

# Security performance

Windows are often ‘soft targets’ for intruders and if subjected to a blast attack, flying shards of glass will be an extreme hazard. Retrofitted secondary glazing provides a discreet, extra protective barrier; being a reversible adaptation it is ideal for Listed properties.

Some systems also aid containment in locations such as laboratories and secure health facilities, or offer protection against fire arms or spread of flame. The result is safer, more secure environments be it at home, business premises or public institutions.

## Why improve?

**Peace of mind.** Burglary can be a very disturbing and disruptive experience. Electronic security will warn but not resist and even a simple secondary window with locks and enhanced glazing will be a deterrent to an opportunistic attack.

**Duty of care.** Those responsible for buildings that could suffer the effects of a bomb blast or an outside disturbance as well as physical attack by intruders will have a duty of care to employees and visitors.

**Insurance risk.** Poor protection of a building could result in higher insurance premiums or removal of cover. In particular, museums with high value exhibits must meet strict security guidelines to benefit from a Government indemnity scheme.

**Regulation.** Building Regulations Approved Document Q covers unauthorised access in dwellings. Laboratories are subject to HSE standards and facilities considered to be part of Critical National Infrastructure are covered by Government security standards.



## Intruder protection

Frames, locks and fixings must resist driving force and levering; if the glass is vulnerable it must be difficult to break. The selection of frame and glass will be dependent on the risk.

Risk Level	Risk description	Treatment	Standard	Note
Low	Opportunistic attack	Standard frames with simple locks and toughened or laminated glass	None	
Medium	More determined attack using stealth to avoid noise that could attract attention	Robust frames with multipoint locking to opening panels and a choice of anti-bandit laminated glass	Secured by Design	1
High	A planned and determined attack on both the frame and glass	Enhanced frames with multipoint locking to opening panels and glazed with a specialist secure glass	LPS 1175	2

**Note 1:** Secured by Design is a Police Crime Prevention Initiative. Products successfully tested to PAS 24 are awarded a 'Police Preferred Specification' and also comply with Building Regulation Part Q: Security – Dwellings. PAS 24: 2016 security test simulates forced entry by stealth and does not involve glass breakage which would draw attention to the intruder. However, SBD guidance requires 'at risk' windows to meet glazing standard EN 356 Level P1A (6.8mm laminate) but higher strength laminated glass can be fitted in areas of increased risk.

**Note 2:** LPS1175 is a standard developed by the Loss Prevention Certification Board to test elements of the building façade such as doors, windows, shutters and grilles but is also applied to gates, fencing and security enclosures. There are eight test levels each with a defined set of tools and attack time becoming more severe at each higher level. The tests are extremely rigorous and involve every part of the window including glass. Certified products are listed on [www.redbooklive.com](http://www.redbooklive.com) and twice yearly audits ensure continued compliance. Secondary windows are tested stand-alone and hence the existing primary window could increase resistance. Secondary windows are available up to Level 3.



## Blast mitigation

A vehicle bomb will shatter glass at a distance of more than 100m and glass shards will cause injury to people and damage to sensitive equipment. Frames, locks and glass must absorb and spread the blast load. Laminated glass is specified as it is made from sheets of glass bonded to a polyvinyl butyral (pvb) interlayer. Under load the pvb stretches and holds the glass so that damaging shards are not formed. The selection of frame and glass will be dependent on the risk.

Risk Level	Risk description	Treatment	Standard	Note
Low	The building is not a direct target but its commercial or public use may impose a 'duty of care'	Standard frames with simple locks and 6.8mm laminated glass	ISO 16933 Level EXV45	3
Medium	The building is close to more sensitive buildings and hence could be more vulnerable	Robust frames, multipoint locking to opening panels, 6.8mm laminated glass with deeper edge cover and stronger structure fixings	ISO 16933 Level EXV33	3
High	The building is a potential direct target on account of its use or ownership and is likely to have a number of protective strategies	Enhanced frames designed to absorb higher blast loads, secure multi-point locking to opening panels, laminated glass with minimum 1.5mm pvb interlayer (7.5mm, 9.5mm, 11.5mm) and secure structure fixings	ISO 16933 Level EXV25	3

**Note 3:** ISO 16933 is a test to determine the air blast resistance of security glazing using a range of charges at different distances. 100kg TNT equivalent is generally used to simulate a small vehicle bomb. The target can be positioned at a number of distances, or stand-offs, starting at 45M. Products tested at this level are classified EXV45 together with a hazard rating based on the level of damage. EXV45 (a) denotes 'no break' in the glass whereas (d) denotes very low hazard and (e) low hazard.

Other stand-offs are 33m, 25m, 19m, 15m, 12m and 10m. A rating below EXV25 is not normally required but selected Selectaglaze systems can protect to EXV15(d).



## Ballistic attack

Traditionally, ballistic protection has been provided by multiple layers of glass laminated together with pvb interlayers. The resultant material is both thick and heavy and needs large supporting frames. Thinner and lighter panes can be produced by laminating layers of glass with polycarbonate. This allows the design of smaller more easily handled frames, making it the preferred material for retrofitted secondary glazing.

To ensure continuous protection, Selectaglaze ballistic windows consist of demountable fixed panels which are attached by removable fixings to permanently anchored frames. This design allows for planned maintenance.



## Fire protection

Secondary glazing may be required to windows that need fire resistance on account of proximity to a fire escape or an adjacent building. A fully developed fire achieves temperatures that will melt aluminium so frames must be specially adapted. The inclusion of Pilkington Pyrodur™ glass in conjunction with intumescent seals and fire rated mastics provides half hour integrity protection.



## Testing and certification

### Physical Intrusion

Physical tests are conducted to the following standards:

- LPS 1175: Issue 7. Specification for testing and classifying the burglary resistance of building components, strong-points and security enclosures
- PAS 24:2012. Enhanced security performance requirements for doorsets and windows in the UK

Note : PAS 24 has been developed as a standard for primary windows and doors but secondary windows successfully tested in accordance with the requirements are accepted as a Police Preferred Specification under the Secured by Design initiative.

Selectaglaze products are tested at the Building Research Establishment

### Blast

Blast testing is carried out in accordance with:

- ISO 16933:2007. Glass in Building – Explosion Resistant Security Glazing – Test and Classification for Arena Air Blast Loading.

Selectaglaze products are tested at arena trials conducted by Comblast at the DNV-GL's Spadeadam test centre.

### Ballistic tests

Ballistic tests are conducted to standard:

- EN 1522 /1523, 'Windows, doors, shutters and blinds – Bullet resistance – Requirements, Classification and Test method'.

The standard has eight levels of certification covering handguns, rifles and shotguns.

Selectaglaze product is tested by Wiltshire Ballistic Services.

### Fire tests

Fire tests are conducted to standard:

- BS EN 1363-1, 1364-1, 'Fire resistance tests. General requirements/fire resistance tests for non-load bearing elements. Walls'

Selectaglaze product is tested by Chiltern International Fire.

Please visit our website for performance figures. Summary tables are on page 51.

# Case study: Banqueting House, London

The stunning Grade I Listed Banqueting House, managed and cared for by Historic Royal Palaces, was designed by Inigo Jones between 1619 and 1622 after its predecessor was destroyed by fire. It has stood witness to many historical events, most famously, King Charles I was executed, in Cromwell's time, outside the building in 1649 on a temporary scaffold specially built for the occasion.

Banqueting House still contains the only surviving in-situ ceiling painting series by Sir Peter Paul Rubens, a breath-taking canvas masterpiece commissioned by Charles I to commemorate his father's life, King James I.

The security window installations were part of the first phase of works to repair and restore this building. Security was a key concern when planning the works, as was reducing noise from the busy Whitehall outside. The design replaced the blast net curtains and allows daylight once again to flood into the Main Hall, as well as providing a significant level of noise insulation to ensure visitors peace and tranquillity when viewing the Rubens.

Selectaglaze was approached to provide a fitting bespoke solution that not only offered protection to the large windows, but was a discreet and unobtrusive window treatment, to blend in with the historic interior.



Selectaglaze has products certified to the requirement, but they had never been specified to these sizes (the Main Hall window openings were 3.6m high and 2.0m wide). Blast testing was carried out on the largest ever single casement to be tested in the UK. The results were a success and planning for the installation began.

Installing the units provided a challenge as half the openings were at upper gallery level 10m above the main floor. The gallery could not be loaded. Working very closely with Gardner & Theobald, structural engineers Hockley & Dawson and Royal Warrant holding scaffolders Allen and Foxworthy, a careful method of installation was devised involving a columnar scaffolding design complete with lifting apparatus to each opening. In all, 39 units were installed.

