



MITSUBISHI CEMENT CORPORATION

CERTIFICATE OF TEST

Source: Cushenbury Plant

Portland Cement – Type III

Date: 6/9/2017

ASTM designation: C 150 – 16 for Type III low alkali Cement.

Production Period

CALTRANS Specification: Section 90 – 1.02B(2) for Type III.

From: 5/22/ 2017

NDOT Specification: Section 701 – 3.01 for Type III.

To: 5/22/ 2017

AZDOT Specifications Subsection 1006-2.01 for Type III.

Chemical Composition:

| | ASTM C-150 Limits Type III | Test Results |
|--|-------------------------------|-----------------|
| Silicon Dioxide (SiO ₂), % | ---- | 21.2 |
| Aluminum Oxide (Al ₂ O ₃), % | ---- | 5.1 |
| Ferric Oxide (Fe ₂ O ₃), % | ---- | 1.1 |
| Calcium Oxide (CaO), % | ---- | 64.5 |
| Magnesium Oxide (MgO), % | 6.0 Max. | 2.0 |
| Sulfur Trioxide (SO ₃), % | 4.5 Max. | 3.4 |
| Loss on Ignition, % | 3.0 Max. | 1.2 |
| Insoluble Residue, % | 1.5 Max. | 0.10 |
| Total Alkali (%Na ₂ O + 0.658 * %K ₂ O), % | 0.60 Max. | 0.43 |
| Tricalcium Silicate (C ₃ S), % | ---- | 56 |
| Tricalcium Aluminate (C ₃ A), % | 15 Max. | 12 |
| Limestone, % | 5.0 Max. | 0.0 |
| Free Lime, % | ---- | 1.2 |

PHYSICAL RESULTS:


| | | |
|--|----------------------|------|
| Blaine Fineness Average (m ² /kg) | ---- | 551 |
| 325 Mesh (% Passing) | ---- | 99.1 |
| Autoclave Expansion (%) | 0.80 Max. | 0.09 |
| Time of Set Initial Vicat (minutes) | 45 / 375 Min. / Max. | 75 |
| Air Entrainment (% by Volume) | 12 Max. | 7.5 |
| Heat of Hydration (kJ/kg) | ---- (a) | 382 |
| False Set (%) | 50 Min. | 94 |
| Color (L value) | ---- (a) | 77 |

Compressive Strength Test:

| | Type III | | | MPA | PSI |
|--------|----------|------|------|------|------|
| | MPA | psi | | | |
| 1 Day | 12.0 | 1740 | Min. | 28.1 | 4080 |
| 3 Day | 24.0 | 3480 | Min. | 34.4 | 4990 |
| 7 Day | ---- | ---- | | 39.2 | 5680 |
| 28 Day | ---- | ---- | | 41.7 | 6050 |

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.

MITSUBISHI CEMENT CORPORATION
Cushenbury plant



Tom Gepford
Quality Control Manager