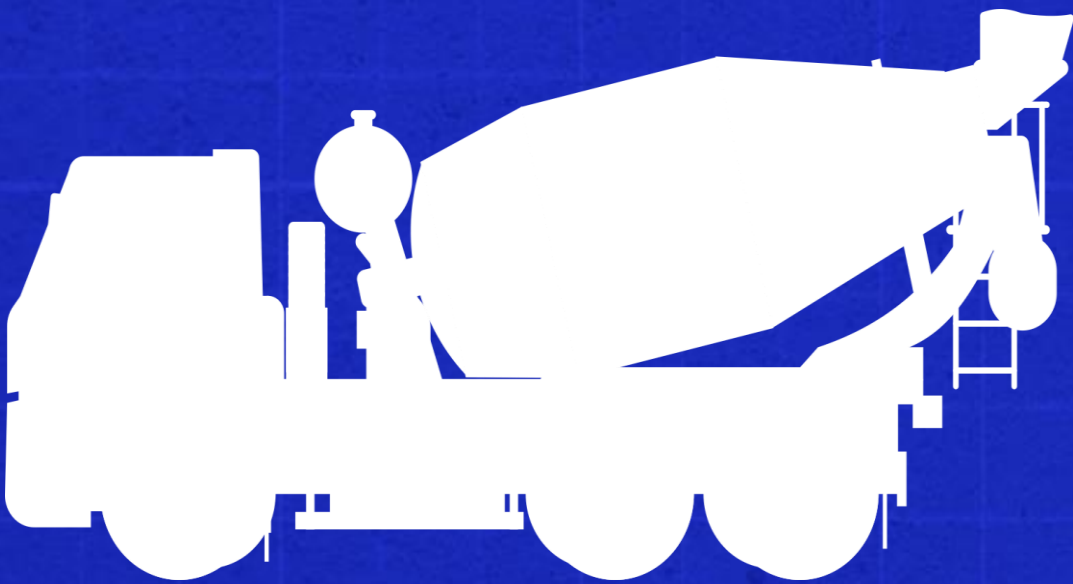




# ENVIRONMENTAL PRODUCT DECLARATION



**Environmental Product Declaration for ready mix concrete products produced by CEMEX México at their MX-PD0617 MORELIA facility in Michoacán, México.**

**FUTURE IN  
ACTION**



## ADMINISTRATIVE INFORMATION

### International Certified Environmental Product Declaration

<b>Declared Product:</b>	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
<b>Declaration Owner:</b>	CEMEX Concretos S.A. de C.V./ CEMEX S.A.B. de C.V.
	444 av. Constitución Pte, Col. Centro
	Monterrey, Nuevo León.
	www.cemexmexico.com
	Arturo Gaytan Covarrubias. <a href="mailto:arturo.gaytanc@cemex.com">arturo.gaytanc@cemex.com</a> Maria Paulette Chambers Rubio <a href="mailto:mariapaulette.chambers@cemex.com">mariapaulette.chambers@cemex.com</a>
<b>Program Operator:</b>	Labeling Sustainability
	Address, 11670 W Sunset Blvd.
	Los Angeles, CA
	www.labelingsustainability.com
<b>Product Category Rule:</b>	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, <a href="mailto:t.gloria@industrial-ecology.com">t.gloria@industrial-ecology.com</a> . Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, <a href="mailto:mrovercash@earthlink.net">mrovercash@earthlink.net</a> . Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, <a href="mailto:bstough@sustainableresearchgroup.com">bstough@sustainableresearchgroup.com</a> . Mr. Jack Geilbig, EcoForm: 2624 Abelia Way, Suite 611, Knoxville, TN 37931, <a href="mailto:jgeilbig@ecoform.com">jgeilbig@ecoform.com</a> .
<b>Independent LCA Reviewer and EPD Verifier:</b>	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 ( <a href="http://www.environdec.com">www.environdec.com</a> ), CSA Group ( <a href="http://www.csaregistrries.ca">www.csaregistrries.ca</a> )
<b>Date of Issue:</b>	30 August 2024
<b>Period of Validity:</b>	5 years; valid until 30 August 2029
<b>EPD Number:</b>	21a80a63-86f2-4b1a-847e-7eae85983233



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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 59 concrete mixes manufactured at the CEMEX MX-PD0617 Morelia concrete facility at Norte Sur Sn, Morelia, Cd. Industrial Morelia, Michoacán, 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	1.06	Clásico
2	Convencional - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.96	Clásico
3	Ligero - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.38	
4	Mortero - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.86	Clásico
5	Mortero estabilizado - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.86	Clásico
6	Pervia - MR 26 - 28 días	11.51 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	11.51	28	0.26	
7	Relleno fluido - 100 - 28 días	9.81 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	9.81	28	0.85	Clásico



8	Trabajabilidad extendida - 100 - 28 días, trab ext 3 horas	9.81 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	9.81	28	1.07	Clásico
9	Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.96	Clásico
10	Vertua Materiales Reciclados - 050 - 28 días	4.90 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	4.90	28	0.85	Clásico

### 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	H2O to cement ratio	Level of vertua lower carbon
11	Acelerado - 200 - 3 días	19.61 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	19.61	3	0.60	Clásico
12	Antibacteriano - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.75	Clásico
13	Antihongo antialga - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.75	Clásico
14	Antitermita - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.75	Clásico
15	Convencional - 200 - 14 días	19.61 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	19.61	14	0.76	Clásico
16	Convencional - 200 - 28 días	19.61 MPa 28d strength	Ready Mix Concrete	19.61	28	0.85	Clásico



		Ready Mix Concrete					
<b>17</b>	Convencional - 200 - 7 días	19.61 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	19.61	7	0.71	Clásico
<b>18</b>	Impercem - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.80	Clásico
<b>19</b>	Materiales Reciclados Llanta - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.80	Clásico
<b>20</b>	Materiales Reciclados Pet - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.80	Clásico
<b>21</b>	Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.80	Clásico
<b>22</b>	Pervia - MR 30 - 28 días	15.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	15.32	28	0.26	
<b>23</b>	Reducrack - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.82	Clásico
<b>24</b>	Reducrack Sin malla - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.79	Clásico
<b>25</b>	Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.82	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	H <sub>2</sub> O to cement ratio	Level of vertua lower carbon
26	Acelerado - 250 - 3 días	24.52 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.54	Clásico
27	Aparentia - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.72	Clásico
28	Autocompactable - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.56	
29	Convencional - 250 - 14 días	24.52 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	24.52	14	0.67	Clásico
30	Convencional - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.74	Clásico
31	Convencional - 250 - 7 días	24.52 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.62	Clásico
32	Duramax - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.50	
33	Duramax Autosellante - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.50	
34	Estructural - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.71	Clásico





35	Lanzado - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.56	Clásico
36	Reducrack - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.74	Clásico
37	Revenimiento total - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.70	Clásico
38	Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	24.52 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	24.52	14	0.67	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	0.73	Clásico
40	Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	24.52 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.61	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	0.47	Clásico
42	Acelerado - MR 40 - 3 días, trab ext 3 horas	27.24 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	27.24	3	0.50	Clásico
43	Convencional - 300 - 14 días	29.42 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	29.42	14	0.58	Clásico



44	Convencional - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.62	Clásico
45	Estructural - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.60	Clásico
46	Pavicrete - MR 40 - 3 días	27.24 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	27.24	3	0.50	Clásico
47	Pavicrete - MR 40 - 7 días	27.24 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	27.24	7	0.53	Clásico
48	Pesado - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.49	
49	Reducrack - MR 40 - 28 días, trab ext 3 horas	27.24 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	27.24	28	0.62	Clásico
50	Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.61	Clásico

### 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
51	Antideslave - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.46	
52	Baja contracción - MR 42 - 28 días	30.03 MPa 28d strength	Ready Mix Concrete	30.03	28	0.55	Clásico



		Ready Mix Concrete					
53	Contracción compensada - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.58	Clásico
54	Convencional - 350 - 7 días	34.32 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	34.32	7	0.49	Clásico
55	Grout premezclado - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.42	
56	Hidratium - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.61	Clásico
57	Pavicrete - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.61	Clásico
58	Pavicrete - MR 42 - 3 días	30.03 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	30.03	3	0.49	Clásico

### Mix Designs: 46 to 50 MPa

Table 6: Declared products with Mix designs: 46 to 50MPa 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
59	Alta resistencia - 500 - 28 días	49.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	49.03	28	0.36	Clásico

## 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 7: 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.

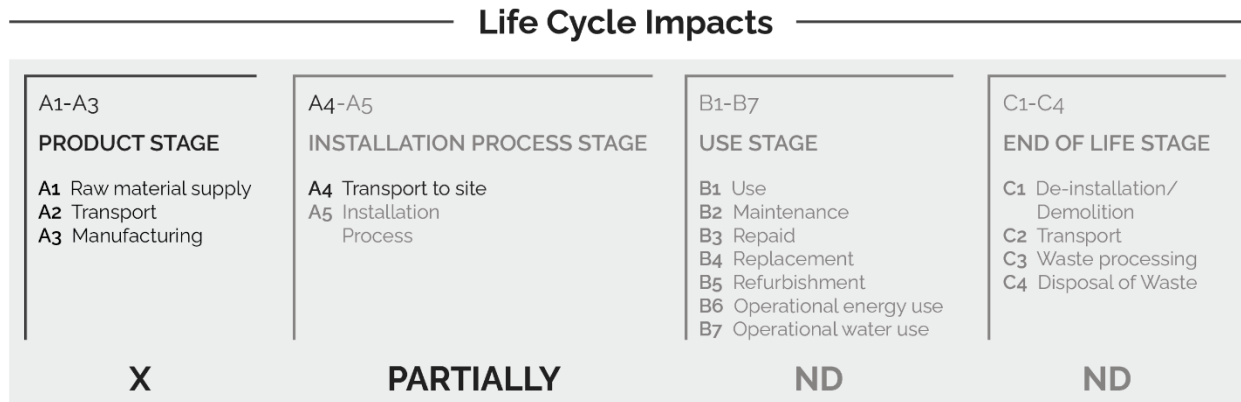


Figure 1: General life cycle phases for consideration in a construction works system

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

<p>Raw Material Supply <b>(A1)</b> Cements &amp; SCMs Aggregates Admixtures Batch Water Fibers &amp; Pigments</p>	<p>Transport <b>(A2)</b> Truck, Rail, Ship Energy Carriers (fuels)</p>	<p>Manufacturing <b>(A3)</b> 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</p>	<p>Transport <b>(A4)</b> Truck Energy carriers (diesel and natural gas)</p>
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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-PD0617 Morelia 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 8: 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		Geography	Reliability	Completeness	
						Time				
<b>Micro silica</b>	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
<b>Basalt gravel</b>	basalt quarry operation/basalt/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Michoacán	2024		2	3	1	3	3
<b>Water</b>	tap water production, conventional treatment/tap water/RoW/kg	ecoinvent v3.10 in 2024	Michoacán	2024		2	3	1	3	3
<b>Additives</b>	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	Edo. Mex.	2024		2	3	1	3	3
<b>Hidratium</b>	chemical production, inorganic/chemical, inorganic/GLO/kg	ecoinvent v3.10 in 2024	Hidalgo	2024		2	3	1	3	3
<b>Cement</b>	Gris CPC40	Progam Operator: Labeling Sustainability - EPD ID: c9067c84-e015-42a1-8c45-c389cb8fa0a4	Hidalgo	07 June 2023		3	3	3	3	3
<b>Volcanic Sand</b>	sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Michoacán	2024		2	3	1	3	3
<b>Llanta kg</b>	Waste input produced off-site	See A3 inputs	Guanajuato	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 g: Life cycle impact categories and life cycle inventory metrics

ID	LCIA.indicators	Abbreviations	Units
1	Climate change: global warming potential (GWP100)	GWP100	kg CO <sub>2</sub> -eq
2	Ozone depletion: ozone depletion potential (ODP)	ODP	kg CFC-11-eq
3	Acidification: acidification potential (AP)	AP	kg SO <sub>2</sub> -eq
4	Eutrophication: eutrophication potential	EP	kg N-eq
5	Smog formation potential	SFP	kg O <sub>3</sub> -eq
6	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADP <sub>fossil</sub>	MJ
<b>Inventory metrics</b>			
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	m <sup>3</sup>
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
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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 1m<sup>3</sup> of concrete basis.

Table 10: **Total life cycle (across modules in scope) impact results for all mix designs, assuming the geometric mean point values on a per 1 m<sup>3</sup> of concrete basis.**

a) Midpoint Impact Categories:

Indicator/LCI Metric	GWP100	ODP	AP	EP	SFP	ADP <sub>fossil</sub>
Unit	kg CO <sub>2</sub> -eq	kg CFC-11-eq	kg SO <sub>2</sub> -eq	kg N-eq	kg O <sub>3</sub> -eq	MJ
Acelerado - 200 - 3 días	310	2.20E-06	0.347	0.215	7.06	1750
Acelerado - 250 - 3 días	337	2.38E-06	0.366	0.231	7.37	1880
Acelerado - 300 - 3 días	393	2.74E-06	0.403	0.263	7.92	2160
Acelerado - MR 40 - 3 días, trab ext 3 horas	381	2.55E-06	0.39	0.209	7.75	2040
Alta resistencia - 500 - 28 días	534	3.80E-06	0.508	0.412	9.49	2940
Antibacteriano - 200 - 28 días	252	1.82E-06	0.31	0.177	6.52	1460
Antideslave - 350 - 28 días	418	2.99E-06	0.429	0.297	8.31	2350
Antihongo antialga - 200 - 28 días	258	2.04E-06	0.329	0.262	6.78	1580
Antitermita - 200 - 28 días	252	1.82E-06	0.31	0.177	6.52	1460
Aparentia - 250 - 28 días	292	3.12E-06	0.424	0.67	8.08	2210
Autocompactable - 250 - 28 días	340	2.46E-06	0.37	0.257	7.42	1930
Baja contracción - MR 42 - 28 días	321	2.31E-06	0.363	0.237	7.35	1830
Contracción compensada - MR 42 - 28 días	333	2.37E-06	0.373	0.228	7.47	1890
Convencional - 100 - 28 días	180	1.37E-06	0.258	0.137	5.73	1110
Convencional - 150 - 28 días	197	1.48E-06	0.27	0.148	5.9	1190
Convencional - 200 - 14 días	252	1.83E-06	0.305	0.179	6.41	1460
Convencional - 200 - 28 días	223	1.65E-06	0.287	0.163	6.16	1320
Convencional - 200 - 7 días	272	1.96E-06	0.32	0.192	6.64	1560
Convencional - 250 - 14 días	283	2.03E-06	0.326	0.198	6.74	1620
Convencional - 250 - 28 días	254	1.85E-06	0.309	0.182	6.49	1480



Convencional - 250 - 7 días	296	2.11E-06	0.337	0.206	6.93	1680
Convencional - 300 - 14 días	333	2.35E-06	0.359	0.227	7.23	1860
Convencional - 300 - 28 días	300	2.14E-06	0.34	0.209	6.97	1700
Convencional - 350 - 7 días	384	2.68E-06	0.399	0.26	7.85	2120
Duramax - 250 - 28 días	361	2.71E-06	0.394	0.319	7.77	2100
Duramax Autosellante - 250 - 28 días	370	3.06E-06	0.426	0.456	8.2	2290
Estructural - 250 - 28 días	264	1.91E-06	0.315	0.187	6.59	1520
Estructural - 300 - 28 días	320	2.27E-06	0.351	0.219	7.11	1800
Grout premezclado - 350 - 28 días	589	4.19E-06	0.52	0.393	9.47	3270
Hidratium - MR 42 - 28 días	312	2.15E-06	0.349	0.185	7.1	1720
Impercem - 200 - 28 días	254	2.06E-06	0.327	0.275	6.7	1590
Lanzado - 250 - 28 días	347	2.64E-06	0.388	0.305	7.68	2060
Ligero - 150 - 28 días	514	3.35E-06	0.431	0.267	7.9	2640
Materiales Recicladados Llanta - 200 - 28 días	233	1.72E-06	0.295	0.169	6.29	1380
Materiales Recicladados Pet - 200 - 28 días	233	1.72E-06	0.295	0.169	6.29	1370
Materiales Recicladados Plástico de difícil reciclado - 200 - 28 días	236	1.75E-06	0.3	0.172	6.39	1410
Mortero - 150 - 28 días	255	1.90E-06	0.274	0.173	5.85	1480
Mortero estabilizado - 150 - 28 días	257	1.99E-06	0.282	0.208	5.96	1540
Pavicrete - MR 40 - 3 días	377	2.55E-06	0.391	0.215	7.76	2040
Pavicrete - MR 40 - 7 días	355	2.41E-06	0.377	0.205	7.54	1930
Pavicrete - MR 42 - 28 días	307	2.12E-06	0.345	0.183	7.05	1700
Pavicrete - MR 42 - 3 días	391	2.60E-06	0.39	0.214	7.66	2080
Pervia - MR 26 - 28 días	368	2.39E-06	0.383	0.199	7.36	1930
Pervia - MR 30 - 28 días	377	2.45E-06	0.389	0.202	7.44	1980
Pesado - 300 - 28 días	412	3.33E-06	0.495	0.322	9.94	2680
Reducrack - 200 - 28 días	237	1.73E-06	0.296	0.171	6.29	1390
Reducrack - 250 - 28 días	259	1.88E-06	0.313	0.185	6.57	1500
Reducrack - MR 40 - 28 días, trab ext 3 horas	307	2.17E-06	0.347	0.207	7.07	1730
Reducrack Sin malla - 200 - 28 días	243	1.77E-06	0.306	0.176	6.43	1420



Relleno fluido - 100 - 28 días	246	1.62E-06	0.229	0.0903	4.76	1300
Revenimiento total - 250 - 28 días	276	2.04E-06	0.33	0.221	6.8	1610
Trabajabilidad extendida - 100 - 28 días, trab ext 3 horas	194	1.47E-06	0.268	0.151	5.85	1180
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	215	1.60E-06	0.282	0.163	6.06	1290
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	231	1.71E-06	0.296	0.174	6.3	1370
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	296	2.13E-06	0.338	0.214	6.93	1690
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	267	1.94E-06	0.319	0.196	6.65	1550
Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	314	2.25E-06	0.351	0.225	7.13	1780
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	323	2.31E-06	0.355	0.23	7.19	1830
Vertua Materiales Reciclados - 050 - 28 días	215	1.43E-06	0.204	0.0811	4.27	1150

## 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	69.7	1.17	69.7	687	0.422	0.00491	0.226	0.613
Acelerado - 250 - 3 días	74.6	1.17	74.6	752	0.449	0.00513	0.24	0.62
Acelerado - 300 - 3 días	84.6	1.17	84.5	889	0.504	0.00557	0.267	0.65
Acelerado - MR 40 - 3 días, trab ext 3 horas	81.7	1.17	81.7	845	0.48	0.00536	0.24	0.61
Alta resistencia - 500 - 28 días	111	1.17	111	1250	0.656	0.00683	0.369	0.768
Antibacteriano - 200 - 28 días	59.5	1.17	59.5	545	0.366	0.00447	0.197	0.583
Antideslave - 350 - 28 días	89.5	1.17	89.4	940	0.561	0.00653	0.32	0.718
Antihongo antialga - 200 - 28 días	62.6	1.17	62.5	580	0.387	0.00466	0.241	0.633



Antitermita - 200 - 28 días	59.5	1.17	59.5	545	0.366	0.00447	0.197	0.583
Aparentia - 250 - 28 días	78.4	1.17	78.1	768	0.499	0.00566	0.452	0.878
Autocompactable - 250 - 28 días	75.5	1.17	75.4	766	0.458	0.00522	0.253	0.655
Baja contracción - MR 42 - 28 días	72.8	1.17	72.7	716	0.436	0.00504	0.243	0.603
Contracción compensada - MR 42 - 28 días	74.8	1.17	74.7	731	0.46	0.0057	0.271	0.64
Convencional - 100 - 28 días	46.2	1.17	46.2	370	0.297	0.00392	0.161	0.559
Convencional - 150 - 28 días	49.4	1.17	49.3	413	0.314	0.00406	0.17	0.568
Convencional - 200 - 14 días	59	1.17	59	547	0.367	0.00447	0.195	0.601
Convencional - 200 - 28 días	54	1.17	54	476	0.339	0.00425	0.183	0.58
Convencional - 200 - 7 días	62.9	1.17	62.9	597	0.385	0.0046	0.207	0.603
Convencional - 250 - 14 días	64.7	1.17	64.6	623	0.397	0.00471	0.211	0.613
Convencional - 250 - 28 días	59.7	1.17	59.7	552	0.369	0.00449	0.198	0.591
Convencional - 250 - 7 días	67.2	1.17	67.1	652	0.409	0.00481	0.219	0.606
Convencional - 300 - 14 días	73.7	1.17	73.6	745	0.444	0.00508	0.236	0.636
Convencional - 300 - 28 días	68	1.17	67.9	663	0.413	0.00484	0.221	0.609
Convencional - 350 - 7 días	83.4	1.17	83.4	868	0.493	0.00546	0.265	0.638
Duramax - 250 - 28 días	80.5	1.17	80.4	832	0.491	0.00551	0.288	0.69
Duramax Autosellante - 250 - 28 días	85.5	1.17	85.3	890	0.526	0.00583	0.359	0.77
Estructural - 250 - 28 días	61.4	1.17	61.4	575	0.378	0.00456	0.203	0.594
Estructural - 300 - 28 días	71.2	1.17	71.2	712	0.432	0.00499	0.229	0.628
Grout premezclado - 350 - 28 días	117	1.17	117	1340	0.782	0.00915	0.444	0.981
Hidratium - MR 42 - 28 días	70.1	1.17	70.1	680	0.419	0.00492	0.232	0.596
Impercem - 200 - 28 días	62.2	1.17	62.1	576	0.391	0.00474	0.262	0.673
Lanzado - 250 - 28 días	77.7	1.17	77.6	785	0.5	0.006	0.303	0.727



Ligero - 150 - 28 días	102	1.17	102	1190	0.582	0.00581	0.275	0.634
Materiales Reciclados Llanta - 200 - 28 días	55.9	1.17	55.8	500	0.351	0.00436	0.189	0.586
Materiales Reciclados Pet - 200 - 28 días	55.9	1.17	55.8	500	0.351	0.00436	0.188	0.586
Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días	56.3	1.17	56.3	500	0.366	0.00456	0.196	0.591
Mortero - 150 - 28 días	54.8	1.17	54.8	560	0.39	0.0048	0.175	0.782
Mortero estabilizado - 150 - 28 días	56.1	1.17	56	575	0.399	0.00488	0.193	0.802
Pavicrete - MR 40 - 3 días	81.6	1.17	81.6	836	0.481	0.00542	0.26	0.619
Pavicrete - MR 40 - 7 días	77.6	1.17	77.6	782	0.46	0.00525	0.251	0.612
Pavicrete - MR 42 - 28 días	69.3	1.17	69.3	670	0.414	0.00488	0.23	0.589
Pavicrete - MR 42 - 3 días	83.5	1.17	83.5	873	0.481	0.00526	0.242	0.588
Pervia - MR 26 - 28 días	82.1	1.17	82.1	817	0.434	0.00468	0.26	0.351
Pervia - MR 30 - 28 días	83.6	1.17	83.6	838	0.443	0.00475	0.263	0.355
Pesado - 300 - 28 días	90.3	1.17	90.1	833	0.759	0.00904	0.408	0.756
Reducrack - 200 - 28 días	56.4	1.17	56.3	509	0.353	0.00437	0.189	0.594
Reducrack - 250 - 28 días	60.6	1.17	60.5	562	0.374	0.00455	0.201	0.6
Reducrack - MR 40 - 28 días, trab ext 3 horas	69.6	1.17	69.6	679	0.416	0.00484	0.224	0.595
Reducrack Sin malla - 200 - 28 días	58.3	1.17	58.2	522	0.359	0.00445	0.213	0.588
Relleno fluido - 100 - 28 días	51.2	1.17	51.2	534	0.332	0.00389	0.122	0.619
Revenimiento total - 250 - 28 días	64.4	1.17	64.4	611	0.394	0.00469	0.223	0.614
Trabajabilidad extendida - 100 - 28 días, trab ext 3 horas	48.9	1.17	48.9	408	0.311	0.00402	0.17	0.583



Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	52.6	1.17	52.6	458	0.331	0.00418	0.181	0.593
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	55.7	1.17	55.7	497	0.349	0.00435	0.19	0.59
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	67.4	1.17	67.3	654	0.41	0.00482	0.223	0.623
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	62.2	1.17	62.1	584	0.383	0.00461	0.209	0.608
Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	70.6	1.17	70.5	700	0.43	0.00499	0.232	0.634
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	72.1	1.17	72.1	722	0.438	0.00504	0.236	0.642
Vertua Materiales Reciclados - 050 - 28 días	45.9	1.17	45.9	465	0.295	0.00349	0.109	0.584

## 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	2.83	65	0.000151	0.000483	0.0273	6.06E-05
Acelerado - 250 - 3 días	3.02	69.3	0.000161	0.000519	0.0294	6.48E-05
Acelerado - 300 - 3 días	3.38	77.7	0.00018	0.00059	0.0336	7.31E-05
Acelerado - MR 40 - 3 días, trab ext 3 horas	3.17	72.2	0.000172	0.000565	0.0326	6.72E-05
Alta resistencia - 500 - 28 días	4.53	105	0.000237	0.000791	0.0447	9.99E-05
Antibacteriano - 200 - 28 días	2.45	56.1	0.000132	0.00041	0.023	5.19E-05
Antideslave - 350 - 28 días	3.71	84.8	0.000191	0.000626	0.0356	0.00011
Antihongo antialga - 200 - 28 días	2.78	64.9	0.000146	0.000446	0.024	6.00E-05
Antitermita - 200 - 28 días	2.45	56.1	0.000132	0.00041	0.023	5.19E-05
Aparentia - 250 - 28 días	4.37	107	0.000214	0.000623	0.0294	9.97E-05
Autocompactable - 250 - 28 días	3.11	71.8	0.000164	0.000527	0.0297	6.73E-05
Baja contracción - MR 42 - 28 días	3.01	69	0.000161	0.000511	0.0285	6.41E-05





<b>Contracción compensada - MR 42 - 28 días</b>	3.1	70.7	0.000163	0.00052	0.0293	9.98E-05
<b>Convencional - 100 - 28 días</b>	1.96	44.7	0.000104	0.000312	0.0173	4.12E-05
<b>Convencional - 150 - 28 días</b>	2.07	47.4	0.00011	0.000335	0.0187	4.38E-05
<b>Convencional - 200 - 14 días</b>	2.42	55.6	0.000128	0.000403	0.0228	5.18E-05
<b>Convencional - 200 - 28 días</b>	2.24	51.4	0.00012	0.000368	0.0206	4.77E-05
<b>Convencional - 200 - 7 días</b>	2.57	59.2	0.000137	0.000433	0.0244	5.49E-05
<b>Convencional - 250 - 14 días</b>	2.63	60.5	0.00014	0.000445	0.0252	5.65E-05
<b>Convencional - 250 - 28 días</b>	2.46	56.4	0.000131	0.00041	0.0231	5.24E-05
<b>Convencional - 250 - 7 días</b>	2.74	62.8	0.000146	0.000465	0.0262	5.86E-05
<b>Convencional - 300 - 14 días</b>	2.97	68.3	0.000158	0.00051	0.029	6.39E-05
<b>Convencional - 300 - 28 días</b>	2.77	63.5	0.000148	0.00047	0.0266	5.92E-05
<b>Convencional - 350 - 7 días</b>	3.35	77	0.000179	0.000584	0.0331	7.19E-05
<b>Duramax - 250 - 28 días</b>	3.42	79.5	0.000178	0.000571	0.0316	7.50E-05
<b>Duramax Autosellante - 250 - 28 días</b>	3.95	93.7	0.000201	0.000629	0.0333	8.82E-05
<b>Estructural - 250 - 28 días</b>	2.52	57.8	0.000134	0.000422	0.0238	5.38E-05
<b>Estructural - 300 - 28 días</b>	2.88	66.2	0.000153	0.000492	0.028	6.19E-05
<b>Grout premezclado - 350 - 28 días</b>	4.76	109	0.000229	0.000799	0.0473	0.000192
<b>Hidratium - MR 42 - 28 días</b>	2.82	64.4	0.000152	0.000485	0.0275	6.04E-05
<b>Impercem - 200 - 28 días</b>	2.83	66.4	0.000145	0.000443	0.0237	6.26E-05
<b>Lanzado - 250 - 28 días</b>	3.37	77.9	0.000171	0.000547	0.0305	9.83E-05
<b>Ligero - 150 - 28 días</b>	3.73	86	0.000198	0.000695	0.0414	8.18E-05
<b>Materiales Reciclados Llanta - 200 - 28 días</b>	2.32	53.1	0.000123	0.000382	0.0214	4.95E-05
<b>Materiales Reciclados Pet - 200 - 28 días</b>	2.32	53.1	0.000123	0.000382	0.0214	4.94E-05
<b>Materiales Reciclados Plástico de difícil reciclado - 200 - 28 días</b>	2.38	54.3	0.000126	0.000387	0.0217	5.17E-05
<b>Mortero - 150 - 28 días</b>	2.14	49.7	0.000101	0.000346	0.0211	5.05E-05
<b>Mortero estabilizado - 150 - 28 días</b>	2.27	53.3	0.000107	0.000362	0.0215	5.39E-05
<b>Pavicrete - MR 40 - 3 días</b>	3.23	73.6	0.000173	0.000567	0.0324	6.93E-05



Pavicrete - MR 40 - 7 días	3.09	70.5	0.000166	0.000539	0.0307	6.63E-05
Pavicrete - MR 42 - 28 días	2.79	63.7	0.00015	0.000479	0.0272	5.97E-05
Pavicrete - MR 42 - 3 días	3.21	73.4	0.000175	0.000577	0.0333	6.79E-05
Pervia - MR 26 - 28 días	3.23	72.7	0.000182	0.000582	0.0326	6.64E-05
Pervia - MR 30 - 28 días	3.28	73.9	0.000185	0.000592	0.0332	6.76E-05
Pesado - 300 - 28 días	4.46	98.3	0.00022	0.00067	0.037	0.000111
Reducrack - 200 - 28 días	2.33	53.4	0.000124	0.000385	0.0216	4.97E-05
Reducrack - 250 - 28 días	2.5	57.3	0.000133	0.000417	0.0234	5.32E-05
Reducrack - MR 40 - 28 días, trab ext 3 horas	2.82	64.7	0.000152	0.000484	0.0273	5.98E-05
Reducrack Sin malla - 200 - 28 días	2.46	56.4	0.000131	0.000403	0.0224	5.28E-05
Relleno fluido - 100 - 28 días	1.72	39.7	8.45E-05	0.000307	0.0198	3.96E-05
Revenimiento total - 250 - 28 días	2.71	62.6	0.000144	0.00045	0.025	5.80E-05
Trabajabilidad extendida - 100 - 28 días, trab ext 3 horas	2.06	47.5	0.00011	0.000332	0.0185	4.37E-05
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	2.2	50.8	0.000117	0.000359	0.02	4.68E-05
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	2.33	53.4	0.000124	0.000382	0.0213	4.96E-05
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	2.76	63.7	0.000147	0.000467	0.0263	5.92E-05
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	2.57	59.2	0.000137	0.00043	0.0241	5.49E-05
Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	2.88	66.3	0.000153	0.000489	0.0276	6.20E-05
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	2.94	67.7	0.000156	5.00E-04	0.0283	6.33E-05
Vertua Materiales Reciclados - 050 - 28 días	1.52	35.6	7.45E-05	0.000269	0.0175	3.52E-05



## 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 11: **A4 Diesel Emissions**

PLANT NAME	L DIESEL NOT INCLUDING A3	GWP FACTOR kgCO <sub>2</sub> / LITER	Total kg CO <sub>2</sub> eq (A4)	Total kg CO <sub>2</sub> eq/m <sup>3</sup> (A4)
MX-PD0617 Morelia	100,348.00	2.596	260,503.41	8.10

### CEMEX Calculated Simplified CO<sub>2</sub> 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 (CO<sub>2</sub>) 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 CO<sub>2</sub> 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 CO<sub>2</sub> footprint calculations. It is a starting point to monitor CO<sub>2</sub> emissions in concrete while transitioning to a more comprehensive indicator based on the Life Cycle Assessment, such as the CO<sub>2</sub> footprint or the Global Warming Potential indicator.

Table 12: **Simplified CO<sub>2</sub>**

NEW ID	Net (kgCO <sub>2</sub> /m <sup>3</sup> )	Gross (kgCO <sub>2</sub> /m <sup>3</sup> )
Acelerado - 200 - 3 días	187	218
Acelerado - 250 - 3 días	205	239
Acelerado - 300 - 3 días	242	282
Acelerado - MR 40 - 3 días, trab ext 3 horas	236	275
Alta resistencia - 500 - 28 días	332	388
Antibacteriano - 200 - 28 días	149	173
Antideslave - 350 - 28 días	254	296
Antihongo antialga - 200 - 28 días	149	173
Antitermita - 200 - 28 días	149	173
Aparentia - 250 - 28 días	154	180



Autocompactable - 250 - 28 días	205	240
Baja contracción - MR 42 - 28 días	193	226
Contracción compensada - MR 42 - 28 días	199	233
Convencional - 100 - 28 días	101	117
Convencional - 150 - 28 días	112	131
Convencional - 200 - 14 días	149	174
Convencional - 200 - 28 días	129	151
Convencional - 200 - 7 días	162	189
Convencional - 250 - 14 días	170	198
Convencional - 250 - 28 días	150	175
Convencional - 250 - 7 días	177	207
Convencional - 300 - 14 días	203	237
Convencional - 300 - 28 días	180	210
Convencional - 350 - 7 días	236	276
Duramax - 250 - 28 días	218	254
Duramax Autosellante - 250 - 28 días	218	254
Estructural - 250 - 28 días	156	182
Estructural - 300 - 28 días	194	226
Grout premezclado - 350 - 28 días	363	423
Hidratium - MR 42 - 28 días	189	221
Impercem - 200 - 28 días	146	170
Lanzado - 250 - 28 días	205	240
Ligero - 150 - 28 días	329	384
Materiales Recicladados Llanta - 200 - 28 días	136	159
Materiales Recicladados Pet - 200 - 28 días	136	159
Materiales Recicladados Plástico de difícil reciclado - 200 - 28 días	136	159
Mortero - 150 - 28 días	151	176
Mortero estabilizado - 150 - 28 días	151	176
Pavicrete - MR 40 - 3 días	233	271
Pavicrete - MR 40 - 7 días	218	254
Pavicrete - MR 42 - 28 días	186	217
Pavicrete - MR 42 - 3 días	244	284
Pervia - MR 26 - 28 días	230	268
Pervia - MR 30 - 28 días	236	275
Pesado - 300 - 28 días	224	261
Reducrack - 200 - 28 días	138	161
Reducrack - 250 - 28 días	153	178
Reducrack - MR 40 - 28 días, trab ext 3 horas	186	216
Reducrack Sin malla - 200 - 28 días	142	166
Relleno fluido - 100 - 28 días	153	178
Revenimiento total - 250 - 28 días	163	190
Trabajabilidad extendida - 100 - 28 días, trab ext 3 horas	110	129
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	124	145
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	134	157
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	177	207
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	158	184



Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	189	221
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	195	228
Vertua Materiales Reciclados - 050 - 28 días	133	155

## REFERENCES

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- ASTM C150/C150M Standard Specification for Portland Cement // NMX-C-414-ONNCCE-2017 Construction Industry - Hydraulic Cements - Specifications and Test Methods
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- 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
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- 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

