AS 5041—2003
(Incorporating Amendment No. 1)
Reconfirmed 2016

AS 5041—2003

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)
- Curtin University of Technology
- Department of Housing New South Wales
- Housing Industry Association
- Insurance Council of Australia
- Master Builders Australia
- Master Locksmiths Association of Australasia
- Monash University
- NSW Police Service
- National Security Screen Association
- Queensland Police Service
- Security Agents Institute of WA
- Steel Security Manufacturers Association Queensland
- University of Western Sydney
- Victoria Police
- Victorian Employers Chamber of Commerce and Industry
- Western Australia Police

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STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 5041—2003

Methods of test—Security screen doors and window grilles

RECONFIRMATION NOTICE

Major stakeholders of this publication have been consulted and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

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NOTES

AS 5041—2003
(Incorporating Amendment No. 1)

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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*

CONTENTS

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.

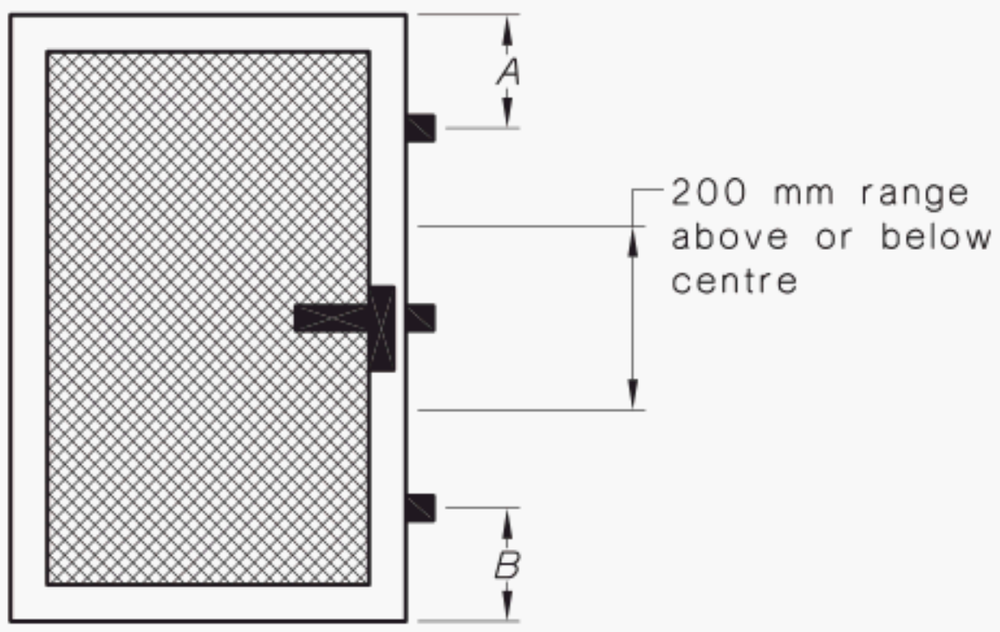


FIGURE 2.1 RANGES FOR LOCK MECHANISM (HINGED DOORS)

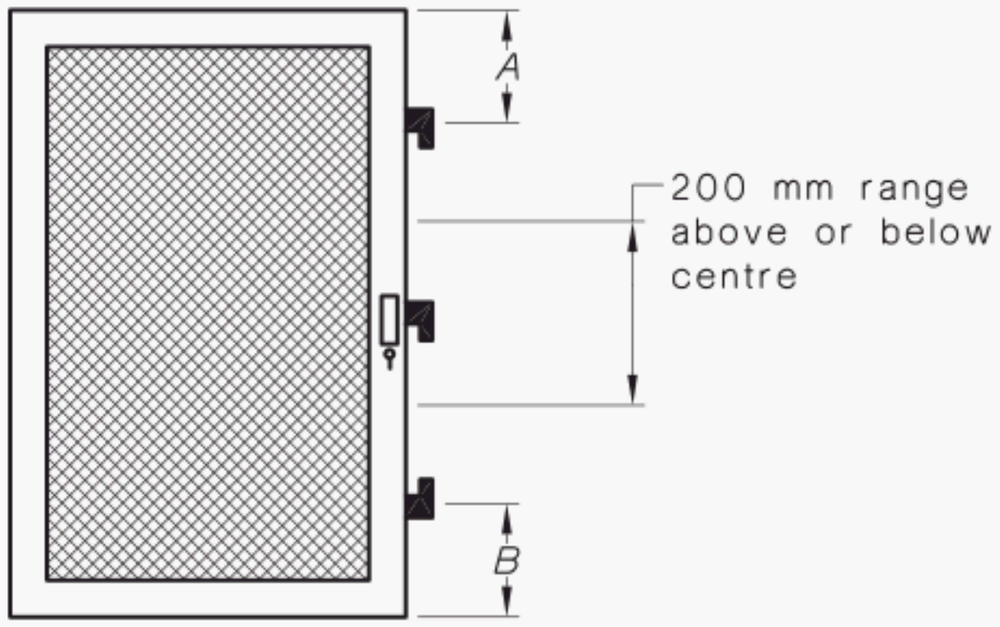


FIGURE 2.2 RANGES FOR LOCK MECHANISM (SLIDING DOORS)

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.

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 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

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 ..... $\pm 3°$ of the nominated angle.

(b) All forces ..... ±2% of the nominated value.

(c) All dimensions ..... ±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:

$$h = \frac{10204}{m} \qquad \ldots 3.5$$

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.

(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
A1 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.

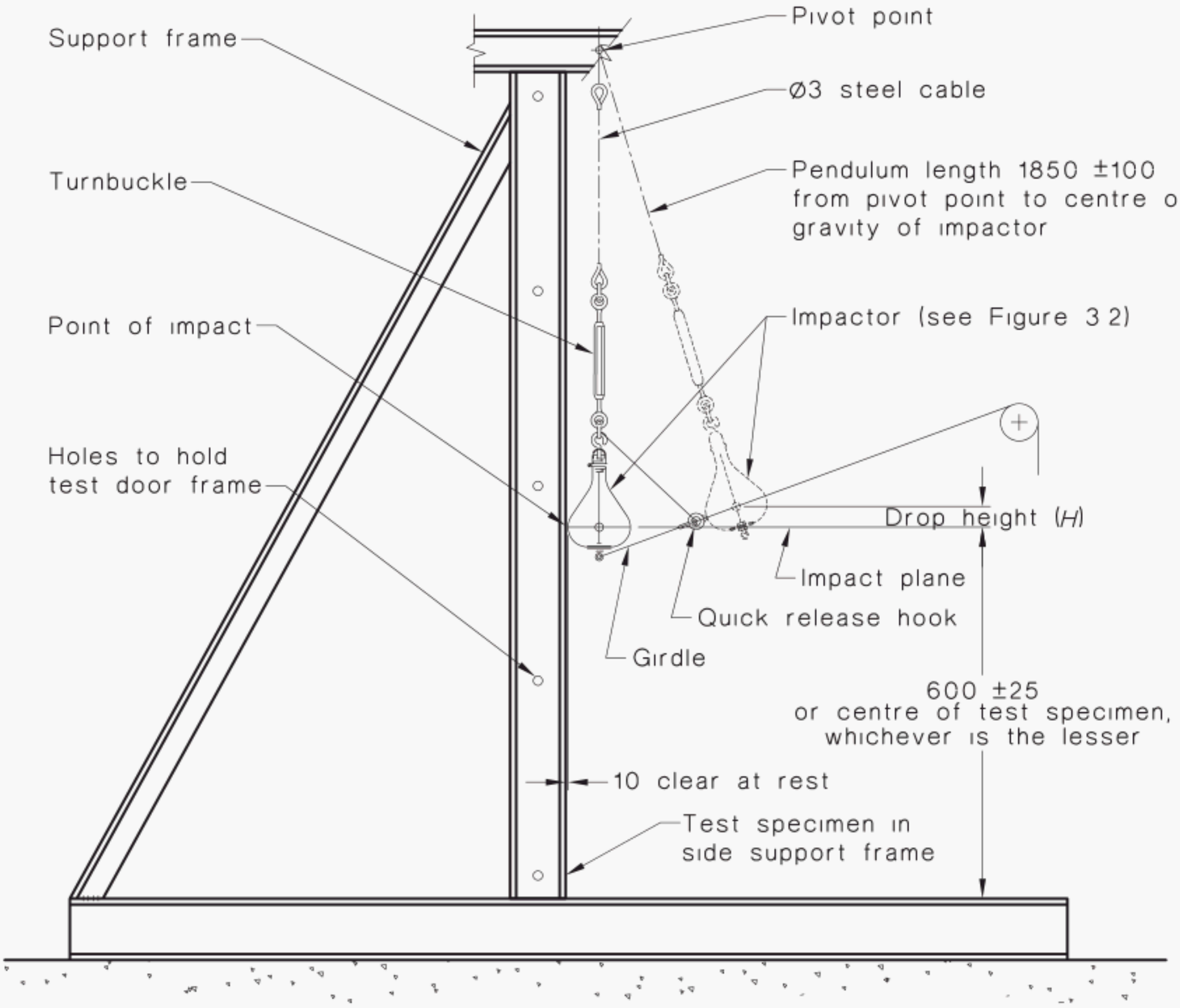
(k) For a Type I infill material attempt to pass a 65 ±0.5 mm × 25 ±0.5 mm × 15 ±0.5 mm probe (see AS 5039) through any part of the infill material (including the infill to framing section) using reasonable manual force.

(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.

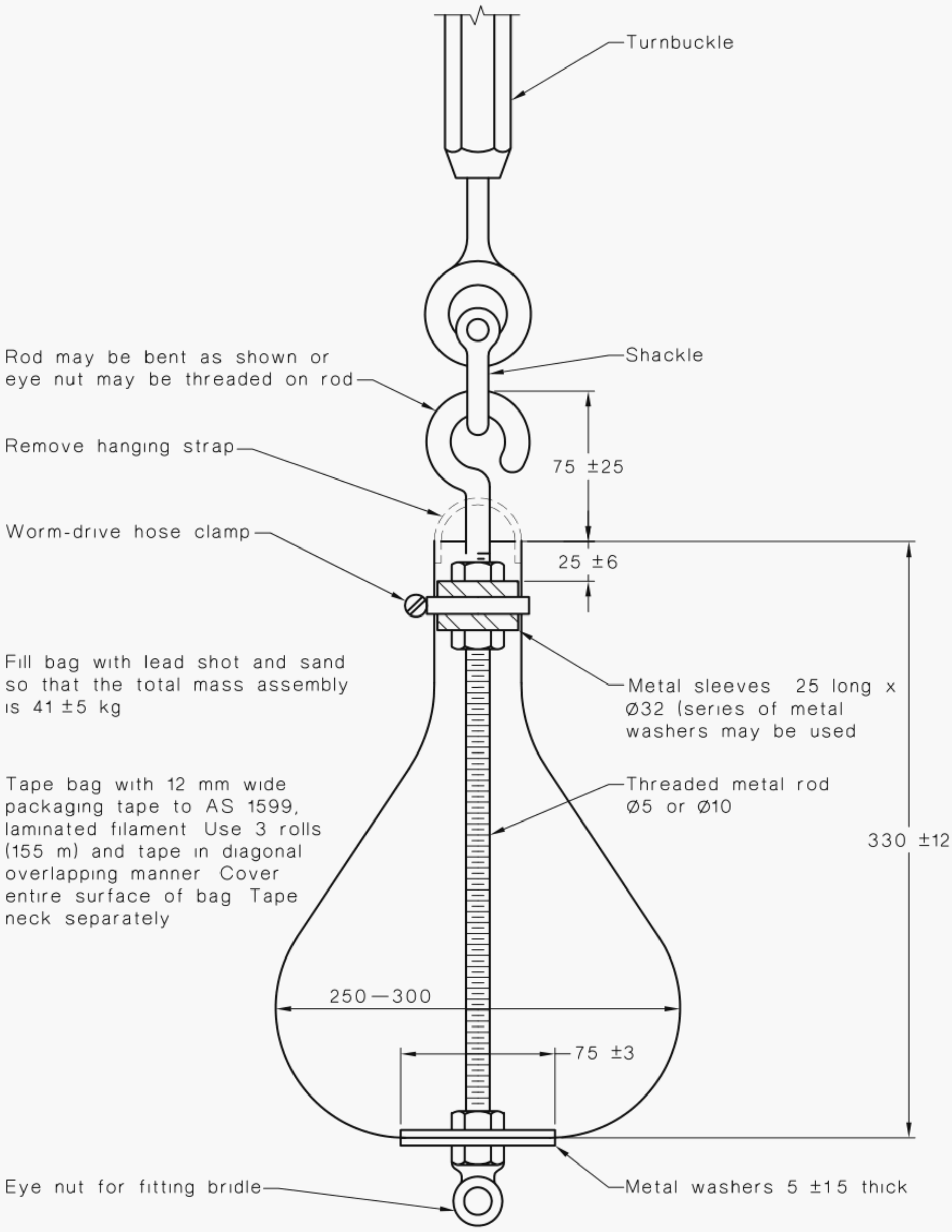
NOTE: An example of a test report is given in Appendix C of AS 5039. It also includes the identification details that should be submitted.



DIMENSIONS IN MILLIMETRES

FIGURE 3.1 SCHEMATIC ARRANGEMENT OF TEST APPARATUS

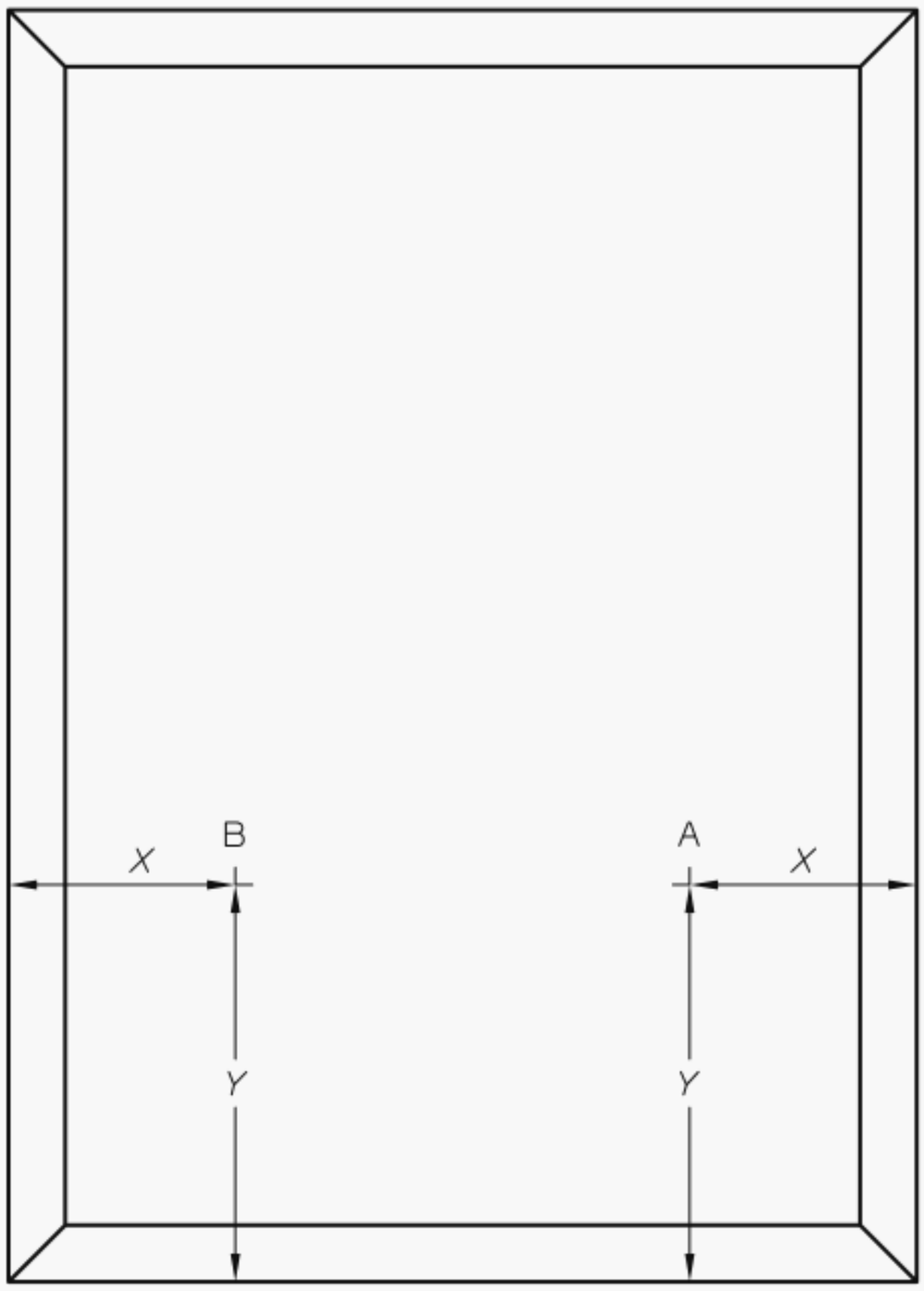
A1



DIMENSIONS IN MILLIMETRES

FIGURE 3.2 TYPICAL STANDARD IMPACTOR

A1



LEGEND

X = 250 ±25 mm

Y = 600 ±25 mm or the centre of the test specimen, whichever is the lesser

FIGURE 3.3 IMPACT POSITION

SECTION 4 JEMMY TEST

4.1 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 lever force.

4.2 PRINCIPLE

The effects of a jemmy attack against a security screen door or window grille are simulated by allowing a standardized narrow-bladed lever to be inserted against the locking, fastening and hinging points and a turning force (torque) is applied to those points via the lever.

4.3 APPARATUS

The following apparatus is required:

(a) *Force application* Means of applying the forces specified in Clause 4.4 to the locking, fastening, hinging and other locations on the test specimen. The forces shall be applied steadily and non-impulsively.

(b) *Lever* A narrow bladed lever capable of transferring the forces to the test locations. The lever shall comply with the dimensions shown in Figure 4.1, and capable of applying the full test load without permanent deformation, can be used for the lever tests in this Section.

A1

(c) *Test rig* The test rig used to apply the torque shall be such that the point of application can be close to the point of test. The method of application of the lever torque is illustrated in Figure 4.2, Figure 4.3 and Figure 4.4 (as applicable) and the apparatus used shall be suitably tethered to prevent possible injury to test staff in the event of a sudden release of the force.

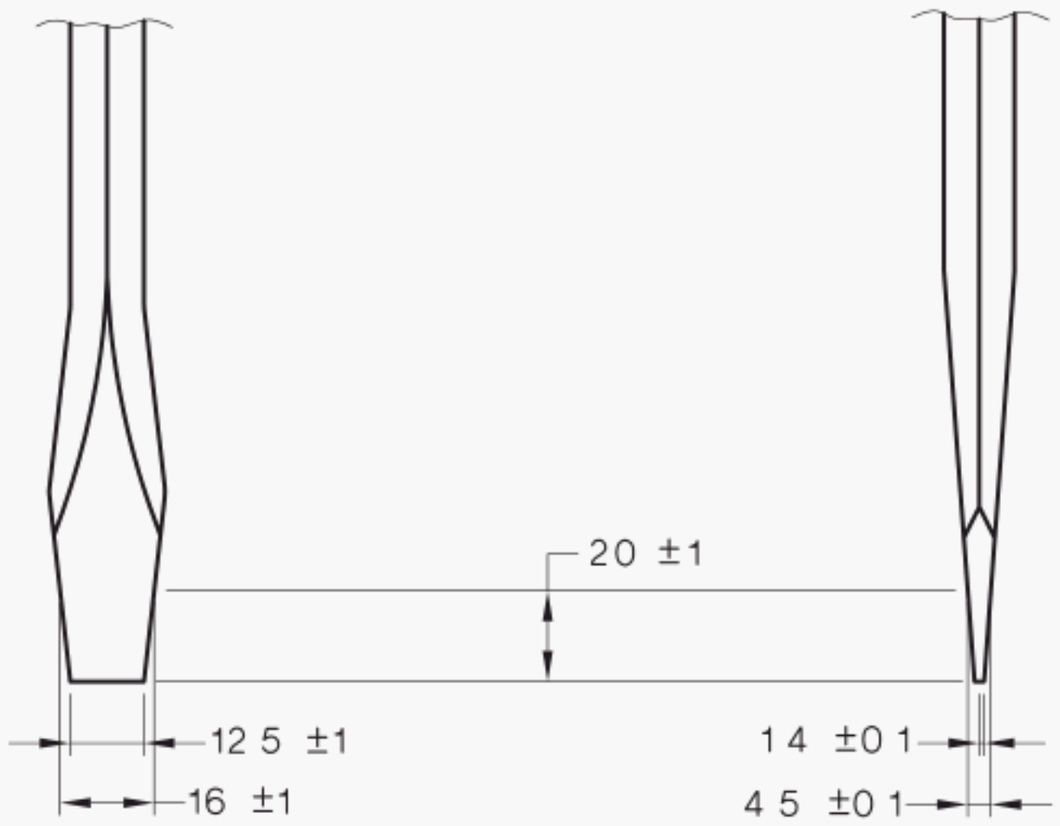
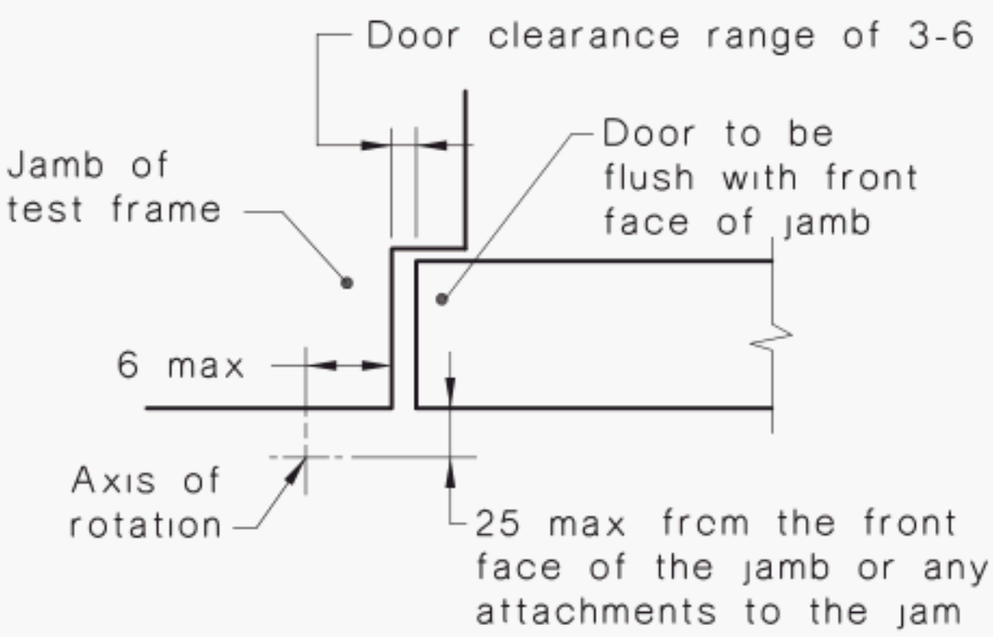


FIGURE 4.1 TEST LEVER



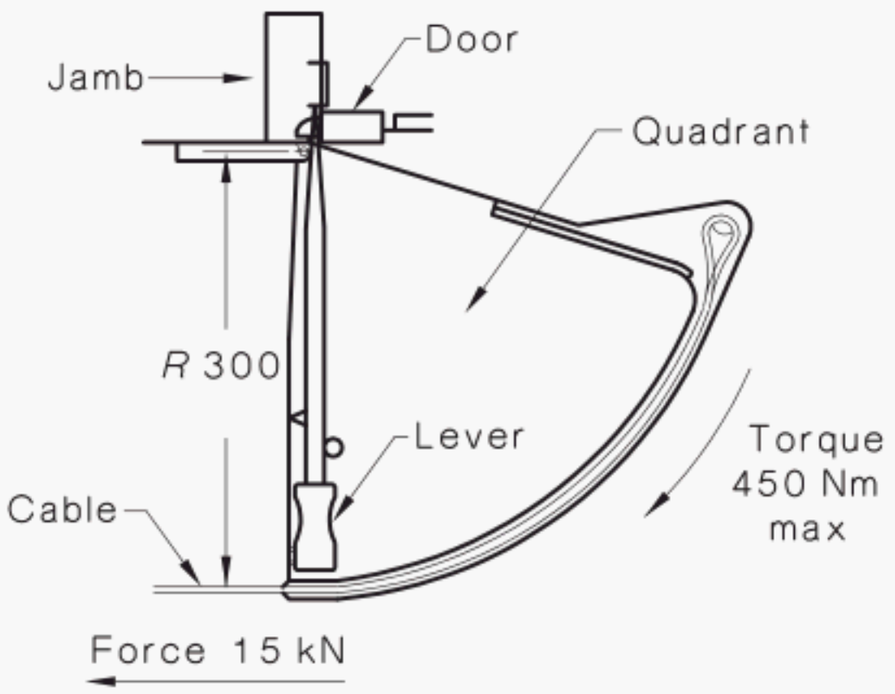
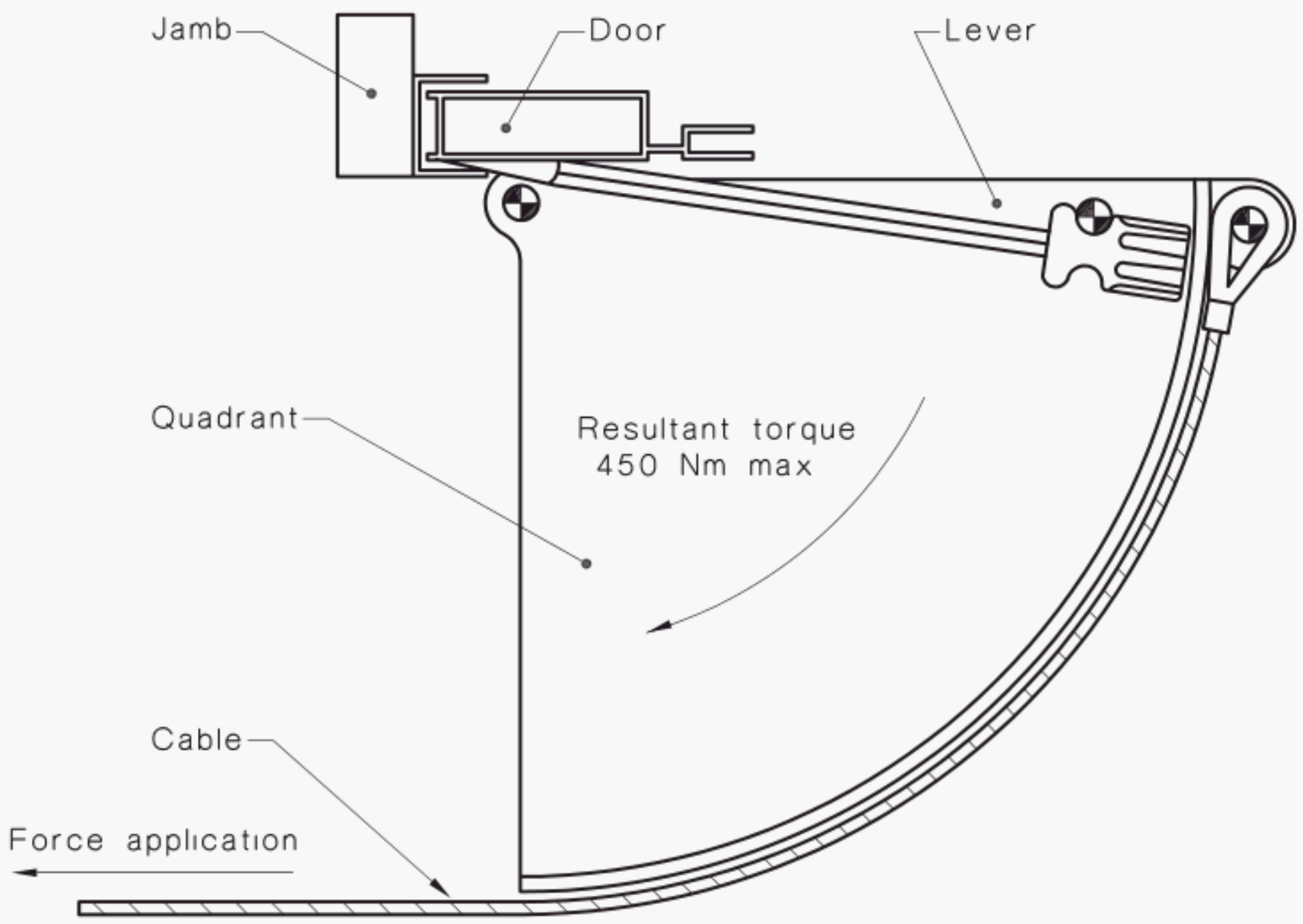


FIGURE 4.2 HINGED TEST SPECIMEN TEST SET-UP

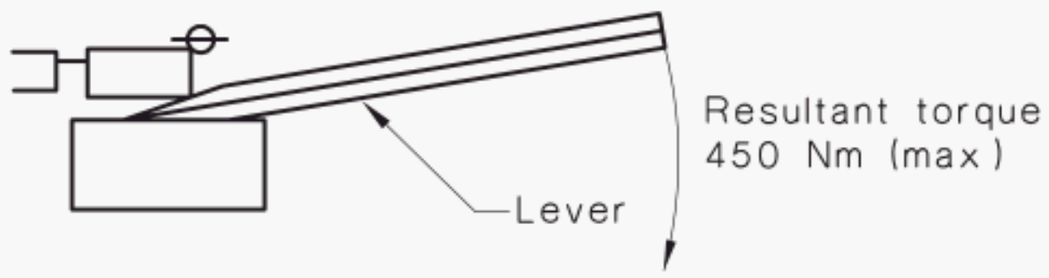
(a) Pivot centre for torque application



(b) Typical lever torque application

FIGURE 4.3 SLIDING TEST SPECIMEN TEST SET-UP

(a) Rebate fixed security window grille



(b) Face fixed security window grille

FIGURE 4.4 WINDOW GRILLE TEST SPECIMEN TEST SET-UP

4.4 TEST PROCEDURE

4.4.1 Attack on hinged security screen doors

4.4.1.1 *Attack upon locks*

The point of application of the lever shall be within 50 mm of the centre of the lock bolt and shall bear on the lock body. For the purpose of the test, the lever shall be inserted between the door and the jamb so that the tip of the lever is aligned with the back edge of the doorframe (see Figure 4.5). The test shall be applied to all locking points. If the test cannot be applied within 50 mm from a locking point, the test shall be applied as close as possible to the locking point.

The lever shall be inserted using reasonable manual force and manipulation without the aid of any other hand tools. If the necessary depth cannot be achieved within three minutes, the test shall be continued at the insertion depth obtained. Alternatively, the lever may be mechanically inserted to a maximum force of 980 N, or until the lever reaches the door or window grille stop.

Whilst performing this test, the lever shall be secured in relation to the pivot point with a hold in force of 700 N.

Should the lever be displaced during the test, the above directions shall be repeated a second time.

Should the lever disengage the second time, the next test shall be carried out.

NOTE: The lever should be restrained in a manner that prevents injury to test personnel.

Whilst performing this test, the lever shall be secured in relation to the pivot point and restrained at that point to prevent axial displacement of the lever away from the doorframe.

NOTE: The intention is to stop the lever from slipping out of the door frame during testing.

When testing type 3 products, if a gap of 15 mm × 90 mm is achieved, which is large enough to allow the insertion of the testing pull bracket, a pull test shall be required.

The lever shall then be subjected to a force that will result in a maximum torque of 450 Nm being applied to the lever about the axis of rotation, for the full movement arc of the lever (see Figure 4.2). The test shall be repeated at all locking points on the door.

NOTE: If, in seeking to apply the torque specified, the full torque value has not been achieved after the lever has been rotated through 80° from the normal to the door, this will not constitute a failure of the test provided that the requirements of this Clause are met.

The load shall be applied for 20 s after the maximum load or displacement is reached.

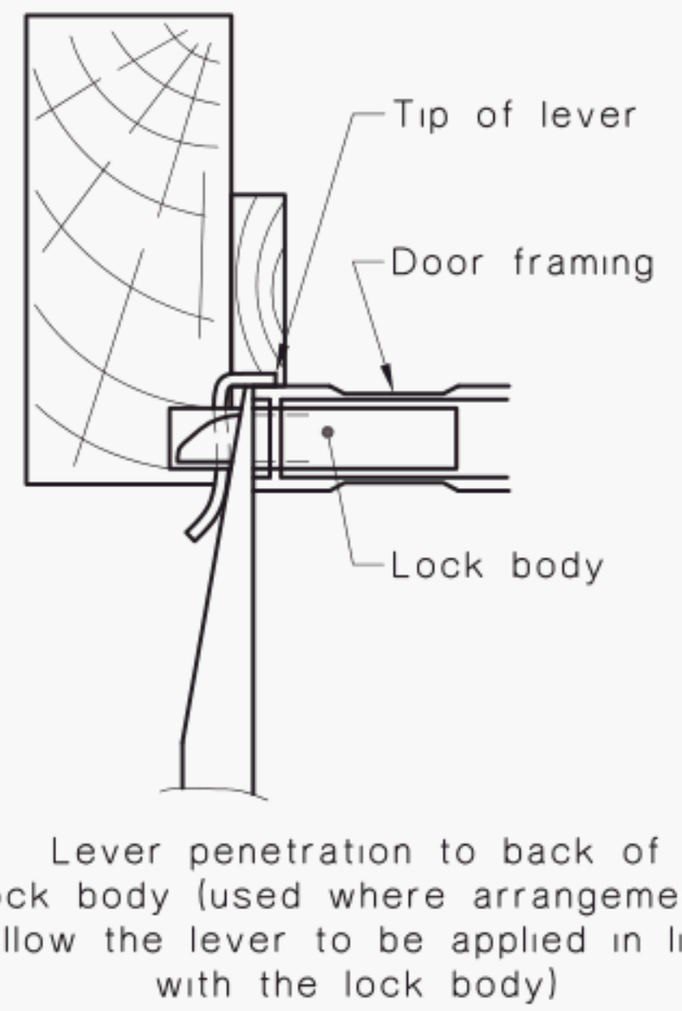


FIGURE 4.5 LEVER ATTACK ON DOOR FRAME

4.4.1.2 *Anti-jemmy strips*

If the door is fitted with an anti-jemmy strip, the lever shall be applied beneath the anti-jemmy strip as shown in Figure 4.6 so as to lift the strip, using a torque of 450 Nm applied about the point of contact of the lever with the jamb. The lever should penetrate behind the strip as far as the frame.

If deformation of the anti-jemmy strip allows the lever to be inserted between the door, the test shall proceed as described in Clause 4.4.1.1.

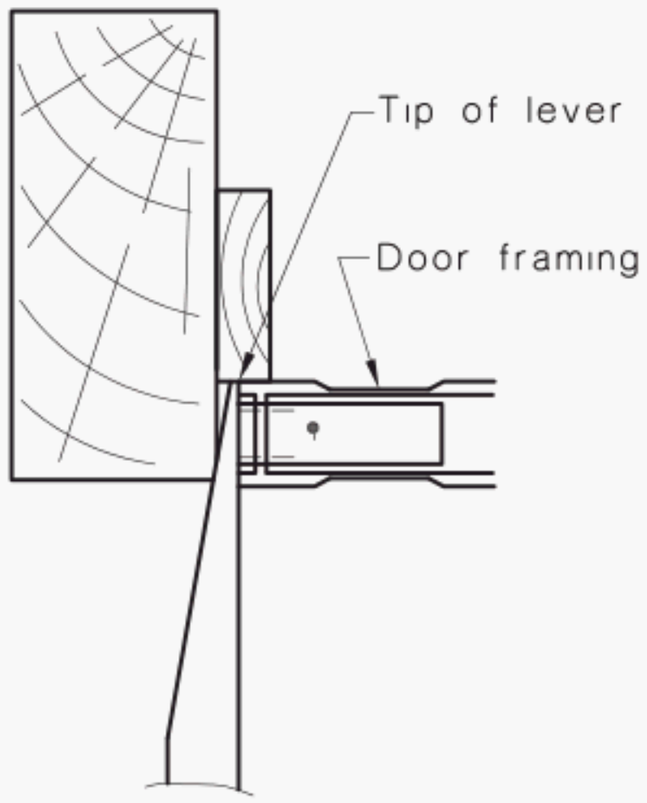
Application of lever to anti-jemmy site (where fitted)

FIGURE 4.6 TEST ON LOCK/HINGES

4.4.1.3 *Hinge attack*

The lever shall be inserted between the door and the jamb within 25 mm of the edge of the hinge leaf so that the tip of the lever is aligned with the back edge of the doorframe (see Figure 4.7). The test shall be applied to all hinge points. If the test cannot be applied within 25 mm from a hinge point, the test shall be applied as close as possible to the hinge point.

The lever shall be loaded as per the lock attack sequence and repeated at all hinge points, in accordance with Clause 4.4.1.1. Attack points are below the top hinge and above the centre and bottom hinges. The load shall be applied for 20 s after the maximum load or displacement is reached.



Lever penetration to back edge
of door for hinge attack

FIGURE 4.7 HINGE ATTACK

A1 | **4.4.2 Attack on sliding security screen doors**

The locks on sliding security screen doors shall be subjected to a jemmy attack in two stages, as follows:

(a) *Stage one* The lever shall be inserted between the closing channel and the door frame within 50 mm of the centre of the lock bolt and bearing on the lock body, unless the testing authority deems that there is an easier path to the opening of the lock, by leverage, that is outside the prescribed testing locality. For the purpose of the test, the lever shall be inserted to a depth where the tip of the lever bottoms in the closing jamb (see Figure 4.8).

The lever shall be inserted using reasonable manual force and manipulation without the aid of other hand tools. If this depth cannot be achieved within 3 min, the test shall be continued at the insertion depth obtained.

The lever shall then be subjected to a force that will result in a maximum torque of 450 Nm being applied about the axis of rotation of the lever. The force application shall cease when any resultant movement of the lever ceases or reaches a position perpendicular to the door.

(b) *Stage two* Where the result of stage one allows the lever to be inserted to a depth where the lever tip is aligned with the back edge of the door framing it shall be inserted to that depth (see Figure 4.9). The lever shall be inserted using reasonable manual force and manipulation without the aid of any other hand tools. If this depth cannot be achieved within 3 min, the test shall be continued at the insertion depth obtained.

The force application shall be continued at the same level until the resultant movement ceases or the lever reaches an angle of 160° from the face of the door.

The lock attack shall be repeated at all active locking points of the door.

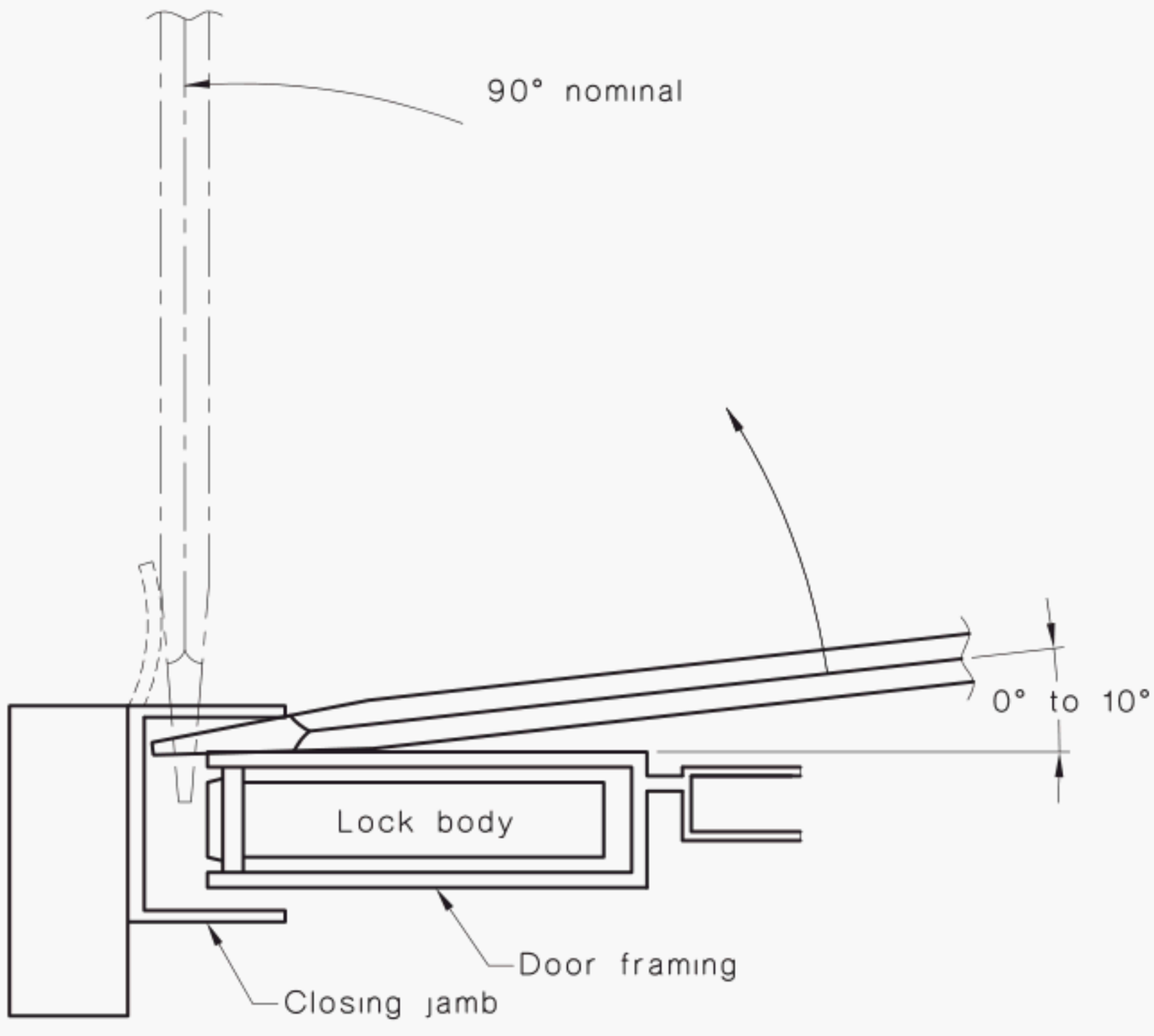


FIGURE 4.8 LEVER ATTACK—STAGE ONE

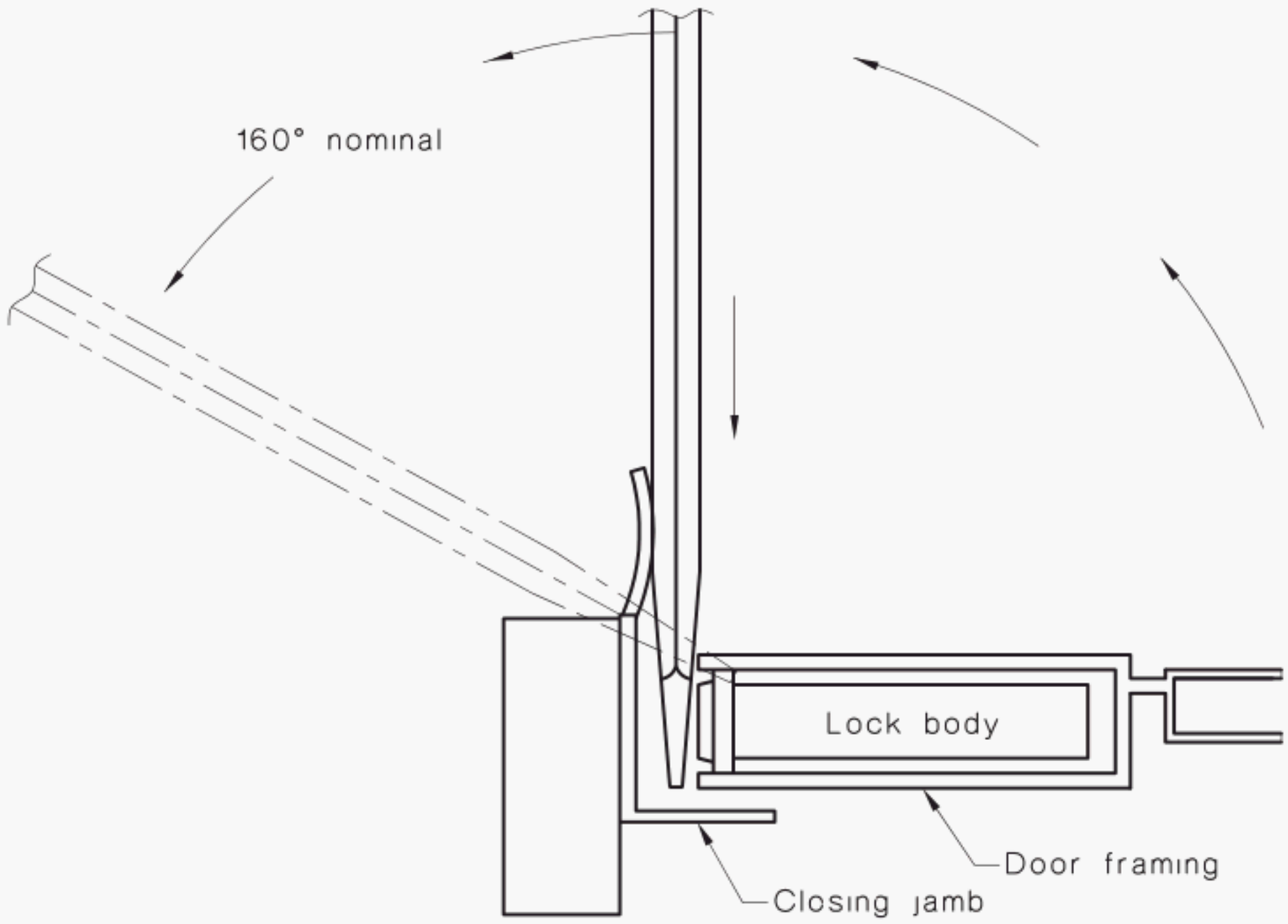


FIGURE 4.9 LEVER ATTACK—STAGE TWO

4.5 ATTACK ON SECURITY WINDOW GRILLES

4.5.1 Anti-jemmy strips/anti-jemmy stop beads

If the security window grille is fitted with an anti-jemmy strip, it shall be attacked in accordance with Clause 4.4.1.2. If the test cannot be applied within 50mm from a locking point, the test shall be applied as close as possible to the locking point.

4.5.2 Lock attack

For those security window grilles incorporating a lock or locking points, the points of application of the lever shall be within 50 mm of the centre of the locking point. The lever shall be inserted between the security window grille and the window frame. If the security window grille is housed in a jamb, the tip of the lever should be aligned with the back edge of the jamb (see Figure 4.8). If the test cannot be applied within 50 mm from a locking point, the test shall be applied as close as possible to the locking point.

The test shall be repeated at all locking points on the window grille. The lock attack test shall be performed in accordance with Clause 4.4.1.1.

4.5.3 Hinge/fastening point attack

For security window grilles incorporating a hinge or fastening point, the lever shall be inserted between the security window grille and the jamb within 25 mm of the edge of the hinge or fastening point so that the tip of the lever is aligned to the back edge of the window frame (see Figure 4.10). For face fixing, the lever shall be inserted to a depth of 20 mm (see Figure 4.11). If the test cannot be applied within 25 mm from a hinge point, the test shall be applied as close as possible to the hinge point.

The test shall be repeated at all hinge/fastening points on the window grille. The hinge/fastener attack test shall be performed in accordance with Clause 4.4.1.1

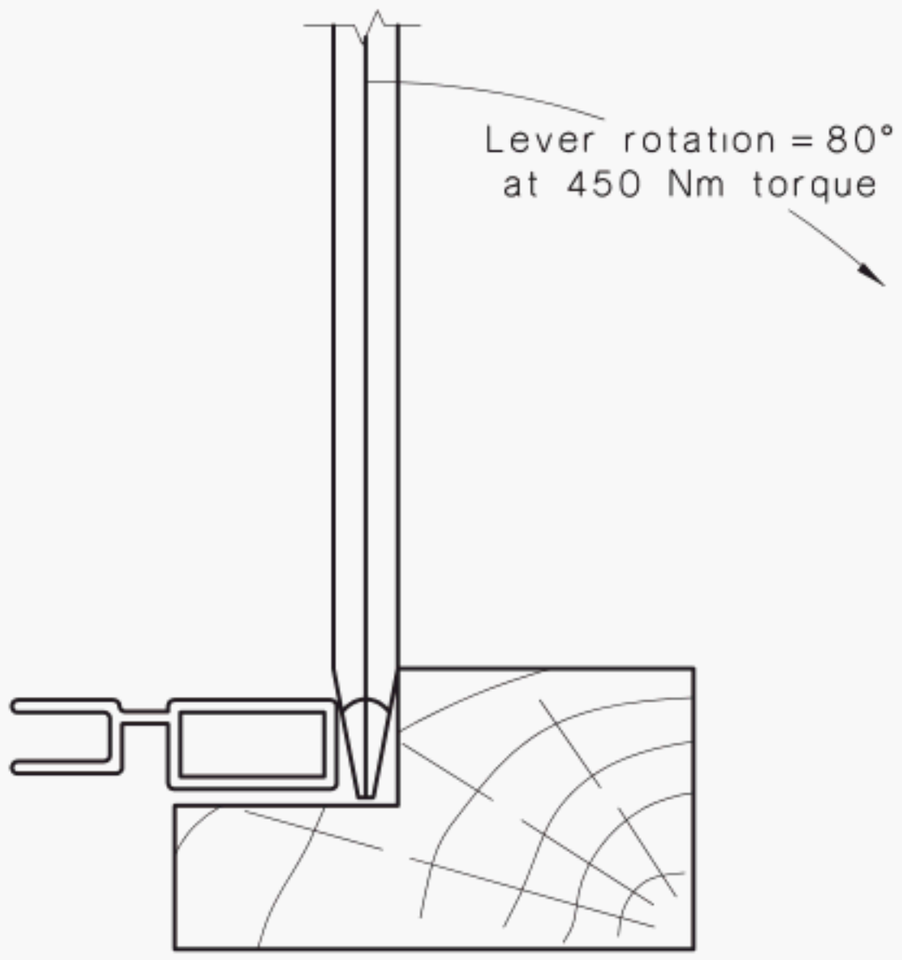


FIGURE 4.10 REBATE FIXED SECURITY WINDOW GRILLES

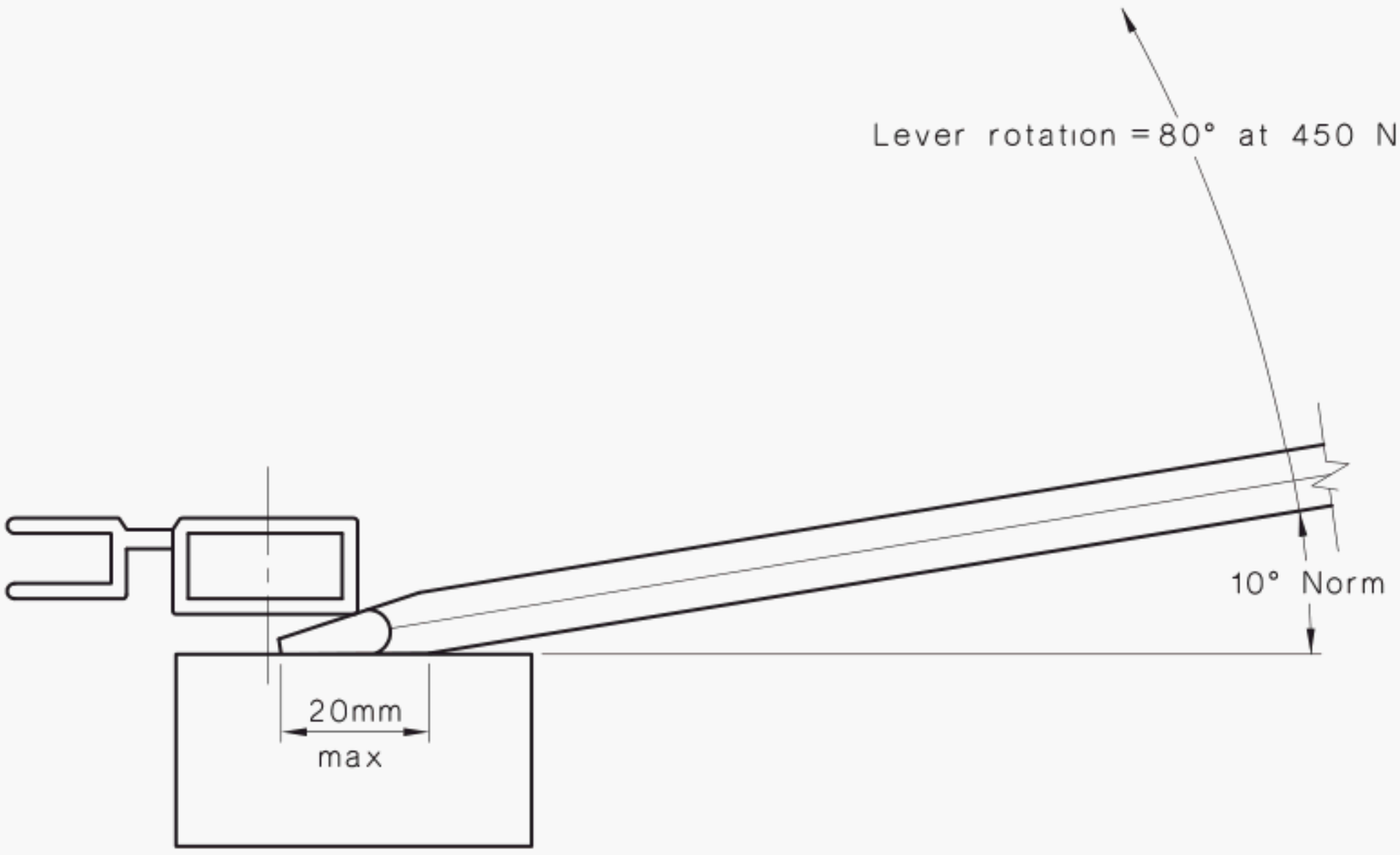


FIGURE 4.11 FACE FIXED SECURITY WINDOW GRILLE

4.6 TEST REPORT

Relevant identification details and results of 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.

SECTION 5 PULL TEST

5.1 SCOPE

This Section sets out a method for determining the resistance of security screen doors and security window grilles incorporating infill panels to specified levels of pull forces.

5.2 PRINCIPLE

The effects of a pull attack against a security screen door or window grille are simulated by allowing a direct force to be applied to the test specimen via a cable. The forces are applied at different angles and different levels depending upon the force location.

5.3 APPARATUS

The following apparatus is required:

(a) Means of applying the forces specified in Clause 5.4 to the appropriate location on the test specimen. The forces shall be applied in accordance with Figure 5.1 and 5.2, as applicable.

NOTE: The allowable variation in the direction of the application of the forces applied to the test specimen provides for flexibility in the arrangement of test rigs. The forces are applied at one angle only, determined by the nature of the rig used. This may give rise to a slight variation in the results, but this is not considered to be significant because the normally applied force at the centre has the greatest tendency to remove the infill material.

(b) A suitable arrangement for applying the forces to the test specimen.

NOTE: If a mass and pulley system is used to apply the forces, attention has to be given to frictional effects in designing the system.

(c) A support frame that 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.

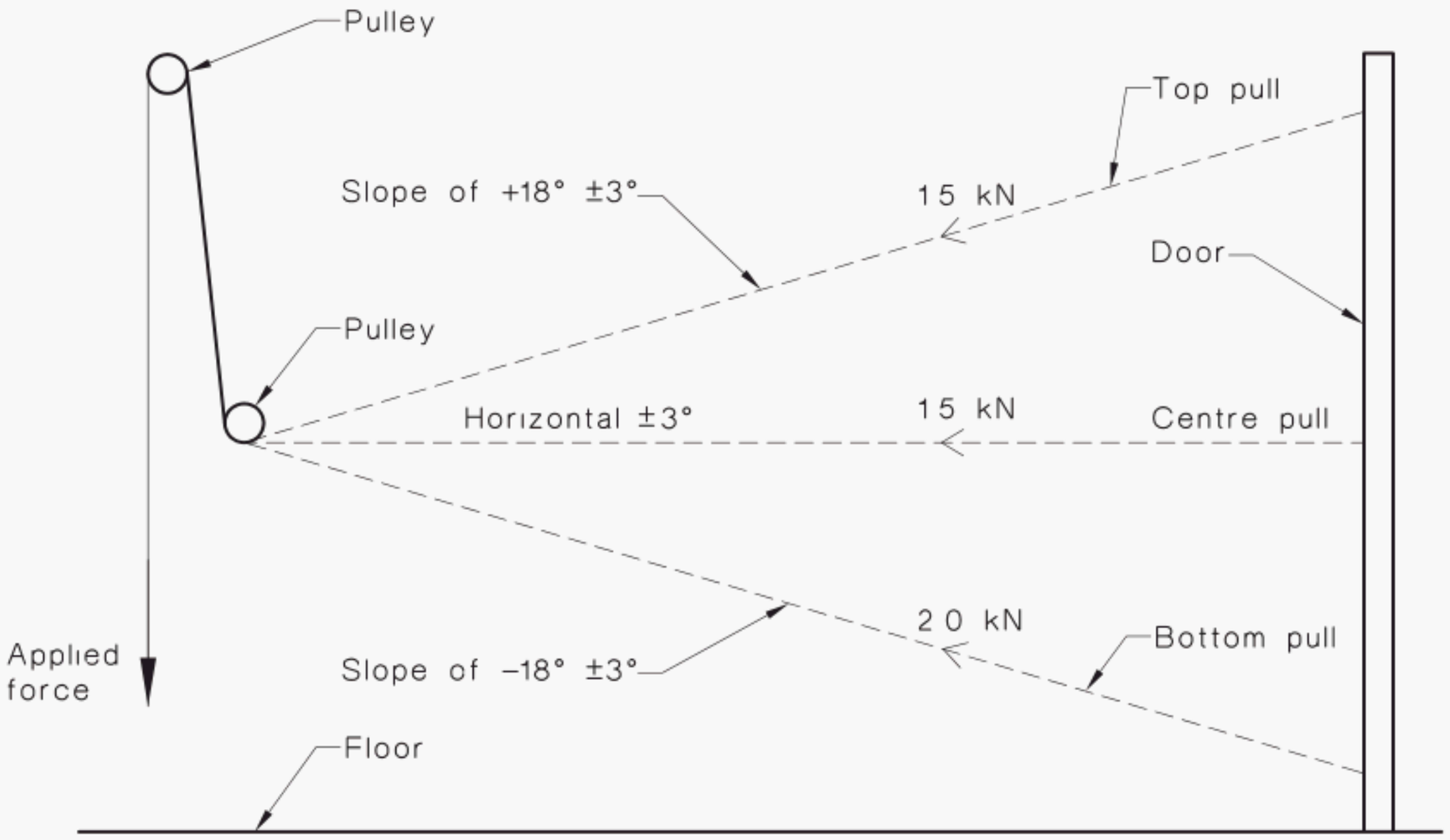
The components of the frame may include the following:

(i) Two lateral specimen supports that extend for the full width of the specimen.

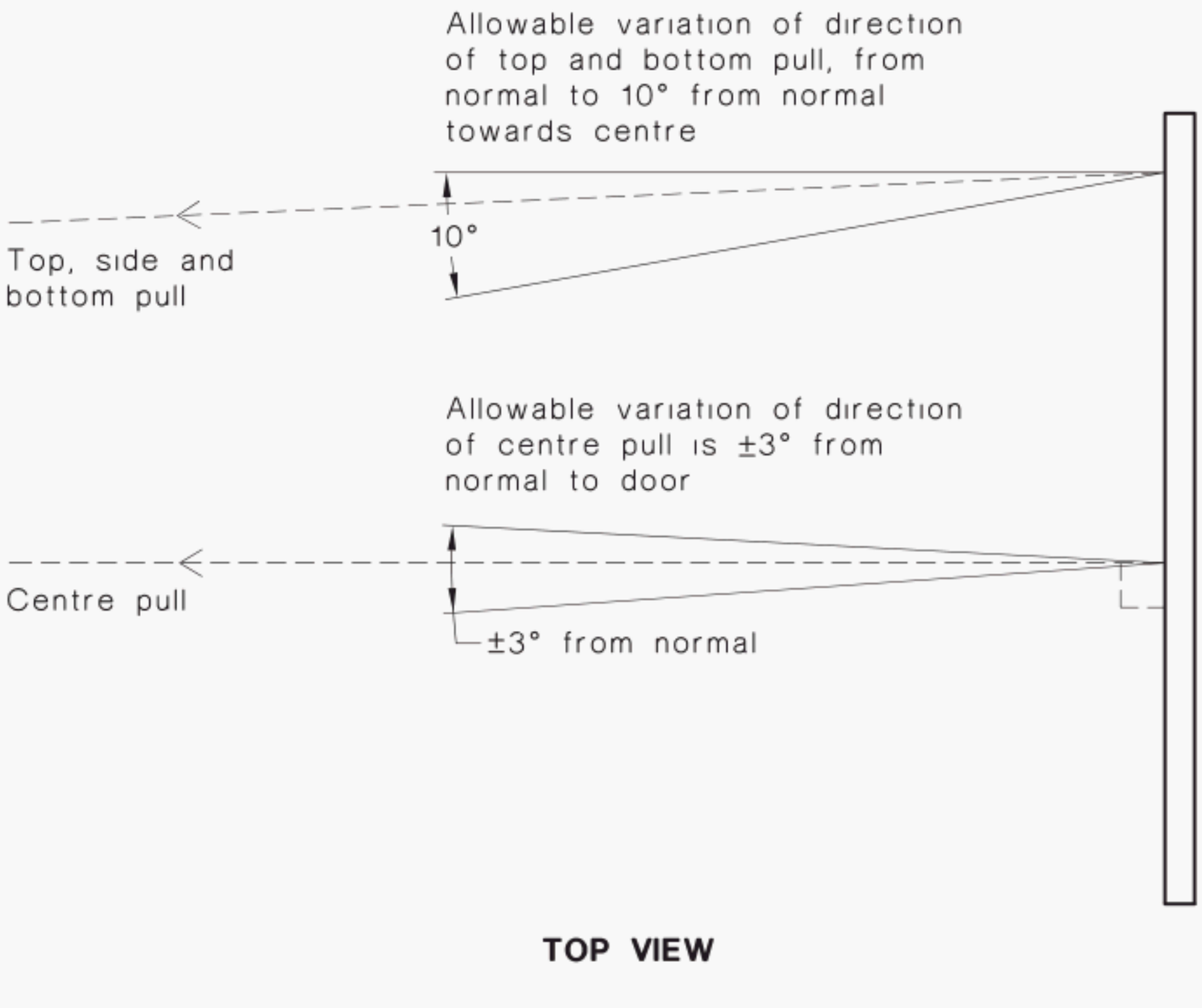
(ii) Vertical specimen supports that extend for the full height of the specimen.

(iii) A means of supporting the loading mechanism.

(iv) Means for holding the test specimen firmly in contact with both vertical supports.



SIDE VIEW



TOP VIEW

FIGURE 5.1 PULL TESTS ON DOORS

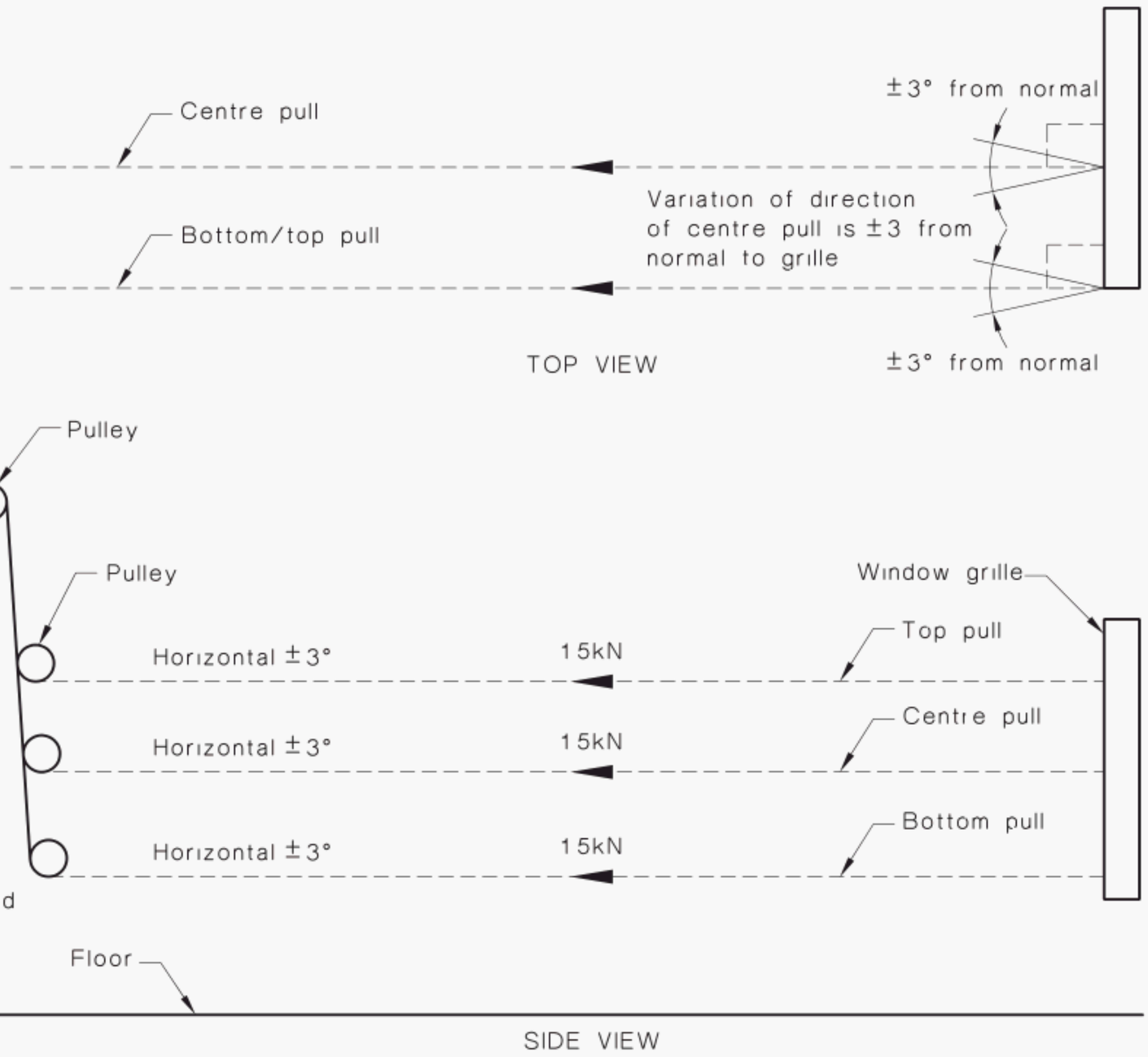
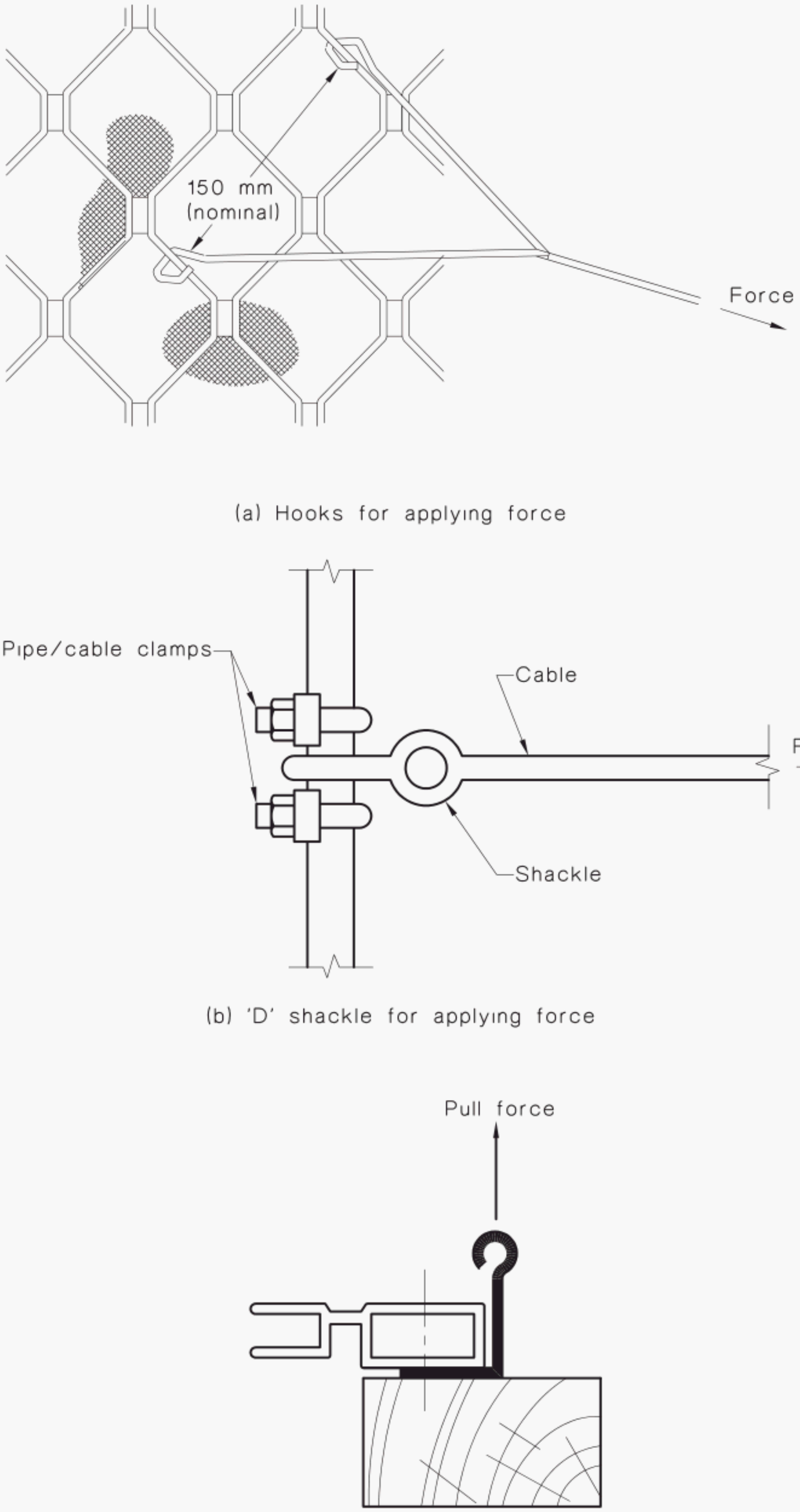


FIGURE 5.2 PULL TESTS ON WINDOW GRILLES

5.4 TEST PROCEDURE

5.4.1 Method of application of pull test forces to the test specimen

The forces applied to the test specimen shall be by means of two hooks or 'D' shackles over the chords of the infill material nominally 150 mm apart (see Figure 5.3). Alternatively, 'L' hooks or an alternative device may be used on the edge of the test specimen (see Figure 5.3).

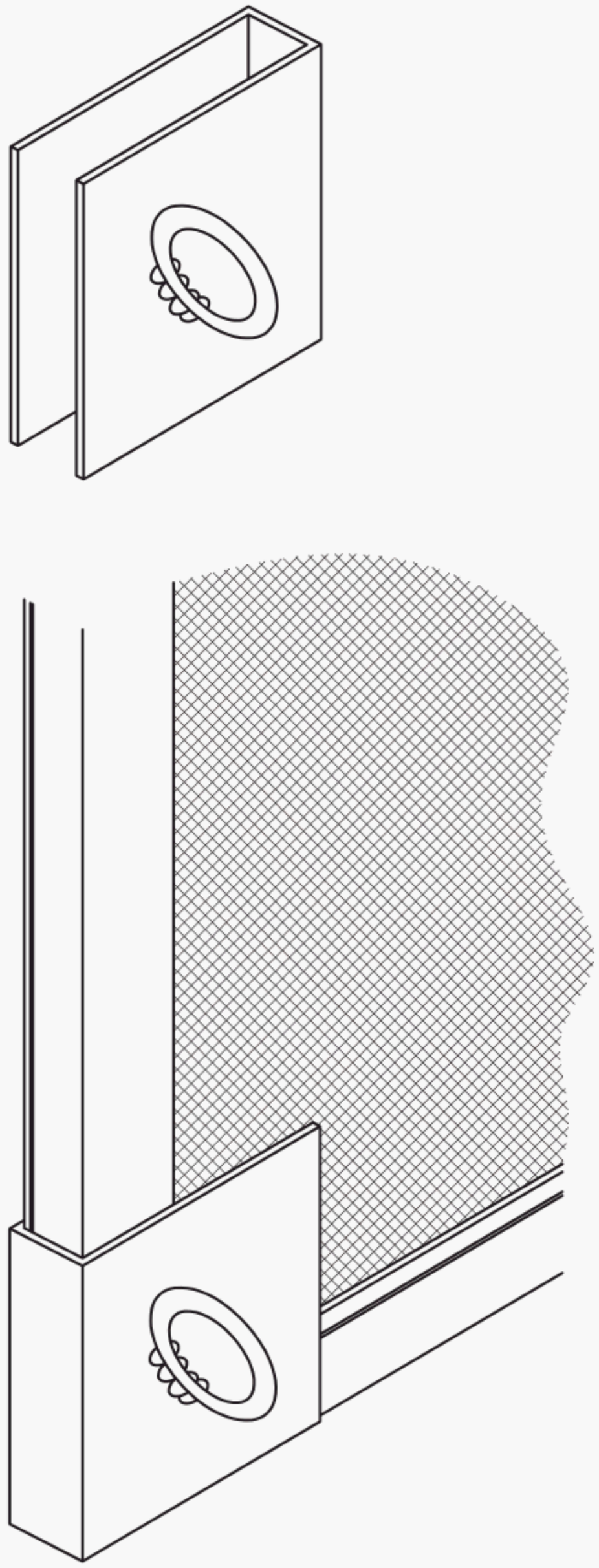


(a) Hooks for applying force

(b) 'D' shackle for applying force

(c) 'L' hooks for applying force

FIGURE 5.3 (in part) METHODS OF APPLICATION OF PULL FORCES TO THE TEST SPECIMEN

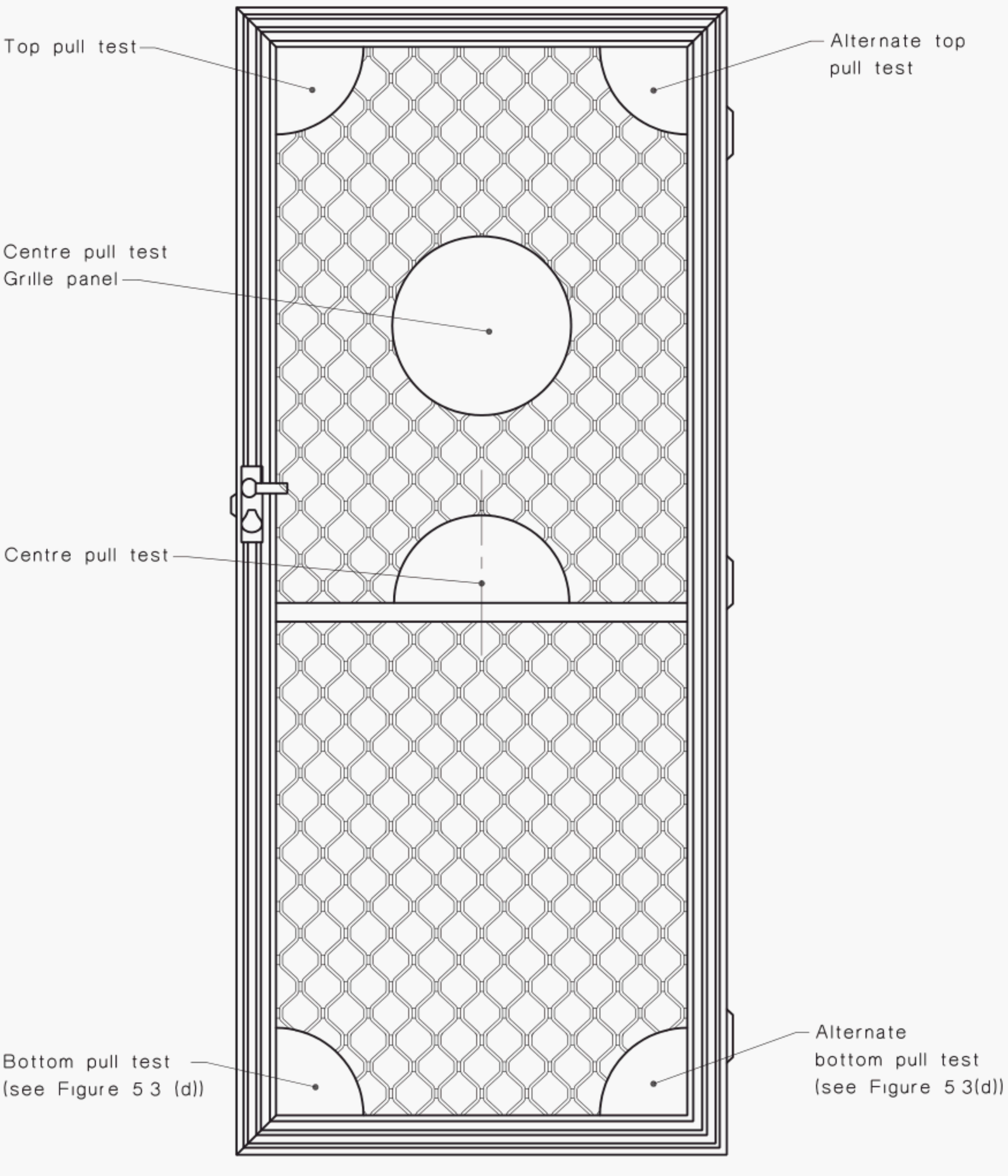


(d) Alternative device for applying force

FIGURE 5.3 (in part) METHODS OF APPLICATION OF PULL FORCES TO THE TEST SPECIMEN

5.4.2 Zones for application of pull force

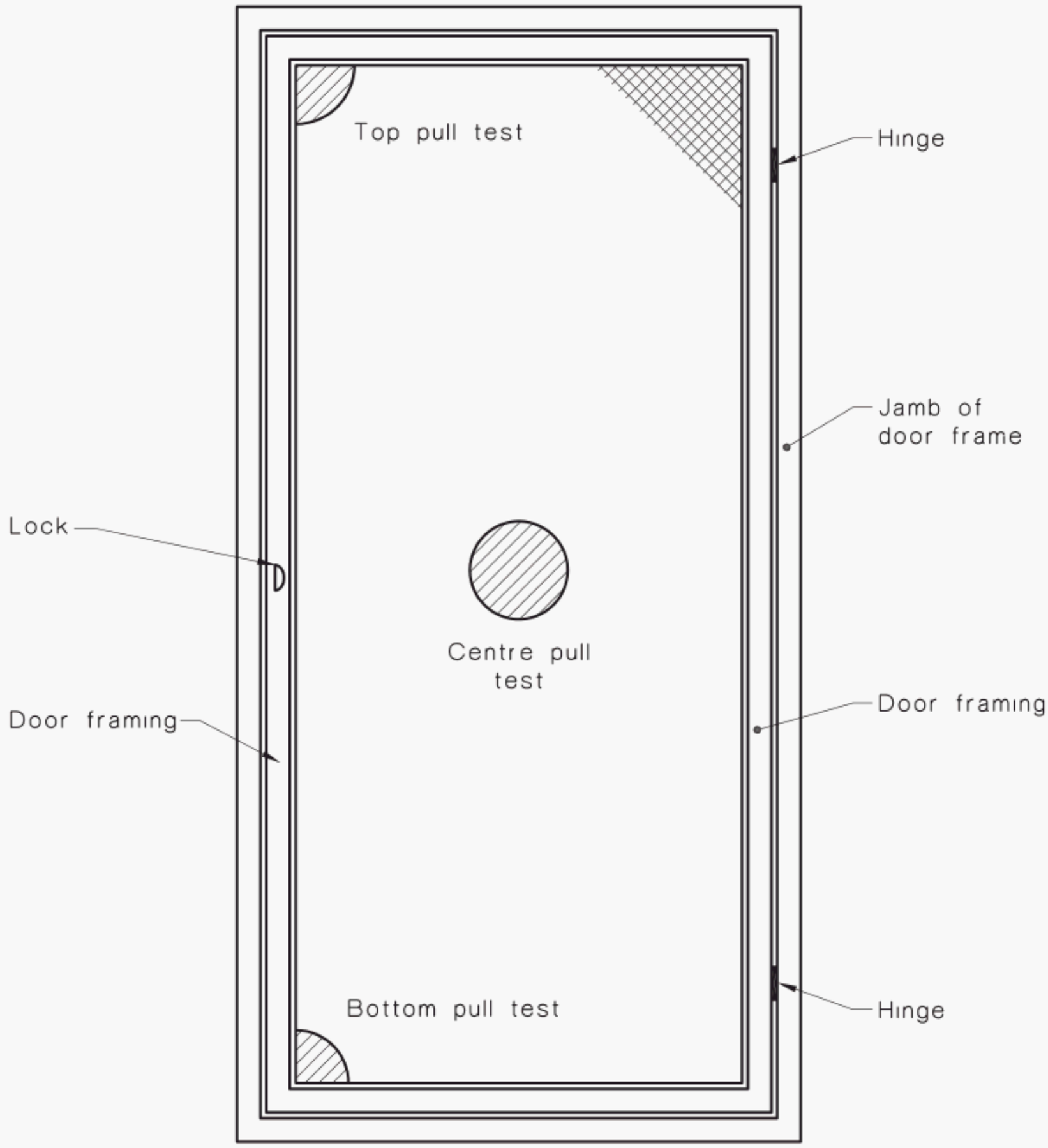
The pull force shall be applied to the nominated areas (as applicable) as specified in Figure 5.4 for hinged doors, Figure 5.5 for sliding doors and Figure 5.6 for window grilles.



Half panel door

DIMENSIONS IN MILLIMETRES

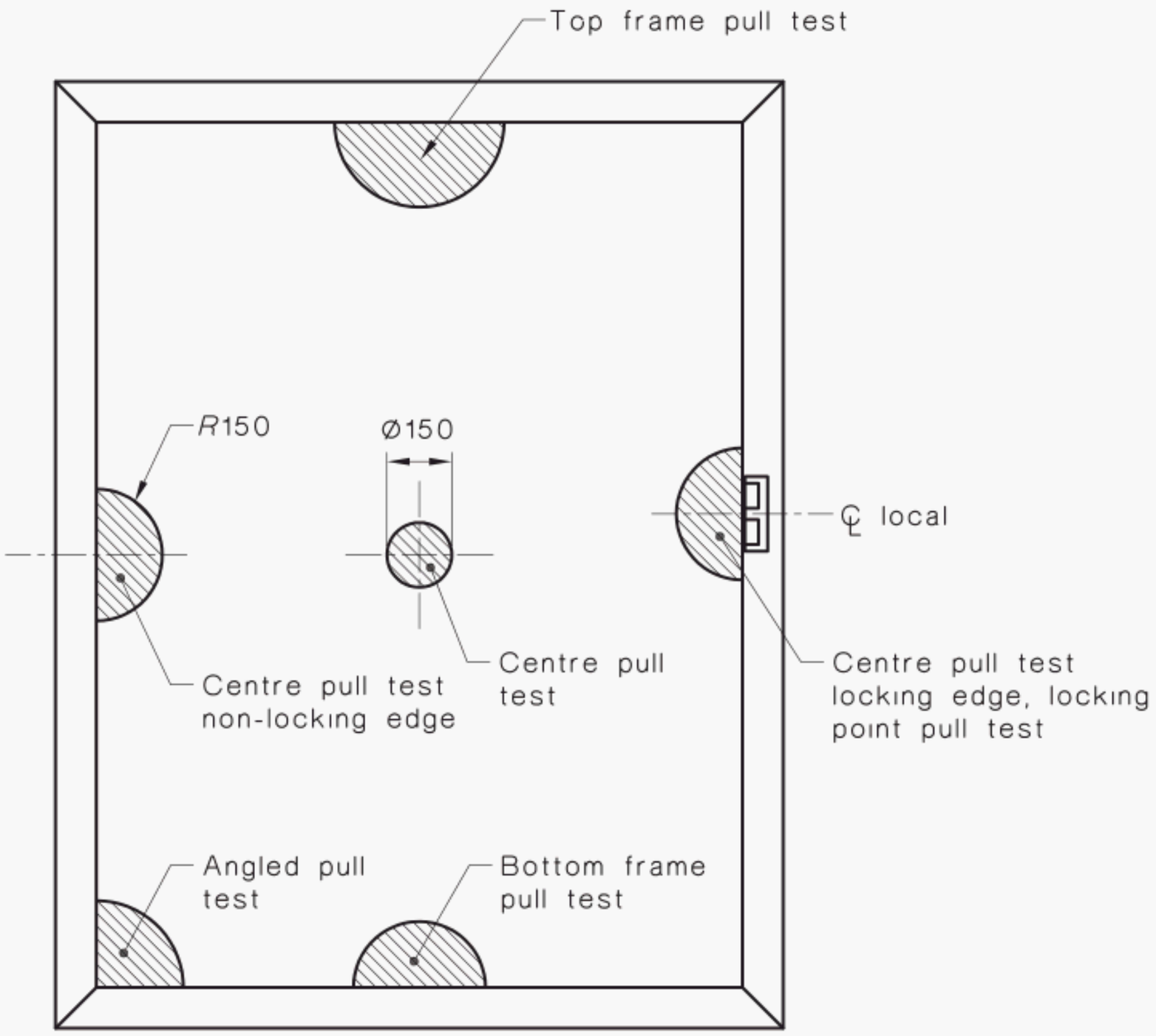
FIGURE 5.4(A) HALF PANEL HINGED DOOR PULL TEST POSITIONS



Full panel door—typical door with grille over full test positions

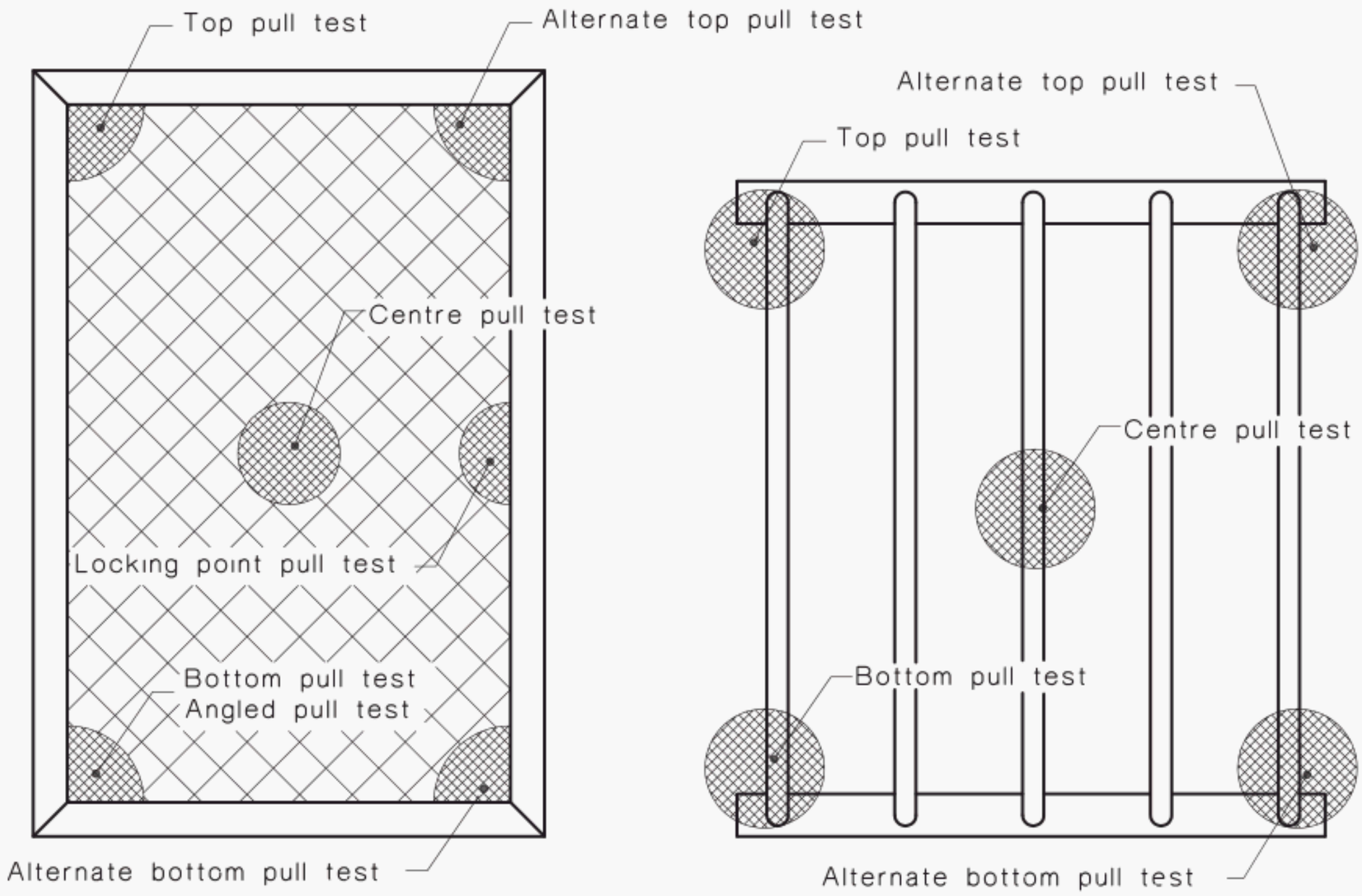
DIMENSIONS IN MILLIMETRES

FIGURE 5.4(B) HINGED DOOR PULL TEST POSITIONS

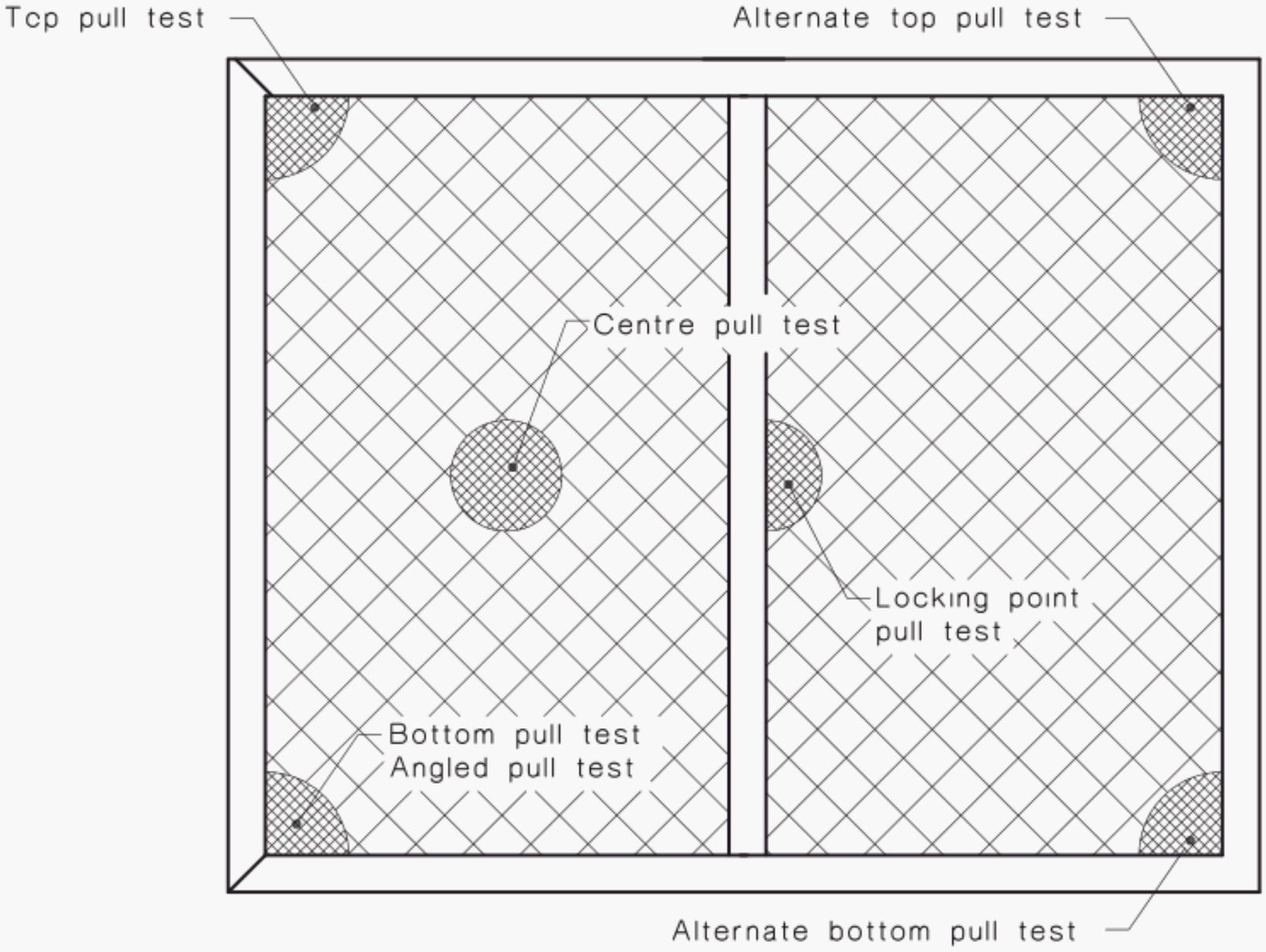


DIMENSIONS IN MILLIMETRES

FIGURE 5.5 SLIDING DOOR PULL TEST POSITIONS



(a) Single panel security window grilles



(b) Double panel security window grilles

FIGURE 5.6 WINDOW GRILLES PULL TEST POSITIONS

5.5 PULL TEST

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5.5A General

The pull test shall be applied to all Type I and Type II security screen doors and window grilles. The pull test shall also be applied to any Type III security screen door or window grille that has developed an opening greater than 15 mm × 90 mm between the edge of the door or window grille and the door or window frame as a result of the dynamic impact or jemmy tests, or as a result of the design of the door or window grille. Additionally, a pull test shall be applied to the point least able to resist deflection, at the discretion of testing authority, where a gap greater than 15 mm × 90 mm would develop under load if a jemmy test (as specified in Clause 7.3) was applied at that point.

5.5.1 Centre pull test (only applicable to Type I and II test specimens)

A force of 1.5 kN, acting within 3° of normal to the plane of the infill material, shall be applied within a 150 mm radius of the centre of the largest infill material panel on the test specimen. For test specimen fitted with midrails, this pull test shall also be applied adjacent to the centre of the joiner. The load shall be applied for 20 s after the maximum load or displacement is reached.

Where a test specimen incorporates a midrail, the centre pull shall also be applied to the centre of the largest infill panel.

5.5.2 Centre pull test locking and non locking edge (only applicable to sliding doors)

A force of 1.5 kN, on the vertical centre-line of the lock body, and within 3° of the vertical plane and 10° of the horizontal plane of the test specimen, shall be applied within a 150 mm radius to the locking edge of the test specimen. The load shall be applied for 20 s after the maximum load or displacement is reached.

5.5.3 Locking point pull test (only applicable to sliding doors and Class B, Class C and Class D window grilles)

A force of 2.0 kN shall be applied within 5° of parallel to the opening movement of the test specimen. The test shall be applied within 150 mm radius of the locking mechanism. The load shall be applied for 20 s after the maximum load or displacement is reached. Refer to Figure 5.7 for application of the test force.

5.5.4 Top pull test (applicable to hinged doors and window grilles)

A1

A force of 1.5 kN shall be applied to doors in accordance with Figure 5.1 and to windows in accordance with Figure 5.2. The force shall be applied to the door or window grille as close as is practicable to the top corner of the test specimen furthermost from the hinged side. It should be within an area of 150 mm radius to the top corner. This test shall be performed at the alternate top pull test position where this is deemed by the testing authority to be the weaker of the two positions.

The load shall be applied for 20 s after the maximum load or displacement is reached.

5.5.5 Top frame pull test (only applicable to sliding doors)

A force of 1.5 kN, on the head edge (top frame), and within 3° of the normal in the horizontal plane and at 18° downwards in the vertical plane of the test specimen, shall be applied within a 150 mm radius of the centre of the head edge of the test specimen. The load shall be applied for 20 s after the maximum load or displacement is reached.

5.5.6 Bottom pull test (only applicable to hinged doors and window grilles)

5.5.6.1 *For hinged doors*

A force of 2 kN, acting at a slope of 18° upwards, shall be applied to the door. The force shall be applied to the door as close as is practicable to the bottom corner of the door frame furthest from the hinged side and shall be within the area of 150 mm radius to the bottom corner. This test shall be performed at the alternate bottom pull test position where this is deemed by the testing authority to be the weaker of the two positions.

For Type III infill material, half panel doors and doors where the bottom pull test cannot be applied to the infill material, the bottom pull test shall be performed as shown in Figure 5.3(d). The testing authority will need to decide how to conduct this test without altering the door.

NOTE: If the gap between the door and the frame is greater than or equal to a gap of 15 × 90 mm, then it is permissible for the testing authority to further manipulate the opening to insert the bracket as shown in Figure 5.3 (d).

The load shall be applied for 20 s after the maximum load or displacement is reached.

5.5.6.2 *For window grilles*

A force of 1.5 kN, acting within 3° of normal to the place of the infill material, shall be applied to one of the bottom corners of security window grille. This test shall be performed at the alternate bottom pull test position where this is deemed by the testing authority to be the weaker of the two positions. The force shall be applied within a 150 mm radius of the bottom corner chosen. The load shall be applied for 20 s after the maximum load or displacement is reached.

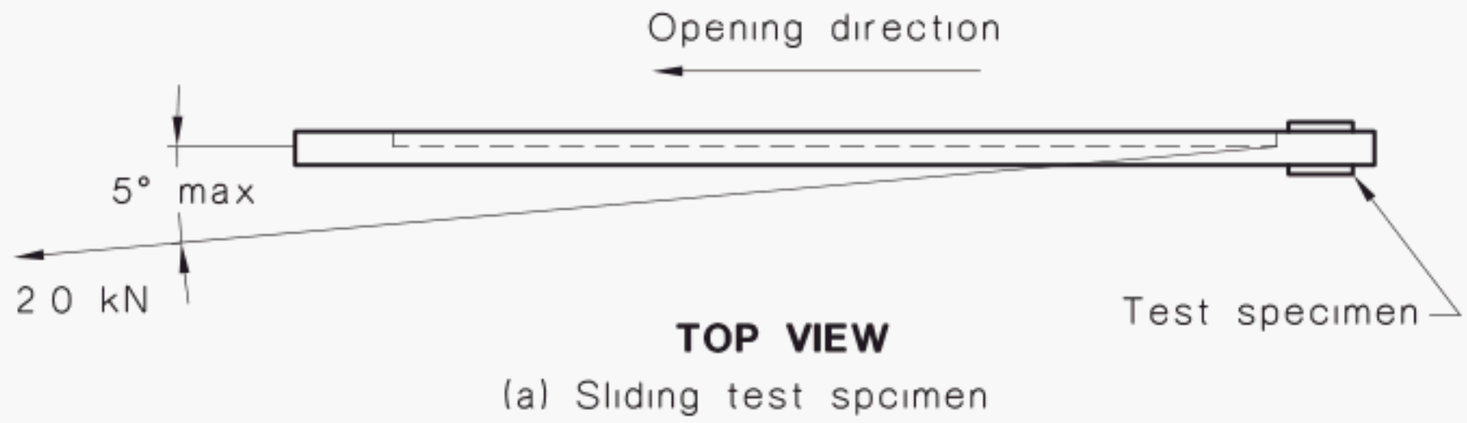
For Type III Classs A security window infill aperture, it may not be possible to perform this test. In this case, the test authority may use a screwdriver and using reasonable manual force and manipulation, without the aid of any other hand tools, attempt to prise out the corner of the security window grille. If a gap of more than 15 mm is achieved, the pull test shall be performed using a suitable attachment device to the corner of the window grille.

5.5.7 Bottom frame pull test (only applicable to sliding doors)

A force of 2.0 kN, on the sill edge (bottom frame), and within 3° of the normal in the horizontal frame and of 18° upwards in the vertical plane of the test specimen, shall be applied within a 150 mm radius of the centre of the sill edge of the test specimen (see Figure 5.5). The load shall be applied for 20 s after the maximum load or displacement is reached.

5.5.8 Angled pull test (only applicable to sliding doors and sliding window grilles)

A force of 1.5 kN shall be applied to the bottom corner of the non-locking side of the test specimen. The force shall be at shall be at 45° to the infill material, in the horizontal plane, in the opening direction of the test specimen and at 18° upwards in the vertical plane of the infill material. The force shall be applied within 150 mm radius of the bottom corner and shall be applied for 20 s after the maximum load or displacement is reached. See Figure 5.8 for the position for the, and application of, the force.



(a) Sliding test specimen

(b) Hinged test specimen

FIGURE 5.7 (IN PART) LOCKING POINT PULL TEST

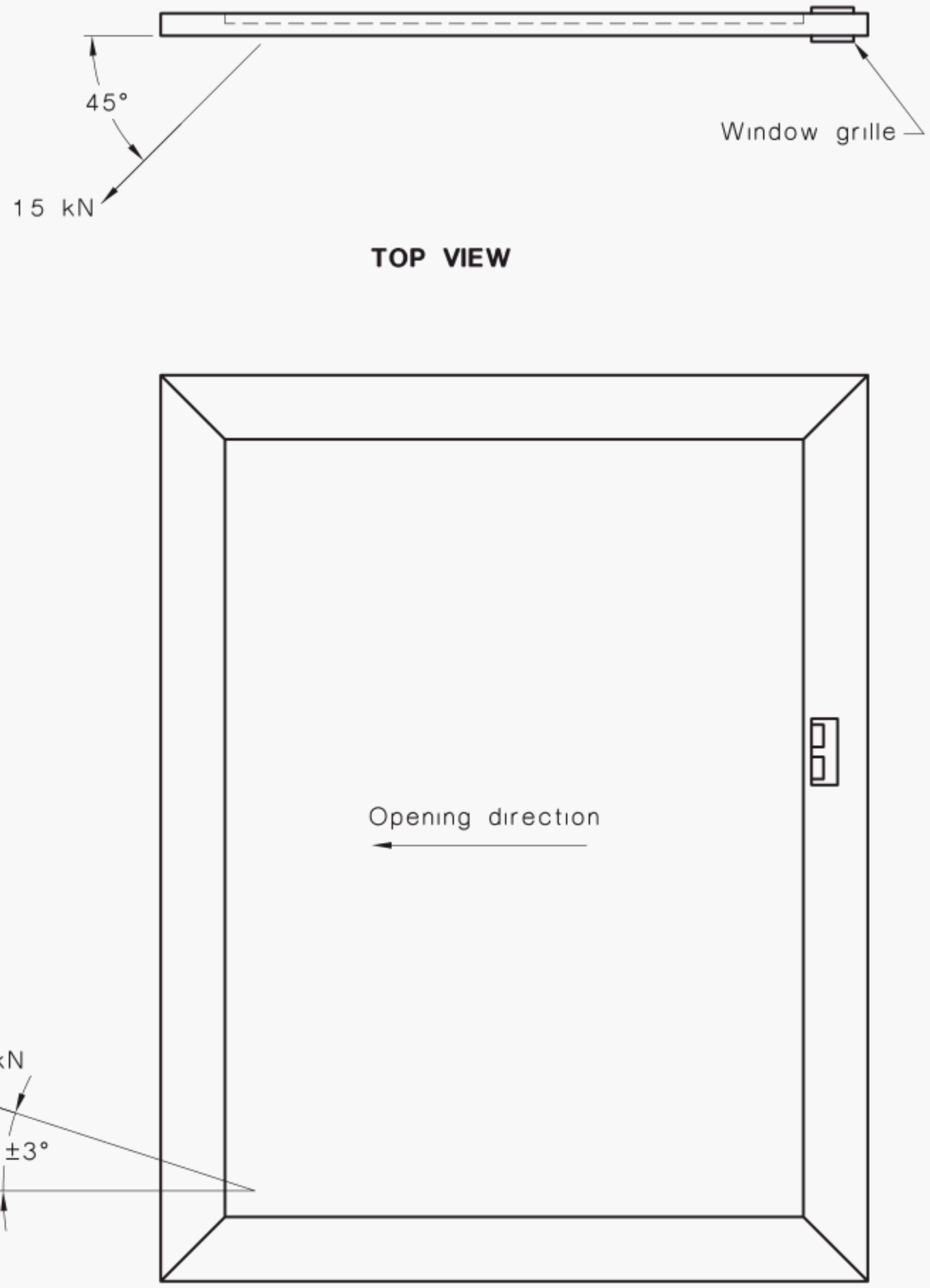


FIGURE 5.8 ANGLED PULL TEST

5.6 TEST REPORT

The relevant identification details and the 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.

SECTION 6 PROBE TEST

6.1 SCOPE

This Section sets out a method for determining the resistance of security screen doors and window grilles incorporating infill panels to a specified level of attack using a probe. It is only applicable to Type II products.

6.2 PRINCIPLE

The effects of a probe attack against a security screen door or window grille is simulated by allowing opposing forces to be applied to the chords of the infill material in an attempt to separate the chords thus allowing access of a hand or arm.

6.3 APPARATUS

The following apparatus is required:

(a) Means of applying opposing forces as specified in Clause 6.4 to the chords of the infill material in a Type II test specimen.

(b) A suitable arrangement for applying the forces to the test specimen.

NOTE: If a mass and pulling system is used to apply the forces, attention has to be given to frictional effects in designing the system.

(c) 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 may include the following:

(i) Two lateral specimen supports that extend for the full width of the specimen.

(ii) Vertical specimen supports that extend for the full height of the specimen.

(iii) A means of supporting the loading mechanism.

(iv) Means for holding the test specimen firmly in contact with both vertical supports.

6.4 TEST PROCEDURE

The procedure for carrying out the probe 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.

(b) If the infill material is of uniform size, shape and openings, the testing authority will have the discretion of choosing in what position(s) the test shall be applied, based on their determination of the weakest point(s) on the test specimen.

(c) Apply a deflecting force of 1.5 kN to each of the opposite sides of the opening, so as to increase the opening. Maintain that force and attempt to pass a spherical probe through the opening, using reasonable manual force, as follows:

(i) For an 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 the opening.

(ii) For an infill material 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 the opening.

(iii) The forces applied to each side of the opening shall be opposing forces (action/reaction forces) arranged so that as much as possible of the force is applied to increase the opening, with as little as possible transmitted to the remainder of the test specimen.

(d) Record whether the test probe passed through the opening.

6.5 TEST REPORT

The information required in the relevant identification details and the results of 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.

SECTION 7 SHEAR TEST

7.1 SCOPE

This Section sets out a method for determining the resistance of security screen doors and window grilles incorporating infill panels, to a specified level of attack using a shearing device. It is only applicable to Type I and Type II materials.

7.2 PRINCIPLE

The effects of a hard plier attack against a security screen door or window grille is simulated by allowing a single chord of the infill material to be fractured in a shearing apparatus.

7.3 APPARATUS

A shearing tool with apparatus for measuring the shear force required to cut a strand of the infill. A suitable double shear tool is shown in Figure 7.1.

7.4 TEST PROCEDURE

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

(a) Transpose a circle of 150 mm diameter onto the infill of the test specimen. Count and

(g) Infill material, including—

(i) infill type (e.g., 711);

(ii) fabrication method;

(iii) surface finish/coating;

(iv) nominal aperture;

(v) means of securing to framing;

(vi) Test results, including—

(A) number of chords/strands intersected by 150 mm circle; and

(B) strand size.

(h) Test results table, including sample of infill recorded and, as applicable, to the requirements of AS 5041, Section 7—Shear test, as follows:

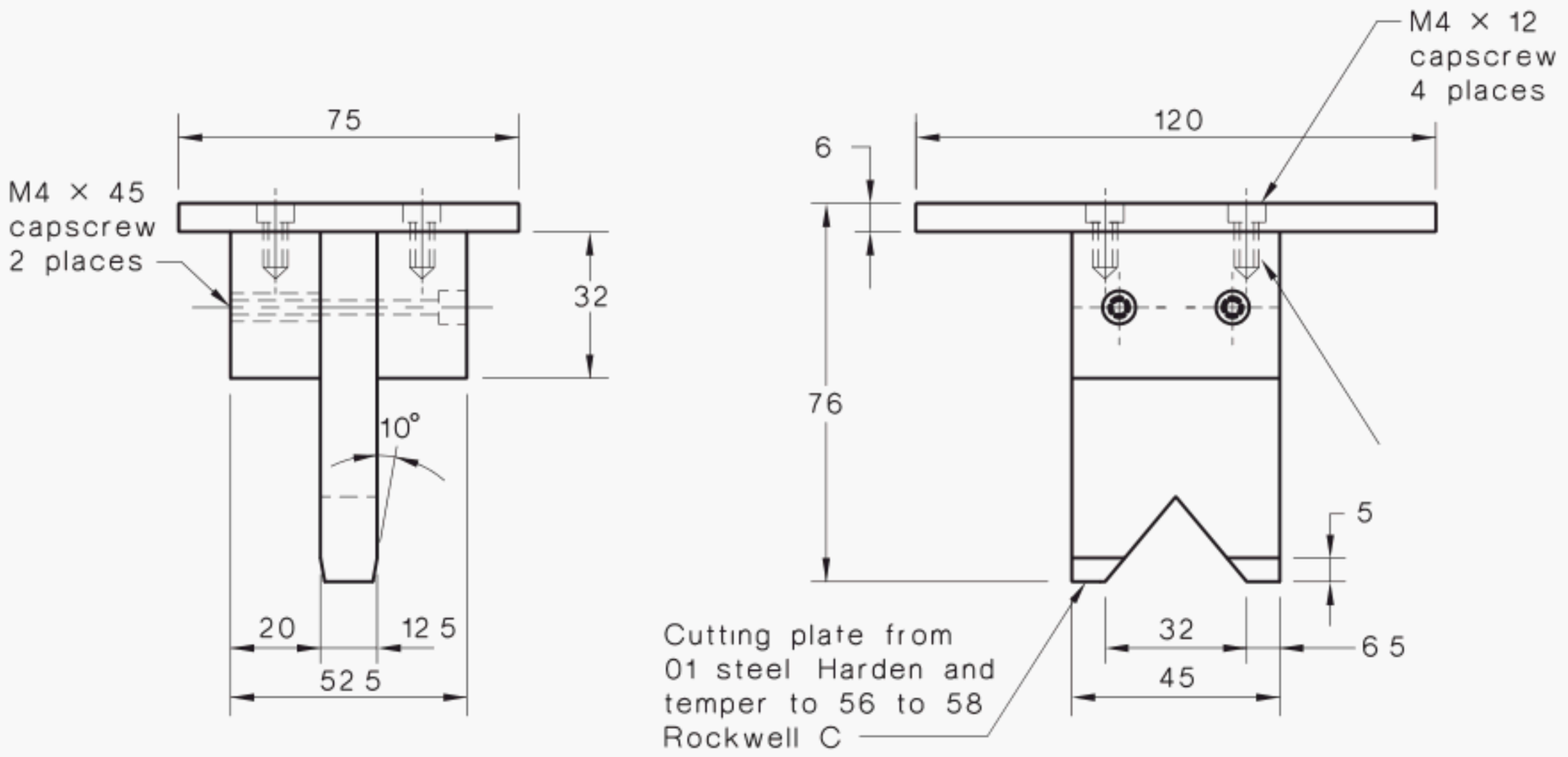
Specimen identification	Sample orientation	Shear force (KN)	Breaking force (KN)
	Vertical		
	Vertical		
	Vertical		
	Horizontal		
	Horizontal		
	Horizontal		
	Diagonal		
	Diagonal		
	Diagonal		

(i) Pass of fail.

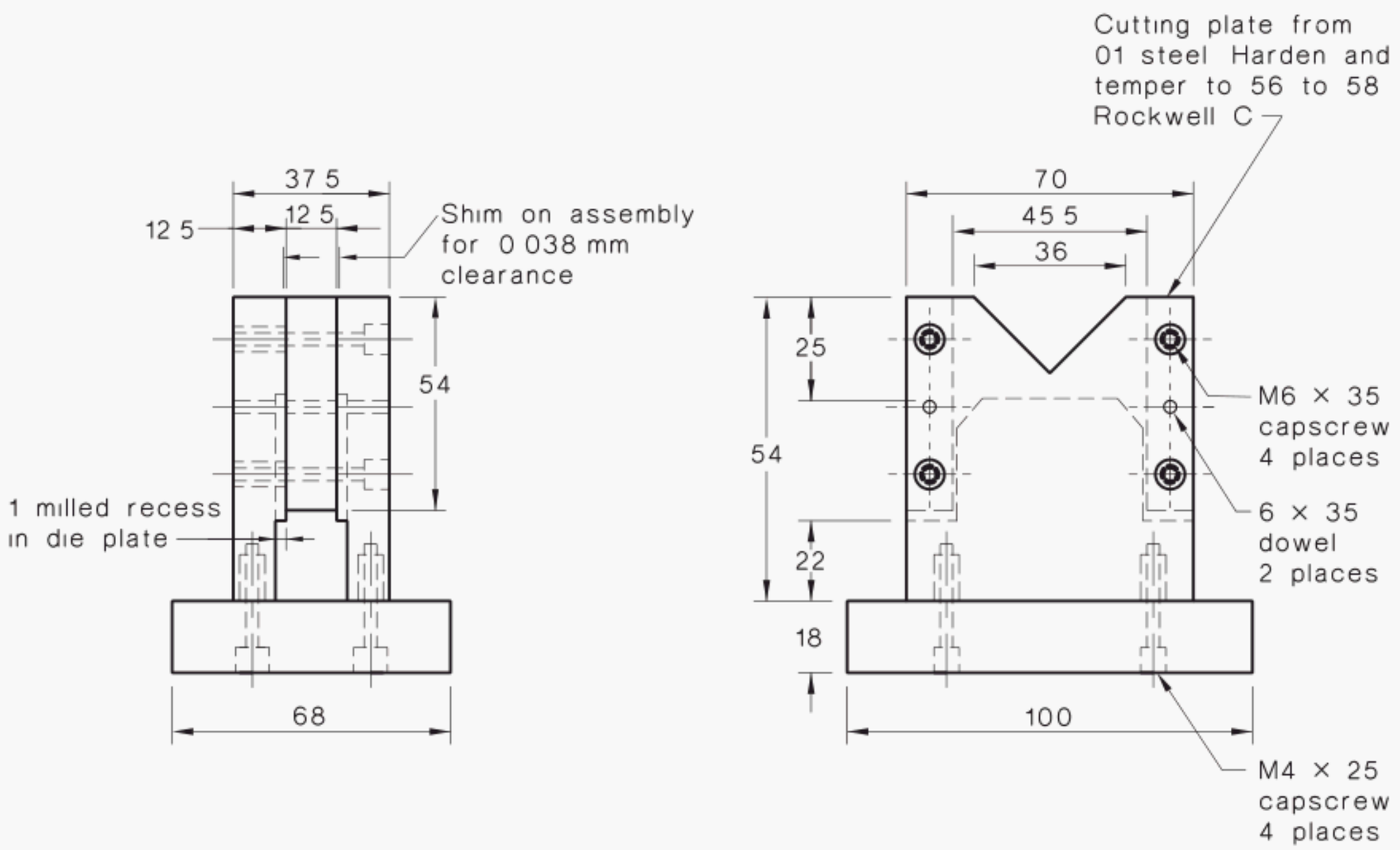
(j) The number of this Australian Standard, including test performed, i.e., AS 5041, shear test.

(k) Signature and position of testing personnel.

(l) Date.



(a) Punch



(b) Die

Finish $\frac{32}{\nabla}$ all over
Material low carbon steel

DO NOT SCALE
DIMENSIONS IN MILLIMETRES

FIGURE 7.1 SUITABLE SHEAR TOOL FOR SHEAR TEST

(a) Typically steel

(b) Typically aluminium

FIGURE 7.2 DIRECTION OF SHEAR TEST CHORD POSITIONING

SECTION 8 KNIFE SHEAR TEST

8.1 SCOPE

This Standard sets out a method for determining the resistance of a security screen infill material to a specified level of attack by a heavy duty trimming knife. The knife shear test shall be applied only to Type III infill materials.

8.2 PRINCIPLE

The effects of a physical cutting attack against the infill material are simulated by allowing a standardized shearing tool (heavy duty trimming knife) to pass over the infill material a number of times under a constant force

8.3 TEST SPECIMEN

The test specimen shall consist of a piece of infill material held in a frame of dimensions 645 ±20 mm × 645 ±20 mm (see Figure 8.1) The infill material size shall be no smaller than 445 × 445 mm.

8.4 APPARATUS

The test apparatus shall consist of the following:

(a) *Test frame*—a frame that is able to securely accept the test specimen.

(b) *Heavy duty trimming knife*—a commercially available heavy duty trimming knife.

NOTE: A 'Stanley' trimming knife (10-999) or equivalent would be suitable for this purpose.

(c) *Heavy duty trimming knife blades*—3 hardened steel trimming knife blades to suit the trimming knife.

NOTE: 'Stanley' heavy duty trimming knife blades (11-921) or equivalent would be suitable for this purpose.

(d) *Means of applying* a force of 150 ±5 N vertically, and a force of up to 350 N horizontally to the trimming knife (see Figure 8.2) at a nominal draw speed of 6.0 mm ±1 mm per second.

A1

NOTE: The intent of the horizontal force is to maintain the draw speed of 6.0 mm ±1 mm. If

(e) Draw the trimming knife smoothly along the line, with a force of 150 ±5 N vertically downwards, and a force of up to 350 N horizontally (see Figure 8.2) at a draw speed of 6.0 ±1.0 mm per second along the line. Stop the cut at completion of the 250 mm draw. In the event of the blade becoming 'snagged' (i.e., jammed or hooked up) in the test specimen, the forces shall be applied for 20 s at a force of 350 N. If the blade still remains snagged, that particular cut shall be deemed to be completed. In the case of penetration, the blade holder shall not come within 5 mm of touching the test specimen. The forces shall be applied smoothly and constantly to the test specimen during the drawing of the trimming knife (see Note).

NOTE: The smooth application of forces will avoid the knife blade 'bouncing' on the test specimen along the draw line.

(f) Repeat Step (e) two more times with a new blade each time to give a total of 3 cuts along the same line of cut.

(g) Record the extent of any complete penetrations of the infill material by the trimming knife blade.

8.6 TEST REPORT

The following details shall be reported:

(a) Model number/name.

(b) Sample number:

(c) Manufacturer's name.

(d) Date of submission:

(e) Description, including—

(i) type;

(ii) drawings; and

(iii) infill description e.g., woven mesh, perforated mesh, expanded mesh.

(f) Type III infill material, including—

(i) length, diameter and gauge;

(ii) thickness;

(iii) grade;

(iv) surface finish/coding;

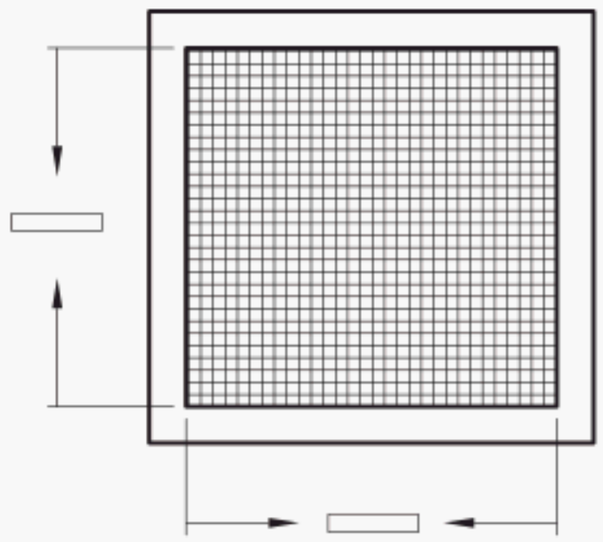
(v) type and fabrication method;

(vi) manufacturers name/part no;

(vii) attach dimensional drawing, including number, issue, height and width;

(viii) nominal aperture; and

(ix) mass per square metre, in kilograms.



(g) Knife shear report, including—

(i) model number/name;

(ii) report/sample number;

(iii) manufacturer's name;

(iv) date of test.

(h) Results, as follows:

(i) Length of continuous penetration in millimetres, and if hook up is evident for—

(A) Draw No. 1 _____

Draw No. 2 _____

Draw No. 3 _____

(ii) Observations: _____

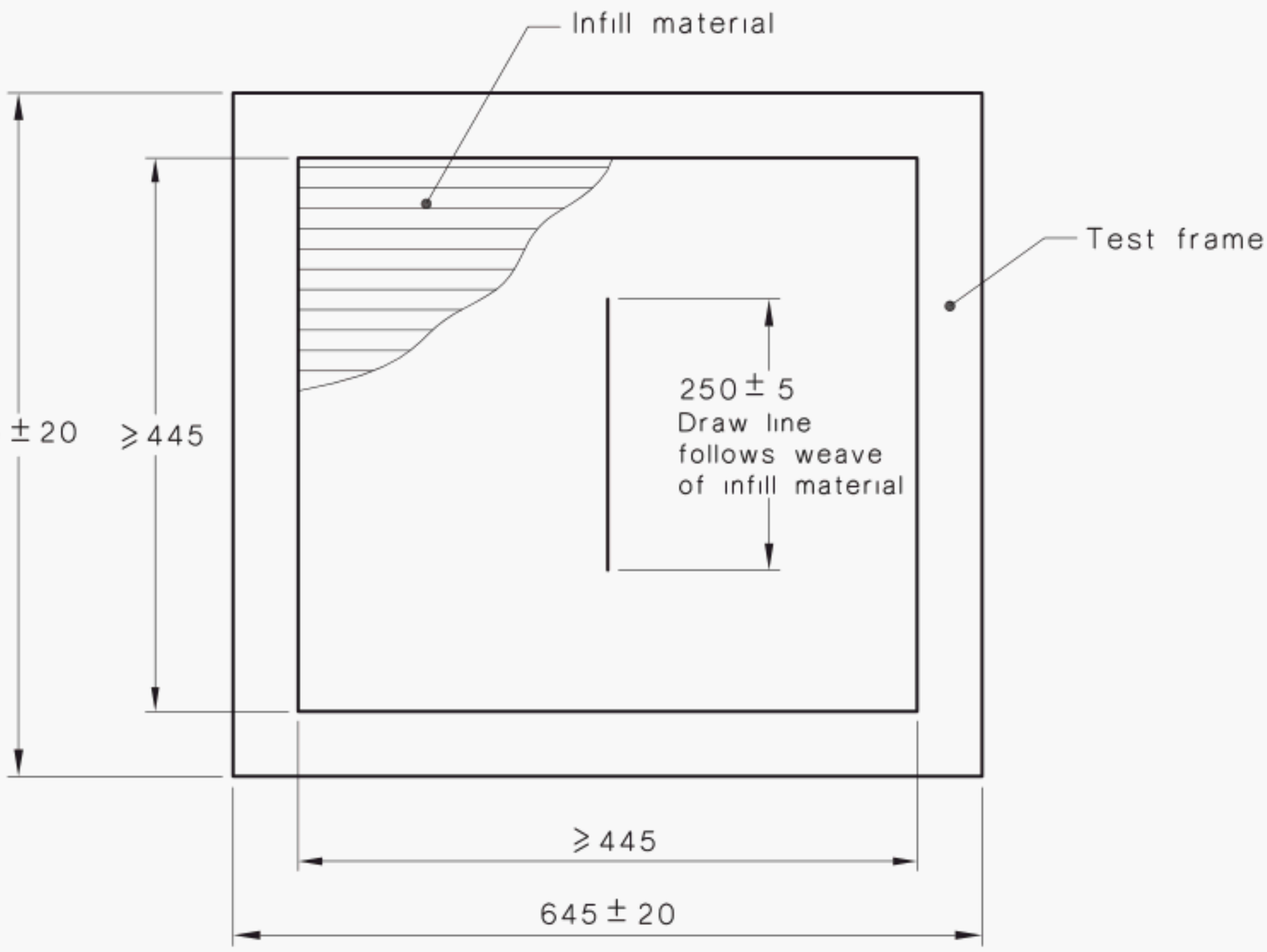
_____

_____

(iii) Pass or fail.

(iv) Name of examiner, including signature.

(v) Name of witness, including signature.



DIMENSIONS IN MILLIMTRES

FIGURE 8.1 PREPARATION FOR TESTING

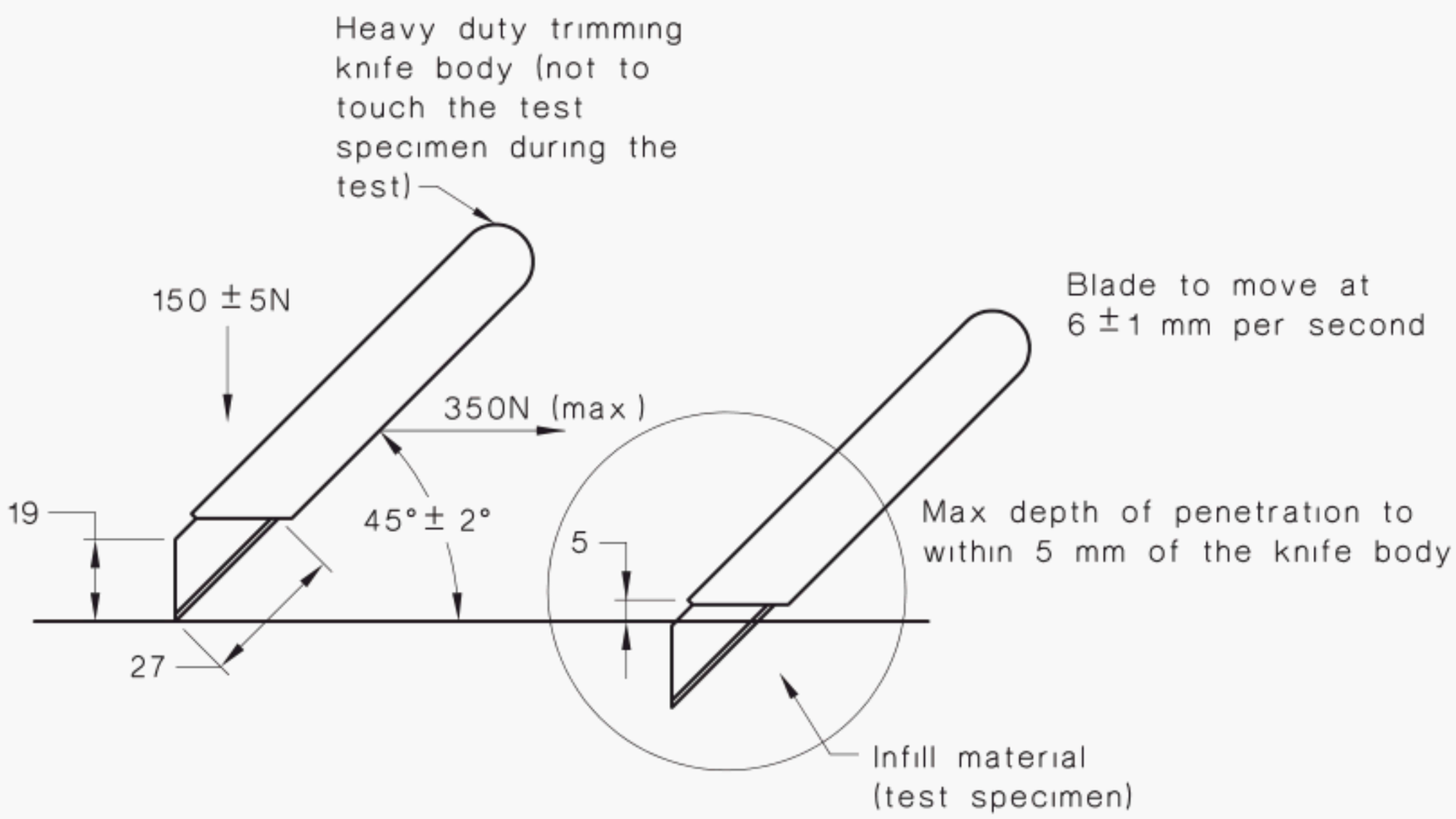


FIGURE 8.2 APPLICATION OF FORCES TO TRIMMING KNIFE

AMENDMENT CONTROL SHEET

AS 5041—2003

Amendment No. 1 (2007)

REVISED TEXT

SUMMARY: This Amendment applies to Clauses 2.4.1.1, 2.4.2.1, 3.6, 4.3, 4.4.1.4, 5.5, 5.5.4, and 8.4 and Figures 3.2 and 3.3.

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NOTES

NOTES

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