GUIDANCE NOTE: GLAZING ENHANCEMENT TO IMPROVE BLAST RESISTANCE

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Introduction

This Guidance Note replaces HOSDB 11/08 Guidance Note: Glazing Enhancement to Improve Blast Resistance 11 June 2008 (Edition 1). It has been issued to provide updated guidance on the use of glazing to reduce potential hazards from flying glass in the event of an explosion, and to provide guidance on the specification of more specialised glazing systems such as fixed point glazing which are frequently used in new commercial developments.

The measures contained in the Guidance Note should be considered as the minimum requirements: other requirements such as Health and Safety and wind loading may take precedence and mean that thicker panes of glass or larger fixings are required. Where window systems require a level of blast resistance they should be specified by designers competent in the field of blast design.

NOTE: (1) Suitable engineers should be members of the Register of Security Engineers and Specialists (RSES) (www.rses.org.uk) or be able to demonstrate that they have the training and experience to meet the appropriate RSES competences.

Enhancement measures covered

There are three common measures which can be used to enhance the blast performance of glazing and reduce the potential hazard in framed window systems:

- The use of Anti-Shatter Film (ASF) and Bomb Blast Net Curtains (BBNC)
- Laminated Glass in normal window frames
- Blast Resistant Glazing in Blast Enhanced Frames or Fixed Point Glazing

There are also other measures that can be used with specialist windows systems or where it is not practical, or economic, to install retrofits such as ASF or new windows with laminated glass. The most common of these is:

- Secondary windows

In addition to the measures identified above, combinations of laminated and toughened glass are frequently used in large window panes in areas classified as ‘crowded spaces’, such as shopping centres and transport related buildings, where a level of blast resistance may be required. In these situations the driving factor for determining the appropriate pane thickness will often be compliance with the Building Regulations or wind loading and not the minimum thicknesses specified in this guidance note. In such situations the assistance of designers competent in the field of blast design should be sought (see Note 1 above).

Anti-Shatter Film (ASF) and Bomb Blast Net Curtains (BBNC)

- These should be used in normal window frames as a retrofit for existing glass only where the windows cannot be replaced.
Laminated glass in normal window frames

- This option provides better blast-resistance than ASF and BBNC, subject to suitable frame fixings into the adjacent structure.
- Required in lieu of ASF and BBNC for 1) new builds; or 2) window replacements in Government buildings.
- As a general principle laminated glass should be specified for all new works as it provides a significant improvement in blast resistance for a minimal increase in cost. Compliance with Building Regulations for heat loss generally dictates the use of double glazed units which are able to accommodate the increase in thickness required for laminated glass. For government buildings any deviation from this must be approved by the Departmental Security Officer. Further guidance for Government Departments can be found in the Security Policy Framework, Security Policy 4 - Physical Security and Counter-Terrorism.
- For single glazing not less than 6.8mm laminated glass should be used. In double glazed units (DGU) the inner pane should not be less than 6.8mm laminated glass and the outer pane should be a minimum of 6mm toughened or 6.8mm laminated glass. These dimensions relate to panes with maximum dimensions of approximately 1.5x1.2m. Where the pane dimensions are greater than this the guidance of an engineer with experience in designing glazing systems to withstand blast loads should be sought (see Note 1). This is applicable for external facing windows where there is no likelihood of impact by people. If used in internal locations where the glass may be impacted by people, then the glass should also be designed in accordance with BS6262: Glazing in buildings - Part 4:2005 Safety related to human impact which may require toughened laminated glass to be used for both panes.
- Further slight improvements in safety may be achieved for laminated glass by selective strengthening of the glazing assembly; e.g. by adding fixing screws to beading and/or the frame.

Blast Resistant Glazing with Blast Enhanced Frames – where a greater level of blast resistance is required

- In DGUs the inner pane should not be less than 7.5mm laminated glass and the outer pane should be a minimum of 6mm toughened or 6.8mm laminated glass. These pane thicknesses are for panes with maximum dimensions of approximately 1.5m by 1.2m. Where the pane dimensions are greater than this the guidance of an engineer with experience in designing glazing systems to withstand blast loads should be sought (see Note 1).
- The glass should be well held in suitable gaskets in 35mm rebates or be in at least 30mm rebates if held in well bedded clamped gaskets or, preferably, bonded with silicon or polysulphide sealant. The latter will reduce the hazard range to about a quarter of that for plain annealed glass.
- Other designed combinations of toughened and/or laminated glass or polycarbonate can be specified with appropriately designed and tested frames and fixings.
- In all cases the surrounding structure and fixings must be capable of withstanding the increased loads expected.

Secondary glazing

- In situations where a greater level of blast resistance is required, and it is not practical to replace the window with laminated glass in enhanced frames, secondary glazing units may be considered.
- These window systems are designed to prevent the external glazing from entering the building and are either fixed within the window reveal or, where there is a reduced wall thickness, to the inner face of the wall.
- Such window systems are designed to be openable to aid cleaning and access to the inside of the external glazing.

Fixed point glazing

- Fixed point, or planar glazing, is increasingly used for commercial buildings where architects want to reduce the visual impact of any support system. The design and specification of such windows systems should only be undertaken by appropriately qualified façade designers.
- Where a degree of blast enhancement is required the fixings must be considered in conjunction with a correctly designed façade and support system which must be checked by façade designers competent in the field of blast design (see note on page 1).
- Details of suitable fixings for blast situations can be found in CPNI EBP 01/13 - Fixed-Point Glass: Specification for Blast Enhanced Fixings.