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CONFIDENTIAL

Test Report : RF95130

A fire resistance test performed on two single acting single leaf doorsets

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

Test Date: 14 December 1995

Test for : Environmental Seals Ltd
Envirograf House
Barfreston
Nr Dover
Kent
CT15 7JG

A fire resistance test performed on two single acting single leaf doorsets

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

1. Introduction

The doorsets were manufactured by Castle Joinery, Rye, Sussex and supplied for test by the client on 12 December 1995. TRADA Technology Limited (TTL) constructed a timber stud/plasterboard clad partition and installed the doorsets into the partition.

2. Specification

2.1 Door leaves

The left leaf was designated doorset A and measured 1980mm high x 762mm wide x 54mm thick. The right leaf was designated doorset B and measured 1980mm high x 762mm wide x 54mm thick. Both leaves were hung to open towards the furnace. No latches were installed for the test.

2.1.1 Doorset A

Materials	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Stiles	Sapele	95 wide x 54 thick	640**	8-9
Top rail	Sapele	95 wide x 54 thick	640**	9
Middle and bottom rail	Sapele	195 wide x 54 thick	640**	9
Top panels	Sapele grooved into the stiles and rails to a depth of 15mm	987 high x 240 wide x 45 thick reducing to 17 thick	640**	9
Bottom panels	Sapele grooved into the stiles and rails to a depth of 15mm	511 high x 240 wide x 33 thick reducing to 16 thick	640**	9
Adhesive	Not specified	-	-	-
Face treatments (to entire exposed face)	Coated with Environmental Seals product 103/ES/RFC consisting of one coat of primer (at 12m²/litre), two coats of Envirograf clear intumescent coating (at 12m²/litre), one layer of clear undercoat (at 12m²/litre) and one layer of clear hard coating (at 12m²/litre)	-	-	-

2.1.1 Doorset A (continued)

Materials	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Face treatments (to only the panels and beading of the unexposed face only)	Coated with Environmental Seals Product 103/ES/RFC	-	-	-

* Stated density, not checked by laboratory
** Nominal density

2.1.2 Doorset B

Materials	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Stiles	Iroko	95 wide x 54 thick	660**	9-10
Top rail	Iroko	95 wide x 54 thick	660**	10-11
Middle and bottom rail	Iroko	194 wide x 54 thick	660**	10-11
Top panels	Iroko, faced with Envirograf ES/MPPV intumescent membrane paper adhered to panel using IA intumescent adhesive on both faces extending underneath the planted mouldings. The panels were grooved into the stiles and rails to a depth of 15mm	986 high x 240 wide x 19 thick	660**	-
Bottom panels	Iroko, faced with Envirograf ES/MPPV intumescent membrane paper adhered to panel using IA intumescent adhesive on both faces extending underneath the planted mouldings. The panels were grooved into the stiles and rails to a depth of 15mm	511 high x 240 wide x 19 thick	660**	-
Mouldings	Sapele	33.5 wide x 20 deep	640**	13
Face treatments (to exposed face only)	Sapele mouldings coated with one coat of Envirograf HW01 and one coat of Envirograf HW04. The entire exposed face of the doorleaf was coated with Hutchings gloss household white paint	-	-	-
Face treatments (to unexposed face only)	Sapele mouldings coated with one coat of Envirograf HW02 clear intumescent coating and one coat of Envirograf HW03 coating. The entire unexposed face of the doorleaf was coated with one coat of Envirograf HW03 coating	-	-	-

* Stated density, not checked by laboratory
** Nominal density

2.2. Door frames

2.2.1 Both doorsets

Materials	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)
Head & Jambs	Sapele	32 x 102	640**	<8
Stops	Sapele - planted	12 deep	640**	9
Architrave	Plasterboard	12.5 thick	-	-
Threshold	Non-combustible	-	-	-

* Stated density, not checked by laboratory
** Nominal density

2.3 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.

2.4 Ironmongery

2.4.1 Door A

	Make/type	Size (mm)	Location (mm)
Hinges	3 No steel butt	100 x 30	151, 934 and 1649 from the leaf head
Closer	Dorma TS 83	-	Fitted as per manufacture's instructions
Latch	None fitted	-	-
Furniture	Henderson Hardware aluminium lever handles	-	950 from the leaf head

2.4.2 Door B

	Make/type	Size (mm)	Location (mm)
Hinges	3No steel butt	100 x 30	155, 935 and 1652 from the leaf head
Closer	Dorma TS 83	-	Fitted as per manufacturer's instructions
Latch	None fitted	-	-
Furniture	Henderson Hardware aluminium lever handles	-	950 from the leaf head

2.5 Intumescent materials

2.5.1 Door A

	Make/Type	Size (mm)	Location (mm)
Door edges	None fitted	-	-
Frame reveal	Envirograf Intumescent Fire and Smoke seal - reference IS25/S with an additional 1mm of Multigraf No2 intumescent adhered to the back	20 x 5	Centrally fitted within the frame reveal
Around hinges	Above strip partially interrupted	-	-
Under hinge flap	Envirograf Intumescent Hinge Protection	100 x 30 x 1 thick	Behind all hinge flaps
Around latch	None fitted	-	-
Under latch keep	None fitted	-	-

2.5.2 Door B

	Make/Type	Size (mm)	Location (mm)
Door edges	None fitted	-	-
Frame reveal	Envirograf ES/SDS/P Fire and Smoke seal	30 x 2	Surface mounted, fitted abutting the door stop
Around hinges	Above strip uninterrupted	30 x 2	Strip running continuously over the hinge blades
Under hinge flap	None fitted	-	-
Around latch	None fitted	-	-
Under latch keep	None fitted	-	-

2.6 Closer Forces

Measured in accordance with FTSG Resolution No. 63

	Opening Force (Nm)	Closing Force (Nm)
Left	52.5	38.5
Right	58.1	35.0

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	39 (thirty nine) minutes	56 (fifty six) minutes
Insulation	39 (thirty nine) minutes	53 (fifty three) minutes

4. Exclusions

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 2.3. 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. TTL 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: 3/4/96

5. Observations

Time	Comments
00.00	Test started.
07.18	Doorset A, heavy smoke issuing from the closing edge at mid-height.
07.44	Doorset A, heavy smoke issuing from the top hanging corner.
08.39	Doorset A, the bottom closing corner has distorted in towards the furnace by approximately 6mm.
14.50	Doorset A, the intumescent varnish coating on the leaf has started to discolour and blister with the heat.
17.30	Doorset A, the top closing corner has distorted in towards the furnace by approximately 5mm.
19.10	Doorset B, the top closing corner has distorted in towards the furnace by approximately 8mm.
21.10	Doorset A, the top closing corner has distorted in towards the furnace by approximately 12mm.
23.55	Doorset A, smoke issuing from the lower right hand panel at the junction with the middle rail.
28.05	Doorset A, the top and bottom closing corners have distorted in towards the furnace by approximately 15mm.
28.50	Doorset B, the bottom closing corner has distorted in towards the furnace by approximately 10mm.
32.25	Doorset B, the smoke seal to the head of the door has become detached from the frame reveal at the top closing corner the distortion of the leaf towards the furnace.
33.50	Doorset A, smoke issuing from the top corners of both upper panels. A crack has appeared in the top left upper panel, approximately 50mm long towards the centre.
35.55	Doorset A, a cotton pad integrity test was performed on the upper left hand panel, no failure.

36.55 Doorset A, scorch marks appearing from the top left hand corner of the upper right hand panel.

37.15 Doorset A, the lower right hand panel has produced a crack approximately 50mm long towards the top left hand corner of the panel.

38.00 Doorset A, the top right hand panel is showing signs of glowing towards the top left hand corner.

38.55 Doorset A, a crack has appeared in the lower half of the right hand upper panel, approximately 50mm long. Glowing is apparent through this crack.

39.27 Doorset A, continuous flaming from the top right hand panel constituting **INTEGRITY FAILURE.**

40.25 Doorset A, intermittent flaming from across the top of the lower right hand panel.

41.25 Doorset A, the bottom closing corner has distorted in towards the furnace by approximately 20mm.

42.44 Doorset A, continuous flaming from the top left hand panel.

43.15 Doorset B, the mouldings to all panels now showing signs of reacting to the heat.

45.53 Doorset B, the membrane covering all panels now showing signs of discolouration.

49.50 Doorset B, smoke issuing from between the stile and moulding on the top right hand panel, approximately half way down.

50.50 Doorset B, the top right panel moulding has now bowed away from the central stile by approximately 7mm. The membrane covering this panel is now bubbling extensively.

52.15 Doorset A, continuous flaming from the top right corner of the bottom left hand panel. Cracking in all panels now extensive.

55.05 Doorset B, glowing apparent through the bottom half of the top right hand panel.

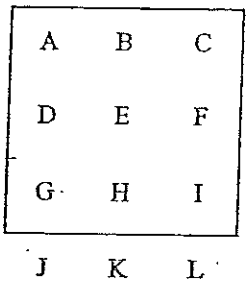
55.37 Doorset B, a cotton pad integrity test was performed at the centre of the top left hand panel, no failure.

56.10 Doorset B, continuous flaming from both the upper left and right panels, thereby constituting **INTEGRITY FAILURE.**

Test terminated.

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 Door (hung on left and opening towards the fire)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	1	1.5	3.5	0	-0.5	-0.5	2	3	4	-0.5	0	0
30	8	8.5	11.5	0	-1	0	7.5	7.5	10	-2.5	-2.5	-3
45	-	-	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-	-	-

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

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	3	0.5	0	0	-1.5	0	-3	-0.5	0	-1.5	-0.5	-1
30	10	4.5	4	0.5	-6	-1.5	6	1.5	1.5	-3.5	-3.5	-3.5
45	11	6.5	5.5	0.5	-10.5	-1.5	7.5	1.5	2	-3	-3.5	-3.5
60	-	-	-	-	-	-	-	-	-	-	-	-

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 10°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 face was monitored by means of five thermocouples fixed to the surface of each doorleaf, and three thermocouples attached to each frame, one at midheight on each jamb and one centrally located above each 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

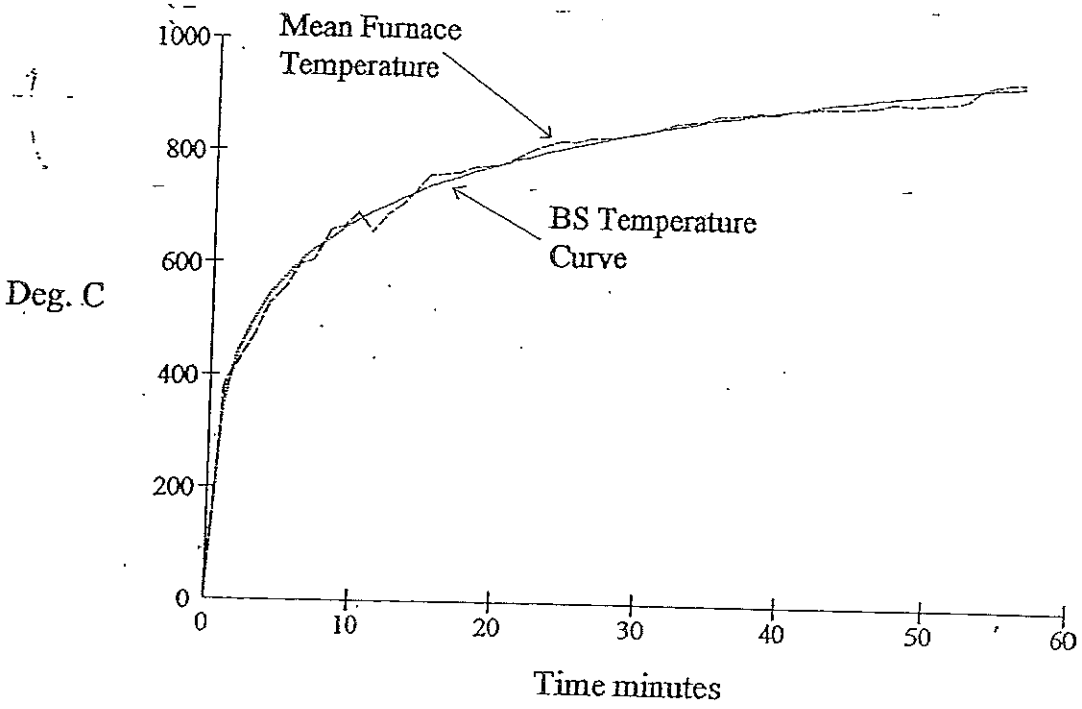
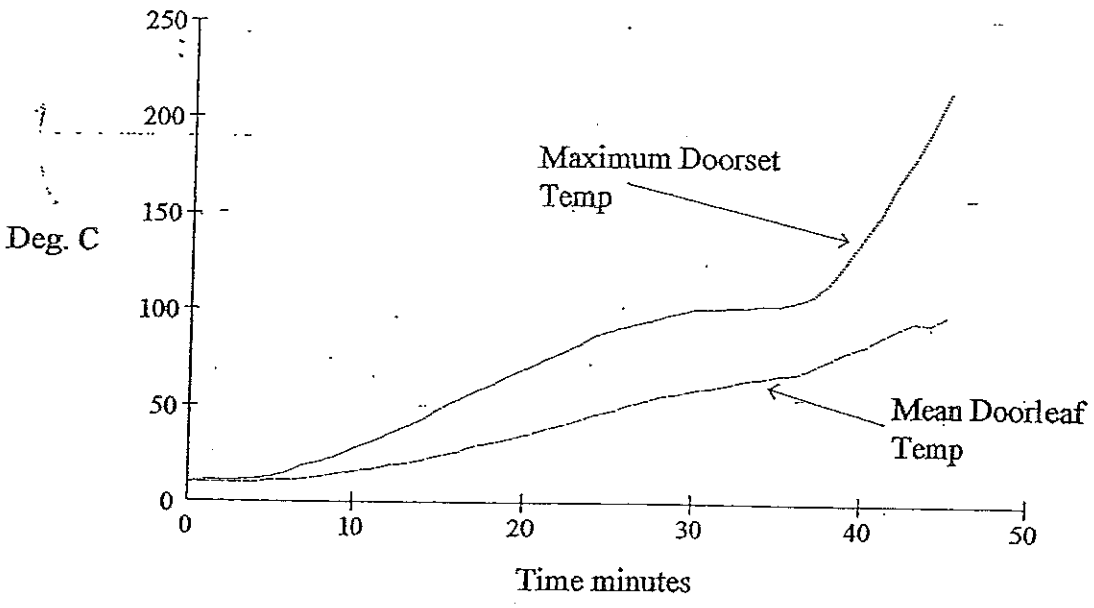
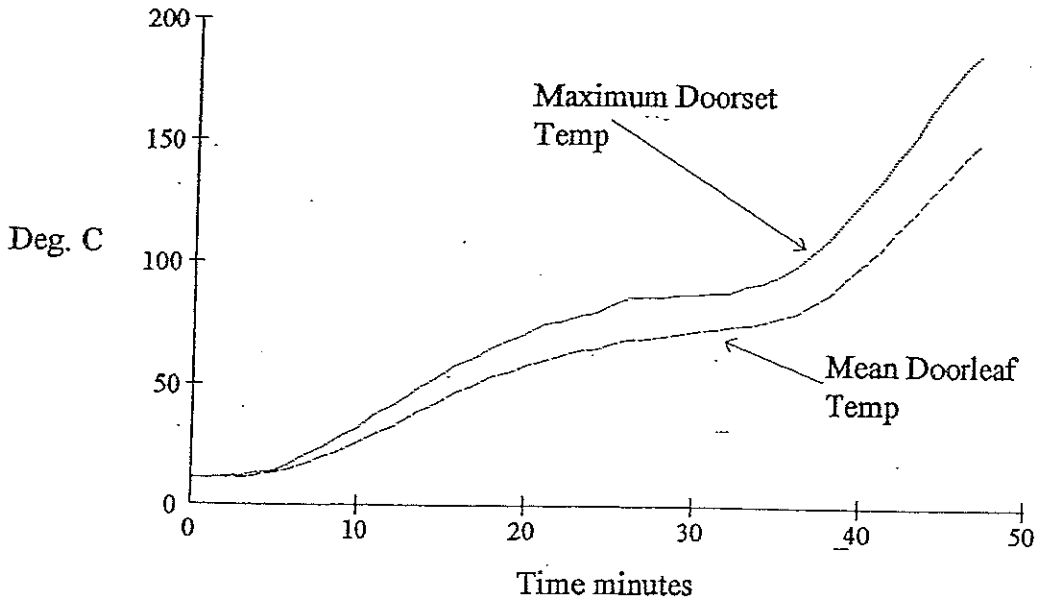


FIGURE 2 UNEXPOSED FACE TEMPERATURE CURVES

Doorset A



Doorset B

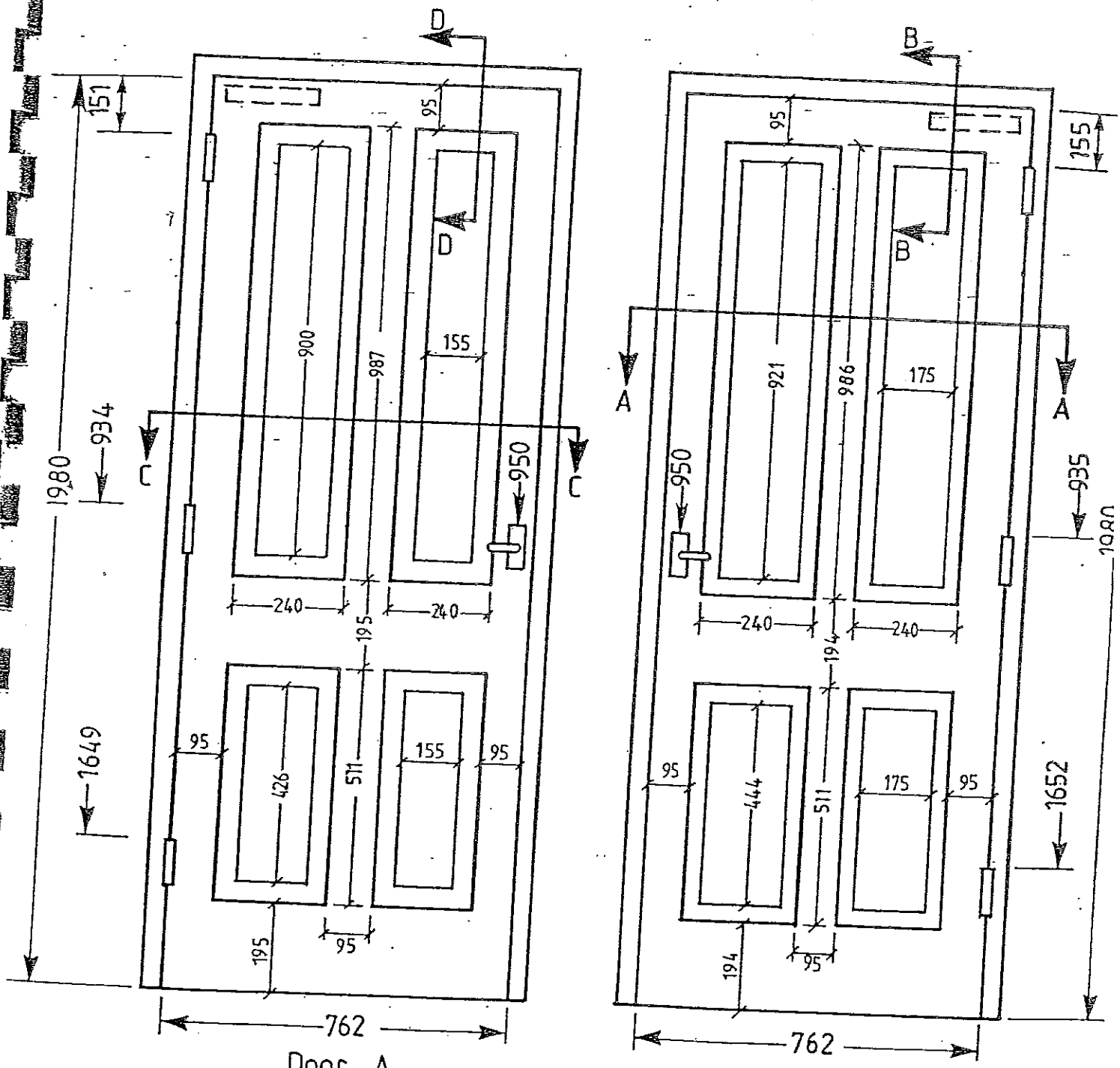


KEY TO FIGURES

All dimensions on Figures in millimetres. Do not scale.

1. 32 x 102 sapele hardwood door framing
2. 12 deep sapele hardwood door stops
3. 33.5 x 20 sapele mouldings
4. 54 thick iroko hardwood stiles and rails
5. 30 x 2 Envirograf ES/SDS/P fire and combined smoke seal
6. Envirograf ES/MPPV intumescent membrane paper
7. 19 thick iroko hardwood panels
8. 20 x 5 Envirograf intumescent strip with an additional 1 thick strip of Multigraf No2 adhered to the back
9. 54 thick sapele hardwood stiles and rails
10. 33 thick sapele hardwood raised panels reducing to 17 thick

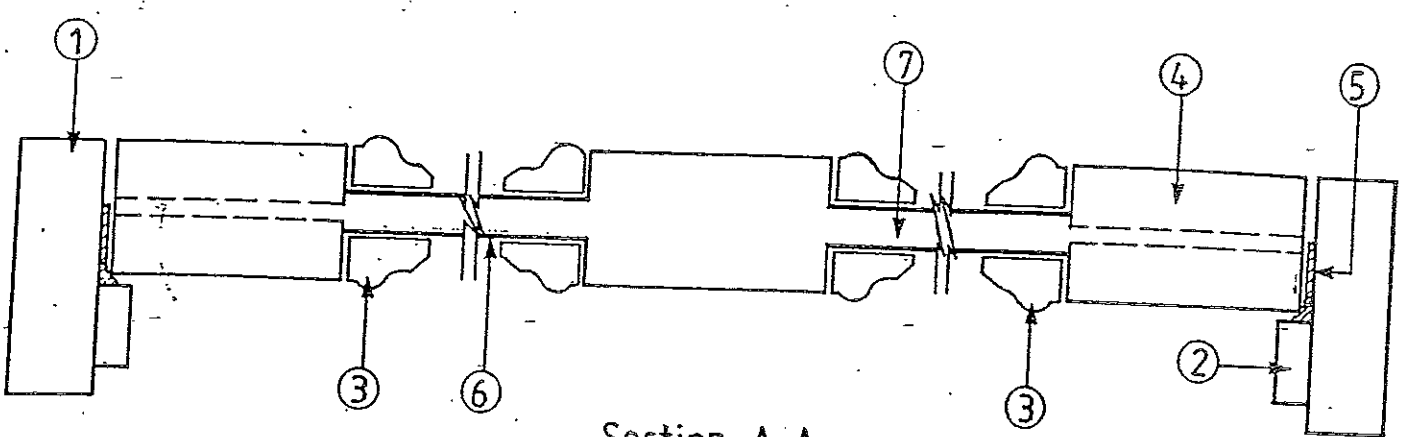
FIGURE 3



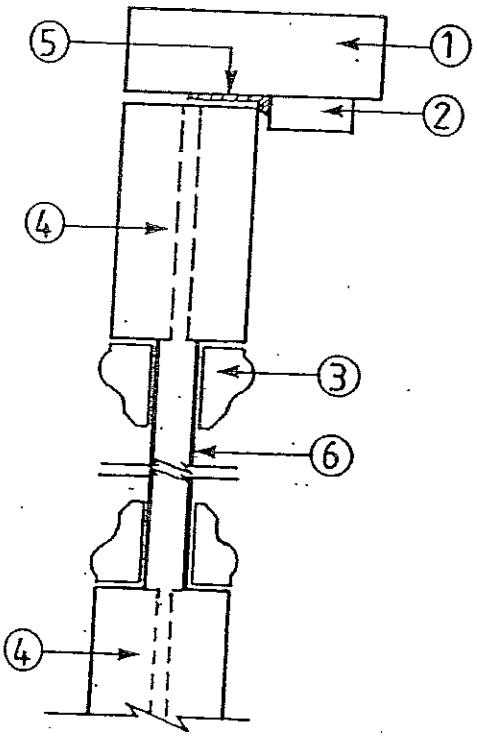
Unexposed Face

ELEVATION AND IRONMONGERY

FIGURE 4

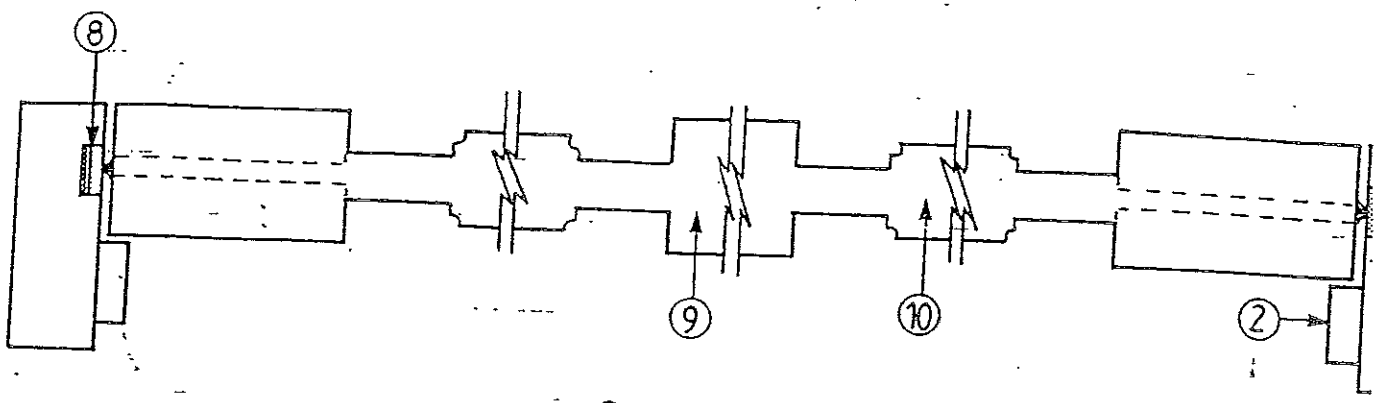


Section A-A

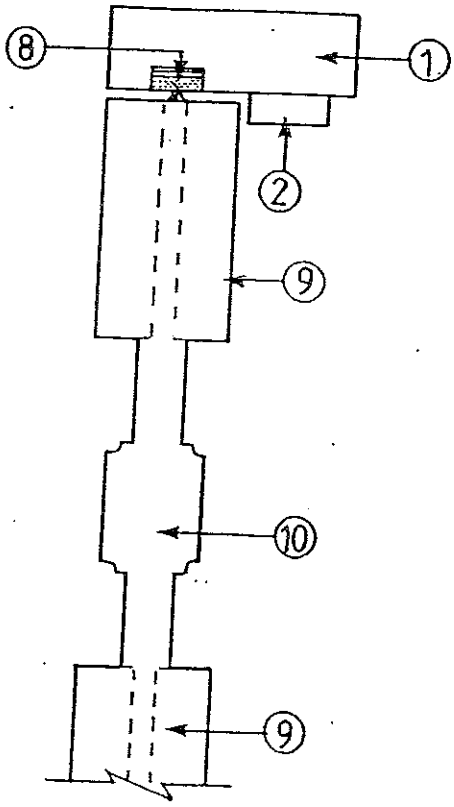


Section B-B

FIGURE 5

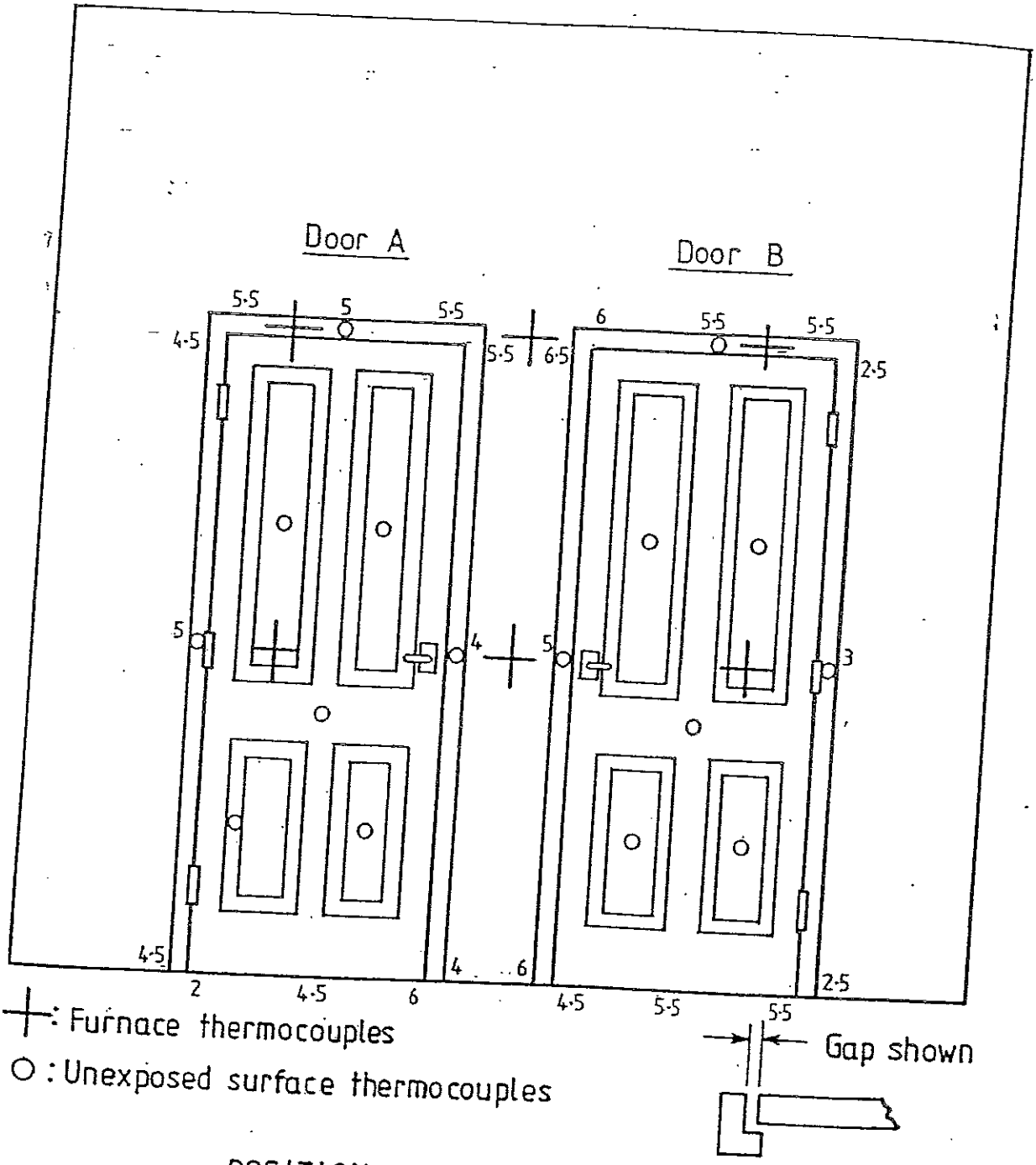


Section C-C



Section D-D

FIGURE 6



POSITION OF THERMOCOUPLES
and
DOOR GAPS (in mm)