

Title:

The Fire Resistance
Performance Of Timber-
Based Insulated Doorsets
When Fitted With Stainless
Steel Flushbolts

Report No:

363741 Issue 3

Prepared for:

Frelan Hardware Ltd.
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Date:

12th April 2016

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Foreword

This assessment report has been commissioned by Frelan Hardware Ltd and relates to the fire resistance of flushbolts.

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 flushbolts under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the flushbolts in use.

This assessment has been prepared and checked by Certification Engineers 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.

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).

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 single-acting timber-based doorsets when fitted with Frelan stainless steel flushbolts, if tested in accordance with BS EN 1634-1.

Report Sponsor **Frelan Hardware Ltd**

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Summary of Conclusions Should the recommendations given in this report be followed, it can be concluded that the Frelan stainless steel flushbolts detailed within this report may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated single-action, double-leaf timber-based doorsets to provide 30 minutes or 60 minutes integrity and insulation performance, if tested in accordance with BS EN 1634-1.

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 16th March 2026

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Introduction

This report presents an appraisal of the fire resistance performance of single-acting insulated timber-based doorsets when fitted with a range of Frelan stainless steel flushbolts. The doorset, onto which the proposed hardware is to be fitted, shall be a single-action, double-leaf configuration.

The proposed doorsets are required to provide a fire resistance performance of 30 minutes or 60 minutes integrity and insulation with respect to BS EN 1634-1.

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

Doorsets

It is assumed that the flushbolts will be fitted to an insulated timber-based doorset which has also been previously shown to be capable of providing the required fire resistance performance when tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) in accordance with BS EN 1634-1 and fitted with similarly sized and positioned flush bolts in the proposed configuration i.e. single-action, double-leaf. The critical aspects of the door construction are detailed later in this report.

In addition, it is assumed that the door leaves will be in the closed position, with the primary leaf latched and the secondary leaf bolted top and bottom.

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.

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.

Supporting wall

It is also 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.

Installation

It is assumed that the doorsets will be installed in a similar manner to that of the previously tested assembly by competent installers.

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 considered applicable to all versions of EN1634-1 issued prior to the issue of this assessment.

Proposals

It is proposed that the Frelan stainless steel flushbolts, as referenced within this report, may be fitted into a previously tested (in accordance with BS EN 1634-1) insulated timber-based doorset which has been shown to be capable of providing 30 minutes or 60 minutes integrity and insulation in the same configuration as that proposed i.e. single-action, double-leaf.

Basic Test Evidence

WF Test Report No. 363166

The fire resistance test referenced WF No. 363166 is an investigation on the small-scale furnace which utilised the heating and pressure conditions given in BS EN 1363-1:2012.

The purpose of the test was to provide an indication of the fire resistance performance two specimens of single-acting, double-leaf simulated doorsets when installed with stainless steel flush bolts.

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.

Assessed Performance

General

It is proposed that the Frelan stainless steel flushbolts, as referenced within this report, may be fitted into a previously tested (in accordance with BS EN 1634-1) insulated timber-based doorset which has been shown to be capable of providing 30 minutes or 60 minutes integrity and insulation in the same configuration as that proposed i.e. single-action, double-leaf.

The range consists of the following sizes and designs of flushbolt, all of which are manufactured entirely from 304 grade stainless steel:

Satin Stainless Steel		Polished Stainless Steel	
Reference	Size	Reference	Size
Square Corners			
JSS50	150 x 20 mm	JPS50	150 x 20 mm
JSS51	203 x 20 mm	JPS51	203 x 20 mm
JSS52	305 x 20 mm	JPS52	305 x 20 mm
JSS53	457 x 20 mm	JPS53	457 x 20 mm
JSS56	609 x 20 mm	JPS56	609 x 20 mm
JSS57	914 x 20 mm	JPS57	914 x 20 mm
Radiused Corners			
JSS50R	150 x 20 mm	JPS50R	150 x 20 mm
JSS51R	203 x 20 mm	JPS51R	203 x 20 mm
JSS52R	305 x 20 mm	JPS52R	305 x 20 mm
JSS53R	457 x 20 mm	JPS53R	457 x 20 mm
JSS56R	609 x 20 mm	JPS56R	609 x 20 mm
JSS57R	914 x 20 mm	JPS57R	914 x 20 mm

The performances of the flushbolts during the test referenced WF No.363166 is cited to display the ability of the locksets to contribute towards the required fire resistance performances.

On reviewing the observations taken from the test report, it's clear that there were no integrity failures associated with flushbolts fitted to Doorset A (E30), for a test duration of 41 minutes (at which point the door was blanked off to allow the testing of the Doorset B to continue), or Doorset B (E60) for a test duration of 71 minutes.

Alternative Flushbolts

One key aspect of the flushbolts use is it location within the doorset as the performance will be influenced by whether they fitted in edge or face of doorsets, also the location in the height is significant as flushbolts in the top of the door are subject to increased positive pressure which may result in hot gases and flames being pushed around the bolts, and burn through of the leaf and at the leaf to frame gap at the bolt position. Flushbolts fitted in the bottom edge are considered less prone to failure, although the increase erosion due to a negative pressure at this point requires consideration.

The JSS57 (reported as JSS57SSS) was fitted at the tops of the secondary leaf of both doorsets and the flushbolt referenced JSS50 (reported as JSS50SSS) were fitted at the bottom - the top bolt was engaged whilst the bottom was disengaged. These flushbolts were chosen for the test on the basis that they were considered the most onerous of the proposed range. The JSS57 had overall dimensions 914 mm by 20 mm, and the JSS50 overall dimensions 150 mm by 20 mm.

In terms of the flushbolt material, it is critical that materials which are combustible or have a lower melting point are not utilised since materials which melt or ignite may advance the burn through of the leaf and therefore lead to a premature integrity failure.

It is critical that the flushbolt dimensions are not increased since the increased mortice required for a larger body, forend or keep may lead to an earlier burn through of the leaf or increased strike/forend dimensions may lead to the penetration of flames/hot gases at the leaf edge due to further interruption of intumescent seals and an increase in conducted heat.

In terms of the intumescent protection, it is critical that this is not reduced from that tested, as the reaction of this material when subjected to the heating conditions of the test is essential in limiting the burn through of the leaf and at the leaf to frame gap at the bolt position.

Substitution of alternative flushbolts from the proposed range may therefore be considered in terms of the critical aspects discussed and where such flushbolts fall within the scope of the tested locksets, it is considered reasonable to assume that no reduction in the performance of the doorset would be expected as a consequence of their substitution.

All of the proposed flushbolts are of identical materials and will utilise the same level of intumescent protection and all are of the same or smaller dimensions and therefore they may be positively appraised.

The proposed flushbolts are of the same basic construction as those tested comprising steel bodies and operating mechanism, with steel bolts and keeps. All flushbolts have bolt projections at least equal to that of the tested models. The nominal dimensions of all the flushbolts considered by this report fall within the range of dimensions of the tested flushbolts and therefore the full range of sizes required are considered suitable for use in the top leading edge of the secondary leaf.

With regards the bottom flushbolts, as the tested bolt was only 150 mm by 20 mm, and there is potential for increased erosion due to negative pressure at this position, therefore the maximum size of the flushbolt shall be restricted. However, due to the extent of the overrun on both doorset it is considered reasonable that the maximum permit size be increased to 305 x 20 mm at this location

In both the top and bottom locations, the flushbolts shall only be fitted in the leading edge of the secondary leaf.

Radiused and square forends

The tested forend and keep plates incorporated were square. It is proposed that radiused forends and keep plates also be permitted.

As the radiused forend and keep plates require the removal of less material to both the frame and leaf edge, when fitted to timber doorsets, their inclusion can only be considered to be beneficial. Therefore the alternative forend and keep plate variants are approved subject to intumescent specification discussed earlier in this report.

Issue 3 – Decorative finishes

It is proposed that the steel flushbolts may be provided in the following decorative finishes:

- PVD Brass
- Antique Bronze
- Electrophoresis Matt Black

All the above are decorative finishes applied to the base steel flushbolts, and their presence is not seen as detrimental to the fire resistance of the flushbolts.

The use of these decorative finishes is therefore approved.

FD30 Intumescent Protection

It is a requirement of this appraisal that the flushbolts must be installed within the doorsets such that the same level of intumescent protection is provided. This protection shall be such that the case is wrapped with a 1 mm thickness of Interdens intumescent to all faces of the recess for the flushbolt body and that a 1 mm thickness of the same material is provided behind the forend and keep plate. In addition the perimeter intumescent within the meeting edge of the doors (primary or secondary leaf) and head of the frame shall by-pass the flushbolts/keep plate by a minimum of 5 mm wide on each side (see example below).

FD60 Intumescent Protection

It is a requirement of this appraisal that the flushbolts must be installed within the doorsets such that the same level of intumescent protection is provided. This protection shall be such that the case is wrapped with a 2 mm thickness of Interdens intumescent to all faces of the recess for the flushbolt body and that a 2 mm thickness of the same material is provided behind the forend and keep plate. In addition the perimeter intumescent within the meeting edge of the doors (primary or secondary leaf) and head of the frame shall by-pass the flushbolts/keep plate by a minimum of 10 mm wide on each side (see example below).



Proposed Doorsets

As stated in this report, the doorset, in the required configuration, will be previously tested (or assessed by Warringtonfire, BM TRAD or Chiltern International Fire) and its performance is therefore not in doubt.

To enable the use of the Frelan stainless steel flushbolts on 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 locksets to be used safely:

- a) The doorset shall carry valid certification or the doorset, including the door frame and associated ironmongery should have achieved 30 or 60 minutes integrity, as appropriate, when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRAD or Chiltern International Fire) to BS EN 1634-1.
- b) As the proposed doorset is to be used in double-leaf configuration the test or assessment evidence should be applicable to double-leaf configuration.
- c) The leaves of the proposed doorset shall be of a minimum thickness of 44 mm for 30 minute doorsets and 54 mm for 60 minute doorsets.

- d) The leaves should incorporate hardwood lippings of a minimum thickness of 6 mm and minimum density 640kg/m^3 .
- e) The door frame of 30 minute doorsets shall be of softwood or hardwood and have a minimum density of 450kg/m^3 .
- f) The door frame of 60 minute doorsets shall be of hardwood and have a minimum density of 640kg/m^3 .

Conclusions

Should the recommendations given in this report be followed, it can be concluded that the Frelan stainless steel flushbolts detailed within this report may be fitted to previously tested or assessed (by Warringtonfire, BM TRAD or Chiltern International Fire) insulated single-action, double-leaf timber-based doorsets to provide 30 minutes or 60 minutes integrity and insulation performance, if tested in accordance with BS EN 1634-1.

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.

Review

It has been confirmed by Frelan Hardware Ltd that there have been no changes to the specification, materials or manufacturing location of the flushbolts considered in the original appraisal referenced WF Assessment Report No. 363741 issue 2 issued 2nd August 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 flushbolts 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. 363741, 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 Frelan Hardware 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 available at the time of issue. If contradictory evidence becomes available to Warringtonfire the assessment will be unconditionally withdrawn Frelan Hardware Ltd 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 16th March 2026, 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 Test Report No. 363166

A test report detailing a test conducted on the front vertical face of a 1.5 metre wide by 1.5 metre high by 2 metre deep gas fired furnace chamber, which utilised the heating and pressure conditions given in BS EN 1363-1:2012. The purpose of the test was to provide an indication of the fire resistance performance two specimens of single-acting, double-leaf simulated doorsets when installed with stainless steel flush bolts.

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

Specimen A briefly had overall nominal dimensions 1490 mm high by 735 mm wide incorporating two sections of door leaf, each with overall dimensions 1458 mm high by 366 mm wide by 44 mm thick. The door leaves were of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges. Both leaves were butted together to simulate a double leaf doorset and included a section of softwood timber at the head of the leaves to simulate an upper frame member.

The right side leaf (Leaf B) incorporated two flush bolts, one fitted at the head referenced "JSSS57SSS" which was engaged for the test and had overall dimensions 914 mm by 20 mm, the other fitted at the bottom of the leaf referenced "JSSS50SSS" which was disengaged and had overall dimensions 150 mm by 20 mm. Both flush bolts were protected with 1 mm Interdens intumescent lining around the aperture and behind the face plate.

Specimen B briefly had overall nominal dimensions 1490 mm high by 735 mm wide incorporating two sections of door leaves each with overall dimensions 1458 mm high by 366 mm wide by 54 mm thick. The door leaves were of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges. Both leaves were butted together to simulate a double leaf doorset and included a section of hardwood timber at the head of both leaves to simulate an upper frame member.

The right side leaf (Leaf B) incorporated two flush bolts, one fitted at the head referenced "JSSS57SSS" which was engaged for the test and had overall dimensions 914 mm by 20 mm, the other fitted at the bottom of the leaf referenced "JSSS50SSS" which was disengaged and had overall dimensions 150 mm by 20 mm. Both flush bolts were protected with 2 mm Interdens intumescent lining around the aperture and behind the face plate.

The specimens were orientated to simulate a full doorset that would open towards the heating conditions of the test.

At 41 mins Doorset A was blanked off without failure, to allow the test to continue on Specimen B.

At 71 minutes the test was terminated without failure recorded of Doorset B

Test date : 29th March 2016

Test sponsor : Frelan Hardware Ltd

Declaration by Frelan Hardware 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: Frelan Hardware Ltd

Signatories


Responsible Officer R. Anning* - Principal Certification Engineer


Approved M. Tolan* - Senior Certification Engineer

* For and on behalf of Warringtonfire.

Report Issued: 14th April 2016

Issue 2 – product references amended – 2nd August 2016

Issue 3 – Review/revalidation + finishes added – 17th March 2021

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

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