



Cement Mill Test Report

Date of Issue: September 12, 2022

Plant: Exshaw, AB
 Product: Portland Limestone Cement Type IL(13) (HS)
 Mill Test Report Number: MTR-IL-2022-08
 Manufactured: August 1-31, 2022

CHEMICAL ANALYSIS

PHYSICAL ANALYSIS

| Item | Spec limit | Test Result | Item | Spec limit | Test Result |
|---|------------|-------------|---|-----------------|-------------|
| Rapid Method, X-Ray (C114) | | | Blaine Fineness (m ² /kg) (C204) | | 506 |
| SiO ₂ (%) | | 17.5 | Passing 45 μm (%) (C430) | | 99.4 |
| Al ₂ O ₃ (%) | | 3.5 | Autoclave Expansion (%) (C151) | -0.20 to 0.80 | 0.12 |
| Fe ₂ O ₃ (%) | | 3.2 | Air Content (%) (C186) | 12 max | 5 |
| CaO (%) | | 60.6 | Compressive Strength (MPa[psi]) (C109) | | |
| MgO (%) | | 4.4 | 1 day | | 17.2 [2500] |
| SO ₃ (%) | 3.0 max* | 3.4 | 3 days | 13.0 [1890] min | 30.1 [4360] |
| Loss on Ignition @ 950 (%) | 10.0 max | 6.8 | 7 days | 20.0 [2900] min | 35.3 [5120] |
| Loss on Ignition @ 550 (%) | | 0.9 | 28 days (Reflects previous month's data) | 25.0 [3620] min | 42.8 [6200] |
| Limestone (%) | 15.0 max | 13.7 | Time of setting (minutes) (C191) | | |
| CaCO ₃ in Limestone (%) | 70 min | 93 | Vicat Initial | 45 min. | 112 |
| Inorganic Process Addition | 5.0 max | - | ASTM C1012 Expansion %, (6 months)*** | | 0.048 |
| Adjusted Potential Phase Composition (C 150 - For information only) | | | Mortar Bar Expansion (%) (C1038) | 0.020 max | 0.009 |
| C ₃ S (%) | --- | 55 | | | |
| C ₂ S (%) | --- | 16 | | | |
| C ₃ A (%) | --- | 4 | | | |
| C ₄ AF (%) | --- | 11 | | | |
| NaEq (%) | | 0.49 | | | |

* May exceed the SO₃ maximum based on C1038 results of <0.020% expansion at 14 days.

** Most recent result provided

*** Performed by Lafarge Edmonton and/or Seattle Labs

We certify that the above described cement, at the time of shipment, meets the chemical and physical requirements of ASTM C 595-21 & AASHTO M 240-20 STANDARD SPECIFICATIONS FOR TYPE IL CEMENT.

Prepared By:

Lorraine Johnson

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Lorraine Johnson
 Quality Manager



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Additional Data - For information only.

| Item | Test Result | Test Result |
|------------------------------------|-------------|--|
| | Limestone | Inorganic Process Addition Lafarge Cement Kiln Dust |
| Amount (%) | 13.7 | - |
| SiO ₂ (%) | 0.9 | n/a |
| Al ₂ O ₃ (%) | 0.5 | n/a |
| Fe ₂ O ₃ (%) | 0.2 | n/a |
| CaO (%) | 51.7 | n/a |
| SO ₃ (%) | 0.2 | n/a |
| CO ₂ (%) | 42.9 | n/a |

Base Cement Phase Composition - C150 - For information only.

| Item | Test Result |
|-----------------------|-------------|
| C ₃ S (%) | 55 |
| C ₂ S (%) | 16 |
| C ₃ A (%) | 4 |
| C ₄ AF (%) | 11 |

Specific Gravity: 3.11**

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