

 **mitsubishi CEMENT CORPORATION**  
**CERTIFICATE OF TEST**

Source: Cushenbury Plant

Limestone Modified Portland Cement - Block

Date: 04/14/2021

ASTM designation: C 1157 – 11 for Type HE	Production Period
UBC Standard: Section 21.303.1 Vol. 3	From: 03/01/2021
	To: 03/25/2021

Chemical Composition:	ASTM Limits	UBC Limits	Test Results
Silicon Dioxide (SiO <sub>2</sub> ), %	---	---	19.2
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	---	---	5.0
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	---	---	1.2
Calcium Oxide (CaO), %	---	---	64.4
Magnesium Oxide (MgO), %	---	---	2.3
Sulfur Trioxide (SO <sub>3</sub> ), %	---	---	3.3
Loss on Ignition, %	---	7.0 Max.	5.4
Insoluble Residue, %	---	1.5 Max.	1.0
Total Alkali (%Na <sub>2</sub> O + 0.658 * %K <sub>2</sub> O), %	---	---	0.32
Tricalcium Silicate (C <sub>3</sub> S), [b] %	---	---	52
Tricalcium Aluminate (C <sub>3</sub> A), [b] %	---	---	11
CO <sub>2</sub> , %	---	---	4.6
Limestone, %	15 Max.	---	11.2
Limestone Purity, %	---	85 Min.	93
Free Lime, %	---	---	0.8

**PHYSICAL RESULTS:**

Blaine Fineness Average (m <sup>2</sup> /kg)	---	---	542
325 Mesh (% Passing)	---	---	99.2
Autoclave Expansion (%)	0.80 Max.	---	0.08
Mortar Bar Expansion (%) March 2021	0.020 Max.	---	0.009
Time of Set Initial Vicat (minutes)	45 / 420 Min. / Max.	---	93
Air Content (% by Volume)	12 Max	22 Max.	7.6
C1702 Heat of Hydration (J/g)	(a)	---	374
Color (L value)	(a)	---	77

Compressive Strength Test:	ASTM Limits	MPA	PSI
	MPA    psi		
1 Day	12.0    1740    Min.	20.8	3020
3 Day	24.0    3480    Min.	30.2	4370
7 Day	---	35.8	5190
28 Day            February 2021	---	39.8	5770

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 Superintendent

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**Additional Data**

**Limestone Addition**

% Addition:	11.2
SiO <sub>2</sub> (%)	3.7
Al <sub>2</sub> O <sub>3</sub> (%)	0.8
Fe <sub>2</sub> O <sub>3</sub> (%)	0.3
CaO (%)	52.4
SO <sub>3</sub> (%)	0.0

**Base Cement Phase Composition**

C <sub>3</sub> S	58
C <sub>2</sub> S	15
C <sub>3</sub> A	12
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.

**MITSUBISHI CEMENT CORPORATION**  
Cushenbury plant



**Evan Coss**  
**Quality Control Superintendent**