

Report Number: **BTC 21578F**

A FIRE RESISTANCE TEST ON A 550 MM WIDE GYPWALL AUDIO METAL STUD PARTITION WITH 92 MM STUD FRAMEWORK CLAD EACH SIDE WITH A TRIPLE LAYER OF 15 MM GYPROC SOUNDBLOC WITH 100 MM ISOVER CLADDING ROLL 40 IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 30th November 2020

Report Issue Date: 3rd December 2020

www.btconline.co.uk

Customer: British Gypsum
East Leake
Loughborough
Leicestershire
LE12 6HX

Customer: **British Gypsum**

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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 a triple layer of SoundBloc incorporating 100 mm Isover Cladding Roll 40 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 27th and 31st November 2020. The Building Test Centre played no role in the design or selection of materials comprising the test specimen. This information is provided by the customer.

The test was conducted on the 30th November 2020.

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



Danielle Yates
BSc. (Hons.) MSc.
Scientist

Authorised by



Paul Miller
BSc. (Hons.)
Fire Test Manager

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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 two refractory concrete lined steel restraint test frames braced together with an opening of 3000 mm (high) x 3000 mm (wide).

The specimen consisted of two separate metal frameworks with a 100 mm gap in between. Each metal framework was constructed as follows in frame 1 and frame 2 respectively:

Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels were fixed to the head and base of the test aperture at 600 mm centres using two staggered rows of 60 mm fire resistant fixings.

Gypframe 92S10 'C' Studs were positioned between the head and the base channels at 600 mm centres. The right hand stud of each frame viewed from unexposed face was not fixed to the perimeter of the test frame, and the gap between the studs and the frame lining was filled with a 25 mm rock mineral fibre gasket.

At the left-hand end of each frame a Gypframe 92S10 'C' Stud was used to fix the partition to the test frame with 60 mm fire resistant fixings at 600mm centres.

Gypframe GAB3 Acoustic Braces were installed between opposing studs using two 13 mm British Gypsum Wafer Head Jack - Point Screws at each stud position (4 per brace in total).

The braces for adjacent stud pairs were staggered vertically by 1200 mm.

- Braces at 900 mm for stud pairs 3 and 5.
- Braces 2100 mm high for stud pairs 2, 4 and 6.

Stud pair 1 is the left-hand studs viewed from the unexposed face (at the fixed end); stud pair 6 is the right hand studs viewed from the unexposed face (at the free end).

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

100 mm Isover Cladding Roll 40 were positioned in the air cavity between the two metal frames.

Each framework was lined on the outer face with a triple layer of 15mm Gyproc SoundBloc. The inner layer was fixed around the perimeter with 25 mm British Gypsum Jack-Point Screws at 300 mm centres. The middle layer was fixed around the perimeter with 41 mm British Gypsum Jack-Point Screws at 300 mm centres. The outer layer was fixed around the perimeter and within the field of the boards with 60 mm British Gypsum Jack-Point Screws at 300 mm centres.

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 and on the inner layer, and 600 mm from the base on the middle layer, 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.

Test Construction Drawings

Horizontal Cross Section

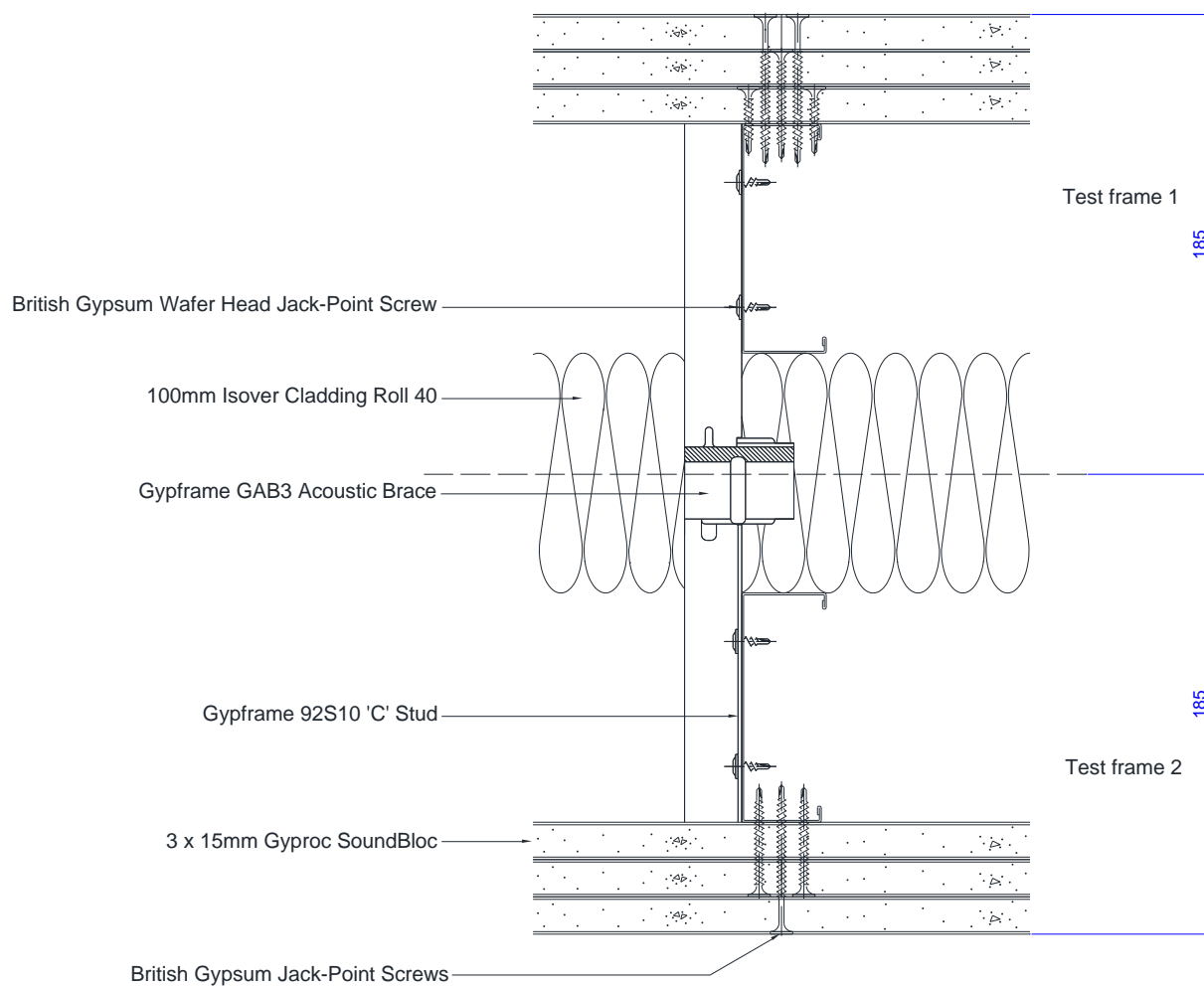


Figure 1 – Horizontal cross section.

Brace Positions

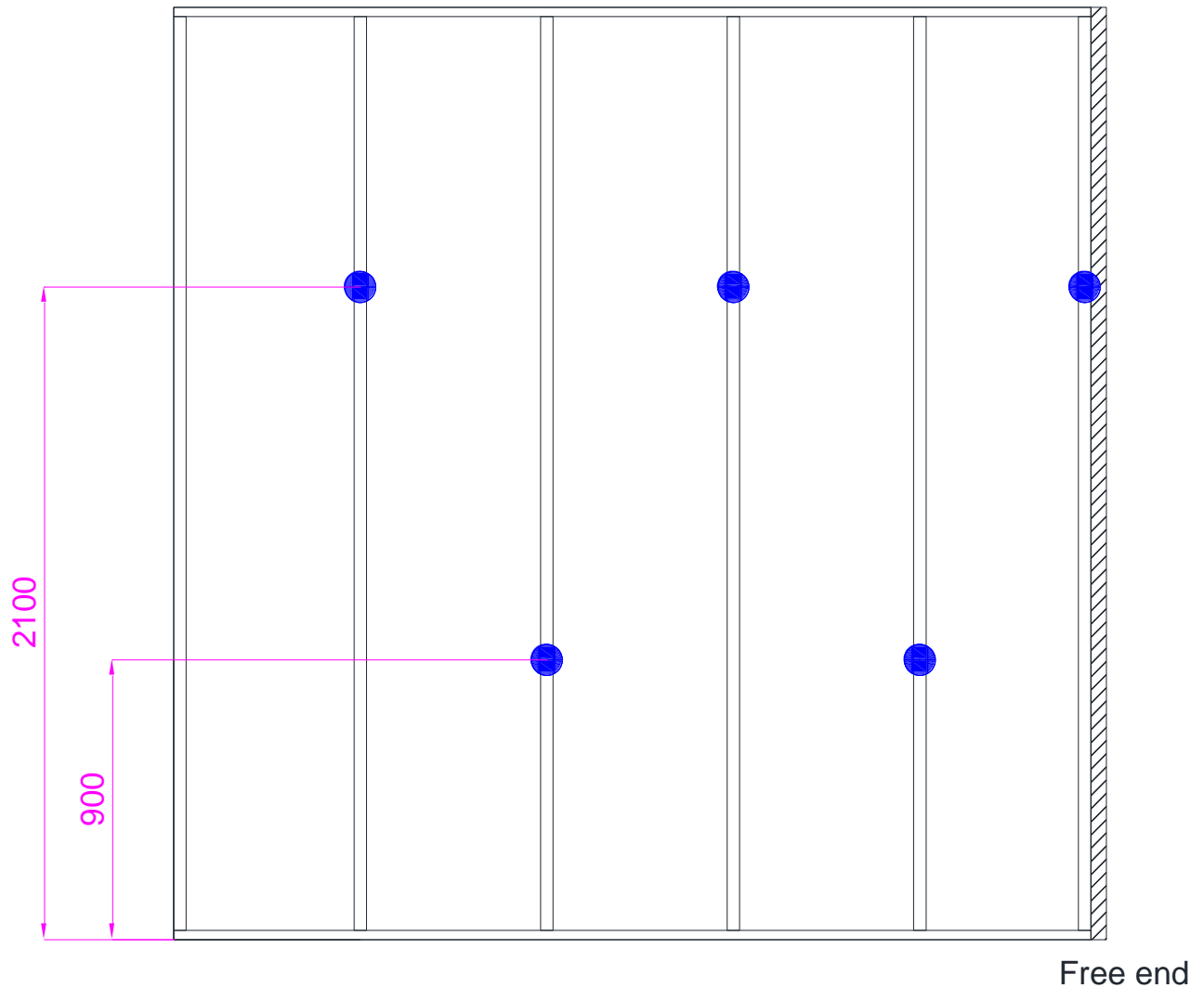


Figure 2 - Acoustic brace positions viewed from the unexposed face.

Exposed Face Elevation

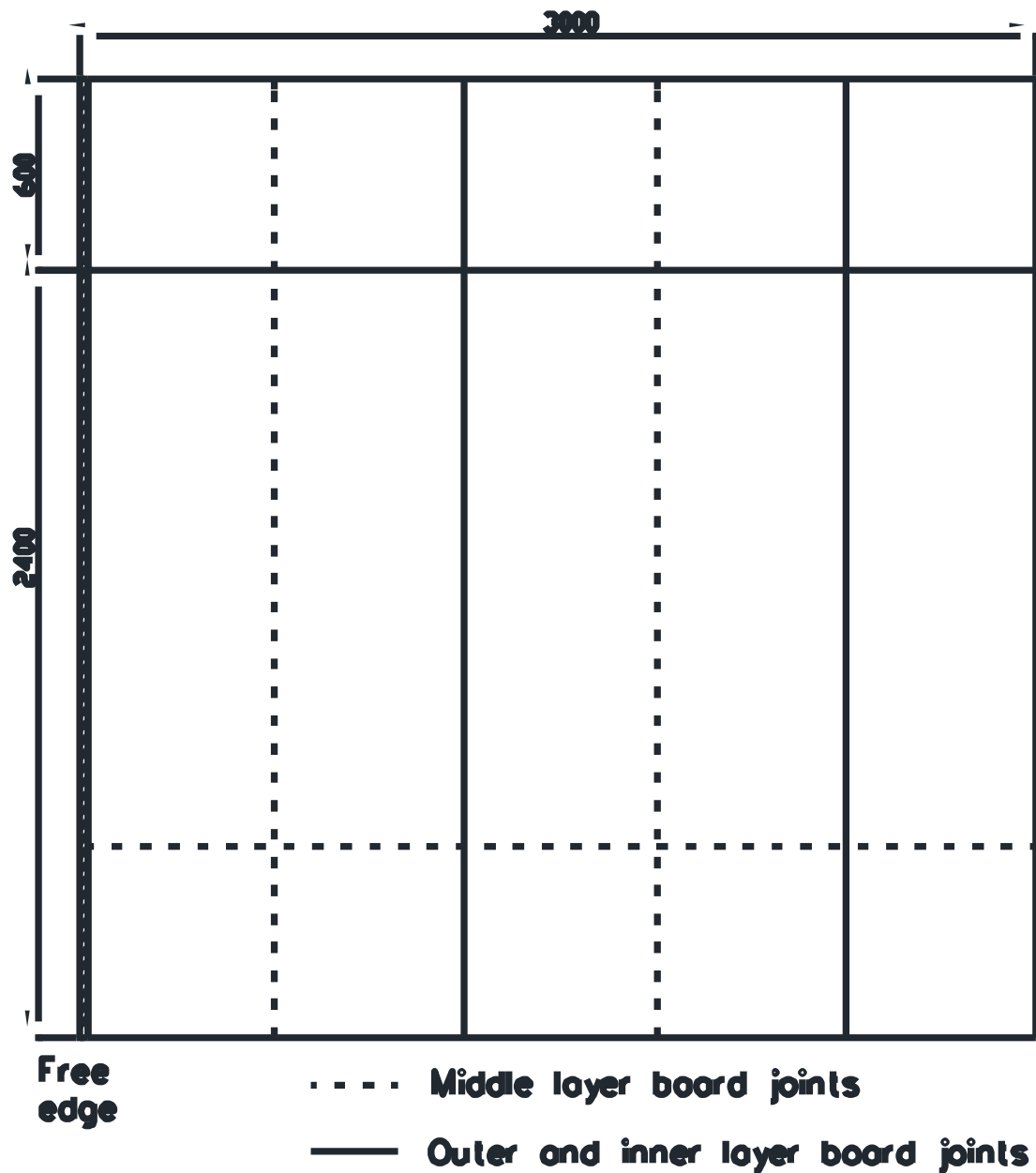


Figure 3 – Exposed face elevation.

Unexposed Face Elevation

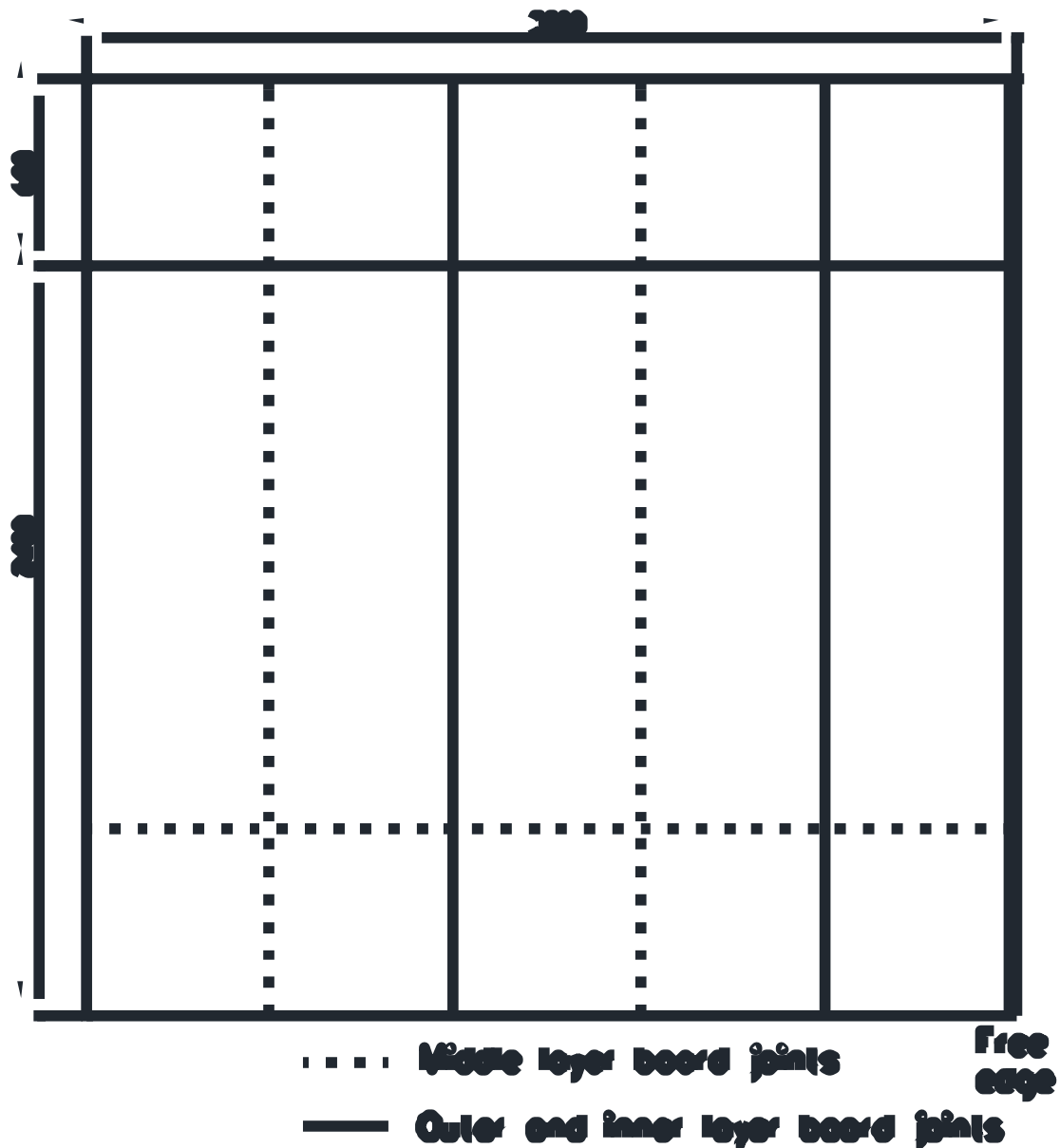


Figure 4 – Unexposed face elevation.

TEST MATERIALS

Plasterboard

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

Measured mass per unit area:	14.4 kg/m ²
Measured thickness:	15 mm
Board identification numbers:	31 296 20 22:14 31 296 20 22:15 31 296 20 22:15
Measured moisture content:	0.68%

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

- ii) GAB3 Acoustic Braces
- iii) Gypframe 94FEC50 Standard Folded Edge Floor & Ceiling Channels.
- iv) Gypframe 92S10 'C' Studs.
- v) Gypframe GFS1 Fixing Strap.

All metal components were supplied by British Gypsum.

Fasteners

- vi) 13 mm British Gypsum Wafer Head Jack-Point Screws, supplied by The Building Test Centre.
- vii) 25 mm British Gypsum Jack-Point Screws, supplied by The Building Test Centre.
- viii) 41 mm British Gypsum Jack-Point Screws, supplied by The Building Test Centre.
- ix) 60 mm British Gypsum Jack-Point Screws, supplied by The Building Test Centre.
- x) 60 mm fire resistant fixings, supplied by The Building Test Centre.

Miscellaneous Components

- xi) Gyproc Paper Joint Tape, supplied by The Building Test Centre.
- xii) Gyproc Joint Filler, supplied by The Building Test Centre.

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- xiii) Rock mineral fibre gasket, supplied by The Building Test Centre.

Insulation

- xiv) Nominally 100 mm (thick) Isover Cladding Roll, manufactured by Saint-Gobain Isover and supplied by British Gypsum.

Measured surface density: 1.22 kg/m²

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. 1.1.

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 14 °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 6**.

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	186 minutes, no failure.
	6 mm Gap Gauge	186 minutes.
	25 mm Gap Gauge	186 minutes, no failure.
	Cotton Pad	186 minutes, no failure.
Insulation		182 minutes.
Test Terminated		186 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: Danielle Yates
Exposed face: Denis Bradshaw & Eric Chee

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 1-2 mm. Horizontal joint had opened up to approximately 1-2 mm.
0	30	Left-hand vertical joint had opened up to approximately 6-7 mm. Right-hand vertical joint had opened up to approximately 4-5 mm. Horizontal joint had opened up to approximately 3-4 mm. <i>Unexposed face</i> No visible change.
0	40	Left-hand vertical joint had opened up to approximately 16-18 mm. Right-hand vertical joint had opened up to approximately 7-8 mm. Horizontal joint had opened up to approximately 4-5 mm. Boards began to crack around the screw heads.
0	50	Left-hand vertical joint had opened up to approximately 24-26 mm. Right-hand vertical joint had opened up to approximately 9-10 mm. Horizontal joint had opened up to approximately 7-8 mm.
1	00	Left-hand vertical joint had opened up to approximately 22-24 mm. Right-hand vertical joint had opened up to approximately 10-12 mm. Horizontal joint had opened up to approximately 8-9 mm. <i>Unexposed face</i> No visible change.

Time		Observations
Hours	Minutes	
1	10	Left-hand vertical joint had opened up to approximately 24-26 mm. Right-hand vertical joint had opened up to approximately 14-15 mm. Horizontal joint had opened up to approximately 10-12 mm.
1	20	Left-hand vertical joint had opened up to approximately 26 mm. Right-hand vertical joint had opened up to approximately 16 mm. Horizontal joint had opened up to approximately 13-14 mm.
1	30	Lower centre board had fallen into the furnace. Second layer boards had begun to craze. <i>Unexposed face</i> No visible change.
1	40	Lower left-hand board had fallen into the furnace.
1	50	Second layer lower centre board cracks had opened up to approximately 4-5 mm. Second layer lower left-hand board cracks had opened up to approximately 2-3 mm. Lower right-hand board had fallen into the furnace.
1	53	Second layer lower centre board had fallen into the furnace.
1	58	Third layer lower centre board had fallen into the furnace. All studs had warped.
2	00	Second layer lower left hand board had fallen into the furnace. <i>Unexposed face</i> Smoke issuing from the left-hand side of the specimen at approximately 2600 mm height.
2	05	Third layer lower left-hand board had fallen into the furnace.
2	10	80% of the third layer boards had fallen into the furnace. Fourth layer boards began to craze.
2	20	100% of the third layer boards had fallen into the furnace.

Time		Observations
Hours	Minutes	
2	30	Fourth layer lower centre board cracks had opened up to approximately 5-6 mm. <i>Unexposed face</i> No visible change.
2	40	Fourth layer lower centre board had fallen into the furnace. Fourth layer lower right-hand board had fallen into the furnace.
2	47	<i>Unexposed face</i> All screw heads had discoloured.
2	50	Fifth layer boards had crazed.
3	00	Fifth layer lower centre board had fallen into the furnace. <i>Unexposed face</i> No visible change.
3	02	<i>Unexposed face</i> INSULATION FAILURE. The temperature rise of thermocouple no.32 positioned at mid-height centre of the lower centre board had exceeded 180 °C.
3	03	<i>Unexposed face</i> The transducer had detached from the specimen.
3	04	<i>Unexposed face</i> A line of discolouration extended along the centre of the centre of the centre board at approximately 900 – 1800 mm height.
3	06	<i>Unexposed face</i> INTEGRITY FAILURE. The gap at approximately 900 mm height at the centre of the centre board had exceeded 6 mm x 150 mm (6 mm gap visual). TEST TERMINATED at the request of the sponsor.

Furnace Temperature Graph

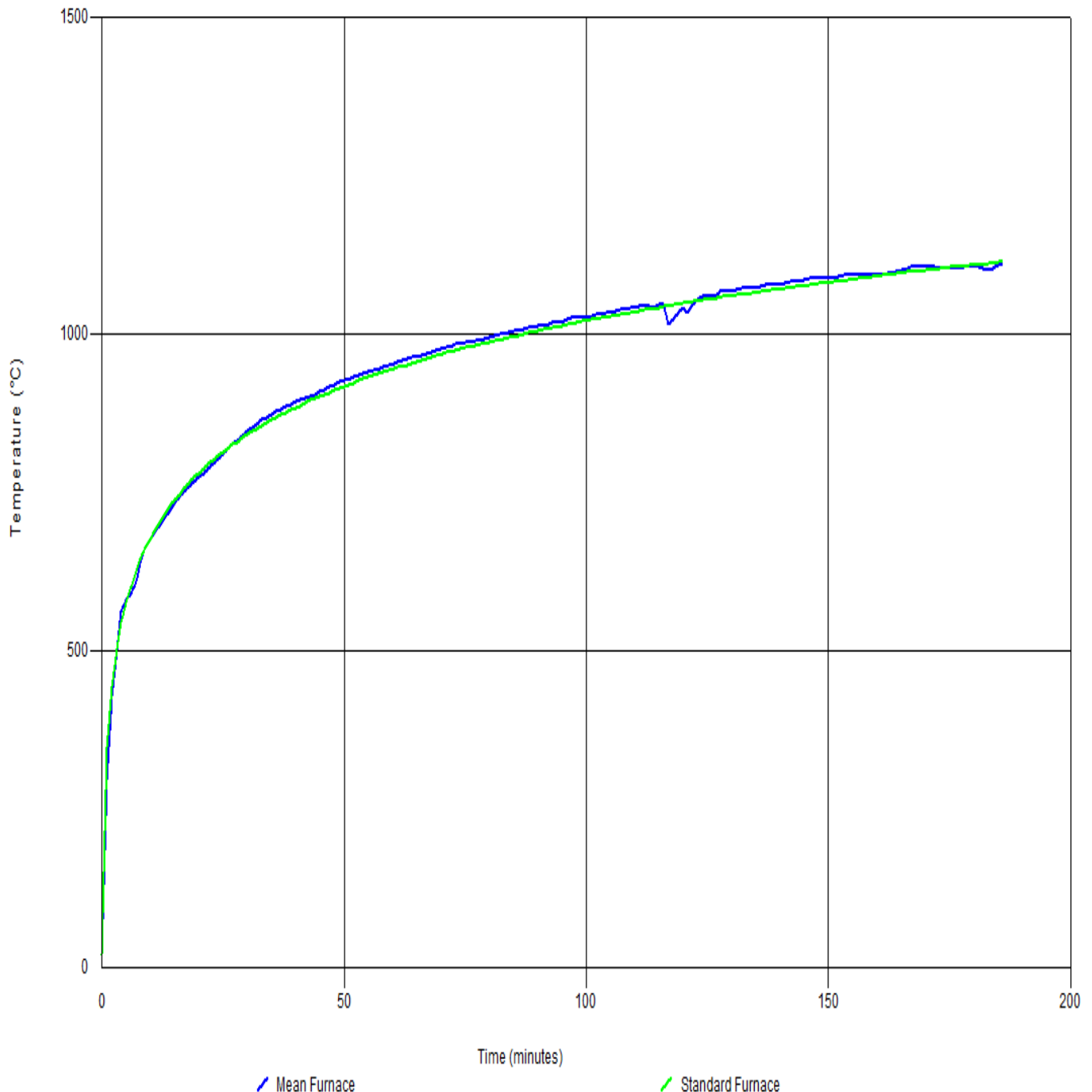


Figure 5 – Furnace temperature graph.

Furnace Pressure Graph

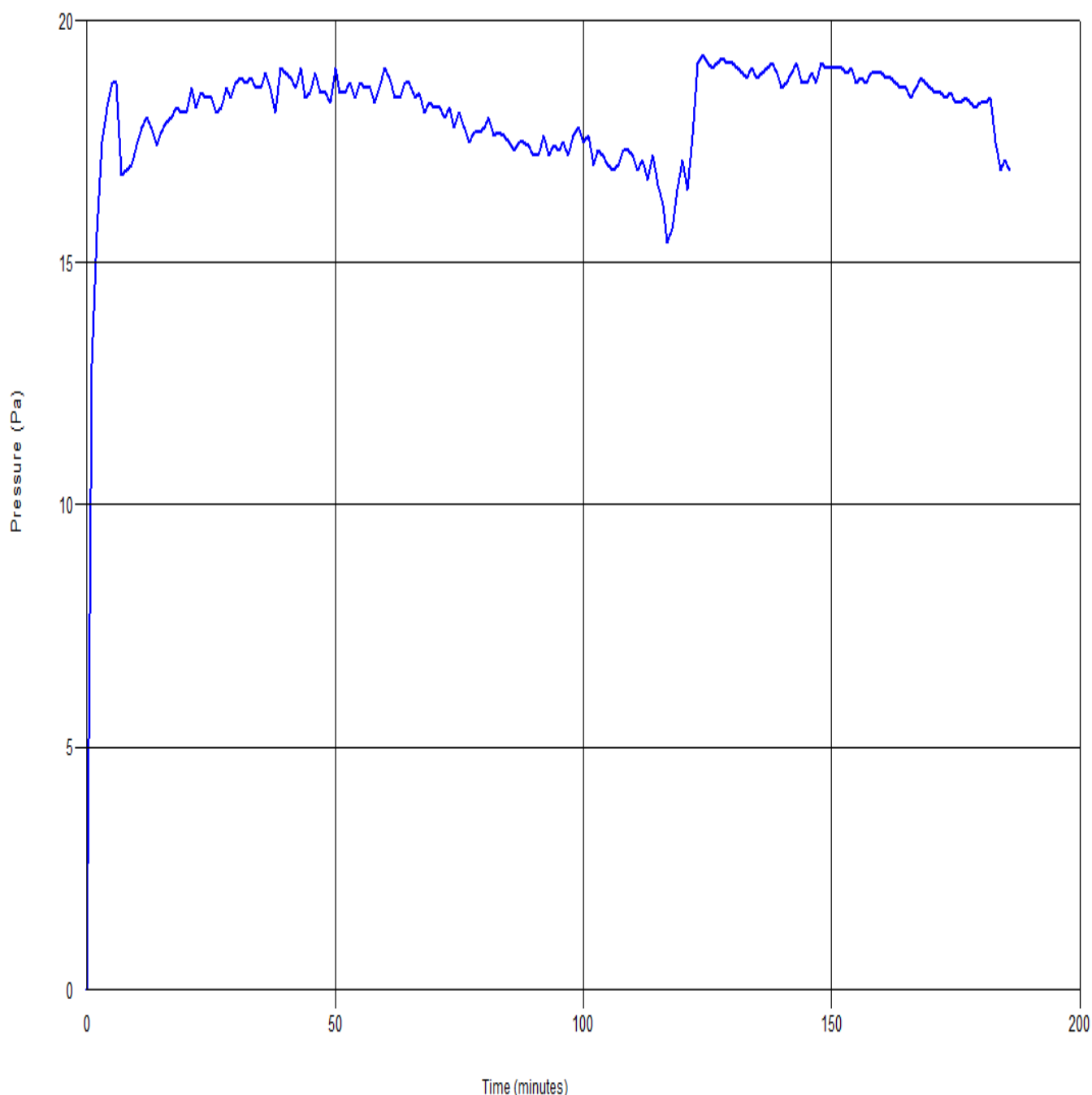


Figure 6 – Furnace pressure graph.

Unexposed Face Temperature Graph

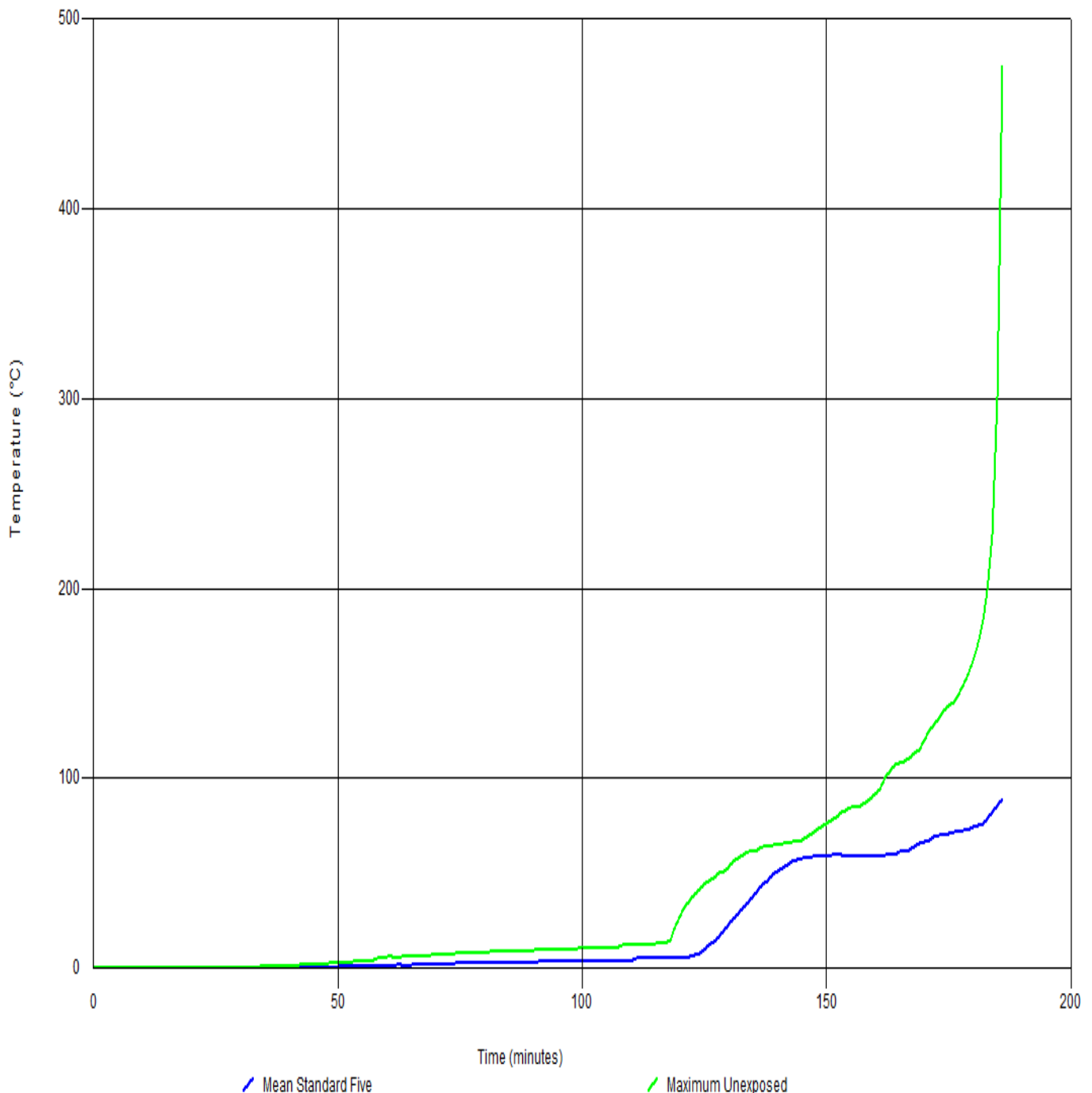


Figure 7 – Unexposed face temperature graph.

Unexposed Face Thermocouple Layout

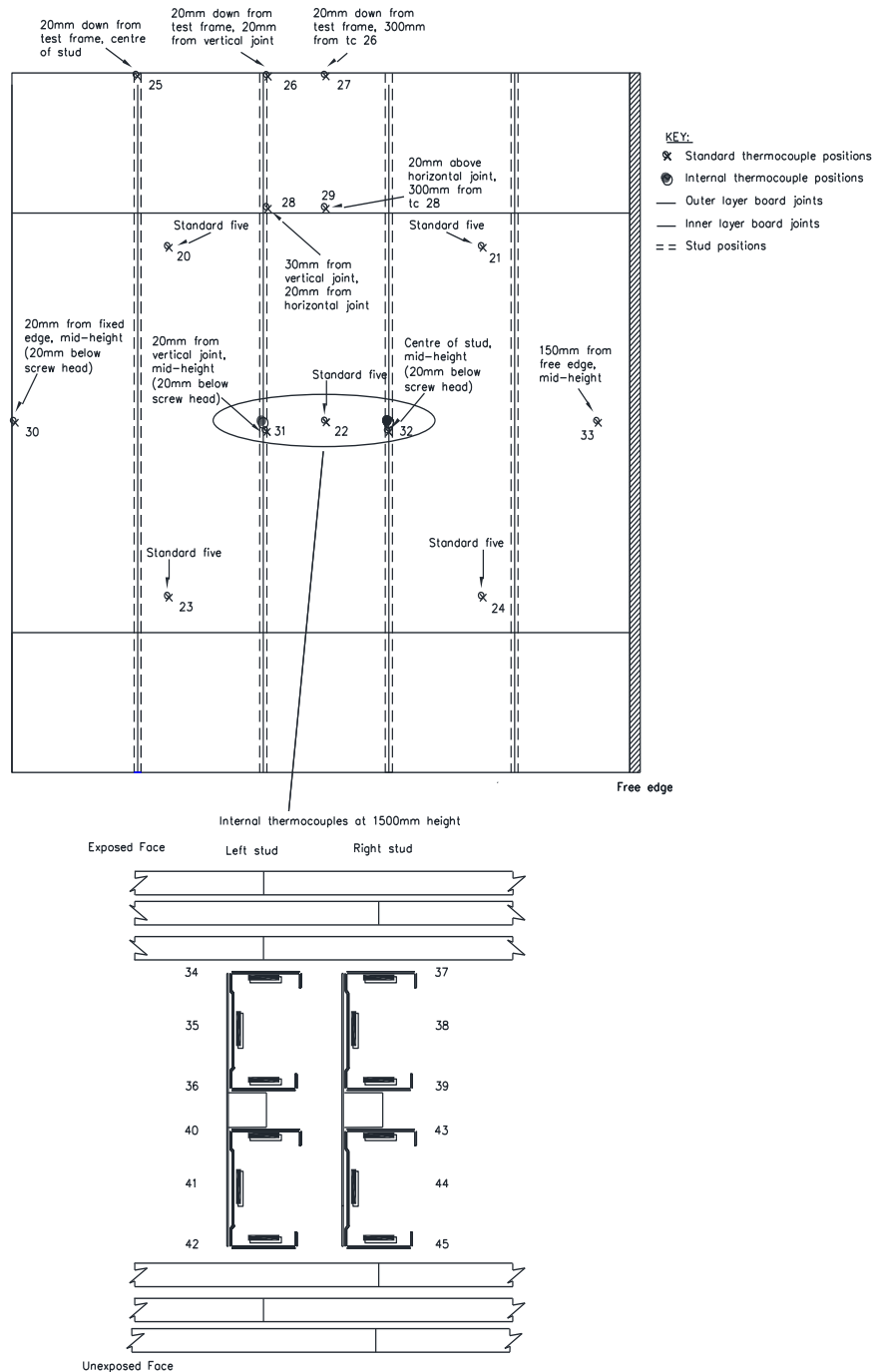


Figure 8 – Unexposed face thermocouple layout.

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Unexposed Face Standard Five Temperature Data

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
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	0	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	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	0	0
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	0	0	0	0	0	0
35	0	0	0	0	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	0	0	0	0

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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
39	0	0	0	0	0	0
40	0	0	0	0	0	0
41	1	0	0	0	0	0
42	1	1	0	0	0	0
43	1	1	0	0	0	0
44	1	1	0	0	0	0
45	1	1	0	0	0	0
46	1	1	0	0	0	0
47	1	1	0	0	0	0
48	1	1	0	0	0	0
49	1	1	0	0	0	0
50	2	1	1	0	0	1
51	2	2	1	0	0	1
52	2	2	1	0	0	1
53	2	2	1	0	0	1
54	2	2	1	0	0	1
55	2	2	1	0	0	1
56	2	2	1	0	1	1
57	2	2	1	0	0	1
58	2	2	1	0	1	1
59	3	2	1	0	1	1
60	3	3	1	0	0	1
61	3	3	1	0	0	1
62	3	3	1	0	1	2
63	3	3	1	0	1	2
64	3	3	1	0	0	1
65	4	3	1	0	0	2
66	4	4	1	0	0	2
67	4	4	1	0	1	2
68	4	4	1	0	0	2
69	4	4	2	0	1	2
70	4	4	1	0	0	2
71	4	4	2	0	1	2
72	4	4	2	0	1	2
73	4	5	2	0	1	2
74	5	5	2	0	1	3
75	5	5	2	0	1	3
76	5	5	2	0	1	3
77	5	5	2	0	1	3
78	5	5	2	0	1	3
79	5	5	2	0	1	3

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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	
80	5	5	2	0	1	3
81	5	6	2	0	1	3
82	5	6	2	1	1	3
83	5	6	2	0	1	3
84	6	6	2	1	1	3
85	6	6	2	1	1	3
86	6	6	2	1	1	3
87	6	6	2	1	1	3
88	6	6	2	1	1	3
89	6	6	3	1	1	3
90	6	6	3	1	1	3
91	6	7	3	1	1	4
92	6	7	3	1	1	4
93	6	7	3	1	1	4
94	6	7	3	1	1	4
95	6	7	3	1	1	4
96	6	7	3	1	1	4
97	7	7	3	1	1	4
98	7	7	3	1	1	4
99	7	7	3	1	1	4
100	7	7	3	1	1	4
101	7	8	3	1	1	4
102	7	8	3	1	1	4
103	7	8	3	1	1	4
104	7	8	3	1	1	4
105	7	8	3	1	1	4
106	7	8	3	1	1	4
107	7	8	3	1	1	4
108	7	8	3	1	2	4
109	8	8	3	1	2	4
110	8	8	3	1	2	4
111	8	9	4	1	2	5
112	8	9	4	1	2	5
113	8	9	4	1	2	5
114	8	9	4	1	2	5
115	8	9	4	1	2	5
116	8	9	4	1	2	5
117	8	9	4	1	2	5
118	8	9	4	1	2	5
119	9	9	4	1	2	5
120	9	9	4	1	2	5

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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
121	9	10	5	1	2	5
122	10	11	5	1	2	6
123	11	12	6	2	2	7
124	13	15	8	2	2	8
125	15	18	10	2	3	10
126	18	22	13	3	4	12
127	20	26	16	4	5	14
128	24	30	19	6	7	17
129	27	33	22	8	10	20
130	30	37	25	11	13	23
131	33	40	28	14	16	26
132	36	42	31	18	20	29
133	39	45	34	21	23	32
134	41	47	37	25	26	35
135	43	49	41	28	30	38
136	45	51	44	31	32	41
137	49	53	47	34	35	44
138	51	55	50	38	38	46
139	54	56	53	41	40	49
140	55	57	54	45	43	51
141	57	58	56	49	45	53
142	58	59	57	52	47	55
143	59	60	57	54	49	56
144	60	60	58	56	51	57
145	60	60	58	58	52	58
146	61	60	58	60	53	58
147	61	60	58	60	54	59
148	61	60	58	61	55	59
149	61	60	59	61	55	59
150	61	60	59	61	56	59
151	60	60	59	62	57	60
152	60	60	59	62	57	60
153	60	60	59	62	57	60
154	60	60	59	61	56	59
155	60	60	59	61	56	59
156	60	60	59	61	56	59
157	60	60	59	61	56	59
158	60	61	60	61	55	59
159	60	61	60	60	55	59
160	61	61	60	60	55	59
161	61	61	60	60	55	59

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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
162	61	61	60	60	56	60
163	61	60	60	61	57	60
164	62	60	60	61	58	60
165	63	60	63	61	57	61
166	62	59	65	61	59	61
167	64	59	67	61	61	62
168	68	61	68	61	63	64
169	71	65	69	60	64	66
170	72	68	70	59	64	67
171	72	69	71	61	66	68
172	72	70	71	64	67	69
173	72	71	72	66	68	70
174	72	73	72	67	68	70
175	73	73	72	68	68	71
176	73	74	73	69	69	72
177	73	74	73	70	69	72
178	74	75	74	71	69	73
179	75	75	75	72	70	73
180	75	76	76	73	71	74
181	76	77	78	73	72	75
182	78	77	80	74	73	76
183	79	77	84	77	77	79
184	83	78	89	79	82	82
185	89	79	94	80	87	86
186	94	80	99	81	91	89

See **Figure 8** 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	1	0	0	1
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	0	0	0	0
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	0	0	0	0	0
23	0	0	0	0	0
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
31	0	0	0	0	0
32	0	0	0	0	0
33	0	0	0	0	0
34	1	0	0	0	0
35	1	1	1	0	0
36	1	0	1	0	0
37	1	1	1	0	0
38	1	1	1	0	0

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
39	1	1	1	1	0
40	1	1	1	1	1
41	1	1	1	1	1
42	2	1	1	1	1
43	2	1	2	1	1
44	2	2	2	1	1
45	2	2	2	1	1
46	2	2	2	1	1
47	2	2	2	1	1
48	3	2	3	1	1
49	3	2	3	2	1
50	3	3	3	2	2
51	3	3	3	2	2
52	3	3	3	2	2
53	4	3	4	2	2
54	4	3	4	2	2
55	4	4	4	2	2
56	4	4	4	3	2
57	4	4	4	3	3
58	4	3	5	2	3
59	5	5	5	3	2
60	6	5	5	4	3
61	6	5	5	3	3
62	5	5	5	3	3
63	6	5	6	4	4
64	6	5	6	4	4
65	6	5	6	4	4
66	6	5	6	4	4
67	6	5	6	4	4
68	6	5	6	4	4
69	7	6	6	4	4
70	7	6	6	4	4
71	7	6	7	5	4
72	7	6	7	5	5
73	7	6	7	5	5
74	8	6	7	5	5
75	8	6	7	5	5
76	8	6	7	5	5
77	8	6	7	5	5
78	8	6	7	5	5
79	8	7	7	5	5

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
80	8	7	8	5	6
81	9	7	8	6	6
82	9	7	8	6	6
83	9	7	8	6	6
84	9	7	8	6	6
85	9	7	8	6	6
86	9	7	8	6	6
87	9	7	8	6	6
88	9	7	8	6	6
89	9	7	8	6	6
90	10	7	9	6	6
91	10	7	9	6	6
92	10	7	9	6	7
93	10	8	9	7	7
94	10	8	9	6	7
95	10	8	9	7	7
96	10	8	9	7	7
97	10	8	9	7	7
98	10	8	9	7	7
99	11	8	10	7	7
100	11	8	9	7	7
101	11	8	10	7	7
102	11	8	9	7	7
103	11	8	10	7	7
104	11	8	9	7	7
105	11	8	9	7	7
106	11	8	10	7	8
107	11	9	10	7	8
108	12	9	10	8	8
109	12	9	10	8	8
110	12	9	10	8	8
111	12	9	10	8	8
112	12	9	10	8	8
113	12	9	10	8	8
114	12	9	10	8	8
115	13	9	11	8	8
116	13	9	11	8	8
117	13	10	11	8	9
118	13	11	15	8	9
119	13	12	21	9	9
120	13	15	27	9	9

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
121	14	18	32	10	10
122	15	21	36	12	11
123	16	25	39	14	13
124	18	29	42	16	15
125	20	33	44	19	18
126	23	37	46	22	20
127	26	41	48	25	23
128	30	44	50	28	25
129	37	46	51	32	28
130	45	48	53	35	30
131	51	51	55	37	32
132	55	54	58	39	33
133	58	56	60	40	35
134	59	56	61	41	37
135	59	56	60	43	39
136	60	55	59	45	40
137	60	56	60	47	43
138	60	56	61	49	44
139	60	57	61	51	46
140	61	58	61	53	47
141	61	58	62	53	49
142	62	59	62	54	50
143	63	60	63	54	51
144	63	60	63	54	52
145	63	61	63	54	53
146	64	61	63	54	54
147	64	62	64	55	54
148	64	62	64	55	54
149	64	62	64	56	55
150	64	63	64	56	55
151	64	63	64	57	55
152	64	64	64	58	56
153	64	64	64	58	56
154	64	64	64	58	57
155	64	65	65	59	57
156	64	65	65	60	58
157	64	65	65	62	58
158	64	66	65	64	59
159	64	66	65	66	60
160	64	67	65	68	61
161	64	67	66	69	63

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
162	64	67	66	69	64
163	64	68	66	70	65
164	64	68	67	71	67
165	64	69	67	71	68
166	65	69	67	72	68
167	65	69	68	73	69
168	66	70	68	74	70
169	66	69	69	74	71
170	66	68	69	74	71
171	67	68	70	74	72
172	67	68	70	74	72
173	68	69	72	75	73
174	69	70	73	75	73
175	69	71	74	75	74
176	70	72	75	76	74
177	71	73	76	76	75
178	71	74	77	77	76
179	72	75	78	77	77
180	72	75	78	78	77
181	72	75	79	79	78
182	73	75	79	81	80
183	74	75	80	83	81
184	75	75	83	88	82
185	76	75	86	96	84
186	77	76	88	102	87

See **Figure 8** for the location of the thermocouples.

Customer: **British Gypsum**

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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
1	0	-	0	0
2	0	-	0	0
3	0	-	0	0
4	0	-	0	0
5	0	-	0	0
6	0	-	0	0
7	0	-	0	0
8	0	-	0	0
9	0	-	0	0
10	0	-	0	0
11	0	-	0	0
12	0	-	0	0
13	0	-	0	0
14	0	-	0	0
15	0	-	0	0
16	0	-	0	0
17	0	-	0	0
18	0	-	0	0
19	0	-	0	0
20	0	-	0	0
21	0	-	0	0
22	0	-	0	0
23	0	-	0	0
24	0	-	0	0
25	0	-	0	0
26	0	-	0	0
27	0	-	0	0
28	0	-	0	0
29	0	-	0	0
30	0	-	0	0
31	0	-	0	0
32	0	-	0	0
33	0	-	0	0
34	0	-	0	0
35	0	-	0	0
36	0	-	0	0
37	0	-	0	0
38	0	-	0	0

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
39	0	-	0	0
40	0	-	0	0
41	0	-	0	0
42	0	-	0	0
43	0	-	0	0
44	0	-	0	0
45	0	-	1	0
46	0	-	1	0
47	0	-	1	0
48	0	-	1	0
49	0	-	1	0
50	0	-	1	0
51	0	-	1	0
52	0	-	1	0
53	0	-	1	1
54	0	-	1	0
55	0	-	1	1
56	0	-	1	1
57	0	-	1	1
58	1	-	1	1
59	0	-	1	1
60	1	-	2	1
61	0	-	1	1
62	1	-	1	1
63	0	-	2	1
64	1	-	1	1
65	1	-	1	1
66	1	-	2	1
67	1	-	2	1
68	0	-	2	1
69	1	-	2	1
70	1	-	2	1
71	1	-	2	1
72	2	-	2	1
73	1	-	2	1
74	1	-	2	1
75	1	-	2	2
76	1	-	2	2
77	1	-	2	2
78	1	-	2	2
79	1	-	2	2

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
80	1	-	2	2
81	1	-	2	2
82	1	-	2	2
83	1	-	2	2
84	1	-	3	2
85	1	-	3	2
86	1	-	3	2
87	1	-	3	2
88	1	-	3	2
89	1	-	3	2
90	1	-	3	2
91	1	-	3	2
92	1	-	3	2
93	1	-	3	2
94	1	-	3	2
95	1	-	3	2
96	1	-	3	2
97	1	-	3	2
98	1	-	3	3
99	1	-	3	3
100	1	-	3	3
101	1	-	3	3
102	1	-	3	3
103	1	-	3	3
104	1	-	3	3
105	2	-	3	3
106	2	-	3	3
107	2	-	4	3
108	2	-	4	3
109	2	-	4	3
110	2	-	4	3
111	2	-	4	3
112	2	-	4	3
113	2	-	4	3
114	2	-	4	3
115	2	-	4	3
116	2	-	4	3
117	2	-	4	3
118	2	-	4	3
119	2	-	4	3
120	3	-	5	4

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
121	3	-	6	4
122	4	-	7	4
123	5	-	10	4
124	7	-	13	5
125	9	-	18	6
126	12	-	21	7
127	16	-	25	9
128	21	-	31	12
129	26	-	39	15
130	31	-	47	19
131	36	-	52	23
132	41	-	55	26
133	45	-	56	30
134	48	-	58	33
135	51	-	59	37
136	53	-	59	39
137	56	-	60	42
138	58	-	60	44
139	60	-	59	46
140	61	-	59	49
141	62	-	59	51
142	62	-	60	53
143	63	-	60	54
144	64	-	60	55
145	64	-	60	56
146	65	-	60	57
147	66	-	60	57
148	66	-	60	58
149	66	-	60	58
150	66	-	60	58
151	67	-	61	58
152	67	-	61	59
153	67	-	62	59
154	67	-	62	59
155	67	-	62	59
156	68	-	63	59
157	67	-	63	58
158	68	-	64	58
159	68	-	64	58
160	68	-	64	58
161	68	-	65	58

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
162	68	-	65	58
163	68	-	67	58
164	68	-	69	59
165	69	-	70	59
166	69	-	72	59
167	69	-	73	59
168	70	-	74	59
169	70	-	75	59
170	71	-	76	59
171	71	-	76	60
172	71	-	77	60
173	72	-	78	60
174	73	-	80	60
175	74	-	86	62
176	75	-	89	64
177	76	-	91	64
178	78	-	95	64
179	79	-	100	65
180	81	-	107	66
181	82	-	124	67
182	84	-	151	68
183	85	-	183	69
184	86	-	222	69
185	88	-	301	70
186	89	-	475	70

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

- Thermocouple was discounted from the data as it was placed over a screw head.

See **Figure 8** for the location of the thermocouples.

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Internal Temperature Data at 1500 mm 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	18	18	17	17	17	17
1	17	18	17	18	17	16
2	17	16	16	42	16	15
3	20	17	17	51	18	17
4	22	17	17	39	19	17
5	27	17	17	34	20	17
6	33	18	17	32	20	18
7	40	19	18	32	20	18
8	47	19	18	32	20	18
9	53	21	18	32	21	18
10	58	22	19	33	21	19
11	62	24	20	34	22	19
12	66	26	21	36	23	20
13	69	27	23	38	24	21
14	72	29	24	40	25	22
15	74	31	26	43	27	23
16	77	34	28	46	29	25
17	79	36	30	49	31	26
18	80	38	32	53	33	28
19	82	41	34	56	36	30
20	83	43	36	59	38	32
21	84	46	38	61	41	34
22	85	48	40	64	43	36
23	86	50	42	66	45	38
24	86	52	44	68	47	40
25	86	54	46	70	49	42
26	87	55	48	72	51	44
27	88	57	49	74	54	46
28	89	58	51	76	56	47
29	90	59	52	78	58	49
30	91	61	54	80	61	51
31	92	62	55	82	63	53
32	93	63	57	84	65	54
33	93	65	58	85	67	56
34	94	66	59	87	68	57
35	95	66	60	89	70	59
36	95	67	61	90	71	60

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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
37	96	68	62	91	72	61
38	96	69	63	92	73	63
39	97	69	64	93	74	64
40	97	70	64	94	75	64
41	98	70	65	95	75	65
42	98	71	65	95	76	66
43	98	71	66	95	76	67
44	99	71	66	96	77	67
45	99	72	66	96	77	68
46	99	72	67	96	77	68
47	99	72	67	97	78	69
48	100	73	67	97	78	69
49	100	73	68	97	78	69
50	100	73	68	98	78	69
51	100	73	68	98	79	70
52	100	73	68	99	79	70
53	101	73	68	99	79	70
54	101	73	68	100	79	70
55	102	73	68	101	79	71
56	102	74	68	101	80	71
57	103	74	69	102	80	71
58	103	74	69	102	80	72
59	104	74	69	103	81	72
60	104	75	69	104	81	72
61	105	74	69	105	82	72
62	106	75	69	106	83	72
63	106	75	70	107	83	73
64	107	76	70	108	84	73
65	108	76	70	109	85	73
66	109	76	70	111	86	74
67	109	77	71	113	87	74
68	110	77	71	115	88	75
69	112	78	71	118	90	76
70	113	79	72	122	91	76
71	114	79	72	125	92	77
72	115	80	73	128	92	77
73	116	81	73	130	93	78
74	117	81	74	132	94	79
75	118	82	75	135	94	80

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
76	119	83	75	137	96	80
77	120	84	76	140	97	81
78	122	84	77	144	99	82
79	123	85	78	149	101	83
80	124	86	78	155	104	84
81	126	87	79	163	107	85
82	127	88	80	171	110	87
83	128	88	81	178	113	88
84	130	89	81	183	115	90
85	131	90	82	188	117	91
86	133	91	83	193	119	93
87	134	91	83	198	120	94
88	136	92	84	202	122	95
89	137	93	84	206	123	96
90	139	94	85	210	125	97
91	140	94	85	215	127	98
92	145	95	86	219	128	99
93	158	96	87	224	130	100
94	170	97	87	229	132	101
95	180	98	88	235	134	102
96	189	100	89	241	135	103
97	197	101	89	246	137	104
98	206	103	90	251	139	105
99	215	104	91	257	142	106
100	224	106	92	263	144	107
101	233	107	93	270	147	109
102	243	109	94	276	150	110
103	253	111	95	284	153	112
104	264	113	96	293	156	114
105	277	117	98	302	159	116
106	292	122	99	311	163	118
107	310	128	101	319	165	121
108	328	135	104	329	168	124
109	347	144	108	346	172	127
110	365	155	112	370	177	131
111	382	167	119	402	185	135
112	398	180	123	443	202	143
113	414	199	134	610	297	169
114	462	367	230	978	575	357

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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
115	559	546	417	973	763	630
116	656	590	516	944	782	695
117	862	850	879	861	875	872
118	913	890	946	967	967	856
119	992	828	989	1016	985	899
120	986	836	1021	1029	1013	974
121	998	898	1091	1060	1030	971
122	1060	917	-	-	1037	1027
123	1088	871	-	-	-	-
124	1090	844	-	-	-	-
125	-	825	-	-	-	-
126	-	828	-	-	-	-
127	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

See **Figure 8** for the location of the thermocouples.

Additional Frame Internal Temperature Data at 1500 mm 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	15	15	14	15	16	15
1	14	13	13	15	15	14
2	13	13	12	14	14	13
3	14	14	14	15	15	15
4	14	14	14	15	15	15
5	14	14	14	15	15	15
6	14	14	14	15	15	15
7	14	14	14	15	15	15
8	14	14	14	15	15	15
9	14	14	14	15	15	15
10	14	14	14	15	15	15
11	14	14	14	15	15	15
12	14	14	14	15	15	15
13	14	14	14	15	15	15
14	14	14	14	15	15	15
15	15	14	14	15	15	15
16	15	15	14	15	15	15
17	15	15	14	15	15	15
18	15	15	14	16	15	15
19	15	15	14	16	16	15
20	15	15	14	16	16	15
21	16	16	14	16	16	16
22	16	16	15	17	17	16
23	16	17	15	17	17	16
24	17	17	15	18	18	16
25	17	18	15	18	18	17
26	17	18	15	19	19	17
27	18	18	16	19	19	17
28	18	19	16	20	20	18
29	18	19	16	20	20	18
30	18	20	16	21	21	19
31	19	20	17	21	21	19
32	19	20	17	22	22	19
33	20	21	17	22	22	20
34	20	21	18	23	23	20
35	20	22	18	23	23	21
36	21	22	18	24	24	21

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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
37	21	22	18	24	24	21
38	21	23	19	24	25	22
39	22	23	19	25	25	22
40	22	23	19	25	25	22
41	22	24	19	25	26	23
42	22	24	19	25	26	23
43	22	24	20	26	26	23
44	23	24	20	26	26	24
45	23	24	20	26	27	24
46	23	24	20	26	27	24
47	23	25	20	26	27	24
48	23	25	20	26	27	24
49	23	25	20	26	27	24
50	23	25	20	26	27	24
51	24	25	21	27	27	24
52	24	25	21	27	27	25
53	24	25	21	27	28	25
54	24	25	21	27	27	25
55	24	25	21	27	27	25
56	24	25	21	27	28	25
57	24	25	21	27	28	25
58	24	26	21	27	28	25
59	24	26	21	27	28	25
60	24	26	22	28	29	25
61	24	25	21	27	28	26
62	25	26	21	27	28	25
63	25	25	22	28	28	26
64	24	26	22	27	28	26
65	25	26	22	27	28	25
66	25	26	22	27	28	26
67	24	26	22	27	28	26
68	25	26	22	27	28	26
69	25	26	22	28	28	26
70	25	26	22	28	28	26
71	25	26	22	28	28	26
72	25	26	22	28	29	26
73	25	26	22	28	28	26
74	25	27	22	28	29	26
75	25	27	22	28	29	26

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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
76	25	27	22	28	29	26
77	25	27	22	28	29	26
78	25	27	22	28	29	26
79	25	27	23	28	29	26
80	25	27	23	28	29	27
81	26	27	23	28	29	27
82	26	27	23	29	29	27
83	26	27	23	29	30	27
84	26	28	23	29	30	27
85	26	28	23	29	30	27
86	26	28	23	29	30	27
87	26	28	23	29	30	27
88	26	28	23	30	30	28
89	27	28	24	30	31	28
90	27	28	24	30	31	28
91	27	28	24	30	31	28
92	27	29	24	30	31	28
93	27	29	24	30	31	28
94	27	29	24	30	32	28
95	27	29	24	31	32	28
96	27	29	24	31	32	28
97	28	29	24	31	32	29
98	28	29	24	31	32	29
99	28	29	24	31	32	29
100	28	29	25	32	33	29
101	28	29	25	32	33	29
102	28	29	25	32	33	29
103	29	30	25	32	33	29
104	29	30	25	33	33	29
105	29	30	25	33	34	30
106	29	30	25	33	34	30
107	30	30	25	34	34	30
108	30	30	25	34	35	30
109	30	31	25	34	35	30
110	30	31	25	35	35	30
111	29	31	26	35	35	31
112	29	31	26	36	35	31
113	30	31	26	42	36	31
114	72	42	29	117	45	37

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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
115	180	95	51	404	136	140
116	322	260	88	556	353	276
117	854	752	374	781	692	567
118	842	1005	697	858	882	834
119	614	-	834	919	-	920
120	559	-	924	938	-	932
121	652	-	1091	-	-	964
122	706	-	-	-	-	967
123	724	-	-	-	-	-
124	748	-	-	-	-	-
125	759	-	-	-	-	-
126	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

See **Figure 8** for the location of the thermocouples.

Specimen Lateral Deflection

Time (minutes)	Deflection (mm)
	Centre
0	0
1	-0.1
2	-0.2
3	-0.2
4	-0.3
5	-0.3
6	-0.3
7	-0.5
8	-0.7
9	-0.8
10	-1
11	-1
12	-1.2
13	-1.3
14	-1.4
15	-1.5
16	-1.7
17	-1.7
18	-1.8
19	-1.8
20	-1.9
21	-1.8
22	-2
23	-1.9
24	-1.9
25	-1.9
26	-1.8
27	-1.8
28	-2
29	-1.9
30	-1.8
31	-1.8
32	-1.8
33	-1.8
34	-1.8
35	-1.8
36	-1.6
37	-1.7
38	-1.6

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Time (minutes)	Deflection (mm)
	Centre
39	-1.7
40	-1.8
41	-1.8
42	-1.7
43	-1.8
44	-1.8
45	-1.8
46	-1.8
47	-1.8
48	-1.8
49	-1.9
50	-2
51	-2.1
52	-2
53	-2
54	-2.2
55	-2.2
56	-2.2
57	-2.3
58	-2.3
59	-2.4
60	-2.5
61	-2.5
62	-2.6
63	-2.6
64	-2.7
65	-2.7
66	-2.8
67	-2.9
68	-3
69	-3
70	-3.1
71	-3.2
72	-3.3
73	-3.4
74	-3.5
75	-3.5
76	-3.5
77	-3.6
78	-3.7
79	-3.8

Customer: **British Gypsum**

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Time (minutes)	Deflection (mm)
	Centre
80	-3.8
81	-3.8
82	-4
83	-4
84	-4.1
85	-4.1
86	-4.2
87	-4.2
88	-4.3
89	-4.3
90	-4.4
91	-4.5
92	-4.4
93	-4.5
94	-4.5
95	-4.5
96	-4.5
97	-4.6
98	-4.6
99	-4.6
100	-4.7
101	-4.7
102	-4.7
103	-4.8
104	-4.8
105	-4.8
106	-4.8
107	-4.8
108	-4.9
109	-5.1
110	-5
111	-5
112	-4.8
113	-4.5
114	-2.5
115	10.4
116	19.4
117	25.3
118	20.9
119	21
120	21

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Time (minutes)	Deflection (mm)
	Centre
121	20.9
122	20.9
123	22.8
124	24.8
125	27.1
126	29.3
127	31.7
128	34
129	36.6
130	38.7
131	41.2
132	43.1
133	45
134	47.4
135	49
136	51.3
137	53
138	55
139	56.3
140	57.5
141	59.2
142	60
143	60.8
144	61.7
145	62.4
146	63.1
147	64.1
148	64.6
149	65.3
150	65.5
151	66
152	66.5
153	66.7
154	67
155	67.3
156	67.7
157	67.8
158	68
159	68.2
160	68.5
161	69.1

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Time (minutes)	Deflection (mm)
	Centre
162	69.3
163	70
164	71.8
165	72.1
166	72.6
167	73.6
168	74.5
169	75.3
170	76.2
171	76.9
172	77.3
173	77.9
174	78.5
175	79.1
176	79.3
177	79.7
178	79.9
179	80.5
180	80.5
181	80.5
182	80.1
183	80
184	-
185	-
186	-

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

- Indicates a broken transducer.

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PHOTOGRAPHS

Exposed Face Prior to Test



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Unexposed Face Prior to Test



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Unexposed Face at 30 Minutes



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Unexposed Face at 1 Hour



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Unexposed Face at 2 Hours



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Unexposed Face at 2 Hours, 30 Minutes



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Unexposed Face at 3 hours



Customer: **British Gypsum**

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Unexposed Face at 3 Hours, 06 Minutes, at Test Termination



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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 3000 mm.
- ii) Increase in the thickness of the wall (minimum thickness 374 mm).
- iii) Increase thickness of component materials (minimum Gypframe stud depth 92 mm, minimum Gypframe stud gauge 1 mm).
- iv) Decrease in the linear dimensions of the boards but not thickness (≤ 2400 mm (long) $\times \leq 1200$ mm (wide) Gyproc SoundBloc).
- v) Decrease stud spacing from 600 mm.
- vi) Decrease in fixing centres from 300 mm.
- 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 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:

$$\frac{120 \text{ minutes}}{\leq 100 \text{ mm}}$$