

The Building Test Centre

Fire Acoustics Structures

The Building Test Centre

British Gypsum

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Report Number: **BTC 20740F**

A FIRE RESISTANCE TEST ON A BRITISH GYPSUM GYPWALL QUIET IWL TWIN FRAME PARTITION CLAD WITH AN OUTER LAYER OF 12.5MM GYPROC HABITO AND INNER LAYER OF 15MM GYPROC SOUNDBLOC F EACH SIDE WITH 50MM ISOVER APR 1200 INSULATION IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 15th November 2018

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FOREWORD

This test report details a fire resistance test conducted on a twin frame metal stud partition clad on each face with an inner layer of Gyproc SoundBloc F and an outer layer of Gyproc Habito incorporating 50mm Isover Acoustic Partition Roll 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 9th and 14th November 2018. The Building Test Centre played no role in the design or selection of materials comprising the test specimen.

The test was witnessed by Mr Robert Evans and was conducted on the 15th November 2018.

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: 2012, section 12.1)

REPORT AUTHORISATION

Report Author



Denis Bradshaw
Scientist

Authorised by



Paul Miller
BSc. (Hons.)
Fire Test Manager

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TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author

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Role

Amendments Authorised by

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TEST CONSTRUCTION

Description of Construction

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

Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres using 60mm fire resistant fixings.

Gypframe 48I50 'I' Studs were positioned at 600mm centres between the channels. 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 a 25mm thick rock mineral fibre gasket.

At the left-hand edge a Gypframe 48S50 'C' Stud was used to fix the partition to the test frame, using 60mm fire resistance fixings at 600mm centres.

A second framework using the same components and fixing details was located to create the twin frame and a final partition thickness of 200mm. The Gypframe 48I50 'I' Studs were located at 600mm centres parallel with the first set of framework studs.

Thermocouples were added to the studs at mid height on the web, hot and cold flanges of the central two studs on both the exposed frame and unexposed frame.

50mm Isover APR 1200 was placed within the stud cavity.

Both the unexposed face and exposed face of the specimen were clad with an inner layer of 15mm Gyproc SoundBloc F and an outer layer of 12.5mm Gyproc Habito.

The inner layer of boards was screw fixed around the perimeter of the board at 300mm centres using 25mm British Gypsum Drywall Screws.

The outer layer of boards was screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 40mm British Gypsum High Performance Screws.

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 2400mm from the base on the outer layer boards and at 600mm from the base on the inner layer boards, on both faces of the specimen. A Gypframe GFS1 Fixing Strap was used behind the horizontal outer layer board joint.

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.

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Test Construction Drawings

Horizontal Cross Section

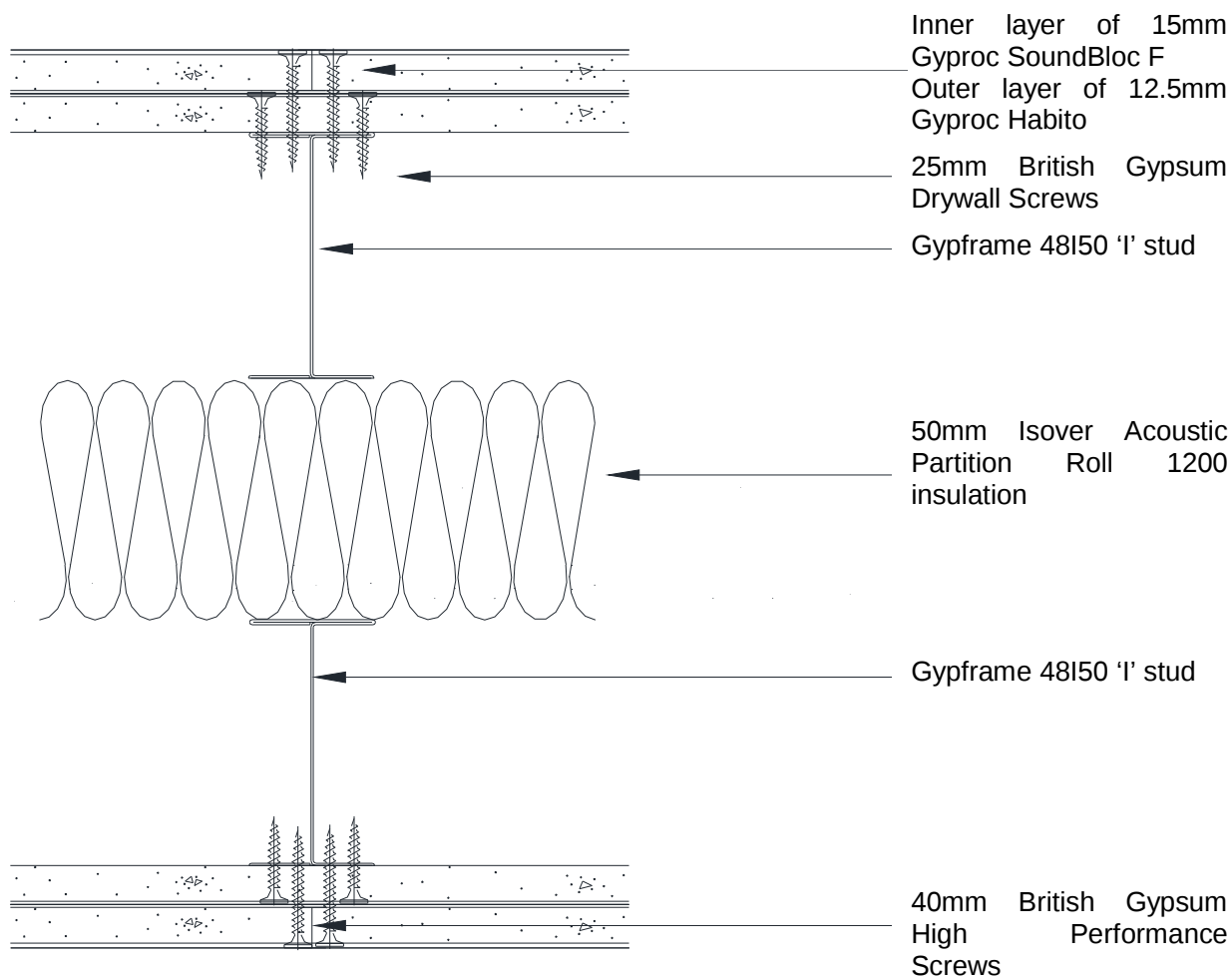


Figure 1 – Horizontal cross section.

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Exposed Face Elevation

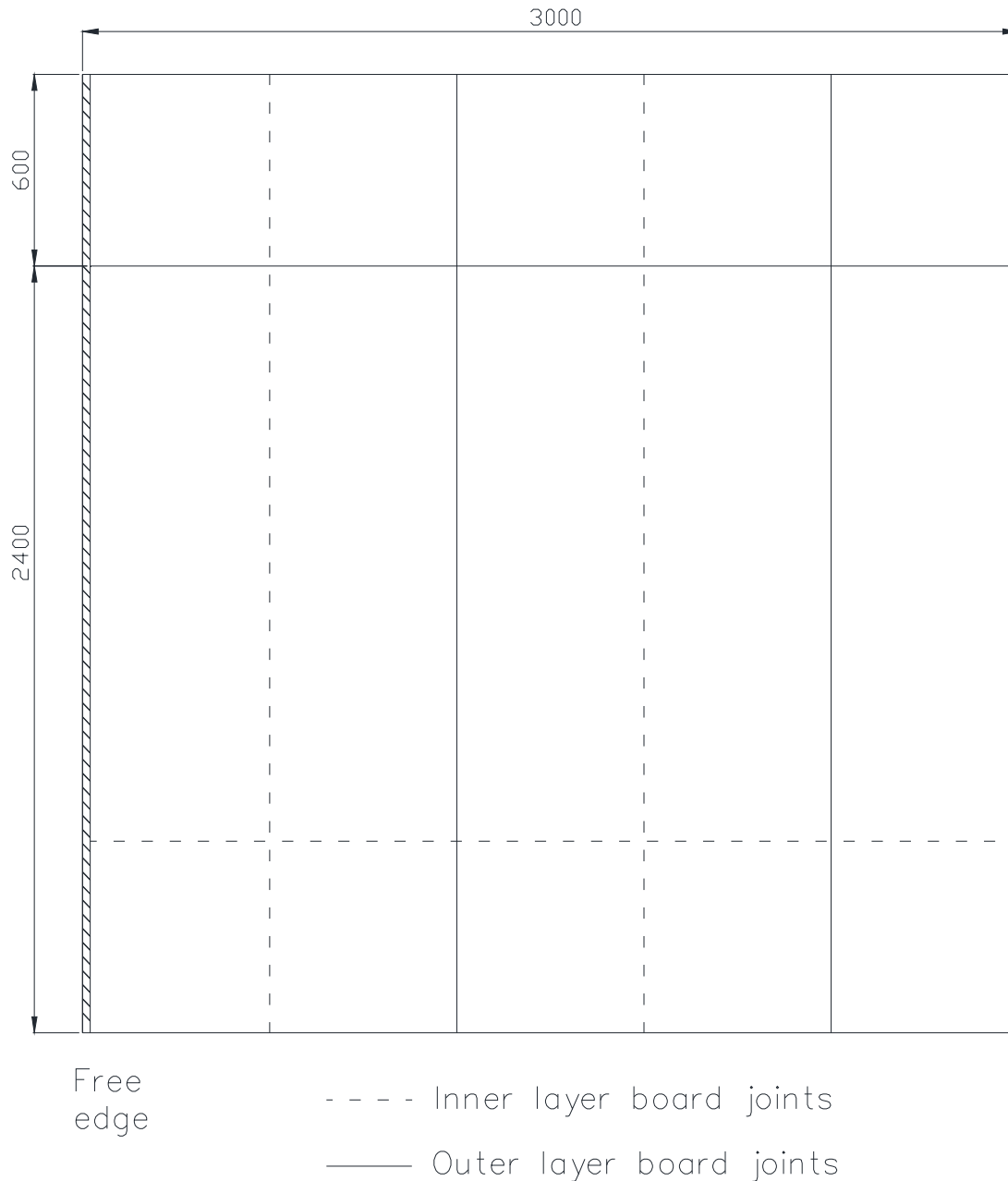


Figure 2 – Exposed face elevation.

Unexposed Face Elevation

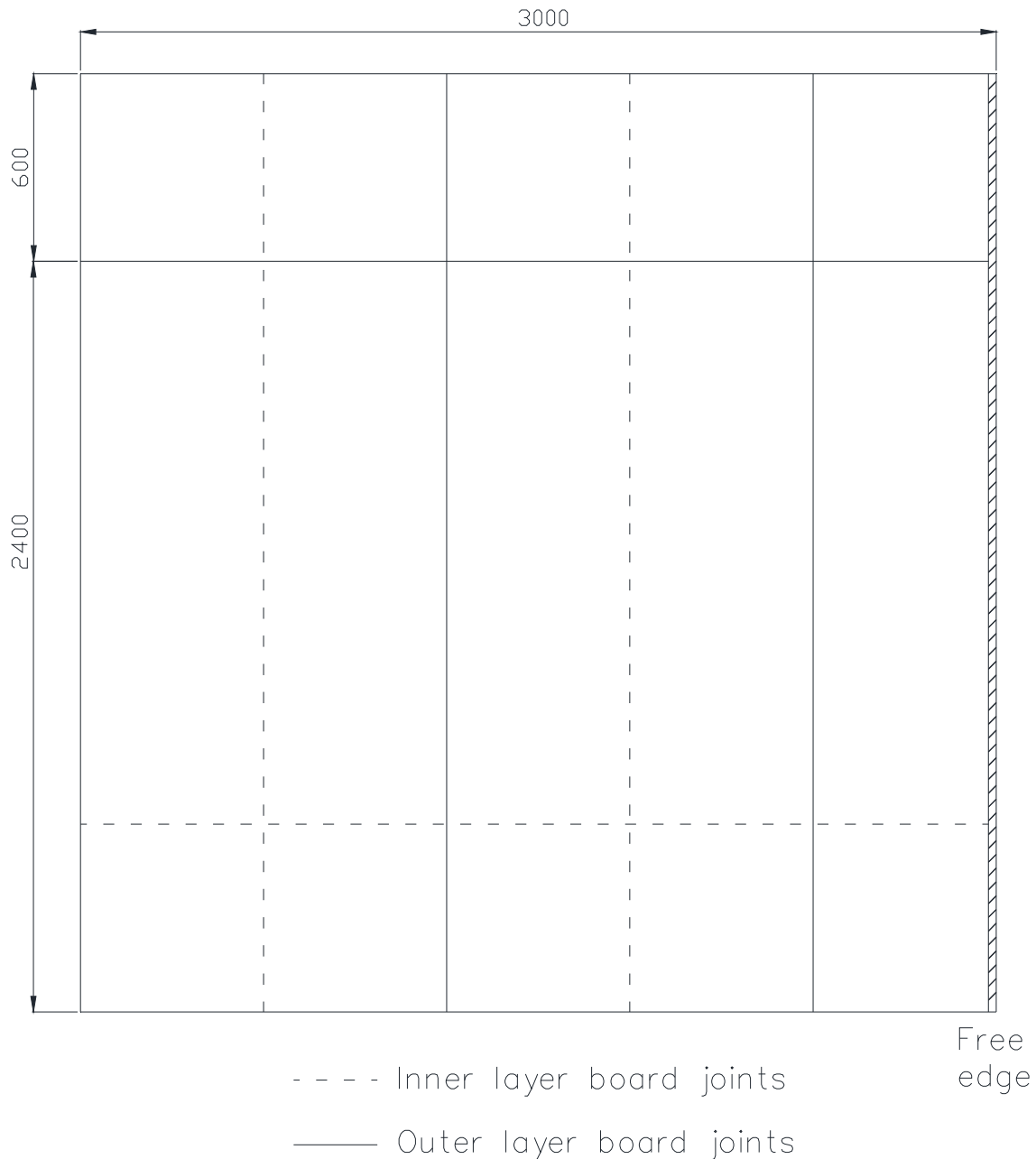


Figure 3 – Unexposed face elevation.

TEST MATERIALS

Plasterboard

- i) Nominally, 2400mm (long) x 1200mm (wide) x 15mm (thick), Gyproc SoundBloc F (TE), manufactured and supplied by British Gypsum, ex Kirkby Thore.

Measured mass per unit area:	13.6 kg/m ²
Measured thickness:	15.4 mm
Board identification numbers:	26 176 18 09:47
	26 176 18 09:47
	26 176 18 09:47
Measured moisture content:	0.55%

- ii) Nominally, 2400mm (long) x 1200mm (wide) x 12.5mm (thick), Gyproc Habito (TE), manufactured and supplied by British Gypsum, ex Sherburn.

Measured mass per unit area:	12.2 kg/m ²
Measured thickness:	12.9 mm
Board identification numbers:	31 276 18 10:51
	31 276 18 10:51
	31 276 18 10:52
Measured moisture content:	0.27%

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.

Metal Components

- iii) Gypframe 50FEC50 Standard Folded Edge Floor & Ceiling Channels.
- iv) Gypframe 48I50 'I' Studs.
- v) Gypframe 48S50 'C' Studs.
- vi) Gypframe GFS1 Fixing Strap.

All metal components were supplied by British Gypsum.

Fasteners

- vii) 25mm British Gypsum Drywall Screws, supplied by British Gypsum.
- viii) 40mm British Gypsum High Performance Screws, supplied by British Gypsum.
- ix) 60mm fire resistant fixings, supplied by The Building Test Centre.

Miscellaneous Components

- x) Gyproc Paper Joint Tape, supplied by British Gypsum.
- xi) Gyproc Joint Filler, supplied by British Gypsum.
- xii) Rock mineral fibre gasket, supplied by The Building Test Centre.

Insulation

- xiii) Nominally 50mm (thick) Isover APR 1200 manufactured and supplied by Saint-Gobain Isover.

Measured surface density: 0.625 kg/m²

Where measurements could not be taken then mass and dimensions were provided by the customer or the manufacturer e.g. from material labelling. Material information was recorded according to procedure AP070 vs. 1.1.

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 19°C.

The furnace pressure was set to control at 18 ± 2 Pa positive with respect to atmosphere, 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: 2012 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: 2012.

TEST RESULTS

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

Integrity	Sustained Flaming	150 minutes, no failure.
	6mm Gap Gauge	150 minutes, no failure.
	25mm Gap Gauge	150 minutes, no failure.
	Cotton Pad	150 minutes, no failure.
Insulation		126 minutes.
Test Terminated		150 minutes, at the request of the sponsor.

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: Denis Bradshaw and Lynda Cooper
Exposed face: Ryan Skilton

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 1-2 mm. Right-hand vertical joint had opened up to approximately 2-3 mm. Horizontal joint had opened up to approximately 1-2 mm.
0	30	Left-hand vertical joint had opened up to approximately 4-5 mm. Right-hand vertical joint had opened up to approximately 3-4 mm. Horizontal joint had opened up to approximately 1-2 mm. <i>Unexposed face</i> No visible change.
0	40	Left-hand vertical joint had opened up to approximately 10-12 mm. Right-hand vertical joint had opened up to approximately 6-8 mm. Horizontal joint had opened up to approximately 4-6 mm. Cracks around screw heads adjacent to all joints.
0	50	Left-hand vertical joint had opened up to approximately 20 mm. Right-hand vertical joint had opened up to approximately 8-10 mm. Horizontal joint had opened up to approximately 10-12 mm. Boards breaking around screw heads adjacent to joints.

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Time		Observations
Hours	Minutes	
1	00	Left-hand vertical joint had opened up to approximately 30-35 mm. Right-hand vertical joint had opened up to approximately 20-25 mm. Horizontal joint had opened up to approximately 20 mm. Boards had begun to pull away from screw heads adjacent to all joints. <i>Unexposed face</i> No visible change.
1	10	Left-hand vertical joint had opened up to approximately 50 mm. Right-hand vertical joint had opened up to approximately 35 mm. Horizontal joint had opened up to approximately 20 mm.
1	20	Left-hand vertical joint had opened up to approximately 200 mm. Right-hand vertical joint had opened up to approximately 600 mm. Horizontal joint had opened up to approximately 40 mm. Lower left-hand board had begun to peel away from the left-hand vertical joint into the furnace.
1	25	Lower left-hand board had fallen into the furnace.
1	30	Second layer left-hand vertical joint had opened up to approximately 10-12 mm. Second layer right-hand vertical joint had opened up to approximately 15-18 mm. Second layer upper centre board had a vertical crack approximately 600 mm long down the centre. Second layer lower centre board had a vertical crack approximately 600 mm long down the centre from the horizontal joint. Second layer boards were crazed. <i>Unexposed face</i> No visible change.
1	42	The second layer centre boards had fallen into the furnace. Third layer boards were crazed.

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Time Hours Minutes		Observations
1	50	Approximately 65% of the first and second layer boards had fallen into the furnace. Studs of the first frame had severely warped. <i>Unexposed face</i> Screw heads had discoloured on the left-hand vertical joint from approximately 900mm to 1800mm height. Screw heads discoloured on the right-hand vertical joint from approximately 1200mm to 2400mm height.
1	58	<i>Unexposed face</i> Screw heads had discoloured on the centre of the lower centre board at approximately 600 mm to 1500 mm height.
2	00	Approximately 80% of the first and second layer boards had fallen into the furnace. No other visible change.
2	06	<i>Unexposed face</i> All screw heads had discoloured. INSULATION FAILURE. The temperature rise of thermocouple no.32 positioned at mid-height on the centre of the lower centre board exceeded 180°C.
2	10	Approximately 90% of the first and second layer boards had fallen into the furnace. No other visible change. <i>Unexposed face</i> Discoloured line down the centre of the left-hand board from approximately 600 mm to 1800 mm height.
2	15	<i>Unexposed face</i> Discoloured line down the centre of the left-hand board from approximately 1800 mm to 2400 mm height.
2	20	All remaining first and second layer boards had fallen into the furnace. No other visible change.

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Time		Observations
Hours	Minutes	
2	21	<i>Unexposed face</i> Cotton pad attempt at the top of specimen, approximately 900 mm from the free edge – no failure.
2	25	<i>Unexposed face</i> The mean temperature rise of the standard five thermocouples exceeded 140°C.
2	30	No visible change.
2	30	TEST TERMINATED at the request of the sponsor.

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Furnace Temperature Graph

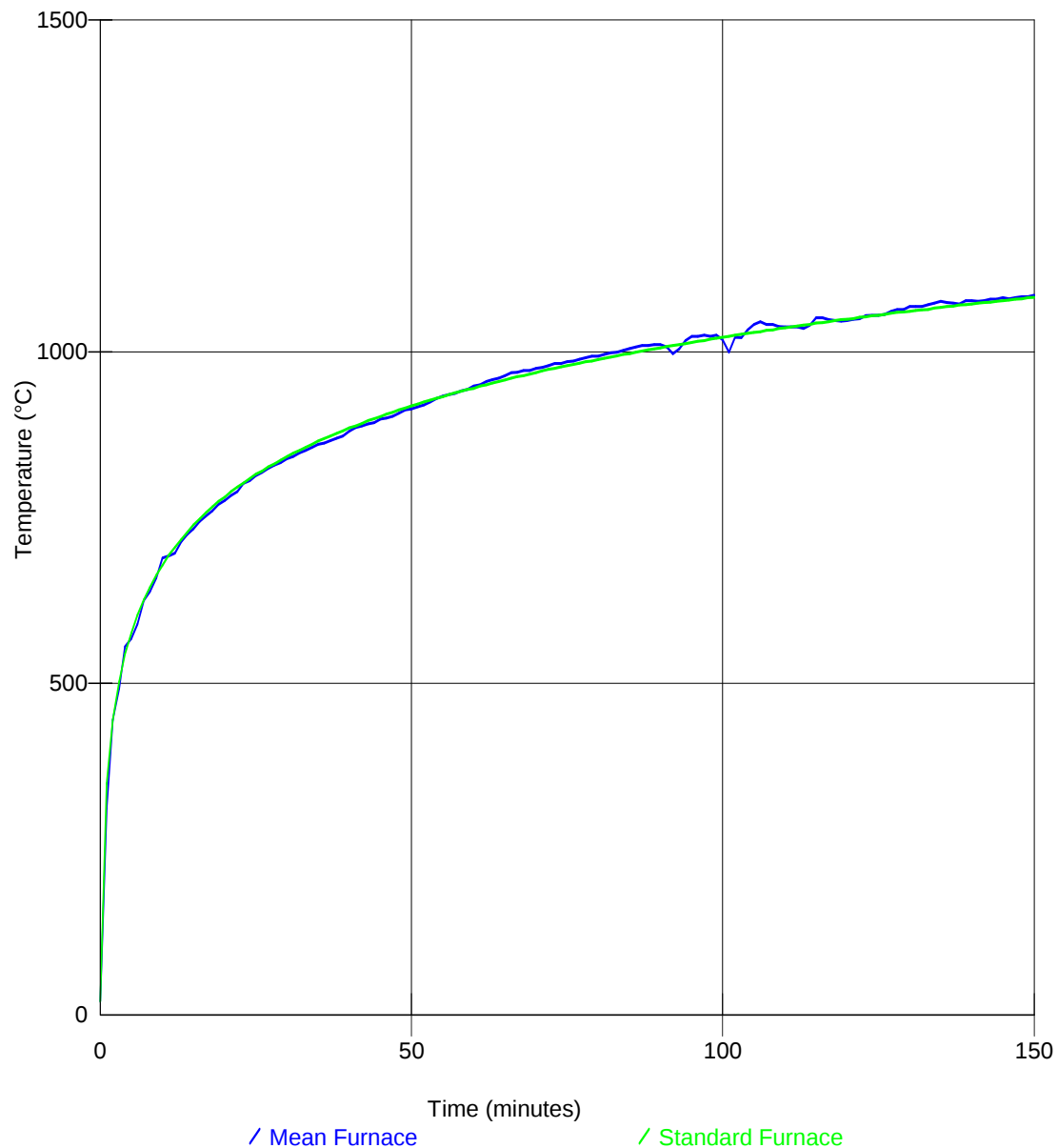


Figure 4 – Furnace temperature graph.

Furnace Pressure Graph

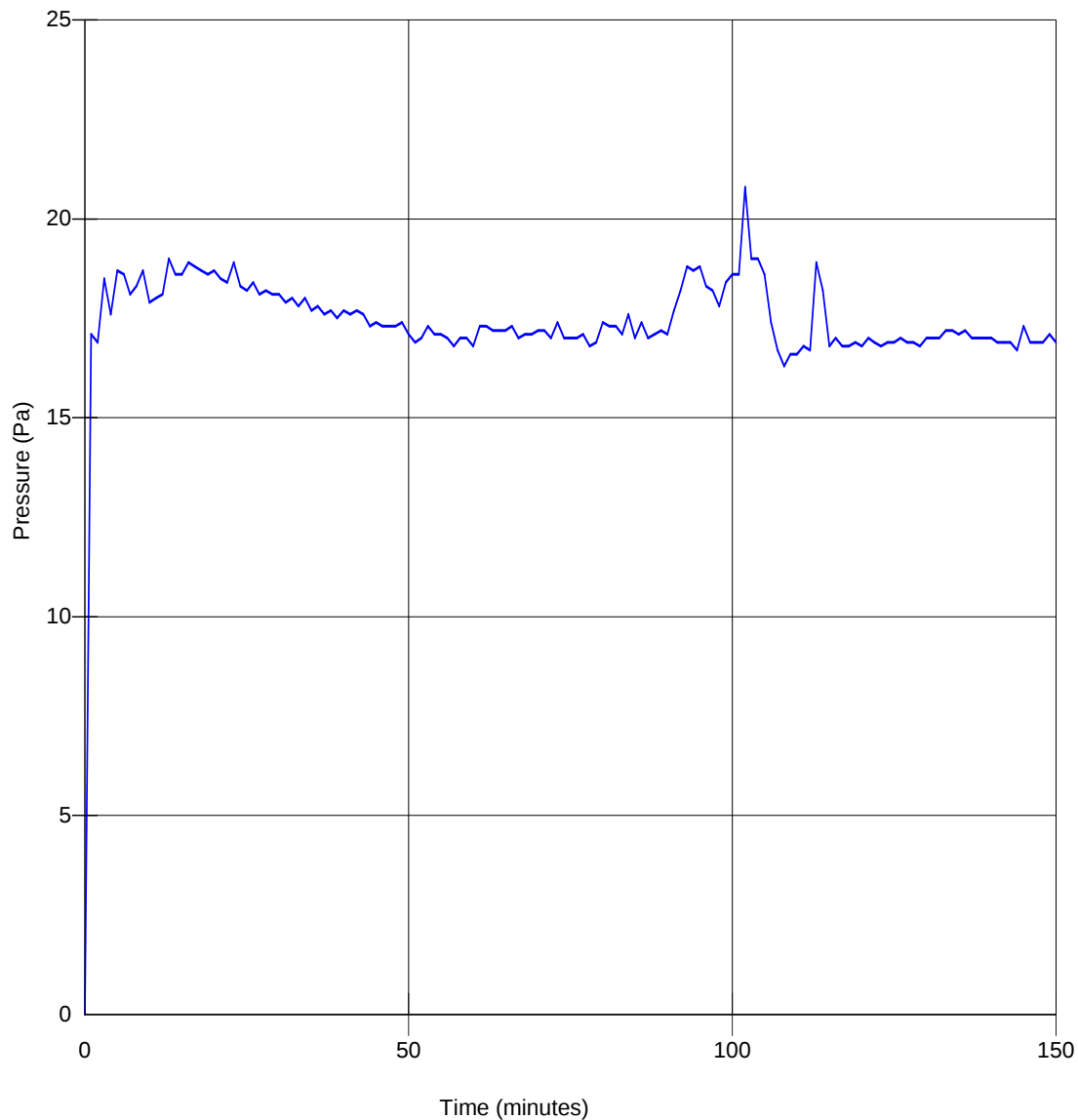


Figure 5 – Furnace pressure graph.

Unexposed Face Temperature Graph

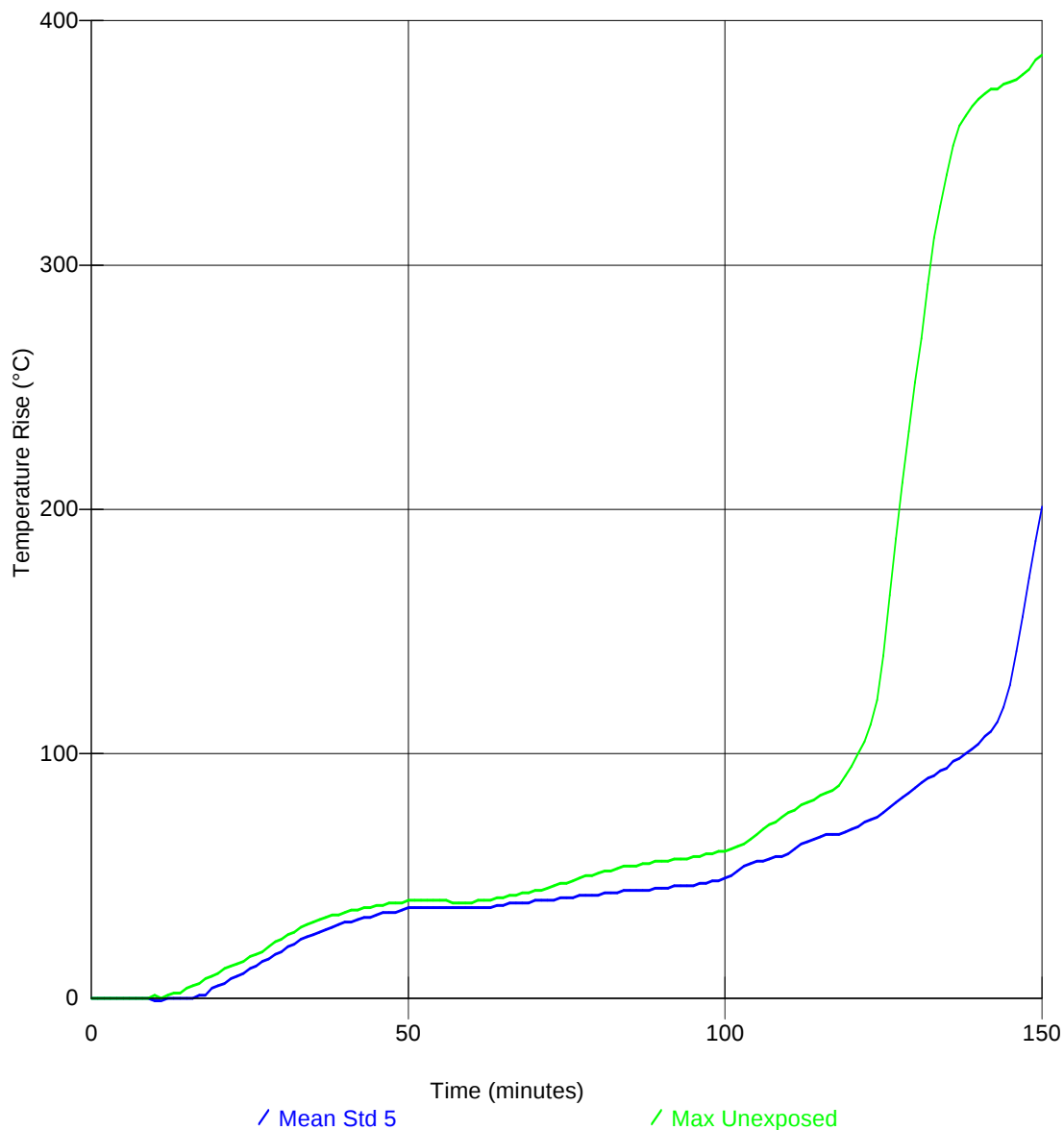


Figure 6 – Unexposed face temperature graph.

Unexposed Face Thermocouple Layout

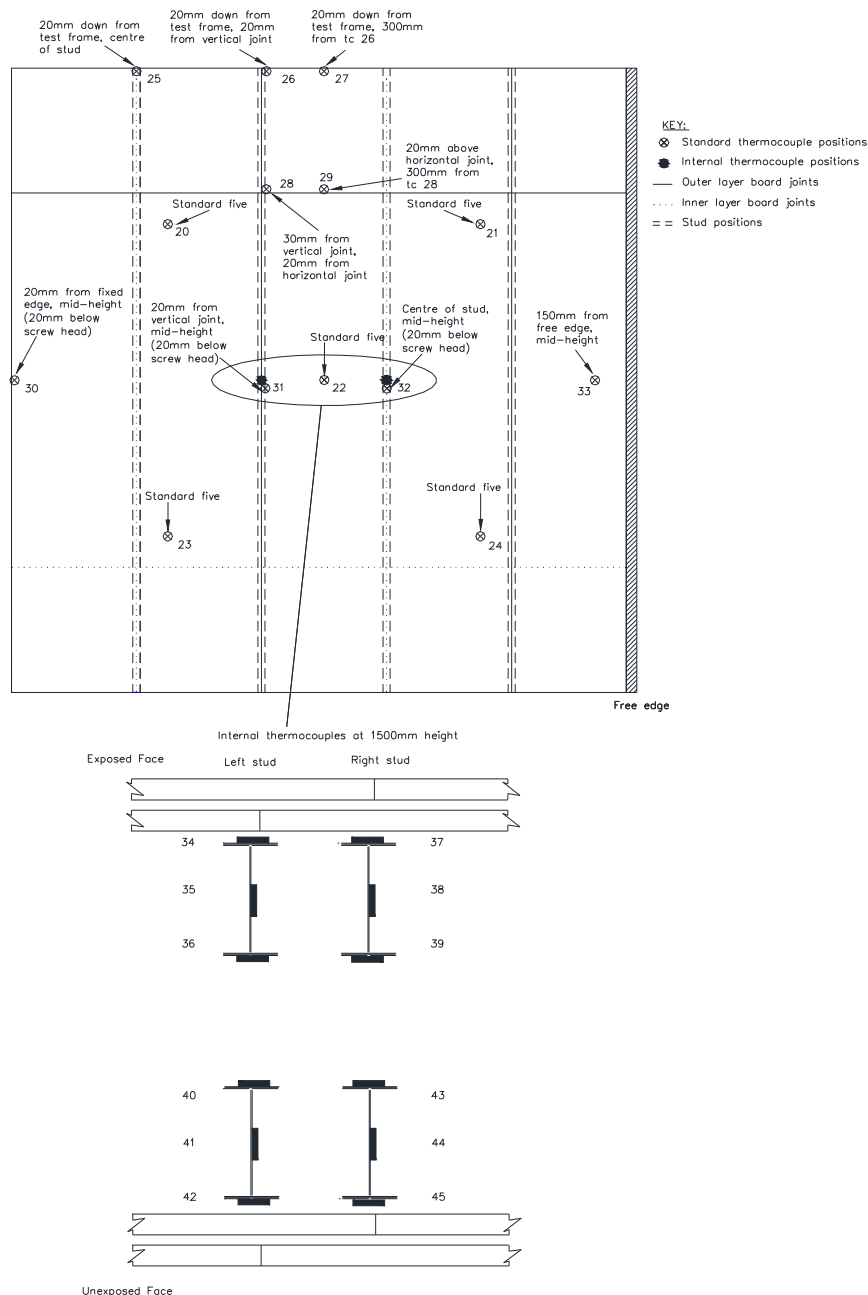


Figure 7 – Unexposed face thermocouple layout.

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Unexposed Face Standard Five Temperature Data

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

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Time (minutes)	Temperature Rise (°C)					Mean Standard Five
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	
38	34	33	27	25	26	29
39	34	34	28	26	27	30
40	35	35	29	27	28	31
41	36	35	29	28	29	31
42	36	36	30	29	30	32
43	37	36	31	30	31	33
44	37	37	31	30	31	33
45	38	37	32	31	32	34
46	38	38	32	32	33	35
47	39	38	33	32	33	35
48	39	38	33	33	34	35
49	39	39	34	34	35	36
50	40	39	34	34	36	37
51	40	38	34	35	36	37
52	40	39	35	35	36	37
53	40	39	34	35	35	37
54	40	39	35	35	36	37
55	40	39	35	35	37	37
56	40	39	35	36	37	37
57	39	39	35	36	37	37
58	39	39	35	36	37	37
59	39	39	35	36	37	37
60	39	39	35	36	37	37
61	40	39	35	36	37	37
62	40	39	35	36	37	37
63	40	39	35	36	37	37
64	41	40	36	36	37	38
65	41	40	36	37	37	38
66	42	41	36	37	37	39
67	42	41	36	37	37	39
68	43	42	36	37	37	39
69	43	42	37	37	37	39
70	44	43	37	37	37	40
71	44	43	37	37	37	40
72	45	44	38	37	37	40
73	46	44	38	37	37	40
74	47	45	39	37	37	41
75	47	45	39	37	37	41
76	48	45	39	37	37	41
77	48	46	40	38	37	42

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
78	48	46	40	38	38	42
79	49	46	41	38	38	42
80	49	46	41	38	38	42
81	49	46	41	39	38	43
82	50	47	42	39	39	43
83	50	47	42	39	39	43
84	50	47	42	40	39	44
85	50	47	42	40	39	44
86	50	47	42	40	40	44
87	50	48	42	41	40	44
88	50	48	43	41	40	44
89	50	48	43	41	41	45
90	51	48	43	42	41	45
91	51	49	44	42	41	45
92	51	49	44	42	42	46
93	51	49	45	43	42	46
94	51	49	45	43	42	46
95	50	49	46	44	43	46
96	50	50	47	44	44	47
97	50	50	47	45	44	47
98	50	50	48	45	45	48
99	51	51	48	46	46	48
100	51	51	49	47	47	49
101	50	52	50	47	51	50
102	51	53	52	49	54	52
103	52	54	54	51	57	54
104	53	54	55	53	58	55
105	54	55	55	55	59	56
106	55	56	56	56	59	56
107	56	56	56	57	59	57
108	58	57	56	58	59	58
109	58	59	56	58	58	58
110	59	63	58	58	58	59
111	62	65	61	58	58	61
112	65	66	65	58	59	63
113	66	66	67	57	62	64
114	67	67	67	59	66	65
115	67	67	67	63	67	66
116	67	67	67	66	68	67
117	67	68	67	67	68	67

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
118	67	68	67	67	67	67
119	68	69	68	67	68	68
120	69	71	69	67	68	69
121	70	74	70	67	69	70
122	72	79	70	67	70	72
123	73	82	70	68	71	73
124	75	84	71	69	72	74
125	78	86	72	70	74	76
126	82	87	76	71	75	78
127	85	88	81	72	76	80
128	87	90	84	73	77	82
129	89	91	86	75	80	84
130	90	92	88	78	84	86
131	92	93	89	81	87	88
132	93	94	91	84	89	90
133	94	95	92	85	91	91
134	96	97	94	87	93	93
135	97	98	95	88	94	94
136	99	100	98	90	96	97
137	100	101	99	91	98	98
138	102	103	101	93	100	100
139	104	105	104	94	102	102
140	106	108	107	96	104	104
141	109	111	110	97	106	107
142	111	114	113	99	109	109
143	113	120	120	101	111	113
144	116	130	132	104	115	119
145	121	142	148	106	122	128
146	133	163	170	108	135	142
147	144	181	190	111	154	156
148	165	197	207	116	174	172
149	185	209	220	127	192	187
150	201	221	234	141	208	201

Figures highlighted in red indicate the minute in which the temperature rise exceeded 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. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	-1	0	-1	0
10	0	-1	1	0	0
11	0	0	0	0	-1
12	1	1	1	0	-1
13	2	2	1	0	0
14	2	2	1	0	0
15	4	3	2	1	1
16	5	4	2	2	1
17	6	6	4	3	2
18	8	7	3	4	3
19	9	8	5	5	4
20	10	9	7	6	5
21	12	11	8	8	7
22	13	12	10	9	8
23	14	13	11	11	10
24	15	15	13	12	11
25	17	16	14	14	13
26	18	17	15	15	14
27	19	18	17	17	15
28	20	20	18	18	17
29	21	21	19	19	18
30	22	22	20	21	19
31	23	23	21	22	21
32	24	24	22	23	22
33	25	25	23	24	23
34	26	25	24	25	24
35	26	26	25	26	25
36	27	27	26	26	26
37	27	27	26	27	27

The Building Test Centre

Fire Acoustics Structures

The Building Test Centre
British Gypsum
East Leake
Loughborough
Leicestershire, LE12 6NP
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Fax: (0115) 945 1562
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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
38	27	28	27	28	28
39	28	28	28	28	28
40	28	29	28	29	29
41	28	29	29	29	29
42	29	30	29	30	30
43	29	30	30	30	30
44	29	30	30	31	31
45	29	30	30	31	31
46	29	31	31	32	32
47	30	31	31	32	32
48	29	32	31	32	32
49	30	31	31	33	33
50	31	32	32	32	33
51	31	32	32	33	34
52	30	32	34	34	33
53	30	33	33	33	33
54	31	33	33	34	33
55	31	33	33	34	34
56	31	33	34	34	34
57	31	34	34	34	34
58	31	34	34	35	34
59	32	34	34	35	34
60	32	35	34	35	34
61	32	35	34	36	35
62	33	35	34	36	35
63	34	36	35	37	35
64	34	37	35	37	35
65	35	37	35	38	36
66	36	38	35	38	37
67	37	39	36	39	37
68	39	40	36	40	38
69	40	41	36	40	38
70	41	42	36	41	39
71	43	43	37	42	39
72	44	44	37	42	40
73	45	45	38	43	40
74	46	46	38	43	41
75	47	47	38	44	41
76	48	48	39	45	41
77	49	49	40	45	42

Customer: **British Gypsum**

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East Leake

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
78	49	50	40	46	42
79	50	50	41	46	43
80	50	51	41	47	43
81	51	52	42	47	43
82	51	52	43	47	44
83	52	53	43	48	45
84	52	54	44	48	45
85	52	54	44	48	45
86	53	54	44	48	46
87	53	55	45	48	46
88	53	55	45	48	46
89	54	56	46	48	46
90	54	56	46	48	46
91	54	56	47	48	46
92	55	57	47	48	46
93	55	57	47	48	46
94	56	57	48	48	46
95	56	58	49	48	46
96	57	58	49	49	46
97	57	59	50	49	46
98	58	59	51	49	46
99	59	60	52	49	46
100	59	60	53	50	47
101	60	61	54	50	47
102	62	61	55	51	47
103	63	63	58	52	48
104	65	64	60	53	48
105	67	66	61	54	49
106	69	67	63	56	49
107	71	68	63	59	49
108	72	69	64	61	50
109	74	71	64	63	53
110	76	72	64	65	56
111	77	73	65	65	59
112	79	75	66	66	60
113	80	77	66	67	61
114	81	79	67	68	62
115	83	81	68	68	63
116	84	82	70	69	63
117	85	83	71	70	64

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
118	87	84	72	71	65
119	89	86	74	73	66
120	90	87	76	75	67
121	92	88	79	78	68
122	94	90	82	80	69
123	96	91	85	82	70
124	98	92	88	83	71
125	100	94	90	85	72
126	101	96	92	86	74
127	103	97	94	87	76
128	105	100	95	89	78
129	107	103	97	90	80
130	110	105	98	91	81
131	113	108	100	92	82
132	116	111	101	93	84
133	120	115	103	94	85
134	126	120	105	95	86
135	133	124	107	96	87
136	145	129	109	97	89
137	158	134	113	98	89
138	174	141	118	99	90
139	190	148	124	100	92
140	205	156	131	102	93
141	219	164	141	105	94
142	233	175	152	110	96
143	246	186	165	116	97
144	257	197	178	127	99
145	269	210	192	140	101
146	280	222	207	152	104
147	290	234	223	175	107
148	299	248	242	194	113
149	306	261	265	210	124
150	310	276	288	224	138

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

Additional Unexposed Face Temperature Data

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

The Building Test Centre

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
38	26	30	27	28
39	27	30	28	29
40	27	31	29	30
41	28	32	29	31
42	28	33	30	32
43	29	33	31	33
44	29	34	31	33
45	30	34	32	34
46	30	35	33	35
47	31	35	33	35
48	31	35	34	35
49	31	36	34	36
50	32	36	35	36
51	32	36	35	37
52	32	38	36	37
53	31	37	36	37
54	32	37	36	38
55	32	37	37	38
56	32	37	37	38
57	32	37	37	37
58	32	37	37	37
59	32	37	37	37
60	32	37	37	37
61	32	37	38	37
62	32	37	38	37
63	32	37	38	37
64	32	37	38	37
65	32	38	38	37
66	32	38	38	38
67	33	38	38	38
68	33	38	39	38
69	33	38	39	38
70	33	39	40	39
71	33	39	40	39
72	33	40	41	39
73	33	40	41	40
74	33	40	42	40
75	34	41	43	41
76	35	41	43	42
77	35	42	44	42

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
78	36	42	45	43
79	37	43	45	43
80	37	43	46	44
81	38	44	46	44
82	38	44	46	45
83	39	45	47	45
84	39	45	47	45
85	40	46	47	46
86	41	46	48	46
87	42	46	48	46
88	43	47	48	47
89	44	47	48	47
90	45	47	48	48
91	46	47	49	48
92	47	48	49	49
93	49	48	49	49
94	49	48	49	50
95	50	49	50	50
96	50	50	50	51
97	51	51	50	51
98	51	52	51	52
99	52	53	52	52
100	52	54	52	53
101	52	55	53	53
102	51	56	55	53
103	51	56	56	54
104	52	56	58	54
105	54	56	59	56
106	56	56	60	57
107	57	56	62	58
108	59	56	64	60
109	60	57	66	61
110	59	60	68	63
111	59	63	70	64
112	59	64	71	65
113	59	65	73	68
114	60	66	75	70
115	60	67	78	70
116	61	68	80	71
117	61	68	83	71

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
118	61	68	87	71
119	62	69	91	71
120	62	70	95	72
121	63	71	100	73
122	64	75	105	74
123	65	80	112	75
124	66	83	122	78
125	67	85	140	82
126	68	87	165	88
127	70	88	188	91
128	71	89	211	94
129	73	90	232	96
130	76	91	252	97
131	80	92	270	98
132	84	93	292	99
133	88	94	311	101
134	92	95	324	102
135	97	96	337	104
136	102	97	349	106
137	107	99	357	107
138	113	101	361	109
139	119	107	365	112
140	125	116	368	114
141	133	125	370	116
142	141	138	372	119
143	152	155	372	123
144	165	176	374	129
145	178	195	375	144
146	191	212	376	159
147	202	227	378	183
148	213	243	380	205
149	223	258	384	225
150	232	272	386	242

Figures highlighted in red indicate the minute in which the temperature rise exceeded 180°C.

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

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Internal Temperature Data on Exposed Face Studs at 1500mm Height

Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
0	24	23	23	24	23	23
1	24	23	23	24	23	23
2	25	23	23	26	23	23
3	29	26	23	29	23	23
4	44	35	24	32	24	23
5	67	45	26	37	25	24
6	74	50	30	44	28	25
7	77	53	37	51	33	29
8	80	57	47	60	42	37
9	83	63	56	69	52	49
10	86	71	66	79	62	60
11	89	77	73	86	71	69
12	91	80	77	91	77	74
13	93	83	79	95	82	78
14	94	84	81	98	85	80
15	95	86	82	99	87	82
16	95	87	83	100	88	83
17	96	88	84	100	89	83
18	96	89	84	101	89	83
19	97	90	85	101	90	84
20	98	91	87	102	91	85
21	99	93	90	104	93	86
22	100	96	93	104	94	88
23	101	98	96	106	95	89
24	102	99	98	108	96	91
25	103	101	100	110	96	93
26	104	103	102	114	97	94
27	105	105	104	119	98	96
28	106	107	106	124	99	97
29	108	109	108	130	100	99
30	111	112	111	135	101	100
31	116	116	114	140	103	102
32	124	119	117	144	104	103
33	134	122	119	148	107	104
34	142	125	122	152	109	105
35	148	128	124	156	111	106

Customer: **British Gypsum**



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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
36	154	131	126	161	113	107
37	159	134	128	165	116	108
38	165	137	130	171	118	109
39	173	142	131	177	120	110
40	184	148	133	185	122	112
41	196	155	136	193	124	113
42	210	163	139	204	127	115
43	226	172	143	215	130	117
44	243	181	148	229	133	119
45	260	189	154	243	138	122
46	276	198	161	259	145	127
47	291	206	168	275	154	133
48	303	214	176	292	166	141
49	316	222	187	309	179	151
50	327	233	198	326	195	164
51	339	244	211	342	212	176
52	350	258	226	358	229	191
53	362	271	241	373	246	207
54	375	286	257	388	265	226
55	387	301	273	402	283	244
56	399	316	290	415	300	263
57	411	331	306	426	316	279
58	421	345	321	436	330	293
59	431	357	336	446	342	305
60	442	369	349	457	353	316
61	454	382	363	467	364	327
62	459	393	376	472	375	340
63	465	403	388	477	387	353
64	471	412	399	483	399	366
65	479	421	409	490	411	378
66	488	430	416	497	421	391
67	508	446	426	504	431	405
68	524	463	442	509	439	414
69	537	475	457	515	447	426
70	547	483	468	520	454	436
71	556	489	476	524	459	445
72	563	495	483	528	464	451
73	569	501	490	532	469	456

Customer: **British Gypsum**

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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
74	575	507	497	536	474	462
75	581	512	502	540	480	467
76	587	516	507	545	485	474
77	592	520	512	549	490	480
78	596	524	516	553	496	486
79	600	528	521	558	501	492
80	605	532	526	563	507	499
81	610	537	531	568	512	505
82	614	542	537	573	518	511
83	618	546	541	577	523	517
84	622	551	546	582	529	523
85	627	557	552	587	534	529
86	640	570	563	592	540	535
87	694	601	590	599	549	543
88	733	625	612	607	558	553
89	763	647	633	615	568	563
90	796	669	654	625	580	576
91	825	664	683	636	595	591
92	853	681	638	650	615	611
93	892	695	668	666	640	636
94	919	716	705	687	665	661
95	934	736	728	711	693	693
96	-	749	743	737	720	717
97	-	760	751	765	745	735
98	-	765	754	792	776	751
99	-	824	831	838	888	913
100	-	-	-	857	-	-
101	-	-	-	-	-	-
102	-	-	-	-	-	-
103	-	-	-	-	-	-
104	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

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

The Building Test Centre

Fire Acoustics Structures

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Internal Temperature Data on Unexposed Face Studs at 1500mm Height

Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 40	Web Thermocouple No. 41	Cold Flange Thermocouple No. 42	Hot Flange Thermocouple No. 43	Web Thermocouple No. 44	Cold Flange Thermocouple No. 45
0	21	21	20	21	21	20
1	21	21	20	21	20	20
2	21	21	20	21	20	20
3	21	21	20	21	20	20
4	21	21	20	21	20	20
5	21	21	20	21	21	20
6	21	21	20	21	21	20
7	23	22	20	22	22	21
8	26	29	21	26	25	22
9	40	45	29	35	32	26
10	57	62	43	46	42	33
11	69	73	55	54	52	41
12	74	77	61	62	62	50
13	78	80	66	69	68	57
14	80	82	69	73	72	62
15	81	83	72	75	75	66
16	82	83	73	77	76	68
17	82	84	74	78	78	71
18	82	84	74	79	79	72
19	82	84	74	79	79	73
20	82	84	75	80	80	74
21	83	85	77	81	81	75
22	84	86	78	83	83	77
23	85	87	79	84	84	78
24	86	88	80	85	85	80
25	86	89	81	86	86	81
26	87	89	82	87	86	81
27	88	90	82	87	87	82
28	88	90	83	87	87	83
29	89	91	83	88	87	83
30	89	92	84	88	88	84
31	90	93	84	88	88	84
32	91	94	85	88	88	85
33	91	94	85	89	89	85
34	92	95	86	89	89	86
35	93	96	86	89	89	86

Customer: **British Gypsum**



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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 40	Web Thermocouple No. 41	Cold Flange Thermocouple No. 42	Hot Flange Thermocouple No. 43	Web Thermocouple No. 44	Cold Flange Thermocouple No. 45
36	93	97	86	90	89	86
37	94	97	87	90	90	87
38	95	98	87	90	90	88
39	95	98	87	90	90	88
40	96	98	88	91	90	88
41	96	99	88	91	90	88
42	97	99	88	91	91	88
43	97	100	88	91	91	89
44	98	100	88	91	91	89
45	98	100	88	91	91	89
46	99	101	89	92	92	89
47	100	101	89	92	92	89
48	101	101	88	92	91	89
49	102	101	89	92	92	89
50	104	101	89	92	92	88
51	106	101	88	92	92	89
52	109	103	89	92	91	88
53	114	107	88	92	91	88
54	123	116	89	94	92	88
55	134	129	91	95	93	88
56	146	145	94	97	95	89
57	158	160	97	98	97	90
58	169	173	101	100	100	91
59	181	184	106	102	102	92
60	191	194	111	109	105	94
61	203	202	115	129	109	97
62	213	210	119	158	114	99
63	223	218	123	176	120	102
64	232	225	127	187	128	105
65	240	232	131	197	137	109
66	247	237	135	207	146	112
67	254	240	138	224	154	117
68	262	243	141	248	162	123
69	269	247	144	268	171	130
70	277	253	148	278	179	137
71	284	258	152	285	186	144
72	290	263	155	288	191	150
73	296	268	158	292	197	156

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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 40	Web Thermocouple No. 41	Cold Flange Thermocouple No. 42	Hot Flange Thermocouple No. 43	Web Thermocouple No. 44	Cold Flange Thermocouple No. 45
74	301	273	161	297	202	161
75	306	277	164	302	207	165
76	311	281	167	309	211	169
77	315	285	169	317	215	172
78	318	288	172	324	219	175
79	322	292	174	331	224	179
80	325	295	177	339	228	183
81	329	299	179	346	233	187
82	333	303	182	350	236	191
83	337	306	185	356	240	194
84	342	310	188	365	244	198
85	346	314	190	372	249	202
86	351	319	194	378	254	206
87	360	326	198	389	262	210
88	372	336	204	400	269	215
89	387	348	211	406	276	220
90	404	362	217	417	283	225
91	424	377	225	428	292	231
92	445	391	233	440	301	238
93	484	414	246	453	309	245
94	539	455	269	471	320	255
95	602	505	321	505	334	270
96	663	553	385	566	367	310
97	696	594	455	645	432	400
98	705	638	547	708	518	509
99	772	764	719	811	854	851
100	862	786	749	-	906	-
101	-	-	-	-	924	-
102	-	-	-	-	938	-
103	-	-	-	-	-	-

- 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
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	1
9	3
10	5
11	6
12	8
13	8
14	9
15	9
16	9
17	9
18	9
19	9
20	9
21	9
22	9
23	10
24	10
25	10
26	10
27	11
28	11
29	11
30	11
31	12
32	12
33	12
34	12
35	13
36	13
37	13

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Time (minutes)	Deflection (mm)
	Centre
38	13
39	14
40	14
41	14
42	14
43	14
44	15
45	15
46	15
47	15
48	15
49	16
50	16
51	16
52	17
53	18
54	19
55	20
56	21
57	22
58	23
59	24
60	25
61	26
62	27
63	28
64	29
65	30
66	32
67	34
68	35
69	37
70	38
71	40
72	41
73	42
74	43
75	44
76	45
77	46

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Time (minutes)	Deflection (mm)
	Centre
78	47
79	48
80	49
81	50
82	51
83	52
84	52
85	53
86	54
87	55
88	56
89	58
90	59
91	61
92	63
93	66
94	69
95	72
96	74
97	77
98	80
99	86
100	87
101	91
102	96
103	101
104	103
105	103
106	103
107	103
108	104
109	104
110	105
111	107
112	108
113	109
114	110
115	110
116	110
117	111

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Time (minutes)	Deflection (mm)
	Centre
118	111
119	112
120	113
121	114
122	115
123	115
124	116
125	116
126	117
127	117
128	117
129	117
130	117
131	116
132	116
133	115
134	115
135	114
136	112
137	111
138	110
139	108
140	107
141	106
142	106
143	107
144	109
145	110
146	112
147	113
148	114
149	115
150	116

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

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PHOTOGRAPHS

Exposed Face Prior to Test



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Unexposed Face Prior to Test



Customer: **British Gypsum**

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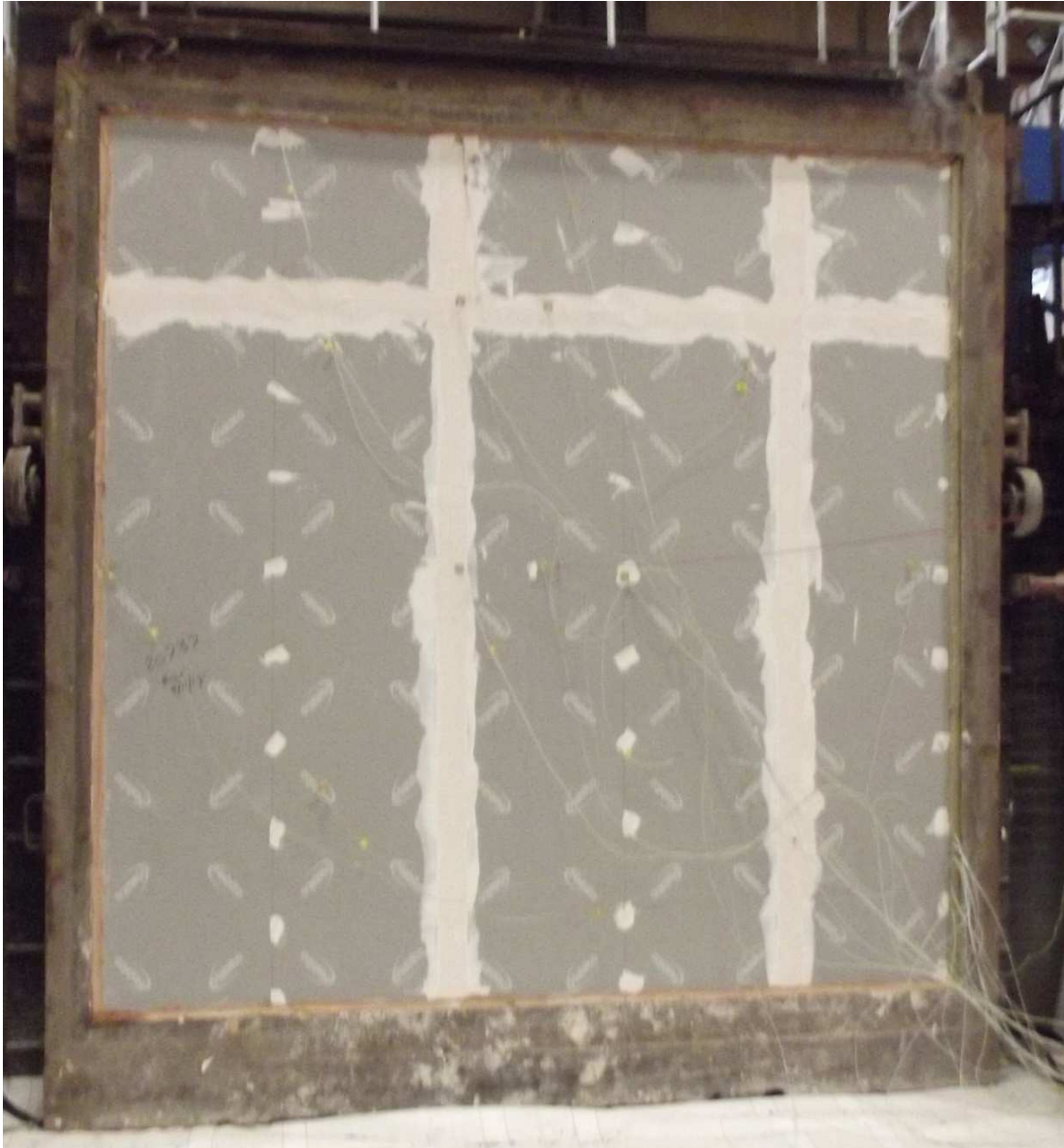
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Unexposed Face at 30 Minutes



Customer: **British Gypsum**

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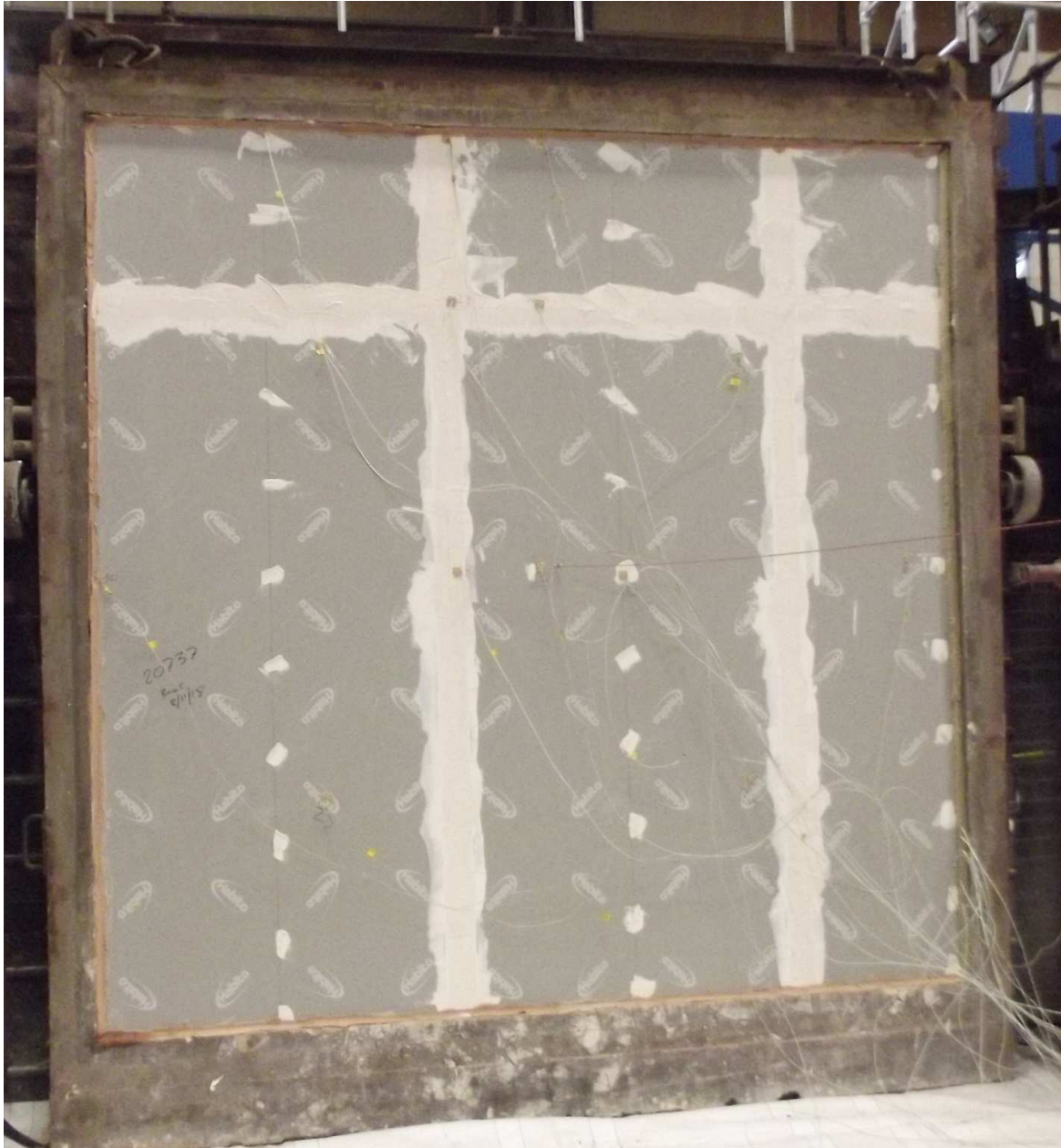
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Unexposed Face at 1 Hour



Customer: **British Gypsum**

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Unexposed Face at 1 Hour, 30 Minutes



Customer: **British Gypsum**

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Unexposed Face at 2 Hours



Customer: **British Gypsum**

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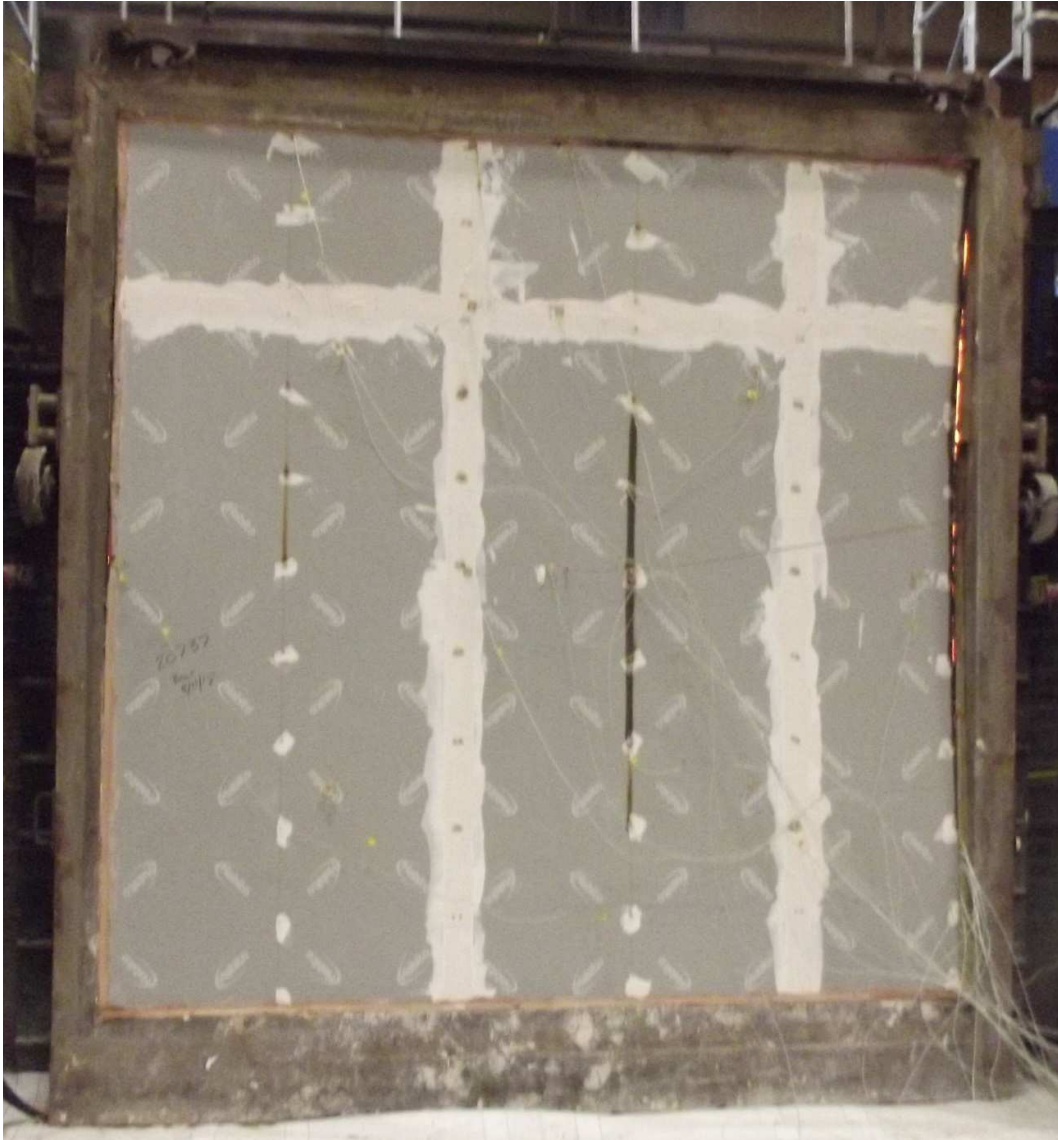
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Unexposed Face at 2 Hours, 30 Minutes, at Test Termination



Customer: **British Gypsum**

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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 from 3000mm.
- ii) Increase in the thickness of the wall (minimum thickness 200mm).
- iii) Increase thickness of component materials (minimum Gypframe stud depth 48mm, minimum Gypframe stud gauge 0.50mm).
- iv) Decrease in the linear dimensions of the boards but not thickness ($\leq 2400\text{mm}$ (long) x $\leq 1200\text{mm}$ (wide) Gyproc Habito and Gyproc SoundBloc F).
- v) Decrease stud spacing from 600mm.
- vi) Decrease in fixing centres from 300mm.
- vii) Increase in the number of horizontal joints, of the type tested, when tested with one joint not more than (500 ± 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 3000mm wide with one vertical edge without restraint.

Extension of Height

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

30 minutes	60 minutes	90 minutes
$\leq 100\text{mm}$	$\leq 100\text{mm}$	$\leq 100\text{mm}$