

CURTAIN CALL:  
HOW INSULATED FIRE CURTAINS  
MARK A NEW AGE OF PASSIVE  
FIRE PROTECTION



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## INTRODUCTION

Recent high profile fires including the Grenfell tower disaster in London and Lacrosse fire in Melbourne have made the global construction industry acutely aware of the importance of adequate fire protection. Though both fires were ultimately attributed to flammable aluminium composite cladding, they highlight the importance of incorporating precautions against fire in all building elements. Passive fire protection has become extremely topical, with builders and designers investigating new, innovative means of achieving fire protection.

However, the specification of fire protection measures is complicated by two key factors. Firstly, the Australian regulatory landscape for fire resistance is more stringent than ever in terms of standards and codes; and secondly, architecture is increasingly complex in terms of both smaller footprints – as high density developments become the norm – and more storeys. In this whitepaper, we explore how insulated fire curtains can be used to address the two above concerns and provide passive fire protection in a range of applications.

## THE NEED FOR FIRE PROTECTION

Unlike active fire protection measures such as detectors and sprinklers, passive fire protection is concerned with containing – rather than extinguishing – flames. It is crucial to ensuring safety in the case of a fire event, and is particularly important in proximity to an egress path such as a door, stairs, or corridor. Adequate fire safety measures prevent flames and smoke from reaching the egress path, allowing occupants to evacuate safely in the case of a fire event.

The need for passive fire protection is enhanced by the presence of combustibles including boxes, furniture, and paper or potential ignition sources such as machinery.

### FIRE RESISTANCE LEVEL (FRL)

Fire resistance level (FRL) is defined in A1.1 General Provisions of the Building Code of Australia (BCA) as the grading period in minutes for structural adequacy, integrity, and insulation.<sup>1</sup> Performance is assessed in accordance with Specification A2.3 of the BCA and given in the format “-/-/-”.

For example, an FRL of - / 120 / - means that there is no requirement for structural adequacy or insulation, and that the element will maintain its integrity for 120 minutes in the event of fire. Similarly, an FRL of - / 120 / 120 describes an element with no requirement for structural adequacy but which will maintain its integrity and insulation properties for 120 minutes in a fire event.

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## CURRENT SOLUTIONS

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The five main methods of passive fire protection in Australia are as follows.

**Uninsulated fire curtains** are cost effective and well suited to the open floor plans that have become the norm in commercial and residential projects alike, but offer no protection against radiant heat.

**Insulated walls** compartmentalise flames and reduce radiant heat, but can be costly and cumbersome.

**Fire rated glass** is a viable solution where extensive glazing is desired, but is often very heavy and prohibitively expensive.

**Fire doors** compartmentalise flames and quell radiant heat, with the added benefit of easy operation in the event of fire. However, they are significantly limited in terms of available dimensions.

**Sprinklers and drenchers** may cause damage to contents of a space in the event of their use and may be impractical to operate, significantly undermining their efficiency.

### INSULATED FIRE CURTAINS

Akin to their uninsulated counterparts, insulated fire curtains are ideal for open plans and provide an effective means of compartmentalising flames in a fire event. Unlike uninsulated fire curtains, however, they are impregnated with an intumescent coating that expands and provides insulation against radiant heat when exposed to flames.

Insulated fire curtains are specifically designed to minimise levels of radiant heat on the 'safe' side that is not exposed to flames, creating an egress path safe from smoke, flames, and heat. A high performance, economical passive fire protection solution, insulated fire curtains also offer outstanding practicality in that they do not take up space when not in operation.

## APPLICATIONS OF INSULATED FIRE CURTAINS

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### WHERE SPRINKLERS CANNOT BE USED

Though sprinklers are one of the most widely used and recognisable means of fire protection, they are not suitable for every environment. There is ongoing lobbying to introduce sprinkler requirements in buildings less than 25 metres high;<sup>ii</sup> presently, Specification E1.5 of the BCA only requires sprinklers if any part of the building has an effective height of greater than 25 metres.

Additionally, certain circumstances render the use of sprinklers impractical. For example, in sensitive environments such as art galleries and museums, the building contents must be protected from water damage and sprinklers are thus undesirable.

In other scenarios, a tenuous urban or rural water supply may be unsuitable for providing water flow for effective sprinkler design. Increasing numbers of water supplies are now reaching capacity as a direct result of increased population density, while other locations simply do not have a water supply reliable enough for sprinklers to offer adequate, consistent protection.

### PROTECTING GLASS

As the popularity of glass facades and extensive, full-height glazing endures across the commercial and residential sectors, there remains a need to protect glass from flames and radiant heat. During a fire event, glass panes expand and reach a temperature exceeding that of the surrounding building plane. This temperature differential and thermal expansion often result in cracking,<sup>iii</sup> which is both dangerous and costly and inconvenient to repair.

Options for protecting glass are limited to drencher systems – which wet the whole glazing surface and frame unit to protect it from radiant heat – and fire rated glazing, which is often restrictively expensive. Fire curtains pose an economic, practical alternative to both.

## MULTI-RESIDENTIAL APARTMENTS

In Australia, the multi-level apartment sector is in the throes of significant growth, expanding by 18.9% in 2017-18 alone.<sup>iv</sup> With this growth comes a host of new challenges including decreasing floor spaces and increasingly complex floor plans and egress paths.

Designers and engineers must now carefully lay out floors to ensure that fire stairs are separated from lift chambers, bearing in mind that smoke ascending via lift chambers is one of the biggest problems and health risks in high-rise fire events.

Fire/smoke curtains compartmentalise space on multi-occupancy floor plates and separate fire stairs from lift or egress conditions where the plan may not otherwise permit this. The curtains are also ideal for allowing compartmentalisation in the case of open plan penthouse apartments where lift doors open directly into the apartment.

## BASEMENT CAR PARKS

The Deemed to Satisfy provision of Specification E1.5 of the BCA requires all enclosed car parks with spaces for 40 or more cars to be sprinklered. The specification encompasses car parks such as those found in multi-residential apartments and offices, and also requires such car parks to be capable of segmentation into compartments in the event of a fire. Insulated fire curtains are an effective means of achieving this while offering the added element of protection against radiant heat.

## UNDERSTANDING THE REGULATIONS

There are three ways to meet the performance requirements set out in the BCA.

- **Deemed to Satisfy (DtS)** solutions meet all the prescriptive DtS provisions in the relevant part of the BCA.
- **Performance solutions** are tailored solutions that meet the intended objective of the performance requirements.
- **Combined** solutions are a hybrid of DtS and performance solutions.

Changes made to BCA Specification A2 - Acceptance of Design and Construction in 2016 mean that DtS solutions must be capable of achieving FRL performance without any active suppression devices such as sprinklers or drencher systems. Under this new system, non-fire rated glass, for example, can never be DtS as it cannot achieve FRL without a drencher solution.

As it stands, the testing methodologies for DtS solutions in Specification A2.3 of the BCA do not reflect the actual performance of insulated curtains. As such, insulated fire curtains are not a DtS solution, but can be a central part of a performance solution. It should be noted that fire curtains, sprinklers, and doors must all be regularly inspected and tested in accordance with AS1851 – Maintenance of fire protection systems and equipment.





## INSULATED FIRE CURTAINS BY GREENE FIRE

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For nearly 20 years, Greene Fire has led the Australian market in fire and smoke curtain solutions. Their flagship Concertina product is the most popular fire curtain solution in Australia, and embodies the ongoing Greene Fire commitment to high quality, complete solutions. The Greene Fire range of high performance fire protection products is bolstered by excellent customer service and support by knowledgeable, experienced staff who understand the complexities of fire performance requirements in Australia.

**FireMaster® Plus** is an insulated fire curtain featuring a unique intumescent fabric developed and produced by Coopers Fire. The curtain remains retracted within a lightweight, compact head box until it is automatically activated by a fire alarm signal, at which time it deploys at a controlled speed of 0.06 to 0.15 metres per second. Once activated, the FireMaster® Plus can completely enclose openings up to 7.5m tall and 30m wide, creating a compartment that is free of smoke and fire. It can also reduce radiant heat to under 2.5 kilowatts per metre over 15 minutes, allowing safe escape in close proximity to a 600°C fire.

When exposed to heat, the intumescent graphite flake coating of FireMaster® Plus expands to over 20 times its original thickness, providing an FRL of - / 120 / 120 without sprinklers, drenchers, or heavy substrates. As a consequence, 120 minutes of insulation are achieved when measured 50mm from the face of the curtain.

## REFERENCES

- <sup>i</sup> National Construction Code Series. Vol. 1. Canberra, ACT: Australian Building Codes Board, 2015.p 23
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- <sup>iv</sup> AI Group. "Construction on track for solid upturn." November 14, 2017. Accessed March 14, 2018. <https://www.aigroup.com.au/policy-and-research/mediacentre/releases/Construction-Outlook-Nov2017/>.

