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Report Number **BTC 13228F**

FULL SCALE LOADED FIRE RESISTANCE TEST ON A TIMBER JOIST FLOOR PROTECTED BY AN INNER LAYER OF 19mm GYPROC PLANK AND AN OUTER LAYER OF 12.5mm GYPROC FIRELINE MOUNTED ON RB1 GYPFRAME RESILIENT BAR CONDUCTED IN ACCORDANCE WITH BS EN 1365-2: 2000.

Test Date: 15th March 2004

www.btconline.co.uk

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

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The Building Test Centre
Fire Acoustics Structures

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LOADING CALCULATIONS _____ *28*
FIELD OF DIRECT APPLICATION _____ *35*

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FOREWORD

This test report details a full scale fire resistance test on a loaded timber joist floor. The test sponsor was British Gypsum Limited.

The test specimen was installed by the British Gypsum Limited. The construction of the specimen took place between the 8th and 9th March 2004. British Gypsum Limited designed and selected the materials comprising the test specimen.

The test was carried out on the 15th March 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 1365-2 is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

REPORT AUTHORISATION

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

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TEST CONSTRUCTION

The specimen was constructed in a refractory concrete lined steel restraint frame having an opening of 4000mm long x 3000mm wide.

195mm x 38mm C24 grade timber joists were placed, nominally, at 600mm centres, spanning 4000mm length of the test frame. Full-depth noggings were fixed at each end of the joists (within the test aperture) and at mid-span of the specimen with 100mm round nails.

The tops of the joists were covered with a walking surface of 18mm (finished thickness) tongue and groove floor boarding (nominally 115mm wide) which was fixed using 40mm floor brads (2 per board at each joist position).

Gypframe RB1 Resilient Bar was fixed to the underside of the joists, at 450mm centres perpendicular to the joist span and around the perimeter of the floor, using 36mm Gyproc drywall screws.

100mm Isowool General Purpose Roll was positioned in the joist cavity.

The underside of the floor was lined with a double layer of plasterboard perpendicular to the Gypframe RB1 Resilient Bar as follows:

The inner layer consisted of 19mm Gyproc Plank fixed at 200mm centres within the field of the board (4 fixings per 600mm board width) and at 225mm centres around the long edge ceiling perimeter and at 200mm centres around the short edge ceiling perimeter using 32mm Gyproc drywall screws.

The outer layer consisted of 12.5mm Gyproc FireLine fixed at 234mm centres within the field of the board (6 fixings per 1200mm board width) and at 225mm centres around the long edge ceiling perimeter and at 234mm centres around the short edge ceiling perimeter using 42mm Gyproc drywall screws.

All board joints were staggered between layers and all board ends coincided with Gypframe RB1 Resilient Bar in both layers.

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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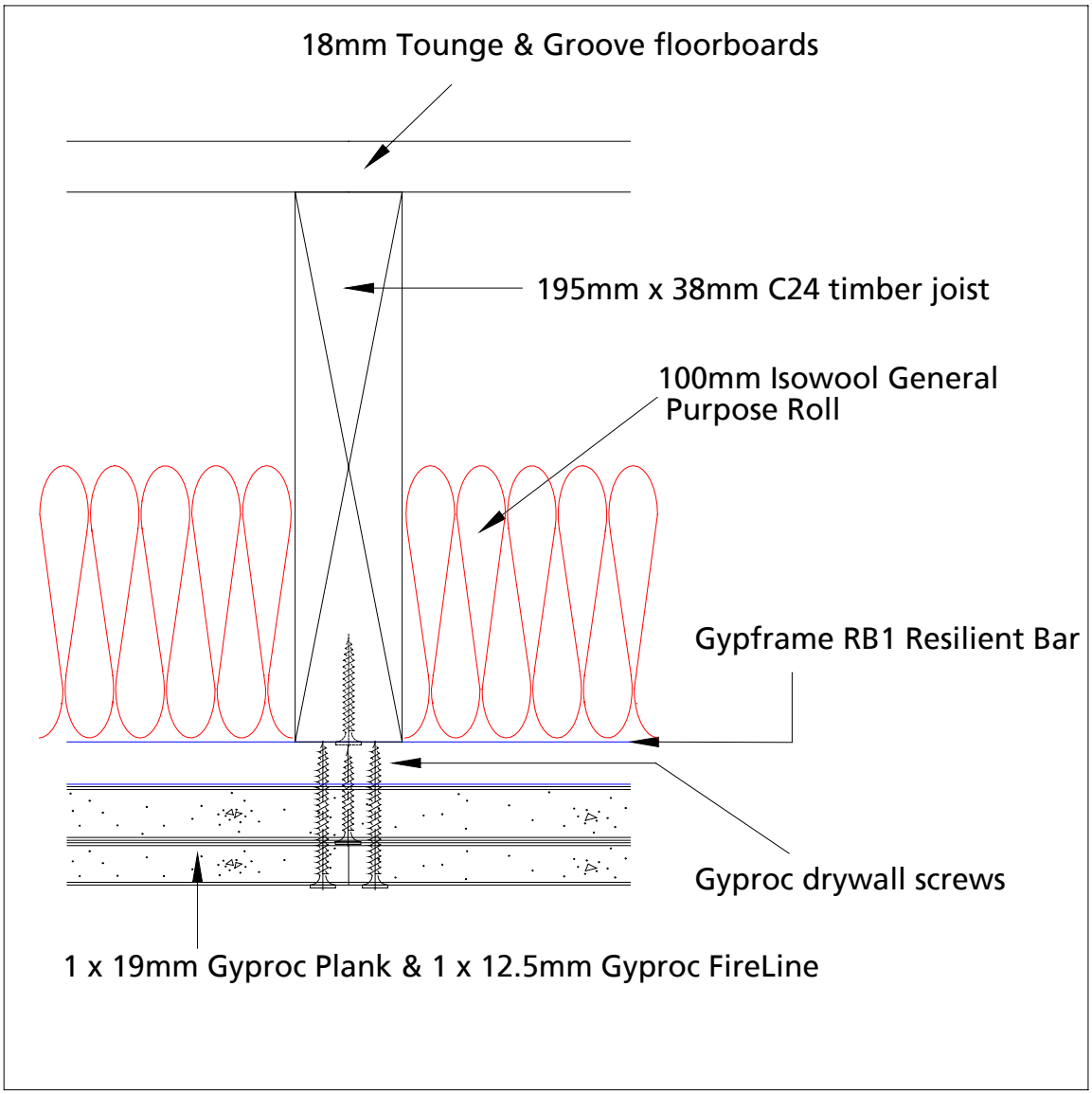

Figure 1. Cross section through the specimen.

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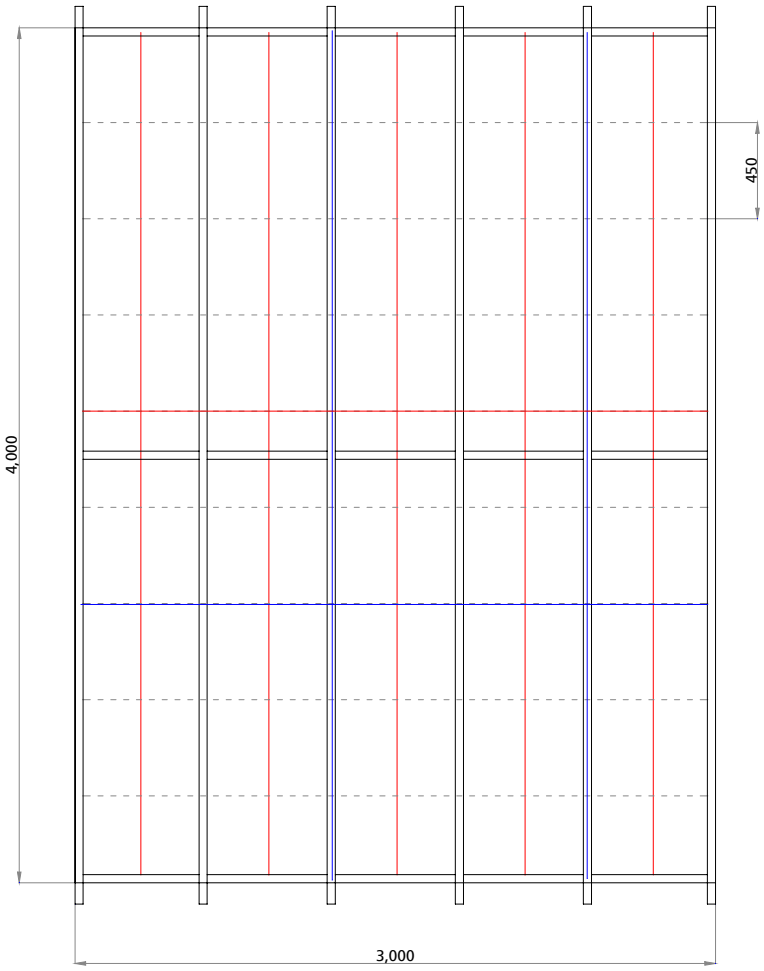

Figure 2. Board and joist layout.

NB. Timber joist frame was larger than the test aperture.

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 FireLine

Nominally, 3000mm (long) x 1200mm (wide) x 12.5mm (thick), Gyproc FireLine T/E manufactured and supplied by British Gypsum Limited, ex East Leake.

Actual surface density:	10.09kg/m^2.
Actual thickness:	12.83mm.
Board identification numbers:	16 320 3 23:13
Actual moisture content:	0.84%

The surface density 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 has been established from measurements made using samples dried to constant weight in an oven at 40°C.

Gyproc Plank

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

Actual surface density:	15.02kg/m^2.
Actual thickness:	19.21mm.
Board identification numbers:	24 353 3 05:48
Actual moisture content:	0.31%

The surface density 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 has been established from measurements made using samples dried to constant weight in an oven at 40°C.

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Timber Components

Nominally 4210mm (long) x 195mm (deep) x 38mm (wide), softwood joists special structural C24 grade.

Measured density:	429kg/m^3
Measured moisture content:	9.32%

Nominally 115mm (wide) x 18mm (thick) softwood Tongue and Groove flooring.

Actual thickness	18.39mm
Measured surface density:	7.88kg/m^2
Measured moisture content:	8.88%

The moisture content was established from measurements made using samples dried to constant weight in an oven at 40°C.

Timber supplied by Nixon Knowles & Co. Limited.

Insulation

Nominally 100mm thick Isowool General Purpose Roll supplied by British Gypsum-Isover Limited.

Measured surface density	1.01kg/m^2
Measured density	10.09kg/m^3

Metal Components

i) Gypframe RB1 Resilient Bar supplied by British Gypsum Limited.

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Fasteners

i) 32mm Gyproc drywall screws supplied by British Gypsum Limited.
ii) 36mm Gyproc drywall screws supplied by British Gypsum Limited.
iii) 42mm Gyproc drywall screws supplied by British Gypsum Limited.
iv) 40mm Floor brads.
v) 100mm round nails.

Miscellaneous Components

i) Gyproc Joint Filler supplied by British Gypsum Limited.
ii) Gyproc Paper Tape supplied by British Gypsum Limited.

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TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1365-2: 2000. The asymmetrical specimen was subjected to fire from the underside (plasterboard side) this being the required direction of fire resistance as specified in BS EN 1363-1: 1999.

The test procedure used was EN 1365-2 Issue 2.

The ambient temperature at the commencement of the test was 14°C.

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

The allowable tolerances are ±5 Pa from 5 minutes to 10 minutes and ±3 Pa from 10 minutes onwards. It is of the opinion of the laboratory that the variations in the furnace pressure exceeding the tolerances stated in BS EN 1363-1:1999 have not unduly influenced the results of this test. The furnace pressure graph is on page 17.

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.

A total load of 10.56kN was applied to twenty-four equally distributed loading points to represent 100% of the design load (see figure 7).

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TEST RESULTS

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

Loadbearing Capacity:		71 minutes	(no failure test discontinued at the request of the customer)
Integrity:	25mm Gap gauge	71 minutes	(no failure test discontinued at the request of the customer)
	6mm Gap gauge	71 minutes	(no failure test discontinued at the request of the customer)
	Sustained flaming	70 minutes	
	Cotton pad	69 minutes	
Insulation:		69 minutes	By virtue of integrity

The test was terminated at 71 minutes at the request of the customer.

LIMITATIONS

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

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TEST DATA

Observations

Observers: Unexposed face J McLavy and A Richardson
Exposed face P Cao

Time		*Observations*
hrs	mins	All observations refer to the exposed face unless otherwise stated.
	0	Test started.
	5	The face paper and jointing material had started to char and fall into the furnace.
	10	The face paper and jointing material continued to char and fall into the furnace.
	15	All board joints had opened to approximately 2-3mm.
	20	All board joints had opened to approximately 6-7mm.
	25	All board joints had opened to approximately 8-9mm. The boards had sagged between the fixings by approximately 10-20mm.
	30	All board joints had opened to approximately 10-12mm.
	35	No visible change to the specimen.
	40	All board joints had opened to approximately 12-15mm.
	45	The boards had sagged into the furnace by approximately 40-50mm at the left-hand longitudinal joint, transverse joint intersection (viewed from the observation platform).
	50	The boards had peeled into the furnace at the left-hand longitudinal joint, transverse joint intersection (viewed from the observation platform).

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Time		*Observations*
hrs	mins	All observations refer to the exposed face unless otherwise stated.
	53	*Unexposed face* Smoke was issued from the specimen perimeter.
	54	Outer layer board fall – Sections of the 1st and 2nd row left-hand boards approximately 500mm x 500mm had fallen into the furnace adjacent to the left-hand longitudinal joint, transverse joint intersection. Inner layer board fall – From the same location as the outer layer. Flames were visible inside the furnace from the cavity.
	55	*Unexposed face* Popping and cracking sounds were heard.
	57	Outer layer board fall – Sections of the 1st and 2nd row left-hand boards had fallen into the furnace adjacent to the left-hand longitudinal joint, transverse joint intersection. Inner layer board fall – From the same location as the outer layer. Further flames were visible inside the furnace from the cavity.
	58	*Unexposed face* Further popping and cracking sounds were heard. Smoke issue from the specimen perimeter had increased.
	59	*Unexposed face* Smoke was issued from between the floorboard joints.
1	00	Outer layer board fall – Sections of the 1st and 2nd row centre boards had fallen into the furnace adjacent to the transverse joint. Inner layer board fall – From the same location as the outer layer.
1	01	*Unexposed face* Further popping and cracking sounds were heard.
1	02	Outer layer board fall – Sections of the 2nd row left-hand and centre boards had fallen into the furnace adjacent to the longitudinal joint. Inner layer board fall – From the same location as the outer layer.

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Time		*Observations*
hrs	mins	All observations refer to the exposed face unless otherwise stated.
1	03	No further exposed face observations were possible. *Unexposed face* Smoke issue from between the floorboard joints had increased. Smoke was issued from the floorboard knots.
1	05	*Unexposed face* Discolouration was visible at approximately 750mm from the left-hand side and approximately 1000mm from the observation platform. Smoke was issued from the same location.
1	07	*Unexposed face* Discolouration was visible at approximately 600-1600mm from the left-hand side and approximately 1000-1700mm from the observation platform. A glow was visible between the floor board joints at approximately 1000mm from the left-hand side and approximately 1300mm from the observation platform.
1	08	*Unexposed face* A cotton pad was used at approximately 1000mm from the left-hand side and approximately 1300mm from the observation platform but did not glow or ignite.
1	09	*Unexposed face* **INTEGRITY FAILURE.** The cotton pad failed at approximately 1000mm from the left-hand side and approximately 1300mm from the observation platform.
1	10	*Unexposed face* **FURTHER INTEGRITY FAILURE.** Sustained flaming exceeding 10 seconds occurred at approximately 1000mm from the left-hand side and approximately 1300mm from the observation platform.
1	11	**TEST TERMINATED** at the request of the customer.

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Furnace Temperature Graph

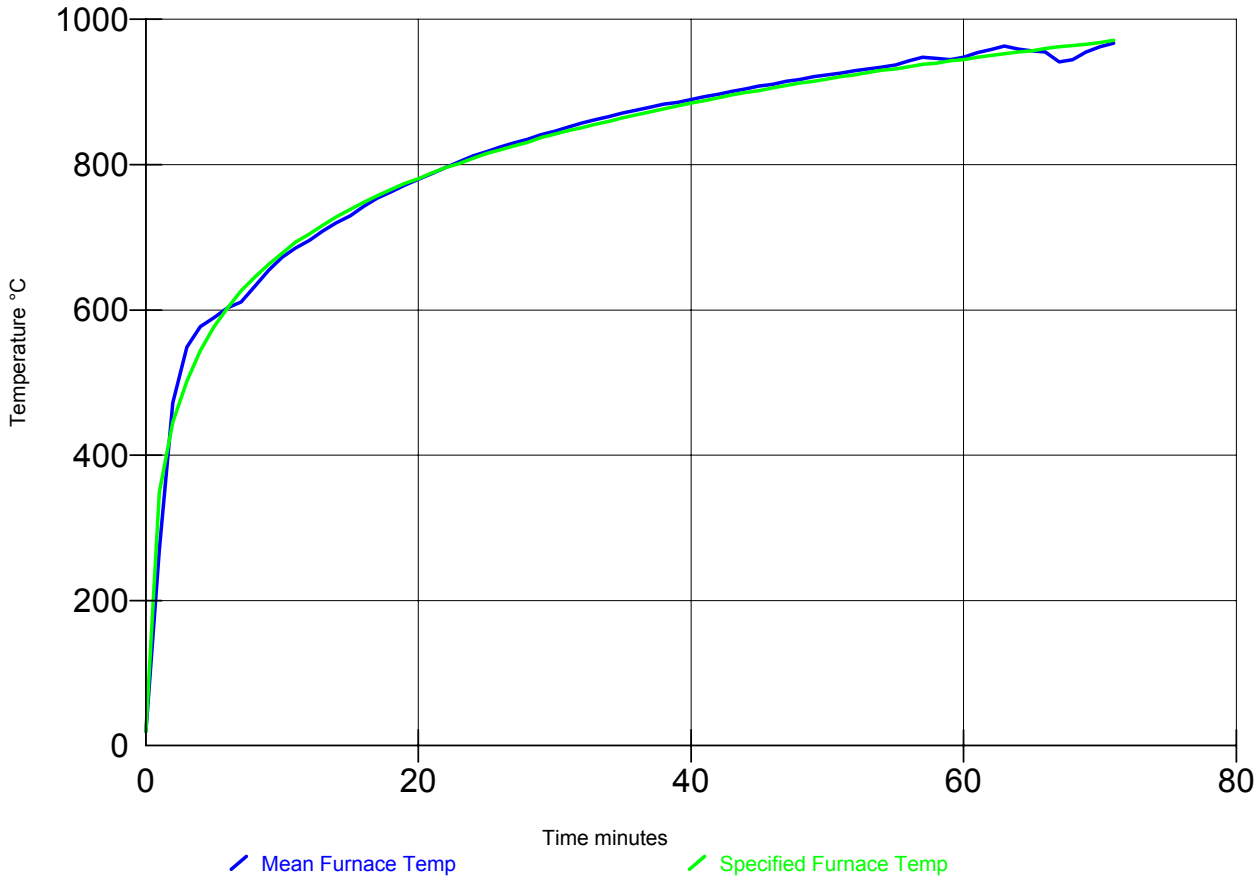

Figure 3. Furnace temperature graph.

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Furnace Pressure Graph

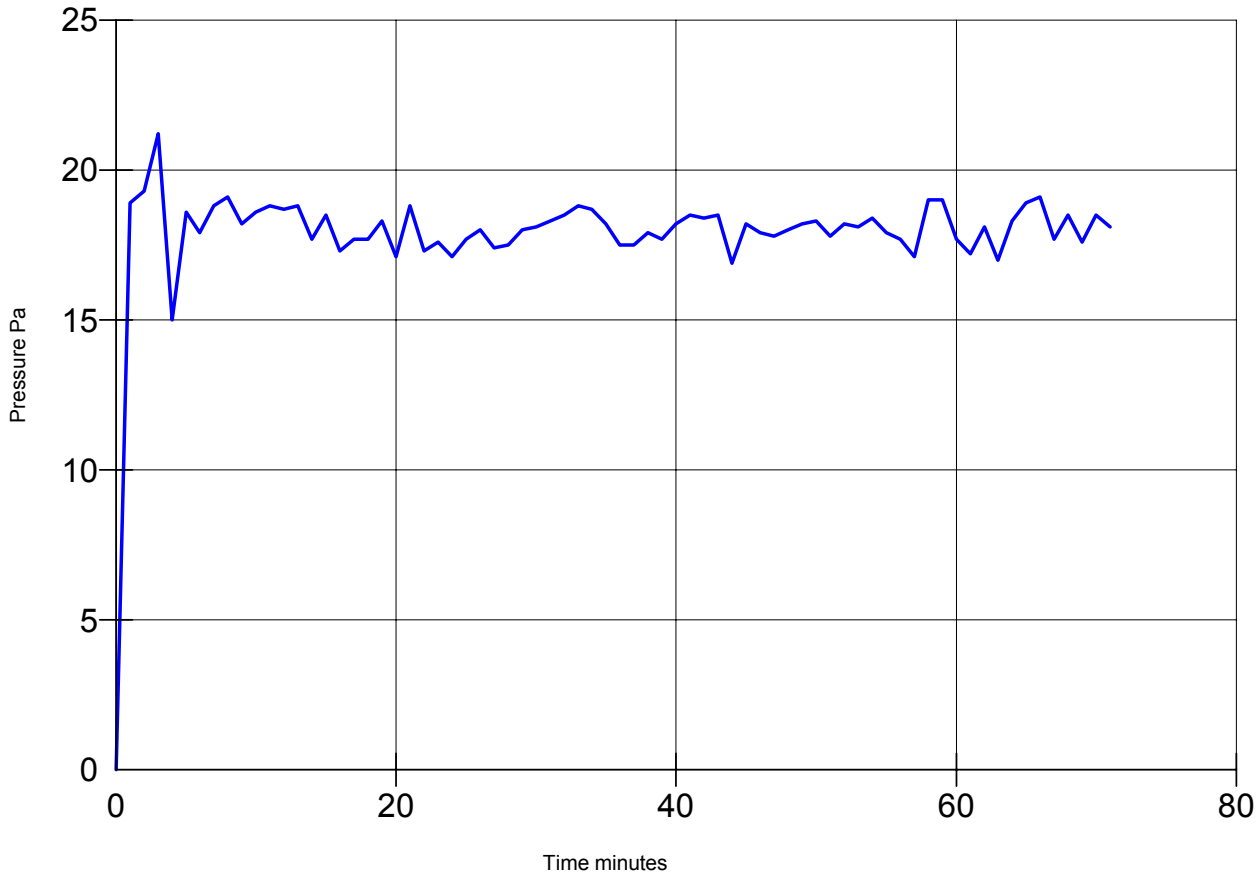

Figure 4. Furnace pressure graph.

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Unexposed Face Temperature Graph

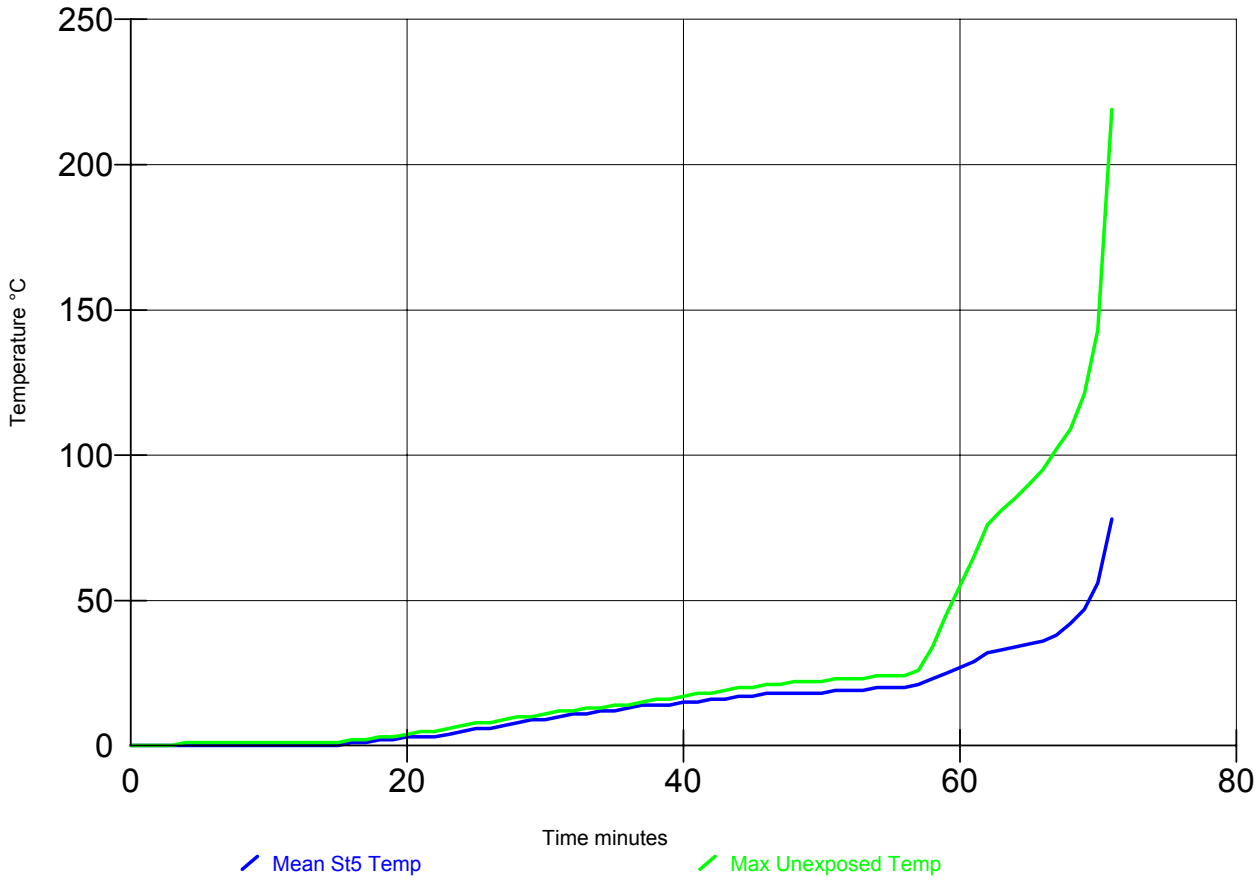

Figure 5. Unexposed face temperature graphs.

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Unexposed Face Thermocouple Layout

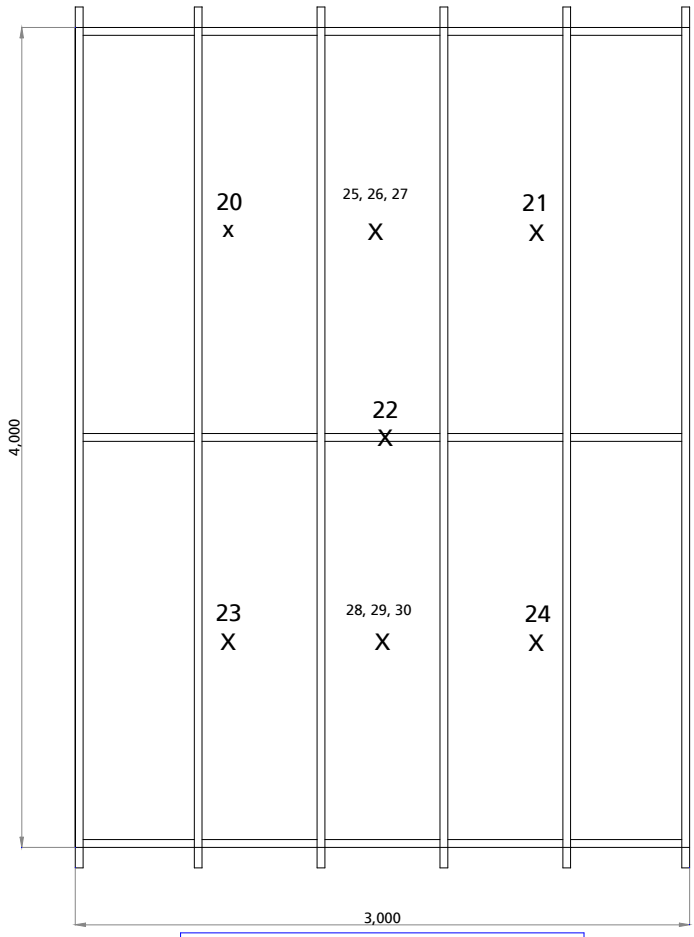

Figure 6. Unexposed face thermocouple layout.

NB. Joist framework was larger than the test aperture.

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

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Time (mins)	Temperature Rise °C				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
38	15	15	12	14	16
39	15	16	12	14	16
40	16	17	13	15	17
41	16	17	13	15	18
42	17	18	13	15	18
43	17	19	13	16	19
44	17	19	13	16	20
45	17	19	13	16	20
46	18	20	14	17	21
47	18	20	14	17	21
48	18	21	14	17	22
49	18	21	14	17	22
50	19	21	14	17	22
51	19	22	14	18	23
52	19	22	14	18	23
53	19	22	14	18	23
54	20	23	14	19	24
55	20	23	14	19	24
56	20	23	15	21	24
57	20	23	15	26	25
58	20	24	15	34	25
59	20	24	15	45	25
60	20	24	15	55	25
61	20	24	15	65	25
62	20	24	15	76	25
63	20	24	15	81	25
64	20	24	16	85	25
65	21	24	16	90	26
66	21	24	17	95	26
67	21	24	18	102	28
68	22	24	22	109	33
69	23	24	28	121	41
70	25	25	37	143	54
71	28	27	46	219	73

See figure 6 for the location of the thermocouples.

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Internal Temperature Data

Time (mins)	Actual Temperature °C					
	Thermocouple No. 25 (walking)	Thermocouple No. 26 (Joist)	Thermocouple No. 27 (Cavity)	Thermocouple No. 28 (walking)	Thermocouple No. 29 (Joist)	Thermocouple No. 30 (Cavity)
0	15	14	15	14	14	14
1	15	14	15	14	14	14
2	15	14	15	14	14	14
3	15	14	15	14	14	14
4	15	14	15	14	14	14
5	15	14	15	14	15	14
6	15	14	16	14	15	14
7	16	14	17	14	15	15
8	16	14	19	15	15	15
9	16	14	24	15	15	17
10	17	15	31	16	15	20
11	19	15	42	18	16	25
12	22	16	50	20	17	32
13	26	18	57	22	19	41
14	31	19	63	26	21	49
15	38	22	69	30	25	55
16	45	25	74	36	29	59
17	52	29	77	42	33	63
18	58	35	80	48	38	66
19	63	40	83	53	44	70
20	68	47	87	57	51	74
21	73	54	89	62	57	77
22	77	62	91	65	63	79
23	80	68	91	68	68	80
24	83	73	92	71	72	82
25	84	76	93	74	76	83
26	85	79	93	76	78	84
27	86	81	93	77	80	85
28	86	83	93	79	82	85
29	86	84	92	80	83	86
30	86	84	91	80	83	86
31	86	85	91	80	83	85
32	85	85	90	80	83	85
33	85	85	90	80	83	85
34	85	86	90	80	83	85
35	85	86	91	81	83	85
36	85	86	91	81	84	85

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Time (mins)	Actual Temperature °C					
	Thermocouple No. 25 (walking)	Thermocouple No. 26 (Joist)	Thermocouple No. 27 (Cavity)	Thermocouple No. 28 (walking)	Thermocouple No. 29 (Joist)	Thermocouple No. 30 (Cavity)
37	86	87	91	82	84	86
38	86	87	91	83	84	86
39	86	87	90	83	85	86
40	86	87	90	83	85	87
41	86	88	90	84	85	87
42	86	88	90	84	85	87
43	86	88	90	83	85	87
44	85	88	90	83	85	86
45	85	88	90	83	85	86
46	85	88	90	82	85	85
47	85	88	89	81	84	84
48	84	88	88	81	84	84
49	83	88	88	80	83	83
50	83	87	87	81	83	83
51	82	87	87	80	82	82
52	82	87	87	81	81	81
53	81	87	87	81	80	80
54	81	86	87	83	79	80
55	80	86	86	86	79	82
56	80	85	86	88	79	83
57	80	85	85	91	80	87
58	81	85	86	93	80	91
59	80	85	85	96	82	105
60	80	85	89	99	84	139
61	80	85	104	101	87	131
62	83	86	117	102	93	243
63	85	86	126	257	107	755
64	87	87	134	813	319	831
65	89	88	148	871	720	874
66	90	89	192	887	827	896
67	93	90	309	882	850	892
68	103	95	469	899	879	913
69	108	104	571	919	905	936
70	223	135	755	930	919	950
71	496	631	794	952	941	976

See figure 6 for the location of the thermocouples.

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Specimen Deflection

Time (mins)	Deflection (mm)
0	0
1	1.7
2	1.8
3	1.5
4	1.5
5	1.5
6	1.5
7	1.7
8	1.8
9	2
10	2.2
11	2.4
12	2.6
13	2.8
14	3.1
15	3.3
16	3.5
17	3.8
18	4.3
19	4.3
20	4.5
21	4.8
22	5.1
23	5.5
24	5.8
25	6.1
26	6.4
27	6.8
28	7.1
29	7.4
30	7.6
31	8
32	8.3
33	8.6
34	9
35	9.2

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Time (mins)	Deflection (mm)
36	9.6
37	9.9
38	10.2
39	10.5
40	10.8
41	11.1
42	11.4
43	11.7
44	12
45	12.2
46	12.5
47	12.8
48	13.1
49	13.3
50	13.6
51	14
52	14.4
53	14.8
54	15.5
55	16.1
56	16.6
57	17.3
58	18.1
59	19
60	20.1
61	21.4
62	22.8
63	24.4
64	27.8
65	31.6
66	36.4
67	43
68	53.7
69	80.5
70	125.8
71	195.3

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The deflection was recorded on the walking surface at the approximate centre of the specimen.

Positive readings indicate deflection into the furnace.

Limiting deflection = 205.1mm (Not exceeded)

Limiting rate of deflection = 9.1mm/min (exceeded at 67 minutes)

Both must be exceeded for loadbearing capacity failure.

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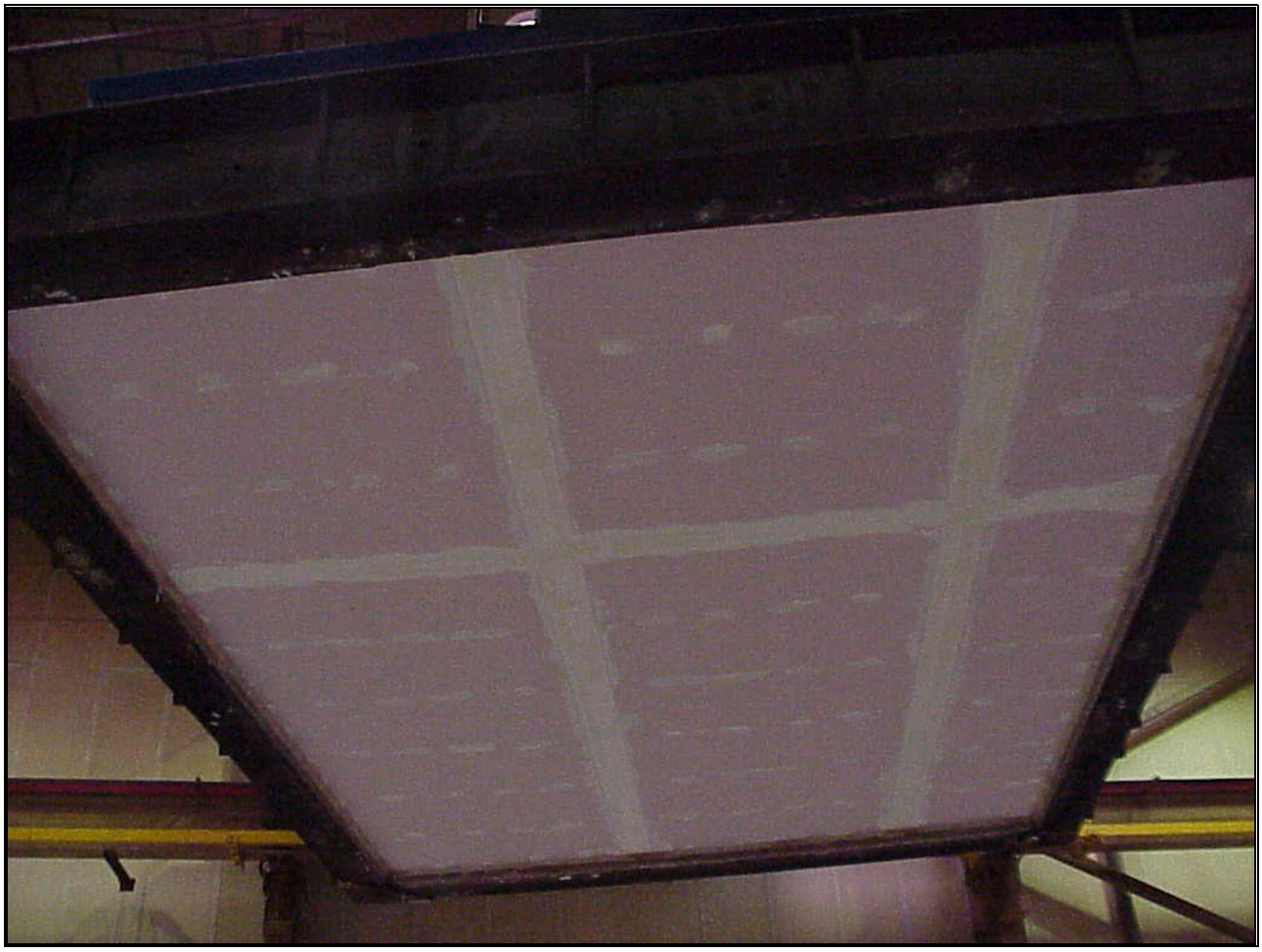
PHOTOGRAPHS



Photograph 1. Exposed face prior to test.

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LOADING CALCULATIONS

The dead load was applied by dividing the floor area of 4m x 3m into 6 x 4 matrix of equal rectangles creating 24 uniformly distributed point loads, the load being applied to each geometric centre of each rectangle. This takes no account of joist positions. The test load was calculated based on the joist carrying the heaviest load being subjected to the maximum allowable stress, in accordance with BS 5268: Part 2: 1996.
NOTE: Final loading value was calculated using unrounded intermediate results.

1. Weights and densities of materials used in construction

Joist data:	Actual joist breadth, b	=	38	mm
	Actual joist depth, d	=	195	mm
	Nominal joist spacing, s	=	600	mm
	Clear span, L	=	4000	mm
	Rows of load points	=	4	
	Total length	=	4200	mm
	Weight	=	12.81	kg
	Density, ρ	=	429	kg/m^3
	Weight per unit length	=	3.18	kg/m
Walking Surface:	Weight per unit area	=	7.88	kg/m^2
Ceiling:	Weight per unit area	=	25.11	kg/m^2

2. Joist reactions

Load points	Joist No. and distances between load points and joists (mm)							
	1	2	3	4	5	6	7	8
First left	0	0	600	600	600	600		
Second left	0	0	0	0	0	0		
First right	600	600	600	600	0	0		
Second right	0	0	0	0	0	0		
TOTAL =	0	0.5	1.0	1.0	0.5	0		

Max. joist load = 1.00 x P where P is point load

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3. Bending calculations

Structural Use of Timber, BS 5268: Part 2: 1996, was used to obtain modification factors and timber grade bending stress.

Grade bending stress, $\sigma_{m,g}$ (Table 7) = 7.5 N/mm^2

Load duration, K_3 (Table 14) = 1
Depth, K_7 (clause 2.10.6) = 1.049
Load Sharing, K_8 (clause 2.9) = 1.1

Permissible bending stress, $\sigma_{m,adm}$ = $(\sigma_{m,g}) \times K_7 \times K_8$

= 8.650 N/mm^2

Permissible applied bending stress, $\sigma_{m,a}$ = $(\sigma_{m,adm})$

= 8.650×10^3 kN/m^2

Section elastic modulus for joists, Z_x = $\frac{b \times d^2}{6}$

= 0.241×10^{-3} m^3

Maximum bending moment, M_0, to be induced in joists:

M_0 = $(\sigma_{m,a}) \times Z_x$

= 2.083 kNm

Required loading, W, to produce maximum bending moment, M_0:
For uniformly distributed load (U.D.L) of W kN/m

M_0 = $\frac{W \times L^2}{8}$

Therefore, W = $\frac{8 \times M_0}{L^2}$

= 1.042 kN/m
= 1.736 kN/m^2

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4. Calculation of self loading

Self weights per 600mm bay (joist centres) per metre run.

Joists:	3.18 x 1.0 x 9.81	=	31.20	N/m
Walking surface:	7.88 x 0.6 x 9.81	=	46.38	N/m
Ceiling:	25.1 x 0.6 x 9.81	=	147.8	N/m
Total		=	225.4	N/m
		=	0.225	kN/m

5. Applied load

Applied loading required = Req'd loading – self loading

= 1.042 – 0.2

= 0.816 kN/m

Considering the position of the 4 rows of point loads and the resulting joist reactions, the worst affected joist, from section 2, will carry a load 1.0 x P.

Hence, applied load required = 1.0 x P

$$P = \frac{0.816}{1.0}$$

= 0.82 kN/m

and, 4P = 3.28 kN/m

Total floor load = 4P x clear span

= 13.12 kN

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6. Deflection check

Since a load sharing system is assumed, E_{mean} and G_{mean} will be assumed from table 7 of BS 5268: Part 2: 1996 as follows:

Modulus of Elasticity, E_{mean} = 10800 N/mm^2

Modulus of Rigidity, G_{mean} = $\frac{10800}{16}$

= 675 N/mm^2

Moment of inertia, I = $\frac{b \times d^3}{12}$

= $23.48 \times 10^6 mm^4$

Bending defection = $\frac{5 \times W \times L^4}{384 \times E \times I}$

= 13.69 mm

Shear deflection = $\frac{K_{form} \times M_0}{A \times G_{mean}}$

(Where K_{form} = 1.2 & A = joist section area)

= 0.500 mm

Total deflection = 14.19 mm

Permissible deflection = 0.003 x clear span

= 12.0 mm

(BS 5268: Part 2: 1996, clause 2.10.7)

Permissible deflection 12.0 mm < Calculated total deflection 14.19 mm

Calculated total deflection ABOVE permissible deflection – SEE LOADING CORRECTION.

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7. Bearing compression check

From Table 7 of BS 5268: Part 2: 1996, for material grade C24:

Grade compression stress $\sigma(_{c,a,tra})$	=	2.4 N/mm^2
Load on most highly stressed joist	=	1.00 P + self weight
	=	1.045 kN/m
	=	4.391 kN (for effective length)
Total bearing area	=	b x d x 2
	=	14820 mm^2
Actual stress at bearing	=	Max. Joist load / Bearing area
	=	0.30 N/mm^2

Permissible comp. Stress 2.4 > Actual bearing stress 0.3

8. Corrected applied load for permissible deflection excess

Corrected required loading	=	Permissible defln / Calculated defln x Req'd loading
	=	0.881 kN/m
	=	1.468 kN/m^2
Applied loading required	=	Required loading – self loading
	=	0.881 – 0.2
	=	0.655 kN/m

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Considering the position of the 4 rows of point loads and the resulting joist reactions, the worst affected joist, from section 2, will carry a load of 1.00 x P.

Hence, Applied load required		=	1.00 x P
	P	=	$\frac{0.655}{1.0}$
		=	0.66 kN/m
and	4P	=	2.64 kN/m
Total floor load		=	4P x clear span
		=	**10.56 kN**
Total dead weight		=	$\frac{10.56 \times 10^3}{9.81}$
		=	1076.45 kg
Therefore, total dead weight per foot		=	$\frac{1076.45}{6}$
		=	**179.4 kg**

The accuracy of the individual dead weights used in the test were within the tolerance stated in BS EN 1363-1: 1999.

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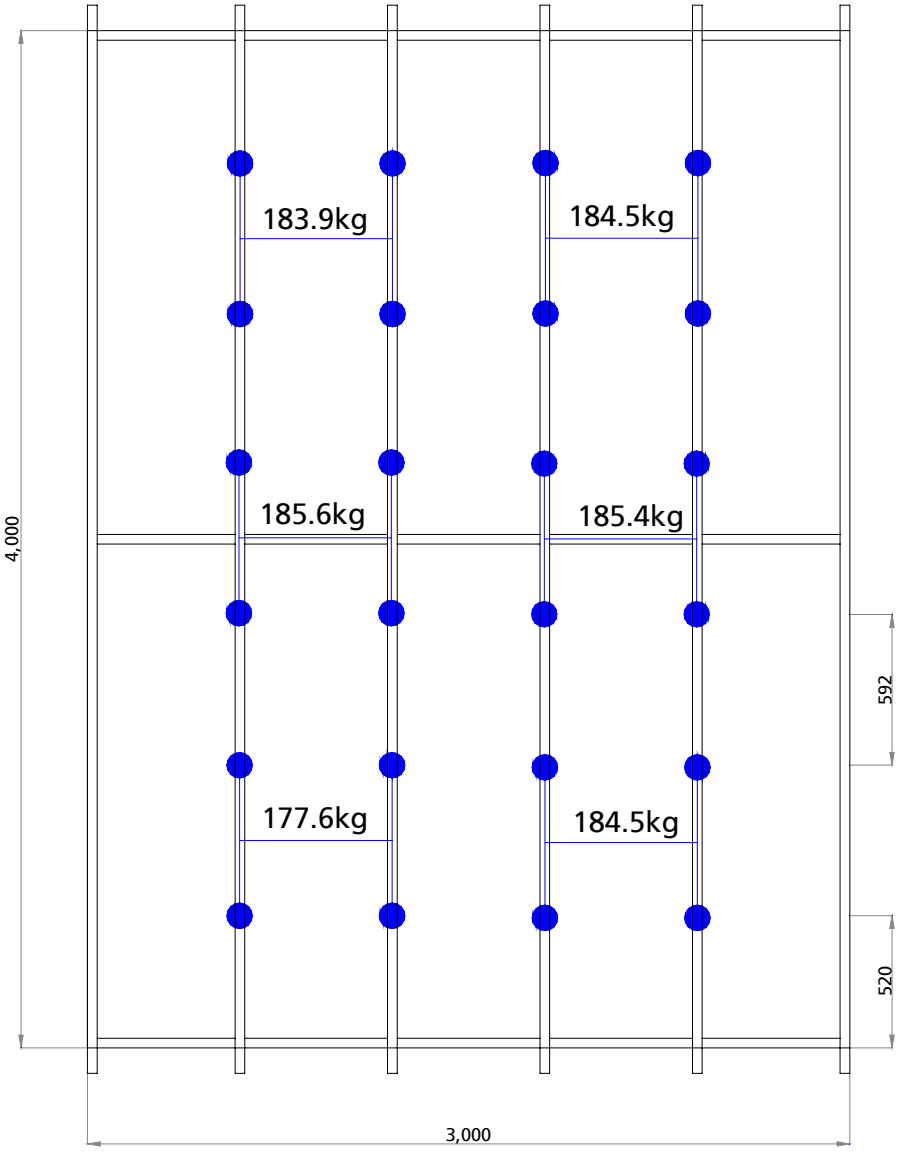

Figure 7. Layout of the actual dead load weights.

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FIELD OF DIRECT APPLICATION

The test results are directly applicable to a similar untested floor construction provided the following is true:

i) With respect to the structural member:

- The maximum moments and shear forces, which when calculated on the same basis as the test load, shall not be greater than those tested.

ii) With respect to the ceiling system:

- The size of panels of the ceiling lining shall not be changed.
- The total area occupied by fixtures and fittings relative to the area of the ceiling lining is not increased and the maximum tested opening in the lining is not exceeded.

iii) With respect to the cavity:

- The height of the cavity or cavities is equal or greater than the height tested.
- No combustible or insulating material is added to the cavity unless the same amount (fire load) of combustible or insulating material was included in the test specimen.