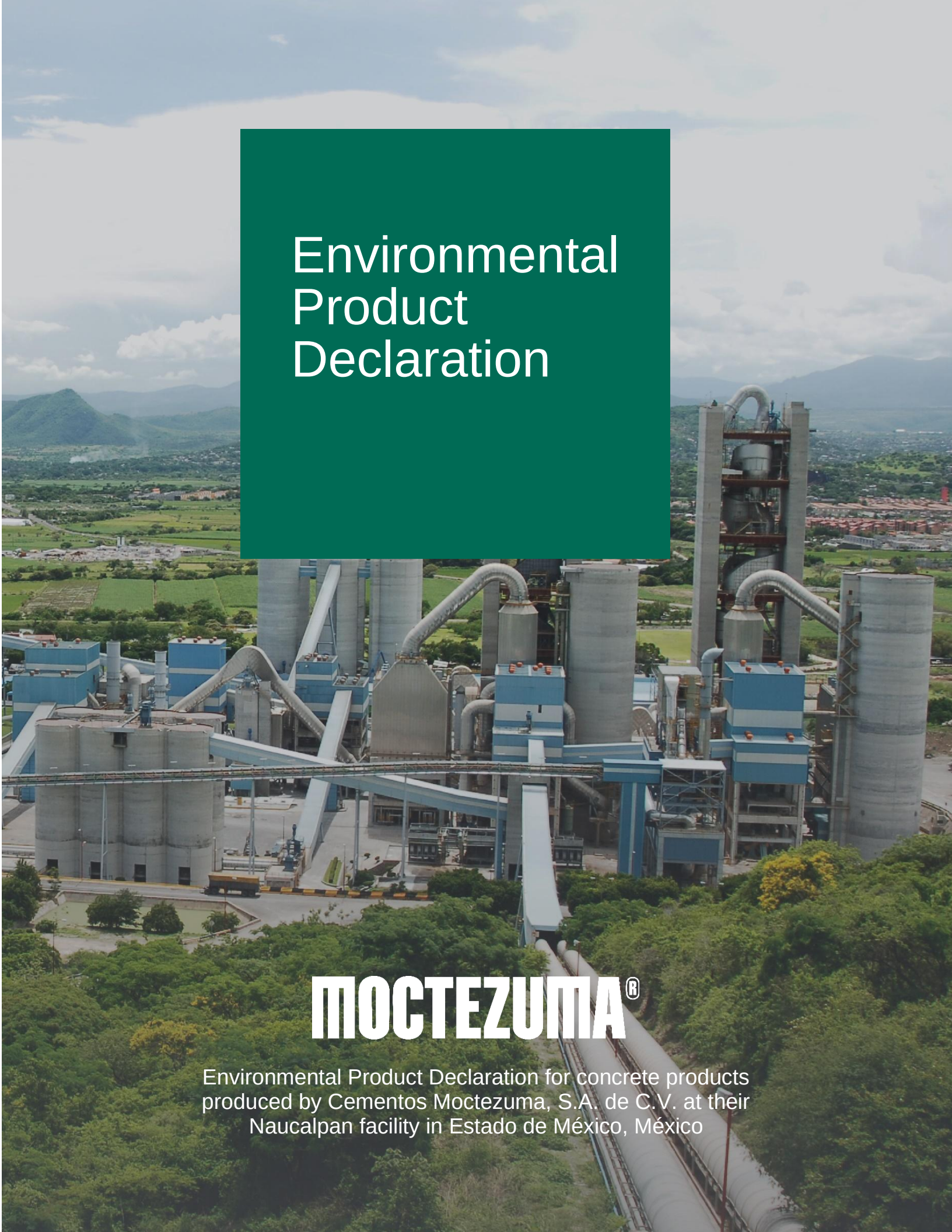

# Environmental Product Declaration

MOCTEZUMA®

Environmental Product Declaration for concrete products produced by Cementos Moctezuma, S.A. de C.V. at their Naucalpan facility in Estado de México, México

# ADMINISTRATIVE INFORMATION

## International Certified Environmental Product Declaration

| | |
|---|---|
| **Declared Product:** | This Environmental Product Declaration (EPD) covers ready mix concrete products produced by Cementos Moctezuma S.A. de C.V. Declared unit: 1 m3 of concrete |
| **Declaration Owner:** | Cementos Moctezuma S.A. de C.V.<br>134 PH Monte Elbruz, Col. Lomas de Chapultepec<br>Ciudad de México, México<br>www.cmoctezuma.com.mx<br>Jair Juan Manuel Martínez Miguel, martinez.jair@cmoctezuma.com.mx |
| **Program Operator:** | Labeling Sustainability<br>Address, 11670 W Sunset Blvd.<br>Los Angeles, CA<br>www.labelingsustainability.com |
| **Product Category Rule:** | ISO 21930:2017 Sustainability in Building Construction – Environmental Declaration of Building Products: serves as the core PCR Product Category Rule of Environmental Product Declarations PCR for Concrete serves as the sub-category PCR.<br>PCR Program Operator: NSF International<br>Sub-category PCR review was conducted by: Thomas P. Gloria, Ph. D. of Industrial Ecology Consultants: 35 Bracebridge, Rd., Newton, MA 02459-1728, t.gloria@industrial-ecology.com. Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, mrovercash@earthlink.net. Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, bstough@sustainableresearchgroup.com. |
| **Independent LCA Reviewer and EPD Verifier:** | This EPD was independently verified in accordance with ISO 14025 and ISO 21930. The life cycle assessment was independently reviewed in accordance ISO 14044 and the referenced PCR.<br>Independent verification of the declaration, according to ISO 14025:2006<br>External<br>Third Party Verifier<br>Geoffrey Guest, Certified 3rd Party Verifier under the International EPD Program (www.environdec.com), CSA Group (www.csaregistries.ca) |
| **Date of Issue:** | 23 January 2025 |
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| **EPD Number:** | a4bc773a-dd21-432c-9e83-3b14c2082821 |

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## COMPANY DESCRIPTION

Cementos Moctezuma is a prominent Mexican company established in 1943, specializing in the production, distribution, and marketing of cement, concrete, and aggregates under the well-known brands Cementos Moctezuma and Concretos Moctezuma. Listed on the Mexican Stock Exchange since 1988, the company maintains a strong financial position characterized by discipline and zero debt.

With three cement plants boasting an annual capacity of eight million tons and 30 concrete plants producing over 590 types of concrete, Cementos Moctezuma has an extensive distribution network of more than 530 centers, covering 95% of Mexico. The company also offers value-added services, including specialized technical advice, mobile laboratories, construction supervision, and training.

Cementos Moctezuma is committed to sustainable development, aligning its operations with the United Nations' Sustainable Development Goals through a strategy focused on five pillars: Safety and health, Energy and climate change, Corporate social responsibility, Environment and biodiversity, and Circular economy. The company emphasizes technological innovation and operational efficiency to produce high-quality products while minimizing environmental impact, including reducing $CO_2$ emissions and optimizing water use.

A qualified team of 1,303 passionate collaborators drives Cementos Moctezuma's mission to promote the construction of a better country for families and future generations while being committed to environmental stewardship. The company also champions equity and inclusion in the construction industry through initiatives like Casco Rosa, which recognizes the contributions of women in the sector. Additionally, Cementos Moctezuma actively engages in social responsibility programs to enhance the quality of life in the communities it serves, reinforcing its status as a consolidated company with deep Mexican roots.

## 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. 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 differentiate Cementos Moctezuma from their competition for the following reasons: generate an advantage for the organization; offer customers information to help them make informed product decisions; improve the environmental performance of Cementos Moctezuma 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; and to strengthen Cementos Moctezuma's license to operate in the community. The intended audience for this LCA report is Cementos Moctezuma'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 142 concrete mixes manufactured at Cementos Moctezuma concrete facility in Naucalpan, Estado de México. Mexico.

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. Excluded stages include transportation of the manufactured material to the construction site; 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **1** | Convencional - f´c 100 - 7 dias | 9.80 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 9.80 | Proprietary |
| **2** | Convencional - f´c 100 - 3 dias | 9.80 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 9.80 | Proprietary |
| **3** | Convencional - f´c 100 - 28 dias | 9.80 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 9.80 | Proprietary |
| **4** | Convencional - f´c 100 - 14 dias | 9.80 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 9.80 | Proprietary |
| **5** | Convencional - f´c 150 - 7 dias | 14.70 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 14.70 | Proprietary |
| **6** | Convencional - f´c 150 - 3 dias | 14.70 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 14.70 | Proprietary |
| **7** | Convencional - f´c 150 - 28 dias | 14.70 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 14.70 | Proprietary |

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|---|---|---|---|---|---|
| **8** | Convencional - f´c 150 - 14 dias | 14.70 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 14.70 | Proprietary |
| **57** | Relleno Fluido - f´c 30 - 7 dias | 2.94 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 2.94 | Proprietary |
| **58** | Relleno Fluido - f´c 30 - 3 dias | 2.94 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 2.94 | Proprietary |
| **59** | Relleno Fluido - f´c 30 - 28 dias | 2.94 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 2.94 | Proprietary |
| **60** | Relleno Fluido - f´c 30 - 14 dias | 2.94 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 2.94 | Proprietary |
| **61** | Relleno Fluido - f´c 15 - 7 dias | 1.47 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 1.47 | Proprietary |
| **62** | Relleno Fluido - f´c 15 - 3 dias | 1.47 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 1.47 | Proprietary |
| **63** | Relleno Fluido - f´c 15 - 28 dias | 1.47 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 1.47 | Proprietary |
| **64** | Relleno Fluido - f´c 15 - 14 dias | 1.47 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 1.47 | Proprietary |
| **65** | Relleno Fluido - f´c 20 - 7 dias | 1.96 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 1.96 | Proprietary |
| **66** | Relleno Fluido - f´c 20 - 3 dias | 1.96 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 1.96 | Proprietary |
| **67** | Relleno Fluido - f´c 20 - 28 dias | 1.96 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 1.96 | Proprietary |
| **68** | Relleno Fluido - f´c 20 - 14 dias | 1.96 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 1.96 | Proprietary |
| **69** | Relleno Fluido - f´c 25 - 7 dias | 2.45 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 2.45 | Proprietary |
| **70** | Relleno Fluido - f´c 25 - 3 dias | 2.45 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 2.45 | Proprietary |
| **71** | Relleno Fluido - f´c 25 - 28 dias | 2.45 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 2.45 | Proprietary |
| **72** | Relleno Fluido - f´c 25 - 14 dias | 2.45 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 2.45 | Proprietary |

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|---|---|---|---|---|---|
| **73** | Relleno Fluido - f´c 40 - 7 dias | 3.92 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 3.92 | Proprietary |
| **74** | Relleno Fluido - f´c 40 - 3 dias | 3.92 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 3.92 | Proprietary |
| **75** | Relleno Fluido - f´c 40 - 28 dias | 3.92 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 3.92 | Proprietary |
| **76** | Relleno Fluido - f´c 40 - 14 dias | 3.92 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 3.92 | Proprietary |
| **77** | Relleno Fluido - f´c 50 - 7 dias | 4.90 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 4.90 | Proprietary |
| **78** | Relleno Fluido - f´c 50 - 3 dias | 4.90 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 4.90 | Proprietary |
| **79** | Relleno Fluido - f´c 50 - 28 dias | 4.90 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 4.90 | Proprietary |
| **80** | Relleno Fluido - f´c 50 - 14 dias | 4.90 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 4.90 | Proprietary |
| **81** | Relleno Fluido - f´c 60 - 7 dias | 5.88 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 5.88 | Proprietary |
| **82** | Relleno Fluido - f´c 60 - 3 dias | 5.88 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 5.88 | Proprietary |
| **83** | Relleno Fluido - f´c 60 - 28 dias | 5.88 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 5.88 | Proprietary |
| **84** | Relleno Fluido - f´c 60 - 14 dias | 5.88 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 5.88 | Proprietary |
| **85** | Relleno Fluido - f´c 70 - 7 dias | 6.86 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 6.86 | Proprietary |
| **86** | Relleno Fluido - f´c 70 - 3 dias | 6.86 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 6.86 | Proprietary |
| **87** | Relleno Fluido - f´c 70 - 28 dias | 6.86 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 6.86 | Proprietary |
| **88** | Relleno Fluido - f´c 70 - 14 dias | 6.86 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 6.86 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **9** | Convencional - f´c 200 - 7 dias | 19.60 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **10** | Convencional - f´c 200 - 3 dias | 19.60 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **11** | Convencional - f´c 200 - 28 dias | 19.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **12** | Convencional - f´c 200 - 14 dias | 19.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **127** | Lanzado - f´c 200 - 7 dias | 19.60 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **128** | Lanzado - f´c 200 - 3 dias | 19.60 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **129** | Lanzado - f´c 200 - 28 dias | 19.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |
| **130** | Lanzado - f´c 200 - 14 dias | 19.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 19.6 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **13** | Convencional - f´c 250 - 7 dias | 24.50 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **14** | Convencional - f´c 250 - 3 dias | 24.50 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **15** | Convencional - f´c 250 - 28 dias | 24.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **16** | Convencional - f´c 250 - 14 dias | 24.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **25** | Estructural - f´c 250 - 7 dias | 24.50 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **26** | Estructural - f´c 250 - 3 dias | 24.50 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **27** | Estructural - f´c 250 - 28 dias | 24.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **28** | Estructural - f´c 250 - 14 dias | 24.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **89** | Modulo de ruptura - MR 35 - 7 dias | 24.50 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **90** | Modulo de ruptura - MR 35 - 3 dias | 24.50 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **91** | Modulo de ruptura - MR 35 - 28 dias | 24.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **92** | Modulo de ruptura - MR 35 - 14 dias | 24.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **131** | Lanzado - f´c 250 - 7 dias | 24.50 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **132** | Lanzado - f´c 250 - 3 dias | 24.50 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |
| **133** | Lanzado - f´c 250 - 28 dias | 24.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |

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|---|---|---|---|---|---|
| **134** | Lanzado - f´c 250 - 14 dias | 24.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 24.5 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **17** | Convencional - f´c 300 - 7 dias | 29.40 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **18** | Convencional - f´c 300 - 3 dias | 29.40 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **19** | Convencional - f´c 300 - 28 dias | 29.40 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **20** | Convencional - f´c 300 - 14 dias | 29.40 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **29** | Estructural - f´c 300 - 7 dias | 29.40 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **30** | Estructural - f´c 300 - 3 dias | 29.40 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **31** | Estructural - f´c 300 - 28 dias | 29.40 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **32** | Estructural - f´c 300 - 14 dias | 29.40 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **93** | Modulo de ruptura - MR 38 - 7 dias | 26.60 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **94** | Modulo de ruptura - MR 38 - 3 dias | 26.60 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **95** | Modulo de ruptura - MR 38 - 28 dias | 26.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **96** | Modulo de ruptura - MR 38 - 14 dias | 26.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **97** | Modulo de ruptura - MR 40 - 7 dias | 28.00 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |

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|---|---|---|---|---|---|
| **98** | Modulo de ruptura - MR 40 - 3 dias | 28.00 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |
| **99** | Modulo de ruptura - MR 40 - 28 dias | 28.00 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |
| **100** | Modulo de ruptura - MR 40 - 14 dias | 28.00 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |
| **101** | Modulo de ruptura - MR 42 - 7 dias | 29.40 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **102** | Modulo de ruptura - MR 42 - 3 dias | 29.40 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **103** | Modulo de ruptura - MR 42 - 28 dias | 29.40 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **104** | Modulo de ruptura - MR 42 - 14 dias | 29.40 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **113** | Modulo de ruptura - MR 36 - 7 dias | 25.20 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 25.2 | Proprietary |
| **114** | Modulo de ruptura - MR 36 - 3 dias | 25.20 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 25.2 | Proprietary |
| **115** | Modulo de ruptura - MR 36 - 28 dias | 25.20 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 25.2 | Proprietary |
| **116** | Modulo de ruptura - MR 36 - 14 dias | 25.20 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 25.2 | Proprietary |
| **117** | Baja contracción - MR 38 - 28 dias | 26.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **118** | Baja contracción - MR 38 - 14 dias | 26.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 26.6 | Proprietary |
| **119** | Baja contracción - MR 40 - 28 dias | 28.00 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |
| **120** | Baja contracción - MR 40 - 14 dias | 28.00 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 28.0 | Proprietary |
| **121** | Baja contracción - MR 42 - 28 dias | 29.40 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **122** | Baja contracción - MR 42 - 14 dias | 29.40 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |

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|---|---|---|---|---|---|
| **135** | Lanzado - f´c 300 - 7 dias | 29.40 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **136** | Lanzado - f´c 300 - 3 dias | 29.40 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **137** | Lanzado - f´c 300 - 28 dias | 29.40 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |
| **138** | Lanzado - f´c 300 - 14 dias | 29.40 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 29.4 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **21** | Convencional - f´c 350 - 7 dias | 34.30 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **22** | Convencional - f´c 350 - 3 dias | 34.30 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **23** | Convencional - f´c 350 - 28 dias | 34.30 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **24** | Convencional - f´c 350 - 14 dias | 34.30 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **33** | Estructural - f´c 350 - 7 dias | 34.30 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **34** | Estructural - f´c 350 - 3 dias | 34.30 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **35** | Estructural - f´c 350 - 28 dias | 34.30 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **36** | Estructural - f´c 350 - 14 dias | 34.30 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **105** | Modulo de ruptura - MR 45 - 7 dias | 31.50 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |
| **106** | Modulo de ruptura - MR 45 - 3 dias | 31.50 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |

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|---|---|---|---|---|---|
| **107** | Modulo de ruptura - MR 45 - 28 dias | 31.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |
| **108** | Modulo de ruptura - MR 45 - 14 dias | 31.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |
| **109** | Modulo de ruptura - MR 48 - 7 dias | 33.60 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **110** | Modulo de ruptura - MR 48 - 3 dias | 33.60 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **111** | Modulo de ruptura - MR 48 - 28 dias | 33.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **112** | Modulo de ruptura - MR 48 - 14 dias | 33.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **123** | Baja contracción - MR 45 - 28 dias | 31.50 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |
| **124** | Baja contracción - MR 45 - 14 dias | 31.50 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 31.5 | Proprietary |
| **125** | Baja contracción - MR 48 - 28 dias | 33.60 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **126** | Baja contracción - MR 48 - 14 dias | 33.60 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 33.6 | Proprietary |
| **139** | Lanzado - f´c 350 - 7 dias | 34.30 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **140** | Lanzado - f´c 350 - 3 dias | 34.30 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **141** | Lanzado - f´c 350 - 28 dias | 34.30 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |
| **142** | Lanzado - f´c 350 - 14 dias | 34.30 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 34.3 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **37** | Alta resistencia - f´c 400 - 7 dias | 39.20 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 39.2 | Proprietary |
| **38** | Alta resistencia - f´c 400 - 3 dias | 39.20 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 39.2 | Proprietary |
| **39** | Alta resistencia - f´c 400 - 28 dias | 39.20 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 39.2 | Proprietary |
| **40** | Alta resistencia - f´c 400 - 14 dias | 39.20 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 39.2 | Proprietary |

## 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 | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **41** | Alta resistencia - f´c 450 - 7 dias | 44.10 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 44.1 | Proprietary |
| **42** | Alta resistencia - f´c 450 - 3 dias | 44.10 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 44.1 | Proprietary |
| **43** | Alta resistencia - f´c 450 - 28 dias | 44.10 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 44.1 | Proprietary |
| **44** | Alta resistencia - f´c 450 - 14 dias | 44.10 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 44.1 | Proprietary |

## Mix Designs: 46 to 50 MPa

Table 7: **Declared products with Mix designs: 46 to 50MPa considered in this environmental product declaration**

| Mix# | Unique name/ID | Short description | Product type | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **45** | Alta resistencia - f´c 500 - 7 dias | 49.00 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 49 | Proprietary |

| | | | | | |
|---|---|---|---|---|---|
| **46** | Alta resistencia - f´c 500 - 3 dias | 49.00 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 49 | Proprietary |
| **47** | Alta resistencia - f´c 500 - 28 dias | 49.00 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 49 | Proprietary |
| **48** | Alta resistencia - f´c 500 - 14 dias | 49.00 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 49 | Proprietary |

## Mix Designs: 51 to 55 MPa

Table 7: **Declared products with Mix designs: 51 to 55MPa considered in this environmental product declaration**

| Mix# | Unique name/ID | Short description | Product type | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **49** | Alta resistencia - f´c 550 - 7 dias | 53.90 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 53.9 | Proprietary |
| **50** | Alta resistencia - f´c 550 - 3 dias | 53.90 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 53.9 | Proprietary |
| **51** | Alta resistencia - f´c 550 - 28 dias | 53.90 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 53.9 | Proprietary |
| **52** | Alta resistencia - f´c 550 - 14 dias | 53.90 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 53.9 | Proprietary |

## Mix Designs: 56 to 60 MPa

Table 7: **Declared products with Mix designs: 56 to 60MPa considered in this environmental product declaration**

| Mix# | Unique name/ID | Short description | Product type | Resistance strength, MPa | H2O to cement ratio |
|---|---|---|---|---|---|
| **53** | Alta resistencia - f´c 600 - 7 dias | 58.80 MPa 7d strength Ready Mix Concrete | Ready Mix Concrete | 58.8 | Proprietary |
| **54** | Alta resistencia - f´c 600 - 3 dias | 58.80 MPa 3d strength Ready Mix Concrete | Ready Mix Concrete | 58.8 | Proprietary |
| **55** | Alta resistencia - f´c 600 - 28 dias | 58.80 MPa 28d strength Ready Mix Concrete | Ready Mix Concrete | 58.8 | Proprietary |
| **56** | Alta resistencia - f´c 600 - 14 dias | 58.80 MPa 14d strength Ready Mix Concrete | Ready Mix Concrete | 58.8 | Proprietary |

## 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.

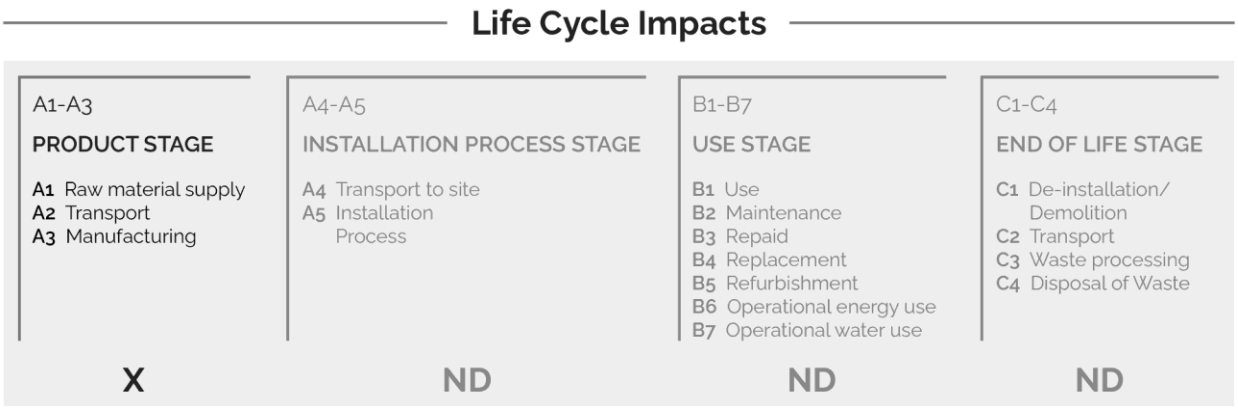


Figure 1: **General life cycle phases for consideration in a construction works system**

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.

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

## System Boundary

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

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

In addition, 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 is related to company management and sales activities.

For this LCA the manufacturing plant, owned and operated by Cementos Moctezuma, is located at their Naucalpan facility in Estado de México. All operating data is formulated using the actual data from Cementos Moctezuma'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 Cementos Moctezuma 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**: The plant operates without utilizing grid electricity and instead relies on diesel generators for power generation.

**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 Moctezuma information for the reference year 2023.

**Waste generation**: No High-level radioactive waste is generated on-site at this facility.

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

**Recycled/reused material/components**: The amount of returned concrete is based on Moctezuma 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 Moctezuma information for the reference year 2023.

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

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

| Input | LCI.activity | Data.source | Geo | Year | Technology | Time | Geography | Reliability | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| **Andesite Sand** | basalt quarry operation/basalt/RoW/ kg; Note: modifications made (see ecoinvent activity changes table) | ecoinvent v3.10 in 2024 | Edo. Mex | 2024 | 2 | 3 | 1 | 3 | 3 |
| **Water** | tap water production, conventional treatment/tap water/RoW/kg | ecoinvent v3.10 in 2024 | Edo. Mex | 2024 | 2 | 3 | 2 | 3 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Limestone Gravel** | limestone quarry operation/limestone, unprocessed/RoW/kg; Note: modifications made (see ecoinvent activity changes table) | ecoinvent v3.10 in 2024 | Edo. Mex | 2024 | 2 | 3 | 1 | 3 | 3 |
| **Additives** | chemical production, organic/chemical, organic/GLO/kg | ecoinvent v3.10 in 2024 | Queretaro | 2024 | 2 | 3 | 1 | 3 | 3 |
| **Cement** | Gris CPC 40RS/cement/MX/tonne | Program Operator: Labeling Sustainability - EPD ID: bb72e77d-c6d2-4caa-ba9e-18cce10c7824 | Morelos | 23 November 2024 | 3 | 3 | 3 | 3 | 3 |
| **River Sand** | sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (see ecoinvent activity changes table) | ecoinvent v3.10 in 2024 | Morelos | 2024 | 2 | 3 | 2 | 3 | 3 |

## DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the data quality achieved 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 input 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 level 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 CO2-eq |
| 2 | Ozone depletion: ozone depletion potential (ODP) | ODP | kg CFC-11-eq |
| 3 | Acidification: acidification potential (AP) | AP | kg SO2-eq |
| 4 | Eutrophication: eutrophication potential | EP | kg N-eq |
| 5 | Smog formation potential | SFP | kg O3-eq |

| | | | |
|---|---|---|---|
| **6** | Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels | ADPfossil | MJ |
| **Inventory metrics** | | | |
| **7** | Inventory indicators ISO21930: Cumulative Energy Demand - renewable energy resources | RPRE | MJ |
| **8** | Inventory indicators ISO21930: Renewable primary resources with energy content used as material (i.e., PERM) | PRM | MJ |
| **9** | Inventory indicators ISO21930: Cumulative Energy Demand - non-renewable energy resources | NRPRE | MJ |
| **10** | Inventory indicators ISO21930: Non-renewable primary resources with energy content used as material (i.e., PENRM) | NRPRM | kg |
| **11** | Inventory indicators ISO21930: use of secondary material | SM | MJ |
| **12** | Inventory indicators ISO21930: use of renewable secondary fuels | RSF | MJ |
| **13** | Inventory indicators ISO21930: recovered energy | RE | MJ |
| **14** | Inventory indicators ISO21930: use of net fresh water | FW | m3 |
| **15** | Inventory indicators ISO21930: hazardous waste disposed | HWD | kg |
| **16** | Inventory indicators ISO21930: non-hazardous waste disposed | NHWD | kg |
| **17** | Inventory indicators ISO21930: high-level radioactive waste disposed | HLRW | kg |
| **18** | Inventory indicators ISO21930: intermediate and low-level radioactive waste disposed | ILLRW | kg |
| **19** | Inventory indicators ISO21930: materials for recycling | MR | kg |
| **20** | Inventory indicators ISO21930: materials for energy recovery | MER | kg |

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

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

- Components for reuse;
- Materials for recycling;
- Materials for energy recovery;
- Recovered energy exported from the product system.

## LIMITATIONS

This EPD is a declaration of potential environmental impact and does not support or provide definitive comparisons of the environmental performance of specific products. Only EPDs prepared from cradle-to-grave life cycle results and based on the same function and reference service life and quantified by the same functional unit can be used to assist purchasers and users in making informed comparisons between products.

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

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

## TOTAL IMPACT SUMMARY

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

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

a) Midpoint Impact Categories:

| Indicator/LCI Metric | GWP100 | ODP | AP | EP | SFP | ADPfossil |
|---|---|---|---|---|---|---|
| **Unit** | **kg CO2-eq** | **kg CFC-11-eq** | **kg SO2-eq** | **kg N-eq** | **kg O3-eq** | **MJ** |
| **Alta resistencia - f´c 400 - 14 dias** | 470 | 3.79E-06 | 0.503 | 0.279 | 9.38 | 3020 |
| **Alta resistencia - f´c 400 - 28 dias** | 448 | 3.63E-06 | 0.488 | 0.269 | 9.17 | 2900 |
| **Alta resistencia - f´c 400 - 3 dias** | 546 | 4.32E-06 | 0.551 | 0.312 | 10.1 | 3430 |
| **Alta resistencia - f´c 400 - 7 dias** | 501 | 4.01E-06 | 0.522 | 0.293 | 9.67 | 3190 |
| **Alta resistencia - f´c 450 - 14 dias** | 511 | 4.08E-06 | 0.528 | 0.297 | 9.75 | 3240 |
| **Alta resistencia - f´c 450 - 28 dias** | 489 | 3.92E-06 | 0.514 | 0.287 | 9.54 | 3120 |
| **Alta resistencia - f´c 450 - 3 dias** | 586 | 4.61E-06 | 0.576 | 0.331 | 10.5 | 3650 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Alta resistencia - f´c 450 - 7 dias** | 542 | 4.30E-06 | 0.548 | 0.311 | 10 | 3410 |
| **Alta resistencia - f´c 500 - 14 dias** | 547 | 4.33E-06 | 0.552 | 0.313 | 10.1 | 3440 |
| **Alta resistencia - f´c 500 - 28 dias** | 525 | 4.18E-06 | 0.537 | 0.303 | 9.89 | 3320 |
| **Alta resistencia - f´c 500 - 3 dias** | 623 | 4.86E-06 | 0.6 | 0.347 | 10.8 | 3840 |
| **Alta resistencia - f´c 500 - 7 dias** | 578 | 4.55E-06 | 0.572 | 0.327 | 10.4 | 3610 |
| **Alta resistencia - f´c 550 - 14 dias** | 597 | 4.73E-06 | 0.587 | 0.356 | 10.6 | 3730 |
| **Alta resistencia - f´c 550 - 28 dias** | 574 | 4.57E-06 | 0.573 | 0.346 | 10.4 | 3610 |
| **Alta resistencia - f´c 550 - 3 dias** | 672 | 5.26E-06 | 0.636 | 0.393 | 11.3 | 4140 |
| **Alta resistencia - f´c 550 - 7 dias** | 627 | 4.95E-06 | 0.607 | 0.372 | 10.9 | 3900 |
| **Alta resistencia - f´c 600 - 14 dias** | 646 | 5.06E-06 | 0.618 | 0.373 | 11.1 | 3980 |
| **Alta resistencia - f´c 600 - 28 dias** | 623 | 4.90E-06 | 0.603 | 0.363 | 10.9 | 3860 |
| **Alta resistencia - f´c 600 - 3 dias** | 721 | 5.59E-06 | 0.666 | 0.409 | 11.8 | 4390 |
| **Alta resistencia - f´c 600 - 7 dias** | 676 | 5.28E-06 | 0.638 | 0.388 | 11.4 | 4150 |
| **Baja contracción - MR 38 - 3 dias** | 367 | 3.18E-06 | 0.429 | 0.216 | 8.39 | 2560 |
| **Baja contracción - MR 38 - 7 dias** | 345 | 3.02E-06 | 0.415 | 0.206 | 8.18 | 2440 |
| **Baja contracción - MR 40 - 14 dias** | 377 | 3.24E-06 | 0.436 | 0.22 | 8.49 | 2610 |
| **Baja contracción - MR 40 - 28 dias** | 355 | 3.09E-06 | 0.421 | 0.21 | 8.27 | 2490 |
| **Baja contracción - MR 42 - 3 dias** | 388 | 3.32E-06 | 0.443 | 0.225 | 8.6 | 2670 |
| **Baja contracción - MR 42 - 7 dias** | 366 | 3.17E-06 | 0.428 | 0.215 | 8.38 | 2550 |
| **Baja contracción - MR 45 - 14 dias** | 407 | 3.45E-06 | 0.455 | 0.233 | 8.78 | 2770 |
| **Baja contracción - MR 45 - 28 dias** | 385 | 3.30E-06 | 0.44 | 0.223 | 8.56 | 2650 |
| **Baja contracción - MR 48 - 3 dias** | 427 | 3.59E-06 | 0.468 | 0.242 | 8.97 | 2870 |
| **Baja contracción - MR 48 - 7 dias** | 405 | 3.44E-06 | 0.454 | 0.232 | 8.75 | 2760 |
| **Convencional - f´c 100 - 14 dias** | 211 | 1.80E-06 | 0.332 | 0.155 | 6.88 | 1500 |
| **Convencional - f´c 100 - 28 dias** | 189 | 1.65E-06 | 0.318 | 0.147 | 6.66 | 1380 |
| **Convencional - f´c 100 - 3 dias** | 286 | 2.31E-06 | 0.379 | 0.183 | 7.58 | 1900 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Convencional - f´c 100 - 7 dias** | 242 | 2.01E-06 | 0.352 | 0.167 | 7.17 | 1660 |
| **Convencional - f´c 150 - 14 dias** | 233 | 1.95E-06 | 0.346 | 0.163 | 7.09 | 1620 |
| **Convencional - f´c 150 - 28 dias** | 211 | 1.80E-06 | 0.332 | 0.155 | 6.87 | 1500 |
| **Convencional - f´c 150 - 3 dias** | 308 | 2.47E-06 | 0.393 | 0.191 | 7.79 | 2020 |
| **Convencional - f´c 150 - 7 dias** | 264 | 2.16E-06 | 0.366 | 0.175 | 7.38 | 1780 |
| **Convencional - f´c 200 - 14 dias** | 272 | 2.22E-06 | 0.371 | 0.178 | 7.45 | 1820 |
| **Convencional - f´c 200 - 28 dias** | 250 | 2.06E-06 | 0.356 | 0.169 | 7.24 | 1710 |
| **Convencional - f´c 200 - 3 dias** | 347 | 2.73E-06 | 0.418 | 0.205 | 8.15 | 2220 |
| **Convencional - f´c 200 - 7 dias** | 303 | 2.43E-06 | 0.39 | 0.189 | 7.74 | 1990 |
| **Convencional - f´c 250 - 14 dias** | 314 | 2.51E-06 | 0.397 | 0.193 | 7.84 | 2050 |
| **Convencional - f´c 250 - 28 dias** | 292 | 2.36E-06 | 0.383 | 0.185 | 7.63 | 1930 |
| **Convencional - f´c 250 - 3 dias** | 389 | 3.02E-06 | 0.444 | 0.221 | 8.55 | 2440 |
| **Convencional - f´c 250 - 7 dias** | 345 | 2.72E-06 | 0.417 | 0.205 | 8.14 | 2210 |
| **Convencional - f´c 300 - 14 dias** | 372 | 2.90E-06 | 0.432 | 0.214 | 8.36 | 2350 |
| **Convencional - f´c 300 - 28 dias** | 349 | 2.75E-06 | 0.418 | 0.206 | 8.15 | 2230 |
| **Convencional - f´c 300 - 3 dias** | 446 | 3.41E-06 | 0.479 | 0.242 | 9.06 | 2750 |
| **Convencional - f´c 300 - 7 dias** | 402 | 3.11E-06 | 0.452 | 0.225 | 8.65 | 2510 |
| **Convencional - f´c 350 - 14 dias** | 424 | 3.26E-06 | 0.465 | 0.233 | 8.85 | 2630 |
| **Convencional - f´c 350 - 28 dias** | 402 | 3.11E-06 | 0.451 | 0.225 | 8.64 | 2510 |
| **Convencional - f´c 350 - 3 dias** | 499 | 3.78E-06 | 0.512 | 0.261 | 9.55 | 3030 |
| **Convencional - f´c 350 - 7 dias** | 455 | 3.47E-06 | 0.485 | 0.245 | 9.14 | 2790 |
| **Estructural - f´c 250 - 14 dias** | 323 | 2.62E-06 | 0.394 | 0.151 | 7.77 | 2160 |
| **Estructural - f´c 250 - 28 dias** | 301 | 2.47E-06 | 0.381 | 0.146 | 7.57 | 2040 |
| **Estructural - f´c 250 - 3 dias** | 398 | 3.11E-06 | 0.438 | 0.166 | 8.42 | 2540 |
| **Estructural - f´c 250 - 7 dias** | 354 | 2.82E-06 | 0.412 | 0.157 | 8.04 | 2310 |
| **Estructural - f´c 300 - 14 dias** | 374 | 2.95E-06 | 0.423 | 0.161 | 8.19 | 2420 |

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|---|---|---|---|---|---|---|
| **Estructural - f´c 300 - 28 dias** | 352 | 2.81E-06 | 0.411 | 0.157 | 8 | 2300 |
| **Estructural - f´c 300 - 3 dias** | 448 | 3.44E-06 | 0.467 | 0.177 | 8.84 | 2800 |
| **Estructural - f´c 300 - 7 dias** | 405 | 3.15E-06 | 0.442 | 0.168 | 8.46 | 2580 |
| **Estructural - f´c 350 - 14 dias** | 419 | 3.24E-06 | 0.451 | 0.171 | 8.6 | 2650 |
| **Estructural - f´c 350 - 28 dias** | 397 | 3.10E-06 | 0.437 | 0.166 | 8.41 | 2530 |
| **Estructural - f´c 350 - 3 dias** | 493 | 3.73E-06 | 0.494 | 0.187 | 9.25 | 3030 |
| **Estructural - f´c 350 - 7 dias** | 449 | 3.44E-06 | 0.469 | 0.177 | 8.87 | 2800 |
| **Lanzado - f´c 200 - 14 dias** | 387 | 3.07E-06 | 0.435 | 0.214 | 8.31 | 2480 |
| **Lanzado - f´c 200 - 28 dias** | 360 | 2.88E-06 | 0.419 | 0.205 | 8.07 | 2330 |
| **Lanzado - f´c 200 - 3 dias** | 432 | 3.39E-06 | 0.463 | 0.23 | 8.72 | 2720 |
| **Lanzado - f´c 200 - 7 dias** | 414 | 3.26E-06 | 0.452 | 0.224 | 8.55 | 2620 |
| **Lanzado - f´c 250 - 14 dias** | 414 | 3.26E-06 | 0.452 | 0.224 | 8.56 | 2620 |
| **Lanzado - f´c 250 - 28 dias** | 387 | 3.07E-06 | 0.435 | 0.215 | 8.32 | 2480 |
| **Lanzado - f´c 250 - 3 dias** | 458 | 3.57E-06 | 0.479 | 0.24 | 8.96 | 2870 |
| **Lanzado - f´c 250 - 7 dias** | 440 | 3.45E-06 | 0.468 | 0.234 | 8.8 | 2770 |
| **Lanzado - f´c 300 - 14 dias** | 449 | 3.51E-06 | 0.474 | 0.237 | 8.88 | 2820 |
| **Lanzado - f´c 300 - 28 dias** | 422 | 3.32E-06 | 0.457 | 0.227 | 8.64 | 2670 |
| **Lanzado - f´c 300 - 3 dias** | 494 | 3.82E-06 | 0.501 | 0.253 | 9.29 | 3060 |
| **Lanzado - f´c 300 - 7 dias** | 476 | 3.69E-06 | 0.49 | 0.246 | 9.12 | 2960 |
| **Lanzado - f´c 350 - 14 dias** | 489 | 3.78E-06 | 0.499 | 0.252 | 9.25 | 3030 |
| **Lanzado - f´c 350 - 28 dias** | 462 | 3.60E-06 | 0.482 | 0.242 | 9.01 | 2880 |
| **Lanzado - f´c 350 - 3 dias** | 534 | 4.09E-06 | 0.526 | 0.267 | 9.65 | 3270 |
| **Lanzado - f´c 350 - 7 dias** | 516 | 3.97E-06 | 0.515 | 0.261 | 9.49 | 3170 |
| **Modulo de ruptura - MR 35 - 14 dias** | 369 | 3.06E-06 | 0.428 | 0.197 | 8.27 | 2480 |
| **Modulo de ruptura - MR 35 - 28 dias** | 347 | 2.91E-06 | 0.414 | 0.189 | 8.06 | 2360 |
| **Modulo de ruptura - MR 35 - 3 dias** | 452 | 3.62E-06 | 0.48 | 0.225 | 9.04 | 2920 |

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|---|---|---|---|---|---|---|
| **Modulo de ruptura - MR 35 - 7 dias** | 409 | 3.32E-06 | 0.452 | 0.21 | 8.64 | 2690 |
| **Modulo de ruptura - MR 36 - 14 dias** | 373 | 3.08E-06 | 0.43 | 0.198 | 8.3 | 2500 |
| **Modulo de ruptura - MR 36 - 28 dias** | 351 | 2.93E-06 | 0.416 | 0.19 | 8.09 | 2380 |
| **Modulo de ruptura - MR 36 - 3 dias** | 456 | 3.65E-06 | 0.482 | 0.226 | 9.07 | 2930 |
| **Modulo de ruptura - MR 36 - 7 dias** | 412 | 3.35E-06 | 0.455 | 0.211 | 8.67 | 2700 |
| **Modulo de ruptura - MR 38 - 14 dias** | 381 | 3.14E-06 | 0.435 | 0.201 | 8.38 | 2540 |
| **Modulo de ruptura - MR 38 - 28 dias** | 359 | 2.99E-06 | 0.421 | 0.193 | 8.17 | 2430 |
| **Modulo de ruptura - MR 38 - 3 dias** | 465 | 3.71E-06 | 0.487 | 0.229 | 9.15 | 2980 |
| **Modulo de ruptura - MR 38 - 7 dias** | 421 | 3.41E-06 | 0.46 | 0.214 | 8.75 | 2750 |
| **Modulo de ruptura - MR 40 - 14 dias** | 391 | 3.21E-06 | 0.441 | 0.204 | 8.47 | 2600 |
| **Modulo de ruptura - MR 40 - 28 dias** | 369 | 3.06E-06 | 0.427 | 0.196 | 8.26 | 2480 |
| **Modulo de ruptura - MR 40 - 3 dias** | 474 | 3.77E-06 | 0.493 | 0.233 | 9.24 | 3030 |
| **Modulo de ruptura - MR 40 - 7 dias** | 431 | 3.47E-06 | 0.466 | 0.218 | 8.84 | 2800 |
| **Modulo de ruptura - MR 42 - 14 dias** | 403 | 3.29E-06 | 0.449 | 0.208 | 8.58 | 2660 |
| **Modulo de ruptura - MR 42 - 28 dias** | 381 | 3.14E-06 | 0.435 | 0.201 | 8.37 | 2540 |
| **Modulo de ruptura - MR 42 - 3 dias** | 486 | 3.85E-06 | 0.501 | 0.237 | 9.35 | 3100 |
| **Modulo de ruptura - MR 42 - 7 dias** | 443 | 3.56E-06 | 0.474 | 0.222 | 8.95 | 2870 |
| **Modulo de ruptura - MR 45 - 14 dias** | 423 | 3.42E-06 | 0.461 | 0.215 | 8.76 | 2760 |
| **Modulo de ruptura - MR 45 - 28 dias** | 401 | 3.27E-06 | 0.447 | 0.207 | 8.55 | 2650 |
| **Modulo de ruptura - MR 45 - 3 dias** | 506 | 3.98E-06 | 0.513 | 0.243 | 9.53 | 3200 |
| **Modulo de ruptura - MR 45 - 7 dias** | 462 | 3.69E-06 | 0.486 | 0.229 | 9.13 | 2970 |
| **Modulo de ruptura - MR 48 - 14 dias** | 444 | 3.56E-06 | 0.474 | 0.222 | 8.95 | 2870 |
| **Modulo de ruptura - MR 48 - 28 dias** | 422 | 3.41E-06 | 0.46 | 0.214 | 8.75 | 2760 |
| **Modulo de ruptura - MR 48 - 3 dias** | 527 | 4.13E-06 | 0.526 | 0.251 | 9.73 | 3310 |
| **Modulo de ruptura - MR 48 - 7 dias** | 483 | 3.83E-06 | 0.499 | 0.236 | 9.32 | 3080 |
| **Relleno Fluido - f´c 15 - 14 dias** | 178 | 1.51E-06 | 0.278 | 0.125 | 5.76 | 1260 |

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|---|---|---|---|---|---|---|
| **Relleno Fluido - f´c 15 - 28 dias** | 156 | 1.36E-06 | 0.264 | 0.118 | 5.55 | 1150 |
| **Relleno Fluido - f´c 15 - 3 dias** | 262 | 2.07E-06 | 0.33 | 0.151 | 6.53 | 1700 |
| **Relleno Fluido - f´c 15 - 7 dias** | 218 | 1.77E-06 | 0.303 | 0.137 | 6.13 | 1470 |
| **Relleno Fluido - f´c 20 - 14 dias** | 183 | 1.54E-06 | 0.281 | 0.126 | 5.8 | 1290 |
| **Relleno Fluido - f´c 20 - 28 dias** | 161 | 1.39E-06 | 0.267 | 0.119 | 5.59 | 1170 |
| **Relleno Fluido - f´c 20 - 3 dias** | 266 | 2.10E-06 | 0.333 | 0.152 | 6.57 | 1720 |
| **Relleno Fluido - f´c 20 - 7 dias** | 222 | 1.80E-06 | 0.306 | 0.139 | 6.17 | 1490 |
| **Relleno Fluido - f´c 25 - 14 dias** | 188 | 1.57E-06 | 0.284 | 0.128 | 5.85 | 1310 |
| **Relleno Fluido - f´c 25 - 28 dias** | 166 | 1.44E-06 | 0.272 | 0.129 | 5.66 | 1210 |
| **Relleno Fluido - f´c 25 - 3 dias** | 271 | 2.14E-06 | 0.336 | 0.154 | 6.62 | 1750 |
| **Relleno Fluido - f´c 25 - 7 dias** | 227 | 1.84E-06 | 0.309 | 0.14 | 6.22 | 1520 |
| **Relleno Fluido - f´c 30 - 14 dias** | 194 | 1.61E-06 | 0.288 | 0.13 | 5.91 | 1340 |
| **Relleno Fluido - f´c 30 - 28 dias** | 172 | 1.46E-06 | 0.274 | 0.122 | 5.69 | 1230 |
| **Relleno Fluido - f´c 30 - 3 dias** | 277 | 2.18E-06 | 0.34 | 0.156 | 6.68 | 1780 |
| **Relleno Fluido - f´c 30 - 7 dias** | 234 | 1.88E-06 | 0.313 | 0.142 | 6.28 | 1550 |
| **Relleno Fluido - f´c 40 - 14 dias** | 206 | 1.70E-06 | 0.296 | 0.133 | 6.02 | 1410 |
| **Relleno Fluido - f´c 40 - 28 dias** | 184 | 1.55E-06 | 0.282 | 0.126 | 5.81 | 1290 |
| **Relleno Fluido - f´c 40 - 3 dias** | 290 | 2.26E-06 | 0.347 | 0.16 | 6.79 | 1850 |
| **Relleno Fluido - f´c 40 - 7 dias** | 246 | 1.96E-06 | 0.32 | 0.146 | 6.39 | 1620 |
| **Relleno Fluido - f´c 50 - 14 dias** | 222 | 1.80E-06 | 0.306 | 0.139 | 6.17 | 1490 |
| **Relleno Fluido - f´c 50 - 28 dias** | 200 | 1.65E-06 | 0.291 | 0.131 | 5.95 | 1380 |
| **Relleno Fluido - f´c 50 - 3 dias** | 305 | 2.37E-06 | 0.357 | 0.165 | 6.93 | 1930 |
| **Relleno Fluido - f´c 50 - 7 dias** | 262 | 2.07E-06 | 0.33 | 0.151 | 6.53 | 1700 |
| **Relleno Fluido - f´c 60 - 14 dias** | 240 | 1.92E-06 | 0.316 | 0.144 | 6.32 | 1580 |
| **Relleno Fluido - f´c 60 - 28 dias** | 218 | 1.77E-06 | 0.302 | 0.137 | 6.12 | 1470 |
| **Relleno Fluido - f´c 60 - 3 dias** | 323 | 2.49E-06 | 0.368 | 0.17 | 7.09 | 2020 |

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|---|---|---|---|---|---|---|
| **Relleno Fluido - f´c 60 - 7 dias** | 279 | 2.19E-06 | 0.341 | 0.156 | 6.69 | 1790 |
| **Relleno Fluido - f´c 70 - 14 dias** | 257 | 2.04E-06 | 0.327 | 0.149 | 6.48 | 1680 |
| **Relleno Fluido - f´c 70 - 28 dias** | 235 | 1.89E-06 | 0.313 | 0.142 | 6.27 | 1560 |
| **Relleno Fluido - f´c 70 - 3 dias** | 340 | 2.60E-06 | 0.378 | 0.175 | 7.25 | 2110 |
| **Relleno Fluido - f´c 70 - 7 dias** | 297 | 2.31E-06 | 0.351 | 0.162 | 6.85 | 1880 |

b) Resource Inventory Metrics:

| **Indicator/LCI Metric** | **RPRE** | **PRM** | **NRPRE** | **NRPRM** | **SM** | **RSF** | **RE** | **FW** |
|---|---|---|---|---|---|---|---|---|
| **Unit** | **MJ** | **MJ** | **MJ** | **kg** | **MJ** | **MJ** | **MJ** | **m3** |
| **Alta resistencia - f´c 400 - 14 dias** | 99.8 | 4.11 | 98.8 | 1320 | 0.68 | 0.00684 | 0.321 | 0.553 |
| **Alta resistencia - f´c 400 - 28 dias** | 95.5 | 4.04 | 94.6 | 1250 | 0.661 | 0.00673 | 0.314 | 0.544 |
| **Alta resistencia - f´c 400 - 3 dias** | 114 | 4.33 | 113 | 1560 | 0.743 | 0.00717 | 0.342 | 0.593 |
| **Alta resistencia - f´c 400 - 7 dias** | 106 | 4.2 | 105 | 1420 | 0.706 | 0.00697 | 0.329 | 0.57 |
| **Alta resistencia - f´c 450 - 14 dias** | 108 | 4.23 | 107 | 1450 | 0.715 | 0.00703 | 0.332 | 0.578 |
| **Alta resistencia - f´c 450 - 28 dias** | 103 | 4.16 | 102 | 1380 | 0.696 | 0.00693 | 0.326 | 0.568 |
| **Alta resistencia - f´c 450 - 3 dias** | 122 | 4.45 | 121 | 1700 | 0.777 | 0.00735 | 0.354 | 0.618 |
| **Alta resistencia - f´c 450 - 7 dias** | 114 | 4.32 | 112 | 1550 | 0.74 | 0.00716 | 0.341 | 0.594 |
| **Alta resistencia - f´c 500 - 14 dias** | 115 | 4.33 | 114 | 1570 | 0.745 | 0.00718 | 0.343 | 0.596 |
| **Alta resistencia - f´c 500 - 28 dias** | 110 | 4.27 | 109 | 1500 | 0.726 | 0.00708 | 0.336 | 0.584 |
| **Alta resistencia - f´c 500 - 3 dias** | 129 | 4.55 | 128 | 1810 | 0.806 | 0.0075 | 0.364 | 0.634 |
| **Alta resistencia - f´c 500 - 7 dias** | 121 | 4.42 | 119 | 1670 | 0.77 | 0.00731 | 0.352 | 0.611 |
| **Alta resistencia - f´c 550 - 14 dias** | 125 | 4.47 | 123 | 1730 | 0.79 | 0.00744 | 0.368 | 0.633 |
| **Alta resistencia - f´c 550 - 28 dias** | 120 | 4.41 | 119 | 1660 | 0.771 | 0.00734 | 0.361 | 0.622 |
| **Alta resistencia - f´c 550 - 3 dias** | 139 | 4.69 | 138 | 1980 | 0.851 | 0.00776 | 0.39 | 0.673 |
| **Alta resistencia - f´c 550 - 7 dias** | 131 | 4.56 | 129 | 1830 | 0.815 | 0.00757 | 0.377 | 0.649 |
| **Alta resistencia - f´c 600 - 14 dias** | 134 | 4.62 | 133 | 1890 | 0.827 | 0.00762 | 0.379 | 0.653 |

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|---|---|---|---|---|---|---|---|---|
| **Alta resistencia - f´c 600 - 28 dias** | 130 | 4.55 | 129 | 1820 | 0.809 | 0.00752 | 0.372 | 0.641 |
| **Alta resistencia - f´c 600 - 3 dias** | 149 | 4.83 | 147 | 2140 | 0.888 | 0.00793 | 0.401 | 0.692 |
| **Alta resistencia - f´c 600 - 7 dias** | 140 | 4.71 | 139 | 1990 | 0.852 | 0.00774 | 0.388 | 0.671 |
| **Baja contracción - MR 38 - 3 dias** | 75.2 | 3.77 | 74.5 | 949 | 0.678 | 0.00763 | 0.297 | 0.615 |
| **Baja contracción - MR 38 - 7 dias** | 70.8 | 3.71 | 70.2 | 877 | 0.661 | 0.00755 | 0.291 | 0.607 |
| **Baja contracción - MR 40 - 14 dias** | 77.1 | 3.8 | 76.4 | 980 | 0.686 | 0.00766 | 0.3 | 0.616 |
| **Baja contracción - MR 40 - 28 dias** | 72.7 | 3.74 | 72.1 | 909 | 0.669 | 0.00759 | 0.293 | 0.609 |
| **Baja contracción - MR 42 - 3 dias** | 79.4 | 3.84 | 78.6 | 1020 | 0.694 | 0.0077 | 0.303 | 0.621 |
| **Baja contracción - MR 42 - 7 dias** | 75 | 3.77 | 74.3 | 946 | 0.677 | 0.00762 | 0.297 | 0.613 |
| **Baja contracción - MR 45 - 14 dias** | 83 | 3.89 | 82.2 | 1080 | 0.708 | 0.00776 | 0.308 | 0.626 |
| **Baja contracción - MR 45 - 28 dias** | 78.7 | 3.83 | 77.9 | 1010 | 0.691 | 0.00768 | 0.302 | 0.62 |
| **Baja contracción - MR 48 - 3 dias** | 87 | 3.95 | 86.2 | 1140 | 0.723 | 0.00782 | 0.313 | 0.633 |
| **Baja contracción - MR 48 - 7 dias** | 82.7 | 3.89 | 81.9 | 1070 | 0.706 | 0.00774 | 0.307 | 0.626 |
| **Convencional - f´c 100 - 14 dias** | 53.2 | 3.38 | 52.8 | 520 | 0.38 | 0.00451 | 0.221 | 0.381 |
| **Convencional - f´c 100 - 28 dias** | 48.9 | 3.32 | 48.5 | 449 | 0.362 | 0.00442 | 0.216 | 0.372 |
| **Convencional - f´c 100 - 3 dias** | 67.6 | 3.61 | 67 | 761 | 0.441 | 0.00482 | 0.24 | 0.417 |
| **Convencional - f´c 100 - 7 dias** | 59.1 | 3.48 | 58.7 | 619 | 0.405 | 0.00464 | 0.229 | 0.396 |
| **Convencional - f´c 150 - 14 dias** | 57.4 | 3.45 | 57 | 591 | 0.398 | 0.00461 | 0.227 | 0.391 |
| **Convencional - f´c 150 - 28 dias** | 53.2 | 3.38 | 52.8 | 520 | 0.38 | 0.00451 | 0.221 | 0.382 |
| **Convencional - f´c 150 - 3 dias** | 71.9 | 3.67 | 71.2 | 832 | 0.459 | 0.00492 | 0.245 | 0.429 |
| **Convencional - f´c 150 - 7 dias** | 63.4 | 3.54 | 62.9 | 690 | 0.423 | 0.00474 | 0.235 | 0.408 |
| **Convencional - f´c 200 - 14 dias** | 64.9 | 3.56 | 64.4 | 716 | 0.429 | 0.00476 | 0.236 | 0.411 |
| **Convencional - f´c 200 - 28 dias** | 60.6 | 3.5 | 60.1 | 645 | 0.411 | 0.00467 | 0.231 | 0.401 |
| **Convencional - f´c 200 - 3 dias** | 79.3 | 3.79 | 78.6 | 956 | 0.49 | 0.00508 | 0.255 | 0.448 |
| **Convencional - f´c 200 - 7 dias** | 70.9 | 3.66 | 70.2 | 815 | 0.454 | 0.0049 | 0.244 | 0.426 |
| **Convencional - f´c 250 - 14 dias** | 73 | 3.69 | 72.4 | 851 | 0.463 | 0.00494 | 0.247 | 0.431 |

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|---|---|---|---|---|---|---|---|---|
| **Convencional - f´c 250 - 28 dias** | 68.8 | 3.62 | 68.2 | 781 | 0.445 | 0.00484 | 0.241 | 0.422 |
| **Convencional - f´c 250 - 3 dias** | 87.5 | 3.91 | 86.6 | 1090 | 0.524 | 0.00525 | 0.265 | 0.468 |
| **Convencional - f´c 250 - 7 dias** | 79 | 3.78 | 78.3 | 950 | 0.488 | 0.00507 | 0.254 | 0.446 |
| **Convencional - f´c 300 - 14 dias** | 84 | 3.86 | 83.2 | 1040 | 0.509 | 0.00516 | 0.26 | 0.467 |
| **Convencional - f´c 300 - 28 dias** | 79.7 | 3.79 | 79 | 965 | 0.491 | 0.00507 | 0.255 | 0.456 |
| **Convencional - f´c 300 - 3 dias** | 98.4 | 4.08 | 97.4 | 1280 | 0.569 | 0.00547 | 0.279 | 0.502 |
| **Convencional - f´c 300 - 7 dias** | 89.9 | 3.95 | 89.1 | 1130 | 0.534 | 0.00529 | 0.268 | 0.482 |
| **Convencional - f´c 350 - 14 dias** | 94.1 | 4.02 | 93.2 | 1210 | 0.551 | 0.00538 | 0.273 | 0.49 |
| **Convencional - f´c 350 - 28 dias** | 89.9 | 3.95 | 89 | 1130 | 0.533 | 0.00528 | 0.268 | 0.48 |
| **Convencional - f´c 350 - 3 dias** | 109 | 4.24 | 107 | 1450 | 0.612 | 0.00569 | 0.292 | 0.526 |
| **Convencional - f´c 350 - 7 dias** | 100 | 4.11 | 99.1 | 1300 | 0.576 | 0.00551 | 0.281 | 0.505 |
| **Estructural - f´c 250 - 14 dias** | 69.7 | 3.69 | 69.1 | 834 | 0.544 | 0.00604 | 0.245 | 0.456 |
| **Estructural - f´c 250 - 28 dias** | 65.6 | 3.62 | 65 | 765 | 0.525 | 0.00593 | 0.242 | 0.449 |
| **Estructural - f´c 250 - 3 dias** | 83.6 | 3.91 | 82.7 | 1070 | 0.605 | 0.00635 | 0.258 | 0.487 |
| **Estructural - f´c 250 - 7 dias** | 75.4 | 3.78 | 74.7 | 931 | 0.569 | 0.00616 | 0.251 | 0.468 |
| **Estructural - f´c 300 - 14 dias** | 79.1 | 3.84 | 78.3 | 995 | 0.585 | 0.00624 | 0.254 | 0.487 |
| **Estructural - f´c 300 - 28 dias** | 75.1 | 3.78 | 74.3 | 926 | 0.567 | 0.00615 | 0.25 | 0.477 |
| **Estructural - f´c 300 - 3 dias** | 93 | 4.06 | 92 | 1230 | 0.644 | 0.00654 | 0.266 | 0.515 |
| **Estructural - f´c 300 - 7 dias** | 84.9 | 3.93 | 84 | 1090 | 0.609 | 0.00636 | 0.259 | 0.497 |
| **Estructural - f´c 350 - 14 dias** | 87.6 | 3.97 | 86.7 | 1140 | 0.62 | 0.00642 | 0.262 | 0.502 |
| **Estructural - f´c 350 - 28 dias** | 83.5 | 3.91 | 82.6 | 1070 | 0.602 | 0.00632 | 0.258 | 0.494 |
| **Estructural - f´c 350 - 3 dias** | 101 | 4.19 | 100 | 1370 | 0.678 | 0.00671 | 0.274 | 0.532 |
| **Estructural - f´c 350 - 7 dias** | 93.3 | 4.06 | 92.3 | 1230 | 0.644 | 0.00654 | 0.267 | 0.515 |
| **Lanzado - f´c 200 - 14 dias** | 84.3 | 3.89 | 83.5 | 1070 | 0.56 | 0.00574 | 0.268 | 0.506 |
| **Lanzado - f´c 200 - 28 dias** | 79.4 | 3.81 | 78.6 | 984 | 0.535 | 0.00559 | 0.261 | 0.494 |
| **Lanzado - f´c 200 - 3 dias** | 92.6 | 4.02 | 91.7 | 1210 | 0.602 | 0.00601 | 0.28 | 0.527 |

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|---|---|---|---|---|---|---|---|---|
| **Lanzado - f´c 200 - 7 dias** | 89.3 | 3.97 | 88.4 | 1150 | 0.584 | 0.00589 | 0.275 | 0.518 |
| **Lanzado - f´c 250 - 14 dias** | 89.3 | 3.97 | 88.5 | 1150 | 0.585 | 0.0059 | 0.276 | 0.518 |
| **Lanzado - f´c 250 - 28 dias** | 84.4 | 3.89 | 83.6 | 1070 | 0.56 | 0.00575 | 0.269 | 0.507 |
| **Lanzado - f´c 250 - 3 dias** | 97.6 | 4.1 | 96.6 | 1300 | 0.626 | 0.00615 | 0.287 | 0.54 |
| **Lanzado - f´c 250 - 7 dias** | 94.3 | 4.05 | 93.4 | 1240 | 0.609 | 0.00604 | 0.282 | 0.531 |
| **Lanzado - f´c 300 - 14 dias** | 96 | 4.07 | 95.1 | 1270 | 0.616 | 0.00607 | 0.285 | 0.536 |
| **Lanzado - f´c 300 - 28 dias** | 91 | 3.99 | 90.1 | 1180 | 0.591 | 0.00593 | 0.278 | 0.524 |
| **Lanzado - f´c 300 - 3 dias** | 104 | 4.2 | 103 | 1410 | 0.656 | 0.00632 | 0.296 | 0.558 |
| **Lanzado - f´c 300 - 7 dias** | 101 | 4.15 | 100 | 1350 | 0.639 | 0.00621 | 0.292 | 0.549 |
| **Lanzado - f´c 350 - 14 dias** | 104 | 4.19 | 103 | 1390 | 0.649 | 0.00626 | 0.295 | 0.554 |
| **Lanzado - f´c 350 - 28 dias** | 98.6 | 4.11 | 97.6 | 1310 | 0.626 | 0.00612 | 0.288 | 0.543 |
| **Lanzado - f´c 350 - 3 dias** | 112 | 4.32 | 111 | 1540 | 0.689 | 0.0065 | 0.306 | 0.575 |
| **Lanzado - f´c 350 - 7 dias** | 109 | 4.27 | 107 | 1480 | 0.673 | 0.0064 | 0.302 | 0.566 |
| **Modulo de ruptura - MR 35 - 14 dias** | 77.4 | 3.81 | 76.7 | 972 | 0.624 | 0.00682 | 0.279 | 0.522 |
| **Modulo de ruptura - MR 35 - 28 dias** | 73.2 | 3.74 | 72.5 | 902 | 0.606 | 0.00673 | 0.273 | 0.513 |
| **Modulo de ruptura - MR 35 - 3 dias** | 93.5 | 4.05 | 92.6 | 1240 | 0.688 | 0.00712 | 0.298 | 0.558 |
| **Modulo de ruptura - MR 35 - 7 dias** | 85.1 | 3.92 | 84.2 | 1100 | 0.654 | 0.00696 | 0.288 | 0.539 |
| **Modulo de ruptura - MR 36 - 14 dias** | 78.1 | 3.82 | 77.3 | 984 | 0.627 | 0.00683 | 0.28 | 0.526 |
| **Modulo de ruptura - MR 36 - 28 dias** | 73.8 | 3.75 | 73.1 | 913 | 0.609 | 0.00674 | 0.274 | 0.517 |
| **Modulo de ruptura - MR 36 - 3 dias** | 94.2 | 4.06 | 93.2 | 1250 | 0.691 | 0.00713 | 0.299 | 0.56 |
| **Modulo de ruptura - MR 36 - 7 dias** | 85.7 | 3.93 | 84.9 | 1110 | 0.657 | 0.00697 | 0.289 | 0.54 |

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|---|---|---|---|---|---|---|---|---|
| **Modulo de ruptura - MR 38 - 14 dias** | 79.8 | 3.84 | 79 | 1010 | 0.634 | 0.00687 | 0.282 | 0.528 |
| **Modulo de ruptura - MR 38 - 28 dias** | 75.5 | 3.78 | 74.8 | 941 | 0.616 | 0.00678 | 0.276 | 0.519 |
| **Modulo de ruptura - MR 38 - 3 dias** | 95.9 | 4.09 | 94.9 | 1280 | 0.698 | 0.00716 | 0.301 | 0.564 |
| **Modulo de ruptura - MR 38 - 7 dias** | 87.4 | 3.96 | 86.6 | 1140 | 0.664 | 0.00701 | 0.291 | 0.545 |
| **Modulo de ruptura - MR 40 - 14 dias** | 81.6 | 3.87 | 80.8 | 1040 | 0.641 | 0.0069 | 0.284 | 0.533 |
| **Modulo de ruptura - MR 40 - 28 dias** | 77.4 | 3.81 | 76.6 | 972 | 0.624 | 0.00682 | 0.279 | 0.522 |
| **Modulo de ruptura - MR 40 - 3 dias** | 97.7 | 4.12 | 96.7 | 1310 | 0.705 | 0.0072 | 0.303 | 0.567 |
| **Modulo de ruptura - MR 40 - 7 dias** | 89.3 | 3.99 | 88.4 | 1170 | 0.672 | 0.00705 | 0.293 | 0.547 |
| **Modulo de ruptura - MR 42 - 14 dias** | 84 | 3.91 | 83.2 | 1080 | 0.651 | 0.00695 | 0.287 | 0.538 |
| **Modulo de ruptura - MR 42 - 28 dias** | 79.7 | 3.84 | 79 | 1010 | 0.633 | 0.00686 | 0.281 | 0.528 |
| **Modulo de ruptura - MR 42 - 3 dias** | 100 | 4.15 | 99.1 | 1350 | 0.715 | 0.00724 | 0.306 | 0.572 |
| **Modulo de ruptura - MR 42 - 7 dias** | 91.6 | 4.02 | 90.7 | 1210 | 0.681 | 0.00709 | 0.296 | 0.555 |
| **Modulo de ruptura - MR 45 - 14 dias** | 87.7 | 3.96 | 86.9 | 1140 | 0.666 | 0.00702 | 0.291 | 0.544 |
| **Modulo de ruptura - MR 45 - 28 dias** | 83.5 | 3.9 | 82.7 | 1070 | 0.648 | 0.00693 | 0.286 | 0.535 |
| **Modulo de ruptura - MR 45 - 3 dias** | 104 | 4.21 | 103 | 1410 | 0.729 | 0.00731 | 0.31 | 0.579 |
| **Modulo de ruptura - MR 45 - 7 dias** | 95.4 | 4.08 | 94.4 | 1270 | 0.696 | 0.00715 | 0.3 | 0.561 |
| **Modulo de ruptura - MR 48 - 14 dias** | 91.8 | 4.03 | 90.9 | 1210 | 0.682 | 0.00709 | 0.296 | 0.553 |

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|---|---|---|---|---|---|---|---|---|
| **Modulo de ruptura - MR 48 - 28 dias** | 87.5 | 3.96 | 86.7 | 1140 | 0.664 | 0.007 | 0.291 | 0.543 |
| **Modulo de ruptura - MR 48 - 3 dias** | 108 | 4.27 | 107 | 1480 | 0.745 | 0.00738 | 0.315 | 0.588 |
| **Modulo de ruptura - MR 48 - 7 dias** | 99.4 | 4.14 | 98.4 | 1340 | 0.712 | 0.00723 | 0.305 | 0.569 |
| **Relleno Fluido - f´c 15 - 14 dias** | 44.8 | 3.31 | 44.4 | 435 | 0.322 | 0.00382 | 0.184 | 0.402 |
| **Relleno Fluido - f´c 15 - 28 dias** | 40.6 | 3.24 | 40.3 | 365 | 0.305 | 0.00373 | 0.179 | 0.392 |
| **Relleno Fluido - f´c 15 - 3 dias** | 60.8 | 3.56 | 60.2 | 702 | 0.389 | 0.00416 | 0.202 | 0.438 |
| **Relleno Fluido - f´c 15 - 7 dias** | 52.4 | 3.43 | 51.9 | 561 | 0.353 | 0.00398 | 0.193 | 0.418 |
| **Relleno Fluido - f´c 20 - 14 dias** | 45.6 | 3.32 | 45.3 | 449 | 0.326 | 0.00384 | 0.185 | 0.405 |
| **Relleno Fluido - f´c 20 - 28 dias** | 41.4 | 3.25 | 41.1 | 379 | 0.307 | 0.00374 | 0.18 | 0.394 |
| **Relleno Fluido - f´c 20 - 3 dias** | 61.6 | 3.57 | 61 | 716 | 0.392 | 0.00418 | 0.203 | 0.441 |
| **Relleno Fluido - f´c 20 - 7 dias** | 53.2 | 3.44 | 52.8 | 575 | 0.357 | 0.004 | 0.194 | 0.421 |
| **Relleno Fluido - f´c 25 - 14 dias** | 46.6 | 3.34 | 46.3 | 466 | 0.329 | 0.00386 | 0.186 | 0.407 |
| **Relleno Fluido - f´c 25 - 28 dias** | 42.7 | 3.27 | 42.4 | 399 | 0.314 | 0.00379 | 0.185 | 0.402 |
| **Relleno Fluido - f´c 25 - 3 dias** | 62.6 | 3.59 | 62 | 733 | 0.396 | 0.0042 | 0.204 | 0.443 |
| **Relleno Fluido - f´c 25 - 7 dias** | 54.2 | 3.45 | 53.7 | 592 | 0.361 | 0.00402 | 0.195 | 0.424 |
| **Relleno Fluido - f´c 30 - 14 dias** | 47.8 | 3.35 | 47.4 | 485 | 0.335 | 0.00389 | 0.188 | 0.412 |
| **Relleno Fluido - f´c 30 - 28 dias** | 43.6 | 3.29 | 43.2 | 415 | 0.317 | 0.00379 | 0.182 | 0.402 |
| **Relleno Fluido - f´c 30 - 3 dias** | 63.8 | 3.6 | 63.2 | 752 | 0.401 | 0.00422 | 0.206 | 0.448 |
| **Relleno Fluido - f´c 30 - 7 dias** | 55.4 | 3.47 | 54.9 | 612 | 0.367 | 0.00405 | 0.196 | 0.429 |
| **Relleno Fluido - f´c 40 - 14 dias** | 50.2 | 3.39 | 49.8 | 525 | 0.345 | 0.00394 | 0.19 | 0.418 |
| **Relleno Fluido - f´c 40 - 28 dias** | 46 | 3.32 | 45.6 | 455 | 0.328 | 0.00385 | 0.186 | 0.409 |
| **Relleno Fluido - f´c 40 - 3 dias** | 66.1 | 3.64 | 65.5 | 792 | 0.411 | 0.00427 | 0.208 | 0.454 |
| **Relleno Fluido - f´c 40 - 7 dias** | 57.8 | 3.51 | 57.2 | 651 | 0.376 | 0.0041 | 0.199 | 0.435 |
| **Relleno Fluido - f´c 50 - 14 dias** | 53.2 | 3.44 | 52.8 | 575 | 0.358 | 0.00401 | 0.194 | 0.425 |

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|---|---|---|---|---|---|---|---|---|
| **Relleno Fluido - f´c 50 - 28 dias** | 49 | 3.37 | 48.6 | 505 | 0.339 | 0.0039 | 0.189 | 0.416 |
| **Relleno Fluido - f´c 50 - 3 dias** | 69.1 | 3.69 | 68.5 | 842 | 0.424 | 0.00433 | 0.212 | 0.462 |
| **Relleno Fluido - f´c 50 - 7 dias** | 60.8 | 3.56 | 60.2 | 702 | 0.389 | 0.00416 | 0.202 | 0.442 |
| **Relleno Fluido - f´c 60 - 14 dias** | 56.5 | 3.49 | 56 | 632 | 0.371 | 0.00407 | 0.197 | 0.433 |
| **Relleno Fluido - f´c 60 - 28 dias** | 52.3 | 3.43 | 51.9 | 561 | 0.354 | 0.00398 | 0.193 | 0.424 |
| **Relleno Fluido - f´c 60 - 3 dias** | 72.5 | 3.74 | 71.8 | 899 | 0.437 | 0.0044 | 0.216 | 0.469 |
| **Relleno Fluido - f´c 60 - 7 dias** | 64.1 | 3.61 | 63.5 | 758 | 0.402 | 0.00423 | 0.206 | 0.449 |
| **Relleno Fluido - f´c 70 - 14 dias** | 59.9 | 3.54 | 59.4 | 688 | 0.385 | 0.00414 | 0.201 | 0.44 |
| **Relleno Fluido - f´c 70 - 28 dias** | 55.7 | 3.48 | 55.2 | 618 | 0.367 | 0.00404 | 0.196 | 0.43 |
| **Relleno Fluido - f´c 70 - 3 dias** | 75.8 | 3.79 | 75.1 | 955 | 0.451 | 0.00447 | 0.219 | 0.477 |
| **Relleno Fluido - f´c 70 - 7 dias** | 67.4 | 3.66 | 66.8 | 814 | 0.416 | 0.00429 | 0.21 | 0.457 |

c) Waste/output Inventory Metrics:

| **Indicator/LCI Metric** | **HWD** | **NHWD** | **HLRW** | **ILLRW** | **MR** | **MER** |
|---|---|---|---|---|---|---|
| **Unit** | **kg** | **kg** | **kg** | **kg** | **kg** | **kg** |
| **Alta resistencia - f´c 400 - 14 dias** | 3.98 | 95.5 | 0.000221 | 0.000737 | 0.0435 | 8.82E-05 |
| **Alta resistencia - f´c 400 - 28 dias** | 3.87 | 92.7 | 0.000214 | 0.000709 | 0.0417 | 8.62E-05 |
| **Alta resistencia - f´c 400 - 3 dias** | 4.35 | 105 | 0.000244 | 0.000831 | 0.0497 | 9.50E-05 |
| **Alta resistencia - f´c 400 - 7 dias** | 4.13 | 99.6 | 0.000231 | 0.000776 | 0.0461 | 9.10E-05 |
| **Alta resistencia - f´c 450 - 14 dias** | 4.18 | 101 | 0.000233 | 0.000787 | 0.0469 | 9.20E-05 |
| **Alta resistencia - f´c 450 - 28 dias** | 4.07 | 98 | 0.000227 | 0.000759 | 0.045 | 8.99E-05 |
| **Alta resistencia - f´c 450 - 3 dias** | 4.56 | 111 | 0.000257 | 0.000882 | 0.053 | 9.86E-05 |
| **Alta resistencia - f´c 450 - 7 dias** | 4.33 | 105 | 0.000243 | 0.000826 | 0.0494 | 9.47E-05 |
| **Alta resistencia - f´c 500 - 14 dias** | 4.36 | 106 | 0.000245 | 0.000833 | 0.0499 | 9.52E-05 |
| **Alta resistencia - f´c 500 - 28 dias** | 4.25 | 103 | 0.000238 | 0.000806 | 0.048 | 9.31E-05 |
| **Alta resistencia - f´c 500 - 3 dias** | 4.74 | 115 | 0.000268 | 0.000928 | 0.056 | 0.000102 |
| **Alta resistencia - f´c 500 - 7 dias** | 4.52 | 110 | 0.000254 | 0.000873 | 0.0524 | 9.79E-05 |

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|---|---|---|---|---|---|---|
| **Alta resistencia - f´c 550 - 14 dias** | 4.69 | 114 | 0.000263 | 0.000903 | 0.054 | 0.000101 |
| **Alta resistencia - f´c 550 - 28 dias** | 4.57 | 111 | 0.000256 | 0.000875 | 0.0522 | 9.94E-05 |
| **Alta resistencia - f´c 550 - 3 dias** | 5.07 | 124 | 0.000287 | 0.000999 | 0.0603 | 0.000108 |
| **Alta resistencia - f´c 550 - 7 dias** | 4.85 | 118 | 0.000273 | 0.000943 | 0.0566 | 0.000104 |
| **Alta resistencia - f´c 600 - 14 dias** | 4.91 | 120 | 0.000278 | 0.000964 | 0.0581 | 0.000105 |
| **Alta resistencia - f´c 600 - 28 dias** | 4.8 | 117 | 0.000271 | 0.000936 | 0.0562 | 0.000103 |
| **Alta resistencia - f´c 600 - 3 dias** | 5.3 | 130 | 0.000302 | 0.00106 | 0.0643 | 0.000112 |
| **Alta resistencia - f´c 600 - 7 dias** | 5.07 | 124 | 0.000288 | 0.001 | 0.0606 | 0.000108 |
| **Baja contracción - MR 38 - 3 dias** | 3.37 | 78.6 | 0.000167 | 0.000556 | 0.0336 | 8.66E-05 |
| **Baja contracción - MR 38 - 7 dias** | 3.25 | 75.6 | 0.00016 | 0.000527 | 0.0317 | 8.47E-05 |
| **Baja contracción - MR 40 - 14 dias** | 3.42 | 79.9 | 0.00017 | 0.000568 | 0.0344 | 8.74E-05 |
| **Baja contracción - MR 40 - 28 dias** | 3.3 | 76.9 | 0.000163 | 0.000539 | 0.0325 | 8.55E-05 |
| **Baja contracción - MR 42 - 3 dias** | 3.47 | 81.4 | 0.000174 | 0.000583 | 0.0353 | 8.83E-05 |
| **Baja contracción - MR 42 - 7 dias** | 3.36 | 78.4 | 0.000167 | 0.000554 | 0.0335 | 8.64E-05 |
| **Baja contracción - MR 45 - 14 dias** | 3.57 | 83.8 | 0.00018 | 0.000608 | 0.0369 | 8.98E-05 |
| **Baja contracción - MR 45 - 28 dias** | 3.45 | 80.9 | 0.000173 | 0.000578 | 0.035 | 8.79E-05 |
| **Baja contracción - MR 48 - 3 dias** | 3.67 | 86.5 | 0.000187 | 0.000634 | 0.0385 | 9.14E-05 |
| **Baja contracción - MR 48 - 7 dias** | 3.56 | 83.6 | 0.00018 | 0.000605 | 0.0367 | 8.96E-05 |
| **Convencional - f´c 100 - 14 dias** | 2.63 | 61.1 | 0.000155 | 0.000443 | 0.0232 | 5.38E-05 |
| **Convencional - f´c 100 - 28 dias** | 2.52 | 58.3 | 0.000148 | 0.000415 | 0.0213 | 5.20E-05 |
| **Convencional - f´c 100 - 3 dias** | 2.98 | 70.4 | 0.000178 | 0.000537 | 0.0293 | 5.99E-05 |
| **Convencional - f´c 100 - 7 dias** | 2.77 | 64.9 | 0.000164 | 0.000482 | 0.0257 | 5.64E-05 |
| **Convencional - f´c 150 - 14 dias** | 2.73 | 63.8 | 0.000162 | 0.000471 | 0.025 | 5.56E-05 |
| **Convencional - f´c 150 - 28 dias** | 2.62 | 61.1 | 0.000155 | 0.000443 | 0.0231 | 5.38E-05 |
| **Convencional - f´c 150 - 3 dias** | 3.09 | 73.2 | 0.000184 | 0.000564 | 0.0311 | 6.17E-05 |
| **Convencional - f´c 150 - 7 dias** | 2.88 | 67.7 | 0.000171 | 0.00051 | 0.0275 | 5.82E-05 |

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| **Convencional - f´c 200 - 14 dias** | 2.92 | 68.7 | 0.000173 | 0.000519 | 0.0281 | 5.88E-05 |
| **Convencional - f´c 200 - 28 dias** | 2.81 | 65.9 | 0.000167 | 0.000491 | 0.0263 | 5.69E-05 |
| **Convencional - f´c 200 - 3 dias** | 3.27 | 78 | 0.000196 | 0.000612 | 0.0343 | 6.48E-05 |
| **Convencional - f´c 200 - 7 dias** | 3.06 | 72.5 | 0.000183 | 0.000558 | 0.0307 | 6.13E-05 |
| **Convencional - f´c 250 - 14 dias** | 3.11 | 73.9 | 0.000186 | 0.000572 | 0.0316 | 6.22E-05 |
| **Convencional - f´c 250 - 28 dias** | 3.01 | 71.1 | 0.000179 | 0.000544 | 0.0298 | 6.03E-05 |
| **Convencional - f´c 250 - 3 dias** | 3.47 | 83.2 | 0.000209 | 0.000665 | 0.0377 | 6.82E-05 |
| **Convencional - f´c 250 - 7 dias** | 3.26 | 77.7 | 0.000196 | 0.00061 | 0.0341 | 6.47E-05 |
| **Convencional - f´c 300 - 14 dias** | 3.38 | 81 | 0.000203 | 0.000642 | 0.0363 | 6.67E-05 |
| **Convencional - f´c 300 - 28 dias** | 3.27 | 78.2 | 0.000196 | 0.000614 | 0.0344 | 6.49E-05 |
| **Convencional - f´c 300 - 3 dias** | 3.73 | 90.2 | 0.000226 | 0.000735 | 0.0424 | 7.28E-05 |
| **Convencional - f´c 300 - 7 dias** | 3.53 | 84.8 | 0.000212 | 0.00068 | 0.0388 | 6.92E-05 |
| **Convencional - f´c 350 - 14 dias** | 3.63 | 87.5 | 0.000219 | 0.000708 | 0.0406 | 7.09E-05 |
| **Convencional - f´c 350 - 28 dias** | 3.52 | 84.7 | 0.000212 | 0.00068 | 0.0388 | 6.91E-05 |
| **Convencional - f´c 350 - 3 dias** | 3.98 | 96.7 | 0.000241 | 8.00E-04 | 0.0467 | 7.70E-05 |
| **Convencional - f´c 350 - 7 dias** | 3.78 | 91.3 | 0.000228 | 0.000746 | 0.0431 | 7.35E-05 |
| **Estructural - f´c 250 - 14 dias** | 3 | 70.3 | 0.000165 | 0.000528 | 0.031 | 6.93E-05 |
| **Estructural - f´c 250 - 28 dias** | 2.91 | 68 | 0.000159 | 0.000502 | 0.0292 | 6.76E-05 |
| **Estructural - f´c 250 - 3 dias** | 3.3 | 78.4 | 0.000185 | 0.000614 | 0.0369 | 7.46E-05 |
| **Estructural - f´c 250 - 7 dias** | 3.12 | 73.7 | 0.000173 | 0.000563 | 0.0334 | 7.14E-05 |
| **Estructural - f´c 300 - 14 dias** | 3.2 | 75.9 | 0.000178 | 0.000586 | 0.035 | 7.28E-05 |
| **Estructural - f´c 300 - 28 dias** | 3.11 | 73.5 | 0.000173 | 0.000561 | 0.0333 | 7.12E-05 |
| **Estructural - f´c 300 - 3 dias** | 3.51 | 83.9 | 0.000198 | 0.000673 | 0.041 | 7.79E-05 |
| **Estructural - f´c 300 - 7 dias** | 3.33 | 79.2 | 0.000187 | 0.000622 | 0.0375 | 7.49E-05 |
| **Estructural - f´c 350 - 14 dias** | 3.39 | 80.8 | 0.000191 | 0.000639 | 0.0386 | 7.59E-05 |
| **Estructural - f´c 350 - 28 dias** | 3.3 | 78.4 | 0.000185 | 0.000614 | 0.0369 | 7.43E-05 |

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| **Estructural - f´c 350 - 3 dias** | 3.7 | 88.8 | 0.000211 | 0.000726 | 0.0446 | 8.10E-05 |
| **Estructural - f´c 350 - 7 dias** | 3.52 | 84.1 | 0.000199 | 0.000675 | 0.0411 | 7.79E-05 |
| **Lanzado - f´c 200 - 14 dias** | 3.4 | 81.6 | 0.000195 | 0.000633 | 0.0368 | 7.23E-05 |
| **Lanzado - f´c 200 - 28 dias** | 3.27 | 78.4 | 0.000188 | 0.000602 | 0.0346 | 6.98E-05 |
| **Lanzado - f´c 200 - 3 dias** | 3.6 | 87 | 0.000207 | 0.000685 | 0.0403 | 7.66E-05 |
| **Lanzado - f´c 200 - 7 dias** | 3.52 | 84.8 | 0.000202 | 0.000664 | 0.0389 | 7.48E-05 |
| **Lanzado - f´c 250 - 14 dias** | 3.52 | 84.9 | 0.000203 | 0.000665 | 0.0389 | 7.49E-05 |
| **Lanzado - f´c 250 - 28 dias** | 3.4 | 81.7 | 0.000195 | 0.000633 | 0.0368 | 7.24E-05 |
| **Lanzado - f´c 250 - 3 dias** | 3.73 | 90.2 | 0.000215 | 0.000717 | 0.0425 | 7.91E-05 |
| **Lanzado - f´c 250 - 7 dias** | 3.65 | 88.1 | 0.00021 | 0.000696 | 0.041 | 7.73E-05 |
| **Lanzado - f´c 300 - 14 dias** | 3.69 | 89.2 | 0.000213 | 0.000707 | 0.0418 | 7.80E-05 |
| **Lanzado - f´c 300 - 28 dias** | 3.56 | 86 | 0.000205 | 0.000676 | 0.0396 | 7.56E-05 |
| **Lanzado - f´c 300 - 3 dias** | 3.9 | 94.6 | 0.000225 | 0.00076 | 0.0453 | 8.22E-05 |
| **Lanzado - f´c 300 - 7 dias** | 3.81 | 92.4 | 0.00022 | 0.000739 | 0.0439 | 8.04E-05 |
| **Lanzado - f´c 350 - 14 dias** | 3.88 | 94.1 | 0.000224 | 0.000756 | 0.045 | 8.15E-05 |
| **Lanzado - f´c 350 - 28 dias** | 3.75 | 90.9 | 0.000217 | 0.000724 | 0.0429 | 7.90E-05 |
| **Lanzado - f´c 350 - 3 dias** | 4.08 | 99.4 | 0.000236 | 0.000808 | 0.0486 | 8.55E-05 |
| **Lanzado - f´c 350 - 7 dias** | 4 | 97.3 | 0.000232 | 0.000787 | 0.0471 | 8.38E-05 |
| **Modulo de ruptura - MR 35 - 14 dias** | 3.31 | 78.1 | 0.000175 | 0.000576 | 0.0344 | 7.99E-05 |
| **Modulo de ruptura - MR 35 - 28 dias** | 3.21 | 75.4 | 0.000169 | 0.000548 | 0.0326 | 7.81E-05 |
| **Modulo de ruptura - MR 35 - 3 dias** | 3.7 | 88.3 | 0.000201 | 0.00068 | 0.0412 | 8.61E-05 |
| **Modulo de ruptura - MR 35 - 7 dias** | 3.5 | 82.9 | 0.000187 | 0.000625 | 0.0376 | 8.28E-05 |
| **Modulo de ruptura - MR 36 - 14 dias** | 3.33 | 78.5 | 0.000176 | 0.00058 | 0.0347 | 8.01E-05 |
| **Modulo de ruptura - MR 36 - 28 dias** | 3.22 | 75.8 | 0.00017 | 0.000553 | 0.0328 | 7.83E-05 |
| **Modulo de ruptura - MR 36 - 3 dias** | 3.72 | 88.7 | 0.000202 | 0.000684 | 0.0415 | 8.64E-05 |
| **Modulo de ruptura - MR 36 - 7 dias** | 3.52 | 83.3 | 0.000189 | 0.00063 | 0.0379 | 8.31E-05 |

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| **Modulo de ruptura - MR 38 - 14 dias** | 3.37 | 79.6 | 0.000179 | 0.000591 | 0.0354 | 8.08E-05 |
| **Modulo de ruptura - MR 38 - 28 dias** | 3.27 | 76.9 | 0.000172 | 0.000564 | 0.0336 | 7.90E-05 |
| **Modulo de ruptura - MR 38 - 3 dias** | 3.76 | 89.8 | 0.000204 | 0.000695 | 0.0422 | 8.71E-05 |
| **Modulo de ruptura - MR 38 - 7 dias** | 3.56 | 84.4 | 0.000191 | 0.000641 | 0.0386 | 8.38E-05 |
| **Modulo de ruptura - MR 40 - 14 dias** | 3.41 | 80.7 | 0.000182 | 0.000603 | 0.0362 | 8.15E-05 |
| **Modulo de ruptura - MR 40 - 28 dias** | 3.31 | 78 | 0.000175 | 0.000575 | 0.0344 | 7.98E-05 |
| **Modulo de ruptura - MR 40 - 3 dias** | 3.8 | 90.9 | 0.000207 | 0.000707 | 0.043 | 8.78E-05 |
| **Modulo de ruptura - MR 40 - 7 dias** | 3.6 | 85.6 | 0.000194 | 0.000653 | 0.0394 | 8.45E-05 |
| **Modulo de ruptura - MR 42 - 14 dias** | 3.47 | 82.3 | 0.000186 | 0.000618 | 0.0372 | 8.25E-05 |
| **Modulo de ruptura - MR 42 - 28 dias** | 3.37 | 79.5 | 0.000179 | 0.000591 | 0.0354 | 8.08E-05 |
| **Modulo de ruptura - MR 42 - 3 dias** | 3.86 | 92.4 | 0.000211 | 0.000722 | 0.044 | 8.87E-05 |
| **Modulo de ruptura - MR 42 - 7 dias** | 3.66 | 87.1 | 0.000198 | 0.000668 | 0.0404 | 8.54E-05 |
| **Modulo de ruptura - MR 45 - 14 dias** | 3.56 | 84.6 | 0.000191 | 0.000642 | 0.0388 | 8.40E-05 |
| **Modulo de ruptura - MR 45 - 28 dias** | 3.46 | 81.9 | 0.000185 | 0.000615 | 0.037 | 8.22E-05 |
| **Modulo de ruptura - MR 45 - 3 dias** | 3.95 | 94.7 | 0.000217 | 0.000746 | 0.0456 | 9.01E-05 |
| **Modulo de ruptura - MR 45 - 7 dias** | 3.75 | 89.4 | 0.000204 | 0.000692 | 0.042 | 8.69E-05 |
| **Modulo de ruptura - MR 48 - 14 dias** | 3.66 | 87.1 | 0.000198 | 0.000668 | 0.0405 | 8.55E-05 |
| **Modulo de ruptura - MR 48 - 28 dias** | 3.56 | 84.4 | 0.000191 | 0.000641 | 0.0387 | 8.38E-05 |
| **Modulo de ruptura - MR 48 - 3 dias** | 4.05 | 97.3 | 0.000223 | 0.000773 | 0.0473 | 9.17E-05 |
| **Modulo de ruptura - MR 48 - 7 dias** | 3.84 | 92 | 0.00021 | 0.000718 | 0.0437 | 8.84E-05 |
| **Relleno Fluido - f´c 15 - 14 dias** | 2.19 | 52.4 | 0.00013 | 0.000372 | 0.0196 | 4.51E-05 |
| **Relleno Fluido - f´c 15 - 28 dias** | 2.09 | 49.7 | 0.000123 | 0.000344 | 0.0178 | 4.35E-05 |
| **Relleno Fluido - f´c 15 - 3 dias** | 2.57 | 62.3 | 0.000154 | 0.000474 | 0.0264 | 5.15E-05 |
| **Relleno Fluido - f´c 15 - 7 dias** | 2.37 | 57.1 | 0.000141 | 0.000421 | 0.0228 | 4.81E-05 |
| **Relleno Fluido - f´c 20 - 14 dias** | 2.22 | 53 | 0.000131 | 0.000377 | 0.0199 | 4.55E-05 |
| **Relleno Fluido - f´c 20 - 28 dias** | 2.11 | 50.2 | 0.000124 | 0.00035 | 0.0181 | 4.37E-05 |

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| **Relleno Fluido - f´c 20 - 3 dias** | 2.59 | 62.8 | 0.000156 | 0.00048 | 0.0267 | 5.18E-05 |
| **Relleno Fluido - f´c 20 - 7 dias** | 2.4 | 57.7 | 0.000143 | 0.000426 | 0.0232 | 4.85E-05 |
| **Relleno Fluido - f´c 25 - 14 dias** | 2.24 | 53.5 | 0.000132 | 0.000384 | 0.0204 | 4.58E-05 |
| **Relleno Fluido - f´c 25 - 28 dias** | 2.17 | 51.7 | 0.000127 | 0.00036 | 0.0187 | 4.49E-05 |
| **Relleno Fluido - f´c 25 - 3 dias** | 2.62 | 63.5 | 0.000157 | 0.000486 | 0.0272 | 5.22E-05 |
| **Relleno Fluido - f´c 25 - 7 dias** | 2.42 | 58.2 | 0.000144 | 0.000432 | 0.0236 | 4.88E-05 |
| **Relleno Fluido - f´c 30 - 14 dias** | 2.27 | 54.3 | 0.000134 | 0.000391 | 0.0209 | 4.64E-05 |
| **Relleno Fluido - f´c 30 - 28 dias** | 2.16 | 51.6 | 0.000128 | 0.000364 | 0.0191 | 4.46E-05 |
| **Relleno Fluido - f´c 30 - 3 dias** | 2.64 | 64.2 | 0.000159 | 0.000494 | 0.0277 | 5.27E-05 |
| **Relleno Fluido - f´c 30 - 7 dias** | 2.45 | 59 | 0.000146 | 0.00044 | 0.0241 | 4.94E-05 |
| **Relleno Fluido - f´c 40 - 14 dias** | 2.32 | 55.8 | 0.000138 | 0.000406 | 0.0219 | 4.73E-05 |
| **Relleno Fluido - f´c 40 - 28 dias** | 2.22 | 53.2 | 0.000131 | 0.000379 | 0.0201 | 4.57E-05 |
| **Relleno Fluido - f´c 40 - 3 dias** | 2.7 | 65.7 | 0.000162 | 0.000509 | 0.0287 | 5.36E-05 |
| **Relleno Fluido - f´c 40 - 7 dias** | 2.5 | 60.5 | 0.00015 | 0.000455 | 0.0251 | 5.03E-05 |
| **Relleno Fluido - f´c 50 - 14 dias** | 2.4 | 57.7 | 0.000143 | 0.000426 | 0.0232 | 4.86E-05 |
| **Relleno Fluido - f´c 50 - 28 dias** | 2.29 | 55 | 0.000136 | 0.000399 | 0.0214 | 4.67E-05 |
| **Relleno Fluido - f´c 50 - 3 dias** | 2.77 | 67.5 | 0.000167 | 0.000528 | 0.03 | 5.48E-05 |
| **Relleno Fluido - f´c 50 - 7 dias** | 2.57 | 62.3 | 0.000154 | 0.000474 | 0.0264 | 5.15E-05 |
| **Relleno Fluido - f´c 60 - 14 dias** | 2.47 | 59.7 | 0.000148 | 0.000447 | 0.0246 | 4.98E-05 |
| **Relleno Fluido - f´c 60 - 28 dias** | 2.37 | 57.1 | 0.000141 | 0.00042 | 0.0228 | 4.82E-05 |
| **Relleno Fluido - f´c 60 - 3 dias** | 2.85 | 69.6 | 0.000172 | 0.000549 | 0.0314 | 5.61E-05 |
| **Relleno Fluido - f´c 60 - 7 dias** | 2.65 | 64.4 | 0.000159 | 0.000496 | 0.0278 | 5.28E-05 |
| **Relleno Fluido - f´c 70 - 14 dias** | 2.55 | 61.8 | 0.000153 | 0.000469 | 0.026 | 5.11E-05 |
| **Relleno Fluido - f´c 70 - 28 dias** | 2.45 | 59.1 | 0.000146 | 0.000441 | 0.0242 | 4.94E-05 |
| **Relleno Fluido - f´c 70 - 3 dias** | 2.93 | 71.6 | 0.000177 | 0.000571 | 0.0328 | 5.74E-05 |
| **Relleno Fluido - f´c 70 - 7 dias** | 2.73 | 66.4 | 0.000164 | 0.000517 | 0.0292 | 5.41E-05 |

## OTHER ENVIRONMENTAL INFO

- Certificado SIG Calidad
- Certificado SIG Medio Ambiente
- Certificado SIG Seguridad y Salud en el Trabajo
- ONNNCE
- EMA
- Industria Limpia
- Empresa Segura

## REFERENCES

**ASTM Standards:**


- ASTM A36/A36M Standard Specification for Carbon Structural Steel
- ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM A184 Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
- ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
- ASTM A416/A416M Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
- ASTM A555/A555M Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods
- ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- ASTM A706/A706M Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- ASTM A767/A767M Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- ASTM A775/A775M Standard Specification for Epoxy-Coated Steel Reinforcing Bars
- ASTM A820/A820M Standard Specification for Steel Fibers for Fiber-Reinforced Concrete
- ASTM A884/A884M Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
- ASTM A934/A934M Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- ASTM C33/C33M Standard Specification for Concrete Aggregates
- ASTM C94 Standard Specification for Ready-Mixed Concrete

- ASTM C150/C150M Standard Specification for Portland Cement
- ASTM C260/C260M Standard Specification for Air-Entraining Admixtures for Concrete
- ASTM C595 Standard Specification for Blended Hydraulic Cements
- ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- ASTM C979/C979M Standard Specification for Pigments for Integrally Colored Concrete
- ASTM C989/C989M Standard Specification for Slag Cement for Use in Concrete and Mortars
- ASTM C1017/C1017M Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
- ASTM C1116/C1116M Standard Specification for Fiber-Reinforced Concrete
- ASTM C1157/C1157M Standard Performance Specification for Hydraulic Cement
- ASTM C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
- ASTM C1602/C1602M Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- ASTM G109 Standard Test Method for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments
- ASTM C330/C330M Standard Specification for Lightweight Aggregates for Structural Concrete
- ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete

**ISO Standards:**

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