

# IFC ENGINEERING ASSESSMENT PRINCIPLES

## TECHNICAL NOTE 1: ORIENTATION OF TIMBER FIRE DOOR TESTING

August 2018

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**IFC are very proud of our reputation as one of the world's leading fire engineering solution providers; trusted by many of the world's most prestigious construction firms, architects and estate owners.**

Our holistic approach to fire safety ensures clients always receive bespoke best value advice and quality assurance for the lifetime of their projects. Indeed, we have lent our expertise to developments right across the built environment spectrum, from the necessities of Residential structures, Education and Healthcare to the more iconic buildings of the past, such as historic palaces.

Our highly experienced Fire Engineers, Fire safety professionals, CAD/BIM designers and commercial team work in partnership with our clients to deliver an independent and unique top-to-toe fire safety consultancy service.

Our expertise includes fire strategy, computational modelling, product engineering assessments, fire risk management, as well as the design of tailored passive and active fire safety systems. We ensure that your buildings not only comply with relevant legislation, but also provide a safe environment for the occupants and users in the most cost-effective manner, that does not compromise the fabric of the building or the architectural integrity of the designs.

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This technical note is issued to provide comment upon the guidance for fire doors in Approved Document B (ADB) of the Building Regulations England, which states that *"...the requirement is for test exposure from each side of the door separately"*. ADB refers to fire resistance testing in accordance with BS476: Part 22: 1987 or BS EN 1634-1: 2014.

Peter Jackman, the founder of International Fire Consultants Ltd (IFC), was lead author of BS476: Part 22: 1987, and he included the statement that *"doorsets and shutter assemblies shall be tested from both sides, i.e. two specimens, unless the doorset or shutter assembly, including the hardware, is entirely symmetrical, or unless the weakest direction can be clearly identified, or unless the doorset or shutter assembly is known to be exposed to a fully developed fire from one side only ..."*.



IFC has established principles, based upon extensive experience of testing timber doors for fire resistance in both directions of exposure. These principles define which orientation is 'the weakest direction' for timber doors installed in timber or metal frames.

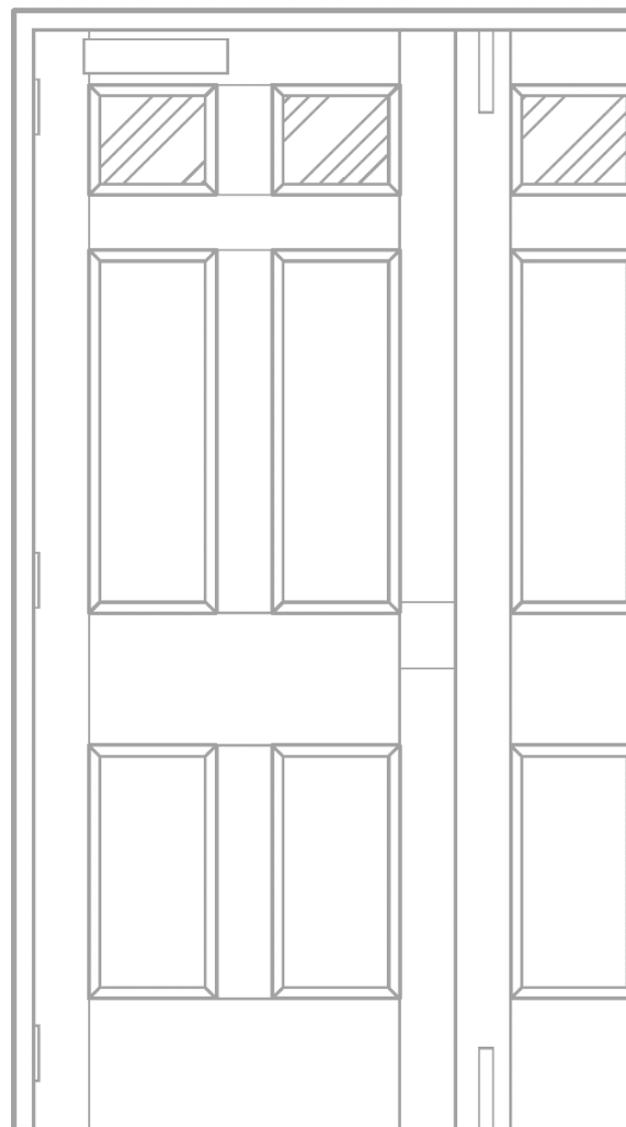


When testing timber, hinged or pivoted, door assemblies, it is the opinion of IFC that the weakest direction is that where specimens are installed with the leaf opening in towards the furnace. Testing in this orientation is therefore incorporated into Engineering Assessments to cover doors opening in the opposite direction.

The primary reason for this is that as the timber is heated under fire resistance test conditions, it shrinks due to thermal dehydration from the exposed cell structure. Following exposure to the extreme heat experienced in a fire resistance test, the exposed face will shrink resulting in bowing of the door with the top and bottom corners of the leaf distorting towards the furnace. The bowing of the door leaf will create the potential for the passage of hot furnace gases around the leaf perimeter, often leading to premature integrity failure under the criteria of the test standard.

When tested in the opposite orientation, bowing of the leaf will generally be arrested by the stops, hence why this is the less onerous direction.

It is the opinion of IFC that if symmetrical, hinged or pivoted, timber door assemblies are tested with the leaf opening into the furnace, the result can also be applied to door assemblies, of the same symmetrical design, with the leaf opening away from the furnace. The principle is only applicable when the door construction, and any features within the door leaf, such as glazing, are symmetrical.



This principle has been endorsed in the European Standard for fire resistance testing of doors, shutters and openable windows, **EN 1634-1: 2014(+A1: 2018)**. Table 2 in Clause 13.4 lists the 'direction for testing' for different door types. For a hinged or pivoted, timber leaf in timber or metal frames, Table 2 states that a door assembly tested with the leaf opening towards the furnace, will cover the same door assemblies when installed to open in the opposite direction.

Whilst **BS476: Part 22: 1987** and **EN 1634-1: 2014** each have an independent methodology, it is evident that the principles long established within IFC are echoed within the more recent **EN 1634-1 Standard**. This only serves to confirm the suitability of the principle that has been applied by IFC within Engineering Assessments.

*Version 1.0 – August 2018*