

Test Report No. 7191061185-MEC13-OKB
dated 17 Jun 2013

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HEAT / RAIN PERFORMANCE TEST
OF
“V-Premium’ FIBRE CEMENT BOARD
TESTED
IN ACCORDANCE WITH ASTM C1185 - 2012

TESTED FOR:

Visaka Industries Limited
Visaka Towers
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A.P 500003
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A handwritten signature in black ink, appearing to read 'David H. J.', located below the table of contents.



1. INTRODUCTION

This document consists of the "V-Premium" fibre cement board" test report for Visaka Industries Ltd.

This report describes the test procedures and records the results obtained during the respective tests.

2. OBJECTIVES

The mock-up is subjected for evaluations. Visaka Industries Ltd had proposed to test the unit, to demonstrate the heat / rain performance integrity of the "V-Premium" fibre cement board" under the specified design requirements. The mock-up is proposed, subjected to accelerated weathering test, expose to alternating wetting and heating up to 25 cycles. And at the end of the test, any surface alteration of the mock-up partition wall system is recorded.

3. TEST DETAILS

Date Tested : 28 May 2013 (2 pm) ~ 3 Jun 2013 (8 pm)

Venue : TUV SUD PSB Pte Ltd
No 1, Science Park Drive,
Singapore 118221

Tested by : David Li Chee Leong & Ong Khay Beng (TUV SUD PSB Pte Ltd)

4. TEST SPECIFICATIONS

The performance tests is tested accordance with the following specifications:

ASTM C 1185-2012

Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Sheet, Roofing and Sliding
Singles, and Clapboards¹

Clause 14 Heat/Rain – Wall Structures

A handwritten signature in black ink, appearing to read 'David Li Chee Leong'.

5. DESCRIPTION OF MOCK-UP TEST SPECIMEN

3 pieces of "V-Premium" fibre cement board" are received and each having a nominal size of 2440mm (L) X 1220mm (W) X 8mm (Thk). The panels are constructed onto TUV SUD PSB test-rig to form system having an overall size of 1.87 m (W) X 2.4m (H), producing a surface area of 4.49m².



Photo 1: "V-Premium" fibre cement board" mock-up.
(Indicated with numbering markings for surface observation before and after test)

Note: Refer to close-up photographs on page 7 ~ 8.



6. TEST EQUIPMENT AND SETUP

The following test equipment were provided by TUV SUD PSB Pte Ltd.

- i) The test chamber is customized to the mock-up specimen size, having an opening of 1.87m width X 2.4m height.
- ii) Water nozzles are installed in the test chamber to provide uniform water spray on the mock-up specimen to simulate rain exposure during the test
- iii) A water pump system is introduced to control the water flow between the test chamber reservoir and the water nozzles in-order to ensure the continuity of water spray during the simulated rain exposure test.
- iv) 9 sets of 500 watts floor-light are installed in the test chamber to provide uniform radiant heat on the mock-up specimen to simulate sunlight exposure during the test.
- v) A control panel is used to control the cyclic test sequence of simulated heat / rain exposure.
- vi) Test chamber is fully covered and sealed, to avoid any significant external air-flow contact throughout the 25 cyclic test



Photo 5: Simulate rain exposure.

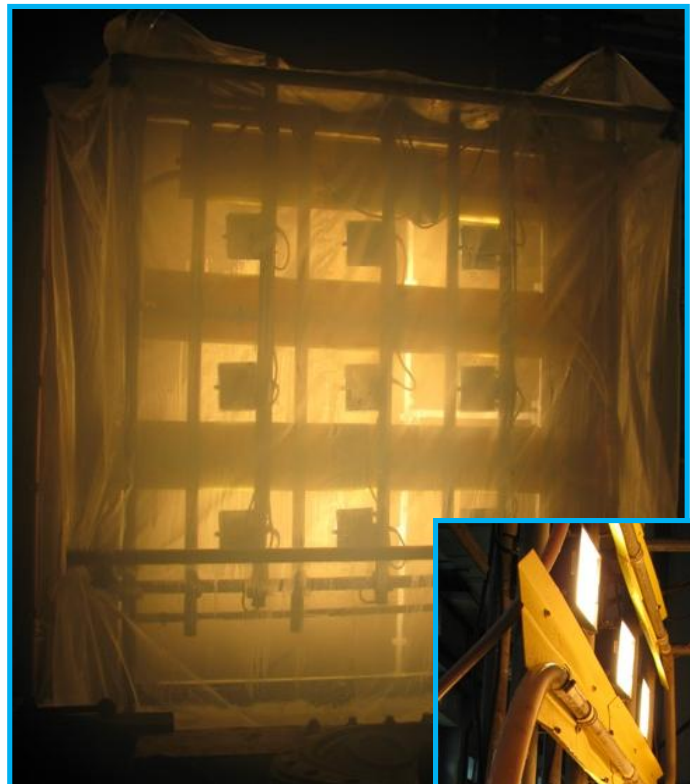


Photo 2: Simulate heat exposure.

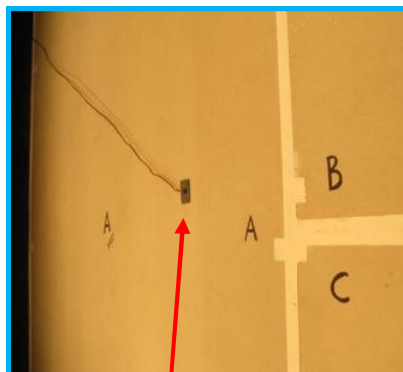


Photo 4: Thermocouple.



Photo 3: Closeup view of 500 watts floor-light.





7. TEST PROCEDURE

The heat / rain test is conducted as follow;

- i) Apply water spray across the entire mock-up specimen at a rate of 1gal/min for a period of 2h 55min, water temperature not to exceed 86°F (30°C).
- ii) Pause for a period of 5 min.
- iii) Apply radiant heat of 140 ±9°F (60 ±5°C) across the under-test face of entire mock-up specimen for a period of 2h 55min.
- iv) Pause for a period of 5 min.
- v) Repeat steps (i) ~ (iv) for 25 cycles..

8. TEST RESULTS

Date of test: 28 May 2013 (2 pm) ~ 3 Jun 2013 (8 pm)

Visual observation of mock-up specimen after the 25 cycles of heat / rain exposure test (150 hrs) are as follow;;

- a. The mock-up underface is observed damped during the simulated rain exposure.
- b. There is no sign of any water droplets formation.
- c. There is no sign of cracks, delamination, warping and bowing on the tested face.
- d. There is no sign of surface alteration of "V-Premium" fibre cement board on the under-test face.

Refer to photographs on page 7-8 for the "V-Premium" fibre cement board surface condition, before and after test.

9. CONCLUSION

There isn't any severe damage, failure or harmful deformation of the "V-Premium" fibre cement board installed as wall system is observed after the 25 cycles of heat / rain test (150 hrs). The test is conducted successfully in accordance with ASTM C1185:2012.

A handwritten signature in black ink, appearing to read 'David H. J.', with a stylized flourish at the end.

APPENDIX 1 – 1

Before test

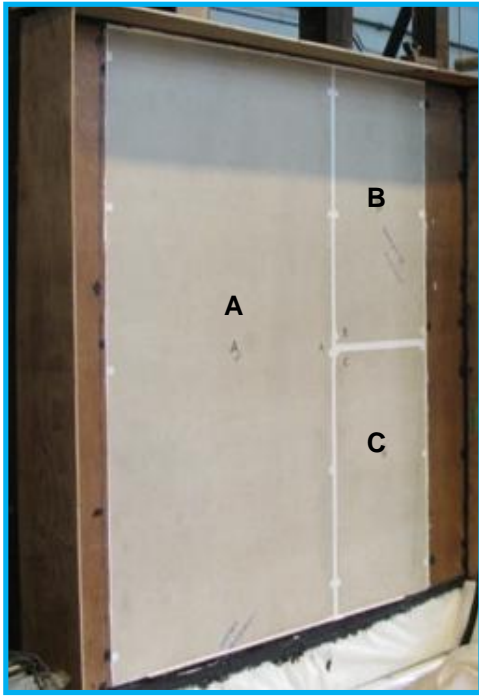


Photo 5: Front face

After test

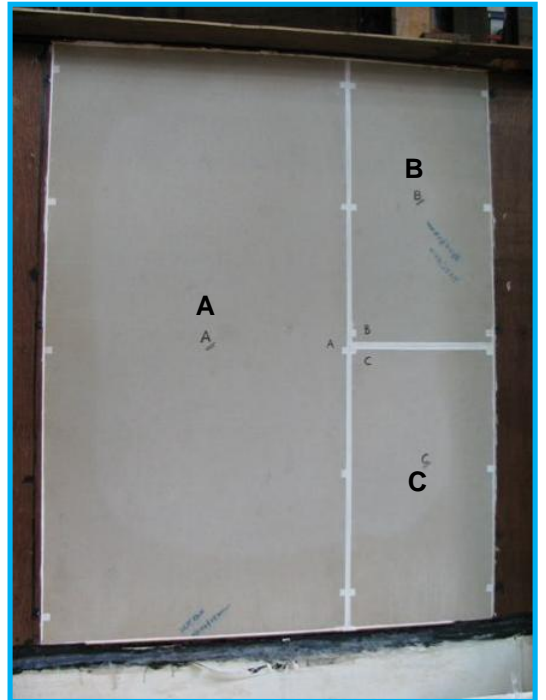


Photo 7: Front face



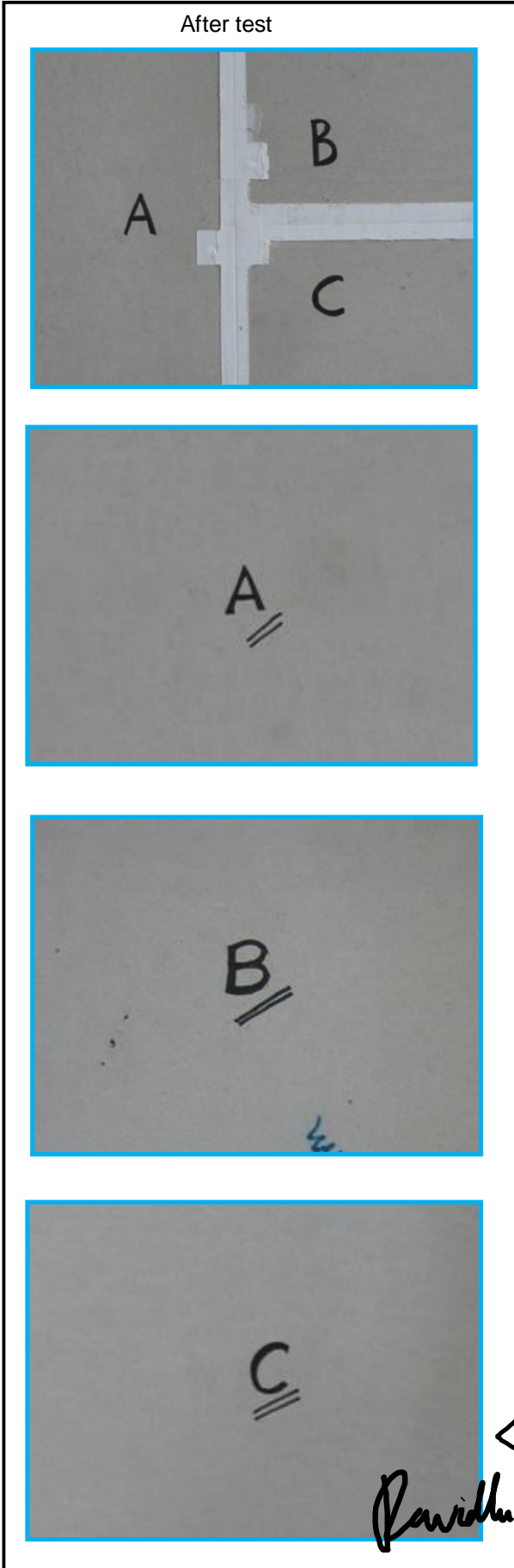
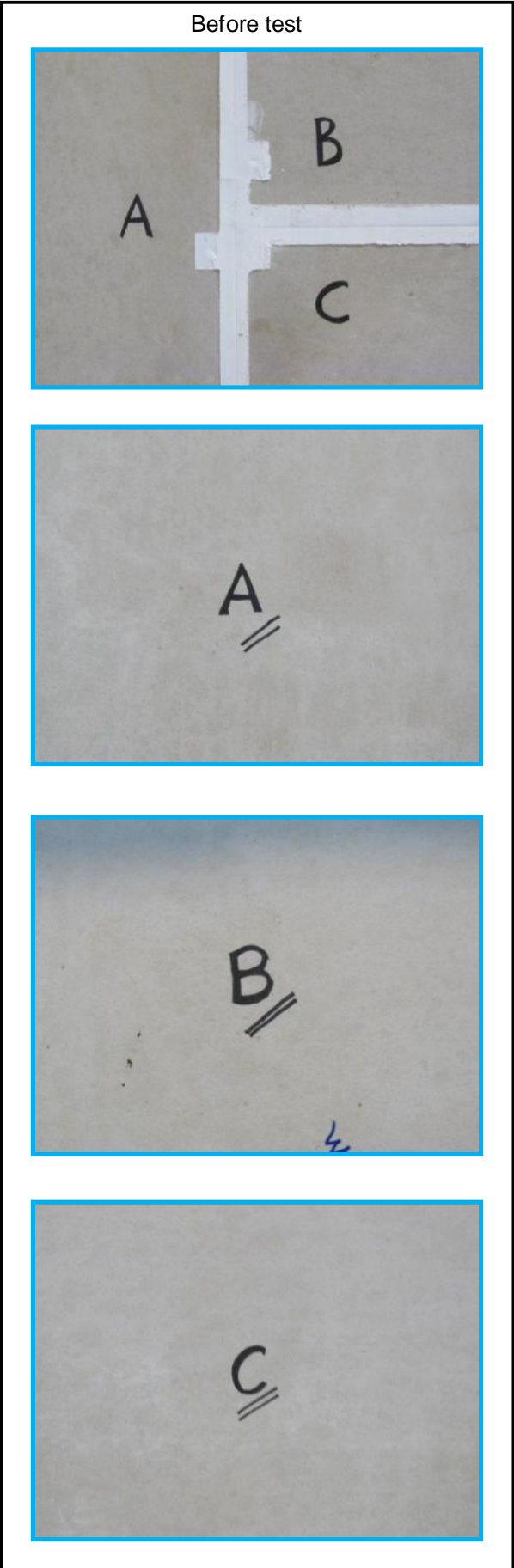
Photo 6: Back face



Photo 8: Back face



APPENDIX 1 - 2



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PSB Singapore

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July 2011

