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Testing. Advising. Assuring.

Title:

The Fire Resistance
Performance of Modified
Timber Based Panelled
Doorsets

**WF Assessment Report
No:**

172391 Issue 6

Prepared for:

Doortec (PTY) Limited

12 Cherry Road,
Pinetown,
KZN Natal
South Africa.
3610

Date:

9th December 2013

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Executive Summary

Objective	This report provides a considered opinion regarding the fire resistance performance of timber based doorsets similar to the specimens tested under the references WF Test Report No.'s 169709 (Doorset B) and 168784/A, when incorporating alternative panel options and supplied with modified leaf dimensions.
Report Sponsor	Doortec (PTY) Limited
Address	12 Cherry Road, Pinetown, KZN Natal South Africa 3610
Summary of Conclusions	Should the recommendations given in this report be followed, it can be concluded that timber doorsets similar to the doorsets tested under the references WF Test Report No.'s 169709 (Doorset B) and 168784/A, when including modifications as detailed within this report, would be expected to provide 30 minutes integrity and insulation performance, if subjected to a test in accordance with BS 476: Part 22: 1987.
Valid until	1 st January 2019

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Introduction

This report provides a considered opinion regarding the fire resistance performance of timber based doorsets similar to the specimens tested under the references WF Test Report No.'s 169709 (Doorset B) and 168784/A, when incorporating alternative panel options and supplied with modified leaf dimensions.

The proposed doorsets are required to provide a fire resistance performance of 30 minutes integrity and insulation, with respect to BS 476: Part 22: 1987.

FTSG

The data referred to in the supporting data section has been considered for the purpose of this appraisal which has been prepared in accordance with the Fire Test Study Group Resolution No. 82: 2001.

Assumptions

Supporting wall

It is assumed that the construction of the wall, which supports the proposed doorsets, will have been the subject of a separate test and the performance of the wall is such that it will not influence the performance of the doorset for the required period.

Clearance gaps

Door leaf to frame clearance gaps can have a significant effect on the overall fire performance of a doorset. It is therefore assumed that the leaf to leaf and leaf to frame clearance gaps will not exceed 3 mm. In addition it is assumed that the door leaves will be in the closed position and will be latched/bolted.

Doorsets

It is assumed that the doorsets will be identical to those tested under the reference WF No. 169709 (Doorset B) or WF No. 168784/A (including modifications as detailed in the addendum to the report), unless specified otherwise in this report.

Installation

It is assumed that the proposed doorsets will be installed by competent installers, in a similar manner to the tested doorsets.

Proposals

It is proposed that timber based doorsets, similar to the specimen referenced Doorset A, tested under the reference WF No. 169709, will provide 30 minutes integrity (and insulation when incorporating less than 20% uninsulated glazing) performance with respect to BS 476: Part 22: 1987, when including the following modifications:

**WF No. 169709
(Shaker Panel
Door)**

- Assessment of a 4-panel option in lieu of the tested 2-panel configuration. The 4 panel option may either be a traditional 4-panel design or may incorporate four equal horizontal panels.
- Provision of smaller door leaves
- Provision of bigger door leaves
- Substitution of MDF facings
- Option of 'Slat Style' door
- Alternative panel constructions

**WF No. 168784/A
(Pine Panel Door)**

- Assessment of a 6-panel option in lieu of the tested 4-panel configuration.
- Provision of smaller door leaves
- Increased timber framework section sizes
- Alternative profile at panels edges

Basic Test Evidence

WF No. 169709

The report referenced WF No. 169709 and briefly described in the supporting data section of this report, relates to a test conducted in accordance with BS 476: Part 22: 1987 on two specimens of single-acting, single-leaf, timber doorset. This assessment report considers the performance of the specimen referenced Doorset B in this report

Doorset B had overall dimensions of 2024 mm high by 924 mm wide and incorporated a door leaf of overall dimensions of 1981 mm high by 838 mm wide by 44 mm thick. The door leaf was of a two panel design and was formed from laminated softwood stiles and rails and comprised a 15 mm thick 'BPB Firestop Gypsum' core, 3.2 mm thick HDF facings and hardwood lippings to the vertical edges. The door leaf was hung within a softwood frame on three steel hinges. The doorset incorporated a surface mounted overhead door closer fitted on the exposed face and included a latch and handles at approximately mid-height which was engaged for the duration of the test.

The test demonstrated the ability of the doorset to provide 32 minutes integrity and insulation performance.

WF No. 168784

A test conducted in accordance with BS 476: Part 22: 1987 on a fully insulated single-acting, single-leaf doorset.

The doorset had overall dimensions of 2082 mm high by 987 mm wide and incorporated a door leaf of overall dimensions of 2040 mm high by 926 mm wide by 44 mm thick. The door leaf was of a four panel design and was formed from softwood stiles and rails and incorporated softwood veneer facings with a 12.5 mm thick 'BPB Firestop Gypsum' core. The door leaf was hung within a softwood frame on three steel hinges.

The doorset incorporated a surface mounted overhead door closer fitted on the exposed face and included a latch and handles at approximately mid-height which was engaged for the duration of the test.

The doorset was orientated such that it opened towards the heating conditions of the test.

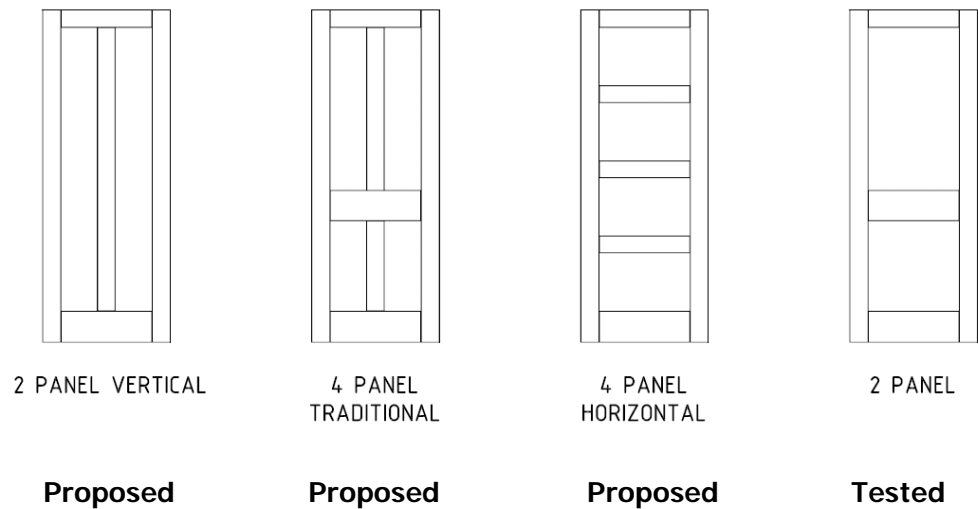
The test demonstrated the ability of the doorset to provide 29 minutes integrity and insulation performance. Integrity failure at this time was caused by the formation of a through gap in excess of the maximum dimensions permitted by the test Standard. An addendum to this report concludes that if the plasterboard forming the door panels were to be increased in thickness from 12.5 mm to 15 mm, then it would be expected that the integrity and insulation performance criteria would have been satisfied for 30 minutes.

Assessed Performance

WF No. 169709 (Shaker Panel Door)

Doorset B tested under the reference WF No. 169709 had overall dimensions of 2024 mm high by 924 mm wide and incorporated a door leaf of overall dimensions of 1981 mm high by 838 mm wide by 44 mm thick. The door leaf was of a two panel design and was formed from laminated softwood stiles and rails and comprised a 15 mm thick 'BPB Firestop Gypsum' core, 3.2 mm thick HDF facings and hardwood lippings to the vertical edges. The door leaf was hung within a softwood frame on three steel hinges.

It is proposed that the door leaf may be supplied in a 4-panel configuration rather than the 2-panel design tested. The 4-panel door design may either be a traditional design or can incorporate 4 equally spaced horizontal panels as shown diagrammatically below:



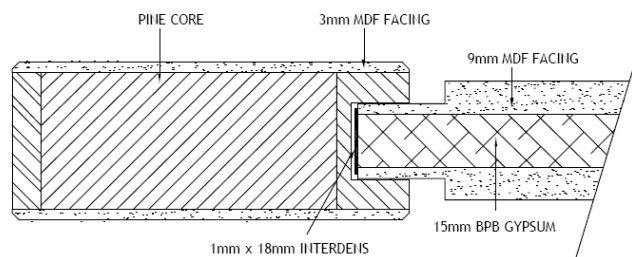
The proposed 4-panel door designs are considered less onerous than the successfully tested 2 panel design for the following reasons:

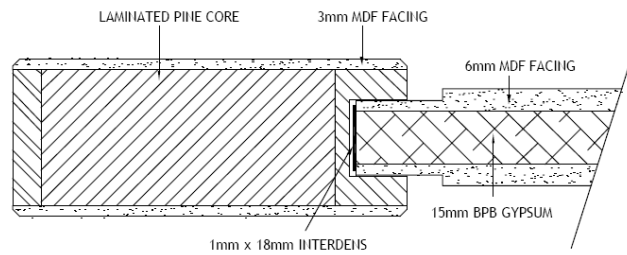
- The increase in panels requires the use of extra transoms and/or mullions. The use of these additional transoms/mullions are expected to improve the 'stiffness' of the door and may lead to a door which is more resistant to thermally induced deflections
- The increase in the number of panels will have the effect of reducing the dimensions of individual panels. Smaller panels would be expected to have an increased dimensional stability and be more resistant to impermeability loss.

On the understanding that the perimeter stiles and rails of the doors are not reduced in size, the proposed 4-panel options are therefore positively assessed.

The proposed alternative 2 panel door retains a similar level of framework and panel areas and therefore the change in panel shape is not considered significant to performance.

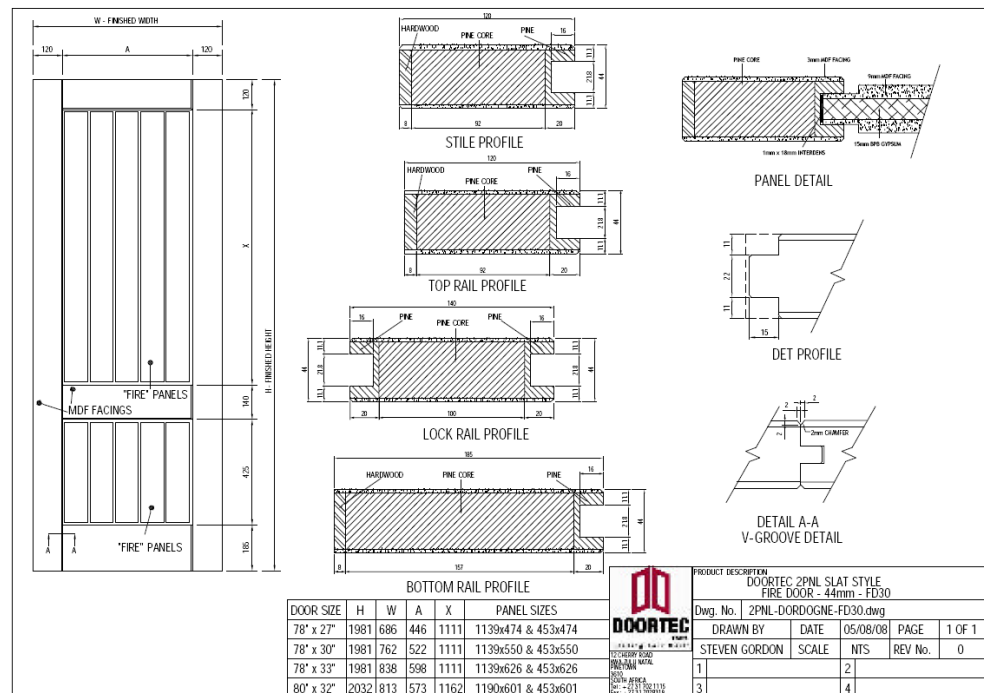
It is further proposed that the panels may be of the following alternative constructions:





While the tested panels had uniform thickness, even where the panel was inserted into the rebate, they were also somewhat thinner, comprising a 15 mm Gypsum board and 3.2 mm Hardboard facings. The proposed panels are therefore comparable to that tested at their thinnest points but are thicker over much of their area and therefore this would not be expected to present any increased risk of burn through.

Additionally on the same basis, these panels may also be grooved to give a 'Slat Style' appearance, as shown below:



The tested door leaf dimensions were 1981 mm high by 838 mm wide. The doorset achieved a fire resistance performance of 32 minutes, i.e. the doorset achieved an overrun in performance of 6%.

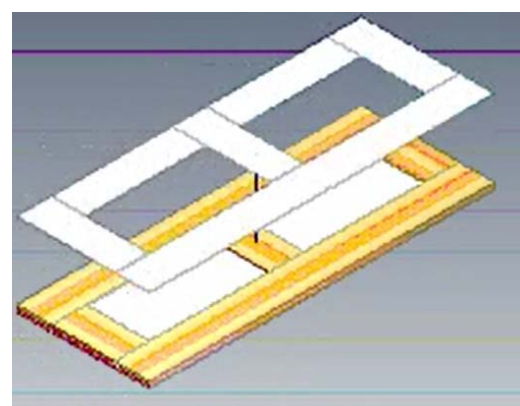
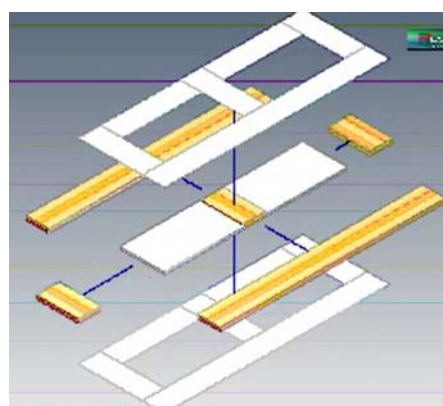
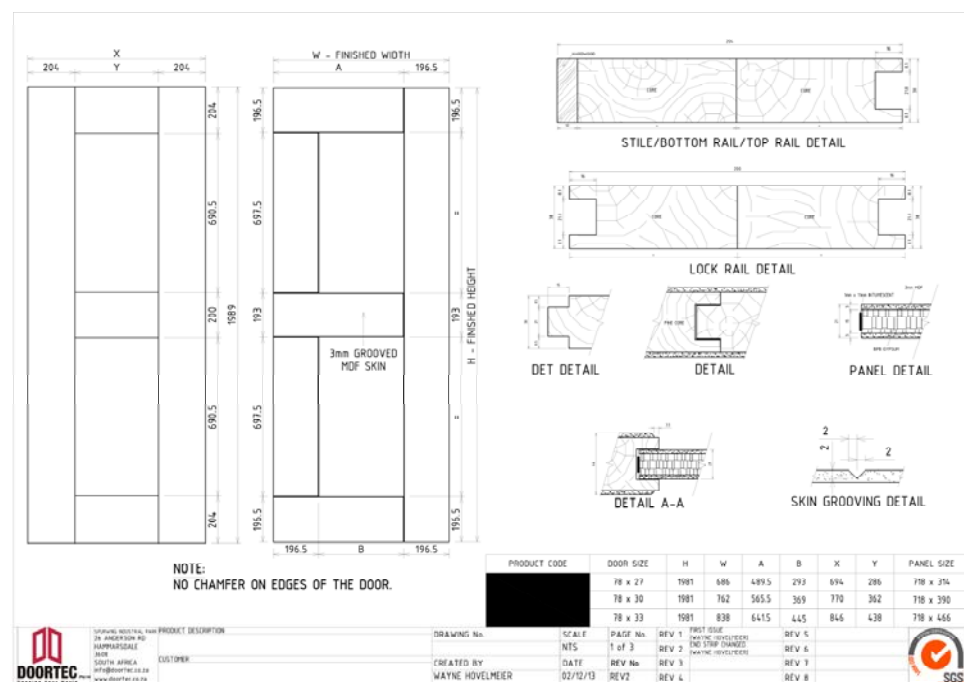
This percentage overrun can be used to assess an increased leaf dimension by a similar percentage. Therefore, the maximum assessed leaf dimensions are 2100 mm high by 888 mm wide. These are maximum leaf dimensions and are subject to a maximum leaf area of 1.76m².

On the basis that smaller door leaves would be expected to suffer from less thermally induced deflections which could be detrimental to the fire resistance performance, the dimensions of door leaves may be reduced without limit (providing that the perimeter stiles and rails of the doors are not reduced in size from that tested).

It is further proposed that MDF facings may be substituted for the Hardboard facings originally tested. Empirical evidence and test experience has demonstrated that MDF and Hardboard have comparable charring rates and provide similar levels of stability when used as door leaf facings and on this basis no reduction in performance is anticipated.

Alternative Construction

It is proposed that an a variant on the shaker door be appraised. The construction of the door will be similar to that described in the previous section, the main difference being the design of the MDF facing used – designed to provide an alternative stile/rail layout aesthetic. Details of the proposed door and the lay up detail are given below:



The proposed door is construction in a similar manner to the previously

assessed shaker doors in a traditional joinery manner, using panels of a specification as assessed. The timber stile and rail dimensions will actually be slightly larger than the normal shaker door, which is expected to add dimensional stability under fire exposure. The asymmetrical feature groove detail within the MDF facing, essentially provided for aesthetic purposes, will provide a similar level of burn through resistance and stiffening action as the traditional laid on facing.

Based on this, the proposed doorset design is positively appraised.

**WF No. 168784/A
(Pine Panel Door)**

The doorset had overall dimensions of 2082 mm high by 987 mm wide and incorporated a door leaf of overall dimensions of 2040 mm high by 926 mm wide by 44 mm thick. The door leaf was of a four panel design and was formed from softwood stiles and rails and incorporated softwood veneer facings with a 12.5 mm thick 'BPB Firestop Gypsum' core. The door leaf was hung within a softwood frame on three steel hinges.

It is proposed that the door leaf may be supplied in a 6-panel configuration rather than the 4-panel design tested.

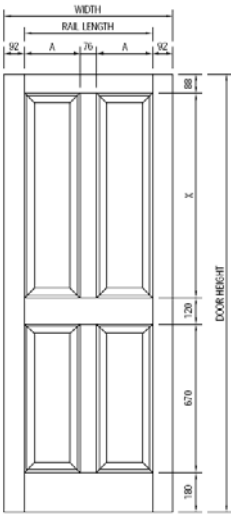
The proposed 4-panel door designs are considered less onerous than the successfully tested 2 panel design for the following reasons:

- The increase in panels requires the use of extra transoms and/or mullions. The use of these additional transoms/mullions are expected to improve the 'stiffness' of the door and may lead to a door which is more resistant to thermally induced deflections
- The increase in the number of panels will have the effect of reducing the dimensions of individual panels. Smaller panels would be expected to have an increased dimensional stability and be more resistant to impermeability loss.

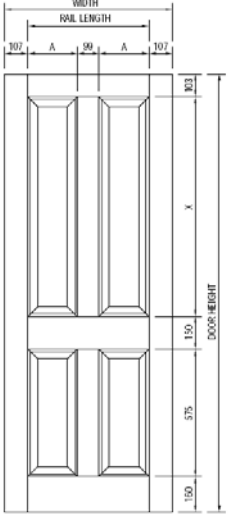
On the understanding that the perimeter stiles and rails of the doors are not reduced in size, the proposed 4-panel options are therefore positively assessed.

On the basis that smaller door leaves would be expected to suffer from less thermally induced deflections which could be detrimental to the fire resistance performance, the dimensions of door leaves may be reduced without limit (providing that the perimeter stiles and rails of the doors are not reduced in size from that tested).

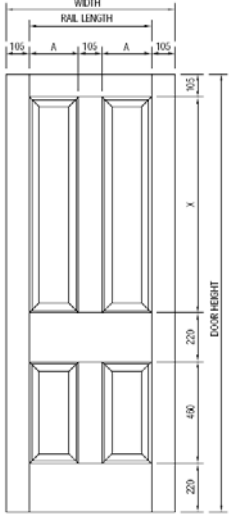
It is further proposed that leaf perimeter framework sections may be of increased dimensions, as shown below:



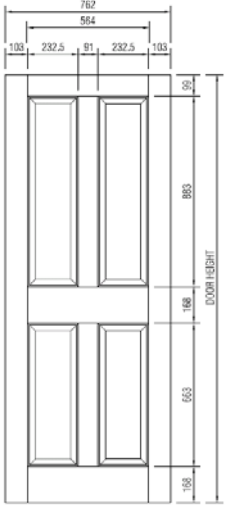
SPEC AS PER TEST



PROPOSED NEW SPEC



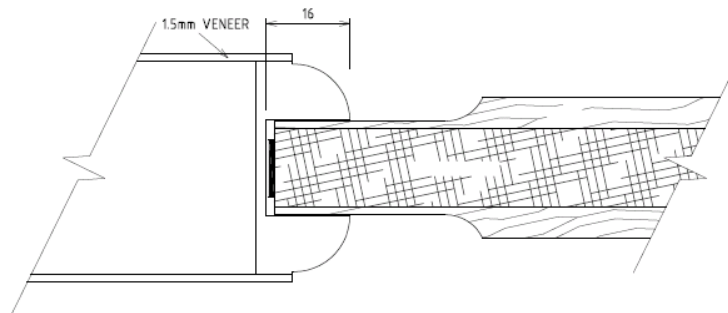
PROPOSED NEW SPEC



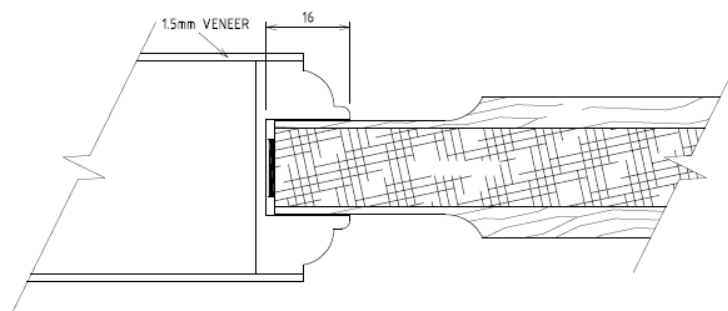
PROPOSED NEW SPEC

Increased perimeter framework sections would be expected to result in improved leaf stability under test conditions and the proposed modification would therefore only be expected to have a positive affect upon the performance of the doorset.

It is also proposed that that the profile which retains the panels may be of a modified design, as illustrated below:



CURRENT PROFILE



PROPOSED PROFILE

While this profile is critical to panel retention and resistance to burn through at the panel edge, the proposed modification is very minor and results in almost no actual change to the amount of timber retaining the panel and therefore no reduction in performance is anticipated.

Conclusions

Should the recommendations given in this report be followed, it can be concluded that timber doorsets similar to the doorsets tested under the references WF Test Report No.'s 169709 (Doorset B) and 168784/A, when including modifications as detailed within this report, would be expected to provide 30 minutes integrity and insulation performance, if subjected to a test in accordance with BS 476: Part 22: 1987.

Validity

This assessment is issued on the basis of test data and information available at the time of issue. If contradictory evidence becomes available to Exova **warringtonfire** the assessment will be unconditionally withdrawn and **Doortec (PTY) Limited** will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested because actual test data is deemed to take precedence over an expressed opinion. The assessment is valid initially for a period of five years i.e. until 1st January 2019, after which time it is recommended that it be returned for re-appraisal.

The appraisal is only valid provided that no other modifications are made to the tested construction other than those described in this report.

Summary of Primary Supporting Data

WF No. 169709

A test conducted in accordance with BS 476: Part 22: 1987 on two specimens of single-acting, single-leaf, timber doorset.

Doorset A had overall dimensions of 2024 mm high by 924 mm wide and incorporated a door leaf of overall dimensions of 1981 mm high by 838 mm wide by 44 mm thick. The door leaf was formed from laminated softwood stiles and rails and comprised a 15 mm thick 'BPB Firestop Gypsum' core, 3.2 mm thick HDF facings and hardwood lippings to the vertical edges. The door leaf was hung within a softwood frame on three steel hinges.

The door leaf incorporated a glazed aperture of nominal aperture dimensions 648 mm wide by 1017 mm high glazed with nominally 7 mm thick 'Pyrodur Plus' glass. The glass was retained via a perimeter seal referenced 'Pyrostrip 500FSA'.

Doorset B had overall dimensions of 2024 mm high by 924 mm wide and incorporated a door leaf of overall dimensions of 1981 mm high by 838 mm wide by 44 mm thick. The door leaf was of a two panel design and was formed from laminated softwood stiles and rails and comprised a 15 mm thick 'BPB Firestop Gypsum' core, 3.2 mm thick HDF facings and hardwood lippings to the vertical edges. The door leaf was hung within a softwood frame on three steel hinges.

Both doorsets incorporated a surface mounted overhead door closer fitted on the exposed face and included a latch and handles at approximately mid-height which was engaged for the duration of the test.

The results of the test were as follows:

	Integrity	Insulation
Doorset A	17 minutes	17 minutes
Doorset B	32 minutes	32 minutes

Test Date : 10th January 2008

Sponsor : Doortec (PTY) Limited

WF No. 168784

A test conducted in accordance with BS 476: Part 22: 1987 on a fully insulated single-acting, single-leaf doorset.

The doorset had overall dimensions of 2082 mm high by 987 mm wide and incorporated a door leaf of overall dimensions of 2040 mm high by 926 mm wide by 44 mm thick. The door leaf was of a four panel design and was formed from softwood stiles and rails and incorporated softwood veneer facings with a 12.5 mm thick 'BPB Firestop Gypsum' core. The door leaf was hung within a softwood frame on three steel hinges.

The doorset incorporated a surface mounted overhead door closer fitted on the exposed face and included a latch and handles at approximately mid-height which was engaged for the duration of the test.

The doorset was orientated such that it opened towards the heating conditions of the test.

The results of the test were as follows:

Integrity 29 minutes*

Insulation 29 minutes*

* Integrity failure at this time was caused by the formation of a through gap in excess of the maximum dimensions permitted by the test Standard. An addendum to this report concludes that if the plasterboard forming the door panels were to be increased in thickness from 12.5 mm to 15 mm, then it would be expected that the integrity and insulation performance criteria would have been satisfied for 30 minutes.

Test Date : 5th December 2007

Sponsor : Doortec (PTY) Limited

Declaration by Doortec (PTY) Limited.

We the undersigned confirm that we have read and complied with the obligations placed on us by the UK Fire Test Study Group Resolution No. 82: 2001.

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.


We are not aware of any information that could adversely affect the conclusions of this assessment.


If we subsequently become aware of any such information we agree to cease using the assessment and ask Exova **warringtonfire** to withdraw the assessment.

Signed:

For and on behalf of:

Signatories


Responsible Officer A. Kearns* - Technical Manager


Approved D. Hankinson* - Principal Certification Engineer

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

Report Issued: 06 th December 2013

Issue 2 – Addition of modified panels, facings and perimeter framework dimensions (15th September 2008)

Issue 3 – Addition of further modified perimeter framework dimensions (29th June 2010)

Issue 4 – Addition of alternative 2 panel design (17th Feb 2012)

Issue 5 – Addition of alternative profile for retaining door panels (22nd June 2012)

Issue 6 – Review and revalidation and addition of door design (6th December 2013)

The assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

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