



RADCO TEST REPORT
Test Report No. RAD-4093
Project No. C488A

**Racking Shear Tests on Wallpanel Anchored Assembly
per ASTM E72**

Prepared for

Wallpanel Inc.
P.O. Box 13023
Prescott, AZ 86304

by

RADCO
Resources, Applications, Designs and Controls, Inc.
Listing and Testing Division
3220 E. 59th Street
Long Beach, CA 90805
Telephone: 562-272-7231
Facsimile: 562-529-7513
www.radcoinc.com

Prepared by:

Winston Wade
4-6-07

Winston Wade
Senior Consultant

Submitted by:

4/6/07
Michael L. Zieman

Michael L. Zieman, P.E.
President

Issued: April 6, 2007

RADCO reports are for the exclusive use of the client to whom they are addressed. Permission is granted to reproduce this report provided it is reproduced in its entirety. The use of the name RADCO (Resources Applications, Designs and Controls, Inc.,) in any advertising or related materials must receive prior written approval from RADCO. Reports apply only to samples tested at the time of testing and are not necessarily indicative of the quality of apparently identical or similar products. This report contains confidential information intended for the sole use of the addressee. Transmittal by facsimile is prohibited without the express approval and concurrence of the addressee.



TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 TEST SPECIMENS 1

3.0 TEST PROCEDURE AND RESULTS 1

 3.1 Procedure 1

 3.2 Results 2

APPENDIX

Load vs. Deflection Tables (A-1 through A-3)

Load vs. Deflection Chart (B-1)

Photographs:

Test Specimen Details (C-1)



1.0 INTRODUCTION

At the request of Wallpanel Inc. RADCO performed the racking shear tests described below on Spruce-Pine-Fir wooden stud frames. The tests were conducted in accordance with ASTM E72-05, "Standard Methods of Conducting Strength Tests of Panels for Building Construction".

2.0 TEST SPECIMENS

The 8' x 8' assemblies were constructed by Wallpanel with attachment to testing fixtures facilitated by RADCO personnel.

Test Specimen Description:

All specimens were prepared in March 2007.

All references to attaching and fastening use #8, 1/2" length, self tapping screws.

The Wallpanel assemblies consisted of base and crown channels of 18 gage steel with 6" width and 2" sides. Eleven (11) 18 gage steel studs were attached on end to the base channel so that the wider cross section dimension was parallel to the length of the panels. The studs were set so that six (6) studs were on one side of the panel and five (5) were on the other in an off-set pattern.

Similar to field construction, foundation anchors were attached at the ends and the base plates of the racking fixture were drilled so as to accommodate 5/8" anchor bolts.

Pre-formed EPS foam was then inserted between the two courses of studs. The foam had a density of 2 pounds per cubic foot. The crown channel was then attached.

Twenty-four (24) inch square gusset plates were attached to the corners and two straps, three inches wide, were attached from corner to corner. See attached photograph for attachment details.

3.0 TEST PROCEDURE AND RESULTS

3.1 Procedure

Prior to each test, the condition of the equipment used was examined and verified to be operational and in current calibration.

Test Conditions: All specimens were tested in ambient warehouse conditions.

The testing was conducted in March 2007. The racking shear tests were conducted in accordance with ASTM E72-05.

The specimens were loaded in three stages to 800, 1600, 2400, and 4000 lbf total load at a uniform rate and released after every load increment up to 4000 lbs. Load beyond 4000 lb. was not released to zero. Deflection readings were taken at various load increments and after the load was released. The panels were allowed a 1 minute recovery period before taking the zero load deflections.



Dial indicators accurate to 0.0001" were provided to measure the displacement of the specimen during test. The dial at the lower right corner (Dial #3), below the point of load application, measured the amount of lift (rotation), the dial at the lower left corner (Dial #2) measured the slippage of the sample, and the dial at the upper left corner (Dial #1) measured the total deformation of the wall (including the slip and lift). The total deflection of the sample for each loading was the reading of the dial at the upper left minus the readings of the other two dials (Dial #1 - Dial #2 - Dial #3).

(Note: The gages ran out of travel while the frame was still capable of taking load. The gages were removed at that point and the frames were then taken to ultimate load)

3.2 Results

Test Number	Ultimate Load (lbf)	lbf/lineal ft.	Load @ 1/8" Deflection (lbs.)	lbf/lineal ft.
1	12000	1500	752	94
2	13100	1638	592	74
3	14300	1788	1120	140
Average	13133	1642	821	103
Std. Dev.	1150	144	271	34

******END OF REPORT******



RAD-4093

APPENDIX

Load vs. Deflection Tables (A-1 through A-3)
Load vs. Deflection Chart (B-1)

Photographs:
Test Specimen Details (C-1 through C-2)

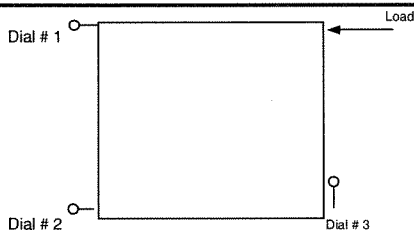


RAD-4093

APPENDIX A
LOAD VS. DEFLECTION TABLES

WALLPANEL Inc.
Racking Shear, ASTM E-72: RADCO W.O. # C-488A

Date: Mar 22, 07
Time: 6:00P.M.
Test No.: 1
Specimen: 8' x 8'
Panel Type: 6" EPS core with 18 gage studs



Hold Downs: Yes (hand tightened)

Preload 100 lbs.
Max. Load 12,000 lbs.

(lbs.)	Deflections (in.)					Net Defn.
	Dial # 1	Dial # 2	Dial # 3	Dummy		
0	0.0000	0.0000	0.0000	0.0000	0.0000	
400	-0.0539	-0.0029	-0.0042	0.0000	0.0469	1/8" deflection @ 752 lbf
800	-0.1695	-0.0103	-0.0235	0.0000	0.1357	94 pif
0	-0.0560	-0.0074	-0.0092	0.0000	0.0394	
1000	-0.2767	-0.0238	-0.0438	0.0000	0.2091	
1600	-0.3650	-0.0364	-0.0685	0.0000	0.2602	
0	-0.1490	-0.0341	-0.0206	0.0000	0.0944	
1800	-0.3963	-0.0424	-0.0782	0.0000	0.2757	
2400	-0.4677	-0.0513	-0.1073	0.0000	0.3092	
0	-0.2048	-0.0517	-0.0274	0.0000	0.1258	
3000	-0.5534	-0.0657	-0.1370	0.0000	0.3508	
3500	-0.6247	-0.0754	-0.1619	0.0000	0.3875	
4000	-0.6902	-0.0796	-0.1851	0.0000	0.4255	
0	-0.3034	-0.0775	-0.0464	0.0000	0.1795	
4500	-0.7703	-0.0788	-0.2128	0.0000	0.4788	
5000	-0.8492	-0.0794	-0.2403	0.0000	0.5296	
5500	-0.9531	-0.0794	-0.2739	0.0000	0.5999	
6000	-1.0907	-0.0817	-0.3046	0.0000	0.7045	
6500	-1.3551	-0.0831	-0.3467	0.0000	0.9253	
7000	-1.6006	-0.0847	-0.3854	0.0000	1.1306	
7500	-2.0812	-0.0892	-0.4543	0.0000	1.5377	
8000	-2.4368	-0.0917	-0.5022	0.0000	1.8429	
8500	-2.7621	-0.0949	-0.5484	0.0000	2.1189	
9000	-3.0835	-0.0981	-0.5992	0.0000	2.3863	
9500	-3.4412	-0.0999	-0.6489	0.0000	2.6924	
10000	Ram ran out of travel					

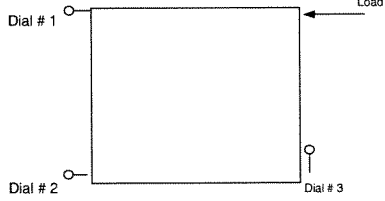
Net Deflection = Dial # 1-Dial # 2-Dial # 3
Load Cell: 200K Sensotec Load Cell, sl # 242093, calibration due: 09-13-07
Technicians: Ted Wade, David Bautista, Shaun Harlan & Javier Camacho

Mode of Failure: Panel was unable to resist further loading.

Testing Notes: Dial indicator # 1 was positioned on the center of the 6" width and 1" from the top edge of the panel. Dial indicator # 2 was positioned on the center the 6" width and 1" from the bottom edge of the panel. At a load of 2,100 lbs., cross brace or metal strap began to buckle. Cross brace that buckled was the one that ran diagonally from the loading nose area, down to the area where dial indicator # 2 was positioned. At a load of 9,900 lbs. the ram ran out of travel. After the ram ran out of travel the dial indicators were removed and the panel was examined. After examination, it was determined that the cross brace was buckled, but the panel could resist further loading. Metal spacers (plates), were placed in the fixture, behind the load cell, to provide additional clearance and the panel was loaded again. At a load of 12,000 lbs. the panel experienced failure and the live load dropped to 7,500 lbs. At time of failure, cross brace that ran from the corner of the panel, in the area of dial indicator # 1, broke in half at the center of it's span.
Note: In this particular test series, the specimen had two anchor bolts, both approximately 5-1/2" from each end and/or side. These anchor bolts went through the bottom C-channel of the test fixture and into an internal hold down within the panel. With such hold downs, the panel's failure in this series, (3 tests) was not similar to the tests conducted on October. The bottom C-channel of the panel experienced very little uplift and buckling as a result of failure and the loads that were applied. Reference photo's for more information.

WALLPANEL Inc.
Racking Shear, ASTM E-72: RADCO W.O. # C-488A

Date: Mar 23, 07
 Time: 9:10P.M.
 Test No.: 2
 Specimen: 8' x 8'
 Panel Type: 6" EPS core with 18 gage studs



Hold Downs: **Yes (hand tightened)**

Preload 100 lbs.
 Max. Load **13,100 lbs.**

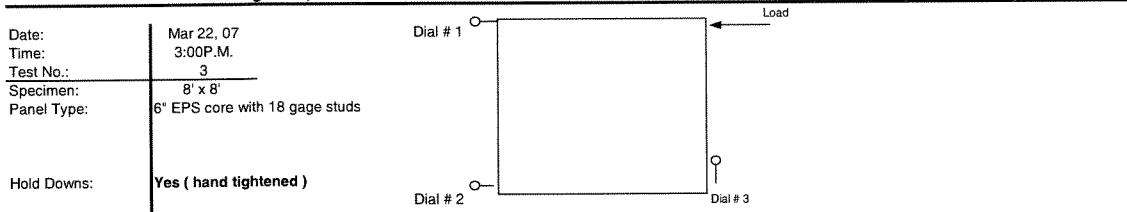
(lbs.)	Deflections (in.)			Dummy	Net Defln.	
	Dial # 1	Dial # 2	Dial # 3			
0	0.0000	0.0000	0.0000	0.0000	0.0000	
400	-0.1462	-0.0049	-0.0396	0.0000	0.1018	1/8" deflection @ 592 lbf
800	-0.2109	-0.0096	-0.0511	0.0000	0.1502	74 pit
0	-0.0762	-0.0036	-0.0235	0.0000	0.0492	
1000	-0.2734	-0.0321	-0.0614	0.0000	0.1799	
1600	-0.3676	-0.0473	-0.0786	0.0000	0.2418	
0	-0.1312	-0.0367	-0.0214	0.0000	0.0732	
1800	-0.4195	-0.0573	-0.0894	0.0000	0.2729	
2400	-0.4705	-0.0633	-0.1002	0.0000	0.3070	
0	-0.2385	-0.0554	-0.0488	0.0000	0.1344	
3000	-0.5426	-0.0728	-0.1174	0.0000	0.3525	
3500	-0.5910	-0.0782	-0.1287	0.0000	0.3841	
4000	-0.6646	-0.0836	-0.1458	0.0000	0.4352	
0	-0.3454	-0.0806	-0.0649	0.0000	0.2000	
4500	-0.7520	-0.0879	-0.1649	0.0000	0.4993	
5000	-0.8429	-0.0921	-0.1846	0.0000	0.5662	
5500	-0.9764	-0.0971	-0.2082	0.0001	0.6711	
6000	-1.1748	-0.1023	-0.2371	0.0000	0.8355	
6500	-1.4999	-0.1075	-0.2794	0.0000	1.1131	
7000	-1.8100	-0.1097	-0.3155	0.0000	1.3848	
7500	-2.1928	-0.1168	-0.3632	0.0001	1.7129	
8000	-2.6526	-0.1220	-0.4113	0.0000	2.1194	
8500	-3.1373	-0.1274	-0.4678	0.0000	2.5422	
9000	Ram ran out of travel					

Net Deflection = Dial # 1-Dial # 2-Dial # 3
 Load Cell: 200K Sensotec Load Cell, sl # 242093, calibration due: 09-13-07
 Technicians: Ted Wade, David Bautista, Shaun Harlan & Javier Camacho

Mode of Failure: Panel was unable to resist further loading.

Testing Notes: Dial indicator # 1 was positioned on the center of the 6" width and 1" from the top edge of the panel. Dial indicator # 2 was positioned on the center the 6" width and 1" from the bottom edge of the panel. During the preload, cross brace or metal strap began to buckle. Cross brace that buckled was the one that ran diagonally from the loading nose area, down to the area where dial indicator # 2 was positioned. At a load of 8,700 lbs. the ram ran out of travel. After the ram ran out of travel the dial indicators were removed and the panel was examined. After examination, it was determined that the cross brace was buckled, but the panel could resist further loading. Metal spacers (plates), were placed in the fixture, behind the load cell, to provide additional clearance and the panel was loaded again. At a load of 13,100 lbs. the panel experienced failure and the live load dropped to a load of 6,900 lbs.
 Note: In this particular test series, the specimen had two anchor bolts, both approximately 5-1/2" from each end and/or side. These anchor bolts went through the bottom C-channel of the test fixture and into an internal hold down within the panel. With such hold downs, the panel's failure in this series, (3 tests) was not similar to the tests conducted on October. The bottom C-channel of the panel experienced very little uplift and buckling as a result of failure and the loads that were applied.
 Reference photo's for more information.

WALLPANEL Inc.
Racking Shear, ASTM E-72: RADCO W.O. # C-488A



Date: Mar 22, 07
 Time: 3:00P.M.
 Test No.: 3
 Specimen: 8' x 8'
 Panel Type: 6" EPS core with 18 gage studs

Hold Downs: Yes (hand tightened)

Preload 100 lbs.
 Max. Load 14300 lbs.

(lbs.)	Deflections (in.)					Net Defln.
	Dial # 1	Dial # 2	Dial # 3	Dummy		
0	0.0000	0.0000	0.0000	0.0000	0.0000	
400	-0.1118	-0.0139	-0.0456	0.0000	0.0523	
800	-0.2395	-0.0347	-0.1036	0.0000	0.1013	
0	-0.0918	-0.0306	-0.0295	0.0000	0.0317	
1000	-0.2833	-0.0430	-0.1229	0.0000	0.1174	1/8" deflection @ 1120 lbf
1600	-0.3739	-0.0638	-0.1547	0.0000	0.1555	140 plf
0	-0.1501	-0.0564	-0.0432	0.0000	0.0505	
1800	-0.4267	-0.0804	-0.1718	0.0000	0.1745	
2400	-0.5229	-0.0967	-0.2092	0.0000	0.2170	
0	-0.2142	-0.0843	-0.0586	0.0000	0.0714	
3000	-0.5999	-0.1043	-0.2389	0.0000	0.2567	
3500	-0.6819	-0.1092	-0.2726	0.0000	0.3001	
4000	-0.7711	-0.1105	-0.3019	0.0000	0.3587	
0	-0.2760	-0.0775	-0.0866	0.0000	0.1119	
4500	-0.8369	-0.1117	-0.3249	0.0000	0.4004	
5000	-0.9365	-0.1119	-0.3592	0.0000	0.4655	
5500	-1.0598	-0.1117	-0.3950	0.0000	0.5532	
6000	-1.3411	-0.1133	-0.4539	0.0000	0.7739	
6500	-1.7030	-0.1165	-0.5156	0.0000	1.0709	
7000	-2.2612	-0.1217	-0.6121	0.0000	1.5275	
7500	-2.6426	-0.1262	-0.6775	0.0000	1.8390	
8000	-3.1910	-0.1357	-0.7644	0.0000	2.2910	
8500	Ram ran out of travel					

Net Deflection = Dial # 1-Dial # 2-Dial # 3
 Load Cell: 200K Sensotec Load Cell, sl # 242093, calibration due: 09-13-07
 Technicians: Ted Wade, David Bautista, Shaun Harian & Javier Camacho

Mode of Failure: Panel was unable to resist further loading.

Testing Notes: Dial indicator # 1 was positioned on the center of the 6" width and 1" from the top edge of the panel. Dial indicator # 2 was positioned on the center the 6" width and 1" from the bottom edge of the panel. At a load of 3,900 lbs., cross brace or metal strap began to buckle. Cross brace that buckled was the one that ran diagonally from the loading nose area, down to the area where dial indicator # 2 was positioned. At a load of 8,900 lbs. the ram ran out of travel. After the ram ran out of travel the dial indicators were removed and the panel was examined. After examination, it was determined that the cross brace was buckled, but the panel could resist further loading. Metal spacers (plates), were placed in the fixture, behind the load cell, to provide additional clearance and the panel was loaded again. At a load of 14,300 lbs. the panel experienced failure and the live load dropped to a load of 6,400 lbs.
 Note: In this particular test series, the specimen had two anchor bolts, both approximately 5-1/2" from each end and/or side. These anchor bolts went through the bottom C-channel of the test fixture and into an internal hold down within the panel. With such hold downs, the panel's failure in this series, (3 tests) was not similar to the tests conducted on October. The bottom C-channel of the panel experienced very little uplift and buckling as a result of failure and the loads that were applied. Reference photo's for more information.



RAD-4093

APPENDIX B
LOAD VS. DEFLECTION CHART

