RESEARCH ENGINEERING DEVELOPMENT FAÇADE CONSULTANTS LIMITED -
Fire and Facade Testing Laboratory
雄略幕牆顧問有限公司 - 消防及幕牆檢測實驗中心
DD134, Lung Kwu Tan, Tuen Mun, N.T., Hong Kong

HOKLAS 091 TEST

FIRE RESISTANCE TEST IN ACCORDANCE WITH BS EN 1364-1: 2015

On a Fully Insulated Partition Boards Wall System

Test Report No.: R24F28-1A

Identification No. Q24F35

Issue Date: 24 July 2024

Test Sponsor

Jason New Materials Co., Ltd

NO . 1000,HAIHE ROAD,DUSHANGANG DISTRICT, PINGHU CITY ,ZHEJIANG PROVINCE,CHINA

APPROVED SIGNATORY: _____

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CONTENT

1 SUMMARY

Fire resistance test conducted in accordance with BS EN 1364-1: 2015 on a fully insulated partition boards wall system.

A specimen of fully insulated partition boards wall system had been subjected to a test in accordance with BS EN 1364-1: 2015. As requested by the test sponsor, the specimen was mounted within concrete lined specimen holder by test sponsor. The specimen was symmetrical and the fire side was determined by the test sponsor.

The specimen had overall dimensions of 3,480 mm wide by 3,050 mm high. It was comprised of 1 layer of nominal 12.5 mm thick fire rated board mounted on both sides of steel framework. The steel framework was constructed with top and bottom U-shaped runners and vertical wall C-studs. The top and bottom U-shaped runners were with sizes of 50 mm by 35 mm by nominal 0.6 mm thick. The vertical wall C-studs were with sizes of 50 mm by 45 mm by nominal 0.6 mm thick and with 407 mm nominal centres. A horizontal G.M.S. plate was fixed 500 mm above and below the bottom and top edge of specimen respectively. Nominal 50 mm thick rockwool was filled in the cavity of steel framework and hold by rockwool nail (refer to test sponsor's drawings in appendix).

The top and bottom U-shaped runners were fixed to the concrete testing rig with M6 by 50 mm long anchor bolts at 400 mm nominal centres and all boards were fixed to the framework by M4 self-tapping screws. Joint compound was applied at board joints and screw portions.

The specimen satisfied the performance requirements specified in BS EN 1364-1: 2015 for the following periods:

Integrity:	**Cotton Pad**	**62** Minutes (No failure)
	Gap Gauge	**62** Minutes (No failure)
	Sustained Flaming	**62** Minutes (No failure)
Insulation:		**62** Minutes

The test was discontinued after a heating period of 62 minutes.

2 INTRODUCTION

The objective of the test is to determine the fire resistance performance of specimen of a fully insulated partition boards wall system when tested in accordance with BS EN 1364-1: 2015, 'Fire resistance tests for non-loadbearing elements – Part 1 Walls'.

This test report should be read in conjunction with BS EN 1363-1: 2012, 'Fire resistance tests – Part 1: General requirements'.

3 TEST INFORMATION

3.1 Test Sponsor

Jason New Materials Co., Ltd

NO. 1000, HAIHE ROAD, DUSHANGANG DISTRICT, PINGHU CITY,

ZHEJIANG PROVINCE, CHINA

3.2 Testing Location

Research Engineering Development Façade Consultants Limited, Huizhou Laboratory at Route YE60, Shan Pi Village, Lilin Town, Zhong Kai Gao Xin District, Huizhou City, Guang Dong Province, China

3.3 Date of Test

25th June 2024

3.4 Witness of the test

The test was led by Mr. Ben Li of Research Engineering Development Façade Consultants Limited (RED) and was witness by Mr. Fung, the representative of the test sponsor.

4 EQUIPMENT

Nine (9) 'type K' thermocouples to monitor the temperature of the furnace, which were kept at 100 mm from the exposed face of the specimen (see Figure 1).

Eleven (11) 'type K' thermocouples to monitor the temperature of the unexposed face of the specimen (see Figure 2).

A 'type K' roving thermocouple to measure temperature on hot spots of unexposed surface.

A micro-manometer provided to monitor the furnace pressure.

Cotton pad, 6 mm and 25 mm gap gauges.

Five (5) laser distance metres to monitor the lateral deflection of the specimen.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

5 CONDITIONING

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 4 days. Throughout this period of time, both of the temperature and humidity of the laboratory were measured and recorded as being within a range of 28 °C to 36 °C and 56 % to 89 % respectively, which was different from the ambient atmosphere of 50 % relative humidity at 23 °C as requested by BS EN 1363-1: 2012.

6 TEST SPECIMEN CONSTRUCTION

The specimen was installed into a concrete specimen holder with pre-prepared opening to form the test construction. The details of the fixings are outlined in Appendix D.

A comprehensive description of the test specimen construction is presented in the appendix, which is based on a survey of the specimen and information supplied by the test sponsor.

7 VERIFICATION OF TEST SPECIMEN

In order to ensure the description of the test specimen, and in particular its construction, is on conformity with the test specimen, the laboratory shall either oversee the fabrication of the test specimens or request an additional test specimen.

In this case, the construction details of specimen were verified on site by RED, which is shown in 'APPENDIX D – INFORMATION FROM TEST SPONSOR'.

8 TEST PROCEDURES

The test was conducted in accordance with the procedures specified in BS EN 1364-1: 2015. The ambient temperature of the test area during the test was measured. After the first 5 minutes of the test, the furnace pressure was maintained at 0 ± 3 Pa relative to atmosphere, at 500 mm from the notional floor level.

The furnace was monitored by nine (9) thermocouples so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012. The temperature of the unexposed surface was monitored by means of eleven (11) thermocouples fixed to the unexposed surface (see Figure 2 for the locations and reference numbers of the thermocouples). Thermocouples S1 – S5 were fixed on the specimen for both mean and maximum temperatures of the unexposed surface of the specimen. Thermocouples S6 - S11 were fixed on the specimen form maximum temperatures of the unexposed surface of the specimen. The mean and maximum temperatures were recorded.

The gap gauges were used, if considered appropriate, to determine compliance with the integrity criterion of the standard. The occurrence of sustained flaming on the unexposed surface was monitored to determine compliance with this criterion. The lateral deflection of the specimen was measured by five (5) laser distance metres and recorded. The radiation of the specimen was measured by a radiometer located at 1,000 mm from the unexposed surface of specimen and recorded.

9 TEST DATA AND INFORMATION

The ambient temperature of the test area during the test was 32 °C.

The furnace was controlled so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012. The temperature recorded is shown graphically in Figure 4.

The mean and maximum temperature rises of specimen is shown graphically in Figure 5.

The furnace pressure is shown graphically in Figure 6.

The radiation is shown graphically in Figure 7.

A summary of the observations made on the general behaviour of the specimen is given in the appendix.

The deflection obtained is summarized in Table 1.

The mean furnace temperature obtained is summarized in Table 2.

The temperature rises of specimen obtained are summarized in Table 3.

The test was discontinued after a heating period of 62 minutes.

10 RESULTS

When tested in accordance with BS EN 1364-1: 2015, the requirements of the standard were satisfied for the following periods:

Integrity:	**Cotton Pad**	**62** Minutes (No failure)
	Gap Gauge	**62** Minutes (No failure)
	Sustained Flaming	**62** Minutes (No failure)
Insulation:		**62** Minutes

Integrity - It is required that there is no collapse for the specimen, no sustained flaming on the unexposed surface and no loss of impermeability.

The specimen met the integrity requirements after a heating period of 62 minutes.

Insulation - It is required that the mean temperature rise of the unexposed surface shall not be greater than 140 °C and that maximum temperature rise shall not be greater than 180 °C. Insulation failure also occurs simultaneously with integrity failure.

The 140 °C rise of the mean temperature of the unexposed surface of specimen did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach the test. The maximum temperature rise of specimen was 134 °C which was measured by thermocouple S11 after a heating period of 62 minutes.

11 LIMITATIONS

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in EN 1363–1, and where appropriate EN 1363–2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

The test results are valid only for the conditions under which the test was conducted.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result. Therefore, the results 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.

APPENDIX A – Photos and Test Record

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

Photo 2: The unexposed face of the specimen after a heating period of 60 minutes.

Photo 3: The unexposed face of the specimen after the test.

Photo 4: The exposed face of the specimen after the test.

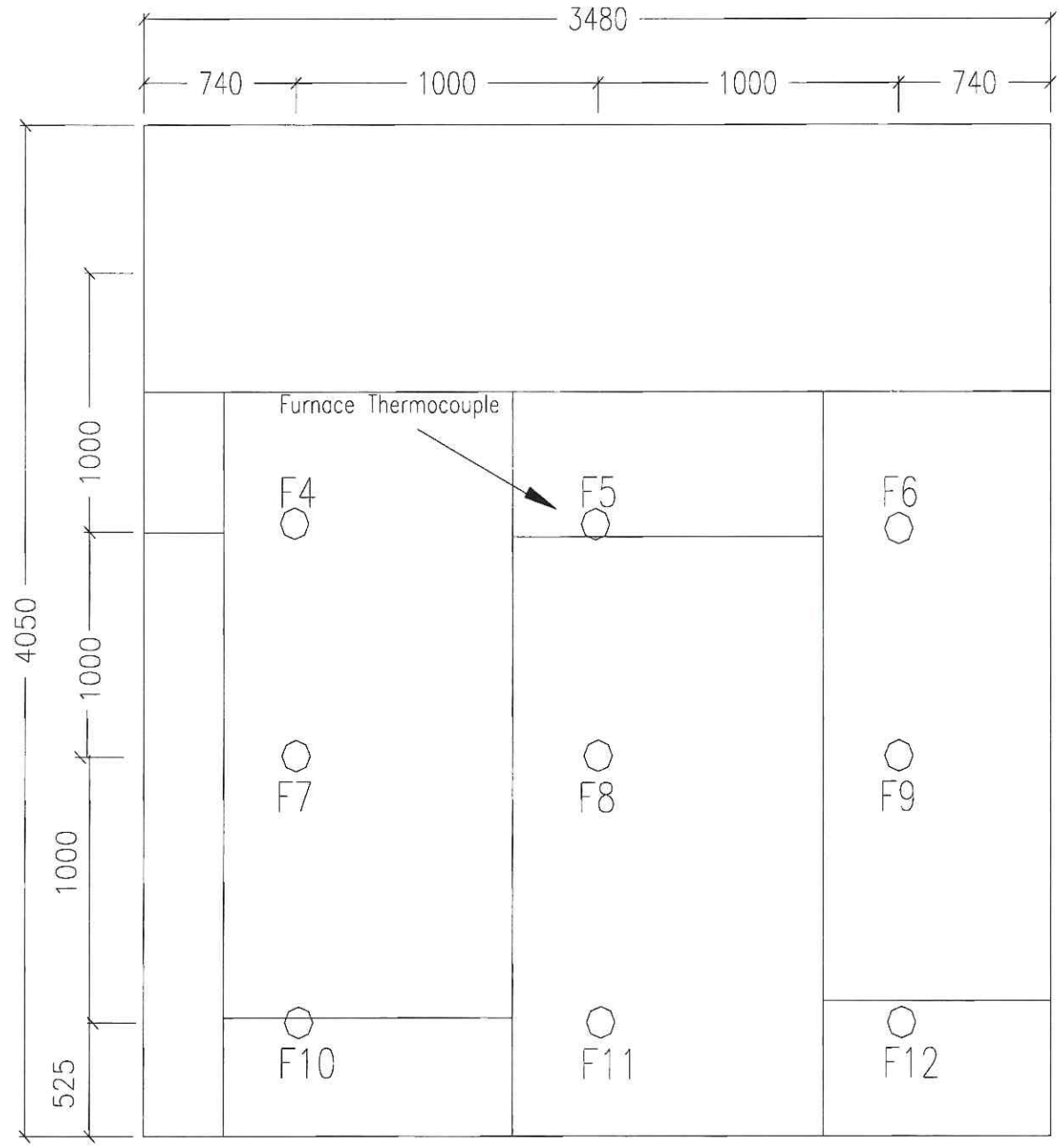

Figure 1 – Locations and reference numbers of furnace thermocouples.
(This figure is not to scale and all dimensions are in millimetres.)

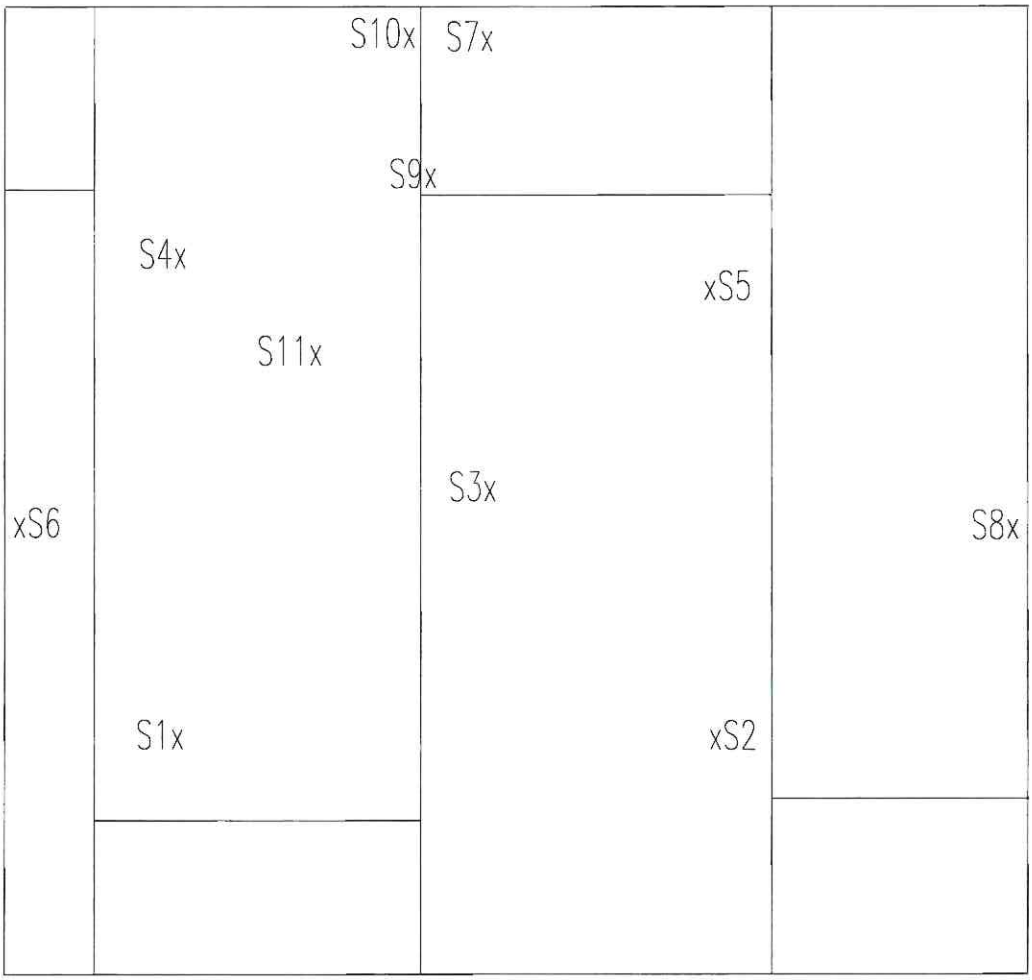

Figure 2 – Locations and reference number of thermocouples to monitor the temperature of unexposed surface of the specimen.
(This figure is not to scale.)

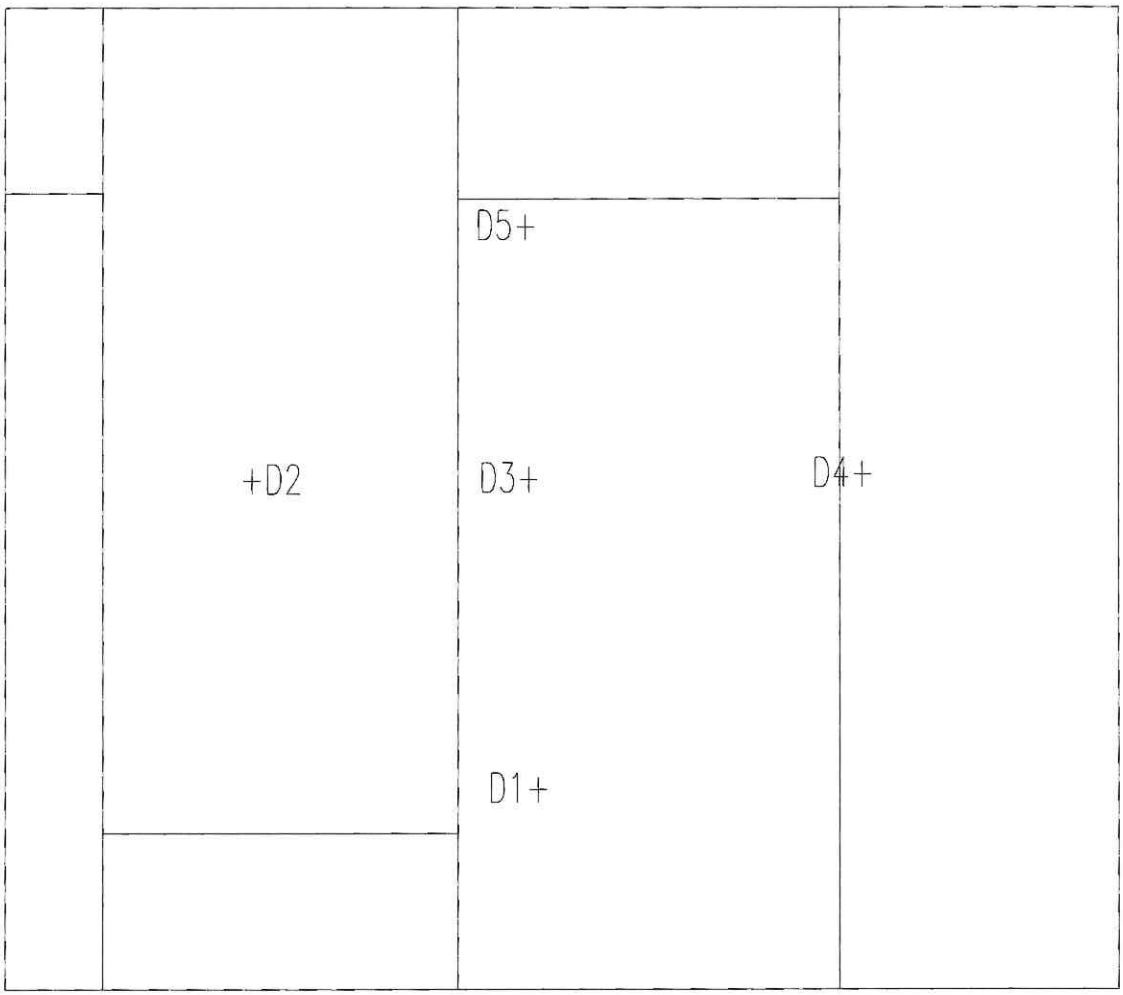

Figure 3 – Locations and reference numbers of displacement measurement.
(This figure is not to scale.)

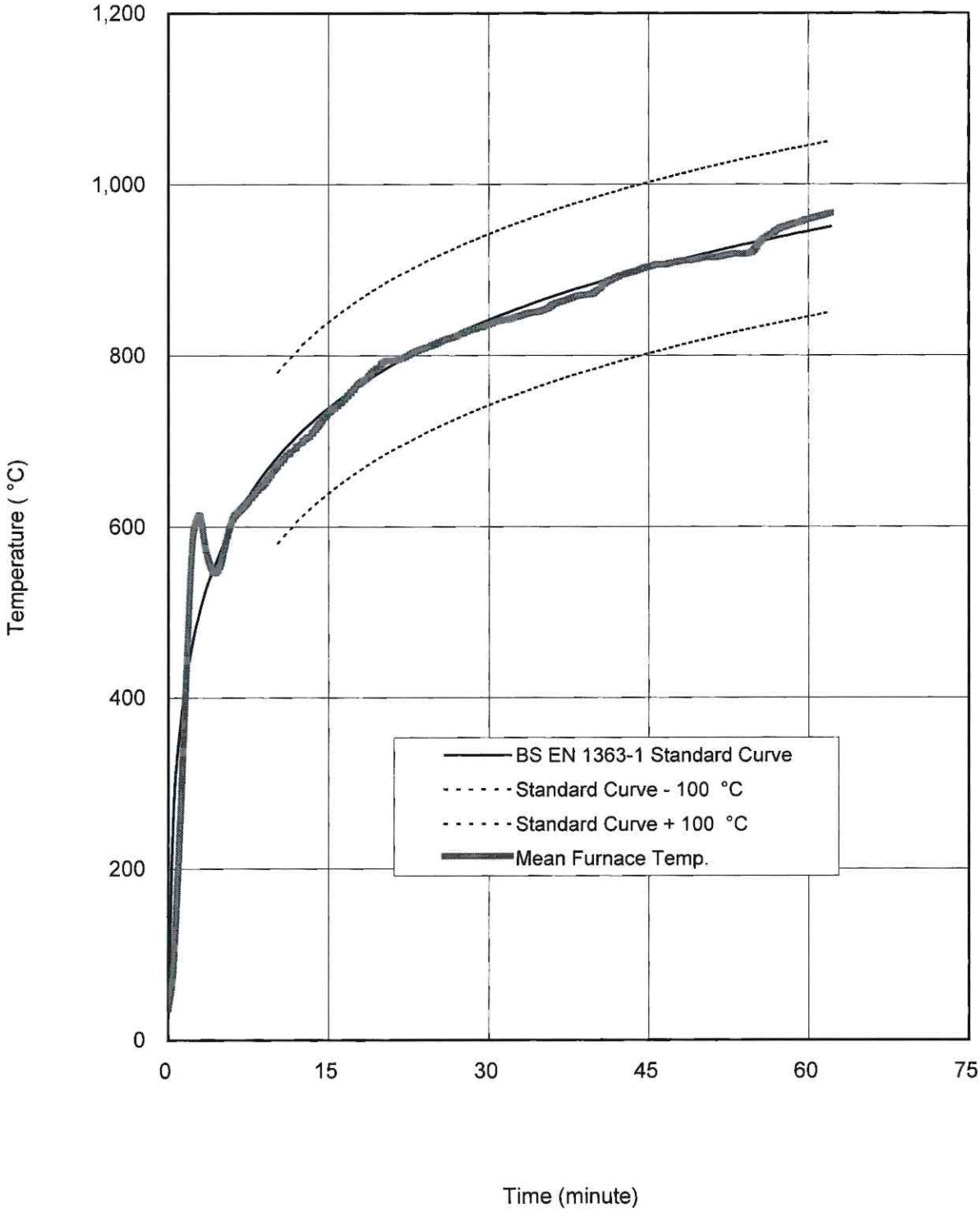

Figure 4 – Mean furnace temperature.

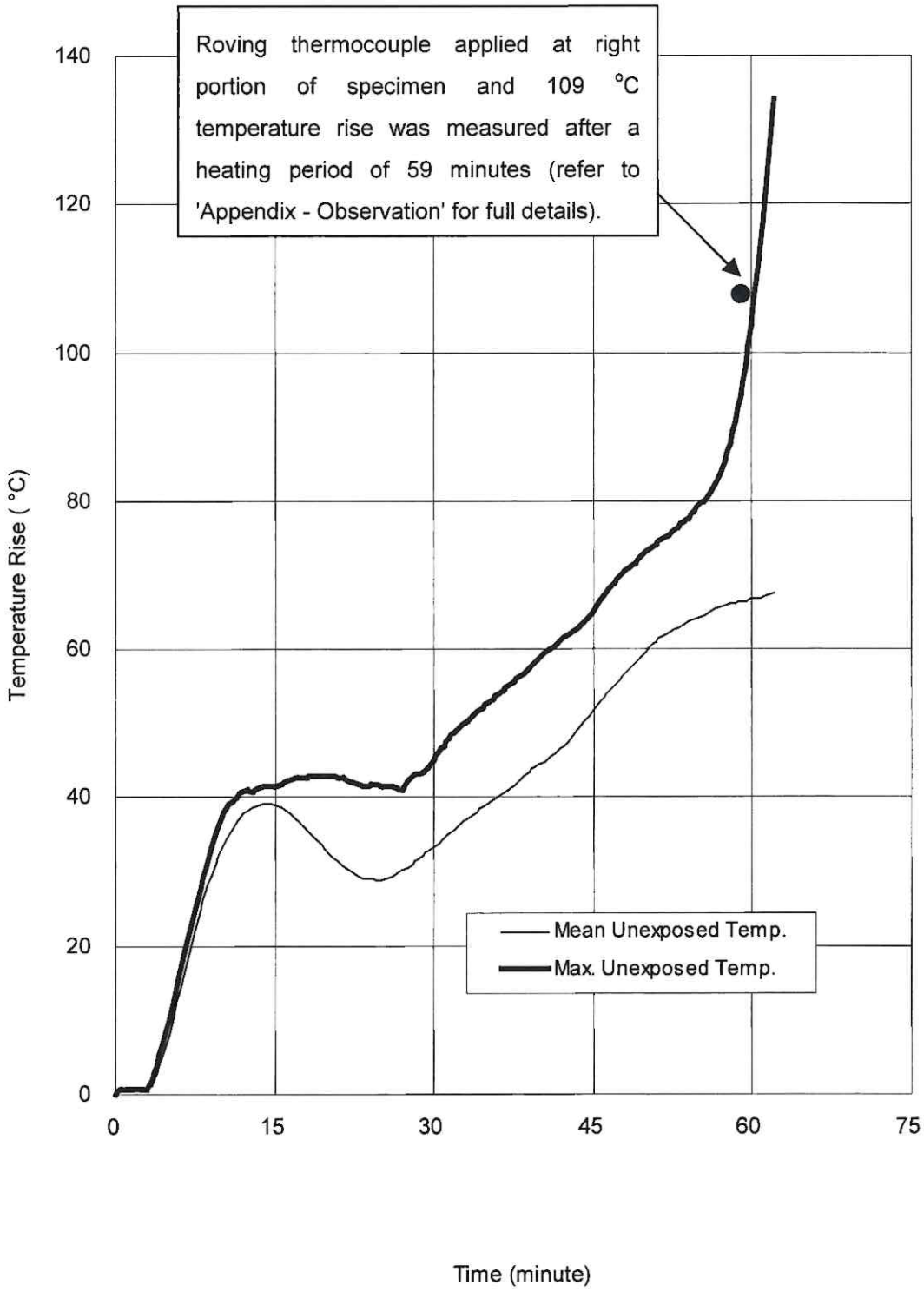

Figure 5 – Mean and maximum temperature rises of specimen.

After the first 5 minutes of the test, the furnace pressure was maintained at 17 ± 3 Pa relative to atmosphere, at top of specimen.

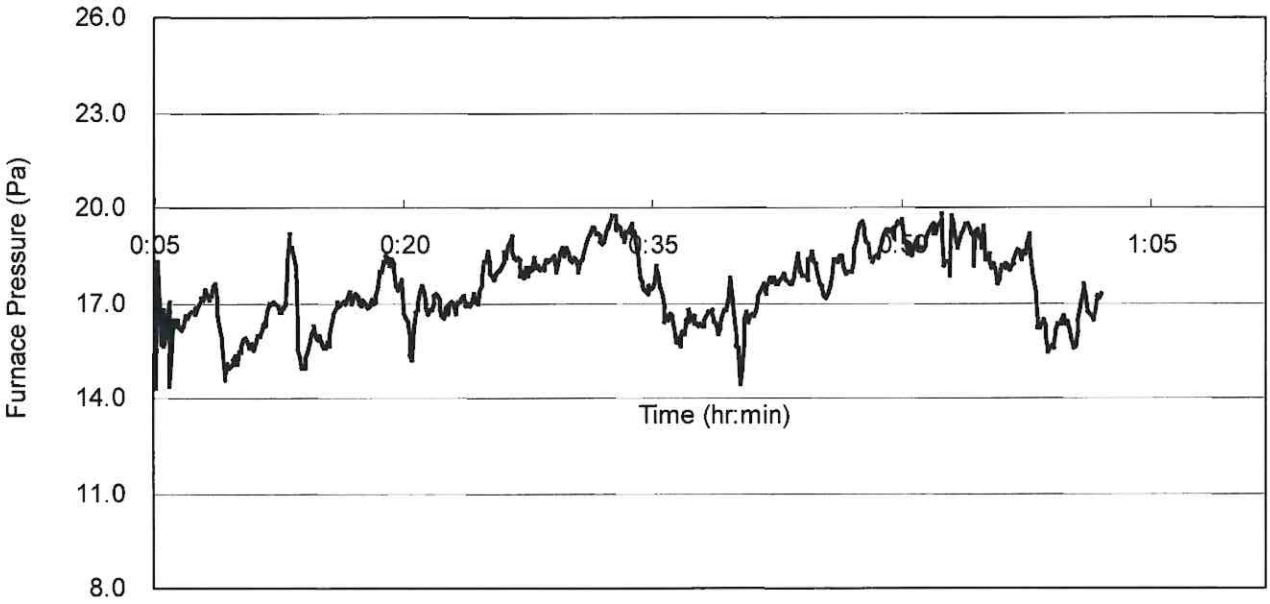

Figure 6 – Furnace pressure.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

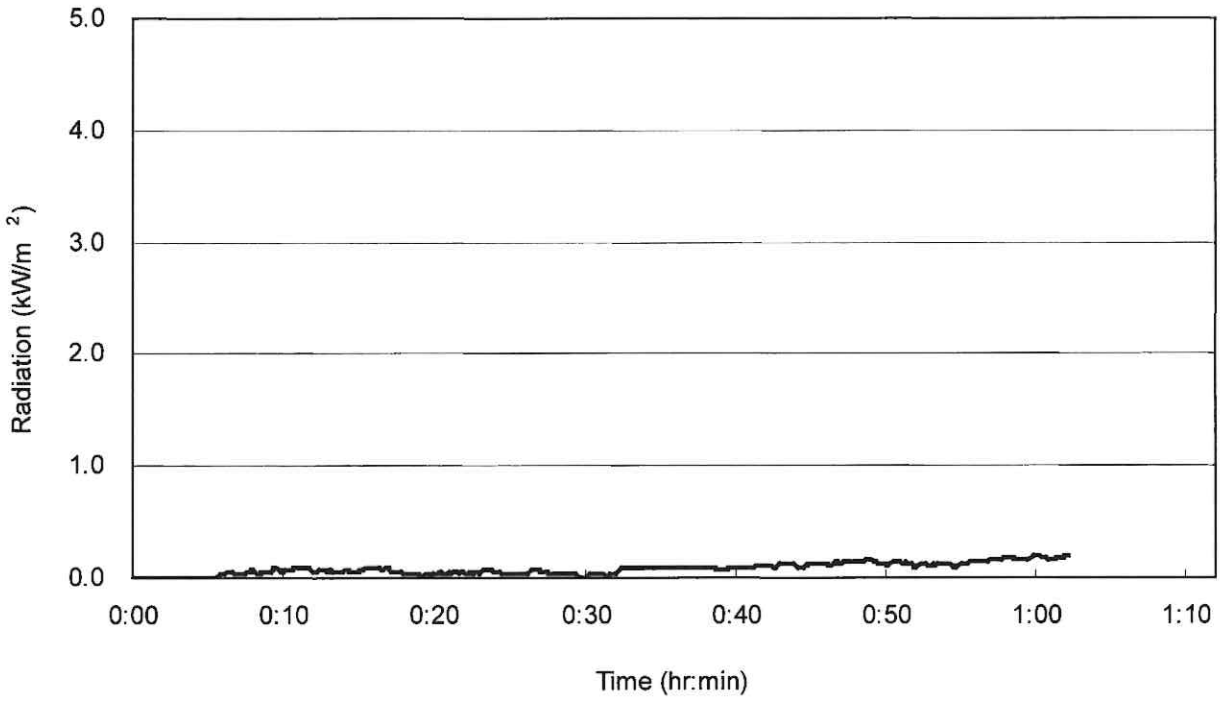

Figure 7 – Radiation.

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APPENDIX B – OBSERVATION

Time (min.sec)	Exposed (E) or Unexposed (U)	Observation
00.00	-	Test started.
04.49	E	Joint compound detached.
06.38	U	Smoke started releasing at top edge of specimen.
08.51	U	Right vertical edge of specimen turned dark.
13.57	E	Cracks developed at joint compound.
21.54	U	Joint compound turned deep.
30.33	U	Cracks developed at fire rated boards.
35.56	E	Cracks developed at fire rated boards.
54.17	U	Cotton pad test applied at centre portion of specimen and the test passed.
56.30	U	Roving thermocouple applied at right portion of specimen and 107 °C was measured.
56.49	U	Right portion of specimen turned dark.
59.55	U	Roving thermocouple applied at right portion of specimen and 139 °C was measured.
60.00	U	The specimen satisfied the integrity and insulation requirements performance.
62.08	--	Test was terminated as requested by the test sponsor.

Appendix C – DATA RECORDED DURING THE TEST

Table 1 - Lateral deflection of the specimen during the test, as viewed from the unexposed face.

(All dimensions are in millimetres)

Time (mins) / Location	0	10	20	30	45	60
D1	0	9	28	53	63	58
D2	0	9	27	50	52	46
D3	0	8	47	75	80	75
D4	0	13	45	60	67	57
D5	0	6	37	61	71	65

Positive deflection indicates movement towards the furnace (see also Figure 4 for the locations).

The maximum deflection of the specimen occurred at location D3 was 80 mm moving towards the furnace after a heating period of 45 minutes.

Table 2 - Mean furnace temperature.

Time (minute)	BS EN 1363-1 Standard Temp. Curve (°C)	Actual Mean Furnace Temp. (°C)
0	20	36
5	576	553
10	21	671
15	739	733
20	22	788
25	815	815
30	23	837
35	865	852
40	24	873
45	902	905
50	25	914
55	932	922
60	26	961
62	950	967

Notes: Locations of furnace thermocouples are shown in Figure 1.

The test was terminated as requested by the test sponsor after a heating period of 62 minutes.

Table 3 - Time and related temperature rises measured by thermocouples S1 – S11.

Time (min)	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
0	0	0	0	0	0	0	0	0	0	0	0
5	6	10	7	9	7	1	2	1	4	2	5
10	29	35	32	35	35	18	34	19	26	35	37
15	38	37	41	42	38	35	42	33	35	41	40
20	32	30	34	35	32	40	43	33	36	42	35
25	29	30	29	29	28	42	38	32	37	41	36
30	35	37	32	31	31	39	33	32	45	38	44
35	40	44	38	37	37	35	33	34	53	37	51
40	44	52	43	41	42	32	36	35	59	38	59
45	53	61	51	45	49	31	38	37	64	40	65
50	59	67	58	54	60	32	42	41	69	44	73
55	63	70	64	61	65	34	47	44	73	47	79
60	65	72	66	64	67	36	57	47	79	50	104
62	66	73	67	65	68	37	60	48	82	52	134

Notes: Locations of thermocouples S1 – S11 are shown in Figure 2.

The test was terminated as requested by the test sponsor after a heating period of 62 minutes.

APPENDIX D – Information from Test Sponsor

(The information provided by the test sponsor, which was not verified by RED or unless specified.)

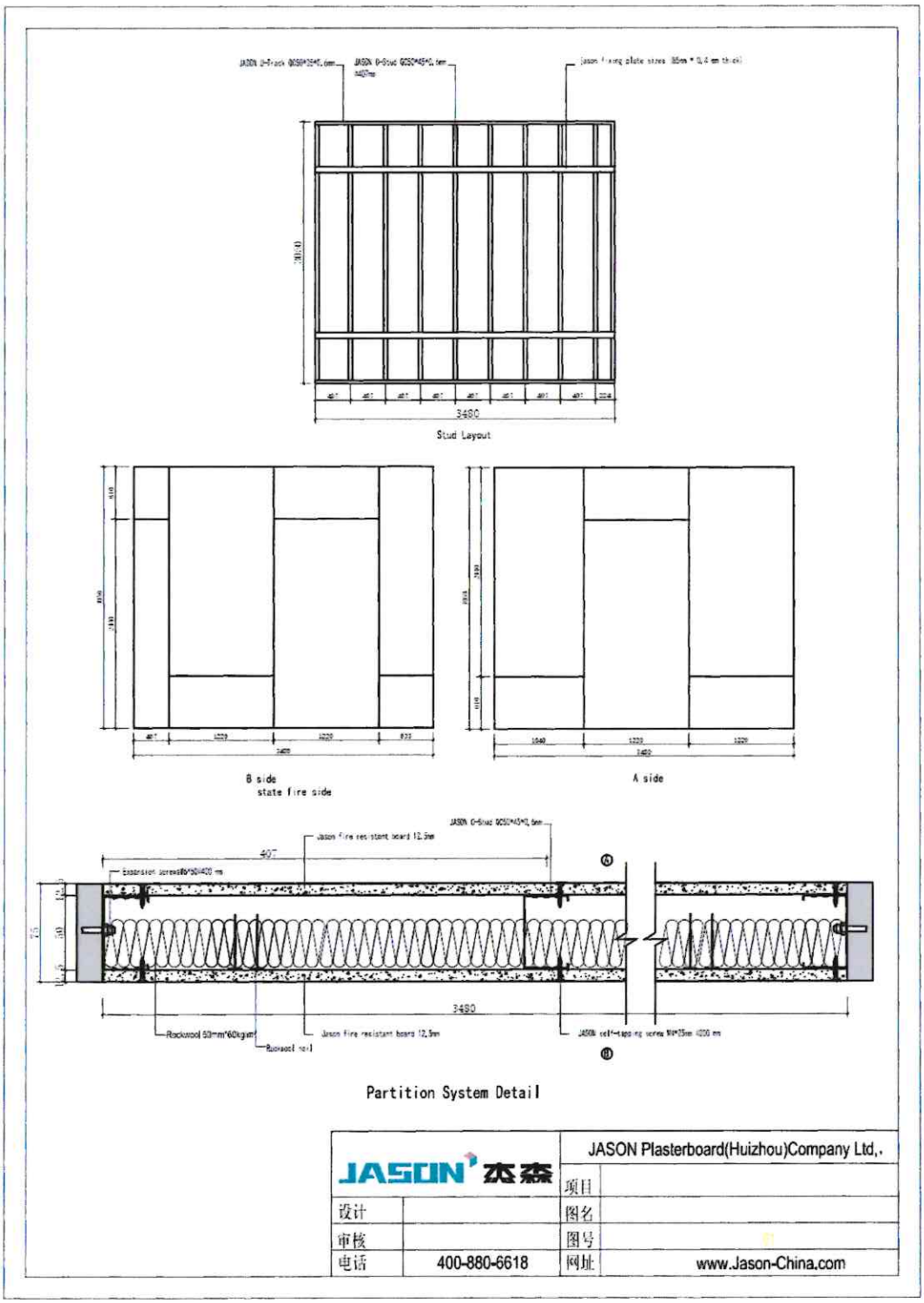
Item	Description	
1	**Top and Bottom Runners, Vertical Channels**	
	Dimensions	: 50 mm x 45 mm x 0.6 mm thick.*
	Material	: Galvanized steel.
	Fixing method to concrete lining of test rig	: The top and bottom runners were fixed to outer hollows by M6 x 50 mm long anchor bolt and welding at 400 mm nominal centres.*
2	**Vertical Channels**	
	Dimensions	: 50 mm x 35 mm x 0.6 mm thick.*
	Material	: Galvanized steel.
	Fixing method	: Fixed by M4 by 25 mm long self tapping screws at 200 mm c/c.*
3	**Horizontal Plate**	
	Dimensions	: 85 mm wide by 0.4 mm thick.*
	Material	: Galvanized steel.
	Fixing method	: Fixed 550 mm above the bottom edge and below the top edge of specimen.*
4	**Fire Rated Board**	
	Brand	: JASON.
	Thickness	: Nominal 12.5 mm.*
	Materials	: Plasterboard.
	Density	: Nominal 975 kg/m^3.
	Fixing Method	: Fixed by M4 by 25 mm long self tapping screws at 200 mm c/c.*
5	**Rockwool**	
	Brand	: Rockwool.
	Thickness	: 50 mm.*
	Density	: 60 kg/m^3.
	Applied location	: Filled in the cavity of specimen and hold by rockwool nail.#
6	**Joint Compound**	
	Brand	: N/A.
	Model	: Ready-mix compound.
	Applied location	: Board joints and screws portion.#

*Notes: * Verified on site by RED.*

 # As shown on the test construction.

Drawings from Test Sponsor

(The drawings provided by test sponsor, which was not verified by RED, except those specified and described in 'information from test sponsor'.)



- End of report -