

The Department of Fire Technology

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FIRE PERFORMANCE EVALUATION OF AN
ALUMINUM COMPOSITE MATERIAL PANEL
WALL ASSEMBLY IN GENERAL ACCORDANCE
WITH ASTM E 119, *STANDARD TEST METHODS
FOR FIRE TESTS OF BUILDING CONSTRUCTION
AND MATERIALS*

FINAL REPORT
Consisting of 18 Pages

SwRI® Project No. 01.12694.01.307
Test Completion Date: January 10, 2007
Report Date: January 30, 2007

Prepared for:

Alubond
Eurocon Building Industries
P.O. Box 4819
Ajman Freezone, AJMAN
U.A.E.



SOUTHWEST RESEARCH INSTITUTE®

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Prepared by:

A handwritten signature in blue ink, appearing to read 'Majid Mehrafza', is written over a large, stylized blue bracket.

Majid Mehrafza, M.S.
Research Engineer
Fire Resistance Section

Approved by:

A handwritten signature in blue ink, appearing to read 'Barry L. Badders', is written over a large, stylized blue bracket.

for Barry L. Badders, P.E.
Acting Group Leader
Fire Resistance Section

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ABSTRACT

An asymmetric, nonbearing, aluminum composite material wall assembly was tested from one side by Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, Texas, for Alubond, located in AJMAN, U.A.E. Alubond FR U.S.A., located in Rockford, Illinois provided the test panels. Testing was completed on January 10, 2007, in general accordance with ASTM E 119 (2000), *Standard Test Methods for Fire Tests of Building Construction and Materials*. The hose stream test was not conducted per Client's request.

The wall system, as described in this report, **passed** the temperature requirements of ASTM E 119 for 1 hr and 42 min duration of the fire-rating test without passage of flame or gases hot enough to ignite the cotton waste, per Section 18.1.1 of the Standard.

1.0 INTRODUCTION

A fire performance evaluation of an asymmetric, non-load bearing, aluminum composite panel (ACP) wall assembly was conducted for Alubond, located in AJMAN, U.A.E., at Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, TX. Alubond FR U.S.A. located in Rockford, Illinois provided the composite panels for testing. Testing was completed on January 10, 2007, in general accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*. The hose stream test was not conducted per Client's request.

This report contains a description of the test procedure followed, assembly tested, and the results obtained. The results presented in this report apply only to the assembly tested, in the manner tested, and not to any similar assemblies or material combinations.

2.0 OBJECTIVE

The ASTM E 119 test method is intended to evaluate the duration for which the assembly tested will contain a fire, or retain its structural integrity, or display both properties dependent upon the type of assembly involved, during a predetermined fire exposure time.

This test measures the response of the assembly to exposure in terms of the transmission of heat and hot gases through the assembly. This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment, which takes into account all the factors that are pertinent to an assessment of the fire hazard of a particular end use.

3.0 TEST ASSEMBLY

SwRI personnel constructed a wall assembly with a nominal area of 100 ft² by utilizing 18-ga, 3-⁵/₈-in. corrosion resistant steel C-channel studs framed 24 in. on center on both sides. To accommodate the installation of the composite panels, three studs in the middle of the wall were spaced 9-¹/₄ in. on center. The wall was insulated with 3-¹/₂-in. thick, 8-lb/ft³, Delta-8, mineral wool board insulation manufactured by Rock Wool Manufacturing Company, located in Leeds, AL. One layer of ⁵/₈-in. thick Type "X" gypsum wallboard was used on both sides of the wall. The joints of the gypsum wallboard were staggered from the exposed and unexposed sides. The gypsum wallboard was mechanically fastened with No. 6, 1-¹/₄-in. Type S screws spaced 8 in. on center around the perimeter and joints, and 12 in. on center within the field. The gypsum wallboard on both sides were taped and treated with joint compound. The exposed fastener heads were also covered with joint compound.

SwRI received two ACP panels, identified by the Client as “Alubond U.S.A. FR Aluminum Composite Panel,” on January 10, 2007. The panels were “route and return” on all sides, 10 ft 3 in long, 4 ft 10 in. wide, and 0.157 in. thick with 1 × 1 in L angle cleats. The panels are coated with a PVDF, flouropolymer, or polyester on the front surface and polyester on the back skin. The composite panels were prepared in the form of a tray with 1-½-in. lips. Each composite panel was insulated with 1-½-in. thick 8-lb/ft³, Delta-8, mineral wool board insulation manufactured by Rock Wool Manufacturing Company, located in Leeds, AL. Aluminum L-shaped angles measuring 1 × 1 × ¼ × 4 in. long were attached, along the perimeter of the tray, 16-in. apart. The angle clips were staggered to avoid overlapping during the installation onto the exposed surface. The ACP panels were fastened to the exposed face of the wall with No. 6, 1-¼-in. Type S screws spaced 16 in. on center around the perimeter and joints and within the field.

All of the Client-supplied drawings are presented in Appendix A. Select photographs are provided in Appendix B. Temperature data is provided in Appendix C. Video documentation and photographs taken during the test accompany this report as enclosures on DVD and compact disc, respectively, and are considered part of this report.

4.0 TEST RESULTS

The test was completed on January 10, 2007. The wall assembly was mounted to SwRI’s large-vertical furnace with the ACP panels exposed to the furnace environment and all instrumentation connections were verified. The wall assembly was exposed to the standard temperature-time curve specified in ASTM E 119. Unexposed side temperatures and furnace temperature data for the tests are contained in Appendix C. The ambient temperature and relative humidity at the time of the test were 70°F and 67 percent, respectively. Visual observations are presented in Table 1.

Table 1. Test Observations.

TIME Min:Sec	OBSERVATIONS
0:00	Start of test.
30:00	Light smoke along top perimeter.
45:00	Light smoke along right edge.
62:00	Inward bowing. No discoloration on the unexposed side.
88:00	Discoloration of gypsum wallboard on the left hand side of the wall.
94:00	Discoloration of gypsum wallboard at center of the wall.
102:23	Maximum single point temperature exceeded. Test Terminated.
104:00	End of test. Hose stream test was not conducted.
Post Test	ACM panels totally consumed. Steel studs warped and bowed. Gypsum wallboard intact.

5.0 CONCLUSION

The wall system, as described in this report, **passed** the temperature requirements when tested in general accordance with ASTM E 119, for 1 hr and 42 min duration of the fire-rating test without passage of flame or gases hot enough to ignite the cotton waste, per Section 18.1.1 of the Standard. The hose stream test was not conducted per Client's request.

APPENDIX A
CLIENT PROVIDED WALL DRAWINGS AND INSTALLATION DETAILS
(CONSISTING OF 4 PAGES)

APPENDIX B
SELECTED PHOTOGRAPHIC DOCUMENTATION
(CONSISTING OF 5 PAGES)

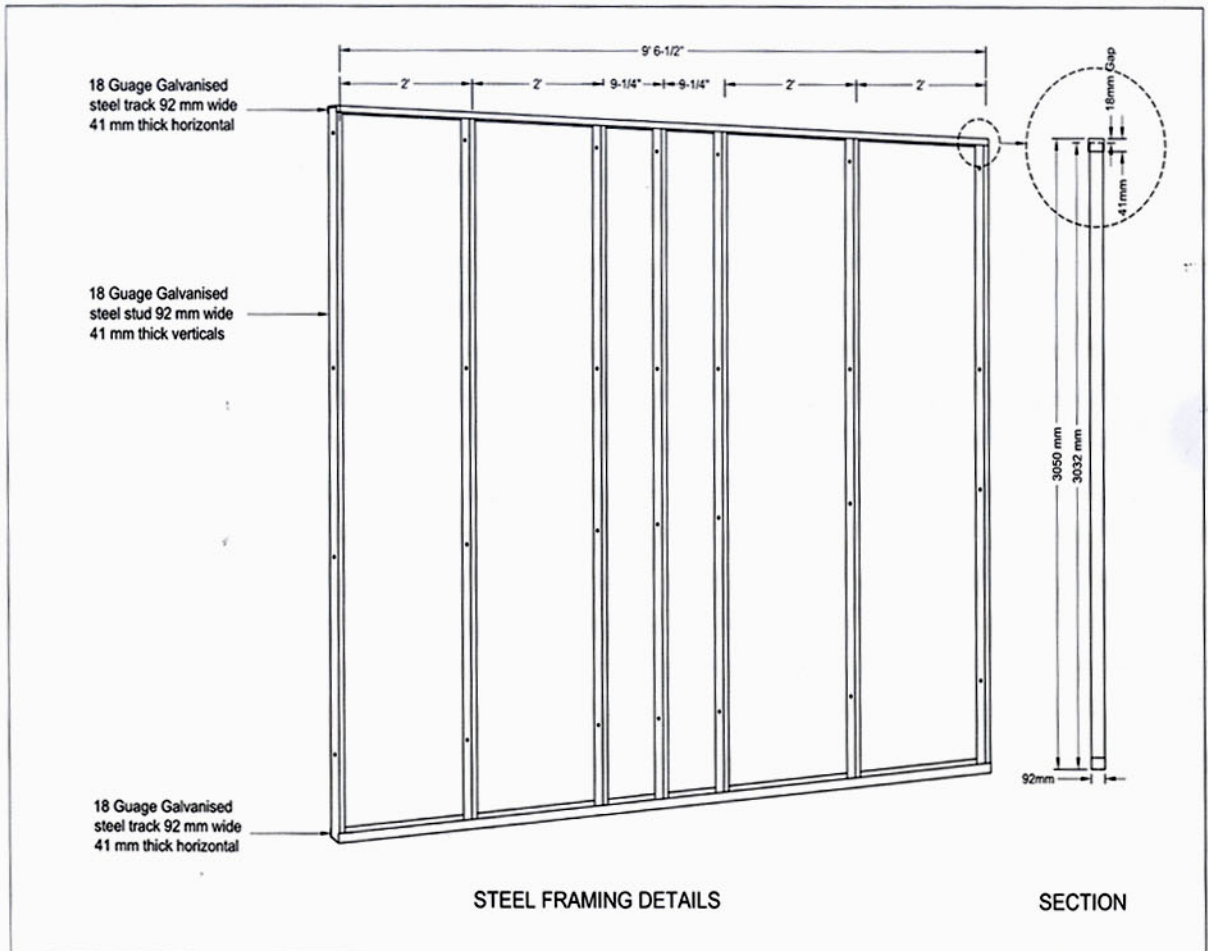


Figure A-1. Steel Stud Details.

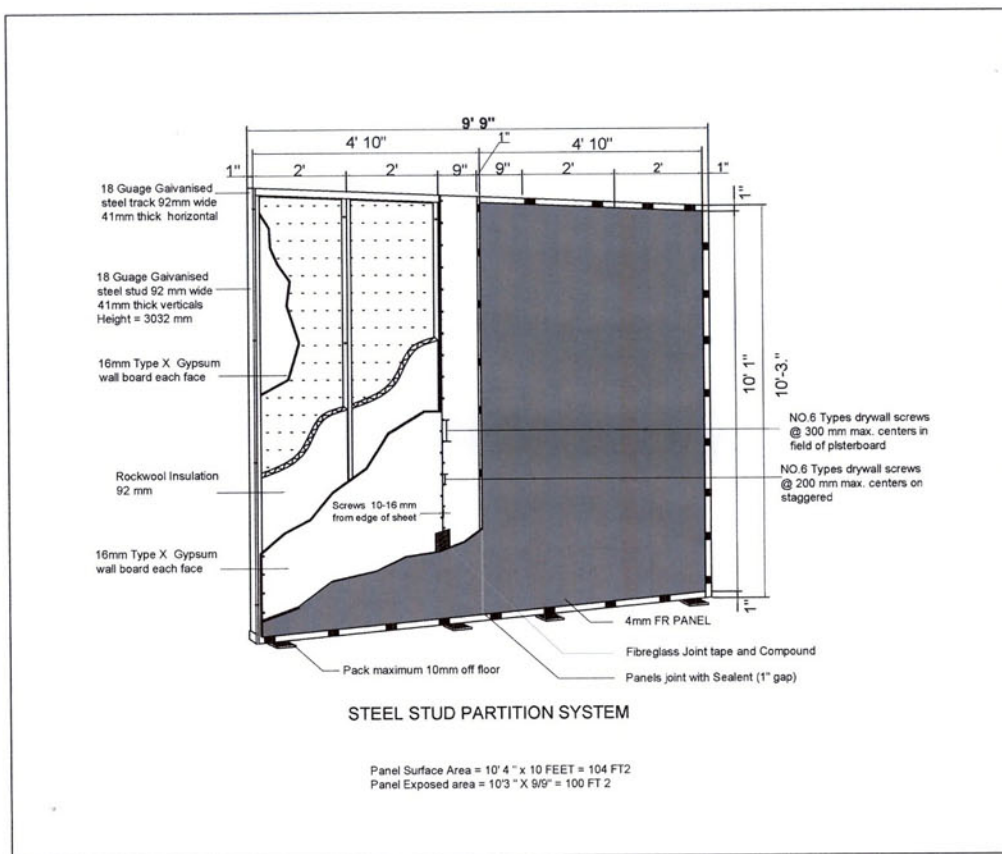
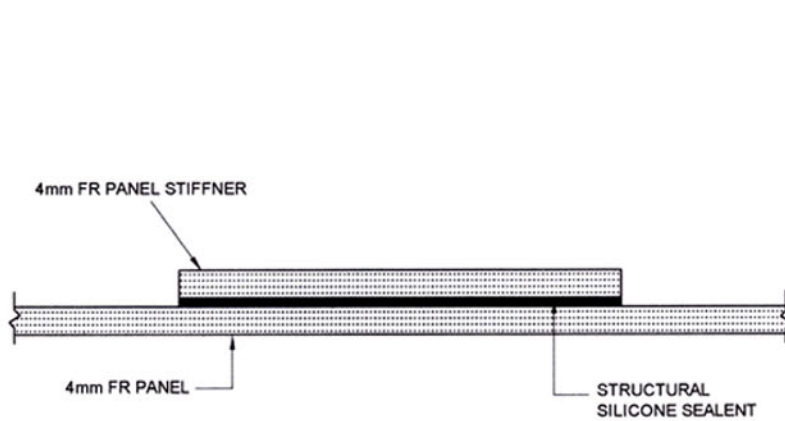


Figure A-2. Wall Details.



SECTION A-A
Figure (1*)
ROUT AND RETURN CLIP SYSTEM

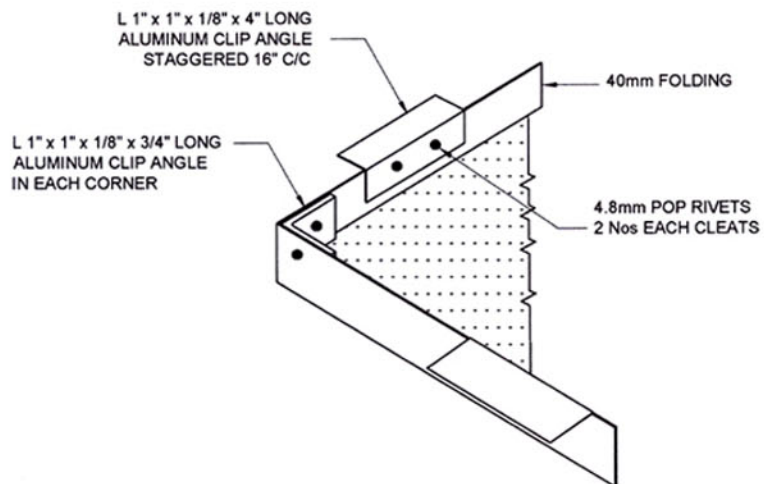


Figure (2*)
CORNER BRACE & CLEATS DETAILS

Figure A-3. Stiffener and Bracket Details.

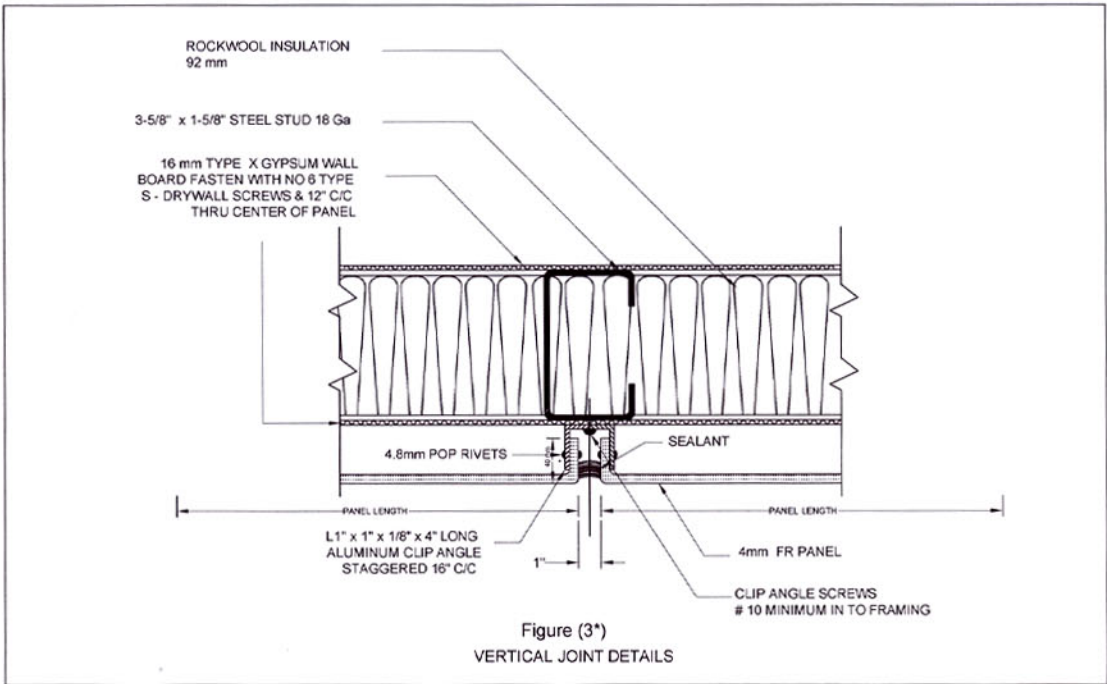


Figure A-4. Bracket Installation Details.

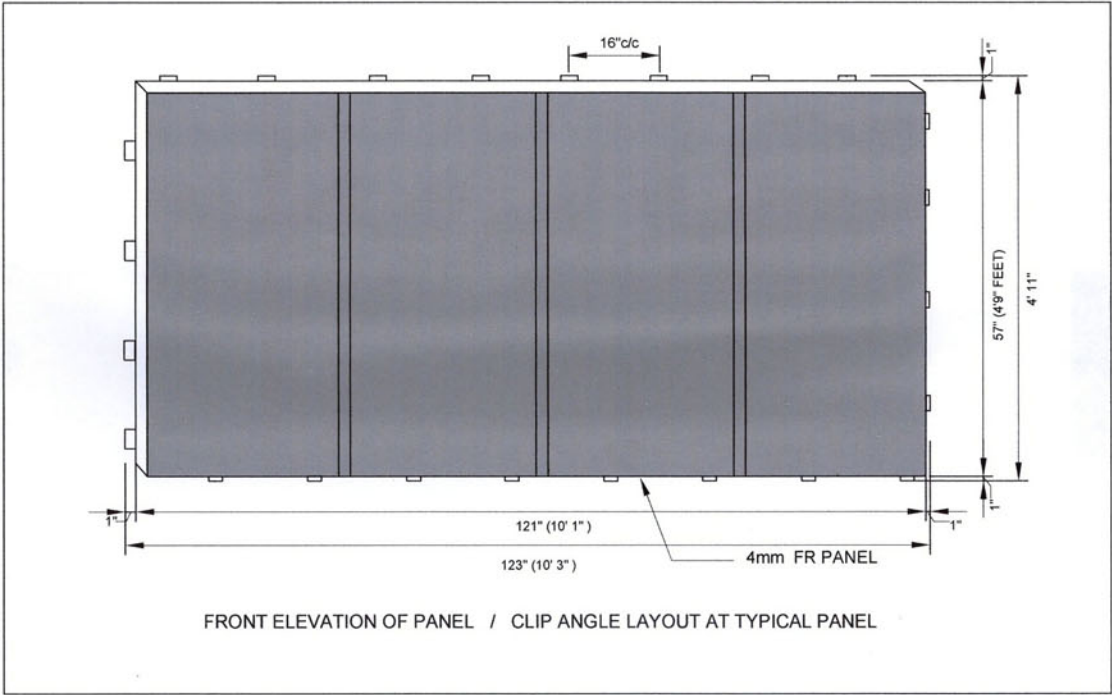


Figure A-5. ACP Details and Installation Brackets.



Figure B-1. Wall Construction in Progress.



Figure B-2. Wall Construction With Insulation Boards Being Installed.



Figure B-3. Unexposed Side of the Wall With Instrumentation is Completed.



Figure B-4. ACP Panel Insulation in Progress.



Figure B-5. ACP Panels Being Installed on the Exposed Face of the Wall.

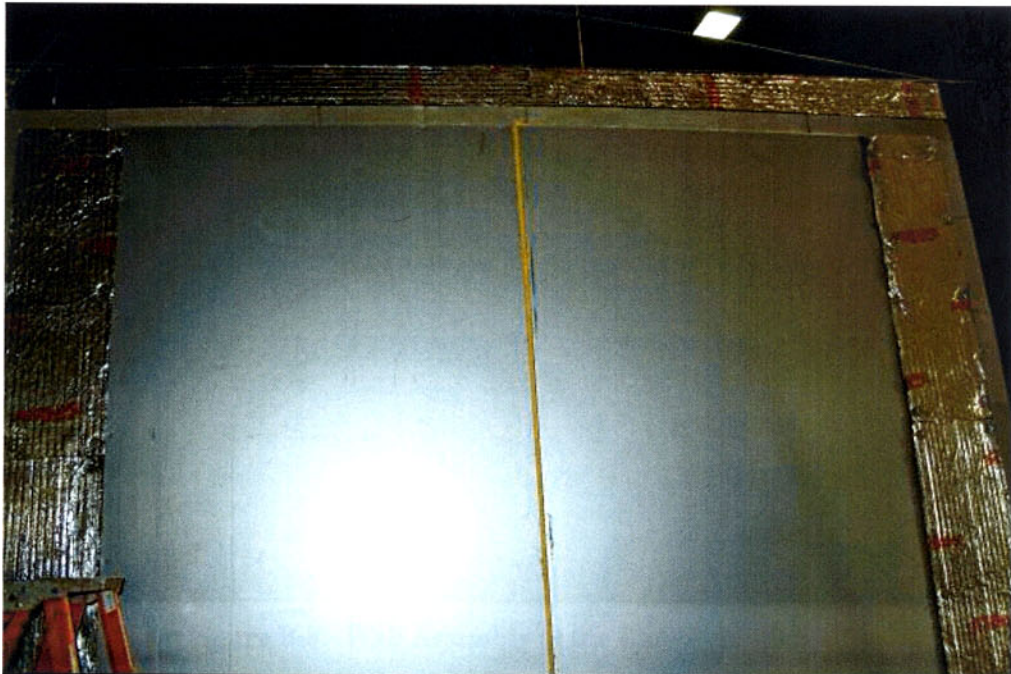


Figure B-6. ACP Panel Installation Completed. Joints Filled With Fire-Rated Caulk.

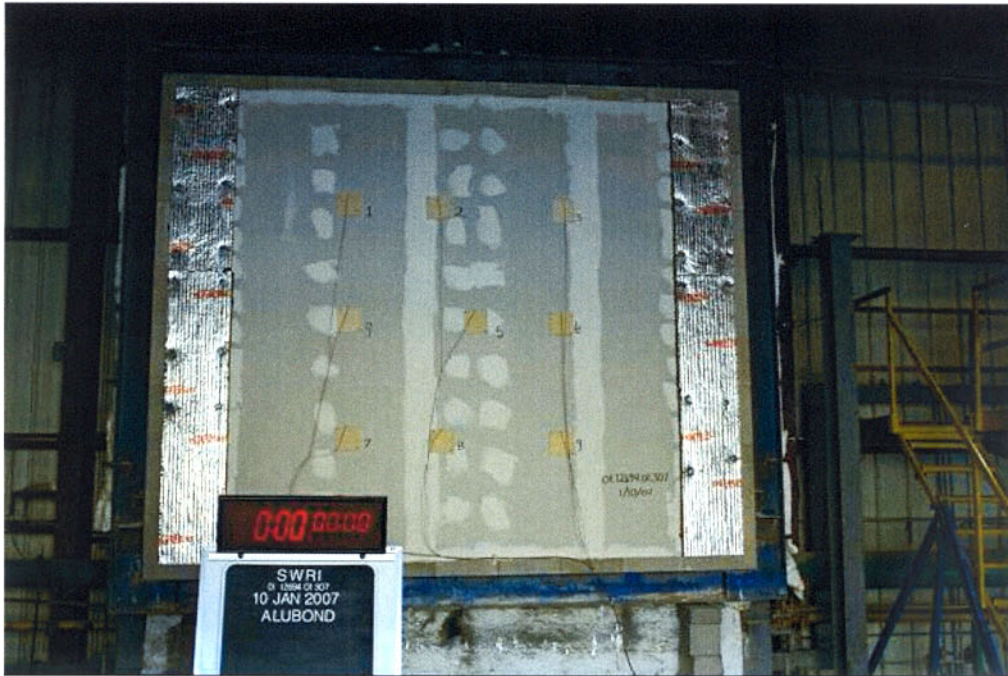


Figure B-7. Wall Assembly at the Start of the Test.

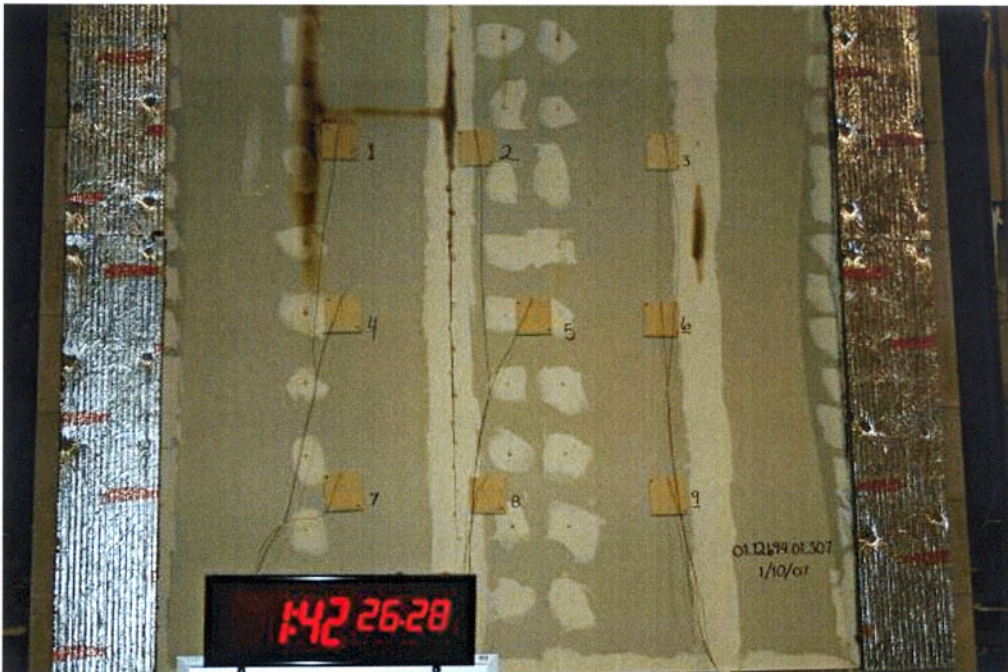


Figure B-8. Wall Assembly at the End of the Test.



Figure B-9. Exposed Side of Wall Assembly After the Fire Test.

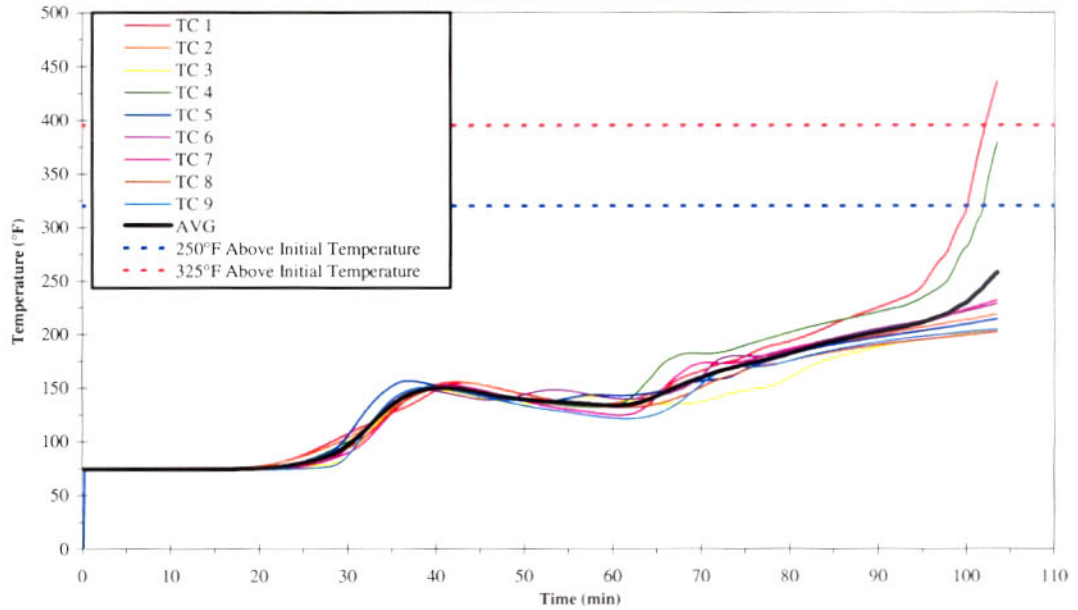


Figure B-10. Unexposed Side of Wall Assembly After the Fire Test.

APPENDIX C
TEMPERATURE DATA
(CONSISTING OF 1 PAGE)

Client: Alubond
SwRI Project No.: 01.12694.01.307
Test Date: January 10, 2007
Test ID: 07-010Alu1.csv

UNEXPOSED FACE THERMOCOUPLES



Client: Alubond
SwRI Project No.: 01.12694.01.307
Test Date: January 10, 2007
Test ID: 07-010Alu1.csv

FURNACE AVERAGE TEMPERATURE

