193	0.396
Aparentia - 250 - 28 días	115	1.35	115	1270	0.595	0.00569	0.643	0.928
Autocompactable - 250 - 28 días	96.3	1.35	97.1	1080	0.442	0.00419	0.257	0.474
Baja contracción - 250 - 28 días	82	1.35	82.6	969	0.546	0.00588	0.245	0.651
Baja contracción - MR 40 - 28 días	79.6	1.35	80.2	942	0.524	0.00567	0.211	0.589
Baja contracción - MR 45 - 28 días	87.7	1.35	88.4	1060	0.561	0.00589	0.239	0.632
Contracción compensada - MR 42 - 28 días	86.9	1.35	87.6	1030	0.574	0.00653	0.282	0.679
Convencional - 100 - 28 días	55.4	1.35	56	468	0.258	0.00305	0.168	0.358
Convencional - 150 - 28 días	62.5	1.35	63.1	574	0.289	0.00323	0.179	0.377



Convencional - 150 - 7 días	71.3	1.35	71.9	710	0.327	0.00345	0.192	0.408
Convencional - 200 - 14 días	74.3	1.35	75	757	0.34	0.00353	0.197	0.42
Convencional - 200 - 28 días	68.6	1.35	69.3	668	0.316	0.0034	0.189	0.394
Convencional - 200 - 7 días	78.3	1.35	79	817	0.358	0.00364	0.203	0.429
Convencional - 250 - 14 días	78.1	1.35	78.9	812	0.358	0.00365	0.204	0.419
Convencional - 250 - 28 días	74.2	1.35	74.9	753	0.34	0.00355	0.198	0.409
Convencional - 250 - 7 días	83.5	1.35	84.3	897	0.381	0.00378	0.211	0.442
Convencional - 300 - 28 días	87.8	1.35	88.6	965	0.399	0.00386	0.217	0.466
Duramax - 350 - 14 días	105	1.35	106	1260	0.538	0.00513	0.267	0.525
Duramax Autosellante - 250 - 28 días	97	1.35	97.6	1180	0.614	0.00631	0.319	0.746
Estructural - 250 - 14 días	75	1.35	75.6	820	0.399	0.0042	0.2	0.446
Estructural - 250 - 28 días	68.7	1.35	69.3	735	0.386	0.00422	0.192	0.424
Estructural - 250 - 7 días	78.8	1.35	79.5	879	0.417	0.00432	0.206	0.456
Estructural - 300 - 14 días	84.2	1.35	84.9	962	0.442	0.00447	0.215	0.471
Estructural - 300 - 28 días	82	1.35	82.6	944	0.444	0.00453	0.21	0.479
Estructural - 300 - 7 días	88.1	1.35	88.8	1020	0.459	0.00458	0.221	0.481
Estructural - 300 - 80% a 1 día	111	1.35	112	1390	0.571	0.00531	0.238	0.528
Estructural - 350 - 28 días	87.8	1.35	88.5	1030	0.472	0.00473	0.221	0.486
Estructural - 350 - 7 días	96.8	1.35	97.6	1150	0.499	0.00482	0.234	0.504
Grout premezclado - 350 - 28 días	144	1.35	145	1820	0.877	0.00929	0.458	1.02
Hidratium - 250 - 28 días	94	1.35	94.5	1040	0.517	0.00526	0.441	0.705
Hidratium - 350 - 28 días	117	1.35	118	1380	0.633	0.00606	0.539	0.833
Impercem - 250 - 28 días	79.7	1.35	80.4	822	0.374	0.00383	0.251	0.477
Lanzado - 300 - 28 días	98.9	1.35	99.7	1180	0.576	0.00585	0.274	0.72
Ligero - 100 - 28 días	119	1.35	119	1800	0.559	0.00481	0.264	1.02



Materiales Recicladados Llanta - 200 - 28 días	72.1	1.35	72.7	716	0.334	0.00354	0.2	0.403
Materiales Recicladados Pet - 200 - 28 días	72	1.35	72.7	716	0.333	0.00352	0.199	0.403
Materiales Recicladados Plástico de difícil reciclado - 200 - 28 días	72.6	1.35	73.2	716	0.35	0.00375	0.208	0.408
Mortero - 125 - 28 días	67.7	1.35	68.3	691	0.308	0.00313	0.193	0.489
Mortero estabilizado - 125 - 28 días	70.2	1.35	70.8	720	0.325	0.00329	0.228	0.529
Pavicrete - MR 36 - 28 días	77.9	1.35	78.5	882	0.434	0.00456	0.198	0.43
Pavicrete - MR 38 - 28 días	79.8	1.35	80.5	911	0.443	0.00461	0.201	0.435
Pavicrete - MR 40 - 28 días	81.7	1.35	82.4	940	0.451	0.00466	0.203	0.44
Pavicrete - MR 40 - 3 días	111	1.35	112	1210	0.619	0.00635	0.308	0.697
Pavicrete - MR 40 - 80% a 1 día	114	1.35	115	1440	0.596	0.00554	0.244	0.528
Pavicrete - MR 42 - 28 días	83.6	1.35	84.3	969	0.46	0.00471	0.206	0.445
Pavicrete - MR 42 - 80% a 3 días	92.4	1.35	93.1	1090	0.496	0.00499	0.241	0.473
Pavicrete - MR 45 - 28 días	87.2	1.35	87.9	1030	0.476	0.00481	0.21	0.46
Pavicrete - MR 45 - 7 días	93.9	1.35	94.7	1130	0.508	0.00503	0.221	0.471
Pavicrete - MR 48 - 28 días	90.6	1.35	91.3	1070	0.492	0.00496	0.234	0.477
Pavicrete - MR 48 - 7 días	98.2	1.35	99	1190	0.527	0.00519	0.245	0.495
Pervia - MR 36 - 28 días	99.1	1.35	99.8	1250	0.553	0.00531	0.278	0.465
Pesado - 300 - 28 días	107	1.35	108	1130	0.667	0.00713	0.375	0.554
Reducrack - 250 - 28 días	70.8	1.35	71.4	769	0.395	0.00426	0.191	0.429
Reducrack Sin malla - 250 - 28 días	71.3	1.35	71.9	769	0.398	0.00434	0.211	0.435
Relleno fluido - 25 - 28 días	44	1.35	44.4	338	0.199	0.00243	0.127	0.325
Relleno fluido - MR 50 - 28 días	54.3	1.35	54.8	490	0.244	0.00272	0.14	0.353



Revenimiento total - 350 - 28 días	104	1.35	105	1200	0.478	0.00447	0.269	0.5
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	71.3	1.35	71.9	706	0.33	0.00349	0.207	0.424
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	75.5	1.35	76.2	768	0.35	0.00363	0.216	0.428
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	76.2	1.35	76.9	782	0.352	0.00362	0.219	0.45
Vertua Materiales Reciclados - 050 - 28 días	55.3	1.35	55.8	523	0.245	0.00262	0.135	0.352

c) Waste/output Inventory Metrics:

Indicator/LCI Metric	HWD	NHWD	HLRW	ILLRW	MR	MER
Unit	kg	kg	kg	kg	kg	kg
Acelerado - 200 - 3 días	2.99	72.9	0.00019	0.000612	0.035	5.34E-05
Acelerado - 250 - 3 días	3.16	77.2	2.00E-04	0.000649	0.0372	5.70E-05
Acelerado - 250 - 3 días, trab ext 3 horas	3.37	82.4	0.000209	0.000671	0.0378	6.18E-05
Acelerado - 300 - 3 días	3.26	79.9	0.000192	0.000668	0.0402	6.55E-05
Acelerado - MR 45 - 3 días	3.79	92.7	0.000207	0.000762	0.047	8.33E-05
Alta resistencia - 400 - 28 días	3.63	88.7	0.000209	0.000724	0.0429	7.47E-05
Antibacteriano - 200 - 28 días	2.56	61.8	0.000163	0.000495	0.0275	4.55E-05
Antideslave - 350 - 28 días	3.78	91.4	0.000214	0.000724	0.0424	0.000106
Antihongo antialga - 200 - 28 días	2.9	70.6	0.000177	0.000532	0.0285	5.36E-05
Antitermita - 200 - 28 días	2.56	61.8	0.000163	0.000495	0.0275	4.55E-05
Aparentia - 250 - 28 días	6.16	156	0.000323	0.000937	0.0432	0.00013
Autocompactable - 250 - 28 días	3.38	82.8	0.000209	0.000675	0.038	6.22E-05
Baja contracción - 250 - 28 días	2.95	70.6	0.000152	0.000538	0.033	6.92E-05
Baja contracción - MR 40 - 28 días	2.69	64	0.00014	0.00051	0.0322	6.30E-05
Baja contracción - MR 45 - 28 días	3	72	0.000158	0.000571	0.0355	6.92E-05
Contracción compensada - MR 42 - 28 días	3.14	74.9	0.00016	0.000568	0.035	0.000107



Convencional - 100 - 28 días	2.15	51.3	0.000138	0.000392	0.021	3.77E-05
Convencional - 150 - 28 días	2.34	56.1	0.000149	0.000439	0.024	4.12E-05
Convencional - 150 - 7 días	2.56	62	0.000163	0.000497	0.0277	4.55E-05
Convencional - 200 - 14 días	2.64	64	0.000167	0.000518	0.029	4.70E-05
Convencional - 200 - 28 días	2.5	60.2	0.000159	0.00048	0.0266	4.43E-05
Convencional - 200 - 7 días	2.74	66.7	0.000174	0.000544	0.0306	4.90E-05
Convencional - 250 - 14 días	2.75	66.6	0.000174	0.000544	0.0306	4.91E-05
Convencional - 250 - 28 días	2.64	64	0.000168	0.000518	0.0289	4.71E-05
Convencional - 250 - 7 días	2.88	70.2	0.000182	0.000579	0.0328	5.16E-05
Convencional - 300 - 28 días	2.98	73	0.000188	0.000607	0.0346	5.35E-05
Duramax - 350 - 14 días	3.53	86.5	0.000206	0.000711	0.0422	7.11E-05
Duramax Autosellante - 250 - 28 días	3.67	89.5	0.000189	0.000659	0.0389	8.44E-05
Estructural - 250 - 14 días	2.61	63.4	0.000153	0.000504	0.0298	5.27E-05
Estructural - 250 - 28 días	2.45	58.9	0.00014	0.000458	0.0272	5.10E-05
Estructural - 250 - 7 días	2.71	65.9	0.000159	0.000529	0.0314	5.47E-05
Estructural - 300 - 14 días	2.85	69.5	0.000167	0.000565	0.0337	5.75E-05
Estructural - 300 - 28 días	2.77	67.7	0.000159	0.000545	0.0328	5.74E-05
Estructural - 300 - 7 días	2.95	72.1	0.000173	0.000591	0.0353	5.95E-05
Estructural - 300 - 80% a 1 día	3.41	83.8	0.000201	0.000729	0.0451	6.94E-05
Estructural - 350 - 28 días	2.93	71.6	0.000169	0.000584	0.0353	6.06E-05
Estructural - 350 - 7 días	3.18	77.9	0.000187	0.000648	0.039	6.40E-05
Grout premezclado - 350 - 28 días	5.04	122	0.000267	0.000966	0.0584	0.000191
Hidratium - 250 - 28 días	4.41	110	0.000233	0.00071	0.0363	9.52E-05
Hidratium - 350 - 28 días	5.42	136	0.000285	0.000891	0.0457	0.000117
Impercem - 250 - 28 días	3.08	75.3	0.000188	0.000572	0.0309	5.71E-05
Lanzado - 300 - 28 días	3.38	81.6	0.000189	0.000661	0.0397	7.27E-05
Ligero - 100 - 28 días	3.84	89.1	0.000211	0.000767	0.0473	7.06E-05
Materiales Reciclad Llanta - 200 - 28 días	2.62	63.3	0.000166	0.000506	0.028	4.70E-05



Materiales Reciclados Pet - 200 - 28 días	2.62	63.2	0.000166	0.000505	0.028	4.68E-05
Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días	2.69	64.5	0.000168	0.000511	0.0283	4.94E-05
Mortero - 125 - 28 días	2.46	61.6	0.000152	0.00047	0.0261	4.49E-05
Mortero estabilizado - 125 - 28 días	2.73	68.6	0.000164	0.000499	0.0269	5.13E-05
Pavicrete - MR 36 - 28 días	2.63	63.3	0.000151	0.000514	0.0312	5.51E-05
Pavicrete - MR 38 - 28 días	2.68	64.5	0.000154	0.000527	0.0321	5.60E-05
Pavicrete - MR 40 - 28 días	2.72	65.7	0.000156	0.000539	0.0329	5.69E-05
Pavicrete - MR 40 - 3 días	5.47	101	0.000214	0.000745	0.0559	8.52E-05
Pavicrete - MR 40 - 80% a 1 día	3.5	85.8	0.000204	0.000749	0.0466	7.20E-05
Pavicrete - MR 42 - 28 días	2.77	66.9	0.000159	0.000551	0.0337	5.78E-05
Pavicrete - MR 42 - 80% a 3 días	3.07	74.5	0.000177	0.000615	0.0373	6.43E-05
Pavicrete - MR 45 - 28 días	2.85	69.2	0.000164	0.000575	0.0352	5.95E-05
Pavicrete - MR 45 - 7 días	3.03	73.5	0.000175	0.000619	0.0381	6.31E-05
Pavicrete - MR 48 - 28 días	2.99	72.6	0.00017	0.000598	0.0366	6.32E-05
Pavicrete - MR 48 - 7 días	3.18	77.4	0.000182	0.000648	0.0398	6.70E-05
Pervia - MR 36 - 28 días	3.35	81.9	0.00018	0.000655	0.04	7.48E-05
Pesado - 300 - 28 días	4.39	103	0.000249	0.000775	0.0432	9.51E-05
Reducrack - 250 - 28 días	2.48	59.7	0.000142	0.000471	0.0282	5.15E-05
Reducrack Sin malla - 250 - 28 días	2.54	61.2	0.000144	0.000476	0.0283	5.38E-05
Relleno fluido - 25 - 28 días	1.65	39.9	0.000107	0.000301	0.0163	2.84E-05
Relleno fluido - MR 50 - 28 días	1.91	46.3	0.000124	0.000369	0.0207	3.30E-05
Revenimiento total - 350 - 28 días	3.6	88.2	0.000224	0.00073	0.0414	6.61E-05
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	2.65	64.5	0.000166	0.000503	0.0276	4.79E-05
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	2.79	67.7	0.000174	0.000533	0.0294	5.05E-05
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	2.81	68.7	0.000175	0.000537	0.0296	5.11E-05



Vertua Materiales Reciclados - 050 - 28 días	1.87	45.8	0.000121	0.00037	0.0211	3.25E-05
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OTHER ENVIRONMENTAL INFO

A4 Diesel Emissions

The following table below is the GWP100 for the A4 diesel emissions. These emissions were calculated from primary CEMEX data on the exact diesel usage for the mixing trucks, minus 16.99% which was allotted to A3 for mixing the concrete.

Table 12: A4 Diesel Emissions

PLANT NAME	L DIESEL NOT INCLUDING A3	GWP FACTOR kgCO ₂ / LITER	Total kg CO ₂ eq (A4)	Total kg CO ₂ eq/m ³ (A4)
MX-PD0481 PACHUCA	157,641.00	2.596	409,236.04	10.43

CEMEX Calculated Simplified CO₂ Emissions

Under the auspices of the Global Commitment, the Global Cement and Concrete Association (GCCA) endeavors to establish a standardized methodology for assessing carbon dioxide (CO₂) emissions with a view to facilitating effective comparative analyses. The association's computation model currently operates on a simplified premise, predominantly focusing on the efficiency of cement production within the concrete mix design.

The GCCA mandates the dual reporting of both Net Emissions and Gross Emissions, differentiating the impact of alternative fuel utilization in the cement production process. Net Emissions pertain to the CO₂ emissions generated without considering the carbon offset potential of alternative fuels used in the production process. On the other hand, Gross Emissions account for this factor, recognizing the carbon neutrality or even carbon negativity that can be achieved through the strategic use of such alternative fuels. This dual-pronged reporting approach provides a more nuanced understanding of the industry's carbon footprint, thereby better informing efforts towards emissions reduction.

These calculations do not intend to replace CO₂ footprint calculations. It is a starting point to monitor CO₂ emissions in concrete while transitioning to a more comprehensive indicator based on the Life Cycle Assessment, such as the CO₂ footprint or the Global Warming Potential indicator.

Table 13: Simplified CO₂

NEW ID	Net (kgCO ₂ /m ³)	Gross (kgCO ₂ /m ³)
Acelerado - 200 - 3 días	232	257
Acelerado - 250 - 3 días	249	275
Acelerado - 250 - 3 días, trab ext 3 horas	249	275
Acelerado - 300 - 3 días	284	314
Acelerado - MR 45 - 3 días	345	381
Alta resistencia - 400 - 28 días	301	333
Antibacteriano - 200 - 28 días	165	183



Antideslave - 350 - 28 días	288	319
Antihongo antialga - 200 - 28 días	165	183
Antitermita - 200 - 28 días	165	183
Aparentia - 250 - 28 días	215	237
Autocompactable - 250 - 28 días	251	278
Baja contracción - 250 - 28 días	225	249
Baja contracción - MR 40 - 28 días	225	249
Baja contracción - MR 45 - 28 días	250	276
Contracción compensada - MR 42 - 28 días	239	264
Convencional - 100 - 28 días	111	122
Convencional - 150 - 28 días	136	150
Convencional - 150 - 7 días	168	186
Convencional - 200 - 14 días	179	198
Convencional - 200 - 28 días	158	175
Convencional - 200 - 7 días	193	214
Convencional - 250 - 14 días	192	213
Convencional - 250 - 28 días	178	197
Convencional - 250 - 7 días	212	235
Convencional - 300 - 28 días	229	253
Duramax - 350 - 14 días	295	327
Duramax Autosellante - 250 - 28 días	264	292
Estructural - 250 - 14 días	194	215
Estructural - 250 - 28 días	174	192
Estructural - 250 - 7 días	208	230
Estructural - 300 - 14 días	228	252
Estructural - 300 - 28 días	224	247
Estructural - 300 - 7 días	242	267
Estructural - 300 - 80% a 1 día	333	368
Estructural - 350 - 28 días	244	270
Estructural - 350 - 7 días	274	302
Grout premezclado - 350 - 28 días	422	467
Hidratium - 250 - 28 días	204	226
Hidratium - 350 - 28 días	271	299
Impercem - 250 - 28 días	185	205
Lanzado - 300 - 28 días	279	308
Ligero - 100 - 28 días	349	386
Materiales Recicladados Llanta - 200 - 28 días	169	187
Materiales Recicladados Pet - 200 - 28 días	169	187
Materiales Recicladados Plástico de difícil reciclado - 200 - 28 días	169	187
Mortero - 125 - 28 días	159	176
Mortero estabilizado - 125 - 28 días	159	176
Pavicrete - MR 36 - 28 días	211	233
Pavicrete - MR 38 - 28 días	218	241
Pavicrete - MR 40 - 28 días	225	249
Pavicrete - MR 40 - 3 días	288	319
Pavicrete - MR 40 - 80% a 1 día	346	383



Pavicrete - MR 42 - 28 días	232	257
Pavicrete - MR 42 - 80% a 3 días	260	288
Pavicrete - MR 45 - 28 días	246	272
Pavicrete - MR 45 - 7 días	271	299
Pavicrete - MR 48 - 28 días	257	284
Pavicrete - MR 48 - 7 días	285	315
Pervia - MR 36 - 28 días	288	319
Pesado - 300 - 28 días	260	288
Reducrack - 250 - 28 días	183	202
Reducrack Sin malla - 250 - 28 días	183	202
Relleno fluido - 25 - 28 días	82	90
Relleno fluido - MR 50 - 28 días	119	131
Revenimiento total - 350 - 28 días	279	308
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	164	181
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	178	197
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	181	200
Vertua Materiales Reciclados - 050 - 28 días	127	140

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- ASTM C33/C33M Standard Specification for Concrete Aggregates // NMX-C-111-ONNCCE-2018 Construction Industry - Aggregates for hydraulic concrete - Specifications and Test Methods
- ASTM C94 Standard Specification for Ready-Mixed Concrete //NMX-C-155-ONNCCE-2004 Construction Industry - Hydraulic Concrete - Mass dosed - Specifications and Test Methods
- ASTM C150/C150M Standard Specification for Portland Cement // NMX-C-414-ONNCCE-2017 Construction Industry - Hydraulic Cements - Specifications and Test Methods
- ASTM C260/C260M Standard Specification for Air-Entraining Admixtures for Concrete // NMX-C-255-ONNCCE-2006 Construction Industry - Concrete Chemical Admixtures - Specifications, sampling and test methods
- ASTM C595 Standard Specification for Blended Hydraulic Cements // NMX-C-414-ONNCCE-2017 Construction Industry - Hydraulic Cements-Specifications and Test Methods
- ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete // NMX-C-146-ONNCCE-2000 Construction Industry - Concrete additives raw or calcined natural pozzolana and fly ash for use as a mineral admixture in Portland cement concrete - Specifications
- ASTM C979/C979M Standard Specification for Pigments for Integrally Colored Concrete // NMX-C-313-1981 Construction Industry - Cement Portland - Color of mortars and concrete
- ASTM C989/C989M Standard Specification for Slag Cement for Use in Concrete and Mortars



- ASTM C1017/C1017M Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete // NMX-C-255-ONNCCE-2006 Construction Industry - Concrete Chemical Admixtures - Specifications, sampling and test methods
- ASTM C1116/C1116M Standard Specification for Fiber-Reinforced Concrete
- ASTM C1157/C1157M Standard Performance Specification for Hydraulic Cement // NMX-C-414-ONNCCE-2017 Construction Industry - Hydraulic Cements - Specifications and Test Methods
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- ASTM C1602/C1602M Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete // NMX-C-122-ONNCCE-2019 Construction Industry - Water for Concrete - Specifications
- ASTM G109 Standard Test Method for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments
- ASTM C330/C330M Standard Specification for Lightweight Aggregates for Structural Concrete // NMX-C-299-ONNCCE-2010 Construction Industry - Structural Hydraulic Concrete - Lightweight aggregates-specifications and test methods
- ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete // NMX-C-255-ONNCCE-2006 Construction Industry - Concrete Chemical Admixtures - Specifications, sampling and test methods

ISO Standards:

- ISO 6707-1: 2014 Buildings and Civil Engineering Works - Vocabulary - Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling)
- ISO 14025:2006 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures
- ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- ISO 14067:2018 Greenhouse Gases - Carbon Footprint of Products - Requirements and Guidelines for Quantification
- ISO 14050:2009 Environmental Management - Vocabulary
- ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products