



# MITSUBISHI CEMENT CORPORATION

## CERTIFICATE OF TEST

Source: Cushenbury Plant

Limestone Modified Portland Cement - Block

Date: 11/10/2020

ASTM designation: C 1157 – 20 for Type HE.

Production Period

From: 10/01/2020

To: 10/21/2020

### Chemical Composition:

	ASTM Limits	Test Results
Silicon Dioxide (SiO <sub>2</sub> ), %	----	19.9
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	----	5.1
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	----	1.2
Calcium Oxide (CaO), %	----	62.8
Magnesium Oxide (MgO), %	----	2.4
Sulfur Trioxide (SO <sub>3</sub> ), %	----	3.2
Loss on Ignition, %	----	5.5
Total Alkali (%Na <sub>2</sub> O + 0.658 * %K <sub>2</sub> O), %	----	0.40
Tricalcium Silicate (C <sub>3</sub> S), [b] %	----	52
Tricalcium Aluminate (C <sub>3</sub> A), [b] %	----	11
CO <sub>2</sub> , %	----	4.3
Limestone, %	15 Max.	10.8
Limestone Purity, %	----	91
Free Lime, %	----	1.0

### PHYSICAL RESULTS:

	ASTM Limits	Test Results
Blaine Fineness Average (m <sup>2</sup> /kg)	----	555
325 Mesh (% Passing)	----	98.6
Autoclave Expansion (%)	0.80 Max.	0.07
Mortar Bar Expansion (%) September 2020	0.020 Max.	0.014
Time of Set Initial Vicat (minutes)	45 / 420 Min. / Max.	85
Air Content (% by Volume)	12 Max.	7.0
Early Stiffening (Final Penetration %)	50 Max.	81
C1702 Heat of Hydration at 3 Days (J/g)	(a)	355
Color (L value)	(a)	77

### Compressive Strength Test:

	ASTM Limits		MPA	PSI
	MPA	psi		
1 Day	12.0	1740 Min.	21.2	3070
3 Day	24.0	3480 Min.	30.3	4390
7 Day	----	----	37.7	5470
28 Day September 2020	----	----	39.4	5710

This cement has been sampled and tested in accordance with ASTM standard methods and procedures. All tests results are certified to comply with the type specification designated above. No other warranty is made or implied. We are not responsible for improper use or workmanship. The MCC laboratory is AASHTO accredited. [a] For information only. [b] Adjusted per ASTM C150 A1.6

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Quality Control Manager



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**Additional Data**

**Limestone Addition**

% Addition:	10.8
SiO <sub>2</sub> (%)	4.9
Al <sub>2</sub> O <sub>3</sub> (%)	1.2
Fe <sub>2</sub> O <sub>3</sub> (%)	0.5
CaO (%)	50.9
SO <sub>3</sub> (%)	0.0

**Base Cement Phase Composition**

C <sub>3</sub> S	59
C <sub>2</sub> S	14
C <sub>3</sub> A	13
C <sub>4</sub> AF	4

We certify that the above described data represents the material used in the cement manufactured during the production period indicated.

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**Cushenbury plant**

**Tom Gepford**  
**Quality Control Manager**