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Report Number BTC 13485F

A FIRE RESISTANCE TEST ON A BRITISH GYPSUM GYPWALL QUIET SF PARTITION CLAD WITH AN INNER LAYER OF 19mm GYPROC PLANK AND AN OUTER LAYER OF 12.5mm GYPROC SOUNDBLOC EACH SIDE OF GYPFRAME 70S50 STUDS WITH GYPFRAME RB1 RESILIENT BAR ON THE EXPOSED FACE, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

Test Date: 20th September 2004

www.btconline.co.uk

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

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

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FOREWORD

This test report details a fire resistance test conducted on a sheet and stud partition system. The test sponsor was British Gypsum Limited.

The test specimen was installed by British Gypsum Limited. The construction of the specimen took place between the 31st August 2004 and 1st September 2004. British Gypsum Limited designed the partition system and selected the materials for the test specimen.

The test was carried out on the 20th September 2004.

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, construction details, loads, stresses, edge or 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.

REPORT AUTHORISATION

Report Author	Authorised by
James McLavy BSc. (Hons.), AMIOA, AIFireE *Project Leader*	**Eur Ing. Paul Howard** BSc. (Hons.), CEng., MIOA *Head of Laboratory*

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TEST CONSTRUCTION

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

Gypframe 72C50 Standard Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings. Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. The right hand stud viewed from unexposed face was not fixed to the perimeter test frame, and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket. At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

50mm Isowool Acoustic Partition Roll (1200) was positioned in the partition cavity.

Gypframe RB1 Resilient Bar was fixed horizontally to the metal framework on the exposed face at 600mm centres with Gyproc Wafer Head Drywall Screws. The Gypframe RB1 Resilient Bar was positioned such that it backs the partitions horizontal joints (see below). Sections of Gypframe RB1 Resilient Bar were fixed vertically to the fixed end stud using two Gyproc Wafer Head Drywall Screws per section.

The Gypframe RB1 Resilient Bar on the exposed face was lined with an inner layer of 19mm Gyproc Plank and an outer layer of 12.5mm Gyproc SoundBloc board.

The inner layer was fixed vertically at each Gypframe RB1 Resilient Bar position with 32mm Gyproc drywall screws (two per board width). The outer layer was fixed around the perimeter and within the field of the board with 42mm Gyproc drywall screws at 300mm centres. All joints were staggered between layers.

The Gypframe 70S50 studs on the unexposed face were lined with an inner layer of 19mm Gyproc Plank and an outer layer of 12.5mm Gyproc SoundBloc board.

The inner layer was fixed horizontally at each stud position with 32mm Gyproc drywall screws (two per board width). The outer layer was fixed around the perimeter and within the field of the board with 42mm Gyproc drywall screws at 300mm centres. All joints were staggered between layers.

Horizontal joints were positioned 2400mm from the base for the outer layers on both the exposed and unexposed faces of the construction.

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All horizontal joints on the exposed face coincided with the Gypframe RB1 Resilient Bar positions.

A Gypframe GFS1 Fixing Strap was used behind the horizontal board joint in the unexposed face outer layer.

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

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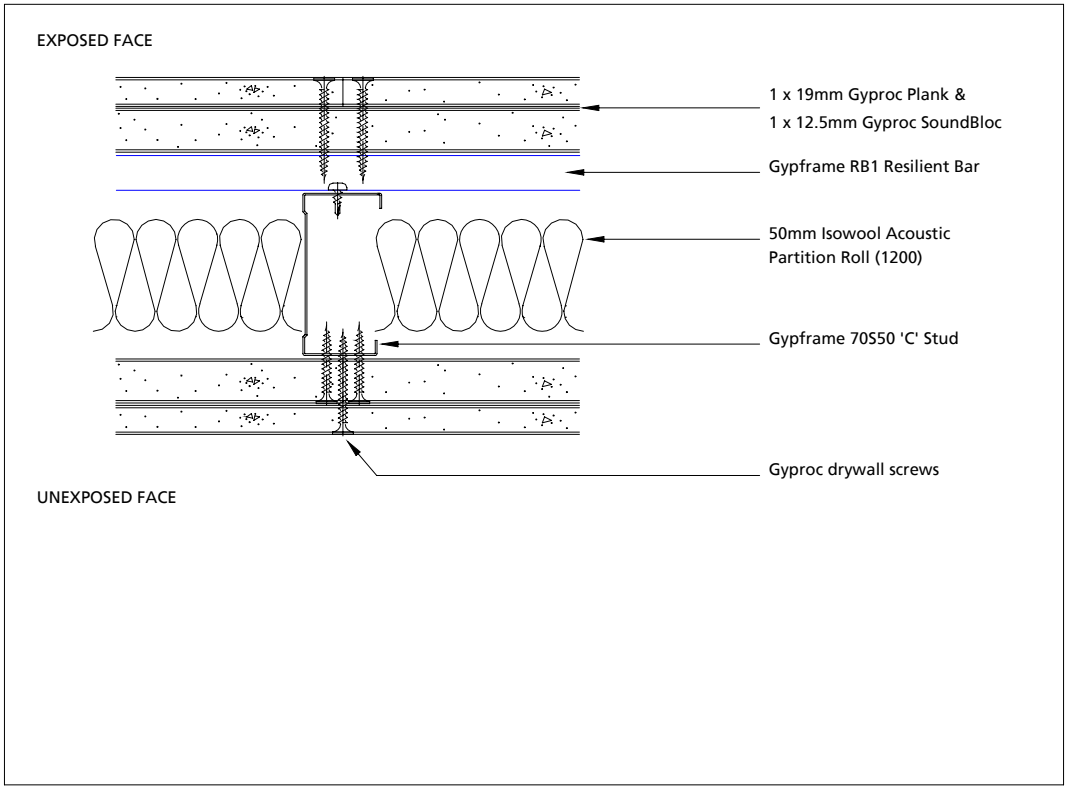

Figure 1. Cross-section of partition specimen.

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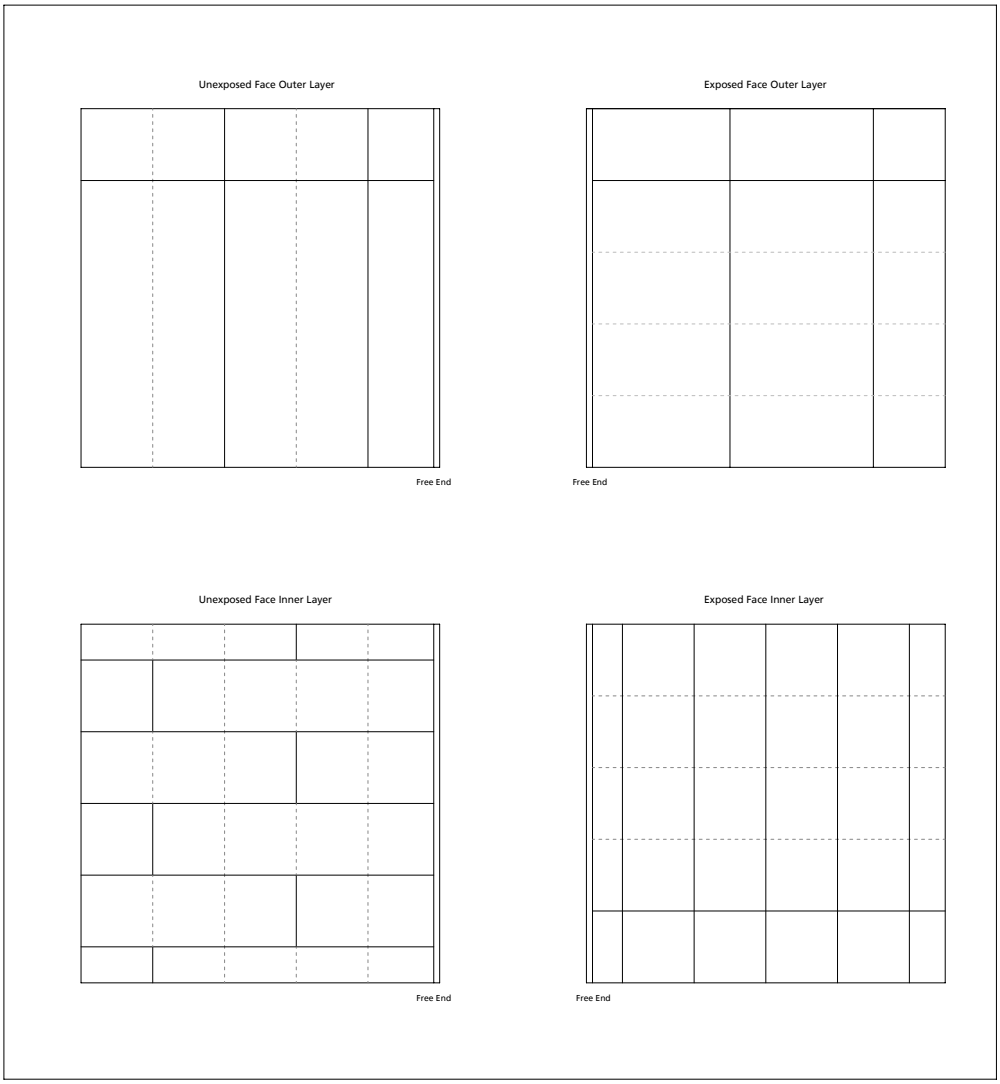

Figure 2. Specimen board layouts.

The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.

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TEST MATERIALS

Gyproc SoundBloc

Nominally, 2400mm (long) x 1200mm (wide) x 12.5mm (thick), Gyproc SoundBloc plasterboard manufactured and supplied by British Gypsum Limited, ex East Leake works.

Actual surface density:	10.57kg/m^2.
Actual thickness:	12.52mm.
Board identification numbers:	18 205 4 19:47
Actual moisture content:	0.46%.

The surface density and thickness was calculated using the actual weight and size of a selection of the boards used in the test specimen. The moisture content of the plasterboard used in construction was established from measurements made using samples dried to a constant weight in an oven at 40°C.

Gyproc Plank

Nominally, 2400mm (long) x 600mm (wide) x 19mm (thick), Gyproc Plank plasterboard manufactured and supplied by British Gypsum Limited.

Actual surface density:	14.90kg/m^2.
Actual thickness:	19.04mm.
Board identification numbers:	Not recorded
Actual moisture content:	0.34%.

The surface density and thickness was calculated using the actual weight and size of a selection of the boards used in the test specimen. The moisture content of the plasterboard used in construction was established from measurements made using samples dried to a constant weight in an oven at 40°C.

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Metal components

i) Gypframe 70S50'C' Studs manufactured from galvanised mild steel using the 'UltraSTEEL' process.
ii) Gypframe 72C50 Standard Floor & Ceiling Channel manufactured from galvanised mild steel using the 'UltraSTEEL' process.
iii) Gypframe RB1 Resilient Bar.
iv) Gypframe GFS1 Fixing Strap.

All metal components supplied by British Gypsum Limited.

Insulation

Nominally 50mm (thick) Isowool Acoustic Partition Roll (1200) glass mineral wool manufactured and supplied by British Gypsum – Isover Limited.

Measured density:	13.59kg/m^3
Measured surface density:	0.68kg/m^2

The density was calculated using the insulation roll used in the test specimen.

Fasteners

i) 32mm Gyproc drywall screws supplied by British Gypsum Limited.
ii) 42mm Gyproc drywall screws supplied by British Gypsum Limited.
iii) 13mm Gyproc Wafer Head Drywall Screws supplied by British Gypsum Limited.
iv) 60mm fire resistant fixings.

Miscellaneous components

i) Gyproc Paper Joint Tape.
ii) Gyproc Joint Filler.

All miscellaneous components were supplied by British Gypsum Limited.

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TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1364-1:1999. The specimen was subjected to fire from one side, as specified in BS EN 1364-1:1999. The test specimen was asymmetrical therefore separate test would be required to cover the fire resistance from the other direction.

The test procedure used was EN 1364-1 Issue 2.

The ambient temperature at the commencement of the test was 18°C.

The furnace pressure was set to control at 18 ±2 Pa positive with respect to atmosphere, at the top of the specimen, except during the first 5 minutes of the test.

The allowable tolerances are ±5 Pa from 5 minutes to 10 minutes and ±3 Pa from 10 minutes onwards. It is of the opinion of the laboratory that the variations in the furnace pressure exceeding the tolerances stated in BS EN 1363-1:1999 have not unduly influenced the results of this test. Furnace pressure data is shown on page 20.

The test conditions did not meet the full requirements of BS EN 1363-1:1999 as the test frame stiffness did not fully comply. The test centre is of the opinion that this deviation from the documented method will not unduly effect the result of the test.

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TEST RESULTS

The requirements of the standard were satisfied for the following periods:

Integrity:	Sustained flaming	119 minutes (no failure test discontinued at the request of the customer)
	25mm Gap gauge	118 minutes
	6mm Gap gauge	118 minutes
	Cotton pad	114 minutes
Insulation:		106 minutes

The test was terminated at 119 minutes at the request of the customer.

LIMITATIONS

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

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TEST DATA

Observations

Observers: Unexposed face J McLavy
Exposed face C Warren

Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
	0	Test started.
	5	The jointing material and face paper had started to char.
	10	The jointing material and face paper continued to char. The left-hand vertical joint had opened to approximately 5mm. The right-hand vertical joint had opened to approximately 3mm. The horizontal joint had opened to approximately 3mm.
	15	The right-hand vertical joint had opened to approximately 3-5mm. The horizontal joint had opened to approximately 5mm.
	20	The left-hand vertical joint had opened to approximately 5-7mm. The right-hand vertical joint had opened to approximately 5mm. The horizontal joint had opened to approximately 5-7mm.
	25	The left-hand vertical joint had opened to approximately 7-10mm. The right-hand vertical joint had opened to approximately 5-7mm. The horizontal joint had opened to approximately 10mm. The lower centre board had started to detach from its fixings along the horizontal joint. The lower left-hand board had started to detach from its fixings along the horizontal joint. *Unexposed face* The joint tape had lifted slightly on the horizontal joint.
	30	The horizontal joint had opened to approximately 10-12mm.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
	35	A crack approximately 300mm long had developed on the lower centre board. All lower boards had started to detach from their fixings adjacent to the vertical joints.
	40	The lower centre board had detached from its fixings along the horizontal joint. The lower left-hand board had detached from its fixings along the horizontal joint. Cracks had developed around the fixings on the right-hand vertical joints. The horizontal joint had opened to approximately 15mm.
	45	No visible change to the specimen.
	50	The lower centre board had detached from its fixings. The right-hand vertical joint had opened to approximately 10mm.
	55	No visible change to the specimen.
1	00	A section of the outer layer lower centre board approximately 800mm x 800mm had fallen into the furnace.
1	05	The inner layer boards had detached from their fixings where exposed.
1	10	A section of the outer layer lower centre board approximately 200mm x 800mm had fallen into the furnace. A section of the inner layer (from the centre of the specimen) had fallen into the furnace.
1	15	A section of the outer layer lower centre board approximately 600mm x 600mm had fallen into the furnace. A section of the inner layer (from the centre of the specimen) had fallen into the furnace.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
1	20	Sections of the outer layer lower left-hand, lower centre and lower right-hand boards had fallen into the furnace. Sections of the inner layer (from the left-hand and right-hand sides of the specimen) had fallen into the furnace. *Unexposed face* The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 1800-2100mm height.
1	25	Sections of the outer layer upper and lower centre boards had fallen into the furnace. Sections of the inner layer had fallen into the furnace.
1	30	A section of the outer layer upper centre board had fallen into the furnace. A section of the inner layer had fallen into the furnace. *Unexposed face* A glow was visible on the free end at mid-height. The jointing material had discoloured at the screw head positions on the right-hand vertical joint at approximately 1800mm height.
1	35	Sections of the outer layer lower left-hand and lower right-hand boards had fallen into the furnace. Sections of the inner layer (from the left-hand and right-hand sides of the specimen) had fallen into the furnace.
1	36	*Unexposed face* The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 1200-2100mm height. The jointing material had discoloured at the screw head positions on the right-hand vertical joint at approximately 900-2100mm height.

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Time		*Observations*
hrs	mins	All observations refer to exposed face unless otherwise stated.
1	38	*Unexposed face* The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 600-2100mm height. The jointing material had discoloured at the screw head positions on the right-hand vertical joint at approximately 900-2100mm height.
1	40	No visible change to the specimen. Approximately 80% of the outer and inner layers had fallen into the furnace. *Unexposed face* The joint tape had lifted slightly on the left-hand vertical joint.
1	41	*Unexposed face* The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 600-2400mm height. The jointing material had discoloured at the screw head positions on the right-hand vertical joint at approximately 600-2100mm height.
1	43	*Unexposed face* The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 600-2700mm height. The jointing material had discoloured at the screw head positions on the horizontal joint.
1	44	*Unexposed face* The jointing material had charred on the left-hand vertical joint at approximately 2100mm height.
1	45	The unexposed face inner layer boards had started to detach from their fixings adjacent to the horizontal joints at the centre of the specimen. *Unexposed face* Discolouration had developed on lower centre board at approximately 2100mm height (in line with an inner layer horizontal joint).

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
1	46	*Unexposed face* **INSULATION FAILURE.** The temperature rise of the roving thermocouple exceeded 180°C on lower centre board at approximately 2100mm height and mid-width of the specimen (in line with an inner layer horizontal joint). Discolouration had developed on the left-hand vertical joint at approximately 1800-2100mm height.
1	47	*Unexposed face* A slight glow was visible on the left-hand vertical joint at approximately 2100mm height.
1	50	No visible change to the specimen. *Unexposed face* A cotton pad was used on the left-hand vertical joint at approximately 2100mm height but did not glow or ignite. Discolouration had developed on lower left-hand board at approximately 2100mm height (in line with an inner layer horizontal joint).
1	51	*Unexposed face* Discolouration had developed on the centre line of the lower centre board at approximately 1500-2100mm height. Discolouration had developed on the left-hand vertical joint at approximately 1800-2400mm height. A cotton pad was used on the left-hand vertical joint at approximately 2100mm height but did not glow or ignite.
1	52	*Unexposed face* Discolouration had developed on the right-hand vertical joint at approximately 1800-2100mm height. A cotton pad was used on the left-hand vertical joint at approximately 2100mm height but did not glow or ignite.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
1	53	*Unexposed face* Discolouration had developed on lower centre board at approximately 1500mm height (in line with an inner layer horizontal joint). A glow was visible on the left-hand vertical joint at approximately 1800-2100mm height.
1	54	*Unexposed face* **INTEGRITY FAILURE.** The cotton pad glowed when used on the left-hand vertical joint at approximately 2100mm height. Discolouration had developed on the left-hand vertical joint at approximately 1200-2400mm height. Discolouration had developed on the right-hand vertical joint at approximately 1500-2100mm height.
1	55	The outer layer upper left-hand and upper right-hand boards had fallen into the furnace. Sections of the inner layer (from the left-hand and right-hand sides of the specimen) had fallen into the furnace.
1	57	*Unexposed face* Flash flaming was visible on the left-hand vertical joint at approximately 1800mm height. A glow was visible on the left-hand vertical joint at approximately 1500-2100mm height. A glow was visible on the right-hand vertical joint at approximately 1800-2100mm height.
1	58	*Unexposed face* **FURTHER INTEGRITY FAILURE.** The 6mm x 150mm gap gauge entered the furnace through the left-hand vertical joint at approximately 1500-2100mm height. **FURTHER INTEGRITY FAILURE.** The 25mm gap gauge entered the furnace through the left-hand vertical joint at approximately 1800mm height.
1	59	**TEST TERMINATED** at the request of the customer.

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Furnace Temperature Graph

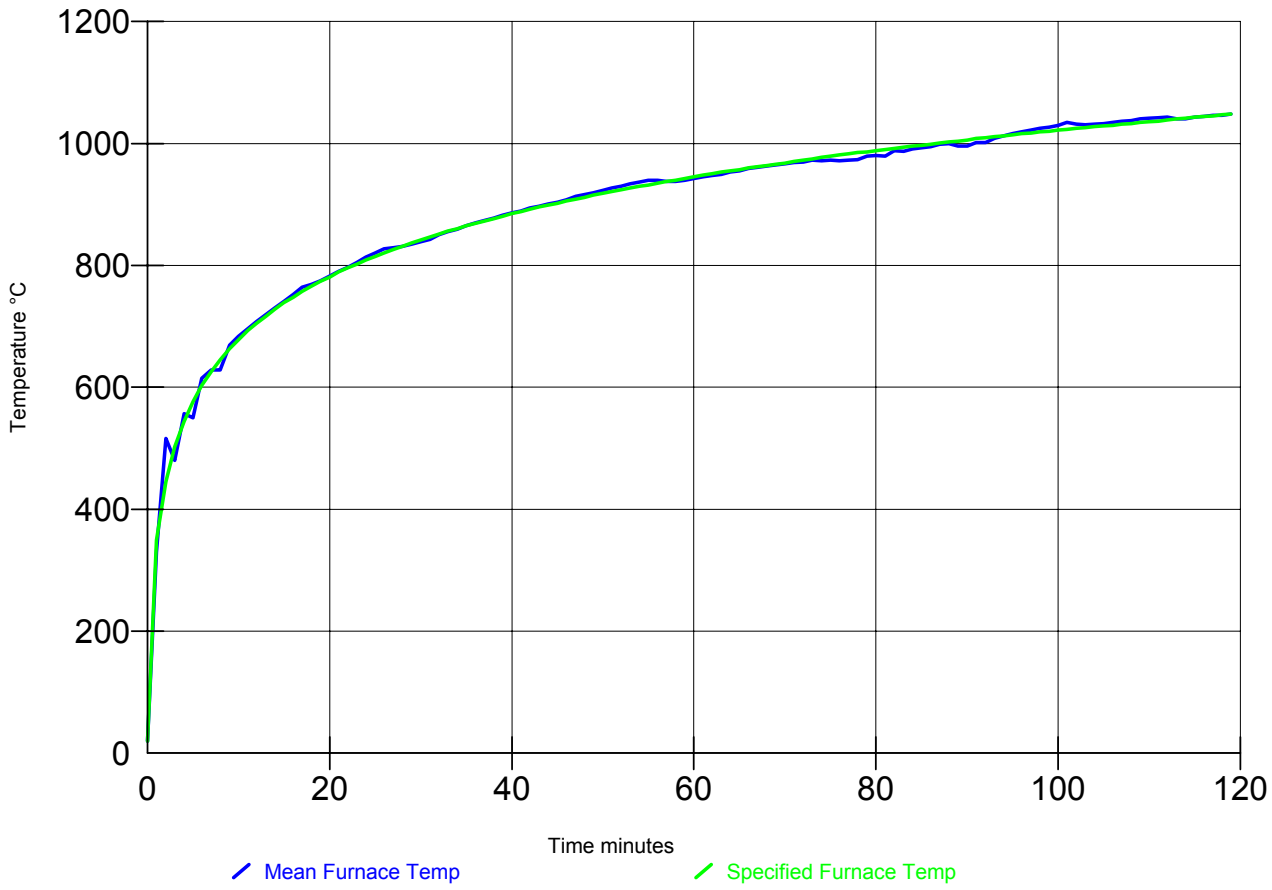

Figure 3. Furnace temperature graph.

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Furnace Pressure Graph

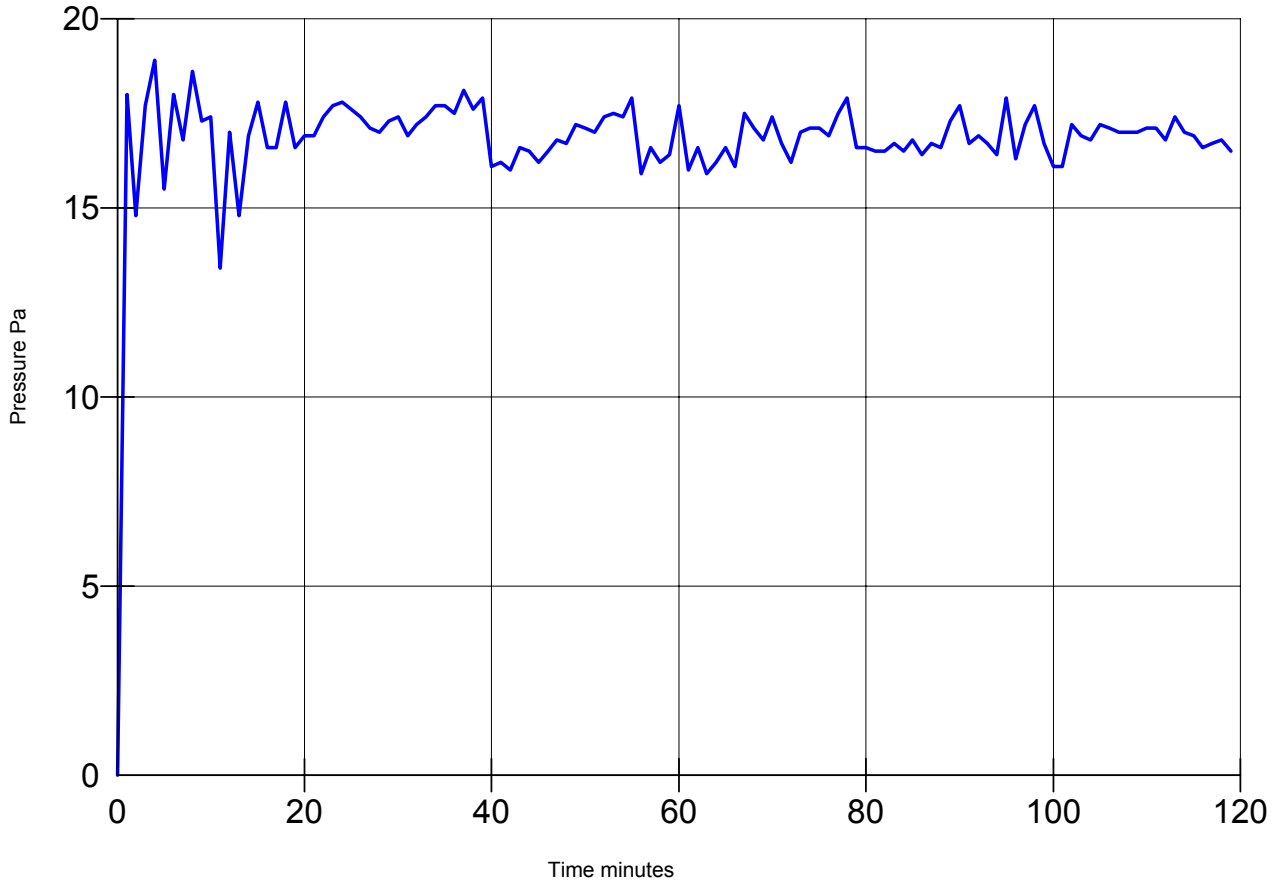

Figure 4. Furnace pressure graph.

The furnace pressure was outside of the allowable tolerance at 11 and 13 minutes.

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Unexposed Face Temperature Graph

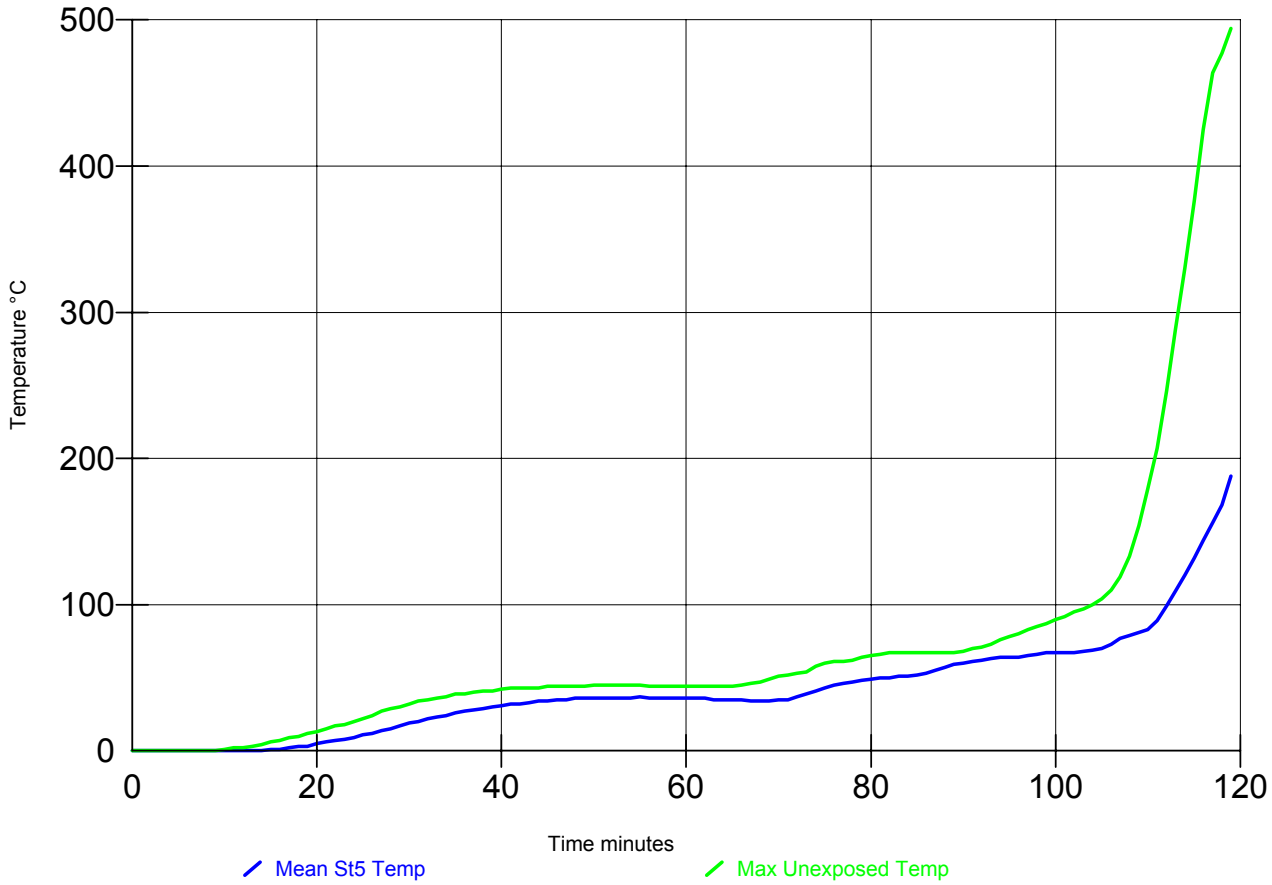

Figure 5. Unexposed face temperature graph.

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Unexposed Face Thermocouple Layout

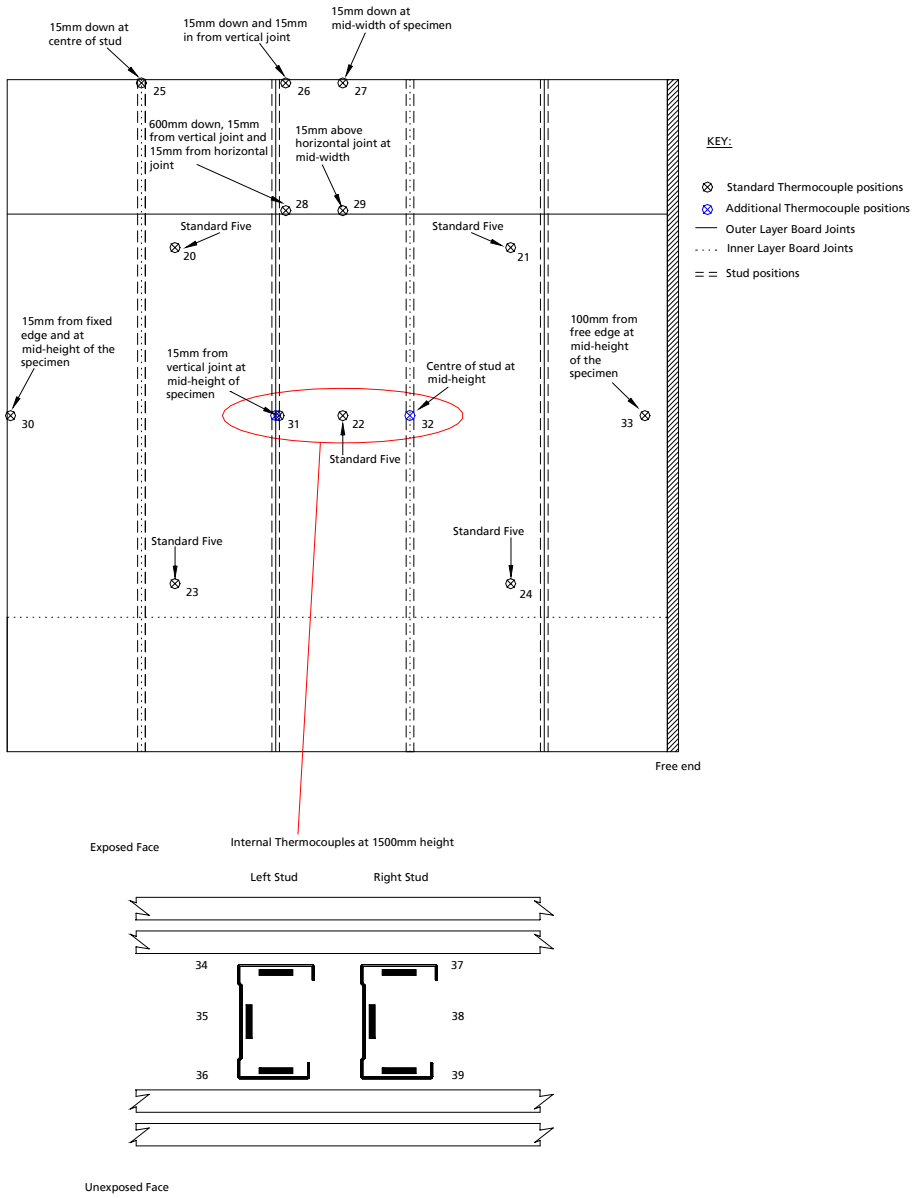

Figure 6. Unexposed face thermocouple layout.

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Unexposed Face Standard Five Thermocouple Data

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

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
34	19	34	31	15	24
35	21	34	33	17	26
36	22	35	34	18	28
37	23	36	35	19	29
38	24	36	36	20	31
39	25	37	36	21	32
40	27	38	37	23	33
41	28	38	37	24	34
42	28	38	38	25	35
43	29	39	38	26	36
44	30	39	38	27	37
45	31	40	38	28	37
46	32	40	38	29	38
47	32	40	38	29	38
48	32	40	39	30	39
49	33	39	39	31	39
50	33	39	39	31	40
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63	35	34	37	35	38
64	35	34	37	35	37
65	35	33	37	35	37
66	35	33	36	35	36
67	35	33	36	34	36
68	36	33	35	34	35
69	37	33	35	34	35
70	38	34	35	34	34

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
71	41	35	35	33	34
72	47	37	37	33	34
73	54	38	39	33	34
74	58	41	42	32	34
75	60	42	48	32	34
76	61	44	53	32	35
77	61	46	56	32	35
78	61	48	58	32	36
79	62	51	58	32	37
80	62	54	58	33	38
81	62	57	59	33	39
82	62	59	59	33	40
83	61	60	60	34	41
84	62	61	60	34	42
85	62	61	60	35	44
86	62	61	61	36	48
87	62	62	61	38	54
88	62	62	61	46	57
89	62	62	61	53	60
90	61	62	62	58	60
91	62	62	63	60	60
92	63	62	65	61	60
93	66	61	67	61	61
94	68	61	70	61	61
95	69	61	72	61	61
96	69	61	73	60	60
97	70	62	75	60	61
98	71	64	76	61	61
99	71	67	76	61	61
100	72	68	76	61	61
101	73	68	76	61	61
102	73	69	76	61	60
103	75	69	76	61	60
104	76	70	76	61	62
105	78	70	78	61	64
106	84	72	83	63	67
107	89	72	91	66	67

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
108	91	72	98	68	68
109	92	73	104	68	68
110	94	73	114	68	69
111	97	74	139	69	70
112	100	76	182	70	71
113	105	78	222	70	73
114	110	82	262	71	77
115	117	89	307	72	78
116	130	94	349	73	78
117	146	99	384	74	80
118	176	102	407	75	80
119	247	106	423	76	91

See figure 6 for the locations of the thermocouples.

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Additional Unexposed Face Temperature Data

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

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

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
71	34	28	32	44	50
72	35	29	32	47	52
73	35	30	32	49	53
74	36	31	33	51	54
75	37	32	33	52	54
76	38	33	34	53	54
77	39	33	34	54	56
78	39	34	35	55	57
79	40	35	35	56	58
80	41	35	36	56	59
81	42	36	36	56	60
82	43	36	37	56	59
83	44	37	37	55	59
84	45	37	37	55	60
85	46	37	38	55	61
86	46	38	39	56	62
87	47	38	39	56	63
88	48	39	40	56	64
89	49	40	40	57	66
90	50	41	41	58	68
91	51	45	45	58	70
92	53	49	53	59	71
93	55	52	58	60	73
94	59	54	62	63	76
95	61	54	63	65	78
96	63	55	63	67	80
97	65	56	64	69	83
98	67	56	64	70	85
99	67	57	64	71	87
100	68	57	65	72	90
101	68	57	65	73	92
102	69	57	65	74	95
103	69	58	65	75	97
104	69	58	66	76	100
105	70	59	66	77	104
106	70	59	66	82	109
107	71	59	66	90	114

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
108	71	60	66	97	122
109	72	63	67	105	132
110	73	66	67	111	144
111	74	69	68	118	158
112	75	72	69	135	175
113	76	77	71	160	194
114	78	81	72	184	212
115	80	86	73	210	229
116	82	91	74	232	246
117	84	97	75	250	264
118	88	103	77	279	288
119	96	106	80	324	311

See figure 6 for the locations of the thermocouples.

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Additional Unexposed Face Temperature Data

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

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Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
34	21	36	37	16
35	23	37	39	17
36	24	38	39	19
37	25	39	40	20
38	26	39	41	21
39	28	40	41	22
40	29	41	42	23
41	30	41	43	25
42	31	41	43	26
43	32	42	43	27
44	32	42	43	28
45	33	42	44	28
46	34	42	44	29
47	34	43	44	30
48	35	43	44	31
49	35	43	44	31
50	36	43	45	32
51	36	43	45	33
52	36	43	45	33
53	36	43	45	34
54	36	43	45	34
55	37	43	45	35
56	36	43	44	35
57	36	42	44	35
58	36	42	44	35
59	36	42	44	35
60	36	41	44	36
61	36	41	44	36
62	36	41	44	36
63	36	40	44	36
64	36	40	44	36
65	36	40	44	36
66	36	40	45	36
67	37	40	46	35
68	37	41	47	35
69	37	42	49	35
70	37	44	51	34

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Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
71	36	46	52	34
72	37	49	53	34
73	37	51	53	34
74	37	53	52	34
75	37	56	54	33
76	38	58	58	33
77	38	60	61	34
78	38	62	62	34
79	39	63	64	34
80	39	65	65	35
81	40	66	65	35
82	40	67	64	36
83	40	67	65	37
84	41	67	65	38
85	42	67	66	39
86	43	67	66	40
87	43	67	67	42
88	45	67	67	44
89	46	67	67	50
90	47	66	66	56
91	49	66	66	60
92	51	66	67	62
93	53	66	69	63
94	54	68	71	63
95	54	69	72	63
96	54	71	73	63
97	55	72	74	63
98	56	71	76	63
99	56	71	77	63
100	57	72	78	64
101	57	73	81	66
102	57	75	86	68
103	58	78	90	69
104	58	86	93	71
105	58	100	97	73
106	58	110	102	75
107	58	119	108	76

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Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
108	58	133	116	78
109	58	154	130	78
110	58	179	162	79
111	58	207	204	80
112	59	236	246	82
113	60	268	288	94
114	61	302	330	102
115	62	342	376	108
116	62	382	425	117
117	62	420	464	139
118	63	461	477	193
119	63	494	485	256

See figure 6 for the locations of the thermocouples.

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Internal Thermocouple Data at 1500mm height

Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
0	18	18	18	18	18	18
1	18	18	18	18	18	18
2	18	18	18	18	18	18
3	18	18	18	18	18	18
4	19	18	18	19	18	18
5	23	21	19	21	19	19
6	31	26	27	30	30	20
7	43	37	38	44	45	24
8	56	51	51	58	58	33
9	64	61	62	68	67	45
10	71	69	68	73	72	59
11	75	74	72	75	74	65
12	76	75	73	77	76	68
13	77	76	75	79	78	70
14	78	77	78	80	79	71
15	79	78	79	82	81	73
16	81	80	82	84	82	74
17	82	81	84	85	84	76
18	84	83	86	88	87	79
19	86	86	88	90	89	81
20	89	89	90	92	90	84
21	91	91	91	94	92	85
22	92	92	92	95	93	87
23	93	93	93	96	94	89
24	94	93	94	97	95	90
25	94	93	95	97	95	91
26	95	93	95	97	96	91
27	95	94	96	98	97	92
28	96	93	96	98	97	92
29	96	95	96	99	97	92
30	96	95	96	99	96	93
31	97	95	97	99	97	93

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Fire Acoustics Structures

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Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand 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
32	98	95	97	100	97	93
33	98	95	96	100	97	92
34	99	96	96	101	97	92
35	101	97	96	102	98	92
36	103	98	97	103	98	93
37	104	99	97	104	99	93
38	105	100	97	104	100	93
39	107	101	97	105	100	94
40	109	101	97	105	101	95
41	109	102	97	107	101	95
42	111	102	97	107	101	96
43	111	102	98	108	101	96
44	112	103	98	107	101	97
45	113	103	98	108	102	97
46	113	104	97	108	103	97
47	113	104	98	109	103	97
48	113	104	98	109	104	96
49	114	104	97	111	104	95
50	115	104	97	114	105	94
51	115	104	98	120	107	93
52	116	104	97	131	110	93
53	117	105	98	142	113	93
54	118	105	100	151	118	93
55	119	105	104	162	124	93
56	120	106	108	172	130	93
57	121	107	112	184	138	93
58	124	108	118	196	146	94
59	128	110	124	209	157	94
60	133	114	132	227	169	95
61	143	119	139	245	182	96
62	157	127	148	263	195	98
63	175	140	158	282	209	101
64	203	160	170	305	225	105
65	233	183	180	333	245	108
66	265	208	190	369	270	110

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Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand 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
67	301	240	204	408	300	116
68	341	275	220	451	332	129
69	381	310	234	495	363	160
70	422	351	250	517	391	200
71	454	389	263	534	414	243
72	490	427	283	-	446	279
73	537	477	368	-	528	312
74	574	535	640	740	739	350
75	-	598	733	830	690	399
76	-	670	771	836	725	471
77	753	765	788	837	757	566
78	796	841	799	834	781	811
79	799	886	813	831	801	899
80	883	898	827	837	820	909
81	-	-	947	960	958	-
82	-	-	-	-	-	-

See figure 6 for the locations of the thermocouples.

Thermocouple No. 34 did not work between 75-76 minutes and after 80 minutes.
Thermocouple No. 35 did not work after 80 minutes.
Thermocouple No. 36 did not work after 81 minutes.
Thermocouple No. 37 did not work between 72-73 minutes and after 81 minutes.
Thermocouple No. 38 did not work after 81 minutes.
Thermocouple No. 39 did not work after 80 minutes.

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Specimen Lateral Deflection

Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
0	0	0
1	-2	2
2	-2	2
3	-2	2
4	-2	2
5	-2	2
6	3	3
7	5	3
8	6	3
9	7	3
10	8	3
11	8	3
12	8	3
13	8	3
14	9	3
15	9	3
16	9	3
17	9	3
18	9	3
19	9	3
20	9	3
21	9	3
22	10	3
23	10	3
24	10	3
25	10	3
26	9	3
27	9	3
28	9	3
29	9	3
30	8	3
31	8	3
32	8	3
33	8	3
34	8	3
35	7	3
36	8	3
37	8	3

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Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
38	8	3
39	9	3
40	9	3
41	9	3
42	9	3
43	9	3
44	9	3
45	9	3
46	10	4
47	10	4
48	10	4
49	10	4
50	10	4
51	10	4
52	10	4
53	11	4
54	11	5
55	12	5
56	13	5
57	13	5
58	14	6
59	14	6
60	16	6
61	18	7
62	21	8
63	25	10
64	30	12
65	38	17
66	40	20
67	44	24
68	47	27
69	49	31
70	51	37
71	54	43
72	57	47
73	60	52
74	62	56
75	65	60
76	67	64
77	69	67
78	70	70
79	71	73

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Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
80	72	76
81	74	84
82	74	90
83	76	92
84	77	93
85	77	95
86	77	95
87	78	96
88	78	97
89	79	98
90	79	98
91	80	99
92	81	101
93	80	103
94	80	105
95	80	107
96	79	108
97	79	108
98	80	108
99	81	110
100	81	110
101	81	110
102	81	110
103	80	110

Both deflection measurements were taken at the mid-height of the specimen.

Negative values indicate that the specimen deflected out of the furnace.

The deflection readings were discontinued after 103 minutes.

(The lateral deflection was recorded by taking measurements relative to a fixed reference wire at 1 minute intervals due to equipment availability at the time of the test).

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PHOTOGRAPHS

Photograph 1. View of the exposed face prior to test.

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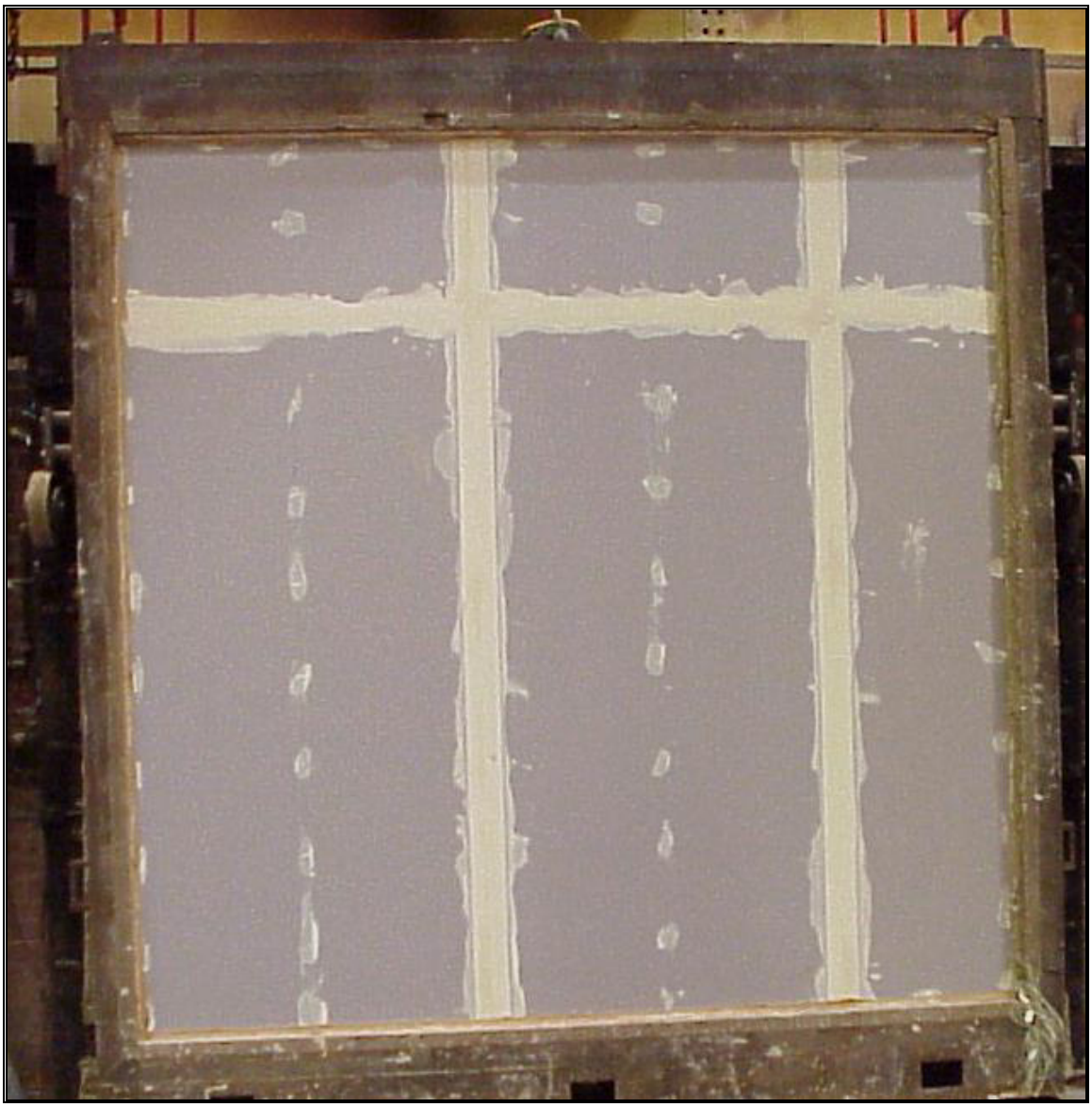

Photograph 2. View of the unexposed face prior to test.

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Photograph 3. View of the unexposed face at 106 minutes (after insulation failure).

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Photograph 4. View of the unexposed face at 114 minutes (after integrity failure).

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Photograph 5. View of the unexposed face at test termination (119 minutes).

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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 151mm).

(iii) Increase thickness of component materials (minimum Gypframe stud depth 70mm, minimum Gypframe 'C' stud gauge 0.5mm).

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

(v) Decrease stud spacing from 600mm.

(vi) Decrease in fixing centres from 300mm.

(vii) Horizontal and vertical joints, of the type tested.

Extension of Width

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 constructions tested at a minimum of 3000mm, maybe increased to 4000mm at the following fire resistance periods as the lateral deflection was below 100mm.

30 minutes	60 minutes	90 minutes
<100mm, ∴4000mm	<100mm, ∴4000mm	<100mm, ∴4000mm