



The Building Test Centre

Fire Acoustics Structures

The Building Test Centre
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Report Number **BTC 11173F**

A FIRE RESISTANCE TEST, ON A GYPROC METAL STUD
PARTITION FEATURING A DOUBLE LAYER OF 15mm
GYPROC FIRELINE, CONDUCTED IN ACCORDANCE
WITH BS EN 1364-1:1999

Test Date: 13th September 2000

Customer: **British Gypsum Limited**
East Leake
Loughborough
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Customer: **British Gypsum Limited**

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A FIRE RESISTANCE TEST, ON A GYPROC METAL STUD PARTITION FEATURING A DOUBLE LAYER OF 15mm GYPROC FIRELINE, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1:1999.

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FOREWORD

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

The test specimen was installed by British Gypsum Limited. The construction of the specimen took place between the 4th and 8th September 2000. The Building Test Centre played no role in the design or selection of the materials comprising the test specimen. The boards were delivered direct from British Gypsum's East Leake works.

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedures outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge 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

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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.

Gyproc 50C50 channels were fixed to the head and base of the test aperture at 600mm centres with 60mm Hilti Hus fixings. Gyproc 48S50 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, but the gap between the stud and the lining was filled with a 50mm Rockwool Firebatt gasket. The left-hand stud was fixed to the test frame with 60mm Hilti Hus fixings.

The framework was lined both sides with a double layer 15mm Gyproc Fireline. The inner layer boards were fixed with 25mm Gyproc drywall screws at 300mm centres around the perimeter only. The outer layer boards were fixed with 42mm Gyproc Drywall screws at 300mm centres around the perimeter and at the intermediate stud positions. All vertical joints and horizontal joints were staggered between layers. The horizontal joints were positioned 2400mm from the base on the outer layer and 600mm from the base on the inner layer on both the exposed and unexposed faces of the construction. A Gyproc GFS1 fixing strap is used behind the horizontal board joint in the outer layers.

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

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 Fireline

Nominally, 2400mm (long) x 1200mm (wide) x 15mm (thick), Gyproc Fireline Board manufactured by British Gypsum Limited.

Measured surface density:	11.73 kg/m ² .
Measured thickness:	14.97 mm.
Board identification numbers:	1652340 04:42
Moisture content:	<1%

The surface density and board thickness were calculated using a selection of boards used in the test specimen.

Metal components

- (i) Gyproc 48S50 metal studs and 50C50 channel manufactured from galvanised mild steel nominally 0.5mm thick.
- (ii) Gyproc GFS1 fixing strap manufactured from galvanised mild steel nominally 0.5mm thick

All metal components supplied by British Gypsum Limited.

Fasteners

- i) 25mm Gyproc Drywall screws supplied by British Gypsum Limited
- ii) 42mm Gyproc drywall screws supplied by British Gypsum Limited.
- iii) 60mm Hilti Hus fixings supplied by Hilti 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 1.

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

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The furnace pressure was maintained at 18 ± 2 Pa positive with respect to atmosphere, at a point 100 mm below the top of the specimen, except during the first 5 minutes of the test.

The test conditions did not meet the full requirements of BS EN 1363-1:1999 as the furnace linings and test frame stiffness did not fully comply. The test centre is of the opinion that these deviations 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	149 minutes (sustained flaming)
Insulation	139 minutes (roving thermocouple)

The test was terminated at 151 minutes.

LIMITATIONS

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

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 L Cooper

Time		Observations
hrs	mins	
		All observations refer to the exposed face unless otherwise stated.
	0	Test Started
	18	Horizontal joints open to approximately 2mm.
	26	Horizontal joints open to approximately 5mm.
	38	All joints open to approximately 15mm. Top corners of lower boards broken away from screw-heads.
	49	Boards breaking away from screw-heads on all joints.
1	05	All joints open to approximately 30mm. Boards 'crazed'.
1	15	No board fall.
1	24	Joints open to approximately 50mm.
1	32	Upper section of lower centre board fallen. Joint in inner layer open to approximately 30mm.
1	42	Further board fall from lower centre board.
1	52	Right-hand side half of lower centre board fallen. Exposed stud buckled.
1	58	<i>Unexposed face:</i> Screw-heads appearing on left hand joint.
2	01	Upper centre board fallen.

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Time		Observations
hrs	mins	
		All observations refer to the exposed face unless otherwise stated.
2	03	Lower right-hand board fallen. Inner layer lower centre board pulling from fixings. <i>Unexposed face:</i> Screw heads appearing in field of centre board.
2	06	Further inner layer board fall.
2	10	<i>Unexposed face:</i> Discolouration of jointing material around exposed screw-heads.
2	12	Further board fall from left-hand side of specimen. Poor visibility prevents further observations.
2	17	<i>Unexposed face:</i> Discolouration of left-hand board around exposed screw-heads.
2	18	<i>Unexposed face:</i> Screw-heads visible on right-hand board.
2	19	<i>Unexposed face:</i> INSULATION FAILURE (roving thermocouple measured >180°C) mid-height within field of left hand board (see photograph).
2	22	<i>Unexposed face:</i> Cotton pad used at point of insulation failure did not glow or ignite.
2	24	<i>Unexposed face:</i> Cotton pad used at point of insulation failure did not glow or ignite.
2	28	<i>Unexposed face:</i> Charring on left hand joint.
2	29	<i>Unexposed face:</i> INTEGRITY FAILURE. Sustained flaming 600mm from base of centre board (level with inner horizontal joint).



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Time		Observations
hrs	mins	
2	31	TEST TERMINATED.

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Furnace Temperature Graph

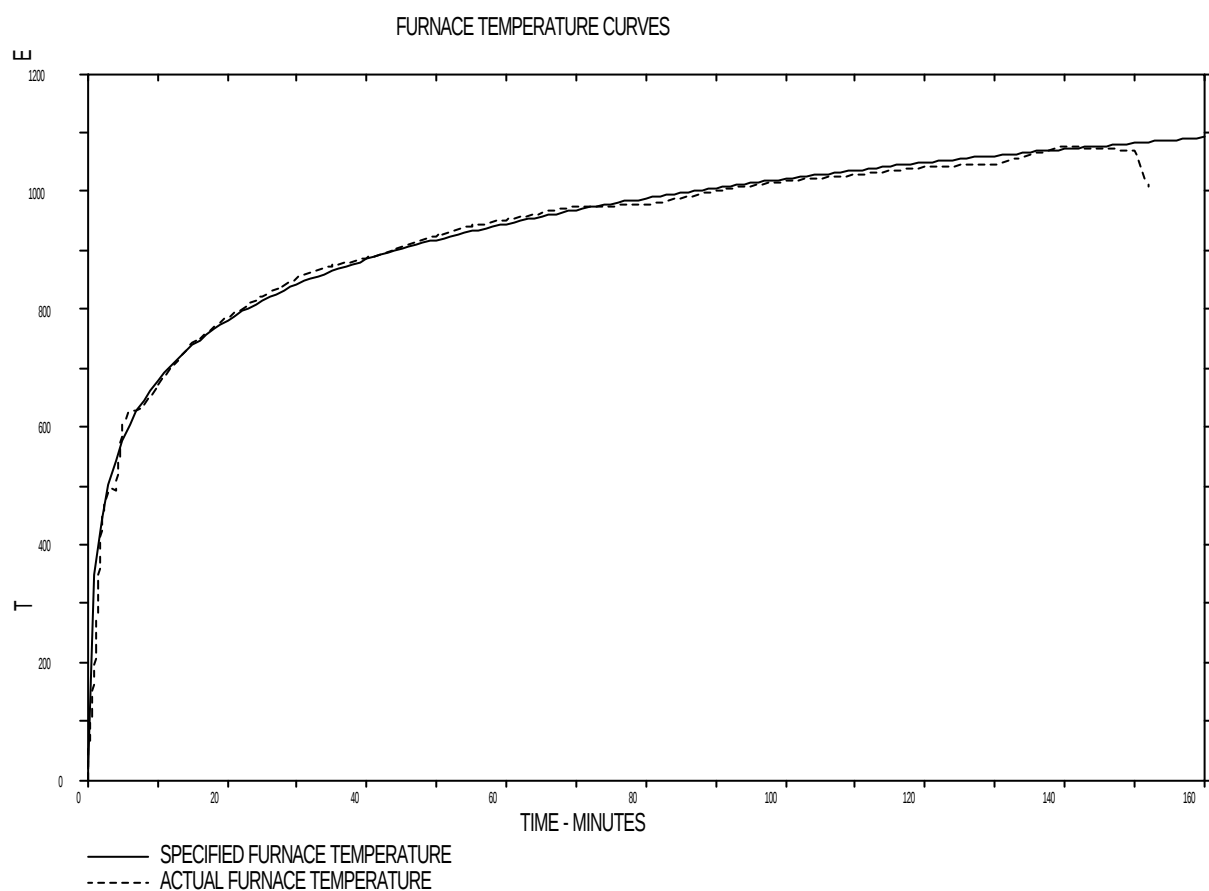


Figure 1. Furnace temperature graph

Unexposed Face Temperature Graph

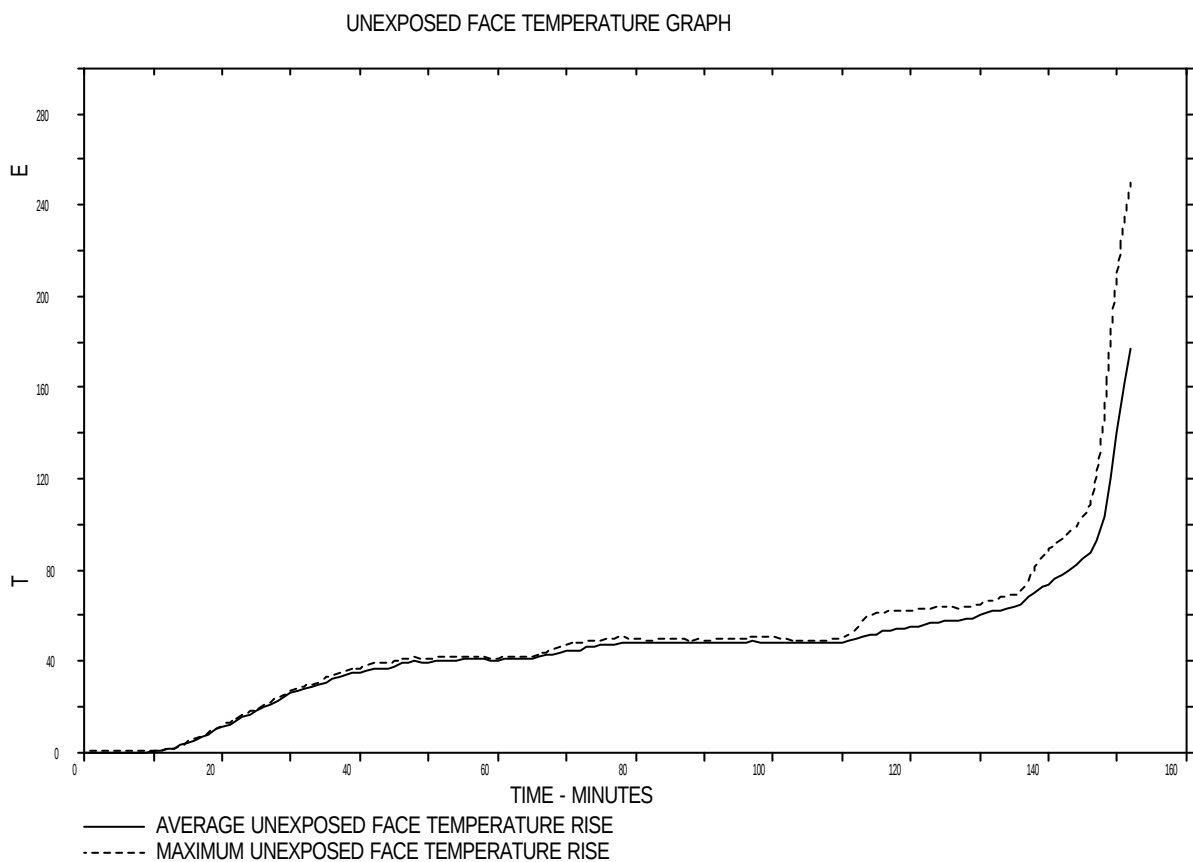


Figure 2. Unexposed face temperature graph

Unexposed Face Thermocouple Layout

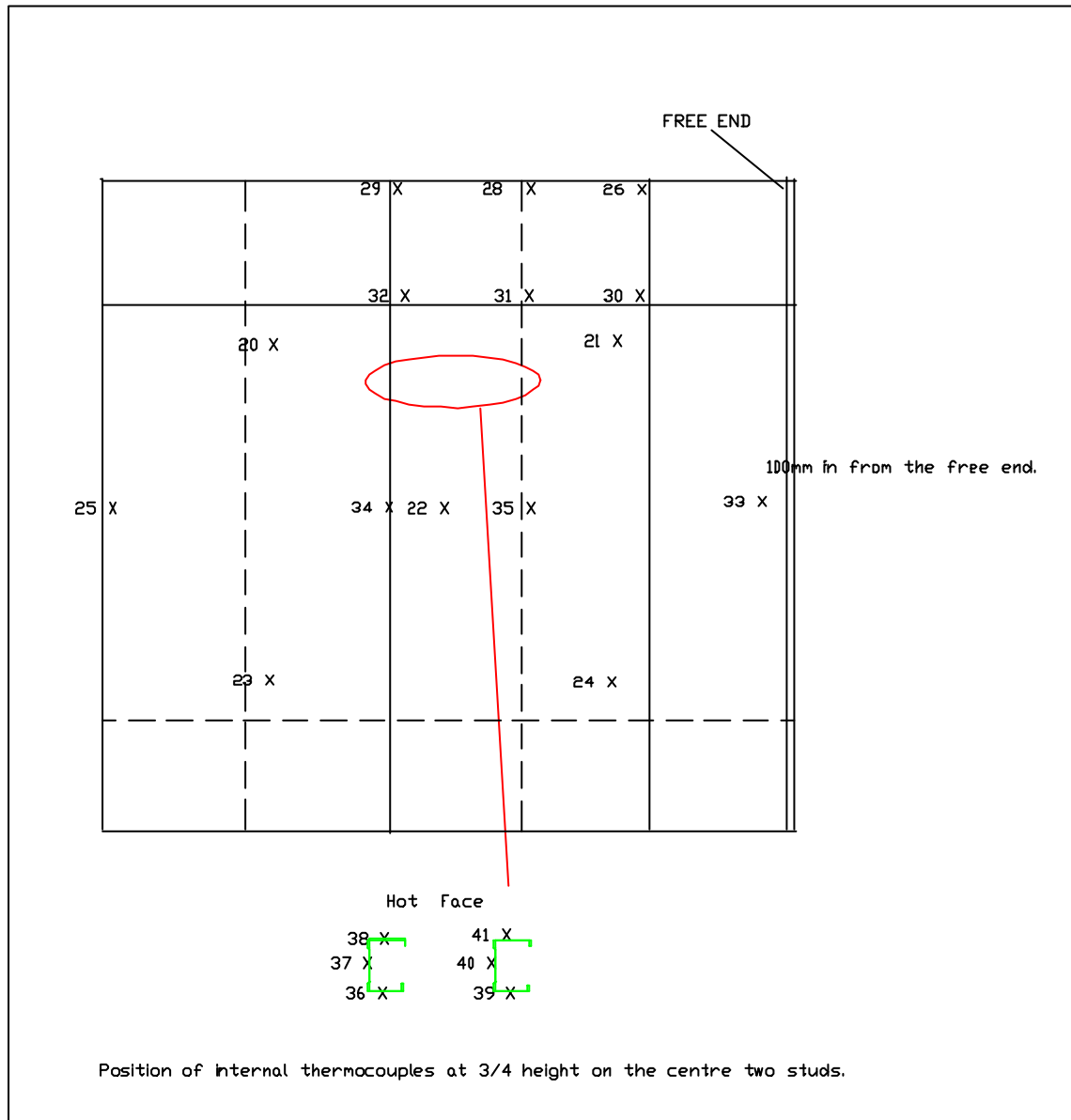


Figure 3. Unexposed face thermocouple layout.



Unexposed Face Standard Five Temperature Data

Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean
0	0	0	0	0	0	0
1	1	0	0	0	0	0
2	1	0	0	0	0	0
3	1	0	0	0	0	0
4	1	0	0	0	0	0
5	1	0	0	1	0	0
6	1	0	0	0	0	0
7	1	0	0	0	0	0
8	1	1	0	0	0	0
9	1	0	0	0	0	0
10	1	1	1	1	1	1
11	1	1	1	1	1	1
12	2	2	2	2	2	2
13	2	2	2	2	2	2
14	3	3	3	3	3	3
15	5	4	4	4	4	4
16	6	5	6	5	5	5
17	7	7	7	6	7	7
18	9	8	9	7	8	8
19	10	10	10	9	9	10
20	12	12	12	10	11	11
21	13	13	13	11	12	12
22	15	15	15	13	14	14
23	17	17	17	14	15	16
24	18	18	18	15	16	17
25	19	19	19	16	18	18
26	21	21	20	18	19	20
27	22	22	22	19	21	21
28	24	24	23	20	22	23
29	25	25	25	22	24	24
30	27	27	26	23	25	26
31	28	28	27	24	27	27
32	29	29	28	25	28	28
33	30	30	29	27	29	29
34	31	31	30	27	29	30
35	32	33	32	28	31	31
36	33	34	32	29	31	32
37	34	35	33	30	32	33
38	35	36	34	31	33	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	Mean
39	36	37	35	32	34	35
40	37	37	36	32	34	35
41	37	38	37	33	35	36
42	38	39	37	33	36	37
43	38	39	38	34	36	37
44	38	39	38	34	36	37
45	39	40	39	35	37	38
46	40	41	40	36	38	39
47	40	41	40	36	39	39
48	40	42	40	37	39	40
49	39	41	39	36	38	39
50	39	41	39	36	38	39
51	40	42	40	37	40	40
52	40	42	41	38	40	40
53	40	42	41	38	41	40
54	40	42	41	38	40	40
55	41	42	41	39	41	41
56	41	42	41	39	41	41
57	40	42	41	39	41	41
58	40	42	41	39	41	41
59	40	41	40	38	41	40
60	39	41	40	38	40	40
61	40	42	41	39	41	41
62	40	42	41	39	41	41
63	41	42	41	39	41	41
64	41	42	42	39	41	41
65	42	42	42	40	41	41
66	43	43	43	41	42	42
67	44	43	43	41	42	43
68	45	44	43	42	42	43
69	46	44	43	42	43	44
70	47	45	44	43	44	45
71	48	46	44	43	45	45
72	48	46	44	44	45	45
73	49	46	44	44	47	46
74	49	46	45	44	48	46
75	49	47	45	44	49	47
76	50	47	46	44	50	47
77	50	47	46	44	50	47
78	50	48	47	44	51	48
79	50	48	47	44	50	48



Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean
80	50	48	47	44	49	48
81	50	49	47	44	48	48
82	49	49	48	44	48	48
83	49	50	48	45	47	48
84	49	50	48	45	47	48
85	49	50	48	45	46	48
86	50	50	49	45	46	48
87	49	50	49	45	46	48
88	49	49	49	45	46	48
89	49	49	50	46	46	48
90	49	48	49	46	46	48
91	49	48	49	46	46	48
92	49	48	50	46	47	48
93	49	48	50	46	47	48
94	49	48	50	46	47	48
95	49	48	50	46	47	48
96	49	48	50	47	47	48
97	49	49	51	47	48	49
98	48	48	50	47	47	48
99	48	48	51	47	48	48
100	48	48	51	47	48	48
101	48	48	50	47	48	48
102	48	48	50	47	48	48
103	47	48	49	47	48	48
104	47	48	49	46	48	48
105	47	48	49	47	48	48
106	48	48	49	46	48	48
107	48	48	49	46	47	48
108	48	48	49	47	47	48
109	49	48	50	46	47	48
110	50	47	50	46	47	48
111	52	47	51	46	47	49
112	54	48	54	46	47	50
113	55	48	58	46	47	51
114	56	49	60	47	47	52
115	56	50	61	47	47	52
116	57	50	61	48	47	53
117	57	51	62	48	47	53
118	57	52	62	50	47	54
119	57	52	62	51	48	54
120	58	53	62	53	48	55



Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean
121	58	52	63	53	49	55
122	59	53	63	54	51	56
123	60	53	63	54	53	57
124	61	53	64	55	54	57
125	61	54	64	56	55	58
126	61	54	64	56	55	58
127	62	54	63	56	54	58
128	62	55	64	57	55	59
129	63	56	64	58	56	59
130	64	56	65	60	57	60
131	65	57	66	61	57	61
132	66	57	67	62	57	62
133	66	58	68	62	58	62
134	68	58	69	63	59	63
135	69	59	69	64	59	64
136	71	60	71	64	61	65
137	75	61	75	65	64	68
138	79	61	81	66	65	70
139	81	63	86	67	66	73
140	84	64	89	68	66	74
141	86	64	92	73	66	76
142	88	65	94	78	67	78
143	90	66	96	81	67	50
144	93	67	99	84	68	82
145	96	69	103	86	69	85
146	99	71	109	90	71	88
147	104	75	121	94	73	93
148	113	79	145	103	77	103
149	131	82	182	119	85	120
150	165	84	210	149	90	140
151	196	87	234	202	93	162



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	Thermocouple No. 30
0	-1	0	0	0	-1	-1
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	1	0	0
4	0	0	0	0	0	0
5	0	0	0	1	0	0
6	0	0	0	1	0	0
7	0	0	0	1	1	0
8	0	1	0	1	1	0
9	0	1	0	2	1	0
10	0	1	1	3	2	0
11	1	2	1	5	3	0
12	2	3	2	7	4	1
13	2	4	2	9	5	1
14	4	6	4	11	7	2
15	5	8	5	14	9	3
16	6	10	7	16	11	4
17	8	12	9	18	13	6
18	10	15	10	20	15	7
19	11	17	12	21	17	8
20	13	19	14	23	19	10
21	14	21	16	24	20	11
22	16	23	18	25	22	13
23	18	25	20	26	24	14
24	19	26	21	26	24	15
25	21	27	22	27	26	16
26	22	28	24	28	27	18
27	24	29	25	29	28	19
28	25	31	27	30	30	21
29	27	32	28	30	31	22
30	29	33	30	31	32	23
31	30	34	31	32	32	24
32	31	35	32	33	34	26
33	33	36	33	34	34	27
34	34	37	34	35	35	28
35	35	38	35	36	36	30
36	36	38	36	37	37	30
37	37	39	37	38	38	32
38	38	40	37	38	39	33



Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
39	39	40	38	39	40	33
40	40	41	38	39	40	35
41	41	41	39	40	41	35
42	41	41	39	40	42	36
43	42	42	39	41	42	37
44	42	42	39	42	42	37
45	43	42	40	44	43	38
46	44	43	41	45	44	39
47	44	44	41	46	44	39
48	45	44	41	46	44	40
49	44	43	40	45	43	39
50	44	43	40	45	43	39
51	45	44	41	46	44	40
52	46	45	41	46	44	40
53	46	45	41	46	44	41
54	45	45	41	46	44	40
55	46	45	41	46	44	41
56	46	45	41	46	44	41
57	46	45	41	46	44	41
58	46	44	41	46	43	41
59	45	44	40	46	43	40
60	45	44	40	46	42	40
61	45	44	40	46	42	40
62	45	44	40	46	42	40
63	44	44	41	46	42	40
64	44	44	41	47	42	41
65	44	44	41	47	43	41
66	44	45	42	48	43	42
67	44	45	42	49	43	42
68	44	45	43	49	44	42
69	44	46	43	50	44	43
70	45	47	44	51	45	44
71	45	48	45	52	45	44
72	46	48	46	52	46	45
73	47	49	47	52	47	46
74	47	49	47	53	47	46
75	48	49	48	53	48	47
76	49	50	48	53	49	47
77	49	50	48	53	49	47
78	49	51	49	53	50	48
79	50	51	49	53	50	49

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Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
80	50	51	49	53	51	49
81	50	51	49	53	52	50
82	50	51	49	53	52	51
83	50	52	49	53	53	51
84	50	52	49	53	53	50
85	50	52	49	52	53	50
86	51	52	49	52	54	50
87	51	52	49	52	54	50
88	51	52	49	52	54	50
89	51	53	49	52	55	50
90	51	53	49	52	55	49
91	51	53	49	52	55	49
92	52	53	49	52	55	49
93	51	53	48	52	55	49
94	52	53	48	51	55	49
95	52	53	48	51	55	49
96	52	54	48	51	55	49
97	52	54	48	52	56	49
98	52	54	47	52	56	49
99	52	54	47	52	56	49
100	52	54	47	52	56	49
101	52	54	47	52	55	49
102	52	54	47	52	55	49
103	52	54	47	52	55	49
104	51	53	47	52	55	49
105	52	54	47	53	55	49
106	52	54	47	53	55	49
107	52	54	47	53	55	49
108	52	54	48	54	56	50
109	52	54	48	54	56	50
110	52	54	48	54	56	50
111	52	54	48	54	56	51
112	52	54	48	55	57	51
113	52	54	48	55	57	51
114	52	54	48	55	57	52
115	52	54	49	55	57	52
116	52	54	49	55	58	53
117	52	54	49	55	58	53
118	52	54	49	55	58	53
119	53	54	49	56	58	54
120	52	54	50	56	59	55



Time (mins)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
121	53	54	50	56	60	56
122	53	54	50	56	62	57
123	53	54	51	57	63	57
124	54	54	52	58	64	58
125	54	54	52	58	65	58
126	54	55	53	59	66	58
127	55	55	54	60	67	57
128	55	55	55	61	68	58
129	57	56	55	62	68	58
130	58	57	56	63	69	59
131	59	58	57	65	69	59
132	60	59	58	65	70	59
133	62	60	59	66	71	60
134	63	61	60	67	72	61
135	65	62	60	67	73	61
136	66	63	61	68	75	61
137	68	64	62	68	77	62
138	69	65	63	69	80	62
139	71	66	64	69	83	64
140	72	68	65	71	85	64
141	75	69	65	72	86	65
142	78	71	66	74	87	66
143	79	73	68	79	88	67
144	82	75	69	81	89	69
145	83	76	69	83	90	70
146	85	77	71	86	91	71
147	87	79	72	88	94	73
148	88	79	73	91	96	74
149	89	81	74	93	98	76
150	90	82	78	96	101	78
151	91	83	79	100	104	80

Additional Unexposed Face Temperature Data

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
0	0	-1	0	0	-1
1	0	0	0	1	0
2	0	0	0	1	0
3	0	0	0	0	0
4	0	0	0	1	0
5	0	0	0	1	0
6	0	0	0	1	0
7	1	0	0	1	0
8	0	0	1	1	0
9	0	0	0	1	0
10	1	0	1	1	1
11	1	1	1	2	1
12	1	2	2	4	2
13	2	2	2	4	3
14	3	4	4	6	4
15	4	5	4	7	5
16	5	6	6	9	6
17	7	7	7	11	7
18	8	9	9	12	9
19	10	10	11	14	10
20	11	12	12	16	11
21	12	13	14	17	13
22	14	14	16	19	14
23	15	16	17	21	16
24	17	17	19	22	17
25	18	18	20	23	18
26	19	19	22	24	19
27	20	20	23	26	20
28	22	22	25	27	22
29	23	23	26	28	23
30	24	24	27	29	24
31	25	25	28	31	25
32	26	26	29	31	25
33	27	28	31	33	26
34	28	28	32	33	27
35	29	30	33	34	28
36	30	31	34	35	29

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

Customer: **British Gypsum Limited**





Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
78	53	48	49	53	47
79	53	49	49	54	47
80	52	49	49	53	47
81	52	49	50	54	47
82	51	49	50	54	47
83	50	49	50	54	47
84	49	49	50	54	48
85	49	49	50	53	47
86	49	49	50	54	48
87	48	49	50	53	48
88	48	49	50	54	48
89	48	49	50	54	48
90	48	49	50	53	48
91	48	49	50	54	48
92	48	50	50	54	49
93	48	50	49	54	48
94	47	51	49	54	48
95	47	51	49	54	49
96	47	52	49	54	49
97	47	52	49	54	50
98	47	52	49	54	49
99	47	53	49	54	50
100	48	53	49	54	50
101	48	53	49	54	51
102	48	54	49	54	51
103	48	54	49	54	51
104	48	55	48	53	51
105	48	56	49	54	52
106	48	57	49	55	52
107	48	59	49	54	53
108	49	59	49	55	53
109	49	60	49	55	54
110	50	60	49	56	55
111	50	61	49	57	56
112	51	62	49	60	57
113	52	63	50	62	59
114	53	63	50	64	59
115	54	64	50	65	60
116	54	64	51	66	61
117	54	65	51	67	62
118	55	66	51	67	62

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Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
119	55	66	52	68	63
120	55	66	53	68	64
121	56	67	54	68	65
122	56	68	55	69	66
123	56	68	55	69	66
124	57	69	55	69	67
125	58	71	55	70	69
126	58	72	56	70	69
127	59	75	56	70	71
128	60	77	57	71	74
129	61	78	57	72	76
130	61	79	58	72	77
131	62	80	58	74	78
132	63	81	59	75	80
133	63	81	59	77	81
134	64	82	60	80	82
135	64	83	61	83	84
136	65	85	61	86	87
137	66	87	63	88	91
138	66	88	65	89	95
139	67	91	66	91	100
140	67	94	67	93	107
141	68	96	67	95	116
142	69	100	68	97	136
143	70	103	69	99	162
144	73	108	71	102	194
145	76	116	72	105	226
146	78	132	77	112	256
147	82	148	80	130	286
148	84	164	82	147	318
149	87	184	85	172	348
150	90	201	87	199	375
151	92	215	89	221	390



Additional Internal Temperature Data

Time (mins)	Actual Temperature (°C)					
	Stud 1			Stud 2		
	Cold Flange Thermocouple No. 36	Web Thermocouple No. 37	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Web Thermocouple No. 40	Hot Flange Thermocouple No. 41
0	24	25	25	25	24	26
1	25	25	25	25	24	26
2	25	25	26	25	25	26
3	25	26	38	25	25	26
4	27	33	62	26	25	28
5	33	43	74	29	27	32
6	42	52	79	36	31	41
7	51	59	82	45	39	54
8	59	66	85	54	47	65
9	64	71	87	61	54	73
10	69	75	89	66	60	78
11	72	77	90	70	65	82
12	74	79	91	74	70	86
13	76	81	92	76	72	87
14	78	82	93	78	74	89
15	79	83	93	80	75	89
16	80	84	93	80	77	90
17	80	85	93	81	78	90
18	81	85	93	82	78	90
19	81	85	93	83	78	90
20	81	85	92	83	79	90
21	81	84	89	83	79	90
22	81	84	91	84	79	91
23	82	85	94	85	80	92
24	83	86	96	86	81	94
25	83	87	98	87	83	95
26	85	88	102	88	83	95
27	86	90	107	88	84	96
28	88	93	111	90	85	97
29	88	94	112	90	86	97
30	89	94	110	91	86	97
31	89	94	107	91	87	97
32	89	95	105	92	87	97
33	90	95	105	93	88	98

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Time (mins)	Actual Temperature (°C)					
	Stud 1			Stud 2		
	Cold Flange Thermocouple No. 36	Web Thermocouple No. 37	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Web Thermocouple No. 40	Hot Flange Thermocouple No. 41
34	90	95	105	93	88	97
35	91	96	106	94	89	98
36	91	96	106	94	89	98
37	92	97	107	95	90	98
38	92	96	109	96	90	98
39	92	97	109	96	91	98
40	93	97	110	96	91	99
41	93	97	110	97	92	101
42	93	97	110	98	92	106
43	93	97	110	98	92	109
44	93	98	110	99	92	111
45	94	98	111	101	92	115
46	95	99	113	103	94	119
47	96	99	114	104	94	123
48	95	99	115	108	96	130
49	95	98	115	111	95	141
50	95	99	117	119	97	159
51	97	100	120	127	99	182
52	97	101	124	138	100	203
53	98	102	127	144	100	221
54	99	103	132	155	101	236
55	100	104	139	164	102	249
56	100	106	146	172	101	259
57	101	109	158	180	101	269
58	102	113	171	189	102	278
59	101	119	185	197	102	286
60	101	130	202	206	104	294
61	102	143	218	217	112	302
62	102	159	236	228	119	311
63	102	176	254	238	135	320
64	102	189	270	248	178	328
65	102	203	287	258	207	335
66	106	216	301	268	222	342
67	122	229	314	277	232	348
68	148	241	325	285	243	356
69	188	255	337	296	254	362
70	217	268	349	307	266	369
71	232	278	357	316	276	378



Time (mins)	Actual Temperature (°C)					
	Stud 1			Stud 2		
	Cold Flange Thermocouple No. 36	Web Thermocouple No. 37	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Web Thermocouple No. 40	Hot Flange Thermocouple No. 41
72	242	287	366	326	286	386
73	252	296	373	335	297	395
74	260	301	378	343	305	402
75	268	309	384	350	313	409
76	276	315	390	358	321	415
77	282	321	396	364	329	421
78	290	329	403	370	336	429
79	297	336	409	375	342	436
80	304	343	417	380	347	438
81	312	350	426	385	351	442
82	320	358	434	390	354	446
83	327	364	439	393	355	450
84	334	370	444	396	355	454
85	341	377	449	400	357	458
86	348	384	454	404	359	462
87	357	391	461	407	360	465
88	366	398	466	411	361	468
89	376	407	477	414	362	472
90	385	415	492	419	365	476
91	395	427	508	427	369	482
92	407	439	526	435	374	489
93	417	449	547	444	380	495
94	430	462	589	453	386	503
95	449	480	647	462	392	509
96	472	504	722	469	398	515
97	503	535	1284	472	405	521
98	539	574	1284	486	411	526
99	578	624	1284	493	416	532
100	624	670	1284	501	420	538
101	668	736	1284	513	427	545
102	708	752	623	526	439	554
103	756	774	748	533	449	559
104	793	786	779	540	458	565
105	822	804	808	549	467	571
106	836	806	816	557	475	578
107	843	804	824	567	485	585
108	832	797	814	575	494	592
109	811	755	789	579	496	597



Time (mins)	Actual Temperature (°C)					
	Stud 1			Stud 2		
	Cold Flange Thermocouple No. 36	Web Thermocouple No. 37	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Web Thermocouple No. 40	Hot Flange Thermocouple No. 41
110	799	736	772	578	490	599
111	792	731	755	574	482	597
112	791	731	753	573	477	597
113	798	734	760	574	477	598
114	816	757	769	577	479	600
115	814	744	778	580	481	602
116	821	747	783	583	482	1284
117	827	750	787	583	482	598
118	839	754	793	585	482	604
119	848	759	799	587	483	605
120	870	765	805	587	483	605
121	874	773	812	592	487	609
122	884	779	820	598	491	614
123	905	791	839	603	495	618
124	924	798	855	611	502	624
125	942	822	918	622	510	627
126	953	820	954	640	525	296
127	1012	829	978	674	554	526
128	1028	843	990	709	580	534
129	1033	871	1087	736	607	507
130	1028	897	1015	759	630	555
131	1031	973	1004	774	654	632
132	1035	1080	1011	786	674	713
133	1032	1035	1022	982	1014	1010
134	1027	1047	1032	1028	1009	1013
135	1019	1040	1029	1034	983	996
136	1022	1049	1034	1030	953	945
137	1031	1062	1039	1045	943	926
138	1040	1066	1041	1045	944	913
138	1047	1073	1036	1048	943	947
140	1052	1077	1042	1046	900	945
141	1055	1072	1041	1051	903	960
142	1056	1084	1089	1055	913	964
143	1053	1085	1089	1059	883	965
144	1044	810	1087	1060	863	975
145	1023	766	1074	1062	846	983
146	983	728	1050	1059	831	993
147	949	714	1011	1059	1035	1003

Customer: **British Gypsum Limited**

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Time (mins)	Actual Temperature (°C)					
	Stud 1			Stud 2		
	Cold Flange Thermocouple No. 36	Web Thermocouple No. 37	Hot Flange Thermocouple No. 38	Cold Flange Thermocouple No. 39	Web Thermocouple No. 40	Hot Flange Thermocouple No. 41
148	903	713	969	902	1033	1011
149	861	719	927	884	1039	1019
150	827	731	883	861	852	1013
151	800	745	847	863	830	998



Specimen Lateral Deflection

A negative deflection indicates movement toward the furnace.

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



Time (mins)	Deflection (mm)	
	On free edge	Centrally
38	-3	-27
39	-3	-28
40	-3	-29
41	-3	-29
42	-3	-30
43	-4	-30
44	-4	-31
45	-4	-31
46	-4	-32
47	-4	-34
48	-4	-35
49	-4	-37
50	-4	-39
51	-5	-41
52	-5	-43
53	-5	-45
54	-5	-47
55	-6	-48
56	-6	-50
57	-7	-52
58	-7	-54
59	-8	-56
60	-9	-58
61	-10	-60
62	-11	-62
63	-13	-64
64	-14	-66
65	-16	-68
66	-17	-70
67	-19	-72
68	-20	-74
69	-21	-75
70	-22	-77
71	-24	-78
72	-25	-80
73	-26	-81
74	-27	-82
75	-28	-83
76	-29	-84
77	-30	-85
78	-31	-86
79	-33	-87



Time (mins)	Deflection (mm)	
	On free edge	Centrally
80	-34	-88
81	-35	-89
82	-36	-90
83	-37	-90
84	-39	-91
85	-40	-92
86	-41	-93
87	-42	-93
88	-42	-94
89	-43	-94
90	-44	-95
91	-44	-95
92	-45	-95
93	-45	-95
94	-45	-96
95	-45	-96
96	-45	-96
97	-45	-96
98	-45	-96
99	-46	-96
100	-46	-97
101	-46	-97
102	-46	-96
103	-46	-96
104	-46	-96
105	-46	-96
106	-46	-96
107	-46	-96
108	-46	-96
109	-46	-96
110	-46	-96
111	-46	-97
112	-46	-97
113	-46	-97
114	-46	-97
115	-46	-97
116	-46	-97
117	-46	-97
118	-46	-97
119	-46	-97
120	-46	-97
121	-46	-98



Time (mins)	Deflection (mm)	
	On free edge	Centrally
122	-46	-98
123	-45	-97
124	-45	-97
125	-45	-97
126	-45	-97
127	-45	-97
128	-45	-97
129	-45	-97
130	-45	-98
131	-44	-97
132	-44	-97
133	-44	-97
134	-44	-97
135	-44	-97
136	-44	-96
137	-45	-96
138	-45	-95
139	-46	-94
140	-46	-93
141	-47	-92
142	-47	-90
143	-48	-87
144	-48	-85
145	-49	-82
146	-50	-79
147	-52	-75
148	-53	-71
149	-54	-65
150	-54	-181
151	-166	-168

Negative readings indicate deflection into the furnace



PHOTOGRAPHS

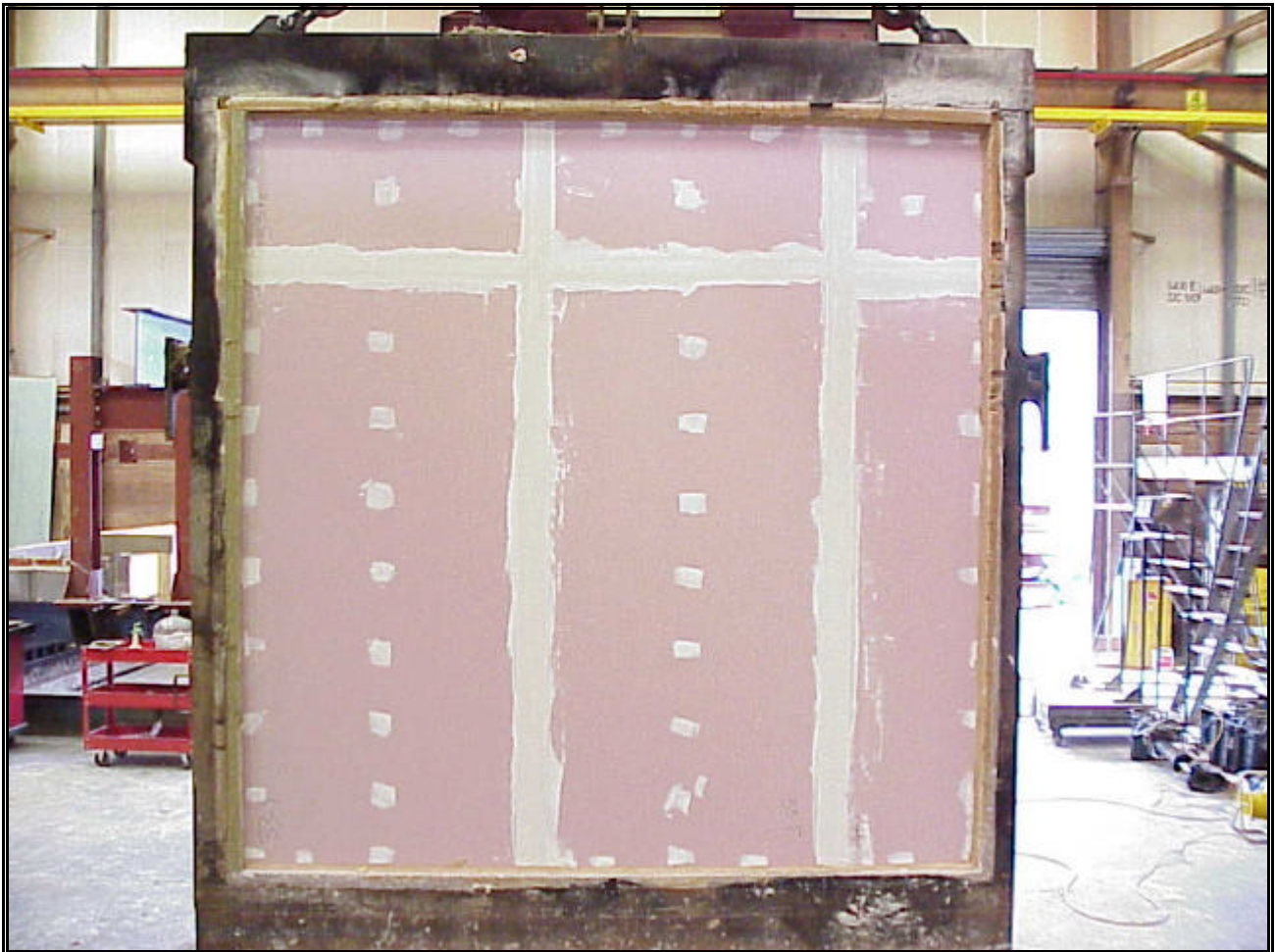


Photo 1. Exposed face prior to test.



The Building Test Centre

Fire Acoustics Structures

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Photo 2. Unexposed face prior to test

Customer: **British Gypsum Limited**

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Photo 3. Point of insulation failure in field of board.



Photo 4. Specimen towards end of test (sustained flaming of paper liner visible)