



Report Number BTC 13488F

A FIRE RESISTANCE TEST ON A 5m (HIGH) x 3m (WIDE) BRITISH GYPSUM GYPWALL STAGGERED PARTITION CLAD WITH A DOUBLE LAYER OF 15mm GYPROC SOUNDBLOC EACH SIDE OF GYPFRAME 60I70 STUDS AND 50mm ISOWOOL 1200 IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

Test Date: 24th September 2004

www.btconline.co.uk

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

Customer: **British Gypsum Limited**

BTC 13488F: Page 1 of 46



0296

A FIRE RESISTANCE TEST ON A 5m (HIGH) x 3m (WIDE) BRITISH GYPSUM GYPWALL STAGGERED PARTITION CLAD WITH A DOUBLE LAYER OF 15mm GYPROC SOUNDBLOC EACH SIDE OF GYPFRAME 60I70 STUDS AND 50mm ISOWOOL 1200 IN THE CAVITY, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

TABLE OF CONTENTS

FOREWORD	4
REPORT AUTHORISATION	4
TEST CONSTRUCTION	5
TEST MATERIALS	7
Gyproc SoundBloc	7
Metal components	7
Insulation	8
Fasteners	8
Miscellaneous components	8
TEST PROCEDURE	9
TEST RESULTS	10
LIMITATIONS	10
TEST DATA	11
Observations	11
Furnace Temperature Graph	18
Furnace Pressure Graph	19
Unexposed Face Temperature Graph	20
Unexposed Face Thermocouple Layout	21
Unexposed Face Standard Five Thermocouple Data	22
Additional Unexposed Face Temperature Data	26
Additional Unexposed Face Temperature Data	30
Internal Thermocouple Data at 3750mm height	34
Internal Thermocouple Data at 2500mm height	37
Specimen Lateral Deflection	40

Customer: British Gypsum Limited

BTC 13488F: Page 2 of 46

<i>PHOTOGRAPHS</i>	41
<i>FIELD OF DIRECT APPLICATION</i>	46

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 6th and 7th September 2004. British Gypsum Limited designed the partition system and selected the materials for the test specimen.

The test was carried out on the 24th 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



James McLavy
BSc. (Hons.), AMIOA, AIFireE
Project Leader

Authorised by



Eur Ing. Paul Howard
BSc. (Hons.), CEng., MIOA
Head of Laboratory

The Building Test Centre will not discuss the content of this report without written permission from the test sponsor. The Building Test Centre retains ownership of the test report content but authorises the test sponsor to reproduce the report as necessary in its entirety only.

Customer: **British Gypsum Limited**

BTC 13488F: Page 4 of 46

TEST CONSTRUCTION

The specimen was constructed in a refractory concrete lined steel restraint frame having an opening of 5000mm high x 3000mm wide.

Gypframe 72DC60 Deep Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 60I70 'I' Studs were positioned at 300mm staggered centres between the channels (each set of studs was positioned at 600mm centres). Gypframe SC1 Spacer Clips were used at the head and base to stagger the studs.

Each 5000mm length of stud comprised of one full 3600mm length plus a second length 1400mm long, overlapped by a 600mm long length of Gypframe 62C50 Standard Floor & Ceiling Channel and fixed together using four Gyproc Wafer Head Jack-Point Screws, four to each flange (8 fixings in total).

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.

The framework was lined both sides with a double layer of 15mm Gyproc SoundBloc board. The inner layer was fixed around the perimeter with 25mm Gyproc drywall screws at 300mm centres. 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 3000mm & 4700mm from the base for the outer layers on both the exposed and unexposed faces of the construction. Horizontal joints were positioned 2000mm from the base for the inner layers on both the exposed and unexposed faces of the construction. A Gypframe GFS1 Fixing Strap was used behind the horizontal board joints in the outer layers.

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

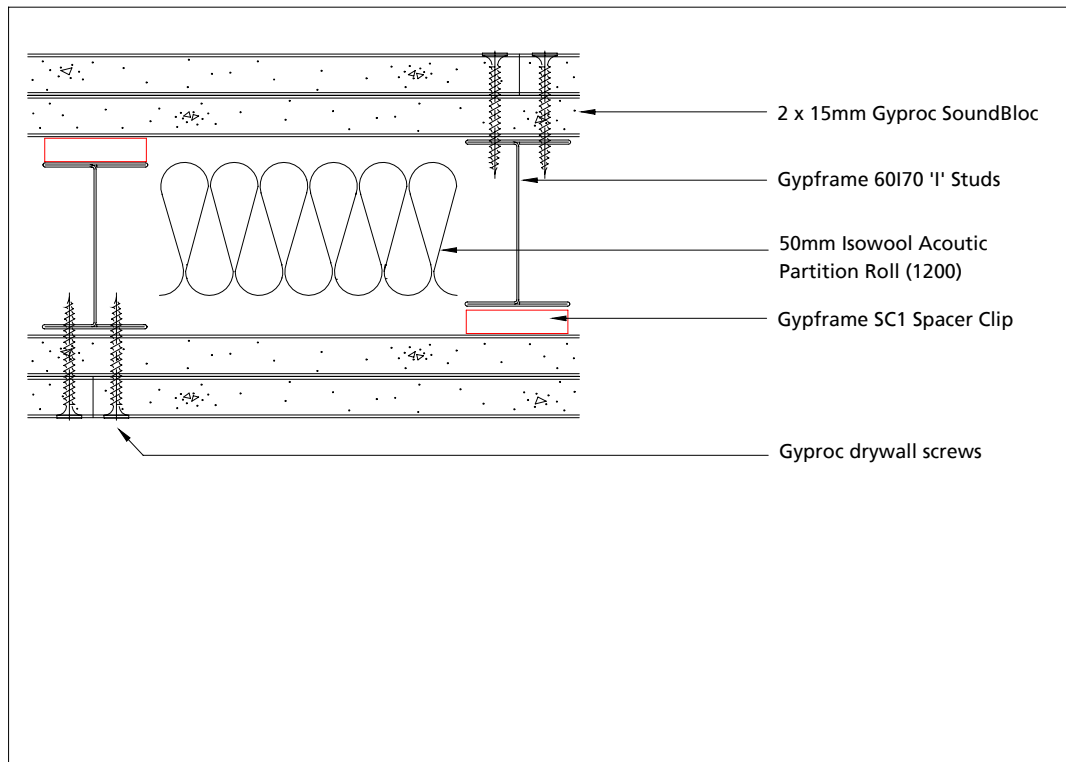


Figure 1. Cross-section of partition specimen.

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

TEST MATERIALS

Gyproc SoundBloc

Nominally, 3000mm (long) x 1200mm (wide) x 15mm (thick), Gyproc SoundBloc plasterboard manufactured and supplied by British Gypsum Limited, ex East Leake works.

Actual surface density:	12.77kg/m ² .
Actual thickness:	14.76mm.
Board identification numbers:	18 192 4 08:22
Actual moisture content:	0.55%.

Actual surface density:	12.76kg/m ² .
Actual thickness:	15.15mm.
Board identification numbers:	18 233 4 19:23
Actual moisture content:	0.55%.

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.

Metal components

- i) Gypframe 60I70 'I' Studs manufactured from galvanised mild steel.
- ii) Gypframe 70S50 'C' Studs manufactured from galvanised mild steel using the 'UltraSTEEL' process.
- iii) Gypframe 72DC60 Deep Flange Floor & Ceiling Channel manufactured from galvanised mild steel using the 'UltraSTEEL' process.
- iv) Gypframe 62C50 Standard Floor & Ceiling Channel manufactured from galvanised mild steel using the 'UltraSTEEL' process.
- v) Gypframe GFS1 Fixing Strap.
- vi) Gypframe SC1 Spacer Clips.

All metal components supplied by British Gypsum Limited.

Customer: **British Gypsum Limited**

BTC 13488F: Page 7 of 46

Insulation

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

Measured density:	13.97kg/m ³
Measured surface density:	0.70kg/m ²

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

Fasteners

- i) 25mm Gyproc drywall screws supplied by British Gypsum Limited.
- ii) 42mm Gyproc drywall screws supplied by British Gypsum Limited.
- iii) 13mm Gyproc Wafer Head Jack-point 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.

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. 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 2.

The ambient temperature at the commencement of the test was 16°C.

The furnace pressure head was located at a height of 3 metres and the pressure was set to control at 1 ± 2 Pa positive with respect to the atmosphere, except during the first 5 minutes of the test.

This equated to 18 ± 2 Pa positive with respect to the atmosphere, at the top of the specimen.

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 19.

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.

TEST RESULTS

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

Integrity:	Sustained flaming	130 minutes (no failure test discontinued at the request of the customer)
	Cotton pad	130 minutes (no failure test discontinued at the request of the customer)
	25mm Gap gauge	120 minutes
	6mm Gap gauge	118 minutes
Insulation:		105 minutes

The test was terminated at 130 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.



TEST DATA

Observations

Observers: Unexposed face J McLavy
Exposed face C Warren

Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
	0	Test started.
	5	The jointing material and face paper had started to char.
	10	The jointing material and face paper continued to char.
	15	The left-hand vertical joint had opened to approximately 2mm. The right-hand vertical joint had opened to approximately 2mm. The lower horizontal joint had opened to approximately 3mm.
	20	The left-hand vertical joint had opened to approximately 3mm. The right-hand vertical joint had opened to approximately 3mm. The lower horizontal joint had opened to approximately 4mm.
	25	The left-hand vertical joint had opened to approximately 4-5mm. The right-hand vertical joint had opened to approximately 5mm. The lower horizontal joint had opened to approximately 5-10mm. Cracks had developed at the screw head positions adjacent to the board joints.
	30	The left-hand vertical joint had opened to approximately 5-8mm. The right-hand vertical joint had opened to approximately 5mm. The lower horizontal joint had opened to approximately 15mm. The lower left-hand and lower centre boards had started to detach from their fixings adjacent to the horizontal joint.
	35	The left-hand vertical joint had opened to approximately 7-10mm. The right-hand vertical joint had opened to approximately 7mm.





Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
	40	No visible change to the specimen.
	45	The lower horizontal joint had opened to approximately 15-20mm.
	50	The left-hand vertical joint had opened to approximately 10-15mm. The right-hand vertical joint had opened to approximately 10mm. The lower left-hand and lower centre boards had detached from their fixings adjacent to the horizontal joint.
	55	No visible change to the specimen.
1	00	The left-hand vertical joint had opened to approximately 20mm. The right-hand vertical joint had opened to approximately 15-20mm. The lower right-hand board had detached from its fixings adjacent to the horizontal joint. The boards had detached from their fixings adjacent to the vertical joints.
1	05	No visible change to the specimen. <i>Unexposed face</i> The specimen had bowed significantly into the furnace. A glow was visible at the free end at mid-height.
1	10	A section of the outer layer lower centre board approximately 1200mm x 1200mm had fallen into the furnace. <i>Unexposed face</i> The joint tape had lifted on the lower horizontal joint.
1	15	A section of the outer layer lower centre board approximately 1800mm x 600mm had fallen into the furnace. The stud behind the inner layer right-hand vertical joint had bowed into the furnace where exposed.



Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
1	20	<p>A section of the outer layer lower centre board approximately 1800mm x 600mm had fallen into the furnace. The majority of the outer layer lower left-hand board had fallen into the furnace. A section of the inner layer lower right-hand board approximately 2000mm x 600mm had fallen into the furnace. A section of the inner layer upper right-hand board approximately 800mm x 600mm had fallen into the furnace.</p> <p><i>Unexposed face</i> A gap up to approximately 10mm wide had developed at the fixed end (no route was visible into the furnace).</p>
1	25	<p>The remainder of the outer layer lower left-hand board had fallen into the furnace. The entire inner layer lower left-hand and centre boards had fallen into the furnace. A section of the inner layer upper centre board approximately 300mm x 1200mm had fallen into the furnace.</p>
1	26	<p><i>Unexposed face</i> Smoke and steam issued from the lower horizontal joint.</p>
1	30	<p>A section of the inner layer upper centre board approximately 500mm x 1200mm had fallen into the furnace. A section of the inner layer upper left-hand board approximately 500mm x 600mm had fallen into the furnace. The studs had bowed into the furnace where exposed.</p>
1	33	<p><i>Unexposed face</i> The jointing material had discoloured at the screw head positions on the centre vertical joint at approximately 1200-1800mm height.</p>





Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
1	35	<p>A section of the outer layer lower right-hand board approximately 1500mm x 600mm had fallen into the furnace.</p> <p>A section of the inner layer lower right-hand board approximately 800mm x 600mm had fallen into the furnace.</p> <p>A section of the inner layer upper right-hand board approximately 800mm x 600mm had fallen into the furnace.</p> <p><i>Unexposed face</i> The jointing material had discoloured at the screw head positions on the centre vertical joint at approximately 600-1800mm height.</p>
1	40	<p>The entire outer layer upper left-hand, centre and right-hand boards (between 3000-4700mm height) had fallen into the furnace.</p> <p><i>Unexposed face</i> The jointing material had discoloured at the screw head positions on the centre vertical joint at approximately 300-2700mm height. The jointing material had discoloured at the screw head positions on the left-hand vertical joint at approximately 1800-2100mm height. The jointing material had discoloured at the screw head positions on the right-hand vertical joint at approximately 1500-2700mm height. Staining had developed on the horizontal joint tape due to smoke issued.</p>
1	45	<p>A section of the inner layer upper centre board approximately 1200mm x 600mm had fallen into the furnace.</p> <p>A section of the inner layer upper right-hand board approximately 1200mm x 600mm had fallen into the furnace.</p> <p><i>Unexposed face</i> Discolouration had developed on the centre line of the lower left-hand full board at approximately 2400mm height. INSULATION FAILURE. The temperature rise of thermocouple No. 31 exceeded 180°C.</p>
1	49	<p><i>Unexposed face</i> Discolouration had developed on the centre line of the lower left-hand full board at approximately 1800-2700mm height.</p>





Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
1	50	No visible change to the specimen.
1	53	<i>Unexposed face</i> Discolouration had developed on the centre line of the lower left-hand full board at approximately 1200-3000mm height. Discolouration had developed across the lower left-hand full board at approximately 2000mm height (in line with the inner layer horizontal joint).
1	54	<i>Unexposed face</i> A slight glow was visible at a screw head position within the field of the lower left-hand full board at approximately 2700mm height. A cotton pad was used on the above location but did not glow or ignite. Discolouration had developed on the centre vertical joint at approximately 2000-2100mm height. Discolouration had developed on the centre line of the lower right-hand full board at approximately 2100-2700mm height.
1	55	A section of the inner layer unexposed face board had fallen into the furnace.
1	57	<i>Unexposed face</i> Discolouration had developed on the centre line of the lower left-hand full board at approximately 1200-3000mm height. Discolouration had developed on the centre line of the lower right-hand full board at approximately 1200-3000mm height. Discolouration had developed on the left-hand vertical joint at approximately 2100-2400mm height. Discolouration had developed on the centre vertical joint at approximately 1800-2400mm height. A glow was visible on the centre line of the lower left-hand full board at approximately 2000mm height. A cotton pad was used on the above location but did not glow or ignite.



Time		Observations
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
1	58	<i>Unexposed face</i> INTEGRITY FAILURE. The 6mm x 150mm gap gauge entered the furnace through a crack along the centre line of the lower left-hand full board at approximately 1800-2100mm height.
2	00	Visibility inside the furnace was poor. <i>Unexposed face</i> FURTHER INTEGRITY FAILURE. The 25mm gap gauge entered the furnace through a crack along the centre line of the lower left-hand full board at approximately 2000mm height. Discolouration had developed on the field of the lower left-hand full board.
2	05	<i>Unexposed face</i> Discolouration had developed on the centre line of the lower left-hand full board at approximately 600-3300mm height. Discolouration had developed on the centre line of the lower right-hand full board at approximately 600-3000mm height. Discolouration had developed on the left-hand vertical joint at approximately 2100-2700mm height. Discolouration had developed on the centre vertical joint at approximately 600-3000mm height. Discolouration had developed on the right-hand vertical joint at approximately 900-3000mm height. Discolouration had developed on the field of the lower right-hand full board. A glow was visible along the centre line of the lower left-hand full board at approximately 1500-2100mm height A glow was visible on the centre vertical joint at approximately 1800-2100mm height.
2	07	<i>Unexposed face</i> A glow was visible along the horizontal joint at mid-width.

Time		<i>Observations</i>
hrs	mins	
		All observations refer to exposed face unless otherwise stated.
2	10	<p><i>Unexposed face</i> Sections of the lower left-hand and right-hand full boards collapsed and fell out of the furnace.</p> <p>TEST TERMINATED at the request of the customer.</p>



Furnace Temperature Graph

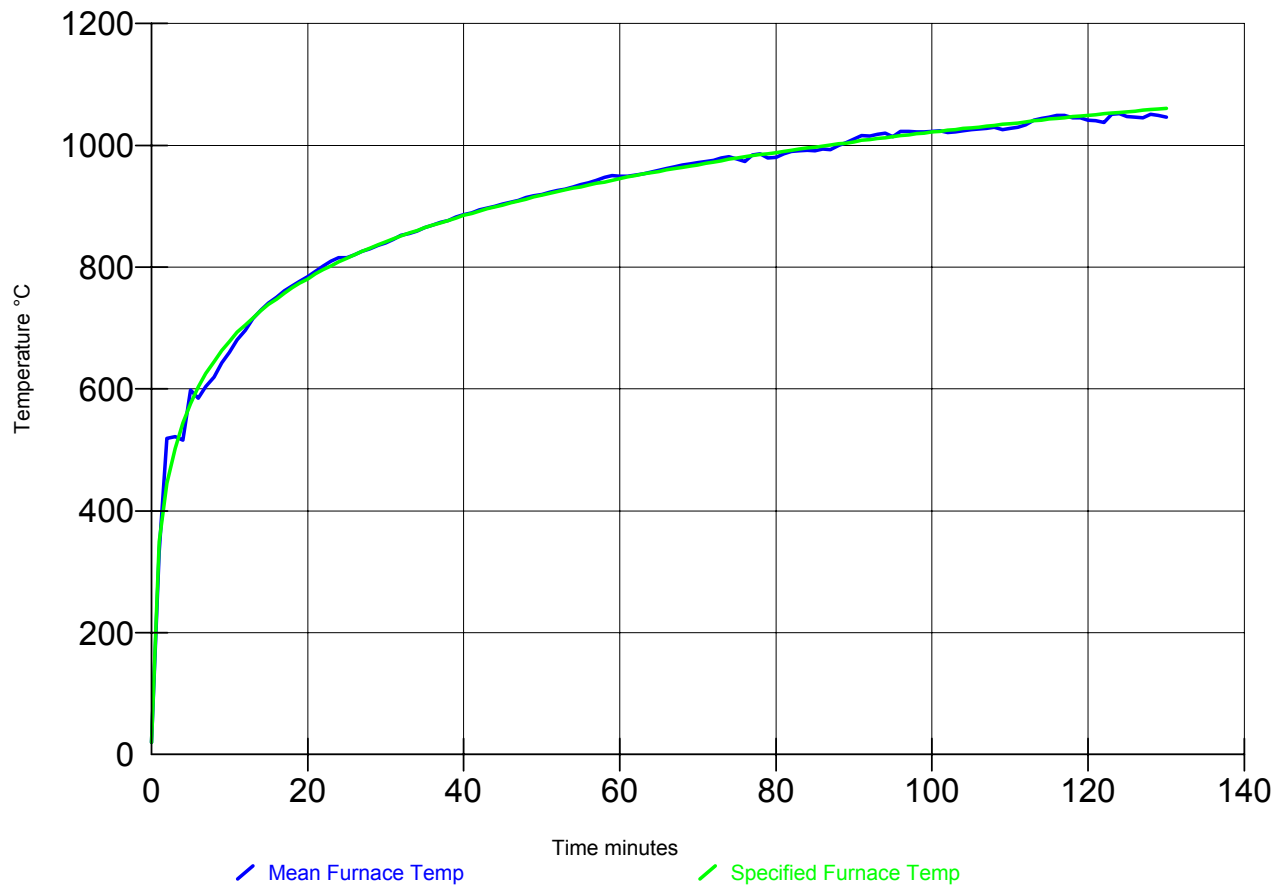


Figure 2. Furnace temperature graph.

Furnace Pressure Graph

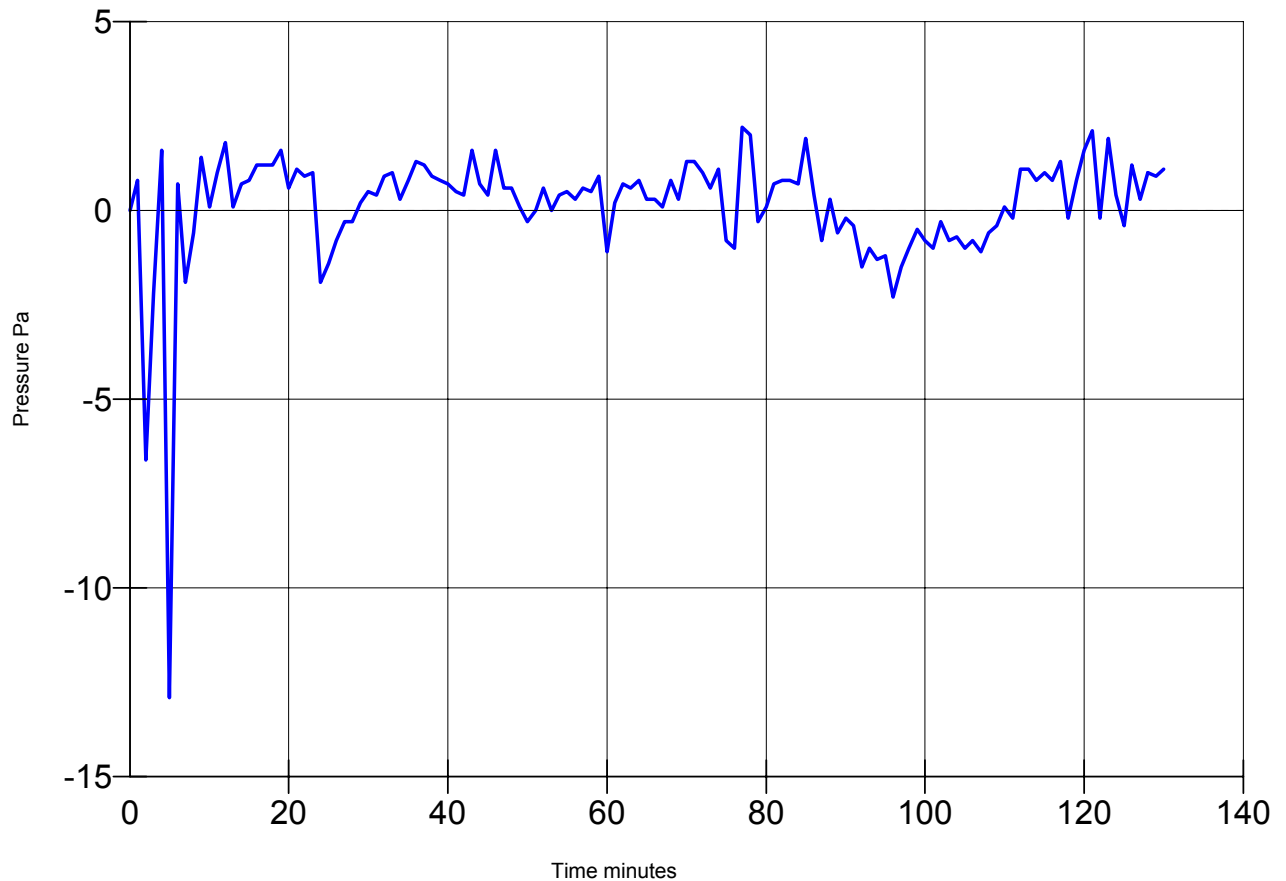


Figure 3. Furnace pressure graph.

The pressure was outside of the allowable tolerance at 96 minutes.

Unexposed Face Temperature Graph

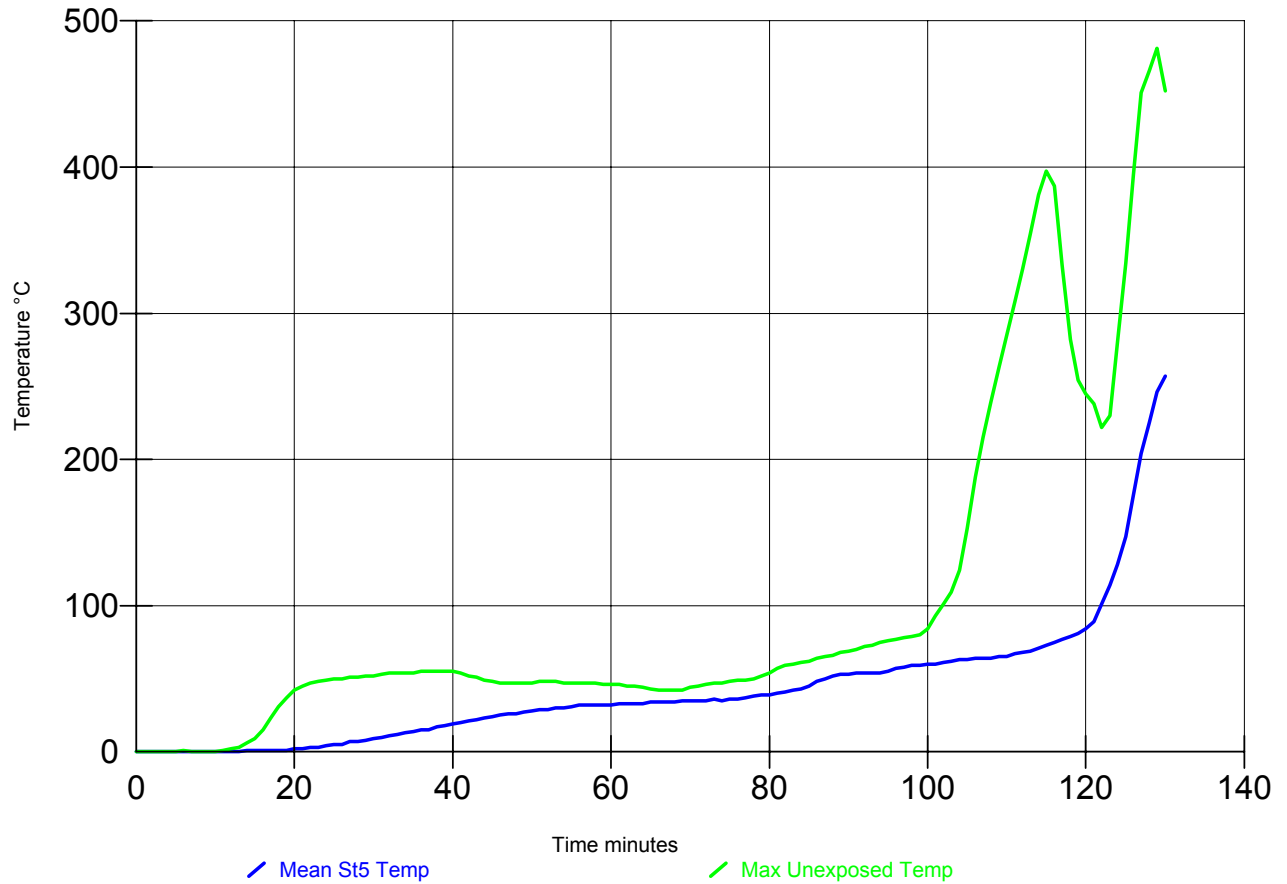


Figure 4. Unexposed face temperature graph.

Unexposed Face Thermocouple Layout

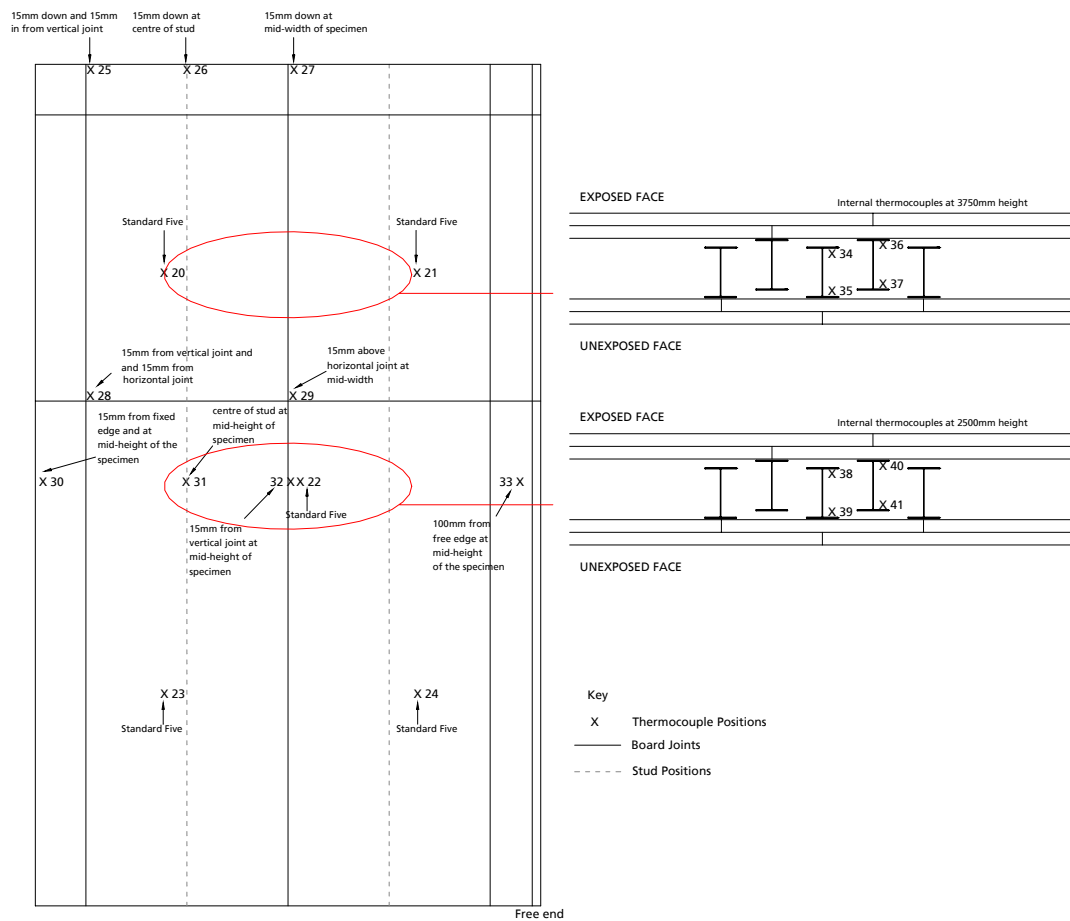


Figure 5. Unexposed face thermocouple layout.



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



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



Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
71	34	39	39	30	34
72	35	39	39	30	34
73	36	40	40	30	34
74	36	40	40	30	33
75	37	41	41	31	33
76	37	41	41	31	33
77	38	41	42	32	34
78	39	42	43	32	34
79	40	43	44	33	35
80	40	43	45	34	36
81	41	44	46	35	37
82	42	44	46	36	37
83	43	44	47	39	39
84	43	45	48	43	40
85	44	46	49	48	41
86	44	46	52	53	45
87	43	46	55	56	51
88	45	46	57	58	56
89	45	46	58	59	58
90	45	47	58	60	58
91	45	47	59	60	59
92	46	47	59	60	59
93	46	47	58	60	59
94	47	48	59	60	59
95	47	48	59	61	60
96	48	48	62	64	63
97	48	49	65	65	66
98	49	49	66	65	66
99	50	50	66	65	67
100	51	50	67	67	67
101	51	50	67	67	68
102	52	51	68	68	68
103	53	51	69	69	69
104	54	51	70	70	70
105	54	51	70	70	70
106	55	52	71	71	71
107	55	52	72	72	72





Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
108	56	52	72	72	72
109	57	52	73	73	73
110	56	52	74	74	73
111	58	53	75	75	74
112	61	53	76	76	75
113	62	53	77	78	76
114	64	53	81	83	77
115	65	53	86	86	79
116	66	53	88	87	82
117	67	54	90	90	88
118	68	55	91	93	90
119	68	56	92	99	92
120	69	57	94	108	95
121	70	58	97	126	98
122	71	58	101	174	101
123	72	58	107	230	107
124	73	59	114	280	117
125	74	61	123	334	146
126	76	64	139	395	209
127	82	66	158	451	267
128	85	69	181	466	328
129	87	72	198	481	395
130	100	75	215	452	446

See figure 5 for the locations of the thermocouples.



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	1	1	1	1
7	-1	-1	-1	-1	-1
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
11	1	0	1	0	0
12	2	0	2	0	0
13	3	1	3	0	0
14	6	2	6	1	1
15	7	3	9	0	1
16	9	4	15	1	1
17	11	5	23	1	1
18	14	6	31	1	2
19	15	7	37	1	2
20	18	10	42	1	3
21	20	13	45	1	3
22	22	16	47	2	4
23	24	19	48	2	4
24	26	23	49	3	5
25	28	27	50	3	5
26	30	30	50	4	6
27	31	33	51	4	7
28	33	35	51	5	8
29	34	38	52	6	9
30	35	40	52	7	9
31	37	42	53	7	10
32	38	43	54	8	11
33	39	45	54	9	12



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



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



Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
108	63	52	59	69	76
109	63	53	60	70	78
110	64	53	60	70	80
111	64	53	62	71	83
112	65	54	63	71	86
113	66	54	64	72	88
114	66	55	65	72	90
115	67	55	66	73	92
116	67	56	67	75	95
117	68	56	68	80	97
118	68	57	69	86	101
119	69	57	71	90	104
120	69	59	72	95	109
121	69	61	74	100	116
122	69	63	77	105	124
123	70	65	79	109	138
124	71	67	82	116	153
125	74	69	86	125	171
126	76	70	89	140	199
127	78	72	93	151	229
128	80	73	97	165	260
129	82	75	101	179	289
130	85	78	105	191	342

See figure 5 for the locations of the thermocouples.



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



Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
34	19	17	13	14
35	19	18	14	15
36	20	19	15	17
37	21	20	16	18
38	22	21	17	19
39	23	22	17	20
40	24	23	18	22
41	25	24	20	23
42	25	25	20	24
43	26	26	21	25
44	27	27	22	27
45	27	28	23	28
46	28	29	24	29
47	28	29	25	30
48	29	30	26	31
49	29	31	27	32
50	30	32	27	33
51	30	32	28	34
52	30	33	29	34
53	30	33	30	35
54	31	33	30	35
55	30	33	31	35
56	31	33	31	35
57	30	33	32	35
58	30	32	32	35
59	30	32	32	35
60	30	32	33	35
61	30	32	33	35
62	30	33	34	35
63	29	33	34	35
64	29	34	34	35
65	29	36	34	35
66	28	37	34	35
67	28	39	35	35
68	28	40	35	36
69	28	42	35	37
70	28	44	36	37



Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
71	28	45	37	38
72	28	46	37	38
73	28	47	38	39
74	28	47	39	39
75	29	48	40	40
76	29	49	41	41
77	29	49	42	41
78	29	50	43	42
79	29	52	44	43
80	29	54	45	43
81	29	57	46	44
82	29	59	47	44
83	29	60	48	44
84	29	61	49	45
85	28	62	51	45
86	28	64	54	46
87	28	65	56	46
88	28	66	58	46
89	29	68	59	47
90	29	69	59	48
91	29	70	59	49
92	29	72	59	53
93	30	73	59	56
94	30	75	59	58
95	30	76	61	58
96	32	77	65	59
97	38	78	68	59
98	46	79	69	59
99	52	80	70	59
100	55	84	71	59
101	57	93	71	59
102	58	101	71	60
103	58	109	72	60
104	58	124	72	63
105	57	153	73	65
106	58	188	73	66
107	58	215	74	66



Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
108	60	239	74	67
109	61	263	76	67
110	62	285	79	68
111	62	308	85	69
112	63	330	89	70
113	65	354	92	70
114	65	381	94	70
115	67	397	98	71
116	67	-	104	71
117	68	-	111	72
118	69	-	120	72
119	69	-	134	73
120	70	-	151	74
121	71	-	172	75
122	71	-	191	76
123	72	-	209	78
124	73	-	224	82
125	74	-	240	86
126	76	-	257	88
127	78	-	274	90
128	83	-	292	93
129	86	-	306	96
130	87	-	323	99

See figure 5 for the locations of the thermocouples.

Figures shown in red indicate the time and position of insulation failure.

Thermocouple No. 31 did not work after 115 minutes.



Internal Thermocouple Data at 3750mm height

Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 34	Cold Flange Thermocouple No. 35	Hot Flange Thermocouple No. 36	Cold Flange Thermocouple No. 37
0	22	21	24	22
1	22	21	24	22
2	22	20	24	22
3	22	21	25	23
4	23	21	28	23
5	23	21	32	23
6	25	21	37	24
7	27	21	43	25
8	35	24	51	30
9	44	27	59	35
10	54	33	68	44
11	65	41	75	54
12	73	49	81	63
13	79	56	86	70
14	83	60	89	76
15	85	62	91	78
16	87	64	93	80
17	88	64	94	82
18	90	66	96	82
19	90	65	96	82
20	91	67	97	83
21	91	67	97	84
22	95	70	99	86
23	96	73	100	87
24	99	77	102	89
25	100	79	103	90
26	99	81	103	91
27	101	82	103	91
28	103	84	103	92
29	104	85	104	93
30	104	86	105	93

Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 34	Cold Flange Thermocouple No. 35	Hot Flange Thermocouple No. 36	Cold Flange Thermocouple No. 37
31	104	87	106	94
32	105	88	108	94
33	105	89	110	95
34	105	90	112	95
35	105	90	113	95
36	105	91	115	96
37	105	91	116	97
38	105	91	118	97
39	105	91	120	98
40	105	89	122	98
41	101	88	127	98
42	100	88	133	98
43	100	88	142	100
44	100	88	155	101
45	100	88	147	102
46	99	87	154	105
47	103	87	172	109
48	103	87	189	112
49	103	86	205	117
50	103	86	220	122
51	104	87	234	128
52	104	88	261	135
53	105	90	278	143
54	105	90	281	153
55	105	89	295	164
56	106	89	296	175
57	108	91	332	186
58	107	91	344	196
59	107	92	356	207
60	106	95	367	219
61	112	100	376	232
62	129	105	386	244
63	168	113	398	256
64	226	122	410	270



Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 34	Cold Flange Thermocouple No. 35	Hot Flange Thermocouple No. 36	Cold Flange Thermocouple No. 37
65	258	134	422	284
66	287	149	432	300
67	318	171	442	317
68	344	195	453	334
69	368	209	465	345
70	387	222	478	354
71	404	233	487	363
72	419	243	494	373
73	432	252	501	383
74	445	261	506	390
75	459	267	514	400
76	474	268	521	409
77	490	283	529	418
78	499	284	535	431
79	500	305	545	446
80	501	312	553	459
81	503	318	561	468
82	508	323	568	473
83	515	331	576	475
84	526	364	647	477
85	670	595	700	502
86	725	762	713	588
87	891	905	903	905
88	-	-	-	-
89	-	-	-	-
90	-	-	-	-

See figure 5 for the locations of the thermocouples.

Thermocouple No. 34 did not work after 87 minutes.
Thermocouple No. 35 did not work after 87 minutes.
Thermocouple No. 36 did not work after 87 minutes.
Thermocouple No. 37 did not work after 87 minutes.

Customer: **British Gypsum Limited**



Internal Thermocouple Data at 2500mm height

Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Hot Flange Thermocouple No. 40	Cold Flange Thermocouple No. 41
0	23	20	23	21
1	22	20	23	21
2	22	20	23	21
3	23	20	24	21
4	30	22	27	22
5	42	25	31	22
6	52	30	37	25
7	51	31	43	27
8	55	34	55	33
9	60	36	60	38
10	66	40	67	45
11	71	45	74	52
12	76	50	79	57
13	80	54	83	62
14	83	58	86	66
15	85	61	88	69
16	87	63	90	70
17	88	64	91	72
18	89	66	93	73
19	89	67	94	74
20	89	68	95	75
21	90	69	97	76
22	91	71	98	77
23	93	73	99	78
24	95	76	99	80
25	96	78	100	81
26	97	79	100	82
27	98	80	101	83
28	98	81	101	80
29	98	82	102	83
30	99	82	103	86



Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Hot Flange Thermocouple No. 40	Cold Flange Thermocouple No. 41
31	99	83	103	85
32	100	84	104	86
33	101	85	105	86
34	101	85	105	87
35	101	86	106	87
36	101	87	109	88
37	101	88	113	92
38	102	89	118	94
39	101	89	123	94
40	101	90	130	95
41	101	90	139	96
42	101	90	150	97
43	101	90	167	98
44	101	91	184	99
45	101	91	200	99
46	100	91	215	103
47	100	91	231	108
48	99	91	248	115
49	98	91	264	125
50	98	90	276	134
51	99	90	288	143
52	100	89	306	153
53	102	89	326	163
54	104	90	342	173
55	105	90	357	182
56	105	90	371	191
57	104	90	388	201
58	104	90	405	211
59	106	92	425	175
60	114	95	442	232
61	136	98	452	243
62	192	104	458	254
63	225	112	461	263
64	253	121	463	272





Time (mins)	Actual Temperature (°C)			
	Left-hand stud		Right-hand stud	
	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Hot Flange Thermocouple No. 40	Cold Flange Thermocouple No. 41
65	279	130	468	280
66	303	141	475	288
67	324	151	483	296
68	343	160	490	304
69	364	172	496	313
70	382	182	502	319
71	400	191	510	325
72	419	202	518	331
73	438	213	529	337
74	464	225	539	344
75	497	238	548	352
76	529	250	558	361
77	546	264	570	370
78	562	277	583	380
79	553	296	598	390
80	576	310	610	392
81	616	334	626	407
82	650	373	646	458
83	680	429	672	515
84	482	534	696	566
85	751	704	705	647
86	827	812	759	794
87	901	910	910	908
88	-	-	-	-
89	-	-	-	-
90	-	-	-	-

See figure 5 for the locations of the thermocouples.

Thermocouple No. 38 did not work after 87 minutes.
Thermocouple No. 39 did not work after 87 minutes.
Thermocouple No. 40 did not work after 87 minutes.
Thermocouple No. 41 did not work after 87 minutes.

Customer: **British Gypsum Limited**



Specimen Lateral Deflection

Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
0	0	0
5	9	5
10	19	6
15	24	9
20	25	10
25	26	10
30	27	10
35	28	10
40	29	10
45	34	12
50	38	17
55	48	19
60	68	58
65	109	113
70	135	127
75	156	138
80	176	142
85	176	143
90	163	143
95	148	135
100	144	134
105	144	134

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 105 minutes.

(The lateral deflection was recorded by taking measurements relative to a fixed reference wire at 5 minute intervals due to equipment availability at the time of the test).

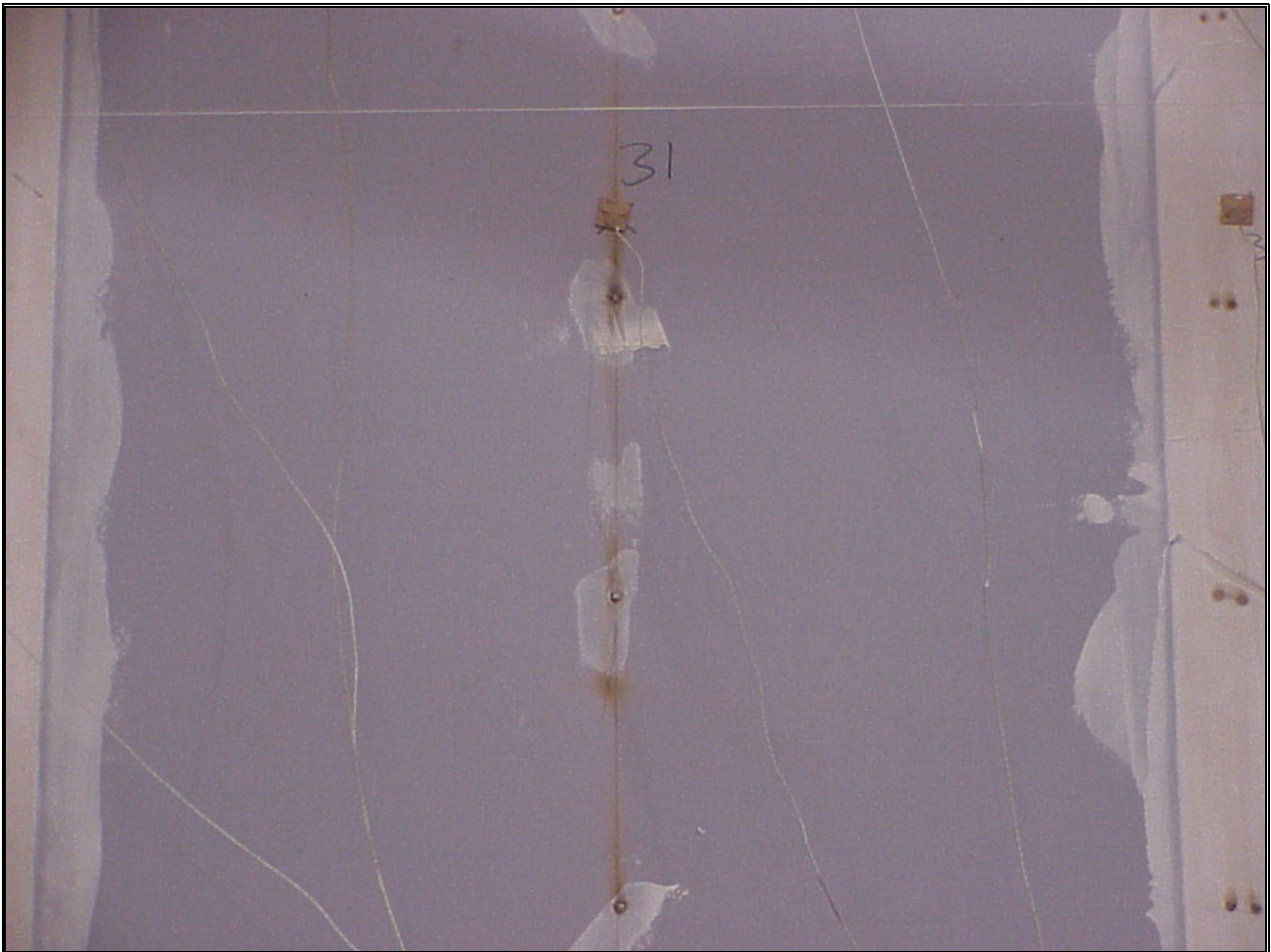
PHOTOGRAPHS



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



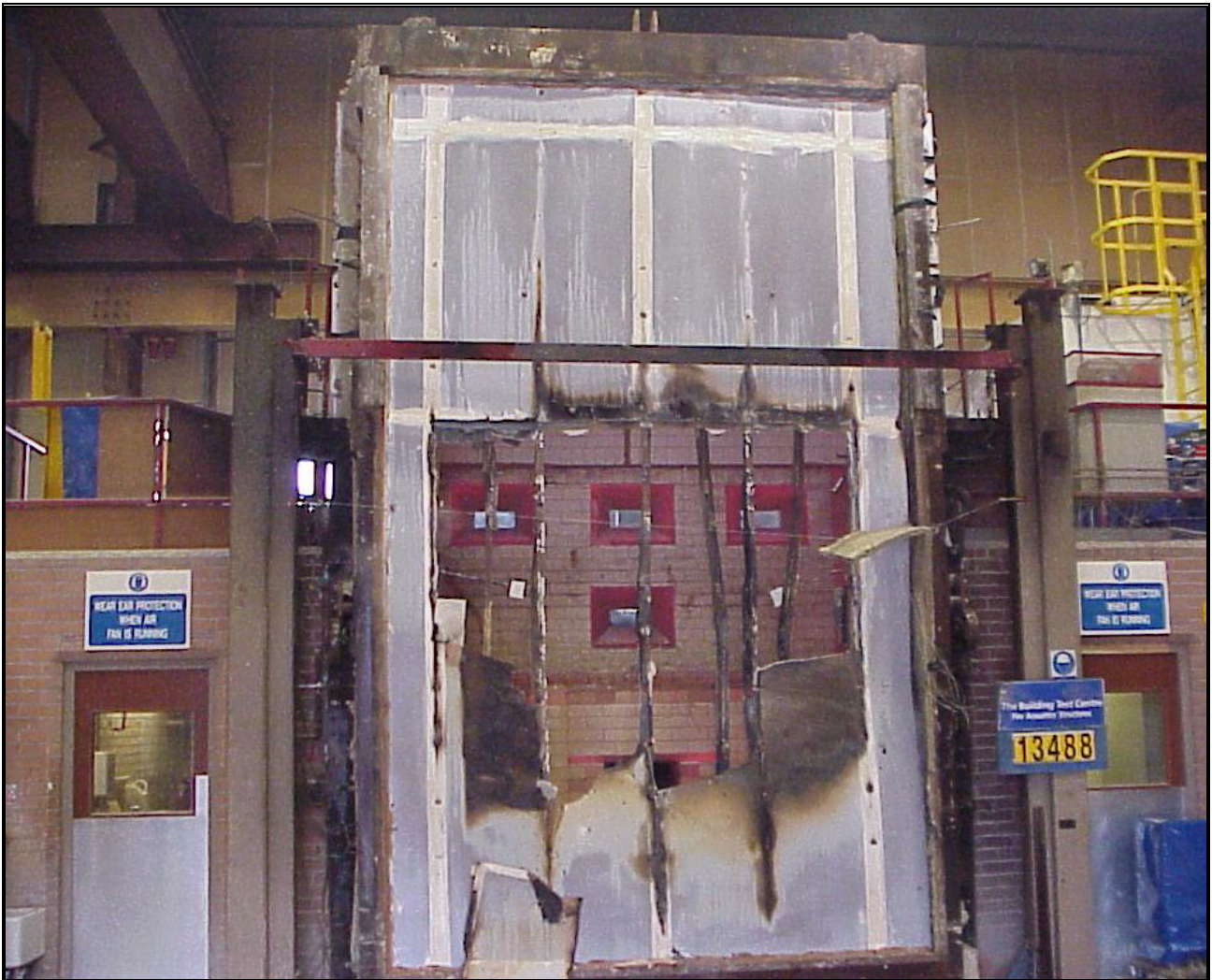
Photograph 2. View of the unexposed face prior to test.



Photograph 3. Position of insulation failure at 105 minutes.



Photograph 4. Position of integrity failure at 118 minutes.



Photograph 5. View of the unexposed face at test termination (130 minutes).

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 5000mm.
- (ii) Increase in the thickness of the wall (minimum thickness 132mm).
- (iii) Increase thickness of component materials (minimum Gypframe stud depth 60mm, minimum Gypframe 'I' stud gauge 0.7mm).
- (iv) Decrease in the linear dimensions of the boards but not thickness ($\leq 3000\text{mm}$ long x $\leq 1200\text{mm}$ wide Gyproc SoundBloc).
- (v) Decrease stud spacing from 300mm staggered.
- (vi) Decrease in fixing centres from 300mm.
- (vii) Increase in the number of horizontal joints.
- (viii) 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

No extension of height above 5000mm is permitted under the field of direct application.

30 minutes	60 minutes	90 minutes
5000mm	5000mm	5000mm