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Title:

Ad-Hoc Fire Resistance Test Utilising The General Principles Of BS EN 1363-1: 2012 On Five Specimens Of Linear Gap Seals And Four Specimens Of Penetration Seals Mounted Within A Plasterboard Wall Construction

Report No:

326796/B



Prepared for:

Everbuild Building Products

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

Date:

2013

Notified Body No:

0833



0249

Summary

Objective

An Ad-Hoc fire resistance test has been conducted to assess the ability of five specimens of linear gap seals and four specimens of penetration seals mounted within a section of steel stud, plasterboard faced partition wall. The performance of the specimens was assessed against the integrity and insulation (maximum temperature rise only) performance criteria defined in BS EN 1363-1: 2012.

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 specimens were referenced G to O.

The partition assembly had overall nominal dimensions of 1500 mm high by 1500 mm wide by 100 mm thick and was formed from 50 mm wide galvanised mild steel studs, friction fitted into galvanised steel head and base channels. Each side of the stud frame was faced with two layers of 12.5 mm thick 'Gypsum' Type F plasterboard. The framework was infilled with mineral wool insulation having a nominal density of 100 kg/m³.

The linear gaps were each nominally 10 mm wide by 1500 mm high and were formed between the partition studs and a range of timber and steel sections fitted to the adjacent steel stud. Each gap was sealed with Acrylic based intumescent sealant referenced "Everbuild Firemate Intumescent Sealant/Fireseal 300/AC95". Each seal was cartridge gunned into the gaps.

The four holes nominally 38 mm diameter were cut through the face of the partition and penetrated by telecommunication cables. Each of the apertures was sealed with Acrylic based intumescent sealant referenced "Everbuild Firemate Intumescent Sealant/Fireseal 300/AC95". Each seal was cartridge gunned into the gaps. Specific details of each of the seals are given in the table below:

Linear Gap Specimens	Gap width	Seal details
G	Plasterboard/ Softwood	25 mm deep, cartridge gunned flush with both faces of the partition. Both unexposed and exposed gap seals were faced internally with 13 mm diameter polyethylene backing rods.
H	Plasterboard/ Hardwood	25 mm deep, cartridge gunned flush with both faces of the partition. Both unexposed and exposed gap seals were faced internally with 13 mm diameter polyethylene backing rods.
I	Plasterboard/ Plasterboard	25 mm deep, cartridge gunned flush with both faces of the partition. Both unexposed and exposed gap seals were faced internally with 13 mm diameter polyethylene backing rods.
J	Plasterboard/ Steel	25 mm deep, cartridge gunned flush with both faces of the partition. Both unexposed and exposed gap seals were faced internally with 13 mm diameter polyethylene backing rods.
K	Plasterboard/ Plasterboard	25 mm deep, cartridge gunned flush with both faces of the partition with a backing of 50 mm thick and a nominal density of 100 kg/m ³ mineral wool insulation.

Penetration Seal Specimens	Penetration Services	Seal Details
L	Single Telecoms Cable laid at the bottom of the aperture	25 mm deep, cartridge gunned flush with both faces of the partition with a backing of 50 mm thick and a nominal density of 100 kg/m ³ mineral wool insulation.
M	Single Telecoms Cable laid at the bottom of the aperture	100 mm deep, cartridge gunned flush with both faces of the partition
N	Bunch of 5 Telecoms Cables laid at the bottom of the aperture	25 mm deep, cartridge gunned flush with both faces of the partition with a backing of 50 mm thick and a nominal density of 100 kg/m ³ mineral wool insulation.
O	Bunch of 5 Telecoms Cables laid at the bottom of the aperture	100 mm deep, cartridge gunned flush with both faces of the partition

The test incorporated 6 other specimens referenced "Specimens A to F, which are reported separately in WF Report No. 326796/A.

If the performance of the specimens were assessed against the integrity and insulation (maximum temperature rise only) performance criteria of BS EN 1363-1: 2012. The results obtained could be expressed as follows:

Test Results

Specimen	Integrity (mins)		Insulation (mins)
	Cotton Pad	Sustained flaming	
G	122#	122#	122#
H	122#	122#	122#
I	122#	122#	122#
J	122#	122#	77
K	122#	122#	122#
L	122#	122#	85
M	122#	122#	73
N	122#	122#	122#
O	122#	122#	122#

The test was discontinued after a period of 300 minutes. #Specimen blanked off to allow the test to continue.

At the request of the sponsor the test was performed upon the specimen sealing systems installed within a partition of reduced dimensions. The results of this test may not therefore apply to supporting constructions of larger dimensions than those tested.

Date of Test

8th April 2013

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Signatories

Responsible Officer D. Yates* Testing Officer

Approved C. Abbott* Senior Certification Engineer

Head of Department S. Hankey* Operations Manager

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

Report Issued
Date : 2013

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Test Procedure

Introduction

At the request of the sponsor this test was carried out utilising the general principles of BS EN 1363-1: 2012, 'Fire resistance tests Part 1: General Requirements' to determine the integrity and insulation performances of the specimens as defined in that standard.

At the request of the sponsor the test was performed upon the specimen sealing systems installed within a partition of reduced dimensions. The results of this test may not therefore apply to supporting constructions of larger dimensions than those tested.

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 April 2013 at the request of Everbuild Building Products, the sponsor of the test.

The test was witnessed by Mr. P. Thomas, a representative of the sponsor of the test.

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

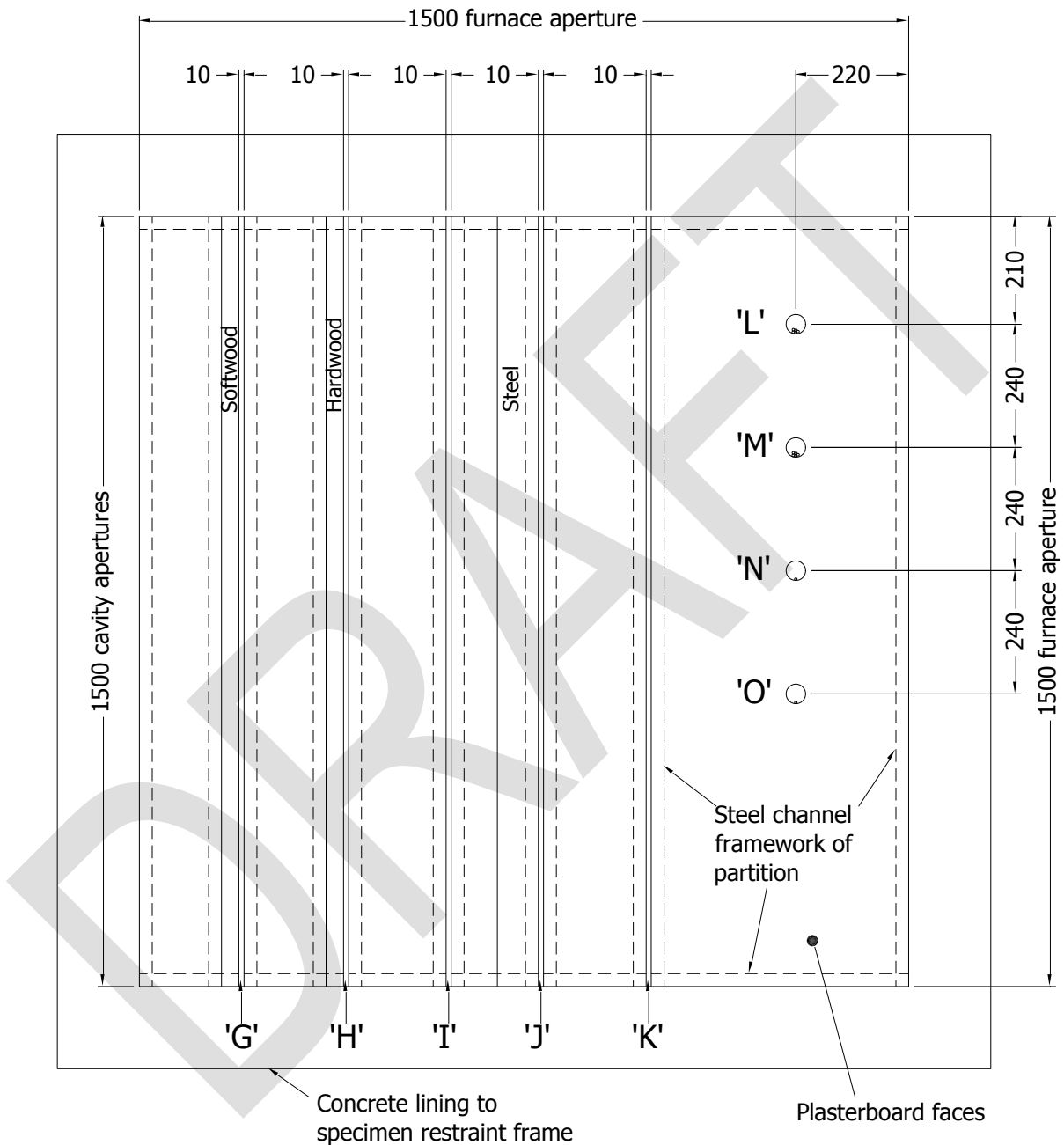
Exova Warringtonfire supplied the wall construction. The sealing systems were provided and installed by a representative of the test sponsor on the 7th March 2013.

Sampling

A representative of Warrington Certification Limited selected and sampled the intumescent sealant on the 15th November 2012.

Test Specimen

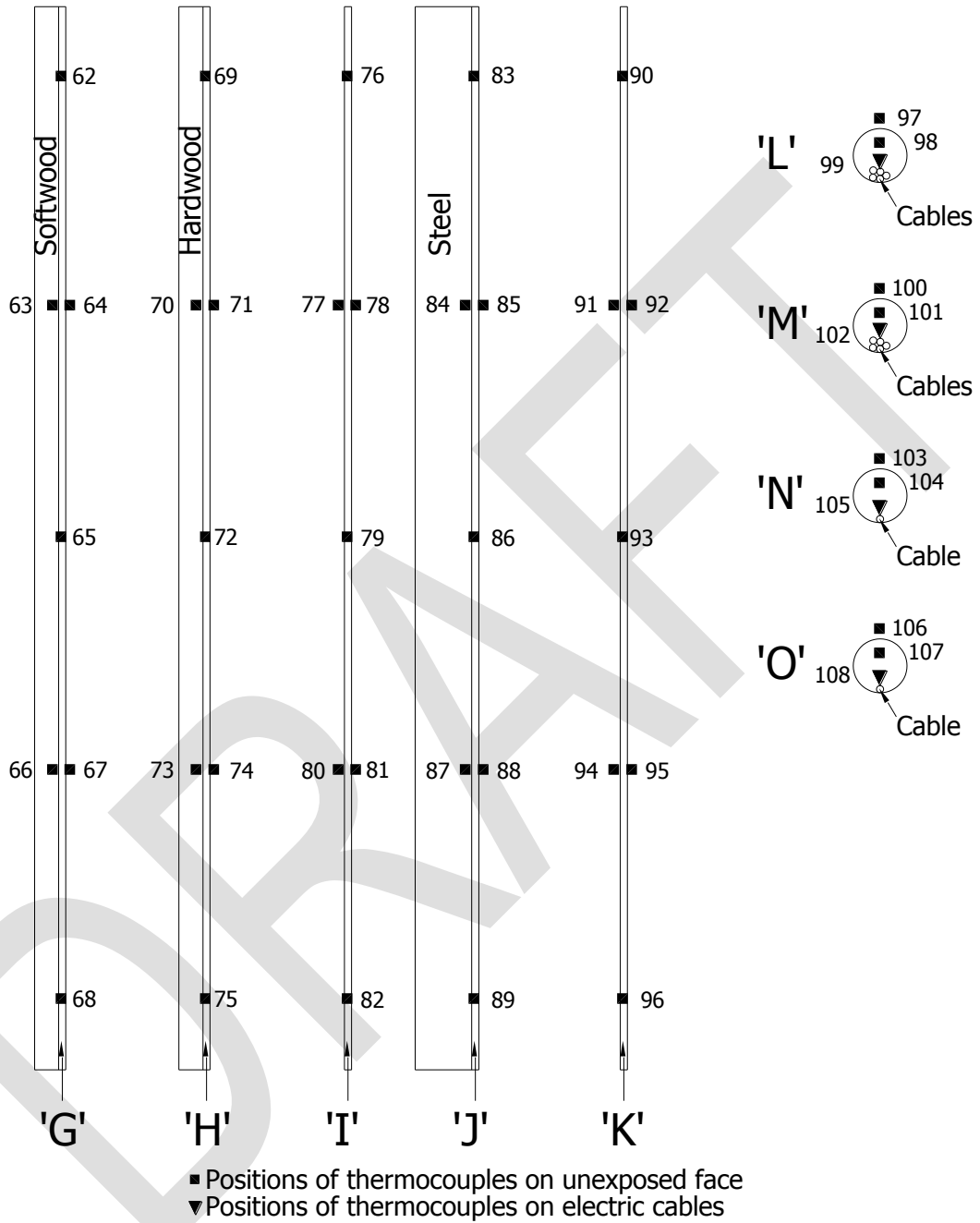
Figure 1 – General elevation of the Unexposed Face of the Wall Test Specimens



GENERAL ELEVATION OF UNEXPOSED
FACE OF WALL SPECIMENS

Do not scale. All dimensions are in mm

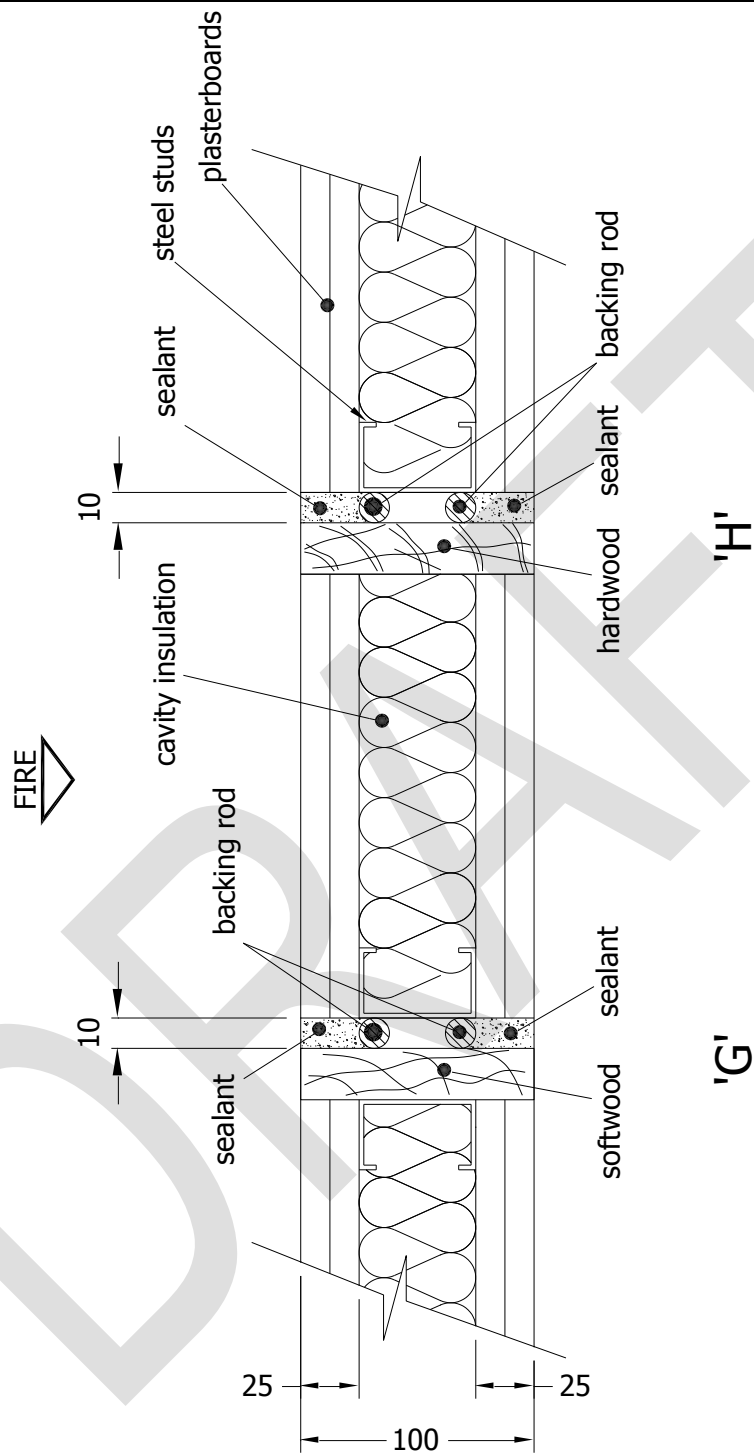
Figure 2 – View showing the Unexposed Face Thermocouples on the Wall Test Specimens



**ELEVATION ON WALL SPECIMENS
SHOWING THERMOCOUPLE POSITIONS**

Do not scale. All dimensions are in mm

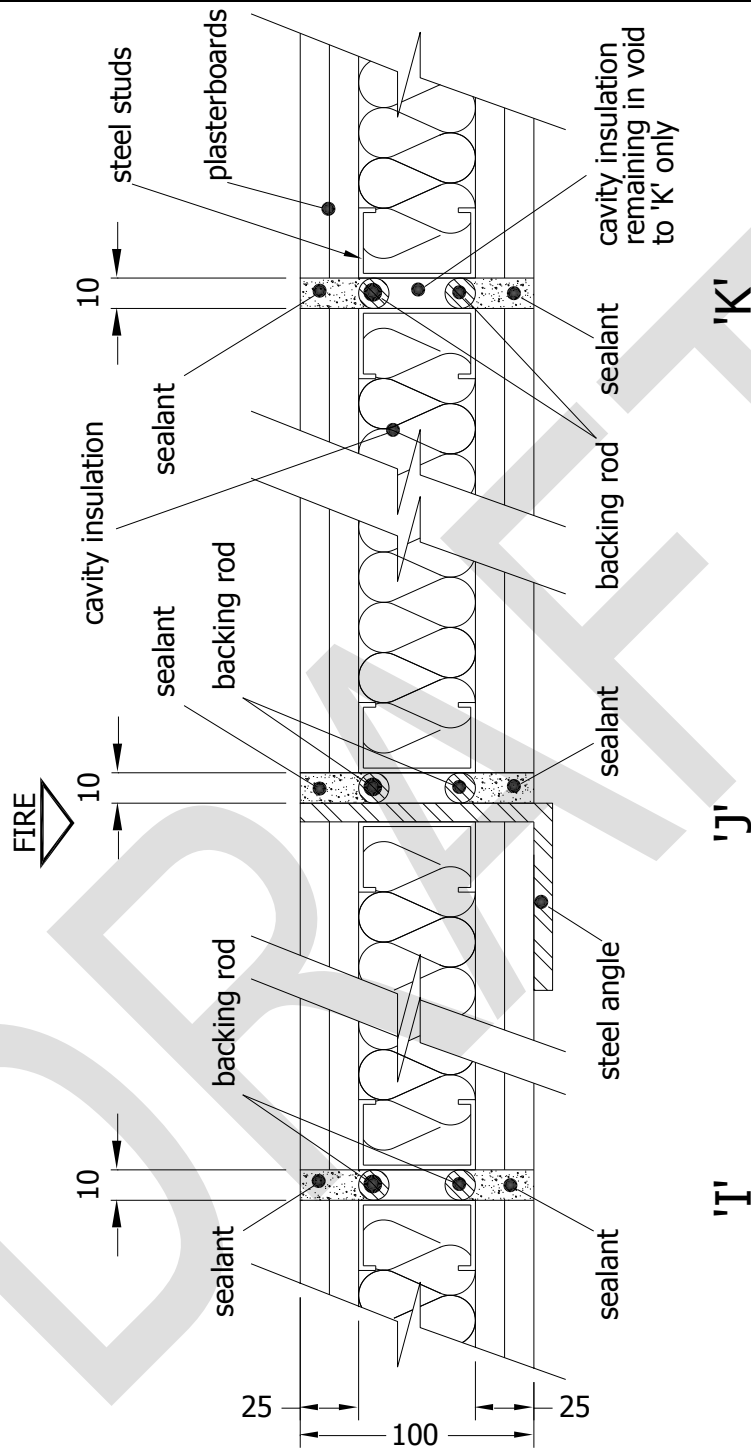
Figure 3 – Section through Wall Specimens 'G' and 'H'



SECTION THROUGH WALL SPECIMENS 'G' AND 'H'

Do not scale. All dimensions are in mm

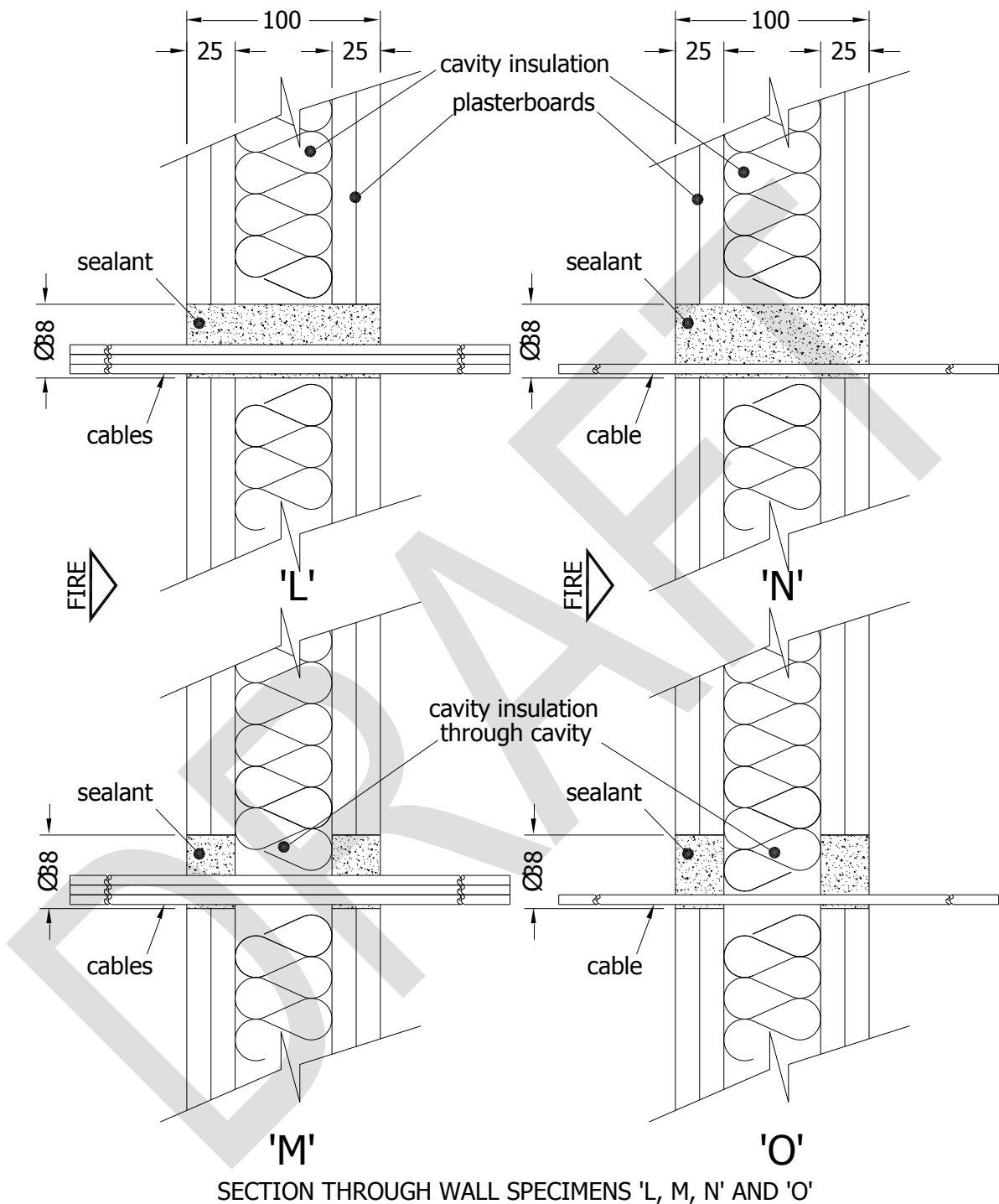
Figure 4 – Section through Wall Specimens 'I, J' and 'K'



SECTION THROUGH WALL SPECIMENS 'I, J' AND 'K'

Do not scale. All dimensions are in mm

Figure 5 – Section through Wall Specimens 'L, M, N' and 'O'



SECTION THROUGH WALL SPECIMENS 'L, M, N' AND 'O'

Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 5)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
Details of Wall Cavity Barriers	
1. Specimen 'G'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 10 mm wide x 25 mm thick x 1500 mm long
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 10 mm wide x 100 mm deep x 1000 mm long
Details of backing rod	
i. material	: Polyethylene
ii. size	: 13 mm diameter
iii. fixing method	: Friction fit within cavity
Cavity facings	: Plasterboards to general commercial softwood
Details of timber	
i. size	: 34 mm wide x 100 mm deep
ii. fixing method	: Screw fixed to steel stud of partition
Cavity insulation within gap	: None
2. Specimen 'H'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 10 mm wide x 25 mm thick x 1500 mm long
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 10 mm wide x 100 mm deep x 1000 mm long
Details of backing rod	
i. material	: Polyethylene
ii. size	: 13 mm diameter
iii. fixing method	: Friction fit within cavity
Cavity facings	: Plasterboards to general commercial hardwood
Details of timber	
i. size	: 34 mm wide x 100 mm deep
ii. fixing method	: Screw fixed to steel stud of partition
Cavity insulation within gap	: None

<u>Item</u>	<u>Description</u>
3. Specimen 'I'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 10 mm wide x 25 mm thick x 1500 mm long
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 10 mm wide x 100 mm deep x 1000 mm long
Details of backing rod	
i. material	: Polyethylene
ii. size	: 13 mm diameter
iii. fixing method	: Friction fit within cavity
Cavity facings	: Plasterboards to plasterboards
Cavity insulation within gap	: None
4. Specimen 'J'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 10 mm wide x 25 mm thick x 1500 mm long
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 10 mm wide x 100 mm deep x 1000 mm long
Details of backing rod	
i. material	: Polyethylene
ii. size	: 13 mm diameter
iii. fixing method	: Friction fit within cavity
Cavity facings	: Plasterboards to steel
Details of steel	
i. size	: Angle section 8 mm thick x 80 mm x 150 mm
ii. fixing method	: Screw fixed to steel stud of partition
Cavity insulation within gap	: None
5. Specimen 'K'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 10 mm wide x 25 mm thick x 1500 mm long
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 10 mm wide x 100 mm deep x 1000 mm long
Details of backing rod	
i. material	: Polyethylene
ii. size	: 13 mm diameter
iii. fixing method	: Friction fit within cavity
Cavity facings	: Plasterboards to plasterboards
Cavity insulation within gap	: The cavity insulation from the partition continues into the gap between the plasterboard faces

<u>Item</u>	<u>Description</u>
6. Specimen 'L'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 38 mm diameter x 100 mm thick
v. application method	: Cartridge gunned to infill cavity
vi. overall size of cavity	: 38 mm diameter x 100 mm wide
Penetration	: Five communication cables, each 5 mm overall diameter, 4 core copper, laid at the bottom of the hole
Cavity facings	: Plasterboards to plasterboards
Cavity insulation within gap	: None, entire cavity filled with sealant
7. Specimen 'M'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 38 mm diameter x 25 mm thick
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 38 mm diameter x 100 mm wide
Penetration	: Five communication cables, each 5 mm overall diameter, 4 core copper, laid at the bottom of the hole
Cavity facings	: Plasterboards to plasterboards
Cavity insulation within gap	: The cavity insulation from the partition continues into the gap between the plasterboard faces
8. Specimen 'N'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: 38 mm diameter x 100 mm thick
v. application method	: Cartridge gunned to infill cavity
vi. overall size of cavity	: 38 mm diameter x 100 mm wide
Penetration	: Single communication cable, 5 mm overall diameter, 4 core copper, laid at the bottom of the hole
Cavity facings	: Plasterboards to plasterboards
Cavity insulation within gap	: None, entire cavity filled with sealant
9. Specimen 'O'	
Details of sealant	
i. manufacturer	: Everbuild
ii. reference	: Everbuild Firemate intumescent sealant/Fireseal 300/AC95
iii. material	: Acrylic sealant
iv. overall size of sealant	: Double seal, each 38 mm diameter x 25 mm thick
v. application method	: Cartridge gunned at both faces of cavity
vi. overall size of cavity	: 38 mm diameter x 100 mm wide

Item

Description

9. Specimen 'O' (continued)

Penetration	:	Single communication cable, 5 mm overall diameter, 4 core copper, laid at the bottom of the hole
Cavity facings	:	Plasterboards to plasterboards
Cavity insulation within gap	:	The cavity insulation from the partition continues into the gap between the plasterboard faces

10. Partition / drywall construction

Materials

i. top and bottom track	:	Galvanised mild steel channels referenced, British Gypsum 52 C 25
ii. studs and gap framing	:	Galvanised mild steel channels referenced, British Gypsum 50 S 32
iii. plasterboards	:	Gypsum plasterboard, referenced British Gypsum 'Type F' boards
iv. cavity insulation	:	Mineral wool insulation, referenced Rockwool RW45
Section sizes		
i. top & bottom track	:	0.7 mm thick x 52 mm wide x 25 mm deep
ii. studs and aperture framing	:	0.55 mm thick x 50 mm wide x 30 mm deep
iii. plasterboards	:	25 mm overall (12.5 mm + 12.5 mm layers)
iv. cavity insulation	:	50 mm thick x 45 kg/m ³ density
Fixing methods		
i. top & bottom track	:	Steel screws and plugs fixed to the concrete lining of the specimen restraint frame.
ii. studs	:	The studs are friction fitted between the track section
.	:	The plasterboards are fitted in two layers per side, and screwed to the framework using 3.9 mm diameter drywall screws, 25 mm long and 35 mm long respectively for the inner and outer layers. All board joints are staggered with respect to the adjacent layer. The outer boards joints are finished with Knauf tape and scrim
iii. cavity insulation	:	The cavity is filled with the insulation which is friction fitted in between the studs.

Instrumentation

General	The instrumentation was provided in accordance with BS EN 1363-1: 2012.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2012 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	<p>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:</p> <p>The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 2.</p>
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.

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 10°C at the start of the test with a maximum variation of +7°C during the test.
00	00	The test commences.
02	00	Smoke release begins from the perimeter edges of Specimens G, H & L.
07	00	View from the exposed face, the paper face of the wall construction has charred and burnt away. The timber substrates of the Specimens G & H appears cracked and charred throughout, but more so to the softwood timber substrate of Specimen G.
09	50	Smoke release from Specimens G, H & L has reduced and almost stopped.
13	30	Smoke/steam release is evident at the top of Specimen J.
24	00	Viewed from the exposed face, a blue flame issues from the cables of Specimens L to O. A crack has formed within the supporting wall construction between Specimens J & K at approximately 1/3 height.
45	00	The seal of Specimens J, L & M has expanded out of the aperture by approximately 8-10mm.
52	10	Smoke release increases from the perimeter edges of Specimen H along the timber substrate to partition intersection.
54	20	Viewed from the exposed face, flames issue along the seal of Specimens G to J.
58	00	The supporting wall construction has bowed towards the furnace at mid-height between Specimens H & I.
73	00	The supporting wall construction continues to bow towards the furnace chamber at mid-height between Specimens H & I, now by approximately 20-25mm. The seal of Specimen I has separated away from the supporting construction at various locations.
80	30	Viewed from the exposed face, a section of first layer of plaster board has fallen from the supporting construction between Specimens H & I at mid height. A crack is evident within the second layer of board at the same location. The timber substrate of Specimens G & H appears heavily charred.
106	50	The timber substrate begins to degrade at the head and mid height of Specimen H.
120	00	No significant visible change. All specimens continue to satisfy integrity criteria. All specimens (excluding Specimens J, L and M) continue to satisfy the insulation criteria.
122	00	The timber substrate of Specimens G & H continues to degrade. The wall mounted specimens are blanked off at the sponsors request to allow the test to continue.
300	00	The test is discontinued at the request of the sponsor.

Test Photographs

The exposed face of the wall construction prior to testing



The unexposed face of the wall construction prior to testing



The unexposed face of the wall construction after 30 minutes of testing



The unexposed face of the wall construction after 60 minutes of testing



The exposed face of the wall construction after 90 minutes of testing



The unexposed face of the wall construction after 92 minutes of testing



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



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Temperature Data

Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In BS
EN 1363-1: 2012

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	12
10	678	689
20	781	778
30	842	837
40	885	877
50	918	917
60	945	949
70	968	972
80	988	991
90	1006	1010
100	1022	1023
110	1036	1039
120	1049	1053
130	1061	1065
140	1072	1077
150	1082	1085
160	1092	1092
170	1101	1099
180	1110	1110
190	1118	1122
200	1126	1129
210	1133	1134
220	1140	1138
230	1146	1149
240	1153	1151
250	1159	1161
260	1165	1164
270	1170	1167
280	1176	1176
290	1181	1183
300	1186	1187

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

Time	T/C	T/C	T/C	T/C	T/C	T/C	T/C
Mins	Number	Number	Number	Number	Number	Number	Number
	62	63	64	65	66	67	68
	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C
0	17	16	16	16	15	16	16
5	19	41	20	17	18	17	16
10	18	29	19	17	20	17	17
15	19	27	22	18	21	19	20
20	22	26	26	21	23	24	25
25	27	27	33	25	26	29	29
30	33	29	40	30	29	34	33
35	38	31	47	34	31	39	37
40	41	33	51	38	35	43	41
45	45	36	53	41	36	46	44
50	47	38	55	42	39	49	46
55	48	42	57	44	43	55	48
60	50	44	63	48	47	65	50
65	54	46	71	51	50	26	57
70	59	48	76	54	54	25	64
75	65	50	80	60	59	26	*
80	68	51	83	63	65	26	
85	71	54	84	*	72	28	
90	73	57	85		80	29	
95	76	61	87		88	30	
100	78	66	90		93	31	
105	83	75	97		96	35	
110	87	82	108		*	*	
115	90	*	120				
120	95		135				
122	#	#	#	#	#	#	#

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

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

Time Mins	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	T/C Number 74 Deg. C	T/C Number 75 Deg. C
0	17	16	16	16	15	16	15
5	18	17	17	17	17	17	16
10	18	17	17	17	17	17	16
15	19	20	18	18	18	18	17
20	22	22	22	21	19	20	19
25	25	25	28	25	22	25	22
30	29	27	34	30	24	30	25
35	32	30	39	34	27	36	29
40	35	33	43	38	30	41	33
45	38	35	46	42	32	45	37
50	40	38	48	48	34	48	41
55	43	42	51	52	38	51	44
60	48	45	57	54	42	55	47
65	54	49	65	56	46	63	52
70	61	51	69	59	50	66	55
75	64	55	67	63	53	59	62
80	67	57	64	69	55	58	66
85	69	60	61	72	57	55	70
90	71	63	60	74	60	54	70
95	72	67	62	78	63	56	71
100	*	70	66	81	67	58	71
105		74	63	82	73	62	73
110		79	65	85	84	66	76
115		86	69	89	88	69	78
120		94	76	99	93	75	80
122	#	#	#	#	#	#	#

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

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

Time Mins	T/C Number 76 Deg. C	T/C Number 77 Deg. C	T/C Number 78 Deg. C	T/C Number 79 Deg. C	T/C Number 80 Deg. C	T/C Number 81 Deg. C	T/C Number 82 Deg. C
0	17	16	16	16	15	15	15
5	17	17	*	17	16	16	16
10	19	17	16	17	16	17	17
15	26	21	22	21	20	21	20
20	33	27	30	30	26	29	25
25	40	35	37	39	33	37	31
30	46	42	44	46	39	42	36
35	50	48	49	52	44	46	40
40	53	52	52	55	49	49	44
45	55	54	54	57	52	51	47
50	56	55	56	59	54	53	50
55	58	57	59	61	56	56	54
60	61	63	66	65	59	61	57
65	67	70	71	70	64	66	62
70	71	74	75	73	69	69	66
75	70	77	78	75	72	71	69
80	69	79	80	77	74	73	72
85	69	78	81	78	75	75	74
90	71	79	82	79	76	77	76
95	74	82	83	80	78	78	78
100	77	85	85	83	79	80	81
105	78	88	87	87	81	81	85
110	81	91	37	92	86	85	90
115	83	96	37	96	90	89	93
120	86	104	40	108	94	93	95
122	#	#	#	#	#	#	#

*Temporary thermocouple malfunction
#Specimen blanked off to allow the test to continue

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

Time Mins	T/C Number 83 Deg. C	T/C Number 84 Deg. C	T/C Number 85 Deg. C	T/C Number 86 Deg. C	T/C Number 87 Deg. C	T/C Number 88 Deg. C	T/C Number 89 Deg. C
0	16	16	16	16	15	16	15
5	20	18	17	18	17	17	17
10	33	28	20	29	25	20	17
15	54	40	27	44	36	26	20
20	73	56	38	60	48	35	25
25	87	74	51	74	57	46	31
30	98	89	61	86	**	57	38
35	105	97	67	95		64	45
40	108	101	70	*		124	50
45	109	122	72		73	172	53
50	114	134	77		79	172	54
55	122	145	84		85	175	56
60	131	158	88		90	177	59
65	137	169	91		92	184	64
70	145	179	93		94	188	69
75	153	188	97		96	194	72
80	162	191	101		99	196	74
85	172	179	104		101	204	76
90	181	188	108		105	211	78
95	189	186	112		108	220	80
100	197	200	116		112	236	80
105	202	*	119		115	258	81
110	209		123		118	268	82
115	216		127		123	281	82
120	224		134		128	289	83
122	#	#	#	#	#	#	#

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

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

Time Mins	T/C Number 90 Deg. C	T/C Number 91 Deg. C	T/C Number 92 Deg. C	T/C Number 93 Deg. C	T/C Number 94 Deg. C	T/C Number 95 Deg. C	T/C Number 96 Deg. C
0	16	16	16	16	15	15	15
5	17	17	17	16	17	17	16
10	18	18	18	19	17	17	17
15	26	28	26	33	20	20	21
20	36	39	36	43	24	24	26
25	44	47	44	49	31	29	32
30	49	52	49	55	38	36	39
35	52	56	52	59	45	42	46
40	54	59	54	62	50	47	52
45	55	60	55	63	53	50	55
50	56	64	56	64	54	52	56
55	59	67	59	66	55	53	57
60	63	71	63	69	59	55	59
65	66	74	66	72	64	60	63
70	68	77	68	74	69	65	68
75	70	79	70	75	72	68	72
80	71	79	71	77	74	70	74
85	73	79	73	78	76	72	76
90	74	78	74	80	78	73	78
95	75	81	75	82	80	75	80
100	77	82	77	84	80	75	82
105	79	82	79	87	81	76	85
110	82	81	82	90	82	77	87
115	85	85	85	93	82	78	89
120	90	89	90	97	83	80	93
122	#	#	#	#	#	#	#

#Specimen blanked off to allow the test to continue

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

Time Mins	T/C Number 97 Deg. C	T/C Number 98 Deg. C	T/C Number 99 Deg. C
0	16	16	15
5	17	19	38
10	20	37	73
15	23	53	86
20	27	62	100
25	35	69	112
30	44	69	124
35	53	72	134
40	59	73	142
45	61	74	149
50	60	75	155
55	57	77	163
60	55	78	172
65	55	79	178
70	56	81	184
75	58	82	188
80	61	83	191
85	63	85	195
90	65	87	200
95	68	89	203
100	68	90	202
105	68	82	201
110	67	78	201
115	67	78	203
120	68	81	207
122	#	#	#

#Specimen blanked off to allow the test to continue

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

Time Mins	T/C Number 100 Deg. C	T/C Number 101 Deg. C	T/C Number 102 Deg. C
0	15	14	14
5	16	18	44
10	17	31	79
15	20	49	100
20	26	67	113
25	35	82	125
30	45	91	133
35	55	92	141
40	60	92	151
45	61	89	158
50	59	89	162
55	56	90	171
60	54	90	177
65	54	91	185
70	56	91	192
75	58	91	195
80	60	92	198
85	63	94	203
90	64	96	206
95	66	99	209
100	66	99	211
105	67	98	219
110	66	97	221
115	67	97	223
120	69	102	225
122	#	#	#

#Specimen blanked off to allow the test to continue

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

Time Mins	T/C Number 103 Deg. C	T/C Number 104 Deg. C	T/C Number 105 Deg. C
0	15	15	14
5	16	17	31
10	17	21	37
15	18	25	41
20	21	30	42
25	27	40	43
30	35	49	45
35	43	57	48
40	50	63	51
45	54	66	51
50	53	69	54
55	51	70	58
60	48	70	59
65	46	69	62
70	47	67	64
75	50	68	68
80	53	68	71
85	56	69	74
90	58	70	78
95	59	71	80
100	60	72	82
105	62	73	89
110	63	74	92
115	63	75	95
120	64	76	97
122	#	#	#

#Specimen blanked off to allow the test to continue

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

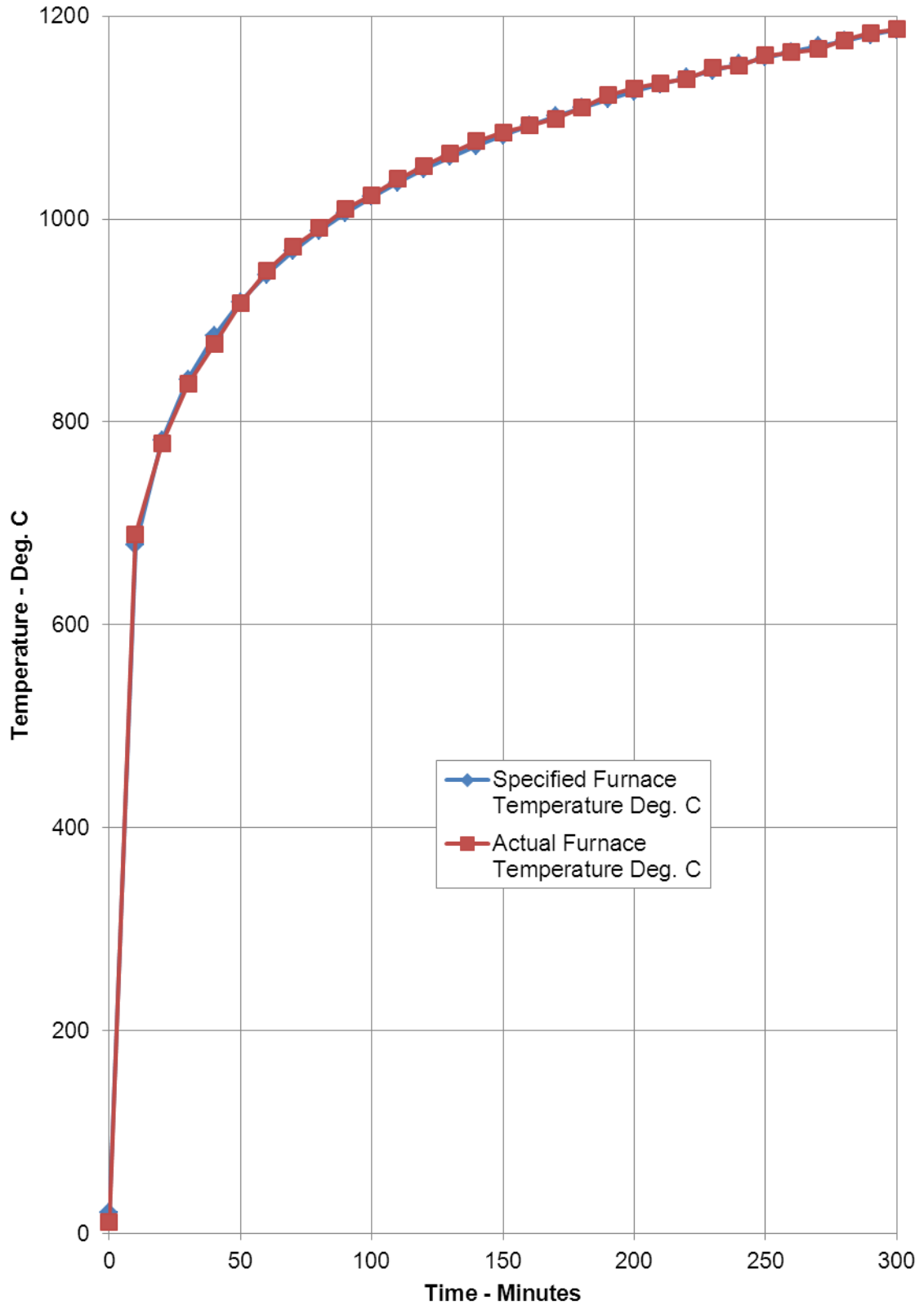
Time Mins	T/C Number 106 Deg. C	T/C Number 107 Deg. C	T/C Number 108 Deg. C
0	15	15	14
5	16	16	27
10	17	21	34
15	19	29	40
20	23	39	44
25	30	48	49
30	38	56	53
35	45	65	57
40	52	69	59
45	55	72	61
50	55	73	63
55	53	72	65
60	50	70	66
65	48	70	68
70	49	72	70
75	51	74	73
80	55	77	75
85	58	80	78
90	59	83	79
95	61	85	82
100	62	87	83
105	64	89	89
110	65	90	90
115	65	92	92
120	66	94	93
122	#	#	#

#Specimen blanked off to allow the test to continue

Table Showing Recorded Furnace Pressure At 100 MM Above The Top Of The Wall Specimens

Time Mins	Recorded Pressure Pascals
0	0.0
10	21.6
20	21.9
30	21.5
40	21.5
50	22.0
60	21.6
70	19.8
80	19.6
90	19.4
100	19.0
110	19.3
120	19.3
130	19.4
140	19.8
150	19.6
160	19.4
170	19.9
180	18.7
190	19.5
200	19.2
210	18.9
220	19.3
230	20.2
240	19.5
250	19.8
260	19.1
270	19.5
280	19.8
290	19.4
300	19.9

Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In BS EN 1363-1: 2012



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: 2012, or resulting in sustained flaming on the unexposed surface. **These requirements were satisfied for the periods shown below:**

Specimen	Integrity (mins)	
	Cotton Pad	Sustained flaming
G	122#	122#
H	122#	122#
I	122#	122#
J	122#	122#
K	122#	122#
L	122#	122#
M	122#	122#
N	122#	122#
O	122#	122#

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: 2012. **These requirements were satisfied for the periods shown below:**

Specimen	Insulation (mins)
G	122#
H	122#
I	122#
J	77
K	122#
L	85
M	73
N	122#
O	122#

The test was discontinued after a period of 300 minutes. #Specimen blanked off to allow the test to continue.

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 (linear gap seals) or penetration services (penetration seals), sealant depths, orientations, supporting construction and backing material vary from those tested.

As no movement was induced into the specimens during the test there can be no evaluation of the performance of the seals where movement is induced in a building under actual fire conditions.

The service cables were not provided with any means of independent support/restraint, therefore the test does not take any account of the possible influence that this may have on the performance of the penetration seals in an independently supported/restrained scenario.

Conclusions

Evaluation against objective

An Ad-Hoc fire resistance test has been conducted to assess the ability of five specimens of linear gap seals and four specimens of penetration seals mounted within a section of steel stud, plasterboard face partition wall assembly. The performance of the specimens was assessed, with respect to the integrity and insulation (maximum temperature rise only) performance criteria, as defined in BS EN 1363-1: 2012.

If the performance of each specimen was assessed against the performance requirements for integrity and insulation (maximum temperature rise) specified in BS EN 1363-1: 2012, the results obtained could be expressed as follows:

Test Results:

Specimen	Integrity (mins)		Insulation (mins)
	Cotton Pad	Sustained flaming	
G	122#	122#	122#
H	122#	122#	122#
I	122#	122#	122#
J	122#	122#	77
K	122#	122#	122#
L	122#	122#	85
M	122#	122#	73
N	122#	122#	122#
O	122#	122#	122#

The test was discontinued after a period of 300 minutes. #Specimen blanked off to allow the test to continue.