



# Environmental Product Declaration

**MOCTEZUMA®**

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



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

### 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



<b>97</b>	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 días	29.40 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	29.4	Proprietary
<b>135</b>	Lanzado - f'c 300 - 7 días	29.40 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	29.4	Proprietary
<b>136</b>	Lanzado - f'c 300 - 3 días	29.40 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	29.4	Proprietary
<b>137</b>	Lanzado - f'c 300 - 28 días	29.40 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	29.4	Proprietary
<b>138</b>	Lanzado - f'c 300 - 14 días	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
<b>21</b>	Convencional - f'c 350 - 7 días	34.30 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>22</b>	Convencional - f'c 350 - 3 días	34.30 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>23</b>	Convencional - f'c 350 - 28 días	34.30 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>24</b>	Convencional - f'c 350 - 14 días	34.30 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>33</b>	Estructural - f'c 350 - 7 días	34.30 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>34</b>	Estructural - f'c 350 - 3 días	34.30 MPa 3d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>35</b>	Estructural - f'c 350 - 28 días	34.30 MPa 28d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>36</b>	Estructural - f'c 350 - 14 días	34.30 MPa 14d strength Ready Mix Concrete	Ready Mix Concrete	34.3	Proprietary
<b>105</b>	Modulo de ruptura - MR 45 - 7 días	31.50 MPa 7d strength Ready Mix Concrete	Ready Mix Concrete	31.5	Proprietary



<b>106</b>	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.

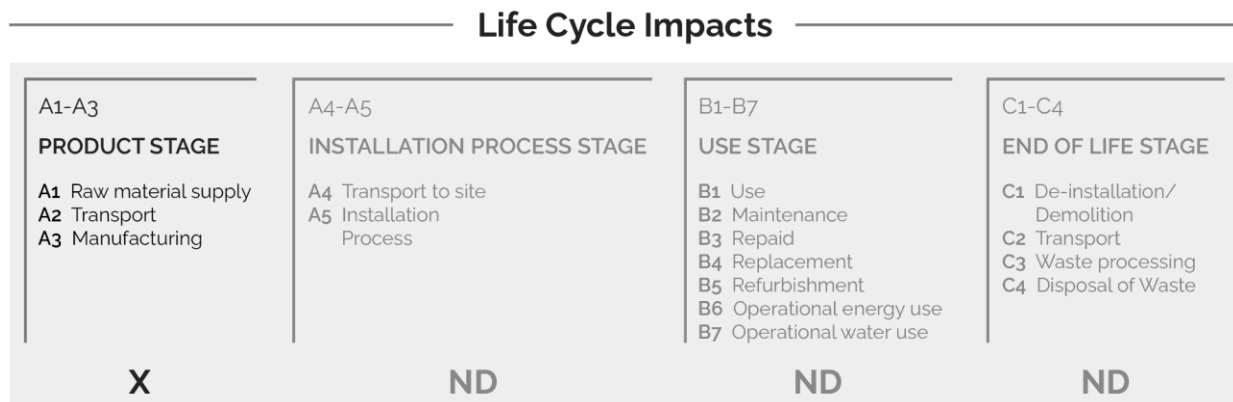


Figure 1: General life cycle phases for consideration in a construction works system

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

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

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 Teoloyucan 2 facility in Estado de México, 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:** Electricity consumption values are for Moctezuma in calendar year 2023. The plant operates without utilizing grid electricity

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

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
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;	ecoinvent v3.10 in 2024	Edo. Mex	2024	2	3	1	3	3





	Note: modifications made (see ecoinvent activity changes table)								
<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 (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	ADP <sub>fossil</sub>	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 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	GWP100	ODP	AP	EP	SFP	ADP <sub>fossil</sub>
Unit	kg CO <sub>2</sub> -eq	kg CFC-11-eq	kg SO <sub>2</sub> -eq	kg N-eq	kg O <sub>3</sub> -eq	MJ
Alta resistencia - f'c 400 - 14 dias	471	3.72E-06	0.471	0.295	8.7	2920
Alta resistencia - f'c 400 - 28 dias	448	3.56E-06	0.455	0.284	8.46	2790
Alta resistencia - f'c 400 - 3 dias	547	4.28E-06	0.523	0.334	9.5	3340
Alta resistencia - f'c 400 - 7 dias	502	3.95E-06	0.493	0.311	9.03	3090
Alta resistencia - f'c 450 - 14 dias	513	4.03E-06	0.5	0.317	9.14	3150
Alta resistencia - f'c 450 - 28 dias	491	3.87E-06	0.485	0.305	8.91	3030
Alta resistencia - f'c 450 - 3 dias	590	4.59E-06	0.553	0.356	9.95	3580
Alta resistencia - f'c 450 - 7 dias	545	4.26E-06	0.522	0.333	9.48	3330
Alta resistencia - f'c 500 - 14 dias	554	4.32E-06	0.528	0.338	9.57	3380



Alta resistencia - f' c 500 - 28 días	531	4.16E-06	0.512	0.326	9.33	3250
Alta resistencia - f' c 500 - 3 días	630	4.88E-06	0.58	0.377	10.4	3800
Alta resistencia - f' c 500 - 7 días	585	4.55E-06	0.55	0.354	9.9	3550
Alta resistencia - f' c 550 - 14 días	607	4.75E-06	0.569	0.387	10.2	3700
Alta resistencia - f' c 550 - 28 días	584	4.59E-06	0.553	0.375	9.94	3570
Alta resistencia - f' c 550 - 3 días	683	5.31E-06	0.622	0.429	11	4120
Alta resistencia - f' c 550 - 7 días	638	4.99E-06	0.591	0.405	10.5	3870
Alta resistencia - f' c 600 - 14 días	657	5.10E-06	0.602	0.407	10.7	3960
Alta resistencia - f' c 600 - 28 días	634	4.94E-06	0.586	0.394	10.5	3840
Alta resistencia - f' c 600 - 3 días	733	5.66E-06	0.655	0.448	11.5	4390
Alta resistencia - f' c 600 - 7 días	688	5.33E-06	0.624	0.424	11	4140
Baja contracción - MR 38 - 3 días	357	3.01E-06	0.404	0.221	7.96	2410
Baja contracción - MR 38 - 7 días	335	2.86E-06	0.39	0.212	7.75	2290
Baja contracción - MR 40 - 14 días	367	3.07E-06	0.411	0.225	8.05	2460
Baja contracción - MR 40 - 28 días	345	2.92E-06	0.396	0.216	7.84	2340
Baja contracción - MR 42 - 3 días	378	3.15E-06	0.418	0.23	8.16	2520
Baja contracción - MR 42 - 7 días	356	3.00E-06	0.403	0.221	7.94	2400
Baja contracción - MR 45 - 14 días	397	3.28E-06	0.43	0.238	8.34	2620
Baja contracción - MR 45 - 28 días	375	3.13E-06	0.416	0.229	8.13	2500
Baja contracción - MR 48 - 3 días	417	3.42E-06	0.443	0.247	8.54	2720
Baja contracción - MR 48 - 7 días	395	3.27E-06	0.429	0.238	8.32	2610
Convencional - f' c 100 - 14 días	192	1.66E-06	0.273	0.131	5.67	1350
Convencional - f' c 100 - 28 días	170	1.50E-06	0.258	0.123	5.44	1220
Convencional - f' c 100 - 3 días	268	2.19E-06	0.323	0.16	6.44	1760
Convencional - f' c 100 - 7 días	224	1.88E-06	0.294	0.143	5.98	1520
Convencional - f' c 150 - 14 días	222	1.87E-06	0.293	0.142	5.97	1510





Convencional - f'c 150 - 28 dias	200	1.71E-06	0.278	0.134	5.74	1390
Convencional - f'c 150 - 3 dias	298	2.40E-06	0.343	0.171	6.74	1920
Convencional - f'c 150 - 7 dias	253	2.09E-06	0.314	0.154	6.29	1680
Convencional - f'c 200 - 14 dias	258	2.12E-06	0.317	0.157	6.36	1700
Convencional - f'c 200 - 28 dias	236	1.96E-06	0.303	0.148	6.13	1580
Convencional - f'c 200 - 3 dias	334	2.64E-06	0.368	0.185	7.12	2110
Convencional - f'c 200 - 7 dias	289	2.33E-06	0.338	0.168	6.67	1870
Convencional - f'c 250 - 14 dias	295	2.37E-06	0.342	0.17	6.73	1900
Convencional - f'c 250 - 28 dias	272	2.21E-06	0.327	0.162	6.5	1780
Convencional - f'c 250 - 3 dias	371	2.90E-06	0.392	0.199	7.5	2310
Convencional - f'c 250 - 7 dias	326	2.59E-06	0.362	0.182	7.05	2070
Convencional - f'c 300 - 14 dias	348	2.74E-06	0.377	0.191	7.26	2190
Convencional - f'c 300 - 28 dias	326	2.59E-06	0.362	0.182	7.04	2070
Convencional - f'c 300 - 3 dias	424	3.27E-06	0.427	0.219	8.03	2600
Convencional - f'c 300 - 7 dias	380	2.96E-06	0.398	0.202	7.58	2360
Convencional - f'c 350 - 14 dias	396	3.07E-06	0.408	0.209	7.74	2450
Convencional - f'c 350 - 28 dias	373	2.92E-06	0.393	0.2	7.51	2330
Convencional - f'c 350 - 3 dias	472	3.60E-06	0.458	0.237	8.51	2860
Convencional - f'c 350 - 7 dias	427	3.29E-06	0.429	0.22	8.06	2620
Estructural - f'c 250 - 14 dias	295	2.37E-06	0.342	0.17	6.73	1900
Estructural - f'c 250 - 28 dias	272	2.21E-06	0.327	0.162	6.5	1780
Estructural - f'c 250 - 3 dias	371	2.90E-06	0.392	0.199	7.5	2310
Estructural - f'c 250 - 7 dias	326	2.59E-06	0.362	0.182	7.05	2070
Estructural - f'c 300 - 14 dias	348	2.74E-06	0.377	0.191	7.26	2190
Estructural - f'c 300 - 28 dias	326	2.59E-06	0.362	0.182	7.04	2070
Estructural - f'c 300 - 3 dias	424	3.27E-06	0.427	0.219	8.03	2600



Estructural - f'c 300 - 7 dias	380	2.96E-06	0.398	0.202	7.58	2360
Estructural - f'c 350 - 14 dias	396	3.07E-06	0.408	0.209	7.74	2450
Estructural - f'c 350 - 28 dias	373	2.92E-06	0.393	0.2	7.51	2330
Estructural - f'c 350 - 3 dias	472	3.60E-06	0.458	0.237	8.51	2860
Estructural - f'c 350 - 7 dias	427	3.29E-06	0.429	0.22	8.06	2620
Lanzado - f'c 200 - 14 dias	388	3.08E-06	0.435	0.227	8.38	2480
Lanzado - f'c 200 - 28 dias	362	2.90E-06	0.42	0.218	8.17	2350
Lanzado - f'c 200 - 3 dias	431	3.37E-06	0.459	0.241	8.73	2710
Lanzado - f'c 200 - 7 dias	414	3.25E-06	0.449	0.235	8.59	2620
Lanzado - f'c 250 - 14 dias	414	3.25E-06	0.45	0.236	8.6	2620
Lanzado - f'c 250 - 28 dias	388	3.08E-06	0.435	0.227	8.39	2480
Lanzado - f'c 250 - 3 dias	458	3.55E-06	0.475	0.25	8.95	2850
Lanzado - f'c 250 - 7 dias	440	3.43E-06	0.465	0.244	8.82	2760
Lanzado - f'c 300 - 14 dias	449	3.49E-06	0.471	0.248	8.9	2800
Lanzado - f'c 300 - 28 dias	423	3.32E-06	0.456	0.239	8.69	2670
Lanzado - f'c 300 - 3 dias	493	3.79E-06	0.496	0.262	9.27	3030
Lanzado - f'c 300 - 7 dias	475	3.67E-06	0.486	0.256	9.12	2940
Lanzado - f'c 350 - 14 dias	489	3.76E-06	0.495	0.261	9.25	3010
Lanzado - f'c 350 - 28 dias	462	3.58E-06	0.479	0.252	9.03	2880
Lanzado - f'c 350 - 3 dias	532	4.06E-06	0.52	0.276	9.62	3240
Lanzado - f'c 350 - 7 dias	515	3.94E-06	0.51	0.27	9.48	3150
Modulo de ruptura - MR 35 - 14 dias	352	2.76E-06	0.375	0.181	7.23	2200
Modulo de ruptura - MR 35 - 28 dias	330	2.60E-06	0.36	0.173	7	2080
Modulo de ruptura - MR 35 - 3 dias	423	3.25E-06	0.422	0.206	7.94	2590
Modulo de ruptura - MR 35 - 7 dias	392	3.03E-06	0.402	0.195	7.64	2420
Modulo de ruptura - MR 36 - 14 dias	356	2.78E-06	0.378	0.182	7.26	2220



Modulo de ruptura - MR 36 - 28 dias	333	2.63E-06	0.363	0.174	7.03	2100
Modulo de ruptura - MR 36 - 3 dias	427	3.27E-06	0.424	0.207	7.97	2600
Modulo de ruptura - MR 36 - 7 dias	396	3.06E-06	0.405	0.197	7.68	2440
Modulo de ruptura - MR 38 - 14 dias	365	2.84E-06	0.384	0.186	7.36	2270
Modulo de ruptura - MR 38 - 28 dias	342	2.69E-06	0.369	0.178	7.12	2150
Modulo de ruptura - MR 38 - 3 dias	436	3.33E-06	0.43	0.211	8.06	2650
Modulo de ruptura - MR 38 - 7 dias	405	3.12E-06	0.41	0.2	7.77	2490
Modulo de ruptura - MR 40 - 14 dias	375	2.91E-06	0.39	0.189	7.46	2320
Modulo de ruptura - MR 40 - 28 dias	352	2.76E-06	0.375	0.181	7.22	2200
Modulo de ruptura - MR 40 - 3 dias	446	3.40E-06	0.437	0.214	8.16	2710
Modulo de ruptura - MR 40 - 7 dias	415	3.19E-06	0.417	0.203	7.87	2540
Modulo de ruptura - MR 42 - 14 dias	387	3.00E-06	0.399	0.193	7.59	2390
Modulo de ruptura - MR 42 - 28 dias	383	3.00E-06	0.412	0.201	7.92	2410
Modulo de ruptura - MR 42 - 3 dias	458	3.49E-06	0.445	0.219	8.29	2770
Modulo de ruptura - MR 42 - 7 dias	427	3.27E-06	0.425	0.208	8	2610
Modulo de ruptura - MR 45 - 14 dias	407	3.13E-06	0.412	0.2	7.79	2500
Modulo de ruptura - MR 45 - 28 dias	384	2.98E-06	0.397	0.192	7.55	2380
Modulo de ruptura - MR 45 - 3 dias	478	3.62E-06	0.458	0.225	8.49	2880
Modulo de ruptura - MR 45 - 7 dias	447	3.41E-06	0.438	0.215	8.2	2710
Modulo de ruptura - MR 48 - 14 dias	428	3.28E-06	0.426	0.208	8.01	2610
Modulo de ruptura - MR 48 - 28 dias	406	3.13E-06	0.411	0.2	7.77	2490
Modulo de ruptura - MR 48 - 3 dias	499	3.77E-06	0.472	0.233	8.71	2990
Modulo de ruptura - MR 48 - 7 dias	468	3.56E-06	0.452	0.222	8.42	2830
Relleno Fluido - f'c 15 - 14 dias	196	1.59E-06	0.251	0.118	5.09	1280
Relleno Fluido - f'c 15 - 28 dias	174	1.43E-06	0.236	0.111	4.87	1160
Relleno Fluido - f'c 15 - 3 dias	281	2.16E-06	0.306	0.144	5.94	1740



Relleno Fluido - f'c 15 - 7 dias	236	1.86E-06	0.277	0.13	5.49	1500
Relleno Fluido - f'c 20 - 14 dias	201	1.62E-06	0.254	0.119	5.14	1310
Relleno Fluido - f'c 20 - 28 dias	179	1.46E-06	0.239	0.112	4.91	1190
Relleno Fluido - f'c 20 - 3 dias	285	2.19E-06	0.308	0.145	5.98	1760
Relleno Fluido - f'c 20 - 7 dias	241	1.89E-06	0.28	0.132	5.54	1520
Relleno Fluido - f'c 25 - 14 dias	206	1.65E-06	0.257	0.121	5.19	1340
Relleno Fluido - f'c 25 - 28 dias	184	1.50E-06	0.243	0.114	4.97	1220
Relleno Fluido - f'c 25 - 3 dias	291	2.23E-06	0.312	0.147	6.03	1790
Relleno Fluido - f'c 25 - 7 dias	246	1.92E-06	0.283	0.133	5.59	1550
Relleno Fluido - f'c 30 - 14 dias	212	1.69E-06	0.261	0.122	5.24	1370
Relleno Fluido - f'c 30 - 28 dias	189	1.54E-06	0.246	0.115	5.02	1250
Relleno Fluido - f'c 30 - 3 dias	296	2.26E-06	0.315	0.149	6.09	1820
Relleno Fluido - f'c 30 - 7 dias	252	1.96E-06	0.287	0.135	5.65	1580
Relleno Fluido - f'c 40 - 14 dias	225	1.78E-06	0.269	0.127	5.38	1440
Relleno Fluido - f'c 40 - 28 dias	203	1.63E-06	0.255	0.12	5.15	1320
Relleno Fluido - f'c 40 - 3 dias	309	2.35E-06	0.324	0.153	6.22	1890
Relleno Fluido - f'c 40 - 7 dias	265	2.05E-06	0.295	0.139	5.78	1650
Relleno Fluido - f'c 50 - 14 dias	242	1.89E-06	0.28	0.132	5.54	1530
Relleno Fluido - f'c 50 - 28 dias	220	1.74E-06	0.266	0.125	5.32	1410
Relleno Fluido - f'c 50 - 3 dias	326	2.47E-06	0.335	0.158	6.39	1980
Relleno Fluido - f'c 50 - 7 dias	282	2.17E-06	0.306	0.144	5.95	1740
Relleno Fluido - f'c 60 - 14 dias	259	2.01E-06	0.291	0.137	5.71	1620
Relleno Fluido - f'c 60 - 28 dias	236	1.86E-06	0.276	0.13	5.49	1500
Relleno Fluido - f'c 60 - 3 dias	343	2.58E-06	0.346	0.163	6.56	2070
Relleno Fluido - f'c 60 - 7 dias	299	2.28E-06	0.317	0.149	6.11	1830
Relleno Fluido - f'c 70 - 14 dias	281	2.16E-06	0.305	0.144	5.93	1740



Relleno Fluido - f'c 70 - 28 dias	259	2.01E-06	0.291	0.137	5.71	1620
Relleno Fluido - f'c 70 - 3 dias	365	2.74E-06	0.36	0.17	6.78	2190
Relleno Fluido - f'c 70 - 7 dias	321	2.43E-06	0.331	0.156	6.33	1950

## 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	95.7	9.33	94.9	1390	0.609	0.00601	0.28	0.537
Alta resistencia - f'c 400 - 28 dias	91.2	9.26	90.4	1320	0.588	0.00589	0.272	0.526
Alta resistencia - f'c 400 - 3 dias	111	9.55	110	1640	0.676	0.00641	0.308	0.583
Alta resistencia - f'c 400 - 7 dias	102	9.42	101	1490	0.636	0.00617	0.292	0.556
Alta resistencia - f'c 450 - 14 dias	104	9.45	103	1530	0.647	0.00623	0.296	0.566
Alta resistencia - f'c 450 - 28 dias	99.6	9.38	98.8	1450	0.626	0.00611	0.288	0.553
Alta resistencia - f'c 450 - 3 dias	119	9.67	118	1770	0.715	0.00664	0.324	0.608
Alta resistencia - f'c 450 - 7 dias	110	9.54	109	1630	0.674	0.0064	0.308	0.582
Alta resistencia - f'c 500 - 14 dias	112	9.57	111	1660	0.682	0.00644	0.311	0.586
Alta resistencia - f'c 500 - 28 dias	108	9.5	107	1580	0.662	0.00632	0.303	0.574
Alta resistencia - f'c 500 - 3 dias	127	9.79	126	1900	0.75	0.00684	0.339	0.631
Alta resistencia - f'c 500 - 7 dias	118	9.66	117	1760	0.71	0.00661	0.322	0.603
Alta resistencia - f'c 550 - 14 dias	123	9.72	122	1830	0.734	0.00677	0.342	0.629
Alta resistencia - f'c 550 - 28 dias	119	9.65	118	1760	0.713	0.00664	0.332	0.615
Alta resistencia - f'c 550 - 3 dias	139	9.94	137	2080	0.802	0.00717	0.371	0.673
Alta resistencia - f'c 550 - 7 dias	130	9.81	128	1930	0.762	0.00694	0.354	0.647
Alta resistencia - f'c 600 - 14 dias	133	9.86	132	1990	0.776	0.00701	0.356	0.65
Alta resistencia - f'c 600 - 28 dias	129	9.8	127	1920	0.756	0.00689	0.348	0.638
Alta resistencia - f'c 600 - 3 dias	148	10.1	147	2230	0.844	0.00741	0.386	0.695



Alta resistencia - f'c 600 - 7 dias	139	9.96	138	2090	0.804	0.00717	0.368	0.671
Baja contracción - MR 38 - 3 dias	71.7	8.94	71.2	969	0.598	0.00679	0.267	0.588
Baja contracción - MR 38 - 7 dias	67.4	8.88	66.9	897	0.582	0.00672	0.261	0.582
Baja contracción - MR 40 - 14 dias	73.7	8.97	73.1	1000	0.606	0.00683	0.27	0.591
Baja contracción - MR 40 - 28 dias	69.3	8.91	68.8	929	0.589	0.00675	0.264	0.584
Baja contracción - MR 42 - 3 dias	75.9	9.01	75.4	1040	0.614	0.00686	0.273	0.595
Baja contracción - MR 42 - 7 dias	71.5	8.94	71	966	0.597	0.00678	0.267	0.588
Baja contracción - MR 45 - 14 dias	79.6	9.06	79	1100	0.628	0.00692	0.278	0.601
Baja contracción - MR 45 - 28 dias	75.2	9	74.7	1030	0.612	0.00685	0.272	0.594
Baja contracción - MR 48 - 3 dias	83.6	9.12	82.9	1160	0.644	0.00699	0.284	0.608
Baja contracción - MR 48 - 7 dias	79.2	9.06	78.6	1090	0.627	0.00691	0.278	0.601
Convencional - f'c 100 - 14 dias	39.7	8.51	39.5	496	0.356	0.00448	0.167	0.383
Convencional - f'c 100 - 28 dias	35.3	8.44	35.2	425	0.337	0.00437	0.161	0.372
Convencional - f'c 100 - 3 dias	54.6	8.73	54.1	736	0.423	0.00487	0.19	0.42
Convencional - f'c 100 - 7 dias	45.8	8.6	45.5	595	0.384	0.00464	0.177	0.399
Convencional - f'c 150 - 14 dias	45.5	8.6	45.2	589	0.382	0.00464	0.176	0.397
Convencional - f'c 150 - 28 dias	41.1	8.53	40.9	519	0.363	0.00452	0.17	0.387
Convencional - f'c 150 - 3 dias	60.3	8.82	59.9	830	0.448	0.00502	0.199	0.435
Convencional - f'c 150 - 7 dias	51.6	8.69	51.2	688	0.41	0.0048	0.186	0.412
Convencional - f'c 200 - 14 dias	52.8	8.71	52.4	705	0.411	0.00478	0.187	0.414
Convencional - f'c 200 - 28 dias	48.4	8.64	48.1	635	0.391	0.00466	0.18	0.404
Convencional - f'c 200 - 3 dias	67.6	8.93	67.1	946	0.477	0.00517	0.21	0.452
Convencional - f'c 200 - 7 dias	58.9	8.8	58.5	804	0.438	0.00494	0.196	0.43
Convencional - f'c 250 - 14 dias	60	8.81	59.5	821	0.443	0.00497	0.198	0.432
Convencional - f'c 250 - 28 dias	55.6	8.75	55.2	750	0.423	0.00485	0.191	0.421
Convencional - f'c 250 - 3 dias	74.8	9.04	74.1	1060	0.509	0.00535	0.221	0.469



Convencional - f c 250 - 7 dias	66.1	8.91	65.5	920	0.47	0.00513	0.207	0.448
Convencional - f c 300 - 14 dias	70.4	8.97	69.9	991	0.49	0.00524	0.214	0.467
Convencional - f c 300 - 28 dias	66.1	8.91	65.5	920	0.47	0.00512	0.207	0.457
Convencional - f c 300 - 3 dias	85.3	9.2	84.5	1230	0.556	0.00562	0.237	0.504
Convencional - f c 300 - 7 dias	76.5	9.07	75.9	1090	0.517	0.0054	0.224	0.484
Convencional - f c 350 - 14 dias	79.7	9.11	79	1140	0.53	0.00547	0.228	0.49
Convencional - f c 350 - 28 dias	75.3	9.05	74.7	1070	0.511	0.00536	0.221	0.479
Convencional - f c 350 - 3 dias	94.5	9.34	93.7	1380	0.596	0.00585	0.251	0.527
Convencional - f c 350 - 7 dias	85.8	9.21	85	1240	0.557	0.00563	0.237	0.505
Estructural - f c 250 - 14 dias	60	8.81	59.5	821	0.443	0.00497	0.198	0.432
Estructural - f c 250 - 28 dias	55.6	8.75	55.2	750	0.423	0.00485	0.191	0.421
Estructural - f c 250 - 3 dias	74.8	9.04	74.1	1060	0.509	0.00535	0.221	0.469
Estructural - f c 250 - 7 dias	66.1	8.91	65.5	920	0.47	0.00513	0.207	0.448
Estructural - f c 300 - 14 dias	70.4	8.97	69.9	991	0.49	0.00524	0.214	0.467
Estructural - f c 300 - 28 dias	66.1	8.91	65.5	920	0.47	0.00512	0.207	0.457
Estructural - f c 300 - 3 dias	85.3	9.2	84.5	1230	0.556	0.00562	0.237	0.504
Estructural - f c 300 - 7 dias	76.5	9.07	75.9	1090	0.517	0.0054	0.224	0.484
Estructural - f c 350 - 14 dias	79.7	9.11	79	1140	0.53	0.00547	0.228	0.49
Estructural - f c 350 - 28 dias	75.3	9.05	74.7	1070	0.511	0.00536	0.221	0.479
Estructural - f c 350 - 3 dias	94.5	9.34	93.7	1380	0.596	0.00585	0.251	0.527
Estructural - f c 350 - 7 dias	85.8	9.21	85	1240	0.557	0.00563	0.237	0.505
Lanzado - f c 200 - 14 dias	83	9.06	82.3	1080	0.56	0.00589	0.274	0.508
Lanzado - f c 200 - 28 dias	78.2	8.98	77.6	996	0.54	0.00579	0.269	0.497
Lanzado - f c 200 - 3 dias	91	9.19	90.2	1220	0.593	0.00605	0.282	0.526
Lanzado - f c 200 - 7 dias	87.8	9.14	87.1	1170	0.58	0.00598	0.279	0.518
Lanzado - f c 250 - 14 dias	87.8	9.14	87.1	1170	0.58	0.00599	0.279	0.518





Lanzado - f c 250 - 28 dias	83	9.06	82.3	1080	0.56	0.00589	0.274	0.508
Lanzado - f c 250 - 3 dias	95.9	9.27	95.1	1310	0.614	0.00616	0.287	0.538
Lanzado - f c 250 - 7 dias	92.7	9.22	91.9	1250	0.601	0.00609	0.284	0.53
Lanzado - f c 300 - 14 dias	94.4	9.24	93.6	1280	0.608	0.00613	0.286	0.535
Lanzado - f c 300 - 28 dias	89.6	9.16	88.8	1190	0.588	0.00604	0.282	0.525
Lanzado - f c 300 - 3 dias	103	9.38	102	1420	0.642	0.0063	0.295	0.554
Lanzado - f c 300 - 7 dias	99.3	9.32	98.4	1360	0.629	0.00623	0.292	0.547
Lanzado - f c 350 - 14 dias	102	9.36	101	1410	0.639	0.00629	0.295	0.552
Lanzado - f c 350 - 28 dias	97	9.28	96.2	1320	0.619	0.00619	0.29	0.542
Lanzado - f c 350 - 3 dias	110	9.49	109	1550	0.674	0.00646	0.304	0.571
Lanzado - f c 350 - 7 dias	107	9.44	106	1490	0.66	0.00639	0.301	0.563
Modulo de ruptura - MR 35 - 14 dias	70.2	8.99	69.6	1000	0.494	0.00529	0.208	0.472
Modulo de ruptura - MR 35 - 28 dias	65.8	8.92	65.3	931	0.474	0.00518	0.201	0.461
Modulo de ruptura - MR 35 - 3 dias	84.1	9.2	83.4	1230	0.554	0.00563	0.228	0.506
Modulo de ruptura - MR 35 - 7 dias	78.1	9.11	77.4	1130	0.529	0.0055	0.22	0.491
Modulo de ruptura - MR 36 - 14 dias	70.9	9	70.3	1010	0.497	0.00531	0.209	0.473
Modulo de ruptura - MR 36 - 28 dias	66.5	8.93	66	942	0.478	0.0052	0.202	0.462
Modulo de ruptura - MR 36 - 3 dias	84.8	9.21	84.1	1240	0.558	0.00565	0.229	0.508
Modulo de ruptura - MR 36 - 7 dias	78.8	9.12	78.1	1140	0.532	0.00551	0.221	0.492
Modulo de ruptura - MR 38 - 14 dias	72.7	9.02	72	1040	0.505	0.00536	0.212	0.478
Modulo de ruptura - MR 38 - 28 dias	68.3	8.96	67.7	970	0.485	0.00524	0.205	0.467



Modulo de ruptura - MR 38 - 3 dias	86.6	9.24	85.8	1270	0.565	0.00569	0.232	0.512
Modulo de ruptura - MR 38 - 7 dias	80.5	9.14	79.8	1170	0.539	0.00556	0.223	0.497
Modulo de ruptura - MR 40 - 14 dias	74.6	9.05	73.9	1070	0.514	0.00541	0.214	0.482
Modulo de ruptura - MR 40 - 28 dias	70.2	8.99	69.6	1000	0.494	0.00529	0.208	0.472
Modulo de ruptura - MR 40 - 3 dias	88.5	9.26	87.7	1300	0.574	0.00574	0.235	0.517
Modulo de ruptura - MR 40 - 7 dias	82.4	9.17	81.7	1200	0.548	0.00561	0.226	0.5
Modulo de ruptura - MR 42 - 14 dias	77	9.09	76.3	1110	0.524	0.00547	0.218	0.489
Modulo de ruptura - MR 42 - 28 dias	78.1	9.06	77.4	1080	0.541	0.00573	0.238	0.5
Modulo de ruptura - MR 42 - 3 dias	91	9.3	90.1	1340	0.584	0.00581	0.238	0.522
Modulo de ruptura - MR 42 - 7 dias	84.9	9.21	84.1	1240	0.559	0.00567	0.23	0.507
Modulo de ruptura - MR 45 - 14 dias	80.9	9.15	80.1	1170	0.541	0.00557	0.224	0.497
Modulo de ruptura - MR 45 - 28 dias	76.5	9.08	75.8	1100	0.522	0.00545	0.217	0.486
Modulo de ruptura - MR 45 - 3 dias	94.8	9.36	93.9	1400	0.601	0.0059	0.244	0.53
Modulo de ruptura - MR 45 - 7 dias	88.7	9.27	87.9	1300	0.576	0.00577	0.235	0.516
Modulo de ruptura - MR 48 - 14 dias	85.1	9.21	84.3	1240	0.56	0.00568	0.23	0.506
Modulo de ruptura - MR 48 - 28 dias	80.7	9.15	80	1170	0.54	0.00556	0.223	0.496
Modulo de ruptura - MR 48 - 3 dias	99	9.42	98.1	1470	0.62	0.00601	0.25	0.541



Modulo de ruptura - MR 48 - 7 dias	92.9	9.33	92.1	1370	0.594	0.00587	0.241	0.525
Relleno Fluido - f'c 15 - 14 dias	41.1	8.55	40.8	533	0.309	0.00364	0.143	0.367
Relleno Fluido - f'c 15 - 28 dias	36.8	8.48	36.6	463	0.291	0.00353	0.138	0.357
Relleno Fluido - f'c 15 - 3 dias	57.5	8.8	57	800	0.381	0.00405	0.166	0.405
Relleno Fluido - f'c 15 - 7 dias	48.9	8.67	48.5	660	0.344	0.00383	0.154	0.386
Relleno Fluido - f'c 20 - 14 dias	42	8.56	41.7	547	0.313	0.00366	0.145	0.37
Relleno Fluido - f'c 20 - 28 dias	37.7	8.49	37.4	477	0.294	0.00355	0.139	0.36
Relleno Fluido - f'c 20 - 3 dias	58.4	8.81	57.9	814	0.385	0.00407	0.167	0.409
Relleno Fluido - f'c 20 - 7 dias	49.8	8.68	49.4	674	0.348	0.00386	0.155	0.387
Relleno Fluido - f'c 25 - 14 dias	43	8.58	42.7	564	0.318	0.00369	0.146	0.374
Relleno Fluido - f'c 25 - 28 dias	38.7	8.51	38.4	494	0.299	0.00358	0.14	0.363
Relleno Fluido - f'c 25 - 3 dias	59.4	8.83	58.9	830	0.39	0.0041	0.169	0.412
Relleno Fluido - f'c 25 - 7 dias	50.8	8.7	50.4	690	0.352	0.00388	0.157	0.391
Relleno Fluido - f'c 30 - 14 dias	44.1	8.59	43.7	581	0.323	0.00372	0.148	0.378
Relleno Fluido - f'c 30 - 28 dias	39.8	8.53	39.5	511	0.304	0.00361	0.142	0.368
Relleno Fluido - f'c 30 - 3 dias	60.5	8.85	60	847	0.394	0.00413	0.17	0.416
Relleno Fluido - f'c 30 - 7 dias	51.9	8.71	51.4	707	0.357	0.00391	0.158	0.395
Relleno Fluido - f'c 40 - 14 dias	46.7	8.63	46.3	623	0.334	0.00378	0.151	0.385
Relleno Fluido - f'c 40 - 28 dias	42.4	8.57	42	553	0.315	0.00367	0.145	0.374
Relleno Fluido - f'c 40 - 3 dias	63.1	8.89	62.5	889	0.406	0.00419	0.174	0.423
Relleno Fluido - f'c 40 - 7 dias	54.4	8.75	54	749	0.368	0.00398	0.162	0.402
Relleno Fluido - f'c 50 - 14 dias	49.9	8.68	49.5	676	0.348	0.00386	0.156	0.393
Relleno Fluido - f'c 50 - 28 dias	45.6	8.62	45.3	606	0.329	0.00375	0.15	0.383
Relleno Fluido - f'c 50 - 3 dias	66.4	8.94	65.8	942	0.42	0.00427	0.178	0.431
Relleno Fluido - f'c 50 - 7 dias	57.7	8.8	57.2	802	0.383	0.00406	0.166	0.411



Relleno Fluido - f'c 60 - 14 dias	53.2	8.73	52.8	730	0.363	0.00394	0.16	0.4
Relleno Fluido - f'c 60 - 28 dias	48.9	8.67	48.5	660	0.344	0.00383	0.154	0.391
Relleno Fluido - f'c 60 - 3 dias	69.6	8.99	69	996	0.434	0.00435	0.182	0.438
Relleno Fluido - f'c 60 - 7 dias	61	8.85	60.5	856	0.397	0.00414	0.171	0.419
Relleno Fluido - f'c 70 - 14 dias	57.5	8.8	57	800	0.381	0.00405	0.166	0.409
Relleno Fluido - f'c 70 - 28 dias	53.2	8.73	52.8	730	0.362	0.00394	0.16	0.4
Relleno Fluido - f'c 70 - 3 dias	73.9	9.05	73.2	1070	0.453	0.00446	0.188	0.449
Relleno Fluido - f'c 70 - 7 dias	65.3	8.92	64.7	926	0.415	0.00424	0.177	0.428

## 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	3.69	91.4	0.000196	0.000683	0.0416	7.78E-05
Alta resistencia - f'c 400 - 28 dias	3.56	88.2	0.000188	0.000653	0.0397	7.54E-05
Alta resistencia - f'c 400 - 3 dias	4.12	103	0.000222	0.000785	0.0481	8.56E-05
Alta resistencia - f'c 400 - 7 dias	3.87	96	0.000207	0.000725	0.0443	8.10E-05
Alta resistencia - f'c 450 - 14 dias	3.93	97.7	0.00021	0.000739	0.0452	8.22E-05
Alta resistencia - f'c 450 - 28 dias	3.8	94.4	0.000202	0.000709	0.0433	7.98E-05
Alta resistencia - f'c 450 - 3 dias	4.37	109	0.000237	0.000842	0.0517	9.01E-05
Alta resistencia - f'c 450 - 7 dias	4.11	102	0.000221	0.000782	0.0479	8.54E-05
Alta resistencia - f'c 500 - 14 dias	4.16	104	0.000225	0.000794	0.0486	8.63E-05
Alta resistencia - f'c 500 - 28 dias	4.03	100	0.000217	0.000764	0.0467	8.40E-05
Alta resistencia - f'c 500 - 3 dias	4.59	115	0.000251	0.000896	0.0551	9.41E-05
Alta resistencia - f'c 500 - 7 dias	4.34	108	0.000236	0.000836	0.0513	8.96E-05
Alta resistencia - f'c 550 - 14 dias	4.55	113	0.000246	0.000872	0.0532	9.39E-05
Alta resistencia - f'c 550 - 28 dias	4.41	110	0.000238	0.000841	0.0513	9.13E-05
Alta resistencia - f'c 550 - 3 dias	4.99	125	0.000274	0.000976	0.0597	0.000102



Alta resistencia - f' c 550 - 7 días	4.73	118	0.000258	0.000915	0.0559	9.72E-05
Alta resistencia - f' c 600 - 14 días	4.81	120	0.000263	0.000937	0.0574	9.83E-05
Alta resistencia - f' c 600 - 28 días	4.67	117	0.000255	0.000907	0.0555	9.59E-05
Alta resistencia - f' c 600 - 3 días	5.25	131	0.00029	0.00104	0.0639	0.000106
Alta resistencia - f' c 600 - 7 días	4.99	125	0.000274	0.00098	0.0601	0.000102
Baja contracción - MR 38 - 3 días	3.21	76.7	0.000156	0.000525	0.0318	7.62E-05
Baja contracción - MR 38 - 7 días	3.1	73.8	0.000149	0.000497	0.0299	7.45E-05
Baja contracción - MR 40 - 14 días	3.26	78	0.000159	0.000538	0.0326	7.71E-05
Baja contracción - MR 40 - 28 días	3.15	75.1	0.000152	0.000509	0.0307	7.52E-05
Baja contracción - MR 42 - 3 días	3.32	79.5	0.000163	0.000553	0.0335	7.80E-05
Baja contracción - MR 42 - 7 días	3.2	76.6	0.000156	0.000524	0.0317	7.61E-05
Baja contracción - MR 45 - 14 días	3.41	82	0.000169	0.000577	0.0351	7.95E-05
Baja contracción - MR 45 - 28 días	3.3	79.1	0.000162	0.000548	0.0332	7.77E-05
Baja contracción - MR 48 - 3 días	3.52	84.7	0.000176	0.000604	0.0368	8.11E-05
Baja contracción - MR 48 - 7 días	3.4	81.7	0.000168	0.000575	0.0349	7.93E-05
Convencional - f' c 100 - 14 días	2.02	49	9.48E-05	0.000302	0.018	4.71E-05
Convencional - f' c 100 - 28 días	1.9	46.1	8.75E-05	0.000274	0.0161	4.50E-05
Convencional - f' c 100 - 3 días	2.41	59.1	0.00012	4.00E-04	0.0243	5.40E-05
Convencional - f' c 100 - 7 días	2.18	53.2	0.000105	0.000343	0.0206	4.99E-05
Convencional - f' c 150 - 14 días	2.17	53	0.000105	0.000341	0.0204	4.98E-05
Convencional - f' c 150 - 28 días	2.05	50	9.72E-05	0.000312	0.0186	4.77E-05
Convencional - f' c 150 - 3 días	2.57	63	0.000129	0.000439	0.0267	5.68E-05
Convencional - f' c 150 - 7 días	2.33	57.1	0.000115	0.000381	0.023	5.27E-05
Convencional - f' c 200 - 14 días	2.37	57.9	0.000118	0.00039	0.0235	5.28E-05
Convencional - f' c 200 - 28 días	2.25	55	0.00011	0.000361	0.0216	5.07E-05
Convencional - f' c 200 - 3 días	2.76	68	0.000142	0.000488	0.0298	5.98E-05



Convencional - f'c 200 - 7 dias	2.53	62.1	0.000128	0.00043	0.0261	5.57E-05
Convencional - f'c 250 - 14 dias	2.56	62.8	0.00013	0.000437	0.0265	5.62E-05
Convencional - f'c 250 - 28 dias	2.44	59.8	0.000122	0.000409	0.0247	5.41E-05
Convencional - f'c 250 - 3 dias	2.95	72.8	0.000154	0.000535	0.0329	6.32E-05
Convencional - f'c 250 - 7 dias	2.72	66.9	0.00014	0.000478	0.0292	5.91E-05
Convencional - f'c 300 - 14 dias	2.83	70	0.000147	0.000506	0.031	6.12E-05
Convencional - f'c 300 - 28 dias	2.72	67.1	0.00014	0.000478	0.0292	5.91E-05
Convencional - f'c 300 - 3 dias	3.23	80	0.000172	0.000604	0.0373	6.81E-05
Convencional - f'c 300 - 7 dias	3	74.2	0.000157	0.000547	0.0336	6.41E-05
Convencional - f'c 350 - 14 dias	3.08	76.2	0.000163	0.000568	0.035	6.55E-05
Convencional - f'c 350 - 28 dias	2.96	73.3	0.000155	0.000539	0.0331	6.34E-05
Convencional - f'c 350 - 3 dias	3.47	86.3	0.000187	0.000665	0.0413	7.24E-05
Convencional - f'c 350 - 7 dias	3.24	80.4	0.000173	0.000608	0.0375	6.83E-05
Estructural - f'c 250 - 14 dias	2.56	62.8	0.00013	0.000437	0.0265	5.62E-05
Estructural - f'c 250 - 28 dias	2.44	59.8	0.000122	0.000409	0.0247	5.41E-05
Estructural - f'c 250 - 3 dias	2.95	72.8	0.000154	0.000535	0.0329	6.32E-05
Estructural - f'c 250 - 7 dias	2.72	66.9	0.00014	0.000478	0.0292	5.91E-05
Estructural - f'c 300 - 14 dias	2.83	70	0.000147	0.000506	0.031	6.12E-05
Estructural - f'c 300 - 28 dias	2.72	67.1	0.00014	0.000478	0.0292	5.91E-05
Estructural - f'c 300 - 3 dias	3.23	80	0.000172	0.000604	0.0373	6.81E-05
Estructural - f'c 300 - 7 dias	3	74.2	0.000157	0.000547	0.0336	6.41E-05
Estructural - f'c 350 - 14 dias	3.08	76.2	0.000163	0.000568	0.035	6.55E-05
Estructural - f'c 350 - 28 dias	2.96	73.3	0.000155	0.000539	0.0331	6.34E-05
Estructural - f'c 350 - 3 dias	3.47	86.3	0.000187	0.000665	0.0413	7.24E-05
Estructural - f'c 350 - 7 dias	3.24	80.4	0.000173	0.000608	0.0375	6.83E-05
Lanzado - f'c 200 - 14 dias	3.52	85.1	0.000194	0.000625	0.0362	7.31E-05



Lanzado - f' c 200 - 28 dias	3.41	82.2	0.000187	0.000596	0.0341	7.12E-05
Lanzado - f' c 200 - 3 dias	3.69	89.7	0.000205	0.000674	0.0396	7.61E-05
Lanzado - f' c 200 - 7 dias	3.62	87.9	2.00E-04	0.000655	0.0382	7.49E-05
Lanzado - f' c 250 - 14 dias	3.62	87.9	0.000201	0.000655	0.0382	7.49E-05
Lanzado - f' c 250 - 28 dias	3.52	85.1	0.000194	0.000626	0.0362	7.31E-05
Lanzado - f' c 250 - 3 dias	3.8	92.7	0.000212	0.000705	0.0417	7.81E-05
Lanzado - f' c 250 - 7 dias	3.73	90.9	0.000207	0.000686	0.0403	7.69E-05
Lanzado - f' c 300 - 14 dias	3.78	92	0.00021	0.000697	0.0411	7.76E-05
Lanzado - f' c 300 - 28 dias	3.67	89.1	0.000203	0.000667	0.039	7.58E-05
Lanzado - f' c 300 - 3 dias	3.96	96.9	0.000221	0.000747	0.0445	8.08E-05
Lanzado - f' c 300 - 7 dias	3.89	95	0.000217	0.000727	0.0431	7.96E-05
Lanzado - f' c 350 - 14 dias	3.95	96.7	0.000221	0.000744	0.0442	8.07E-05
Lanzado - f' c 350 - 28 dias	3.84	93.7	0.000214	0.000714	0.0422	7.88E-05
Lanzado - f' c 350 - 3 dias	4.14	102	0.000233	0.000795	0.0477	8.39E-05
Lanzado - f' c 350 - 7 dias	4.07	99.7	0.000228	0.000775	0.0463	8.27E-05
Modulo de ruptura - MR 35 - 14 dias	2.78	68.8	0.000142	0.000499	0.031	6.07E-05
Modulo de ruptura - MR 35 - 28 dias	2.66	65.8	0.000135	0.00047	0.0291	5.87E-05
Modulo de ruptura - MR 35 - 3 dias	3.14	78.1	0.000166	0.000591	0.0369	6.70E-05
Modulo de ruptura - MR 35 - 7 dias	2.99	74.1	0.000156	0.000551	0.0344	6.43E-05
Modulo de ruptura - MR 36 - 14 dias	2.8	69.2	0.000144	0.000503	0.0313	6.10E-05
Modulo de ruptura - MR 36 - 28 dias	2.68	66.3	0.000136	0.000474	0.0294	5.90E-05
Modulo de ruptura - MR 36 - 3 dias	3.16	78.5	0.000167	0.000595	0.0372	6.73E-05
Modulo de ruptura - MR 36 - 7 dias	3	74.5	0.000157	0.000555	0.0347	6.47E-05
Modulo de ruptura - MR 38 - 14 dias	2.84	70.5	0.000147	0.000515	0.0321	6.19E-05
Modulo de ruptura - MR 38 - 28 dias	2.73	67.5	0.000139	0.000486	0.0302	5.98E-05
Modulo de ruptura - MR 38 - 3 dias	3.21	79.7	0.00017	0.000607	0.038	6.81E-05





Modulo de ruptura - MR 38 - 7 dias	3.05	75.7	0.00016	0.000567	0.0354	6.54E-05
Modulo de ruptura - MR 40 - 14 dias	2.89	71.7	0.00015	0.000528	0.0329	6.28E-05
Modulo de ruptura - MR 40 - 28 dias	2.78	68.8	0.000142	0.000499	0.031	6.07E-05
Modulo de ruptura - MR 40 - 3 dias	3.26	81	0.000173	0.00062	0.0388	6.90E-05
Modulo de ruptura - MR 40 - 7 dias	3.1	77	0.000163	0.00058	0.0362	6.63E-05
Modulo de ruptura - MR 42 - 14 dias	2.96	73.4	0.000154	0.000544	0.0339	6.39E-05
Modulo de ruptura - MR 42 - 28 dias	3.14	76.9	0.000166	0.000565	0.0343	6.76E-05
Modulo de ruptura - MR 42 - 3 dias	3.32	82.6	0.000177	0.000636	0.0398	7.01E-05
Modulo de ruptura - MR 42 - 7 dias	3.17	78.6	0.000167	0.000596	0.0373	6.75E-05
Modulo de ruptura - MR 45 - 14 dias	3.06	75.9	0.00016	0.000569	0.0356	6.56E-05
Modulo de ruptura - MR 45 - 28 dias	2.94	73	0.000153	0.00054	0.0337	6.36E-05
Modulo de ruptura - MR 45 - 3 dias	3.42	85.2	0.000184	0.000661	0.0415	7.18E-05
Modulo de ruptura - MR 45 - 7 dias	3.27	81.2	0.000174	0.000621	0.0389	6.92E-05
Modulo de ruptura - MR 48 - 14 dias	3.17	78.7	0.000168	0.000597	0.0373	6.76E-05
Modulo de ruptura - MR 48 - 28 dias	3.05	75.8	0.00016	0.000568	0.0355	6.55E-05
Modulo de ruptura - MR 48 - 3 dias	3.53	88	0.000191	0.000689	0.0433	7.38E-05
Modulo de ruptura - MR 48 - 7 dias	3.38	84	0.000181	0.000649	0.0407	7.11E-05
Relleno Fluido - f'c 15 - 14 dias	1.87	46.8	9.55E-05	0.000309	0.0183	3.97E-05
Relleno Fluido - f'c 15 - 28 dias	1.76	44	8.84E-05	0.00028	0.0164	3.78E-05
Relleno Fluido - f'c 15 - 3 dias	2.29	57.5	0.000123	0.000416	0.0253	4.69E-05
Relleno Fluido - f'c 15 - 7 dias	2.07	51.9	0.000108	0.00036	0.0216	4.31E-05
Relleno Fluido - f'c 20 - 14 dias	1.9	47.4	9.69E-05	0.000314	0.0186	4.01E-05
Relleno Fluido - f'c 20 - 28 dias	1.79	44.6	8.98E-05	0.000286	0.0168	3.82E-05
Relleno Fluido - f'c 20 - 3 dias	2.31	58.1	0.000124	0.000422	0.0256	4.73E-05
Relleno Fluido - f'c 20 - 7 dias	2.1	52.5	0.00011	0.000365	0.022	4.35E-05
Relleno Fluido - f'c 25 - 14 dias	1.92	48.1	9.86E-05	0.000321	0.0191	4.05E-05



Relleno Fluido - f'c 25 - 28 dias	1.81	45.3	9.15E-05	0.000293	0.0172	3.86E-05
Relleno Fluido - f'c 25 - 3 dias	2.34	58.8	0.000126	0.000429	0.0261	4.78E-05
Relleno Fluido - f'c 25 - 7 dias	2.12	53.1	0.000111	0.000372	0.0224	4.40E-05
Relleno Fluido - f'c 30 - 14 dias	1.95	48.8	1.00E-04	0.000328	0.0195	4.10E-05
Relleno Fluido - f'c 30 - 28 dias	1.84	46	9.33E-05	3.00E-04	0.0177	3.91E-05
Relleno Fluido - f'c 30 - 3 dias	2.37	59.5	0.000127	0.000436	0.0265	4.82E-05
Relleno Fluido - f'c 30 - 7 dias	2.15	53.9	0.000113	0.000379	0.0228	4.44E-05
Relleno Fluido - f'c 40 - 14 dias	2.02	50.5	0.000105	0.000345	0.0206	4.22E-05
Relleno Fluido - f'c 40 - 28 dias	1.91	47.7	9.75E-05	0.000317	0.0188	4.03E-05
Relleno Fluido - f'c 40 - 3 dias	2.43	61.2	0.000132	0.000452	0.0276	4.94E-05
Relleno Fluido - f'c 40 - 7 dias	2.21	55.5	0.000117	0.000396	0.024	4.56E-05
Relleno Fluido - f'c 50 - 14 dias	2.1	52.6	0.00011	0.000366	0.022	4.36E-05
Relleno Fluido - f'c 50 - 28 dias	1.99	49.8	0.000103	0.000338	0.0202	4.17E-05
Relleno Fluido - f'c 50 - 3 dias	2.52	63.3	0.000137	0.000474	0.029	5.08E-05
Relleno Fluido - f'c 50 - 7 dias	2.3	57.7	0.000123	0.000417	0.0254	4.70E-05
Relleno Fluido - f'c 60 - 14 dias	2.18	54.8	0.000115	0.000388	0.0234	4.50E-05
Relleno Fluido - f'c 60 - 28 dias	2.07	52	0.000108	0.00036	0.0216	4.31E-05
Relleno Fluido - f'c 60 - 3 dias	2.6	65.4	0.000142	0.000495	0.0304	5.22E-05
Relleno Fluido - f'c 60 - 7 dias	2.38	59.8	0.000128	0.000439	0.0267	4.84E-05
Relleno Fluido - f'c 70 - 14 dias	2.29	57.5	0.000122	0.000416	0.0253	4.69E-05
Relleno Fluido - f'c 70 - 28 dias	2.18	54.7	0.000115	0.000388	0.0234	4.50E-05
Relleno Fluido - f'c 70 - 3 dias	2.71	68.2	0.000149	0.000524	0.0323	5.41E-05
Relleno Fluido - f'c 70 - 7 dias	2.49	62.6	0.000135	0.000467	0.0286	5.03E-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

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### 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

