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Title:

The Fire Resistance Performance Of Previously Fire Tested Insulated Timber/Mineral-Based Doorsets Incorporating Simonswerk TE 525, TE 526 3D, TE 527 3D, TE 528 3D TE526 3D Energy and TE 527 3D Energy Hinges

WF Assessment Report No:

178450 Issue 8

Prepared for:

Simonswerk UK Ltd

Burcot Works
Spring Street
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Issue 1:

21st November 2008

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TABLE OF CONTENTS

SECTION PAGE

Foreword 3
Executive Summary 4
Introduction 5
Assumptions 5
Proposals 6
Basic Test Evidence 6
Assessed Performance 7
Conclusions 12
Validity 14
Summary of Primary Supporting Data 15
Declaration by Simonswerk UK Ltd 17
Signatories 18
Revision History 19

Foreword

This assessment report has been commissioned by Simonswerk UK Ltd and relates to the fire resistance of concealed hinges.

This assessment is for National Application and has been written in accordance with the general principles outlined in BS EN 15725: 2010; Extended application reports on the fire performance of construction products and building elements, as appropriate.

This assessment uses established empirical methods of extrapolation and experience of fire testing similar products, in order to extend the scope of application by determining the limits for the design based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance, if the elements were to be tested in accordance with EN1634.

This assessment has been written using appropriate test evidence generated at a UKAS accredited laboratory to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's products and is summarised within the assessment.

The defined scope presented in this assessment report relates to the behaviour of the proposed concealed hinges under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the hinges in use.

This assessment has been prepared and checked by product assessors with the necessary competence, who subscribe to the principles outlined in the Guide to undertaking technical assessments of the fire performance of the fire performance of construction products based on fire test evidence – 2021. The aim of the PFPF guidelines is to give confidence to end-users that assessments that exist in the UK are of a satisfactory standard to be used in lieu of fire tests for building control and other purposes.

The PFPF guidelines are produced by the UK Fire Test Study Group (FTSG) an association of the major fire testing laboratories in the UK and are published by the PFPF, the representative body for the passive fire protection industry in the UK.

This report is not intended for use in support of EN 15269-2 and EN 15269-3 (Extended application of test results for fire resistance and/or smoke control for door, shutter and openable window assemblies, including their elements of building hardware.), or CE Marking of Doorset to EN 16034 (Pedestrian doorsets, industrial, commercial, garage doors and openable windows. Product standard, performance characteristics. Fire resisting and/or smoke control characteristics).

Executive Summary

Objective

This report presents an appraisal of the fire resistance performance of previously tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) fully insulated, single-acting, timber or mineral based doorsets in single or double leaf configurations, when fitted with Simonswerk 'Tectus 525' 'Tectus 526 3D', 'Tectus 527 3D', 'Tectus 528 3D', TE 526 3D Energy and TE 527 3D Energy concealed hinges.

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Summary of Conclusions

Should the recommendations given in this report be followed, it can be concluded that timber or mineral based doorsets*, which have achieved 60 minutes integrity and insulation performance may be fitted with 'Tectus 525' 'Tectus 526 3D', 'Tectus 527 3D', 'Tectus 528 3D', TE 526 3D Energy and TE 527 3D Energy concealed hinges, without detracting from the overall achieved performance of the doorset in accordance with BS 476: Part 22: 1987 or BS EN 1634-1.

*The specification of suitable doorsets is detailed later in this report.

This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with EN1634-1, on the basis of the evidence referred to herein. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any Building Control authority as sufficient for that or any other purpose. This assessment is provided to the client for its own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose.

Valid until

23rd July 2026

Introduction

This report presents an appraisal of the fire resistance performance of previously tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) fully insulated, single-acting, timber or based doorsets in single or double leaf configurations, when fitted with Simonswerk 'Tectus 525' 'Tectus 526 3D', 'Tectus 527 3D', 'Tectus 528 3D', TE 526 3D Energy and TE 527 3D Energy concealed hinges concealed hinges.

The doorsets to which the hinges are to be fitted shall be latched or unlatched and may be of single-leaf or double-leaf configurations.

The proposed doorsets are required to provide a fire resistance performance of 60 minutes integrity and insulation when fitted with 'Tectus 525' 'Tectus 526 3D', 'Tectus 527 3D', 'Tectus 528 3D', TE 526 3D Energy and TE 527 3D Energy concealed hinges, with respect to BS 476: Part 22: 1987 or BS EN 1634-1.

FTSG / PFPF

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 and the Passive Fire Protection Federation (PFPF) Guide to Undertaking Technical Assessments of Fire Performance of Construction Products Based on Fire Test Evidence - 2021.

Assumptions

Supporting construction

It is assumed that the construction, which supports the proposed doorset assembly, will have been the subject of a separate test and its performance 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 those measured for the relevant fire tested doorset and in any case shall not exceed 3.0 mm.

Doorset details

It is assumed that the proposed hinges will be fitted to timber or mineral based door leaves which have previously been shown to be capable of providing 60 minutes integrity and insulation performance in the same configuration as that proposed, with regard to:

a) Single-acting, single or double-leaf
b) Latched or unlatched

Door mass

It is assumed that the hinges will be appropriate to the maximum door mass permitted.

Fixings

The hinges shall only be fitted using the fixings supplied by the hinge manufacturer.

EN1634-1

EN1634-1 was issued originally in 2000, with amended versions issued in 2008, 2014 and 2018. The differences between each version are mainly procedural and are not considered to have a practical impact on the performance of the samples under test. On this basis this evaluation is consider applicable to all versions of EN1634-1 issued prior to the issue of this assessment.

Proposals

It is proposed that the concealed hinges referenced with 'Tectus 525' 'Tectus 526 3D', 'Tectus 527 3D', 'Tectus 528 3D', TE 526 3D Energy and TE 527 3D Energy concealed hinges are fitted to fully insulated doorsets, the specification of which has previously been successfully fire tested by a laboratory appropriately accredited by UKAS (or previously assessed by Warringtonfire, BM TRADA or Chiltern International Fire), for periods of integrity and insulation performance of 60 minutes.

It is proposed that the doorsets may be of single or double-leaf, single-acting configurations.

Doorsets which a suitable for use with the proposed hinges are detailed later in this report.

Basic Test Evidence

WF No. 169840

The test referenced WF No. 169840 and described briefly in the supporting data section of this report describes a fire resistance test in accordance with BS EN 1634-1: 2000 on two specimens of single-leaf, timber based doorset assembly.

The specimens comprised single-acting, single-leaf doorsets which had overall dimensions of 2083 mm high by 1010 mm wide. Doorset A was of a '30 minute' construction, 44 mm thick and was hung upon '0105' spring hinges. Doorset B was of a '60 minute' construction, 54 mm thick and was hung upon 'Tectus 520' concealed hinges.

The test demonstrated the ability of the doorsets to provide 44 minutes and 72 minutes integrity and insulation performance respectively.

Test report review

The original test reports used in support of this assessment have been reviewed and it has been concluded that the test data remains acceptable and the final result would be unchanged on the following basis:

- A comparison of the test procedures and performance criteria with the current standard has identified that any variations would have no detrimental impact on the performance of the doorset and hardware under test
- The client has confirmed that there has been no change to the design or material specification of the hardware tested originally, consequently.

- The reports are available in their entirety, the products are adequately referenced and linked to the products being considered for assessment, and the ownership of the test data has been confirmed as the assessment report holder.

WF No. 348445/R Issue 2

A test to determine the fire resistance performance of two single-acting, single-leaf timber based doorsets incorporating various items of hardware, mounted within a low density rigid supporting construction in accordance with BS EN 1634-1: 2014.

The test demonstrated the ability of the doorsets to provide 33 minutes and 64 minutes integrity and insulation performance respectively.

Assessed Performance

Hardware Variant Specifications

An appraisal of the hardware variants detailed in this report is based upon product information supplied by the hardware manufacturer, which is retained in the confidential file relating to this report. Warringtonfire have not inspected the devices being appraised and cannot be held responsible for the accuracy of the information provided.

Tectus TE525 concealed hinges

It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) timber or mineral based insulated doorsets may be fitted with a ‘Tectus 525’ concealed hinges in order to provide 60 minutes integrity and insulation without detracting from the performance of the doorset.

The tested construction in WF No. 169840 included a timber based door leaf (with non-combustible sub-facings), hung within a hardwood frame and upon examination of the test report, it can be seen that there were no modes of integrity failure, for a period of 72 minutes.

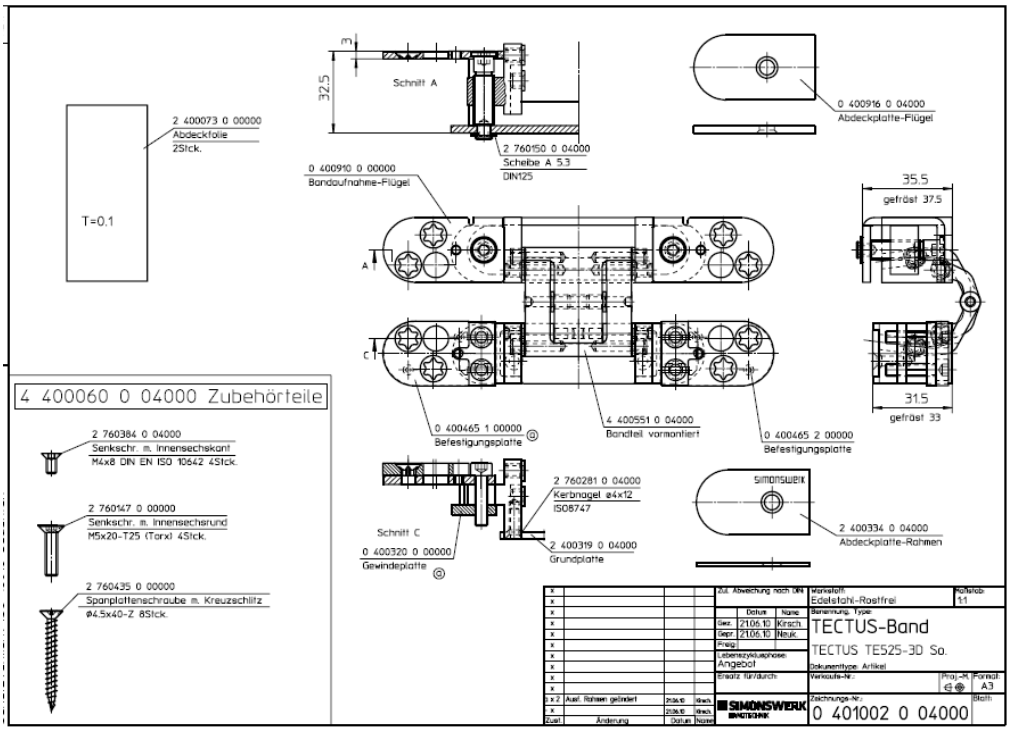
The proposed ‘Tectus 525’ hinge is identical to the tested ‘Tectus 520’ in terms of overall dimensions and materials of construction, the only notable difference being the inclusion of decorative cover plates in the ‘Tectus 525’, which are used to conceal the screw fixings.

Such a minor modification would be expected to have no affect upon the ability of the hinge to provide the required support to the door leaf and a negligible affect in terms of burn through at the hinge position.

This provides confidence that should a doorset of similar specification, which has been separately proven to be capable of providing at least 60 minutes integrity performance (the critical specifications of which are detailed later in this section), be hung upon the ‘Tectus 525’ hinges, then this would not be expected to have any deleterious effects on the performance of the doorset for the required period.

Tectus TE528 3D concealed hinges

The TE 528 3D hinge variant as proposed replaces the cast stainless steel elements of the TE 525 with components made of galvanized steel, these will be the "u" shaped bracket on the sash side of the hinge and on the frame side where the double plate is located, this will also be made of galvanized steel. Both of these parts will be covered with stainless steel cover plates and the connecting arms will be made of stainless steel, so once fitted the appearance will only be stainless steel. The overall dimensions of the hinge are the same as the standard version (see drawing below – note old reference of 525 3D is shown on drawing):



The modification of the stated components from SS to MS would not be considered to significantly affect the stability or strength of the hinge nor affect the thermal transfer through the hinge and into the door leaf or frame.

TE526 3D and TE527 3D

The proposed TE526 3D and TE527 3D models are identical to the TE528 in terms of design and dimensions but differ in terms of their materials of construction.

Like the TE525, the TE526 3D is fully manufactured from stainless steel, whereas the TE527 3D is manufactured from mild steel.

As neither material is considered to be detrimental to the performance of the hinge, and the same hinge design has previously been discussed, the positive appraisal of the TE526 3D and TE527 3D models is considered acceptable.

The performance of the TE527 3D is further demonstrated by Doorset B within WF No. 348445/R Issue 2.

Doorset B was a 1010 x 2089 mm single acting, single leaf doorset with a 932 x 2040 x 54 mm graduated density chipboard door and 8 mm thick hardwood lippings. The leaf was hung within a hardwood frame with a 2No. 15 x 4 mm perimeter intumescent fire seal fitted centrally within the frame rebate 9 mm apart. The door opened towards the heating conditions and was unlatched.

The door was hung on two TECTUS TE527 3D mild steel hinges. The hinges supplied with intumescent to external faces of hinges as follows:

- 1 mm thick self-adhesive mono ammonium phosphate material fixed to external faces of hinge body to door leaf (Ref. ITH-TECTUS-TE525-10).
- The 15 mm perimeter intumescent fire seal within the frame on the stop side of the frame rebate was not cut by the hinge and by-passed the hinge fully.

On reviewing the observations taken from the tests report, there was a sustained flaming integrity failure at the leading edge of Doorset B at 64 minutes, however it's clear that there were no integrity failures associated with the hinges fitted for a test duration of 66 minutes.

The performances of Doorset B during the test referenced WF No. 348445/R Issue 2 is cited to display the ability of TECTUS TE527 3D mild steel hinges to contribute towards the required fire resistance performance for 60 minute rated timber/mineral based doorsets, where the door leaf is a minimum of 54 mm thick and does not incorporate a non-combustible sub-face.

Furthermore this test data is considered suitable justification for all the TECTUS concealed hinges discussed in the appraisal for use in 60 minute rated timber/mineral based doorsets, where the door leaf is a minimum of 54 mm thick and does not incorporate a non-combustible sub-face; on the basis that the intumescent protection tested in WF No. 348445/R Issue 2 is maintained and the perimeter intumescent fire seal within the frame rebate or door edge by passes the hinge by a minimum of 15 mm thickness.

TE 526 3D Energy and TE 527 3D Energy

The 'Tectus' 'TE526-3D Energy' and 'TE527-3D Energy' and are identical in size and construction to the previously discussed 'Tectus' 'TE526-3D' and 'TE527-3D' models with the exception of the addition of a ribbon cable and plug connectors to facilitate power transfer for electrical devices through the hinge.

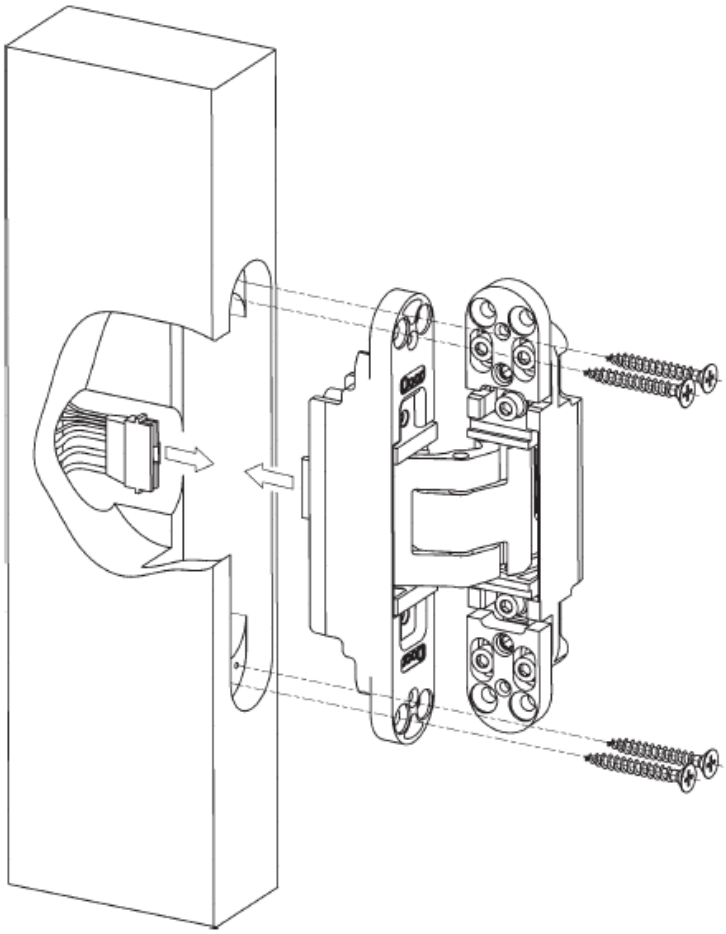


Energy Hinge

The ribbon cable consists of sixteen wires and is relatively thin, the wires have a cross sectional area of 0.14 mm^2 (nominally 0.422 mm diameter) with a polyester coating. When exposed to a direct flame the polyester coating quickly burns / evaporates away leaving no significant residue. Due to the thinness of the cable and limited amount of combustible material it introduces to the hinge, it's not anticipated that the addition of the ribbon cable will have any significant impact on the required fire performance of the hinge.

The intumescent protection shall be as included in WF No. 348445/R Issue 2 and identified above.

The inclusion of the cable connectors necessitates the removal of a small amount of intumescent material nominally, 22 mm x 10 mm, on the back edges of the hinges and a slightly deeper mortice depth in the area of the connector. No intumescent is removed from the sides of the hinge so the potential from burn through and heat transfer from one face of the leaf or frame to the other, at the hinge position, is not affected. Given the overrun achieved in the initial tests it's not anticipated that the removal of a small amount of intumescent material at the bottom of the mortice and the increase in mortice depth in the area of the connector will have any significant impact on the required 60 minutes integrity performance.



Suitable doorsets

To enable the use of the hinges with a range of doorsets, it is necessary to address the available information on the proposed doorset. As this appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of fire resisting doorsets, the following points are given to enable the hinges to be used safely:

- The doorset, including the door frame and associated ironmongery should have achieved 60 minutes integrity and insulation performance, when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) in accordance with BS 476: Part 22: 1987 or BS EN 1634-1.

- If the proposed doorset is to be used in double-leaf configurations, the test or assessment evidence should be applicable to double-leaf configurations.

- Likewise, if the proposed doorset is to be used in unlatched configurations then the available test evidence should be applicable to unlatched doorsets.

- For 60 minutes performance (FD60 or EI60) the door leaf shall be a minimum 54 mm thick timber based or mineral based construction with hardwood lippings with a minimum density of 640 kg/m^3.

- The door frame will be of a timber based or mineral construction with a minimum density of 640 kg/m^3 (60 minutes).

- The intumescent protection shall be:

    - 1 mm thick self-adhesive mono ammonium phosphate material fixed to external faces of hinge body to door leaf (Ref. ITH-TECTUS-TE525-10).

    - Additionally the perimeter intumescent fire seal within the frame rebate or door edge by passes the hinge by a minimum of 15 mm thickness.

The fitting of the hinges onto alternative doorsets, on the basis of compliance with the conditions given above, is therefore considered to be acceptable.

Conclusions

Timber or mineral based doorsets*, which have achieved 60 minutes integrity and insulation performance may be fitted with ‘Tectus 525’ ‘Tectus 526 3D’, ‘Tectus 527 3D’, ‘Tectus 528 3D’, TE 526 3D Energy and TE 527 3D Energy concealed hinges concealed hinges, without detracting from the overall achieved performance of the doorset in accordance with BS 476: Part 22: 1987 or BS EN 1634-1.

*The specification of suitable doorsets is detailed earlier in this report.

Review

It has been confirmed by Simonswerk UK Ltd that there have been no changes to the specification, materials or manufacturing location of the concealed hinges considered in the original appraisal referenced WF Assessment Report No. 178450 issue 6 issued 29th April 2016.

The original assessment has been written using appropriate test evidence generated at accredited test laboratories. The supporting test evidence has been deemed appropriate to support the manufacturers stated design.

The defined scope presented in the original assessment report relates to the behaviour of the proposed design under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the concealed hinges in use.

This revalidation has been prepared and checked by product assessors with the necessary competence, who subscribe to the principles outlined in the PFPF guidelines to undertaking assessments in lieu of fire tests. The aim of the PFPF guidelines is to give confidence to end-users that assessments that exist in the UK are of a satisfactory standard to be used in lieu of fire tests for building control and other purposes.

The PFPF guidelines are produced by the UK Fire Test Study Group (FTSG) an association of the major fire testing laboratories in the UK and are published by the PFPF, the representative body for the passive fire protection industry in the UK.

The data used for the original appraisal has been re-examined and found to be satisfactory. The procedures adopted for the original assessment have also been re-examined and are similar to those currently in use.

Therefore, with respect to the assessment of performance given in WF Assessment Report No. 178450, the contents should remain valid for a further 5 years.

This review is based on information used to formulate the original assessment. No other information or data has been provided by Simonswerk UK Ltd which could affect this review.

The original appraisal report was performed in accordance with the principles of the UK Fire Test Study Group Resolution 82: 2001. This review has therefore also been conducted using the principles of Resolution 82: 2001.

Validity

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to Warringtonfire the assessment will be unconditionally withdrawn and Simonswerk UK Ltd will be notified in writing. Similarly, the assessment should be re-evaluated, if the assessed construction is subsequently tested since actual test data is deemed to take precedence. The assessment is valid initially for a period of five years i.e. until 23rd July 2026, after which time it is recommended that it be returned for re-evaluation.

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. 169840

The test report referenced WF No. 169840 describes a fire resistance test in accordance with BS EN 1634-1: 2000 on two specimens of single-leaf, timber based doorset assembly.

For the purpose of the test the specimens were referenced Doorset A and Doorset B.

Doorset A had overall dimensions of 2083 mm high by 1010 mm wide and incorporated a door leaf of overall dimensions 2042 mm high by 942 mm wide by 43 mm thick. The door leaf was hung within a softwood door frame on three steel spring hinges referenced '0105'. The door leaf comprised softwood stiles and rails, a Flaxboard core and chipboard outer facings.

Doorset B had overall dimensions of 2083 mm high by 1010 mm wide and incorporated a door leaf of overall dimensions 2038 mm high by 928 mm wide by 52 mm thick. The door leaf was hung within a hardwood door frame on three stainless steel hinges referenced 'Tectus 520' which were bedded on 1 mm thick Interdens intumescent material. The door leaf comprised softwood stiles and rails, a high density Flaxboard core, non-combustible board sub-facings and chipboard outer facings.

Both door leaves were orientated such that they opened towards the heating conditions of the test. Both doorsets incorporated a latch and handles at approximately mid-height and were latched for the duration of the test.

The specimens achieved the following results:

Performance Criteria		Doorset A	Doorset B
Integrity	Cotton Pad	44 minutes	72 minutes
	Sustained flames	44 minutes	72 minutes
	Gap gauges	44 minutes	72 minutes
Insulation		44 minutes	72 minutes

Warringtonfire was not involved in any selection or sampling procedures of the specimens or any of their components.

Test date : 24th January 2008

Test sponsor : Simonswerk UK Limited

WF No. 348445/R Issue 2

A test to determine the fire resistance performance of two single-acting, single-leaf timber based doorsets incorporating various items of hardware, mounted within a low density rigid supporting construction in accordance with BS EN 1634-1: 2014.

For the purpose of the test the doorsets were referenced Doorset A and Doorset B.

Doorset A (30 minute) briefly had overall nominal dimensions 2080 mm high by 1005 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 932 mm wide by 44 mm thick. The door leaf was a Halspan three layer particleboard construction, with 8 mm hardwood lippings to the vertical edges and was hung within a softwood frame on two TECTUS TE541 FVZ 3D hinges with the frame covered with plasterboard to the exposed face.

Doorset B (60 minute) briefly had overall nominal dimensions 2089 mm high by 1010 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 932 mm wide by 54 mm thick. The door leaf was a Halspan three layer particleboard construction, with 8 mm hardwood lippings to the vertical edges and was hung within a hardwood frame on two TECTUS TE527 3D hinges.

The doorsets were installed such that they opened towards the heating conditions of the test and were unlatched for the purpose of the test.

The specimens achieved the following results:

Performance Criteria		Doorset A	Doorset B
Integrity	Cotton Pad	33 minutes#	64 minutes
	Sustained flames	33 minutes#	66 minutes*
	Gap gauges	33 minutes#	64 minutes
Insulation		44 minutes	33 minutes#

* The test duration. The test was discontinued after a period of 66 minutes.

The specimen was blanked off.

Warringtonfire was not involved in any selection or sampling procedures of the specimens or any of their components.

Test date : 13th February 2015

Test sponsor : Simonswerk UK Limited

Declaration by Simonswerk UK Ltd

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 Warringtonfire to withdraw the assessment.

Signed:

_____

For and on behalf of:

Signatories



Responsible Officer (Issue 8)

R. Anning* - Principal Certification Engineer



Approved (Issue 8)

M. Tolan* - Senior Certification Engineer

* For and on behalf of Warringtonfire.

Report Issued: 21st November 2008

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

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Revision History

Issue No: 1	Issue Date: 21st November 2008
Written By: C. Johnson	Approved By: D. Forshaw
Issue 2: Inclusion of appraisal of the TE 528 3D hinge model (15th July 2010) Issue 3: Revision of intumescent specification on page 8 (19th July 2010) Issue 4: Inclusion of appraisal of the TE526 3D and TE527 3D hinge models (14th May 2013) Issue 5: Inclusion of TE 526 3D Energy and TE 527 3D Energy hinge models (28th April 2016) Issue 6: Removal of 30 minute timber door requirements (29th April 2016)	
Issue No: 7	Re-issue Date: 23rd July 2021
Revised By: R. Anning	Approved By: M. Tolan
Reason for Revision: Review/revalidation	
Issue No: 8	Re-issue Date: 7th September 2021
Revised By: R. Anning	Approved By: M. Tolan
Reason for Revision: Test report 348445/R Issue 2 added	