

## Further information

More information on laminated glass can be found in the following GGF publications:

- ◆ Laminated Glass and Laminated Safety Glass Data Sheet 4.11
- ◆ Toughened glass safety and strength
- ◆ The Right Glazing in the Right Place
- ◆ Marking of Installed Safety Glass
- ◆ Visual Quality Standard for Installed Insulating Glass Units Constructed from Flat Transparent Glass Data Sheet 4.10
- ◆ Security of Window and Door Products Data Sheet 6.3
- ◆ Non-Vertical Overhead Glazing Data Sheet 7.1
- ◆ Guide to the Selection of Glass and Plastic Glazing Sheet Material for Overhead Glazing in Conservatories Data Sheet 5.7.1

## The Glass and Glazing Federation

The Glass and Glazing Federation (GGF) is the recognised leading authority for employers and companies within the flat glass, glazing, home improvement, plastics and window film industries. GGF Members can be found in over 1,500 business locations throughout the UK.

## Talk to the specialists

All GGF members follow a strict code of conduct which is laid down in the government approved GGF Code of Good Practice. By dealing with a GGF Member you reduce the risk of problems with any work carried out. The GGF logo on a company's literature or vehicles is a sign of quality and reliability. Insist on a GGF member. Contact us for a list of Laminated Glass Group Members in your area.

**Look for the logo**



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## References

*The following standards refer to laminated glass*

- BS 5357 1995 Installation of security glazing.
- BS EN 356 2000 Glass in building – Security glazing – Testing and classification of resistance against manual attack.
- BS EN 1063 2000 Glass in building – Security glazing – Testing and classification of resistance against bullet attack.
- BS 6180 1999 Code of practice for protective barriers in and about buildings.
- BS EN 12600 2002 Glass in building. Pendulum test. Impact test method and classification for flat glass.
- BS 6262 1982 Code of practice for glazing for buildings. Part 4 1994 Safety related to human impact.
- BS 7376 1990 Inclusion of glass in the construction of tables and trolleys.
- BS 7449 1991 Inclusion of glass in furniture other than tables and trolleys including cabinets, shelving systems and wall hung or free standing mirrors.
- BS EN 12543 Laminated glass and laminated safety glass.
- BS EN 14449 Laminated glass and laminated safety glass – evaluation of conformity
- Building Regulations 1991. Approved Document N for England and Wales.
- Building Standards (Scotland) Regulations 2006, Part P.
- Building Regulations (Northern Ireland) 2000 Part V
- Workplace (Health, Safety and Welfare) Regulations 1992.

## Glass and Glazing Federation

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Glass and Glazing Federation

Laminated  
**Glass**  
 lifelong  
 safety and  
**security**

Can you  
 afford **not**  
 to use it?

## What is laminated glass/ laminated safety glass?

Two or more sheets of ordinary or heat treated glass bonded together using interlayers

## Safety and security through strength

Its most significant feature is that, if the glass fractures on impact, the fragments will remain bonded to the interlayer, minimising the risk of injury from flying glass, and maintaining a protective barrier.

## Four strong types

The customer's requirements in respect of the strength of laminated glass can be met by varying the quantity, thickness and nature of its layers to create:

### 1. Laminated safety glass

Laminated safety glass is a recognised safety glazing material as defined in BS EN 12543 part 2. It is therefore suitable for use in the shaded areas shown in the diagram above which require safety glazing by law under Building Regulations.

### 2. Laminated security glass – manual attack resistant glazing

Laminated security glass can withstand repeated manual blows, providing adequate protection until the pane can be replaced. This category of laminated security glazing is manufactured to comply with BS EN 356.

### 3. Laminated security glass – bullet resistant glazing

This category produces an effective barrier between an armed aggressor and the persons under threat. The glass specification will depend on the perceived level of threat as set out in BS EN 1063.

### 4. Laminated security glass - explosion resistant glazing

This category of laminated security glass can mitigate the effects from explosions.

**Note:** Correct framing and installation is essential to achieve the required level of protection.

## More reasons to choose laminated glass

### Noise reduction

Conventional laminated glass reduces noise transmission due to its enhanced acoustic properties. By using a special acoustic interlayer, this noise reduction can be further enhanced.

### UV protection

Laminated glass offers protection against fading and discolouration of interior furnishings by filtering harmful UV radiation.

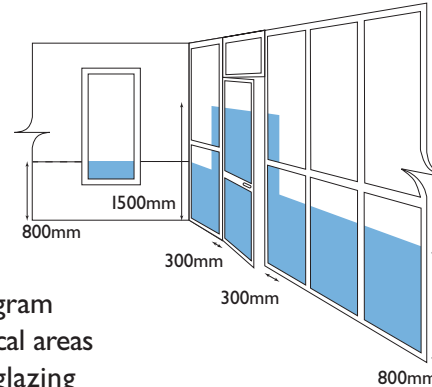
### Solar protection

Solar energy can be controlled by introducing tinted or coated glasses or interlayers.

### Overhead glazing

Laminated glass is an ideal product for use in overhead glazing.

## Mandatory safety glazing areas



The above diagram shows the critical areas where safety glazing materials, like laminated glass, must be used in new and replacement glazing applications in all buildings.

## Special laminates

Laminated glass when incorporating special components can provide a wide range of additional benefits.

- ◆ Laminated double glazing – greater thermal and acoustic insulation.
- ◆ Laminated heat processed glass – greater protection from mechanical and thermal stresses.
- ◆ Laminated metallic coated glazing – greater energy efficiency and protection against sunlight.
- ◆ Laminated fire resistant glass – creates a barrier against fire.
- ◆ Laminated mirror glazing.
- ◆ Laminated decorative glazing.
- ◆ Laminated glass and electronics – heated glass, alarm glass, photo-voltaics

## Recommendations for use according to the desired level of protection

Type of laminated glass	Purpose	Main application
Safety glazing BS EN 12543 Part 2	Where there is a risk of accidental human impact. ('Critical locations')	Any glazing with which people are likely to come into contact whilst moving in or about a building shall: a) if broken on impact, break in a way which is unlikely to cause injury, or b) resist impact without breaking, c) be shielded or protected from impact
Manual attack Security glazing anti-bandit glazing BS EN 356	Where there is a need for protection against manual attack.	Security risk areas in the home; security screens in banks, building societies, post offices, petrol stations, wages offices and cash desks, shop windows.
Bullet resistant glazing BS EN 1063	Where protection from armed attack is required.	Screens in banks, building societies, post offices, petrol stations, wages offices, display cases in jewellers' shops and museums, government offices and embassies.
Blast resistant glazing EN 13541 ISO 16933 ISO 16934	Where there is a danger of explosions.	Shops, government buildings, city offices.

## Availability

Laminated safety glass and some laminated security glasses are available from stock and can be cut to size without delay.

## Appearance

Laminated glass has the same visual qualities as ordinary glass of the same thickness.

## Marking

Laminated glass used in critical locations in buildings must be permanently marked to show compliance with appropriate standards.