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Report Number BTC 14869F

A FIRE RESISTANCE TEST ON A BRITISH GYPSUM GYPWALL PARTITION CLAD WITH AN INNER LAYER OF 15mm GYPROC WALLBOARD AND AN OUTER LAYER OF 12.5mm GLASROC RIGIDUR H, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

Test Date: 4th December 2006

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 on the 30th November 2006. British Gypsum Limited designed the partition system and selected the materials for the test specimen.

The test was carried out on the 4th December 2006.

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

Robert Evans
MEng. (Hons.), AMIMechE, AIFireE, AMIOA
Project Leader

Authorised by

Phil Barnes
BTC Testing Manager

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TEST CONSTRUCTION

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

Gypframe 72C50 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70AS50 AcouStuds were positioned at 600mm centres between the channels. The studs were extended to 3000mm height by overlapping the studs by 600mm and screw fixing twice through each flange using 13mm Gyproc Wafer Head Jack-Point Screws. 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.

The framework was clad with an inner layer of 15mm Gyproc WallBoard and an outer layer of 12.5mm Glasroc Rigidur H.

The inner layer of was fixed around the perimeter of the boards with 32mm Gyproc drywall screws at 300mm centres.

The outer layer was fixed around the perimeter and within the field of the board with 40mm Glasroc S screws at 300mm centres. All vertical joints were staggered between layers.

The inner layer horizontal joints were positioned at 600mm from the base on both sides of the partition. The outer layer horizontal joints were positioned 2400mm from the base on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal joint.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

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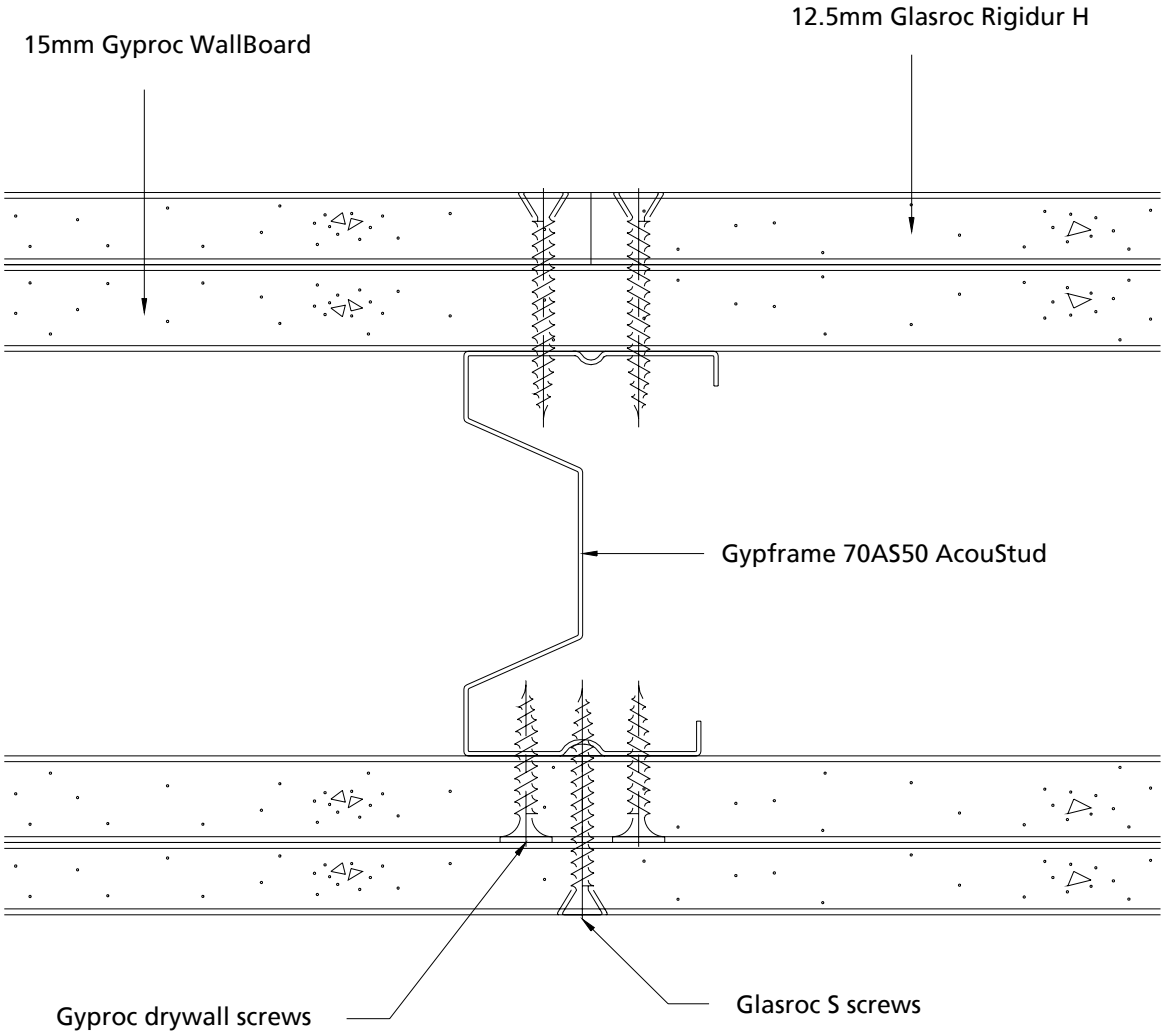

Figure 1. Cross-section of partition specimen.

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 WallBoard

Nominally, 2400mm (long) x 1200mm (wide) x 15mm (thick), Gyproc WallBoard manufactured and supplied by British Gypsum Limited, ex East Leake.

Actual surface density:	10.33kg/m^2
Actual thickness:	15.12mm
Board identification numbers:	18 130 6 22:44

The surface density was calculated using the actual weight and size of a selection of the boards used in the test specimen.

Glasroc Rigidur H

Nominally, 2400mm (long) x 1200mm (wide) x 12.5mm (thick), Glasroc Rigidur H gypsum fibreboard manufactured by BPB Rigips (Germany), ex Bodenwerder, and supplied by British Gypsum Limited.

Actual surface density:	15.97kg/m^2
Actual thickness:	12.39mm
Board identification numbers:	10 041006 12:19

The surface density was calculated using the actual weight and size of a selection of the boards used in the test specimen.

Metal components

i) Gypframe 70AS50 AcouStuds manufactured from galvanised mild steel using the 'Ultrasteel' process.
ii) Gypframe 70S50 'C' Stud manufactured from galvanised mild steel using the 'Ultrasteel' process.
iii) Gypframe 72C50 Standard Floor & Ceiling Channel manufactured from galvanised mild steel using the 'Ultrasteel' process.
iv) Gypframe GFS1 Fixing Strap.

All metal components supplied by British Gypsum Limited.

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Fasteners

i) 32mm Gyproc drywall screws supplied by British Gypsum Limited.
ii) 40mm Glasroc S 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 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. As the test specimen is considered to be symmetrical one test is adequate to cover the fire resistance performance in both directions.

Where areas of the test specification are ambiguous, or open to interpretation, the Fire Test Study Group Resolutions 43, 72, 83 and 85 have been followed (where appropriate). These Resolutions provide the basis of common agreements between the fire test laboratories, which are members of this group.

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

The ambient temperature at the commencement of the test was 17°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. Furnace pressure data is shown on page 16.

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 specimen was not conditioned in accordance with clause 8 of EN 1363-1: 1999.

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TEST RESULTS

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

Integrity:	Sustained flaming	108 minutes (no failure test discontinued)
	25mm gap gauge	108 minutes
	6mm gap gauge	105 minutes
	Cotton pad	104 minutes
Insulation:		82 minutes

The test was terminated at 108 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.

The scope of the Field of Direct Application of the results and construction detailed in this test report is explained in BS EN 1364-1: 1999, section 13.

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TEST DATA

Observations

Observers: Unexposed face M Fountain
Exposed face L Cooper

Time		*Observations*
hrs	mins	All observations refer to exposed face unless otherwise stated.
	0	Test started.
	10	The jointing material had started to char and fall into the furnace from the horizontal joint; none had fallen from the vertical joints.
	15	Left-hand vertical joint had opened to approximately 1-2mm. Right-hand vertical joint had opened to approximately 1-2mm. Horizontal joint had opened to approximately 1mm.
	20	Left-hand vertical joint had opened to approximately 3mm. Right-hand vertical joint had opened to approximately 3mm. Horizontal joint had opened to approximately 3mm.
	25	Left-hand vertical joint had opened to approximately 8mm. Right-hand vertical joint had opened to approximately 5mm. Horizontal joint had opened to approximately 4mm. Horizontal cracks had developed across the full widths of the lower left-hand and centreboards at approximately 1200mm height and had opened to approximately 5mm.
	30	Left-hand vertical joint had opened to approximately 15mm. Right-hand vertical joint had opened to approximately 12mm. Horizontal joint had opened to approximately 6mm. Horizontal cracks had opened to approximately 10mm.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
	35	The top corners of the lower left-hand and centreboards had bowed into the furnace. Exposed second layer board surface had charred. Vertical crack had developed in the middle of the exposed second layer upper centreboard.
	38	Horizontal crack had developed across the entire first layer of the specimen at approximately 1000mm height.
	40	Horizontal crack in lower left-hand board had opened to approximately 30mm.
	42	A section of the first layer lower centreboard, approximately 1200mm x 1200mm, had fallen into the furnace from mid-height.
	45	A section of the first layer lower centreboard, approximately 700mm x 1200mm, had fallen into the furnace from approximately 1000mm height. A section of the first layer lower left-hand board, approximately 2400mm x 600mm, had fallen into the furnace from adjacent to the left-hand vertical joint. Right-hand vertical joint in the second layer had opened to approximately 30mm. Boards had come away from their fixings adjacent to the second layer right-hand vertical joint.
	48	A section of the second layer upper right-hand board, approximately 2000mm x 600mm, had fallen into the furnace from adjacent to the second layer right-hand joint. A section of the second layer lower right-hand board, approximately 600mm x 600mm, had fallen into the furnace from adjacent to the second layer right-hand joint.
	49	A section of the second layer upper centreboard, approximately 1200mm x 600mm, had fallen into the furnace from adjacent to the right-hand vertical joint.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
	50	Approximately 25% of the second layer had fallen into the furnace. The studs had distorted where exposed.
	55	Cracks had developed in the third layer and had opened to approximately 1mm.
1	00	Cracks in the third layer and had opened to approximately 1mm.
1	05	Approximately 70% of the first and second layers of boards had fallen into the furnace. Cracks in the third layer and had opened to approximately 5mm.
1	10	Cracks in the third layer and had opened to approximately 10-20mm.
1	15	Further cracks had developed in the exposed third layer.
1	20	Horizontal joint in the third layer had opened to approximately 30mm. Approximately 95% of the first and second layers of boards had fallen into the furnace.
1	22	*Unexposed face* **INSULATION FAILURE.** The roving thermocouple exceeded a temperature rise of 180°C when placed on the middle of the lower centreboard at approximately 1200mm height.
1	25	No visible change in the specimen.
1	26	*Unexposed face* The jointing material covering the left-hand vertical joint had started to crack.
1	27	*Unexposed face* A crack had developed in the lower centreboard approximately 100mm to the right of the middle of the board and at approximately 600mm height. Discolouration appeared and spread up the surface of the centreboard adjacent to the middle of the board.

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Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
1	28	*Unexposed face* Cracks had developed the lower left-hand board approximately 100mm below the position of thermocouple no.23.
1	30	Cracks in the third layer and had opened to approximately 15-30mm.
1	31	*Unexposed face* A glow was visible through a crack in the lower left-hand board at approximately 600mm height. A glow was visible through the crack adjacent to the middle of the lower centreboard at approximately 600mm height.
1	35	A section of the third layer upper centreboard, approximately 600mm x 600mm, had fallen into the furnace from approximately 600mm height.
1	40	Cracks were visible in the fourth layer right-hand board at approximately 600mm height; flaming was visible in this area.
1	44	*Unexposed face* **INTEGRITY FAILURE.** The cotton pad ignited when placed on the middle of the lower left-hand board at approximately 1200mm height.
1	45	Approximately 25% of the third layer had fallen into the furnace. *Unexposed face* **FURTHER INTEGRITY FAILURE.** 6mm x 150mm gap gauge entered the furnace through a crack in the middle of the lower left-hand board at approximately 1200mm height.
1	48	*Unexposed face* **FURTHER INTEGRITY FAILURE.** 25mm diameter gap gauge entered the furnace through a crack in the middle of the lower left-hand board at approximately 1200mm height. **TEST TERMINATED** at the request of the customer.

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Furnace Temperature Graph

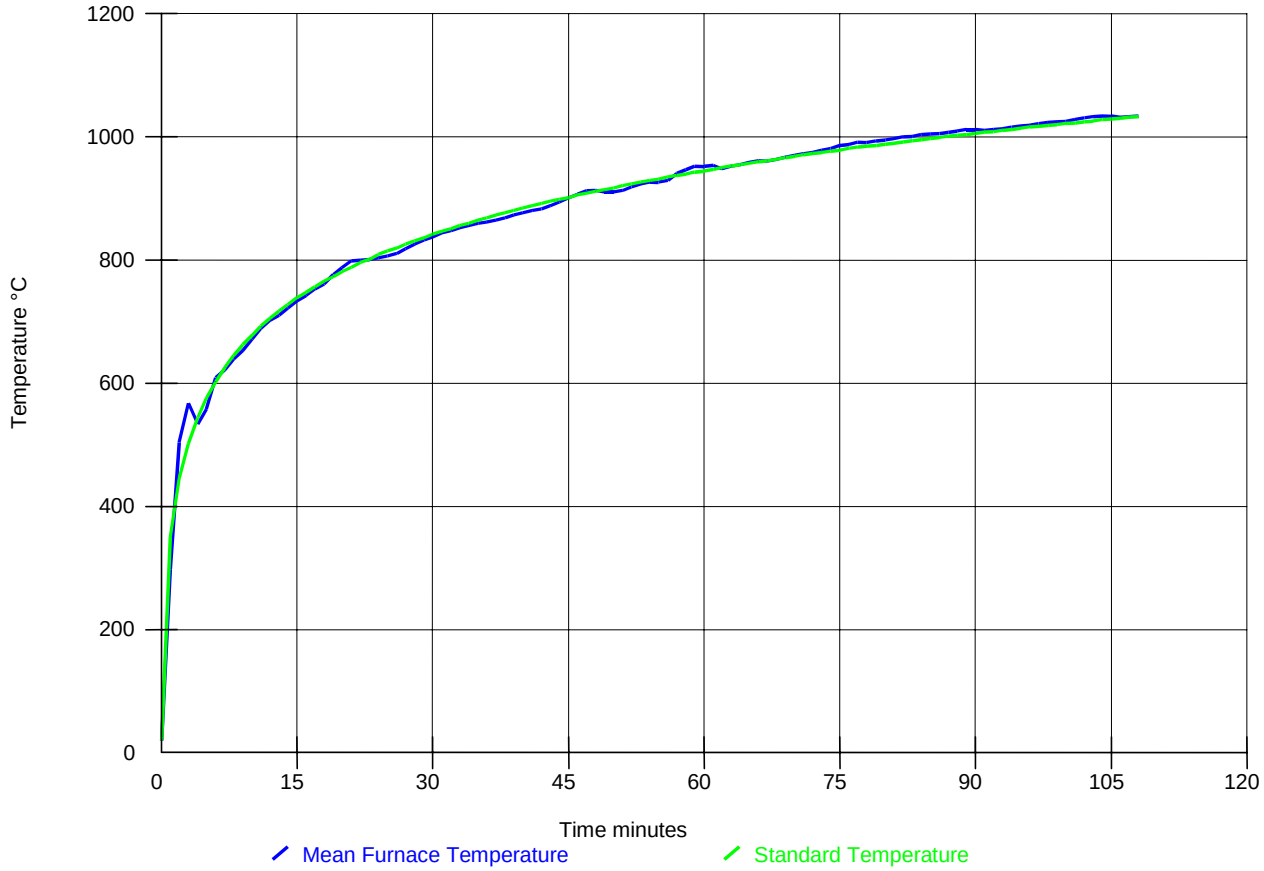

Figure 2. Furnace temperature graph.

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Furnace Pressure Graph

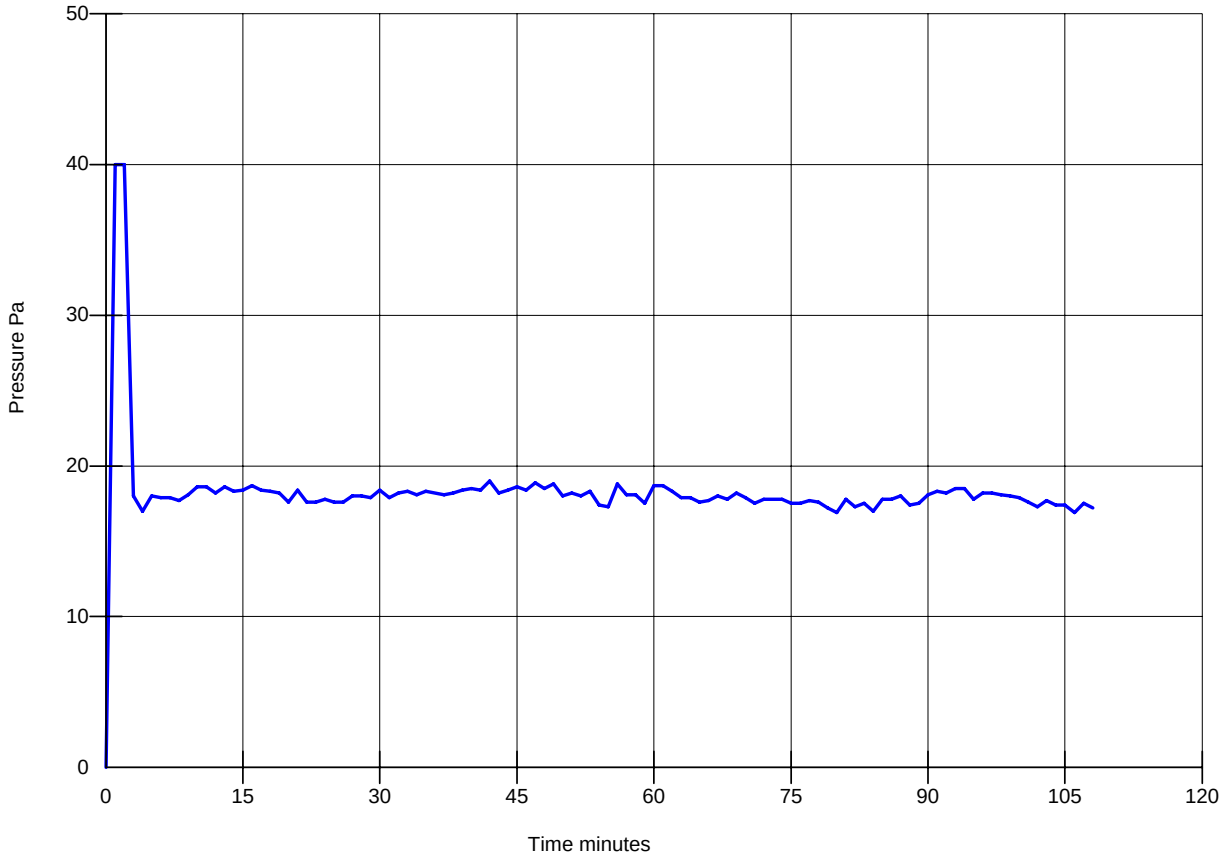

Figure 3. Furnace pressure graph.

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Unexposed Face Temperature Graph

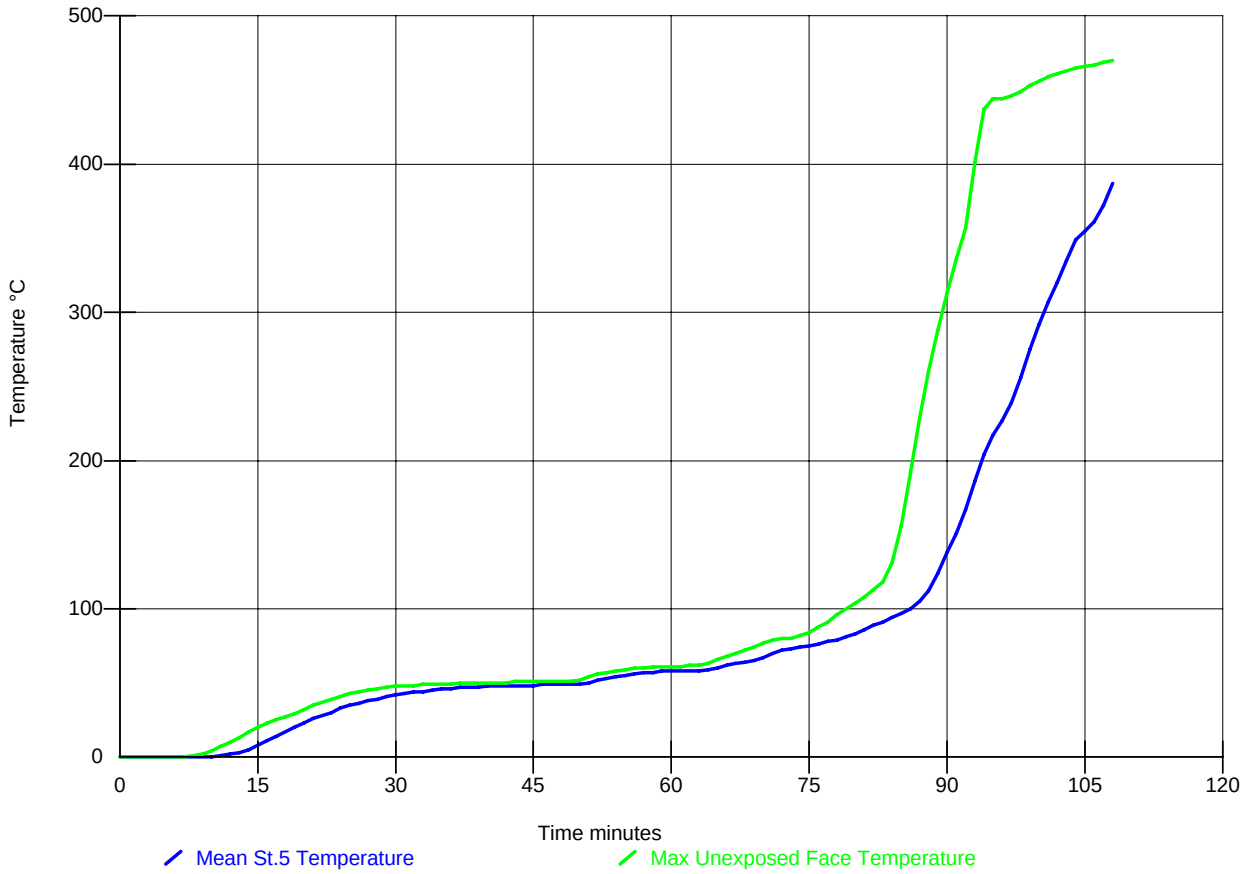

Figure 4. Unexposed face temperature graph.

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Unexposed Face Thermocouple Layout

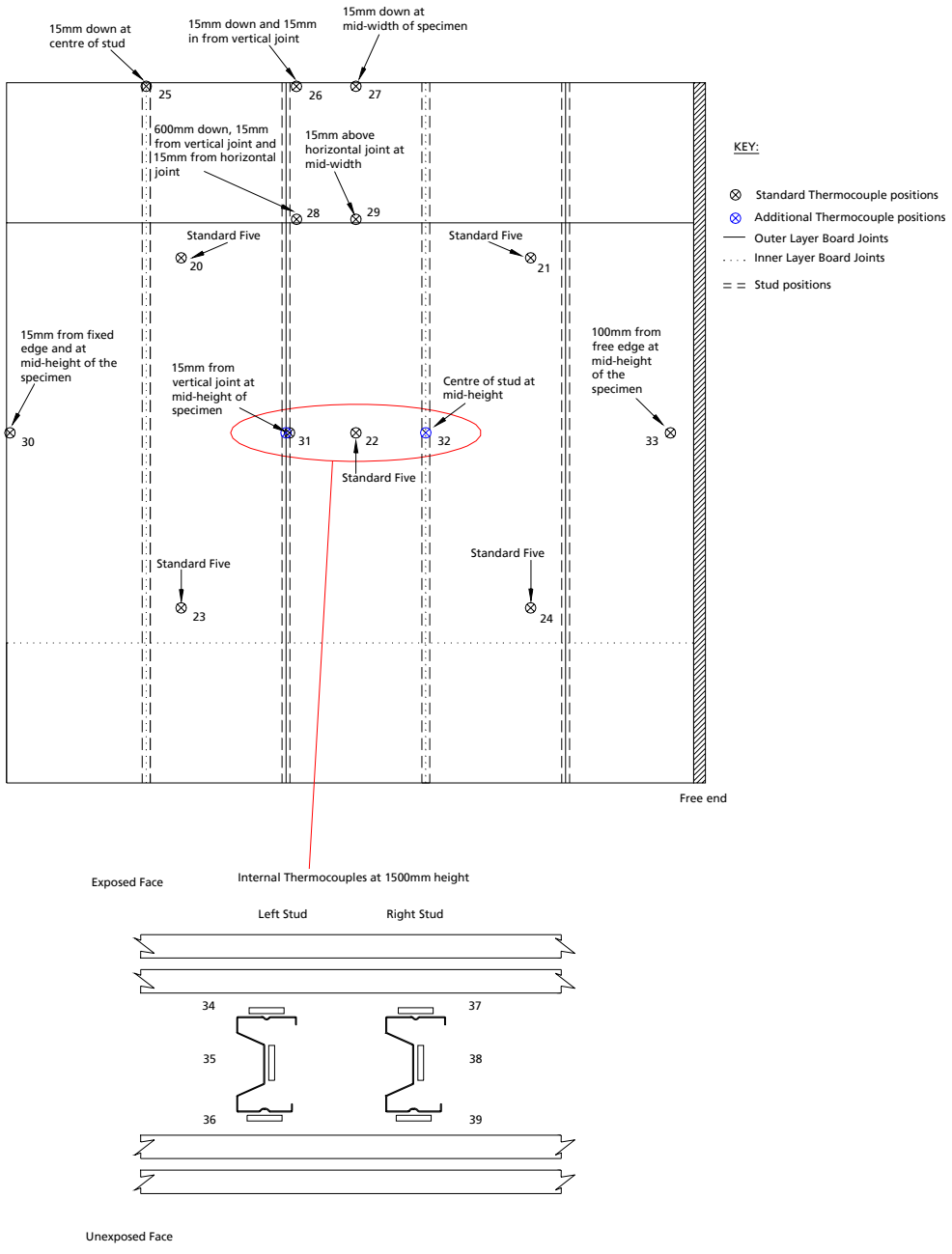

Figure 5. Unexposed face thermocouple layout.

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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	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	1
11	1	1	1	1	2
12	2	2	2	1	3
13	3	3	4	2	6
14	5	5	6	4	9
15	7	8	10	5	13
16	10	12	13	7	17
17	13	15	16	8	21
18	15	19	19	10	25
19	18	22	22	12	29
20	21	25	25	14	32
21	24	28	27	16	35
22	26	31	30	18	37
23	28	33	32	21	39
24	31	36	34	23	41
25	33	38	36	25	43
26	35	39	38	28	44
27	37	41	39	30	45
28	38	42	40	32	46
29	40	44	42	34	47
30	41	45	43	36	48
31	42	46	43	37	48
32	43	47	44	38	48
33	44	47	45	39	49
34	45	48	45	41	49
35	46	48	46	42	49

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
36	46	49	46	43	49
37	47	49	46	44	50
38	47	49	46	44	50
39	47	49	47	45	50
40	48	49	47	46	50
41	48	49	47	46	50
42	48	49	47	47	50
43	48	50	47	47	51
44	48	50	47	48	51
45	48	50	47	48	51
46	48	50	47	49	51
47	48	50	47	49	51
48	48	50	47	49	51
49	48	50	48	50	51
50	47	50	49	52	50
51	48	50	51	54	50
52	51	51	53	56	50
53	53	52	55	57	50
54	54	53	57	58	51
55	55	53	57	59	52
56	56	54	58	60	54
57	57	55	58	60	56
58	57	56	58	60	57
59	57	57	59	60	58
60	57	58	59	59	59
61	57	58	59	59	60
62	57	58	59	59	60
63	57	58	60	59	60
64	57	58	62	60	60
65	57	58	66	63	60
66	58	58	68	66	60
67	60	58	70	69	59
68	63	57	71	72	59
69	65	57	72	74	60
70	67	59	73	77	62
71	69	62	74	79	66
72	70	66	75	80	69
73	71	68	76	80	71

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
74	71	69	77	82	72
75	73	70	78	82	72
76	76	70	80	83	73
77	79	71	81	85	74
78	81	72	83	87	76
79	82	73	84	92	77
80	83	75	87	96	78
81	85	76	91	101	79
82	88	78	94	105	81
83	92	79	97	109	82
84	96	81	99	113	85
85	100	82	101	117	88
86	104	84	104	121	90
87	107	87	106	133	92
88	111	89	108	161	94
89	114	91	110	213	96
90	119	93	112	267	99
91	133	95	115	313	101
92	160	96	118	356	105
93	204	98	123	401	107
94	244	100	132	437	110
95	280	102	147	444	114
96	311	103	161	444	118
97	342	105	181	446	123
98	385	107	203	449	138
99	420	109	222	453	174
100	419	110	239	456	236
101	415	113	255	459	293
102	416	116	269	461	340
103	419	120	283	463	393
104	422	126	296	465	438
105	425	139	309	466	437
106	428	154	324	467	436
107	433	182	340	469	438
108	441	224	362	470	441

See figure 5 for the locations of the thermocouples.

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Additional Unexposed Face Thermocouple 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	1	0	0	0	0
9	2	0	0	0	0
10	4	1	1	0	0
11	7	2	1	0	0
12	10	3	3	1	1
13	13	6	4	2	2
14	17	8	7	3	3
15	20	11	9	5	5
16	23	14	12	8	7
17	25	17	16	10	9
18	27	20	19	13	11
19	29	23	22	16	13
20	30	26	24	18	16
21	31	28	27	20	18
22	32	30	29	22	20
23	33	32	31	24	23
24	34	34	33	26	25
25	35	36	35	27	27
26	36	37	37	28	30
27	37	39	38	29	31
28	38	40	40	30	33
29	39	41	41	32	35
30	40	43	42	33	35
31	41	44	43	34	37
32	42	44	44	34	37
33	42	45	45	35	38
34	43	46	45	36	39
35	44	46	46	36	40

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

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
74	70	60	59	60	64
75	71	60	59	61	64
76	71	60	59	61	65
77	73	61	59	62	66
78	74	61	60	63	66
79	75	61	60	64	67
80	77	61	60	65	68
81	78	61	61	66	69
82	80	62	61	67	69
83	82	63	61	69	71
84	83	64	62	71	71
85	85	65	63	72	72
86	87	66	65	74	73
87	88	68	66	76	74
88	90	69	68	78	76
89	93	71	70	81	77
90	94	72	71	83	78
91	96	73	72	87	80
92	99	74	73	89	82
93	101	75	74	92	84
94	104	77	75	95	86
95	107	78	77	97	88
96	110	79	78	99	91
97	114	81	80	102	94
98	118	83	83	106	97
99	122	85	85	112	100
100	128	88	87	126	103
101	134	90	89	146	107
102	141	93	92	175	110
103	148	95	94	211	113
104	157	98	97	242	117
105	169	101	99	276	121
106	185	104	101	313	134
107	204	108	104	356	155
108	223	112	107	419	184

See figure 5 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	0	0
11	0	2	1	1
12	1	3	2	2
13	2	5	3	4
14	3	8	5	6
15	4	11	7	10
16	5	14	10	13
17	7	18	13	17
18	9	21	16	21
19	10	24	18	24
20	12	27	21	27
21	14	30	24	29
22	17	32	26	32
23	19	34	28	34
24	21	36	30	36
25	23	38	32	38
26	25	40	33	40
27	27	41	35	41
28	30	43	36	43
29	31	44	37	44
30	33	44	38	45
31	35	45	38	46
32	36	46	39	47
33	37	46	39	47
34	38	47	40	48
35	39	47	41	48

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Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
36	40	47	41	49
37	41	47	41	49
38	42	48	42	49
39	42	48	42	50
40	43	48	43	50
41	43	48	43	50
42	44	48	43	50
43	44	48	43	50
44	44	48	44	50
45	44	48	44	50
46	44	49	44	50
47	44	48	45	50
48	44	49	45	50
49	45	49	46	50
50	44	50	47	50
51	44	53	50	50
52	44	55	52	50
53	45	57	55	49
54	45	58	57	49
55	45	59	58	49
56	46	60	59	49
57	46	60	59	49
58	47	61	59	50
59	48	61	60	50
60	49	61	60	51
61	49	61	60	51
62	50	61	60	52
63	51	62	61	53
64	51	63	62	55
65	52	65	63	57
66	52	67	65	58
67	53	69	67	59
68	53	71	69	60
69	54	73	72	60
70	55	74	74	61
71	55	75	76	61
72	56	76	78	61
73	57	77	80	61

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Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
74	58	79	82	62
75	59	80	84	64
76	60	81	88	66
77	61	83	91	68
78	61	86	96	70
79	63	89	100	71
80	63	92	104	73
81	63	94	108	74
82	64	96	113	75
83	66	98	118	76
84	66	100	131	77
85	68	102	156	78
86	70	104	192	80
87	71	106	229	82
88	72	109	260	84
89	72	113	288	87
90	74	117	313	90
91	75	122	336	93
92	76	130	357	96
93	78	143	376	99
94	79	156	392	101
95	81	168	404	104
96	84	187	409	106
97	87	204	411	108
98	89	220	412	111
99	93	236	414	114
100	100	250	415	117
101	106	265	416	120
102	118	278	416	124
103	137	292	417	132
104	137	303	418	148
105	136	312	420	165
106	150	323	423	181
107	181	340	427	214
108	231	358	432	244

See figure 5 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		
	Thermo-couple No. 34 Hot flange	Thermo-couple No. 35 Web	Thermo-couple No. 36 Cold flange	Thermo-couple No. 37 Hot flange	Thermo-couple No. 38 Web	Thermo-couple No. 39 Cold flange
0	17	17	17	17	17	17
1	17	17	17	17	17	17
2	17	17	16	17	17	17
3	18	17	16	18	17	16
4	23	18	16	22	17	17
5	58	25	17	29	19	17
6	87	45	24	42	27	21
7	96	60	35	59	51	36
8	98	72	48	74	70	60
9	99	81	59	85	80	75
10	100	88	69	93	88	84
11	101	93	75	96	91	89
12	102	95	81	98	93	92
13	102	95	85	98	94	92
14	102	95	86	98	94	93
15	102	96	85	98	94	93
16	101	96	84	98	94	93
17	102	96	85	99	94	92
18	102	97	85	99	94	91
19	104	98	87	100	95	92
20	105	100	89	101	97	94
21	105	101	92	101	98	94
22	105	102	92	102	98	94
23	106	103	93	102	98	94
24	107	103	93	103	97	95
25	107	103	93	104	97	95
26	108	103	94	105	97	95
27	108	103	93	106	97	95
28	109	103	93	107	97	95
29	110	103	93	109	97	95
30	111	104	92	111	97	94
31	114	104	92	114	98	94

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Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand stud		
	Thermo-couple No. 34 Hot flange	Thermo-couple No. 35 Web	Thermo-couple No. 36 Cold flange	Thermo-couple No. 37 Hot flange	Thermo-couple No. 38 Web	Thermo-couple No. 39 Cold flange
32	117	104	92	118	98	94
33	123	105	92	121	99	94
34	130	105	91	123	99	94
35	136	106	91	125	99	94
36	142	107	91	126	100	93
37	149	108	90	127	100	94
38	156	109	90	129	99	93
39	166	111	90	132	100	93
40	178	113	90	137	100	93
41	192	116	91	149	101	94
42	206	119	91	172	102	94
43	221	123	91	202	103	94
44	256	131	92	234	107	97
45	321	143	93	275	114	108
46	449	166	99	392	129	121
47	-	212	101	430	154	141
48	-	305	155	445	196	169
49	-	493	335	501	257	209
50	-	-	694	682	442	385
51	-	917	857	805	620	555
52	-	895	891	853	676	635
53	-	847	928	-	-	694
54	-	887	888	-	847	795
55	-	878	878	-	882	870
56	-	908	888	-	871	869
57	-	938	922	-	823	861
58	-	946	947	-	889	875
59	-	936	942	-	924	878
60	-	926	933	-	931	884
61	-	915	924	-	924	890
62	-	891	886	-	922	902
63	-	873	885	-	917	893
64	-	892	902	-	933	915
65	-	904	913	-	952	919

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Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand stud		
	Thermo-couple No. 34 Hot flange	Thermo-couple No. 35 Web	Thermo-couple No. 36 Cold flange	Thermo-couple No. 37 Hot flange	Thermo-couple No. 38 Web	Thermo-couple No. 39 Cold flange
66	-	917	926	-	967	923
67	-	921	929	-	965	925
68	-	895	933	-	953	928
69	-	828	860	-	872	916
70	-	873	856	-	846	866
71	-	902	885	-	866	845
72	-	926	904	-	885	890
73	-	933	912	-	896	906
74	-	938	925	-	917	924
75	-	941	935	-	931	933
76	-	943	936	-	934	936
77	-	954	947	-	946	946
78	-	961	951	-	950	952
79	-	962	955	-	952	956
80	-	963	959	-	955	960
81	-	960	964	-	959	963
82	-	946	969	-	953	962
83	-	917	863	-	910	912
84	-	928	864	-	920	939
85	-	936	868	-	922	945
86	-	942	873	-	929	948
87	-	944	881	-	932	948
88	-	947	888	-	936	949
89	-	956	901	-	943	946
90	-	955	907	-	946	946
91	-	956	912	-	949	948
92	-	956	917	-	951	948
93	-	956	921	-	953	950
94	-	957	925	-	957	957
95	-	958	929	-	961	960
96	-	960	934	-	963	963
97	-	960	940	-	964	969
98	-	961	948	-	965	968
99	-	962	950	-	965	965

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Time (mins)	Actual Temperature (°C)					
	Left-hand stud			Right-hand stud		
	Thermo-couple No. 34 Hot flange	Thermo-couple No. 35 Web	Thermo-couple No. 36 Cold flange	Thermo-couple No. 37 Hot flange	Thermo-couple No. 38 Web	Thermo-couple No. 39 Cold flange
100	-	962	952	-	964	965
101	-	963	955	-	966	966
102	-	963	957	-	965	967
103	-	966	960	-	968	970
104	-	969	949	-	970	972
105	-	966	921	-	969	967
106	-	965	921	-	969	967
107	-	970	923	-	973	971
108	-	970	926	-	974	972

See figure 5 for the locations of the thermocouples.

Thermocouple No.34 failed to record any data after 46 minutes.
Thermocouple No.35 failed to record any data at 50 minutes.
Thermocouple No. 37 failed to record any data after 52 minutes.
Thermocouple No.38 failed to record any data at 53 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	0
2	2	0
3	2	0
4	2	0
5	2	0
6	4	0
7	5	1
8	5	1
9	5	1
10	5	1
11	5	1
12	5	1
13	5	1
14	5	1
15	5	1
16	5	1
17	5	1
18	5	1
19	6	1
20	6	1
21	6	1
22	7	1
23	7	1
24	8	1
25	8	1
26	9	1
27	9	1
28	9	1
29	10	1
30	10	2
31	11	2
32	11	2
33	11	2
34	12	2
35	13	2

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Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
36	14	2
37	15	2
38	16	2
39	17	2
40	19	2
41	20	3
42	23	3
43	25	3
44	29	4
45	34	4
46	38	6
47	42	7
48	45	9
49	49	11
50	52	13
51	53	15
52	55	17
53	57	19
54	59	22
55	61	25
56	63	27
57	64	28
58	65	30
59	66	32
60	67	34
61	67	37
62	70	46
63	71	48
64	72	50
65	72	52
66	73	54
67	73	57
68	74	59
69	74	61
70	75	62
71	75	63
72	75	65
73	75	65

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Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
74	75	66
75	75	68
76	75	68
77	75	69
78	75	70
79	75	71
80	75	72
81	75	72
82	75	74
83	75	75
84	75	76
85	74	77
86	74	78
87	73	80
88	73	82
89	72	85
90	70	87
91	69	88
92	68	91
93	-	93
94	-	-
95	-	-
96	-	-
97	-	-
98	-	-
99	-	-
100	-	-
101	-	-
102	-	-
103	-	-
104	-	-
105	-	-
106	-	-
107	-	-
108	-	-

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

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

The deflection transducers were removed after 92 and 93 minutes in order to protect the equipment.

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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. Position of insulation failure at 82 minutes.

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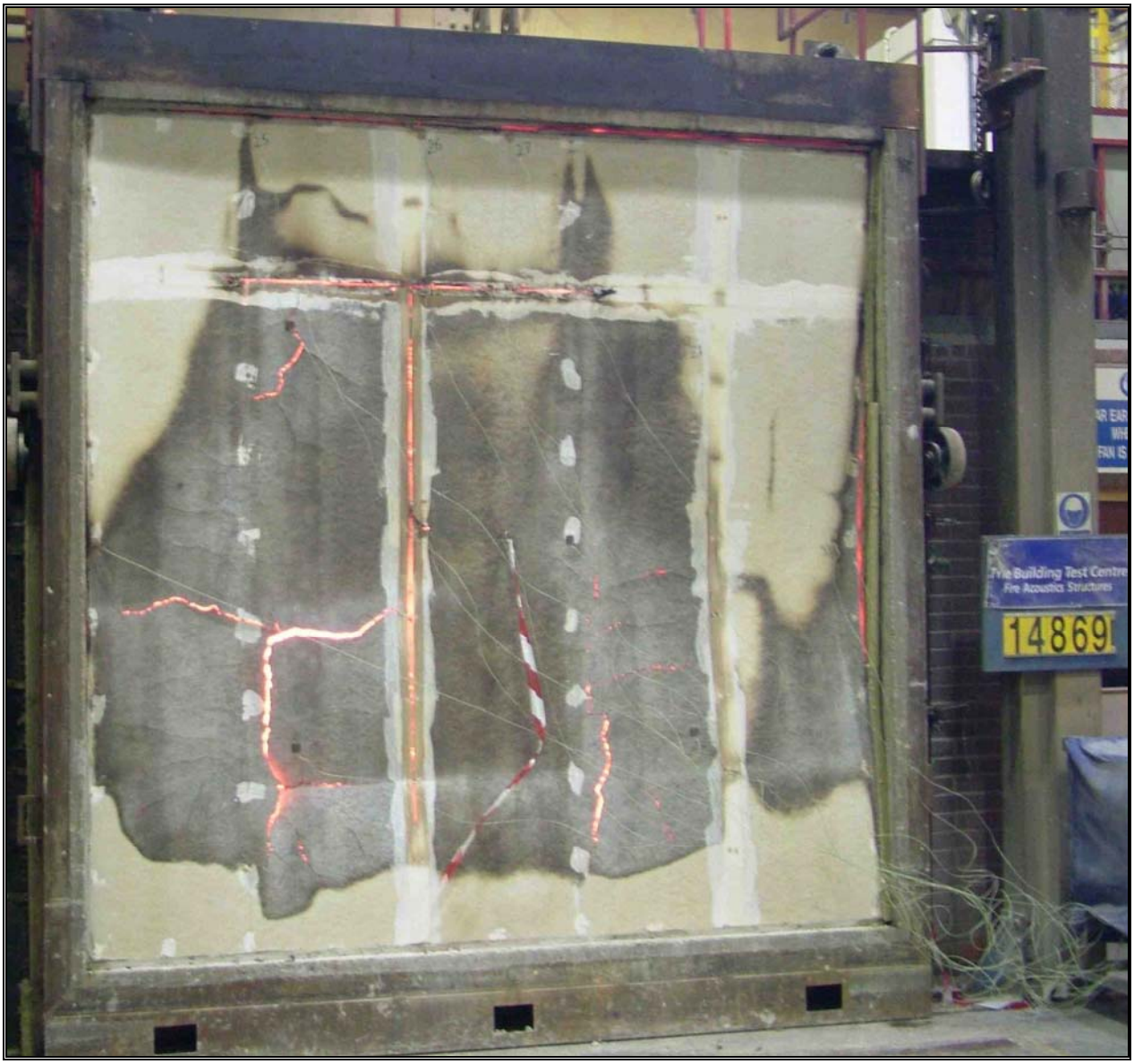

Photograph 4. View of the unexposed face at test termination (108 minutes).

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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 127mm).

(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 Glasroc Rigidur H and ≤2400mm long x ≤1200mm wide Gyproc WallBoard).

(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
<100mm, ∴4000mm	<100mm, ∴4000mm