The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
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Report Number: **BTC 21636F**

A FIRE RESISTANCE TEST ON A BRITISH GYPSUM GYPWALL QUIET IWL TWIN FRAME PARTITION CLAD WITH A DOUBLE LAYER OF 15 MM GYPROC DURALINE EACH SIDE WITH 50 MM ISOVER APR 1200 INSULATION IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364 1: 2015.

Test Date: 22nd January 2021

Report Issue Date: 26th January 2021

Report Amended: 19th February 2021

www.btconline.co.uk

Customer: **British Gypsum**
East Leake
Loughborough
Leicestershire
LE12 6HX

UKAS TESTING
0296

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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 double layer of Gyproc DuraLine, incorporating 50 mm 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 12th and 14th January 2021. 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 conducted on the 22nd January 2021.

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

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Scientist

Authorised by

Paul Miller
BSc. (Hons.)
Fire Test Manager

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TEST REPORT AMENDMENTS

Page	Amendments	Date
1	Report amendment date added to title page. Page amendment date added in footer.	19/02/2021
5	Test report amendments page updated. Page amendment date added in footer.	19/02/2021
6	Test construction final partition thickness description corrected from 210 mm to 200 mm. Page amendment date added in footer.	19/02/2021

Report Amendments Author

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MEng. (Hons.), MIFireE
Laboratory Supervisor

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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 3000 mm (high) x 3000 mm (wide).

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

Gypframe 48I50 'I' Studs were positioned at 600 mm 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 25 mm 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 60 mm fire resistance fixings at 600 mm centres.

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

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

Both the unexposed face and the exposed face of the specimen were clad with a double layer of 15 mm Gyproc DuraLine. The inner layer boards were fixed with 25 mm British Gypsum Drywall Screws at 300 mm centres around the perimeter of the boards only. The outer layer boards were fixed with 40 mm British Gypsum Drywall Screws 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 and at 600 mm 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

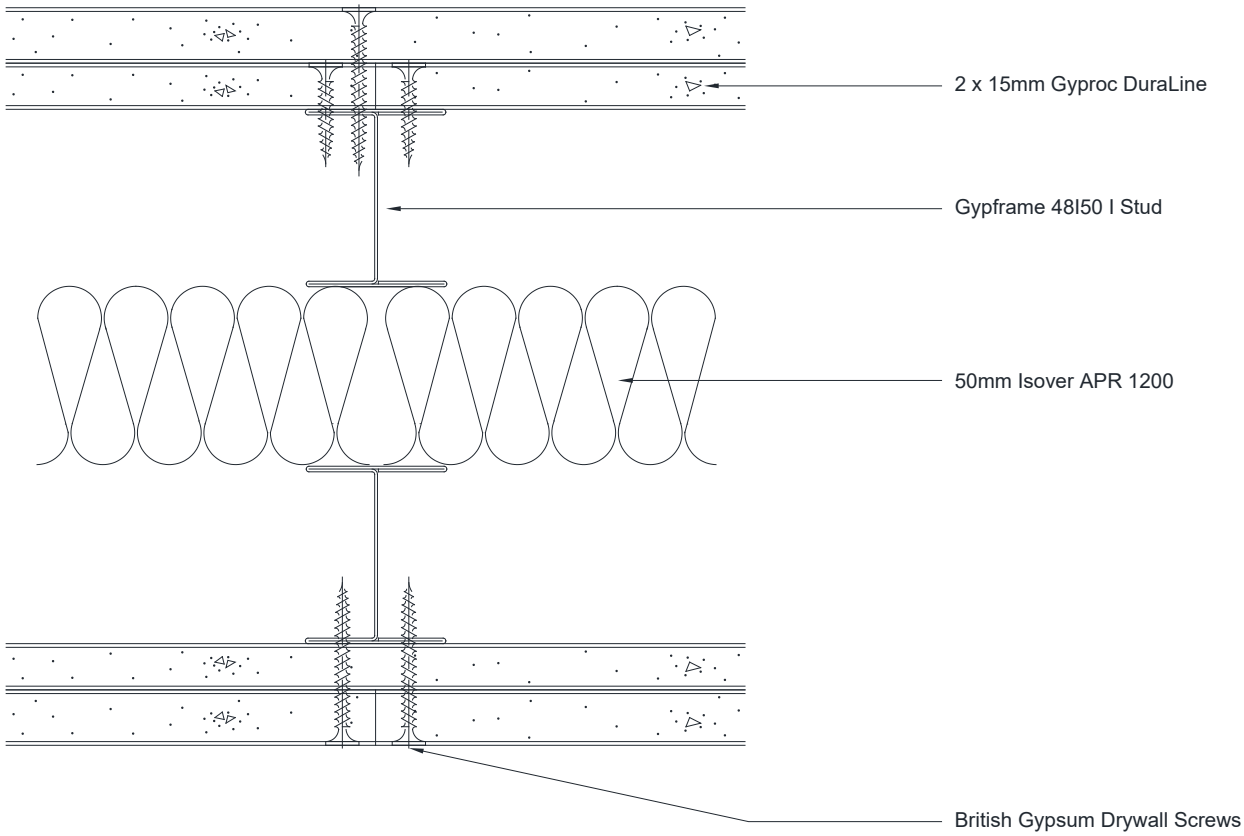

Figure 1 – Horizontal cross section.

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Exposed Face Elevation

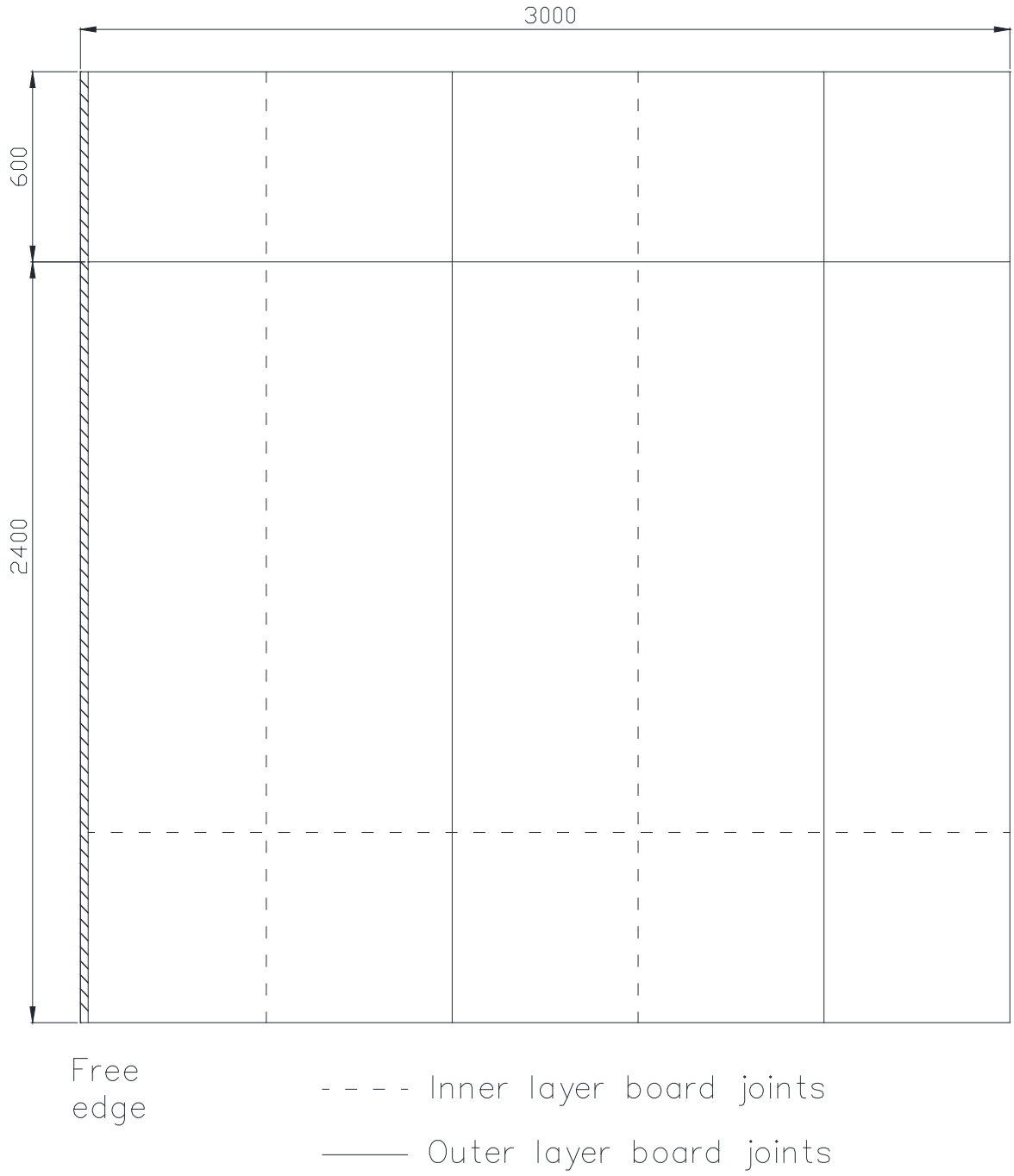

Figure 2 – Exposed face elevation.

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Unexposed Face Elevation

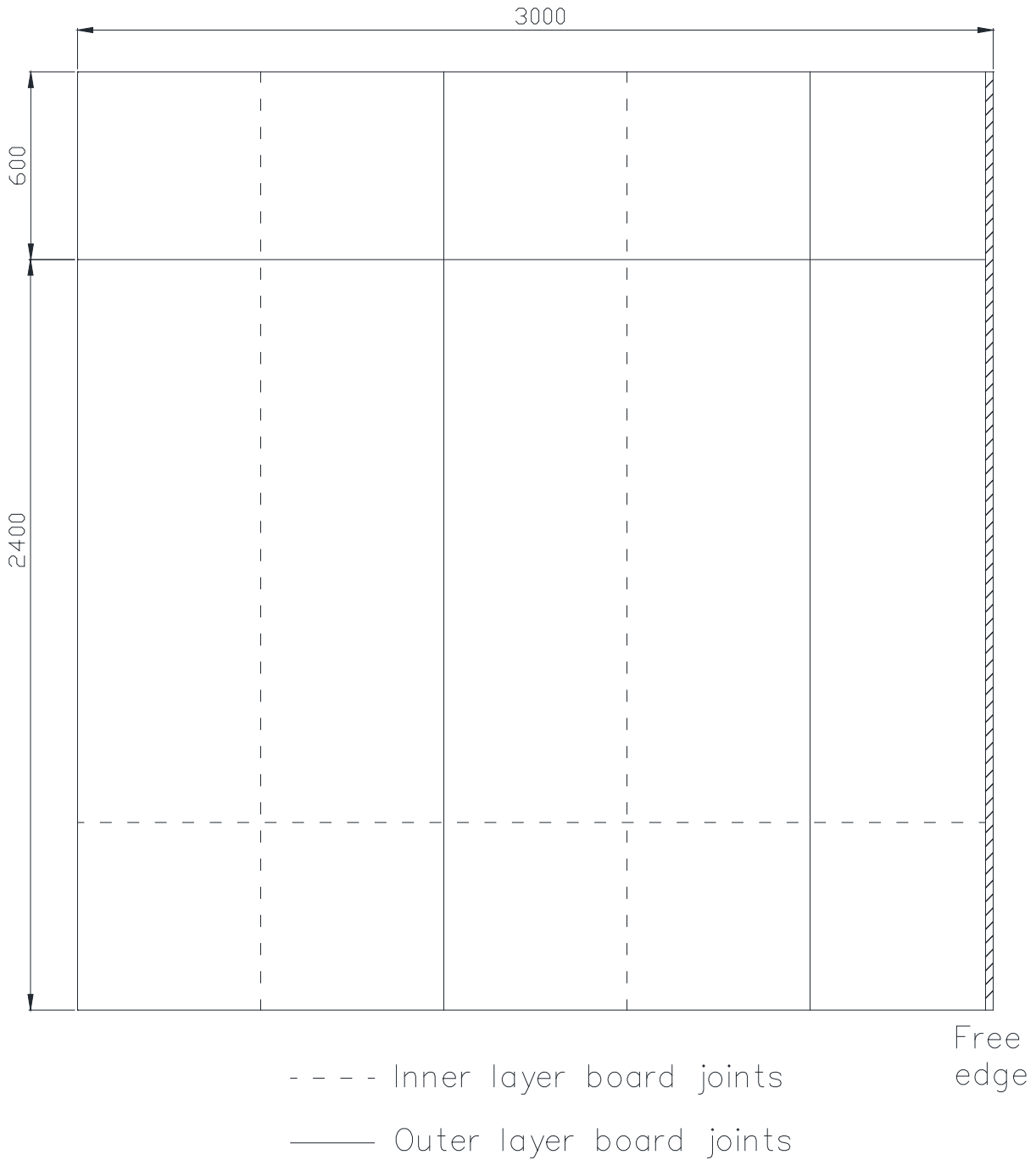

Figure 3 – Unexposed face elevation.

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TEST MATERIALS

Plasterboard

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

Measured mass per unit area:	14.9 kg/m²
Measured thickness:	15.3 mm
Board identification numbers:	26 020 20 02:55
	26 020 20 02:55
	26 020 20 02:56
Measured moisture content:	0.76 %

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) Gypframe 50FEC50 Standard Folded Edge Floor & Ceiling Channels, supplied by The Building Test Centre
iii) Gypframe 48I50 'I' Studs, supplied by British Gypsum.
iv) Gypframe 48S50 'C' Studs, supplied by The Building Test Centre
v) Gypframe GFS1 Fixing Strap, supplied by The Building Test Centre

Fasteners

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

Miscellaneous Components

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

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Insulation

xii) Nominally 50 mm (thick) Isover APR 1200 (Acoustic Partition Roll), manufactured by Saint-Gobain Isover and supplied by British Gypsum.

Measured surface density: 0.608 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.

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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 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.

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TEST RESULTS

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

Integrity	**Sustained Flaming**	**150 minutes, no failure.**
	6 mm Gap Gauge	**150 minutes, no failure.**
	25 mm Gap Gauge	**150 minutes, no failure.**
	Cotton Pad	**150 minutes, no failure.**
Insulation		**147 minutes.**
Test Terminated		**150 minutes, at the request of the laboratory.**

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.

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TEST DATA

Observations

All observations refer to the exposed face unless stated.

Observers: Unexposed face: Denis Bradshaw
Exposed face: Lindsey Watson

Time Hours	Time Minutes	Observations
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 2-3 mm. Right-hand vertical joint had opened up to approximately 2-3 mm. Horizontal joint had opened up to approximately 2-3 mm. Boards began to crack around the screw heads.
0	30	Left-hand vertical joint had opened up to approximately 8-9 mm. Right-hand vertical joint had opened up to approximately 3-4 mm. Horizontal joint had opened up to approximately 3-4 mm. *Unexposed face* No visible change.
0	40	Left-hand vertical joint had opened up to approximately 9 mm. Right-hand vertical joint had opened up to approximately 4-5 mm. Horizontal joint had opened up to approximately 4-5 mm.
0	50	Left-hand vertical joint had opened up to approximately 9-10 mm. Right-hand vertical joint had opened up to approximately 5 mm. Horizontal joint had opened up to approximately 5 mm.
1	00	Left-hand vertical joint had opened up to approximately 11-12 mm. Right-hand vertical joint had opened up to approximately 6 mm. Horizontal joint had closed up. *Unexposed face* No visible change.

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Time Hours	Time Minutes	Observations
1	10	Left-hand vertical joint had opened up to approximately 12-13 mm. Right-hand vertical joint had opened up to approximately 6-7 mm. Horizontal joint had opened up to approximately 5 mm.
1	20	Left-hand vertical joint had opened up to approximately 32-34 mm. Right-hand vertical joint had opened up to approximately 10-12 mm. Horizontal joint had opened up to approximately 9-10 mm.
1	30	Left-hand vertical joint had opened up to approximately 70 mm. Right-hand vertical joint had opened up to approximately 24-26 mm. Horizontal joint had opened up to approximately 24 mm. *Unexposed face* No visible change.
1	40	Lower centre board had fallen into the furnace.
1	50	Second layer right-hand vertical joint had opened up to approximately 32-34 mm. Lower left-hand centre board had began to bow into the furnace.
2	00	Lower left-hand centre board had fallen into the furnace. Second layer lower centre board had began to bow into the furnace. Upper centre board had fallen into the furnace. Studs had warped. *Unexposed face* No visible change.
2	10	Second layer lower centre board had fallen into the furnace. Second layer lower left-hand board had fallen into the furnace. Second layer upper centre board had fallen into the furnace.
2	20	Second layer upper left-hand board had fallen into the furnace.

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Time Hours	Time Minutes	Observations
2	27	*Unexposed face* **INSULATION FAILURE.** The temperature rise of thermocouple no.32 positioned at the centre of the lower centre board exceeded 180 °C. Screw heads had discoloured on the left-hand vertical joint from approximately 600 mm to 2700 mm height. Screw heads had discoloured on the left-hand vertical joint from approximately 600 mm to 2400 mm height.
2	30	Approximately 70% of second layer boards had fallen into the furnace. **TEST TERMINATED** at the request of the laboratory.

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Furnace Temperature Graph

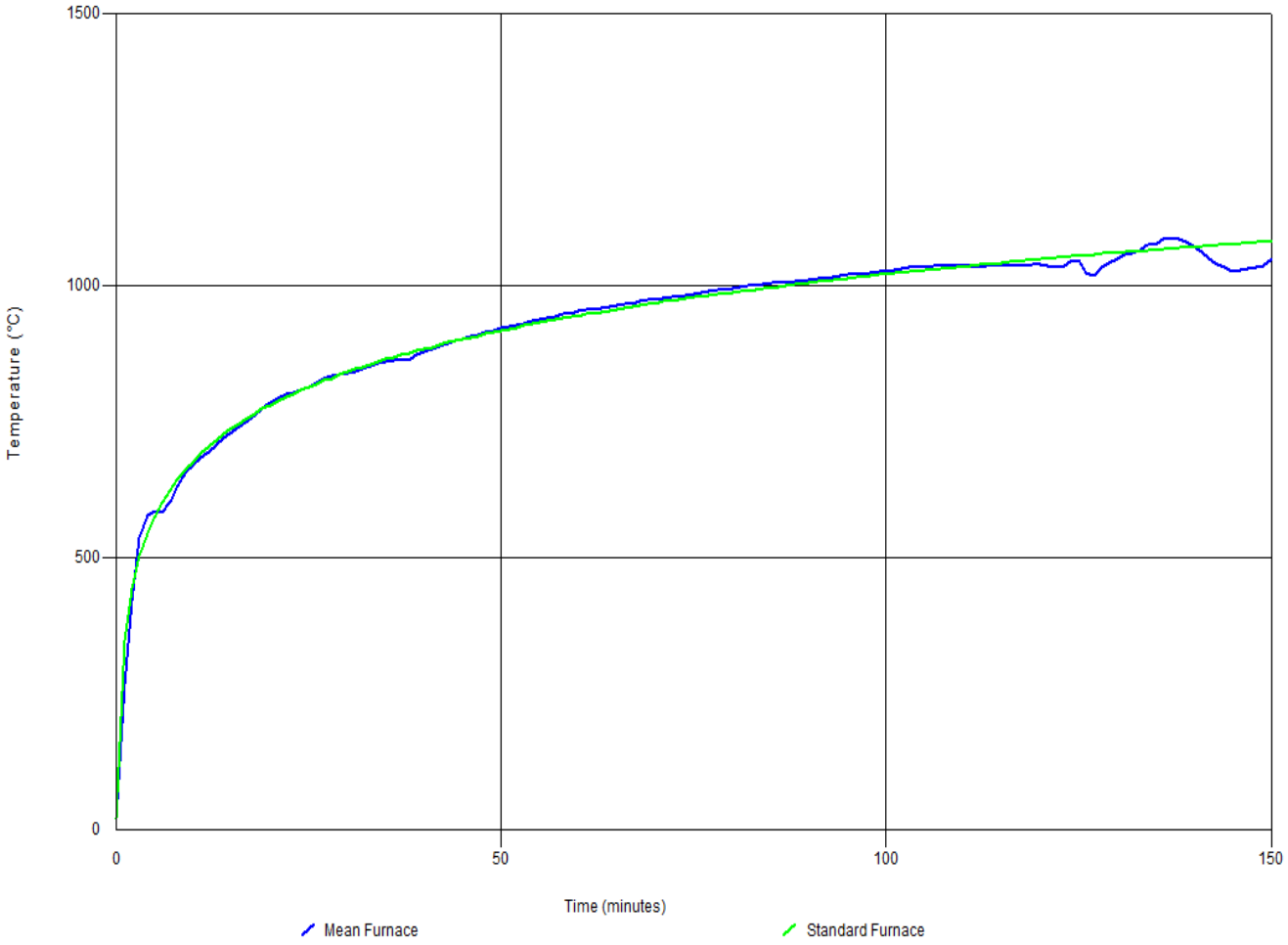

Figure 4 – Furnace temperature graph.

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Furnace Pressure Graph

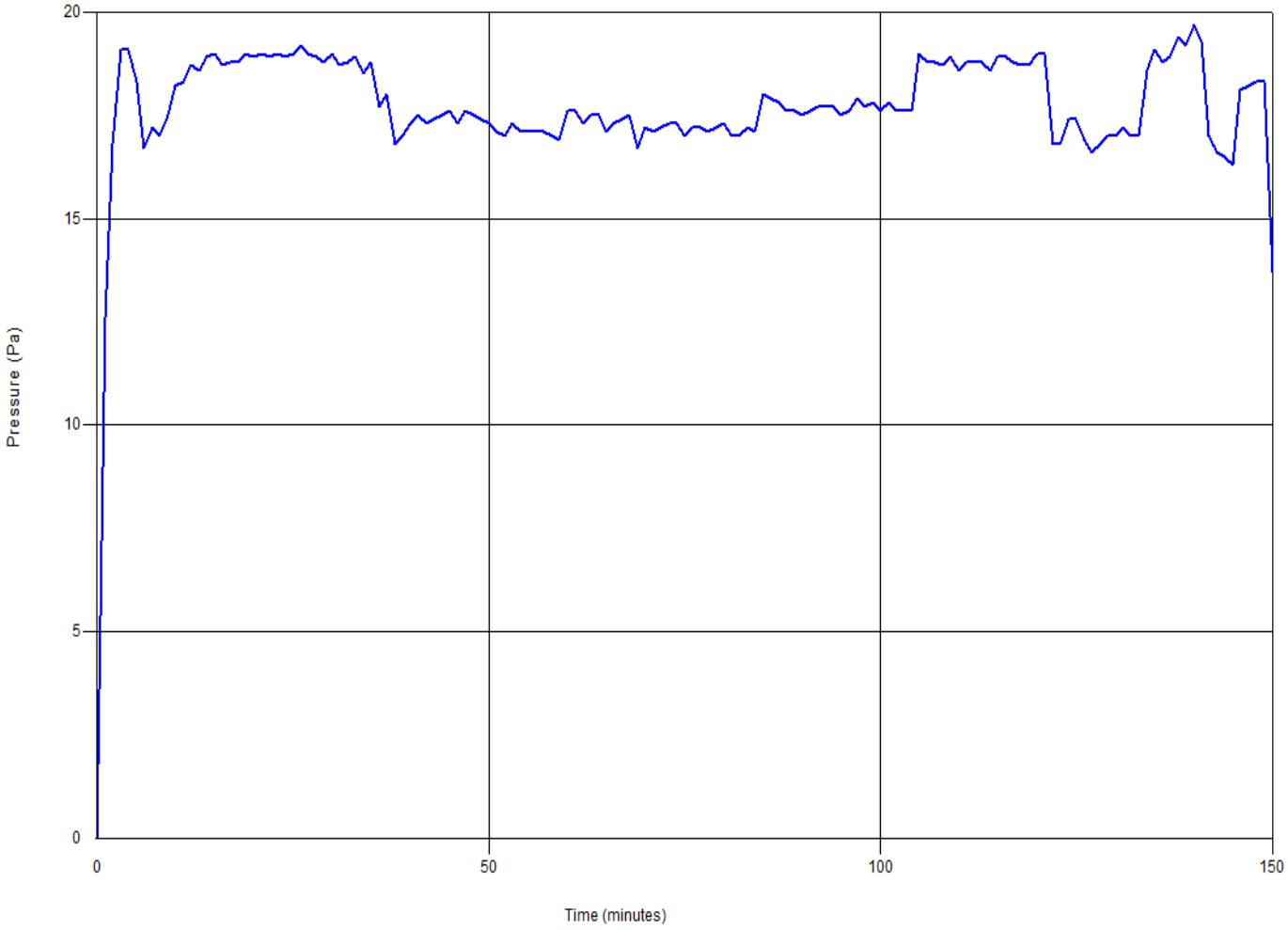

Figure 5 – Furnace pressure graph.

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Unexposed Face Temperature Graph

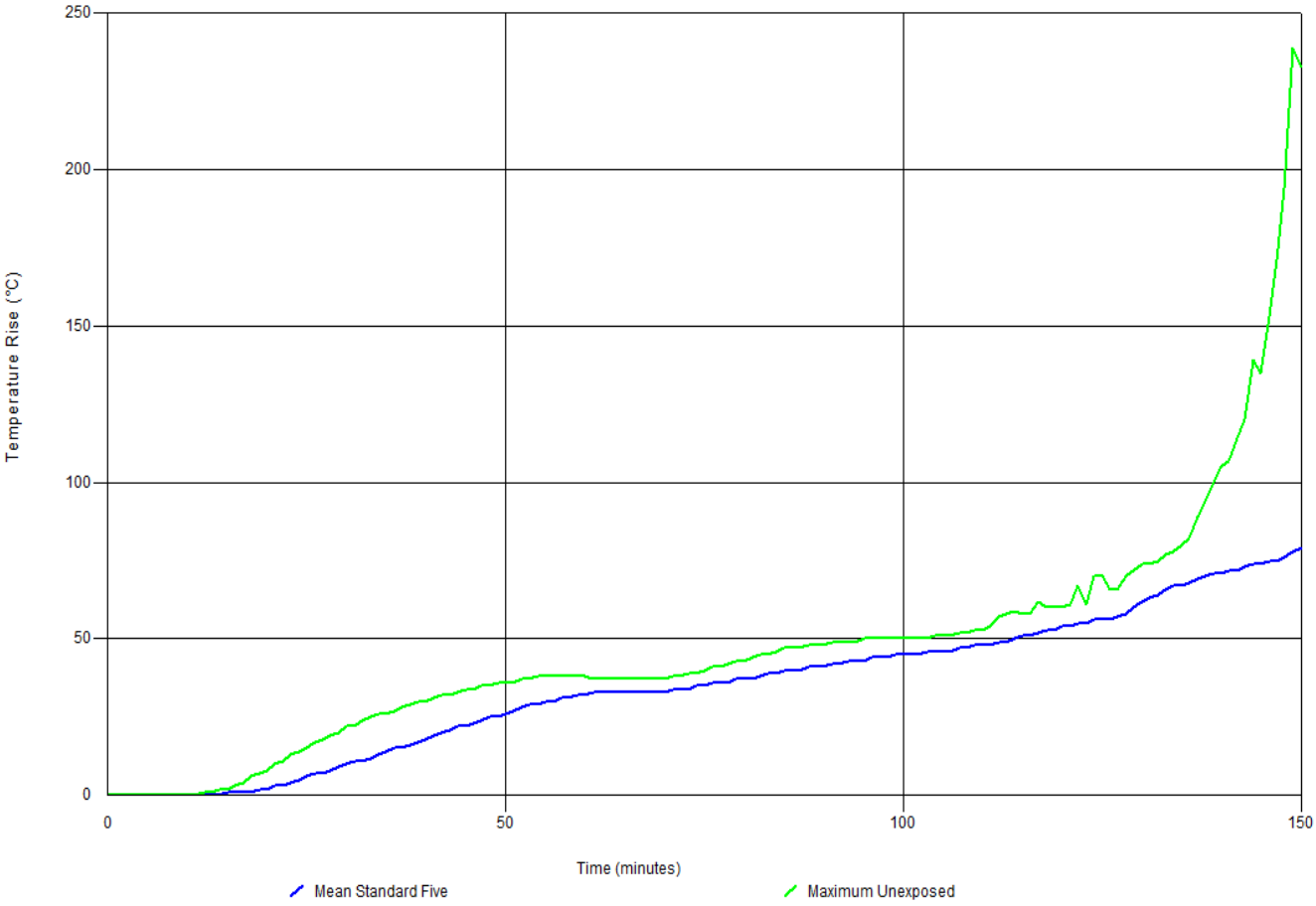

Figure 6 – Unexposed face temperature graph.

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Unexposed Face Thermocouple Layout

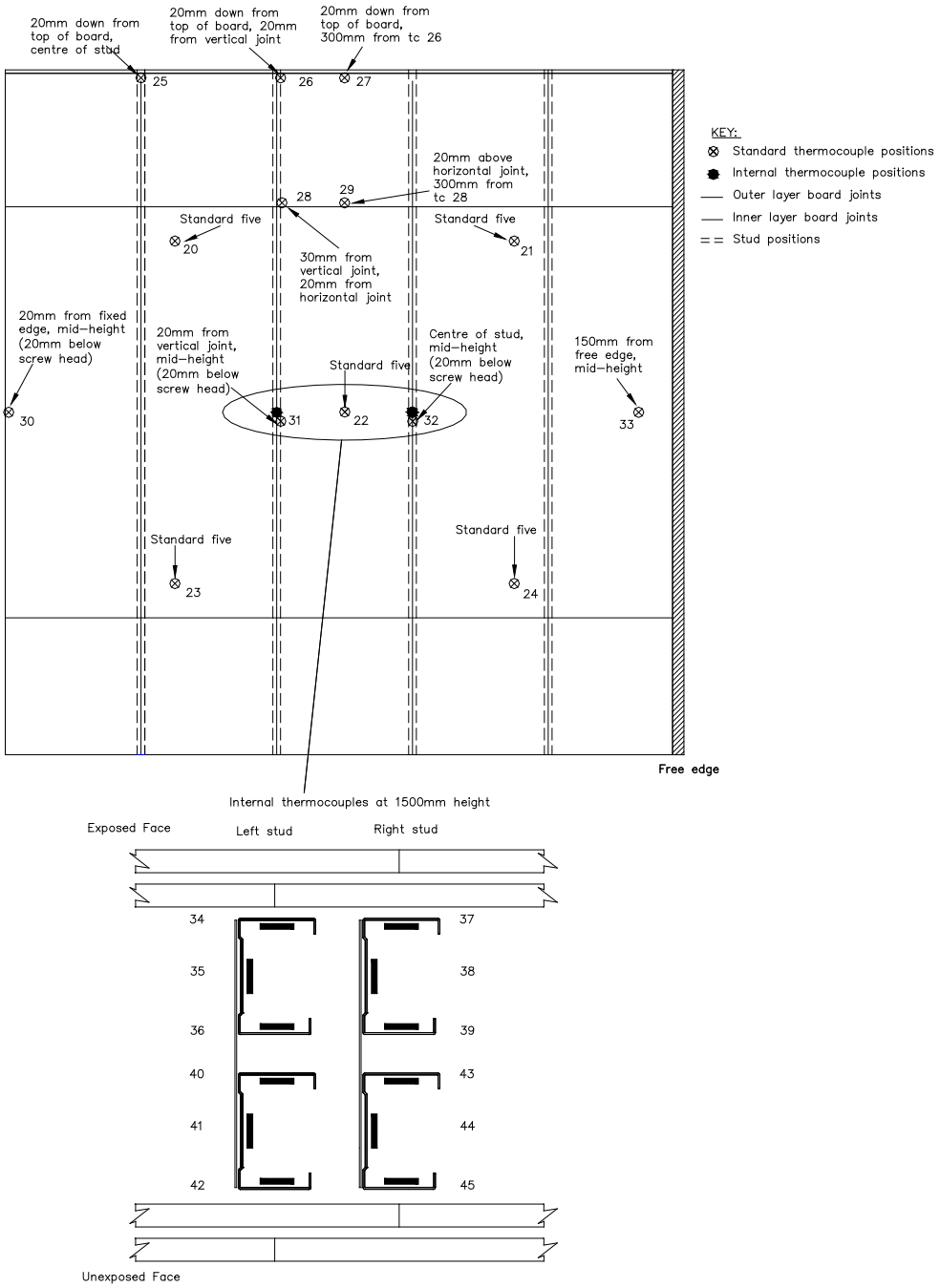

Figure 7 – Unexposed face thermocouple layout.

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Unexposed Face Standard Five Temperature Data

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

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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	22	24	16	10	14	17
40	23	25	17	11	15	18
41	24	26	18	12	15	19
42	25	27	19	13	16	20
43	26	28	19	13	17	21
44	27	29	20	14	18	22
45	27	29	21	15	19	22
46	28	30	22	16	20	23
47	29	31	23	16	20	24
48	30	32	24	17	21	25
49	30	33	24	18	22	25
50	31	33	25	19	23	26
51	32	34	26	19	24	27
52	33	35	27	20	25	28
53	33	35	28	21	26	29
54	34	36	28	22	27	29
55	34	36	29	22	27	30
56	35	36	29	23	28	30
57	35	37	30	24	29	31
58	35	37	31	24	30	31
59	36	37	31	25	30	32
60	36	37	31	25	31	32
61	36	37	32	26	32	33
62	35	37	32	27	32	33
63	35	37	32	27	32	33
64	35	37	32	27	33	33
65	35	37	32	28	33	33
66	35	37	32	28	34	33
67	34	37	33	28	34	33
68	34	37	33	28	34	33
69	34	37	33	28	34	33
70	34	37	33	29	34	33
71	34	38	33	29	35	34
72	35	38	34	29	35	34
73	35	39	34	29	35	34
74	35	39	34	30	35	35
75	35	40	35	30	36	35
76	36	41	35	30	36	36
77	36	41	35	30	36	36
78	37	42	36	30	37	36
79	37	43	36	31	37	37

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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
80	38	43	37	31	37	37
81	38	44	37	31	37	37
82	39	45	38	32	38	38
83	39	45	39	32	38	39
84	40	46	39	32	38	39
85	41	47	40	32	38	40
86	41	47	40	33	38	40
87	41	47	41	34	39	40
88	42	48	41	34	39	41
89	42	48	42	34	39	41
90	43	48	42	35	39	41
91	43	49	43	35	40	42
92	43	49	43	36	40	42
93	44	49	43	36	41	43
94	44	49	44	37	41	43
95	44	50	44	37	41	43
96	45	50	44	38	42	44
97	45	50	44	38	42	44
98	45	50	44	38	43	44
99	46	50	45	39	43	45
100	46	50	45	39	43	45
101	46	50	45	39	44	45
102	47	50	45	40	44	45
103	47	50	46	41	45	46
104	47	50	46	41	45	46
105	47	50	46	42	46	46
106	47	51	46	42	46	46
107	47	51	47	42	47	47
108	48	51	47	43	47	47
109	48	51	48	44	47	48
110	48	52	48	44	48	48
111	48	52	49	45	48	48
112	49	52	50	46	48	49
113	49	52	50	46	49	49
114	49	52	51	48	49	50
115	50	52	52	50	49	51
116	50	51	53	52	50	51
117	50	51	55	54	50	52
118	51	51	56	56	50	53
119	51	51	57	57	51	53
120	52	51	58	57	52	54

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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	52	52	58	58	52	54
122	53	52	59	58	52	55
123	54	52	58	57	53	55
124	54	53	59	58	54	56
125	55	53	59	58	55	56
126	56	53	59	58	56	56
127	57	53	59	58	57	57
128	58	54	61	59	59	58
129	59	55	64	62	61	60
130	60	56	67	64	62	62
131	61	58	68	65	63	63
132	61	61	69	66	64	64
133	63	65	70	66	65	66
134	66	67	70	67	65	67
135	67	67	70	67	64	67
136	68	68	71	68	66	68
137	69	69	71	68	69	69
138	70	70	72	69	71	70
139	71	71	73	70	72	71
140	70	71	73	70	72	71
141	71	72	74	71	73	72
142	71	72	74	71	74	72
143	71	73	75	72	75	73
144	71	74	76	72	75	74
145	72	74	76	72	76	74
146	73	75	77	73	76	75
147	73	75	78	73	77	75
148	74	76	80	73	78	76
149	74	77	85	74	78	78
150	75	80	88	74	79	79

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

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

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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	23	20	30	20	21
40	24	21	30	20	22
41	25	21	31	21	23
42	26	22	32	22	24
43	27	23	32	22	25
44	28	24	33	23	25
45	29	25	34	24	26
46	30	26	34	25	27
47	31	26	35	25	28
48	32	27	35	26	28
49	33	28	36	26	29
50	33	29	36	27	30
51	34	30	36	27	30
52	34	31	37	28	31
53	35	31	37	28	31
54	35	32	38	29	32
55	35	32	38	29	32
56	35	33	38	29	33
57	35	33	38	30	33
58	35	33	38	30	33
59	35	33	38	30	33
60	35	33	38	30	33
61	35	32	37	31	34
62	34	32	37	31	33
63	34	32	37	31	33
64	34	32	36	31	33
65	33	31	36	30	33
66	33	31	36	30	33
67	33	31	35	30	33
68	32	30	35	31	33
69	32	30	35	31	33
70	32	30	36	31	33
71	32	30	36	31	33
72	32	30	36	31	33
73	32	30	36	32	34
74	33	31	36	32	34
75	33	31	36	32	35
76	33	32	37	33	35
77	34	33	37	33	36
78	35	34	37	34	36
79	35	35	37	34	37

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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	36	35	38	35	38
81	37	36	38	35	38
82	38	37	38	36	39
83	39	38	39	37	40
84	40	38	39	37	40
85	41	39	39	38	40
86	42	40	40	39	41
87	43	40	40	39	41
88	44	41	41	40	41
89	45	41	41	40	42
90	45	42	41	40	42
91	46	43	42	41	42
92	47	43	42	41	42
93	47	44	43	41	43
94	48	44	43	42	43
95	48	45	44	42	43
96	48	45	44	43	43
97	49	45	45	43	43
98	49	46	46	43	44
99	49	46	46	44	44
100	49	47	47	44	44
101	50	47	47	44	44
102	50	47	48	45	44
103	50	48	48	45	45
104	51	48	49	45	45
105	51	48	49	46	45
106	51	49	49	46	45
107	52	49	50	47	45
108	52	50	50	48	45
109	53	50	50	49	46
110	53	51	50	50	46
111	54	52	50	51	46
112	55	53	51	53	46
113	56	54	51	53	46
114	57	54	52	53	46
115	58	55	52	53	46
116	58	56	52	54	47
117	59	57	53	56	48
118	59	58	53	56	49
119	60	58	53	57	49
120	60	59	54	58	51

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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	61	59	55	58	52
122	61	59	55	58	53
123	61	59	56	58	53
124	61	60	57	58	54
125	61	60	57	58	54
126	62	60	58	59	54
127	62	60	58	61	55
128	63	60	60	63	56
129	64	61	62	64	57
130	65	62	63	65	60
131	65	63	64	66	62
132	66	63	66	67	64
133	67	64	67	68	65
134	68	64	68	68	66
135	68	65	69	68	66
136	69	65	71	69	67
137	71	66	73	70	68
138	72	68	74	70	69
139	72	69	76	71	70
140	73	70	77	71	70
141	74	71	79	72	71
142	74	71	81	72	71
143	75	72	83	73	72
144	75	72	84	73	73
145	76	73	86	74	73
146	76	73	88	75	74
147	77	74	90	76	75
148	78	74	92	77	76
149	79	74	94	79	77
150	81	75	96	86	79

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

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

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
39	18	6	7	19
40	19	6	7	20
41	19	7	7	21
42	20	7	8	22
43	21	7	8	22
44	22	7	8	23
45	23	8	9	24
46	23	8	9	25
47	24	8	9	26
48	25	9	10	27
49	25	9	10	27
50	26	10	10	28
51	26	10	11	29
52	27	10	12	30
53	28	11	13	30
54	28	11	14	31
55	29	11	15	32
56	29	11	15	32
57	30	12	14	33
58	30	13	14	34
59	31	12	14	34
60	31	12	15	34
61	31	13	14	35
62	32	13	13	35
63	32	13	13	35
64	32	13	13	36
65	32	14	13	36
66	32	13	14	36
67	32	13	18	36
68	32	14	19	36
69	32	13	15	36
70	32	13	14	36
71	32	14	15	36
72	32	15	15	36
73	32	15	17	36
74	32	14	17	36
75	32	15	17	36
76	32	16	18	37
77	33	15	19	37
78	33	16	17	37
79	33	16	17	38

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
80	33	16	20	38
81	33	16	22	39
82	33	16	20	39
83	33	17	17	40
84	34	17	19	40
85	34	17	14	41
86	34	17	13	41
87	35	18	11	42
88	35	19	10	43
89	36	18	10	43
90	36	19	14	44
91	37	19	13	44
92	37	19	13	45
93	38	20	12	45
94	38	19	11	46
95	39	20	11	46
96	40	21	15	46
97	40	20	18	47
98	41	20	27	47
99	41	21	30	47
100	42	21	25	47
101	42	21	21	48
102	43	21	21	48
103	44	21	29	48
104	44	21	30	49
105	44	22	29	49
106	45	22	36	49
107	46	22	35	49
108	46	23	27	49
109	47	22	48	50
110	47	24	27	50
111	48	24	53	50
112	48	24	57	50
113	49	26	58	50
114	49	26	59	50
115	50	26	53	50
116	50	25	54	50
117	51	25	62	50
118	51	26	60	51
119	52	27	51	51
120	53	27	46	51

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
121	54	27	51	51
122	54	26	67	51
123	55	26	61	51
124	56	27	70	51
125	57	28	70	52
126	58	27	66	52
127	59	29	66	52
128	61	30	70	52
129	62	31	72	53
130	62	31	74	54
131	63	31	74	56
132	63	32	75	57
133	64	33	77	59
134	64	33	78	60
135	64	33	80	60
136	64	33	82	61
137	65	34	89	63
138	65	34	94	64
139	66	35	100	67
140	66	36	105	69
141	66	36	107	70
142	67	36	114	71
143	67	39	120	71
144	68	40	139	72
145	69	42	135	72
146	69	46	153	72
147	70	45	**171**	73
148	70	48	194	73
149	71	48	239	74
150	71	51	233	74

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 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	26	25	25	26	25	24
1	27	26	25	26	25	24
2	27	26	25	27	25	24
3	28	26	25	29	26	25
4	32	27	25	32	26	25
5	42	32	26	37	27	26
6	58	42	29	44	30	27
7	70	52	34	51	34	30
8	76	57	42	58	40	36
9	81	61	48	65	48	45
10	85	65	54	72	56	53
11	88	69	60	79	62	59
12	91	74	65	84	68	63
13	93	78	67	88	72	67
14	94	81	70	91	76	69
15	95	83	72	94	78	70
16	95	84	73	95	79	70
17	95	85	75	97	80	71
18	96	86	76	98	81	73
19	96	87	78	99	82	74
20	96	88	79	100	83	75
21	97	88	80	101	85	76
22	98	89	81	102	86	78
23	99	90	82	104	88	80
24	100	91	84	106	89	81
25	100	92	85	108	91	83
26	100	93	86	111	92	85
27	100	94	88	114	94	86
28	101	95	89	117	96	88
29	101	96	91	120	98	90
30	102	96	93	122	100	92
31	103	97	95	125	102	94
32	105	99	97	127	105	96
33	107	101	98	129	107	98
34	111	104	101	131	109	99
35	116	108	103	134	111	101
36	125	114	105	137	113	103

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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	139	120	107	139	115	105
38	153	127	110	142	117	107
39	166	135	113	144	119	108
40	178	144	117	147	121	110
41	190	154	121	151	122	111
42	203	163	124	157	124	113
43	215	171	128	167	125	114
44	227	177	132	177	127	116
45	238	182	136	191	130	117
46	249	187	140	201	133	119
47	260	192	144	212	138	121
48	272	198	148	226	144	125
49	283	204	152	236	151	129
50	293	210	156	250	160	134
51	302	217	161	263	170	139
52	311	223	167	278	181	146
53	319	230	174	292	194	155
54	327	239	182	306	207	165
55	335	248	192	320	222	175
56	343	259	203	334	237	186
57	352	270	215	347	252	199
58	361	282	228	360	268	212
59	370	294	241	373	284	226
60	380	306	254	386	301	242
61	390	318	268	399	318	257
62	401	331	282	412	334	270
63	411	345	297	424	349	282
64	422	359	313	434	362	295
65	433	373	330	445	374	307
66	445	388	346	455	383	318
67	455	403	361	460	391	328
68	462	416	375	467	400	338
69	470	427	388	473	408	347
70	477	437	398	479	415	355
71	483	445	407	485	422	362
72	489	453	414	490	429	369
73	496	461	423	495	435	376
74	502	469	435	499	442	383
75	507	475	446	504	448	389

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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	512	482	453	509	454	395
77	518	488	460	514	461	401
78	522	494	467	518	466	407
79	527	500	473	523	472	413
80	532	505	479	528	478	421
81	537	511	485	532	483	431
82	542	516	491	537	488	440
83	548	522	497	541	494	446
84	555	529	504	545	499	452
85	563	537	512	550	504	457
86	571	544	521	555	509	463
87	579	552	529	559	514	468
88	587	558	537	563	518	473
89	594	564	544	567	522	477
90	601	570	550	572	527	482
91	608	576	556	577	531	487
92	616	583	562	581	535	492
93	627	590	569	587	540	497
94	637	598	576	592	545	502
95	646	606	584	598	549	507
96	655	616	593	603	555	512
97	666	628	603	609	560	516
98	694	644	619	614	565	521
99	716	659	634	619	570	525
100	734	681	650	625	577	529
101	749	703	660	633	584	535
102	759	717	679	641	593	543
103	766	726	689	648	603	550
104	772	723	704	651	610	555
105	-	724	714	656	617	561
106	-	730	726	661	626	568
107	-	735	734	667	635	576
108	-	735	-	672	641	583
109	-	-	-	677	643	588
110	-	-	-	682	-	591
111	-	-	-	681	-	591
112	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

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

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Internal Temperature Data on Unexposed Face Studs 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	18	17	15	19	19	17
1	18	17	16	19	19	17
2	18	17	16	19	19	17
3	18	17	16	19	19	17
4	18	17	16	19	19	17
5	19	17	16	19	19	17
6	20	18	16	20	20	17
7	23	19	16	21	22	17
8	28	21	17	24	26	18
9	35	26	18	29	32	21
10	43	32	20	37	41	26
11	51	41	24	46	49	33
12	59	49	28	55	57	40
13	63	55	33	60	61	45
14	65	59	37	64	63	48
15	67	62	41	66	64	50
16	68	63	44	66	65	52
17	68	63	46	67	65	53
18	68	63	48	67	65	54
19	68	64	49	68	65	54
20	68	64	51	68	65	55
21	68	65	52	68	66	56
22	69	65	53	68	66	57
23	70	66	55	69	67	59
24	71	68	56	70	68	60
25	72	69	58	71	69	61
26	73	69	59	72	70	62
27	73	70	61	72	71	63
28	74	70	62	73	72	64
29	74	71	63	73	73	65
30	75	72	64	74	74	66
31	76	73	65	75	74	67
32	77	73	66	76	76	68
33	79	74	67	77	77	69
34	80	76	69	78	78	70
35	82	77	70	79	79	71
36	83	78	72	80	81	72

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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	84	79	73	81	82	73
38	86	80	75	82	83	74
39	87	81	76	83	84	75
40	88	82	77	84	85	76
41	89	83	78	85	86	77
42	90	84	79	86	87	78
43	91	84	80	87	88	79
44	92	84	81	87	88	80
45	93	85	81	88	89	80
46	93	85	81	88	90	81
47	93	85	82	88	91	81
48	95	85	82	89	92	82
49	96	86	83	90	93	82
50	97	86	83	90	95	83
51	99	86	83	91	98	83
52	101	87	84	92	101	84
53	104	87	84	93	104	84
54	107	87	84	95	109	85
55	112	87	84	96	114	85
56	122	88	83	98	118	86
57	136	88	83	99	123	86
58	151	89	83	100	130	88
59	165	89	82	102	138	90
60	179	89	83	104	149	94
61	192	90	83	108	162	96
62	206	92	84	115	174	101
63	219	96	87	125	187	106
64	230	103	90	140	199	114
65	236	111	94	166	211	122
66	242	114	99	196	219	129
67	250	117	102	215	225	137
68	258	119	105	228	231	142
69	267	123	108	240	237	148
70	275	127	111	250	243	153
71	283	130	114	259	249	158
72	290	134	118	267	254	162
73	297	139	121	274	260	166
74	304	146	124	280	265	170
75	312	157	127	286	271	174

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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	319	169	130	292	276	178
77	327	184	134	297	280	181
78	333	208	137	302	284	185
79	340	229	140	306	288	187
80	347	242	143	310	292	187
81	353	250	146	315	295	188
82	360	257	149	320	299	190
83	366	263	152	324	302	191
84	372	268	155	328	306	194
85	378	274	158	331	310	197
86	385	279	161	335	313	200
87	391	284	163	338	317	204
88	398	289	165	341	321	207
89	404	294	168	346	325	211
90	410	298	170	350	329	214
91	416	303	172	356	335	218
92	422	307	175	363	341	224
93	427	311	177	372	351	231
94	433	316	180	381	359	240
95	439	321	183	390	365	248
96	445	326	186	397	371	256
97	452	331	190	403	376	264
98	460	338	194	408	382	273
99	470	346	199	413	385	279
100	483	355	205	415	386	281
101	503	369	214	419	390	285
102	538	386	226	427	401	297
103	591	417	256	436	409	308
104	655	523	347	443	415	313
105	682	590	424	450	420	321
106	699	620	485	456	427	331
107	708	639	520	462	435	340
108	709	653	546	472	444	352
109	712	667	572	480	450	360
110	722	686	601	485	458	362
111	731	692	623	489	471	375
112	742	696	644	499	488	395
113	747	702	661	511	506	423
114	745	722	676	529	529	452

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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	750	-	694	543	541	474
116	-	-	707	561	561	501
117	-	-	721	581	579	527
118	-	-	731	607	604	554
119	-	-	739	634	627	577
120	-	-	758	655	644	593
121	-	-	768	676	662	615
122	-	-	798	694	684	641
123	-	-	808	714	721	668
124	-	-	-	733	728	697
125	-	-	-	744	728	722
126	-	-	-	-	862	-
127	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

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

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Specimen Lateral Deflection

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

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Time (minutes)	Deflection (mm)
	Centre
39	17
40	17
41	18
42	18
43	18
44	19
45	19
46	19
47	19
48	19
49	20
50	20
51	20
52	20
53	21
54	21
55	21
56	21
57	22
58	23
59	23
60	24
61	26
62	27
63	28
64	30
65	31
66	33
67	34
68	35
69	36
70	37
71	38
72	39
73	40
74	42
75	43
76	44
77	45
78	46
79	47

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Time (minutes)	Deflection (mm)
	Centre
80	48
81	48
82	49
83	50
84	51
85	52
86	52
87	53
88	54
89	54
90	55
91	56
92	57
93	57
94	58
95	59
96	60
97	60
98	61
99	62
100	63
101	64
102	66
103	67
104	68
105	68
106	69
107	70
108	70
109	71
110	73
111	74
112	76
113	77
114	78
115	79
116	80
117	81
118	82
119	82
120	83

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Time (minutes)	Deflection (mm)
	Centre
121	84
122	84
123	85
124	84
125	84
126	84
127	83
128	84
129	85
130	86
131	86
132	86
133	87
134	87
135	88
136	88
137	89
138	89
139	90
140	91
141	91
142	91
143	91
144	91
145	91
146	91
147	91
148	91
149	91
150	91

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

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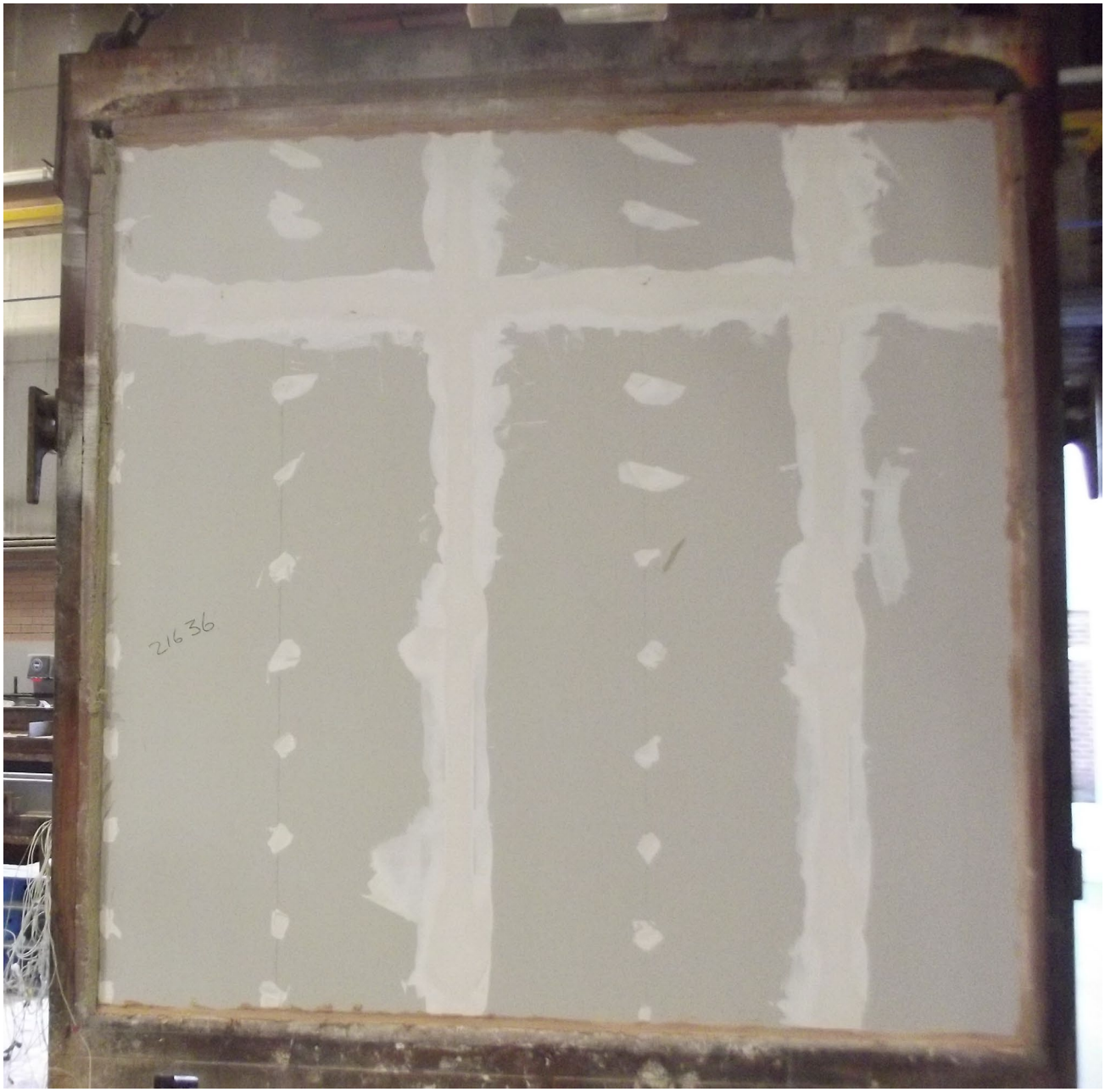
PHOTOGRAPHS

Exposed Face Prior to Test



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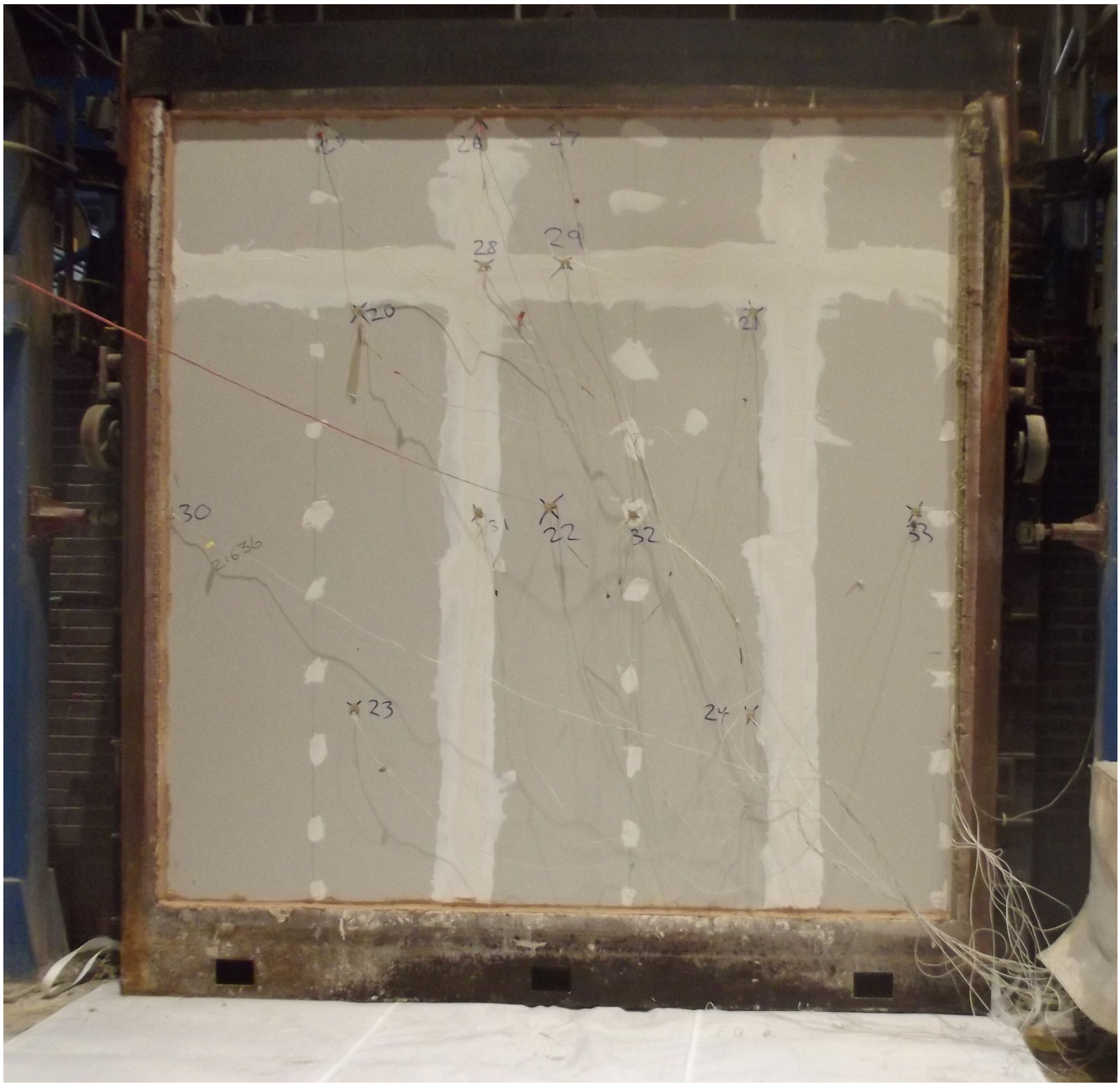
Unexposed Face Prior to Test



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Unexposed Face at 30 Minutes

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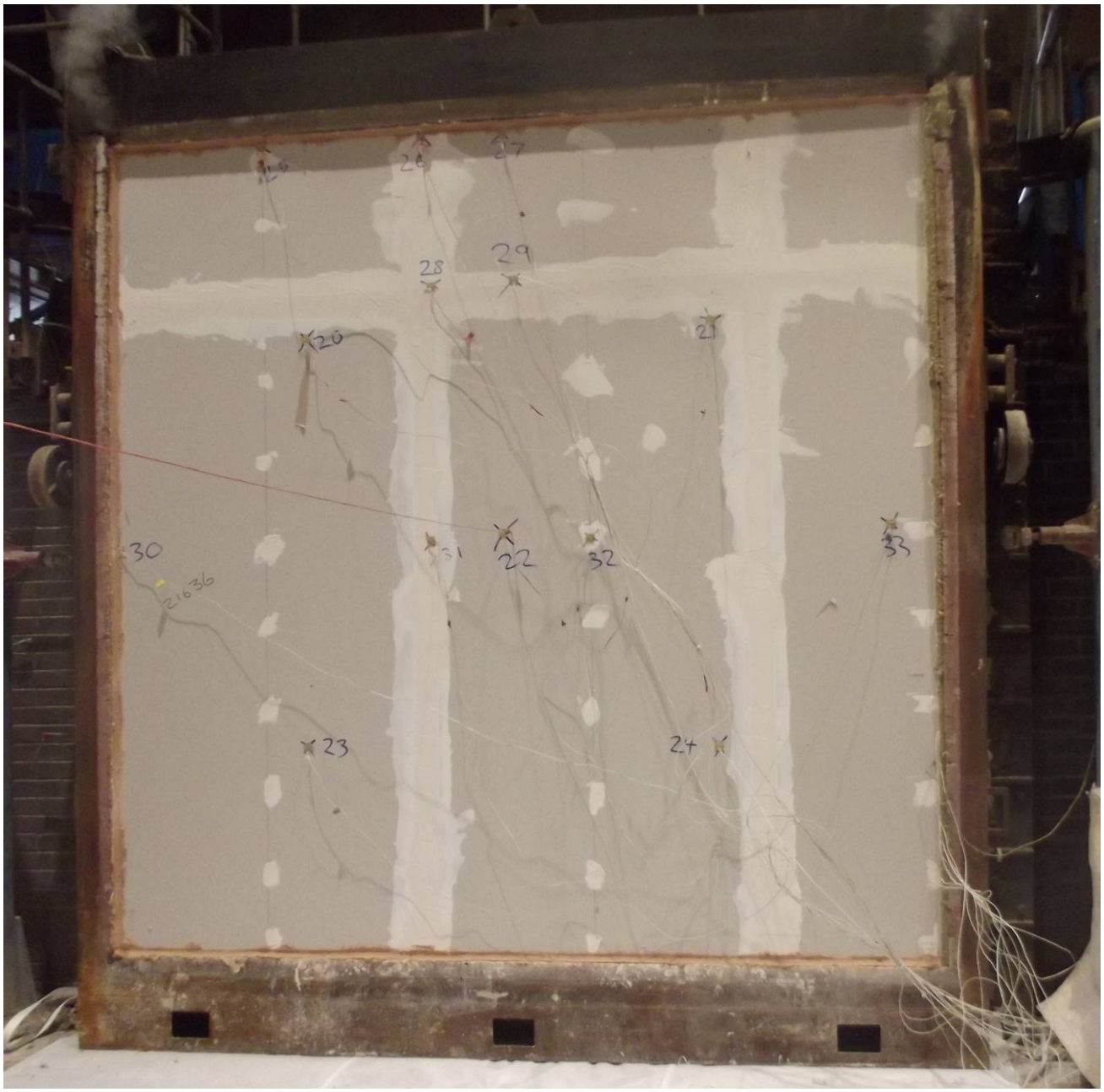
Unexposed Face at 1 Hour



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Unexposed Face at 1 Hour, 30 Minutes

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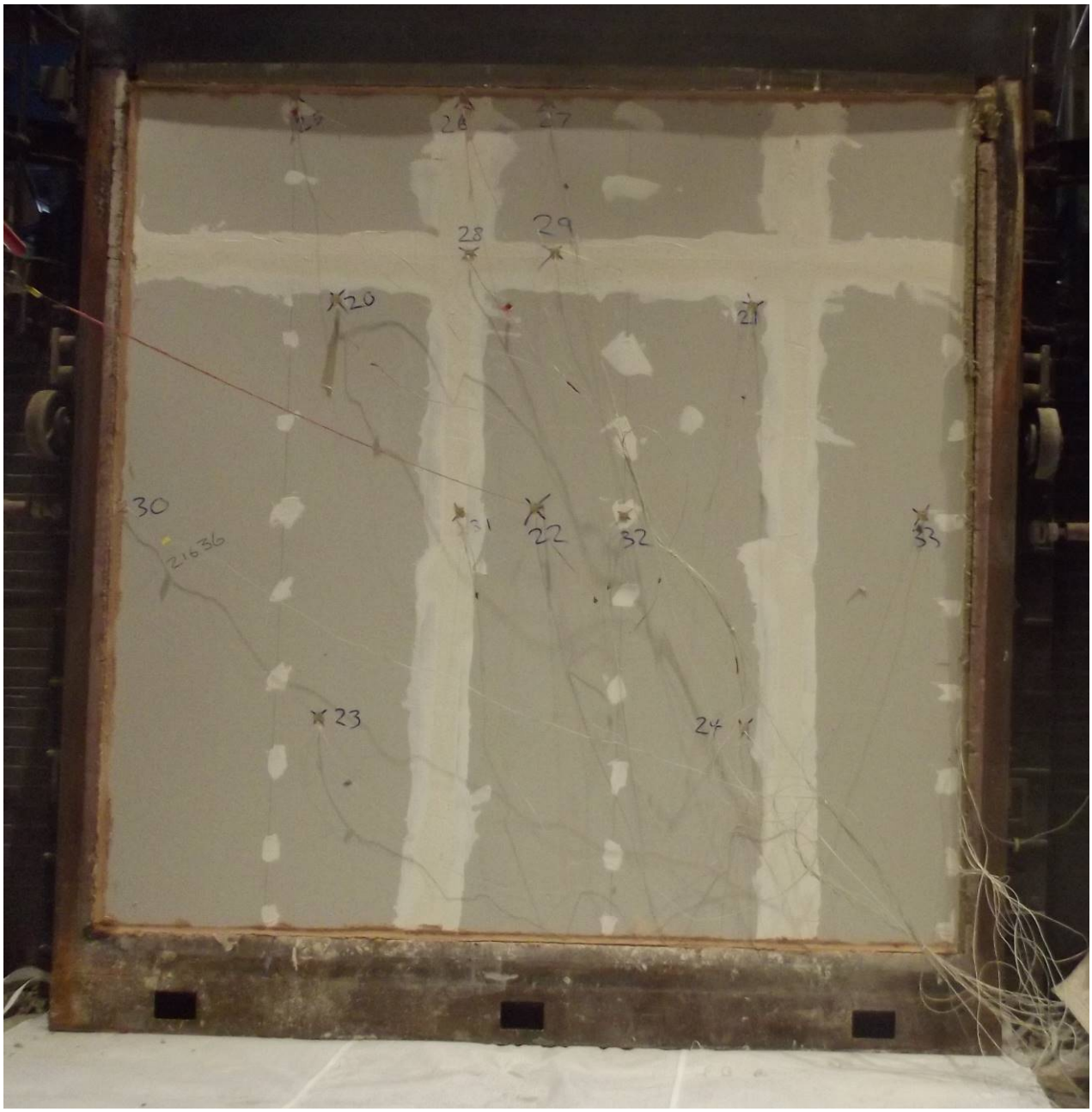
Unexposed Face at 2 Hours



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Unexposed Face at 2 Hours, 30 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 210 mm).

iii) Increase thickness of component materials (minimum Gypframe stud depth 48 mm, minimum Gypframe stud gauge 0.50 mm).

iv) Decrease in the linear dimensions of the boards but not thickness (≤ 2400 mm (long) x ≤ 1200 mm (wide) Gyproc DuraLine).

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:

30 minutes	60 minutes	90 minutes	120 minutes	150 minutes
≤ 100 mm	≤ 100 mm	≤ 100 mm	≤ 100 mm	≤ 100 mm