



March 5, 2019

Mr. Gustavo Calderon
GCC Permian
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Odessa, TX 79760
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**ASTM C 452 Test Results for One Cement Sample Identified as “Samalayuca Plant I/II”
CTLGroup Identification: 4838501
CTLGroup Project No. 382640**

Dear Mr. Calderon,

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 21, 2019.

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 2.80%. This value was used to determine mix proportions for the mortar bars.

Final results indicate the average expansion at 14-day is 0.012%, the referenced cement sample meets the optional sulfate resistance requirement of ASTM C150-18, *Standard Specification for Portland Cement*, for Type V portland cement. According to footnote E of Table 4 in ASTM C150-18, 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 Permian
Project: Cement Testing

CTLGroup Proj. No.: 382640
CTLGroup Proj. Mgr.: Xiuping Feng

Contact: Gustavo Calderon
Submitter: Gustavo Calderon
Date Received: January 21, 2019

Technicians: PS, WD
Approved: S. Nettles
Report Date: March 5, 2019

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

Client's Sample ID: Samalayuca Plant I/II
Material Type: Non-Air-Entrained Cement
CTLGroup Sample ID: 4838501
Cast Date: February 18, 2019

Sulfate Resistance, 14 Day Expansion, %: **0.012**

Date	Age, days	Test Condition	Length Change, %						Average
			A	B	C	D	E	F	
02/19/19	1	moist	0.000	0.000	0.000	0.000	0.000	0.000	0.000
03/04/19	14	moist	0.011	0.013	0.013	0.012	0.012	0.011	0.012

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 112% was recorded.
3. As provided by you, the SO₃ content of the submitted cement sample is 2.80%.
4. Sulfate expansion limit per ASTM C150/C150M-18 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.