



# MITSUBISHI CEMENT CORPORATION

## CERTIFICATE OF TEST

Source: Cushenbury Plant

Limestone Modified Portland Cement - Block

Date: 5/10/2016

ASTM designation: C 1157 – 11 for Type HE.	Production Period
UBC Standard: Section 21.303.1 Vol. 3	From: 5/5/2016
	To: 5/23/2016

### Chemical Composition:

	ASTM Limits	UBC Limits	Test Results
Silicon Dioxide (SiO <sub>2</sub> ), %	----	----	19.4
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	----	----	4.9
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	----	----	1.0
Calcium Oxide (CaO), %	----	----	64.1
Magnesium Oxide (MgO), %	----	----	2.3
Sulfur Trioxide (SO <sub>3</sub> ), %	----	----	3.0
Loss on Ignition, %	----	7.0 Max.	5.4
Insoluble Residue, %	----	1.5 Max.	0.65
Total Alkali (%Na <sub>2</sub> O + 0.658 * %K <sub>2</sub> O), %	----	----	0.42
Tricalcium Silicate (C <sub>3</sub> S), [b] %	----	----	50
Tricalcium Aluminate (C <sub>3</sub> A), [b] %	----	----	11
CO <sub>2</sub> , %	----	----	4.6
Limestone, %	15 Max.	----	11.4
Limestone Purity, %	----	85 Min.	92
Free Lime, %	----	----	1.0

### PHYSICAL RESULTS:

Blaine Fineness Average (m <sup>2</sup> /kg)	----	----	537
325 Mesh (% Passing)	----	----	98.0
Autoclave Expansion (%)	0.80 Max.	----	0.08
Mortar Bar Expansion (%) May 2016	0.020 Max.	----	0.006
Time of Set Initial Vicat (minutes)	45 / 420 Min. / Max.	----	81
Air Content (% by Volume)	12 Max	22 Max.	7.9
Heat of Hydration (kJ/kg)	(a)	----	385
Color (L value)	(a)	----	78

### Compressive Strength Test:

	ASTM Limits			MPA	PSI
	MPA	psi			
1 Day	12.0	1740	Min.	21.3	3088
3 Day	24.0	3480	Min.	32.4	4700
7 Day	----	----		35.1	5098
28 Day	----	----		42.8	6213

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. [a] For information only. [b] Adjusted per ASTM C150 A1.6

MITSUBISHI CEMENT CORPORATION  
Cushenbury plant



Tom Gepford  
Quality Control Manager



# MITSUBISHI CEMENT CORPORATION

## CERTIFICATE OF TEST

Source: Cushenbury Plant

Limestone Modified Portland Cement - Block

Date: 6/9/2016

ASTM designation: C 1157 – 11 for Type HE.

Production Period

UBC Standard: Section 21.303.1 Vol. 3

From: 5/5/2016

To: 5/23/2016

### Additional Data

#### Limestone Addition

% Addition:	11.4
SiO <sub>2</sub> (%)	5.0
Al <sub>2</sub> O <sub>3</sub> (%)	1.0
Fe <sub>2</sub> O <sub>3</sub> (%)	0.3
CaO (%)	50.8
SO <sub>3</sub> (%)	0.1

#### Base Cement Phase Composition

C <sub>3</sub> S	55
C <sub>2</sub> S	17
C <sub>3</sub> A	12
C <sub>4</sub> AF	3

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

Tom Gepford  
Quality Control Manager