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Fire resistance test in accordance with BS 476 Part 22:1987 on a twin-leaf access panel door within a plasterboard partition.

Prepared for:

Fire Proofing Services Ltd.
Evolution House
Aston Road
Nuneaton
CV11 5EL

This test report is additional to that issued as 225286 and dated 30th October 2005. The original test report shall remain valid and is not replaced by this additional test report.

8 March 2006

Additional Test report number 225286A

UKAS TESTING

0578

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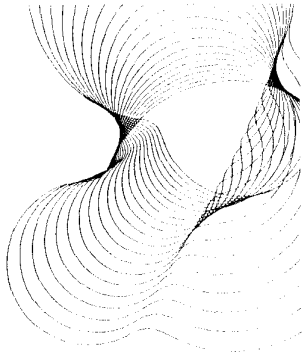

Prepared on behalf of BRE Testing by

Name K. D. Fardell

Position Consultant

Signature K D Fardell

Approved on behalf of BRE Testing by

Name Richard.A.Jones

Position Associate Director

Date 31/1/06

Signature Richard A Jones

BRE Testing
Garston
WD25 9XX
T + 44 (0) 1923 664100
F + 44 (0) 1923 664994
E enquiries@brecertification.co.uk
www.bre.co.uk

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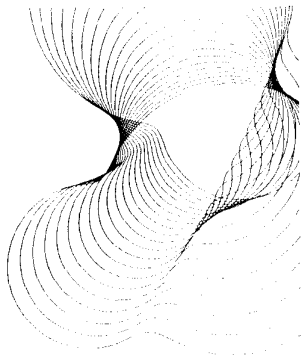
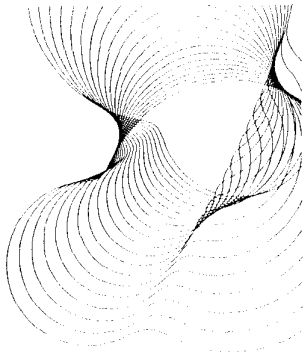


Contents



Summary

A twin-leaf access panel door, 2000mm high x 1800mm wide, installed within the aperture of a fire rated plasterboard wall, was submitted to a fire resistance test in accordance with B.S.476:Part 22:1987[1] for a duration of 67 minutes on Wednesday 28th September 2005.

The access panel door comprised two leaves, each nominally 2000mm high x 900mm wide. The individual leaves comprised 12.5mm Megadeco plasterboard to the exposed face, internal Z-section stiffeners with a 1.5mm-thick Zintec steel skin and box section stiffeners to the unexposed face. The doors were hung on hinges consisting of a steel pin and block with a steel roller ball caster. The right leaf (when viewed from the unexposed face) closed first and was retained closed with a two-point locking system. The left leaf closed over the first and was retained closed with a three-point locking system.

The access panel door frame was fixed into a plasterboard wall comprising a steel stud frame clad on both faces with two layers of 12.5mm-thick Lafarge Firecheck plasterboard.

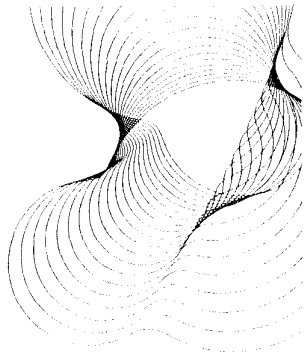
The twin leaf access panel door achieved the following fire resistance rating:

"Integrity: 66 minutes

Insulation: 23 minutes".

This product has not been retested and this additional report does not involve technical changes or technical reviews of the original test report.

The original and the new name of the product and the company commercially responsible for the product, which is the subject of this report, is documented and maintained by BRE laboratory records.



1 Objectives

To determine the fire resistance of a twin-leaf access panel door fixed within the aperture of a fire rated plasterboard wall, when tested in accordance with B.S. 476:Part 22:1987[1].

2 Test Specimen

2.1 General

The twin-leaf access panel door and supporting construction (fire rated plasterboard wall) were installed into the aperture, nominally 3050mm high x 3050mm wide, of a heavily-reinforced concrete test frame, on Thursday 22nd September 2005. The access panel door and supporting construction are shown in Figures 1 and 7 and before the test in Photographs 1, 2 and 3.

2.2 Supporting construction materials

2.2.1 Lafarge Firecheck plasterboard

The Lafarge Firecheck plasterboard was pink paper faced on the front and brown paper faced on the reverse. The boards were 12.5mm thick delivered in sheets 1200mm wide x 2400m long with a tapered edge along both vertical sides. The following was printed on the boards, "Lafarge Firecheck 2545 Type 5 wallboard Firecheck 15:44 BS 1230 part 1 1985 Natural Gypsum" and "Lafarge plasterboard Firecheck 12.5mm TE 2545".

2.2.2 Arrow U-channel

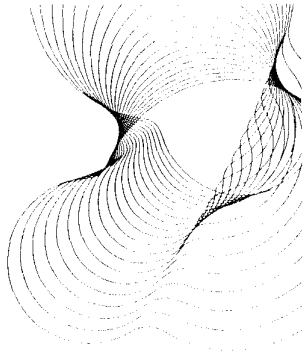
The U-channels used at the head and base of the wall and at the top and bottom of the door frame were Arrow U-channels, nominally 72mm wide x 30mm deep. The U-channel was galvanised steel.

2.2.3 Arrow studs

The studs used for the wall were Arrow studs, nominally 70mm wide x 32mm deep x 3000mm long. The studs were galvanised steel. The following was printed on the studs "Arrow S70 BS 7634 1990 1508".

2.2.4 Arrow fast set joint filler

Arrow fast set joint filler was used to fill joints between adjacent Firecheck boards and around the periphery of the aperture. The jointing compound was delivered as powder in a 12.5kg bag, to be mixed with water.



2.3 Access panel

2.3.1 Access panel frame

The access panel frame, internal aperture 2000mm high x 1800mm wide, was constructed of 1.5mm-thick zintec steel. The frame was nominally 100mm wide with a 25mm-wide external flange to the exposed face of the frame and a 25mm-wide internal flange to the unexposed face of the frame. The frame was polyester powder coated in white, RAL 9010, with a 20% gloss.

2.3.2 Access panel door leaves

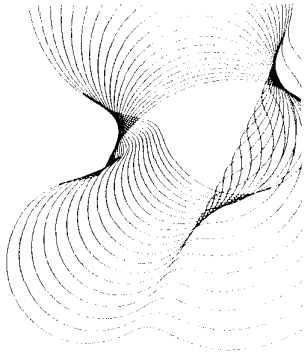
The individual door leaves comprised a 1.5mm-thick zintec steel skin (door tray) with three vertical stiffeners, 90mm wide x 40mm deep, welded to the unexposed side of the skin in the centre and one at each side. (nominally 25mm from the outer edges of the door). (see Figure 1) Additional horizontal stiffeners, 90mm wide x 40mm deep, were welded to the top and bottom of the door leaves on the unexposed side, nominally 25mm from the top and bottom of the door. (see Figure 1) Six horizontal Z-section stiffeners, also used as brackets for fixing the Megadeco plasterboard, were spot welded to the exposed side of the steel skin at nominally 350mm centres from top to bottom. The top, bottom and lock side of both leaves included a 25mm return, 25mm deep, to the exposed face which was used to retain the single layer of 12.5mm-thick Lafarge Megadeco plasterboard, which was inserted from the hinge side during production. The Megadeco was supported on and screw fixed to the horizontal Z-section stiffeners, therefore forming an air gap between the rear face of the Megadeco and the exposed side of the steel skin. The Megadeco was screw fixed to the six horizontal Z-section stiffeners with 25mm-long self drilling/tapping screws at nominally 300mm centres. A 25mm-deep x 25mm-wide zintec steel U-channel capping was screw fixed, at nominally 400mm centres, to the hinge side of each leaf to retain and protect the edge of the door. The door hinges comprised an 8mmØ steel hinge pin and block (see Figure 4) fixed to the unexposed side of the leaf skin, one at the top and one at the bottom of the door. The pin hinge and block were covered with a 1mm-thick top hat steel section extending the full height of the door and spot welded to the unexposed side of the leaf skin. A steel roller ball castor (see Figure 5) was welded to the top and bottom of the outer stiffener on each leaf, adjacent to the hinge pin, to support the hinge.

The left side leaf (when viewed from the unexposed face) incorporated a three-point locking mechanism comprising 8mmØ rods (see Photograph 3) which extended and engaged into the frame at the top and bottom, by 12mm, and a central latch which engaged at mid height into a locking angle, welded to the right side door (see Figure 2). The 8mmØ rods were retained to the unexposed side of the leaf skin using 20mm-long steel tubes welded at nominally 400mm centre to the steel skin (see Figure 6 and Photograph 3). The left side mechanism could only be operated from the exposed face with a square ended T-section key. A 16mmØ metal screw bung was inserted into the front locking hole at the end of assembly.

The right side leaf incorporated a two-point locking mechanism comprising 8mmØ rods which extended and engaged into the frame at the top and bottom by 12mm.

The visible stiffeners and skin were polyester powder coated white, RAL 9010, at 20% gloss.

Measurement of the gaps around the periphery of each door, when closed, were undertaken and a consistent 2.5mm-wide gap was measured around the left leaf, when viewed from the exposed face. The right leaf had a 3.5mm-wide gap across the top of the door, a 2mm-wide gap across the bottom of the door and no through gap at the right side of the door i.e. the door leaf was touching the frame.



2.4 Construction

The partition was constructed within the aperture, nominally 3050mm wide x 3050mm high, of a heavily reinforced concrete test frame. The construction is described when viewed from the unexposed face.

A plasterboard partition incorporating 72mm-wide U-channel and 70mm-wide studs was build into the test frame aperture, leaving a nominally 35mm wide gap at the right side vertical edge, the free edge. (when viewed from the unexposed face). The steel stud frame was clad on both sides with two layers of 12.5mm-thick Lafarge Firecheck plasterboard leaving a central aperture through the partition, nominally 2010mm high x 1810mm wide. The joints between boards and at board edges were sealed with Arrow joint filler and paper tape. The internal periphery of the aperture was finished with a single layer of Firecheck plasterboard. The access panel frame was positioned within the partition aperture, flush with the exposed face, and screw fixed through into the steel frame around the periphery of the aperture. The two access panel door leaves were then positioned into place, with the hinge pins being extended and fixed into position at the top and bottom, to allow the leaves to be opened.

The locking devices on both leaves were engaged prior to the test to prevent door movement. The door leaves were installed to open into the furnace.

In addition, the vertical gap at the free edge (on left side when viewed from the unexposed face) of the partition was sealed with ceramic blanket to prevent the passage of furnace gases, but to allow free movement of the partition edge.

The construction is shown in Figures 1 to 7.

3 Conditioning

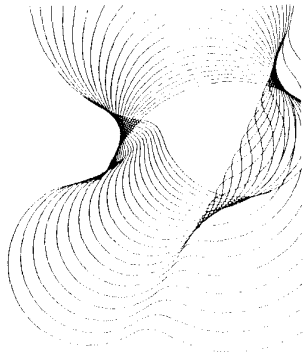
Two representative samples of Lafarge Firecheck plasterboard were randomly selected during construction and placed in an oven at 50°C to determine the moisture contents by weight loss technique. The samples were found to have an average free moisture content of 0.65% as a percentage of the dry weight.

It was not possible to determine the moisture content of the Megadeco plasterboard applied to the front of the leafs, as this was pre-assembled prior to delivery,.

4 Test procedure

4.1 General

The test was carried out on Wednesday 28th September 2005 in accordance with B.S.476:Part 22:1987[2] and was witnessed by Mr Darren Blenkinsop, Mr Ross Stokes and Mr Steve Hammond representing the sponsor. The ambient temperature at the start of the test was **17**°C.



4.2 Furnace control

The furnace temperature was measured by means of sixteen chromel/alumel thermocouples arranged symmetrically in the furnace in four rows of four with their measuring junctions 100mm form the exposed face of the partition. The furnace was controlled so that the mean of the sixteen readings followed the time/temperature relationship specified in B.S.476:Part 20:1987[2]. The mean temperature recorded is plotted against time in Graph 1 with the specified curve for comparison.

A pressure sensing head 2.4m above the base of the test frame monitored pressure in the furnace. The pressure conditions within the furnace were maintained in accordance with section 3.2 of B.S.476:Part 20:1987[2] taking the base of the test frame as the notional floor level.

4.3 Specimen temperature

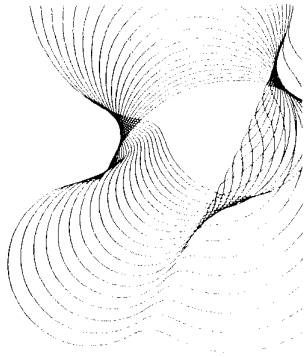
The temperature of the unexposed face of the test construction was measured by sixteen copper/constantan (K-type) thermocouples each soldered to a copper disk and covered with an insulating pad. The location of the thermocouples are given in Table 1 below. Thermocouples 3, 4, 9, 13 and 14 were used for monitoring the mean temperature on the unexposed face of the left door leaf. Thermocouples 5, 6, 10, 15 and 16 were used for monitoring the mean temperature on the unexposed face of the right door leaf.

Table 1 Thermocouple positions on unexposed face

Thermocouple number	Location of thermocouples
1	Top of the right stiffener on the left leaf.
2	Top of the left stiffener on the right leaf.
3	At the centre of the top left quarter of the left leaf.
4	At the centre of the top right quarter of the left leaf.
5	At the centre of the top left quarter of the right leaf.
6	At the centre of the top right quarter of the right leaf.
7	At mid height on the left side of the partition.
8	At mid height of the left side vertical frame member.
9	At the centre of the left leaf.
10	At the centre of the right leaf.
11	At mid height of the right side vertical frame member.
12	At mid height on the right side of the partition.
13	At the centre of the bottom left quarter of the left leaf.
14	At the centre of the bottom right quarter of the left leaf.
15	At the centre of the bottom left quarter of the right leaf.
16	At the centre of the bottom right quarter of the right leaf.

4.4 Specimen Deflection

The deflection of each door was monitored throughout the test by connecting a transducer via a fine taut steel wire to the facia of each leaf. The top right of the left leaf was monitored for deflection and the top left of the right door was monitored for defection.



5 Results

5.1 Observations

The observations made during the test are given in Table 2 below. Unless otherwise stated they are of the exposed face of the partition.

Table 2 Observations

Time (mins/secs)	Observations
0	Test starts.
3/36	Intermittent flaming from the top right of the right leaf.
4/48	Paper facia burning off the Megadeco plasterboard.
8/10	All paper facia burnt off exposed face.
9/13	Small amount of smoke issues from the top left vertical edge of the left leaf.
10/25	Smoke issues from the centre of the door above the locking mechanism.
12/30	Discolouration of the door in the location mentioned at 10/25.
15/13	Bowing of both leaves towards the furnace, approximately 10 to 15mm.
24	**INSULATION FAILURE.** At this point both leaves appear to have failed on the insulation criteria.
30	General discolouration of both leaves.
34	Intermittent flaming from the right side of the right leaf at mid height.
41	Intermittent flaming continues, no failure of integrity
60	Intermittent flaming continues, however there is no failure of integrity.
66	The test is terminated at this point at the request of the sponsor.

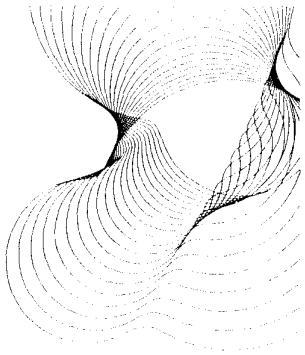
The partition at the end of the test is shown in Photographs 4 and 5.

5.2 Temperatures

The mean and maximum temperatures recorded on the unexposed face of the partition are plotted against time in Graphs 2. The individual surface thermocouple measurements are plotted in Graphs 3, 4, 5 and 6.

The mean temperature rise for insulation (140°C rise above surface temperature at start of test) on both door leaves was exceeded after 23 complete minutes of the test.

The maximum temperature rise for insulation (180°C rise above the surface temperature at the start of the test) on both door leaves was exceeded after 23 complete minutes, recorded using TC 9 on the left leaf and TC10 on the right leaf.



5.3 Deflection

The horizontal deflection recorded at the top right of the left leaf and the top left of the right leaf is plotted against time on Graph 7, positive values indicate deflecting towards the furnace. The maximum deflections achieved during the test were 28.2mm after 67 minutes for the left leaf and 28.1mm after 67 minutes for the right leaf.

6 Performance Criteria

The standards[1,2] state that a partition is regarded as having a fire resistance (expressed in minutes) that is equal to the elapsed time (in complete minutes) between the commencement of heating and the termination of heating, or until failure to meet the integrity or insulation criteria occurs, whichever is the sooner.

Integrity : failure is deemed to occur:

a) when collapse or sustained flaming for not less than 10s on the unexposed face occurs;

b) when (before the exposed face in the vicinity indicates a temperature of 300°C) cracks, gaps or fissures allow flames or hot gases to cause flaming or glowing of a cotton fibre pad;

c) when (after the cotton pad test is unsuitable) a 6mm-diameter gap gauge can penetrate through a gap into the furnace and be moved for a distance of at least 150mm;

d) when(after the cotton pad test is unsuitable) a 25mm-diameter gap gauge can penetrate through a gap into the furnace.

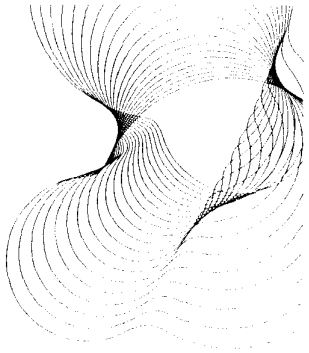
Insulation : failure is deemed to occur;

a) when the mean unexposed face temperature increases by more than 140°C above its initial value;

b) when the temperature recorded at any position on the unexposed face is in excess of 180°C above the initial mean unexposed face temperature;

c) when integrity failure occurs.

The results only relate to the behaviour of the specimen 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.



7 Conclusions

A twin-leaf access panel door, 2000mm x 1800mm, built within a plasterboard partition as described in this report, was submitted to fire resistance test in accordance with B.S.476:Part 22:1987[1] for a duration of 67 minutes on Wednesday 28th September 2005.

The partition achieved the following fire resistance:

"Integrity: 66 minutes

Insulation: 23 minutes"

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. The laboratory that issued the report 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.

8 References

1 Fire tests on building materials and structures. Part 22. Methods for determination of the fire resistance of non-loadbearing elements of construction. British standard 476 : Part 22 : 1987. British Standards Institution, London, 1987.

2 Fire tests on building materials and structures. Part 20 Method for determination of the fire resistance of elements of construction (general principles). British Standard 476 : Part 20 : 1987. British Standards Institution, London, 1987.

Figures

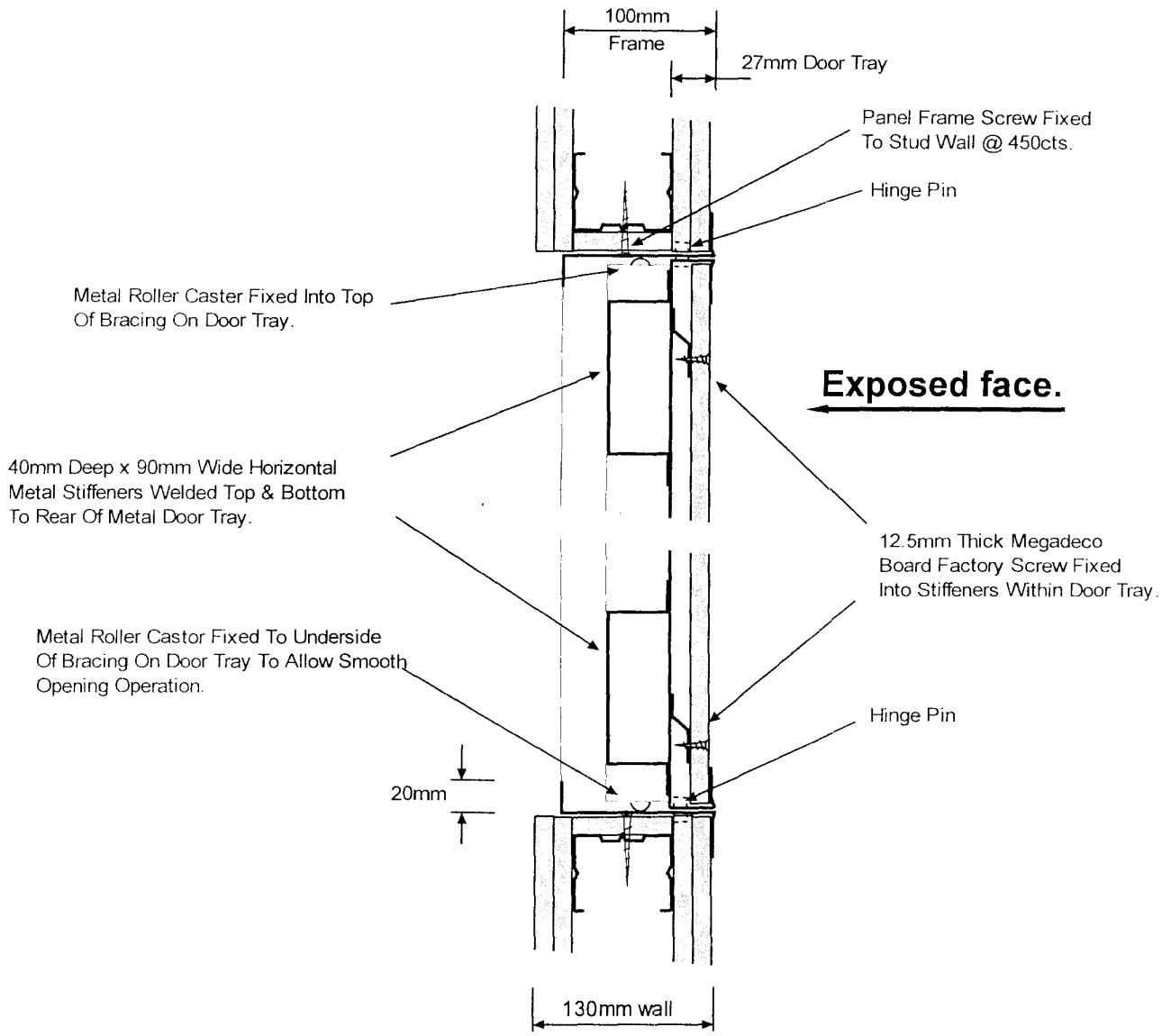


Figure 1 Showing a typical section through the centre of a door leaf.

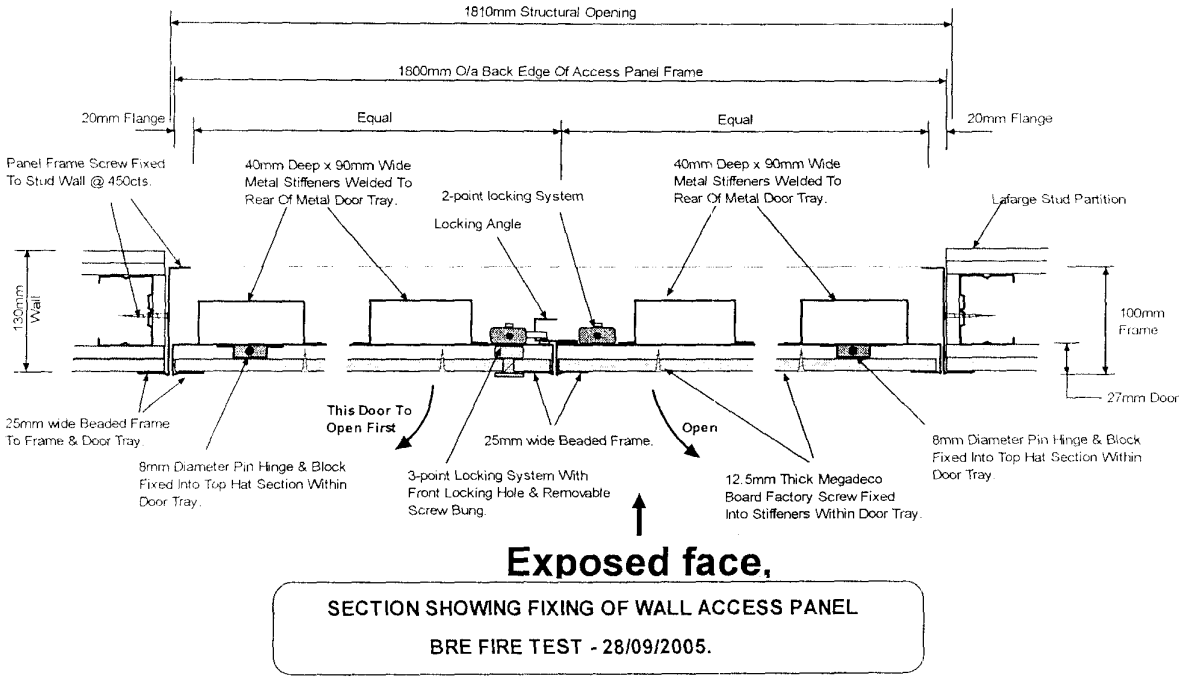


Figure 2 Showing a horizontal section through the access panel. (view is from below)

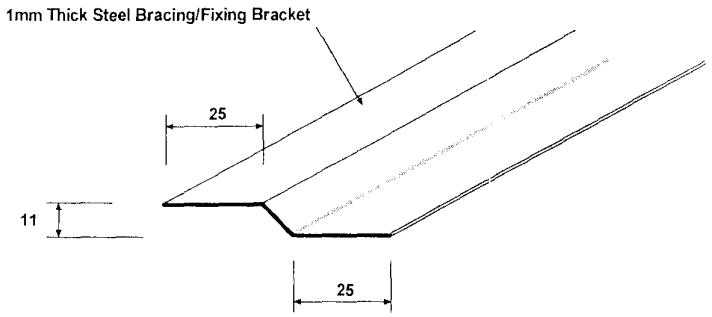


Figure 3 Showing the detail of the internal horizontal door stiffener also used as a fixing bracket for the Megadeco plasterboard.

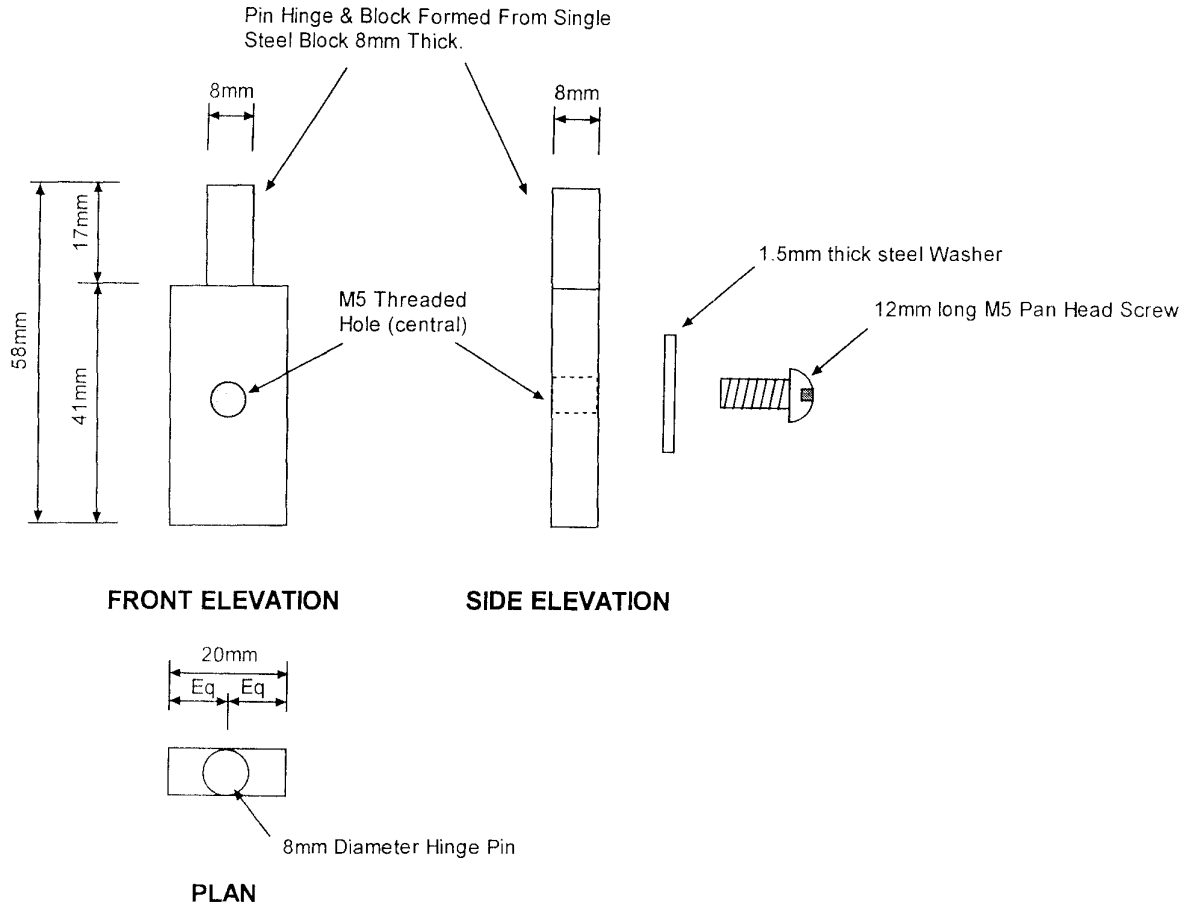


Figure 4 Showing the detail of the hinge pin and block section.

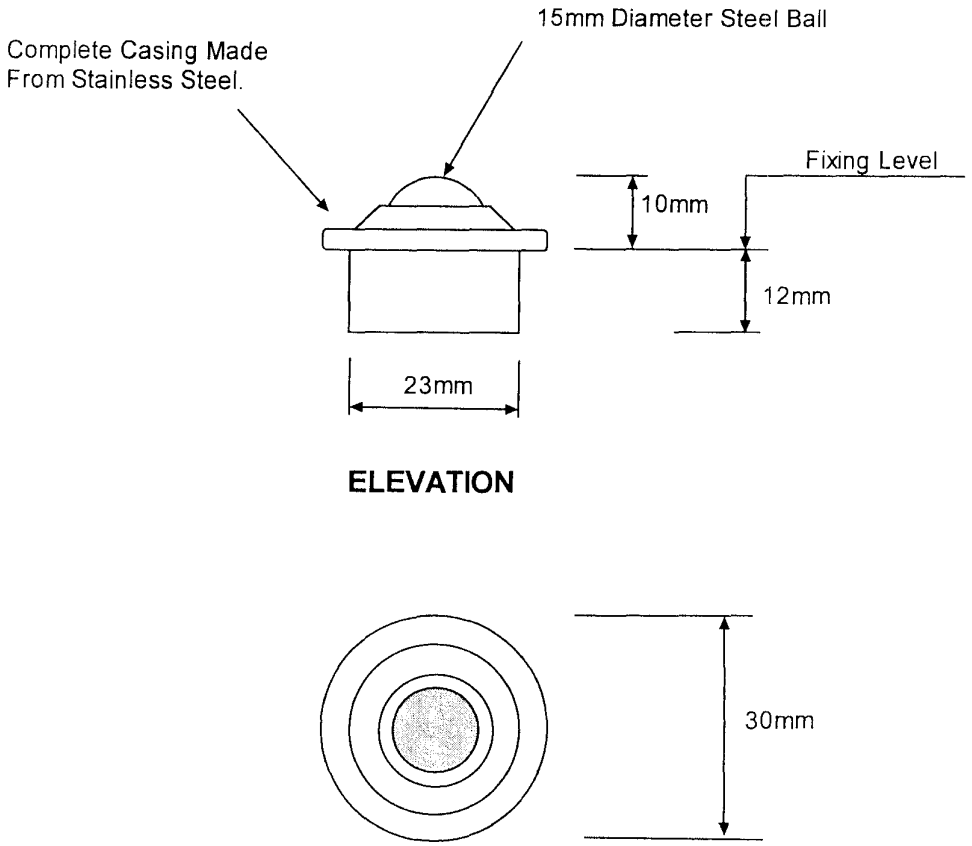
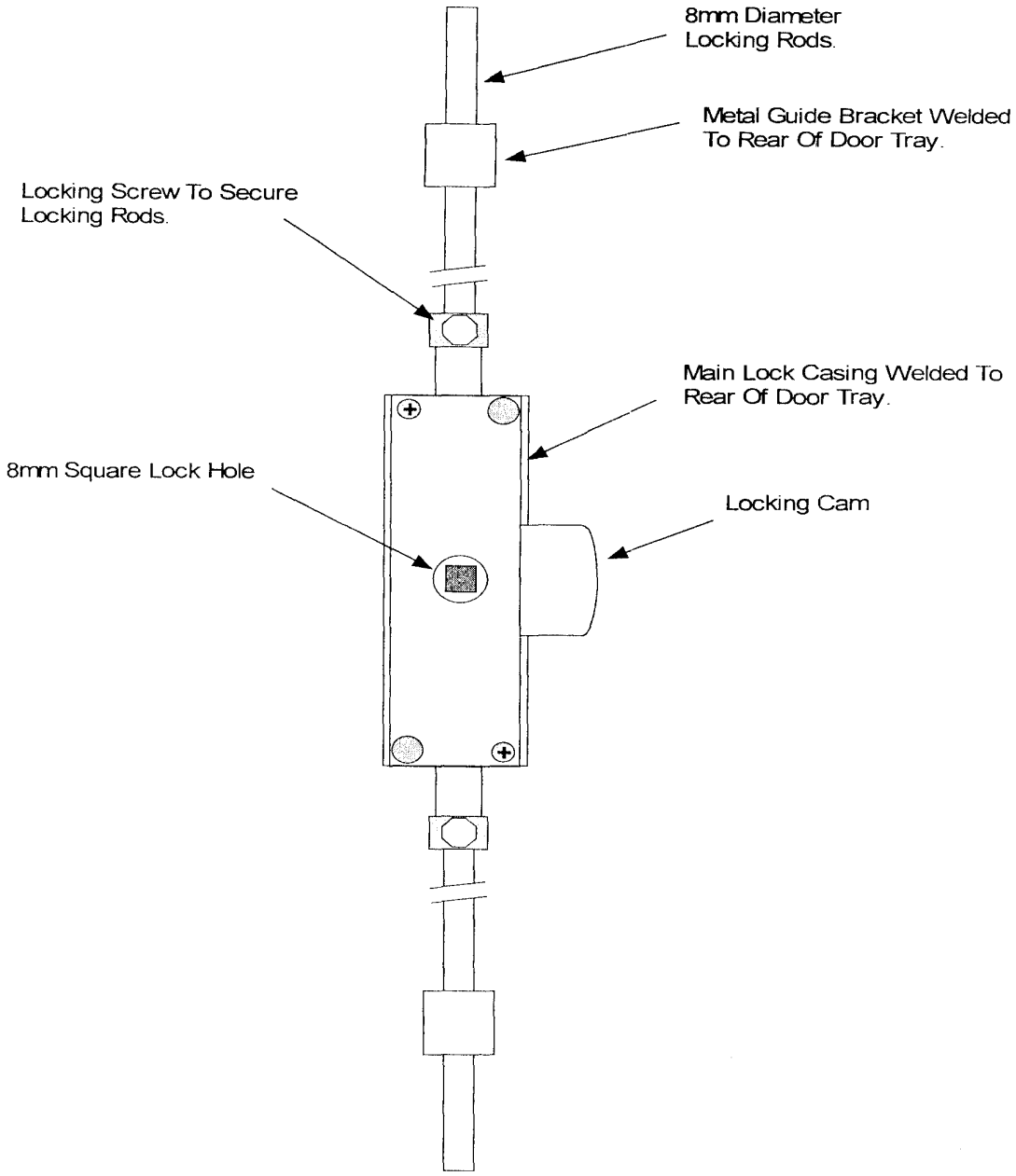


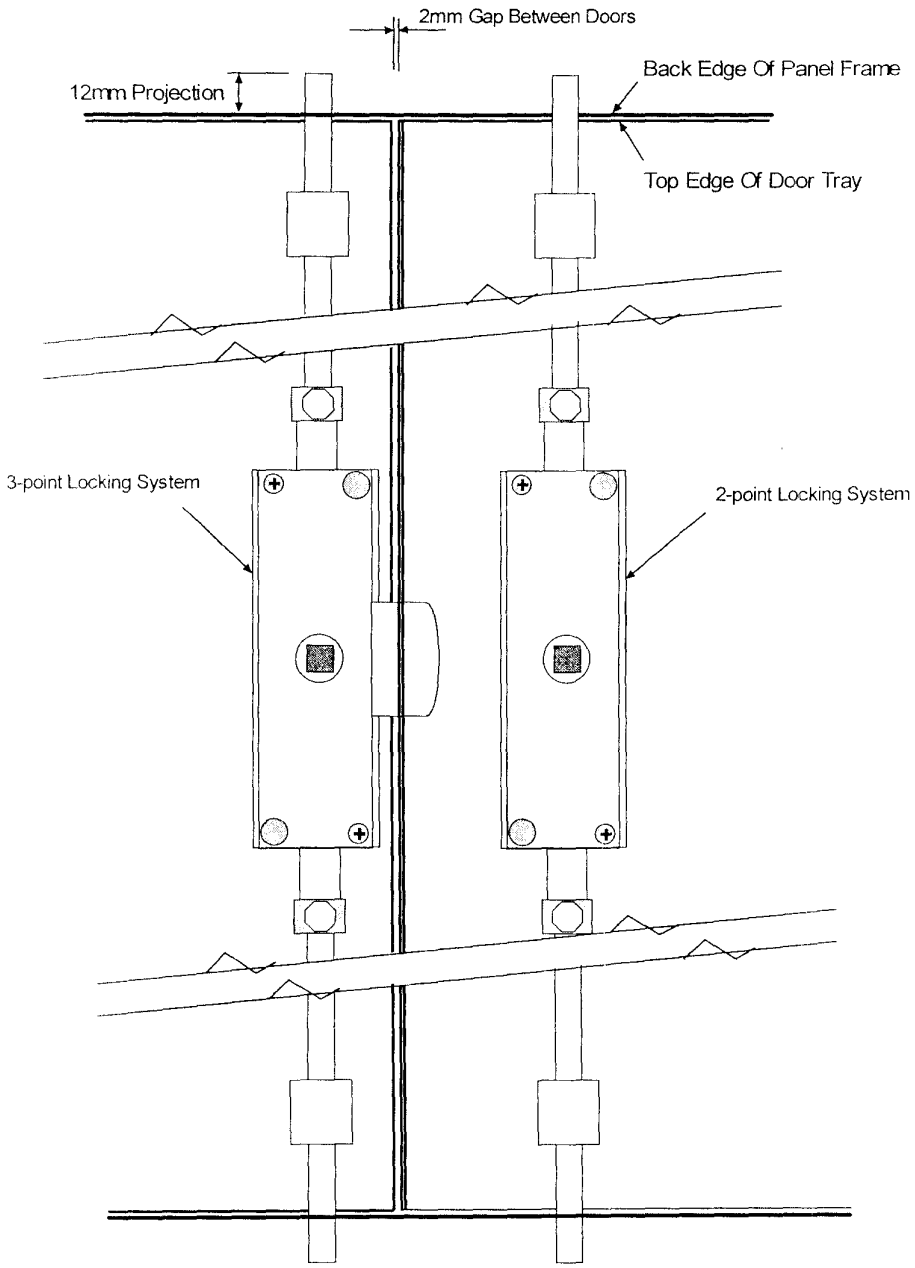
DIAGRAM OF ROLLER BALL & HOUSING FIXED TOP & BOTTOM OF WALL ACCESS PANEL DOOR TRAY

Figure 5 Showing a diagram of the steel roller ball castor used to support the door hinges.



3-Point Locking System
(2-point System Similar But Without Central Locking Cam)

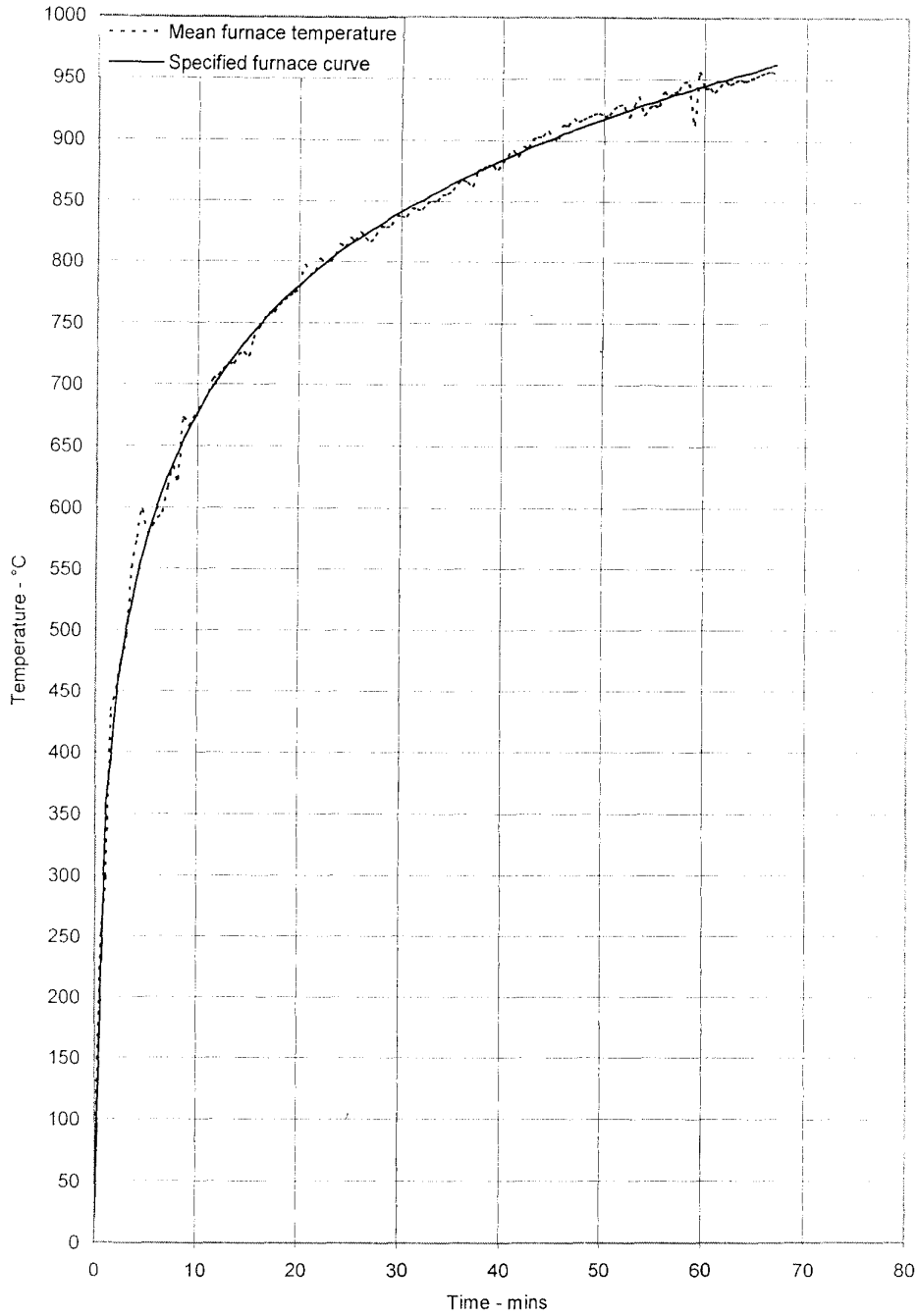
Figure 6 Diagram showing the details of the 3-point locking mechanism.



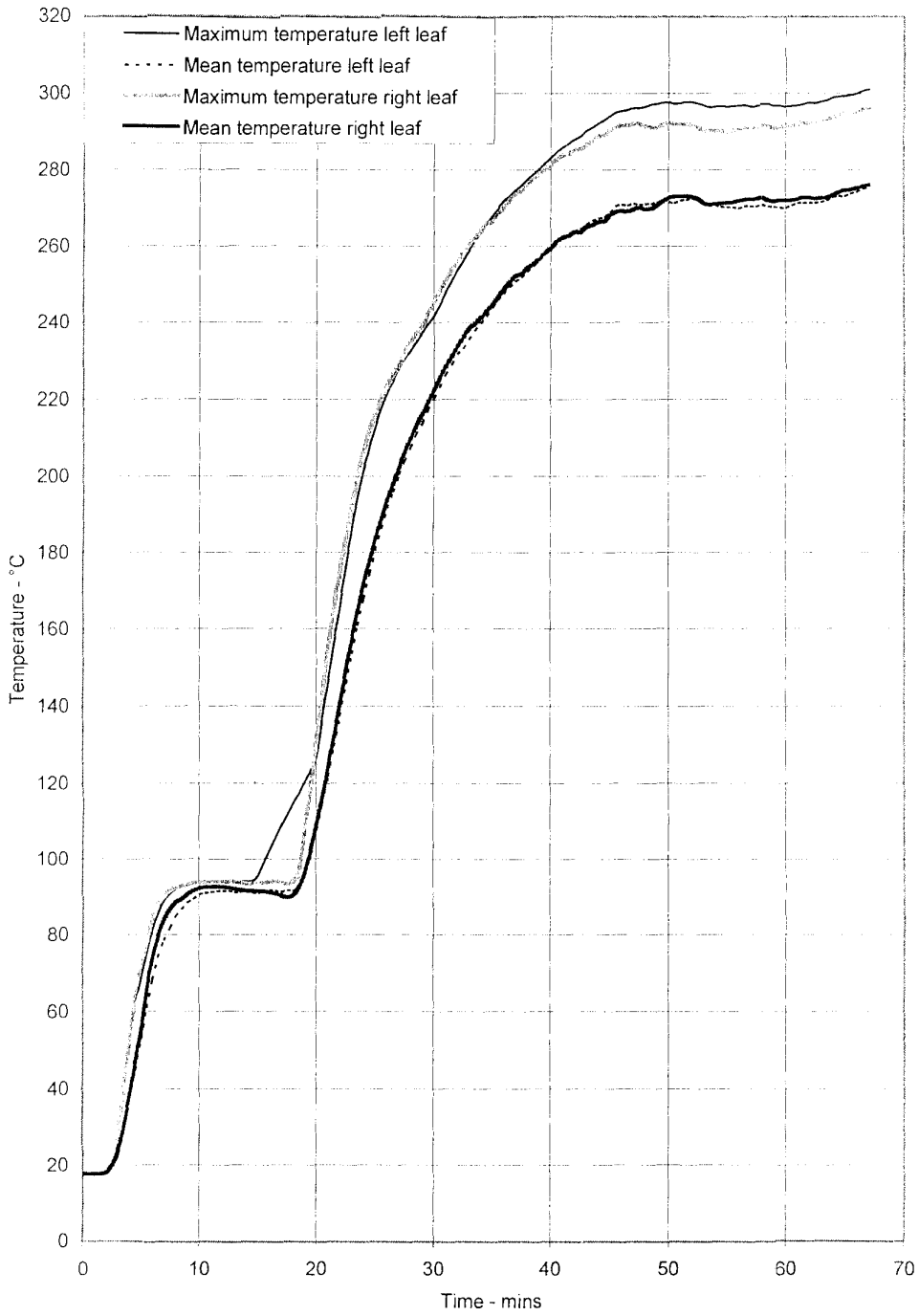
REAR VIEW OF ACCESS PANEL SHOWING LOCKING POSITIONS

Figure 7 Diagram showing details of the 2 and 3-point locking mechanisms.

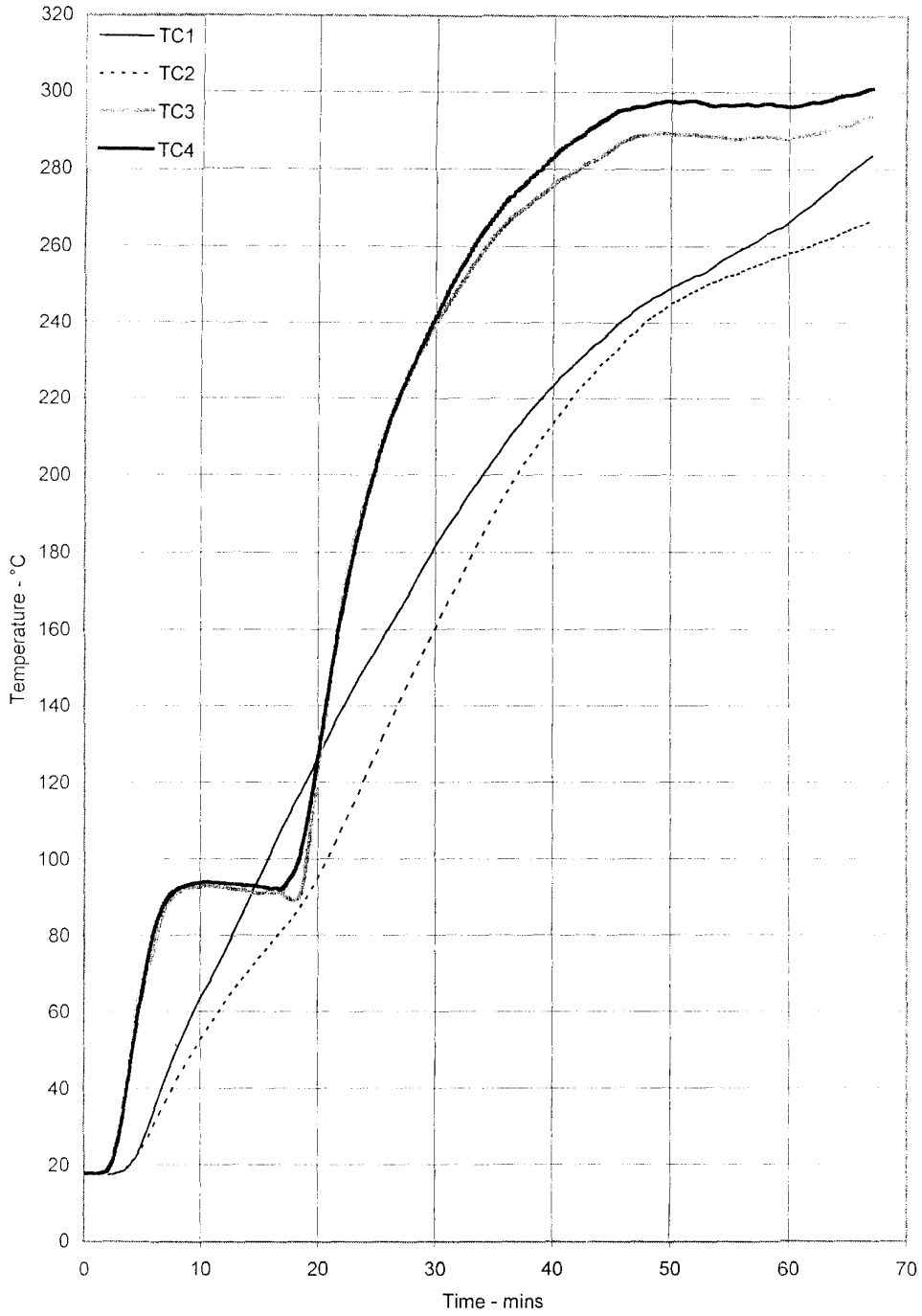
Graphs



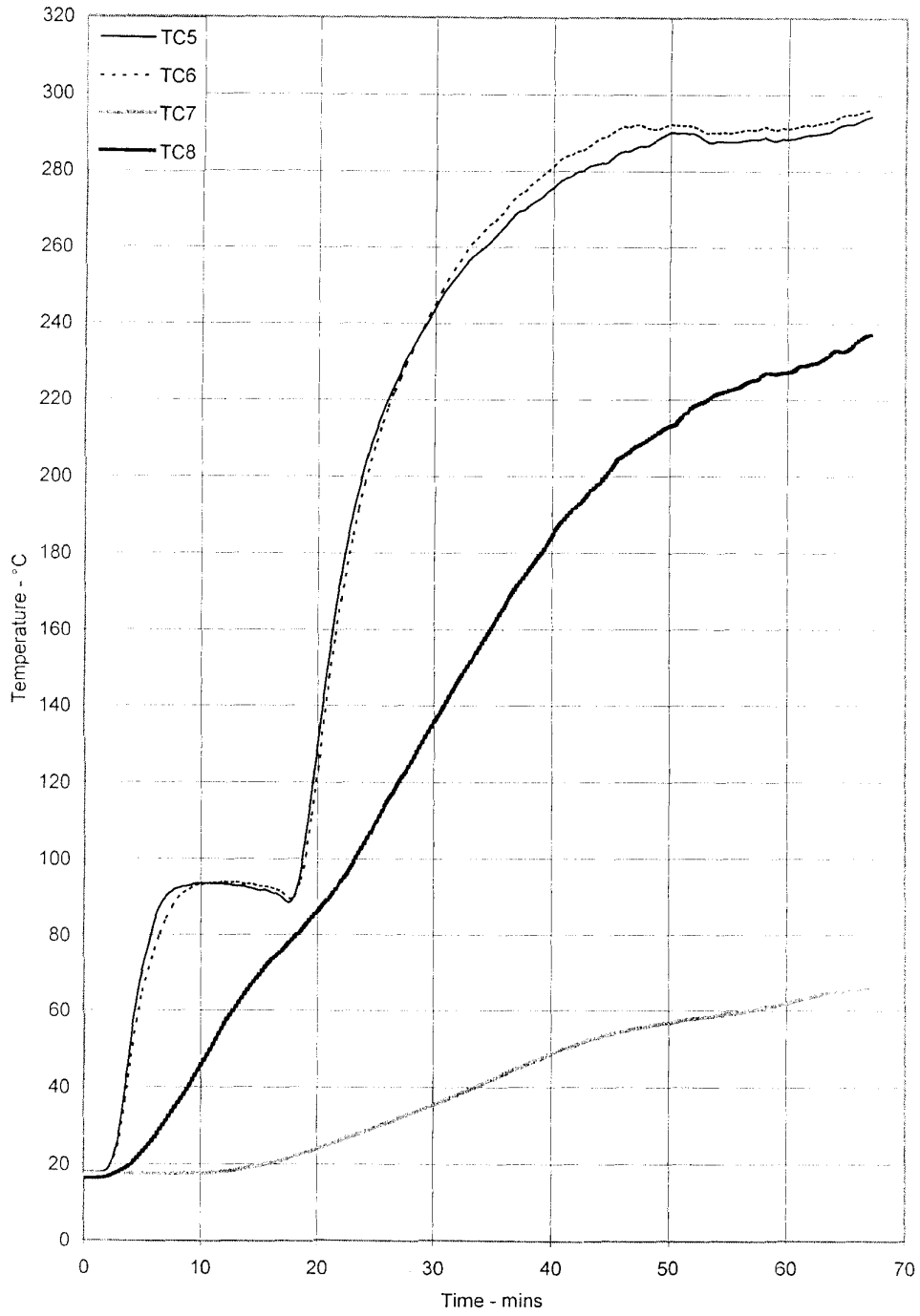
Graph 1 Showing the mean furnace temperature with the specified furnace curve for comparison.



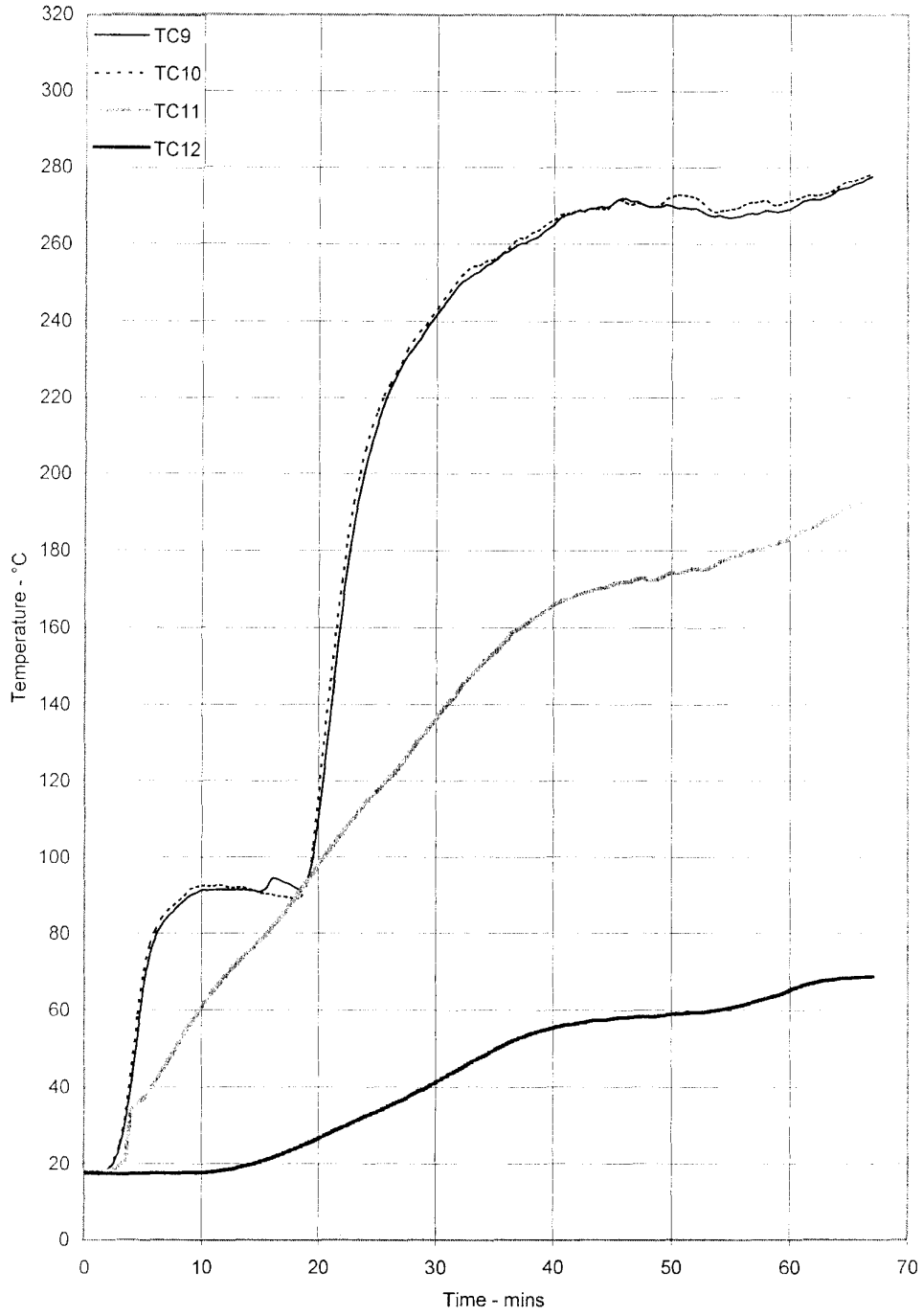
Graph 2 Showing the mean and maximum temperatures recorded on the unexposed face of the left and right leaves of the access panel door.



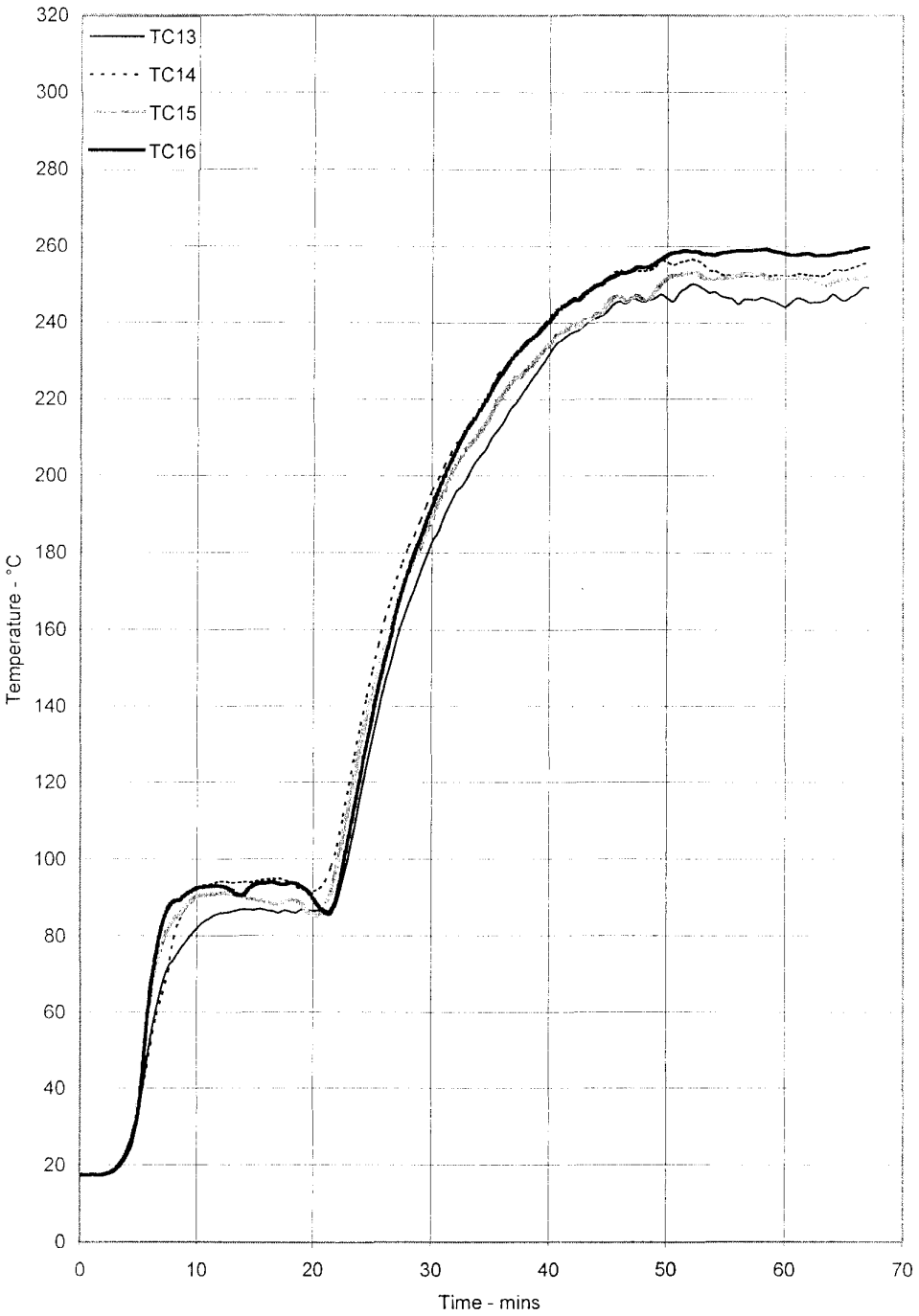
Graph 3 Showing the individual temperatures recorded throughout the test using TC1 to TC4.



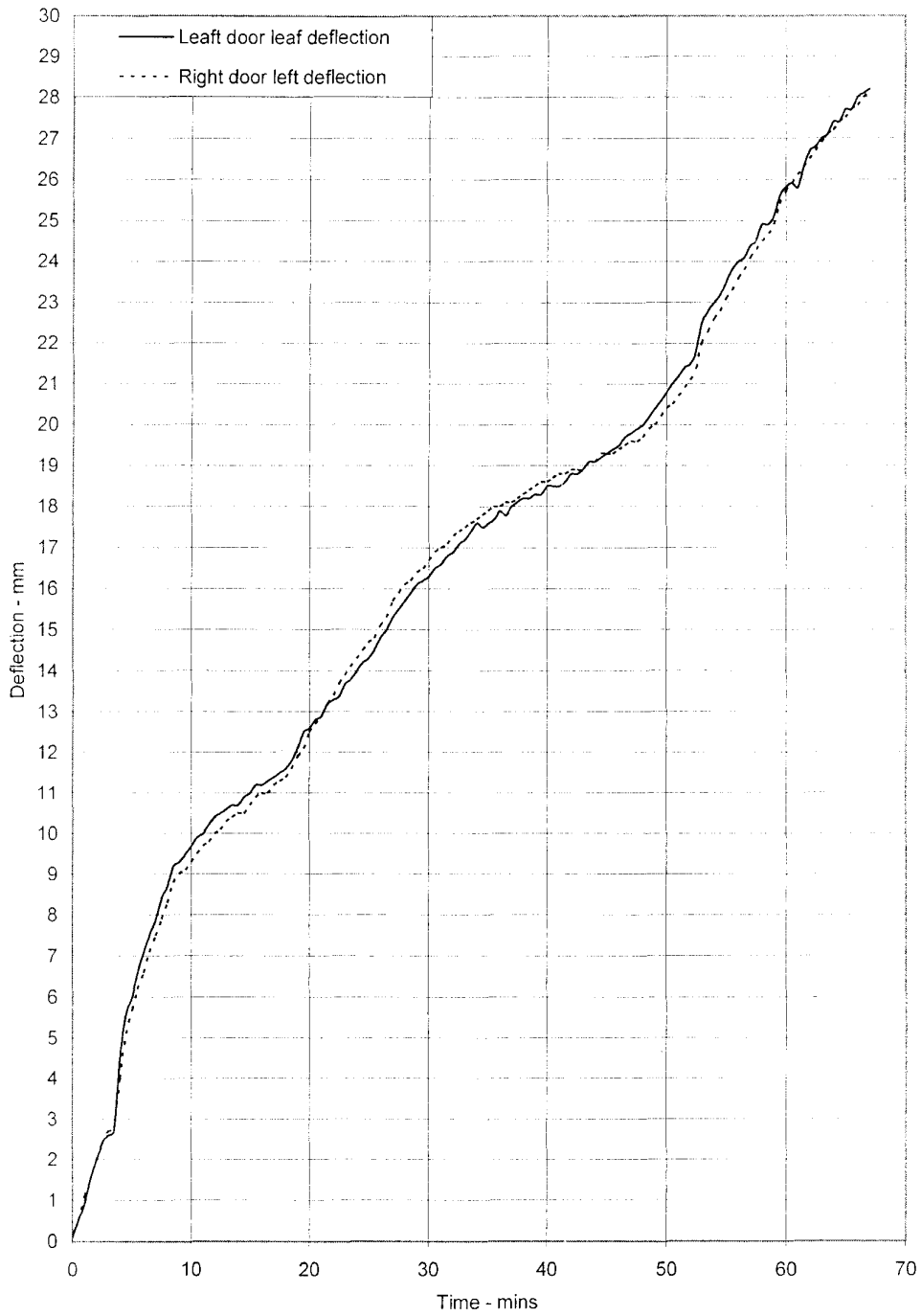
Graph 4 Showing the individual temperatures recorded throughout the test using TC5 to TC8.



Graph 5 Showing the individual temperatures recorded throughout the test using TC9 to TC12.



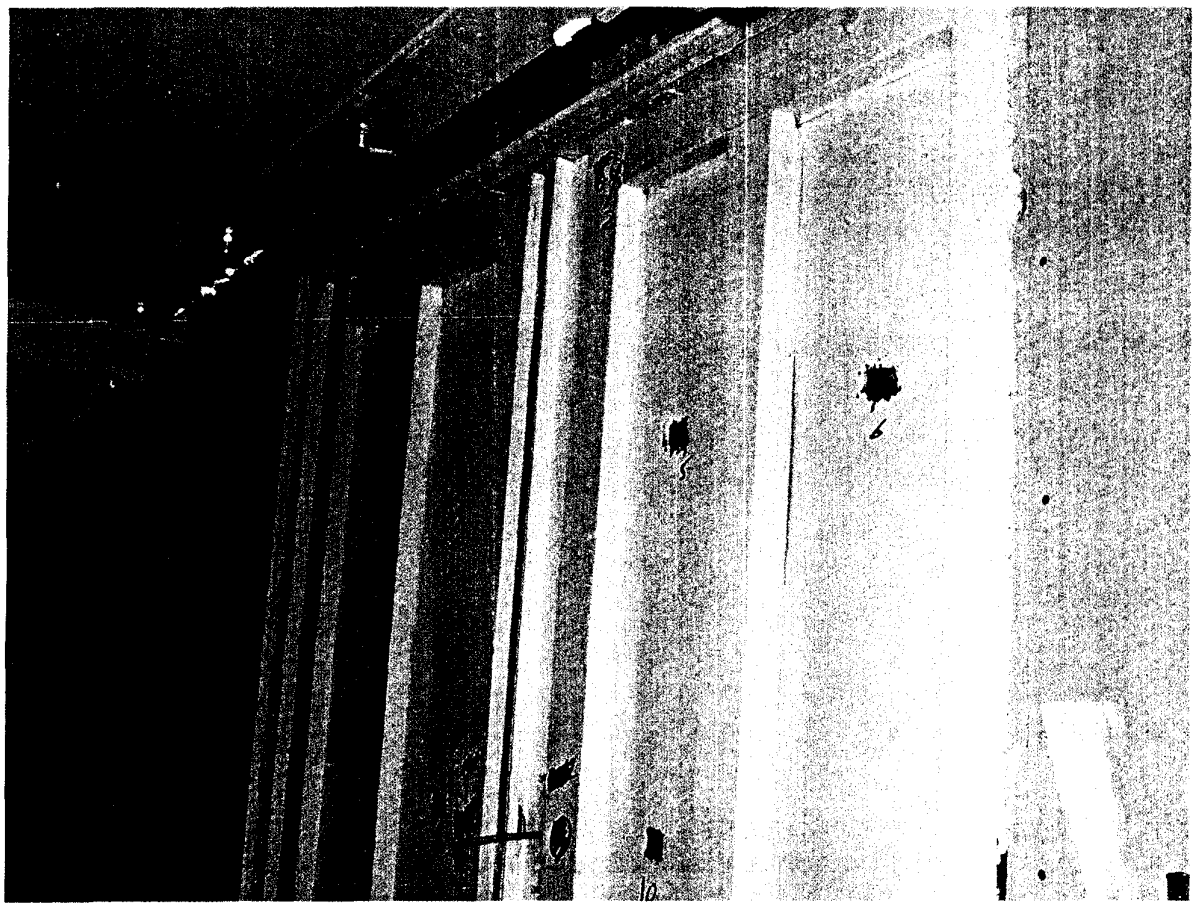
Graph 6 Showing the individual temperatures recorded throughout the test using TC13 to TC16.



Graph 7 Showing the deflection recorded at the top of each leaf, lock side, throughout the test.

Photographs

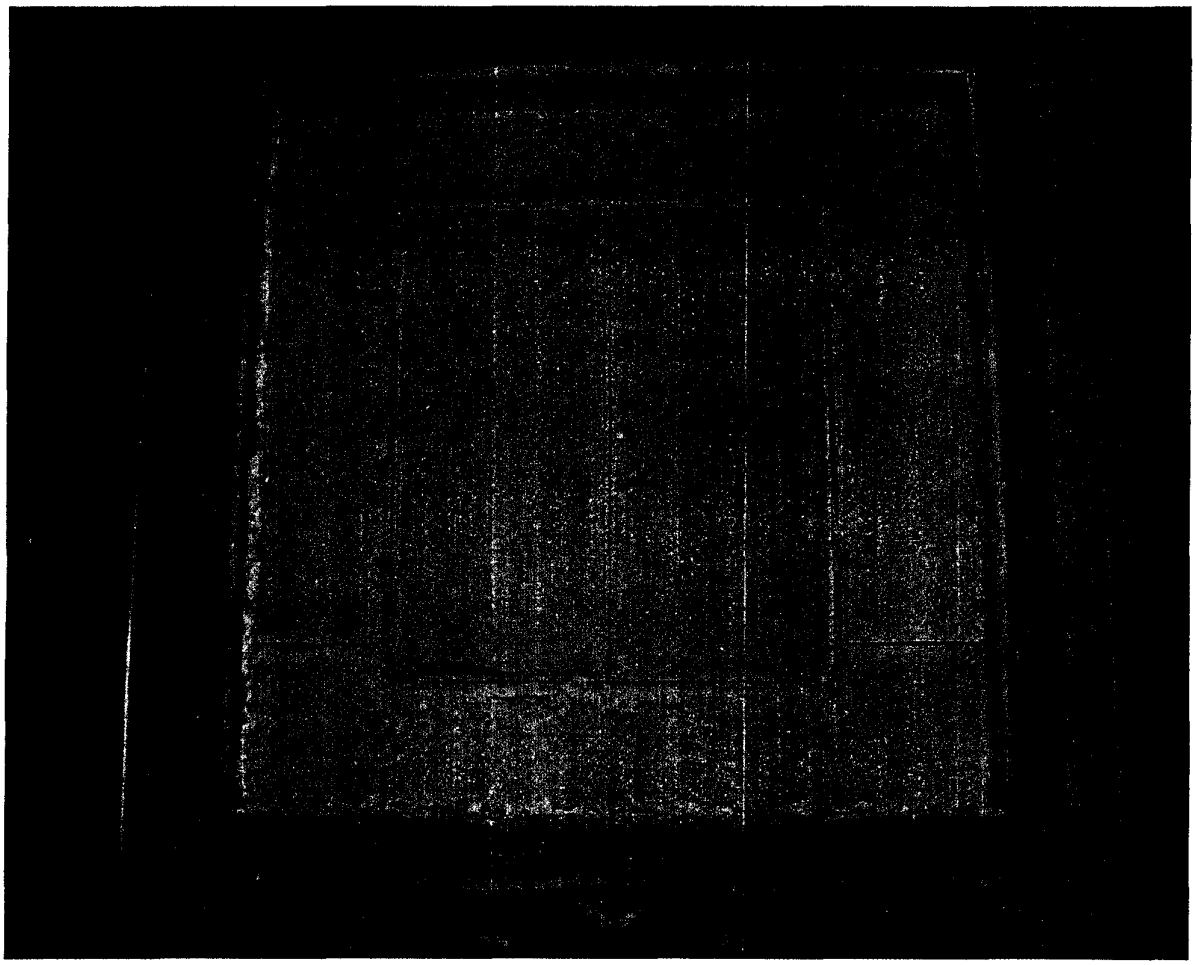
Photograph 1 Showing the exposed face of the access panel door prior to the test.



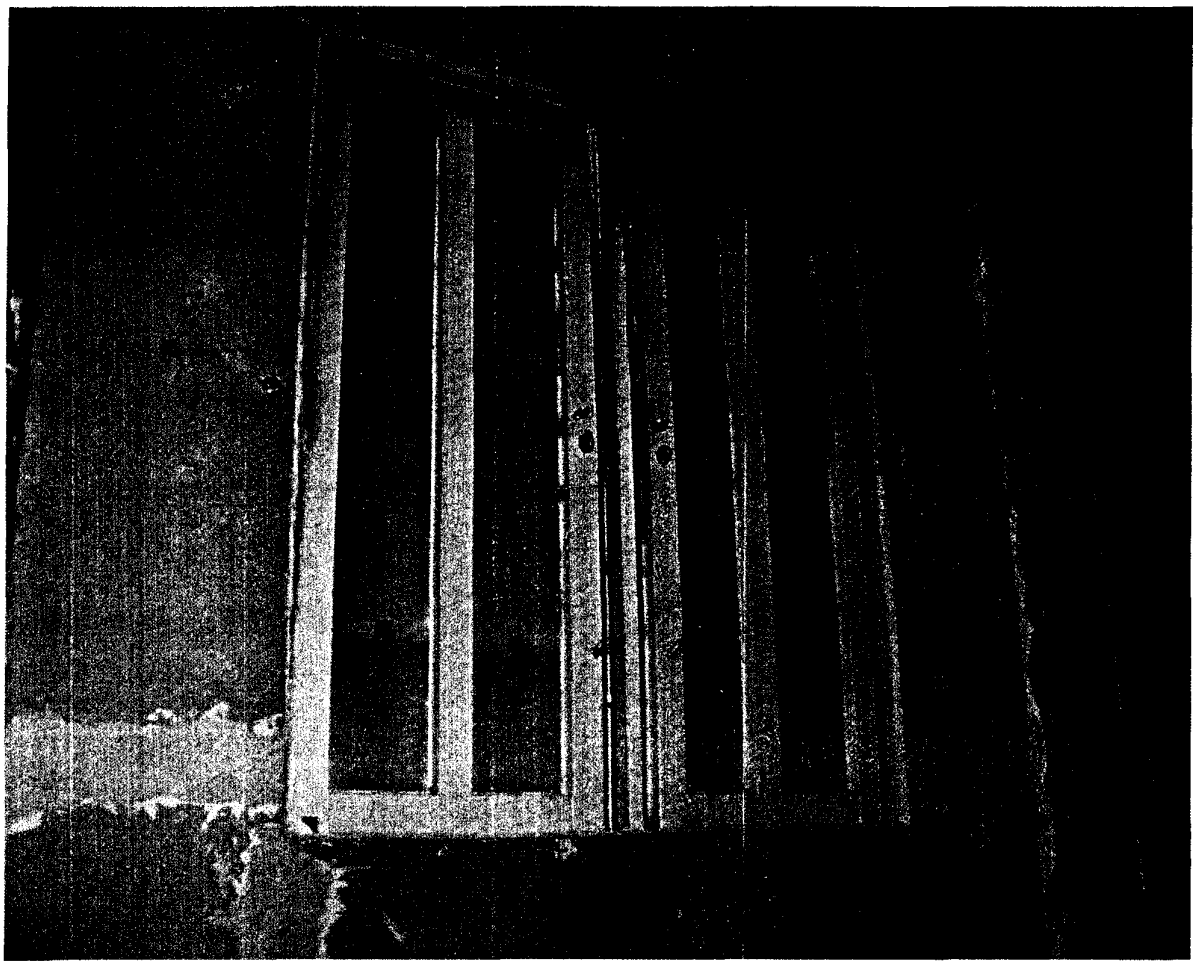
Photograph 2 Showing the unexposed face of the access panel door prior to the test.

Photograph 3 Showing the two point and three point locking mechanisms used on the access panel door.

Fire resistance test in accordance with BS 476 Part 22:1987 on a twin-leaf access panel door within a plasterboard partition.



Photograph 4 Showing the exposed face of the access panel door at the end of the test.



Photograph 5 Showing the unexposed face of the access panel door at the end of the test.

==========REPORT ENDS==========