

The Building Test Centre

Fire Acoustics Structures

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Report Number: **BTC 20083F**

A FIRE RESISTANCE TEST ON A GYPWALL METAL STUD PARTITION WITH 48MM STUD FRAMEWORK CLAD EACH SIDE WITH A DOUBLE LAYER OF 12.5MM GYPROC FIRELINE, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015. (ULTRAEMBOSSED STUD & CHANNEL PROFILES).

Test Date: 23rd May 2017
(Report Amended: 12th June 2017).

www.btconline.co.uk

Customer: British Gypsum
East Leake
Loughborough
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FOREWORD

This test report details a fire resistance test conducted on a metal stud partition clad on each face with a double layer of Gyproc FireLine.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 17th and 18th May 2017. The Building Test Centre played no role in the design or selection of materials comprising the test specimen.

The test was conducted on the 23rd May 2017.

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

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TEST REPORT AMENDMENTS

Page	Amendments	Date
1	Report Amended 12 th June 2016 added below title.	12/06/2017
5	Report amendments added to table.	12/06/2017
31	Red highlighted test data corrected to be 134 minutes and 160 degrees for thermocouple 32.	12/06/2017
1, 5, 31	Page Amended 12 th June 2017 added to footer.	12/06/2017

Report Amendments Author



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Fire Test Manager

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 48S50 'C' 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.

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

Both the unexposed face and the exposed face of the specimen were clad with a double layer of 12.5mm Gyproc FireLine. The inner layer boards were fixed with 25mm British Gypsum Drywall Screws at 300mm centres around the perimeter of the boards only. The outer layer boards were fixed with 35mm British Gypsum Drywall Screws at 300mm 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 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.

Test Construction Drawings

Horizontal Cross Section

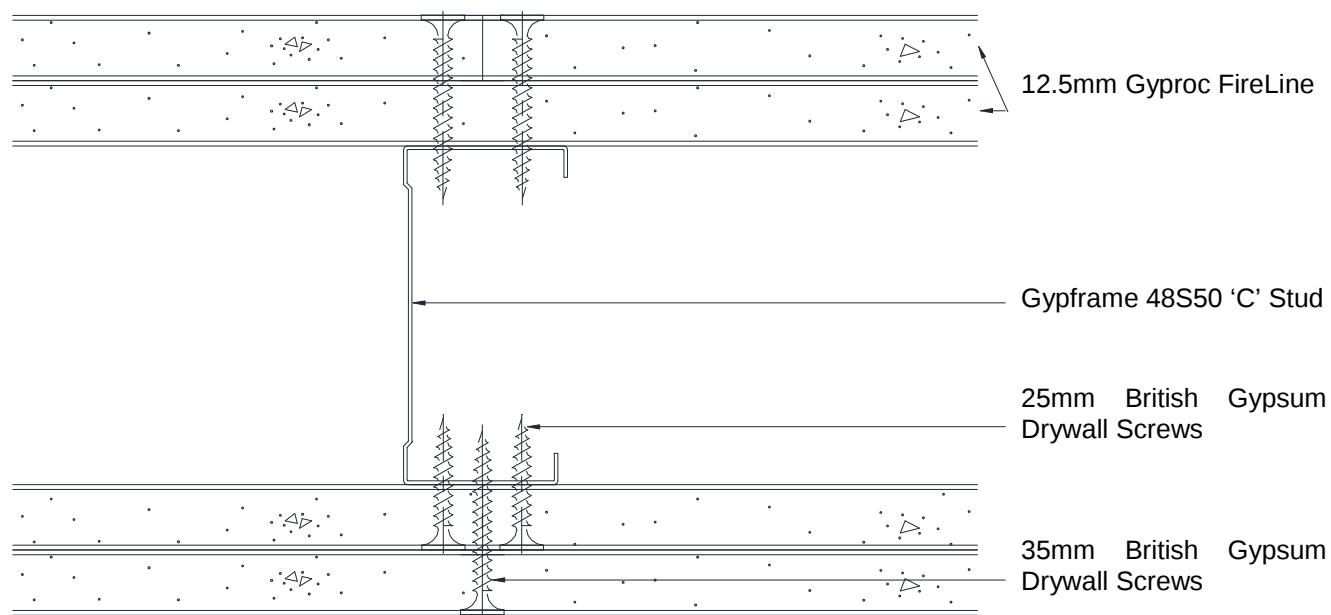
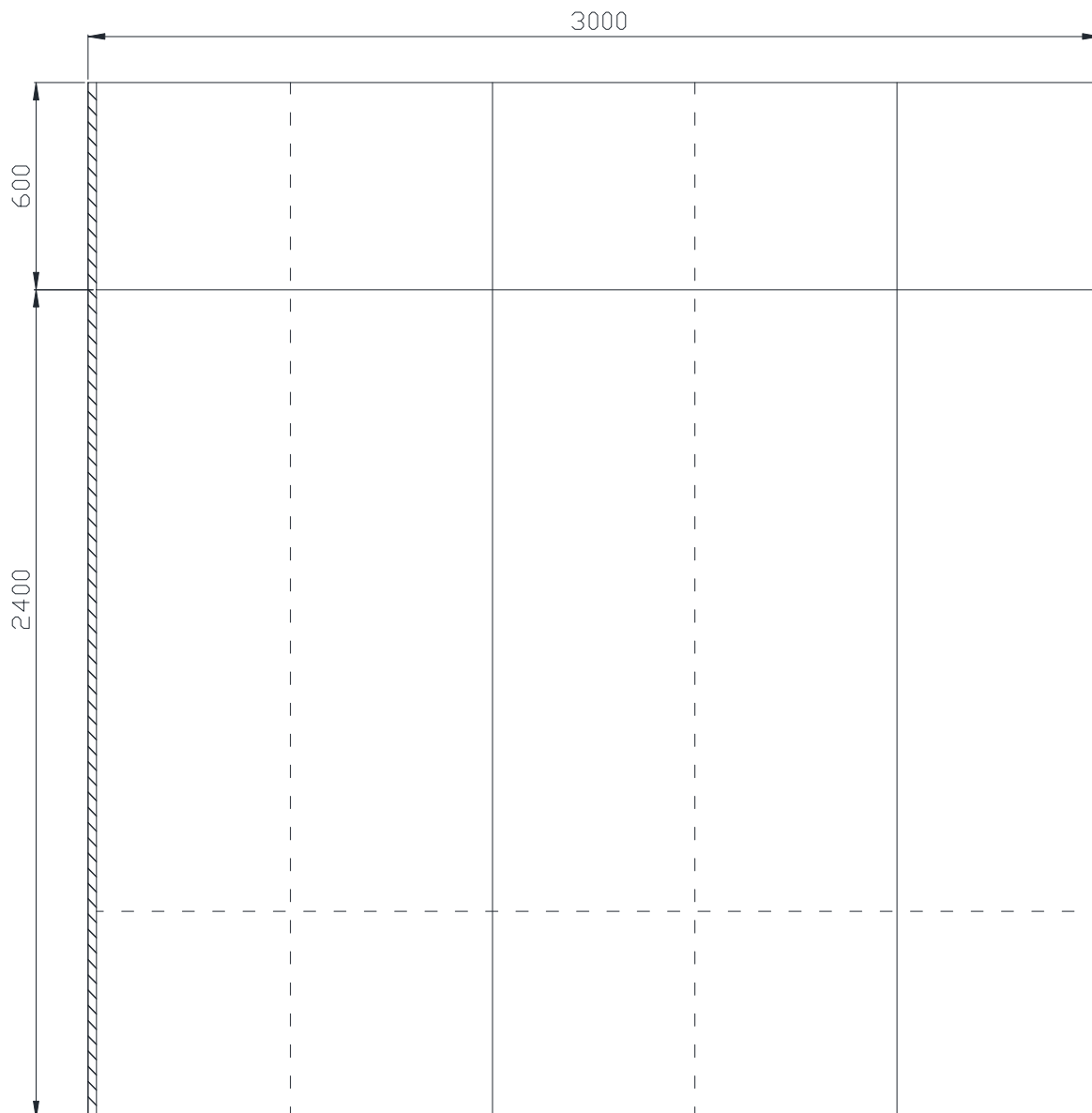


Figure 1 – Horizontal cross section.

Exposed Face Elevation



Free
edge

- - - - Inner layer board joints

—— Outer layer board joints

Figure 2 – Exposed face elevation.

Unexposed Face Elevation

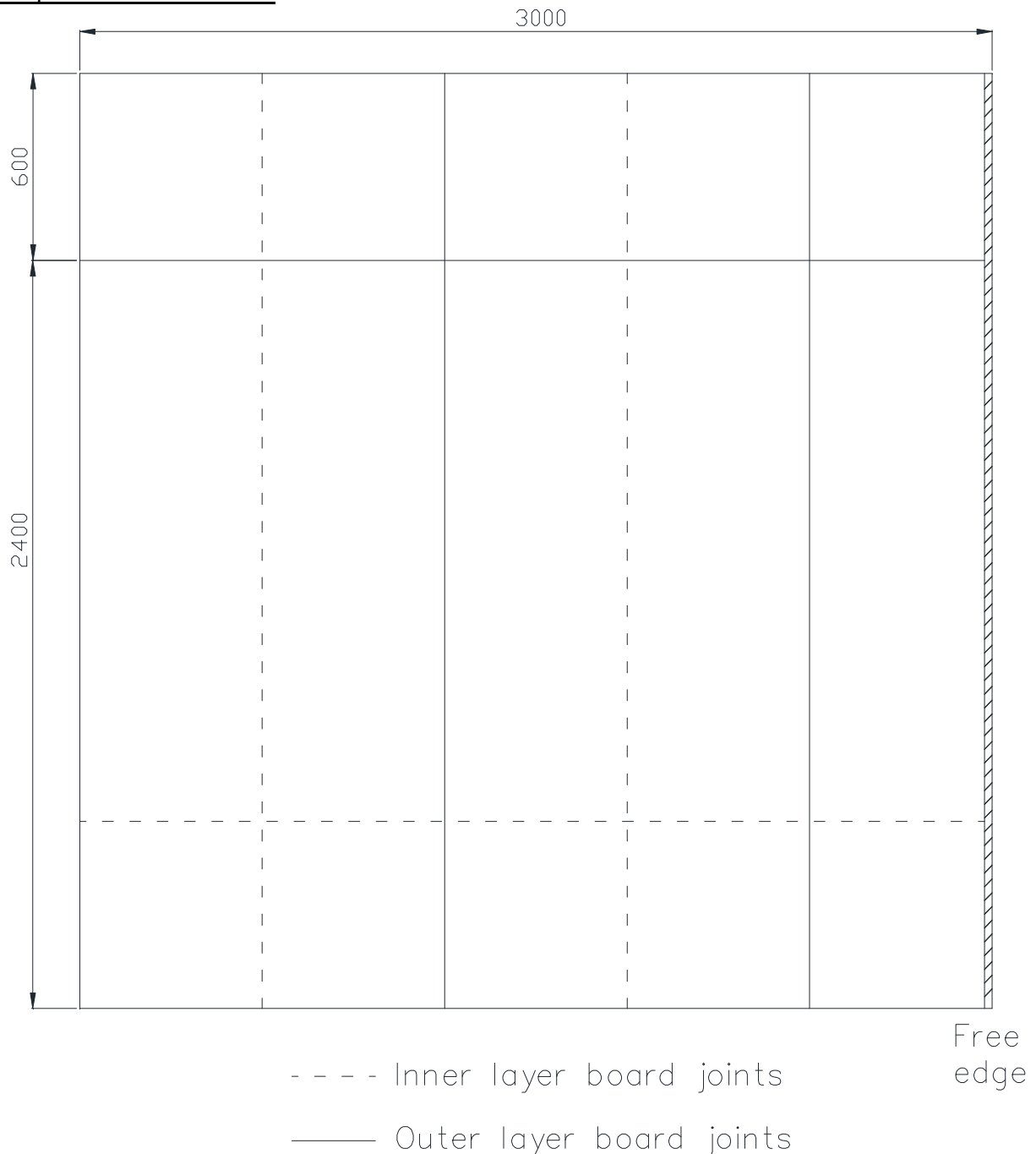


Figure 3 – Unexposed face elevation.

TEST MATERIALS

Plasterboard

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

Measured mass per unit area:	10.1 kg/m ²
Measured thickness:	12.8 mm
Board identification numbers:	31 094 17 23:53 31 094 17 23:53 31 094 17 23:53
Measured moisture content:	0.42%

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.
iii) Gypframe 48S50 'C' Studs.
iv) Gypframe GFS1 Fixing Strap.

All metal components were supplied by British Gypsum.

Fasteners

- v) 25mm British Gypsum Drywall Screws, supplied by British Gypsum.
vi) 35mm British Gypsum Drywall Screws, supplied by British Gypsum.
vii) 60mm fire resistant fixings, supplied by The Building Test Centre.

Miscellaneous Components

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

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. 1.0.

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		134 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: Matthew Porter
Exposed face: James Lucas

Time		Observations
Hours	Minutes	
0	00	Test started.
0	10	Face papers had charred. Jointing material was flaking away.
0	20	Left-hand vertical joint had opened to approximately 1mm. Right-hand vertical joint had opened to approximately 2mm. Horizontal joint had opened to approximately 1mm.
0	30	All joints had opened to approximately 6-8mm. <i>Unexposed face</i> No visible change.
0	40	No visible change.
0	50	Boards breaking around screw heads adjacent to joints.
1	00	All joints had opened to approximately 8-10mm. <i>Unexposed face</i> No visible change.
1	10	All joints had opened to approximately 10-12mm.
1	20	All joints had opened to approximately 12-15mm. Lower boards peeling away at top edge.

Time		Observations
Hours	Minutes	
1	30	Left-hand vertical joint had opened to approximately 18-20mm. Right-hand vertical joint had opened to approximately 15-18mm. Horizontal joint had opened to approximately 18-20mm. <i>Unexposed face</i> No visible change.
1	40	Upper right-hand corner of lower left-hand board peeling into furnace, approximately 600mm x 600mm.
1	50	First layer board fall from upper right-hand corner of lower left-hand board. Second layer joints had opened to approximately 6-8mm where visible.
2	00	Upper half of lower centre board had fallen & was resting on furnace thermocouple. Second layer joints had opened to approximately 10-15mm. <i>Unexposed face</i> Screw heads had discoloured at approximately 600mm, 1800mm and 2100mm height on the left-hand vertical joint.
2	10	Second layer right-hand vertical joint had opened to approximately 20-25mm. Stud warped where visible.
2	14	<i>Unexposed face</i> INSULATION FAILURE. The temperature rise of thermocouple no.32 positioned at mid-height on the lower centre board in centre exceeded 180°C.
2	20	Second layer boards had crazed. <i>Unexposed face</i> Centre of centre board had discoloured at approximately 1200mm up to 2100mm height. Centre of lower left-hand board had discoloured at approximately 1800mm up to 2100mm height. Discolouration of all screw heads.
2	28	<i>Unexposed face</i> The mean temperature rise of the standard five thermocouples exceeded 140°C.

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Time		Observations
Hours	Minutes	
2	30	TEST TERMINATED at the request of the sponsor.

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Furnace Temperature Graph

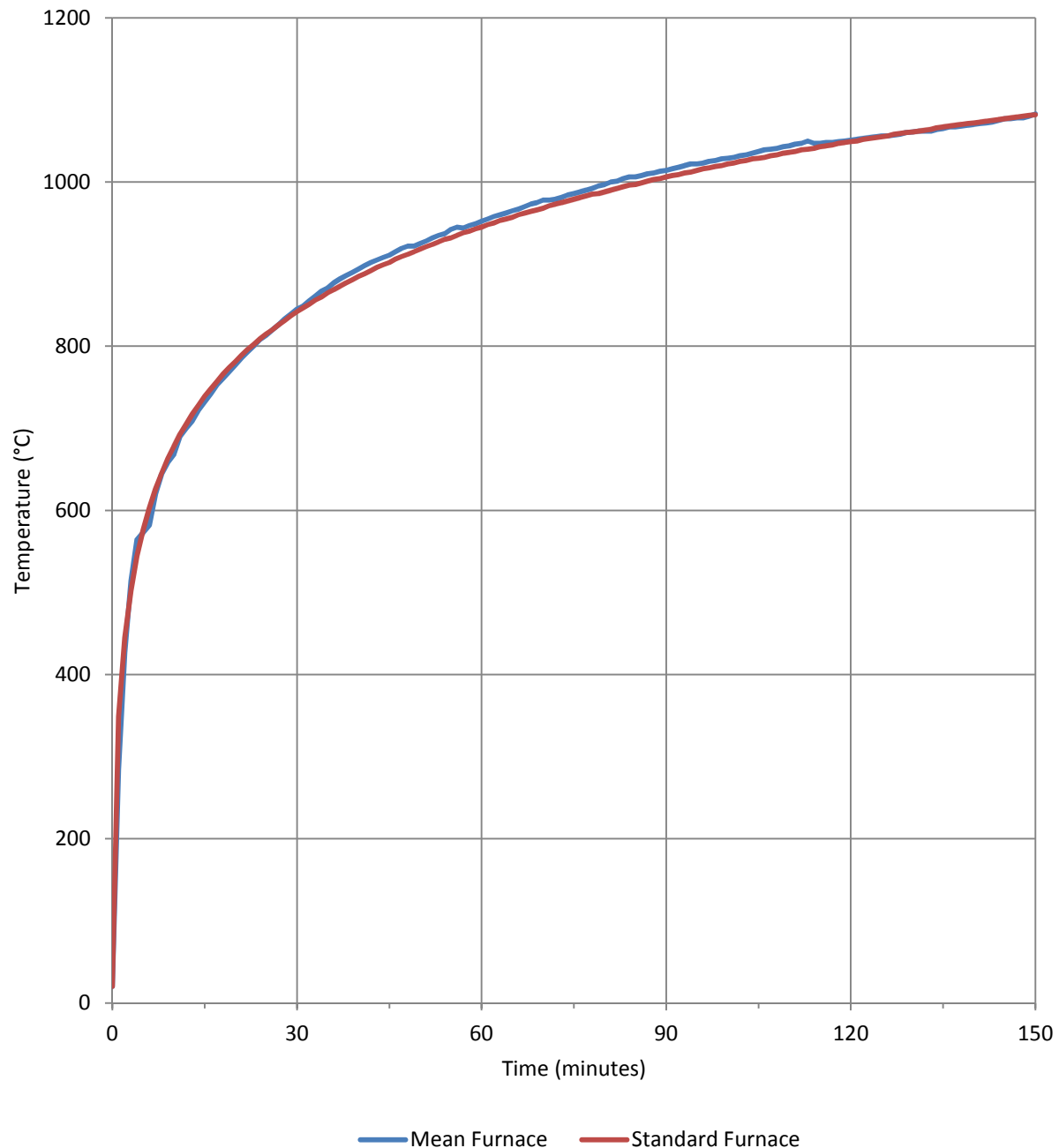


Figure 4 – Furnace temperature graph.

Furnace Pressure Graph

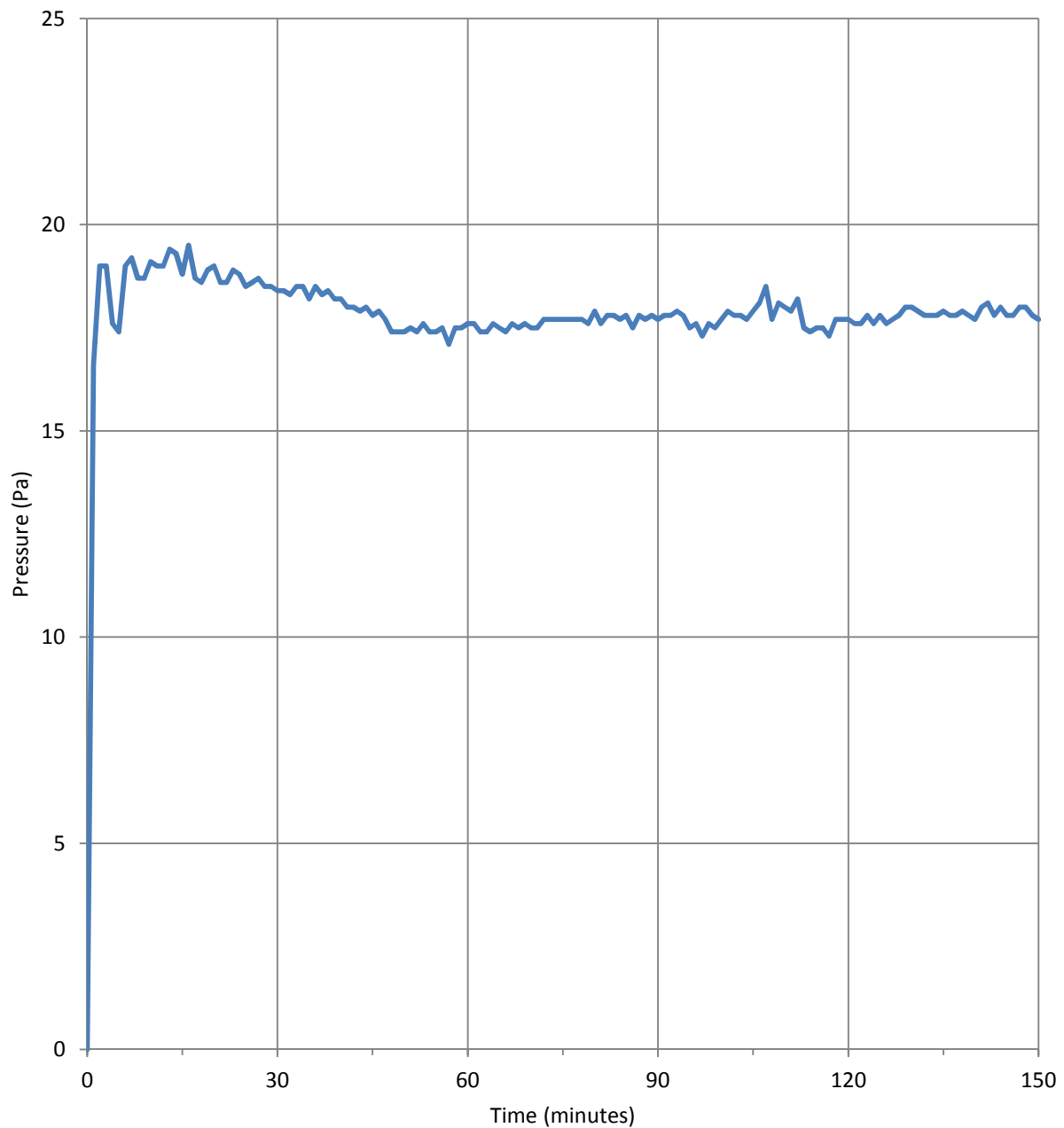


Figure 5 – Furnace pressure graph.

Unexposed Face Temperature Graph

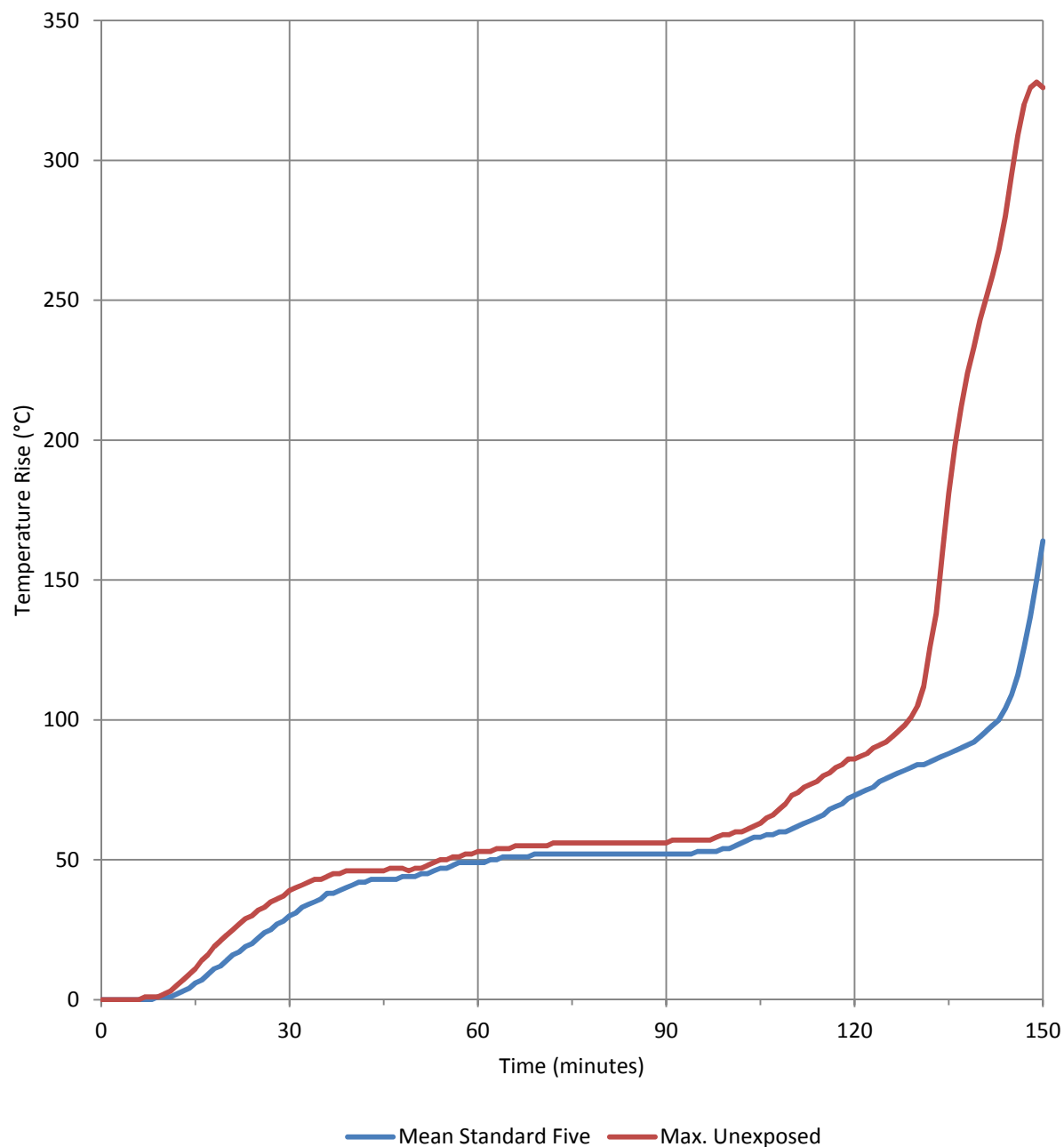


Figure 6 – Unexposed face temperature graph.

Unexposed Face Thermocouple Layout

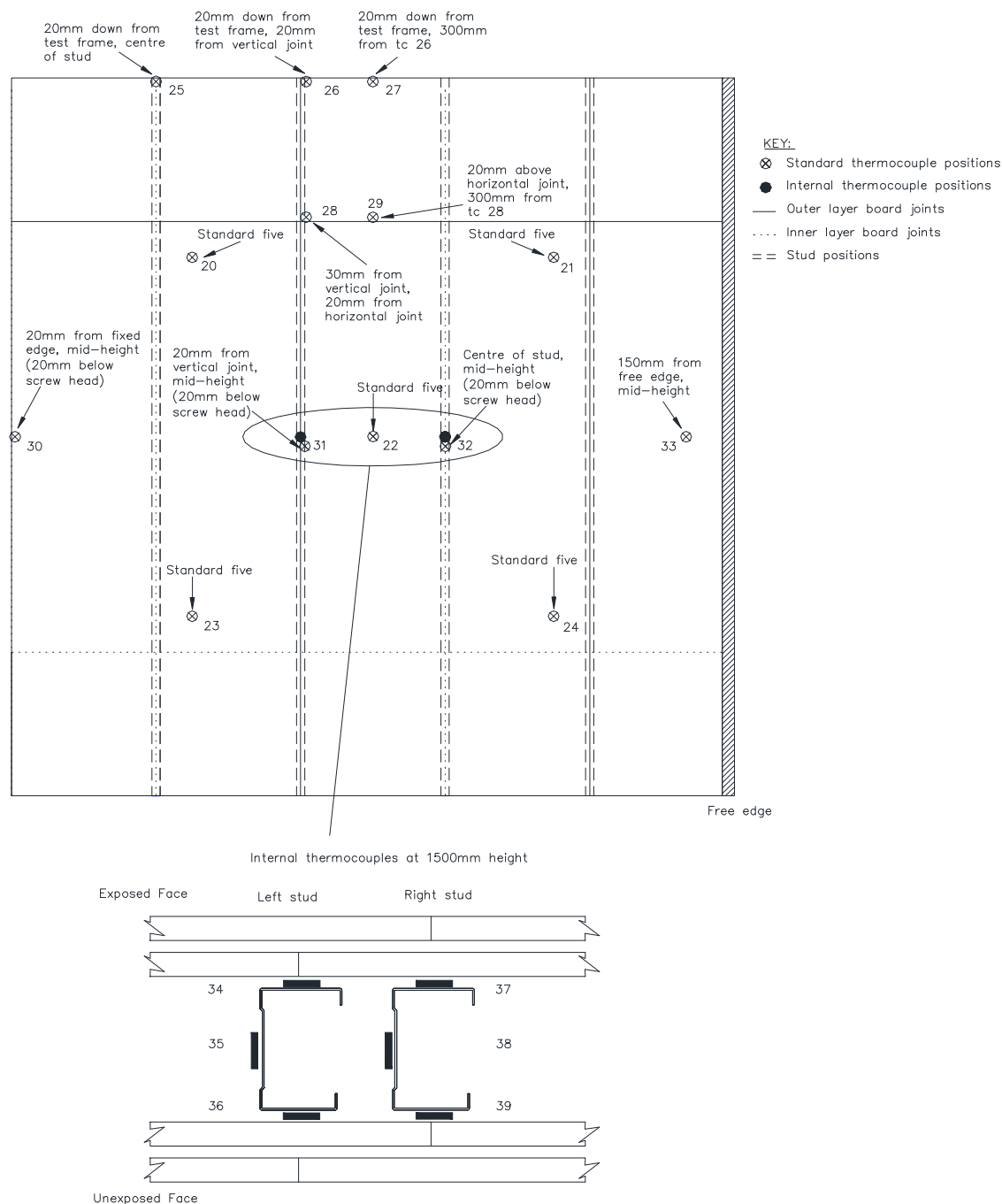


Figure 7 – Unexposed face thermocouple layout.

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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	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	1	1	0	1	1	1
10	1	1	1	1	1	1
11	2	1	1	2	1	1
12	3	2	2	3	2	2
13	4	3	3	4	3	3
14	5	4	4	5	4	4
15	7	6	5	7	5	6
16	9	7	7	8	6	7
17	10	9	8	10	8	9
18	12	11	10	11	9	11
19	14	13	11	13	11	12
20	16	14	13	14	12	14
21	18	16	15	16	14	16
22	19	18	16	17	15	17
23	21	20	18	19	17	19
24	23	21	19	20	18	20
25	24	23	21	21	20	22
26	26	25	23	23	21	24
27	27	26	25	24	23	25
28	29	28	26	26	24	27
29	30	29	28	27	26	28
30	32	31	29	29	28	30
31	33	32	31	30	29	31
32	35	34	32	32	31	33
33	36	35	34	33	32	34
34	37	36	35	34	33	35
35	38	38	36	35	35	36
36	39	39	38	36	36	38
37	40	39	38	37	37	38

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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	40	40	39	38	38	39
39	41	41	40	39	39	40
40	42	42	41	40	40	41
41	42	42	42	41	41	42
42	43	43	42	41	42	42
43	43	43	43	42	42	43
44	43	43	43	42	43	43
45	43	44	43	43	43	43
46	43	44	43	43	44	43
47	43	44	43	43	44	43
48	44	44	44	44	44	44
49	44	44	44	44	44	44
50	44	44	44	44	45	44
51	44	44	45	46	45	45
52	45	45	45	47	45	45
53	45	45	46	48	46	46
54	46	46	47	49	46	47
55	47	46	47	50	47	47
56	48	47	48	50	48	48
57	49	48	48	50	49	49
58	49	48	48	50	50	49
59	50	49	48	50	50	49
60	50	49	48	50	50	49
61	50	49	48	50	50	49
62	50	50	49	51	50	50
63	51	49	49	51	50	50
64	51	50	50	52	50	51
65	51	50	50	52	51	51
66	51	50	50	52	51	51
67	51	50	51	53	51	51
68	51	50	51	53	52	51
69	51	51	51	53	52	52
70	51	51	52	53	52	52
71	51	51	52	53	53	52
72	51	51	52	53	53	52
73	51	51	53	53	53	52
74	50	51	53	54	53	52
75	50	51	53	53	53	52
76	50	51	53	53	53	52
77	50	51	53	53	53	52

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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	50	51	54	53	53	52
79	50	51	54	53	53	52
80	50	51	54	53	53	52
81	50	51	54	53	53	52
82	50	51	54	53	53	52
83	50	51	54	53	53	52
84	50	51	54	53	53	52
85	50	50	54	53	53	52
86	50	50	54	53	53	52
87	50	50	54	53	53	52
88	50	50	53	53	53	52
89	50	51	53	53	53	52
90	50	51	53	53	52	52
91	50	51	53	53	52	52
92	50	51	53	53	52	52
93	50	51	54	54	52	52
94	50	51	54	54	52	52
95	50	51	55	55	52	53
96	50	51	55	55	52	53
97	50	52	56	56	52	53
98	50	52	56	56	52	53
99	50	52	57	57	52	54
100	50	52	59	58	53	54
101	51	53	59	59	53	55
102	52	54	59	60	54	56
103	55	55	59	60	56	57
104	56	56	59	60	58	58
105	56	57	59	61	59	58
106	56	58	59	61	60	59
107	56	58	59	62	60	59
108	57	59	60	63	60	60
109	57	60	60	64	60	60
110	58	60	61	65	61	61
111	60	61	62	66	61	62
112	61	61	63	67	62	63
113	62	62	64	69	62	64
114	64	63	65	70	62	65
115	66	64	66	72	62	66
116	68	64	68	75	63	68
117	70	66	70	76	63	69

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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	
118	71	67	73	76	64	70
119	73	68	76	77	65	72
120	74	69	77	78	66	73
121	74	71	78	79	67	74
122	75	74	79	79	69	75
123	76	75	80	80	70	76
124	77	77	80	81	73	78
125	78	78	81	82	75	79
126	78	79	81	83	77	80
127	79	80	82	84	79	81
128	80	81	83	85	80	82
129	81	82	84	86	81	83
130	82	83	85	87	81	84
131	82	84	85	87	82	84
132	83	85	86	88	83	85
133	84	86	87	89	84	86
134	85	87	89	90	84	87
135	86	88	89	91	85	88
136	87	89	90	92	86	89
137	88	90	91	93	87	90
138	90	92	92	94	88	91
139	91	94	93	96	88	92
140	92	96	94	98	89	94
141	94	98	96	100	90	96
142	96	101	98	102	91	98
143	98	106	100	105	92	100
144	101	116	103	108	92	104
145	104	127	106	113	93	109
146	107	141	111	126	95	116
147	116	160	125	135	96	126
148	127	175	135	151	97	137
149	139	187	153	171	98	150
150	162	196	174	188	100	164

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

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

Additional Unexposed Face Temperature Data

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

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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	43	45	40	37	32
39	44	46	41	37	32
40	44	46	41	38	33
41	45	46	42	39	33
42	44	46	42	39	34
43	45	46	42	39	34
44	45	46	43	40	35
45	45	46	43	40	35
46	45	47	43	40	35
47	45	47	44	40	35
48	45	47	44	40	36
49	44	46	45	41	36
50	45	46	45	40	36
51	45	47	46	41	36
52	45	47	46	41	36
53	46	48	46	42	37
54	46	48	46	43	37
55	47	49	47	43	37
56	48	50	47	44	38
57	50	50	48	45	38
58	51	51	49	45	39
59	52	52	50	46	39
60	52	52	51	46	40
61	53	53	52	46	40
62	53	53	52	47	40
63	53	54	53	47	40
64	54	54	53	47	40
65	54	54	54	48	41
66	54	55	54	48	41
67	54	55	54	48	41
68	54	55	54	49	42
69	54	55	55	49	43
70	54	55	55	49	43
71	54	55	55	50	44
72	55	55	56	50	44
73	55	55	56	50	45
74	54	55	56	50	45
75	54	55	56	50	45
76	54	54	56	50	46
77	54	54	56	50	46

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
78	55	54	56	50	46
79	55	54	56	50	46
80	55	54	56	50	46
81	54	54	56	50	46
82	55	54	56	51	46
83	55	54	56	51	46
84	55	55	56	51	45
85	55	55	56	51	46
86	55	55	56	51	46
87	55	55	56	51	46
88	55	55	56	51	46
89	55	55	56	51	46
90	55	55	56	52	46
91	55	55	57	52	47
92	55	56	57	52	47
93	55	56	57	52	47
94	55	56	57	52	48
95	55	56	57	53	48
96	55	56	57	53	48
97	55	56	57	53	48
98	55	56	57	54	48
99	55	56	57	54	49
100	55	57	57	55	50
101	55	57	58	56	51
102	55	57	58	57	53
103	55	57	59	58	54
104	56	58	59	58	56
105	56	58	59	58	56
106	57	58	60	59	57
107	57	59	60	59	57
108	58	59	60	60	58
109	58	60	61	60	58
110	59	60	61	61	59
111	59	61	62	62	60
112	59	61	63	62	60
113	60	62	64	64	61
114	60	63	65	65	61
115	61	65	65	66	62
116	61	66	66	68	63
117	62	68	67	69	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	62	68	68	69	65
119	64	70	69	70	66
120	65	70	70	71	67
121	67	71	71	71	67
122	69	71	72	72	68
123	71	72	73	72	69
124	72	72	73	73	69
125	73	73	74	73	70
126	74	74	74	74	71
127	75	74	75	74	72
128	75	74	76	75	72
129	76	75	76	76	73
130	77	75	77	76	73
131	77	75	78	76	74
132	78	76	78	77	74
133	78	76	79	78	75
134	78	76	79	79	75
135	79	77	80	79	76
136	79	77	80	81	77
137	80	77	81	81	78
138	81	78	81	82	78
139	81	78	81	83	79
140	82	79	82	85	80
141	83	80	82	86	81
142	83	80	83	88	82
143	84	81	83	89	82
144	85	82	84	91	84
145	85	83	84	93	85
146	86	83	85	95	86
147	87	84	85	97	87
148	88	85	86	99	88
149	89	86	86	101	89
150	90	87	87	104	91

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	1	0
8	0	1	0	0
9	1	1	1	0
10	1	1	1	1
11	2	2	2	1
12	3	3	2	2
13	6	5	4	3
14	8	6	5	3
15	10	7	6	4
16	13	9	8	6
17	15	10	9	7
18	18	12	11	9
19	20	13	12	10
20	22	15	14	12
21	24	16	15	13
22	25	18	17	15
23	26	20	18	17
24	28	21	20	18
25	29	23	21	20
26	30	24	23	22
27	31	26	24	24
28	32	27	25	25
29	34	29	27	27
30	35	30	28	29
31	36	31	29	30
32	37	33	30	32
33	38	34	32	33
34	39	35	33	35
35	40	36	34	36
36	41	37	35	37
37	42	38	35	38

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

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	54	53	51	52
79	54	53	51	52
80	54	53	51	52
81	53	53	51	52
82	53	53	51	53
83	53	54	51	53
84	53	54	51	53
85	53	54	51	52
86	53	54	51	53
87	53	54	51	53
88	53	54	51	53
89	53	54	51	53
90	53	54	51	53
91	53	54	52	52
92	53	54	52	52
93	53	55	52	52
94	53	55	54	52
95	53	55	55	52
96	53	55	56	52
97	53	56	57	52
98	53	56	58	52
99	53	56	59	52
100	53	57	59	53
101	53	57	60	53
102	53	58	60	53
103	54	58	61	53
104	54	59	62	54
105	55	59	63	54
106	55	60	65	55
107	55	61	66	56
108	55	61	68	56
109	56	62	70	57
110	56	63	73	58
111	58	64	74	58
112	59	65	76	58
113	60	67	77	58
114	61	69	78	58
115	63	71	80	59
116	64	72	81	59
117	65	73	83	60

Customer: **British Gypsum**

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118	67	74	84	60
119	68	75	86	61
120	69	76	86	61
121	69	77	87	62
122	69	77	88	62
123	70	78	90	63
124	71	78	91	64
125	71	79	92	66
126	72	80	94	68
127	72	81	96	71
128	73	82	98	73
129	73	82	101	74
130	74	83	105	75
131	74	84	112	76
132	75	85	126	76
133	75	86	138	77
134	75	87	160	78
135	76	88	181	78
136	76	90	198	79
137	76	91	212	80
138	77	93	224	81
139	77	95	233	81
140	77	98	243	82
141	77	101	251	83
142	78	105	259	83
143	78	111	268	84
144	79	127	280	85
145	79	145	295	86
146	80	170	309	86
147	80	196	320	87
148	81	220	326	87
149	82	243	328	88
150	83	266	326	89

Figures highlighted in red indicated 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 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	25	23	22	25	23	22
1	26	23	22	25	23	22
2	29	24	22	27	23	22
3	37	25	23	29	24	22
4	57	32	24	35	25	23
5	69	43	29	46	30	25
6	75	49	34	60	37	30
7	81	55	40	71	46	37
8	85	61	46	80	53	43
9	89	66	52	86	59	49
10	91	70	56	89	64	55
11	94	73	61	91	69	59
12	96	74	63	92	72	62
13	97	77	65	93	74	65
14	99	78	67	93	76	66
15	100	79	69	94	78	68
16	100	80	71	95	79	70
17	100	81	72	96	80	71
18	100	83	74	98	81	72
19	101	85	76	100	82	74
20	101	87	78	100	85	76
21	101	88	79	100	86	78
22	101	89	80	101	88	79
23	101	91	81	101	88	80
24	101	91	82	101	90	82
25	102	92	83	101	91	83
26	103	93	84	101	92	84
27	106	93	85	101	93	85
28	109	94	86	102	95	86
29	115	95	87	105	96	87
30	124	96	88	110	98	88
31	136	97	88	116	99	89
32	144	99	89	123	101	89
33	149	100	90	135	102	90
34	155	102	90	143	103	90
35	161	104	91	147	104	91

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	169	107	91	151	106	91
37	177	109	91	161	107	91
38	188	113	92	179	110	91
39	200	117	92	204	114	91
40	214	123	92	228	120	92
41	231	130	93	250	127	92
42	249	140	94	271	137	92
43	267	151	98	290	147	93
44	285	163	103	307	157	94
45	303	175	107	322	168	99
46	320	187	112	335	178	104
47	336	199	118	346	187	108
48	352	211	124	357	197	113
49	368	225	132	368	208	120
50	382	238	141	378	218	128
51	395	251	150	388	229	138
52	407	262	159	396	240	147
53	417	271	167	404	249	156
54	425	280	173	411	258	163
55	432	288	179	418	265	169
56	439	296	185	424	273	175
57	445	303	191	430	280	181
58	450	310	198	435	288	188
59	452	316	204	438	295	195
60	452	322	211	441	302	203
61	454	327	218	443	308	210
62	457	332	225	446	315	217
63	459	336	231	449	321	224
64	462	341	237	450	327	231
65	464	346	243	452	333	238
66	467	351	248	453	338	243
67	469	355	254	456	342	249
68	472	360	260	459	347	255
69	474	364	267	462	352	261
70	476	368	273	465	356	267
71	478	372	279	469	361	273
72	481	376	286	472	366	279
73	483	381	292	475	371	286

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	486	386	299	479	375	293
75	489	390	305	482	380	300
76	492	395	312	486	385	307
77	496	400	318	490	391	315
78	499	405	325	495	397	323
79	503	411	332	499	403	331
80	507	417	342	503	410	341
81	511	424	351	508	416	350
82	514	431	360	512	422	358
83	518	438	370	515	428	366
84	524	445	378	519	434	374
85	529	453	389	523	440	382
86	533	459	399	528	446	390
87	536	464	406	532	452	399
88	540	468	412	537	458	408
89	543	473	420	541	464	417
90	546	477	428	545	470	427
91	548	481	435	549	477	438
92	552	488	443	554	483	447
93	556	494	452	558	488	456
94	560	502	462	561	493	463
95	565	509	470	565	499	469
96	571	516	481	569	501	469
97	576	522	488	574	507	476
98	581	528	495	579	514	485
99	585	532	502	585	521	495
100	588	536	507	592	529	504
101	592	541	512	598	536	511
102	595	545	518	603	541	514
103	598	549	523	607	547	519
104	601	554	529	611	552	525
105	605	558	534	616	557	533
106	608	562	539	621	564	541
107	611	567	544	626	570	549
108	615	571	549	631	577	556
109	618	576	554	636	582	562
110	621	580	558	641	589	570
111	625	585	563	645	596	577

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
112	628	589	567	650	603	584
113	632	593	572	655	610	592
114	635	598	576	660	618	599
115	639	602	581	665	627	604
116	642	606	585	670	635	611
117	645	610	590	675	641	616
118	648	613	594	679	647	620
119	651	617	598	683	653	624
120	655	622	603	686	657	628
121	658	625	608	690	662	632
122	662	629	612	694	667	637
123	666	633	616	699	671	643
124	668	637	620	704	675	652
125	671	642	624	712	682	662
126	676	647	630	719	690	671
127	684	653	638	726	697	681
128	695	662	647	733	705	690
129	711	671	657	740	713	699
130	736	686	676	746	721	707
131	802	730	723	752	728	716
132	837	770	765	758	736	724
133	842	800	817	763	744	732
134	834	826	831	769	751	740
135	861	849	825	774	758	747
136	901	803	844	778	765	753
137	930	888	867	782	773	760
138	947	904	884	789	781	768
139	967	917	907	795	790	776
140	978	883	931	802	800	786
141	988	895	941	809	809	794
142	1011	919	968	815	819	804
143	1041	945	974	821	830	813
144	1060	972	989	828	843	827
145	1061	995	967	835	858	840
146	1061	1016	954	840	869	849
147	1061	996	946	844	878	858
148	1061	985	952	850	886	867
149	1075	993	1038	853	889	873

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
150	1072	1046	1050	855	880	883

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

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Specimen Lateral Deflection

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

Customer: **British Gypsum**

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Time (minutes)	Centre Deflection (mm)
38	18
39	19
40	21
41	24
42	27
43	30
44	33
45	37
46	39
47	42
48	44
49	47
50	49
51	52
52	55
53	57
54	58
55	60
56	62
57	64
58	65
59	67
60	68
61	69
62	70
63	71
64	72
65	73
66	74
67	74
68	75
69	76
70	77
71	77
72	78
73	79
74	79
75	80
76	80
77	81

Customer: **British Gypsum**

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Time (minutes)	Centre Deflection (mm)
78	81
79	82
80	82
81	83
82	84
83	84
84	85
85	86
86	86
87	87
88	87
89	88
90	88
91	88
92	89
93	89
94	89
95	89
96	89
97	90
98	90
99	90
100	90
101	90
102	90
103	90
104	90
105	90
106	90
107	90
108	90
109	90
110	90
111	90
112	90
113	90
114	90
115	90
116	90
117	90

Customer: **British Gypsum**

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Time (minutes)	Centre Deflection (mm)
118	90
119	89
120	89
121	89
122	89
123	89
124	89
125	89
126	89
127	89
128	89
129	88
130	88
131	87
132	87
133	86
134	85
135	84
136	82
137	80
138	79
139	77
140	75
141	73
142	71
143	69
144	67
145	64
146	62
147	59
148	56
149	54
150	51

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

Customer: **British Gypsum**

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PHOTOGRAPHS

Exposed face prior to test



Customer: **British Gypsum**

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0296

The Building Test Centre

Fire Acoustics Structures

The Building Test Centre
British Gypsum
East Leake
Loughborough
Leicestershire, LE12 6NP
Tel: (0115) 945 1564
Fax: (0115) 945 1562
Email: btc.testing@saint-gobain.com

Unexposed face prior to test



Customer: **British Gypsum**

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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 3000mm.
- ii) Increase in the thickness of the wall (minimum thickness 100mm).
- 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 FireLine).
- 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	120 minutes
$\leq 100\text{mm}$	$\leq 100\text{mm}$	$\leq 100\text{mm}$	$\leq 100\text{mm}$