



# Environmental Product Declaration

**MOCTEZUMA®**

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

## ADMINISTRATIVE INFORMATION

### International Certified Environmental Product Declaration

<b>Declared Product:</b>	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
<b>Declaration Owner:</b>	Cementos Moctezuma S.A. de C.V.
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<b>Program Operator:</b>	Labeling Sustainability
	Address, 11670 W Sunset Blvd.
	Los Angeles, CA
	www.labelingsustainability.com
<b>Product Category Rule:</b>	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.
	PCR Program Operator: NSF International
	Sub-category PCR review was conducted by: Thomas P. Gloria, Ph. D. of Industrial Ecology Consultants: 35 Bracebridge, Rd., Newton, MA 02459-1728, t.gloria@industrial-ecology.com. Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, mrovercash@earthlink.net. Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, bstough@sustainableresearchgroup.com.
<b>Independent LCA Reviewer and EPD Verifier:</b>	This EPD was independently verified in accordance with ISO 14025 and ISO 21930. The life cycle assessment was independently reviewed in accordance ISO 14044 and the referenced PCR.
	Independent verification of the declaration, according to ISO 14025:2006
	External
	Third Party Verifier
	Geoffrey Guest, Certified 3rd Party Verifier under the International EPD Program ( <a href="http://www.environdec.com">www.environdec.com</a> ), CSA Group ( <a href="http://www.csaregistries.ca">www.csaregistries.ca</a> )
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## COMPANY DESCRIPTION

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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 CO2 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

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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 the Cementos Moctezuma concrete facility in Xochimilco, Ciudad de México, México.

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



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



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



134	Lanzado - f'c 250 - 14 dias	24.50 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	24.5	Proprietary
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### 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



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



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



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

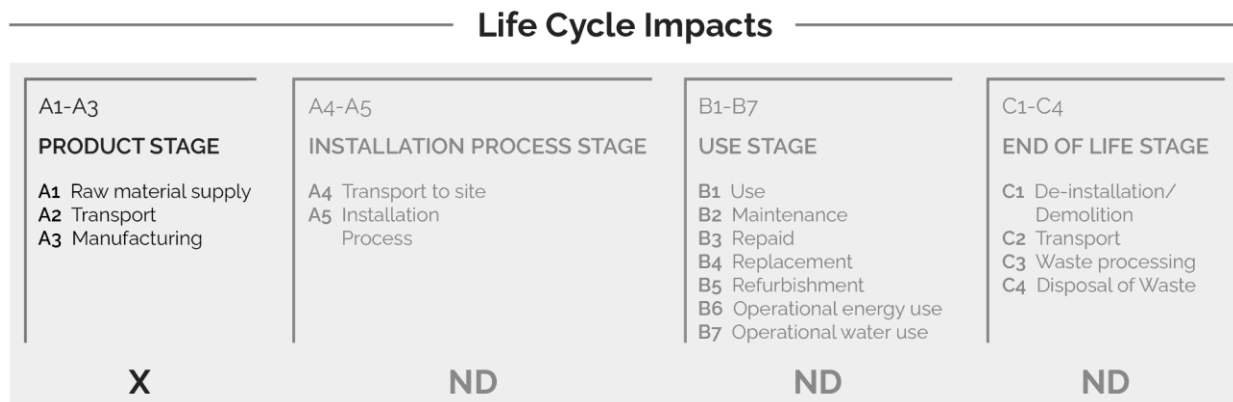


Figure 1: General life cycle phases for consideration in a construction works system

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

<p>Raw Material Supply <b>(A1)</b></p> <p>Cements &amp; SCMs Aggregates Admixtures Batch Water Fibers &amp; Pigments</p>	<p>Transport <b>(A2)</b></p> <p>Truck, Rail, Ship Energy Carriers (fuels)</p>	<p>Manufacturing <b>(A3)</b></p> <p>Energy Carriers (electricity and fuels) Ancillary Materials (lubricants, motor oil, cleaning chemicals, other consumables) Water (manufacturing water, including wash water for cement trucks, but excluding batch water) Waste (end of life treatment of ancillary materials and any packaging) 30% total fleet energy transit mix plants only</p>
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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 Planta Xochimilco facility in Mexico. 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:** Electricity consumption values are for Cementos Moctezuma in calendar year 2023. These values were directly reported from Cementos Moctezuma records. The unit process "market for electricity, medium voltage/electricity, medium voltage/MX/kWh" was used to represent the Mexico grid electricity used by the concrete plant.

**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 appropriateecoinvent 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	ecoinvent v3.10 in 2024	Edo. Mex	2024	2	3	1	3	3





	treatment/tap water/RoW/kg								
<b>Limestone Gravel</b>	limestone quarry operation/limestone, unprocessed/RoW/kg; Note: modifications made (seeecoinvent activity changes table)	ecoinvent v3.10 in 2024	Edo. Mex	2024	2	3	1	3	3
<b>Additives</b>	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	Queretaro	2024	2	3	1	3	3
<b>Cement</b>	Gris CPC 40RS/cement/MX/tonne	Program Operator: Labeling Sustainability - EPD ID: bb72e77d-c6d2-4caabage-18cce10c7824	Morelos	23 November 2024	3	3	3	3	3
<b>River Sand</b>	sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (seeecoinvent 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 O <sub>3</sub> -eq
6	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADP <sub>fossil</sub>	MJ
<b>Inventory metrics</b>			
7	Inventory indicators ISO21930: Cumulative Energy Demand - renewable energy resources	RPRE	MJ
8	Inventory indicators ISO21930: Renewable primary resources with energy content used as material (i.e., PERM)	PRM	MJ
9	Inventory indicators ISO21930: Cumulative Energy Demand - non-renewable energy resources	NRPRE	MJ
10	Inventory indicators ISO21930: Non-renewable primary resources with energy content used as material (i.e., PENRM)	NRPRM	kg
11	Inventory indicators ISO21930: use of secondary material	SM	MJ
12	Inventory indicators ISO21930: use of renewable secondary fuels	RSF	MJ
13	Inventory indicators ISO21930: recovered energy	RE	MJ
14	Inventory indicators ISO21930: use of net fresh water	FW	m <sup>3</sup>
15	Inventory indicators ISO21930: hazardous waste disposed	HWD	kg
16	Inventory indicators ISO21930: non-hazardous waste disposed	NHWD	kg
17	Inventory indicators ISO21930: high-level radioactive waste disposed	HLRW	kg
18	Inventory indicators ISO21930: intermediate and low-level radioactive waste disposed	ILLRW	kg
19	Inventory indicators ISO21930: materials for recycling	MR	kg
20	Inventory indicators ISO21930: materials for energy recovery	MER	kg

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 1m<sup>3</sup> of concrete basis.

Table 11: **Total life cycle (across modules in scope) impact results for all mix designs, assuming the geometric mean point values on a per 1 m<sup>3</sup> of concrete basis.**

a) Midpoint Impact Categories:

Indicator/LCI Metric	GWP <sub>100</sub>	ODP	AP	EP	SFP	ADP <sub>fossil</sub>
Unit	kg CO <sub>2</sub> -eq	kg CFC-11-eq	kg SO <sub>2</sub> -eq	kg N-eq	kg O <sub>3</sub> -eq	MJ
Alta resistencia - f'c 400 - 14 dias	494	3.85E-06	0.5	0.369	9.19	3050
Alta resistencia - f'c 400 - 28 dias	472	3.69E-06	0.486	0.359	8.98	2930
Alta resistencia - f'c 400 - 3 dias	570	4.38E-06	0.548	0.406	9.88	3460
Alta resistencia - f'c 400 - 7 dias	525	4.07E-06	0.52	0.385	9.48	3220
Alta resistencia - f'c 450 - 14 dias	525	4.06E-06	0.519	0.384	9.46	3210
Alta resistencia - f'c 450 - 28 dias	502	3.90E-06	0.505	0.373	9.25	3090



Alta resistencia - f' c 450 - 3 días	600	4.59E-06	0.567	0.421	10.2	3620
Alta resistencia - f' c 450 - 7 días	556	4.28E-06	0.539	0.399	9.75	3380
Alta resistencia - f' c 500 - 14 días	552	4.25E-06	0.537	0.398	9.72	3360
Alta resistencia - f' c 500 - 28 días	530	4.10E-06	0.523	0.387	9.51	3240
Alta resistencia - f' c 500 - 3 días	627	4.78E-06	0.585	0.435	10.4	3770
Alta resistencia - f' c 500 - 7 días	583	4.47E-06	0.557	0.413	10	3530
Alta resistencia - f' c 550 - 14 días	596	4.61E-06	0.569	0.441	10.2	3620
Alta resistencia - f' c 550 - 28 días	574	4.45E-06	0.555	0.429	9.97	3500
Alta resistencia - f' c 550 - 3 días	671	5.14E-06	0.618	0.481	10.9	4030
Alta resistencia - f' c 550 - 7 días	627	4.83E-06	0.589	0.458	10.5	3790
Alta resistencia - f' c 600 - 14 días	635	4.87E-06	0.593	0.455	10.5	3830
Alta resistencia - f' c 600 - 28 días	613	4.71E-06	0.579	0.443	10.3	3710
Alta resistencia - f' c 600 - 3 días	711	5.40E-06	0.642	0.494	11.3	4240
Alta resistencia - f' c 600 - 7 días	667	5.09E-06	0.613	0.471	10.8	4000
Baja contracción - MR 38 - 14 días	357	2.95E-06	0.401	0.272	7.76	2360
Baja contracción - MR 38 - 28 días	335	2.80E-06	0.386	0.262	7.54	2240
Baja contracción - MR 40 - 14 días	367	3.02E-06	0.407	0.276	7.85	2410
Baja contracción - MR 40 - 28 días	345	2.87E-06	0.393	0.266	7.64	2300
Baja contracción - MR 42 - 14 días	378	3.09E-06	0.414	0.281	7.95	2470
Baja contracción - MR 42 - 28 días	356	2.94E-06	0.4	0.271	7.74	2350
Baja contracción - MR 45 - 14 días	396	3.22E-06	0.426	0.289	8.13	2570
Baja contracción - MR 45 - 28 días	374	3.07E-06	0.412	0.279	7.92	2450
Baja contracción - MR 48 - 14 días	417	3.35E-06	0.439	0.298	8.32	2670
Baja contracción - MR 48 - 28 días	395	3.21E-06	0.425	0.288	8.11	2560
Convencional - f' c 100 - 14 días	221	1.82E-06	0.33	0.224	6.8	1500
Convencional - f' c 100 - 28 días	199	1.68E-06	0.316	0.215	6.59	1380





Convencional - f c 100 - 3 dias	296	2.33E-06	0.376	0.252	7.49	1900
Convencional - f c 100 - 7 dias	252	2.03E-06	0.349	0.235	7.09	1670
Convencional - f c 150 - 14 dias	239	1.94E-06	0.341	0.23	6.97	1590
Convencional - f c 150 - 28 dias	217	1.79E-06	0.327	0.222	6.76	1480
Convencional - f c 150 - 3 dias	314	2.45E-06	0.387	0.258	7.66	1990
Convencional - f c 150 - 7 dias	270	2.15E-06	0.36	0.242	7.26	1760
Convencional - f c 200 - 14 dias	267	2.13E-06	0.358	0.241	7.23	1740
Convencional - f c 200 - 28 dias	246	1.99E-06	0.347	0.234	7.08	1630
Convencional - f c 200 - 3 dias	360	2.76E-06	0.418	0.276	8.13	2240
Convencional - f c 200 - 7 dias	298	2.34E-06	0.378	0.252	7.52	1910
Convencional - f c 250 - 14 dias	295	2.32E-06	0.376	0.251	7.49	1890
Convencional - f c 250 - 28 dias	274	2.18E-06	0.364	0.244	7.34	1780
Convencional - f c 250 - 3 dias	370	2.83E-06	0.422	0.279	8.17	2290
Convencional - f c 250 - 7 dias	326	2.53E-06	0.395	0.263	7.77	2060
Convencional - f c 300 - 14 dias	355	2.73E-06	0.412	0.273	8.01	2210
Convencional - f c 300 - 28 dias	333	2.58E-06	0.398	0.265	7.8	2090
Convencional - f c 300 - 3 dias	430	3.23E-06	0.458	0.301	8.7	2600
Convencional - f c 300 - 7 dias	386	2.93E-06	0.431	0.285	8.3	2370
Convencional - f c 350 - 14 dias	410	3.10E-06	0.446	0.294	8.52	2500
Convencional - f c 350 - 28 dias	388	2.95E-06	0.432	0.286	8.31	2380
Convencional - f c 350 - 3 dias	485	3.60E-06	0.492	0.322	9.2	2900
Convencional - f c 350 - 7 dias	441	3.31E-06	0.465	0.305	8.8	2660
Estructural - f c 250 - 14 dias	298	2.36E-06	0.389	0.256	7.81	1930
Estructural - f c 250 - 28 dias	276	2.21E-06	0.376	0.248	7.63	1810
Estructural - f c 250 - 3 dias	373	2.87E-06	0.436	0.285	8.51	2330
Estructural - f c 250 - 7 dias	329	2.57E-06	0.408	0.268	8.09	2090



Estructural - f'c 300 - 14 dias	351	2.71E-06	0.421	0.276	8.27	2210
Estructural - f'c 300 - 28 dias	329	2.57E-06	0.407	0.268	8.08	2090
Estructural - f'c 300 - 3 dias	425	3.22E-06	0.467	0.304	8.95	2600
Estructural - f'c 300 - 7 dias	381	2.92E-06	0.44	0.287	8.55	2370
Estructural - f'c 350 - 14 dias	397	3.03E-06	0.45	0.293	8.7	2450
Estructural - f'c 350 - 28 dias	375	2.88E-06	0.436	0.285	8.49	2330
Estructural - f'c 350 - 3 dias	472	3.53E-06	0.496	0.321	9.37	2850
Estructural - f'c 350 - 7 dias	428	3.24E-06	0.469	0.304	8.97	2610
Lanzado - f'c 200 - 14 dias	393	3.01E-06	0.427	0.276	8.13	2430
Lanzado - f'c 200 - 28 dias	367	2.83E-06	0.411	0.267	7.91	2290
Lanzado - f'c 200 - 3 dias	437	3.31E-06	0.453	0.291	8.5	2660
Lanzado - f'c 200 - 7 dias	420	3.19E-06	0.443	0.285	8.36	2570
Lanzado - f'c 250 - 14 dias	420	3.19E-06	0.443	0.285	8.36	2570
Lanzado - f'c 250 - 28 dias	393	3.01E-06	0.427	0.276	8.14	2430
Lanzado - f'c 250 - 3 dias	464	3.49E-06	0.469	0.3	8.73	2800
Lanzado - f'c 250 - 7 dias	446	3.37E-06	0.458	0.294	8.59	2710
Lanzado - f'c 300 - 14 dias	455	3.43E-06	0.464	0.297	8.67	2760
Lanzado - f'c 300 - 28 dias	429	3.25E-06	0.448	0.288	8.45	2620
Lanzado - f'c 300 - 3 dias	499	3.73E-06	0.49	0.312	9.05	2990
Lanzado - f'c 300 - 7 dias	482	3.61E-06	0.48	0.306	8.9	2900
Lanzado - f'c 350 - 14 dias	495	3.70E-06	0.488	0.311	9.02	2960
Lanzado - f'c 350 - 28 dias	468	3.52E-06	0.472	0.302	8.8	2830
Lanzado - f'c 350 - 3 dias	539	3.99E-06	0.514	0.326	9.4	3200
Lanzado - f'c 350 - 7 dias	521	3.88E-06	0.504	0.32	9.25	3100
Modulo de ruptura - MR 35 - 14 dias	340	2.72E-06	0.393	0.247	7.64	2200
Modulo de ruptura - MR 35 - 28 dias	318	2.57E-06	0.379	0.239	7.43	2080



Modulo de ruptura - MR 35 - 3 dias	423	3.27E-06	0.444	0.276	8.39	2630
Modulo de ruptura - MR 35 - 7 dias	379	2.98E-06	0.417	0.261	8	2400
Modulo de ruptura - MR 36 - 14 dias	343	2.74E-06	0.395	0.248	7.67	2210
Modulo de ruptura - MR 36 - 28 dias	322	2.60E-06	0.381	0.24	7.47	2100
Modulo de ruptura - MR 36 - 3 dias	427	3.30E-06	0.446	0.277	8.42	2650
Modulo de ruptura - MR 36 - 7 dias	383	3.01E-06	0.42	0.262	8.04	2420
Modulo de ruptura - MR 38 - 14 dias	351	2.79E-06	0.399	0.251	7.73	2260
Modulo de ruptura - MR 38 - 28 dias	329	2.65E-06	0.386	0.243	7.53	2140
Modulo de ruptura - MR 38 - 3 dias	434	3.35E-06	0.451	0.28	8.49	2690
Modulo de ruptura - MR 38 - 7 dias	391	3.06E-06	0.424	0.264	8.1	2460
Modulo de ruptura - MR 40 - 14 dias	362	2.86E-06	0.406	0.254	7.83	2310
Modulo de ruptura - MR 40 - 28 dias	340	2.72E-06	0.392	0.247	7.63	2190
Modulo de ruptura - MR 40 - 3 dias	445	3.42E-06	0.458	0.283	8.6	2750
Modulo de ruptura - MR 40 - 7 dias	401	3.13E-06	0.43	0.268	8.19	2520
Modulo de ruptura - MR 42 - 14 dias	373	2.94E-06	0.413	0.258	7.93	2370
Modulo de ruptura - MR 42 - 28 dias	351	2.79E-06	0.399	0.251	7.73	2250
Modulo de ruptura - MR 42 - 3 dias	456	3.49E-06	0.464	0.287	8.69	2810
Modulo de ruptura - MR 42 - 7 dias	413	3.20E-06	0.437	0.272	8.3	2580
Modulo de ruptura - MR 45 - 14 dias	393	3.08E-06	0.425	0.265	8.12	2480
Modulo de ruptura - MR 45 - 28 dias	372	2.93E-06	0.412	0.258	7.92	2360
Modulo de ruptura - MR 45 - 3 dias	477	3.63E-06	0.477	0.294	8.88	2910
Modulo de ruptura - MR 45 - 7 dias	433	3.34E-06	0.45	0.279	8.49	2690
Modulo de ruptura - MR 48 - 14 dias	415	3.22E-06	0.439	0.273	8.31	2590
Modulo de ruptura - MR 48 - 28 dias	393	3.07E-06	0.425	0.265	8.11	2470
Modulo de ruptura - MR 48 - 3 dias	498	3.77E-06	0.49	0.302	9.07	3020
Modulo de ruptura - MR 48 - 7 dias	454	3.48E-06	0.463	0.286	8.67	2790



Relleno Fluido - f'c 15 - 14 dias	170	1.42E-06	0.271	0.185	5.67	1180
Relleno Fluido - f'c 15 - 28 dias	148	1.28E-06	0.257	0.179	5.47	1060
Relleno Fluido - f'c 15 - 3 dias	253	1.97E-06	0.321	0.209	6.42	1610
Relleno Fluido - f'c 15 - 7 dias	210	1.68E-06	0.295	0.197	6.03	1380
Relleno Fluido - f'c 20 - 14 dias	175	1.45E-06	0.273	0.187	5.71	1200
Relleno Fluido - f'c 20 - 28 dias	153	1.30E-06	0.26	0.18	5.51	1080
Relleno Fluido - f'c 20 - 3 dias	258	2.00E-06	0.324	0.211	6.46	1630
Relleno Fluido - f'c 20 - 7 dias	214	1.71E-06	0.298	0.198	6.07	1400
Relleno Fluido - f'c 25 - 14 dias	180	1.48E-06	0.277	0.188	5.76	1230
Relleno Fluido - f'c 25 - 28 dias	158	1.34E-06	0.263	0.182	5.55	1110
Relleno Fluido - f'c 25 - 3 dias	263	2.03E-06	0.327	0.212	6.5	1660
Relleno Fluido - f'c 25 - 7 dias	219	1.74E-06	0.301	0.2	6.11	1430
Relleno Fluido - f'c 30 - 14 dias	186	1.52E-06	0.28	0.19	5.81	1260
Relleno Fluido - f'c 30 - 28 dias	164	1.38E-06	0.267	0.183	5.61	1140
Relleno Fluido - f'c 30 - 3 dias	269	2.07E-06	0.331	0.214	6.56	1690
Relleno Fluido - f'c 30 - 7 dias	225	1.78E-06	0.304	0.201	6.17	1460
Relleno Fluido - f'c 40 - 14 dias	198	1.60E-06	0.288	0.193	5.92	1320
Relleno Fluido - f'c 40 - 28 dias	176	1.46E-06	0.274	0.187	5.72	1210
Relleno Fluido - f'c 40 - 3 dias	281	2.15E-06	0.338	0.218	6.67	1760
Relleno Fluido - f'c 40 - 7 dias	238	1.86E-06	0.312	0.205	6.28	1530
Relleno Fluido - f'c 50 - 14 dias	214	1.71E-06	0.297	0.198	6.06	1400
Relleno Fluido - f'c 50 - 28 dias	193	1.59E-06	0.286	0.201	5.89	1300
Relleno Fluido - f'c 50 - 3 dias	297	2.26E-06	0.348	0.222	6.81	1840
Relleno Fluido - f'c 50 - 7 dias	253	1.97E-06	0.321	0.209	6.42	1610
Relleno Fluido - f'c 60 - 14 dias	232	1.82E-06	0.308	0.203	6.22	1500
Relleno Fluido - f'c 60 - 28 dias	210	1.68E-06	0.294	0.197	6.01	1380



Relleno Fluido - f'c 60 - 3 dias	315	2.37E-06	0.358	0.227	6.96	1930
Relleno Fluido - f'c 60 - 7 dias	271	2.08E-06	0.332	0.214	6.57	1700
Relleno Fluido - f'c 70 - 14 dias	249	1.94E-06	0.318	0.208	6.37	1590
Relleno Fluido - f'c 70 - 28 dias	227	1.79E-06	0.305	0.202	6.17	1470
Relleno Fluido - f'c 70 - 3 dias	332	2.48E-06	0.368	0.232	7.11	2020
Relleno Fluido - f'c 70 - 7 dias	288	2.20E-06	0.342	0.22	6.73	1790

## 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	107	29	107	1510	0.616	0.00569	0.294	0.539
Alta resistencia - f'c 400 - 28 dias	103	28.9	103	1440	0.598	0.00559	0.288	0.527
Alta resistencia - f'c 400 - 3 dias	122	29.2	122	1760	0.678	0.00599	0.317	0.58
Alta resistencia - f'c 400 - 7 dias	113	29.1	113	1610	0.641	0.00581	0.304	0.555
Alta resistencia - f'c 450 - 14 dias	113	29.1	113	1610	0.641	0.00581	0.303	0.559
Alta resistencia - f'c 450 - 28 dias	109	29	109	1540	0.623	0.00572	0.296	0.548
Alta resistencia - f'c 450 - 3 dias	128	29.3	128	1860	0.702	0.00612	0.325	0.6
Alta resistencia - f'c 450 - 7 dias	119	29.2	119	1710	0.666	0.00594	0.312	0.576
Alta resistencia - f'c 500 - 14 dias	118	29.1	119	1700	0.664	0.00593	0.311	0.574
Alta resistencia - f'c 500 - 28 dias	114	29.1	114	1630	0.645	0.00584	0.305	0.562
Alta resistencia - f'c 500 - 3 dias	133	29.4	133	1950	0.725	0.00623	0.334	0.614
Alta resistencia - f'c 500 - 7 dias	124	29.2	125	1800	0.689	0.00605	0.321	0.591
Alta resistencia - f'c 550 - 14 dias	128	29.3	128	1850	0.704	0.00615	0.335	0.609
Alta resistencia - f'c 550 - 28 dias	123	29.2	123	1780	0.686	0.00606	0.328	0.597
Alta resistencia - f'c 550 - 3 dias	142	29.5	142	2100	0.766	0.00646	0.359	0.652
Alta resistencia - f'c 550 - 7 dias	134	29.4	134	1950	0.729	0.00628	0.345	0.628





Alta resistencia - f'c 600 - 14 dias	135	29.4	135	1980	0.735	0.0063	0.344	0.627
Alta resistencia - f'c 600 - 28 dias	131	29.3	131	1910	0.717	0.00621	0.337	0.615
Alta resistencia - f'c 600 - 3 dias	150	29.6	150	2230	0.796	0.0066	0.368	0.668
Alta resistencia - f'c 600 - 7 dias	141	29.5	141	2080	0.76	0.00642	0.354	0.644
Baja contracción - MR 38 - 14 dias	76.2	28.5	76.1	1020	0.568	0.00611	0.248	0.577
Baja contracción - MR 38 - 28 dias	71.8	28.5	71.8	947	0.55	0.00603	0.241	0.571
Baja contracción - MR 40 - 14 dias	78.1	28.6	78	1050	0.574	0.00613	0.25	0.579
Baja contracción - MR 40 - 28 dias	73.7	28.5	73.7	979	0.558	0.00606	0.244	0.573
Baja contracción - MR 42 - 14 dias	80.3	28.6	80.3	1090	0.583	0.00616	0.253	0.584
Baja contracción - MR 42 - 28 dias	76	28.5	75.9	1020	0.566	0.00609	0.247	0.576
Baja contracción - MR 45 - 14 dias	83.9	28.6	83.9	1150	0.596	0.00621	0.258	0.589
Baja contracción - MR 45 - 28 dias	79.6	28.6	79.6	1080	0.579	0.00614	0.252	0.581
Baja contracción - MR 48 - 14 dias	87.9	28.7	87.9	1220	0.611	0.00628	0.263	0.595
Baja contracción - MR 48 - 28 dias	83.6	28.6	83.5	1150	0.595	0.00621	0.257	0.587
Convencional - f'c 100 - 14 dias	58.3	28.1	58.4	610	0.347	0.00392	0.207	0.381
Convencional - f'c 100 - 28 dias	54	28.1	54.1	538	0.329	0.00383	0.201	0.372
Convencional - f'c 100 - 3 dias	72.6	28.4	72.7	857	0.407	0.00422	0.224	0.417
Convencional - f'c 100 - 7 dias	64.2	28.2	64.3	712	0.372	0.00405	0.214	0.395
Convencional - f'c 150 - 14 dias	61.7	28.2	61.7	668	0.361	0.00399	0.211	0.39
Convencional - f'c 150 - 28 dias	57.4	28.1	57.5	596	0.343	0.0039	0.205	0.38
Convencional - f'c 150 - 3 dias	76	28.4	76	915	0.421	0.00429	0.229	0.426
Convencional - f'c 150 - 7 dias	67.6	28.3	67.6	770	0.386	0.00411	0.218	0.405
Convencional - f'c 200 - 14 dias	67.1	28.3	67.1	761	0.384	0.0041	0.218	0.404
Convencional - f'c 200 - 28 dias	63.1	28.2	63.1	688	0.368	0.00405	0.214	0.395
Convencional - f'c 200 - 3 dias	84.9	28.6	85	1070	0.46	0.0045	0.241	0.424
Convencional - f'c 200 - 7 dias	73	28.4	73	862	0.409	0.00423	0.225	0.419



Convencional - f'c 250 - 14 dias	72.4	28.4	72.5	854	0.406	0.00421	0.224	0.418
Convencional - f'c 250 - 28 dias	68.5	28.3	68.5	781	0.391	0.00416	0.221	0.409
Convencional - f'c 250 - 3 dias	86.7	28.6	86.8	1100	0.466	0.00451	0.242	0.454
Convencional - f'c 250 - 7 dias	78.3	28.5	78.4	955	0.431	0.00434	0.232	0.432
Convencional - f'c 300 - 14 dias	83.8	28.6	83.8	1050	0.453	0.00443	0.238	0.454
Convencional - f'c 300 - 28 dias	79.6	28.5	79.6	978	0.435	0.00434	0.232	0.444
Convencional - f'c 300 - 3 dias	98	28.8	98.1	1300	0.513	0.00472	0.256	0.49
Convencional - f'c 300 - 7 dias	89.6	28.7	89.7	1150	0.478	0.00455	0.245	0.469
Convencional - f'c 350 - 14 dias	94.3	28.7	94.4	1230	0.497	0.00465	0.251	0.479
Convencional - f'c 350 - 28 dias	90.1	28.7	90.2	1160	0.479	0.00456	0.246	0.468
Convencional - f'c 350 - 3 dias	109	29	109	1480	0.557	0.00494	0.269	0.514
Convencional - f'c 350 - 7 dias	100	28.8	100	1330	0.522	0.00477	0.258	0.494
Estructural - f'c 250 - 14 dias	73.6	28.4	73.7	854	0.419	0.00441	0.234	0.394
Estructural - f'c 250 - 28 dias	69.5	28.3	69.6	781	0.402	0.00434	0.23	0.384
Estructural - f'c 250 - 3 dias	88	28.6	88	1100	0.479	0.00472	0.253	0.434
Estructural - f'c 250 - 7 dias	79.5	28.5	79.6	955	0.444	0.00453	0.242	0.407
Estructural - f'c 300 - 14 dias	83.6	28.5	83.7	1030	0.46	0.00461	0.246	0.426
Estructural - f'c 300 - 28 dias	79.5	28.5	79.5	955	0.443	0.00452	0.241	0.431
Estructural - f'c 300 - 3 dias	97.9	28.8	97.9	1270	0.52	0.0049	0.264	0.461
Estructural - f'c 300 - 7 dias	89.5	28.6	89.6	1130	0.485	0.00472	0.253	0.44
Estructural - f'c 350 - 14 dias	92.5	28.7	92.6	1180	0.497	0.00479	0.257	0.448
Estructural - f'c 350 - 28 dias	88.3	28.6	88.4	1110	0.48	0.0047	0.252	0.438
Estructural - f'c 350 - 3 dias	107	28.9	107	1430	0.557	0.00507	0.275	0.482
Estructural - f'c 350 - 7 dias	98.4	28.8	98.4	1280	0.522	0.0049	0.264	0.462
Lanzado - f'c 200 - 14 dias	88.2	28.7	88.2	1170	0.505	0.0049	0.24	0.489
Lanzado - f'c 200 - 28 dias	83.3	28.6	83.4	1080	0.484	0.00478	0.234	0.479



Lanzado - f' c 200 - 3 dias	96.3	28.8	96.3	1320	0.542	0.00509	0.249	0.51
Lanzado - f' c 200 - 7 dias	93.1	28.8	93.1	1260	0.527	0.00501	0.246	0.501
Lanzado - f' c 250 - 14 dias	93.1	28.8	93.1	1260	0.527	0.00501	0.246	0.503
Lanzado - f' c 250 - 28 dias	88.2	28.7	88.2	1170	0.505	0.0049	0.24	0.491
Lanzado - f' c 250 - 3 dias	101	28.9	101	1400	0.564	0.00521	0.255	0.524
Lanzado - f' c 250 - 7 dias	98	28.8	98	1340	0.549	0.00513	0.252	0.514
Lanzado - f' c 300 - 14 dias	99.7	28.9	99.7	1370	0.556	0.00516	0.254	0.518
Lanzado - f' c 300 - 28 dias	94.8	28.8	94.8	1290	0.534	0.00505	0.248	0.508
Lanzado - f' c 300 - 3 dias	108	29	108	1520	0.592	0.00535	0.263	0.54
Lanzado - f' c 300 - 7 dias	105	28.9	105	1460	0.578	0.00527	0.26	0.53
Lanzado - f' c 350 - 14 dias	107	29	107	1500	0.588	0.00532	0.263	0.537
Lanzado - f' c 350 - 28 dias	102	28.9	102	1420	0.566	0.00521	0.257	0.525
Lanzado - f' c 350 - 3 dias	115	29.1	115	1650	0.624	0.00551	0.272	0.557
Lanzado - f' c 350 - 7 dias	112	29.1	112	1590	0.609	0.00543	0.269	0.549
Modulo de ruptura - MR 35 - 14 dias	74.9	28.5	74.9	975	0.508	0.00538	0.229	0.481
Modulo de ruptura - MR 35 - 28 dias	70.7	28.4	70.7	903	0.491	0.0053	0.224	0.472
Modulo de ruptura - MR 35 - 3 dias	90.8	28.7	90.8	1250	0.571	0.00566	0.248	0.516
Modulo de ruptura - MR 35 - 7 dias	82.4	28.6	82.4	1110	0.538	0.00552	0.238	0.498
Modulo de ruptura - MR 36 - 14 dias	75.5	28.5	75.5	987	0.51	0.00539	0.23	0.481
Modulo de ruptura - MR 36 - 28 dias	71.3	28.4	71.3	914	0.493	0.00531	0.225	0.475
Modulo de ruptura - MR 36 - 3 dias	91.5	28.8	91.5	1260	0.574	0.00567	0.249	0.518
Modulo de ruptura - MR 36 - 7 dias	83.1	28.6	83.1	1120	0.541	0.00554	0.239	0.498
Modulo de ruptura - MR 38 - 14 dias	77	28.5	77	1010	0.516	0.00542	0.232	0.485
Modulo de ruptura - MR 38 - 28 dias	72.8	28.5	72.8	940	0.499	0.00533	0.227	0.478
Modulo de ruptura - MR 38 - 3 dias	92.9	28.8	92.9	1290	0.58	0.0057	0.25	0.521
Modulo de ruptura - MR 38 - 7 dias	84.6	28.6	84.6	1140	0.547	0.00556	0.241	0.503



Modulo de ruptura - MR 40 - 14 dias	79	28.6	79	1050	0.524	0.00545	0.234	0.489
Modulo de ruptura - MR 40 - 28 dias	74.8	28.5	74.8	975	0.507	0.00537	0.229	0.48
Modulo de ruptura - MR 40 - 3 dias	95	28.8	95	1320	0.589	0.00575	0.253	0.524
Modulo de ruptura - MR 40 - 7 dias	86.6	28.7	86.6	1180	0.555	0.00559	0.243	0.506
Modulo de ruptura - MR 42 - 14 dias	81.2	28.6	81.2	1080	0.533	0.00549	0.236	0.495
Modulo de ruptura - MR 42 - 28 dias	77	28.5	77	1010	0.514	0.00538	0.231	0.481
Modulo de ruptura - MR 42 - 3 dias	97.1	28.9	97.1	1360	0.597	0.00578	0.255	0.529
Modulo de ruptura - MR 42 - 7 dias	88.8	28.7	88.8	1210	0.564	0.00563	0.246	0.51
Modulo de ruptura - MR 45 - 14 dias	85.1	28.7	85.1	1150	0.549	0.00557	0.241	0.503
Modulo de ruptura - MR 45 - 28 dias	80.9	28.6	80.9	1080	0.532	0.00549	0.236	0.492
Modulo de ruptura - MR 45 - 3 dias	101	28.9	101	1430	0.613	0.00586	0.26	0.536
Modulo de ruptura - MR 45 - 7 dias	92.7	28.8	92.7	1280	0.58	0.00571	0.251	0.518
Modulo de ruptura - MR 48 - 14 dias	89.1	28.7	89.1	1220	0.566	0.00565	0.246	0.51
Modulo de ruptura - MR 48 - 28 dias	84.9	28.7	84.9	1150	0.549	0.00557	0.241	0.501
Modulo de ruptura - MR 48 - 3 dias	105	29	105	1500	0.629	0.00593	0.265	0.545
Modulo de ruptura - MR 48 - 7 dias	96.7	28.8	96.7	1350	0.595	0.00578	0.255	0.528
Relleno Fluido - f'c 15 - 14 dias	46.7	28	46.8	458	0.282	0.00329	0.169	0.365
Relleno Fluido - f'c 15 - 28 dias	42.6	27.9	42.6	386	0.264	0.00321	0.164	0.356
Relleno Fluido - f'c 15 - 3 dias	62.5	28.3	62.6	730	0.347	0.0036	0.185	0.4
Relleno Fluido - f'c 15 - 7 dias	54.2	28.1	54.3	587	0.312	0.00344	0.177	0.381
Relleno Fluido - f'c 20 - 14 dias	47.6	28	47.6	472	0.285	0.00331	0.17	0.367
Relleno Fluido - f'c 20 - 28 dias	43.4	28	43.5	400	0.268	0.00323	0.165	0.358
Relleno Fluido - f'c 20 - 3 dias	63.3	28.3	63.4	745	0.35	0.00362	0.186	0.403
Relleno Fluido - f'c 20 - 7 dias	55.1	28.1	55.1	601	0.316	0.00346	0.178	0.383
Relleno Fluido - f'c 25 - 14 dias	48.6	28	48.6	489	0.289	0.00333	0.171	0.37
Relleno Fluido - f'c 25 - 28 dias	44.4	28	44.5	418	0.272	0.00324	0.166	0.36



Relleno Fluido - f'c 25 - 3 dias	64.3	28.3	64.4	762	0.354	0.00364	0.187	0.405
Relleno Fluido - f'c 25 - 7 dias	56	28.2	56.1	618	0.32	0.00348	0.179	0.387
Relleno Fluido - f'c 30 - 14 dias	49.7	28.1	49.8	509	0.294	0.00335	0.172	0.374
Relleno Fluido - f'c 30 - 28 dias	45.6	28	45.6	438	0.276	0.00327	0.168	0.365
Relleno Fluido - f'c 30 - 3 dias	65.5	28.3	65.5	782	0.359	0.00366	0.188	0.408
Relleno Fluido - f'c 30 - 7 dias	57.2	28.2	57.3	639	0.325	0.0035	0.18	0.39
Relleno Fluido - f'c 40 - 14 dias	52.1	28.1	52.1	550	0.303	0.0034	0.174	0.38
Relleno Fluido - f'c 40 - 28 dias	47.9	28	47.9	478	0.286	0.00331	0.17	0.371
Relleno Fluido - f'c 40 - 3 dias	67.8	28.4	67.8	822	0.368	0.00371	0.191	0.415
Relleno Fluido - f'c 40 - 7 dias	59.5	28.2	59.6	679	0.334	0.00354	0.182	0.397
Relleno Fluido - f'c 50 - 14 dias	55	28.1	55.1	601	0.316	0.00345	0.177	0.388
Relleno Fluido - f'c 50 - 28 dias	51.2	28.1	51.3	533	0.301	0.00339	0.178	0.383
Relleno Fluido - f'c 50 - 3 dias	70.8	28.4	70.8	874	0.381	0.00376	0.194	0.422
Relleno Fluido - f'c 50 - 7 dias	62.5	28.3	62.6	730	0.347	0.0036	0.185	0.403
Relleno Fluido - f'c 60 - 14 dias	58.3	28.2	58.4	659	0.329	0.00352	0.181	0.394
Relleno Fluido - f'c 60 - 28 dias	54.2	28.1	54.2	587	0.312	0.00343	0.176	0.386
Relleno Fluido - f'c 60 - 3 dias	74	28.5	74.1	931	0.394	0.00383	0.197	0.429
Relleno Fluido - f'c 60 - 7 dias	65.8	28.3	65.8	788	0.36	0.00367	0.189	0.411
Relleno Fluido - f'c 70 - 14 dias	61.6	28.3	61.7	716	0.343	0.00358	0.184	0.402
Relleno Fluido - f'c 70 - 28 dias	57.5	28.2	57.5	644	0.326	0.0035	0.18	0.392
Relleno Fluido - f'c 70 - 3 dias	77.3	28.5	77.4	989	0.408	0.00389	0.201	0.436
Relleno Fluido - f'c 70 - 7 dias	69.1	28.4	69.1	845	0.374	0.00373	0.192	0.417



## 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	4.12	112	0.000225	0.000776	0.0461	7.82E-05
Alta resistencia - f c 400 - 28 dias	4.01	109	0.000218	0.000748	0.0443	7.62E-05
Alta resistencia - f c 400 - 3 dias	4.5	122	0.000248	0.000871	0.0522	8.48E-05
Alta resistencia - f c 400 - 7 dias	4.28	116	0.000234	0.000815	0.0486	8.09E-05
Alta resistencia - f c 450 - 14 dias	4.27	116	0.000234	0.000813	0.0485	8.08E-05
Alta resistencia - f c 450 - 28 dias	4.16	113	0.000227	0.000785	0.0467	7.88E-05
Alta resistencia - f c 450 - 3 dias	4.65	126	0.000257	0.000909	0.0547	8.74E-05
Alta resistencia - f c 450 - 7 dias	4.43	120	0.000243	0.000853	0.0511	8.35E-05
Alta resistencia - f c 500 - 14 dias	4.41	120	0.000242	0.000848	0.0508	8.33E-05
Alta resistencia - f c 500 - 28 dias	4.3	117	0.000235	0.00082	0.049	8.13E-05
Alta resistencia - f c 500 - 3 dias	4.79	130	0.000266	0.000944	0.0569	8.99E-05
Alta resistencia - f c 500 - 7 dias	4.57	124	0.000252	0.000888	0.0533	8.60E-05
Alta resistencia - f c 550 - 14 dias	4.71	128	0.000259	0.000911	0.0545	8.91E-05
Alta resistencia - f c 550 - 28 dias	4.59	125	0.000252	0.000883	0.0527	8.70E-05
Alta resistencia - f c 550 - 3 dias	5.1	138	0.000283	0.00101	0.0607	9.59E-05
Alta resistencia - f c 550 - 7 dias	4.87	132	0.000269	0.000952	0.0571	9.19E-05
Alta resistencia - f c 600 - 14 dias	4.89	133	0.000271	0.00096	0.0577	9.20E-05
Alta resistencia - f c 600 - 28 dias	4.78	129	0.000264	0.000932	0.0559	9.00E-05
Alta resistencia - f c 600 - 3 dias	5.28	143	0.000295	0.00106	0.0639	9.88E-05
Alta resistencia - f c 600 - 7 dias	5.05	137	0.000281	0.001	0.0603	9.48E-05
Baja contracción - MR 38 - 14 dias	3.27	88.2	0.000159	0.000549	0.0334	7.00E-05
Baja contracción - MR 38 - 28 dias	3.16	85.2	0.000151	0.00052	0.0315	6.81E-05
Baja contracción - MR 40 - 14 dias	3.32	89.5	0.000162	0.000561	0.0341	7.07E-05



Baja contracción - MR 40 - 28 días	3.21	86.5	0.000154	0.000533	0.0323	6.89E-05
Baja contracción - MR 42 - 14 días	3.37	91	0.000165	0.000576	0.0351	7.15E-05
Baja contracción - MR 42 - 28 días	3.26	88	0.000158	0.000547	0.0333	6.98E-05
Baja contracción - MR 45 - 14 días	3.46	93.4	0.000171	6.00E-04	0.0366	7.29E-05
Baja contracción - MR 45 - 28 días	3.35	90.4	0.000164	0.000571	0.0348	7.11E-05
Baja contracción - MR 48 - 14 días	3.56	96.2	0.000178	0.000626	0.0383	7.45E-05
Baja contracción - MR 48 - 28 días	3.45	93.2	0.000171	0.000597	0.0365	7.28E-05
Convencional - f'c 100 - 14 días	2.81	76.9	0.000158	0.00047	0.0249	4.87E-05
Convencional - f'c 100 - 28 días	2.7	74.1	0.000152	0.000442	0.0231	4.69E-05
Convencional - f'c 100 - 3 días	3.16	86.2	0.000181	0.000563	0.031	5.45E-05
Convencional - f'c 100 - 7 días	2.95	80.8	0.000168	0.000508	0.0274	5.11E-05
Convencional - f'c 150 - 14 días	2.89	79.1	0.000164	0.000492	0.0264	5.00E-05
Convencional - f'c 150 - 28 días	2.78	76.3	0.000157	0.000464	0.0246	4.83E-05
Convencional - f'c 150 - 3 días	3.24	88.5	0.000186	0.000585	0.0324	5.59E-05
Convencional - f'c 150 - 7 días	3.03	83	0.000173	0.00053	0.0289	5.24E-05
Convencional - f'c 200 - 14 días	3.02	82.6	0.000172	0.000527	0.0287	5.22E-05
Convencional - f'c 200 - 28 días	2.94	80.2	0.000167	0.000502	0.027	5.09E-05
Convencional - f'c 200 - 3 días	3.47	94.2	0.000201	0.000643	0.0362	5.98E-05
Convencional - f'c 200 - 7 días	3.16	86.5	0.000181	0.000565	0.0312	5.46E-05
Convencional - f'c 250 - 14 días	3.15	86.2	0.000181	0.000562	0.0309	5.44E-05
Convencional - f'c 250 - 28 días	3.07	83.8	0.000175	0.000537	0.0292	5.31E-05
Convencional - f'c 250 - 3 días	3.5	95.5	0.000203	0.000654	0.037	6.02E-05
Convencional - f'c 250 - 7 días	3.3	90	0.00019	6.00E-04	0.0334	5.68E-05
Convencional - f'c 300 - 14 días	3.42	93.6	0.000198	0.000634	0.0357	5.89E-05
Convencional - f'c 300 - 28 días	3.32	90.8	0.000191	0.000607	0.034	5.72E-05
Convencional - f'c 300 - 3 días	3.77	103	0.00022	0.000726	0.0418	6.47E-05





Convencional - f'c 300 - 7 dias	3.56	97.4	0.000207	0.000672	0.0382	6.13E-05
Convencional - f'c 350 - 14 dias	3.68	100	0.000214	0.000702	0.0402	6.32E-05
Convencional - f'c 350 - 28 dias	3.57	97.7	0.000207	0.000675	0.0384	6.14E-05
Convencional - f'c 350 - 3 dias	4.02	110	0.000236	0.000794	0.0463	6.90E-05
Convencional - f'c 350 - 7 dias	3.82	104	0.000223	0.00074	0.0427	6.56E-05
Estructural - f'c 250 - 14 dias	3.25	87.8	0.000187	0.000575	0.0314	5.66E-05
Estructural - f'c 250 - 28 dias	3.16	85.2	0.00018	0.000549	0.0297	5.50E-05
Estructural - f'c 250 - 3 dias	3.61	97.3	0.000209	0.000668	0.0375	6.25E-05
Estructural - f'c 250 - 7 dias	3.4	91.6	0.000196	0.000613	0.0339	5.89E-05
Estructural - f'c 300 - 14 dias	3.49	94.3	0.000202	0.000639	0.0357	6.05E-05
Estructural - f'c 300 - 28 dias	3.39	91.8	0.000195	0.000612	0.0339	5.88E-05
Estructural - f'c 300 - 3 dias	3.84	104	0.000224	0.000731	0.0417	6.63E-05
Estructural - f'c 300 - 7 dias	3.63	98.1	0.000211	0.000677	0.0382	6.29E-05
Estructural - f'c 350 - 14 dias	3.71	100	0.000215	0.000696	0.0394	6.41E-05
Estructural - f'c 350 - 28 dias	3.6	97.4	0.000209	0.000669	0.0377	6.24E-05
Estructural - f'c 350 - 3 dias	4.05	109	0.000237	0.000788	0.0455	6.99E-05
Estructural - f'c 350 - 7 dias	3.85	104	0.000224	0.000734	0.0419	6.65E-05
Lanzado - f'c 200 - 14 dias	3.47	95.3	0.000193	0.000648	0.0379	6.32E-05
Lanzado - f'c 200 - 28 dias	3.36	92.2	0.000187	0.000617	0.0359	6.12E-05
Lanzado - f'c 200 - 3 dias	3.66	100	0.000205	0.000698	0.0414	6.67E-05
Lanzado - f'c 200 - 7 dias	3.59	98.4	2.00E-04	0.000678	0.04	6.53E-05
Lanzado - f'c 250 - 14 dias	3.59	98.4	2.00E-04	0.000678	0.04	6.53E-05
Lanzado - f'c 250 - 28 dias	3.47	95.3	0.000193	0.000648	0.038	6.32E-05
Lanzado - f'c 250 - 3 dias	3.78	104	0.000212	0.000729	0.0435	6.87E-05
Lanzado - f'c 250 - 7 dias	3.7	102	0.000207	0.000709	0.0421	6.74E-05
Lanzado - f'c 300 - 14 dias	3.74	103	0.00021	0.00072	0.0429	6.80E-05



Lanzado - f' c 300 - 28 dias	3.63	99.5	0.000203	0.00069	0.0408	6.60E-05
Lanzado - f' c 300 - 3 dias	3.93	108	0.000222	0.000772	0.0463	7.15E-05
Lanzado - f' c 300 - 7 dias	3.86	106	0.000217	0.000751	0.0449	7.01E-05
Lanzado - f' c 350 - 14 dias	3.92	107	0.000221	0.000768	0.046	7.11E-05
Lanzado - f' c 350 - 28 dias	3.81	104	0.000214	0.000737	0.0439	6.91E-05
Lanzado - f' c 350 - 3 dias	4.11	113	0.000233	0.000819	0.0495	7.45E-05
Lanzado - f' c 350 - 7 dias	4.04	111	0.000228	0.000799	0.0481	7.31E-05
Modulo de ruptura - MR 35 - 14 dias	3.16	85.9	0.000162	0.000547	0.0327	6.32E-05
Modulo de ruptura - MR 35 - 28 dias	3.06	83.2	0.000156	0.00052	0.0309	6.16E-05
Modulo de ruptura - MR 35 - 3 dias	3.54	96.2	0.000187	0.00065	0.0394	6.93E-05
Modulo de ruptura - MR 35 - 7 dias	3.34	90.8	0.000174	0.000597	0.0359	6.62E-05
Modulo de ruptura - MR 36 - 14 dias	3.17	86.4	0.000163	0.000552	0.033	6.35E-05
Modulo de ruptura - MR 36 - 28 dias	3.07	83.7	0.000157	0.000525	0.0312	6.19E-05
Modulo de ruptura - MR 36 - 3 dias	3.55	96.6	0.000188	0.000655	0.0397	6.95E-05
Modulo de ruptura - MR 36 - 7 dias	3.36	91.3	0.000175	0.000601	0.0362	6.65E-05
Modulo de ruptura - MR 38 - 14 dias	3.21	87.3	0.000166	0.000561	0.0336	6.40E-05
Modulo de ruptura - MR 38 - 28 dias	3.11	84.6	0.000159	0.000534	0.0318	6.24E-05
Modulo de ruptura - MR 38 - 3 dias	3.59	97.5	0.00019	0.000664	0.0403	7.01E-05
Modulo de ruptura - MR 38 - 7 dias	3.39	92.2	0.000178	0.00061	0.0368	6.70E-05
Modulo de ruptura - MR 40 - 14 dias	3.25	88.5	0.000169	0.000574	0.0344	6.48E-05
Modulo de ruptura - MR 40 - 28 dias	3.15	85.8	0.000162	0.000547	0.0327	6.31E-05
Modulo de ruptura - MR 40 - 3 dias	3.64	98.9	0.000194	0.000678	0.0412	7.10E-05
Modulo de ruptura - MR 40 - 7 dias	3.44	93.5	0.000181	0.000623	0.0377	6.77E-05
Modulo de ruptura - MR 42 - 14 dias	3.3	89.9	0.000172	0.000588	0.0354	6.56E-05
Modulo de ruptura - MR 42 - 28 dias	3.21	87.3	0.000166	0.000562	0.0336	6.38E-05
Modulo de ruptura - MR 42 - 3 dias	3.69	100	0.000197	0.000691	0.0421	7.17E-05



Modulo de ruptura - MR 42 - 7 dias	3.49	94.9	0.000184	0.000637	0.0386	6.86E-05
Modulo de ruptura - MR 45 - 14 dias	3.4	92.5	0.000178	0.000613	0.037	6.72E-05
Modulo de ruptura - MR 45 - 28 dias	3.3	89.8	0.000172	0.000586	0.0352	6.55E-05
Modulo de ruptura - MR 45 - 3 dias	3.78	103	0.000203	0.000717	0.0438	7.33E-05
Modulo de ruptura - MR 45 - 7 dias	3.59	97.4	0.00019	0.000663	0.0402	7.02E-05
Modulo de ruptura - MR 48 - 14 dias	3.5	95.1	0.000184	0.000639	0.0387	6.88E-05
Modulo de ruptura - MR 48 - 28 dias	3.4	92.4	0.000178	0.000612	0.0369	6.71E-05
Modulo de ruptura - MR 48 - 3 dias	3.88	105	0.000209	0.000743	0.0455	7.48E-05
Modulo de ruptura - MR 48 - 7 dias	3.68	100	0.000196	0.000689	0.0419	7.16E-05
Relleno Fluido - f'c 15 - 14 dias	2.33	66.1	0.00013	0.000381	0.02	3.96E-05
Relleno Fluido - f'c 15 - 28 dias	2.24	63.5	0.000124	0.000354	0.0183	3.80E-05
Relleno Fluido - f'c 15 - 3 dias	2.7	75.9	0.000154	0.000482	0.0267	4.54E-05
Relleno Fluido - f'c 15 - 7 dias	2.51	70.7	0.000142	0.000429	0.0232	4.23E-05
Relleno Fluido - f'c 20 - 14 dias	2.35	66.7	0.000132	0.000387	0.0204	3.99E-05
Relleno Fluido - f'c 20 - 28 dias	2.26	64.1	0.000125	0.00036	0.0186	3.83E-05
Relleno Fluido - f'c 20 - 3 dias	2.71	76.4	0.000155	0.000487	0.0271	4.57E-05
Relleno Fluido - f'c 20 - 7 dias	2.53	71.3	0.000143	0.000434	0.0236	4.27E-05
Relleno Fluido - f'c 25 - 14 dias	2.38	67.3	0.000133	0.000393	0.0208	4.03E-05
Relleno Fluido - f'c 25 - 28 dias	2.28	64.7	0.000127	0.000366	0.019	3.87E-05
Relleno Fluido - f'c 25 - 3 dias	2.74	77	0.000157	0.000493	0.0275	4.61E-05
Relleno Fluido - f'c 25 - 7 dias	2.55	71.9	0.000144	0.000441	0.024	4.30E-05
Relleno Fluido - f'c 30 - 14 dias	2.4	68	0.000135	4.00E-04	0.0213	4.07E-05
Relleno Fluido - f'c 30 - 28 dias	2.31	65.4	0.000128	0.000373	0.0195	3.91E-05
Relleno Fluido - f'c 30 - 3 dias	2.76	77.7	0.000158	0.000501	0.028	4.65E-05
Relleno Fluido - f'c 30 - 7 dias	2.58	72.6	0.000146	0.000448	0.0245	4.35E-05
Relleno Fluido - f'c 40 - 14 dias	2.46	69.5	0.000138	0.000415	0.0223	4.15E-05



Relleno Fluido - f'c 40 - 28 dias	2.36	66.9	0.000132	0.000388	0.0205	3.99E-05
Relleno Fluido - f'c 40 - 3 dias	2.82	79.2	0.000162	0.000516	0.029	4.74E-05
Relleno Fluido - f'c 40 - 7 dias	2.63	74.1	0.000149	0.000463	0.0255	4.43E-05
Relleno Fluido - f'c 50 - 14 dias	2.52	71.3	0.000143	0.000434	0.0236	4.26E-05
Relleno Fluido - f'c 50 - 28 dias	2.46	69.7	0.000138	0.000411	0.0219	4.19E-05
Relleno Fluido - f'c 50 - 3 dias	2.88	81	0.000166	0.000534	0.0303	4.85E-05
Relleno Fluido - f'c 50 - 7 dias	2.7	75.9	0.000154	0.000482	0.0268	4.54E-05
Relleno Fluido - f'c 60 - 14 dias	2.6	73.3	0.000148	0.000455	0.025	4.39E-05
Relleno Fluido - f'c 60 - 28 dias	2.5	70.7	0.000141	0.000428	0.0232	4.23E-05
Relleno Fluido - f'c 60 - 3 dias	2.96	83	0.000171	0.000555	0.0317	4.97E-05
Relleno Fluido - f'c 60 - 7 dias	2.77	77.9	0.000159	0.000503	0.0282	4.66E-05
Relleno Fluido - f'c 70 - 14 dias	2.67	75.4	0.000152	0.000476	0.0264	4.50E-05
Relleno Fluido - f'c 70 - 28 dias	2.58	72.8	0.000146	0.00045	0.0246	4.35E-05
Relleno Fluido - f'c 70 - 3 dias	3.03	85	0.000176	0.000576	0.0331	5.09E-05
Relleno Fluido - f'c 70 - 7 dias	2.85	80	0.000164	0.000524	0.0296	4.78E-05

## OTHER ENVIRONMENTAL INFO

- Certificado SIG Calidad
- Certificado SIG Medio Ambiente
- Certificado SIG Seguridad y Salud en el Trabajo
- ONNCE
- 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

