

**DIXON INTERNATIONAL GROUP LIMITED**

**FIRE RESEARCH AND TEST LABORATORY**

**FIRE TEST REPORT No DFR9810292**

**FIRE TEST IN ACCORDANCE WITH BS 476: PART 22: 1987**

**TEST SPONSOR:** INTUMESCENT SEALS, The Old Brewery, Pampisford Cambridge  
CB2 4EW

**SUMMARY:** Four different letter plate kits (designated A, B, C, D) manufactured by Intumescent Seals for an aperture 300mm x 120mm were tested in a 60 minute laminated softwood core fire door (54mm thick) in accordance with the test conditions laid out in BS 476: Part 22: 1987 to determine its fire resistance.

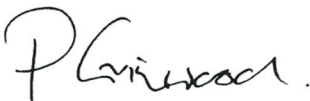
The specimen satisfied the performance requirements specified in Clause 6 of BS 476: Part 22: 1987 for fully insulated doorsets for the following periods:

**Integrity: 66 minutes**  
**Insulation: 31 minutes**

**DATE OF TEST:** 29.10.98

**REPORT ISSUED:** 15.11.98

Signed



**P Grimwood**  
**Laboratory Manager**

**PURPOSE OF THE TEST**

To determine the fire resistance of a door containing a letter plate aperture 300mm x 120mm lined with Intumescent Seals Thermaflex letter plate kits (designated A, B, C, D in this test and described in detail below) when tested in accordance with BS 476: Part 22: 1987.

**INTRODUCTION**

There is no specific test for letter plates whether in doors or walls so the test was carried out on a timber door 54 mm thick which had been successfully tested previously without a letter plate aperture. The test was conducted in accordance with the principles of Clause 6 "Methods for determination of the fire resistance of non-loadbearing elements of construction" of BS 476:Part 22: 1987 and this test report should be read in conjunction with Part 20 "Methods for determination of the fire resistance of elements of construction" of the same standard (general principles).

Because the door type had already been tested the specimen consisted of the door blank in the form of a panel measuring 970 mm wide and 520 mm high with four apertures placed symmetrically to test alternative kits.

**TEST SPECIMEN AND SURROUNDING CONSTRUCTION**

A 54mm thick laminated softwood core door blank was obtained provide a door with certified 60 minute fire resistance.

Four apertures were made in the door blank each measuring 300mm x 120mm and letter plate kits were fitted together with aluminium letter plates on the exposed side and covers in the form of mild steel flaps. Each kit comprised of layers of Therm-A-Flex 2mm thick or 1mm thick containing interlayers of glass fibre between the graphite layers. End protection was provided in some cases. The make up of the kits used is shown below.

	A	B	C	D
<b>Top and bottom</b>				
Graphite Layers	3	3	5	5
Graphite thickness	2	2	1	1
Fibre layers	2	2	4	4
Overall Thickness	6	6	5	5
<b>End Protection</b>				
Intumescent layers*	0	1g	1n	0
Overall thickness	0	2	2	0

\* g denotes Therm-A-Flex layer, n denotes Therm-A-Line layer.

**INSTRUMENTATION AND MEASURING EQUIPMENT**

The instrumentation of the furnace was in accordance with the requirements of the standard.

A roving thermocouple was available for measurement of specific hot spots. Gap gauges were available to measure the diameter of any holes that developed.

**TEST PROCEDURE**

The test was conducted in accordance with the procedure specified in Clause 6 of BS 476: Part 22: 1987.

The furnace temperature was controlled so that the mean value complied with the requirements of BS 476: Part 20: 1987, Clause 3.1.

After the first five minutes of testing the furnace pressure was controlled so that it complied with the requirements of BS 476: Part 20: 1987, Clause 3.2.2. The average furnace pressure during the test was 1.8 Pa giving  $\pm 1.04$  Pa at the centre of the letter plates.

Throughout the test the temperatures of the thermocouples were continuously monitored and recorded.

The specimen was observed throughout the test and the cotton pad used if gas was seen to be issuing from a small hole and larger holes were measured with the gap gauges to assess compliance with the integrity criterion of the standard. The occurrence of any flaming on the unexposed face was recorded to determine compliance with the integrity criterion.

**TEST DATA AND INFORMATION**

The following observations were made during the test at the times indicated.

<b><u>Time</u></b>		<b><u>Observation</u></b>
<b><u>mins</u></b>	<b><u>secs</u></b>	
0	00	Test starts.
3	20	Moisture on panel above A & B.
3	40	Smoke issuing from A & C around letterplates.
4	20	Smoke issuing from B through flap.
5	00	Exposed intumescent activating, B & C appear closed.
7	00	Smoke from A & B around aperture and through flap.
9	00	Exposed side, slight gap in D intumescent. Smoke residue visible on B flap.
10	00	Moisture still visible above A & B.
11	30	Exposed side, panel fissure, intumescent glowing.
15	00	Exposed side; intumescent covering A & B, shrunk back on C & D. vertical intumescent bowed on C, voids still visible on horizontal centre line of all apertures.
17	00	Exposed side; B more compact than A, D more compact than C.
18	00	Smoke still issuing mainly from A & B.
20	30	Intumescent shrunk back from top of A and B on exposed side.
23	00	Exposed side, intumescent extruding out of apertures.
24	00	Flap of B discolouration increased.
26	20	Panel discolouring above all apertures.



28	00	Exposed side, none of apertures are totally sealed.
30	00	Exposed side, B looks best, then A with C and D worst.
31	00	<b>D flap failed insulation.</b>
32	00	Exposed side, intumescent layers coalesced.
33	00	<b>C flap failed insulation.</b>
37	20	Exposed side, best to worst ranking B, A, C, D.
39	00	<b>B flap failed insulation.</b> Smoke issuing from flaps.
41	00	<b>A flap failed insulation.</b>
42	00	B flap 3mm gap at top between flap and panel others have no gaps.
45	00	Brown moisture running down flap B.
46	00	B flap/panel gap = 4mm at top, A flap/panel gap = 1mm at top, C & D have no gap between flap and panel.
47	00	Wisps of smoke from B flap.
50	30	Flap/panel gap on B now 5mm rest as before.
52	30	Brown liquid running down flap A.
57	00	Flap/panel gap on B now 7mm rest as before.
60	00	No glowing.
63	00	Intumescent visible at top of B.
63	30	Scorch marks visible above all apertures.
66	00	Test terminated with no specimens having failed integrity.

### **CONCLUSIONS**

A specimen of a fully insulated door panel containing four apertures 300mm x 120mm sealed with four types of Thermaflex intumescent letter plate kits has been subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, Clause 6 and satisfied the integrity criteria for a period of 66 minutes without failure. All four types satisfied the insulation criteria for 30 minutes.

### **END OF REPORT**

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## THERMOCOUPLE TEMPERATURES FOR TEST NO 9810292

Test Reference: 9810292  
 Test Title: 60 MIN L'PLATES 300 X 120 AP.  
 Test Date: 29 October 1998

Time	Data Channels											
	5	6	7	8	9	11	12	14	15	16	17	18
0.0	38.1	33.9	47.7	46.6	20.0	22.9	19.0	21.9	19.8	19.6	21.1	21.8
1.0	184.4	247.2	253.6	259.0	22.7	49.4	22.1	45.4	27.1	26.9	42.5	47.6
2.0	345.0	406.4	389.6	408.6	29.1	90.3	29.4	69.8	45.5	39.8	73.8	72.6
3.0	401.0	468.7	432.0	455.7	45.5	125.6	47.6	101.0	67.7	56.8	104.1	105.4
4.0	470.0	524.5	495.5	508.2	76.8	162.1	83.2	145.4	98.6	83.8	139.9	147.0
5.0	522.8	575.8	555.8	559.8	100.9	195.0	108.3	176.4	115.8	97.0	162.2	161.0
6.0	585.2	620.0	613.1	630.2	110.5	186.3	119.1	179.8	120.2	102.7	155.2	162.0
7.0	611.2	644.1	646.6	660.4	114.2	173.6	123.1	176.0	118.0	103.4	146.5	159.4
8.0	617.1	647.8	660.8	674.5	113.6	162.2	122.5	169.8	113.4	102.2	141.8	153.3
9.0	625.6	649.0	670.2	680.3	115.2	161.3	122.9	165.8	109.9	101.5	139.9	149.0
10.0	644.2	664.3	688.7	693.7	114.2	157.8	122.2	161.9	109.0	100.8	140.7	146.2
11.0	658.1	679.8	705.9	707.4	116.0	159.8	123.3	161.0	108.7	101.0	142.5	146.2
12.0	672.2	693.4	720.9	719.2	115.7	160.6	123.4	160.1	109.0	100.9	144.3	145.0
13.0	688.0	709.3	735.9	739.9	114.5	159.4	122.4	160.3	109.0	101.5	153.8	154.5
14.0	703.9	727.3	748.8	749.4	116.3	157.2	123.8	159.8	110.6	103.9	156.2	153.0
15.0	716.5	733.8	758.2	758.8	117.0	153.0	125.3	162.1	111.9	105.4	158.7	152.3
16.0	723.8	741.6	764.3	766.9	119.2	154.1	129.3	164.8	114.1	107.6	159.3	151.7
17.0	735.4	754.3	773.1	775.3	122.5	156.8	132.4	167.0	116.1	109.3	161.0	151.8
18.0	742.6	760.0	783.7	785.1	124.6	158.6	133.3	167.2	117.5	109.7	160.8	152.2
19.0	751.8	771.1	794.3	797.3	125.8	160.8	133.6	168.4	119.6	110.3	170.1	159.4
20.0	756.2	773.8	798.5	799.6	126.8	159.2	134.8	167.4	122.5	111.9	176.6	164.1
21.0	761.2	779.5	805.6	805.4	128.7	160.2	135.9	168.0	124.9	113.8	174.6	164.3
22.0	769.6	788.9	815.1	818.0	128.8	158.8	135.8	166.9	126.1	114.5	178.3	167.2
23.0	782.8	798.5	825.8	829.0	130.6	160.5	136.9	168.4	128.2	116.1	180.2	169.5
24.0	791.3	809.6	834.4	838.2	135.8	163.5	140.6	173.1	131.0	117.8	195.5	174.4
25.0	798.7	817.7	846.1	847.9	144.9	185.3	144.7	183.9	145.8	128.4	210.2	197.3
26.0	798.5	816.1	848.7	849.0	142.3	179.5	143.5	179.1	148.7	130.6	203.9	197.0
27.0	801.7	818.0	848.1	849.4	142.2	175.8	143.5	176.2	149.1	131.7	197.6	192.3
28.0	803.8	820.2	850.7	851.5	143.0	174.9	144.5	176.0	148.7	132.0	192.6	187.6
29.0	805.3	822.5	852.9	854.5	145.0	176.3	145.4	176.3	148.2	131.9	188.9	184.0
30.0	818.1	837.5	863.3	864.9	146.0	176.9	145.8	176.3	147.5	131.3	188.0	182.9
31.0	827.8	845.6	871.3	877.3	146.6	176.8	146.0	176.5	148.1	130.9	190.9	185.5
32.0	835.5	853.9	877.1	881.2	149.0	179.4	147.5	179.0	149.6	132.2	193.6	187.5
33.0	836.6	854.9	878.4	884.5	148.3	178.5	147.8	178.7	150.7	132.6	196.0	191.2
34.0	839.0	856.8	882.9	885.9	149.9	179.7	149.0	180.2	153.0	134.8	199.6	194.6
35.0	840.3	862.1	882.7	887.7	152.8	182.3	151.0	182.9	155.4	137.4	200.7	195.7
36.0	842.1	861.9	886.9	889.0	154.3	184.2	152.3	184.2	156.6	139.0	202.6	196.4
37.0	845.0	864.9	888.1	890.0	156.1	185.9	154.1	185.7	157.7	140.4	203.2	197.2
38.0	849.3	868.0	892.4	895.8	157.4	188.6	155.6	187.6	159.1	141.9	206.3	199.6
39.0	851.8	869.2	892.9	894.6	159.7	191.9	157.9	190.5	161.1	144.3	207.6	200.2
40.0	856.3	873.7	900.7	900.3	160.8	193.9	159.8	191.4	162.9	146.2	209.2	201.4
41.0	860.5	877.9	904.7	906.3	160.8	194.1	161.1	191.9	164.5	147.7	211.8	203.8
42.0	865.4	882.4	908.0	907.5	161.8	196.3	163.0	193.6	166.2	150.0	212.1	204.5
43.0	867.6	885.9	907.7	909.8	162.5	199.9	165.2	198.4	169.0	152.4	217.6	209.5
44.0	874.7	890.3	916.2	914.5	163.0	200.1	166.9	198.6	171.9	155.5	219.0	211.6
45.0	875.2	892.1	919.1	918.3	163.5	200.9	168.8	199.9	174.4	158.3	219.5	212.3
46.0	879.7	896.5	921.9	920.5	163.8	202.0	170.5	201.7	177.0	160.6	221.4	216.1
47.0	881.9	898.3	924.5	921.8	164.7	203.6	172.5	203.7	180.2	163.2	222.2	216.6
48.0	885.9	903.4	927.5	928.2	164.5	203.6	173.8	204.7	183.7	164.5	225.8	230.6
49.0	891.1	907.2	932.1	930.9	166.0	206.5	176.6	207.8	189.2	168.2	228.9	236.3

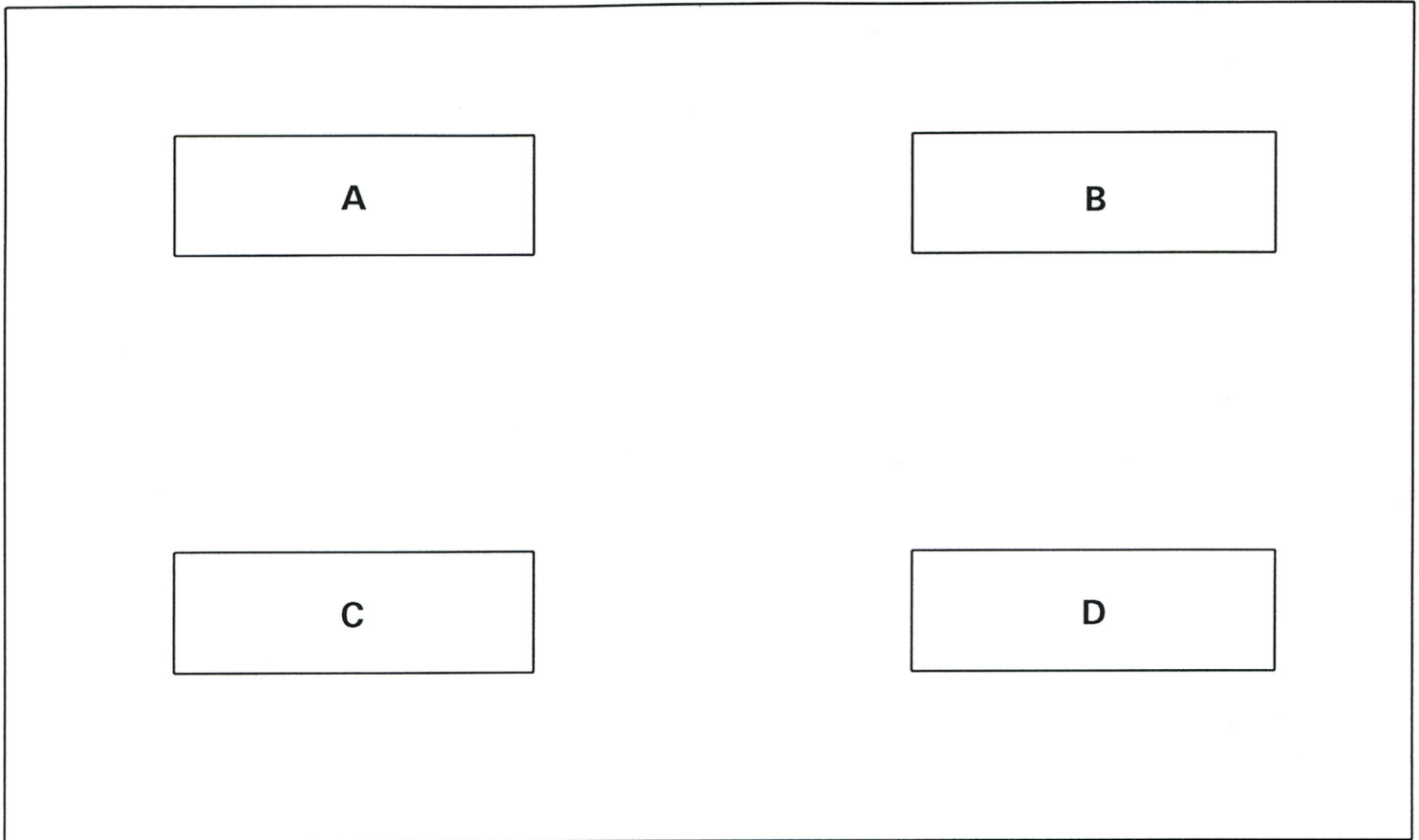


Time	Data Channels											
	5	6	7	8	9	11	12	14	15	16	17	18
50.0	892.9	910.8	935.3	934.1	167.3	208.6	180.8	210.4	194.8	173.3	233.4	238.3
51.0	896.5	911.4	938.0	935.7	168.4	209.1	183.7	212.3	198.4	176.7	235.8	240.9
52.0	898.4	914.0	938.5	935.9	170.0	213.4	189.9	219.8	201.3	179.3	239.7	242.7
53.0	902.9	922.1	945.5	945.1	171.9	216.6	194.6	227.0	204.1	181.9	245.4	247.5
54.0	905.7	925.0	947.3	947.0	174.2	219.8	200.0	233.0	205.0	184.2	249.7	249.6
55.0	910.0	926.7	950.1	948.5	176.5	223.5	204.5	238.9	205.6	185.3	254.5	253.4
56.0	909.1	929.4	951.7	950.7	179.5	228.9	210.1	246.1	207.0	186.9	260.3	257.4
57.0	911.3	930.6	952.5	952.1	183.4	234.0	215.2	253.1	209.3	188.6	267.7	259.8
58.0	915.6	935.8	958.1	959.4	185.1	242.2	220.1	269.2	213.2	191.0	283.0	279.1
59.0	917.7	936.5	958.5	959.0	189.8	247.0	227.0	276.2	219.0	196.4	294.6	287.0
60.0	918.5	938.8	959.8	961.6	193.0	249.4	232.0	280.6	223.9	200.7	306.8	294.0
61.0	921.3	942.9	960.9	962.8	196.6	257.0	240.0	296.6	230.0	205.9	322.6	303.7
62.0	923.3	943.7	959.5	963.1	202.4	263.0	250.2	302.0	236.9	210.6	330.9	303.4
63.0	923.1	941.4	963.8	963.7	206.7	268.6	256.8	315.7	242.6	214.2	348.0	314.0
64.0	924.5	941.8	964.9	963.2	210.4	273.4	263.4	325.6	249.7	218.5	363.7	326.0
65.0	924.2	941.2	964.1	962.4	215.0	279.0	271.9	334.2	257.4	223.8	376.8	332.7
66.0	931.3	948.4	967.1	966.9	221.1	296.6	284.8	360.3	266.3	228.7	390.3	340.4

No more data

#### KEY FOR CHANNELS

Channel no. 5	Furnace
Channel no. 6	Furnace
Channel no. 7	Furnace
Channel no. 8	Furnace
Channel no. 9	B frame
Channel no. 11	B flap
Channel no. 12	A frame
Channel no. 14	A flap
Channel no. 15	D frame
Channel no. 16	C frame
Channel no. 17	D flap
Channel no. 18	C flap



### Details of Specimen

Each aperture is 300mm wide and 120mm high.  
Vertical spacing between apertures is 125mm.  
Horizontal spacing between apertures is 170mm.

### Apertures in 54mm Shadbolt 60 minute door blank

- A 6mm Thermaflex (3x2mm) + 2 glassfibre interlayers  
No end protection
- B 6mm Thermaflex (3x2mm) + 2 glassfibre interlayers  
1x2mm Thermaflex at ends
- C 5mm Thermaflex (5x1mm) + 4 glassfibre interlayers  
1x2mm Thermaline at ends
- D 5mm Thermaflex (5x1mm) + 4 glassfibre interlayers  
No end protection

Horizontal intumescent strips pinned in place with 4no 30mm pins, 1.5mm diameter set at 10mm from face of door and 50mm from end of aperture.

Each aperture was covered on unexposed side by a Fleet letterplate tidy (aluminium)  
Apertures A&B had model no 4466/14/EAAS letterplate tidies  
Apertures C&D had model no 4466/16/EAAS letterplate tidies