



AUGUST 2018

IFC ENGINEERING ASSESSMENT PRINCIPLES

TECHNICAL NOTE 1: ORIENTATION OF TIMBER FIRE DOOR TESTING

About us | International Fire Consultants Ltd

International Fire Consultants is part of the IFC Group. The company is a specialist engineering consultancy delivering independent, honest and practical fire safety solutions to professionals across the built environment. The sought after fire safety advice protects life, preserves property and safeguards business continuity.

International Fire Consultants was established in 1985 to provide high quality and impartial technical expertise concerning fire safety. Since then, our team of highly qualified Fire Engineers and Fire Safety Professionals have continued to deliver robust, innovative and cost-effective fire safety solutions, including Assessments, Designs and Inspections.

International Fire Consultants are able to lend their insight and practical expertise for: Fire Safety Engineering, Fire Risk Management, Product Evaluation, Fire Life Safety Systems, Expert Witness Testimony and Fire Protection Training, to developments of all sizes and complexities; from residential, education and healthcare structures to sporting venues, airports and iconic heritage buildings, such as historical royal palaces and stately homes.

Recognised internationally as the go-to professionals in all aspects of fire safety, International Fire Consultants is one of the world's leading fire engineering and solution providers, trusted by many of the most prestigious construction firms, architects, manufacturers and estate owners.

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.

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.

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.

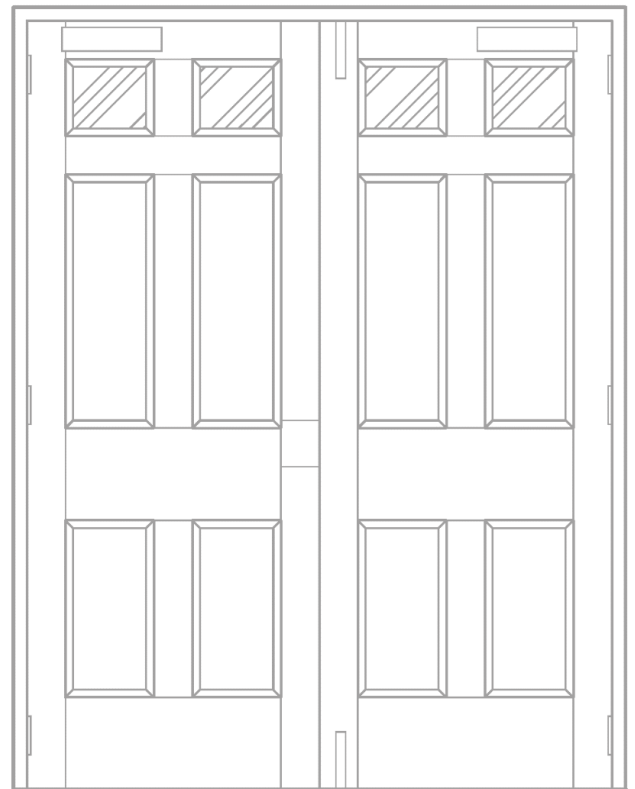


Illustration of Timber Fire Door

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.

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