



March 14, 2017

Mr. Guillermo Delgado
GCC Rio Grande, Inc.
11783 State Highway 337 South
Tijeras, NM 87059
E-mail: gdelgado@gcc.com

ASTM C 452 Test Results for One Cement Sample Identified as “Tijeras Type III”
CTLGroup Identification: 4391302
CTLGroup Project No. 382411

Dear Mr. Delgado,

Following are the sulfate resistance test results for the submitted cement sample. The sample was submitted and identified by Anne Miller, GCC Rio Grande, Inc., and arrived at CTL on February 15, 2017.

As requested, sulfate resistance testing was performed in accordance with ASTM C452-10/ C452M-10, *Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate*. You indicate that the SO₃ content of cement sample is 3.41%. This value was used to determine mix proportions for the mortar bars.

Final results indicate the average expansion at 14-day is 0.009%, the referenced cement sample meets the optional sulfate resistance requirement of ASTM C150-16, *Standard Specification for Portland Cement*, for Type V portland cement. According to footnote F of Table 4 in ASTM C150-16, cement meeting the high sulfate resistance limit for Type V is deemed to meet the moderate sulfate resistance requirement of Type II and Type II(MH). Individual results are attached.

Thank you for choosing CTLGroup for your testing needs. Should you have any questions, please contact me.

Sincerely yours,

CTLGroup, Inc.
An AASHTO Accredited Laboratory – Aggregate, Cement and Concrete

A handwritten signature in black ink, appearing to read "Xiuping Feng".

Xiuping Feng, PhD
Materials Laboratory Services
XFeng@CTLGroup.com
Direct Phone: 847-972-3286

Attachments

Client: GCC Rio Grande
Project: Cement Testing

CTLGroup Proj. No.: 382411
CTLGroup Proj. Mgr.: Xiuping Feng

Contact: Guillermo Delgado
Submitter: Guillermo Delgado
Date Received: February 15, 2017

Technicians: PS, WD
Approved: X. Feng
Report Date: March 14, 2017

ASTM C452
Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate

Client's Sample ID: Tijeras Type III
Material Type: Non-Air-Entrained Cement
CTLGroup Sample ID: 4391302
Cast Date: February 27, 2017

Sulfate Resistance, 14 Day Expansion, %: **0.009**

| Date | Age, days | Test Condition | Length Change, % | | | | | | Average |
|----------|-----------|----------------|------------------|-------|-------|-------|-------|-------|---------|
| | | | A | B | C | D | E | F | |
| 02/28/17 | 1 | moist | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 03/13/17 | 14 | moist | 0.008 | 0.009 | 0.010 | 0.009 | 0.009 | 0.008 | 0.009 |

Specimen Set, Range of Length Change : **0.002**

Notes:

1. For testing purposes, a laboratory stocked high grade natural gypsum (CTLGroup ID 2068501) having an SO₃ content of 46.39% was used to fabricate test specimens.
 2. For testing purposes, it was assumed that the submitted cement sample is non-air-entrained. A flow of 108% was recorded.
 3. As provided by you, the SO₃ content of the submitted cement sample is 3.41%.
 4. Sulfate expansion limit per ASTM C150/C150M-16 for Type V high sulfate resistance cement: maximum 0.040% at 14 days.
Cement meeting the limit for Type V is deemed to meet the moderate sulfate resistance requirement of Type II and Type II(MH).
 5. This report may not be reproduced except in its entirety.
- * data suspected and not reported.