

Title:

The fire resistance performance of three specimens of penetration sealing systems and six specimens of linear gap joint systems all incorporating Britchem Intumescent Acrylic sealant, in accordance with BS EN 1366-3: 2004 and BS EN 1366-4: 2006 (where relevant).

WF Report No:

173658A

Prepared for:

BRITCHEM LIMITED
Unit 6
Beehive Business Park
Smithies Lane
Heckmondwike
WF16 0NF

Date:
22nd May 2008

Note: This report is additional to that issued as WARRES No. 166576A, dated 17th October 2007. The original report remains valid and is not replaced by this additional test report.

Notified Body No:

0833



0249



Summary

Objective	To evaluate the ability of three specimens of penetration sealing systems and six specimens of linear gap joints all incorporating Britchem Intumescent Acrylic Sealant to reinstate the integrity and insulation performance of an autoclaved blockwork wall, when tested in accordance with BS EN 1366-3: 2004 and BS EN 1366-4: 2006 (where relevant).
Sponsor	BRITCHEM LIMITED , Unit 6, Beehive Business Park, Smithies Lane, Heckmondwike, WF16 0NF.
Summary of the Tested Specimen	For the purpose of the test the specimens were referenced as A, B, C, D, I, and K, (Linear gap seals) and M, P and Q (Penetration Seals).

Full details of each specimen is given in the Test Specimen and Schedule of Component section.

The assembly comprised of an autoclaved blockwork wall overall dimensions 3050 mm wide by 3035 mm high by 200 mm thick, The wall incorporated 12 no. linear gaps, nominally 1000 mm in length and between 10 mm and 40 mm wide. Three apertures were provided for the penetration specimens. The aperture for each specimen was nominally 165 mm square with a 200 mm separation between each specimen.

Test Results

Ref.	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flames	
A	252	264*	71
B	264*	264*	264*
C	257	264*	216
D	264*	264*	264*
I	264*	264*	114
K	264*	264*	264*
M	264*	264*	264*
P	264*	264*	232
Q	264*	264*	134

The test also included several additional specimens; these are reported separately under WF Report No. 173658B.

*The test duration. The test was discontinued after a period of 264 minutes.

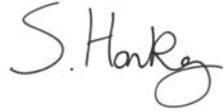
Date of Test 15th August 2007

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Signatories


Responsible Officer S. Gilfedder* Testing Officer


Approved A. Kearns* Technical Manager


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* For and on behalf of Bodycote **warringtonfire**.

Report Issued Date : 22 nd May 2008

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Test Procedure

Introduction

Penetration sealing systems are required to maintain the fire resistance of a separating element at the position at which it has been penetrated by a service. The penetration specimens were therefore tested in accordance with BS EN 1366-3: 2004 'Fire resistance tests for service installations - Part 3: Penetration seals'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 1999, Fire resistance tests - Part 1: General requirements'.

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 linear gap sealing systems were therefore tested in accordance with BS EN 1366-4: 2006 'Fire resistance tests for service installations - Part 4: Linear joint seals' This test report should be read in conjunction with that Standard and with BS EN 1363-1: 1999, Fire resistance tests - Part 1: General requirements'.

The specimens were judged on their ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1366-3 and BS EN 1366-4 (where relevant).

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 15th August 2007 at the request of Britchem Ltd, the sponsor of the test.

Mr. T. Jones, a representative of the test sponsor witnessed 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

The wall construction was supplied by Bodycote **warringtonfire**. The linear gap seals plus penetration seals and their services were supplied and installed by representatives of the sponsor in the week commencing 6th August 2007.

Sampling

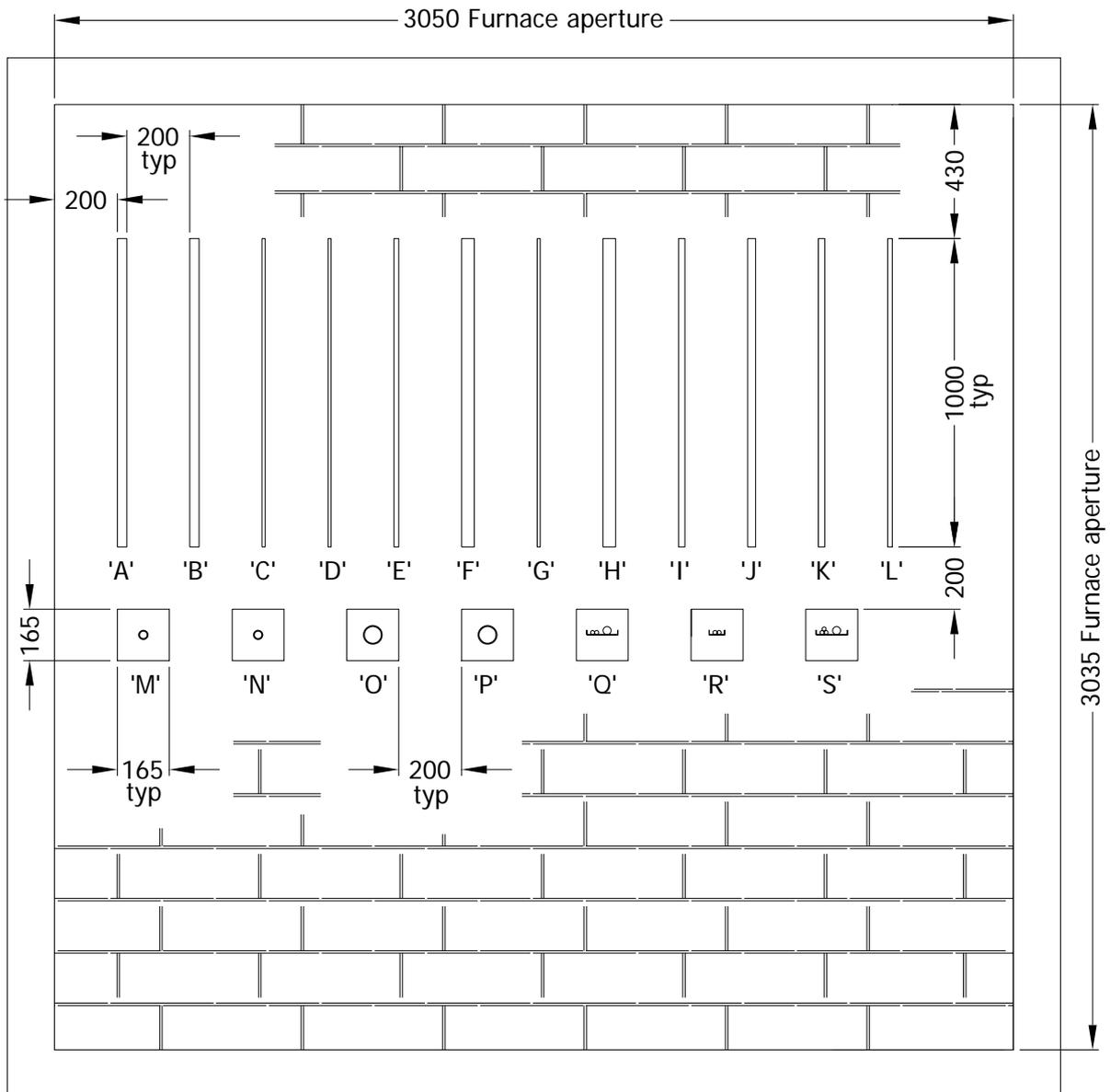
Bodycote **warringtonfire** was not involved in any selection or sampling procedures of the specimens or any of the components.

Conditioning

The specimens' storage, construction, and test preparation took place in the test laboratory over a total, combined time of 7 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 16°C to 26°C and 40% to 90% respectively.

Test Specimen

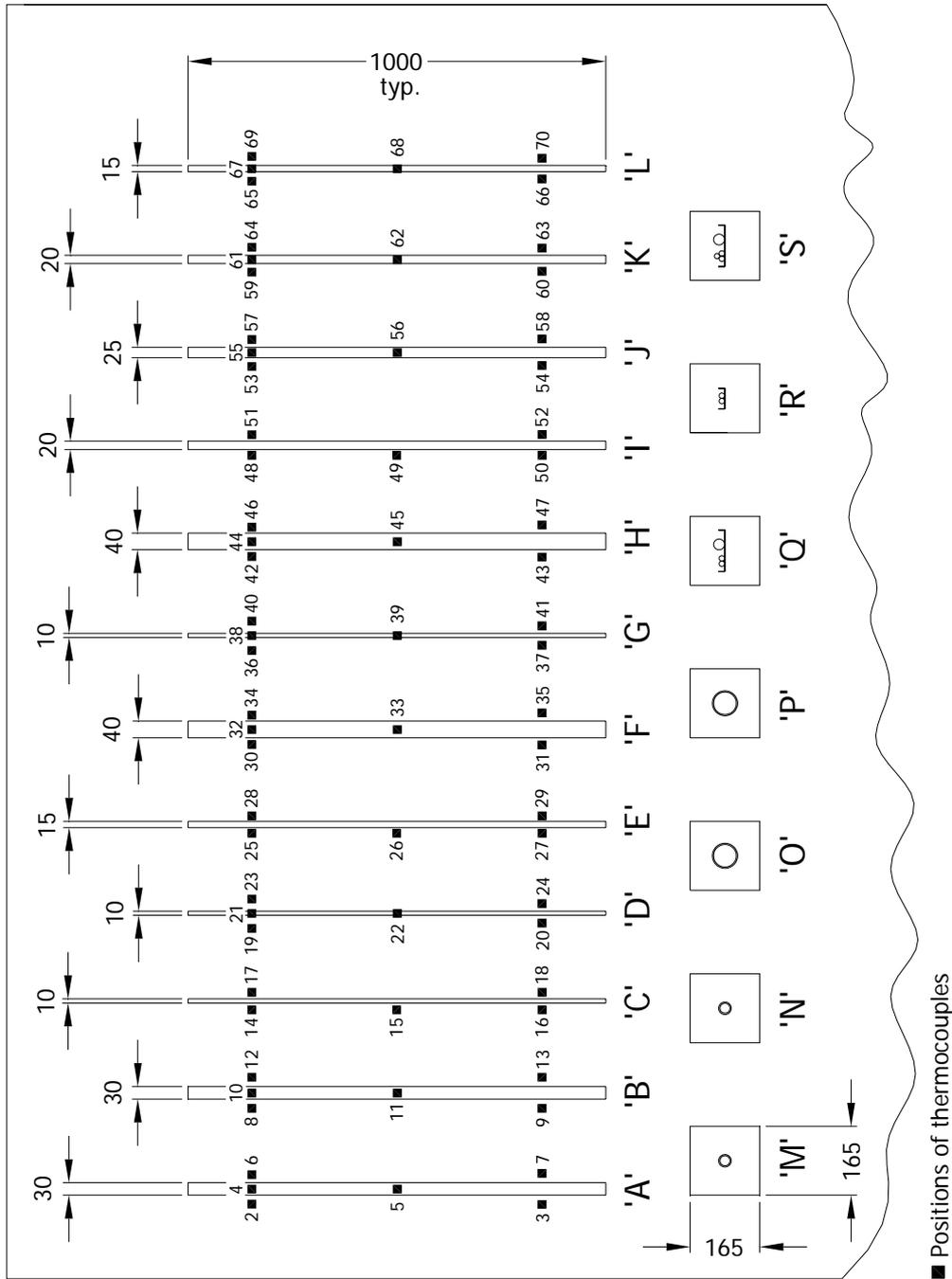
Figure 1- General Elevation of Wall Test Specimens from Unexposed Face



Note
Support framework not shown for clarity.

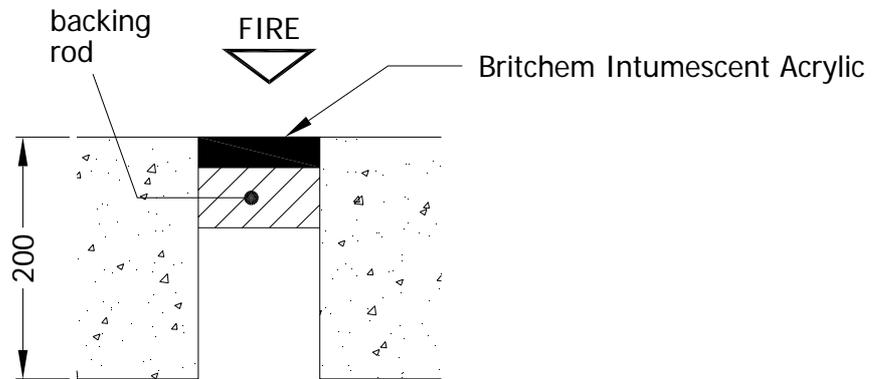
Do not scale. All dimensions are in mm

Figure 2 – Enlarged View showing Unexposed Face Thermocouples for Cavity Barrier Seals

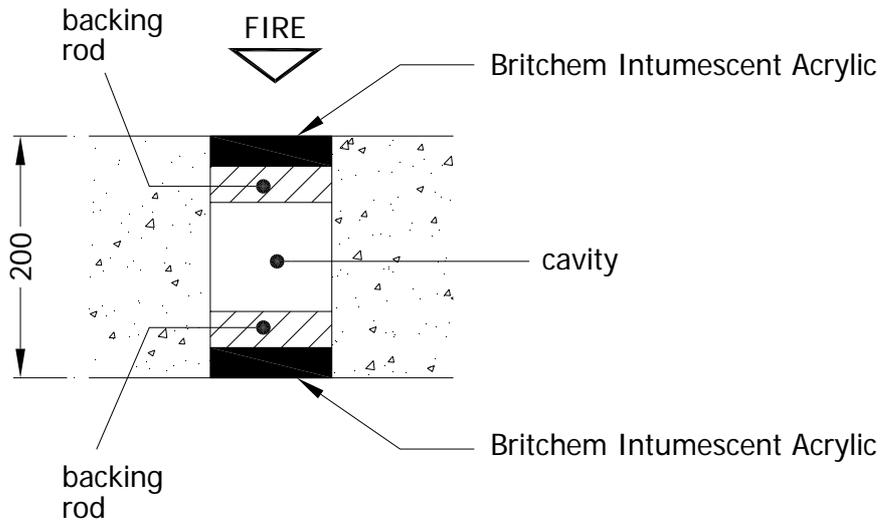


Do not scale. All dimensions are in mm

Figure 3 – Details of Cavity Barrier Seals (items 1 to 6)



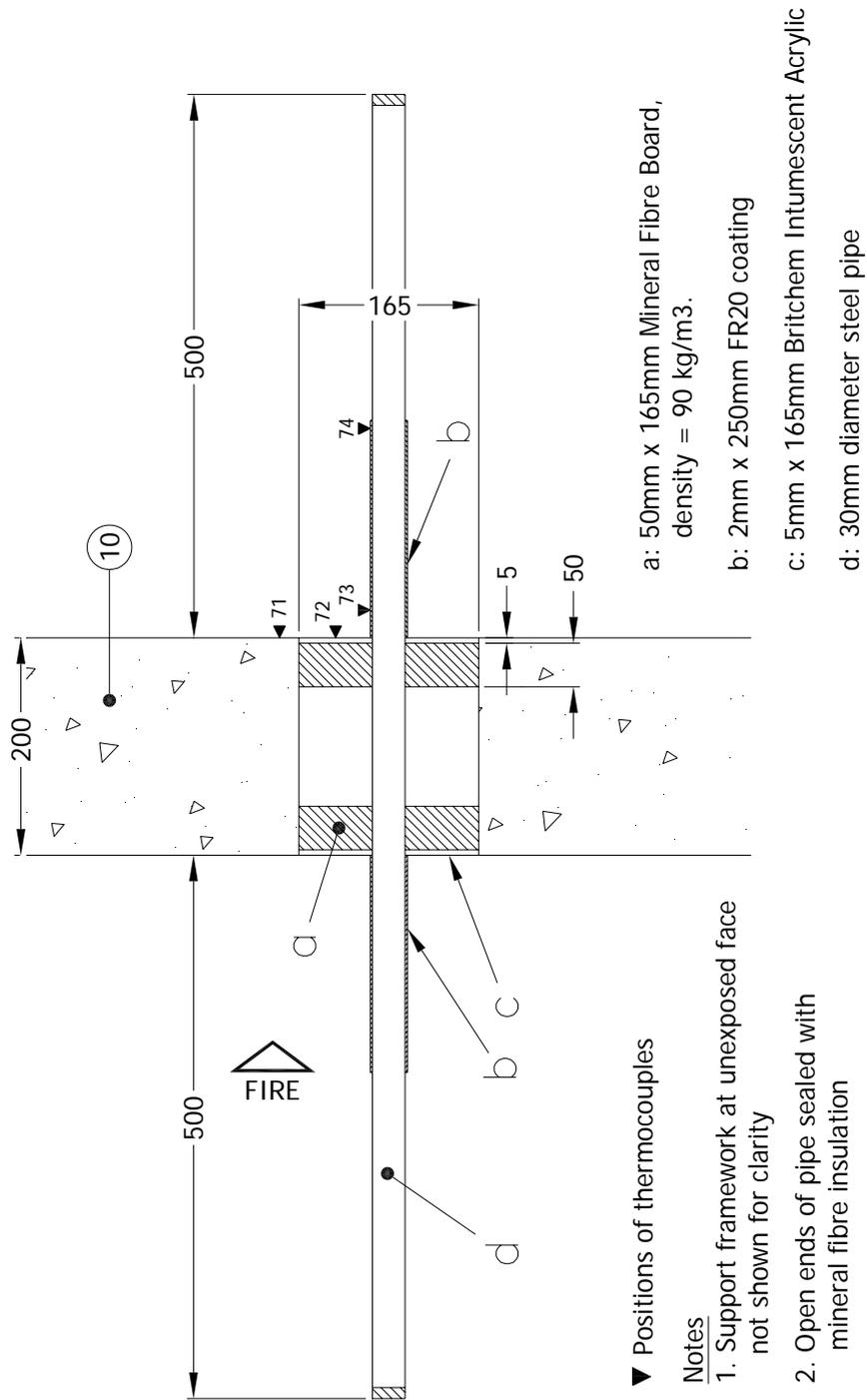
Typical Details for Specimens 'A', 'C' and 'I'



Typical Details for Specimens 'B', 'D' and 'K'

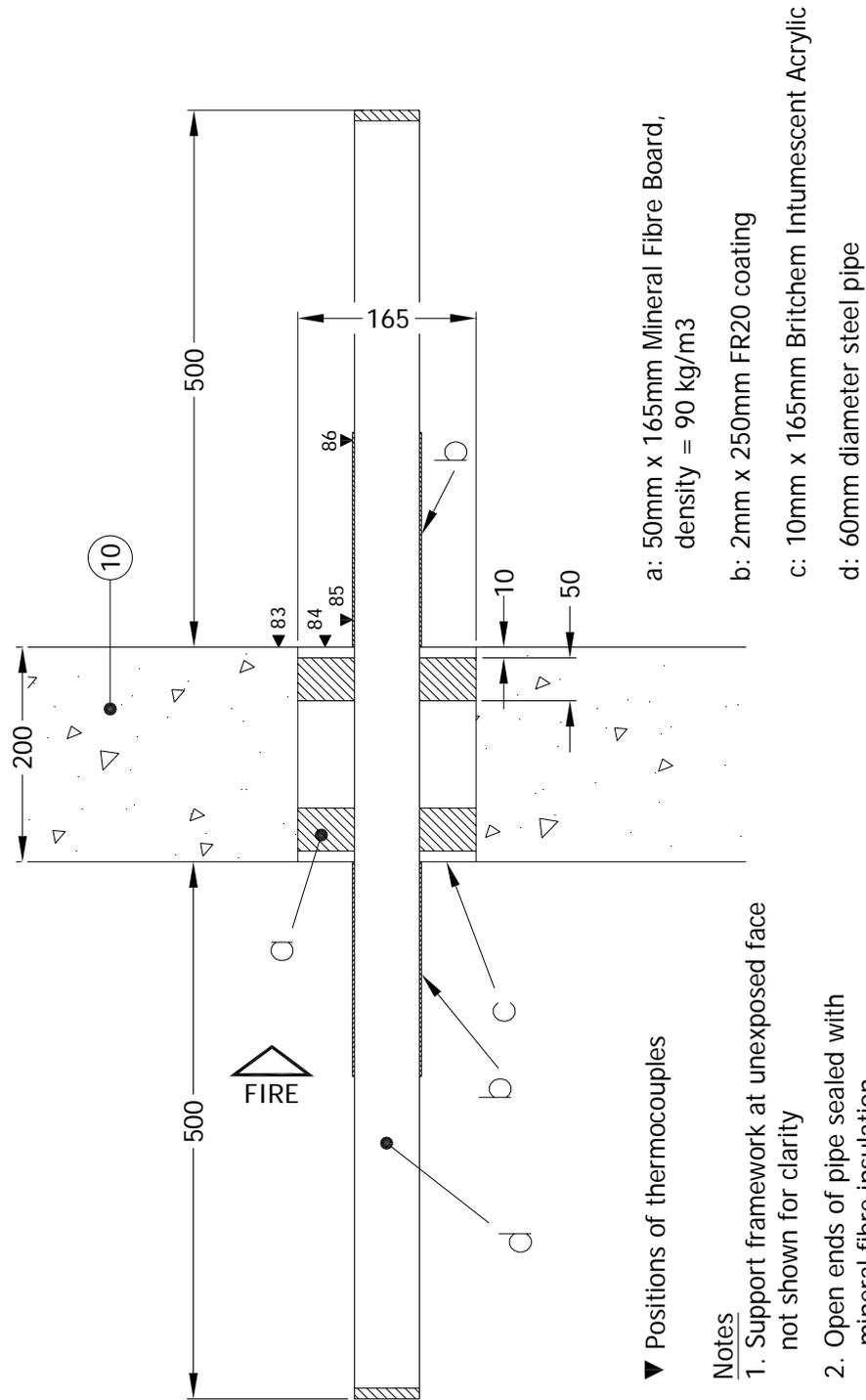
Do not scale. All dimensions are in mm

Figure 4 – Details of Specimen 'M' (item 7)



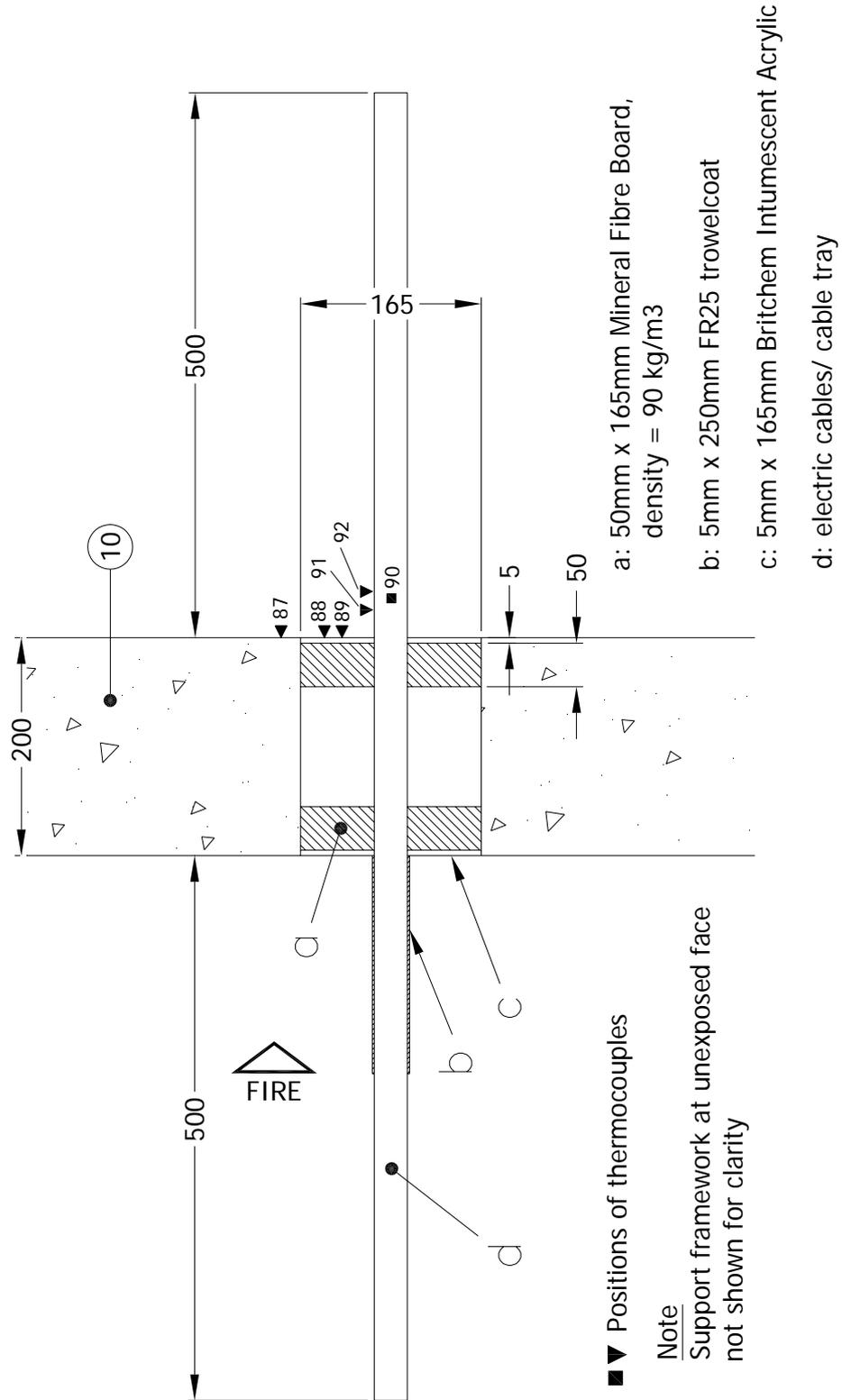
Do not scale. All dimensions are in mm

Figure 5 – Details of Specimen 'P' (item 8)



Do not scale. All dimensions are in mm

Figure 6 – Details of Specimen 'Q' (item 9)



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 6)

(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 (items 1 and 12)	
1. Specimen 'A'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 30 mm wide x 25 mm deep x 1000 mm long
Application method	: Cartridge gunned at exposed face of cavity
Overall size of cavity	: 30 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Polyethylene
Size	: 30 mm diameter (uncompressed)
2. Specimen 'B'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 30 mm wide x 20 mm deep x 1000 mm long
Application method	: Cartridge gunned at both faces of cavity
Overall size of cavity	: 30 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Mineral fibre
Density	: 90 kg/m ³ (stated)
Size	: 30 mm wide x 20 mm deep
3. Specimen 'C'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 10 mm wide x 10 mm deep x 1000 mm long
Application method	: Cartridge gunned at exposed face of cavity
Overall size of cavity	: 10 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Polyethylene
Size	: 15 mm diameter (uncompressed)
4. Specimen 'D'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 10 mm wide x 10 mm deep x 1000 mm long
Application method	: Cartridge gunned at both faces of cavity

<u>Item</u>	<u>Description</u>
4. continued	
Overall size of cavity	: 10 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Mineral fibre
Density	: 90 kg/m ³ (stated)
Size	: 10 mm wide x 10 mm deep
5. Specimen 'I'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 20 mm wide x 20 mm deep x 1000 mm long
Application method	: Cartridge gunned at exposed face of cavity
Overall size of cavity	: 20 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Polyethylene
Size	: 25 mm diameter (uncompressed)
6. Specimen 'K'	
Details of Sealant	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Overall section size of sealant	: 20 mm wide x 10 mm deep x 1000 mm long
Application method	: Cartridge gunned at both faces of cavity
Overall size of cavity	: 20 mm wide x 200 mm deep x 1000 mm long
Details of Backing rod	
Material	: Mineral fibre
Density	: 90 kg/m ³ (stated)
Size	: 20 mm wide x 10 mm deep
7. Specimen 'M' – Pipe Penetration	
Details of Insulation	
Manufacturer	: Rockwool
Material	: Mineral fibre panel
Density	: 90 kg/m ³ (stated)
Thickness	: 50 mm
Overall size of panel	: 165 mm x 165 mm
Aperture size	: 165 mm x 165 mm
Fixing method	: Panel friction fitted within aperture at both faces of wall
Details of Coating to panel face	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Thickness	: 5 mm
Application method	: Trowel
Details of Pipe	
Material	: Mild steel
Overall size	: 30 mm diameter x 3 mm thick wall
Length	: Pipe extended 500 mm from both faces of penetration
Quantity	: 1 no. pipe
Fixing method	: Support framework (item 11)

<u>Item</u>	Description
7. continued	
Details of coating to pipe	
Reference	: FR20 coating
Density	: 1.4 kg/m ³ (nominal, stated)
Thickness	: 2 mm
Application method	: Trowel around pipe diameter for a distance of 250 mm from both faces of penetration.
8. Specimen 'P' – Pipe Penetration	
Details of Insulation	
Manufacturer	: Rockwool
Material	: Mineral fibre panel
Density	: 90 kg/m ³ (stated)
Thickness	: 50 mm
Overall size of panel	: 165 mm x 165 mm
Aperture size	: 165 mm x 165 mm
Fixing method	: Panel friction fitted within aperture at both faces of wall
Details of Coating to panel face	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Thickness	: 10 mm
Application method	: Trowel
Details of Pipe	
Material	: Mild steel
Overall size	: 60 mm diameter x 3 mm thick wall
Length	: Pipe extended 500 mm from both faces of penetration
Quantity	: 1 no. pipe
Fixing method	: Support framework (item 11)
Details of coating to pipe	
Reference	: FR coating
Density	: 1.4 kg/m ³ (nominal, stated)
Thickness	: 2 mm
Application method	: Trowel around pipe diameter for a distance of 250 mm from both faces of penetration.
9. Specimen 'Q' – Cable Penetration	
Details of Insulation	
Manufacturer	: Rockwool
Material	: Mineral fibre panel
Density	: 90 kg/m ³ (stated)
Thickness	: 50 mm
Overall size of panel	: 165 mm x 165 mm
Aperture size	: 165 mm x 165 mm
Fixing method	: Panel friction fitted within aperture at both faces of wall
Details of Coating to panel face	
Manufacturer	: Britchem Ltd.
Reference	: Britchem Intumescent Acrylic
Density	: 1.65 kg/m ³ (nominal, stated)
Thickness	: 5 mm
Application method	: Trowel
Details of cable tray	
Material	: Perforated galvanised steel
Thickness	: 1 mm
Overall size	: 100 mm wide

<u>Item</u>	Description
9. continued	
Length	: Extended 500 mm from both faces of penetration
Quantity	: 1 no. cable tray
Fixing method	: Bolted to support framework (item 11)
Details of Electric cable	
Cable Markings	: 600/1000V Nexans 5x16XLPE
Overall size	: 30 mm diameter (colour, black)
Core material	: Copper core, steel armoured cable
Length	: Cable extended 500 mm from both faces of penetration
Quantity	: 1 no. cable
Fixing method	: Plastic cable ties to cable tray at both sides of penetration.
Details of Electric cables	
Cable Markings	: 600/1000V
Overall size	: 15 mm diameter (colour, black)
Core material	: Copper core, steel armoured cable
Length	: Cable extended 500 mm from both faces of penetration
Quantity	: 2 no. cables
Fixing method	: Plastic cable ties to cable tray at both sides of penetration.
Details of coating to cable tray/ cables	
Reference	: FR25 Trowelcoat
Density	: 1.4 kg/m ³ (nominal, stated)
Thickness	: 5 mm
Application method	: Trowel around cable tray and cables for a distance of 250 mm from exposed face of penetration only.
10. Masonry Wall	
Material	: Autoclaved aerated concrete blocks
Density	: 760 kg/m ³
Thickness	: 200 mm
Bedding material	: Ordinary sand/cement mortar mix
11. Support Framework (not shown on Figures)	
Manufacturer	: Hilti
References	: ML-B-30/350 and ML-C-20 channel system
Fixing method to masonry wall	: Anchor bolted at unexposed face
Details of anchors	
i. manufacturer	: Fischer
ii. reference	: GM8/25P
iii. material	: Steel
Support positions	
i. pipes	: Pipes supported at 330 mm from unexposed face
ii. cable trays	: Cable trays supported at 150 mm and 330 mm from unexposed face.

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 six plate thermometers, distributed over a plane 100 mm from the surface of the test constructions.
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 Figures 2, 4, 5, and 6.</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	The furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1366-3: 2004 and BS EN 1366-4: 2006 The pressure differential relative to the laboratory atmosphere at the lowest penetration specimen was 10 (± 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 17°C at the start of the test with a maximum variation of 1°C during the test.
00	00	The test commences.
02	13	Smoke release starts from top of Specimen C.
03	42	Smoke release visible from Specimen A.
04	15	Slight smoke release visible where the cables exit on penetration Q.
09	31	Slight smoke release from top of Specimen I.
13	00	Smoke release continues around the cable exits on penetration Q.
17	36	Backing material of Specimen C has shrunk significantly.
22	00	Flaming can be seen on all the cable penetrations from the exposed side.
28	32	Backing material starting to shrink at mid-height on specimen A.
30	00	All samples continue to satisfy integrity and insulation criteria.
42	00	Backing material has fallen away on Specimen A. The seal can be seen discoloured brown, a faint glow can be seen at the edges of both Specimen A & C.
47	00	Smoke release has increased from the top of Specimen A.
60	00	All the specimens continued to satisfy insulation and integrity criteria.
62	00	The area of glowing around the edges of Specimen A & C has increased.
71	00	TC 4 on specimen A exceeds 180°C temperature rise. Insulation failure of Specimen A deemed to have occurred.
74	00	Glowing visible around the perimeter of Specimen I.
88	00	Glowing can now be seen around Specimens A, C and I.
106	00	Roving thermocouple used to check surface temperature on Specimen A. Roving read in excess of 200 Deg. C.

Time		
mins	secs	
114	00	TC 48 on Specimen I exceeds 180 °C temperature rise. Insulation failure of Specimen I deemed to have occurred.
116	00	Specimen C is glowing brightly along its full length.
120	00	Specimens B, C, D, K, M, P and Q continue to satisfy the integrity and insulation criteria of the test. Specimens A and I continue to satisfy the integrity criteria of the test.
124	00	A cotton pad is applied to top of Specimen C but failed to ignite.
134	00	Thermocouple 92 exceeds 180 °C temperature rise. Insulation failure of Specimen Q deemed to have occurred.
154	00	A cotton pad is applied at top of Specimen A, but fails to ignite.
155	00	Observations of exposed face now difficult due to glaze and head radiation.
156	00	A cotton pad is applied to top of Specimen C, but fails to ignite.
160	00	A cotton pad is applied to top of Specimen I, but fails to ignite.
167	30	A cotton pad is applied at top of Specimen A, but fails to ignite.
177	00	No significant visible change in appearance to Specimens B, D and K since start of test.
180	00	Specimens B, C, D, K, M and P continue to satisfy the integrity and insulation criteria of the test. Specimens A, I and Q continue to satisfy the integrity criteria of the test.
189	00	A cotton pad is applied to top of Specimen A but fails to ignite.
202	00	Specimens A, C and I all continue to glow bright orange.
210	00	All the pipe penetrations (M-P) show no significant changes. Some discolouration around P at the point of penetration. There is still smoke release from the penetration Q.
216	00	TC 17 on Specimen C exceeds 180°C temperature rise. Insulation failure of Specimen C is deemed to have occurred.
		Cotton pad applied at the top of Specimen A, failed to ignite.

Time		
mins	secs	
232	00	TC 85 on Specimen P exceeds 180 °C temperature rise. Insulation failure of Specimen P deemed to have occurred.
		Crack noticeable about 100-150mm from the bottom of Specimen I.
234	00	Smoke release starts just above the centre point at Specimen B left hand side slight discolouration at this point.
240	00	Specimens B, D, K and M continue to satisfy the integrity and insulation criteria of the test. Specimens A, C, I, P and Q continue to satisfy the integrity criteria of the test.
252	00	A cotton pad is applied to top of Specimen A, and ignites. Cotton pad failure of specimen A deemed to have occurred.
257	00	A cotton pad is applied to top of Specimen C, and ignites. Cotton pad failure of specimen C deemed to have occurred.
259	00	A cotton pad is applied top of Specimen I but failed to ignite.
264	00	The test is discontinued at the sponsors request.

Test Photographs

The exposed Face
Of The Test
Construction
Prior To Testing



The Unexposed
Face Of The Test
Construction
Prior To Testing



The unexposed face of the specimens after a test duration of 61 minutes



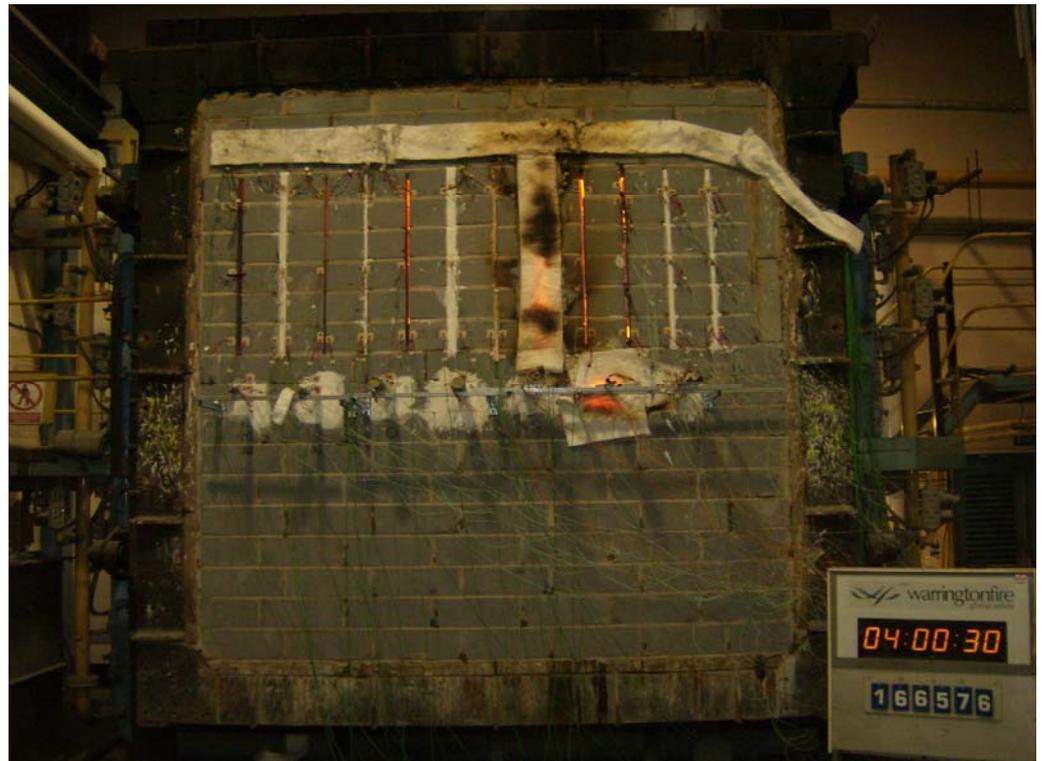
The unexposed face of the specimens after a test duration of 121 minutes



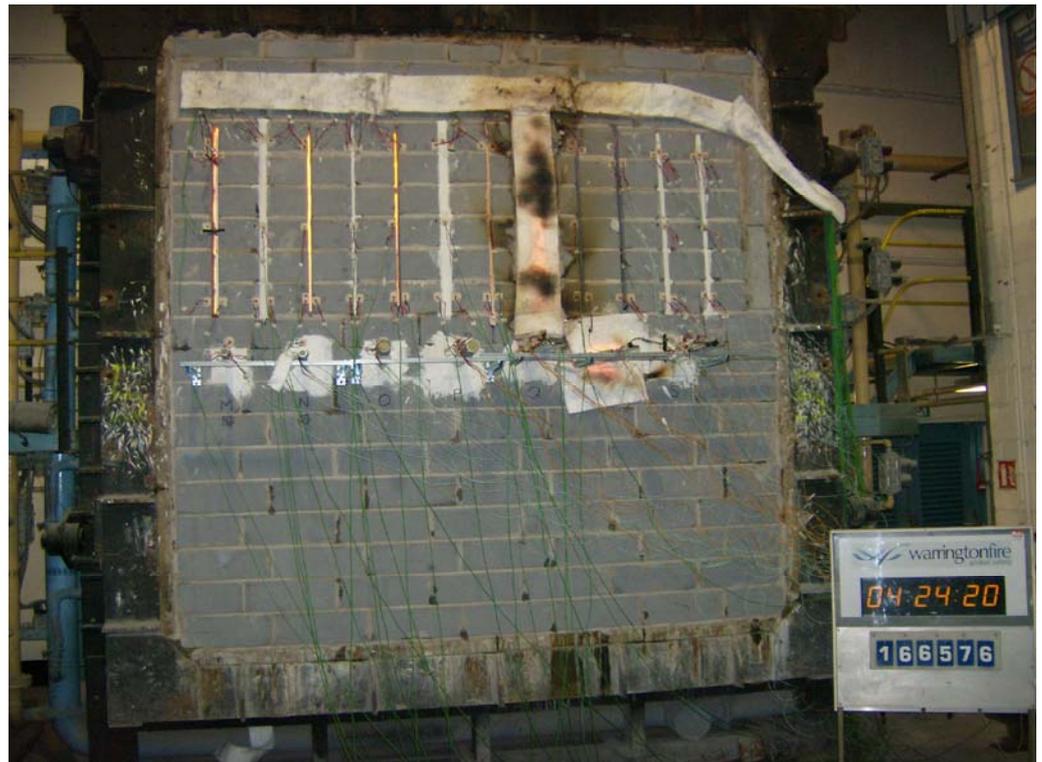
The unexposed face of the specimens after a test duration of 180 minutes



The unexposed face of the specimens after a test duration of 240 minutes



The unexposed face of the specimens after a test duration of 264 minutes



The exposed face of the specimens directly 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	28
10	678	683
20	781	782
30	842	855
40	885	886
50	918	916
60	945	950
70	968	977
80	988	990
90	1006	1010
100	1022	1031
110	1036	1037
120	1049	1049
130	1061	1061
140	1072	1075
150	1082	1084
160	1092	1096
170	1101	1105
180	1110	1116
190	1118	1116
200	1126	1126
210	1133	1134
220	1140	1142
230	1146	1155
240	1153	1156
250	1159	1159
260	1165	1161
264	1167	1165

Individual Temperatures Recorded on the Unexposed Surface Of Specimen A

Time Mins	T/C Number 2 Deg. C	T/C Number 3 Deg. C	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	T/C Number 7 Deg. C
0	18	17	18	18	18	19
10	18	17	25	25	18	19
20	18	18	50	39	19	19
30	18	18	61	59	20	19
40	18	18	63	52	22	19
50	20	18	103	89	23	20
60	21	19	143	120	25	21
70	23	19	184	160	26	21
80	24	20	230	187	28	22
90	26	20	297	205	30	23
100	29	21	382	232	32	23
110	32	22	*	*	36	24
120	37	23			41	26
130	43	25			48	27
140	50	27			56	30
150	58	29			65	32
160	66	32			69	35
170	73	35			74	37
180	81	38			81	40
190	87	41			86	43
200	96	44			91	46
210	102	46			97	48
220	119	49			109	50
230	127	50			122	51
240	137	52			133	53
250	139	54			144	54
260	149	56			153	56
264	153	56			157	56

* Indicates thermocouple detached

Individual Temperatures Recorded on the Unexposed Surface Of Specimen B

Time Mins	T/C Number 8 Deg. C	T/C Number 9 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C
0	20	20	20	20	21	20
10	20	21	20	20	21	20
20	20	21	20	20	21	20
30	20	21	21	21	21	20
40	21	20	22	22	21	23
50	24	18	26	23	23	25
60	27	16	30	26	25	26
70	30	13	34	30	27	27
80	34	30	39	36	31	32
90	38	33	44	40	34	35
100	41	36	48	44	37	38
110	45	39	52	49	40	42
120	48	43	56	52	44	46
130	51	46	59	56	46	49
140	54	50	62	59	50	52
150	57	54	65	62	53	55
160	60	57	67	64	56	59
170	62	60	70	67	59	61
180	65	63	71	69	62	64
190	65	64	67	70	62	66
200	68	66	73	71	65	68
210	69	68	74	72	66	69
220	70	68	74	72	67	70
230	71	69	75	73	67	70
240	72	69	69	73	67	71
250	72	70	75	73	69	71
260	73	70	75	74	69	71
264	73	70	75	74	69	71

Individual Temperatures Recorded on the Unexposed Surface Of Specimen C

Time Mins	T/C Number 14 Deg. C	T/C Number 15 Deg. C	T/C Number 16 Deg. C	T/C Number 17 Deg. C	T/C Number 18 Deg. C
0	20	16	16	16	16
10	21	16	16	17	16
20	21	16	16	17	16
30	21	16	16	17	17
40	22	17	17	18	17
50	23	17	17	19	17
60	24	17	17	20	18
70	26	17	17	22	17
80	31	18	18	30	18
90	50	19	19	45	19
100	75	20	20	67	20
110	86	22	21	82	21
120	91	24	22	90	22
130	96	28	23	95	23
140	104	34	25	103	24
150	119	43	26	118	26
160	133	52	29	131	28
170	145	62	31	149	30
180	157	70	33	164	32
190	177	77	36	166	34
200	181	83	38	184	37
210	191	86	40	192	39
220	198	88	43	200	41
230	203	90	45	212	43
240	213	91	46	213	44
250	218	95	47	230	46
260	223	111	49	237	48
264	226	118	49	233	48

Individual Temperatures Recorded on the Unexposed Surface Of Specimen D

Time Mins	T/C Number 19 Deg. C	T/C Number 20 Deg. C	T/C Number 21 Deg. C	T/C Number 22 Deg. C	T/C Number 23 Deg. C	T/C Number 24 Deg. C
0	17	16	17	19	19	19
10	17	17	17	19	19	19
20	17	17	17	19	19	20
30	19	17	19	20	20	20
40	22	18	22	20	23	20
50	27	19	27	22	26	22
60	31	20	32	25	30	22
70	36	22	38	28	33	24
80	40	25	42	33	38	26
90	43	29	46	39	41	30
100	46	35	48	44	43	35
110	48	39	51	49	46	40
120	51	44	53	53	49	45
130	53	49	56	57	51	50
140	56	53	58	61	53	54
150	58	57	60	64	55	58
160	61	61	62	66	56	61
170	63	63	64	68	60	63
180	65	65	66	69	62	65
190	66	67	67	70	63	66
200	68	67	68	70	64	67
210	69	68	69	71	66	68
220	70	68	70	71	67	69
230	70	68	70	71	67	69
240	71	68	71	71	68	69
250	72	68	72	71	69	69
260	73	68	72	71	70	69
264	73	68	73	71	70	69

Individual Temperatures Recorded on the Unexposed Surface Of Specimen I

Time Mins	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	17	17	16	17	17
10	17	17	17	17	17
20	17	17	16	17	17
30	17	17	17	17	17
40	17	17	17	17	18
50	18	17	17	18	18
60	23	25	32	23	36
70	24	26	31	24	33
80	28	29	35	28	36
90	31	32	36	30	38
100	35	47	45	37	41
110	42	53	56	44	45
120	334	66	60	65	52
130	475	104	108	75	81
140	469	130	118	94	74
150	281	102	114	84	65
160	314	96	109	83	64
170	334	94	107	88	65
180	355	101	122	94	71
190	372	102	127	97	75
200	393	107	131	102	77
210	421	108	139	109	80
220	447	112	151	117	84
230	480	114	160	129	90
240	384	117	167	138	94
250	392	119	167	150	97
260	404	120	169	164	99
264	406	122	170	166	101

Individual Temperatures Recorded on the Unexposed Surface Of Specimen K

Time Mins	T/C Number 59 Deg. C	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
0	20	20	20	20	17	17
10	20	20	20	20	18	17
20	20	20	21	20	20	17
30	21	20	23	21	24	17
40	23	20	27	22	30	18
50	27	21	32	25	37	19
60	31	24	38	29	42	20
70	34	25	42	35	45	22
80	37	27	47	41	49	25
90	41	30	51	47	51	28
100	45	34	55	52	54	33
110	47	38	58	56	56	37
120	51	42	61	60	58	41
130	54	45	64	63	60	46
140	57	49	67	66	61	50
150	59	52	70	69	63	54
160	62	56	72	71	65	57
170	64	58	73	73	66	60
180	66	60	75	74	67	62
190	68	63	75	75	68	64
200	69	64	76	76	69	66
210	70	65	76	76	69	67
220	71	65	77	76	70	67
230	72	65	77	76	70	68
240	72	66	77	76	70	68
250	72	67	77	77	71	68
260	73	68	77	77	71	68
264	73	68	77	77	71	68

Individual Temperatures Recorded on the Unexposed Surface Of Specimen M

Time Mins	T/C Number 71 Deg. C	T/C Number 72 Deg. C	T/C Number 73 Deg. C	T/C Number 74 Deg. C
0	18	18	18	18
10	18	20	51	18
20	19	26	63	20
30	20	32	69	24
40	22	39	77	28
50	25	48	84	30
60	27	55	90	31
70	31	60	94	31
80	35	65	98	32
90	40	69	101	32
100	43	71	104	33
110	46	74	108	32
120	50	76	112	32
130	53	77	116	32
140	55	78	119	32
150	58	80	123	32
160	61	81	128	33
170	63	82	132	33
180	65	83	136	34
190	67	83	139	34
200	69	84	142	34
210	70	84	146	34
220	71	85	150	35
230	72	85	154	36
240	72	86	157	36
250	73	87	161	36
260	75	87	165	37
264	75	88	167	38

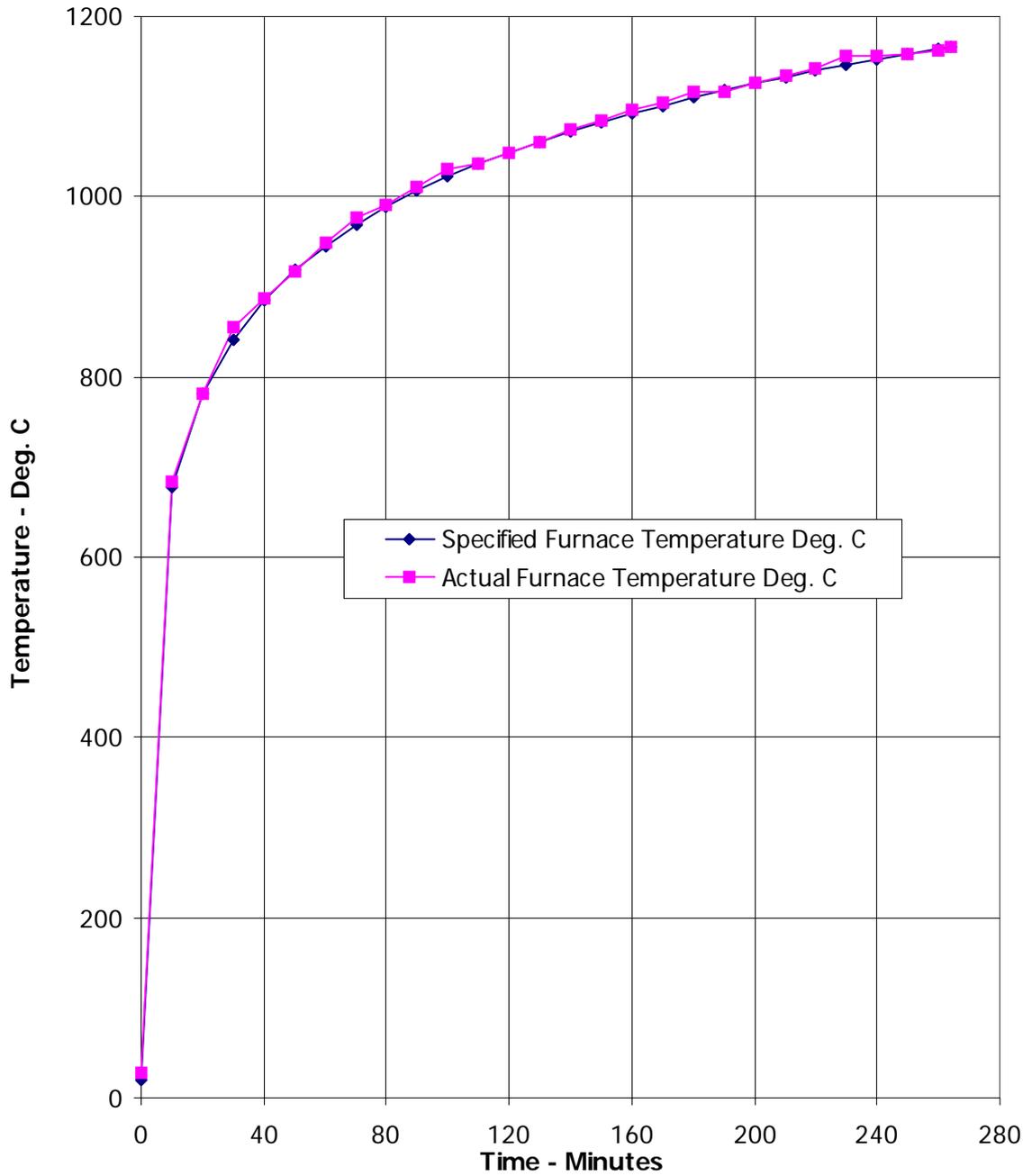
Individual Temperatures Recorded on the Unexposed Surface Of Specimen P

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
0	14	15	17	17
10	15	18	40	22
20	15	28	71	27
30	17	41	95	32
40	20	55	112	37
50	26	67	123	41
60	32	73	133	43
70	37	75	140	45
80	42	79	146	47
90	45	80	150	48
100	48	82	154	49
110	51	84	159	51
120	54	87	161	52
130	55	86	164	52
140	57	86	167	53
150	54	93	170	54
160	41	94	174	55
170	40	95	176	55
180	42	99	179	56
190	44	100	183	57
200	52	104	186	57
210	60	106	189	58
220	64	110	193	59
230	65	113	197	60
240	66	115	202	62
250	67	120	205	62
260	67	124	209	63
264	68	125	210	63

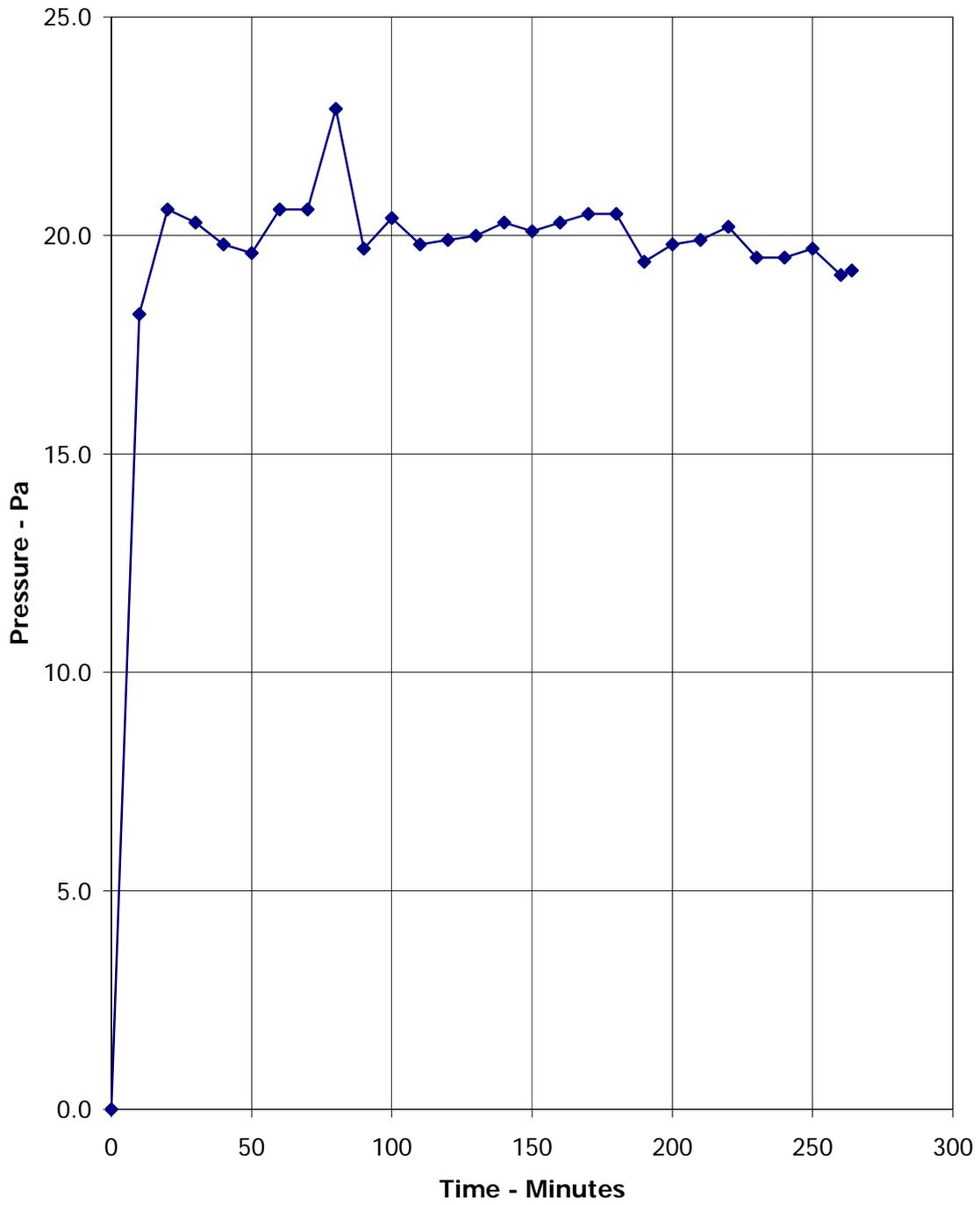
Individual Temperatures Recorded on the Unexposed Surface Of Specimen Q

Time Mins	T/C Number 87 Deg. C	T/C Number 88 Deg. C	T/C Number 89 Deg. C	T/C Number 90 Deg. C	T/C Number 91 Deg. C	T/C Number 92 Deg. C
0	17	16	14	16	16	16
10	17	17	15	28	23	19
20	17	24	21	44	34	36
30	19	37	33	57	45	60
40	21	47	45	66	55	81
50	25	57	56	72	66	101
60	30	67	66	76	78	121
70	43	74	76	82	85	137
80	43	77	79	82	90	147
90	46	80	82	88	94	155
100	64	84	89	94	101	168
110	84	87	91	97	105	174
120	97	91	94	95	110	177
130	149	94	99	104	117	190
140	191	100	105	112	126	200
150	202	106	112	109	131	203
160	200	110	120	113	135	207
170	201	116	129	115	137	212
180	209	122	140	116	141	218
190	221	129	151	115	145	225
200	229	135	158	115	147	230
210	246	142	164	117	151	235
220	254	148	171	117	155	241
230	265	154	178	121	159	247
240	275	159	184	124	163	251
250	280	164	189	123	166	256
260	288	167	194	123	170	260
264	290	169	196	124	171	262

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



Graph Showing Recorded Furnace Pressure At The Head Of The Upper Row Of Specimens.



Performance Criteria and Test Results

Integrity

It is required that the specimens retain their 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:**

Specimen	Integrity (minutes)	
	Cotton pad	Sustained flames
A	252	264*
B	264*	264*
C	257	264*
D	264*	264*
I	264*	264*
K	264*	264*
M	264*	264*
P	264*	264*
Q	264*	264*

*The test duration. The test was discontinued after a period of 264 minutes.

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	71
B	264*
C	216
D	264*
I	114
K	264*
M	264*
P	232
Q	134

Ongoing Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein was tested following the procedure outlined in BS EN 1366-3 and BS EN 1366-4 (where relevant). Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report. Annex A of BS EN 1363-1: 1999, provides guidance information on the application of fire resistance tests and the interpretation of test data.

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.

Conclusions

Evaluation Against Objective

Three specimens of wall mounted penetration sealing systems and six specimens of wall mounted linear gap sealing systems all incorporating Britchem Intumescent Acrylic seals have been tested to evaluate their ability to reinstate the integrity and insulation performance (as defined in BS EN 1366-3 and BS EN 1366-4 of the supporting construction, where it has been provided with apertures and penetration services.

The evaluation of the specimens against the requirements of BS EN 1366-3 and BS EN 1366-4 showed that they satisfied the requirements for the periods shown below.

Specimen	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flames	
A	252	264*	71
B	264*	264*	264*
C	257	264*	216
D	264*	264*	264*
I	264*	264*	114
K	264*	264*	264*
M	264*	264*	264*
P	264*	264*	232
Q	264*	264*	134

*The test duration. The test was discontinued after a period of 264 minutes.



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