

Report Number: **BTC 22869F**

A FIRE RESISTANCE TEST ON A 63 MM DEEP  
TIMBER STUD PARTITION CLAD EACH SIDE WITH A  
SINGLE LAYER OF 15 MM THICK GYPROC  
WALLBOARD 15MM, INCORPORATING 25 MM THICK  
ISOVER ACOUSTIC PARTITION ROLL (APR 1200)  
INSULATION IN THE CAVITY, CONDUCTED IN  
ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 16<sup>th</sup> August 2023

Report Issue Date: 24<sup>th</sup> August 2023

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Customer: **British Gypsum**

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# The Building Test Centre

Fire Acoustics Structures

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### FOREWORD

This test report details a fire resistance test conducted on a timber stud partition clad on each face with a single layer of 15 mm Gyproc WallBoard 15mm incorporating 25 mm Isover Acoustic Partition Roll (APR 1200) Insulation in the cavity.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 14<sup>th</sup> and 16<sup>th</sup> August 2023. The Building Test Centre played no role in the design or selection of materials comprising the test specimen. This information is provided by the sponsor.

The test was witnessed by Ms Hannah Murray, Mr Lee Colemere, Mr Mark Willoughby, and Mr Andrew Bowerbank of Saint-Gobain Interior Solutions and was conducted on 16<sup>th</sup> August 2023.

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 procedures outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge of end conditions other than those allowed under the field of direct application in EN 1364-1 is not covered by this report.

“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.” (BS EN 1363-1: 2020, section 12.1)

### REPORT AUTHORISATION

Report Author



**Sandeep Patel**  
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Authorised by



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## TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author

**Name**  
*Role*

Amendments Authorised by

**Name**  
*Role*

### TEST CONSTRUCTION

#### Description of Construction

The specimen was constructed in a refractory concrete lined steel restraint test frame with an opening of 3000 mm (high) x 3000 mm (wide).

63 mm x 38 mm timber head and sole plates were fixed to the head and base of the test aperture at 600 mm centres using 100 mm long fire-resistant fixings.

63 mm x 38 mm timber studs were positioned at 600 mm centres between the head and sole plates and skew fixed using 65 mm long British Gypsum Drywall Screws 65mm. The right-hand stud viewed from the unexposed face was not fixed to the perimeter of the test frame, and the gap between the stud and the frame lining was filled with 25 mm thick rock mineral fibre gasket.

At the left-hand edge, a 63 mm x 38 mm timber stud was used to fix the partition to the test frame using 100 mm long fire-resistant fixings at 600 mm centres.

63 mm x 38 mm timber stud noggings were positioned between the studs at 2400 mm from the base of the specimen and skew fixed using 65 mm long British Gypsum Drywall Screws 65mm.

Thermocouples were added to the timber studs at mid-height on the web, hot and cold flanges of the central two studs.

A layer of 25mm Isover Acoustic Partition Roll (APR 1200) Insulation was positioned in the stud cavity.

Both the unexposed face and the exposed face of the specimen were clad with a single layer of 15 mm thick Gyproc WallBoard 15mm. The boards were fixed with 40 mm long British Gypsum Drywall Screws 40mm at 300 mm centres around the perimeter and within the field of the boards.

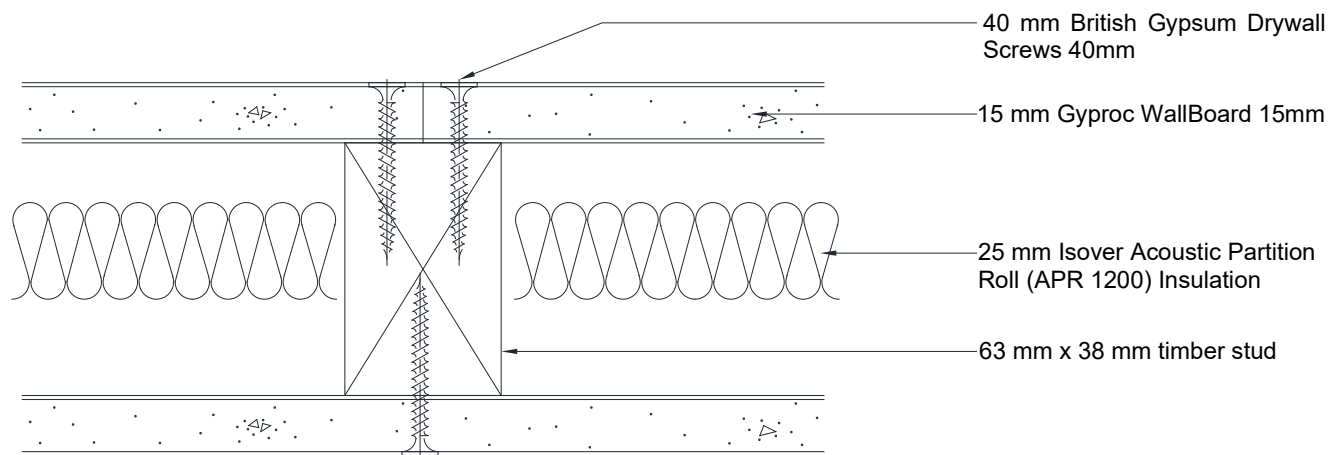
All vertical joints were staggered between layers, with a full board at the free end of the exposed face.

A horizontal joint was positioned at 2400 mm from the base on the outer layer boards on both faces of the specimen.

All external board joints were taped and filled using Gyproc Paper Joint Tape and Gyproc Joint Filler as appropriate. All screw heads were spotted using Gyproc Joint Filler.

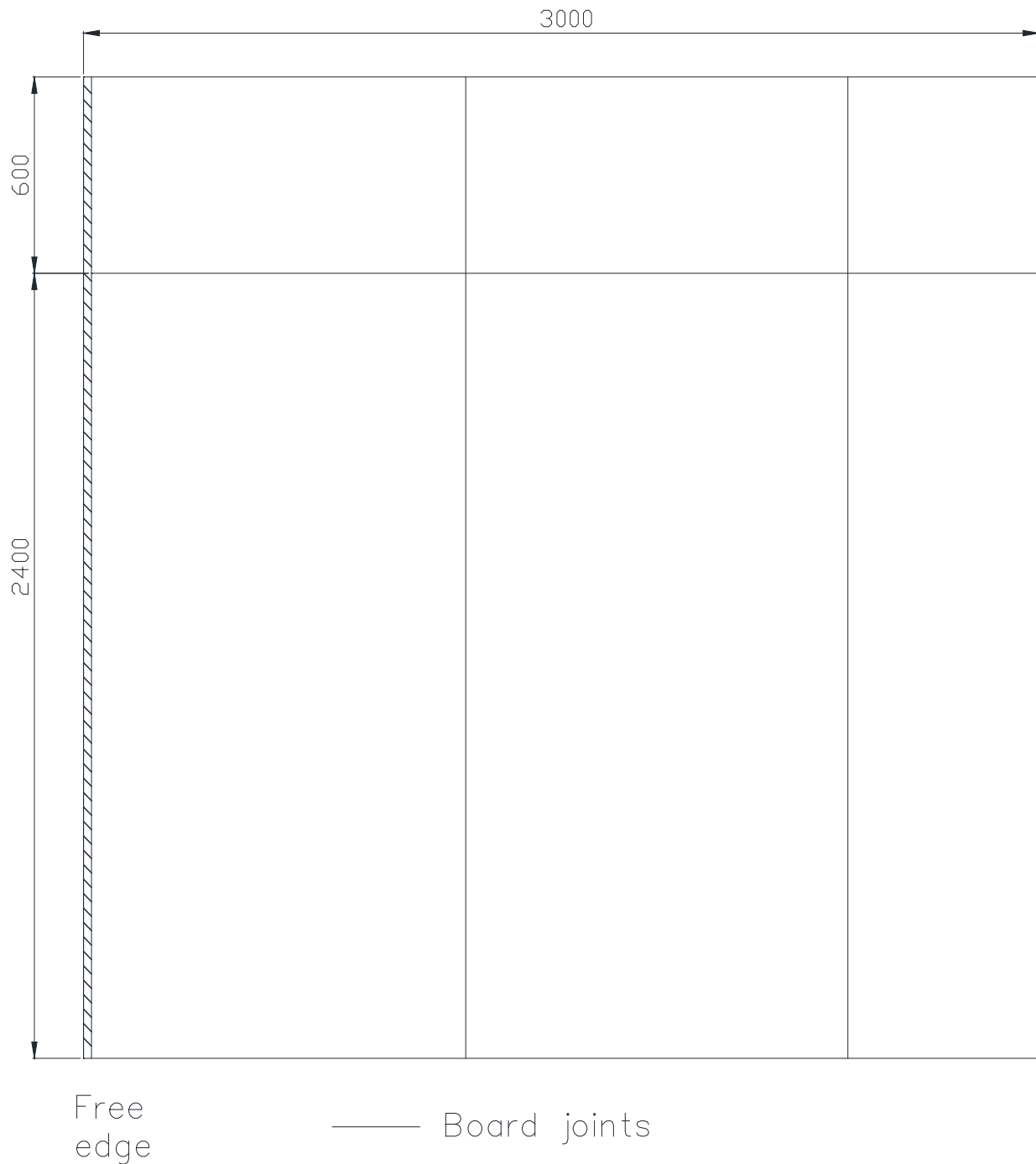
### Test Construction Drawings

#### Horizontal Cross Section



**Figure 1** – Horizontal cross section.

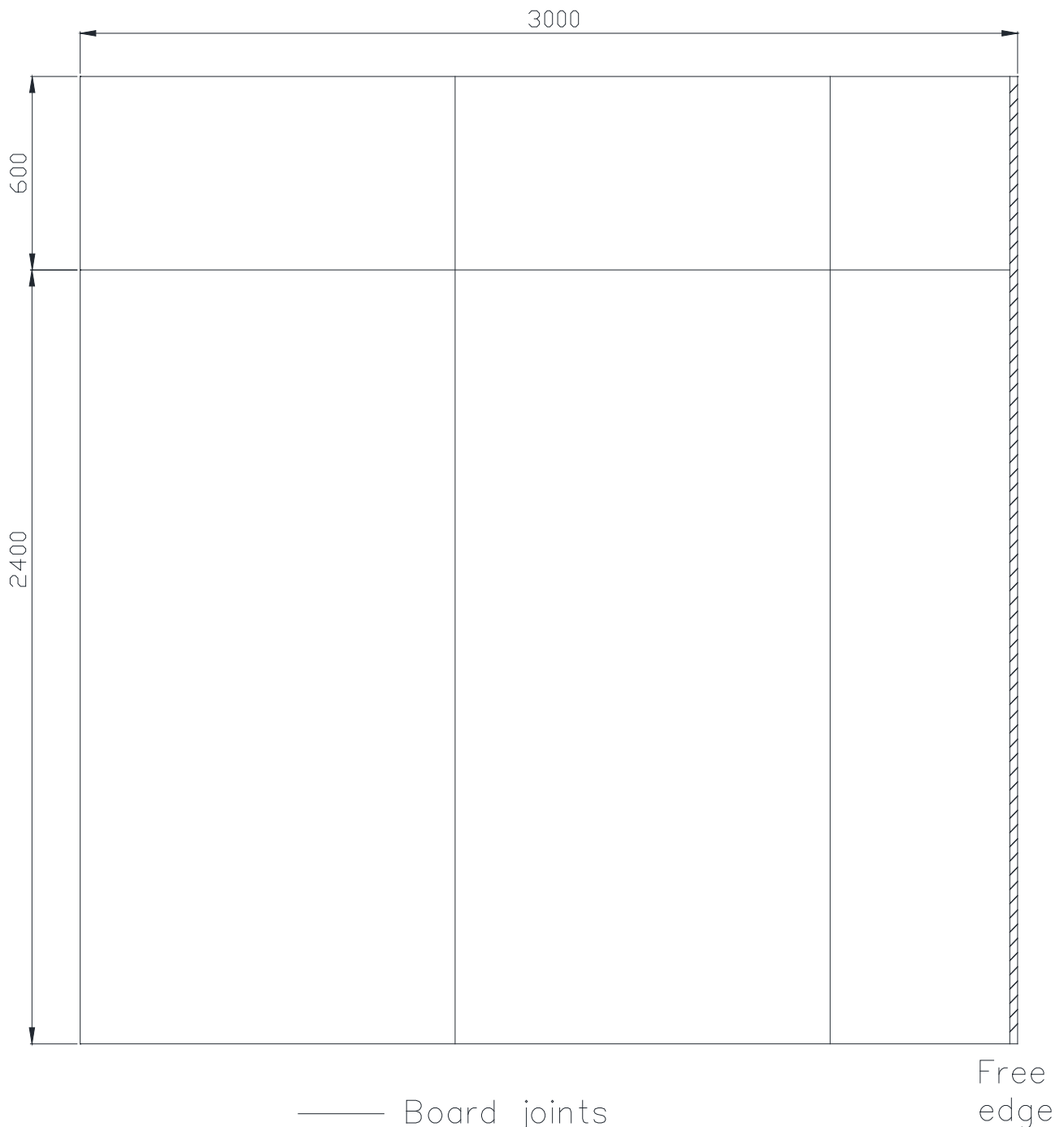
### Exposed Face Elevation



**Figure 2** – Exposed face elevation.



## Unexposed Face Elevation



**Figure 3** – Unexposed face elevation.

### TEST MATERIALS

#### Plasterboard

- i) Nominally, 2400 mm (long) x 1200 mm (wide) x 15 mm (thick), Gyproc WallBoard 15mm (TE), manufactured and supplied by British Gypsum, ex East Leake.

Measured mass per unit area:	10.9 kg/m <sup>2</sup>
Measured thickness:	14.6 mm
Board identification numbers:	18 194 23 08:02
	18 194 23 08:02
	18 194 23 08:03
Measured moisture content:	0.71 %

The surface density and board thickness were calculated using the actual weight and size of a selection of boards used in the test specimen. The moisture content of plasterboard was determined using samples dried to constant weight in an oven at 50 °C.

Material dimensions were supplied by British Gypsum.

#### Timber Components

- ii) Nominally, 3000 mm (long) x 38 mm (wide) x 63 mm (deep), timber studs, supplied by The Building Test Centre.

Measured dimensions:	3000 mm (long)
	38 mm (wide)
	64 mm (deep)
Measured mass per metre:	1.17 kg/m
Measured density:	478.4 kg/m <sup>3</sup>
Measured moisture content:	13.92 %

The mass and dimensions of the timber components were calculated using the actual weight and size of a selection of components used in the test specimen. The moisture content was determined using samples dried to constant weight in an oven at 102 °C.

#### Fasteners

- iii) 40 mm British Gypsum Drywall Screws 40mm.  
iv) 65 mm British Gypsum Drywall Screws 65mm.  
v) 100 mm Hilti HUS-HR Concrete Screw Anchor fire resistant fixings.

All fasteners were supplied by The Building Test Centre.

### Miscellaneous Components

- vi) Gyproc Paper Joint Tape.
- vii) Gyproc Joint Filler.
- viii) Rock mineral fibre gasket.

All miscellaneous components were supplied by The Building Test Centre.

### Insulation

- ix) Nominally 25 mm (thick) Acoustic Partition Roll (APR 1200) Insulation, manufactured by Saint-Gobain Isover and supplied by British Gypsum.

Measured surface density: 0.41 kg/m<sup>2</sup>

*Where measurements could not be taken and were provided by the customer or the manufacturer e.g. from material labelling, or where mass and dimension measurements were provided by the customer or the manufacturer e.g. customer has completed material dimension forms the results only apply to the sample as received.*

*All data and materials supplied by the customer or manufacturer are clearly identified.*

*Material information was sampled and recorded according to procedure AP070 vs. 1.2.*

## TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1364-1: 2015. The specimen was subjected to fire from one side, as specified in BS EN 1364-1: 2015.

As the test specimen is considered to be symmetrical one test is adequate to cover the fire resistance performance in both directions.

The test procedure used was EN 1364-1 Issue 3.

The ambient temperature at the commencement of the test was 22 °C.

The furnace pressure was set to control at  $-1.1 \pm 2$  Pa positive with respect to atmosphere, at a point 750 mm from the base of the specimen equating to  $18 \pm 2$  Pa at the top of the specimen. Furnace pressure data is shown in **Figure 5**.

The test conditions did not meet the full requirements of BS EN 1363-1: 2020 as the test frame stiffness did not fully comply.

The specimen and associated construction were not conditioned in accordance with clause 8 of BS EN 1363-1: 2020.

## **TEST RESULTS**

The requirement of the standard was satisfied for the following periods:

<b>Integrity</b>	<b>Sustained Flaming</b>	<b>60 minutes, no failure.</b>
	<b>6 mm Gap Gauge</b>	<b>60 minutes, no failure.</b>
	<b>25 mm Gap Gauge</b>	<b>60 minutes, no failure.</b>
	<b>Cotton Pad</b>	<b>60 minutes.</b>
<b>Insulation</b>		<b>54 minutes.</b>
<b>Test Terminated</b>		<b>60 minutes, at the request of the sponsor.</b>

## **LIMITATIONS**

The scope of the Field of Direct Application of the results and construction details in this test report is explained in BS EN 1364-1: 2015, section 13.

### TEST DATA

#### Observations

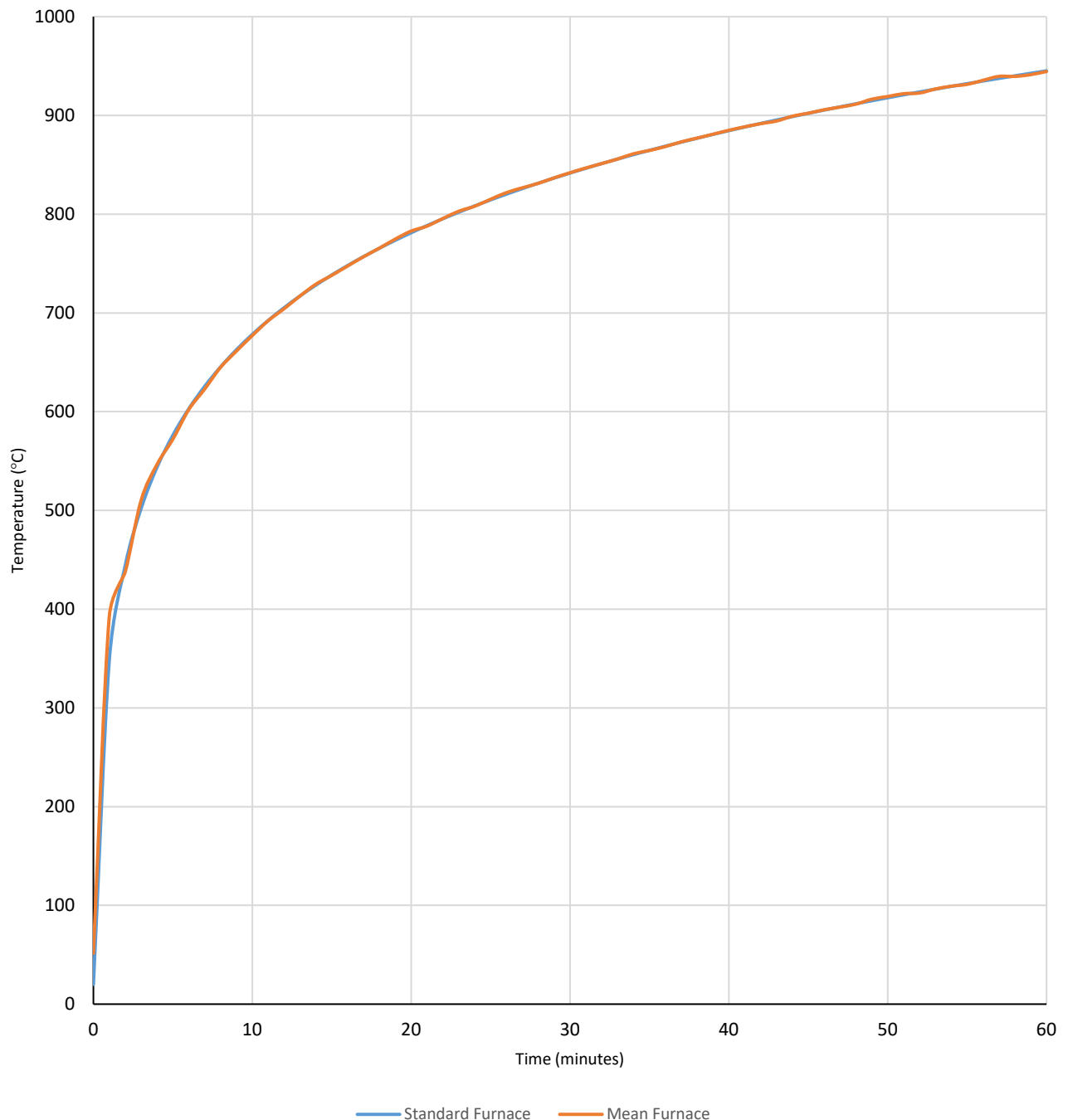
All observations refer to the exposed face unless stated.

Observers: Unexposed face: Lynda Cooper, Matthew Porter & Christian Slee  
Exposed face: Yasmin Hickling & Lynda Cooper

Time		Observations
Hours	Minutes	
0	00	Test started.
0	10	Jointing material was flaking away. Face papers had charred.
0	20	Left-hand vertical joint had opened up to approximately 4-6 mm. Right-hand vertical joint had opened up to approximately 4-6 mm. Horizontal joint had opened up to approximately 6-8 mm. All joints had flames going into the furnace. Boards had cracked around screw heads.
0	30	Left-hand vertical joint had opened up to approximately 10-12 mm. Right-hand vertical joint had opened up to approximately 12-14 mm. Horizontal joint had opened up to approximately 16-18 mm.  <i>Unexposed face</i> No visible change.
0	40	Left-hand vertical joint had opened up to approximately 20-24 mm. Right-hand vertical joint had opened up to approximately 18-20 mm. Horizontal joint had opened up to approximately 25-30 mm. A vertical crack had formed in the centre of the upper left-hand board.  <i>Unexposed face</i> No visible change.
0	50	The lower left-hand board had fallen into the furnace.  <i>Unexposed face</i> A discoloured vertical line had appeared on the lower centre board at approximately mid-height to the right-hand side of the centre and was approximately 600 mm long.

Time		Observations
Hours	Minutes	
0	54	<p><i>Unexposed face</i></p> <p><b>INSULATION FAILURE.</b> The temperature rise at a point approximately to the right-hand side of the centre of the specimen at mid-height on the lower centre board, exceeded 180 °C (roving thermocouple). A vertical crack, approximately 300 mm long had appeared at approximately mid-height on the centre of the lower centre board.</p>
0	56	<p><i>Unexposed face</i></p> <p>Cotton pad attempt – the cotton pad was placed over the vertical crack at approximately mid-height on the centre of the lower centre board – no failure.</p>
0	57	<p><i>Unexposed face</i></p> <p>The mean temperature rise of the standard five thermocouples exceeded 140°C.</p>
0	58	<p><i>Unexposed face</i></p> <p>Cotton pad attempt – the cotton pad was placed over the vertical crack at approximately 1650 mm height on the centre of the lower centre board – no failure. The vertical crack at approximately mid-height on the centre lower centre board had opened to approximately 5 mm and was approximately 1300 mm in length.</p>
0	59	<p><i>Unexposed face</i></p> <p>Discolouration had increased to the whole right-hand side of the lower-centre board. A horizontal crack had appeared on the right-hand side of the lower centre board at approximately 1200 mm height.</p>
1	00	<p><i>Unexposed face</i></p> <p><b>INTEGRITY FAILURE.</b> The cotton pad ignited (flamed) when placed on the vertical crack to the right-hand side of centre, at approximately 1600 mm height on the lower centre board.</p> <p><b>TEST TERMINATED</b> at the request of the sponsor.</p>

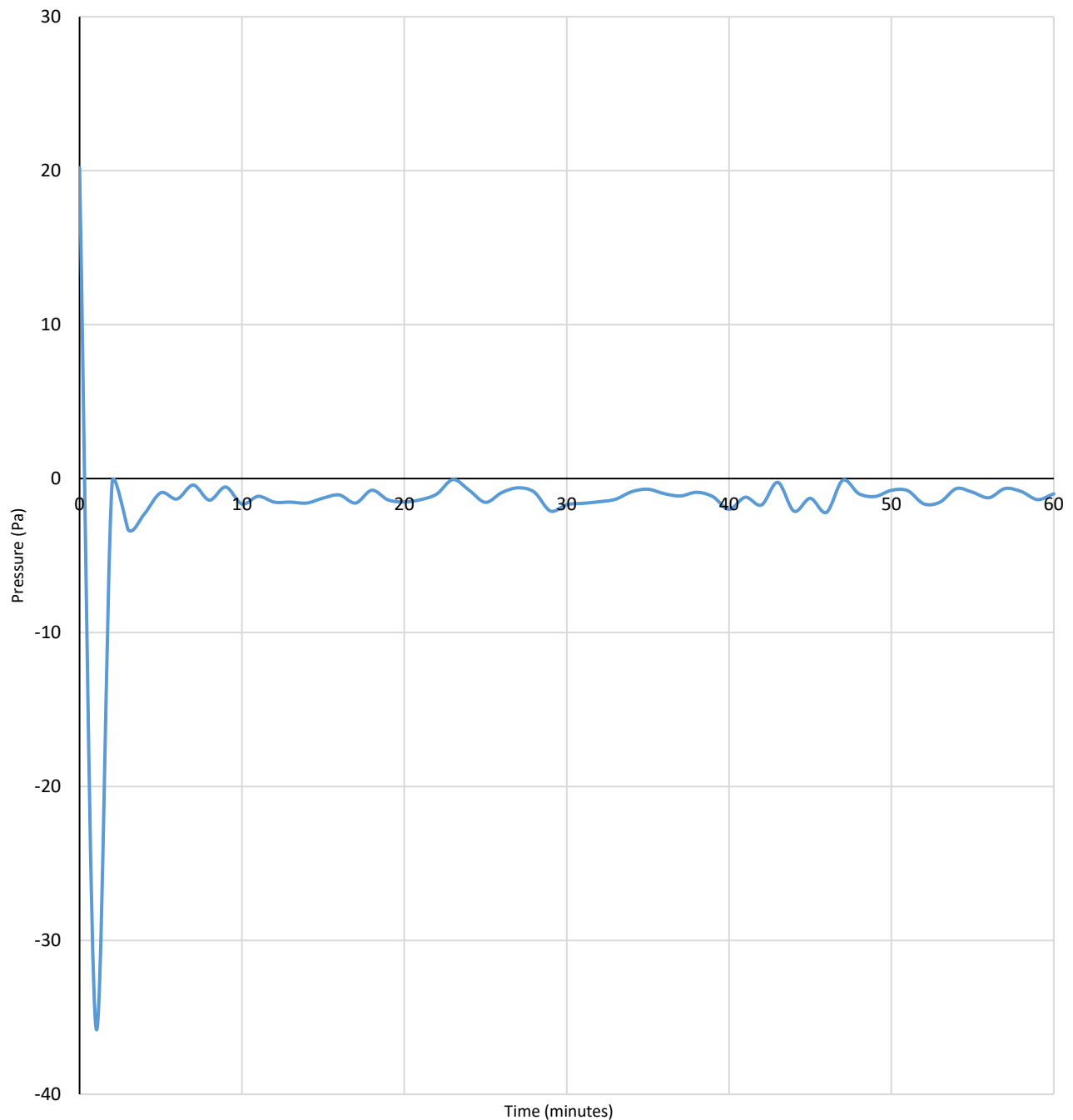
## Furnace Temperature Graph



**Figure 4** – Furnace temperature graph.

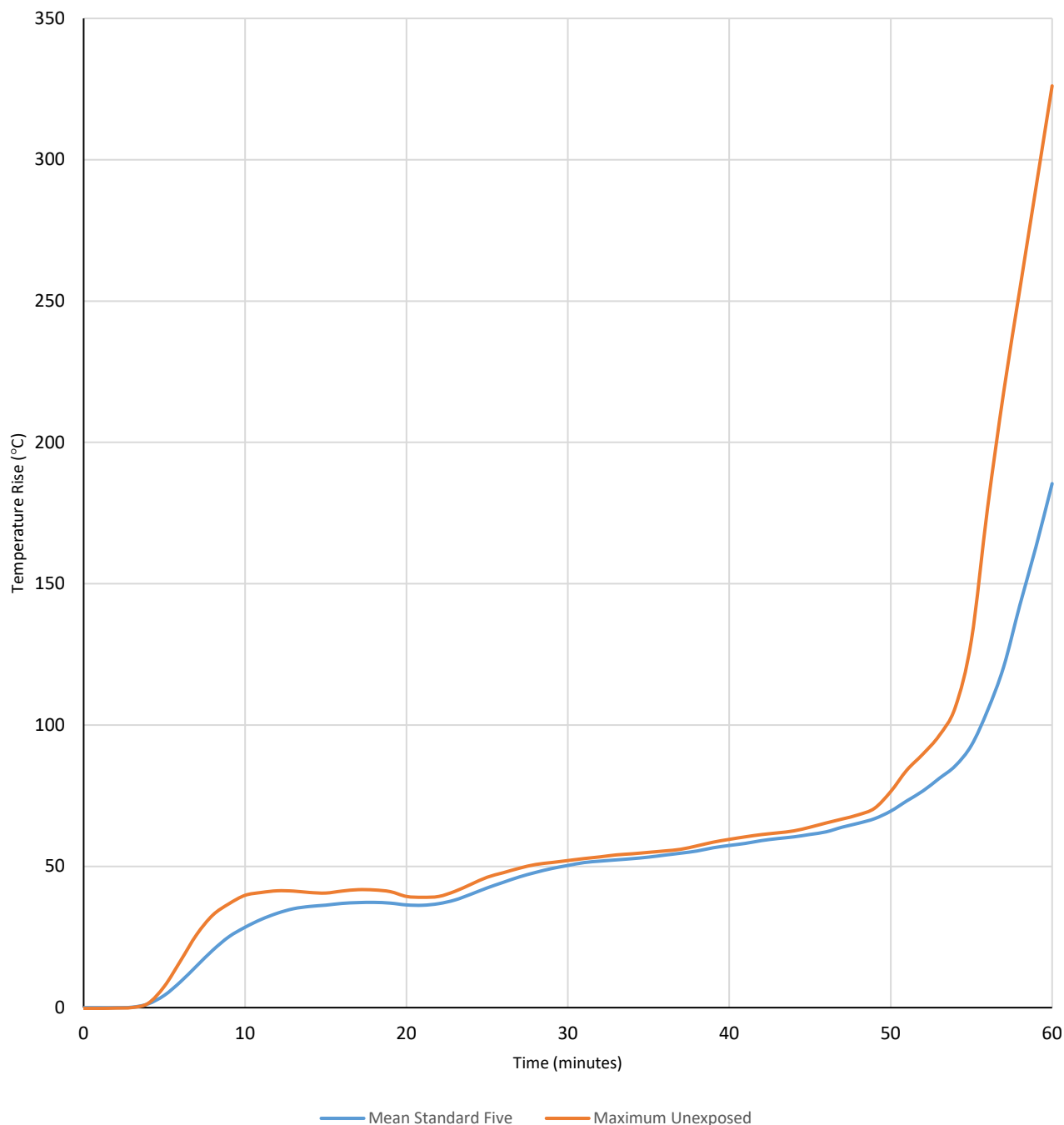


## Furnace Pressure Graph



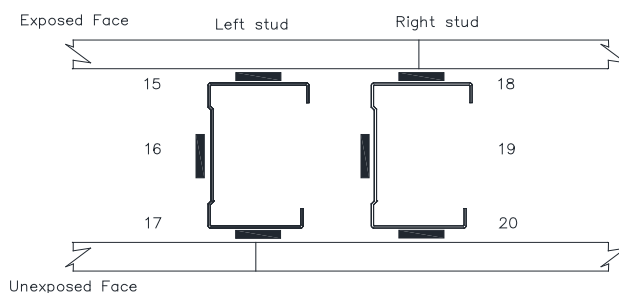
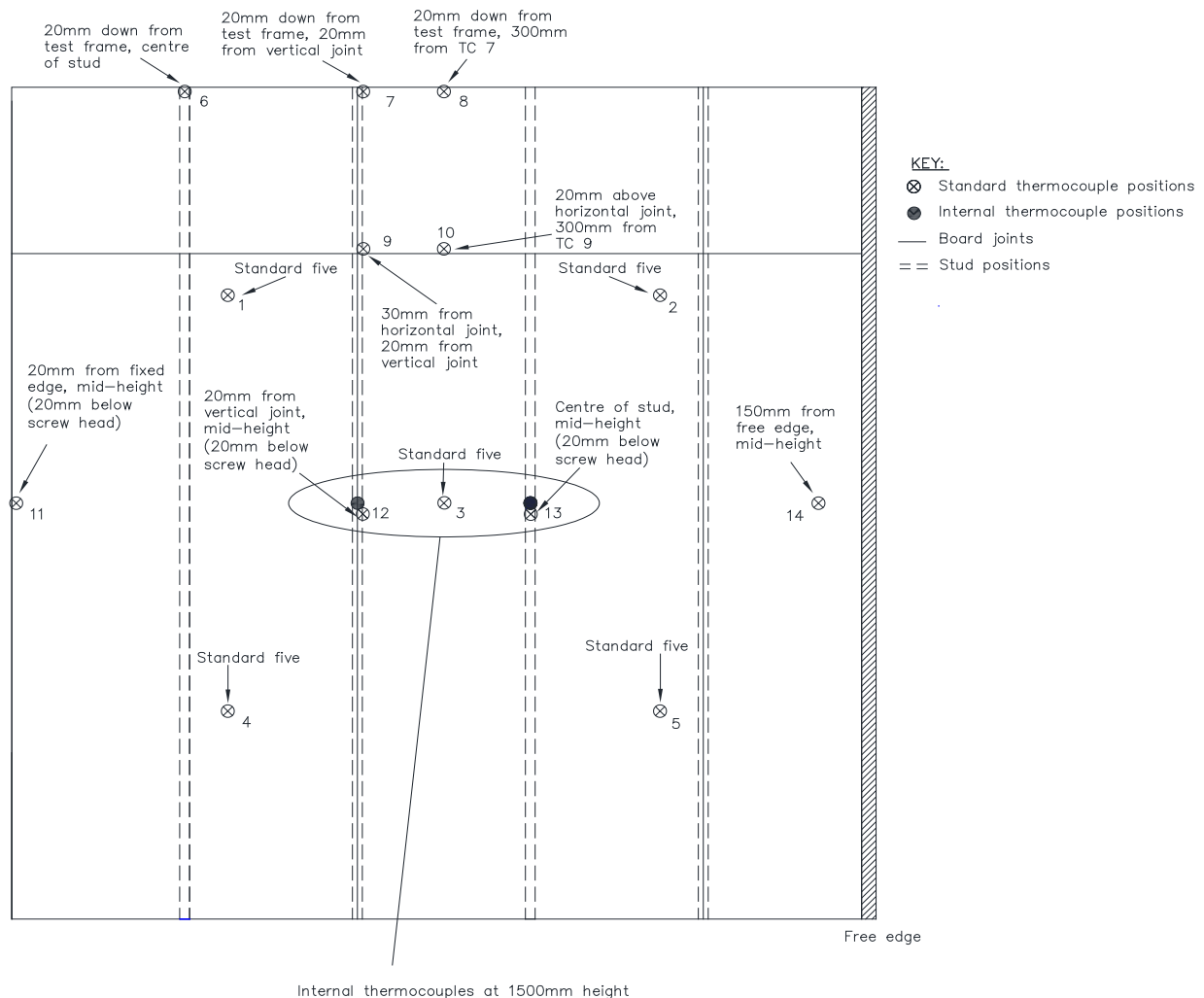
**Figure 5** – Furnace pressure graph.

## Unexposed Face Temperature Graph



**Figure 6** – Unexposed face temperature graph.

### Unexposed Face Thermocouple Layout



**Figure 7 – Unexposed face thermocouple layout.**

### Unexposed Face Standard Five Temperature Data

Time (minutes)	Temperature Rise (°C)					Mean Standard Five
	Thermocouple No. 1	Thermocouple No. 2	Thermocouple No. 3	Thermocouple No. 4	Thermocouple No. 5	
0	0	0	0	0	-1	0
1	0	0	0	0	-1	0
2	0	0	0	0	-1	0
3	1	1	0	0	0	0
4	1	3	2	0	0	1
5	4	8	6	2	2	4
6	8	15	12	5	6	9
7	14	22	18	9	11	15
8	19	28	24	13	17	20
9	24	32	29	17	23	25
10	27	35	33	21	27	28
11	29	37	35	24	31	31
12	32	39	37	27	33	33
13	33	40	38	29	35	35
14	35	40	39	30	35	36
15	35	40	39	31	36	36
16	36	40	40	32	37	37
17	36	40	40	33	36	37
18	36	40	40	34	36	37
19	37	40	39	34	36	37
20	37	39	38	33	35	36
21	36	39	38	33	35	36
22	36	39	39	34	36	37
23	36	40	41	35	38	38
24	37	42	44	37	40	40
25	40	44	46	40	42	42
26	42	46	48	42	44	44
27	44	48	49	44	46	46
28	46	49	51	46	48	48
29	47	50	51	48	50	49
30	48	51	52	50	50	50
31	50	52	53	51	51	51
32	51	53	53	52	51	52
33	51	53	54	52	51	52
34	51	53	54	53	52	53
35	52	54	55	53	52	53
36	53	55	55	54	53	54
37	54	56	56	55	53	55
38	55	57	57	55	54	55

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 1	Thermocouple No. 2	Thermocouple No. 3	Thermocouple No. 4	Thermocouple No. 5	Mean Standard Five
39	56	59	57	56	55	57
40	58	60	58	56	56	57
41	59	60	59	57	56	58
42	60	61	60	57	57	59
43	62	62	61	58	57	60
44	63	62	61	58	57	60
45	63	64	62	59	58	61
46	64	65	63	60	59	62
47	65	67	64	60	63	64
48	66	68	65	62	65	65
49	68	71	67	63	67	67
50	71	76	69	64	68	70
51	74	84	72	65	70	73
52	77	90	75	67	74	77
53	79	96	77	70	83	81
54	81	106	79	73	89	86
55	82	130	81	77	95	93
56	83	177	82	79	104	105
57	85	218	84	82	133	121
58	89	254	88	86	195	142
59	96	290	95	91	243	163
60	110	326	106	97	288	185

Figures highlighted in red indicate the minute in which the mean temperature rise exceeded 140 °C.

See **Figure 7** for the location of the thermocouples.

### Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 6	Thermocouple No. 7	Thermocouple No. 8	Thermocouple No. 9	Thermocouple No. 10
0	-3	-3	-2	-2	-2
1	-3	-3	-2	-2	-2
2	-3	-3	-2	-2	-2
3	-3	-2	-2	-2	-2
4	-3	0	-2	-2	-2
5	-3	7	-2	-2	-1
6	-2	17	-1	-1	0
7	-2	26	1	0	2
8	-1	33	4	2	3
9	0	37	6	3	5
10	1	40	9	5	6
11	2	41	12	6	8
12	3	41	13	7	9
13	4	41	15	9	10
14	5	41	15	10	11
15	6	40	16	11	12
16	8	39	16	12	13
17	9	38	16	13	14
18	10	38	16	15	15
19	11	37	17	17	16
20	11	37	17	19	16
21	12	36	17	20	17
22	13	36	17	21	17
23	13	35	17	22	18
24	14	34	17	24	19
25	14	34	17	25	20
26	15	34	18	27	22
27	15	34	18	29	24
28	16	34	19	30	26
29	16	34	19	32	27
30	17	34	20	33	29
31	17	35	21	34	30
32	18	36	21	35	31
33	19	36	22	36	32
34	19	37	23	37	33
35	20	38	24	38	35
36	22	39	25	39	36
37	23	40	26	39	37
38	24	41	28	40	38

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 6	Thermocouple No. 7	Thermocouple No. 8	Thermocouple No. 9	Thermocouple No. 10
39	25	42	29	40	39
40	26	43	31	41	40
41	27	44	32	42	41
42	28	45	34	42	42
43	29	46	35	43	43
44	30	46	37	44	44
45	31	47	39	45	45
46	32	48	40	46	46
47	32	50	41	46	47
48	33	51	42	47	47
49	34	52	43	48	49
50	35	53	44	49	50
51	36	54	45	49	51
52	37	55	47	49	51
53	38	56	47	50	52
54	40	56	48	50	53
55	43	57	48	50	53
56	46	57	48	50	54
57	49	57	49	51	55
58	51	57	49	52	55
59	51	56	50	53	56
60	51	55	50	54	57

See **Figure 7** for the location of the thermocouples.

### Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 11	Thermocouple No. 12	Thermocouple No. 13	Thermocouple No. 14
0	-2	-3	0	0
1	-2	-3	0	0
2	-2	-3	0	0
3	-2	-3	0	0
4	-2	-2	0	2
5	-2	-2	1	6
6	-1	-1	3	12
7	0	0	7	19
8	1	1	12	25
9	3	3	17	30
10	4	4	21	33
11	6	6	25	35
12	7	8	29	37
13	8	10	31	38
14	10	12	33	39
15	11	14	34	41
16	12	15	34	41
17	13	17	35	42
18	14	19	34	42
19	14	20	33	41
20	15	21	33	39
21	15	23	32	38
22	16	25	32	38
23	16	27	33	39
24	16	29	33	40
25	17	32	34	42
26	17	34	34	44
27	18	37	34	45
28	18	38	35	47
29	19	40	35	48
30	19	42	36	49
31	20	43	37	50
32	20	44	38	50
33	21	46	40	51
34	22	47	42	51
35	23	47	44	51
36	23	48	46	52
37	24	49	48	52
38	25	50	50	52



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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 11	Thermocouple No. 12	Thermocouple No. 13	Thermocouple No. 14
39	26	51	52	53
40	27	51	55	54
41	27	52	57	54
42	28	52	58	54
43	29	53	59	55
44	30	53	59	55
45	30	54	60	56
46	31	54	60	56
47	32	54	61	57
48	33	54	62	58
49	34	55	62	58
50	35	55	63	59
51	36	56	63	61
52	36	57	64	62
53	37	58	65	65
54	38	59	65	67
55	39	61	66	68
56	40	62	66	70
57	41	66	67	73
58	42	68	68	75
59	43	69	70	78
60	44	70	74	81

See **Figure 7** for the location of the thermocouples.

### Internal Temperature Data at 1500 mm Height

Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 15	Web Thermocouple No. 16	Cold Flange Thermocouple No. 17	Hot Flange Thermocouple No. 18	Web Thermocouple No. 19	Cold Flange Thermocouple No. 20
0	31	25	22	29	26	24
1	34	25	22	50	27	24
2	64	30	22	79	30	24
3	79	41	22	91	36	25
4	85	54	23	93	48	26
5	87	62	23	92	55	29
6	89	67	23	92	60	41
7	90	70	24	92	63	57
8	90	72	25	93	67	64
9	90	74	26	92	69	67
10	91	75	27	93	70	70
11	92	75	29	95	72	74
12	95	76	31	102	74	75
13	97	76	32	112	77	75
14	101	77	34	130	78	75
15	105	79	36	146	78	74
16	107	80	39	169	78	74
17	112	80	41	212	79	73
18	119	79	43	266	81	69
19	135	79	46	314	84	68
20	163	82	49	368	91	68
21	200	83	51	466	104	71
22	237	86	54	558	137	71
23	271	90	57	600	172	71
24	301	118	60	639	210	71
25	329	150	63	659	249	71
26	358	177	65	678	285	70
27	387	199	67	706	317	71
28	415	220	69	732	349	72
29	442	241	70	754	381	73
30	469	259	72	773	416	76
31	494	276	75	793	452	79
32	516	291	77	814	492	82
33	538	304	79	824	543	85
34	557	317	81	824	607	88
35	574	329	84	-	644	90
36	587	342	87	-	681	92

Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 15	Web Thermocouple No. 16	Cold Flange Thermocouple No. 17	Hot Flange Thermocouple No. 18	Web Thermocouple No. 19	Cold Flange Thermocouple No. 20
37	600	354	89	-	747	94
38	613	364	91	-	747	96
39	624	374	93	-	769	99
40	634	383	96	-	794	104
41	644	393	98	-	805	127
42	651	403	102	-	810	286
43	655	412	104	-	824	643
44	662	422	105	-	-	750
45	676	429	107	-	-	-
46	683	433	108	-	-	-
47	689	439	110	-	-	-
48	695	444	112	-	-	-
49	698	-	114	-	-	-
50	701	-	116	-	-	-
51	705	-	118	-	-	-
52	708	-	120	-	-	-
53	713	-	123	-	-	-
54	722	-	127	-	-	-
55	744	-	133	-	-	-
56	888	-	146	-	-	-
57	-	-	886	-	-	-
58	-	-	-	-	-	-
59	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

See **Figure 7** for the location of the thermocouples.

### Specimen Lateral Deflection

Time (minutes)	Deflection (mm)
	Centre
0	0.0
1	3.0
2	2.9
3	3.5
4	3.8
5	3.5
6	3.1
7	2.4
8	2.2
9	1.9
10	1.4
11	1.1
12	0.9
13	0.2
14	-0.3
15	-0.1
16	-0.7
17	-1.6
18	-1.9
19	-2.3
20	-2.1
21	-2.5
22	-2.8
23	-3.3
24	-4.3
25	-5.3
26	-5.4
27	-6.1
28	-6.9
29	-8.4
30	-9.3
31	-9.7
32	-10.8
33	-12.8
34	-13.9
35	-14.4
36	-15.3
37	-16.0
38	-16.5

Time (minutes)	Deflection (mm)
	Centre
39	-17.8
40	-18.1
41	-19.4
42	-19.9
43	-19.7
44	-21.3
45	-22.3
46	-23.3
47	-23.6
48	-23.6
49	-24.3
50	-25.1
51	-24.9
52	-24.5
53	-24.4
54	-24.1
55	-23.1
56	-22.9
57	-25.2
58	-25.1
59	-22.7
60	-21.3

The deflection was recorded at the approximate centre of the specimen. Positive readings indicate deflection into the furnace.



## PHOTOGRAPHS

### Exposed Face Prior to Test





## Unexposed Face Prior to Test





## Unexposed Face at 30 Minutes





## Unexposed Face at 1 Hour, at Test Termination



### FIELD OF DIRECT APPLICATION

#### General

The results of the fire test are directly applicable to similar constructions where one or more of the changes listed below are made and the construction continues to comply with the appropriate design code for its stiffness and stability.

- i) Decrease in height.
- ii) Increase in the thickness of the wall.
- iii) Increase thickness of component materials.
- iv) Decrease in the linear dimensions of the boards but not thickness.
- v) Decrease stud spacing.
- vi) Decrease in fixing centres.
- vii) Increase in the number of horizontal joints, of the type tested, when tested with one joint not more than  $(500 \pm 150)$  mm from the top edge.

#### Extension of Width

For test specimens tested without a supporting construction, the width of an identical construction may be increased as the specimen was tested at nominally 3000 mm wide with one vertical edge without restraint.

#### Extension of Height

The height of the construction may be increased by 1000 mm under the following conditions:

30 minutes	60 minutes
$\leq 100$ mm	$\leq 100$ mm