



Kiwa Fire Safety Compliance  
Ground Floor, Suite A, Building 2  
Bear Brook Office Park  
Walton Street  
Aylesbury, Buckinghamshire  
HP21 7GQ

+44 (0)1844 275500  
[uk.firesafety@kiwa.com](mailto:uk.firesafety@kiwa.com)  
[www.kiwa.co.uk](http://www.kiwa.co.uk)

Ref: Smith & Brown Cabinetmakers /280825 / #25855

Email to: [j.benali@smithandbrowncabinetmakers.com](mailto:j.benali@smithandbrowncabinetmakers.com)

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Smith & Brown Cabinetmakers  
Unit 1D The High Cross Centre  
Fountayne Road, London  
N15 4QN

### **Heritage Doors Assemblies for Tottenham House Stables**

This is a technical review of the data collected by Smith & Brown Cabinetmakers for the heritage doors proposed to be retained at Tottenham House Stables. The conclusions of this review are based on the report issued to Kiwa Fire Safety Compliance by Smith & Brown Cabinetmakers on 5<sup>th</sup> August 2025, by email. The report provides key information regarding two door assemblies (Ref: DG15/2 and DG19), both of which are single panelled doors. The intention of the review is to establish whether the door leaves would provide the required fire resistance performance of 30 minutes if they were tested in accordance with BS 476: Part 22: 1987.

Whilst the findings of this report are based on the information for specific door leaves (Ref: DG15/2 and DG19), it is understood that there are other door leaves being proposed to be reinstated, that are of a similar condition and specification to these. In such instances the general principles applied by Kiwa Fire Safety Compliance in coming to the conclusions of this report remain valid, but the particular details in our comments may vary.

Both leaves have been identified to be constructed from Pine. This includes the stiles and rails as well as the panels supported between them. The condition of the Pine, including density and moisture content is unknown, but general guidance documents available to Kiwa Fire Safety Compliance state that the density of Pine would be approximately 430-590kg/m<sup>3</sup>, depending on the species. The char rate for timber such as this can generally be taken to be 0.9mm/min. The thickness of the panels in the door leaves are 14mm. Under the simplest of exposure (one-dimension) conditions (a flat surface, free of defects) the char rate would mean that the panel would be expected to burn through after 15 minutes. This time would be expected to be quicker at areas where cracks are present, the material is not consistent through its depth (such as the locations around the mortice and tenon joints at the panel perimeter) and where corners are present (such as where the panel meets the perimeter beading). The exact impact of these aspects is unknown, but their individual and combined effect will be negative to the potential fire resistance performance of the leaf. Please note that the reference to 15 minutes does not indicate that this is the expected fire resistance performance of the whole leaf. Kiwa Fire Safety Compliance would expect the fire resistance to be less than this based on the analysis above and the following sections. It is not possible to give an accurate value for expected fire resistance performance.

As material is exposed to the conditions of a fire resistance test, they will char and erode. Once this has been allowed to occur for long enough flaming at the unexposed face can occur, this is a failure of integrity for the leaf.

The integrity failure criteria in the BS 476: Part 20/22 test standard are sustained flaming (as referenced above), the use of a gap gauge and cotton pad.

The use of gap gauges and cotton pads are to measure the extent of hot gases reaching the unexposed face of the test specimen. Whilst this can occur anywhere on a timber door specimen, the prominent locations for these failures to occur is at the perimeter of the door leaf. The reason for this is that the distortion of the leaf caused by exposure to the heating conditions of the test cause the exposed face to shrink and the leaf bow towards the furnace. Where excessive movement occurs the leaf can deflect away from the frame enough to cause a gap through which flammable gases can pass through. These gaps are most common at the top corner at the leading edge of the leaf.

The doors referenced herein are not fitted with intumescent seals at their perimeter edge. Intumescent seals would be expected to expand and fill the gaps between the leaf edge and the frame, reducing the chances of a cotton pad or gap gauge failure. The omission of intumescent seals from the doors referenced herein will have a negative impact on the expected fire resistance performance of the door assemblies.

Some hardware used in fire door assemblies are considered essential. These are items of hardware that have been included in a fire resistance test and that were proven to have a positive contribution to the fire resistance performance of the assembly. Typically, these are items that will help to keep the door closed and in position for as long as possible such as latches, hinges and closers. None of the hardware on the doors that are the subject of this analysis will have any sort of evidence of their behaviour in a fire resistance test and therefore cannot be relied upon to have a positive contribution on the assemblies' fire resistance. Furthermore, the hinges are bolted through the complete thickness of the leaf and would be a mechanism of heat transfer to the unexposed face of the door, increasing the likelihood of flaming at the unexposed face.

The report by Smith & Brown Cabinetmakers identifies the items and type of hardware only but it has not been possible to establish the amount of door leaf material has been removed. Excessive rebates in the door leaf around hardware can exacerbate the cause of integrity failure.

The door leaves that have been surveyed by Smith & Brown Cabinetmakers both show significant defects in the material that will have a negative impact on the fire resistance performance. This will include but not be limited to increased rate of burn through and door leaf deflection. Any remedial work is not possible to assess without fire resistance test data. Kiwa Fire Safety Compliance would advise that the use of timber in fire door assemblies shall be in accordance with BS EN 942: 2007.

No information has been provided on the door frames and whether these are to be newly installed or reinstated. The door frame forms a critical element in the door assembly and therefore any shortfall in the specification or condition of the door frame and linear gap sealing method will have a negative impact on the fire resistance performance of the complete assembly.

In conclusion, it is the evaluation of Kiwa Fire Safety Compliance that the door leaves, referenced herein, would not achieve the required fire resistance performance of 30 minutes, should they be tested in accordance with BS 476: Part 22: 1987. Based on the specification and condition of the door leaves Kiwa Fire Safety Compliance would not expect remedial details/measures to provide enough confidence to be able to provide a Technical Assessment Report for these door assemblies.

We trust that this letter is of assistance at this time.

Yours faithfully



Will Lightfoot

BEng (Hons) MSc C Build.E MCABE AIFireE

Associate Director of Product Evaluation

Kiwa Fire Safety Compliance (*part of the Kiwa UK Group*)