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See Also Mounting Frames (Sheets 1 to 4).

Australian Standard 2343—1980

BULLET-RESISTANT GLAZING PANELS FOR INTERIOR USE

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Bankers Association

Australian Bank Employees Union

Confederation of Australian Industry

Department of Defence

Federated Glass Merchants Association

Plastics Institute of Australia Incorporated

Victoria Police

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AUSTRALIAN STANDARD

BULLET-RESISTANT GLAZING PANELS FOR INTERIOR USE

AS 2343—1980

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PREFACE

This standard was prepared by the Association's Committee on Bullet-resistant Glazing Panels following a request from the Department of Defence Materials Research Laboratories. It is based on BS 5051, Security Glazing, Part 1: Bullet-resistant Glazing for Interior Use.

The standard specifies requirements and test methods for bullet-resistant glazing panels for interior use that are designed to provide protection against the effects of ballistic attack involving the use of firearms. Bullet-resistant glazing panels may also be resistant to many forms of manual attack.

The standard classifies bullet-resistant glazing panels according to their performance in preventing penetration by projectiles discharged from firearms under controlled conditions.

Some bullet-resistant glazing panels have been used in service for more than 12 years and are known to have maintained their resistance to penetration over this period. However, new materials are being developed and a safeguard against the possibility of inadequate bullet-resistant service life is required. Six months' exposure to external weathering prior to bullet-resistance testing has been specified in the expectation that this will exclude glazing panels which would have inadequate service life for interior use.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
BULLET-RESISTANT GLAZING PANELS FOR INTERIOR USE

FOREWORD

The first requirement of a bullet-resistant glazing panel is to prevent penetration by projectiles discharged from firearms. Protection from splinters that may be ejected from the rear surface when the panel is attacked is also necessary.

Bullet-resistant glazing panels can be fitted to a wide variety of windows, counter screens, partitions, etc; consequently, it is not possible to specify instructions for installation in this standard. Nevertheless, it should be recognized that the degree of protection depends as much upon the design, fixing and maintenance of the window, counter screen or partition as it does upon the bullet-resistant glazing panel itself. Accordingly, the frames or other areas surrounding the bullet-resistant glazing panel should provide as high a level of protection as the panel and the frame should also provide sufficient overlap to prevent dislodgement of the panel during attack.

Where the bullet-resistant glazing panel is not installed by the manufacturer, it is essential that adequate instructions for installation are provided by the manufacturer. The bullet-resistant glazing panel must be correctly installed according to its design characteristics. For example, installation may necessitate the provision of air gaps of specific distances between the various sheets or panels of glazing material. In some cases, it may be necessary to orientate the bullet-resistant glazing panel in relation to the expected direction of attack.

SPECIFICATION

1 SCOPE. This standard specifies requirements for bullet-resistant glazing panels according to their performance in preventing penetration by projectiles discharged from firearms under controlled conditions. It applies to bullet-resistant glazing panels for interior use at ambient temperature, i.e. 20 ± 10°C.

This standard does not include a requirement for the retention of bullet-resistant properties for a stated period of time nor requirements for certain other aspects such as the durability of the glazing.

NOTE: Glazing panels that are much smaller than the type test samples, as described in this standard, may provide less protection in service than is indicated by the performance of the samples.

2 DEFINITION. For the purpose of this standard, the following definition applies:

Bullet-resistant glazing panel—a complete bullet-resistant unit which is classified (see Clause 3) according to its resistance to ballistic attack by firearms.

3 CLASSIFICATION. Bullet-resistant glazing panels shall be classified according to their resistance to ballistic attack (see Table B1) from firearms as follows:

(a) *Resistance to hand guns and rifles.*

(i) *Class G0*—Resistant to attack by a 9 mm military parabellum hand gun.

(ii) *Class G1*—resistant to attack by a 357 magnum hand gun.

(iii) *Class G2*—resistant to attack by a 44 magnum hand gun.

(iv) *Class R1*—resistant to attack by a 5.56 mm rifle.

(v) *Class R2*—resistant to attack by a 7.62 mm rifle.

NOTES:

1. A panel complying with the requirements of one of the classes of category G will comply with the requirements of other lower numbered classes of category G; e.g. a panel complying with the requirements of Class G2 also complies with the requirements of Class G1 and Class G0.
2. A panel complying with the requirements of either Class R1 or Class R2 will also comply with the requirements of Class G0, Class G1 and Class G2. A panel complying with the requirements of Class R2 will also comply with the requirements of Class R1.

(b) *Resistance to shotguns.*

(i) *Class S0*—resistant to attack by a 12 gauge shotgun (full choke) firing shot.

(ii) *Class S1*—resistant to attack by a 12 gauge shotgun (full choke) firing a single slug.

NOTES:

1. A panel complying with the requirements of Class S1 will also meet the requirements of Class S0.
2. A panel complying with the requirements of Class S0 or Class S1 will not necessarily comply with the requirements of one or more classes of either category G or R for hand guns and rifles.

4 CONSTRUCTION. Bullet-resistant glazing panels shall have a clarity and light transmission in accordance with good architectural practice for the type of installation involved and shall be made from any number of sheets of rigid, solid glazing material of any of the following types:

(a) Plastics or glass materials.

(b) Laminates of plastics materials.

(c) Laminates of glass and plastics materials.

The glass and plastics layers of the laminates may be bonded together or may be separated by air spaces and held in position at the edges.

NOTE: It is not the intention of this standard to restrict the design of bullet-resistant glazing panels. The most important factor is that protection is provided against the specified level of ballistic attack. Consequently, the bullet-resistant glazing panel may consist either of any number of sheets of glazing material essentially designed as a single unit, or any number of such units often designed to be installed with an air gap of a specified distance between them.

5 PERFORMANCE. When a bullet-resistant glazing panel is tested for resistance to attack in accordance with Appendix B, the projectile shall not pass through the panel nor shall any splinters from the panel perforate the witness card.

6 MARKING.

6.1 General Requirements. Bullet-resistant glazing panels shall be clearly marked by the appropriate method (see Clause 6.2) with the following information:

(a) The manufacturer's name or trademark.

(b) The words 'bullet resistant'.

(c) The classification of the bullet-resistant glazing panel (see Clause 3). Where a panel complies with the requirements of more than one class, it shall be designated by the appropriate letters, e.g. S1/R2.

(d) The words 'public side' on the side of the bullet-resistant glazing panel designed to face the direction of attack.

(e) The date of manufacture (to the nearest 3 months).

NOTE: Manufacturers who place the number of this Australian standard on products, packaging or literature related thereto should ensure that the products comply with the standard.

Attention is particularly drawn to the scheme for independent assurance provided by the AS Mark which is a registered certification trademark owned by the Standards Association of Australia.

The presence of the AS Mark on or in relation to a product is an assurance that the goods have been produced under a system of supervision, control and testing applied during manufacture and including periodical inspections at the manufacturer's works in accordance with the certification mark scheme of the SAA.

The AS Mark can be used only by manufacturers licensed under the certification mark scheme operated by the SAA, and only when accompanied by the number of the relevant Australian standard. It will usually be a requirement that the words 'Manufactured to Australian Standard' accompany the number of the standard and enclose the Mark as shown below.

Further particulars of the terms of licence may be obtained from the Director, Standards Association of Australia, 80 Arthur Street, North Sydney, N.S.W., 2060.

6.2 Methods of Marking. The marking shall be either—

(a) of a permanent nature and positioned so that the classification marking in accordance with Clause 6.1(c) is not visible after installation of the bullet-resistant glazing panel; or

(b) of a non-permanent nature of a type which can remain visible until examined by the appropriate authorities and which is self-destroying if removed.

Where the intention is that the marking is not to be removed, the classification marking in accordance with Clause 6.1(c) shall be positioned so as not to be visible after installation of the bullet-resistant glazing panel.

7 TYPE TESTING. For the purpose of type testing, at least three bullet-resistant glazing panels shall be tested in accordance with Appendix B and all panels so tested shall comply with Clause 5.

APPENDIX A

WEATHERING AND CONDITIONING

A1 SCOPE. This Appendix sets out methods for weathering and conditioning bullet-resistant glazing panels.

A2 PRINCIPLE. Bullet-resistant glazing panels are weathered outdoors for 6 months and conditioned by storing at constant temperature.

Where panels are damaged during weathering by factors other than weathering, these panels are discarded without prejudice and replacement panels are weathered in their place for the full period.

A3 APPARATUS. Suitable racks are required to hold the bullet-resistant glazing panels in position during weathering.

The racks shall be designed so that the bullet-resistant glazing panels are held firmly in the racks by means of clamps constructed from inert materials. Where metal clamps are used, aluminium is usually more suitable than brass because of the possible adverse catalytic effect of copper ions; alternatively, a suitable plastics or ceramic material may be used. The clamps should be designed to minimize any stress applied to the bullet-resistant glazing panel and also to prevent rain water from collecting in contact with the panel around the clamps. The racks shall be designed to hold the exposed surface of the bullet-resistant glazing panel at an angle of 45 degrees to the horizontal, in a manner such that there shall be no background for a distance of at least 300 mm in any direction from the rear of the bullet-resistant glazing panel.

A4 SAMPLES. Bullet-resistant glazing panels for weathering and conditioning shall consist of squares of 420 ± 5 mm side.

A5 WEATHERING. The bullet-resistant glazing panels shall be attached to the racks and the racks placed either on open ground, preferably on a concrete surface, or on the roofs of buildings. If the racks are placed on soil, the vegetation should be cleared as completely as possible and the bottom edge of any bullet-resistant glazing panel should not be less than 0.5 m above the level of the cleared area. The racks shall be positioned so that the bullet-resistant glazing panels are exposed to all available sunlight and are not obscured by shadows from buildings, etc.

The edges of the glazing screens may be protected to prevent the entry of moisture into any air spaces or between laminates. Any protection strip shall not extend more than 10 mm on the front or back surfaces of the glazing screens and shall not be more than 3 mm thick.

The date of exposure shall be recorded. The exposed bullet-resistant glazing panels shall be inspected periodically to ensure that they have not been loosened or removed from the racks by the wind.

A6 CONDITIONING. After exposure for 6 months, the bullet-resistant glazing panels shall be washed with the minimum amount of abrasion to remove surface dirt, and allowed to dry. The bullet-resistant glazing panels shall be tested for bullet resistance (see Appendix B) as soon as possible after exposure. Immediately before such testing, the panels shall be conditioned as follows:

Store the bullet-resistant glazing panels at a temperature of 20 ± 10°C for a minimum of 12 h and then maintain them at a temperature of 20 ± 5°C for a period of 1 h for each 25 mm of thickness or part thereof.