CHILTERN
INTERNATIONAL FIRE
Chiltern House, Stocking Lane, Hughenden Valley,
High Wycombe, Buckinghamshire HP14 4ND, UK
Tel: UK: 01494 563091 Intl: +44 1494 563091
Fax: UK: 01494 564895 Intl: +44 1494 564895
Email: cif@ttlchiltern.co.uk.

CONFIDENTIAL

Test Report : RF96095

A fire resistance test performed on two single leaf single acting doorsets with various ironmongery

Test conducted in accordance with BS 476 : Part 22 : 1987

Test Date: 20 November 1996

A fire resistance test performed on two single leaf single acting doorsets with various ironmongery.

Tested in accordance with BS 476 : Part 22 : 1987.

1. Introduction

The doorsets were manufactured and supplied for test by the client and delivered on 15 November 1996. Chiltern International Fire Limited (CIFL) constructed a timber stud/plasterboard clad partition and the client installed the doorsets into the partition.

2. Specification

2.1 Door leaves - both doorsets

Both leaves measured 1978mm high x 835mm wide x 53.5mm thick. Both leaves had blue plugs with circular red centres situated 590mm from the bottom of the leaf on the hanging edge. Both leaves were hung to open in towards the furnace, which is considered to be the most onerous direction based on experience of testing doors of similar construction. It is therefore the opinion of the laboratory that the test results can be applied to doors opening in either direction. The results of this test were obtained from doors fitted with a latch but disengaged and are therefore applicable to both latched and unlatched doorsets.

Apertures had been cut into the door leaves to accept the letterboxes and a ventilation grille, no additional framing was apparent in the region of these apertures

		Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Core		Flaxboard in two vertical pieces	1 No 580 wide x 49 thick 1 No 70 wide x 49 thick	450**	-
Stiles		Whitewood	72 wide x 49 thick	470**	-
Rails	Top	Whitewood	72 wide x 49 thick	470**	9-10
	Bottom	Whitewood	72 wide x 49 thick	470**	9-10
Facings		Exterior grade ply	2.7 thick	446**	11-12
Adhesive	Lipping	PVA	-	-	-
	Facing	Urea formaldehyde	-	-	-
	Core	-	-	-	-
Lippings		Light red meranti - vertical edges only	Hanging edge - 4 thick Closing edge - 6 thick	536**	9

** Nominal density

2.2 Door frames - both doorsets

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Head & Jambs	Utile	94 x 57 inc 13.5 deep stop	-	A - 9 B - 10
Stops	Utile - integral	13.5 deep	-	9
Architrave	Plasterboard	12.5 thick	-	-
Threshold	Non combustible	-	-	-

2.3 Intumescent materials - both doorsets

		Make/type	Size (mm)	Location
Door edges	Head	None fitted	-	-
	Vertical	None fitted	-	-
Frame reveal	Head	1 No FS30X - with brush seal 1 No FS30X (graphite based)	10 x 4 10 x 4	Fitted 6 from the door stop Fitted 6 from the exposed face
	Vertical edges	1 No FS30X - with brush seal 1 No FS30X (graphite based)	10 x 4 10 x 4	Fitted 6 from the door stop Fitted 6 from the exposed face
Around hinges		Partially interrupted	-	-
Under hinge blade		intumescent hinge plates (graphite based)	2 thick	Under hinge blade on frame and leaf
Encasing latch body		Rhone Povlenc 4 hr intumescent mastic + Firestop intumescent latch plate (graphite based)	2 thick	Latch bedded in intumescent
Around latch forend		Partially interrupted	-	-
Under latch forend		Rhone Povlenc 4 hr intumescent mastic	-	Forend bedded in intumescent mastic
Under latch keep		Rhone Povlenc 4 hr intumescent mastic	-	Keep bedded in intumescent mastic
Closer protection		intumescent sheet (graphite based)	2 thick	Doorset A - 108 x 40 Doorset B - 250 x 50
Ventilation grille		Rhone Povlenc 4 hr intumescent mastic	-	Both aluminium grille faces bedded on intumescent mastic

2.4 Ironmongery

2.4.1 Doorset A

	Make/type	Size (mm)	Location
Hinges - 4 No	2 No Top - Frisco Reflex polished brass ref 14859 2 No Bottom - Frisco Eclipse satin stainless steel ball bearing ref 14857	101 x 32 101 x 31 (blade size)	Fitted 145, 667, 1175 and 1680 from the leaf head
Closer	King 700 Series Size 2 (FRISCO) aluminium body	180 x 40	Fitted to the exposed face as per manufacturer's instructions
Latch	Lister Lock Ltd ref No LK40 - disengaged	155 x 25	Fitted 1020 from the leaf head
Furniture	Newman Tonks - Renown lever lock handles P397/77 SCP - zinc	150 x 42	Fitted 950 from the leaf head
Ventilation grille	[illegible] intumescent vent with aluminium grilles	295 x 295 305 x 305	Fitted 1520 from the leaf head and 270 from the closing edge

2.4.2 Doorset B

	Make/type	Size (mm)	Location
Hinges - 3 No	Top and Bottom - Frisco ref 14835 brass butt, Frisco ref 14836 brass butt Middle - Frisco Eclipse polished stainless steel ball bearing ref 14860	101 x 32 101 x 31 (blade size)	Fitted 150, 917 and 1685 from the leaf head
Closer	King 93 Series (one model only) c/w cover (FRISCO) aluminium bodies	254 x 50	Fitted to the exposed face as per manufacturer's instructions
Latch	Lister Lock Ltd - ref No LK90 - disengaged	60 x 26	Fitted 1000 from the leaf head
Furniture	Newman Tonks - Renown lever latch handles P22/77 SCP - zinc	95 x 42	Fitted 950 from the leaf head
Letterbox 1	[illegible] standard intumescent letterbox with graphite liner supported by steel band	72 x 253	954 from leaf head and 293 from closing edge
Letterbox 2	Hewi standard intumescent letterbox with Firestop high performance liner	90 x 383	1170 from leaf head and 230 from closing edge
Letterbox 3	[illegible] standard intumescent letterbox with graphite liner	72 x 253	1410 from leaf head and 295 from closing edge

2.5 Door perimeter gaps

The gaps between the edge of the doors and frame were measured prior to test. A total of 24 readings were taken. The measurements (in mm) are given in Figure 6.

2.6 Closer Forces

Measured in accordance with FTSG Resolution No. 63

	Opening Force (Nm)	Closing Force (Nm)
Left	34	13
Right	25	16

3. Test Results

When tested in accordance with BS476: Part 22: 1987, the requirements of the standard were satisfied for the following periods:

	Door A	Door B
Integrity	**61 (sixty one) minutes***	**43 (forty three) minutes****
Insulation	**61 (sixty one) minutes***	**43 (forty three) minutes****

* No failure recorded upon termination of test

** Failure of first letterplate, subsequent failures are recorded in the observations

At the time of test termination there was no failure of the perimeter of the door leaves attributable to the ironmongery.

4. Limitations

The results only relate to the behaviour 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 of this test were obtained using the door to frame gaps recorded in Figure 6. The fire resistance performance of doors of this design may change if substantially different gaps are employed.

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

J J VIBERT
Laboratory Manager

C P A HOUCHEN
Head of Testing

Date of issue: 14/1/97

5. Observations

Time	Comments
00.00	Test started.
04.12	Both doorsets, continuous smoke issuing from the top half of the closing edge and along the head of the leaf.
05.33	Doorset B, the latch position has distorted in towards the furnace by approximately 2mm, and the head and foot of the leaf have distorted in towards the furnace by approximately 1mm.
07.49	Doorset B, glowing can be seen beneath the letterbox flap on the central letterbox.
13.07	Doorset A, a small area of discolouration has appeared towards the top closing corner approximately 40mm down from the head of the leaf.
13.53	Doorset B, the closing edge has distorted in towards the furnace by approximately 3mm.
17.32	Both doorsets, there is discolouration occurring at the top closing corner. On doorset A it is extending across the head for approximately 300mm and on doorset B it is localised to the top closing corner.
18.15	Doorset A, the bottom closing corner has distorted in towards the furnace by approximately 5mm.
19.18	Doorset B, the intumescent within the middle plastic letterbox has begun to react.
36.09	Doorset A, there is smoke issuing and further discolouration at the top hanging and closing corners.
36.20	Doorset B, there is increased smoke issuing and further discolouration at the top hanging corner with some discolouration beginning to occur at the top closing corner. The closing edge has distorted in towards the furnace by approximately 5mm over the top half of the leaf and 6-7mm over the bottom half of the leaf.
38.13	Doorset B, a small area of discolouration is beginning to appear at the foot of the leaf approximately 150mm in from the hanging edge and 40mm in width which has produced a glow.
40.50	Doorset B, the plastic surround of the bottom letterbox is beginning to soften and sag down.

42.07 Doorset B, the unexposed face plastic flap of the centre letterbox has melted on the left hand side leaving an aperture of approximately 40mm wide x 10-15mm high through which flames can be seen.

43.03 Doorset B, there is intermittent flaming from the centre plastic letterbox.

43.45 Doorset B, the letter-plate surround of the bottom letterbox has melted and the letter-plate has fallen off the door producing continuous flaming from the letterbox thereby constituting **INTEGRITY FAILURE**.

44.53 Doorset B, there is continuous flaming coming through the centre letterbox which has spread up the face of the leaf thereby constituting further **INTEGRITY FAILURE**.

45.48 Doorset B, there are two areas of erosion appearing at the bottom of the leaf, the centre one being approximately 30mm wide x 8mm high and the right hand one being approximately 40mm wide by 3-4mm high.

46.20 Doorset B, both middle and bottom letterboxes have been stuffed with Rockwool to continue the test.

48.41 Doorset A, the intumescent in the top 60mm of the ventilation grille has reacted.

50.57 Doorset B, the top letterbox is beginning to melt with the metal letter-plate on the front beginning to become detached.

51.38 Doorset B, there is intermittent flaming from the top of the top letterbox.

51.54 Doorset B, continuous flaming through the top letterbox thereby constituting further **INTEGRITY FAILURE**.

53.29 Doorset A, there is a small amount of smoke issuing from the top corners of the ventilation grille.

53.56 Doorset A, a vertical scorch mark has occurred on the face of the door approximately 150mm in from the closing edge, extending from the head of the leaf downwards by approximately 1500mm.

54.22 Doorset B, scorch marks similar to doorset A are beginning to occur, some with fissures.

54.55 Doorset B, glowing is now visible from behind the fissures in the doorleaf.

55.59 Doorset B, a cotton pad integrity test was performed at the top of the scorch marks, no failure.

56.15 Doorset B, the vertical scorch mark has fissured along its entire length.

56.35 Doorset B, the vertical fissure and horizontal fissures in the door leaf have ignited resulting in continuous flaming thereby constituting **INTEGRITY FAILURE**.

57.24 Doorset A, the majority of the intumescent in the ventilation grille has reacted although there are a few point glows visible.

58.06 Doorset B, a further scorch mark has occurred towards the top hanging corner approximately 80mm down from the head and edge of the leaf.

59.32 Doorset A, small flames are visible inside the ventilation grille in the bottom left hand corner as the grille is beginning to bow out.

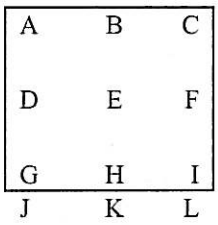
60.00 Doorset A satisfactory.

61.25 Doorset A, a cotton pad integrity test was performed on the fissure at the top of the area of discolouration, no failure.

61.51 Test terminated - there was no failure of doorset A upon termination of the test.

6. Door Distortion Data

The following tables show the distortion of the doors in mm.
A positive measurement indicates distortion towards the fire.
A negative measurement indicates distortion away from the fire.
J, K and L give vertical movement of the door, a negative reading indicates that the door has dropped.



Left Hand Leaf (hung on the right and opening in towards the fire)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	2.5	1	0	2.5	3.5	0.5	2.5	0.5	-1.5	0	0	0.5
30	3	1	-1.5	3	12	-0.5	4	3	-0.5	-1	-1	-0.5
45	4.5	1.5	0.5	2	8	-2	5	4	2	-2	-2	-1.5
60	7.5	0.5	3.5	2.5	-20.5	-3	4	-3.5	4.5	-2.5	-3.5	-3.5

Right Hand Leaf (hung on the right and opening in towards the fire)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	2.5	1	-0.5	3.5	0.5	1.5	2.5	1	0.5	-0.5	-0.5	-0.5
30	3	1.5	0	4	6	1.5	4.5	2	0	-1	-0.5	-1.5
45	4	1	3	4.5	0.5	2	6	2	0.5	-1	-1	-1.5

7. Test Procedure

7.1 Where areas of the test specification are ambiguous or open to interpretation the Fire Test Study Group Resolutions have been followed (where appropriate). These Resolutions provide basis of common agreements between the fire test laboratories which are members of this Group.

7.2 The ambient temperature of the test area at commencement of test was 13°C.

7.3 After the first 5 minutes of the test, the furnace pressure was maintained at 0 ± 2 Pa with respect to atmosphere, at a point 1m from the notional floor level.

7.4 The furnace was controlled to follow the temperature/time relationship specified in BS476: Part 20: 1987 as closely as possible, using the average of six thermocouples suitably distributed within the furnace. The temperatures recorded are shown graphically in Figure 1.

7.5 The temperature of the unexposed faces were monitored by means of five thermocouples fixed to the surface of the door leaves, and three thermocouples attached to each frame, one at midheight on each jamb and one centrally located above the leaf on the frame head. The thermocouple positions are shown in Figure 6. The average temperature of each door leaf and maximum temperature of each doorset are shown graphically in Figure 2.

FIGURE 1 FURNACE TEMPERATURE CURVES

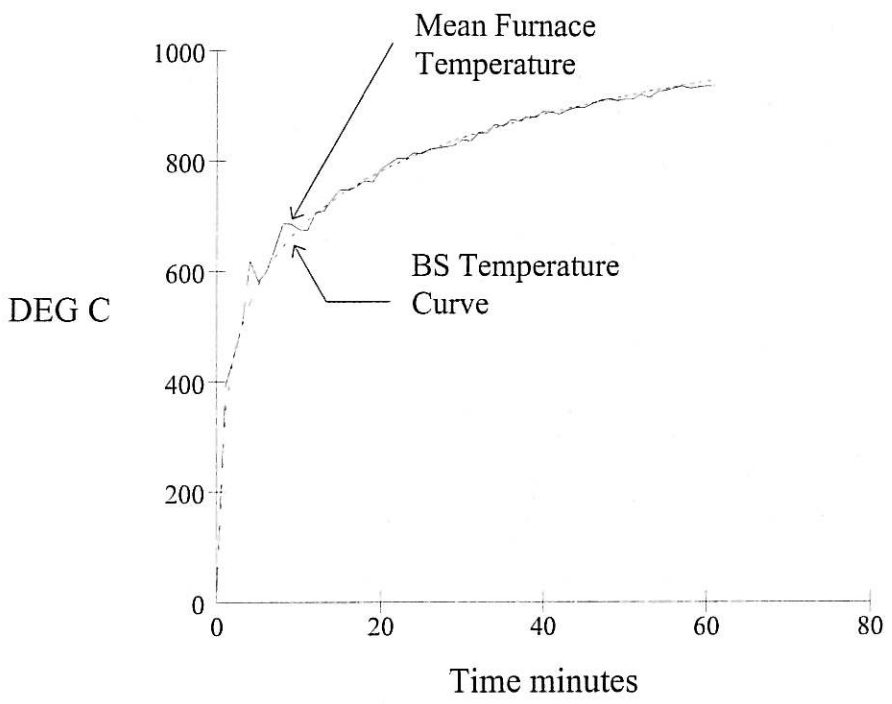
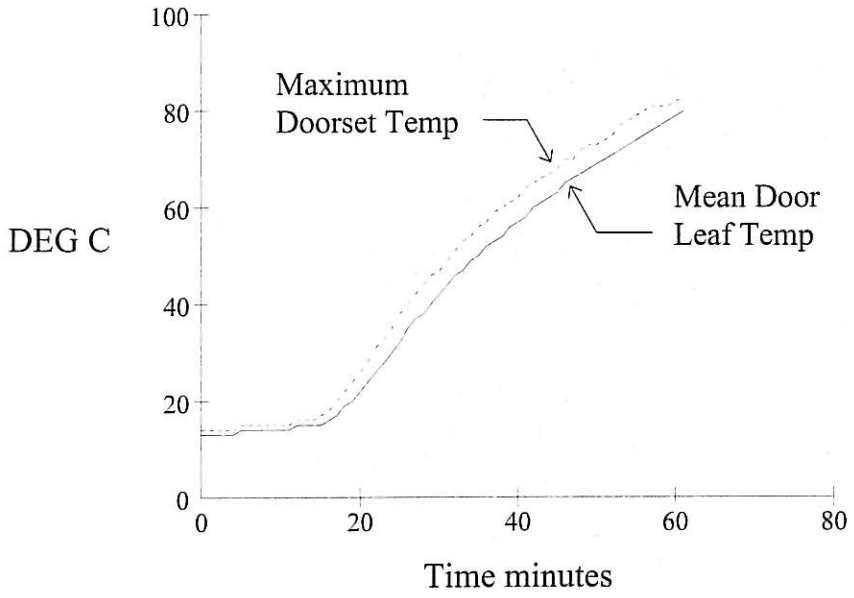
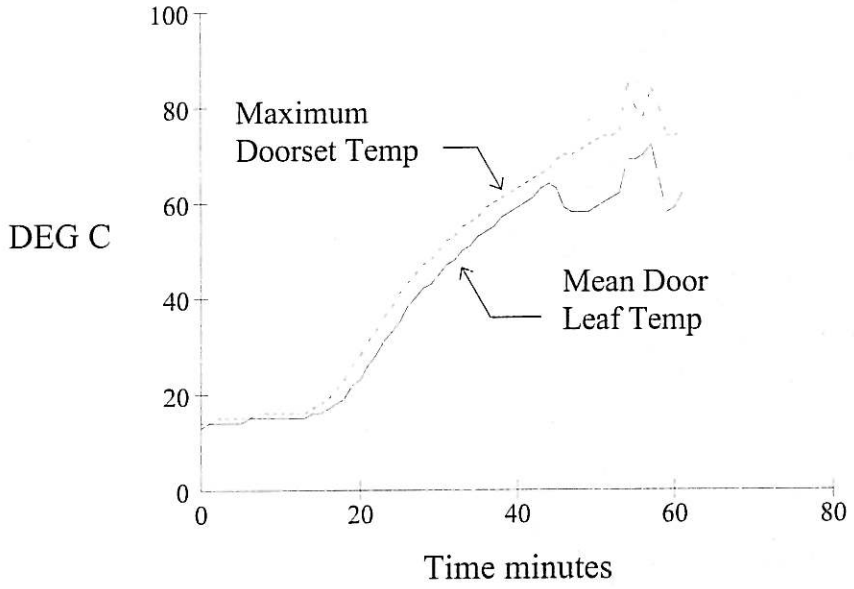


FIGURE 2 UNEXPOSED FACE TEMPERATURE CURVES

DOOR A



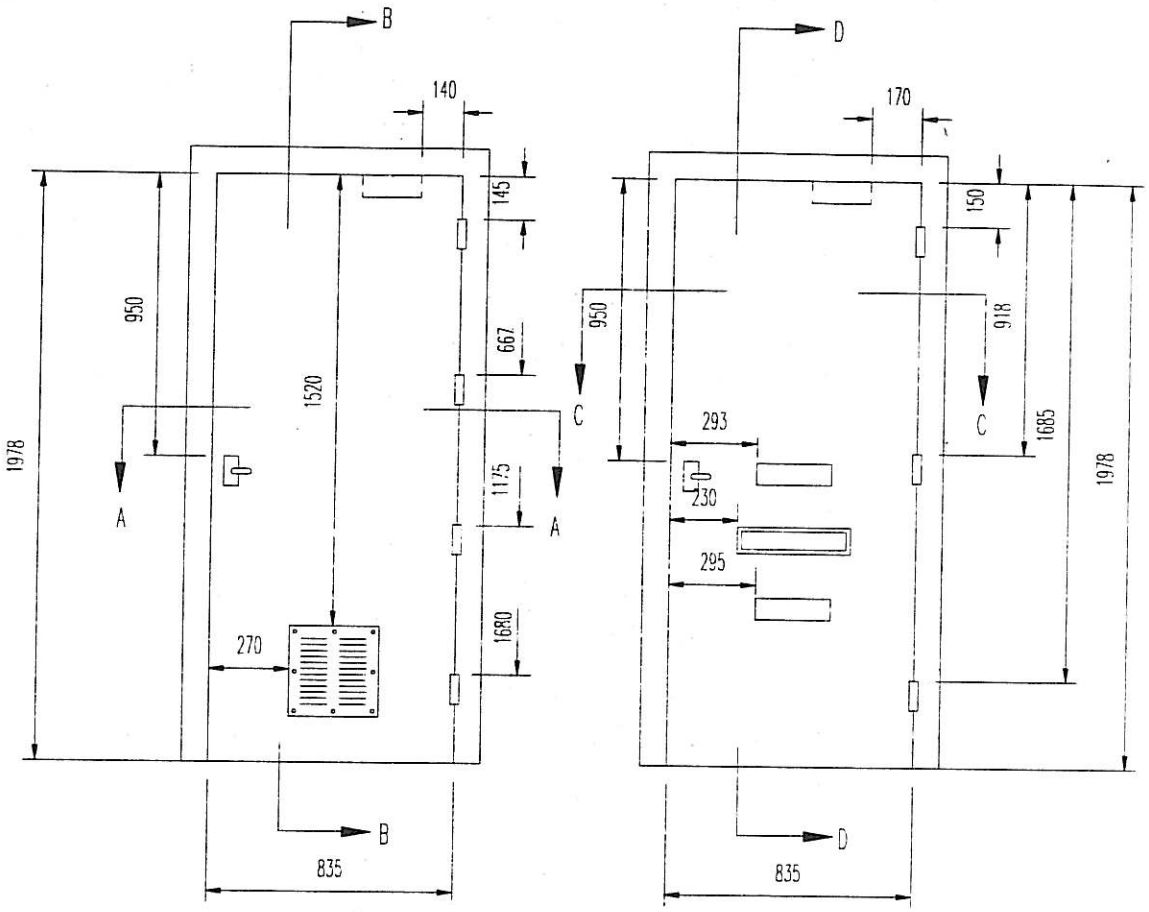
DOOR B



KEY TO FIGURES
All dimensions on Figures in millimetres. Do not scale.

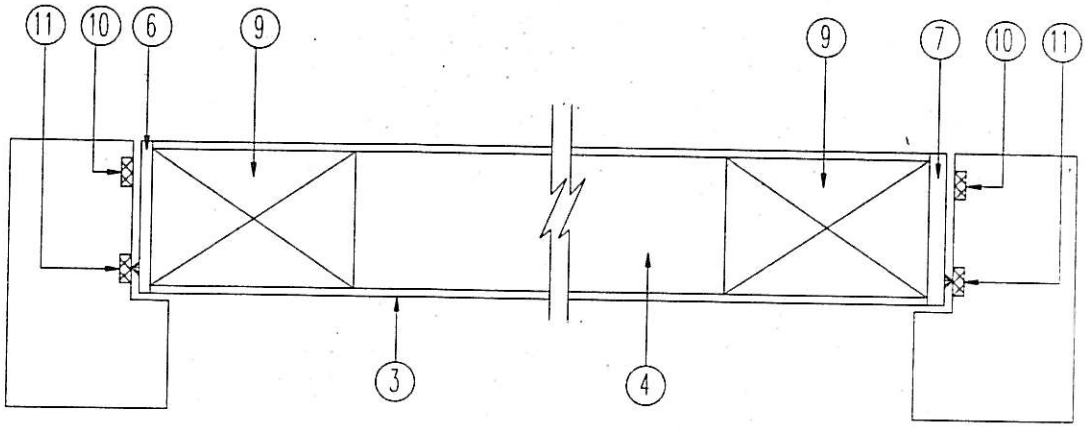
1. 94 x 57 including 13.5 deep stop utile door frame
2. 72 wide x 49 thick whitewood rail
3. 2.7 thick ply facings
4. 49 thick flaxboard core
5. 295 x 295 Firestop intumescent vent with 305 x 305 aluminium grilles
6. 4 thick light red meranti lipping
7. 6 thick light red meranti lipping
8. 3 thick light red meranti lipping
9. 72 wide x 49 thick whitewood stiles
10. 10 x 4 Firestop FS30X graphite intumescent strip
11. 10 x 4 Firestop FS30X graphite intumescent strip with brush seal
12. 72 x 253 Firestop standard intumescent letterbox with steel liner support
13. 90 x 383 Hewi standard intumescent letterbox with Firestop high performance liner
14. 72 x 253 Firestop standard intumescent letterbox

FIGURE 3

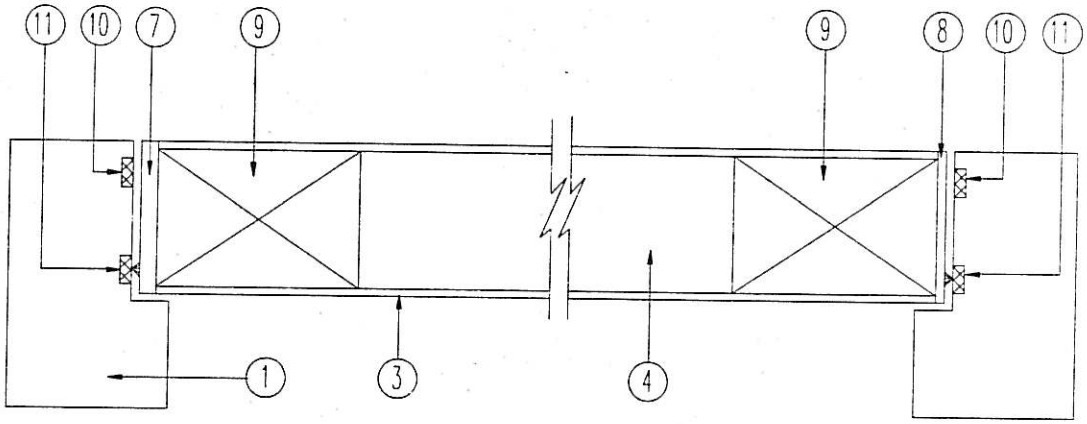


ELEVATION AND IRONMONGERY

FIGURE 4



SECTION A-A



SECTION C-C

FIGURE 5

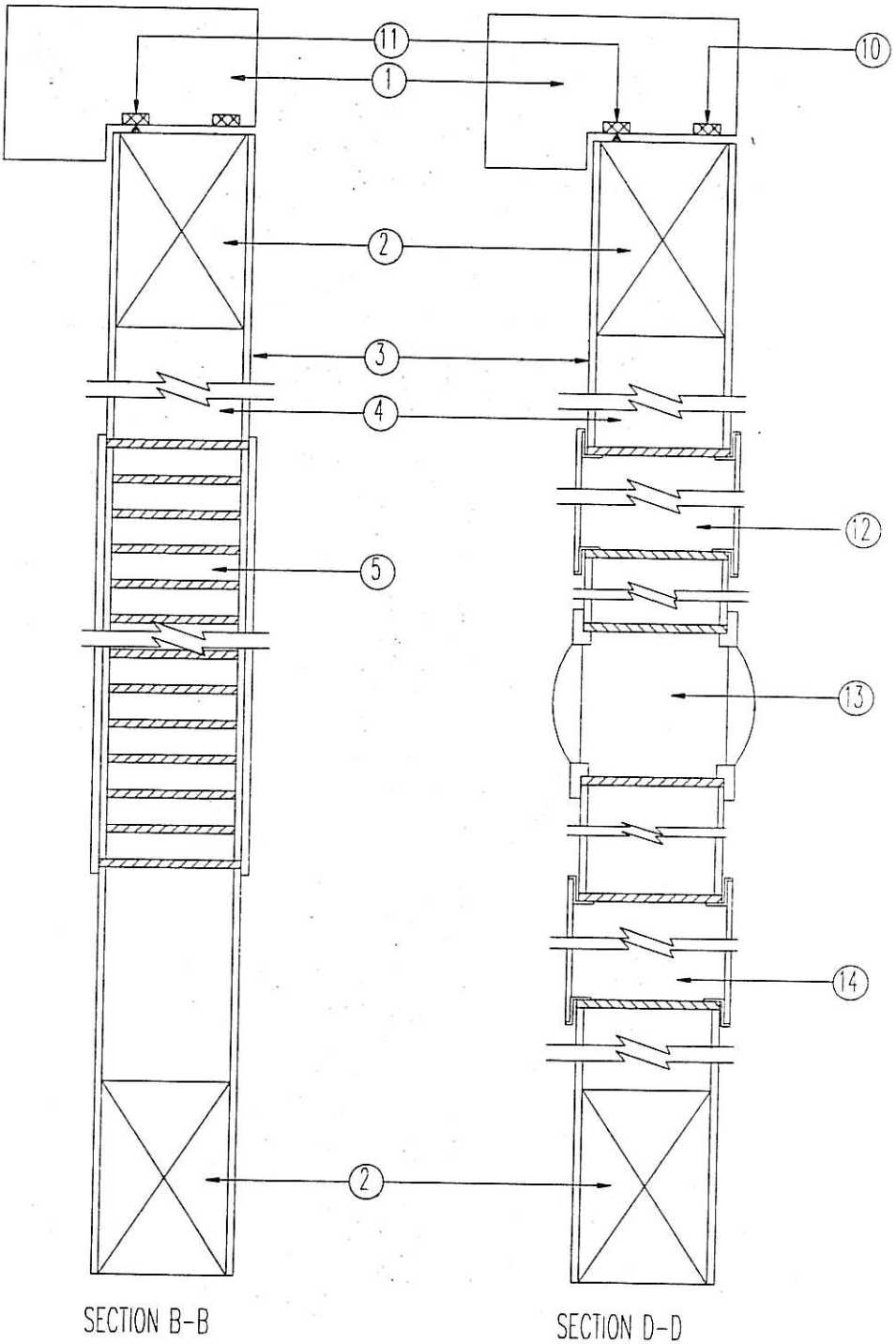
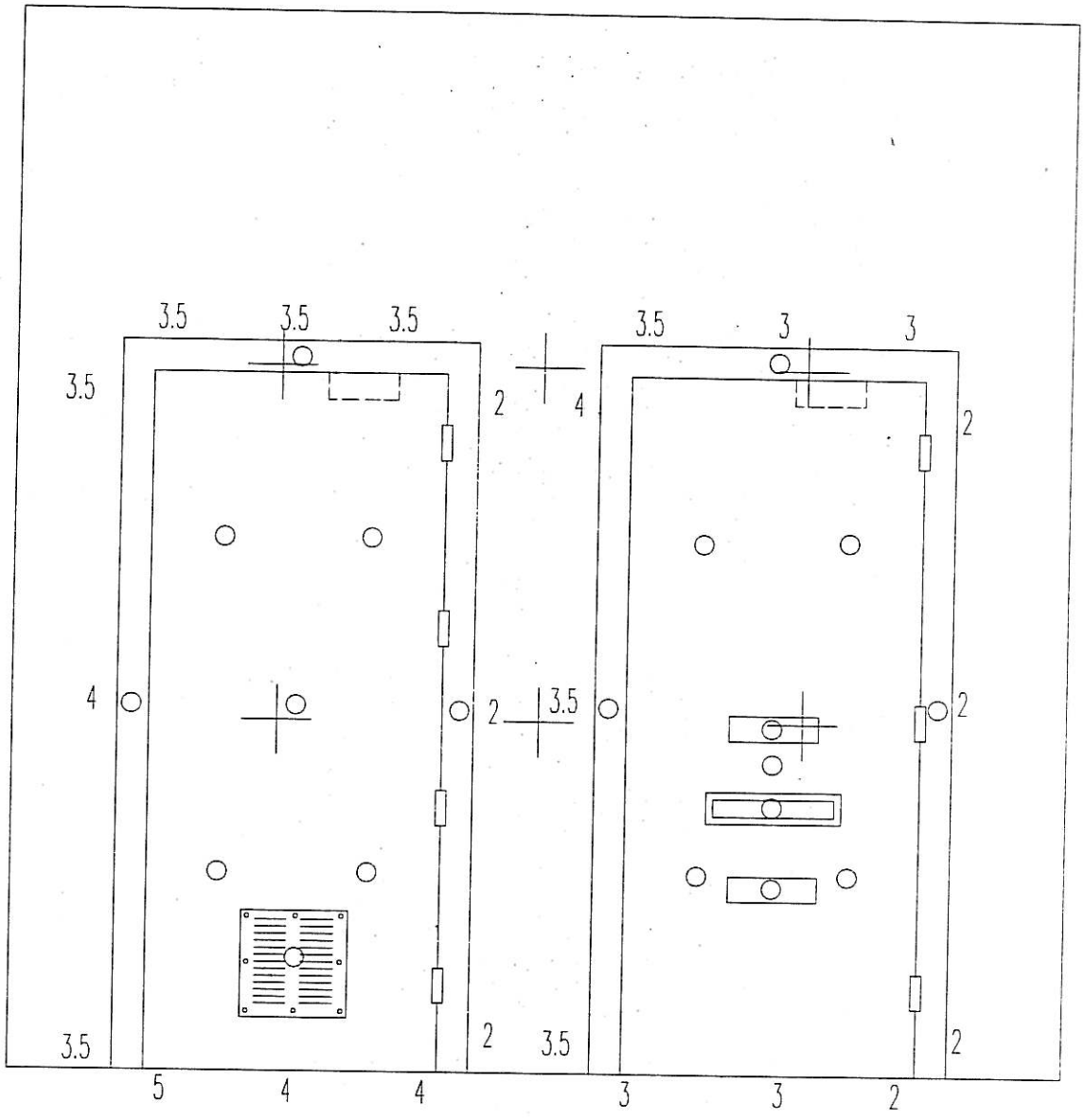


FIGURE 6



POSITION OF THERMOCOUPLES
and
DOOR GAPS (in mm)