

CERTIFICATE OF CONFORMITY

Product Certification Scheme: Class 1

This Certificate is issued to:

WELL AND ABLE INTERNATIONAL PTE LTD
23 Genting Road
#03-06 Chevalier House
Singapore 349481

FOR

Product : Fire Rated Partition System
Brand : "BESTA" 75mm thick wall
Model : N/A
Country of Origin : Shanghai China
Product Details : Integrity: 128mins
Insulation: 97mins
Board: 12mm Besta Board
Wool: 50mm thick SFF Rockwool (40kg/m³)

which has complied with the requirements of the scheme based on the following:

STANDARD(S)

BS 476 Part 22 : 1987

TEST REPORT(S)

719179177-MEC10-GZJ

719188837-MEC10-GZJ

719178407-MEC10-MW



Sze Thiam Siong (Mr)
General Manager
SETSCO Services Pte Ltd
18 Teban Gardens Crescent
Singapore 608925

Certificate No

FSP-2011-0018

Date of Original Issue

26/01/2014

Date of Last Revision

Date of Expiry

25/01/2017



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The use of the SAC accreditation mark indicates accreditation in respect of those activities covered by the accreditation certificate number PD-2010-10.

Test Report No. 719178407-MEC10-MW
dated 22 Jun 2010



PSB Singapore

Note: This report is issued subject to TÜV SÜD PSB's "Terms and Conditions Governing Technical Services".
The terms and conditions governing the issue of this report are set out as attached within this report.

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SUBJECT:

Fire resistance test on a non-loadbearing 75mm thick Besta Wall Panel drywall partition system submitted by Well & Able International Pte Ltd.

TESTED FOR:

Well & Able International Pte Ltd
103 Defu Lane 10
#02-03, BTH Building
Singapore 539223

Attn: Mr. Ronald Cheong

DATE SUBMITTED:

07 Jun 2010

DATE OF TEST:

14 Jun 2010

PURPOSE OF TEST:

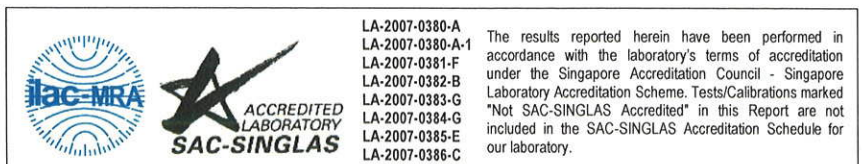
- 1 To determine the fire resistance of the specimen when tested in accordance with BS 476: Part 22: 1987 "Methods for Determination of the Fire Resistance of Non-loadbearing Elements of Construction - Determination of the Fire Resistance of Partition."



Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
TÜV®



The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

TEST PROCEDURE:

- 2 Before the commencement of test, the ambient temperature in the general vicinity of the test specimen construction was ensured to be not exceeding 35°C. The datum values for each individual temperature and deflection measurements were also taken not more than 15 minutes before the commencement of test.
- 3 During the test, with commencement of heating of the specimen, the furnace temperature and pressure were controlled to comply with the requirements specified in BS 476: Part 20: 1987: clause 3.1 and 3.2 respectively. The pressure was controlled such that a linear pressure gradient of 8.5 ± 2 Pa per 1000mm height exist above a neutral pressure axis at a height of approximately 1000mm above the notional floor level. However, the maximum pressure at the top of a vertical test construction shall not exceed 20 Pa.
- 4 Throughout the heating period, the behaviour of the specimen was observed and monitored for compliance with the relevant performance criteria stated in clause 10 of BS 476: Part 20: 1987 (A summary is given in clause 9 of this report.) and the appropriate clause of BS 476: Part 22: 1987.
- 5 For insulated specimen, the mean temperature on the unexposed face were measured by five number of surface mounted thermocouples, with one placed approximately at the centre of each quadrant. In the presence of stiffener, through member or jointing, the thermocouples were located at least 50mm away.
- 6 For insulated specimen, the maximum temperature on the unexposed face were measured by thermocouples placed on locations on one vertical jointing and one at stiffeners which may be hotter than the average on the face. The thermocouples were placed at least 50mm away from edge of stiffeners or any jointing.
- 7 Observations, on the behaviour of the test specimen throughout the heating period, were made and recorded. As appropriate, cotton pads, gap gauges and roving thermocouple were used to establish the occurrence of failure.
- 8 The test was terminated when one or more failures as stated in the performance criteria occurred, or otherwise at a time agreed between the sponsor of test and the test laboratory.



PERFORMANCE CRITERIA:

9 The specimen is assessed against the following test criteria:

9.1 Loss of integrity

Failure shall be deemed to have occurred when one of the following occurs:-

When collapse or sustained flaming for more than 10 seconds on the unexposed face.

When the cotton pad test is conducted, flames and/or hot gas causing flaming or glowing of the cotton pad.

Where the cotton pad test cannot be conducted because of the level of radiation from the specimen, a through gap into furnace exceeding 6mm in width by 150mm in length exists or develops in the specimen.

When a through gap into furnace exceeding 25mm diameter exists or develops in the specimen.

9.2 Insulation

Failure shall be deemed to have occurred when one of the following occurs:-

If the mean unexposed face temperature increases by more than 140°C above its initial value.

If the temperature recorded at any position on the unexposed face is in excess of 180°C above the initial mean unexposed face temperature.

When integrity failures occur.

DESCRIPTION OF TEST SPECIMEN:

10 The test assembly consisted of a non-loadbearing 3000mm (wide) x 3000mm (high) x 75mm thick drywall partition. The nominally 75mm thick partition was constructed vertically within a test frame with ordinary bricks bedded along the base as lateral support, along two vertical sides of the wall and a concrete lintel at top of wall. A free edge clearance of approximately 25mm wide filled with ceramic wool was provided along at one vertical side of the constructed partition. The test frame was mounted onto the furnace (PSB Asset No: 20009077). The fire resistance test was conducted at TÜV SÜD PSB's laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.



The partition was constructed with 'Keel' steel 'U' channels of size 40mm x 50mm x 40mm x 0.6mm thick. The channels were secured onto the top/bottom and one vertical of the surrounding brickwall with 5.8mmØ x 38mm (L) self drilling screws spaced at 500mm apart except the free edge. 50mm thick 'SFF' rockwool of density found to be 37kg/m³ was used to fill the voids between the channels and sandwiched by 12mm nominal thick Besta boards of density found to be 1015kg/m³, secured with 3.5mmØ x 25mm(L) self drilling screws spaced at 400mm apart. Intermediate Besta board of size 200mm (wide) x 12mm nominal thick was placed along the butt jointing between boards, bonded with GX-Adhesive 282 on the 200mm wide surface and reinforced with screws along the butt joints at 400mm apart. Clearance between butt joints were filled with HC-119 Fire-retardant Silicone Sealant of 'HUA CHENG GUI' and finished with a layer of joint compound (mixture of GX-Cote 059w power and GX-Cote 059w liquid) laid over it, inclusive of screw locations.

- 11 An inspection on the drywall partition was conducted during the construction stages by a TÜV SÜD PSB officer to verify on its material used, dimensions and designs. Details of the wall panels construction are as shown in DWG NO.: W&A/WPS-500/T1-1 to W&A/WPS-500/T1-7 dated 14.06.10.
- 12 Installation of the test specimen onto the test furnace was arranged and carried out by Well & Able International Pte Ltd.

TEST RESULTS:

- 13 Table 1 shows the temperature rise for the furnace and the standard curve. In addition, the table shows the percentage difference between the area under the standard curve and the area under the furnace curve compared with the percentage tolerance allowable within the standards.
- 14 Figure 1 shows the actual time-temperature curve of furnace in relation to the specified time-temperature curve.
- 15 Table 2 and 3 show the mean and maximum unexposed face temperature above the initial temperature.
- 16 Table 4 shows the deflection measurement of the partition towards the furnace along its mid-height.
- 17 Photographs of the test are shown in Plates 1 to 6.
- 18 Observations were made during the test on the unexposed face of the test specimen and these are given in Appendix 1 of this report.



- 19 The results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

CONCLUSION:

- 20 The specimen satisfied the requirements of the BS 476: Part 22: 1987 for the periods stated below:

Integrity : 128 minutes
Insulation : 97 minutes

REMARKS

21 Integrity

Integrity failures at 128 minutes 09 seconds of test where continuous flaming for more than 10 seconds at clearance between board butt joint about 150mm above mid height, 560mm from the fixed edge was seen. Therefore, the integrity of the drywall partition meets the standard for 128 minutes.

22 Insulation

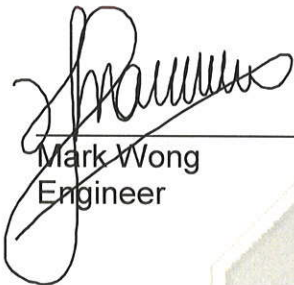
At 97 minutes of test, the maximum mean temperature rise and maximum temperature rise above initial temperature on the unexposed face of specimen were 74.8°C and 177.1°C respectively. At 98 minutes of test, the maximum temperature rise above initial temperature was 182.1°C, which exceeded the maximum permissible temperature of 180°C. Therefore, the insulation of the drywall partition meets the standard for 97 minutes.



WITNESSES

23 The test was witnessed by the following representative:

Well & Able International Pte Ltd : Mr. Ronald Cheong



Mark Wong
Engineer



Chan Lung Toa
Product Manager
(Fire Safety & Security Products)
Mechanical Centre

Table 1 : Comparison of area under the curve

Time (min)	Temperature rise (°C)		Area under curve (°C min)		Percentage difference (%)	Standard tolerance ±%
	Standard	Furnace	Standard	Furnace		
5.0	556.4	577.2	2038.1	1925.0	-5.5	15.0
10.0	658.4	660.9	5102.7	4990.4	-2.2	
15.0	718.6	726.3	8554.8	8466.7	-1.0	10.0
30.0	821.8	821.5	20195.3	20110.6	-0.4	
35.0	844.8	841.2	24363.2	24281.5	-0.3	5.0
65.0	937.3	935.6	51236.6	51176.3	-0.1	
95.0	994.1	991.1	80261.0	80184.4	-0.1	
130.0	1041.0	1047.3	115918.0	115832.5	-0.1	

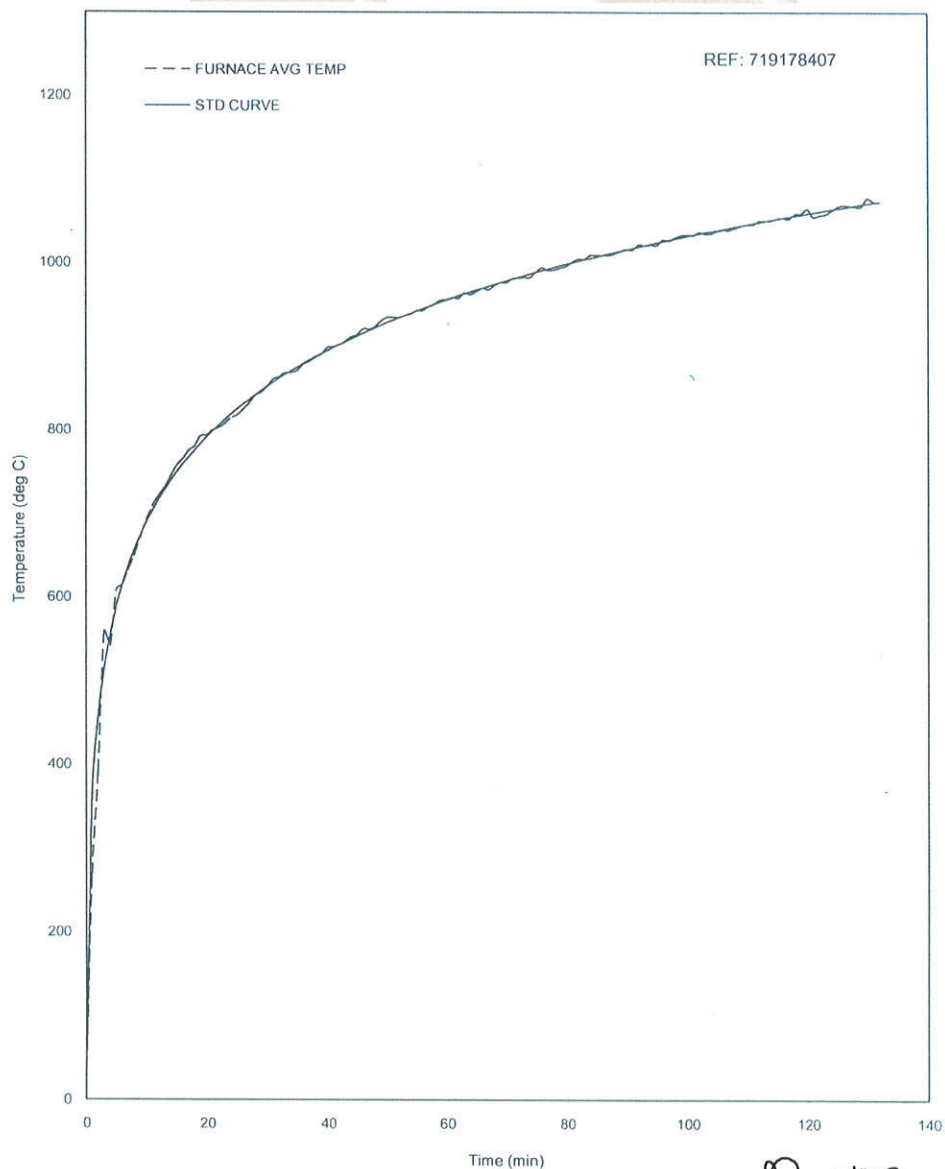


FIGURE 1: FURNACE AVERAGE TEMPERATURE





Table 2 : Unexposed face temperature on drywall partition system

Time (min)	Thermocouple no.					Mean Temp (°C)	Above initial mean temp (°C)	
	100	101	102	104	105		Mean temp	Max. temp
0.0	31.2	31.6	31.3	31.7	31.4	31.4	-	-
12.0	42.2	47.4	41.0	42.4	43.2	43.2	11.8	15.9
24.0	72.1	71.6	62.5	73.4	72.1	70.3	38.9	41.9
36.0	77.6	77.7	75.7	77.9	78.3	77.4	46.0	46.9
48.0	80.9	89.5	79.4	79.9	82.2	82.4	50.9	58.1
60.0	82.5	97.8	82.3	82.8	91.7	87.4	56.0	66.4
72.0	84.2	101.9	87.5	84.8	97.6	91.2	59.8	70.5
84.0	88.0	106.1	93.7	90.6	104.7	96.6	65.2	74.7
97.0	93.8	118.0	102.7	94.9	122.0	106.3	74.8	90.6
98.0	94.1	118.6	103.3	95.1	123.4	106.9	75.5	91.9
108.0	99.3	129.3	113.0	99.8	139.8	116.2	84.8	108.4
121.0	109.4	136.5	131.5	106.6	203.5	137.5	106.1	172.1
122.0	113.2	137.8	134.8	110.6	212.5	141.8	110.4	181.1
132.0	131.8	155.4	198.5	130.3	329.6	189.1	157.7	298.2

Table 3 : Additional unexposed face temperature on drywall partition system

Time (min)	Thermocouple no.		Mean temp (°C)	Above initial mean temp (°C)
	106	108		
0.0	31.2	31.4	31.3	-
12.0	49.6	34.1	41.8	18.3
24.0	73.0	51.0	62.0	41.7
36.0	92.3	74.8	83.6	61.0
48.0	99.1	75.5	87.3	67.8
60.0	109.1	76.1	92.6	77.8
72.0	114.2	78.1	96.1	82.9
84.0	139.7	82.1	110.9	108.4
97.0	208.4	92.9	150.6	177.1
98.0	213.4	93.2	153.3	182.1
108.0	276.3	96.0	186.1	245.0
120.0	296.4	103.1	199.8	265.1
132.0	378.6	219.2	298.9	347.3

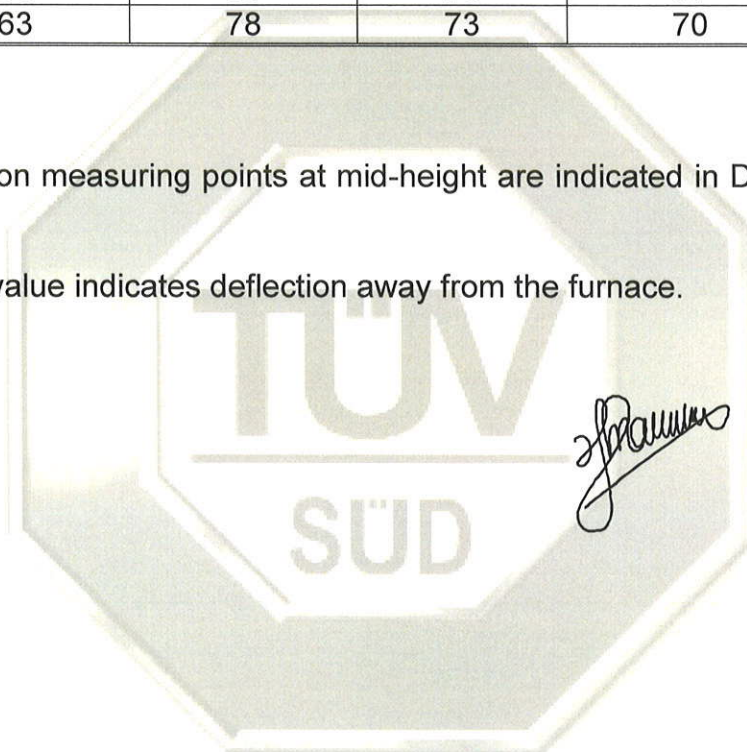


Table 4 : Deflection of the drywall partition system measure at mid height

Time (min.)	Measurement of deflection (mm)				
	A	B	C	D	E
10	9	12	12	13	10
20	20	22	24	23	17
30	41	53	57	54	36
45	63	85	90	80	60
60	68	89	97	81	63
90	53	65	70	57	47
120	63	78	73	70	55

Notes:

- 1) The deflection measuring points at mid-height are indicated in DWG NO.: W&A/WPS-500/T1-3.
- 2) A negative value indicates deflection away from the furnace.



Photographs of test

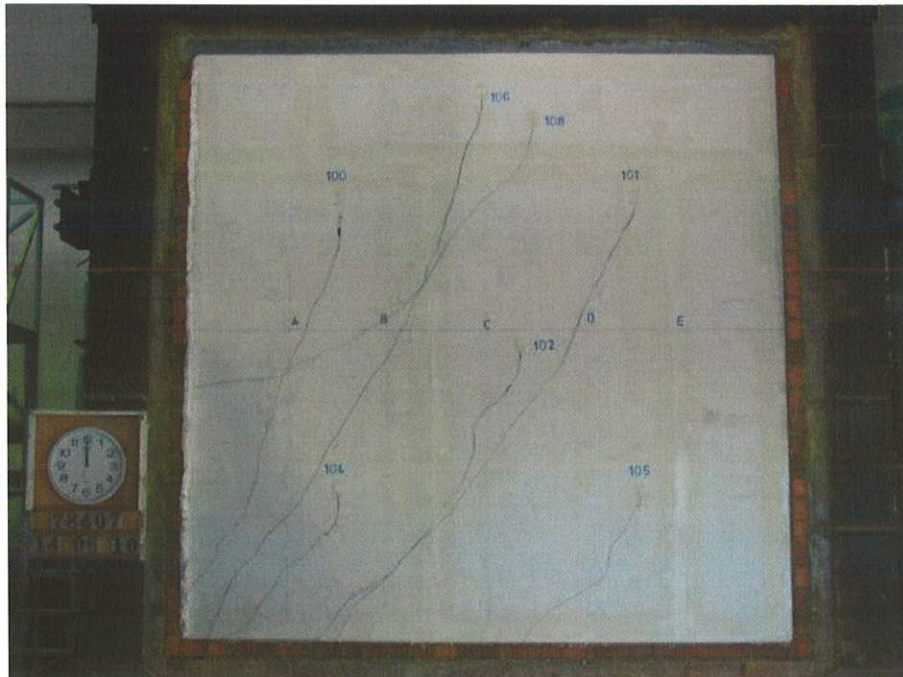


Plate 1 : The unexposed face of specimen before the test.

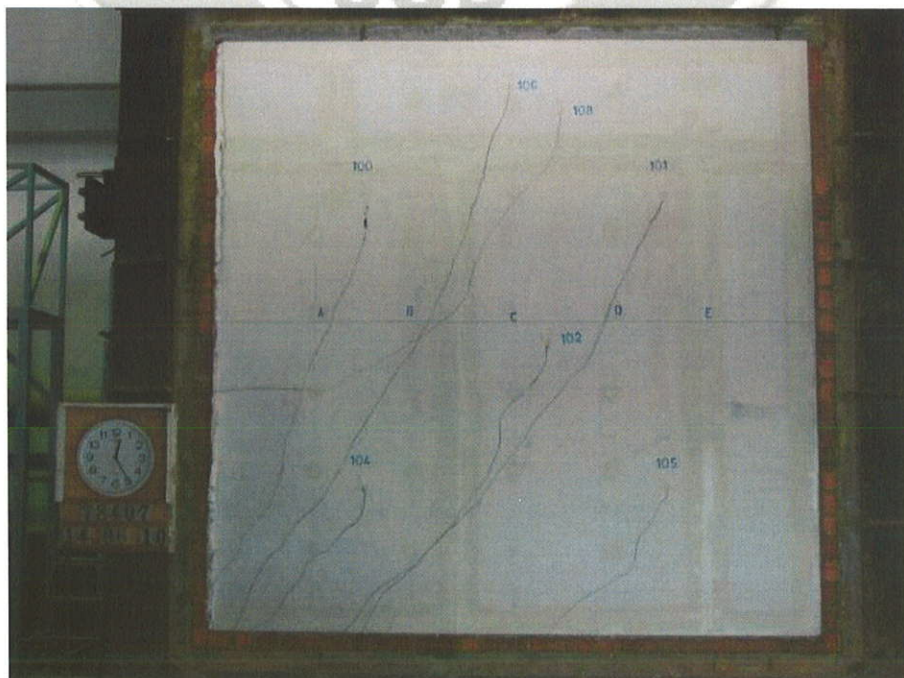


Plate 2 : At about 25 minutes of test.



Photographs of test (cont'd)

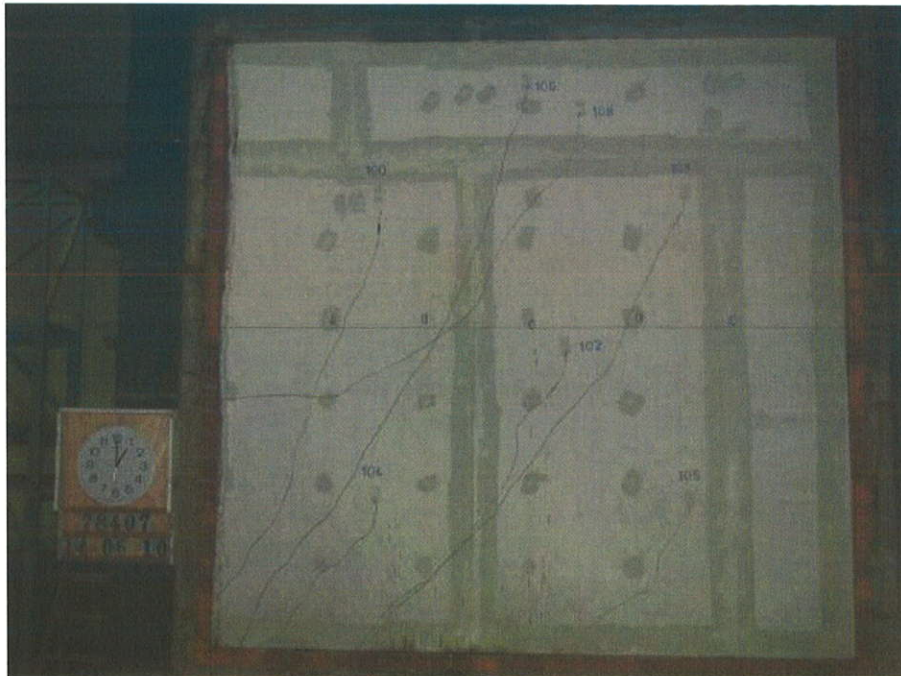


Plate 3 : At about 60 minutes of test.

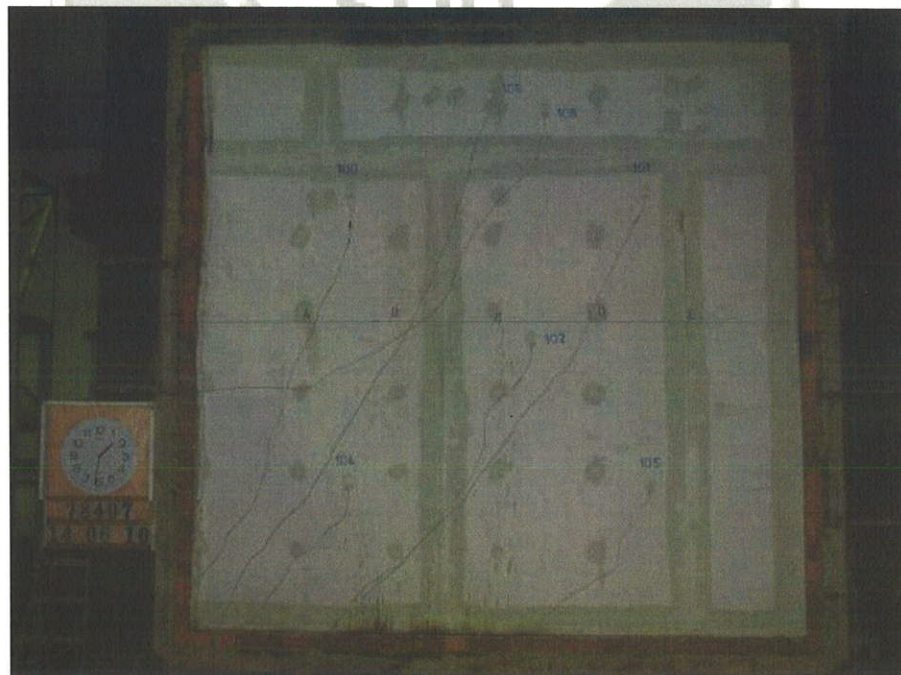


Plate 4 : At about 91 minutes of test



Photographs of test (cont'd)

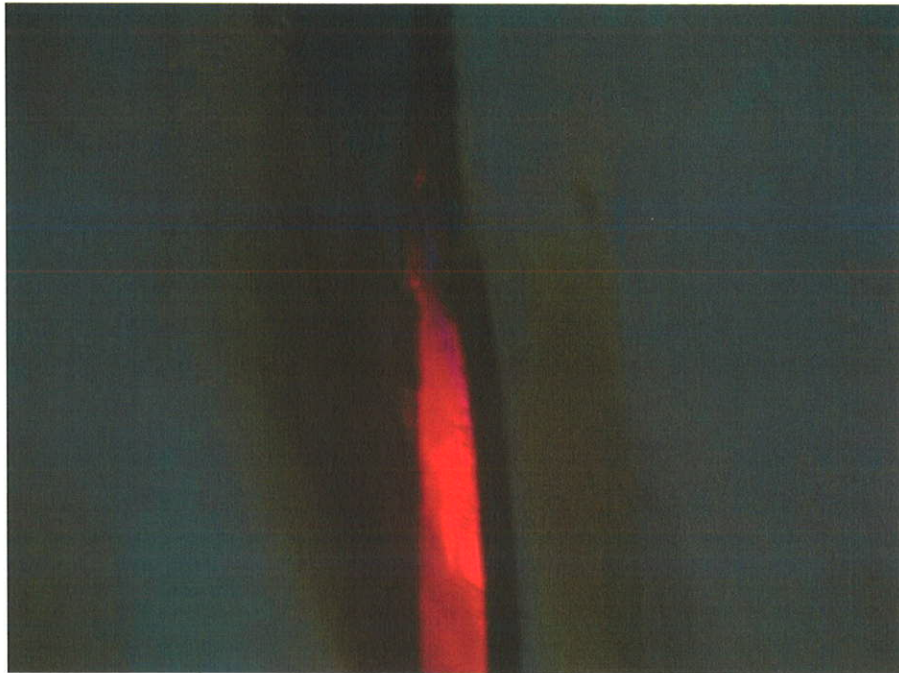


Plate 5 : At about 128 minutes 09 seconds of test, Continuous flaming for more than 10 seconds from the clearance developed from the crackline about 560mm from fixed edge, 200mm above mid height was seen.

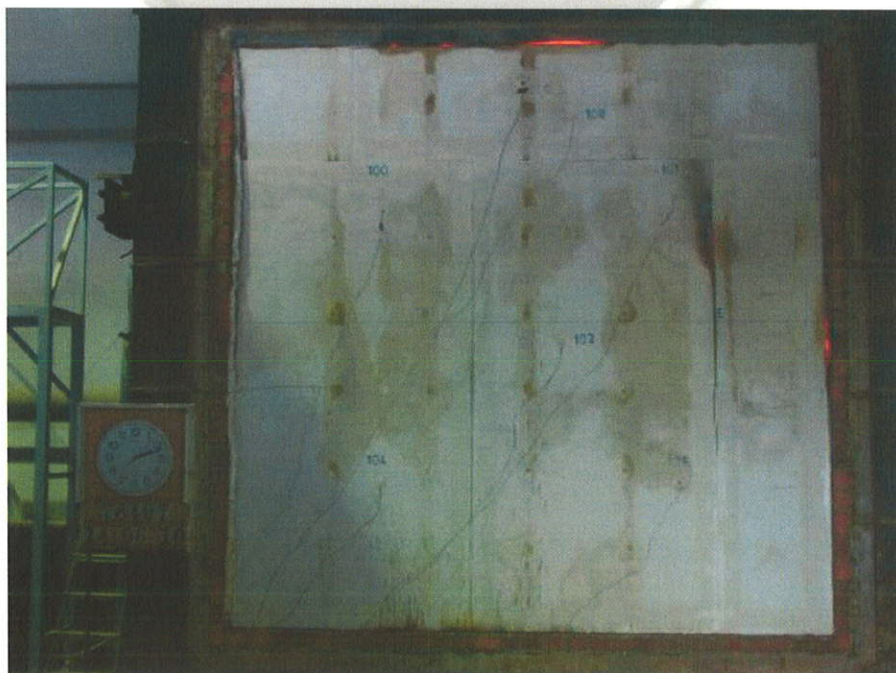
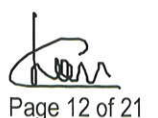


Plate 6 : At about 132 minutes of test.



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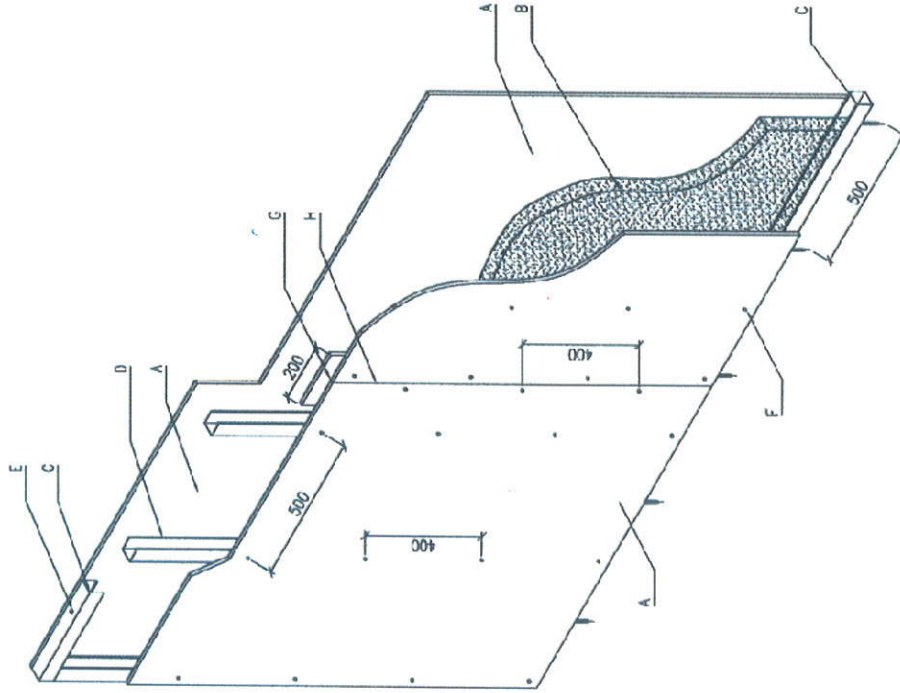
Time (min:sec)	Observations on the unexposed face
00:00	Test commenced.
15:00	No significant changes.
30:00	A vertical crackline about 1220mm from free edge was seen.
40:00	Smoke emission was seen from all edges except free edge.
45:00	A vertical crackline was seen about 560mm from fixed edge at around mid height.
60:00	Smoke can be seen emitting from crackline mentioned at 30 minutes.
75:00	Smoke can be seen emitting from crackline mentioned at 45 minutes. Several black spots can be seen along the bottom edge. Glowing at mid height on the fixed edge was seen.
105:00	Discolouration along the crackline about 560mm from fixed edge, 200mm above mid height was seen. Horizontal crackline about 600mm from top edge was seen.
120:00	Crackline mentioned at 105 minutes developed into clearance of about 10mm with glowing. But not a through gap.
123:00	Clearance mentioned at 120 minutes increased to about 20mm with glowing.
128:09	Continuous flaming for more than 10 seconds from the clearance mentioned at 120 minutes was seen. Integrity failure occurred.
132:00	Test was terminated upon requested by the sponsor of test. Flaming mentioned at 128 minutes 09 seconds continued.

James



PSB Singapore

Test Report No. 719178407-MEC10-MW
dated 22 Jun 2010



System Component	Description
A	12mm Besta Board
B	50mm thk SFF Rockwool (40kg/m ³)
C	40x50x40x0.6mm thk U stud @ Top and Bottom
D	50x50x50x0.6mm thk U stud @ 500mm c/c
E	Self drilling Screw #5.8mm 38mmL @500mm c/c
F	Self drilling Screw #3.5mm 25mmL @400mm c/c
G	GX-Achhesive 282
H	GX-Cote059w (Powder and Liquid)
I	Fire-Retardant Silicone Sealant, HC-119

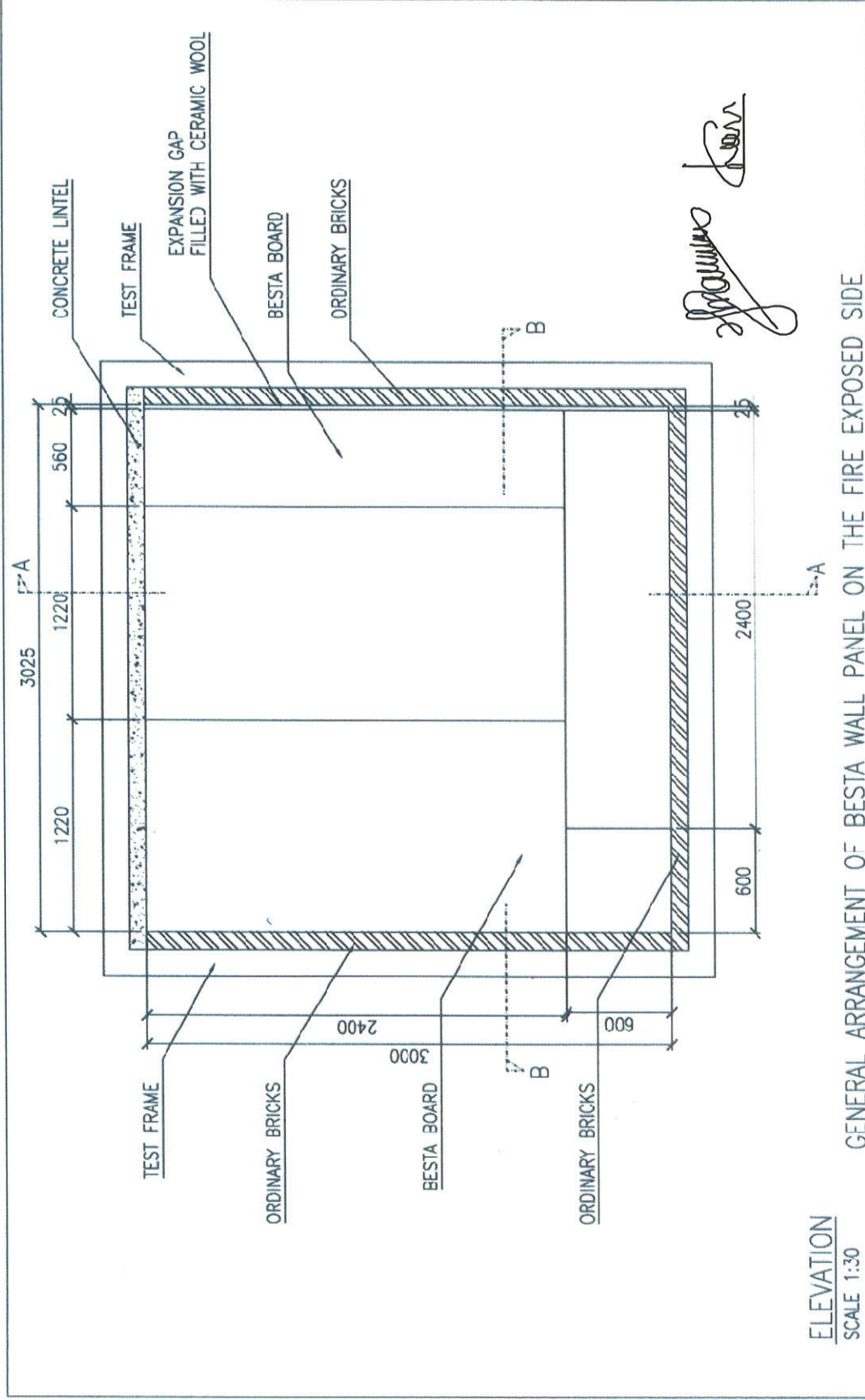
Signature


PROJECT TITLE:	DRAWING TITLE:	SYSTEM SPECIALIST:	DATE:	DWG NO.:
	BESTA WALL PANEL SYSTEM ISOMETRIC VIEW	 Well & Able International Pte Ltd 100 Delfi Lane 10, #02-03, Delfi Building, Singapore 359223 Tel: (65) 63000618 Fax: (65) 63005918	14.06.10	
			DRAWN:	W&A/WPS-500/T1-1
			CHECKED:	
			APPROVED:	SCALE: NTS
				REVISION: R5



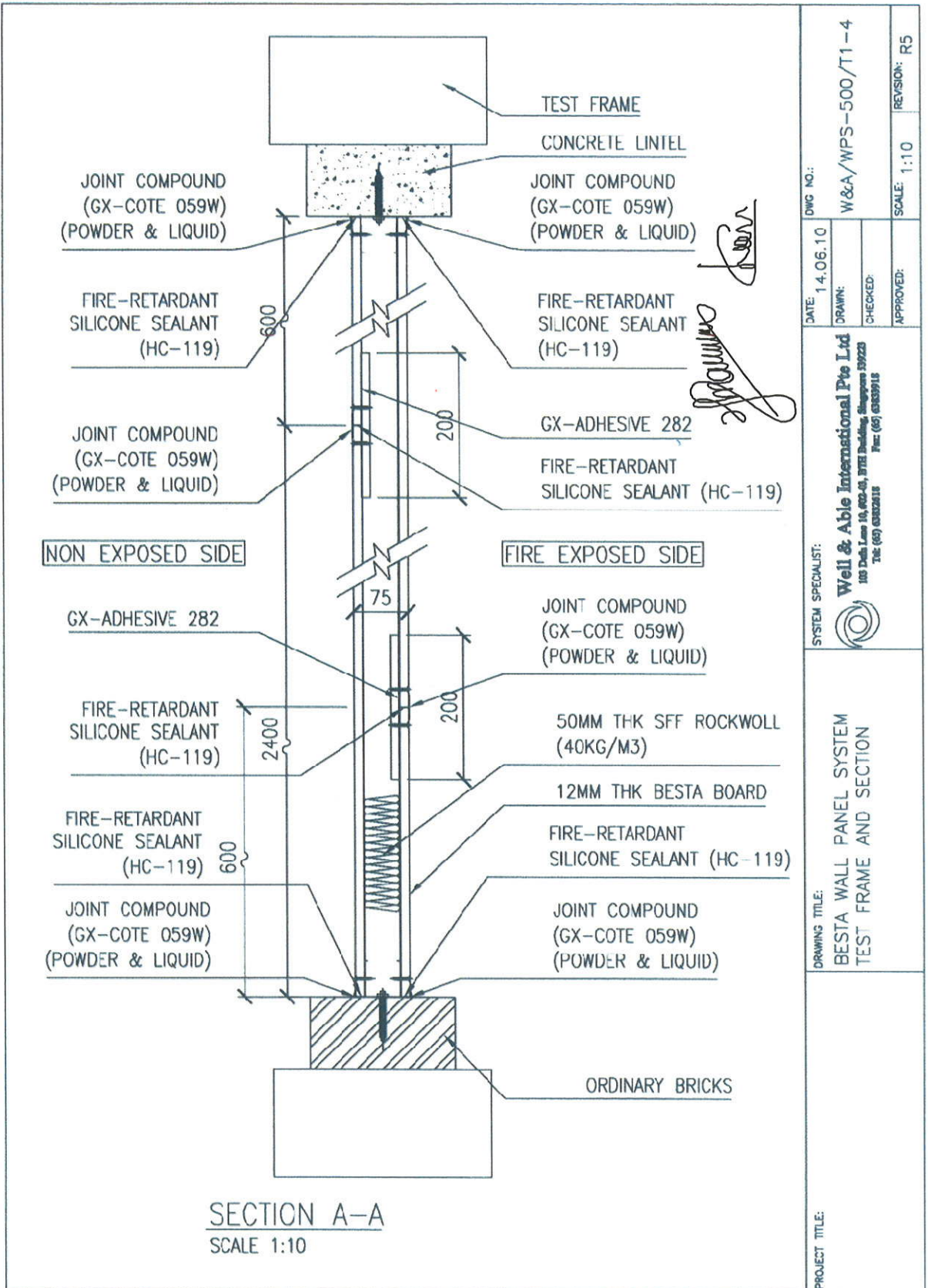
PSB Singapore

Test Report No. 719178407-MEC10-MW
dated 22 Jun 2010



PROJECT TITLE:	DRAWING TITLE: BESTA WALL PANEL SYSTEM TEST FRAME AND SECTION	SYSTEM SPECIALIST:  Well & Able International Pte Ltd 105 Dada Lane 10, #02-08, #101 Building, Singapore 239225 Tel: (65) 63820618 Fax: (65) 63825918	DATE: 14.06.10	DWG NO.:
			DRAWN:	W&A/WPS-500/T1-2
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			APPROVED:	SCALE: 1:30
				REVISION: R5

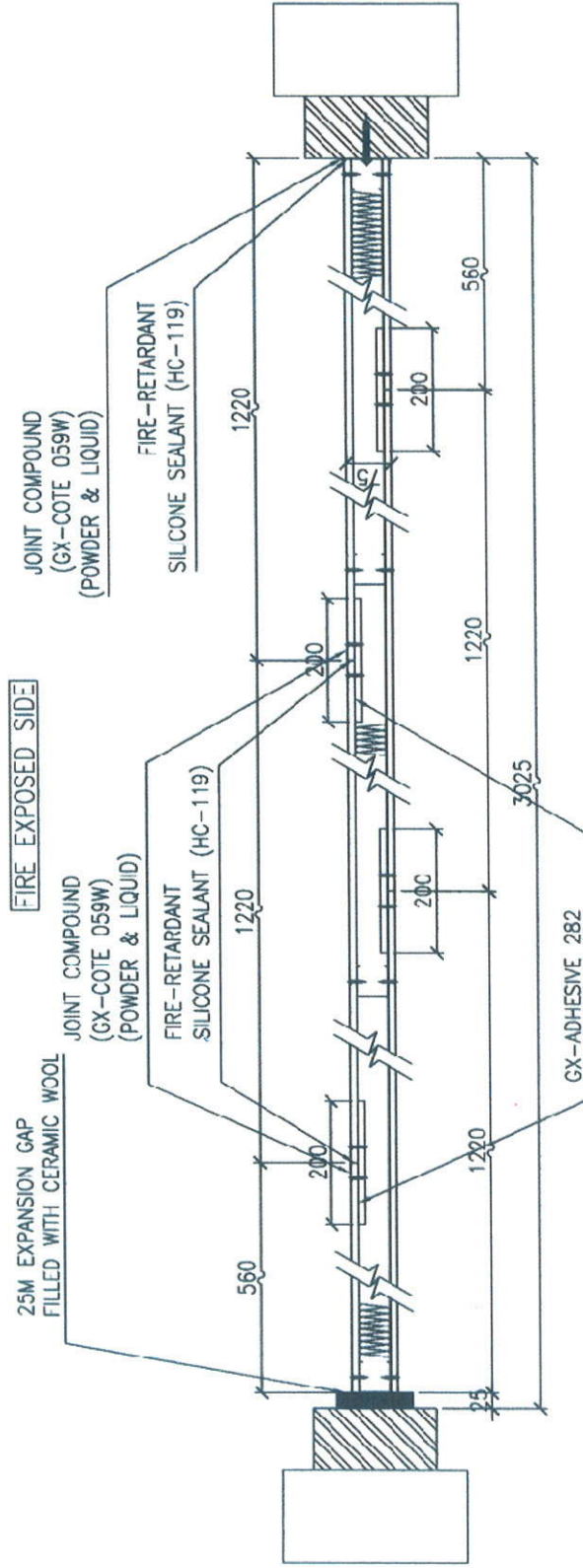
Test Report No. 719178407-MEC10-MW
dated 22 Jun 2010





PSB Singapore

Test Report No. 719178407-MEC10-MW
dated 22 Jun 2010




NON-FIRE EXPOSED SIDE

Signature

SECTION B-B
SCALE 1:10

PROJECT TITLE:	DRAWING TITLE:	SYSTEM SPECIALIST:	DATE:	DWG NO.:
	BESTA WALL PANEL SYSTEM TEST FRAME AND SECTION	 Well & Able International Pte Ltd 100 Delfi Lane 10, #02-09, ITE Building, Singapore 359223 Tel: (65) 63526238 Fax: (65) 63559918	14.06.10	W&A/WPS-500/T1-5
			DRAWN:	
			CHECKED:	
			APPROVED:	
			SCALE:	1:10
			REVISION:	R5



PROJECT TITLE:	DRAWING TITLE:	SYSTEM SPECIALIST:	DATE:	DWG NO.:
	BESTA WALL PANEL SYSTEM BOARD ELEVATION FIRE EXPOSED SIDE AND NON-EXPOSED SIDE	 Well & Able International Pte Ltd 303 Teah Lane 10, #02-03, BITE Building, Singapore 580223 Tel: (65) 63226118 Fax: (65) 63229718	14.06.10	W&A/WPS-500/T1-6
			DRAWN:	
			CHECKED:	
			APPROVED:	SCALE: 1:40
				REVISION: R5



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10. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

March 2010



PSB Singapore

Note: This report is issued subject to TÜV SÜD PSB's "Terms and Conditions Governing Technical Services".
The terms and conditions governing the issue of this report are set out as attached within this report.

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SUBJECT:

Non-combustibility test on "Besta Board (12mm thick)" Dry wall partition, wrapping of column / beam, flooring board and ceiling board material submitted by Well & Able International Pte Ltd on 04 Nov 2010.

TESTED FOR:

Well & Able International Pte Ltd
103 Defu Lane 10
#02-03, BTH Building
Singapore 539223

Attn: Mr Ronald Cheong

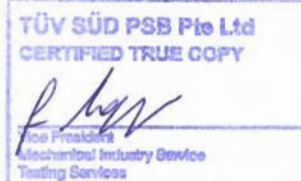
DATE OF TEST:

24 & 25 Nov 2010

PURPOSE OF TEST:

To determine whether the material is non-combustible when it is exposed to the conditions of the test specified in British Standard 476: Part 4: 1970 "Fire Test on Building Materials and Structures - Non-combustibility Test for Materials".

The test was conducted at TÜV SÜD PSB fire test laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.



Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
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The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

DESCRIPTION OF SPECIMENS:

Twenty-four pieces of specimen, said to be "Besta Board (12mm thick)" (12mm thick x 1015kg/m³) Dry wall partition, wrapping of column / beam, flooring board and ceiling board material comprising of magnesium oxide composite mineral board and high strength fibrous reinforcements, each of nominal size of 40mm x 40mm were submitted. Six blocks of specimens, each of nominal test size 40mm x 40mm x 50mm were prepared.

TEST PROCEDURE:

Specimens were exposed to the specified heating conditions ($750 \pm 10^{\circ}\text{C}$) in a furnace conforming to Clause 6 and illustrated in Figure 1, 2 and 3 of the Standard. The furnace was heated and its temperature stabilized at $750 \pm 10^{\circ}\text{C}$ for more than 10 minutes. One specimen was then inserted in the furnace, the whole operation was performed in less than 5 seconds. The temperature of the specimens and the furnace were measured by two separate Chromel/Alumel thermocouples continuously for 20 minutes on the chart of a recorder. The flaming time of the specimen was determined by a stop watch. The procedure was repeated twice for two other specimens, one at each time.

RESULTS:

Description	Specimen 1	Specimen 2	Specimen 3	Requirements
Time of continuous flaming (sec.)	0	0	0	<10
Temperature rise of furnace ($^{\circ}\text{C}$)	21	28	34	<50
Temperature rise of sample ($^{\circ}\text{C}$)	0	0	0	<50
Classification	Non-combustible	Non-combustible	Non-combustible	-

CONCLUSION:

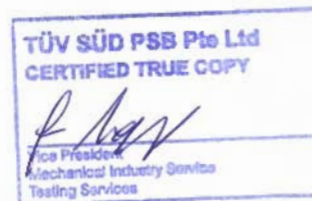
A non-combustibility test for materials in accordance with British Standard 476 Part 4 : 1970 has been performed on the material as described in this report and the classification of the sample is non-combustible.



Leong Gene-Jhou
Associate Engineer



Chan Lung Toa
Product Manager
(Fire Safety & Security Products)
Mechanical Centre



Test Report No. 719188837-MEC10-GZJ
dated 02 Dec 2010

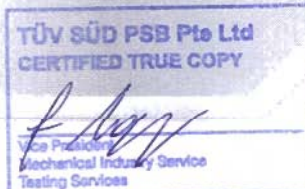


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March 2010





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SUBJECT:

Non-combustibility test on "SFF Rockwool" Thermal Insulation Mineral Wool Board material submitted by Well & Able International Pte Ltd on 21 Jun 2010.

TESTED FOR:

Well & Able International Pte Ltd
103 Defu Lane 10
#02-03, BTH Building
Singapore 539223

Attn: Mr Ronald Cheong

DATE OF TEST:

30 Jun & 01 Jul 2010

PURPOSE OF TEST:

To determine whether the material is non-combustible when it is exposed to the conditions of the test specified in British Standard 476: Part 4: 1970 "Fire Test on Building Materials and Structures - Non-combustibility Test for Materials".

The test was conducted at TÜV SÜD PSB fire test laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.

TÜV SÜD PSB Pte Ltd
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Vice President
Mechanical Industry Service
Testing Services

This test report superseded test report dated 05 Jul 2010



Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R



LA-2007-0380-A
LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
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DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be "SFF Rockwool" (40kg/m³) Thermal Insulation Mineral Wool Board material, each of nominal size of 40mm x 40mm x 50mm thick were submitted.

TEST PROCEDURE:

Specimens were exposed to the specified heating conditions (750 ± 10°C) in a furnace conforming to Clause 6 and illustrated in Figure 1, 2 and 3 of the Standard. The furnace was heated and its temperature stabilized at 750 ± 10°C for more than 10 minutes. One specimen was then inserted in the furnace, the whole operation was performed in less than 5 seconds. The temperature of the specimens and the furnace were measured by two separate Chromel/Alumel thermocouples continuously for 20 minutes on the chart of a recorder. The flaming time of the specimen was determined by a stop watch. The procedure was repeated twice for two other specimens, one at each time.

RESULTS:

Description	Specimen 1	Specimen 2	Specimen 3	Requirements
Time of continuous flaming (sec.)	0	0	0	<10
Temperature rise of furnace (°C)	32	34	39	<50
Temperature rise of sample (°C)	0	32	34	<50
Classification	Non-combustible	Non-combustible	Non-combustible	-

CONCLUSION:

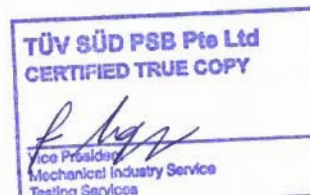
A non-combustibility test for materials in accordance with British Standard 476 Part 4 : 1970 has been performed on the material as described in this report and the classification of the sample is non-combustible.



Leong Gene-Jhou
Associate Engineer



Chan Lung Toa
Product Manager
(Fire Safety & Security Products)
Mechanical Centre



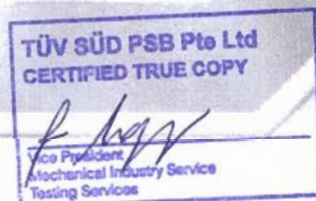
Test Report No. 719179177-MEC10-GZJ
dated 03 Aug 2010



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March 2010



Test Report No. 719179177-MEC10-GZJ
dated 05 Jul 2010



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SUBJECT:

Non-combustibility test on "SFF Rockwool" Thermal Insulation Mineral Wool Board material submitted by Well & Able International Pte Ltd on 21 Jun 2010.

TESTED FOR:

Well & Able International Pte Ltd
103 Defu Lane 10
#02-03, BTH Building
Singapore 539223

Attn: Mr Ronald Cheong

DATE OF TEST:

30 Jun & 01 Jul 2010

PURPOSE OF TEST:

To determine whether the material is non-combustible when it is exposed to the conditions of the test specified in British Standard 476: Part 4: 1970 "Fire Test on Building Materials and Structures - Non-combustibility Test for Materials".

The test was conducted at TÜV SÜD PSB fire test laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.



Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
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LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C

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Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
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DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be "SFF Rockwool" (40kg/m^3) Thermal Insulation Mineral Wool Board material, each of nominal size of 40mm x 40mm x 50mm thick were submitted. The bulk density of the specimen was found to be approximately 43kg/m^3 .

TEST PROCEDURE:


Specimens were exposed to the specified heating conditions ($750 \pm 10^\circ\text{C}$) in a furnace conforming to Clause 6 and illustrated in Figure 1, 2 and 3 of the Standard. The furnace was heated and its temperature stabilized at $750 \pm 10^\circ\text{C}$ for more than 10 minutes. One specimen was then inserted in the furnace, the whole operation was performed in less than 5 seconds. The temperature of the specimens and the furnace were measured by two separate Chromel/Alumel thermocouples continuously for 20 minutes on the chart of a recorder. The flaming time of the specimen was determined by a stop watch. The procedure was repeated twice for two other specimens, one at each time.

RESULTS:

Description	Specimen 1	Specimen 2	Specimen 3	Requirements
Time of continuous flaming (sec.)	0	0	0	<10
Temperature rise of furnace ($^\circ\text{C}$)	32	34	39	<50
Temperature rise of sample ($^\circ\text{C}$)	0	32	34	<50
Classification	Non-combustible	Non-combustible	Non-combustible	-

CONCLUSION:

A non-combustibility test for materials in accordance with British Standard 476 Part 4 : 1970 has been performed on the material as described in this report and the classification of the sample is non-combustible.



Leong Gene-Jhou
Associate Engineer



Chan Lung Toa
Product Manager
(Fire Safety & Security Products)
Mechanical Centre

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March 2010