

Australian Standard[®]

**Methods of test—Security screen doors
and window grilles**



This Australian Standard® was prepared by Committee CS-023, Security Screen Doors and Window Grilles. It was approved on behalf of the Council of Standards Australia on 28 March 2003.
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- Architectural Aluminium Fabricators Association
 - Australian Aluminium Council
 - Australian Chamber of Commerce and Industry
 - Australian Industry Group
 - Australian Window Association
 - Bureau of Steel Manufacturers of Australia
 - Certification Bodies (Australia)
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 - Department of Housing New South Wales
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 - National Security Screen Association
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 - Victorian Employers Chamber of Commerce and Industry
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RECONFIRMATION
OF
AS 5041—2003
Methods of test—Security screen doors and window grilles

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NOTES

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Methods of test—Security screen doors and window grilles

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PREFACE

This Standard was prepared by the Standards Australia Committee CS-023, Security Screen Doors and Window Grilles to supersede AS/NZS 2803.1:1994, AS/NZS 2803.2:1995, AS/NZS 4483.1:1999, and AS/NZS 4483.2:1999.

This Standard incorporates Amendment No. 1 (December 2007). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide a set of methods for testing the compliance of security screen doors and window grilles used in residential structures.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard. All other notes are for information and guidance only.

A significant new development of this Standard is the amalgamation of testing requirements from AS/NZS 2803.1: *Doors-security screen-hinged*, AS/NZS 2803.2: *Doors-security screen-sliding*, AS/NZS 4483.1: *Security screen doors and security window grilles—Methods of test—Dynamic impact test*; and AS/NZS 4483.2: *Security screen doors and security window grilles—Methods of test—Knife shear test*

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STANDARDS AUSTRALIA

Australian Standard

Methods of test—Security screen doors and window grilles

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out methods for testing security screen doors and window grilles used in residential structures in accordance with AS 5039.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 1599 Pressure-sensitive adhesive packaging tapes
- 5039 Security screen doors and window grilles
- 5040 Installation of security screendoors and window grilles

1.3 ALTERNATIVE METHODS

Any alternative testing materials, designs, methods of assembly, procedures, that do not comply with specific requirements of this Standard, but which give equivalent results to those specified are not necessarily precluded; however, equivalent performance will need to be demonstrated.

1.4 DEFINITIONS

For the purpose of this Standard the definitions used in AS 5039 apply.

1.5 LIST OF METHODS

The following is the list of methods set out in this Standard:

- (a) Dynamic impact test Section 3.
- (b) Jemmy test Section 4.
- (c) Pull test.....Section 5.
- (d) Probe test Section 6.
- (e) Shear test Section 7.
- (f) Knife shear test Section 8.

SECTION 2 TEST SPECIMEN AND PREPARATION FOR TESTING

2.1 SCOPE

This Section sets out the requirements for the test specimen and preparation for testing for the dynamic impact test, jemmy test, pull test and probe test.

2.2 GENERAL

The test sequence shall be as described in AS 5039. The test specimen shall be prepared as described in this Section and then subjected to the dynamic impact test, jemmy test, pull test and probe test sequentially, as applicable.

The same test sample shall be used for all of these tests.

2.3 PRINCIPLE

The effects of a physical attack against a security screen door or window grille are replicated in a series of tests. Generally a physical attack would comprise kicking, levering and pulling. It is for this reason that the one test specimen is used and is subjected to a series of consecutive tests as specified in AS 5039.

2.4 TEST SPECIMEN

2.4.1 Security screen doors

2.4.1.1 *General*

Any size screen door may be tested.

Where screen doors are submitted for type testing, the minimum size of the screen door used shall be as follows:

- (a) Hinged screen door..... 2040 mm high × 870 mm wide.
- (b) Sliding screen door..... 2100 ±50 mm high × 1250 mm wide.

A1 | The test specimen for Type I and Type II product shall consist of a piece of infill material with an incomplete pattern on one side and that side shall be subjected to the dynamic impact test as specified in Section 3. If the door or window fabricator manufactures a product with complete infill pattern then that configuration shall be tested.

The results shall be taken as indicative for security screen doors smaller than the type test sample, and which are built by the same method. The security screen doors shall be tested as submitted without any modification to the test specimen.

2.4.1.2 *Hinges (for hinged screen doors only)*

For type testing, hinges shall be situated within 200 mm from the top and bottom of the screen door, measured to the centre of the hinge. Where more than two hinges are provided, they should be evenly spaced between the top and bottom hinges.

Where a continuous hinge is used, the hinge shall extend to within 200 mm from the top and bottom of the screen door.

2.4.1.3 Lock fittings

For type testing purposes, the main lock mechanism shall be sited within a range not greater than 200 mm either side of the door centre height. Where multiple point locking is used, and the auxiliary bolts can be fitted in a range of positions in the lock side door stile, the location of the auxiliary bolts from the ends of the type test door shall be the maximum nominated by the manufacturer for distances A and B (see Figure 2.1 or Figure 2.2).

Doors fitted with auxiliary bolts located at dimensions less than those tested and passed for A and B shall be deemed to have also complied with this Standard.

Doors fitted with auxiliary bolts located at dimensions greater than those tested and passed for distances A and B shall not claim compliance with this Standard until that configuration has been tested.

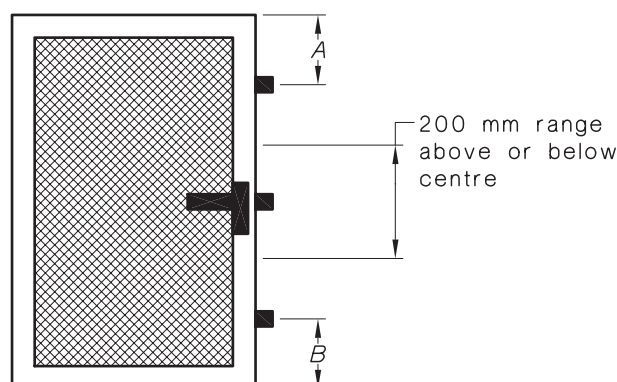


FIGURE 2.1 RANGES FOR LOCK MECHANISM (HINGED DOORS)

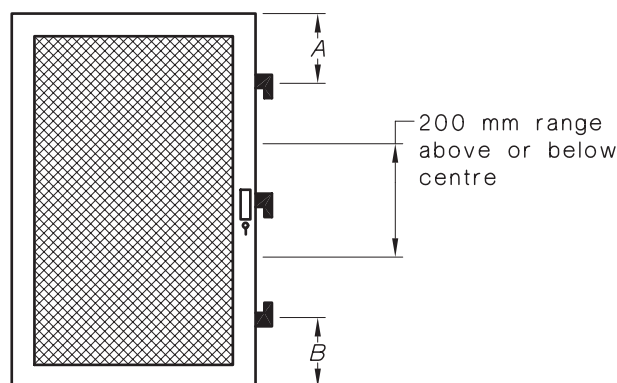


FIGURE 2.2 RANGES FOR LOCK MECHANISM (SLIDING DOORS)

2.4.2 Security window grilles

2.4.2.1 General

Any size security window grille may be tested.

Where security window grilles are submitted for type testing, the minimum size of the security window grille shall be as follows:

- (a) Single window grille..... 1500 mm high × 900 mm wide.
- (b) Double window grille 1500 mm high × 1800 mm wide.

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The test specimen for Type I and Type II product shall consist of a piece of infill material with an incomplete pattern on one side and that side shall be subjected to the dynamic impact test as specified in Section 3. If the door or window fabricator manufactures a product with complete infill pattern then that configuration shall be tested.

The results shall be taken as indicative for security window grilles smaller than the type test sample, and which are built by the same method. The security window grille shall be tested as submitted without any modification to the test specimen.

2.4.2.2 Hinges (for hinged window grilles only)

For type testing, hinges shall be situated within 200 mm from the top and bottom of the window grille, measured to the centre of the hinge. Where more than two hinges are provided, they should be evenly spaced between the top and bottom hinges.

Where a continuous hinge is used, the hinge shall be extended to within 200 mm from the top and bottom of the window grille.

2.5 PREPARATION FOR TESTING

2.5.1 General

Where a security screen door or a security window grille is supplied as a complete screen door set or a complete window grille set, it shall be tested with its frame as supplied, closed and locked.

Where a screen door or a window grille is supplied as a separate leaf, it shall be mounted to a full perimeter frame incorporating a minimum 10 mm × 20 mm stop bead rigidly fixed to the frame. It shall be mounted according to the manufacturer's fitting instruction, closed and locked.

The test apparatus shall not be fixed to the timber frame in any way that would weaken the frame. Penetrations through the frame to fix stabilizing bars are acceptable as these strengthen the test rig.

NOTE: Penetrations such as drilled holes and screw fixings into the frame may have a weakening effect which may affect the test results.

The test frame shall be constructed from seasoned timber species commonly used in entry door frames in the region of installation from clear pinus radiata. The timber test frame profile size shall be as specified by the test authority, in the absence of any specification, the frame size shall be 90 mm × 35 mm.

NOTE: Security doors or window grilles tested in softer timbers such as western red cedar may require additional and stronger fastenings whereas harder timbers such as Jarrah would transmit greater forces to the test specimen in the application of the Jemmy test. It is for this reason that clear pinus radiata was chosen as a timber exhibiting mid-range mechanical properties.

Where the security door or window grille has been specifically designed for metal frames, the security door or window grille shall be fixed to a metal test frame in accordance with the manufacturer's installation instructions.

2.5.2 Hinged doors

Where a door is supplied as a complete door set, it shall be tested with its frame as supplied. Where a door is supplied as a separate leaf it shall be mounted to a full perimeter frame in accordance with the appropriate installation Standard. The door leaf shall fit flush to the door frame and have a clearance between the door and the frame at the hinging points shall not be more than 6 mm for steel doors and 4 mm for all other doors. The clearance between the door and the frame at the locking points shall be not more than 4 mm for all doors. At no point shall the clearance be less than 2.5 mm.

2.5.3 Sliding doors and window grilles

Where the manufacturer supplying the specimen for test makes a product for a specific application (such as window manufacturer), then that product shall be mounted in a complete set for testing in accordance with the manufacturer's installation instructions.

A specimen submitted for type testing shall be run on rollers or guides, on an exposed bottom bead, guided in a top channel and shall close into a receiver channel of jamb section suitable to the door/window being tested.

2.6 TEST APPLICATION

Where security screen doors or window grille design is such that the tests specified cannot be carried out, then that part of the test sequence shall be deemed to have been passed.

When using levers or probes during testing, the lever or probe shall be inserted using reasonable manual force and manipulation for a period not longer than 3 min without the aid of any other hand tools. When using a lever and the depth cannot be achieved within 3 min, the test shall be continued at the insertion depth obtained.

The test shall be separately applied to the test specimen in the sequence laid out in the flow chart provided in AS 5039.

Except for the dynamic impact test, all forces shall be applied non impulsively. Unless otherwise specified, the tolerances shall be as follows:

- (a) All angles..... $\pm 3^\circ$ of the nominated angle.
- (b) All forces $\pm 2\%$ of the nominated value.
- (c) All dimensions $\pm 5\%$ of the nominated value.

Any omissions from the test procedure shall be detailed in the test report, and the reason for the omission shall be explained.

The testing authority shall decide where to apply the corner pull test and the fastening point jemmy attack. The application point will be at the testing authority's determination of the weakest point on the test specimen.

SECTION 3 DYNAMIC IMPACT TEST

3.1 SCOPE

This Section sets out a method of test for determining the resistance of security screen doors and security window grilles incorporating infill panels to a specified level of lateral impact energy.

3.2 PRINCIPLE

The effects of human impact against a security screen door or window grille are simulated by allowing a standardized impactor to swing as a pendulum against a test specimen that is held in a vertical orientation. The levels of dynamic impact energy, required to be resisted by screen doors and window grilles in various situations, are generated by raising the centre of gravity of the impactor to predetermined heights above the impact plane before allowing it to swing freely towards the point of impact.

3.3 DEFINITIONS

For the purpose of this Section, the definitions below apply.

3.3.1 Drop height

The vertical height above the impact plane through which the centre of gravity of the impactor falls during its swing.

3.3.2 Impact plane

A horizontal plane aligned with the centre of the test specimen.

3.3.3 Type test

A test or series of tests directed towards approval of a design, conducted to determine whether a product is capable of meeting the requirements of the product specification or Standard.

3.4 APPARATUS

3.4.1 General

The test apparatus shall consist of the following:

- (a) A support frame for supporting—
 - (i) the test specimen in a vertical orientation; and
 - (ii) the standard impactor as a pendulum.
- (b) A standard impactor with attached suspension cable, bridle and hoisting cable.

NOTE: A schematic arrangement of the apparatus, which is suitable for testing plane specimens, is shown in Figure 3.1.

3.4.2 Support frame

The support frame shall be capable of accommodating the full height and width of the test specimen and of supporting its weight and the applied test forces without appreciable deformation of the individual supports or of the frame as a whole.

The components of the frame shall include the following:

- (a) Two lateral specimen supports that extend for the full width of the specimen.
- (b) Vertical specimen supports that extend for the full height of the specimen.

- (c) A means of supporting the loading mechanism.
- (d) A suspension attachment for the impactor, which is located at the top of and central within the width of the frame, and is adjustable in a direction perpendicular to the plane of the lateral supports.
- (e) Means for holding the test specimen firmly in contact with both vertical supports.

3.4.3 Standard impactor and suspension

The impactor is essentially a cylindrical sand and lead-filled bag incorporating a mild steel suspension rod as shown in Figure 3.2. The bag is constructed of either 3 mm thick pliable leather with a moisture-resistant inner liner or a pliable vinyl of equivalent strength and rigidity. It is partially filled with dry sand and lead so that the total mass of the assembled impactor is in the range of 36 to 46 kg. The mass of the impactor shall be regularly checked and any adjustment made by adding dry sand or lead to, or removing some of the dry sand or lead from, the contents.

The suspension cable and lifting bridle shall be made from stranded steel-wire cable of approximately 3 mm diameter. The suspension cable shall be fitted with a shackle at its suspension end and with an adjustable turnbuckle and shackle at the impactor end, and the hoisting cable shall be fitted with a 'quick release' device.

The outside cover of the impactor shall be marked with a line indicating the plane of impact of the impactor.

3.5 IMPACT ENERGY

The panel being tested shall be subjected to an impact energy of 100 J and remain within the screen door or window grille framing.

To impart an impact energy of 100 J, the drop height in millimetres, to which the centre of gravity of the impactor has to be raised, shall be calculated from the following equation:

$$h = \frac{10204}{m} \quad \dots 3.5$$

where

- h = drop height, in millimetres
- m = mass of impactor, in kilograms

3.6 TEST PROCEDURE

The procedure for carrying out the impact test shall be as follows:

- (a) Attach the test specimen to the support frame in such a way that the specimen to support frame connection is not weakened in any way by the test, and the attachment devices do not impede the path of the deflecting infill. The specimen shall be positioned such that the impactor strikes the outside face of the screen door or the window grille.
- (b) Check and, if necessary, adjust the mass of the impactor so that it is within the prescribed limits.
- (c) Attach the impactor to the suspension cable and suspend it at the point of attachment on the test frame so that the face of the impactor rests on the face of the infill and the suspension cable is vertical.

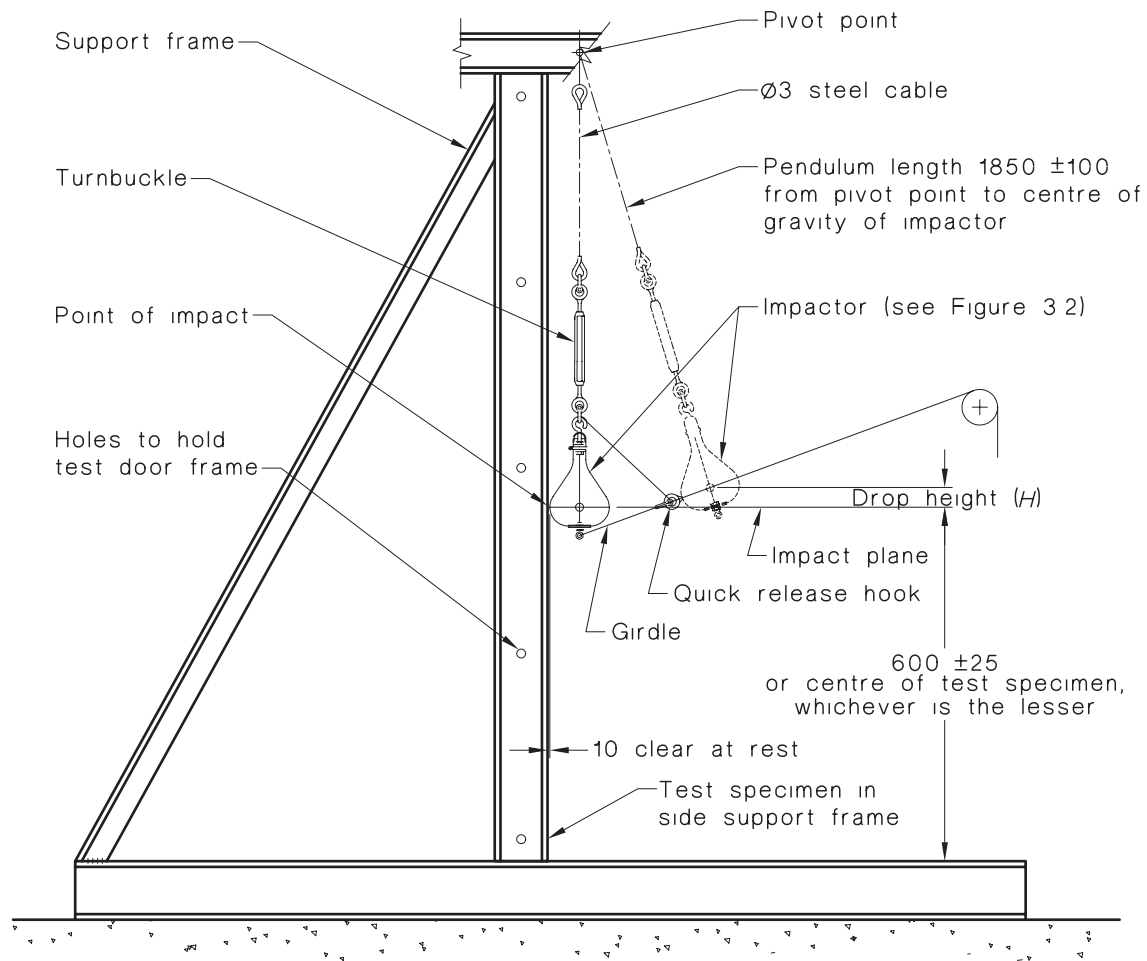
A1

- (d) Adjust the length of the suspension cable and turnbuckle so that the centre of gravity of the impactor is aligned with a point 600 ± 25 mm from the bottom edge of the test specimen or the centre of the test specimen, whichever is the less, and 250 ± 25 mm from the edge of the test specimen (see Figure 3.3). Impact point (A) or (B,) as specified in Figure 3.3, shall be such that it is closest to the incomplete pattern at the edge of the infill material. If both edges of the infill material have complete patterns, then either impact point may be used (see Clause 2.4.1.1 and Clause 2.4.2.1). In the case of a Type II infill material, the impactor shall directly impact upon a chord as close as possible to this range of figures. Ensure that the pendulum length remains in the range 1850 ± 100 mm (see Figure 3.1).
- (e) Using the bridle, swing the impactor away from the infill until the centre of gravity mark is the drop height distance (calculated from Equation 3.5) above the impact plane (see Figure 3.1). Ensure that—
 - (i) the line of swing is perpendicular to the plane of the infill;
 - (ii) the suspension cable is taut; and
 - (iii) the bridle is not angling the impactor through contact at top of edge of same.
- (f) Release the impactor without jerking or impeding its swing in any way and ensure that the impactor is prevented from hitting the screen door or the window grille after the rebound.
- (g) Examine the screen door or window grille and record any observed damage in the form of cracks, gaps or breakage.
- (h) Repeat Steps (e) to (g) four more times to give a total of five impacts.
- (i) Record any deformation or fracture of the test specimen infill material and the size of the largest hole in the infill material.
- (j) Record any deformation or fracture of the test specimen infill material to framing section interface and the size of the largest hole formed at that interface.
- (k) For a Type I infill material attempt to pass a 65 ± 0.5 mm $\times$ 25 ± 0.5 mm $\times$ 15 ± 0.5 mm probe (see AS 5039) through any part of the infill material (including the infill to framing section) using reasonable manual force.
- (l) For a Type II infill material, where the supplied aperture size in either direction is greater than 300 mm, attempt to pass a rigid spherical probe of 150 mm diameter through any opening in the test specimen using reasonable manual force. Where the supplied aperture size in both directions is less than 300 mm, attempt to pass a rigid spherical probe of 213 mm diameter through any opening in the test specimen using reasonable manual force.

3.7 TEST REPORT

The relevant identification details and results of the test shall be reported.

NOTE: An example of a test report is given in Appendix C of AS 5039. It also includes the identification details that should be submitted.



DIMENSIONS IN MILLIMETRES

FIGURE 3.1 SCHEMATIC ARRANGEMENT OF TEST APPARATUS

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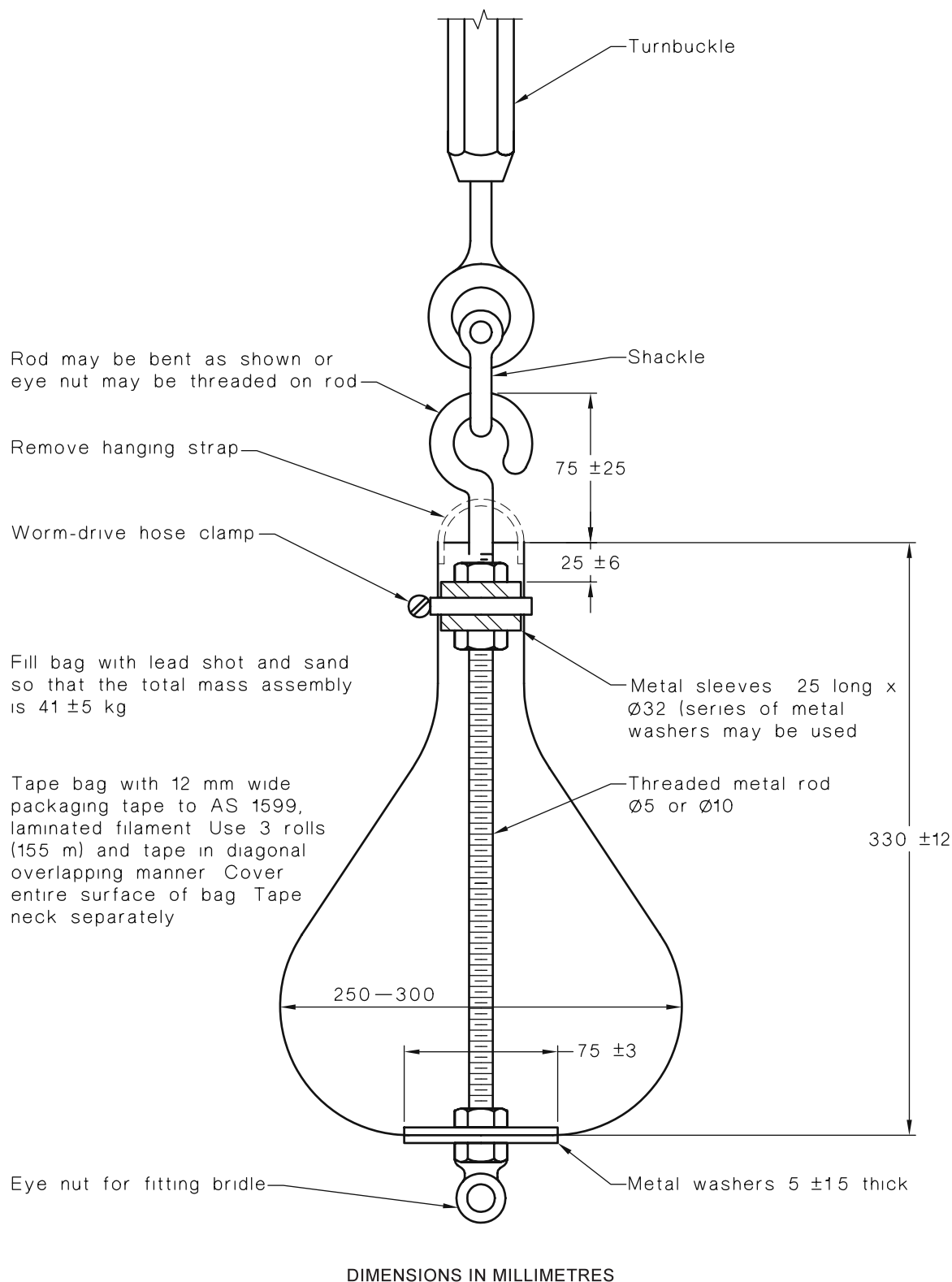


FIGURE 3.2 TYPICAL STANDARD IMPACTOR