



Vulnerability analysis [continued]

Existing doors often have perimeter gaps which exceed 4mm. Many of the existing doors have deformed to varying degrees over time. In some cases they have warped. This means that they do not have consistent perimeter gaps or frame contact. Therefore it is not possible to install intumescent strips and smoke seals in such a way that they can be depended on to perform to prescribed standards.

Note 05: Frame Perimeter

Existing door frames have a tolerance gap around them, between the compartment wall structure and the outer edge of the frame. This gap is, in many cases, covered only by a timber architrave. It is therefore unable to resist the passage of fire, smoke and gas and compromises the integrity of the entire doorway.

Remedial measures

Fire upgrades

The majority of existing doors require upgrade to a 30 minute fire resistance although there are several instances where doors require 60 minute fire resistance. All existing doors have been surveyed, with detailed photographs and measurements taken.

Methods of upgrading these existing doors have been considered. This includes the application of clear fireproof paint, and bonded intumescent cards along with other intumescent seals.

The use of intumescent paint is not a particularly good long term solution. This is because the finish can be readily removed during redecoration or damaged thus compromising the fire strategy in the future. It is also of limited use on glazed doors where the main issue is the quantity and type of glazing.

An applied intumescent card is a more robust option but this would change the appearance of the door unless veneers are applied carefully. It cannot be used on mouldings and profiled timber. Therefore, it is not a practical solution for the doors on this project.

Glazed doors would require the installation of secondary fireproof / insulating glazing if the existing panels were to be retained. This would entail the removal of existing framed copper glazing and changing the existing rebate depth and stop beads before reinstallation with intumescent bedding to the units. It is not possible to increase the depth of the rebates as they are already slight (see 8020-05). The glass units could be replaced with replicas but this does not solve issues with the door structure.

In all cases International Fire Consultants (a fire door specialist) have advised that the upgrade of the existing doors would achieve, at best, a maximum of 20 minutes fire resistance due to the nature of the door construction and their use of animal-based glues which have a poor fire resistance.

Gaps between the existing doors and the door liner / frame are comparatively large in some cases making it difficult to form a discreet and effective smoke seal with even, friction free contact around the perimeter. Use of standard intumescent strip, which works with a typical 3 mm +/- 1 mm gap, would not be effective in many cases.

Vulnerability analysis of existing fire doors.

Note 01: Construction

Door joints are held together with animal glue which melts at a low temperature. When exposed to fire the glue will melt quickly increasing the likelihood of rapid structural failure. Even moderate failure of the glued joints could result in distortion of the doors, thus increasing the gaps between the door and frame, rendering any fire resisting properties ineffectual.

Note 02: Glazing

Many of the existing doors possess large areas of glazing. This existing glazing is not suitable for resisting fire for the following reasons:

- It is not fire resistant or insulating glass. This means that it will break at temperatures between 150 - 200°C.
- Many of the glazing units are composed of small panes of glass supported in a lightweight copper frame. The thin copper strips are likely to expand and distort under extremes of temperature thus contributing to glass breaking and structural failure of the unit.
- The glazed units are loosely fixed into the mullions and transoms of the door with thin battens. They have gaps around them and are not bedded with sealant. Thus fire, smoke and high temperature gas can pass through the unsealed gap between the glazed unit and the timber supports.
- Once the glazing breaks, this allows significantly more air to pass through the door which will feed the fire.
- The mullions and transoms of the glazed door will burn quickly due to their large exposed surface area and comparatively small cross sectional area.

Note 03: Raised and fielded panels

Panels are fixed into a groove routed into the inner edge of the supporting members. At this point the the panel is at its thinnest and most vulnerable to fire penetration. Further, the existing panel is not sealed into the groove with an intumescent sealant. Therefore fire, smoke and high temperature gas can pass through the unsealed gap.

Note 04: Seals

To form an effective fire barrier, doors must fit in their frames such that a consistent gap is formed which does not exceed 4mm. If the gap is greater than this, the intumescent fire seal (which expands on contact with fire) will not fill the perimeter gap, which will in turn compromise the door's fire resistance.

For doors which also require perimeter smoke seals, a consistent contact seal is of critical importance to resist the passage of smoke effectively. [Continued...]

<div>Notes:</div> <div>Drawings are based on survey data and may not accurately represent what is physically present.</div> <div>Do not scale from this drawing. All dimensions are to be verified on site before proceeding with the work.</div> <div>All dimensions are in millimeters unless noted otherwise.</div> <div>Purcell shall be notified in writing of any discrepancies.</div>	<div><div>- This existing door is DEG.70-8</div><div>- Details of Existing Door Type E01A</div></div>	<div>P0018 Dec 2019</div>					<div>CLIENTLendlease</div>	<div>DRAWING TITLEFire Vulnerability Analysis</div>	<div>JOB NUMBER238664</div>	<div><div></div><div>PURCELL</div></div>		
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