

# Bomb Blast Protected Glazed Shelters, Screens & Enclosures PATENTED

### Protecting people and property from terrorist attack

#### **Applications**

- Government, Public & Commercial Buildings
- Public Transport Systems Airports,
   Bus & Train Stations / Shelters
- Sporting Events, Venues & Arenas
- Shopping Centres & Communal Areas
- Conferences, Exhibitions & Events

#### **Fully Certified System**

- Compliant to International, BS & ISO Standards
- Tested to ISO EXV25 (100kgs High Explosive at 25mtrs)

#### **Range of Solutions**

- Permanent & Temporary/Portable Installations
- New Build & Retro-fitted Solutions









**Anti-Terrorist Shelters** 









Public and commerical buildings as well as crowded places are potential terrorist targets

#### Protect your employees, customers and property from terrorist attack

The worldwide political climate has made it more critical than ever for organisations to physically protect buildings, crowded places and the people who frequent them from terrorist bomb attack.

Terrorist targets include key government, public and commercial buildings as well as crowded places such as shopping centres, sport venues, airports, public transport terminals, bus and railway stations.

In the event of an explosion in a built-up environment, approximately 90% of fatalities and injuries are caused by projected glass shards.

The personal cost of the injuries is considerable, and is exacerbated by disruption to the efficient running of business and public services due to injured personal and damaged properties.

Although conventional anti-fragmentation window films can often reduce the quantity of smaller shards, in many cases the window frame will not be strong enough to retain the glass and prevent it from being projected 'en masse'. The projected glass and often the window frame itself pose a high risk of death and serious injury to persons nearby.

Conventional sytems with thin PVB laminated glass are mis-sold as being 'blast resistant' when they are not. Bomb blast rated enhanced glass with a special retaining system is required.

Many companies and public organisations are now implementing bomb blast protection systems in response to government initiatives on protecting people in public spaces.

#### **Bomb Blast Protected Glazed Screens & Structures**

In response to this requirement, Trueform has developed and tested a range of security and anti terrorism products and patented specialist bomb blast protection systems in order to help maintain safety and security, and dramatically minimise disruption should a terrorist attack occur.

Trueform's high strength bomb blast resistant structures are designed to conform to and have been extensively tested to recognised UK, US and international bomb blast standards, typically 100kgs of high explosive at 25 metres range.

The high strength steel framed structures are fitted with bomb blast rated enhanced glass uniquely secured using Trueform patented ultra-high strength 'dry fit' retention

Trueform have recently installed its bomb blast resistant waiting shelters, check-in areas, door entrance portals and retail enclosures at the UK's Heathrow, Gatwick and Edinburgh airports.

The ultra high strength construction incorporates Trueform's high strength bomb blast rated shallow foundation and thus provides robust physical protection, including protection against explosive attack by a vehicle borne explosive device (VBIED).

















**Disadvantages of Conventional Safety Glazing** 

Conventional bomb blast protected glazing has often incorporated antishatter films and/or specialist wet silicones and tapes which are applied to standard window frames 'on site'.

Although less likely to shatter and produce the same level of shards as regular glazing systems, conventional blast protected glazing offers limited protection as their glazing retention is often inadequate to prevent the entire glazing panel being blown out of its frame. These conventional systems therefore also carry significant risk of death or serious injury.

Conventional safety glazing systems suffer from a number of problems. The surfaces of both glass and frame need to be carefully cleaned and primed to ensure satisfactory adhesion by the silicone. It is difficult to achieve this if the process is performed "on site". It is also difficult, if not impossible, to ensure that the silicone has filled all the gaps between the edge region of the glass and the surfaces of the frame. Insufficient filling can lead to insufficient adhesion. Moreover, the silicone takes weeks to cure fully and the adhesion between the retaining member and the glass sheet is weaker during this curing period. Further, the final strength of the adhesion may be reduced if the glass sheet is inadvertently moved, for

example by the wind or members of the public, during the curing process. If the glass sheet is damaged, replacement is onerous as the cured silicone needs to be removed completely from the frame and the frame surfaces cleaned thoroughly before a replacement glass can be fitted.

These limitations expose people and infrastructure to a greatly increased risk of damage, serious injury or death.

Trueform's 'Dry Fit' System is a simple mechanical process that does not require adhesion between the glass sheet and the retaining members. It can be carried out readily on site by personal with no experience of silicone bonding. Unlike the conventional blast-resistant glazing system described previously, which requires formation of a silicone bond between the glass and the retaining members, there's no risk of insufficient bonding due to incomplete filling of the gaps between the glass and the rebate with silicone; no risk of inadequate bonding caused by dirty surfaces and no risk of weakening of the bond by movement of the glass sheet during curing.

Trueform's system provides instantaneous protection.

#### **A Fully Tested System**

Rigorous testing has been undertaken on full scale Trueform bomb blast structures in order to demonstrate their resilience and ability to offer protection in the event of a bomb blast.

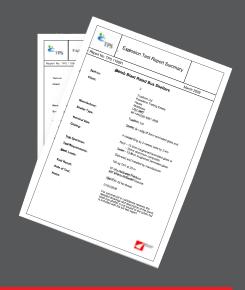
Testing was carried out in accordance with International Standards
Organisation Bomb Blast Standard ISO EXV 25. In simple terms the blast
loading equated to a 100 kg TNT car bomb at 25 m standoff range. The
structures were orientated with the open end facing the bomb to address
the worst bomb blast scenario.

Two bomb blast structures were tested. Both comprised identical robust steel frames and in-situ concrete foundations. Various roof and glazing types were tested.

The tests on Trueform's Bomb Blast structures successfully demonstrated that all glazing and metal panels tested resulted in very low hazard (or less) to personal.

Importantly, the protection could be achieved without the use of any wet applied materials such as silicone.

Furthermore, the tests demonstrated conclusively that Trueform's bomb blast protected shelters significantly reduced the hazard to occupants located behind the structures compared to that provided by standard glazed screens and shelters.



# gular Glazing

- Georgian Wired Glass
- Float / Annealed Glass
- Heat Strengthened Glass
- Toughened Glass
- Acrylic

Regular glazing provides very little protection against bomb blast.

Death or serious injury from broken glass and shrapnel is highly probable.

HAZARD LEVEL









Test: 100Kgs of High Explosive at 25 metres distance, showing complete disintegration of a standard passenger shelter.

pical Safety

Standard Laminated Annealed

Anti Shatter Films

Polycarbonate

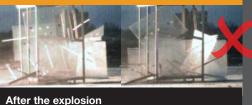
Although less likely to shatter and produce the same levels of shards as regular glazing systems, these glazing types offer limited protection as glazing retention is often inadequate to prevent the entire glazing panel being blown out of its frame - Carries significant risk of death or serious injury.

HAZARD LEVEL









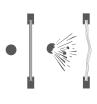
Test: 100Kgs of High Explosive at 25 metres distance, showing complete disintegration of a conventional bomb blast protected passenger shelter.

ruetorm's Bomb Blast Protected

glass with specially 'enhanced interlayers' and Trueform's ultra high strength dynamic 'dry fit' retention system. (PATENTED)

Special bomb blast rated laminated Unique dry system provides instant protection unlike wet silicone systems that glass with specially 'enhanced can take many days to cure.

**HAZARD LEVEL** 









Test: 100Kgs of High Explosive at 25 metres distance. Trueform's Bomb Blast Protected Passenger shelter is virtually unaffected by the explosion.

#### **Features of Trueform's Patented System**

- Fully tested to withstand bomb blast of 100kgs of high explosive at 25mtr distance with no formation of hazardous glass shards
- Compliant to ISO international standards ISO EXV25
- As used by British Airports Authorities BAA
- Can be provided as part of a new build or retrofitted for protection to existing buildings / areas.
- Instant protection immediately after installation
- Provides bomb blast protection to people and property
- Protection against 'Vehicle Borne Improvised Explosive Devices' (VBIEDs)
- Contemporary, architectural design appearance
- Temporary solutions for conferences and events
- Ultra high strength steel structure
- Specialist high strength shallow blast resistant foundation design
- Ultra high strength dynamic 'Dry Fit' glazing retention system
- Special bomb blast rated laminated annealed and toughened laminated blast resistant glass with specially enhanced interlayers
- Comprehensive range of standard structures / designs available to suit a range of applications
- Flexible/custom design: our designers can design/modify the system to suit individual project requirements
- Rapid installation and commission





Bomb Blast Protected Screen for Costa Coffee - Heathrow Airport



Bomb Blast Protected Check-In Area & Digital Passenger Display - Heathrow Airport



Unprotected



Protected with retrofitted glazed bomb blast screen

#### **Retro-fitted and Temporary/Portable**

Trueform provide a range of both permanent and temporary / portable blast resistant screens that can be installed as part of a new build, or 'retrofitted' to existing locations, providing instant bomb blast protection.

#### **Applications Include:**

- Buildings
- Venues & Arenas
- Exhibitions & Conferences

Utilising Trueform's high strength bomb blast rated shallow foundations, the blast protection screens can be rapidly erected outside existing commercial or residential buildings, hotels, embassies, shops, taxi ranks etc. with minimum disruption.

Providing physical protection to employees, delegates, customers and property in the event of terrorist attack, the special blast protected structures have been architecturally designed with contemporary clear glass appearance to complement any architectural surrounding.

Each structure can be manufactured to meet individual customer requirements and colour schemes, including corporate identity and branding.

Trueform have provided blast protection security screens for many clients, including retail screening for Costa Coffee and check in screens for Emirates and Singapore Airlines at Heathrow Airport.

Please contact our sales engineers to discuss your requirements and to arrange a site survey.

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#### **Government Agency Driven**

In order to combat terrorist threats the UK government has instigated a counter terrorism strategy, which is driven by a number of government agencies, the Home Office, Office for Security and Counter-Terrorism, working closely with the Police, and the Centre for the Protection of National Infrastructure (CPNI).

### **CPNI**®

Centre for the Protection of National Infrastructure

The CPNI encourages the implementation of physical security measures to locations at potential risk and provides security advice, awareness and training, including designing out vehicle borne terrorism.



The National Counter Terrorism Security Office coordinates the activities of local police force Counter Terrorism Security Advisers (CTSAs) who deliver guidance on protecting a wide range of assets, including crowded places.

#### **Applications**

- Airports
- Public Transport Terminals
- Bus Shelters
- Bus & Railway Stations
- Shopping Centres
- Sports Venues
- Government & Commercial Buildings
- Embassies
- Crowded Places

