

The Building Test Centre

Fire Acoustics Structures

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Report Number: **BTC 20727F**

A FIRE RESISTANCE TEST ON A GYPWALL METAL STUD PARTITION WITH 92MM STUD FRAMEWORK CLAD EACH SIDE WITH AN OUTER LAYER OF 12.5MM GYPROC HABITO AND INNER LAYER OF 15MM GYPROC SOUNDBLOC F EACH SIDE WITH 50MM ISOVER APR 1200 INSULATION IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 6th November 2018

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 metal stud partition clad on each face with an inner layer of Gyproc SoundBloc F and an outer layer of Gyproc Habito incorporating 50mm Isover Acoustic Partition Roll in the cavity.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 1st November and 5th November 2018. The Building Test Centre played no role in the design or selection of materials comprising the test specimen.

The test was conducted on the 6th November 2018.

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedures outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge of end conditions other than those allowed under the field of direct application in EN 1364-1 is not covered by this report.

"Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result." (BS EN 1363-1: 2012, section 12.1)

REPORT AUTHORISATION

Report Author



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Scientist

Authorised by
p.p Alex Ahern



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

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

Gypframe 92AS50 AcouStuds 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 92AS50 AcouStud 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.

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

Both sides of the framework were clad with an inner layer of 15mm Gyproc SoundBloc F and an outer layer of 12.5mm Gyproc Habito.

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

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

All vertical joints were staggered between layers, with a full board at the free end of the exposed face. A horizontal joint was positioned at 2400mm from the base on the outer layer boards and at 600mm from the base on the inner layer boards, on both faces of the specimen. A Gypframe GFS1 Fixing Strap was used behind the horizontal outer layer board joint.

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

Test Construction Drawings

Horizontal Cross Section

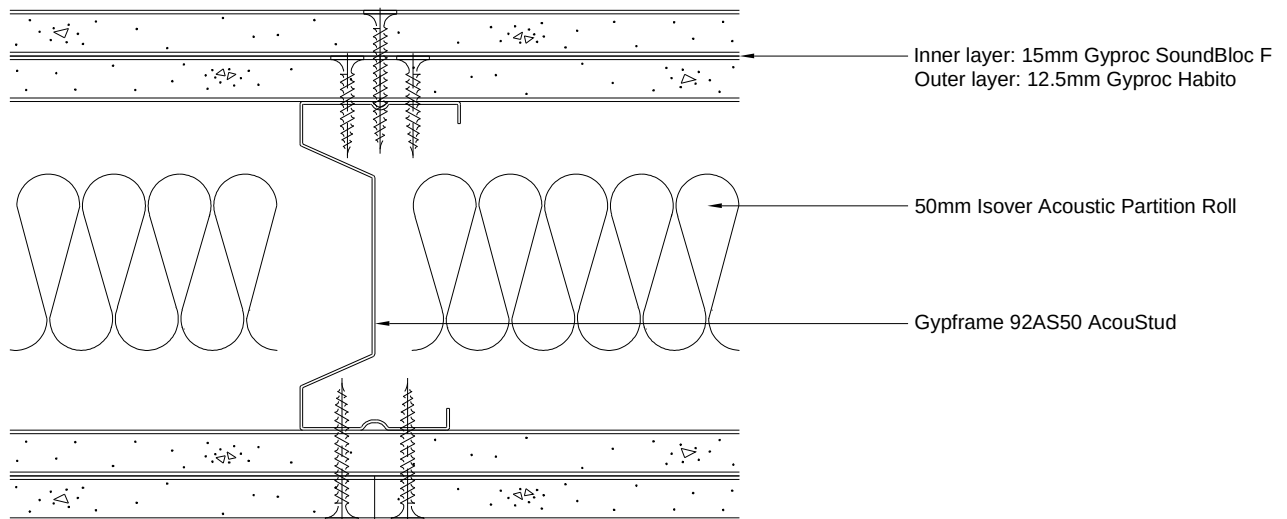
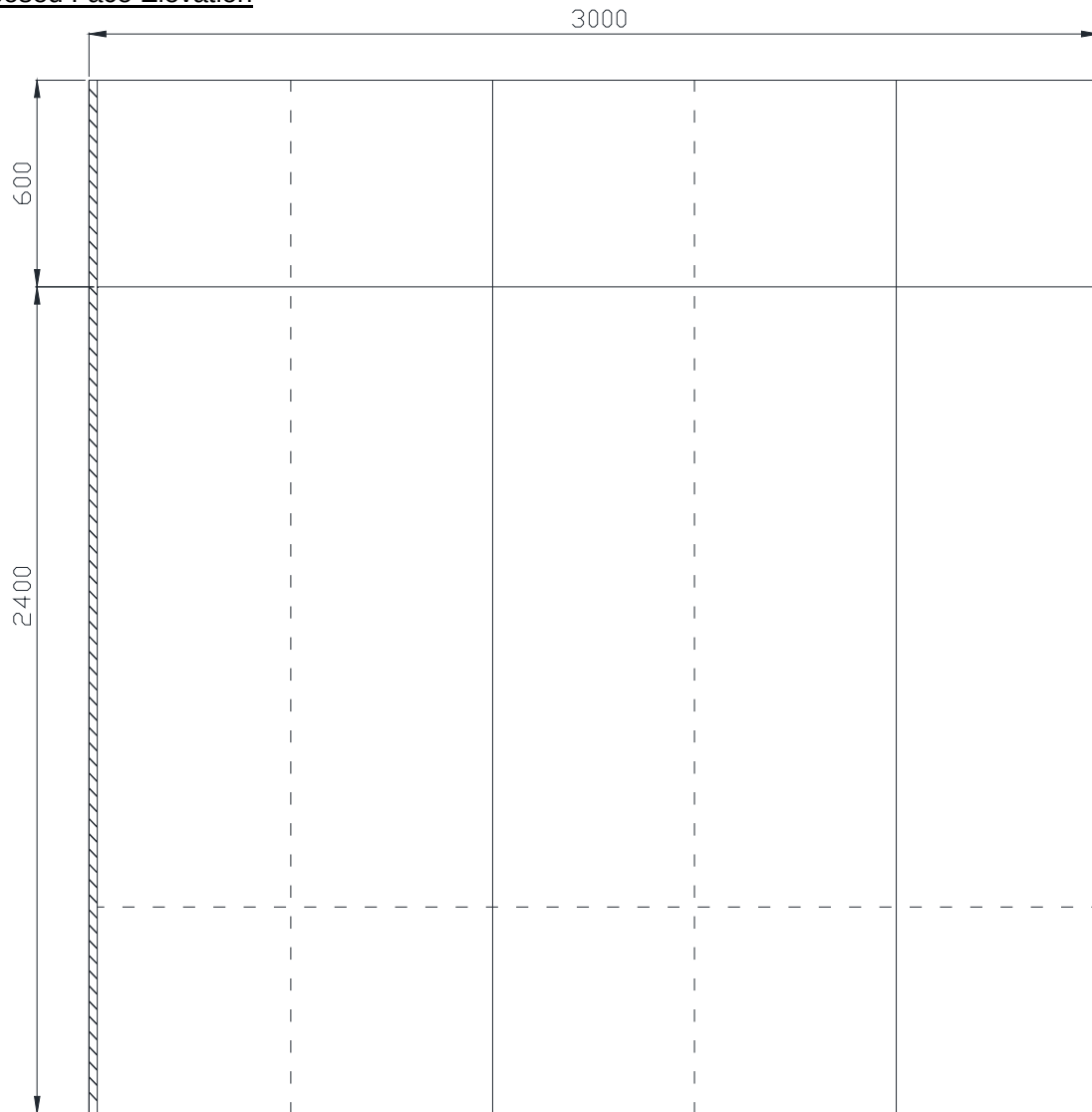


Figure 1 – Horizontal cross section.

Exposed Face Elevation



Free
edge

- - - - Inner layer board joints

— Outer layer board joints

Figure 2 – Exposed face elevation.

Unexposed Face Elevation

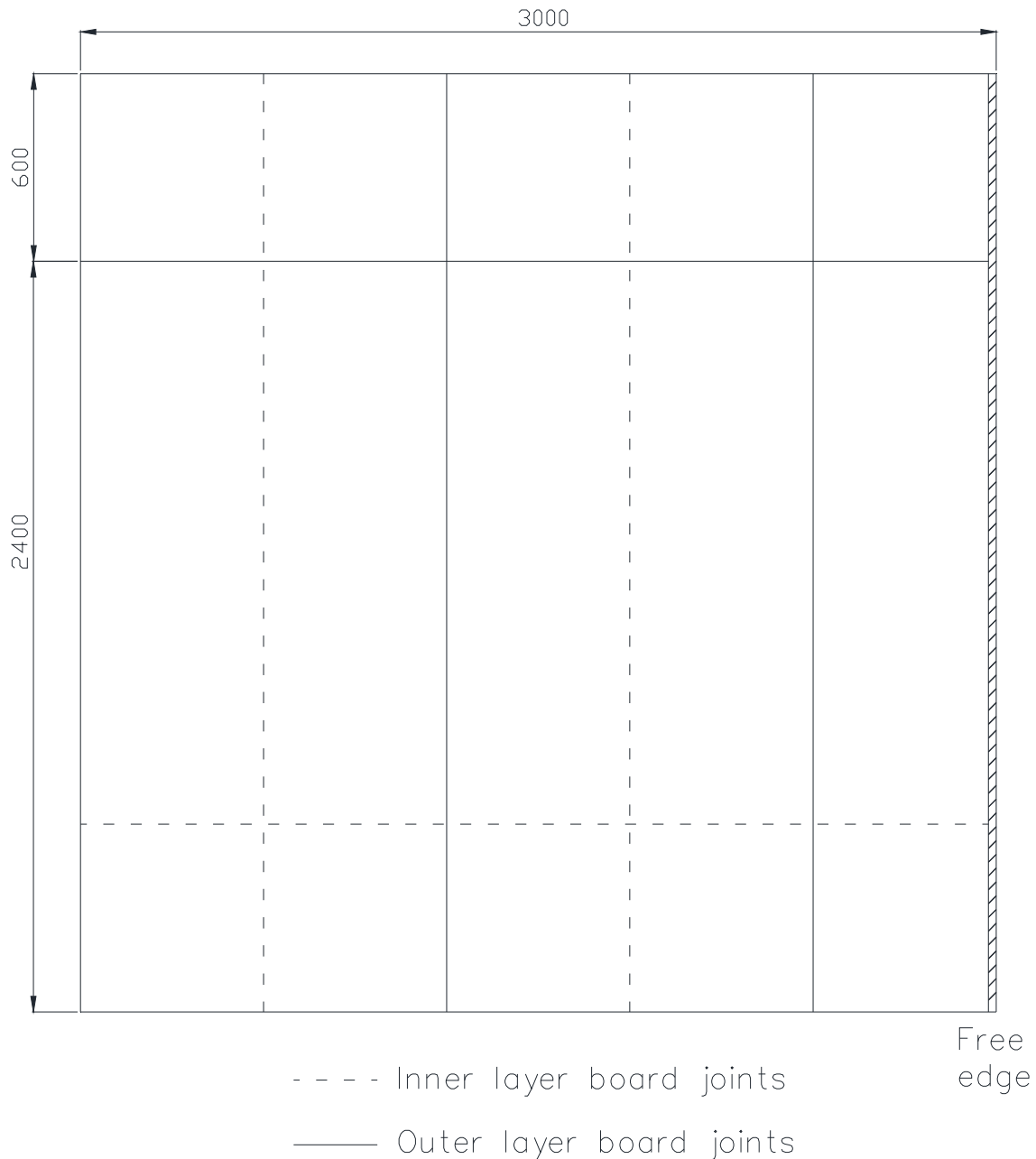


Figure 3 – Unexposed face elevation.

TEST MATERIALS

Plasterboard

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

Measured mass per unit area:	12.2 kg/m ²
Measured thickness:	12.9 mm
Board identification numbers:	31 276 18 10:51 31 276 18 10:51 31 276 18 10:52
Measured moisture content:	0.40%

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

Measured mass per unit area:	13.6 kg/m ²
Measured thickness:	15.4 mm
Board identification numbers:	26 176 18 09:47 26 176 18 09:47 26 176 18 09:47
Measured moisture content:	0.50%

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

Material dimensions were supplied by British Gypsum.

Metal Components

- iii) Gypframe 94FEC50 Standard Folded Edge Floor & Ceiling Channels.
- iv) Gypframe 92AS50 AcouStuds.
- v) Gypframe GFS1 Fixing Strap.

All metal components were supplied by British Gypsum.

Fasteners

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

Miscellaneous Components

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

Insulation

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

Measured surface density: 0.627 kg/m²

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

TEST PROCEDURE

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

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

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

The ambient temperature at the commencement of the test was 19°C.

The furnace pressure was set to control at 18 ± 2 Pa positive with respect to atmosphere, at the top of the specimen. Furnace pressure data is shown in **Figure 5**.

The test conditions did not meet the full requirements of BS EN 1363-1: 2012 as the test frame stiffness did not fully comply.

The specimen and associated construction were not conditioned in accordance with clause 8 of BS EN 1363-1: 2012.

TEST RESULTS

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

Integrity	Sustained Flaming	150 minutes, no failure.
	6mm Gap Gauge	150 minutes, no failure.
	25mm Gap Gauge	150 minutes, no failure.
	Cotton Pad	150 minutes, no failure.
Insulation		133 minutes.
Test Terminated		150 minutes, at the request of the sponsor.

LIMITATIONS

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

TEST DATA

Observations

All observations refer to the exposed face unless stated.

Observers: Unexposed face: Denis Bradshaw and Matt Porter
Exposed face: Ryan Skilton and Lynda Cooper

Time		Observations
Hours	Minutes	
0	00	Test started.
0	10	Jointing material was flaking away. Face papers had charred.
0	20	Left-hand vertical joint had opened up to approximately 2-3mm. Right-hand vertical joint had opened up to approximately 2-3mm. Horizontal joint had opened up to approximately 1-2mm.
0	30	Left-hand vertical joint had opened up to approximately 6-8mm. Right-hand vertical joint had opened up to approximately 4-6mm. Horizontal joint had opened up to approximately 2-4mm. <i>Unexposed face</i> No visible change.
0	40	Left-hand vertical joint had opened up to approximately 8-10mm. Right-hand vertical joint had opened up to approximately 6-8mm. Horizontal joint had opened up to approximately 4-8mm. Cracks around screw heads adjacent to vertical joints.
0	50	Left-hand vertical joint had opened up to approximately 20mm. Right-hand vertical joint had opened up to approximately 10mm. Horizontal joint had opened up to approximately 10-12mm. Boards breaking around screw heads adjacent to joints.

Time Hours Minutes		Observations
1	00	Left-hand vertical joint had opened up to approximately 40mm. Right-hand vertical joint had opened up to approximately 30mm. Horizontal joint had opened up to approximately 25mm. Upper right-hand board had a vertical crack approximately 300mm long, approximately 100mm from the bottom left-hand corner. <i>Unexposed face</i> No visible change.
1	10	Left-hand vertical joint had opened up to approximately 70-80mm. Right-hand vertical joint had opened up to approximately 40-50mm. Horizontal joint had opened up to approximately 25-30mm. Lower centre board had broken from screws around all joints and had started to bow into the furnace. Vertical crack on upper right-hand board had extended to approximately 500mm long.
1	19	The lower centre board had fallen.
1	20	Second layer right-hand vertical joint had opened up to approximately 4-6mm. Remaining first layer boards were cracked around all screw heads.
1	30	Second layer left-hand vertical joint had opened up to approximately 8-10mm. Second layer right-hand vertical joint had opened up to approximately 8-10mm. Second layer lower right-hand board had a vertical crack approximately 1500mm long down the centre. <i>Unexposed face</i> No visible change.
1	40	Second layer left-hand vertical joint had opened up to approximately 15mm. Second layer right-hand vertical joint had opened up to approximately 15mm. Second layer lower centre board had a vertical crack approximately 500mm long down the centre.
1	50	Second layer left-hand vertical joint had opened up to approximately 15-20mm. Second layer right-hand vertical joint had opened up to approximately 8-10mm. Second layer lower centre board had fallen, approximately 600mm from the horizontal joint, and 1200mm wide.

Time Hours	Minutes	Observations
1	51	<i>Unexposed face</i> Screw heads had discoloured on the left-hand vertical joint from approximately 600mm to 2100mm height.
2	00	Approximately 40% of the first and second layer had fallen into the furnace. <i>Unexposed face</i> Screw heads discoloured on the right-hand vertical joint from approximately 600mm to 2100mm height.
2	04	<i>Unexposed face</i> All screw heads had discoloured up to 2400mm height.
2	10	Third layer boards had crazed.
2	13	<i>Unexposed face</i> INSULATION FAILURE. The temperature rise at a point approximately 1100mm from the base of the specimen in the centre of the lower centre board, exceeded 180°C (roving thermocouple). Lower centre board had discoloured down the centre from approximately 900mm to 1500mm height.
2	16	<i>Unexposed face</i> The lower centre board had discoloured from approximately 600mm height from the left-hand vertical joint to the right-hand vertical joint.
2	17	<i>Unexposed face</i> The temperature rise of thermocouple no.32 positioned at 1500mm height on the lower centre board, exceeded 180°C.
2	20	Approximately 80% of the first and second layers had fallen into the furnace. No visible change to third layer.
2	25	<i>Unexposed face</i> Left-hand vertical joint had cracked from the base of the specimen to 2400mm height.
2	30	TEST TERMINATED at the request of the sponsor.

Furnace Temperature Graph

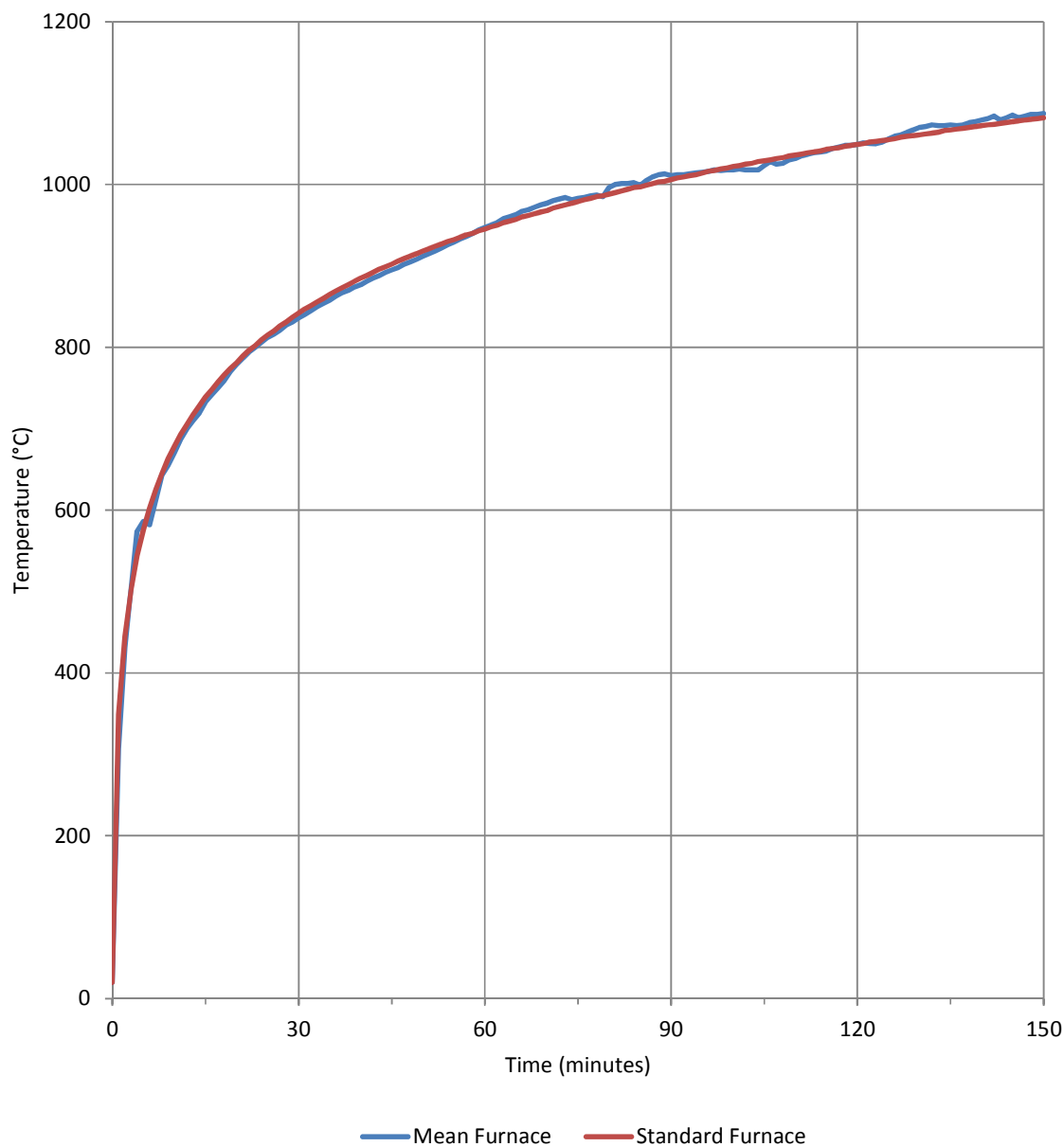


Figure 4 – Furnace temperature graph.

Furnace Pressure Graph

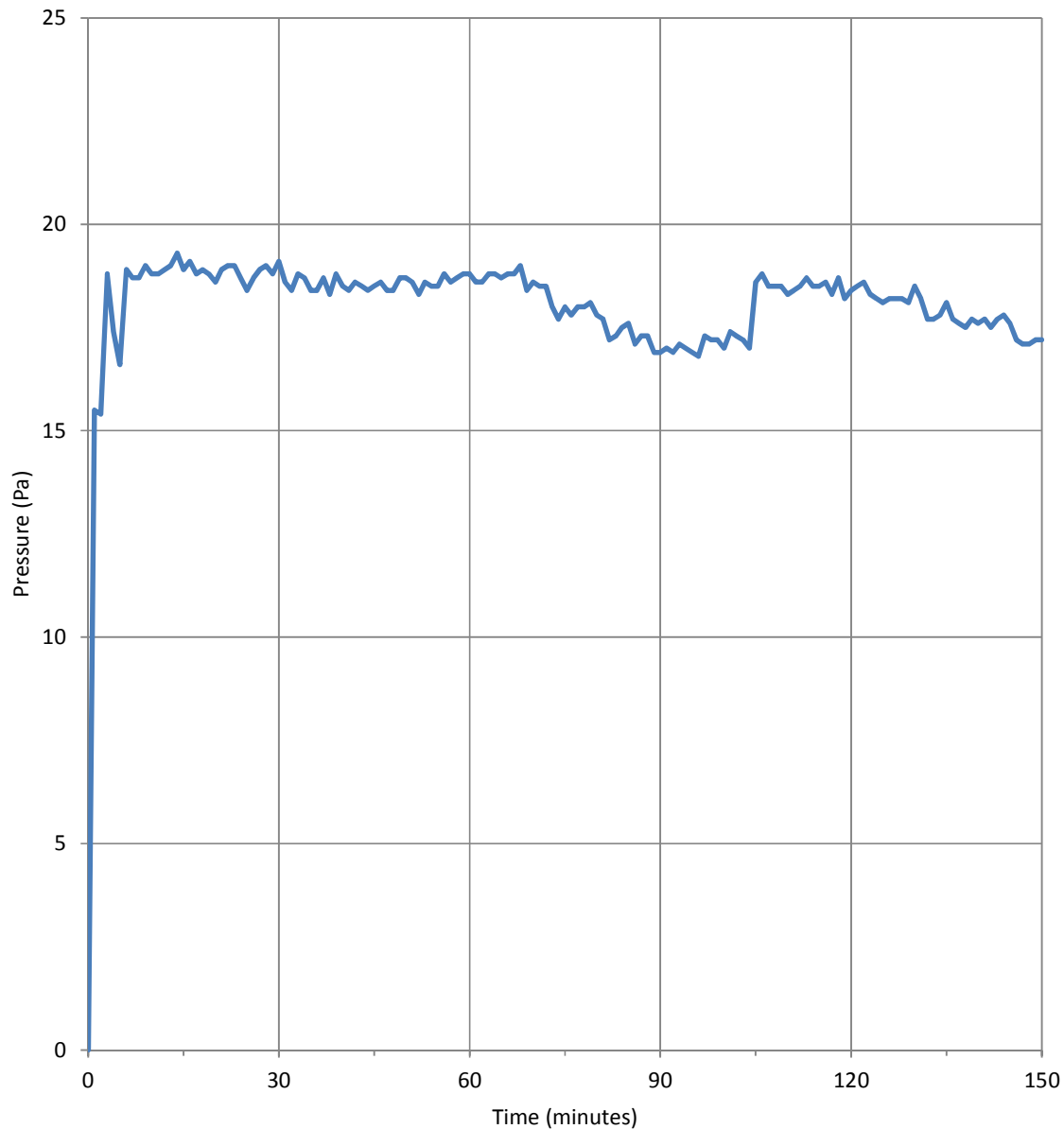


Figure 5 – Furnace pressure graph.

Unexposed Face Temperature Graph

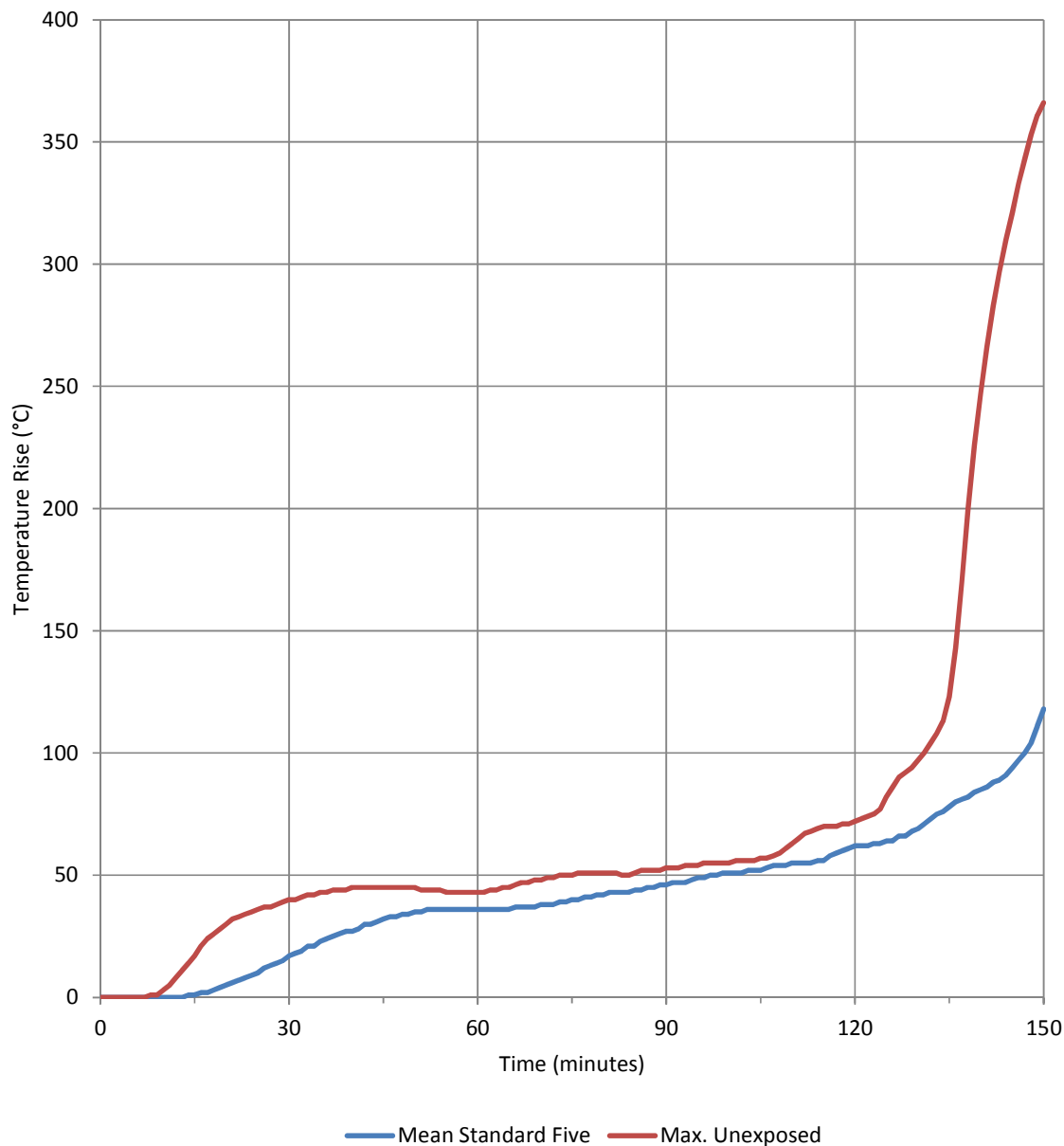


Figure 6 – Unexposed face temperature graph.

KEY:

- ⊗ Standard thermocouple positions
- Internal thermocouple positions
- Outer layer board joints
- - - Inner layer board joints
- == Stud positions

Diagram Labels:

- 20mm down from test frame, centre of stud
- 20mm down from test frame, 20mm from vertical joint
- 20mm down from test frame, 300mm from tc 26
- 20mm above horizontal joint, 300mm from tc 28
- Standard five
- 20mm from fixed edge, mid-height (20mm below screw head)
- 20mm from vertical joint, mid-height (20mm below screw head)
- 30mm from vertical joint, 20mm from horizontal joint
- Standard five
- Centre of stud, mid-height (20mm below screw head)
- 150mm from free edge, mid-height
- Free edge
- Internal thermocouples at 1500mm height
- Exposed Face
- Left stud
- Right stud
- Unexposed Face

Thermocouple Numbers: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39



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

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

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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	
78	43	42	43	39	40	41
79	43	43	43	40	40	42
80	44	43	43	41	41	42
81	44	43	44	41	41	43
82	45	44	44	42	41	43
83	45	44	44	42	41	43
84	45	44	44	42	42	43
85	45	45	44	43	43	44
86	46	45	44	44	43	44
87	46	46	44	44	43	45
88	46	46	45	45	44	45
89	47	46	45	46	45	46
90	47	47	46	46	45	46
91	48	47	46	47	46	47
92	48	47	47	47	46	47
93	49	47	47	47	47	47
94	49	48	48	48	47	48
95	50	48	49	49	48	49
96	50	49	49	49	48	49
97	50	49	50	50	49	50
98	50	49	50	50	49	50
99	51	50	51	51	50	51
100	51	50	51	51	51	51
101	51	50	52	51	52	51
102	51	51	52	51	52	51
103	51	51	53	51	52	52
104	52	51	54	51	52	52
105	52	51	54	52	53	52
106	52	51	55	53	53	53
107	52	52	56	54	54	54
108	52	52	56	55	55	54
109	52	52	56	55	56	54
110	52	52	56	56	57	55
111	53	52	55	56	58	55
112	53	52	55	57	58	55
113	53	52	56	58	58	55
114	53	52	58	57	58	56
115	53	52	62	57	58	56
116	53	53	65	59	58	58
117	53	53	67	63	60	59

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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	53	53	67	65	63	60
119	53	54	68	66	66	61
120	53	54	68	66	67	62
121	54	54	68	66	68	62
122	54	54	69	66	68	62
123	55	55	69	66	68	63
124	56	55	70	67	68	63
125	56	55	70	68	69	64
126	57	56	71	68	69	64
127	59	58	71	70	70	66
128	60	59	72	70	71	66
129	63	60	73	72	73	68
130	65	61	73	74	74	69
131	67	64	74	78	74	71
132	67	66	75	81	75	73
133	67	67	78	84	77	75
134	67	67	83	86	79	76
135	67	67	87	87	83	78
136	68	67	89	88	86	80
137	68	68	92	90	88	81
138	69	68	94	91	90	82
139	69	68	96	93	92	84
140	70	69	98	94	94	85
141	70	70	100	96	96	86
142	71	70	102	98	98	88
143	72	71	104	100	100	89
144	73	72	106	102	103	91
145	76	73	109	105	105	94
146	82	75	112	108	107	97
147	87	78	116	110	110	100
148	90	83	122	114	113	104
149	92	85	137	123	117	111
150	93	87	154	135	123	118

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	1	0	0	0
9	0	1	0	0	0
10	0	3	0	0	0
11	1	5	0	0	0
12	1	8	0	1	0
13	2	11	1	1	1
14	3	14	1	2	1
15	4	17	2	3	2
16	6	21	2	4	3
17	8	24	4	5	4
18	10	26	5	6	5
19	12	28	6	8	6
20	14	30	8	9	8
21	16	32	10	11	9
22	18	33	11	12	10
23	20	34	13	13	12
24	22	35	15	15	13
25	24	36	17	16	15
26	26	37	19	18	16
27	28	37	21	19	18
28	29	38	22	21	19
29	31	39	24	22	20
30	32	40	26	23	22
31	34	40	27	24	23
32	35	41	29	25	25
33	36	42	30	26	26
34	37	42	32	27	27
35	38	43	33	28	28
36	39	43	34	29	29
37	39	44	35	29	30

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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

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

Customer: **British Gypsum**

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Fire Acoustics Structures

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British Gypsum

East Leake

Loughborough

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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	43	48	40	45	39
79	43	48	40	45	39
80	43	49	40	45	40
81	43	49	40	46	40
82	44	49	40	45	40
83	43	49	40	46	41
84	44	49	40	45	39
85	44	50	40	45	40
86	45	52	41	46	41
87	45	52	41	46	41
88	45	52	41	46	41
89	45	52	41	46	41
90	46	53	41	46	41
91	46	53	41	46	42
92	46	53	42	46	42
93	46	54	42	46	42
94	47	54	42	47	43
95	47	54	42	47	43
96	47	55	42	47	43
97	48	55	43	47	43
98	48	55	43	47	43
99	48	55	43	47	44
100	48	55	43	48	44
101	49	56	44	48	44
102	49	56	44	48	44
103	49	56	44	49	45
104	49	56	44	49	45
105	49	57	44	50	45
106	50	57	45	50	46
107	50	57	45	51	46
108	50	57	45	51	47
109	50	57	45	51	47
110	50	58	45	53	47
111	50	58	46	53	48
112	50	58	46	55	48
113	50	58	46	56	48
114	50	59	46	58	48
115	51	59	46	60	48
116	51	59	46	63	49
117	51	60	47	65	49

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	51	60	47	66	49
119	51	60	47	68	49
120	51	61	48	69	50
121	51	61	48	70	50
122	51	61	49	72	50
123	51	62	49	72	50
124	51	62	50	73	50
125	51	63	50	74	51
126	52	63	51	75	52
127	52	64	52	76	55
128	52	65	53	76	58
129	52	65	53	77	61
130	52	66	54	78	64
131	52	67	55	79	65
132	53	68	56	80	66
133	53	69	57	81	67
134	53	70	57	81	67
135	54	72	57	82	68
136	54	73	58	83	69
137	54	77	60	84	70
138	55	80	61	85	71
139	56	84	62	86	73
140	57	88	62	87	74
141	58	92	63	88	76
142	59	96	62	90	78
143	60	100	63	91	79
144	61	103	63	92	81
145	63	107	63	94	83
146	65	110	63	96	85
147	67	112	64	97	86
148	68	115	66	99	88
149	70	118	68	101	89
150	71	122	70	102	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	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	1	0	0
12	0	1	0	0
13	0	1	1	0
14	1	2	1	1
15	1	3	1	1
16	2	4	2	2
17	2	6	2	2
18	3	7	3	3
19	4	9	4	5
20	5	10	5	6
21	6	11	6	7
22	8	13	7	9
23	9	14	8	10
24	10	16	9	12
25	11	17	10	13
26	12	19	11	14
27	14	20	12	15
28	15	21	14	17
29	16	23	15	18
30	18	24	16	19
31	19	26	17	21
32	20	27	18	22
33	21	28	19	23
34	23	29	20	24
35	24	30	21	25
36	25	31	23	26
37	25	32	24	27

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

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	40	51	49	36
79	41	51	49	37
80	41	51	49	37
81	41	51	49	38
82	42	51	49	38
83	42	50	49	39
84	43	50	49	39
85	43	51	49	40
86	43	51	49	41
87	44	51	49	41
88	44	51	50	42
89	45	51	50	42
90	45	52	50	43
91	45	52	50	43
92	46	52	50	44
93	46	52	51	44
94	46	53	51	45
95	47	53	51	45
96	47	53	52	46
97	47	53	52	46
98	48	53	52	47
99	48	54	53	47
100	48	54	53	48
101	48	54	53	48
102	49	55	53	48
103	49	55	53	48
104	49	56	54	49
105	49	56	54	49
106	49	57	55	49
107	50	58	57	50
108	50	59	58	50
109	50	60	61	50
110	50	62	63	50
111	50	65	64	51
112	50	67	66	51
113	50	68	67	51
114	51	69	68	51
115	50	70	69	51
116	51	70	69	51
117	51	70	70	52

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
118	51	71	71	52
119	52	71	71	52
120	52	72	72	53
121	53	73	73	53
122	53	74	74	54
123	53	75	75	54
124	54	77	76	55
125	54	82	77	56
126	54	86	78	57
127	54	90	85	58
128	54	92	90	59
129	55	94	94	61
130	55	96	97	62
131	54	98	100	63
132	54	100	104	64
133	55	102	108	64
134	55	104	113	64
135	55	106	123	64
136	55	109	143	64
137	55	113	170	65
138	55	118	200	65
139	56	126	226	66
140	56	139	247	67
141	57	151	266	68
142	58	169	283	68
143	59	185	297	69
144	59	200	310	70
145	60	214	321	71
146	61	228	333	73
147	62	241	343	78
148	62	256	353	82
149	63	269	361	84
150	64	281	366	85

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

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Email: btc.testing@saint-gobain.com

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	31	28	23	-	27	24
1	35	28	23	-	28	24
2	39	28	23	-	28	24
3	43	28	23	-	29	24
4	58	30	24	-	34	24
5	80	36	24	-	33	24
6	90	47	25	-	33	25
7	93	59	28	-	35	25
8	96	68	32	-	41	27
9	97	77	38	-	46	31
10	98	84	46	-	53	38
11	99	88	53	-	62	47
12	100	90	60	-	70	55
13	101	91	64	-	75	62
14	102	91	69	-	79	66
15	104	91	72	-	80	69
16	108	91	73	-	82	71
17	113	90	74	-	82	73
18	118	89	75	-	83	73
19	122	89	76	-	83	74
20	126	90	76	-	83	74
21	131	92	79	-	85	76
22	136	94	81	-	87	77
23	142	95	83	-	88	79
24	148	95	85	-	89	80
25	154	96	86	-	91	81
26	162	97	89	-	92	83
27	167	98	89	-	93	84
28	174	100	90	-	94	84
29	181	103	91	-	95	86
30	186	105	92	-	96	86
31	192	107	92	-	97	87
32	197	110	92	-	99	87
33	205	112	92	-	100	88
34	214	114	92	-	101	88
35	222	116	92	-	103	88

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	230	118	92	-	105	89
37	239	120	92	-	107	89
38	250	122	92	-	109	90
39	260	125	92	-	110	90
40	273	127	92	-	112	90
41	285	130	92	-	114	90
42	296	133	93	-	116	91
43	308	138	93	-	119	91
44	322	143	93	-	123	92
45	335	150	93	-	127	92
46	352	158	93	-	134	93
47	368	169	93	-	141	92
48	386	184	94	-	151	92
49	404	203	96	309	162	92
50	422	224	98	343	174	93
51	439	244	100	363	187	95
52	455	262	102	380	201	99
53	471	280	104	396	215	103
54	488	295	108	411	229	107
55	504	308	113	426	245	114
56	517	320	118	440	258	119
57	527	333	125	454	272	125
58	536	345	130	467	284	131
59	541	357	137	473	295	136
60	550	371	145	483	308	144
61	553	383	152	492	318	149
62	558	395	159	501	328	155
63	564	405	165	509	338	161
64	570	413	171	516	348	166
65	575	420	177	524	356	171
66	581	427	182	530	364	176
67	586	433	187	537	372	181
68	591	438	191	544	381	187
69	596	444	195	550	388	192
70	601	449	200	557	396	198
71	606	454	205	564	403	204
72	611	458	209	570	410	209
73	616	463	214	577	416	214

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	621	467	219	583	422	218
75	625	471	223	588	428	222
76	630	474	226	593	433	227
77	635	478	230	598	438	231
78	640	482	234	603	443	235
79	647	486	237	608	448	239
80	684	493	240	612	454	244
81	706	504	245	617	459	248
82	722	515	251	623	465	253
83	734	525	257	628	470	258
84	743	534	263	633	476	262
85	750	542	270	639	482	267
86	756	550	278	645	488	273
87	762	558	285	650	492	277
88	758	567	293	656	496	282
89	755	576	301	662	501	287
90	757	586	310	668	505	293
91	758	598	319	673	509	299
92	762	611	330	676	514	306
93	758	626	343	681	521	314
94	768	643	357	686	528	322
95	792	692	371	688	533	330
96	809	834	390	687	538	339
97	819	865	539	685	545	348
98	1116	920	800	687	554	359
99	-	920	828	685	562	371
100	-	926	847	690	593	425
101	-	921	863	695	643	524
102	-	924	905	705	710	693
103	-	924	924	698	739	730
104	-	927	948	784	825	839
105	-	941	981	918	915	918
106	-	947	998	918	-	-
107	-	922	990	916	-	-
108	-	946	1044	928	-	-
109	-	1015	1098	943	-	-
110	-	-	1108	963	-	-
111	-	-	1105	996	-	-

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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	-	-	1097	1018	-	-
113	-	-	-	1034	-	-
114	-	-	-	-	-	-

- Thermocouple broken due to equipment failure.

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

Specimen Lateral Deflection

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

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Time (minutes)	Deflection (mm)
	Centre
38	8
39	9
40	9
41	10
42	11
43	12
44	14
45	16
46	19
47	22
48	25
49	27
50	30
51	33
52	35
53	37
54	39
55	41
56	43
57	45
58	47
59	48
60	50
61	51
62	52
63	53
64	55
65	56
66	57
67	58
68	59
69	60
70	61
71	62
72	63
73	64
74	65
75	65
76	66
77	67

Customer: **British Gypsum**

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Time (minutes)	Deflection (mm)
	Centre
78	68
79	68
80	70
81	71
82	72
83	73
84	74
85	75
86	76
87	77
88	79
89	80
90	81
91	82
92	83
93	84
94	85
95	86
96	87
97	88
98	89
99	89
100	88
101	88
102	88
103	88
104	88
105	89
106	90
107	90
108	90
109	90
110	91
111	91
112	92
113	92
114	93
115	94
116	94
117	95

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Time (minutes)	Deflection (mm)
	Centre
118	95
119	96
120	96
121	97
122	97
123	98
124	98
125	99
126	99
127	99
128	100
129	100
130	100
131	100
132	100
133	100
134	100
135	99
136	99
137	98
138	97
139	96
140	95
141	94
142	93
143	92
144	93
145	93
146	93
147	92
148	91
149	90
150	88

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

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PHOTOGRAPHS

Exposed Face Prior to Test



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Unexposed Face Prior to Test



Customer: **British Gypsum**

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Unexposed Face at 30 Minutes



Customer: **British Gypsum**

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Unexposed Face at 1 Hour



Customer: **British Gypsum**

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Fax: (0115) 945 1562
Email: btc.testing@saint-gobain.com

Unexposed Face at 1 Hour, 30 Minutes



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 at 2 Hours



Customer: **British Gypsum**

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



Customer: **British Gypsum**

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FIELD OF DIRECT APPLICATION

General

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

- i) Decrease in height from 3000mm.
- ii) Increase in the thickness of the wall (minimum thickness 149mm).
- iii) Increase thickness of component materials (minimum Gypframe stud depth 92mm, minimum Gypframe stud gauge 0.50mm).
- iv) Decrease in the linear dimensions of the boards but not thickness ($\leq 2400\text{mm}$ (long) x $\leq 1200\text{mm}$ (wide) Gyproc Habito and 15mm Gyproc SoundBloc F).
- v) Decrease stud spacing from 600mm.
- vi) Decrease in fixing centres from 300mm.
- vii) Increase in the number of horizontal joints, of the type tested, when tested with one joint not more than (500 ± 150) mm from the top edge.

Extension of Width

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

Extension of Height

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

30 minutes	60 minutes	90 minutes	120 minutes
$\leq 100\text{mm}$	$\leq 100\text{mm}$	$\leq 100\text{mm}$	$\leq 100\text{mm}$