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## Fire-resistant glazed systems



### 1 Types of product

Fire-resistant glass must only be used as part of a fire-resistant glazed system. Such a system includes the glass, together with the glazing seal, beads, bead fixings, the frame and the fixings of the frame to the surrounding structure. All these components must be compatible under fire conditions and the full system must be tested as an integrated assembly. It is never acceptable to mix-and-match components from different fire-resistant glazed systems.

Fire-resistant glazed systems provide the basic performance requirements set out in Approved Document B (ADB) to the Building Regulations in England and Wales, that is, integrity (or non-insulating), or integrity and insulation. Integrity means that the glazed system holds back the fire without the transfer of flame or hot gases. Integrity and insulation includes the integrity performance plus restriction of heat transfer from the fire, according to strictly defined measured surface temperature criteria.

It is also common practice within the glazing industry to use the term partial insulation for some integrity glazed systems. This is not an official classification but a way of describing the achievement in part of the insulation criteria by some, mainly interlayer, fire-resistant glazings. This could be, for example, for a limited period of time less than the minimum required 30 minute classification period recommended by ADB. This approach serves to differentiate between different integrity glazings.

Some integrity glazed systems are also able to satisfy the requirements given under BS EN 13501: *Fire classification of construction products and building elements* for the radiant heat classification category under the new European classification scheme (symbol W, maximum radiant heat  $15\text{kW/m}^2$ ). This category is not called up by ADB. Also, the radiant heat classification should not be taken as being directly

equivalent to the description of partial insulation.

A variety of different technologies can be used for fire-resistant glass. For integrity performance, these include wired glass (where the wire mesh is within the body of the glass), modified toughened soda lime glass, glass ceramic, toughened borosilicate and fire-resistant plastic interlayer laminate (either clear or wired). Both integrity and integrity with insulation performance are provided by gel-filled units and special intumescent laminates.

In all cases, specific performance details should be obtained directly from the manufacturer, since performance differs from one glazed system to another. Performance generalisations must not be made or assumed.

#### Applications

Fire-resistant glazed systems play a major role within modern fire protection strategies for buildings, because of the central importance of glass in modern transparent architecture.

This role includes compartmentation and fire separation, the protection of escape and access corridors, fire doors and glazed façades designed to limit external fire spread from floor to floor or from building to building. Applications can be in vertical, horizontal or inclined orientations and can cover the following situations:

- internal and external fire doors (as vision panels or all-glass doors)
- interior partitions and compartment walls
- roofs and floors or ceilings
- façade glazing
- escape and access corridors
- stairways, lobbies and enclosures to protected shafts



Fire test sequence of an intumescent glass

## 2 Types of system

A variety of different systems are approved to give a choice of styles and layouts to suit the varied required applications. Framing materials include a number of suitable materials, such as timber, steel, aluminium and composite frames which may involve a combination of materials (such as calcium silicate boards with metal covers). Each system must be separately approved, based on test evidence for that particular system. This applies to individual proprietary systems and to different applications. For example, approval of door systems should be treated separately from approval for partitions or walls.

So-called frameless, or butt-jointed, systems are also available where any

framing is reduced to the minimum of top and bottom supporting cills. In these systems, the vertical joints typically contain a fire-rated seal compound. Similar systems are also available with vertical minimal width profiles used to cover the vertical joint, allowing decorative effects to be applied on the profile.

In all cases, the application will be governed by the system approval, which will define details such as frame dimensions, overall assembly size, fenestration arrangements and applicable glass pane sizes. Substitutions of components in approved systems must not be made without appropriate approval by an accredited approval body.

## 3 Installation issues

A fire-resistant glazed system should always be installed as approved, including all components and fixing details as specified, otherwise the performance in case of fire may not be as intended. Glazing seals should be used exactly as specified with the particular fire-resistant glass being installed. Standard glazing seals must not be used. The glazing seal must also be applied to both sides of the fire-resistant glass.

Specific details can be critical in terms of achieving the approved level of performance. For example, the fixings for timber beads should be of a certain specified gauge thickness, a defined length and fixed at a specified angle so that the glass will be held in place by the fixings, should the timber beads burn away.

The degree of cover provided by the beads on the glass edges can also be critical. This applies, in particular, to modified toughened soda lime glass types, where a maximum degree of edge cover (typically 10mm maximum) is recommended. Other glass types are less sensitive to framing condition and are more tolerant of surface damage during handling (such as Georgian wired glass and intumescent laminates).

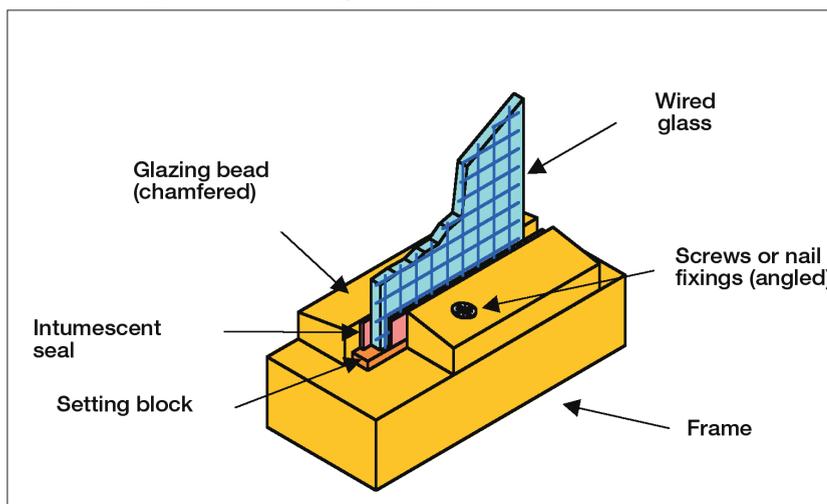
The Glass and Glazing Federation (GGF) recommends that the installer should be able to demonstrate an adequate knowledge of the key competencies and requirements for handling and installing fire-resistant glazed systems. One way to demonstrate this knowledge is through the GGF-supported FIRAS certification scheme for installers.

### Marking of the glass

A fire-resistant glass should be clearly marked with an indelible and permanent mark, which should, as a minimum, show the glass product name, the supplier and the safety impact rating, if required, according to BS 6206: 1981: *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*. This applies, in particular, to clear fire-resistant glass types that cannot easily be distinguished from non-fire-rated clear glass types.

This mark should be visible and legible after installation so that it can be readily checked, for example, during fire safety risk assessments. If this is not the case, then the supplier should be asked to confirm the product and its marking. The marking on the glass, however, should not necessarily be taken as applying to the system as a whole. The performance of the system has to be confirmed by reference to the original documentation provided on installation.

Example of a typical fire-resistant glazed system



## 4 Maintenance issues

A regular visual inspection should be undertaken as part of the normal routine of fire safety risk assessment inspections carried out for the building.

The fire-resistant glazed system should be inspected to check that the original installation has not been damaged, that the beads and fixings are still firmly in place, and that the glazing seals have not deteriorated or been removed, even in part. The surface condition (for example, surface damage) should be checked for modified toughened soda lime glass, since this can influence performance.

If the condition of the fire-resistant glazed system is found to be unsatisfactory then the system should ideally be replaced as an entity according to the original specification.

## 5 Standards, regulations and guidance

The application of fire-resistant glazed systems in England and Wales is covered by the guidance given in Part B of Schedule 1 to the Building Regulations (or its equivalent in Scotland and Northern Ireland). The Regulations require fire-resistance performance to be determined by reference to either national tests, such as the BS 476: *Fire tests on building materials and structures* series, or European tests, such as BS EN 1364: *Fire resistance tests for non-loadbearing elements*, or BS EN 1634: *Fire resistance tests for door and shutter assemblies* (reference Amendment 2002 to ADB). The following may be used separately to support a performance claim:

- a test report from an United Kingdom Accreditation Service approved test facility
- an assessment report (which should reference relevant test information)
- a certificate provided by a third-party product certification scheme
- a certificate and declaration of conformity (used only with a CE mark under the requirements of the European Construction Products Directive)
- a classification report (reference BS EN 13501: *Fire classification of construction products and building elements*)
- an extended application report (reference EN standards, in preparation)

In the case of reliance on assessment reports, only those assessments carried out according to the criteria defined by the Passive Fire Protection Federation should be used and the supplier should be asked to confirm that this is the case.

The use of glazing in hazardous locations must comply with Approved Document N1 of the Building Regulations in England and Wales (or its equivalent in Scotland and Northern Ireland). The impact safety performance for glass used in critical locations should be determined according to BS 6206: 1981: *Specification for the impact safety performance of flat safety glass and safety plastics for use in buildings* and be marked accordingly with the applicable class.

Additional guidance on the application of fire-resistant glazed systems for the protection of property can be obtained from *Design guide for the fire protection of buildings*, published by the Fire Protection Association on behalf of the Association of British Insurers.

Further details on the use of fire-resistant glazed systems can also be obtained from the GGF's data sheet 2.8, and from its more detailed *Best Practice Guide for Fire Resistant Glass*, which will be published early in 2005.

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