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Title:

The Fire Resistance Performance Of Four Specimens Of Wall Mounted And Four Specimens Of Floor Mounted Linear Gap Sealing Systems, Tested In Accordance With BS EN 1366-4: 2006

Report No:

195854/A

Prepared for:

Everbuild Building Products

Site 41,
Knowsthorpe Way,
Cross Green Industrial Estate,
Leeds,
LS9 0SW

Date:

26th October 2010

Notified Body No:

0833

UKAS TESTING
0249

Summary

Objective

A fire resistance test has been conducted to assess the ability of four vertically orientated specimens and four horizontally orientated specimens of linear gap sealing systems, to reinstate the fire resistance of a blockwork wall and a pre-cast, aerated concrete floor incorporating timber and mild steel sections when tested in accordance with BS EN 1366-4: 2006.

Sponsor

Everbuild Building Products, Site 41, Knowsthorpe Way, Cross Green Industrial Estate, Leeds. LS9 0SW

Summary of the Tested Specimen

For the purpose of the test the floor specimens were referenced A to D and the wall specimens were referenced G, J, K and L.

The section of wall had overall dimensions of 1500 mm high by 1500 mm wide by 150 mm thick and was made up of aerated blockwork arranged to provide four 12 mm wide by 1000 mm long linear gaps.

The section of floor had overall dimensions of 2240 mm long by 1730 mm wide by 150 mm thick and was made up of autoclaved aerated concrete lintels arranged to provide two 12 mm wide by 1000 mm long, one 30 mm wide by 1000 mm long and one 50 mm wide by 1000 mm long linear gaps.

Specimen J incorporated a softwood timber gap facing, Specimen K incorporated a hardwood timber gap facing and Specimens D and L incorporated a mild steel angle gap facing.

Specific details of each of the seals are given in the table below:

Specimen	Gap width	Seal reference	Seal details
A	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with the unexposed face and faced on the exposed side with 15 mm diameter polyethylene backing rod
B	30 mm	Hybriflex FR	15 mm deep, cartridge gunned flush with the unexposed face and faced on the exposed side with 2 no. 20 mm diameter polyethylene backing rods
C	50 mm	Hybriflex FR	25 mm deep, cartridge gunned flush with the unexposed face and faced on the exposed side with 2 no. 25 mm diameter polyethylene backing rods

Specimen	Gap width	Seal reference	Seal details
D	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with the unexposed face and faced on the exposed side with 15 mm diameter polyethylene backing rod
G	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with both faces of the cavity. Both unexposed and exposed gap seals were faced internally with 15 mm diameter polyethylene backing rods
J	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with both faces of the cavity. Both unexposed and exposed gap seals were faced internally with 15 mm diameter polyethylene backing rods
K	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with both faces of the cavity. Both unexposed and exposed gap seals were faced internally with 15 mm diameter polyethylene backing rods
L	12 mm	Hybriflex FR	6 mm deep, cartridge gunned flush with both faces of the cavity. Both unexposed and exposed gap seals were faced internally with 15 mm diameter polyethylene backing rods

Full details of the specimens and installation methods are given in the Schedule of Components.

The test incorporated four other linear gap specimens referenced “Specimens E, F, H and I”, which are reported separately in WF Report No’s. 195854/B.

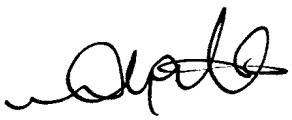
Test Results

Reference	Integrity (mins)		Insulation (mins)
	Cotton Pad	Sustained flaming	
A	240*	240*	140
B	129	131	57
C	91	91	97
D	214	217	81
G	240*	240*	206
J	153	153	151
K	137	137	120
L	240*	240*	69

* The test duration. The test was discontinued after a period of 240 minutes.

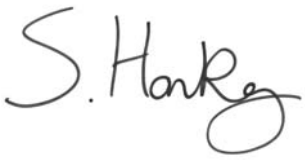
Date of Test 8th September 2010

Signatories



Responsible Officer
D. Yates*
Testing Officer

PP – D. Hankinson
Approved
C. Johnson*
Principal Certification Engineer



Head of Department
S. Hankey*
Operations Manager

* For and on behalf of **Exova Warringtonfire.**

Report Issued

Date : 26th October 2010

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Test Procedure

Introduction

Walls and floors often incorporate gaps to accommodate expansion, contraction or other movement of the structure. The fire resistance of such elements is only as good as their weakest point and it is, therefore, important that any gaps or apertures are adequately sealed, such that weaknesses are not created at these positions.

The specimens were judged on their ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1366-4: 2006.

Fire Test Study Group/EGOLF

Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.

Instruction To Test

The test was conducted on the 8th September 2010 at the request of Everbuild Building Products, the sponsor of the test.

The test was witnessed by Mr. G. Southerington and Mr. C. Abbott.

Test Specimen Construction

A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimens and information supplied by the sponsor of the test.

Installation

Exova Warringtonfire supplied the wall and floor constructions. The gap sealing systems were provided and installed by a representative of the test sponsor during the week commencing 9th August 2010.

Sampling

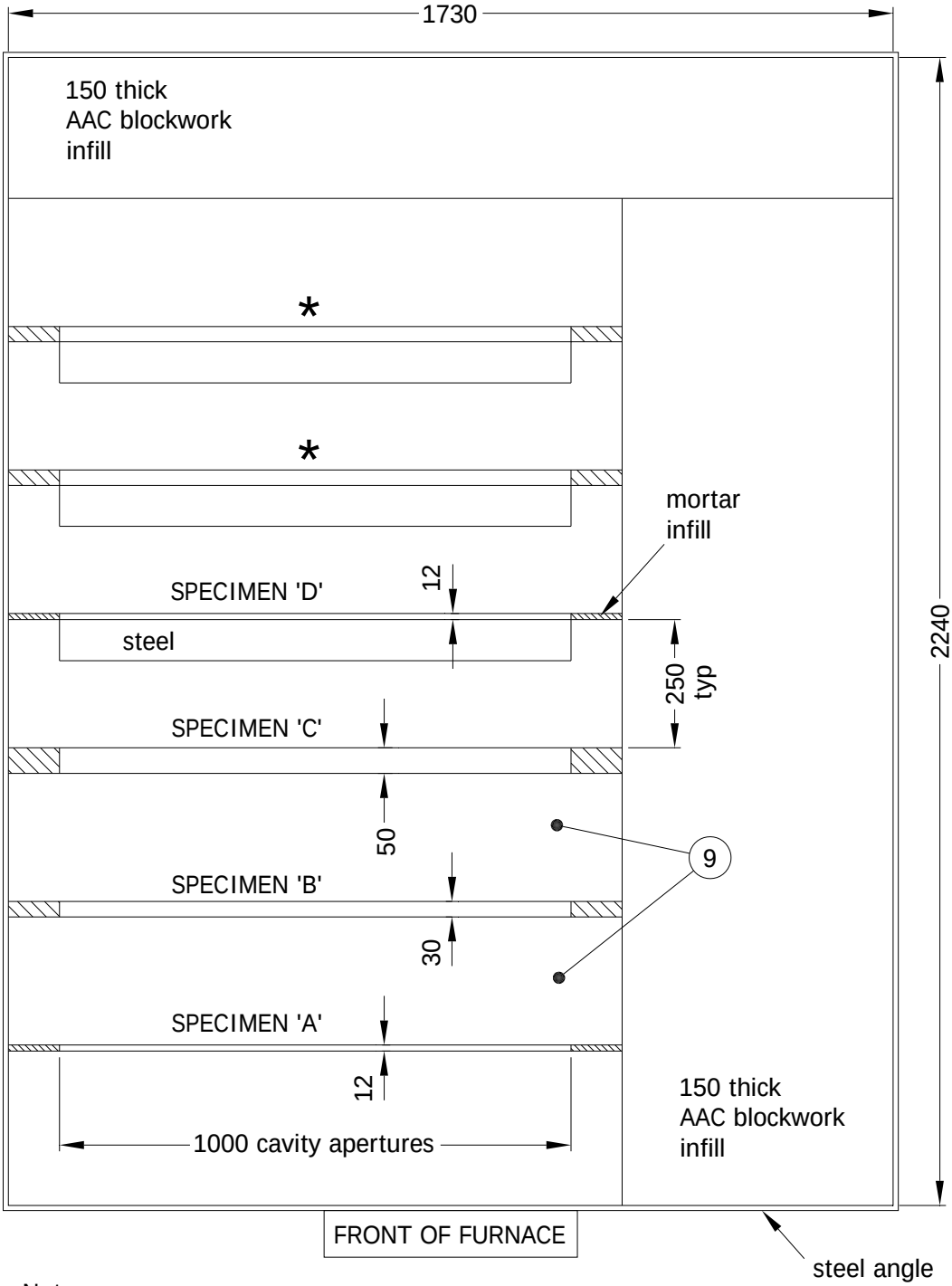
Exova Warringtonfire was not involved in any selection or sampling procedures of the specimen or any of the components.

Conditioning

The specimens' storage, construction, and test preparation took place in the test laboratory over a total, combined time of 31 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 11°C to 26°C and 30% to 88% respectively.

Test Specimen

Figure 1- General Plan of Floor Test Specimens from Unexposed Face

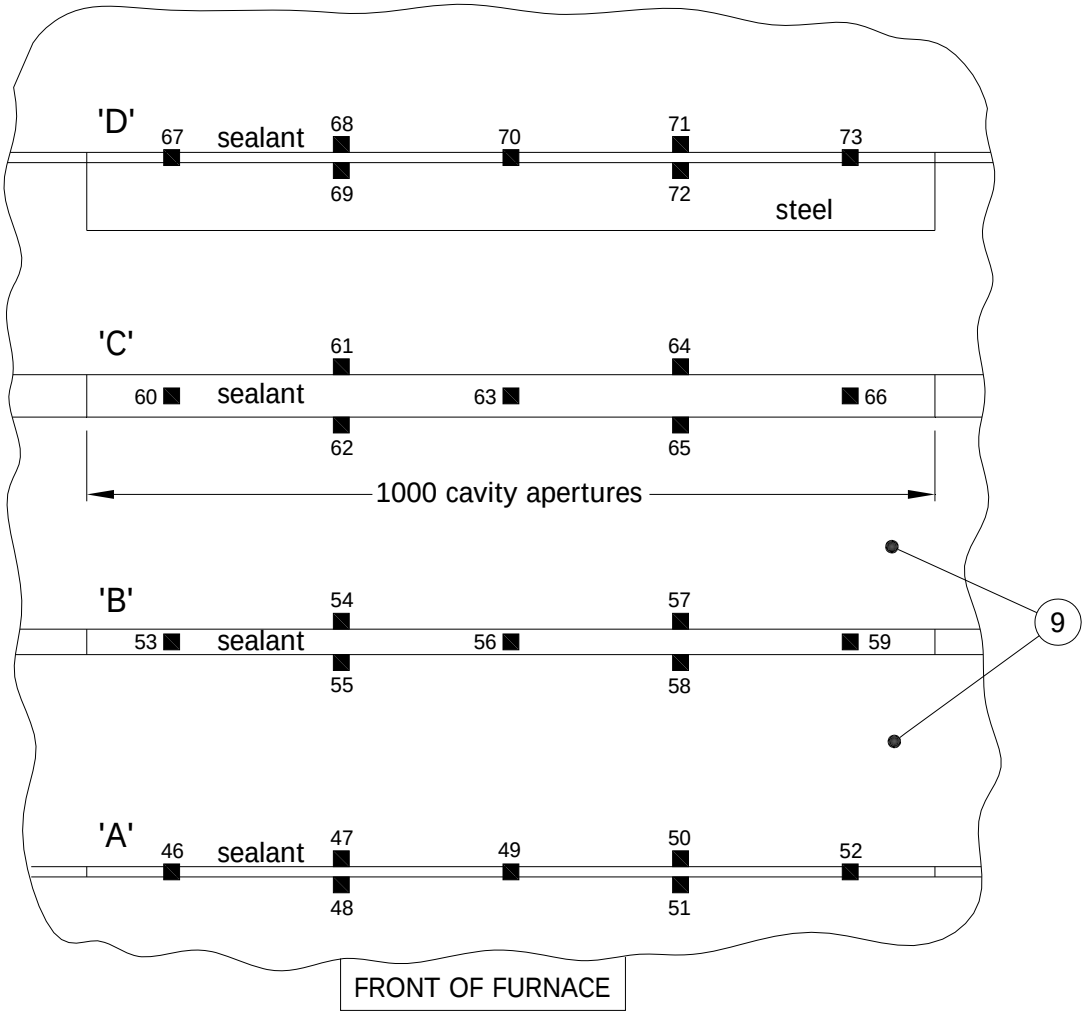


Notes :-

1. Specimens indicated thus * are not the subject of this report
2. AAC = Autoclaved Aerated Concrete

Do not scale. All dimensions are in mm

Figure 2 – Thermocouple Positions at Unexposed Face of Floor Test Specimens

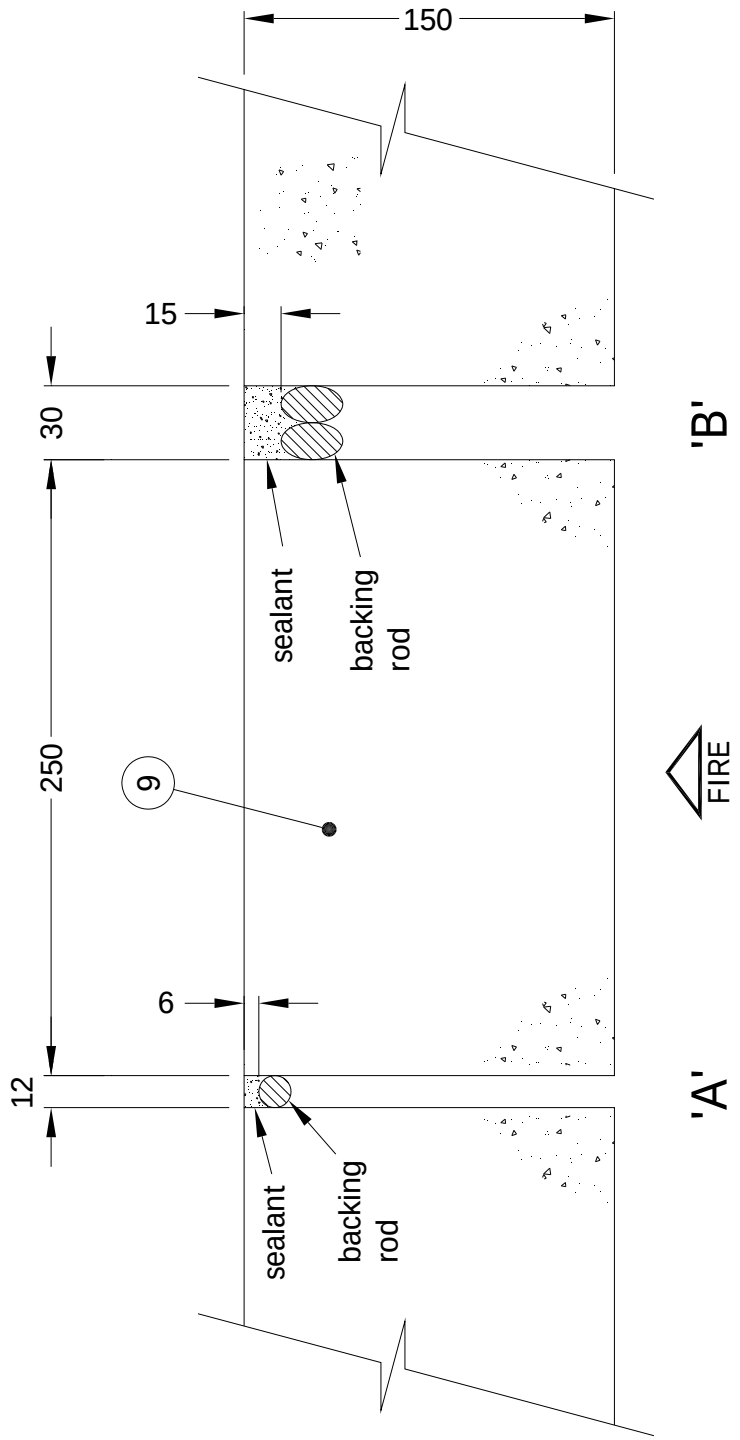


■ Positions of thermocouples

ENLARGED PLAN VIEW ON FLOOR SPECIMENS 'A' TO 'D'
SHOWING THERMOCOUPLE POSITIONS

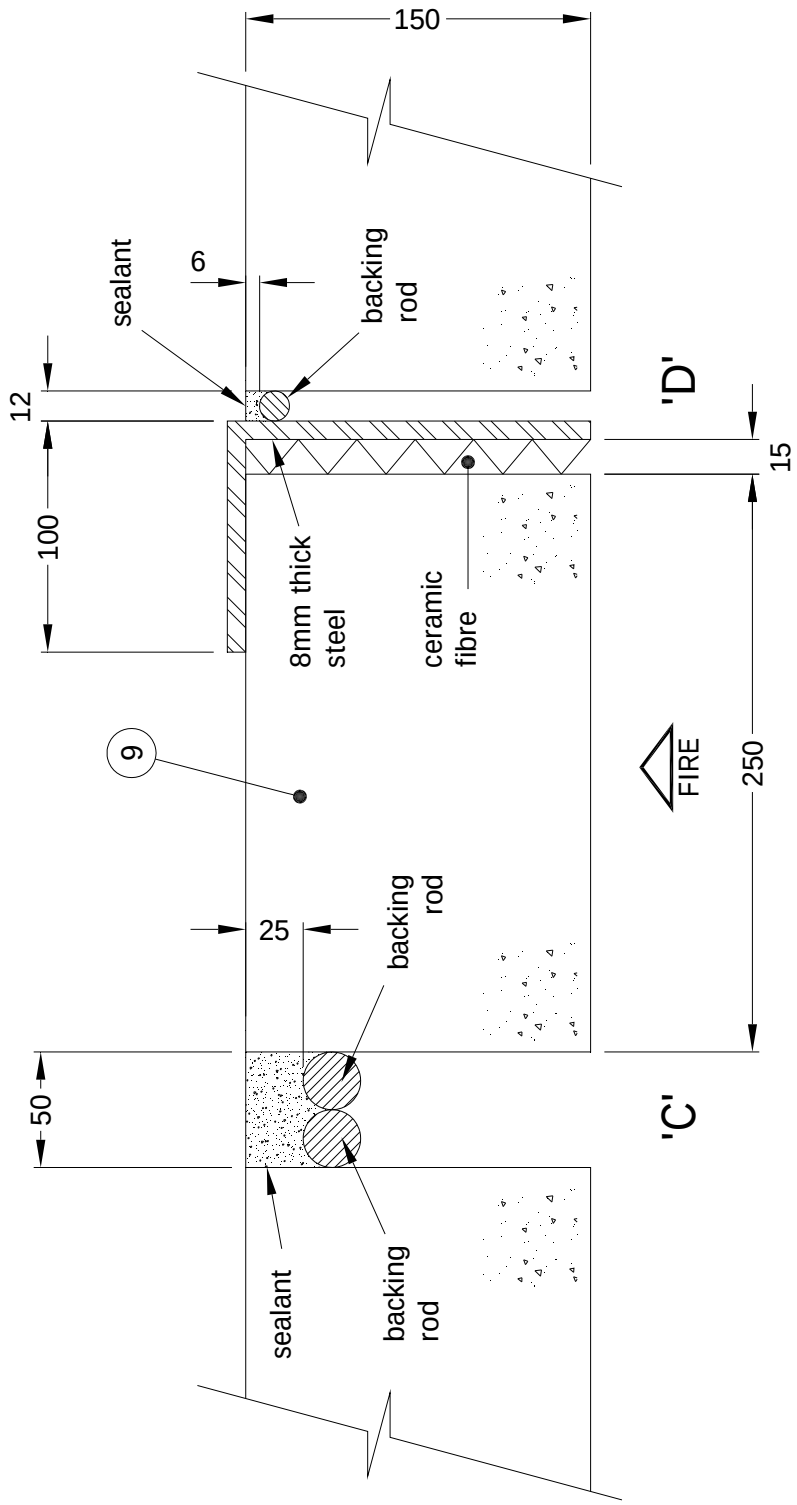
Do not scale. All dimensions are in mm

Figure 3 – Section Through Floor Specimens 'A' and 'B' (items 1 and 2)



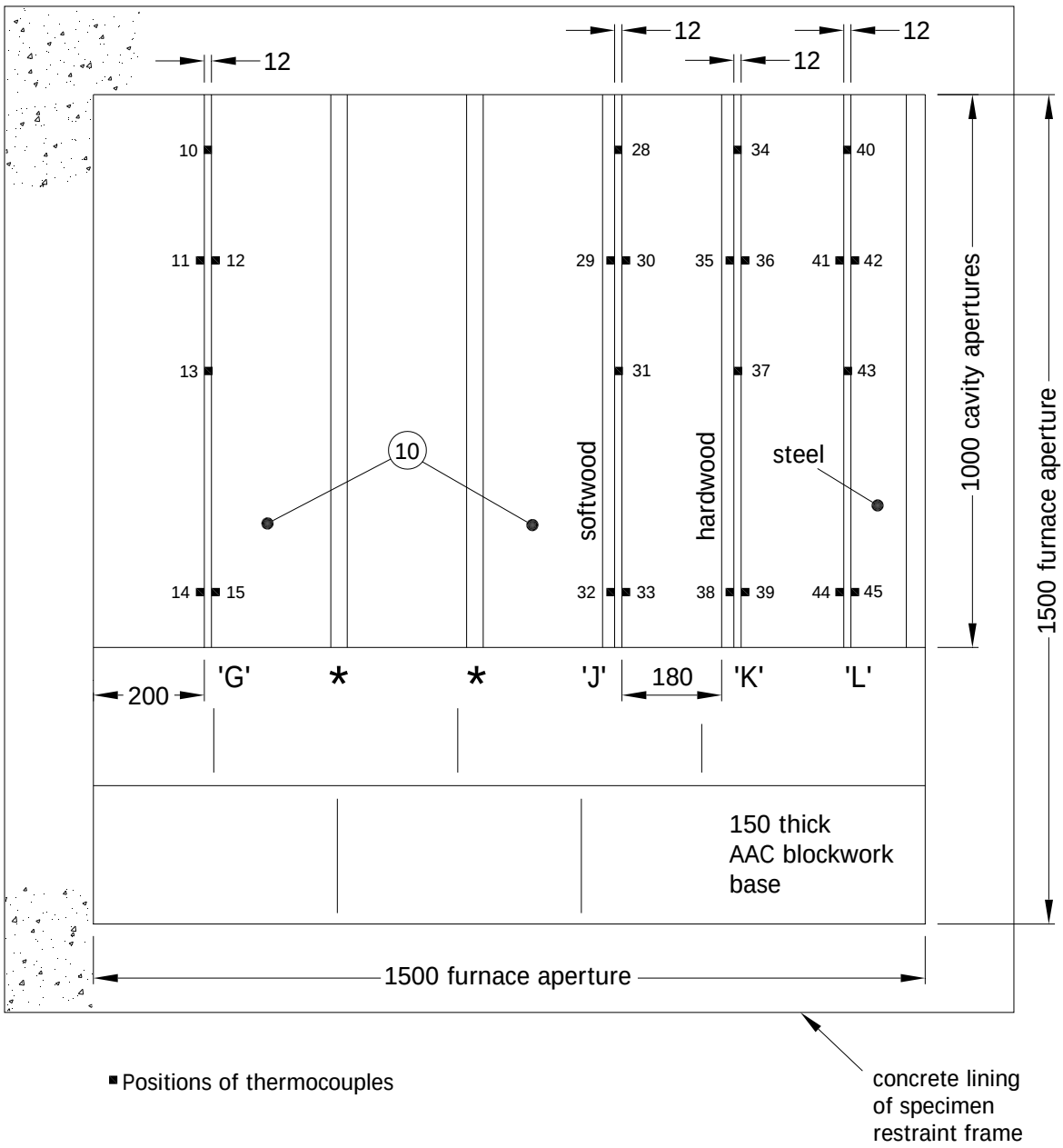
Do not scale. All dimensions are in mm

Figure 4 – Section Through Floor Specimens 'C' and 'D' (items 3 and 4)



Do not scale. All dimensions are in mm

Figure 5 – General Elevation of Wall Test Specimens and Thermocouples at Unexposed Face

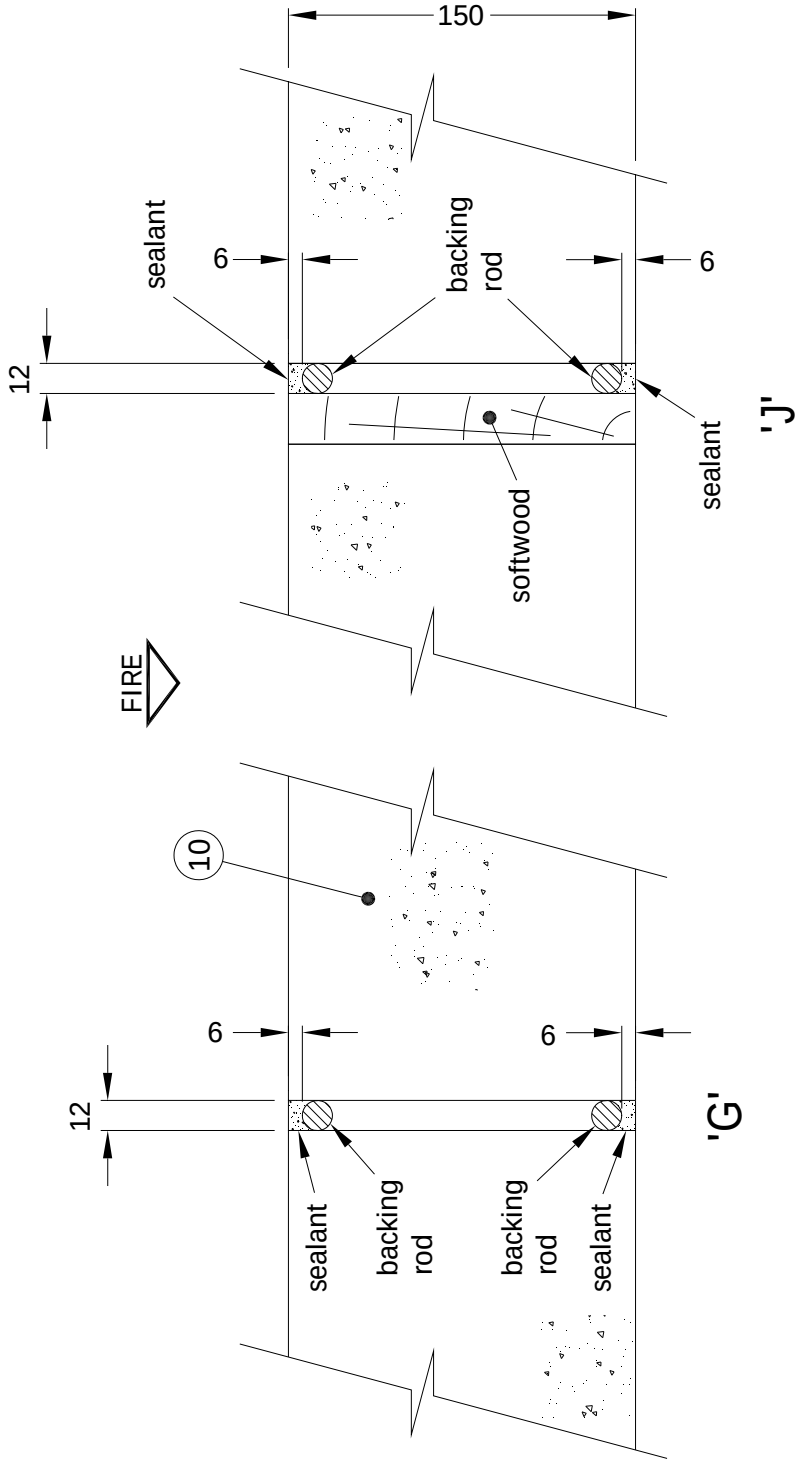


Notes :-

1. Specimens indicated thus * are not the subject of this report
2. AAC = Autoclaved Aerated Concrete

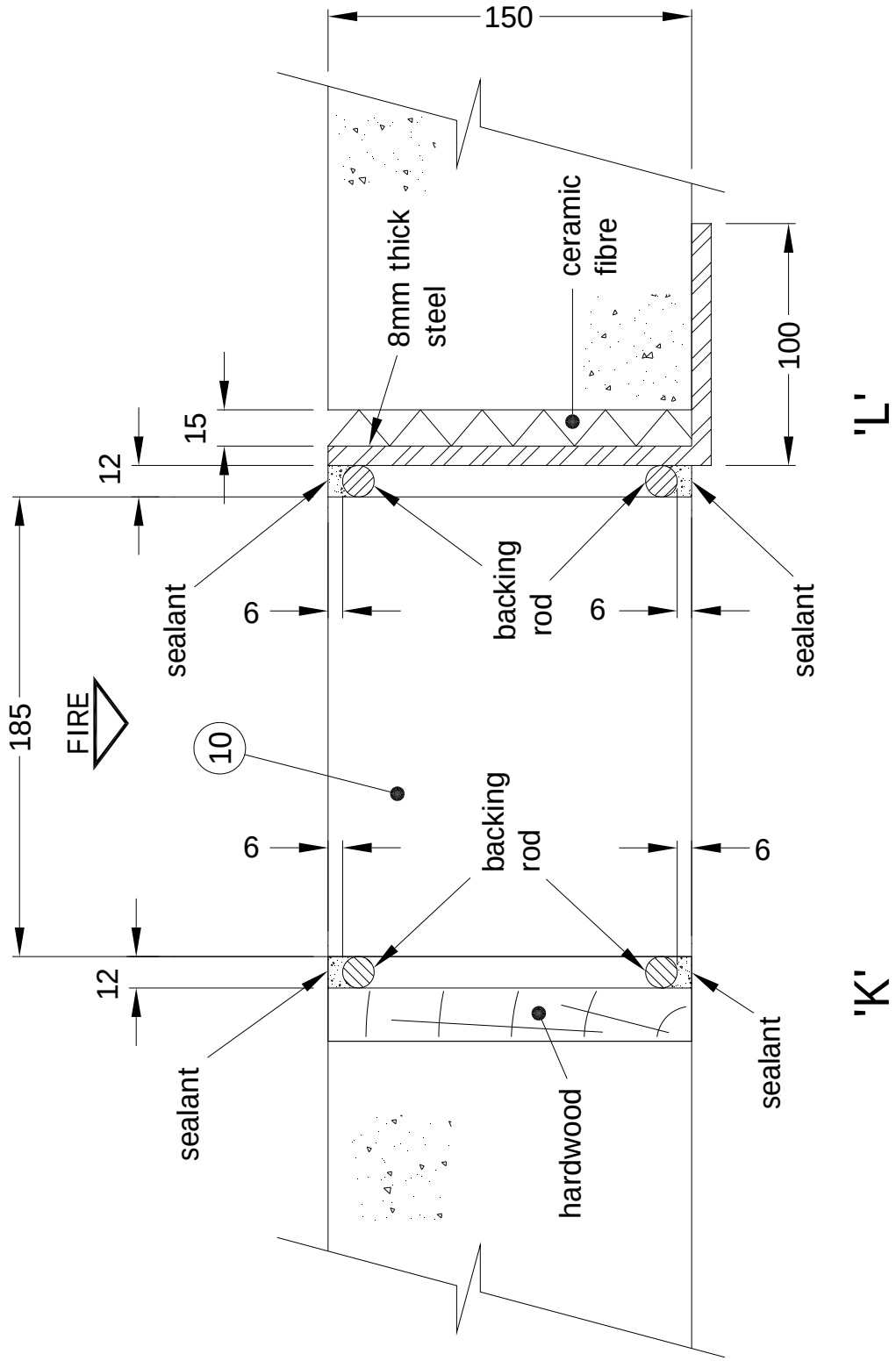
Do not scale. All dimensions are in mm

Figure 6 – Section Through Wall Specimens 'G' and 'J' (items 5 and 6)



Do not scale. All dimensions are in mm

Figure 7 – Section Through Wall Specimens 'K' and 'L' (items 7 and 8)



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 7)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item		Description
Details of Floor Cavity Barriers (items 1 to 4)		
1. Specimen 'A'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at unexposed face of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Masonry (item 9)
2. Specimen 'B'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	30 mm wide x 15 mm deep x 1000 mm long
Application method	:	Cartridge gunned at unexposed face of cavity
Overall size of cavity	:	30 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	2 no. rods, each 20 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Masonry (item 9)
3. Specimen 'C'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	50 mm wide x 25 mm deep x 1000 mm long
Application method	:	Cartridge gunned at unexposed face of cavity
Overall size of cavity	:	50 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	2 no. rods, each 25 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Masonry (item 9)

Item		Description
4. Specimen 'D'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at unexposed face of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Steel/Masonry (item 9)
Details of steel		
Thickness	:	8 mm
Fixing method to masonry	:	Screws
Details of insulation infill		
Material	:	Ceramic fibre insulation
Fixing method	:	Friction fit within void behind steel facing. See Figure 4.
Details of Wall Cavity Barriers (items 5 to 8)		
5. Specimen 'G'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at both faces of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Masonry (item 10)
6. Specimen 'J'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at both faces of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Timber/Masonry (item 10)
Details of Timber		
Material	:	Softwood
Density	:	413 kg/m^3 (measured)
Thickness	:	20 mm
Fixing method to masonry	:	Screws

Item		Description
7. Specimen 'K'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at both faces of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Timber/Masonry (item 10)
Details of Timber		
Material	:	Hardwood
Density	:	686 kg/m^3 (measured)
Thickness	:	20 mm
Fixing method to masonry	:	Screws
8. Specimen 'L'		
Details of Sealant		
Manufacturer	:	Everbuild
Reference	:	Hybriflex FR
Material type	:	MS polymer (Modified Silicone)
Overall section size of sealant	:	12 mm wide x 6 mm deep x 1000 mm long
Application method	:	Cartridge gunned at both faces of cavity
Overall size of cavity	:	12 mm wide x 150 mm deep x 1000 mm long
Details of Backing rod		
Material	:	Polyethylene
Size	:	15 mm diameter
Fixing method	:	Friction fit within cavity
Details of Gap facing	:	Steel/Masonry (item 10)
Details of steel		
Thickness	:	8 mm
Fixing method to masonry	:	Screws
Details of insulation infill		
Material	:	Ceramic fibre insulation
Fixing method	:	Friction fit within void behind steel facing. See Figure 7
9. Concrete Floor		
Material	:	Autoclaved aerated concrete lintels
Density	:	670 kg/m^3
Thickness	:	150 mm
Bedding material	:	Ordinary sand/cement mortar mix
10. Blockwork Wall		
Material	:	Autoclaved aerated concrete blocks
Density	:	760 kg/m^3
Thickness	:	150 mm
Bedding material	:	Ordinary sand/cement mortar mix

Instrumentation

General

The instrumentation was provided in accordance with the requirements of the Standard.

Furnace

The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 1999 Clause 5.1 using three plate thermometers, distributed over a plane 100 mm from the surface of the vertical test construction and three plate thermometers, distributed over a plane 100 mm from the surface of the horizontal test construction

Thermocouple Allocation

Thermocouples were provided to monitor the unexposed surface of the specimens and the output of all instrumentation was recorded at no less than one minute intervals as follows:

The locations and reference numbers of the various unexposed surface thermocouples are shown in Figures 2 and 5.

Roving Thermocouple

A roving thermocouple was available to measure temperatures on the unexposed surface of the specimens at any position, which might appear to be hotter than the temperatures indicated by the fixed thermocouples.

Integrity Criteria

Cotton pads were available to evaluate the integrity of the specimens.

Furnace Pressure

After the first five minutes of testing, the furnace pressure was controlled to maintain a slightly positive pressure relative to the pressure of the laboratory. The furnace atmospheric pressure was measured and controlled such that, at a point at mid height of the specimens in the wall assembly, the differential pressure was calculated to be 15 (±2) Pa. and at a position 100 mm below the underside of the floor assembly was calculated to be 20 (±2) Pa.

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	**secs**	The ambient air temperature in the vicinity of the test construction was 16ºC at the start of the test with a maximum variation of +8ºC during the test.
00	**00**	**The test commences.**
06	**00**	Slight smoke release is evident from the seal of Specimen D.
20	**00**	No further significant changes are evident.
30	**00**	All specimens continue to satisfy the integrity criteria of the test.
50	**00**	Discolouration is evident along the edges of all floor seals. The seal of Specimen B begins to swell along its entire surface.
50	**30**	A large blister forms on the seal of Specimen C directly below thermocouple No. 66.
51	**00**	Large blisters are evident along the entire surface of Specimen C which causes thermocouple No. 60 to become detached.
55	**00**	The seal of Specimen L begins to blister along its entire length.
56	**00**	The seal of Specimen B turns black in colour and begins to crack approximately 50 mm from thermocouple No. 59.
60	**00**	All specimens continue to satisfy the integrity criteria of the test.
60	**10**	A cotton pad integrity test is performed on the seal of Specimen B at the point of discolouration. The cotton pad fails to ignite.
63	**00**	The smoke increases from the floor mounted specimens.
70	**00**	The discolouration on the seal of Specimen B spreads towards the centre of the specimen. The smoke release from Specimen C increases further.
90	**00**	All specimens continue to satisfy the integrity criteria of the test.
91	**00**	A cotton pad integrity test is performed on an area of glowing on Specimen C. The cotton pad ignites and sustained flames continue as the pad is pulled away from the specimen. **Cotton pad and sustained flame integrity failure of Specimen C is deemed to occur.**
100	**00**	No further significant changes are evident.
108	**00**	An area of glowing is evident from between the aerated block and the hard wood substrate of Specimen K.

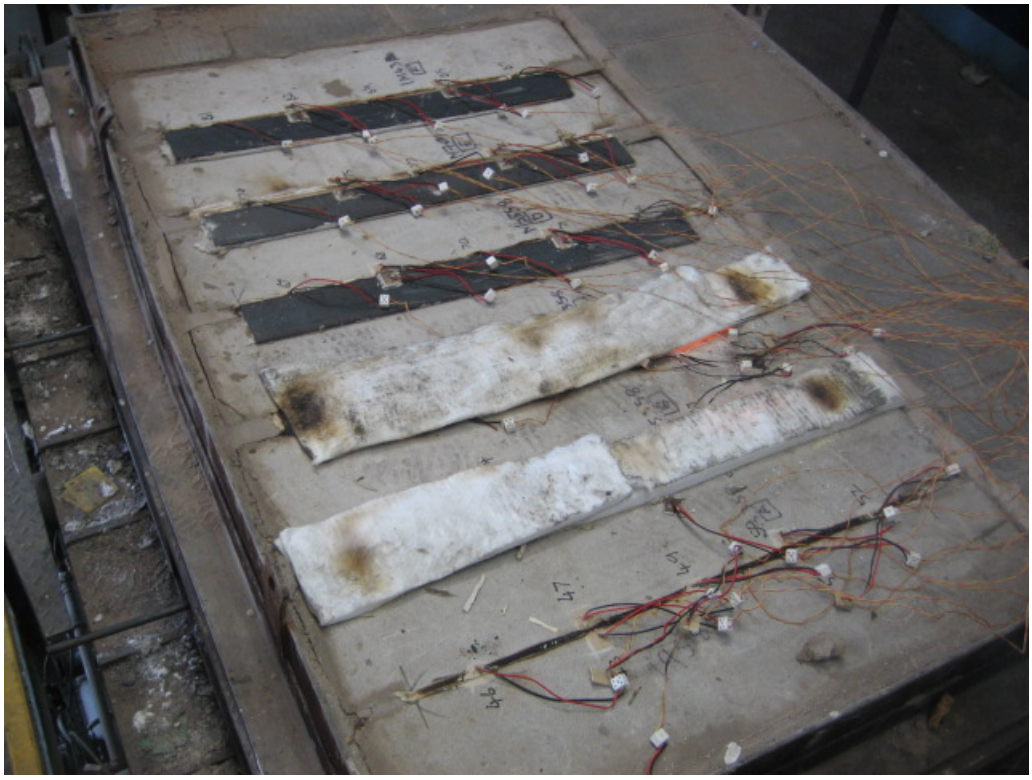
Time		
mins	**secs**	
120	**00**	All specimens excluding from Specimen C continue to satisfy the integrity criteria of the test.
129	**00**	A cotton pad integrity test is performed on an area of glowing on the seal of Specimen B. The cotton pad ignites. The seal degrades so much so that a hole of more than 25 mm appears. **Cotton pad integrity failure of Specimen B is deemed to occur.**
131	**00**	Sustained flames issue from Specimen B. **Sustained flame integrity failure of Specimen B is deemed to occur.** The area is sealed to allow for further examination of the other specimens.
136	**00**	The timber substrate adjacent to the seal of Specimen K glows and degrades.
137	**00**	A cotton pad integrity test is performed on Specimen K. The cotton pad ignites and sustained flames issue. **Cotton pad and sustained flame integrity failure of Specimen K are deemed to occur.**
139	**00**	Areas of glowing are evident along the timber substrate and aerated block of Specimen J.
149	**00**	A cotton pad integrity test is performed on Specimen J. The cotton pad fails to ignite.
152	**00**	A cotton pad integrity test is performed on Specimen J. The cotton pad fails to ignite.
153	**00**	Sustained flames issue from Specimen J. **Sustained flame and cotton pad integrity failure of Specimen J are deemed to occur.**
214	**00**	A cotton pad integrity test is performed over glowing, along the seal of Specimen D. The cotton pad ignites. **Cotton pad integrity failure of Specimen D is deemed to occur**.
217	**00**	A large section of the seal of Specimen D has detached and fallen into the furnace chamber. **Integrity failure of Specimen D is deemed to occur.** Specimen D is blanked off to allow for further examination of other specimens.
240	**00**	The test is discontinued at the request of the sponsor. Specimens A, G, & L continue to satisfy the sustained flame and cotton pad integrity criteria.

Test Photographs

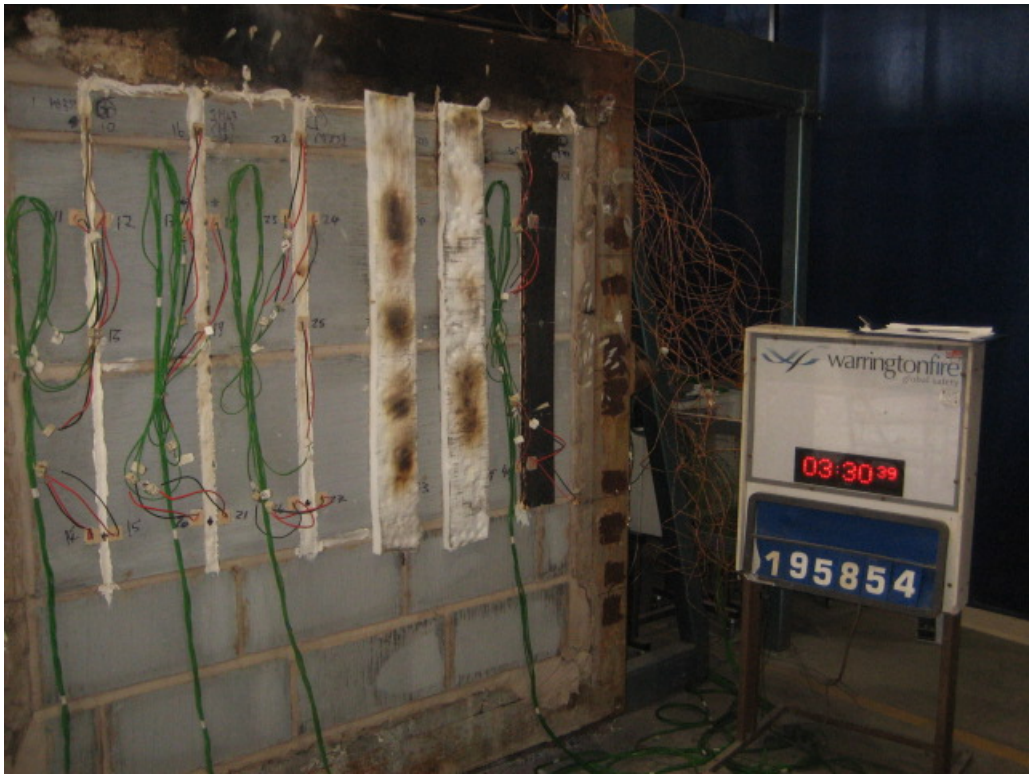
The exposed face of the floor construction prior to testing

The exposed face of the wall construction prior to testing

The unexposed face of the floor construction during the test



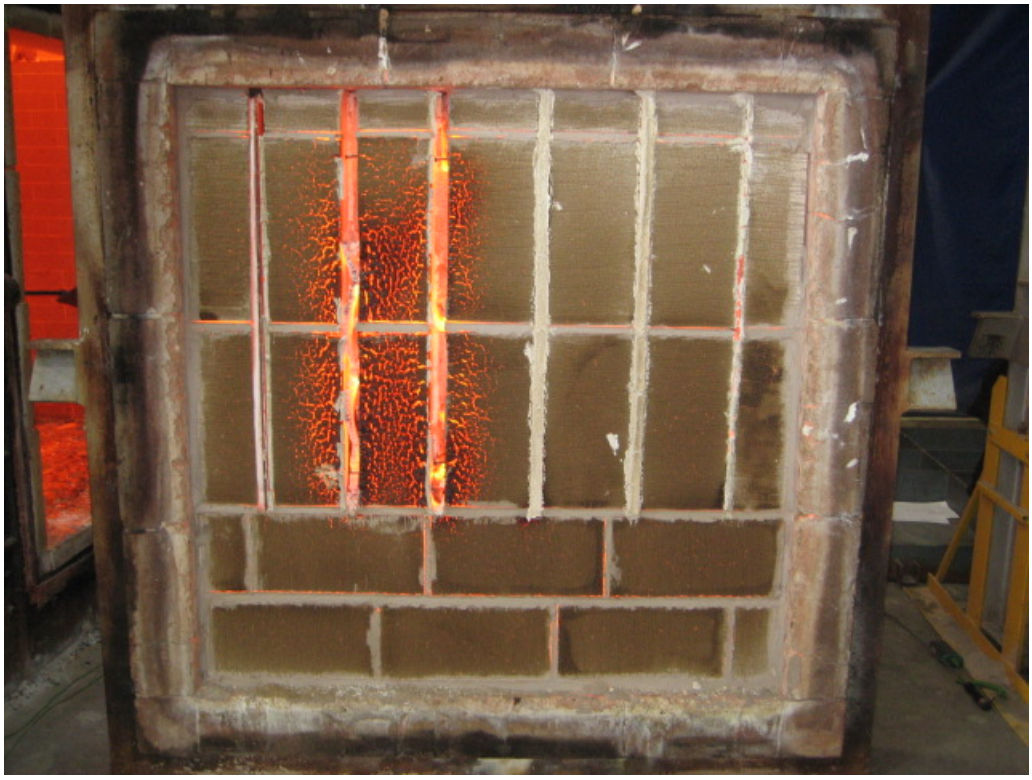
The unexposed face of the wall construction after 210 minutes of testing



The unexposed face of the floor construction during the test

The unexposed face of the wall construction after 240 minutes of testing

The exposed face of the wall construction immediately after the test



Temperature Data

Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	23
10	678	669
20	781	776
30	842	838
40	885	897
50	918	939
60	945	962
70	968	986
80	988	1005
90	1006	1005
100	1022	1016
110	1036	1031
120	1049	1045
130	1061	1057
140	1072	1068
150	1082	1078
160	1092	1088
170	1101	1096
180	1110	1107
190	1118	1115
200	1126	1122
210	1133	1129
220	1140	1134
230	1146	1141
240	1153	1147

Individual Temperatures Recorded On The Unexposed Surface Of Specimen A And Adjacent To Specimen A

Time Mins	T/C Number 46 Deg. C	T/C Number 47 Deg. C	T/C Number 48 Deg. C	T/C Number 49 Deg. C	T/C Number 50 Deg. C	T/C Number 51 Deg. C	T/C Number 52 Deg. C
0	18	18	18	18	18	18	18
10	43	27	30	29	26	25	32
20	74	42	50	54	40	39	56
30	91	55	63	67	50	49	67
40	89	66	70	76	60	60	68
50	98	74	78	85	73	74	75
60	108	78	84	93	79	80	86
70	116	81	88	100	83	83	105
80	126	83	92	110	85	86	120
90	134	84	96	121	87	87	134
100	145	87	104	132	91	91	148
110	155	92	111	142	100	100	161
120	168	100	120	154	109	107	173
130	165	109	126	165	116	114	186
140	165	118	135	176	125	122	198
150	170	128	145	185	135	130	210
160	176	136	156	197	146	143	224
170	177	144	167	207	155	155	238
180	182	153	180	217	165	167	254
190	193	163	192	225	176	180	268
200	211	173	201	234	181	190	281
210	232	177	210	243	187	191	308
220	253	183	216	250	191	197	321
230	280	193	224	265	198	202	339
240	286	198	229	285	201	206	361

Individual Temperatures Recorded On The Unexposed Surface Of Specimen B And Adjacent To Specimen B

Time Mins	T/C Number 53 Deg. C	T/C Number 54 Deg. C	T/C Number 55 Deg. C	T/C Number 56 Deg. C	T/C Number 57 Deg. C	T/C Number 58 Deg. C	T/C Number 59 Deg. C
0	18	18	18	18	18	18	18
5	25	19	19	23	20	19	32
10	51	26	28	45	31	25	64
15	72	36	43	64	42	35	85
20	85	47	57	75	51	45	96
25	92	55	67	82	58	54	101
30	98	63	73	87	64	62	107
35	105	71	79	93	70	71	113
40	109	77	82	98	76	77	123
45	116	82	84	104	85	83	142
50	135	89	88	109	98	88	164
55	155	94	91	117	115	90	187
60	172	100	98	129	129	92	215
65	187	108	108	146	142	94	223
70	204	115	117	165	151	105	248
75	217	124	124	182	163	120	265
80	230	132	132	199	173	131	441
85	243	140	139	213	181	142	517
90	254	147	146	225	188	150	521
95	266	153	153	237	195	162	506
100	277	156	159	246	201	172	499
105	284	161	163	254	215	184	499
110	302	167	167	268	223	197	503
115	334	171	173	303	230	206	509
120	380	176	179	383	231	215	514
125	416	181	185	451	235	219	521
130	459	188	191	485	240	223	623
131	#	#	#	#	#	#	#

#Specimen blanked off to allow the test to continue

Individual Temperatures Recorded On The Unexposed Surface Of Specimen C And Adjacent To Specimen C

Time Mins	T/C Number 60 Deg. C	T/C Number 61 Deg. C	T/C Number 62 Deg. C	T/C Number 63 Deg. C	T/C Number 64 Deg. C	T/C Number 65 Deg. C	T/C Number 66 Deg. C
0	17	16	17	16	17	17	17
3	17	17	17	17	17	17	17
6	19	17	18	18	17	17	21
9	26	20	22	23	18	19	31
12	36	26	30	29	20	22	41
15	45	34	41	36	23	27	50
18	53	45	52	43	27	34	57
21	61	56	62	50	33	42	61
24	67	64	69	56	39	51	63
27	73	70	74	62	45	58	65
30	78	74	76	67	50	62	66
33	82	78	79	72	56	67	68
36	85	80	81	76	62	71	71
39	79	82	82	79	65	73	73
42	50	82	83	83	68	74	58
45	31	83	84	85	70	76	45
48	30	85	86	88	73	78	46
51	33	87	89	92	75	79	55
54	35	88	89	94	76	80	63
57	35	89	91	97	77	81	62
60	37	90	94	98	79	82	69
63	40	92	97	99	80	83	74
66	37	95	106	102	81	85	86
69	41	101	114	105	82	85	77
72	44	111	121	111	85	88	89
75	47	117	126	119	85	89	85
78	53	124	132	125	89	91	69
81	58	130	136	133	90	92	93
84	60	136	141	142	93	93	77
87	65	142	145	148	95	96	*
90	65	148	149	153	96	107	
91	68	150	151	157	95	114	
92	#	#	#	#	#	#	#

*Thermocouple malfunction
#Specimen blanked off to allow the test to continue

Individual Temperatures Recorded On The Unexposed Surface Of Specimen D And Adjacent To Specimen D

Time Mins	T/C Number 67 Deg. C	T/C Number 68 Deg. C	T/C Number 69 Deg. C	T/C Number 70 Deg. C	T/C Number 71 Deg. C	T/C Number 72 Deg. C	T/C Number 73 Deg. C
0	16	18	17	17	16	17	17
10	35	23	30	33	21	28	31
20	77	36	59	57	30	44	47
30	102	52	95	87	42	66	73
40	119	64	122	108	53	94	105
50	142	73	143	129	63	123	132
60	162	80	161	151	74	146	156
70	178	84	174	170	81	165	175
80	195	88	187	188	86	182	188
90	206	90	198	204	89	195	200
100	217	91	207	219	91	206	212
110	229	95	215	232	95	215	225
120	756	102	223	241	100	223	240
130	343	112	230	249	107	230	271
140	372	127	241	260	117	237	315
150	391	138	253	288	138	246	367
160	419	149	269	329	161	258	381
170	446	162	285	373	177	273	412
180	473	178	304	401	193	290	445
190	508	191	322	438	202	308	478
200	550	210	339	483	218	326	509
210	588	218	357	520	232	347	544
216	606	234	368	547	244	362	572
217	#	#	#	#	#	#	#

#Specimen blanked off to allow the test to continue

Individual Temperatures Recorded On The Unexposed Surface Of Specimen G And Adjacent To Specimen G

Time Mins	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	T/C Number 14 Deg. C	T/C Number 15 Deg. C
0	17	17	17	17	17	17
10	18	17	17	19	17	17
20	25	20	20	23	18	18
30	36	25	25	31	21	21
40	51	33	33	42	27	27
50	65	44	45	57	37	37
60	73	58	60	71	48	48
70	77	66	68	75	58	58
80	81	71	73	77	66	66
90	85	74	75	80	69	69
100	89	76	77	82	72	71
110	91	77	78	85	72	72
120	94	78	79	86	74	73
130	100	78	79	87	75	74
140	109	80	80	93	76	75
150	120	81	81	98	78	76
160	133	83	83	104	79	77
170	145	83	85	112	80	78
180	159	85	87	124	82	80
190	173	87	89	138	83	81
200	188	90	92	155	85	83
210	202	98	95	171	87	85
220	217	107	101	184	89	87
230	229	119	111	197	91	89
240	241	130	123	209	92	90

Individual Temperatures Recorded On The Unexposed Surface Of Specimen J And Adjacent To Specimen J

Time	T/C Number	T/C Number	T/C Number	T/C Number	T/C Number	T/C Number
Mins	28	29	30	31	32	33
	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C
0	17	16	17	17	17	17
5	17	17	17	17	17	17
10	17	17	18	17	17	17
15	18	18	18	18	17	17
20	20	19	21	19	17	18
25	21	20	23	21	18	20
30	23	22	25	22	19	22
35	27	24	27	24	20	25
40	32	29	31	26	21	27
45	40	43	35	30	23	29
50	52	55	44	40	24	32
55	63	63	52	49	26	35
60	69	65	59	55	28	38
65	73	68	65	62	31	40
70	75	69	70	68	38	44
75	76	69	74	70	44	46
80	77	70	77	73	52	51
85	77	71	79	75	58	56
90	79	72	81	77	62	62
95	79	73	82	79	68	68
100	80	74	83	83	72	74
105	82	75	84	85	76	80
110	84	77	86	88	79	84
115	85	79	86	90	79	86
120	87	83	87	93	80	88
125	90	88	89	98	80	90
130	94	92	91	101	82	91
135	102	99	93	102	81	93
140	121	111	99	108	61	95
145	165	130	110	123	28	96
150	*	177	121	138	28	98
152		225	128	143	29	100
153	#	#	#	#	#	#

*Thermocouple malfunction
#Specimen blanked off to allow the test to continue

Individual Temperatures Recorded On The Unexposed Surface Of Specimen K And Adjacent To Specimen K

Time	T/C Number	T/C Number	T/C Number	T/C Number	T/C Number	T/C Number
Mins	34	35	36	37	38	39
	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C
0	16	17	17	16	16	17
5	17	17	17	17	17	17
10	19	17	17	17	17	17
15	22	19	18	17	17	17
20	26	21	19	18	17	18
25	30	25	21	19	17	18
30	33	31	24	21	18	19
35	38	37	27	24	19	20
40	43	41	30	28	21	23
45	54	47	34	34	24	25
50	66	58	41	47	29	28
55	75	67	49	58	36	30
60	79	73	55	64	45	33
65	83	77	61	68	51	36
70	88	79	67	71	56	39
75	92	78	71	74	60	42
80	98	80	75	79	67	45
85	105	82	78	82	74	49
90	116	84	80	86	76	53
95	129	87	82	90	78	57
100	144	90	84	95	77	60
105	159	95	85	101	78	64
110	172	102	87	108	79	67
115	185	113	88	141	79	70
120	196	126	92	163	79	74
125	205	147	100	192	81	77
130	208	186	110	230	82	79
135	*	234	119	266	83	80
136		244	121	274	82	81
137	#	#	#	#	#	#

*Thermocouple malfunction
#Specimen blanked off to allow the test to continue

Individual Temperatures Recorded Adjacent To Specimen L

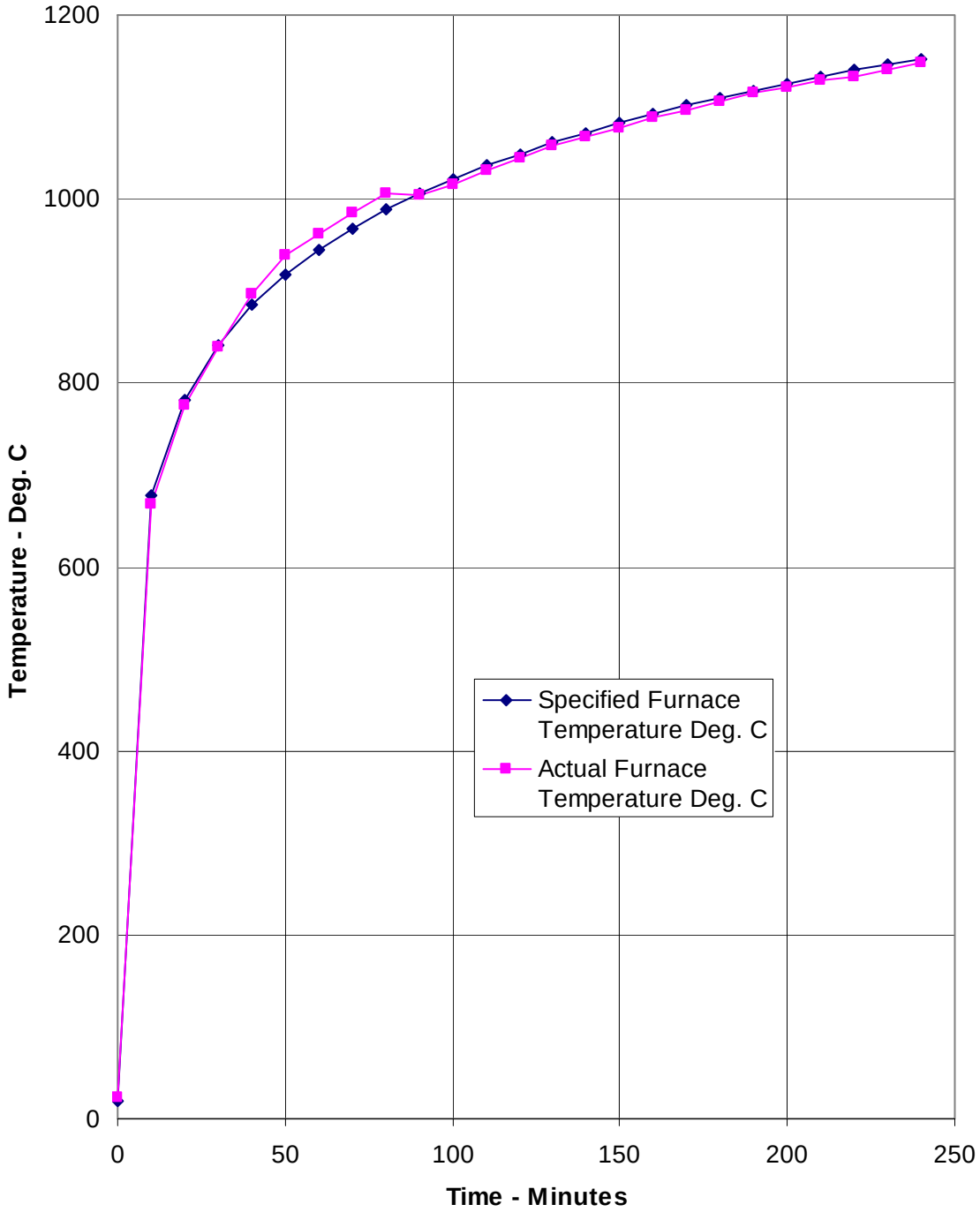
Time Mins	T/C Number 40 Deg. C	T/C Number 41 Deg. C	T/C Number 42 Deg. C	T/C Number 43 Deg. C	T/C Number 44 Deg. C	T/C Number 45 Deg. C
0	17	17	17	17	17	17
10	30	18	27	27	18	24
20	50	25	52	52	24	47
30	79	38	83	88	35	78
40	105	59	115	118	58	107
50	115	74	149	148	72	136
60	121	82	175	176	81	161
70	138	87	196	198	88	182
80	154	90	212	216	92	199
90	167	92	227	231	98	213
100	180	99	238	243	108	225
110	193	110	249	255	120	234
120	210	121	258	265	129	243
130	222	131	267	275	139	252
140	234	139	277	283	146	260
150	241	149	285	276	154	268
160	252	157	294	279	164	276
170	288	165	303	289	169	283
180	356	171	313	*	178	291
190	387	179	322		182	298
200	398	186	332		194	305
210	414	196	342		204	314
220	433	205	352		210	319
230	474	220	363		217	325
240	*	247	376		223	333

*Thermocouple malfunction

Table Showing Recorded Furnace Pressure at mid height of the wall assembly

Time Mins	Recorded Pressure Pascals
0	0
10	16
20	16
30	16
40	16
50	16
60	16
70	16
80	16
90	16
100	16
110	16
120	15
130	16
140	17
150	16
160	14
170	16
180	14
190	16
200	16
210	16
220	17
230	15
240	15

Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard



Performance Criteria and Test Results

Integrity

It is required that the specimen retains its separating function, without either causing ignition of a cotton pad when applied as specified in BS EN 1363-1: 1999, or resulting in sustained flaming on the unexposed surface. **These requirements were satisfied for the periods shown below:**

Reference	Integrity (mins)	
	Cotton Pad	Sustained flaming
A	240*	240*
B	129	131
C	91	91
D	214	217
G	240*	240*
J	153	153
K	137	137
L	240*	240*

Insulation

The requirements of the standard are that the maximum temperature rise shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1363-1: 1999. **These requirements were satisfied for the periods shown below:**

Specimen	Insulation (minutes)
A	140
B	57
C	97
D	81
G	206
J	151
K	120
L	69

* The test duration. The test was discontinued after a period of 240 minutes.

Ongoing Implications

Limitations

The results relate only to the behaviour of the specimens 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 results may not be applicable to situations where the joint widths, sealant depths, orientations, supporting construction and backing material vary from those tested.

Conclusions

Evaluation against objective

A fire resistance test has been conducted to assess the ability of four wall mounted and four floor mounted specimens of linear joint sealing systems, to reinstate the integrity and insulation performance (as defined in BS EN 1366-4: 2006) of a simulated wall construction, where adjacent structures abut.

Test Results:

Reference	Integrity (mins)		Insulation (mins)
	Cotton Pad	Sustained flaming	
A	240*	240*	140
B	129	131	57
C	91	91	97
D	214	217	81
G	240*	240*	206
J	153	153	151
K	137	137	120
L	240*	240*	69

* The test duration. The test was discontinued after a period of 240 minutes.

Field of Direct Application

Orientation

The field of application regarding the orientation of the linear joint is given in Table 1.

Table 1 – Field of application regarding orientation

Tested orientation	Application
A	A, D, E [a]
B	B
C	C, D [b]
[a] Orientation E will only be covered by test orientation A if shear movement was chosen and one face of the joint was fixed and the other face was moved. [b] Orientation D will only be covered by test orientation C if shear movement was chosen and one face of the joint was fixed and the other face was moved.	

Key

A. Linear joint in a horizontal test construction.

B. Vertical linear joint in a vertical test construction.

C. Horizontal linear joint in a vertical test construction.

D. Horizontal wall joint abutting a floor, ceiling or roof.

E. Horizontal floor joint abutting a wall.

Table 1 only applies when both the supporting construction and the location of the seal within the linear joint remain unchanged.

Supporting construction

Test results obtained with autoclaved aerated concrete standard supporting constructions apply to concrete, block work and masonry separating elements of a thickness and density equal to or greater than that tested.

Test results obtained with timber standard supporting construction apply to timber separating elements of a thickness and density equal to or greater than that tested.

Test results obtained with the steel angle standard supporting construction apply to separating element constructions made of metals with a melting point higher than 1 000 °C.

Seal position

Test results are valid only for the position in which the seal was tested, except that where the linear joint seal was fitted flush with the surface of the supporting construction and is exposed to the fire.

Mechanically induced movement

The linear gap sealing systems were not tested for mechanically induced movement, therefore the movement capability of the linear joint seal must be less than ± 7.5 %