



# Cement Mill Test Report

Date of Issue: February 12, 2021

Plant: Exshaw AB  
 Product: Portland Limestone Cement Type IL(10) (HS)  
 Mill Test Report Number: MTR-IL-2021-01  
 Manufactured: January 2021

## CHEMICAL ANALYSIS

| Item  | Spec limit | Test Result |
|---|------------|-------------|
| Rapid Method, X-Ray (C114)  |            |             |
| SiO <sub>2</sub> (%)  |            | 18.5        |
| Al <sub>2</sub> O <sub>3</sub> (%)                                  |            | 3.7         |
| Fe <sub>2</sub> O <sub>3</sub> (%)                                  |            | 3.5         |
| CaO (%)   |            | 61.2        |
| MgO (%)   |            | 4.6         |
| SO <sub>3</sub> (%)   | 3.0 max*   | 3.3         |
| Loss on Ignition @ 950 (%)  | 10.0 max   | 5.0         |
| Loss on Ignition @ 550 (%)  |            | 0.8         |
| Inorganic Process Addition (Lafarge Cement Kiln Dust)               | 5.0 max    | -           |
| Adjusted Potential Phase Composition (C 150 - For information only) |            |             |
| C <sub>3</sub> S (%)  | ---        | 52          |
| C <sub>2</sub> S (%)  | ---        | 13          |
| C <sub>3</sub> A (%)  | ---        | 4           |
| C <sub>4</sub> AF (%)   | ---        | 10          |

## PHYSICAL ANALYSIS

| Item  | Spec limit      | Test Result |
|---|-----------------|-------------|
| Blaine Fineness (m <sup>2</sup> /kg) (C204) |                 | 503         |
| Passing 45 µm (%) (C430)                    |                 | 99.6        |
| Autoclave Expansion (%) (C151)              | -0.20 to 0.80   | 0.03        |
| Air Content (%) (C186)                      | 12 max          | 6           |
| Compressive Strength (MPa[psi]) (C109)      |                 |             |
| 1 day                                       |                 | 20.0 [2900] |
| 3 days                                      | 13.0 [1890] min | 30.7 [4450] |
| 7 days                                      | 20.0 [2900] min | 37.6 [5450] |
| 28 days (Reflects previous month's data)    | 25.0 [3620] min | 42.7 [6200] |
| Time of setting (minutes) (C191)            |                 |             |
| Vicat Initial                               | 45 min.         | 109         |
| ASTM C1012 Expansion %, (6 months)***       |                 | 0.043       |
| Mortar Bar Expansion (%) (C1038)**          | 0.020 max       | 0.010       |

NaEq (%) 0.54

\* May exceed the SO<sub>3</sub> maximum based on C1038 results of <0.020% expansion at 14 days.

\*\* Current Production run not available - most recent provided (Q3)

\*\*\* 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 595-17 & AASHTO M 240-17 STANDARD SPECIFICATIONS FOR TYPE IL CEMENT.

Prepared By:

*Lorraine Richards*

Western BU - Exshaw Plant  
 P.O. Box 160, Highway 1A, Exshaw AB T0L 2C0  
 Phone: 403-673-3815

Lorraine Richards  
 Quality Control Coordinator



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### Additional Data - For information only.

| Item                               | Test Result | Test Result  |
|------------------------------------|-------------|--|
|                                    | Limestone   | Inorganic Process Addition<br>Lafarge Cement Kiln Dust |
| Amount (%)                         | 10.0        | -  |
| SiO <sub>2</sub> (%)               | 2.9         | n/a  |
| Al <sub>2</sub> O <sub>3</sub> (%) | 0.9         | n/a  |
| Fe <sub>2</sub> O <sub>3</sub> (%) | 0.3         | n/a  |
| CaO (%)                            | 50.3        | n/a  |
| SO <sub>3</sub> (%)                | 0.3         | n/a  |
| CO <sub>2</sub> (%)                | 41.7        | n/a  |

### Base Cement Phase Composition - C150 - For information only.

| Item                  | Test Result |
|-----------------------|-------------|
| C <sub>3</sub> S (%)  | 58          |
| C <sub>2</sub> S (%)  | 15          |
| C <sub>3</sub> A (%)  | 4           |
| C <sub>4</sub> AF (%) | 12          |

Specific Gravity: 3.13

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