

Manufacturer's Certification

Report Date: 11/12/2024

We hereby certify that CalPortland Type I/II Cement meets the standard requirements of ASTM C150 and AASHTO M85 specification for Type I and Type II cements. Reported are the average chemical and physical data for the lot.

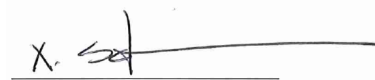
Lot #: 24-293

Type I / II Cement

Source: Nghe An, Vietnam

| Chemical Properties, (ASTM C114) | ASTM C150 and AASHTO M85 Requirements | | Analysis | Limestone |
|--|---------------------------------------|----------|----------|-----------|
| | Type I | Type II | Results | Analysis |
| Silicon dioxide (SiO ₂), % | --- | --- | 20.1 | 0.7 |
| Aluminum oxide (Al ₂ O ₃), max, % | --- | 6.0 | 4.5 | 0.5 |
| Ferric oxide (Fe ₂ O ₃), max, % | --- | 6.0 | 3.9 | 0.6 |
| Calcium oxide (CaO), % | --- | --- | 62.1 | 52.4 |
| Magnesium oxide (MgO), max, % | 6.0 | 6.0 | 3.5 | 1.8 |
| Sulfur trioxide (SO ₃), max, % | 3.0 | 3.0 | 2.7 | 0.2 |
| Loss on ignition (LOI), max, % | 3.5 | 3.5 | 2.1 | |
| Insoluble residue (IR), max, % | 1.5 | 1.5 | 0.6 | Base |
| Alkalies (Na ₂ O+0.658*K ₂ O), % | --- | --- | 0.55 | Cement |
| Tricalcium silicate (C ₃ S), % | --- | --- | 49 | 51 |
| Dicalcium silicate (C ₂ S), % | --- | --- | 20 | 21 |
| Tricalcium aluminate (C ₃ A), max, % | --- | 8 | 5 | 5 |
| Tetracalcium aluminoferrite (C ₄ AF), % | --- | --- | 12 | 12 |
| CO ₂ , % | --- | --- | 1.5 | |
| Limestone addition, max, % | 5.0 | 5.0 | 3.5 | |
| CaCO ₃ in Limestone, min, % | 70 | 70 | 97 | |
| Physical Properties | | | | |
| Air content of mortar, max, volume %, (C185) | 12 | 12 | 7 | |
| Blaine Fineness, min, m ² /kg, (C204) | 260 | 260 | 388 | |
| Autoclave expansion, max, %, (C151) | 0.80 | 0.80 | 0.09 | |
| Compressive Strength, min, (C109) | | | | |
| 1 Day, psi | --- | --- | 2420 | |
| 3 Day, MPa | 12.0 | 10.0 | 24.4 | |
| 3 Day, psi | 1740 | 1450 | 3540 | |
| 7 Day, MPa | 19.0 | 17.0 | 31.1 | |
| 7 Day, psi | 2760 | 2470 | 4520 | |
| 28 Day (from prior lot), MPa | --- | --- | 44.7 | |
| 28 Day (from prior lot), psi | --- | --- | 6480 | |
| Vicat Setting Time, min-max, minutes, (C191) | 45 - 375 | 45 - 375 | 125 | |

Apparatus and methods used in this laboratory have been checked by the Cement and Concrete Reference Laboratory of the National Institute of Standards and Technology. A copy of the report detailing their findings is available upon request. Major oxides are analyzed in accordance with ASTM C114.



X. Schlee
Quality Control Manager