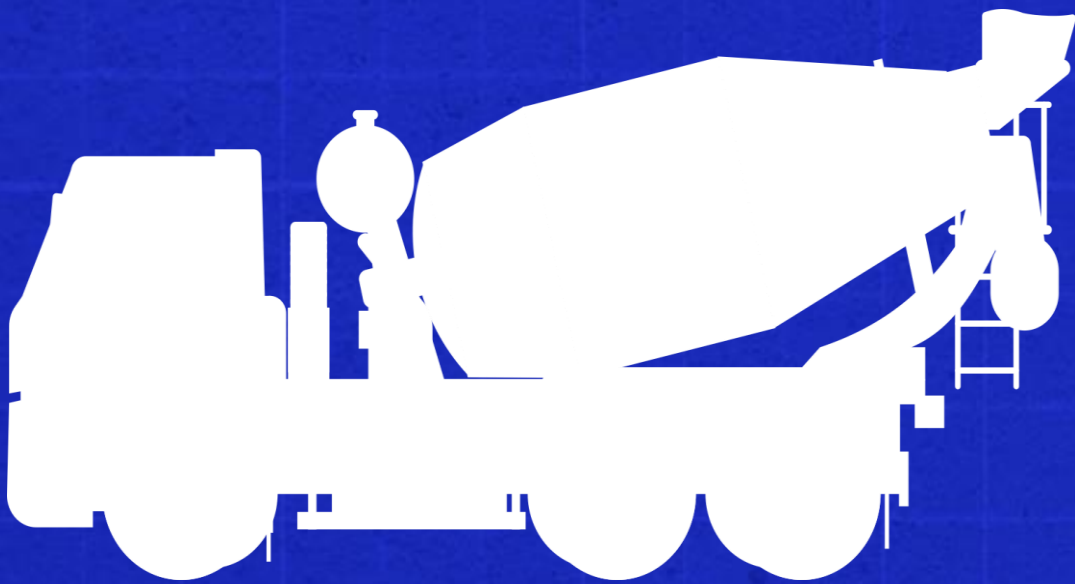




# ENVIRONMENTAL PRODUCT DECLARATION



**Environmental Product Declaration for ready mix concrete products produced by CEMEX México at their MX-PD0101 OAXACA facility in Oaxaca, 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.
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	Monterrey, Nuevo León.
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<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>	11 October 2024
<b>Period of Validity:</b>	5 years; valid until 11 October 2029
<b>EPD Number:</b>	2358509d-7924-4b43-bf9b-ba5429f757f3



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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 88 concrete mixes manufactured at the CEMEX MX-PD0101 OAXACA concrete facility at Carretera Cristóbal Colón Km. 243, Col. La Joya Hacienda Blanca, Santa Maria Atzompa, 68258, 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
22	Convencional - 100 - 28 días	9.81 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	9.81	28	0.95	Clásico
23	Convencional - 150 - 14 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	14	0.70	Clásico
24	Convencional - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.76	Clásico
25	Convencional - 150 - 7 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	7	0.63	Clásico
53	Mortero - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.68	Clásico
54	Mortero estabilizado - 150 - 28 días	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.55	
69	Relleno fluido - 50 - 28 días	4.90 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	4.90	28	0.94	Clásico



70	Relleno fluido - 80 - 28 días	7.85 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	7.85	28	0.80	Clásico
72	Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.73	Clásico
73	Trabajabilidad extendida - 150 - 28 días, trab ext 5 horas	14.71 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	14.71	28	0.67	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
1	Acelerado - 200 - 3 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	3	0.44	Clásico
2	Acelerado - 200 - 3 días, trab ext 3 horas	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	3	0.49	Clásico
26	Convencional - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.65	Clásico
46	Hidratium - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.61	Clásico
47	Impercem - 200 - 28 días	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.63	Clásico
74	Trabajabilidad extendida - 200 - 28 días,	19.61 MPa 28d strength	Ready Mix Concrete	19.61	28	0.67	Clásico



	trab ext 3 horas	Ready Mix Concrete					
75	Trabajabilidad extendida - 200 - 28 días, trab ext 5 horas	19.61 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	19.61	28	0.67	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
3	Acelerado - 250 - 3 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.42	Clásico
4	Acelerado - 250 - 3 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.44	Clásico
5	Acelerado - 250 - 7 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.52	Clásico
12	Antibacteriano - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.68	Clásico
13	Antideslave - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.51	
14	Antihongo antialga - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.68	Clásico
15	Antitermita - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.68	Clásico



<b>16</b>	Aparentia - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.55	Clásico
<b>17</b>	Aparentia - 250 - 3 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.48	Clásico
<b>19</b>	Autocompactable - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.44	Clásico
<b>27</b>	Convencional - 250 - 14 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	14	0.53	Clásico
<b>28</b>	Convencional - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.59	Clásico
<b>29</b>	Convencional - 250 - 7 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.51	Clásico
<b>30</b>	Convencional - 250 - 7 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.49	Clásico
<b>35</b>	Duramax - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.55	Clásico
<b>37</b>	Duramax Autosellante - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.50	Clásico
<b>38</b>	Estructural - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.65	Clásico







39	Estructural - 250 - 3 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.46	Clásico
40	Estructural - 250 - 7 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.49	Clásico
48	Lanzado - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.47	Clásico
49	Ligero - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.48	
50	Materiales Reciclados Llanta - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.63	Clásico
51	Materiales Reciclados Pet - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.63	Clásico
52	Materiales Reciclados Plástico de difícil reciclado - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.63	Clásico
55	Pavicrete - MR 38 - 28 días	24.58 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.58	28	0.53	Clásico
64	Pervia - MR 36 - 28 días	22.06 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	22.06	28	0.29	Clásico
71	Revenimiento total - 250 - 7 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.52	Clásico



<b>76</b>	Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.58	Clásico
<b>77</b>	Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.61	Clásico
<b>78</b>	Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.61	Clásico
<b>79</b>	Trabajabilidad extendida - 250 - 28 días, trab ext 5 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.60	Clásico
<b>80</b>	Trabajabilidad extendida - 250 - 3 días, trab ext 5 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	3	0.45	Clásico
<b>81</b>	Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.47	Clásico
<b>82</b>	Trabajabilidad extendida - 250 - 7 días, trab ext 5 horas	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	7	0.47	Clásico
<b>88</b>	Vertua Materiales Reciclados - 250 - 28 días	24.52 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	24.52	28	0.58	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
6	Acelerado - 300 - 3 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	3	0.39	Clásico
7	Acelerado - MR 40 - 80% a 3 días	27.24 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	27.24	3	0.44	Clásico
31	Convencional - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.54	Clásico
32	Convencional - 300 - 7 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	7	0.48	Clásico
33	Convencional - 300 - 7 días, trab ext 5 horas	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	7	0.46	Clásico
36	Duramax - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.55	Clásico
41	Estructural - 300 - 14 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	14	0.50	Clásico
42	Estructural - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.60	Clásico
56	Pavicrete - MR 40 - 28 días	27.24 MPa 28d strength	Ready Mix Concrete	27.24	28	0.49	Clásico



		Ready Mix Concrete					
65	Pesado - 300 - 28 días	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.57	Clásico
83	Trabajabilidad extendida - 280 - 28 días, trab ext 5 horas	27.46 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	27.46	28	0.54	Clásico
84	Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	28	0.55	Clásico
85	Trabajabilidad extendida - 300 - 7 días, trab ext 3 horas	29.42 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.42	7	0.48	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
8	Acelerado - MR 42 - 1 día	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	1	0.27	
9	Acelerado - MR 45 - 7 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	7	0.44	Clásico
18	Aparentia - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.55	Clásico
20	Baja contracción - MR 45 - 7 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	7	0.39	Clásico



<b>21</b>	Contracción compensada - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.53	Clásico
<b>34</b>	Convencional - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.49	Clásico
<b>43</b>	Estructural - 350 - 14 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	14	0.44	Clásico
<b>44</b>	Estructural - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.52	Clásico
<b>45</b>	Grout premezclado - 350 - 28 días	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.42	
<b>57</b>	Pavicrete - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.52	Clásico
<b>58</b>	Pavicrete - MR 42 - 28 días, trab ext 3 horas	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.47	Clásico
<b>59</b>	Pavicrete - MR 42 - 28 días, trab ext 5 horas	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.46	Clásico
<b>60</b>	Pavicrete - MR 42 - 7 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	7	0.40	Clásico
<b>61</b>	Pavicrete - MR 45 - 1 día	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	1	0.30	

62	Pavicrete - MR 45 - 28 días, trab ext 3 horas	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	28	0.45	Clásico
63	Pavicrete - MR 45 - 3 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	3	0.38	Clásico
66	Reducrack - MR 45 - 3 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	3	0.36	Clásico
67	Reducrack - MR 45 - 7 días	34.48 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.48	7	0.38	Clásico
68	Reducrack Sin malla - MR 42 - 28 días	30.03 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	30.03	28	0.54	Clásico
86	Trabajabilidad extendida - 350 - 14 días, trab ext 3 horas	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	14	0.45	Clásico
87	Trabajabilidad extendida - 350 - 28 días, trab ext 3 horas	34.32 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.32	28	0.50	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	H <sub>2</sub> O to cement ratio	Level of vertua lower carbon
11	Alta resistencia - MR 48 - 14 días	39.23 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	39.23	14	0.40	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
10	Alta resistencia - 450 - 28 días	44.13 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	44.13	28	0.42	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 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.

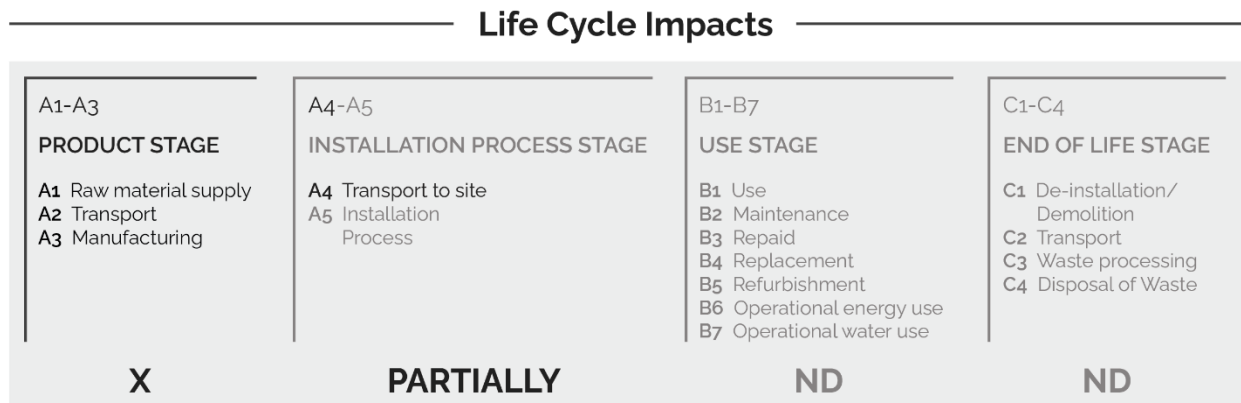


Figure 1: General life cycle phases for consideration in a construction works system





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.

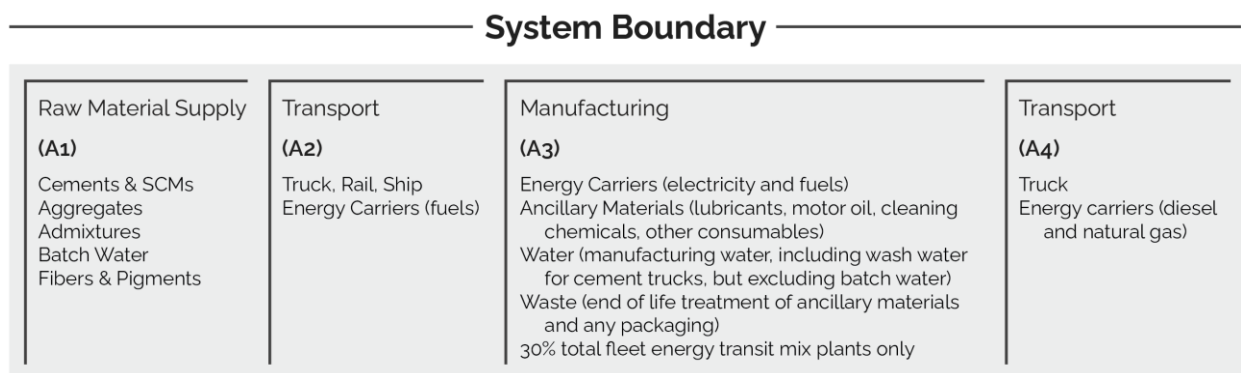


Figure 2: **General system inputs considered in the product system and categorized by modules in scope**

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-PD0101 OAXACA 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. 33.4% is the wind electricity.

**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 g: 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
<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>Barite Aggregate</b>	basalt quarry operation/basalt/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Queretaro	2024	2	3	1	3	3
<b>River gravel</b>	limestone quarry operation/limestone, unprocessed/RoW/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Oaxaca	2024	2	3	1	3	3
<b>Water</b>	tap water production, conventional treatment/tap water/RoW/kg	ecoinvent v3.10 in 2024	Oaxaca	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>Perlita</b>	polystyrene production, general purpose/polystyrene, general purpose/RoW/kg	ecoinvent v3.10 in 2024	Puebla	2024	2	3	1	3	3
<b>Cement</b>	Gris CPC40RS	Progam Operator: Labeling	Puebla	13 April 2023	3	3	3	3	3





		Sustainability - EPD ID: 5cbc65d0- 1881-4d96- 9417- 07c5e8dc1cd 2							
<b>RIVER 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	Oaxaca	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 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 <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	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
21	inventory indicators ISO21930: exported energy - electricity	EEel	MJ
22	inventory indicators ISO21930: exported energy - heat	EEheat	MJ

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 11: **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	GWP <sub>100</sub>	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
<b>Acelerado - 200 - 3 días</b>	366	2.94e-06	0.408	0.239	8.11	2340
<b>Acelerado - 200 - 3 días, trab ext 3 horas</b>	370	2.91e-06	0.403	0.225	7.97	2320
<b>Acelerado - 250 - 3 días</b>	394	3.12e-06	0.426	0.255	8.39	2480
<b>Acelerado - 250 - 3 días, trab ext 3 horas</b>	405	3.2e-06	0.432	0.272	8.43	2530
<b>Acelerado - 250 - 7 días</b>	411	4.62e-06	0.554	0.926	10	3270
<b>Acelerado - 300 - 3 días</b>	435	3.39e-06	0.453	0.278	8.78	2680
<b>Acelerado - MR 40 - 80% a 3 días</b>	418	3.25e-06	0.442	0.258	8.58	2580
<b>Acelerado - MR 42 - 1 día</b>	619	4.48e-06	0.574	0.329	10.7	3550
<b>Acelerado - MR 45 - 7 días</b>	434	3.32e-06	0.448	0.254	8.67	2640
<b>Alta resistencia - 450 - 28 días</b>	457	3.65e-06	0.478	0.349	9.12	2850
<b>Alta resistencia - MR 48 - 14 días</b>	461	3.49e-06	0.466	0.267	8.97	2780
<b>Antibacteriano - 250 - 28 días</b>	304	2.51e-06	0.361	0.203	7.32	2010



Antideslave - 250 - 28 días	374	3.08e-06	0.425	0.268	8.37	2450
Antihongo antialga - 250 - 28 días	308	2.67e-06	0.375	0.271	7.51	2100
Antitermita - 250 - 28 días	304	2.51e-06	0.361	0.203	7.32	2010
Aparentia - 250 - 28 días	372	4.24e-06	0.514	0.848	9.42	3010
Aparentia - 250 - 3 días	419	3.24e-06	0.439	0.251	8.6	2580
Aparentia - 350 - 28 días	473	6.35e-06	0.71	1.6	12.1	4270
Autocompactable - 250 - 28 días	397	3.13e-06	0.426	0.251	8.41	2490
Baja contracción - MR 45 - 7 días	448	3.54e-06	0.469	0.324	8.99	2780
Contracción compensada - MR 42 - 28 días	371	3.04e-06	0.459	0.272	8.93	2410
Convencional - 100 - 28 días	214	1.93e-06	0.3	0.152	6.42	1560
Convencional - 150 - 14 días	267	2.28e-06	0.337	0.182	7	1830
Convencional - 150 - 28 días	239	2.1e-06	0.32	0.167	6.76	1700
Convencional - 150 - 7 días	290	2.43e-06	0.353	0.195	7.25	1950
Convencional - 200 - 28 días	269	2.3e-06	0.341	0.184	7.08	1850
Convencional - 250 - 14 días	319	2.62e-06	0.374	0.212	7.59	2100
Convencional - 250 - 28 días	297	2.48e-06	0.359	0.2	7.36	1980
Convencional - 250 - 7 días	350	2.83e-06	0.395	0.23	7.89	2250
Convencional - 250 - 7 días, trab ext 3 horas	386	3.05e-06	0.417	0.25	8.2	2420
Convencional - 300 - 28 días	338	2.74e-06	0.385	0.223	7.73	2190
Convencional - 300 - 7 días	393	3.1e-06	0.421	0.254	8.25	2460
Convencional - 300 - 7 días, trab ext 5 horas	400	3.23e-06	0.435	0.292	8.5	2540
Convencional - 350 - 28 días	379	3.01e-06	0.413	0.246	8.14	2390
Duramax - 250 - 28 días	347	2.79e-06	0.386	0.227	7.7	2220
Duramax - 300 - 28 días	366	2.91e-06	0.402	0.228	8.02	2320
Duramax Autosellante - 250 - 28 días	374	3.29e-06	0.435	0.392	8.41	2530
Estructural - 250 - 28 días	298	2.48e-06	0.358	0.196	7.33	1990
Estructural - 250 - 3 días	403	3.11e-06	0.425	0.232	8.36	2480
Estructural - 250 - 7 días	359	2.88e-06	0.401	0.235	7.98	2300
Estructural - 300 - 14 días	382	3.03e-06	0.413	0.248	8.14	2400



Estructural - 300 - 28 días	344	2.71e-06	0.382	0.198	7.66	2180
Estructural - 350 - 14 días	410	3.22e-06	0.434	0.264	8.47	2550
Estructural - 350 - 28 días	369	2.93e-06	0.405	0.235	8.03	2340
Grout premezclado - 350 - 28 días	606	4.73e-06	0.59	0.427	10.9	3720
Hidratium - 200 - 28 días	282	2.39e-06	0.351	0.193	7.19	1910
Impercem - 200 - 28 días	325	2.76e-06	0.388	0.267	7.69	2170
Lanzado - 250 - 28 días	454	3.54e-06	0.464	0.308	8.93	2790
Ligero - 250 - 28 días	419	3.1e-06	0.459	0.281	8.35	2850
Materiales Reciclados Llanta - 250 - 28 días	322	2.63e-06	0.374	0.215	7.52	2100
Materiales Reciclados Pet - 250 - 28 días	321	2.63e-06	0.374	0.215	7.51	2100
Materiales Reciclados Plástico de difícil reciclado - 250 - 28 días	324	2.67e-06	0.379	0.217	7.62	2140
Mortero - 150 - 28 días	330	2.75e-06	0.378	0.234	7.75	2180
Mortero estabilizado - 150 - 28 días	413	3.35e-06	0.436	0.319	8.57	2620
Pavicrete - MR 38 - 28 días	365	2.9e-06	0.403	0.233	7.94	2310
Pavicrete - MR 40 - 28 días	374	2.95e-06	0.411	0.229	8.12	2360
Pavicrete - MR 42 - 28 días	381	2.98e-06	0.412	0.227	8.1	2380
Pavicrete - MR 42 - 28 días, trab ext 3 horas	386	3.1e-06	0.423	0.273	8.24	2450
Pavicrete - MR 42 - 28 días, trab ext 5 horas	401	3.12e-06	0.429	0.243	8.4	2490
Pavicrete - MR 42 - 7 días	444	3.39e-06	0.456	0.259	8.83	2700
Pavicrete - MR 45 - 1 día	600	4.42e-06	0.562	0.356	10.4	3480
Pavicrete - MR 45 - 28 días, trab ext 3 horas	413	3.16e-06	0.434	0.231	8.48	2530
Pavicrete - MR 45 - 3 días	495	3.71e-06	0.486	0.29	9.19	2940
Pervia - MR 36 - 28 días	448	3.47e-06	0.451	0.328	8.33	2710
Pesado - 300 - 28 días	463	4.42e-06	0.632	0.371	12.5	3640
Reducrack - MR 45 - 3 días	535	4.02e-06	0.522	0.334	9.73	3170
Reducrack - MR 45 - 7 días	496	3.73e-06	0.493	0.294	9.3	2950
Reducrack Sin malla - MR 42 - 28 días	357	2.87e-06	0.401	0.24	7.87	2280
Relleno fluido - 50 - 28 días	247	2.04e-06	0.286	0.154	5.96	1630





Relleno fluido - 80 - 28 días	281	2.28e-06	0.315	0.175	6.48	1820
Revenimiento total - 250 - 7 días	368	2.91e-06	0.402	0.229	7.99	2320
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	269	2.3e-06	0.337	0.19	6.95	1840
Trabajabilidad extendida - 150 - 28 días, trab ext 5 horas	280	2.36e-06	0.345	0.193	7.08	1890
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	288	2.42e-06	0.351	0.201	7.19	1940
Trabajabilidad extendida - 200 - 28 días, trab ext 5 horas	291	2.49e-06	0.358	0.219	7.31	1980
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	342	2.78e-06	0.387	0.234	7.71	2210
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	317	2.62e-06	0.371	0.219	7.49	2090
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	318	2.59e-06	0.368	0.207	7.43	2070
Trabajabilidad extendida - 250 - 28 días, trab ext 5 horas	323	2.7e-06	0.38	0.24	7.65	2140
Trabajabilidad extendida - 250 - 3 días, trab ext 5 horas	398	3.22e-06	0.435	0.291	8.5	2530
Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	392	3.14e-06	0.426	0.273	8.33	2480
Trabajabilidad extendida - 250 - 7 días, trab ext 5 horas	393	3.11e-06	0.421	0.259	8.26	2460
Trabajabilidad extendida - 280 - 28 días, trab ext 5 horas	351	2.89e-06	0.4	0.254	7.99	2290
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	350	2.84e-06	0.393	0.239	7.83	2250
Trabajabilidad extendida - 300 - 7 días, trab ext 3 horas	408	3.2e-06	0.432	0.263	8.44	2540
Trabajabilidad extendida - 350 - 14 días, trab ext 3 horas	433	3.38e-06	0.448	0.288	8.64	2670
Trabajabilidad extendida - 350 - 28 días, trab ext 3 horas	392	3.11e-06	0.422	0.264	8.25	2460



Vertua Materiales Reciclados - 250 - 28 días	300	2.44e-06	0.336	0.213	6.63	1930
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## 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	73	1.45	73	791	0.659	0.00768	0.326	0.671
Acelerado - 200 - 3 días, trab ext 3 horas	73.3	1.45	73.3	800	0.65	0.00751	0.317	0.667
Acelerado - 250 - 3 días	78.2	1.46	78.2	862	0.685	0.00787	0.341	0.684
Acelerado - 250 - 3 días, trab ext 3 horas	80.6	1.47	80.6	897	0.69	0.00784	0.349	0.705
Acelerado - 250 - 7 días	97.5	1.45	97.2	1080	0.82	0.00907	0.666	1.08
Acelerado - 300 - 3 días	86.1	1.48	86.1	971	0.721	0.0081	0.361	0.71
Acelerado - MR 40 - 80% a 3 días	82.6	1.48	82.6	924	0.702	0.00795	0.348	0.673
Acelerado - MR 42 - 1 día	119	1.58	120	1430	0.89	0.00939	0.436	0.721
Acelerado - MR 45 - 7 días	85.3	1.48	85.3	964	0.71	0.00797	0.349	0.68
Alta resistencia - 450 - 28 días	91.7	1.49	91.7	1040	0.751	0.00833	0.401	0.766
Alta resistencia - MR 48 - 14 días	90.3	1.5	90.3	1030	0.738	0.0082	0.363	0.691
Antibacteriano - 250 - 28 días	61.2	1.42	61.1	635	0.59	0.00706	0.289	0.662
Antideslave - 250 - 28 días	75.4	1.45	75.4	802	0.699	0.00842	0.373	0.726
Antihongo antialga - 250 - 28 días	63.5	1.42	63.5	663	0.605	0.0072	0.323	0.699
Antitermita - 250 - 28 días	61.2	1.42	61.1	635	0.59	0.00706	0.289	0.662
Aparentia - 250 - 28 días	88.7	1.43	88.5	968	0.77	0.00865	0.617	1.04
Aparentia - 250 - 3 días	82.5	1.48	82.5	921	0.706	0.00802	0.345	0.742
Aparentia - 350 - 28 días	124	1.46	124	1400	0.996	0.0106	1.01	1.46
Autocompactable - 250 - 28 días	78.8	1.46	78.8	870	0.688	0.00789	0.339	0.722
Baja contracción - MR 45 - 7 días	89.3	1.49	89.3	1010	0.738	0.00823	0.387	0.711



<b>Contracción compensada - MR 42 - 28 días</b>	75.1	1.45	75.1	804	0.678	0.00818	0.374	0.706
<b>Convencional - 100 - 28 días</b>	44.3	1.37	44.3	404	0.509	0.0065	0.242	0.63
<b>Convencional - 150 - 14 días</b>	54.2	1.4	54.2	538	0.56	0.0069	0.271	0.648
<b>Convencional - 150 - 28 días</b>	49	1.38	49	466	0.538	0.00676	0.258	0.632
<b>Convencional - 150 - 7 días</b>	58.5	1.41	58.5	596	0.584	0.00709	0.284	0.663
<b>Convencional - 200 - 28 días</b>	54.7	1.4	54.6	542	0.567	0.00699	0.274	0.642
<b>Convencional - 250 - 14 días</b>	64	1.42	64	669	0.613	0.00733	0.3	0.66
<b>Convencional - 250 - 28 días</b>	59.8	1.41	59.8	613	0.592	0.00716	0.288	0.653
<b>Convencional - 250 - 7 días</b>	70	1.44	70	752	0.641	0.00751	0.316	0.682
<b>Convencional - 250 - 7 días, trab ext 3 horas</b>	76.8	1.46	76.8	847	0.669	0.00768	0.333	0.704
<b>Convencional - 300 - 28 días</b>	67.7	1.43	67.7	721	0.627	0.00739	0.309	0.681
<b>Convencional - 300 - 7 días</b>	78	1.46	78	864	0.675	0.00771	0.336	0.703
<b>Convencional - 300 - 7 días, trab ext 5 horas</b>	80.3	1.46	80.2	889	0.695	0.00793	0.359	0.724
<b>Convencional - 350 - 28 días</b>	75.4	1.45	75.4	828	0.664	0.00764	0.33	0.691
<b>Duramax - 250 - 28 días</b>	69.3	1.44	69.3	748	0.627	0.00731	0.31	0.684
<b>Duramax - 300 - 28 días</b>	72.7	1.45	72.7	789	0.653	0.0076	0.319	0.716
<b>Duramax Autosellante - 250 - 28 días</b>	78.2	1.45	78.1	856	0.686	0.00785	0.399	0.765
<b>Estructural - 250 - 28 días</b>	60.1	1.41	60	617	0.591	0.00714	0.286	0.673
<b>Estructural - 250 - 3 días</b>	79.2	1.47	79.3	880	0.684	0.0078	0.33	0.693
<b>Estructural - 250 - 7 días</b>	71.7	1.44	71.7	775	0.649	0.00757	0.321	0.684
<b>Estructural - 300 - 14 días</b>	76	1.46	76	837	0.665	0.00763	0.331	0.7
<b>Estructural - 300 - 28 días</b>	68.2	1.44	68.2	732	0.622	0.0073	0.296	0.686
<b>Estructural - 350 - 14 días</b>	81.4	1.47	81.4	908	0.694	0.00787	0.347	0.704
<b>Estructural - 350 - 28 días</b>	73.4	1.45	73.4	800	0.654	0.00758	0.322	0.698



<b>Grout premezclado - 350 - 28 días</b>	121	1.56	121	1380	0.977	0.0114	0.572	1.04
<b>Hidratium - 200 - 28 días</b>	57.5	1.4	57.5	576	0.578	0.00709	0.299	0.644
<b>Impercem - 200 - 28 días</b>	66.8	1.43	66.8	701	0.623	0.00739	0.345	0.709
<b>Lanzado - 250 - 28 días</b>	90.1	1.49	90.1	1030	0.737	0.00818	0.377	0.79
<b>Ligero - 250 - 28 días</b>	81.6	1.47	81.6	1120	0.629	0.00686	0.327	0.926
<b>Materiales Reciclados Llanta - 250 - 28 días</b>	64.6	1.43	64.6	680	0.609	0.00722	0.301	0.66
<b>Materiales Reciclados Pet - 250 - 28 días</b>	64.6	1.43	64.6	680	0.608	0.0072	0.3	0.66
<b>Materiales Reciclados Plástico de difícil reciclado - 250 - 28 días</b>	65.1	1.43	65.1	680	0.625	0.00742	0.309	0.665
<b>Mortero - 150 - 28 días</b>	66.7	1.43	66.7	703	0.635	0.00755	0.311	0.86
<b>Mortero estabilizado - 150 - 28 días</b>	83.2	1.47	83.2	930	0.709	0.00803	0.37	0.905
<b>Pavicrete - MR 38 - 28 días</b>	72.6	1.45	72.6	791	0.645	0.00746	0.32	0.647
<b>Pavicrete - MR 40 - 28 días</b>	74.2	1.45	74.2	809	0.66	0.00764	0.323	0.659
<b>Pavicrete - MR 42 - 28 días</b>	75.4	1.46	75.4	829	0.659	0.00757	0.321	0.661
<b>Pavicrete - MR 42 - 28 días, trab ext 3 horas</b>	77.3	1.46	77.3	852	0.671	0.00768	0.345	0.666
<b>Pavicrete - MR 42 - 28 días, trab ext 5 horas</b>	79.1	1.47	79.1	877	0.686	0.00784	0.337	0.672
<b>Pavicrete - MR 42 - 7 días</b>	87.1	1.49	87.1	986	0.725	0.00812	0.355	0.68
<b>Pavicrete - MR 45 - 1 día</b>	117	1.57	117	1390	0.867	0.00913	0.441	0.732
<b>Pavicrete - MR 45 - 28 días, trab ext 3 horas</b>	80.9	1.47	81	903	0.693	0.00788	0.334	0.667
<b>Pavicrete - MR 45 - 3 días</b>	96.7	1.52	96.8	1120	0.759	0.00826	0.379	0.677
<b>Pervia - MR 36 - 28 días</b>	89.4	1.49	89.4	1040	0.686	0.00737	0.373	0.512
<b>Pesado - 300 - 28 días</b>	96.2	1.45	96	802	1.23	0.0148	0.648	0.787



Reducrack - MR 45 - 3 días	105	1.54	105	1230	0.807	0.00871	0.431	0.722
Reducrack - MR 45 - 7 días	97.4	1.52	97.4	1120	0.768	0.00842	0.402	0.693
Reducrack Sin malla - MR 42 - 28 días	71.7	1.44	71.7	773	0.64	0.00746	0.339	0.666
Relleno fluido - 50 - 28 días	50.3	1.39	50.3	513	0.486	0.00586	0.228	0.718
Relleno fluido - 80 - 28 días	56.6	1.41	56.6	592	0.531	0.0063	0.251	0.745
Revenimiento total - 250 - 7 días	73	1.45	73	796	0.652	0.00756	0.318	0.709
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	54.9	1.4	54.8	550	0.557	0.00681	0.273	0.646
Trabajabilidad extendida - 150 - 28 días, trab ext 5 horas	56.8	1.4	56.8	575	0.568	0.00691	0.278	0.645
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	58.3	1.41	58.3	595	0.578	0.007	0.284	0.665
Trabajabilidad extendida - 200 - 28 días, trab ext 5 horas	59.4	1.41	59.3	606	0.589	0.00712	0.295	0.679
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	68.7	1.44	68.7	738	0.626	0.00733	0.313	0.697
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	63.9	1.42	63.9	671	0.606	0.0072	0.3	0.678
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	63.7	1.42	63.7	671	0.6	0.00713	0.294	0.656
Trabajabilidad extendida - 250 - 28 días, trab ext 5 horas	65.4	1.42	65.4	688	0.619	0.00735	0.314	0.697
Trabajabilidad extendida - 250 - 3 días, trab ext 5 horas	79.9	1.46	79.9	884	0.694	0.00794	0.359	0.72
Trabajabilidad extendida - 250 - 7	78.4	1.46	78.4	867	0.68	0.00777	0.347	0.701



días, trab ext 3 horas								
Trabajabilidad extendida - 250 - 7 días, trab ext 5 horas	78.1	1.46	78.1	865	0.676	0.00771	0.339	0.701
Trabajabilidad extendida - 280 - 28 días, trab ext 5 horas	70.7	1.44	70.7	758	0.649	0.00761	0.329	0.722
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	70.2	1.44	70.2	757	0.636	0.00743	0.318	0.696
Trabajabilidad extendida - 300 - 7 días, trab ext 3 horas	80.9	1.47	80.9	903	0.691	0.00784	0.345	0.715
Trabajabilidad extendida - 350 - 14 días, trab ext 3 horas	85.9	1.48	85.9	972	0.711	0.00795	0.362	0.73
Trabajabilidad extendida - 350 - 28 días, trab ext 3 horas	78.1	1.46	78.1	866	0.675	0.0077	0.341	0.711
Vertua Materiales Reciclados - 250 - 28 días	60.8	1.42	60.8	654	0.539	0.00624	0.274	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	3.33	76.4	0.00016	0.000535	0.0314	9.69e-05
Acelerado - 200 - 3 días, trab ext 3 horas	3.27	75.4	0.000158	0.000533	0.0316	9.51e-05
Acelerado - 250 - 3 días	3.5	80.7	0.00017	0.000572	0.0336	0.000101
Acelerado - 250 - 3 días, trab ext 3 horas	3.58	83.3	0.000175	0.00059	0.0346	0.000103
Acelerado - 250 - 7 días	5.88	144	0.000271	0.000818	0.0397	0.000158
Acelerado - 300 - 3 días	3.75	87.1	0.000185	0.000628	0.037	0.000108
Acelerado - MR 40 - 80% a 3 días	3.61	83.8	0.000177	0.000602	0.0356	0.000104
Acelerado - MR 42 - 1 día	4.73	111	0.000244	0.000858	0.0513	0.000134
Acelerado - MR 45 - 7 días	3.65	85	0.000181	0.000618	0.0368	0.000105
Alta resistencia - 450 - 28 días	4.08	96.1	0.000201	0.000677	0.0391	0.000116
Alta resistencia - MR 48 - 14 días	3.82	88.9	0.00019	0.000654	0.0389	0.00011



Antibacteriano - 250 - 28 días	2.91	66.8	0.000137	0.00045	0.0264	8.56e-05
Antideslave - 250 - 28 días	3.58	82.2	0.000169	0.000557	0.0324	0.000127
Antihongo antialga - 250 - 28 días	3.16	73.6	0.000148	0.000477	0.0272	9.18e-05
Antitermita - 250 - 28 días	2.91	66.8	0.000137	0.00045	0.0264	8.56e-05
Aparentia - 250 - 28 días	5.43	133	0.000248	0.000745	0.0361	0.000147
Aparentia - 250 - 3 días	3.59	83.3	0.000176	0.000599	0.0355	0.000104
Aparentia - 350 - 28 días	8.47	213	0.000384	0.00111	0.0491	0.000221
Autocompactable - 250 - 28 días	3.49	80.7	0.00017	0.000574	0.0338	0.000101
Baja contracción - MR 45 - 7 días	3.96	92.7	0.000195	0.000658	0.0383	0.000113
Contracción compensada - MR 42 - 28 días	3.53	81.4	0.000167	0.000552	0.0346	0.000138
Convencional - 100 - 28 días	2.36	52.8	0.000104	0.000329	0.0193	7.12e-05
Convencional - 150 - 14 días	2.69	60.9	0.000123	4e-04	0.0235	8e-05
Convencional - 150 - 28 días	2.53	56.8	0.000114	0.000363	0.0213	7.6e-05
Convencional - 150 - 7 días	2.84	64.5	0.000132	0.000431	0.0253	8.38e-05
Convencional - 200 - 28 días	2.72	61.4	0.000125	0.000404	0.0237	8.09e-05
Convencional - 250 - 14 días	3.03	69.1	0.000143	0.00047	0.0276	8.89e-05
Convencional - 250 - 28 días	2.89	65.6	0.000135	0.00044	0.0259	8.53e-05
Convencional - 250 - 7 días	3.21	73.9	0.000154	0.000513	0.0301	9.37e-05
Convencional - 250 - 7 días, trab ext 3 horas	3.42	79.4	0.000167	0.000561	0.033	9.9e-05
Convencional - 300 - 28 días	3.13	72	0.000149	0.000496	0.0292	9.15e-05
Convencional - 300 - 7 días	3.46	80.4	0.000169	0.00057	0.0335	1e-04
Convencional - 300 - 7 días, trab ext 5 horas	3.65	84.9	0.000177	0.000592	0.0344	0.000105
Convencional - 350 - 28 días	3.38	78.3	0.000164	0.000551	0.0324	9.8e-05
Duramax - 250 - 28 días	3.16	73	0.000152	0.000507	0.0298	9.18e-05
Duramax - 300 - 28 días	3.27	75.6	0.000158	0.00053	0.0313	9.52e-05
Duramax Autosellante - 250 - 28 días	3.87	91.3	0.000184	0.000595	0.0331	0.00011
Estructural - 250 - 28 días	2.88	65.6	0.000134	0.000441	0.026	8.49e-05
Estructural - 250 - 3 días	3.44	79.6	0.000169	0.000574	0.0342	9.98e-05
Estructural - 250 - 7 días	3.27	75.3	0.000157	0.000525	0.0309	9.51e-05



Estructural - 300 - 14 días	3.39	78.8	0.000165	0.000555	0.0327	9.82e-05
Estructural - 300 - 28 días	3.05	70.4	0.000147	0.000494	0.0294	8.94e-05
Estructural - 350 - 14 días	3.58	83.2	0.000175	0.000594	0.035	0.000103
Estructural - 350 - 28 días	3.3	76.4	0.00016	0.000536	0.0316	9.6e-05
Grout premezclado - 350 - 28 días	5.32	125	0.000261	0.000884	0.0512	0.000229
Hidratium - 200 - 28 días	2.85	64.7	0.000131	0.000425	0.0248	8.49e-05
Impercem - 200 - 28 días	3.28	76.3	0.000153	5e-04	0.0286	9.56e-05
Lanzado - 250 - 28 días	3.9	91.9	0.000194	0.000659	0.0385	0.000111
Ligero - 250 - 28 días	3.58	81.1	0.00017	0.000582	0.0345	9.62e-05
Materiales Reciclados Llanta - 250 - 28 días	3.04	70	0.000144	0.000475	0.0279	8.92e-05
Materiales Reciclados Pet - 250 - 28 días	3.03	69.9	0.000143	0.000474	0.0279	8.9e-05
Materiales Reciclados Plástico de difícil reciclado - 250 - 28 días	3.1	71.1	0.000146	0.00048	0.0282	9.15e-05
Mortero - 150 - 28 días	3.13	72.5	0.000149	0.000491	0.0284	9.07e-05
Mortero estabilizado - 150 - 28 días	3.75	88.4	0.000183	0.000614	0.0353	0.000106
Pavicrete - MR 38 - 28 días	3.28	75.9	0.000158	0.000531	0.0314	9.55e-05
Pavicrete - MR 40 - 28 días	3.32	76.6	0.000161	0.000541	0.032	9.69e-05
Pavicrete - MR 42 - 28 días	3.33	77.1	0.000162	0.000548	0.0326	9.69e-05
Pavicrete - MR 42 - 28 días, trab ext 3 horas	3.51	81.6	0.00017	0.000569	0.0332	0.000101
Pavicrete - MR 42 - 28 días, trab ext 5 horas	3.49	80.6	0.00017	0.000576	0.0341	0.000101
Pavicrete - MR 42 - 7 días	3.72	86.5	0.000185	0.000632	0.0375	0.000107
Pavicrete - MR 45 - 1 día	4.71	111	0.000242	0.000845	0.0501	0.000133
Pavicrete - MR 45 - 28 días, trab ext 3 horas	3.49	80.8	0.000172	0.000586	0.035	0.000102
Pavicrete - MR 45 - 3 días	4.01	94.2	0.000203	7e-04	0.0416	0.000115
Pervia - MR 36 - 28 días	3.85	90.7	0.000192	0.000656	0.0383	0.000109
Pesado - 300 - 28 días	5.99	129	0.00027	0.00079	0.0434	0.000185
Reducrack - MR 45 - 3 días	4.4	104	0.000222	0.000766	0.0451	0.000125
Reducrack - MR 45 - 7 días	4.1	96.2	0.000205	0.000707	0.0418	0.000118
Reducrack Sin malla - MR 42 - 28 días	3.31	76.8	0.000158	0.000527	0.0308	9.68e-05





Relleno fluido - 50 - 28 días	2.32	54	0.00011	0.000363	0.0214	6.77e-05
Relleno fluido - 80 - 28 días	2.57	59.8	0.000123	0.000409	0.0241	7.46e-05
Revenimiento total - 250 - 7 días	3.27	75.6	0.000158	0.000532	0.0314	9.5e-05
Trabajabilidad extendida - 150 - 28 días, trab ext 3 horas	2.71	61.8	0.000125	0.000405	0.0237	8.03e-05
Trabajabilidad extendida - 150 - 28 días, trab ext 5 horas	2.77	63.2	0.000128	0.000419	0.0245	8.19e-05
Trabajabilidad extendida - 200 - 28 días, trab ext 3 horas	2.84	64.8	0.000132	0.00043	0.0252	8.36e-05
Trabajabilidad extendida - 200 - 28 días, trab ext 5 horas	2.93	67	0.000136	0.000441	0.0256	8.6e-05
Trabajabilidad extendida - 250 - 14 días, trab ext 3 horas	3.17	73.4	0.000152	0.000504	0.0295	9.22e-05
Trabajabilidad extendida - 250 - 28 días, trab ext 3 horas	3.02	69.5	0.000143	0.00047	0.0275	8.85e-05
Trabajabilidad extendida - 250 - 28 días, trab ext 4 horas	2.97	68.3	0.000141	0.000467	0.0275	8.73e-05
Trabajabilidad extendida - 250 - 28 días, trab ext 5 horas	3.13	72.2	0.000148	0.000484	0.0281	9.13e-05
Trabajabilidad extendida - 250 - 3 días, trab ext 5 horas	3.64	84.6	0.000176	0.000589	0.0343	0.000105
Trabajabilidad extendida - 250 - 7 días, trab ext 3 horas	3.54	82.3	0.000172	0.000576	0.0337	0.000102
Trabajabilidad extendida - 250 - 7 días, trab ext 5 horas	3.48	80.8	0.00017	0.000571	0.0336	1e-04
Trabajabilidad extendida - 280 - 28 días, trab ext 5 horas	3.31	76.5	0.000158	0.000522	0.0304	9.61e-05
Trabajabilidad extendida - 300 - 28 días, trab ext 3 horas	3.23	74.7	0.000155	0.000515	0.0302	9.38e-05
Trabajabilidad extendida - 300 - 7 días, trab ext 3 horas	3.56	83	0.000175	0.000591	0.0348	0.000103
Trabajabilidad extendida - 350 - 14 días, trab ext 3 horas	3.74	87.7	0.000185	0.000628	0.0368	0.000107



Trabajabilidad extendida - 350 - 28 días, trab ext 3 horas	3.49	81.3	0.00017	0.000572	0.0335	0.000101
Vertua Materiales Reciclados - 250 - 28 días	2.78	64.8	0.000134	0.000445	0.026	8.04e-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 12: 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)
<b>MX-PD0101 OAXACA</b>	93,218	2.596	241,993.93	8.71

### 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 13: 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	211	244
Acelerado - 200 - 3 días, trab ext 3 horas	215	249
Acelerado - 250 - 3 días	230	265
Acelerado - 250 - 3 días, trab ext 3 horas	238	275



Acelerado - 250 - 7 días	214	248
Acelerado - 300 - 3 días	259	299
Acelerado - MR 40 - 80% a 3 días	247	286
Acelerado - MR 42 - 1 día	386	447
Acelerado - MR 45 - 7 días	260	300
Alta resistencia - 450 - 28 días	272	314
Alta resistencia - MR 48 - 14 días	278	321
Antibacteriano - 250 - 28 días	169	195
Antideslave - 250 - 28 días	211	244
Antihongo antialga - 250 - 28 días	169	195
Antitermita - 250 - 28 días	169	195
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