



The burning issue:
Is fire-resistant glazing
up to the challenge?



Foreword



Steve Bond

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A major trend in building design over the past 100 years has been the emergence of glass as one of the most commonly used building materials.

From office blocks and retail buildings to residential and even functional industrial buildings, the use of glass to partition internal spaces has grown rapidly, and this is only looking set to continue.

In order to preserve the safety of our buildings and those who use them, it is essential that glazing design and installation technology reflects the increased use of glass as a functional construction component.

Technological developments have transformed the ability of glazing to withstand fire for extended periods of time, as well as delivering larger pane sizes and clarity along with enhanced protection.

However, these advances have created new challenges in terms of guaranteeing the quality of fire-resistant glazing across the market, and ensuring the right products are always used in the appropriate settings.

This report looks at the current state of play in the way glass is used in fire-sensitive areas of buildings, and the issues which need to be addressed.

It questions whether the current regulations are fit for purpose and asks whether we could do more to ensure glazing delivers the right level of protection against fire.

I'd like to take this opportunity to thank our contributors. I hope you find this a useful snapshot of a developing part of the glazing market playing an essential role in the built environment around the world.

Fire protection isn't just about averting disaster, but also avoiding disruption



Tim Kempster

Managing director, Wrightstyle

Wrightstyle is a leading supplier of steel glazing systems, specialising in fire and ballistics resistance.

Ensuring a building's occupants and contents are protected from the risk of fire begins on the drawing board, and consideration and mitigation of hazards must be baked into the design process from the word go.

To properly address the risks, we recommend taking the widest possible view – looking beyond the letter of the regulations to consider all possible hazards facing a building's occupants, structure, resources and continuity of operations. Only once this detailed assessment has been carried out can the design team make well-informed decisions on acceptable risk levels and cost-effectiveness.

Our view is that compliance with fire regulations, while important and necessary, is not sufficient. They deal only with protecting human safety and, while this is clearly by far the most important concern, it is not the only one. Even in the best-case scenario, any fire will be disruptive. Often it can shut down a business, perhaps permanently, or destroy information vital to continued operations. A robust fire risk assessment should therefore be about more than the practicalities of regulatory compliance.

It is crucial to ask business continuity questions like 'if fire does happen, can we quickly move manufacturing elsewhere?' and 'if we lose data on-site, is all that business-critical information also held elsewhere?'

Modern glazing systems can play a central role in the resulting mitigation strategy by providing complete protection against convection, conduction and radiation – the three means by which fire spreads through a building. It can be used as curtain walling, internal doors, floors or fire screens, creating a barrier for up to three hours, giving more than enough time for a safe evacuation and for emergency services to contain the blaze effectively, minimising losses.

However, the designated responsible person for a project must also ensure that the fire glass and its framing systems have proven compatibility. That means insisting on comprehensive fire test certification that covers both elements because, in a fire, the glass and its frame have to function together to prevent the spread of fire, smoke or toxic gases. If one fails, both fail, with potentially catastrophic consequences.





The importance of regulation



The Glass and Glazing Federation represents companies who make, supply or fit glass and glass-related products in the UK and internationally. Its Fire-Resistant Glazing Group (FRGG) is committed to advancing best practice in manufacturing, testing, specifying and installing fire-resistant glazed systems.

Steve Rice

Director of technical affairs, The Glass and Glazing Federation

Those in the world of fire safety have a lot of respect for the regulatory guidance in Approved Document B (AD B). Its prime purpose is to save lives, and on that score, its record speaks for itself: in 2015 there were 265 fatalities resulting from building fires, 93 per cent in dwellings, compared with 967 in 1981, a steady decline in total deaths of around 20 per year.

However, the same cannot be said of property and business losses. The cost of fire to the UK economy is around £3.5bn per year. That includes £1bn recorded insurance costs and an estimated further £3bn due to uninsured and hidden losses. The number of recorded fires has fallen, but the average losses per fire have risen and evidence indicates that as a result there has been little significant reduction in the overall cost to the economy.

There is now recognition of the need for improvement in AD B to bring it more in step with current practice in building design, construction and product supply. The guidance in AD B has been successful in establishing a firm foundation for fire safety design using fire-resisting constructions, and it is important that any changes stay true to the core principles of fire separation and compartmentation.

Fit for purpose?

There needs to be greater attention to the wider risks fire presents in modern buildings, both to property and people. That particularly concerns glass. AD B is rooted in history, but modern building design, technologies and practices have moved on. We now have bigger and more complex buildings, using more glass in larger assemblies.

Modern buildings are using more and more glass, in larger sizes, in a wider variety of challenging applications. Risk-based decisions – where the approach is based on the probability of any given event occurring, rather than an attempt to achieve absolute protection – are now commonplace.

While this is a practical necessity, it tends to shave levels of confidence off safety margins. Given that budgets often dominate decision making on projects, it does not necessarily lead to the best outcomes in terms of assured fire protection.

Currently, the emphasis of AD B is on getting people out of a building before conditions become untenable and structural stability is threatened. AD B considers integrity performance to be sufficient, and that has led to an emphasis on integrity in UK fire safety design, with only minimal use of insulation as something of an afterthought.

But better property protection and higher levels of assured protection for individuals in more complex modern buildings requires more and better protection from glazing systems – in particular, a greater use of insulation together with integrity, also with longer protection times.

Integrity and insulation fire-resisting glass types have been developed to suit a wide range of applications and have achieved proven performance based on extensive testing. The guidance should better recognise these advances.

Moving with the times

The developments in technology have been significant across the board and there is now more product choice and more levels of performance to exploit.

This is particularly illustrated by high-performing clear and laminated integrity glass products, such as modified toughened glass and laminated types that also provide a good level of fire-resistance insulation. For example, it is now possible to specify these products with 30 minutes' integrity and 15 minutes' insulation.

Regulations need to keep in touch with what they regulate and, despite its success, AD B is lagging behind. A makeover is required. But, in the name of fire safety, it must maintain what is good and build on it to better reflect modern practices and technologies.



Fire-resistance regulations – the basics

The basic fire-resistance levels called for in glass positioned in different areas within a building are laid out in the Building Regulations. However, detailed guidance is contained in another Government publication – Approved Document B (AD B).

The minimum times specified in AD B denote how long the partitions must maintain structural integrity, as well as integrity against smoke and insulation against heat, so any glass integrated into the partition must deliver to meet these criteria.

The purpose of these minimum requirements is to ensure that fire is contained within the room or space of origin, and that the spread of smoke and flames is inhibited by compartmentation. This will ensure that occupants, and the emergency services, have time to evacuate safely.

The requirements vary according to the purpose and height of the building, and these are summarised below.

The partitions separating compartments or rooms must achieve specific periods of fire-resistance, and so the fire-resistance performance of any glazing in such walls is crucial.

Please note that these are only the minimum standards, and the precautions required to provide the right level of fire protection in any given building must be informed by the overall fire-protection strategy. Ultimate responsibility for ensuring the designed-in safety precautions support the strategy is held by the named 'responsible person' for the project.

Basic fire-resistance requirements

Minimum periods of fire-resistance (minutes) of glazed partition walls in a:

Purpose of building	Basement storey		Ground or upper storey			
	Depth (m)		Height (m) of floor above ground level			
	More than 10	Not more than 10	Not more than 5	Not more than 18	Not more than 30	More than 30
Residential	90	60	30*	60	90	120**
Office	90	60	30*	60	90	120**
Shop and commercial	90	60	60	60	90	120**
Assembly and recreation	90	60	60	60	90	120**
Industrial	120	90	60	90	120	120**

* Increased to 60 minutes for compartment walls separating different buildings

** Only permitted where the building is fitted throughout with an automatic sprinkler system

Fire-resistant glazing installation

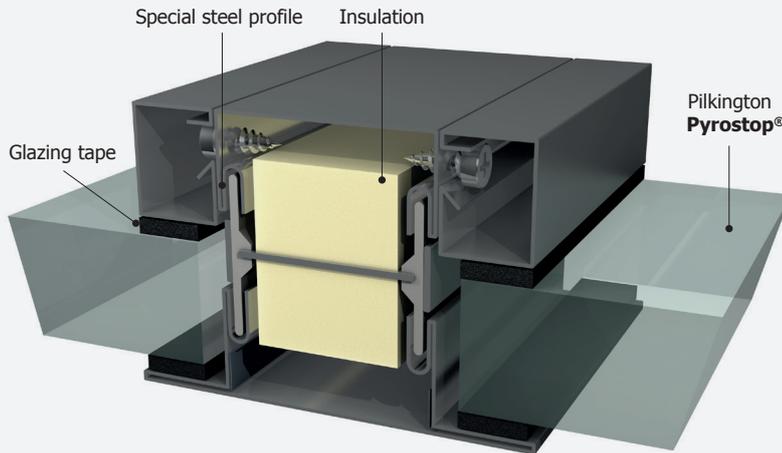
Fire-resistant glazing will only perform as intended when it is correctly installed with appropriate glazing materials in a suitable fire-resistant frame.

For all fire-resistant glazing, the whole assembly must act as an integral system – that means the glass together with the frame, beads, bead fixings, glazing materials and frame fixings all working together with absolute compatibility. The most common framing materials are timber or steel. However, other materials such as aluminium, concrete and gypsum board have been used in fire-resistant glazed screens.

Two examples of typical glazing details – one a wooden frame and one steel – are shown in the diagrams [below].

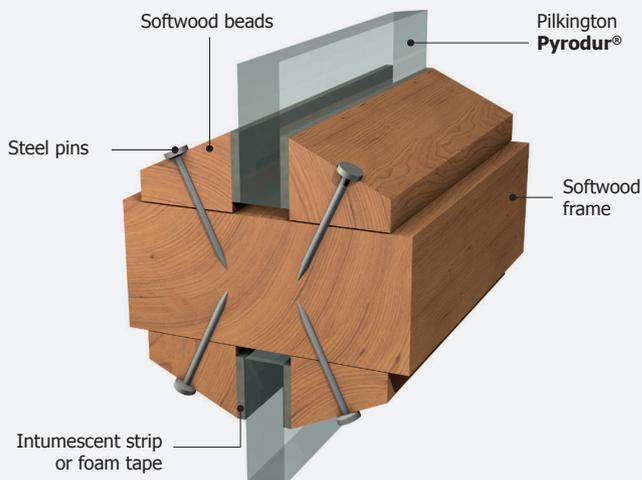
There are many factors that determine the right choice of framing system and glass for any given scenario. The size of the sheets of glazing, whether the application is internal or external, and whether it is protecting key entry and exit points, for example, all have a bearing on what system should be used. It is therefore essential to establish all of the details before the system can be specified.

Pilkington **Pyrostop**® in Multi-pane Steel Screen



Integrity: 60 minutes | Insulation: 60 minutes

Pilkington **Pyrodur**® in Softwood Timber Screen



Integrity: 30 minutes | Insulation: 15 minutes



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