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Structural Testing Laboratory

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TEST REPORT

FOR

PABCO® Gypsum

8000 East Lake Meade Boulevard
Las Vegas, NV 89124

Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels ASTM C1629/C1629M – 15

Hard Body Impact Test

Test Report No:	HB-1701
Assignment No:	J-161
Subject Material:	5/8” QuietRock®530 and 5/8” QuietRock® ES Type X Gypsum Panels
Test Date:	March 31, 2017
Report Date:	April 12, 2017

Prepared by: _____

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Approved by: _____

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Revision Summary

DATE	SUMMARY
April 12, 2017	Original issue date. Original NGCTS report HB-1701.

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Introduction

The subject of this test report is the structural integrity investigation of two different gypsum panel products. The investigation consisted of a series of hard body impact tests conducted on multiple test specimen assemblies containing either 5/8" QuietRock®530 Type X gypsum panels or 5/8" QuietRock® ES Type X gypsum panels. This report presents the results of that investigation and contains a description of the material evaluated and the procedures used.

The purpose of the tests was to determine the Hard Body Impact Classification Level of the gypsum panel products, as measured by the test method described in Annex A1 of ASTM C1629 / C1629M - 15 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

All tests were conducted on March 31, 2017 at the Structural Testing Laboratory of NGC Testing Services™ (NGCTS). Testing was conducted by the engineering and technical staff of NGCTS and was witnessed by representatives of PABCO® Gypsum (Rick Ladwig and Sunder Ram).

Test Specimens

Construction of all hard body impact test specimen assemblies, detailed below, was performed on-site by NGCTS personnel on March 30, 2017. All gypsum panel products used in the construction of the test specimens were manufactured and provided by PABCO® Gypsum. All other materials used in construction were provided by NGCTS.

Materials

The materials used in the construction of the test specimen assemblies are described below.

3-5/8" ClarkDietrich ProSTUD® 20 Drywall Stud – The metal drywall studs, identified as “362S125-20EQ-10”, were fabricated from galvanized steel. The studs were measured to be nominally 0.021 in. thick with 3-5/8 in. deep webs and 1-1/4 in. wide, hemmed leg flanges.

3-5/8" ClarkDietrich ProSTUD 20 Drywall Track – The metal drywall track, identified as “362PDT125-20-10”, were fabricated from galvanized steel. The tracks were measured to be nominally 0.021 in. thick with 3-5/8 in. deep webs and 1-1/4 in. wide, hemmed leg flanges.

5/8" QuietRock® 530 Type X Gypsum Panel – The nominally 5/8 in. thick gypsum panels, identified as “QuietRock 530 TYPE-X”, were manufactured on 01/11/2017 by PABCO® Gypsum. The gypsum panels were supplied in 4 ft. widths and 8 ft. lengths.

5/8" QuietRock® ES Type X Gypsum Panels – The nominally 5/8 in. thick gypsum panels, identified as "QuietRock ES", were manufactured on 03/30/2015 by PABCO® Gypsum. The gypsum panels were supplied in 4 ft. widths and 8 ft. lengths.

Fasteners – #7 x 7/16 in. Type S pan head screws and #6 x 1-1/4 in. Type S-12 bugle head screws.

Construction

The nominal 2 ft. by 2 ft. test specimen assemblies were constructed on-site by the technical staff of NGCTS. Frames consisting of 3-5/8 in. deep 20 ga. steel studs and track were assembled per Figure A1.4 of ASTM C1629/C1629M (see Figure 1). The studs were friction fit between track on the top and bottom of the assembly and then joined using 7/16 in. Type S pan head screws.

Figure 1: Test Specimen Frame (Typical)

The test specimen assemblies were completed by attaching 2 ft. by 2 ft. interior sections of the gypsum panel materials to the frames with 1-1/4 in. Type S-12 bugle head screws spaced 8 in. o.c. (see Figure 2).

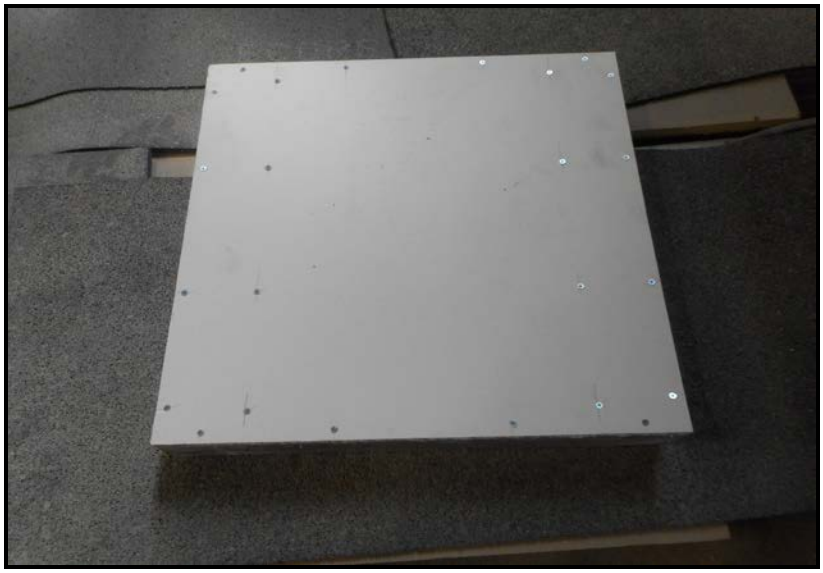

Figure 2: Test Specimen (Typical)

Test Apparatus

The test apparatus utilized for testing complies with Section A1.4 and Figures A1.1 and A1.2 of ASTM C1629/C1629M Annex A1. The apparatus consists of a rigid frame with a ramming arm impactor pinned to a swing arc. The apparatus is securely anchored to a level floor to prevent sliding or rocking of the apparatus during impact. The test apparatus is shown is the photographs (Figures 3 & 4) below.

Figure 3: Test Apparatus Frame

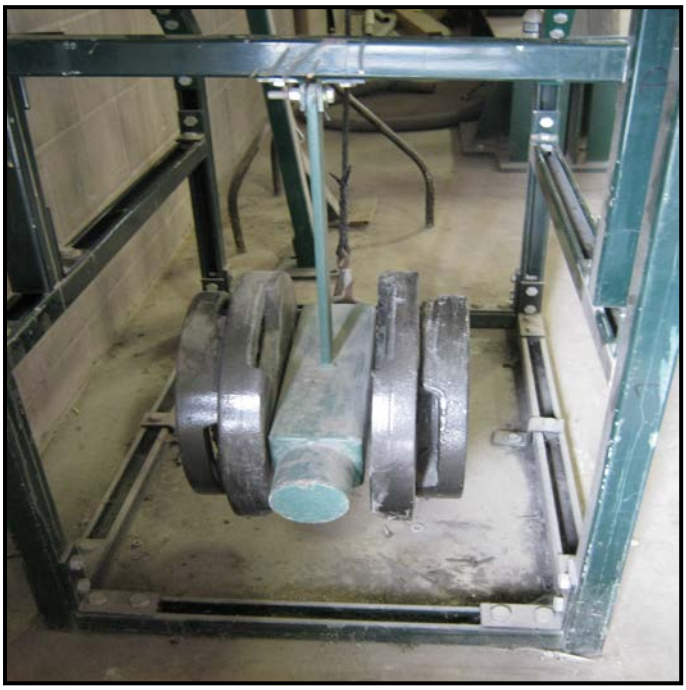

Figure 4: Ramming Arm Impactor with Barbell Free Weights

Test Procedure

Testing was conducted in accordance with the procedure outlined in section A1.7.1 of Annex A1 of ASTM C1629 / C1629M – 15, with modifications as described below.

As agreed upon between NGCTS and the client, a modified procedure was utilized based on the information required – determining the Hard Body Impact Classification Level for the QuietRock® ES panel product, and confirming that the QuietRock®530 panel product met Hard Body Impact Classification Level 3.

The test specimen was securely clamped to the face of the apparatus so that the surface of the test specimen was in the same plane as the face of the impact head. Barbell free weights were added to the ramming arm impactor to achieve the desired impact energy. The ramming arm was raised to a drop height of 12.0 in. (305 mm) and secured. The ramming arm was then released, allowing the impactor to swing freely and strike the test specimen. The test specimen was removed from the apparatus and the impact energy and damage of the test specimen were recorded. A new test specimen assembly was used for each impact.

Failure impact energy, as defined by section A1.7.5.1 of ASTM C1629 / C1629M - 15, is the minimum energy required for the impactor to penetrate through the face

of the panel into the stud cavity, or when the depth of the indentation exceeds the thickness of the product being tested when measured from the face side.

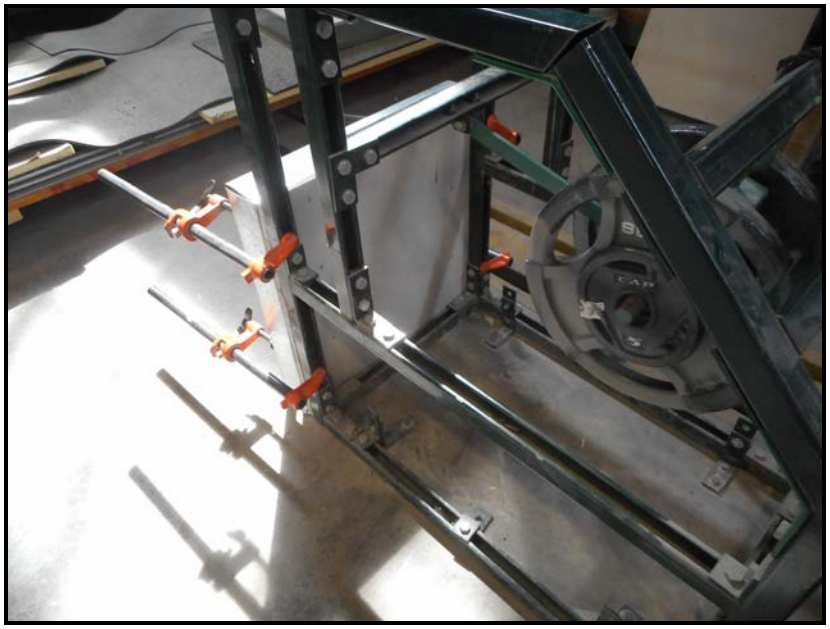

Figure 5: Test Setup (Typical)

Performance Requirements

Abuse resistant panels are classified into one of three levels of abuse resistance based on minimum performance when tested in accordance with ASTM C1629 / C1629M – 15. The minimum requirements for each level are shown in the table below.

Performance Requirements
Hard Body Impact

Classification Level	Hard Body Minimum ft-lbf [J]
1	50 [68]
2	100 [136]
3	150 [204]

Test Results

The hard body impact tests on the 5/8" QuietRock®530 and 5/8" QuietRock® ES Type X gypsum panel products were conducted on March 31, 2017, in accordance with ASTM C1629 / C1629M – 15 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

QuietRock®530

The test specimen assemblies were impacted as required by the hard body impact test method. The failure impact energy, as defined previously, was determined to be greater than 150 ft-lb. Therefore, the impact force withstood is consistent with Hard Body Impact Classification Level 3. Resulting test data is provided in Appendix A.

QuietRock® ES

The test specimen assemblies were impacted as required by the hard body impact test method. The failure impact energy, as defined previously, was determined to be greater than 100 ft-lb, but less than 150 ft-lb. Therefore, the impact force withstood is consistent with Hard Body Impact Classification Level 2. Resulting test data is provided in Appendix A.

Conclusions

QuietRock®530

The 5/8" QuietRock®530 Type X gypsum panel test assemblies, constructed, installed and tested as described in this test report, met the minimum performance requirements for Hard Body Impact Classification Level 3 per ASTM C1629 / C1629M – 15.

QuietRock® ES

The 5/8" QuietRock® ES Type X gypsum panel test assemblies, constructed, installed and tested as described in this test report, met the minimum performance requirements for Hard Body Impact Classification Level 2 per ASTM C1629 / C1629M – 15.

Appendix A
Test Data Sheets

QuietRock®530 – Test Data Sheet

STRUCTURAL TESTING DATA

HARD BODY IMPACT TEST
ASTM C1629 / C1629M

DATE	03/31/17	ASSIGNMENT NO.	J-161	TEST NO.	HB-1701-1
ENGINEER	MJR	TECHNICIAN(S)	SMA / RHB	TEMPERATURE	66 °F
CLIENT	PABCO® Gypsum			HUMIDITY	49%

TEST ASSEMBLY DESCRIPTION	Single layer of 5/8" QuietRock® 530 Type X Gypsum Panel

WEIGHT OF IMPACTOR (lb)	20
IMPACTOR DROP HEIGHT (ft.)	1.0

SPECIMEN #	ADDED WEIGHT (lb)	IMPACT ENERGY (ft-lb)	SPECIMEN DAMAGE / COMMENTS
1	130	150	Shallow circular indentation (depth = 0.132") on front of panel; no visible damage to back of panel
2	130	150	**Invalid test:** test specimen assembly came free from clamps upon impact
3	130	150	Shallow circular indentation (depth = 0.123") on front of panel; no visible damage to back of panel

Failure Impact Energy, ft-lb	**> 150**

Notes: Failure impact energy not determined for any specimen. The impact force withstood (150 ft-lb) by all specimens is consistent with meeting Hard Body Impact Classification Level 3.

QuietRock® ES – Test Data Sheet

STRUCTURAL TESTING DATA

HARD BODY IMPACT TEST
ASTM C1629 / C1629M

DATE	03/31/17	ASSIGNMENT NO.	J-161	TEST NO.	HB-1701-2
ENGINEER	MJR	TECHNICIAN(S)	SMA / RHB	TEMPERATURE	66 °F
CLIENT	PABCO® Gypsum			HUMIDITY	49%

TEST ASSEMBLY DESCRIPTION	Single layer of 5/8" QuietRock® ES Type X Gypsum Panel

WEIGHT OF IMPACTOR (lb)	20
IMPACTOR DROP HEIGHT (ft.)	1.0

SPECIMEN #	ADDED WEIGHT (lb)	IMPACT ENERGY (ft-lb)	SPECIMEN DAMAGE / COMMENTS
1	30	50	Very shallow circular indentation (depth = 0.019") on front of panel; no visible damage to back of panel
2	80	100	Shallow circular indentation (depth = 0.117") on front of panel; no visible damage to back of panel
3	130	150	Impactor head penetrated through panel into stud cavity

Failure Impact Energy, ft-lb	**< 150**

Notes: Precise failure impact energy not determined. The impact force withstood (100 ft-lb) by specimen #2 is consistent with meeting Hard Body Impact Classification Level 2.