



Kosmos Cement Company, LLC  
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### CEMENT MILL TEST REPORT

Source: Kosmos Cement Plant, Louisville, KY

Date of Report: 01/13/2022

Product Type: I,II portland cement with Eq. Alkali Content <0.60%

Production: December 2022

| Standard Chemical Requirements<br>(ASTM C114)                                    | Specifications | ASTM C150 / AASHTO M-85 |         | Test Results      |
|----------------------------------------------------------------------------------|----------------|-------------------------|---------|-------------------|
|                                                                                  |                | Type I                  | Type II |                   |
| Silicon Dioxide (SiO <sub>2</sub> ), %                                           |                | ----                    | ---     | 18.6              |
| Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %                              | Maximum        | ----                    | 6       | 4.5               |
| Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %                                | Maximum        | ----                    | 6       | 2.8               |
| Calcium Oxide (CaO), %                                                           |                | ----                    | ----    | 60.6              |
| Magnesium Oxide (MgO), %                                                         | Maximum        | 6.0                     | 6.0     | 3.6               |
| Sulfur Trioxide (SO <sub>3</sub> ), % **                                         | Maximum        | 3.0                     | 3.0     | 3.65 <sup>A</sup> |
| Loss on Ignition (LOI), %**                                                      | Maximum        | 3.5                     | 3.5     | 2.9 <sup>B</sup>  |
| Insoluble Residue (IR), %                                                        | Maximum        | 1.50                    | 1.50    | 0.70              |
| Equivalent Alkali Content (Na <sub>2</sub> O+0.658 K <sub>2</sub> O), Reported % |                |                         |         | 0.52              |
| Tricalcium Silicate (C <sub>3</sub> S), %                                        |                | ----                    | ----    | 57.7              |
| Dicalcium Silicate (C <sub>2</sub> S), %                                         |                | ----                    | ----    | 7.3               |
| Tricalcium Aluminate (C <sub>3</sub> A), %                                       | Maximum        | ----                    | 8       | 6.9               |
| Sum of C <sub>3</sub> S + 4.75 C <sub>3</sub> A, %**                             | Maximum        | ----                    | 100     | 90 <sup>C</sup>   |
| Limestone content of cement, %                                                   | Maximum        | 5.0                     | 5.0     | 4.8               |
| CO <sub>2</sub> in finished cement, %                                            |                |                         |         | 2.00              |
| CaCO <sub>3</sub> content of Limestone, %                                        | Minimum        | 70                      | 70      | 82                |

### Standard Physical Requirements

|                                                   |         |                          |                          |                          |
|---------------------------------------------------|---------|--------------------------|--------------------------|--------------------------|
| (ASTM C204) Blaine Fineness, m <sup>2</sup> /kg   | Minimum | 260                      | 260                      | 417                      |
| (ASTM C430) Passing No. 325 Sieve, %              |         | ----                     | ----                     | 94.7                     |
| (ASTM C191) Time of Setting; Vicat test:          |         |                          |                          |                          |
| Initial Set, minutes                              | Minimum | 45                       | 45                       | 117                      |
| Final Set, minutes                                | Maximum | 375                      | 375                      | 241                      |
| (ASTM C1702) Calorimetry: 3 days, kJ/kg (cal/g)** |         | ----                     | ----                     | 315 (69) <sup>C</sup>    |
| (ASTM C451) False Set, % (Optional)               | Minimum | 50                       | 50                       | 78                       |
| (ASTM C185) Air Content of Mortar, %              | Maximum | 12                       | 12                       | 7.6                      |
| (ASTM C151) Autoclave Expansion, %                | Maximum | 0.80                     | 0.80                     |                          |
| (ASTM C187) Normal Consistency, %                 |         | ----                     | ----                     | 27.2                     |
| (ASTM C109) Compressive Strength:                 |         |                          |                          |                          |
| 3 Days                                            | Minimum | MPa (psi)<br>12.0 (1740) | MPa (psi)<br>10.0 (1450) | MPa (psi)<br>28.7 (4156) |
| 7 Days                                            | Minimum | 19.0 (2760)              | 17.0 (2470)              | 38.1 (5520)              |
| 28 Days (Optional)                                |         | ----                     | ----                     | ----                     |

<sup>A</sup> Kosmos Type I,II cement has successfully demonstrated by Test Method C1038 that cement with values exceeding the limits in ASTM C150, Table 1 for SO<sub>3</sub> content has not developed expansion exceeding 0.020% at 14 days. Supporting data is available upon request.

<sup>B</sup> When limestone is an ingredient added in the finish mill, the maximum specification limit for the Loss on Ignition value is 3.5%.

<sup>C</sup> In addition to the Table I calculation, the three-day test for Heat of Hydration using Calorimetry per C1702 was performed at the required frequency, and is reported for informational purposes.

Kosmos Cement Company, LLC hereby certifies that this cement meets or exceeds the chemical and physical specifications of ASTM C150 and AASHTO M-85 for the type identified.

Kosmos Cement Company, LLC is not responsible for the improper use or workmanship that may be associated with the use of this cement.

*Tom Kyser*

Tom Kyser Quality Control Manager



**Source: Kosmos Cement Plant, Louisville, KY**

Date of Report: 1/13/2022

**Product Type:** I,II portland cement with Eq. Alkali Content **<0.60%**

**Production: December 2022**

**Base Cement Composition:**

Kosmos Cement Company, LLC hereby certifies that the above data represents the materials used in the cement manufactured during the production period indicated.

By: Tom Kyser  
Tom Kyser Quality  
Control Manager