

 **MITSUBISHI CEMENT CORPORATION**
CERTIFICATE OF TEST

Source: Cushenbury Plant

Limestone Modified Portland Cement - Block

Date: 02/16/2021

ASTM designation: C 1157 – 20 for Type HE.

Production Period

From: 01/02/2021

To: 01/31/2021

Chemical Composition:

	ASTM Limits	Test Results
Silicon Dioxide (SiO ₂), %	----	19.4
Aluminum Oxide (Al ₂ O ₃), %	----	5.1
Ferric Oxide (Fe ₂ O ₃), %	----	1.2
Calcium Oxide (CaO), %	----	64.2
Magnesium Oxide (MgO), %	----	2.4
Sulfur Trioxide (SO ₃), %	----	3.2
Loss on Ignition, %	----	5.3
Total Alkali (%Na ₂ O + 0.658 * %K ₂ O), %	----	0.30
Tricalcium Silicate (C ₃ S), [b] %	----	50
Tricalcium Aluminate (C ₃ A), [b] %	----	11
CO ₂ , %	----	4.5
Limestone, %	15 Max.	10.9
Limestone Purity, %	----	94
Free Lime, %	----	0.9

PHYSICAL RESULTS:

Blaine Fineness Average (m ² /kg)	----	553
325 Mesh (% Passing)	----	98.5
Autoclave Expansion (%)	0.80 Max.	0.10
Mortar Bar Expansion (%) December 2020	0.020 Max.	0.009
Time of Set Initial Vicat (minutes)	45 / 420 Min. / Max.	95
Air Content (% by Volume)	12 Max.	7.8
Early Stiffening (Final Penetration %)	50 Max.	88
C1702 Heat of Hydration at 3 Days (J/g)	(a)	355
Color (L value)	(a)	78

Compressive Strength Test:

	ASTM Limits			MPA	PSI
	MPA	psi			
1 Day	12.0	1740	Min.	21.3	3080
3 Day	24.0	3480	Min.	30.1	4360
7 Day	----	----		35.3	5120
28 Day	----	----	December 2020	38.7	5610

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:	10.9
SiO ₂ (%)	2.8
Al ₂ O ₃ (%)	0.7
Fe ₂ O ₃ (%)	0.2
CaO (%)	52.6
SO ₃ (%)	0.0

Base Cement Phase Composition

C ₃ S	51
C ₂ S	15
C ₃ A	11
C ₄ AF	3

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

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Tom Gepford
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