Warringtonfire
Holmesfield Road
Warrington
WA1 2DS

T: +44 (0)1925 655 116
info.warrington@warringtonfire.com
warringtonfire.com

Title:

The Fire Resistance Performance Of A Range of Royde & Tucker Hinges When Fitted To Previously Fire Tested Doorsets

Report No:

WF No. 138907 Issue 11

Prepared for:

Royde & Tucker Ltd

Bilton Road
Cadwell Lane
Hitchin
Hertfordshire
SG4 0SB

Date:

20th April 2004

Warringtonfire Testing and Certification Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, United Kingdom, SW1W 0EN
Company Registration No: 11371436

TABLE OF CONTENTS

Foreword

This assessment report has been commissioned by Royde & Tucker Ltd and relates to the fire resistance of 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 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 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).

Executive Summary

Objective

This report presents a considered opinion regarding the expected fire resistance performance of single-acting timber based and steel based doorsets, when fitted with a selection of Royde & Tucker hinges as referenced in the Proposal section of this report.

Report Sponsor

Royde & Tucker Ltd

Address

Bilton Road, Cadwell Lane, Hitchin, Hertfordshire SG4 0SB

Summary of Conclusions

Should the recommendations given in this report be followed, it can be concluded that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) timber doorsets which have achieved 30 or 60 minutes integrity (subject to the individual hinge models' scope of appraised performance) as discussed in this report may be fitted with a selection of Royde & Tucker hinges, without detracting from the overall performance of the doorset, with respect to EN 1634-1.

Should the further recommendations given in this report be followed, it can be concluded that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) steel based doorsets which have achieved up to 240 minutes integrity, may be fitted with the specific Royde & Tucker hinges models referenced and discussed in this report, without detracting from the overall performance of the doorset, with respect to 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

1st July 2025

Introduction

Issue 11 of this report supersedes all other previous issues of this report which are now invalid.

This report presents a considered opinion regarding the expected fire resistance performance of single-acting single-leaf doorsets, when fitted with a selection of Royde & Tucker hinges as referenced in the Proposal section of this report.

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

The proposed steel based doorsets are required to provide a fire resistance performance of up to 240 minutes integrity, with respect to 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.

Assumptions

It is assumed that the proposed hinges will be fitted to timber based doorsets which have previously been shown to be capable of providing 30 or 60 minutes integrity and, where applicable, insulation in a single-acting configuration.

It is further assumed that those hinges proposed to be fitted to steel based doorsets will be fitted to steel based doorsets which have previously been shown to be capable of providing up to 240 minutes integrity in a single-acting configuration.

Installation

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

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.

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. In addition, it is assumed that the door leaves will be in the closed position.

Door closers

The proposed doorsets will include a surface mounted overhead door closer capable of returning the door leaf to the fully closed position overcoming any latch mechanism as fitted.

Door mass

It is assumed that the hinges will be appropriate to the maximum door mass permitted under EN1935.

Fixings

For timber and mineral-based doorsets the hinges shall only be fitted using the fixings supplied by the hinge manufacturer.

Proposals

Hinges for timber leaf, timber framed doorsets

It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire, or covered by CERTIFIRE certification) timber doorsets which have achieved 30 or 60 minutes integrity (H1356 and H210-300 hinges 60 minute doorsets only), and where applicable insulation performance, may be fitted with a selection of Royde & Tucker hinges, in accordance with recommendations given in this report without detracting from the overall performance of the doorset.

The range of hinges covered in this proposal is as follows (dimensions given in Annex A):

References	Description	Fire Resistance	
		30 mins	60 mins
H100/102/103/ 104/1250/1254	Butt Hinges	Yes	Yes
H1356	3-knuckle butt hinge	No	Yes
H210-300	Concealed fixing Butt Hinge	No	Yes
H207/208/209/ 210	Concealed Bearing butt Hinges	Yes	Yes
H086/087/101/ 105/107/126/201 /202/203/206	Lift Off Hinges	Yes	Yes
H102-7	flush hinge	Yes	No
H102-C	Swing Clear hinge	Yes	No
H200	Butterfly hinge	Yes	Yes
G4530/G4535/ G4540/G4545	3 knuckle concealed bearing hinge	Yes	Yes
G4530-5/G4535-5/ G4540-5/G4545-5	3 knuckle concealed bearing hinge with dog bolt	Yes	Yes

The hinges which have been subject to previous fire testing with timber based doorsets are the H105, H1250 and H1356 hinges.

The hinges which have been subject to previous fire testing with steel based doorsets are the H207 hinges.

Hinges for timber leaves metallic partition frames

It is further proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire, or covered by CERTIFIRE certification) doorsets comprising a timber door leaf and bespoke metallic door frame for use within partitioning systems, which have achieved 30 minutes, and where applicable insulation performance, may be fitted with the following hinges, in accordance with recommendations given in this report without detracting from the overall performance of the doorset (dimensions given in Annex A):

References	Description	Fire Resistance	
		30 mins	60 mins
H102-P-FS	Partition hinge	Yes	No
H101-P-LR	Partition hinge	Yes	No
H101-P-RR	Partition hinge	Yes	No

The H102-P-FS has previously been subjected to fire testing.

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

Hinges for steel based doorsets

It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) steel based doorsets which have achieved up to 240 minutes integrity may be fitted with a selection of Royde & Tucker hinges, in accordance with recommendations given in this report without detracting from the overall performance of the doorset.

The range of hinges covered in this proposal is as follows (dimensions given in Annex A):

:

References	Description	Fire Resistance
		Up to 240 mins
H102/103/ 104/1250/1254	Butt Hinges	Yes
H210-300	Concealed fixing Butt Hinge	Yes
H207/208/209/ 210	Concealed Bearing Template Hinges	Yes
H101/126/201/ 202/203/206	Lift Off Hinges	Yes
H1252/1254-A/ 1254-B/ 1254-5/1256/ 1258/H102-A/ H102-B	Butt Hinges	Yes

The hinge that has been subject to previous fire testing is the H207.

Basic Test Evidence

The fire test evidence is provided by the test reports referenced WARRES No. 136052, WARRES No. 136053, CFR1009301, CFR1110131, Chilt/RF13172 and WF No. 345331 which are described briefly in the supporting data section of this report. The reports describe full scale fire resistance tests carried out in accordance with EN 1634-1:2000/2008/2014 (as appropriate at the time of the test).

WARRES No. 136052

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Both doorsets had overall dimensions of 2097mm high x 989mm wide and incorporated door leaves of overall dimensions 2057mm high x 920mm wide x 44mm thick.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

Doorset A included a door leaf incorporating a flaxboard core, softwood stiles and rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a softwood door frame via 3No. Royde & Tucker H1250 mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind the blade fixed to the door leaf only. The door frame included a nominally 15mm wide x 4mm thick Lorient Polyproducts Limited intumescent seal referenced 'LP 1504 OSS' self adhered into grooves within the frame.

Doorset B included a door leaf incorporating a softwood lamel core, softwood rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a MDF door frame via 3No. Royde & Tucker H105 mild steel hinges. The door frame included a nominally 10mm wide x 4mm thick Raven Seals Limited intumescent seal referenced 'RP 1004F/Seal Brown 8500'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and an 'RP8Si' drop seal was included within the threshold of the door leaf.

WARRES No. 136053

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Both doorsets had overall dimensions of 2097mm high x 989mm wide and incorporated door leaves of overall dimensions 2057mm high x 920mm wide x 54mm thick.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

Doorset A included a door leaf incorporating a particleboard core, plywood facings and was lipped with hardwood on all four edges. The leaf was hung within a hardwood door frame via 3No. Royde & Tucker H1250 Mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind each blade. The door frame included two Raven Seals Limited intumescent seals nominally 10mm wide x 4mm thick referenced 'RP 1004' and 20mm wide x 4mm thick referenced 'RP 2004'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and a 'RP8Si' drop seal was included within the threshold of the door leaf.

Doorset B included a door leaf incorporating a flaxboard core, softwood stiles and rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a hardwood door frame via 3No. Royde & Tucker H105 Mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind each blade. The door frame included two Raven Seals Limited intumescent seals nominally 10mm x by 4 mm thick referenced 'RP 1004' and 20 mm wide x 4 mm thick referenced 'RP 2004'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and an 'RP8Si' drop seal was included within the threshold of the door leaf.

CFR1009301

For the purpose of the test the specimens were referenced as Left Hand Doorset and Right Hand Doorset. Only the right hand doorset is cited in support of this appraisal and was of an unequal width, double-leaf, single-acting configuration comprising two single-acting timber based door leaves hung within a Pine door frame. The doorset had overall nominal dimensions of 2253 mm high by 1296 mm wide and included door leaves nominally 2201 mm high by 826 mm wide by 44 mm thick and 2200 mm high by 375 mm wide by 45 mm thick. The wider leaf hand leaf was hung within the door frame on 3no.

Royde & Tucker H102-C swing clear hinges. The door leaf construction comprised a multi-layered chipboard core with Sapele hardwood lippings to all four edges.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

CFR1110131

For the purpose of the test the specimens were referenced as Left Hand Doorset and Right Hand Doorset. Only the right hand doorset is cited in support of this appraisal and was of a single-leaf, single-acting configuration comprising a single-acting timber based door leaf hung within a hardwood door frame. The doorset had overall nominal dimensions of 2272 mm high by 1029 mm wide. The door leaf was nominally 2220 mm high by 934 mm wide by 54 mm thick. The leaf was hung within the door frame on 3no. Royde & Tucker H1356 concealed bearing butt hinges. The door leaf construction comprised a Multi-layered chipboard core with Sapele hardwood lippings to the top and both vertical edges.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

Chilt/RF13172

The tested assembly comprised a single-leaf, single-acting timber based door leaf mounted within an extruded aluminium door frame which in turn was mounted within a CCF 'Sektor 85' plasterboard faced partition assembly. The door leaf had overall nominal dimensions of 1980 mm high by 838 mm wide by 44 mm thick. The leaf was hung within the door frame on 2no. partition hinges identical to the H102P-FS-SZP. The door leaf comprised Multi-layered chipboard particle board, 44 mm thick, with hardwood lippings to all four edges.

The doorset was tested opening towards the furnace and was latched for the duration of the test.

WF No. 345331

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Only the details of Doorset B are relevant to the assessment.

Doorset B had overall nominal dimensions 2112 mm high by 1052 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 926 mm wide by 51 mm thick. The door leaf was uninsulated and formed from 1.2 mm Zintec skins and was hung within a mild steel frame on three Royde & Tucker hinges referenced Hi-Load 207.

The doorset was orientated such that it opened away from the furnace. The doorset was unlatched for the duration of the test.

CFR1811211

The test referenced CFR Test Report No. 1811211 briefly described in the supporting data section of this report, describes a test conducted in accordance with BS EN 1634-1: 2014 + A1:2018, which included two single-acting, single-leaf timber doorsets.

The test demonstrated the ability of the doorsets to provide 62 and 38 minutes integrity and insulation performances.

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.

- Where the test data is not the property of assessment report sponsor the original test sponsor has confirmed that this test data may still be used in support of this revalidation.

Assessed Performance

Hinges for Timber based doorsets

The range of hinges covered in this proposal is as follows:

- H100/102/103/104/1250/1254 Butt Hinges;
- H1356 3-knuckle butt hinge
- H210-300 Concealed fixing Butt Hinge;
- H207/208/209/210 Concealed Bearing Template Hinges;
- H086/087/101/105/107/126/201/202/203/206 Lift Off Hinges;
- H102-7 flush hinge and H102-C Swing Clear hinge.
- H200 – Butterfly hinge
- G4530/G4535/ G4540/G4545 3 knuckle concealed bearing hinge
- G4530-5/G4535-5/ G4540-5/G4545-5 3 knuckle concealed bearing hinge with dog bolt

The proposals require Royde & Tucker hinges, as detailed previously, to be fitted to previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) timber doorsets.

This appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of timber based fire doors, subject to the proposed doorset complying with the relevant details given in this report.

The timber doorset, including door frame, intumescent seals and associated ironmongery should have achieved 30 or 60 minutes integrity and, where applicable, insulation when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) to EN 1634-1.

For timber doorsets, the critical factor when changing from one hinge to another is the size of the hinge. A larger hinge may require more cellulosic material to be removed from the leaf and frame and therefore may provide an easier route for the passage of flames and/or hot gases leading to premature integrity failure. Similarly, the reduction in hinge material present will reduce the level of heat transfer from the hinge into the core of the door leaf.

Additionally, the amount of interruption to the intumescent seal specification at the door leaf to frame perimeter clearance gaps should be replicated or reduced from that originally specified for the tested doorset.

In the location of the hinges where the intumescent seal has been removed 'Interdens' of 1mm thickness shall be fitted behind each blade as the bedding material in order to reduce the level of degradation at the hinge positions, in a similar manner to the perimeter intumescent strips. Exceptions to this requirement are the H102-7, H102-C and H1356 hinges; specific details for those hinge models are detailed in the relevant sections later in this report.

The blade sizes of the tested hinges were as follows: H105 98mm long x 34mm wide (reducing to 22mm) x 3.0mm thick and H1250 125mm long x 44mm and 35mm wide x 3.2mm thick.

WARRES No. 136052

Door B incorporating the H105 hinges dropped within its frame after 20 minutes of test. At 27 minutes into the test, the door suffered an integrity failure. This was due to sustained flaming along the head of the door leaf to frame junction and was remote from the hinge area. The test continued for a further 10 minutes without any associated failure in the region of the hinges. The failure of the doorset could therefore be attributed to the intumescent strip along the head of 10mm wide x 4mm thick. We would recommend therefore a minimum requirement of a 15mm wide strip to be used for doorsets subject to EN 1634 tests and incorporating this hinge. The door performance equates to a 23% increase in overrun with respect to the performance of the hinges.

Doorset A, incorporating H1250 hinges, satisfied the failure criteria up to 36 minutes, at which time the doorset suffered sustained flaming at the base of the leading edge. Again this is remote from the hinge area. The test was terminated at 37 minutes.

WARRES No. 136053

At 33 minutes, both door leaves dropped within their frames. At 57 minutes into the test Door B, incorporating the H105 hinges, suffered an integrity failure. This was due to sustained flaming along the bottom leading edge and was remote from the hinge area. The test continued for a further 8 minutes without any associated failure in the region of the hinges. This equates to an 8% increase in overrun with respect to the performance of the hinges.

Doorset A, incorporating H1250 hinges, satisfied the failure criteria up to 65 minutes, at which time the doorset suffered sustained flaming at the top leading edge. Again this is remote from the hinge area. The test was terminated at 65 minutes.

The tested Butt Hinge H1250 is the largest of the Butt Hinge range with respect to blade area and thickness. The proposed range of hinges H100/2/3 and H1254 are all similar in basic design to that tested however they are each reduced in overall blade area. H104 has a further reduced blade width (29.5mm) compared to that tested (35mm and 44mm) however, the proposed hinge incorporates 5No. screw positions in line with that tested and as such is likely to maintain the mechanical fixing of the hinge to the leaf and frame.

Hinge H1250 had a blade thickness of 3.25mm. The proposed ranges listed all incorporate a reduction in material thickness with the exception of H1254 which is also 3.25mm. As the above proposed hinges will result in a reduction of core material removed and associated intumescent strip, their substitution to that tested is positively appraised for both 30 and 60 minutes.

Similarly, the proposed Concealed Bearing Template hinge range H208/9/10 are also positively appraised for 30 and 60 minutes as covered by H1250 and for the reasons stated above with respect to blade area and thickness. H207 has a blade width of 29.3mm, which is the smallest of this proposed range. On reduced width hinges, the position of the fixings with relation to the core is of importance. Here the fixings are marginally closer to the edge of the blade and hence the centre of the door edge. This would assist in the reduction of any burn through affecting the fixings of the hinge and so is positively appraised for 30 and 60 minutes. H210 has a very small increase in blade thickness at 3.3mm, however, this can be offset with the reduction in blade area and hence total material removed from the doorset is less than with the original hinge and so is not deemed to be detrimental to the performance.

The tested Lift Off Hinge was H105. The proposed hinges in this range, H101 and H126 have similar blade areas and thicknesses to H102 and H1254. Although the hinges are mechanically different in knuckle design to the Butt Hinge, this is not deemed to cause a detrimental effect on the overall performance and hence they can be positively appraised by reference to the H1250 Butt Hinge discussion above. Hinges H086 and H087 are essentially the same hinge, with identical blade dimensions. As with hinge H207, the blade dimensions are reduced and the fixings are marginally closer to the edge of the blade and hence the centre of the door edge. This would assist in the reduction of core material removal and in any burn through affecting the fixings of the hinge and so is positively appraised for 30 and 60 minutes.

The H206 Lift Off Hinge has the same overall dimensions as the H207 and consequently the same fixing positions. The H201 Lift Off Hinge has the same blade dimensions as the H101 and the same knuckle diameter as the H206. As per the reasons discussed above, these hinges are considered acceptable and are positively appraised for 30 and 60 minutes.

The tested H105 Lift Off Hinge comprises of two L-shaped opposing blades. Hinge H107 is similar in design to that tested, but incorporates a larger blade area with a width of 25mm expanding to 41mm x 110mm long compared to 22mm expanding to 35mm x 98mm long as tested. H107 also uses four rather than three screw fixings.

Although this is an increase in blade area this can be offset by the position and number of the fixings in relation to the core. The top and centre fixing positions are very similar to that tested with the remaining two positioned nearer the unexposed face of the door leaf were the hinge to be subjected to a fire test. It is likely therefore that, were burn through to occur in this region, the hinge would still be supported by the additional fixing and its position.

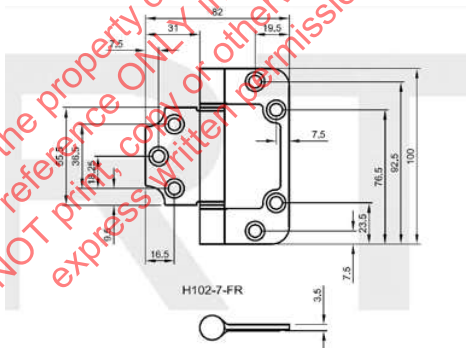
As noted earlier, the failure of the 30 minute doorset (using the H105 hinge) at 27 minutes could be attributed to the inclusion of 1No. intumescent strip along the head of 10mm-wide x 4mm-thick. We would recommend a minimum requirement of a 15mm-wide strip to be used for doorsets subject to EN 1634 tests.

Following the discussion and guidance above, the use of H107 Lift Off Hinges is positively appraised for use with 30 and 60 minutes doorsets.

For all the hinges discussed above shall incorporate 1 mm Interdens or graphite intumescent sheet material behind both blades. Additionally for 60 minute applications only the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

H102-7 Flush hinge – 30 minute applications

The H102-7 Flush hinge comprises a smaller inner blade for mounting to the door leaf edge and a larger outer blade which mounts to the door frame. In the closed position the inner blade sits within, or 'flush' to, the outer blade. Because of its design the H102-7 has a closed thickness of just 3.5 mm and so neither hinge requires mortising into the door leaf or frame to achieve the correct door to frame clearance gaps. Details of the hinge are shown below.



Eliminating the need to mortice the hinge blades into the leaf/frame means that the doorsets standard intumescent seals will not be interrupted. The installation of a hinge would normally necessitate the partial or complete removal of the perimeter intumescent seal at the position of the hinge blade, requiring the use of intumescent hinge bedding to reinstate the protection at that position.

It is proposed that the H102-7 hinges may be fitted to 30 minute timber based doorsets and that due to the design of the H102-7 hinge, the use of intumescent hinge bedding should not be required.

Before making any assessment of the requirement for intumescent protection, it is important to firstly consider the likely performance of the hinge in terms of its positive contribution toward the performance of 30 minute timber based doorsets.

As has been described earlier, the hinge model does not require mortising into either the door leaf edge or the frame and sits on the surface of both elements within the standard clearance gap between them.

To enable confidence to be taken in the proposed use of the H102-7 hinge on 30 minute timber based doorsets, a comparison with other hinges already included within this report can be made.

The H102-7 shares the same knuckle components as the standard H102 hinge previously assessed.

Whilst the H102-7 has fewer fixings that the H102, further comparison of the hinge can be made with the tested H105. The H105 has only three fixings per blade and has demonstrated its ability to contribute positively towards the performance of 30 minute doorsets (WFRC No. 136052) and 60 minute doorsets (WFRC No. 136053). The proposed H102-7 has three fixings to the door mounted blade and four fixings to the frame mounted blade and the fixing positions, relative the hinge knuckle, are very similar (within 1.5 mm) to those of the tested hinge.

Both hinges are capable of supporting a maximum adjusted door weight of 80kg and so are considered to be mechanically equal.

Due to the design of the H102-7 the hinge has both a lesser mass and surface area of metal within the leaf to frame interface. It is therefore considered that the use of intumescent bedding will not be required as the uninterrupted standard perimeter seal will continue to provide protection at the positions of the hinges.

To ensure that the hinge is fitted to doorsets having an appropriate specification, it shall be required that where the hinge is fitted to other, previously proven 30 minute doorsets, the doorset shall include perimeter intumescent seals with minimum dimensions of 15 mm by 4 mm and these shall be mounted within the door frame.

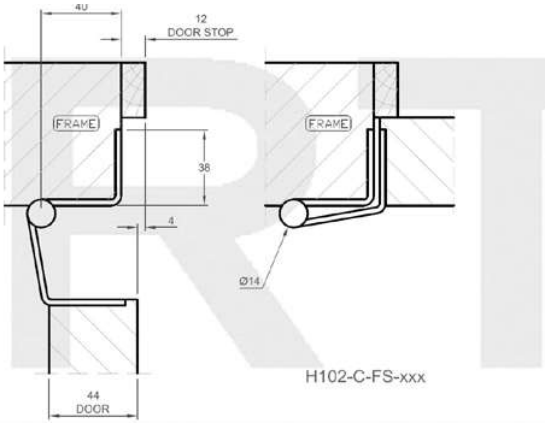
The H102-7 in both mild steel and stainless steel options is therefore positively appraised for use with previously proven timber based doorsets for 30 minute fire performances.

H102-C Swing clear hinge – 30 minute applications

The fire resistance test referenced CFR1009301 detailed previously describes a test conducted in accordance with EN 1634-1:2008 to two timber based doorsets. The doorset included and referenced as Right Hand doorset incorporated 'Penny Farthing' type unequal door leaves, the wider of which was hinge on three H102-C hinges.

The test continued for a period of 41 minutes before any instance of integrity failure occurred.

The H102-C is a cranked swing clear hinge which allows the door leaf to be opened such that it completely clears the door frame aperture. The hinge blades fix to the leaf edge and frame reveal as is typical of standard hinges; however, the blades are extended such that they return over the face of the door frame thereby moving the knuckle, and pivot point of the door, out from the frame aperture. Details of the hinge design are shown below.



The hinges fitted for the fire test were provided with a layer of Interdens Type 15 (1 mm) behind each hinge blade and an additional layer of the same intumescent was provided behind the blade return where it contacted the face of the door frame.

It is reasonable to conclude that, were the hinges to be fitted to other, timber based doorsets required to achieve a 30 minute integrity performance, the hinges would continue to make a positive contribution to the performance of the doorset, subject to the inclusion of the tested intumescent bedding behind the hinge blades and hinge blade return.

H1356 Concealed bearing butt hinge – 60 minute applications

The fire resistance test referenced CFR1110131 detailed previously describes a test conducted in accordance with EN 1634-1:2008 to two timber based doorsets. The doorset included and referenced as 'Right Hand doorset' was of a single-leaf, single-acting configuration whose door leaf was hung on three H1356 concealed bearing butt hinges. The hinges were provided with a bedding of 2 mm thick Interdens intumescent sheet material behind each hinge blade.

Initial integrity failure of the doorset occurred after a period of 38 minutes.

The observations contained in the report show that the initial integrity failure of the doorset was in an area remote from the position of the hinges and was not due to their presence or performance.

A further integrity failure occurred after a period of 54 minutes, but this again was not associated with the presence or performance of the hinges. No hinge related failure was recorded within the 69 minute duration of the test.

It is therefore reasonable to consider that, whilst the doorset did not achieve the required 60 minute performance, the contribution made by the H1356 hinges toward the performance of the doorset was maintained for the 69 minute duration of the test.

It is reasonable to conclude that, were the hinges to be fitted to other, previously proven timber based doorsets required to achieve a 60 minute performance, the hinges would continue to make a positive contribution to the performance of the doorset, subject to the inclusion of the 2 mm thick Interdens intumescent sheet material behind each hinge blade as per the tested hinges. Additionally the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

H210-300 – 60 minute applications

The H210-300 is a concealed fixing but hinge incorporating additional cover plates to conceal the hinge fixings. Assessment of this model is made by comparison with the tested H1250 hinge detailed previously. Whilst the H1250 is proven and assessed for both 30 and 60 minute applications, it is intended that the H210-300 shall only be used with 54 mm thick door leaves in 60 minute applications.

The proposed hinge has overall dimensions of 82 mm wide, by 114 mm high and is formed from 304 grade stainless steel. Like the H1250 the proposed hinge has a blade thickness of 3.25 mm and a 16 mm diameter knuckle. The hinge also incorporates stainless steel cover plates to the face of each blade, 1.2 mm thick, with a 2 mm thick Interdens sheet between the blade and cover. The resultant combined thickness requires a deeper mortice of 7.5 mm (including intumescent bedding) to be cut into the door leaf and frame for its installation.

Although narrower than the overall dimension of the H1250 hinge, the blade width of the proposed hinge at nominally 41 mm from tip to knuckle centre is comparable to that of the shorter blade of the H1250 which is 43 mm. The positions of the fixing screws relative to the hinge knuckle are also comparable.

The inclusion of the cover plates does introduce an additional mass of steel into the leaf to frame clearance gap, however, the inclusion of the 2 mm Interdens pads between the cover plates and blades, in addition to the 1 mm pads that will be fitted between the door/frame and the blades, is considered to sufficiently offset any detrimental effect of their inclusion. Additionally the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

Based on the above discussion, the use of the proposed H210-300 hinge with previously proven timber based doorsets required to provide a 60 minute performance is positively assessed.

Issue 11 – G45xx Series Hinges

The G45xx series are all Concealed Bearing 3-Knuckle hinges, some with dog bolts. The range proposed for use with 30 minute and 60 minute timber based doorsets is as follows:

G4530	Concealed Bearing Hinge 3-Knuckle 114 X 76 X 3.25 mm
G4535	Concealed Bearing Hinge 3-Knuckle 114 X 89 X 3.25 mm
G4540	Concealed Bearing Hinge 3-Knuckle 114 X 102 X 3.25 mm
G4545	Concealed Bearing Hinge 3-Knuckle 114 X 114 X 3.25 mm
G4530-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 76 X 3.25 mm
G4535-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 89 X 3.25 mm
G4540-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 102 X 3.25 mm
G4545-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 114 X 3.25 mm

The hinges incorporated in test CFR Report No. 1811211, were the GF4530 Concealed Bearing Hinge 3-Knuckle 114 X 76 X 3.25 mm. The blade sizes were 114 mm long x 31 mm wide x 3.25mm thick, with a 14 mm diameter pin. The hinge incorporated 4No. 4.7 mm dia. x 37 mm stainless steel screws and the minimum distance of fixing screws from exposed face of door leaf was 10.5 mm.

The right-hand doorset within CFR Report No. 1811211 was a 2352 mm high by 1094 mm wide unlatched single-action, single-leaf 30 minute doorset incorporating a door leaf of dimensions 2300 mm high by 1000 mm wide by 44 mm thick multi-layered chipboard door, lipped on the vertical edges with 6 mm hardwood, hung within a hardwood frame, incorporating a single 15 x 4 mm perimeter intumescent fire seal positioned centrally within the frame rebate.

The door was hung on 3No. GF4530 hinges, with Interdens sheet material of 1mm thickness fitted behind each blade. The hinge fully interrupted the perimeter intumescent. The doorset was installed such that the leaf opened towards the heating conditions of the test and was unlatched for the purpose of the test.

The doorset satisfied the failure criteria up to 38 minutes at which time a cotton pad failure occurred at the top lock edge. Further sustained flaming was recorded at 39 minutes at the top edge. The doorset was blanked off at 40 minutes to allow the testing of Doorset B to continue. No failure was reported associated with or coincident to the hinges.

The left-hand doorset within CFR Report No. 1811211 was a 2354 mm high by 1094 mm wide unlatched single-action, single-leaf 60 minute doorset incorporating a door leaf of dimensions 2300 mm high by 1000 mm wide by 55 mm thick multi-layered chipboard door, lipped on the vertical edges with 6 mm hardwood, hung within a hardwood frame, incorporating 2No. 15 x 4 mm perimeter intumescent fire seals within the frame rebate, positioned 7 mm and 32 mm from the exposed face.

The door was hung on 3No. GF4530 hinges, with Interdens sheet material of 1mm thickness fitted behind each blade. The hinge fully interrupted the first perimeter intumescent fire seal, however, the second remained uninterrupted. The doorset was installed such that the leaf opened towards the heating conditions of the test and was unlatched for the purpose of the test.

The doorset satisfied the failure criteria up to 62 minutes at which time a cotton pad failure occurred at the top lock edge. Further sustained flaming was recorded at 63 minutes at the top edge. The test was discontinued at 68 minutes; no failure was reported associated with or coincident to the hinges.

The above test is considered suitable justification for the basic design of the G45xx Series hinges, and the G4530 specifically for use with 30 minute and 60 minute timber based doorsets

The G4535 and G4540 are identical apart from an increased overall width of 89 mm and 102 mm. These are identical sizes to other hinges previously approved for use with 30 minute and 60 minute timber based doorsets, and therefore it reasonable to conclude that these hinges will perform in a similar manner.

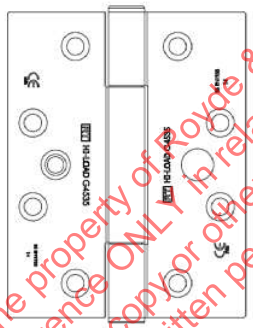
The G4535 and G4540 are therefore positively appraised for use with 30 minute and 60 minute timber based doorsets.

The G4530, G4535 and G4540 shall incorporate 1 mm Interdens or graphite intumescent sheet material behind both blades. Additionally for 60 minute applications only the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

The G4545 is identical to the G4530 apart from an increased overall width of 114 mm.

This size of hinge flap is similar to those previously proven on 60 minute timber based doorsets with the H1356 3-Knuckle Butt Hinge (125 X 112 X 4 mm). The G4545 is therefore approved on the same basis as this hinge, i.e. restricted to 60 minute doorsets only and subject to the inclusion of the 2 mm thick intumescent sheet material behind each hinge blade. Additionally the perimeter intumescent fire seal shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

The variants with a dogbolt require a steel stud to be fixed in the centre of one blade with an associated hole in the opposite blade:



This modification is not considered detrimental to the fire resistance performance, and may offer a very slight benefit with the stud supporting the hinge from dropping to a small a degree.

On this basis the G4530-5, G4535-5, G4540-5 and G4545-5 are positively appraised for use with 30 minute and 60 minute timber based doorsets.

The G4530-5, G4535-5, G4540-5 and G4545-5 shall incorporate 1 mm Interdens or graphite intumescent sheet material behind both blades. Additionally for 60 minute applications only the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

Issue 11 – H202 & H203 Hinges

The H202 and H203 are Concealed Bearing Lift-Off hinges, with the H203 incorporating a dog bolt. The range proposed for use with 30 minute and 60 minute timber based doorsets is as follows:

H202	Concealed Bearing Lift-Off Hinge 102 x 102 x 3.3 mm
H203	Concealed Bearing Lift-Off Hinge with dog bolt 102 x 102 x 3.3 mm

The H202 is identical to the previously approved H201 and H206 lift-off hinges, except with wider blades, i.e. 102 mm overall wide. This wider blade has been previously approved with the H209 fixed pin 3 knuckle hinge, it is therefore reasonable to conclude that the use of the same blade design on a lift-off hinge is likely to perform in a similar manner.

Again the H203 is identical but with the additional dog bolt detail discussed with the G45xx Series above, Consequently the same justification applies here.

On this basis the H202 and H203 are therefore positively appraised for use with 30 minute and 60 minute timber based doorsets.

The H202 and H203 shall incorporate 1 mm Interdens or graphite intumescent sheet material behind both blades. Additionally for 60 minute applications only the perimeter intumescent fire shall bypass the hinge in the frame rebate or door edge by a minimum of 4 mm.

Hinges for timber leaves metallic partition frames

The range of hinges covered in this proposal is as follows:

- H102-P-FS - Partition hinge
- H101-P-LR - Partition hinge
- H101-P-RR - Partition hinge

H102-P-FS partition hinge

The tested partition hinge, H102-P-FS has demonstrated its suitability and the evidence detailed in the fire test report Chilt/RF13172 is cited in support of this proposal. The tested assembly comprised a 44 mm thick Multi-layered chipboard particle board door leaf with 8 mm hardwood lippings to all four edges. The leaf was mounted within a 'Sektor 85' extruded aluminium door frame assembly referenced 'DGA8' which in turn was fitted within a plasterboard faced 'Sektor 85' partition assembly.

The partition hinge is a fixed pin butt hinge, but differs from a standard hinge in the way it fixes to the door frame, the blade fixed to the timber door leaf mounts in the normal way being morticed into the door leaf edge and fixed with countersunk head screws.

The frame mounted blade locates within the door frame via a slotted hole in the frame profile and is secured by three countersunk head screws fixed through the face of the frame, through corresponding holes in the hinge blade and secured back to a hardwood timber infill piece fitted into the back of the door frame profile.

The blades of the hinge are cranked giving a greater closed gap (nominally 5.75mm) to accommodate the alternative method of fixing within the door frame profile whilst maintaining the standard door leaf to frame gap.

The tested hinges were provided with intumescent protection behind the door mounted blade which comprised a 2 mm thickness of Interdens sheet and a 1 mm thickness of graphite sheet.

The test continued for a period of 36 minute before any instance of integrity failure occurred.

It can therefore be confidently concluded that the H102-P-FS hinge made a positive contribution of the towards the fire resistance performance of the doorset for in excess of the required 30 minute period.

The tested door leaf was mounted on two hinges at nominally 1510 mm centres. Where the hinges are fitted to taller doors, an additional hinge or hinges shall be fitted to ensure that the maximum centres of the test are not exceeded.

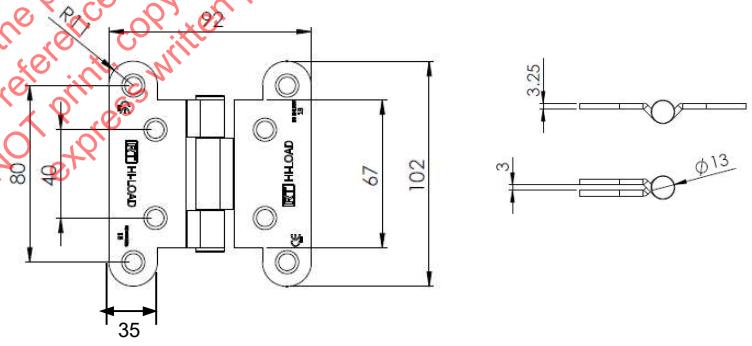
H101-P-LR/RR partition hinge

The proposed H101-P-LR/RR (left and right handed versions), is essentially a lift off version of the tested fixed pin H102-P-FS partition hinge. The dimensions of the hinge are essentially as the fix pin version with minor differences in blade width (max 2mm) between the two designs. Its method of fixing is identical to that of the tested hinge and whilst the lift off design has not been tested in this application, evidence as to the suitability of this different, lift off, design has already been establish by the standard H105 lift off hinge which is tested and appraised for applications of up to 30 minute fire resistance.

It can therefore be confidently concluded that the H101-P-LR/RR lift off partition hinges can be fitted to similar timber leaf/metallic framed doorset assemblies to that detailed in the test report Chilt/RF13172 without detracting from the required fire resistance performance of 30 minutes. Appraisal of the hinges is subject their installation with the same specification of intumescent protection as that included with the tested hinge model and detailed earlier in this report.

H200 'Butterfly' hinge

The H200 hinge comprises equal blades of 3.25 mm thickness with an overall blade size of 102 mm high x 35 mm wide. The hinges are shaped that a knuckle of only a 71 mm high is required. Details of the hinge are shown below.



The basic footprint of the hinge is supported by previous fire testing on the H105 lift-off hinge (98 x 31 x 3 mm blade retained by 3No. fixings) and H1250 butt hinge (114 x 35/44 x 3.25 mm blade retained by 5No. fixings). The hinge also incorporates the concealed bearings already considered within this report.

The blade shape require less material to be removed from the door and frame, the reduction in hinge material present will therefore reduce the level of heat transfer from the hinge into the core of the door leaf. Additionally reduced knuckle height and diameter represents a reduction in steel mass and consequently marginally reduces the potential for heat transfer into the blades of the hinges.

On reduced width hinges, the position of the fixings with relation to the core is of importance. Here the fixings are marginally further away from the knuckle of the hinge blade and hence the centre of the door edge. This would assist in the reduction of any burn through affecting the fixings of the hinge

As noted earlier, the failure of the 30 minute doorset in WF report No. 136052 (using the H105 hinge) at 27 minutes could be attributed to the inclusion of 1No. intumescent strip along the head of 10mm-wide x 4mm-thick. We would recommend a minimum requirement of a 15mm-wide strip to be used for doorsets subject to EN 1634 tests.

Additionally 1 mm thick Interdens material shall be incorporated behind each blade.

The H200 'Butterfly' hinge is therefore positively appraised for 30 and 60 minutes timber-based doorsets.

Hinges for steel based doorsets

The proposals require the following Royde & Tucker hinges be fitted to previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) steel based doorsets:

- H102/103/104/1250/1254 Butt Hinges;
- H207/208/209/210 Concealed Bearing Template Hinges;
- H101/126/201/202/203/206 Lift Off Hinges
- H1252/1254-A/1254-B/1254-5/1256/1258/102-A/H102-B Hinges.

This appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of steel based fire doors, subject to the proposed doorset complying with the relevant details given in this report.

The doorset, including door frame, intumescent seals (where applicable) and associated ironmongery should have achieved up to 240 minutes integrity and, where applicable, insulation when tested by a UKAS approved laboratory (or assessed by Warringtonfire) to EN 1634-1.

When considering an alternative hinge for use on a steel based doorset, the concerns regarding removal of door and frame material given to timber based doorsets are not relevant. Unlike timber based doorsets, steel doorsets are not prone charring or erosion and therefore entirely metal hinges do not introduce any additional risk of ignition or flaming. Therefore consideration of a change of hinge based on overall dimensions of the hinge is less critical and emphasis can be placed on the minimum size, loadbearing ability and fixity of the hinge to the doorset to ensure that the hinges are capable of supporting the door leaves for the required fire resistance period.

In terms of ensuring that the alternative hinge provides adequate support to the door leaf, it should be ensured that both the grade of hinge and number of hinges fitted is commensurate with the size and weight of the proposed door leaf.

Evidence as to the suitability of the proposed hinges is taken from the test report referenced WF No. 345331. Doorset B included in that test was of a typical uninsulated steel based construction and the door leaf was hung on

three Hi-Load H207 stainless steel hinges.

The doorset was tested in accordance with the requirements of BS EN 1634-1:2014 and achieved an integrity performance of 133 minutes, excluding cotton pad failure; which may be disregarded where a doorset is not designed to achieve an insulation performance.

The doorset satisfied the relevant integrity performance criteria of the Standard for the full 133 minute duration of the test.

The tested hinge model was selected on the basis that it is the smallest of the hinges to be considered and, therefore, its performance can be confidently considered to be representative of all of the proposed hinge models.

All of the proposed models listed previously are of a stainless steel construction, have been reviewed against the tested model and are considered suitable for use in the same steel based doorset application.

Whilst the test evidence cited in support of the application is taken from a test concluded after 133 minutes, test experience and the stipulation that all of the appraised models are of a stainless steel construction, provides a high level of confidence that the hinges would continue to contribute positively to the fire resistance performance of previously proven steel based doorsets for fire resistance periods of up to 240 minutes.

The proposed hinges are of a stainless steel construction, a material which has a melting point of between 1300°C and 1600°C, depending upon grade, significantly above the temperatures required within BS EN 1634-1, which at 240 minutes is 1153°C. Stainless steel also demonstrates a high resistance to oxidisation and is not prone to any significant degradation.

Following the discussion and guidance above, the use of the proposed hinges are positively appraised for use with steel based doorsets of up to 240 minutes integrity.

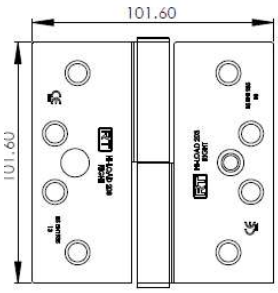
Issue 11 – H202 & H203 Hinges

The H202 and H203 are Concealed Bearing Lift-Off hinges, with the H203 incorporating a dog bolt. The range proposed for use with steel based doorsets of up to 240 minutes integrity as follows:

H202	Concealed Bearing Lift-Off Hinge 102 x 102 x 3.3 mm
H203	Concealed Bearing Lift-Off Hinge with dog bolt 102 x 102 x 3.3 mm

The H202 is identical to the previously approved H201 and H206 lift-off hinges, except with wider blades, i.e. 102 mm overall wide. This wider blade has been previously approved with the H209 fixed pin 3 knuckle hinge, it is therefore reasonable to conclude that the use of the same blade design on a lift-off hinge is likely to perform in a similar manner.

The H203 variant with a dogbolt requires a steel stud to be fixed in the centre of one blade with an associated hole in the opposite blade:



This modification is not considered detrimental to the fire resistance performance, and may offer a very slight benefit with the stud supporting the hinge from dropping to a small a degree.

On this basis the H202 and H203 are therefore positively appraised for use with steel based doorsets of up to 240 minutes integrity.

General Requirements And Scope

Stainless Steel and Mild Steel

The hinges tested are manufactured from stainless steel. It is proposed that identical hinges of mild steel also be approved as part of this evaluation.

The thermal properties of stainless steel differ from those for mild steel, including the rate and magnitude of thermal expansion and the thermal conductivity; however, these differences become less apparent at elevated temperatures, furthermore, are only relevant where large sections of steel are involved.

As hinges are relatively small metal items, which on timber/mineral-based doorsets will be insulated from the timber to some degree by an intumescent pad, the variation of the properties of the two metals is very unlikely to have a deleterious effect on the ability of the hinges to perform within a timber/mineral-based fire resisting doorset. The different materials are not considered to be detrimental for steel-based doorsets.

It is therefore reasonable to conclude that were the mild steel variants of the range of hinges to be fitted to other doorsets the hinges would continue to make a positive contribution to the performance of the timber/mineral-based and steel-based doorsets, subject to the inclusion of the tested intumescent bedding behind the hinge blades on timber/mineral-based doorsets.

Steel Grade

The stainless steel hinges are available in various grades of stainless steel. This is not considered as having a detrimental effect on the performance of the hinges with regards fire resistance, as grades have similar properties with regards melting point, strength, expansion and thermal transmittance.

Therefore the use of all grades of stainless steel is permitted.

Radiused Corners

It is proposed that the hinges incorporate either square or radiused corners. Hinges tested mainly incorporated square corners.

Hinges with radiused corners require less timber material to be removed from the door and frame and represents a slight reduction in metal, this reduces the potential for transferring heat into the door and frame and consequently the risk of flaming and erosion is also slightly reduced.

The use of hinges with either square or radiused corners is therefore approved.

Intumescent protection

In the location of the hinges where the intumescent seal has been removed intumescent sheet material shall be fitted behind each blade as described above for each hinge type, in order to reduce the level of degradation at the hinge positions, in a similar manner to the perimeter intumescent fire strips.

The tested protection was mainly Interdens mono ammonium phosphate-based sheet material, however, empirical data suggest that the performance of graphite intumescent sheet material is seen at least equal to the mono ammonium phosphate material tested in applications where is designed to protect insulated morticed steel hardware from the surrounding cellulosic material. Both materials begin expanding at approximately the same temperature 180-200°C, whilst the graphite material provides significantly more pressure.

Where graphite based intumescent sheet material is to be used in lieu of the mono ammonium phosphate tested, the proposed graphite-based intumescent sheet material, shall have suitable test evidence in the required thickness or less, with timber/mineral-based doorset of the required classification period, in conjunction with steel hinges of a minimum blade size of 32 mm x 100 mm.

Suitable doorsets

As this appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of timber based fire doors, the following points are given to enable the hinges to be used safely:

Timber based doorsets

The timber doorset, including door frame, intumescent seals and associated ironmongery should have achieved 30 or 60 minutes integrity and, where applicable, insulation when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) to BS EN 1634-1.

The critical aspects of the doorset construction are considered to be the material of the door frame, the leaf to frame clearance gaps and the lipping material. Attention should be paid to these details and these should not be amended from that previously fire tested. Where this information is not known the following minimum specification will be followed:

a) Door frame density - 460 kg/m³ (30 minutes), 650 kg/m^3 (60 minutes)

b) Door leaves shall have a minimum thickness of 44 mm for 30 minute applications and 54 mm for 60 minute applications.

c) Leaf to frame clearance gaps not to exceed 2.5 mm average and 3 mm maximum

d) Lipping density - 650 kg/m^3.

e) Partition hinges H102-P-FS and H101-P-LR/RR are approved for 30 minute applications only and shall be fitted to door leaves having a minimum thickness of 44 mm.

f) Lipping density of door leaves fitted with the partition hinges shall be 720kg/m^3.

g) The partition hinges shall only be fitted to doorsets which include the same 'Sector 85' door frame assembly as previously tested, unless suitable confirmatory evidence is available for a similar alternative frame assembly.

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

Steel based doorsets

This appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of steel based fire doors, subject to the proposed doorset complying with the relevant details given in this report.

The steel doorset, including door frame and associated ironmongery should have achieved the required integrity performance when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) to BS EN 1634-1.

For steel-based doorsets, the door leaves shall have a minimum thickness of 44 mm for up to 240 minute applications.

Conclusions

Timber based CERTIFIRE certificated doorsets or doorsets that have previously been successfully fire tested by a UKAS accredited laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) which have achieved either 30 or 60 minutes integrity and insulation as appropriate (subject to the individual hinge models' scope of appraised performance), may be fitted with a selection of Royde & Tucker hinges as discussed in this report, without detracting from the overall performance of the doorset.

Steel based doorsets that have previously been successfully fire tested by a UKAS accredited laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) which have achieved up to 240 minutes integrity (subject to the individual hinge models' scope of appraised performance), may be fitted with the referenced Royde & Tucker hinges as discussed in this report, without detracting from the overall performance of the doorset.

Review

It has been confirmed by Royde & Tucker Ltd that there have been no changes to the specification, materials or manufacturing location of the hinges considered in the original appraisal referenced WF Assessment Report No. 138907 issue 10 issued 11th November 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 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. 138907, 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 Royde & Tucker 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 and Royde & Tucker 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 July 2025, 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.

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.

Summary of Primary Supporting Data

WARRES No. 136052

A fire resistance test conducted in accordance with EN 1634-1: 2000 to two single-leaf, single-acting timber based doorsets.

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Both doorsets had overall dimensions of 2097mm high x 989mm wide and incorporated door leaves of overall dimensions 2057mm high x 920mm wide x 44mm thick.

Doorset A included a door leaf incorporating a flaxboard core, softwood stiles and rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a softwood door frame via 3No. Royde & Tucker H1250 mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind the blade fixed to the door leaf only.

Doorset B included a door leaf incorporating a softwood lamel core, softwood rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a MDF door frame via 3No. Royde & Tucker H105 mild steel hinges. The door frame included a nominally 10mm wide x 4mm thick Raven Seals Limited intumescent seal referenced 'RP 1004F/Seal Brown 8500'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and an 'RP8Si' drop seal was included within the threshold of the door leaf.

The specimens satisfied the test requirements for the following periods:

Test Results:		**Doorset A**	**Doorset B**
Integrity performance	Sustained flaming	36 minutes	27 minutes
	Gap gauge	37 minutes*	37 minutes*
	Cotton Pad	36 minutes	27 minutes
Insulation performance		36 minutes	27 minutes

*The test duration. The test was discontinued after a period of 37 minutes

Date of Test 28th November 2003

Test sponsor Royde & Tucker Ltd

WARRES No. 136053

A fire resistance test conducted in accordance with EN 1634-1: 2000 to two single-leaf, single-acting timber based doorsets.

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Both doorsets had overall dimensions of 2097mm high x 989mm wide and incorporated door leaves of overall dimensions 2057mm high x 920mm wide x 54mm thick.

Doorset A included a door leaf incorporating a particleboard core, plywood facings and was lipped with hardwood on all four edges. The leaf was hung within a hardwood door frame via 3No. Royde & Tucker H1250 Mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind each blade. The door frame included two Raven Seals Limited intumescent seals nominally 10mm wide x 4mm thick referenced 'RP 1004' and 20mm wide x 4mm thick referenced 'RP 2004'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and an 'RP8Si' drop seal was included within the threshold of the door leaf.

Doorset B included a door leaf incorporating a flaxboard core, softwood stiles and rails, MDF facings and was lipped with hardwood on all four edges. The leaf was hung within a hardwood door frame via 3No. Royde & Tucker H105 Mild steel hinges. The hinges were protected via 1 mm thick Interdens material behind each blade. The door frame included two Raven Seals Limited intumescent seals nominally 10mm x by 4 mm thick referenced 'RP 1004' and 20 mm wide x 4 mm thick referenced 'RP 2004'. An acoustic/smoke seal referenced 'RP120' was fitted within the door frame and an 'RP8Si' drop seal was included within the threshold of the door leaf.

Test Results:		**Doorset A**	**Doorset B**
Integrity performance	Sustained flaming	65 minutes	57 minutes
	Gap gauge	65 minutes*	57 minutes
	Cotton Pad	65 minutes	57 minutes
Insulation performance		65 minutes	57 minutes

*The test duration. The test was discontinued after a period of 65 minutes.

Date of Test 8th December 2003

Test sponsor Royde & Tucker Ltd

CFR1009301

A fire resistance test conducted in accordance with EN 1634-1: 2008 to two single-acting timber based doorsets.

For the purpose of the test the specimens were referenced as Left Hand Doorset and Right Hand Doorset. The right hand doorset was of an unequal width, double-leaf, single-acting configuration comprising two single-acting timber based door leaves hung within a Pine door frame. The doorset had overall nominal dimensions of 2253 mm high by 1296 mm wide and included door leaves nominally 2201 mm high by 826 mm wide by 44 mm thick and 2200 mm high by 375 mm wide by 45 mm thick. The wider leaf hand leaf was hung within the door frame on 3no. Royde & Tucker H102-C swing clear hinges. The door leaf construction comprised a Multi-layered chipboard core with Sapele hardwood lippings to all four edges.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

Test Results:		**Right Hand Doorset**
Integrity performance	Sustained flaming	42 minutes
	Gap gauge	51 minutes*
	Cotton Pad	41 minutes
Insulation performance		41 minutes

*The test duration. The test was discontinued after a period of 51 minutes.

Date of Test 30th September 2010

Test sponsor Royde & Tucker Ltd

CFR1110131

A fire resistance test conducted in accordance with EN 1634-1: 2008 to two single-acting timber based doorsets.

For the purpose of the test the specimens were referenced as Left Hand Doorset and Right Hand Doorset. Only the right hand doorset is cited in support of this appraisal and was of a single-leaf, single-acting configuration comprising a single-acting timber based door leaf hung within a hardwood door frame. The doorset had overall nominal dimensions of 2272 mm high by 1029 mm wide. The door leaf was nominally 2220 mm high by 934 mm wide by 54 mm thick. The leaf was hung within the door frame on 3no. Royde & Tucker H1356 concealed bearing butt hinges. The door leaf construction comprised a Multi-layered chipboard core with Sapele hardwood lippings to the top and both vertical edges.

Both doorsets were tested opening towards the furnace and were rendered unlatched for the duration of the test.

Test Results:		**Right Hand Doorset**
Integrity performance	Sustained flaming	54 minutes
	Gap gauge	69 minutes*
	Cotton Pad	38 minutes
Insulation performance		38 minutes

*The test duration. The test was discontinued after a period of 69 minutes.

Date of Test 13th October 2011

Test sponsor Royde & Tucker Ltd

Chilt/RF13172

A fire resistance test conducted in accordance with EN 1634-1: 2008 to a single-acting single-leaf, timber based doorset mounted within a plasterboard faced 'Sektor 85' partition assembly.

The doorset comprised a single-acting timber based door leaf hung within a Sektor 85 'DGA8' extruded aluminium profile door frame. The door leaf was nominally 1980 mm high by 838 mm wide by 44 mm thick. The leaf was hung within the door frame on 2no. Royde & Tucker 'H102-P-FS-SZP' partition butt hinges. The door leaf construction comprised a Multi-layered chipboard particleboard with 8 mm thick Oak hardwood lippings to all four edges.

The doorset was tested opening towards the furnace and was latched for the duration of the test.

Test Results:

Integrity performance	Sustained flaming	36 minutes
	Gap gauge	40 minutes*
	Cotton Pad	37 minutes
Insulation performance		35 minutes

*The test duration. The test was discontinued after a period of 40 minutes.

Date of Test 26th July 2013

Test sponsor Held in confidence – the test sponsor has given permission for the continued use of this test data.

WF No. 345331

A fire resistance test conducted in accordance with EN 1634-1: 2014 to two single-leaf, single-acting doorsets.

For the purpose of the test the specimens were referenced Doorset A and Doorset B. Only the information relating to Doorset B is relevant to the assessment.

Doorset B had overall nominal dimensions 2112 mm high by 1052 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 926 mm wide by 51 mm thick. The door leaf was uninsulated and formed from 1.2 mm Zintec skins and was hung within a mild steel frame on three Royde & Tucker hinges referenced Hi-Load 207. The door leaf also included front and back kick plates, two 6 mm Firelite vision panels and two Royde & Tucker letter plates referenced 'LP03-49-BSS' and a surface mounted door closer referenced TS 4000. The doorset was installed as such that it opened away from the heating conditions of the test.

The specimen satisfied the test requirements for the following periods:

Test Results:		**Doorset B**
Integrity performance	Sustained flaming	133 minutes*
	Gap gauge	133 minutes*
	Cotton Pad	40 minutes
Insulation performance	Doorset	9 minutes
	Glazing	2 minutes

*The test duration. The test was discontinued after a period of 133 minutes

Date of Test 3rd March 2015

Report Owner Royde & Tucker Ltd

WF No. 1811211 To determine the fire resistance performance of two single-acting, single-leaf doorsets incorporating various items of hardware in accordance with BS EN 1634-1: 2014 + A1:2018.

The left-hand doorsets had overall dimensions of 2354 mm high by 1094 mm wide incorporating a door leaf with overall dimensions 2300 mm high by 1000 mm wide by 55 mm thick. The door leaf was of a solid graduated density chipboard construction, with 6 mm hardwood lippings to the vertical edges and was hung within a hardwood frame. The doorset was installed so that it opened towards the heating conditions of the test and was unlatched for the duration of the test. The Doorset incorporated the following hinges:

Item Number	Description	Reference
6L	Concealed Bearing Hinge 3-Knuckle 114 X 76 X 3.25 mm	G4530-FS-BSS

The right-hand doorset had overall dimensions of 2352 mm high by 1094 mm wide incorporating a door leaf with overall dimensions 2300 mm high by 1000 mm wide by 44 mm thick. The door leaf was of a solid graduated density chipboard construction, with 6 mm hardwood lippings to the vertical edges and was hung within a softwood frame. The doorset was installed so that it opened towards the heating conditions of the test and was unlatched for the duration of the test. The Doorset incorporated the following hinges:

Item Number	Description / Location	Reference
4R	Concealed Bearing Hinge 3-Knuckle 114 X 76 X 3.25 mm	3043 – 2BB

	Doorset A	Doorset B
Sustained flaming	63 minutes	39 minutes
Gap gauge	68 minutes	40 minutes[#]
Cotton Pad	62 minutes	38 minutes
Insulation	62 minutes	38 minutes

The test was discontinued after 68 minutes.

[#]The specimen was blanked off to allow the test to continue.

A representative of Warrington Certification sample selected the doorset hardware on the 16th October 2018

Date of Test : 21st November 2018

Test sponsor : Royde & Tucker Ltd

Declaration by Royde & Tucker 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 11)

R Anning* - Principal Certification Engineer

Approved (Issue 11)

M. Tolan* - Senior Certification Engineer

* For and on behalf of Warringtonfire.

Report Issued: 20th April 2004

Issue 2: Inclusion of H206 Lift off hinge 13/05/08

Issue 3: Inclusion of H201 Lift off hinge 16/11/09

Issue 4: Inclusion of H102-7 Lift off hinge, H102-C Swing Clear hinge, H1356 concealed bearing hinge and the H210-300 concealed fixing butt hinge 29/06/12

Issue 5: Correction of report validity date 22/08/12

Issue 6: Inclusion of H102-P-FS and H101-P-LR/RR partition hinges and associated test evidence. 01-11-13

Issue 7: Inclusion of steel doors scope of approval and associated test evidence. 01-07-15

Issue 8: Inclusion of H200 'Butterfly' hinge (24th March 2016)

Issue 9: Addition of H211 and type 400 hinges (16th September 2016)

Issue 10: All modifications made in issue 9 removed (11th November 2016)

Issue 11: Review/revalidation, K9 hinges removed and G45xx series, H202 and H203 hinges added (11th June 2020)

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

Annex A – Approved Hinges

Code	Description	EN1935 grade	Fire Resistance		
			Timber 30	Timber 60	Steel 240
H100	3-Knuckle Butt Hinge 100 X 94 X 2.64 mm	12	Yes	Yes	No
H102	3-Knuckle Butt Hinge 100 X 88 X 3 mm	13	Yes	Yes	Yes
H103	3-Knuckle Butt Hinge 100 X 86 X 2.64 mm	12	Yes	Yes	Yes
H104	3-Knuckle Butt Hinge 100 X 75 X 2.3 mm	11	Yes	Yes	Yes
H1250	3-Knuckle Butt Hinge 125 X 102 X 3.25 mm	12	Yes	Yes	Yes
H1252	3-Knuckle Butt Hinge 125 X 120 X 3.25 mm	12	No	No	Yes
H1254	3-Knuckle Butt Hinge 125 X 93 X 3.25 mm	12	Yes	Yes	Yes
H1254-A	3-Knuckle Projection Butt Hinge - 20mm Projection 125 x 111 x 3.25 mm	13	No	No	Yes
H1254-B	3-Knuckle Projection Butt Hinge - 29mm Projection 125 x 129 x 3.25 mm	12	No	No	Yes
H1254-5	3-Knuckle Butt Hinge with dog bolt 125 X 93 X 3.25 mm	13	No	No	Yes
HH1256	3-Knuckle Butt Hinge 125 X 111 X 3.25 mm	12	No	No	Yes
H1258	3-Knuckle Butt Hinge 125 X 129 X 3.25 mm	12	No	No	Yes
H1356	3-Knuckle Butt Hinge 125 X 112 X 4 mm	14	No	Yes	No
H210-300	Concealed Fixing 3-Knuckle Butt Hinge 114 X 82 X 6.5 mm	13	No	Yes	No
H207	Concealed Bearing Hinge 3-Knuckle 102 X 76 X 3 mm	13	Yes	Yes	Yes
H208	Concealed Bearing Hinge 3-Knuckle 102 X 89 X 3 mm	13	Yes	Yes	Yes
H209	Concealed Bearing Hinge 3-Knuckle 102 X 102 X 3 mm	13	Yes	Yes	Yes
H210	Concealed Bearing Hinge 3-Knuckle 114 X 102 X 3.3 mm	13	Yes	Yes	Yes
H086	Lift-Off hinge 85 x 76 x 2.64 mm	10	Yes	Yes	No
H087	Lift-off hinge 85 x 76 x 2.64 mm	10	Yes	Yes	No
H101	Lift-Off Hinge 100 x 88 x 3 mm	11	Yes	Yes	Yes
H105	Lift-Off Hinge 98 x 82 x 3 mm	11	Yes	Yes	No
H107	Lift-Off Hinge 110 x 98 x 3.2 mm	13	Yes	Yes	No
H126	Lift-Off Hinge 125 x 93 x 3.2 mm	12	Yes	Yes	Yes
H201	Concealed Bearing Lift-Off Hinge 100 X 88 x 3 mm	11	Yes	Yes	Yes
H206	Concealed Bearing Lift-Off Hinge 102 x 76 x 3 mm	11	Yes	Yes	Yes
H102-7	Interleaf Hinge 100 x 82 x 3 mm	13	Yes	No	No
H102-C	Cranked Swing clear hinge 100 x 124 x 3 mm	11	Yes	No	No
H200	Butterfly Hinge 102 x 92 x 3.25 mm	13	Yes	Yes	No

Annex A – Approved Hinges – Cont'd

Code	Description	EN1935 grade	Fire Resistance		
			Timber 30	Timber 60	Steel 240
H102-P-FS	Partition Hinge 100 x 86.5 x 3 mm	13	Yes	No	No
H101-P-LR	Partition Hinge 100 x 85 x 3 mm	11	Yes	No	No
H101-P-RR	Partition Hinge size 100 x 85 x 3 mm	11	Yes	No	No
H102-A	3-Knuckle Projection Butt Hinge - 20mm Projection 100 X 106 X 3 mm	13	No	No	Yes
H102-B	3-Knuckle Projection Butt Hinge - 29mm Projection 100 X 124 X 3 mm	13	No	No	Yes
H202	Concealed Bearing Lift-Off Hinge 102 x 102 x 3.3 mm	13	Yes	Yes	Yes
H203	Concealed Bearing Lift-Off Hinge with dog bolt 102 x 102 x 3.3 mm	13	Yes	Yes	Yes
G4530	Concealed Bearing Hinge 3-Knuckle 114 X 76 X 3.25 mm	14	Yes	Yes	No
G4535	Concealed Bearing Hinge 3-Knuckle 114 X 89 X 3.25 mm	14	Yes	Yes	No
G4540	Concealed Bearing Hinge 3-Knuckle 114 X 102 X 3.25 mm	14	Yes	Yes	No
G4545	Concealed Bearing Hinge 3-Knuckle 114 X 114 X 3.25 mm	14	No	Yes	No
G4530-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 76 X 3.25 mm	14	Yes	Yes	No
G4535-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 89 X 3.25 mm	14	Yes	Yes	No
G4540-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 102 X 3.25 mm	14	Yes	Yes	No
G4545-5	Concealed Bearing Hinge 3-Knuckle with dog bolt 114 X 114 X 3.25 mm	14	No	Yes	No