



February 23, 2018

Ms. Gail Amicucci
GCC Dacotah
501 North Saint Onge
Rapid City, SD 57702
E-mail: gamicucci@gcc.com

**ASTM C452 Test Results for One Cement Sample Identified as “GCC I/II 12.2017”
CTLGroup Identification. 4602001
CTLGroup Project No. 382507**

Dear Ms. Amicucci,

Following are the sulfate resistance test results for the submitted cement sample. The sample was submitted and identified by you and arrived at CTL on January 4, 2018.

As requested, sulfate resistance testing was performed in accordance with ASTM C452-15, *Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate*. You indicate that the SO₃ content of cement sample is 3.04%. This value was used to determine mix proportion for the mortar bars.

Final results indicate the average expansion at 14-day is 0.004%, the referenced cement sample meets the optional sulfate resistance requirement of ASTM C150-17, *Standard Specification for Portland Cement*, for Type V portland cement. According to footnote E of Table 4 in ASTM C150-17, 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 Dacotah
Project: Cement Testing

CTLGroup Proj. No.: 382507
CTLGroup Proj. Mgr.: Xiuping Feng

Contact: Gail Amicucci
Submitter: Gail Amicucci
Date Received: January 4, 2018

Technicians: PS, WD
Approved: S. Nettles
Report Date: February 23, 2018

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

Client's Sample ID: GCC I/II 12.2017
Material Type: Non-Air-Entrained Cement
CTLGroup Sample ID: 4602001
Cast Date: January 8, 2018

Sulfate Resistance, 14 Day Expansion, %: **0.004**

Date	Age, days	Test Condition	Length Change, %						Average
			A	B	C	D	E	F	
01/09/18	1	moist	0.000	0.000	0.000	0.000	0.000	0.000	0.000
01/22/18	14	moist	0.005	0.004	0.003	0.004	0.005	0.005	0.004

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 123% was recorded.
3. As provided by you, the SO₃ content of the submitted cement sample is 3.04%.
4. Sulfate expansion limit per ASTM C150/C150M-17 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.