

PRODUCT ASSESSMENT SPECIFICATION

Enhanced security performance requirements for door assemblies –

Part 1: Single and double leaf, hinged external door assemblies to dwellings

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Contents

	Page
Foreword	iii
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Sample selection	3
5 Testing	4
6 Requirements for test apparatus	7
7 Enhanced security performance requirements	8
8 Design and general performance requirements	8
9 Installation instructions	9
10 Marking	9
Annex A (normative) Test methods	10
Annex B (normative) Standard loading cases	33
Figure 1 — Flow chart	6
Figure A.1 — Parallel to plane loading along the edge	19
Figure A.2 — Parallel to plane loading at right angles to the edge	20
Figure A.3 — Parallel to plane loading at a mullion or transom	21
Figure A.4 — Perpendicular to plane loading	22
Figure A.5 — Suitable test bracket	23
Figure A.6 — Frame support	24
Figure A.7 — Pad for mechanical loading	25
Figure A.8 — Loading bridge	26
Figure A.9 — Soft body impact test apparatus	27
Figure A.10 — Hard body impact test apparatus	28
Figure A.11 — Mechanical loading sequence single and double leaf door assemblies	29
Figure A.12 — Soft and heavy body impact points — Single and double doors	29
Figure A.13 — Hard body impact test points and sequence, double leaf	30
Figure A.14 — Typical straight jaw self gripping pliers	30
Figure A.15 — Typical shallow curve head	31
Figure A.16 — Typical shallow curve head	31
Figure A.17 — Typical hook attachment	32
Figure A.18 — Typical hook attachment	32

Table B.1 — Standard loading cases for single leaf door assemblies without integral or coupled side panels or fanlights 34

Table B.2 — Standard loading cases for single leaf door assemblies with integral or coupled side panels or fanlights 35

Table B.3 — Standard loading cases for all double doors, active and inactive leaf without integral or coupled side panels or fanlights 37

Table B.4 — Standard loading cases for all double doors, active and inactive leaf with integral or coupled side panels or fanlights 39

Foreword

This Product Assessment Specification, PAS 24-1, has been produced by BSI to provide a method for testing and assessing the enhanced security performance requirements of single and double leaf, hinged, external door assemblies to dwellings. It is intended that this Product Assessment Specification should be used in conjunction with PAS 23-1 which includes the assessment of weather and mechanical performance and performance in use.

This Product Assessment Specification is not to be regarded as a British Standard. It will be withdrawn upon publication of its content in, or as, a British Standard.

Acknowledgement is given to the following organizations who were consulted in the development of this specification:

- Association of Builders Hardware Manufacturers;
- British Plastics Federation;
- British Woodworking Federation;
- Council for Aluminium in Building;
- Glass and Glazing Federation;
- Guild of Architectural Ironmongers;
- Steel Window Association;
- Association of Chief Police Officers, national technical committee representatives.

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Annex A and annex B are normative.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a Product Assessment Specification does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 41 an inside back cover and a back cover.

Introduction

The concept of “enhanced security” in this Product Assessment Specification is based upon a relationship between resistance to forced entry by human intervention techniques and resistance to entry under multi-directional loading and hard and soft body impacts. This relationship has been identified following an extensive test programme conducted on a range of doorsets. It is acknowledged that in some cases the assessment of the security characteristics of doorsets by predetermined mechanical loading or impact may alone not give a suitable assessment of their resistance to human attack. To avoid this situation the testing is supplemented by a manual check test to identify any need for additional tests.

It is intended that this should be an evolving specification reflecting current design requirements and intrusion techniques.

This specification provides a means of evaluation against opportunist attack and does not purport to provide a means of evaluation of total security against unauthorized intrusion.

1 Scope

This Product Assessment Specification specifies test methods and acceptance criteria relevant to the enhanced security performance of single and double leaf, single swing, hinged, external door assemblies to dwellings, inward and outward opening, with or without integral or coupled side panels and fanlights. It includes double leaf door assemblies where the size, construction or configuration of the active and inactive leaves are identical or differ. The enhanced security performance requirements in this specification are not material-specific.

This PAS is applicable to new door assemblies as manufactured and prior to installation. It is only applicable to complete door assemblies or a range of door assemblies.

The ability to gain entry by lock picking, by the deliberate breaking of glass or by attack on the frame fixing methods is not addressed in this PAS.

This PAS is not a test of component performance or installation requirements.

This PAS excludes double swing doors, sliding doors, sliding folding doors, pivoted doors and doors with two halves (stable door). It does not cover door assemblies where any frame member is longer than 3 m.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Product Assessment Specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 2911, *Specification for letter plates*.

BS 6206:1981, *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*.

BS 6262, *Code of practice for glazing for buildings*.

BS 6262-4, *Glazing for buildings — Part 4: Safety related to human impact*.

BS 7950, *Specification for enhanced security performance of casement and tilt/turn windows for domestic applications*.

PAS 23-1, *General performance requirements for door assemblies — Part 1: Single leaf, external door assemblies to dwellings* (amendment in preparation).

BS EN 1303, *Building hardware — Cylinders for locks — Requirements and test methods*.

BS EN ISO 10666, *Drilling screws with tapping threads — Mechanical and functional properties*.

BS EN ISO 15480, *Hexagon washer head drilling screws with tapping screw thread*.

BS EN ISO 15481, *Cross recessed pan head drilling screws with tapping screw thread.*

BS EN ISO 15482, *Cross recessed countersunk head drilling screws with tapping screw thread.*

BS EN ISO 15483, *Cross recessed raised countersunk head drilling screws with tapping screw thread.*

3 Terms and definitions

For the purposes of this Product Assessment Specification the following terms and definitions apply.

3.1

entry

⟨where releasing the locking hardware from the inside requires the use of a removable key⟩ creation of an aperture through which a 500 mm long cylindroid with an elliptical section of 225 mm minor and 380 mm major diameters can pass freely

NOTE This simulates the passage of an intruder's body.

3.2

entry

⟨where releasing the locking hardware from the inside does not require the use of a removable key⟩ creation of an aperture through which a 500 mm long cylindroid of diameter 25 mm can pass freely

3.3

door assembly

complete unit, as installed, consisting of the door frame, door leaf, any side panels or fanlights and essential hardware any of which may be obtained from separate sources

3.4

component failure (during mechanical load testing)

failure in which there is an increase in deflection with no further increase in the applied load

3.5

channel glazing

glazing in which the frame overlaps the glazing unit on both sides without the use of an independent glazing bead

3.6

infill medium

single glass, insulating glass units or infill panel

3.7

floor level

underside of the sill or threshold

3.8

range

group of door assemblies with defined limits of size, type, configuration, hardware, glazing, construction and security features.

3.9

technique

combination of tools and locations

NOTE Any change in either the tools or the locations constitutes a new technique.

3.10

midrail

structure between the opposing horizontal edges of infill panels or glazed apertures

3.11**location**

area described by a circle with a radius of 50 mm from a selected point

3.12**false meeting stile**

separate adaptor profile located along the meeting edge of either leaf and attached to that leaf

3.13**active leaf**

leaf of a multi-leafed door assembly intended to be moved first to provide opening

NOTE Also referred to as the master leaf and normally containing the primary lock.

3.14**inactive leaf**

leaf of a multi-leafed door assembly intended to be moved after the active leaf

NOTE Also referred to as the slave leaf.

3.15**integral side panel**

fixed element within the outer frame of the door assembly

3.16**coupled side panel**

fixed element with its own outer frame attached to the outer frame of the door assembly

4 Sample selection

A minimum of three identical door assemblies shall be selected, increased to four when the door assembly includes at least one non-glass infill medium. Samples shall be selected by the test authority and agreed with the supplier/manufacturer. Where a range of door assemblies is to be considered, the number and type of samples chosen shall be representative of the product range which the supplier/manufacturer wishes to have assessed.

NOTE 1 The sample numbers quoted in the test clauses are relevant to the tests conducted on a limited range of configurations. For more extensive ranges a larger number of samples is required.

The cumulative effect of the tests shall be avoided with the exception that for any one configuration:

- the mechanical loading test in **A.6** and the additional mechanical loading test in **A.8** shall be conducted on a single sample; and
- the manual test (infill medium removal) in **A.5.1**, the soft body impact test in **A.9** and the hard body impact test aimed at the door leaf in **A.10.2.2** shall be conducted on another single sample.

NOTE 2 Other tests may be carried out on separate door assemblies.

The samples selected shall include the most adverse and vulnerable aspects of the design, size and configuration. The following list, which is not exhaustive, identifies some of the features that may influence the security of a door assembly:

- a) maximum distance between points which secure the leaf to the outer frame;
- b) hardware: locking and hinge options, fixings and changes with respect to leaf size;
- c) directions of opening;
- d) infill medium options;
- e) infill medium installation methods;

- f) reinforcement used in any system;
- g) flexing of transoms and mullions;
- h) size;
- i) openings, e.g. letterbox, cat flap etc..
- j) false meeting stile configuration on double doors;
- k) location of hardware in inactive leaf in double doors.

For the purpose of these tests, all glass supplied in the samples shall be toughened to meet class A of BS 6206:1981.

5 Testing

5.1 Test methods

The methods of test shall be as specified in annex A.

5.2 Assessment

Assessment shall follow the steps summarized as a flow chart in Figure 1.

5.3 Test report

The test report shall include the following information.

- a) A concise description of the door assembly including at least the following information, checked before test:
 - manufacturer's name and specific product identification;
 - types of door assembly;
 - materials and if applicable, their surface treatment;
 - overall width and overall height of each test sample;
 - method of frame jointing;
 - framing profile and reinforcement details where applicable;
 - types of beading, gaskets, methods of glazing and any security feature in the glazing rebate;
 - type and thickness of glass and overall thickness of infill medium;
 - types and details of hardware;
 - types and details of hardware fixings;
 - detailed drawing(s) of the doorset elevation viewed from the outside, including the position of the hardware.

- b) The definition of the door assembly range applicable to the report including any size limitation and door assembly configuration.
- c) The results obtained during each test.
- d) A diagram of the test apparatus or its reference.
- e) The laboratory ambient temperature at the time of test.
- f) The test organization, date of test and test engineer.
- g) A statement that the results are valid only for the conditions under which the test was conducted and for the specific range of door assemblies.
- h) A summary of the results and assessment of the range.

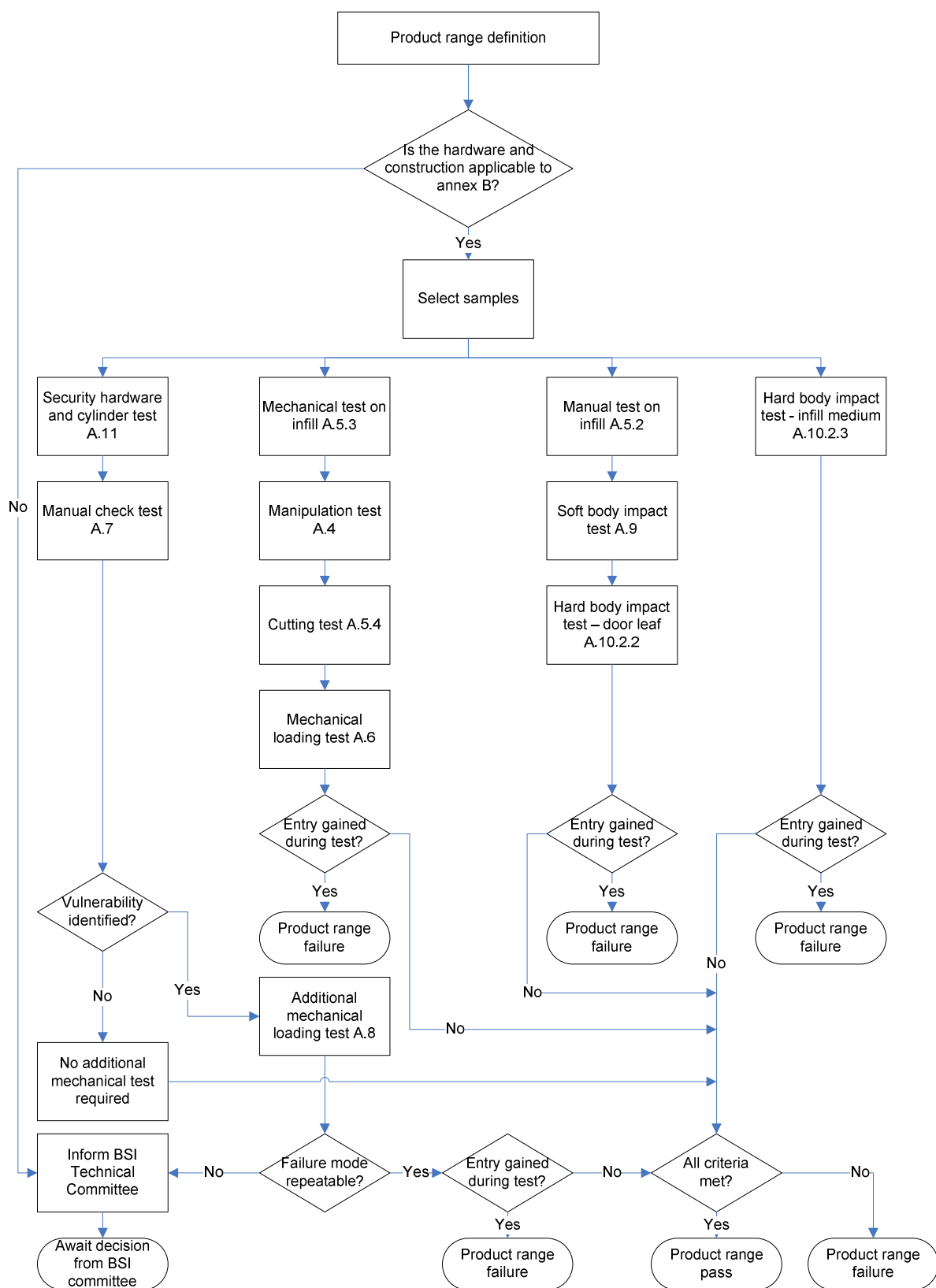


Figure 1 — Flow chart

6 Requirements for test apparatus

6.1 General

The test apparatus shall support the sample rigidly. For all tests the sample shall be installed vertically and square so that the door opens and closes smoothly and is secured to prevent movement in the test apparatus.

When conducting the manual tests the test apparatus shall allow for free unrestricted access to the exterior face of the door. The sample shall be mounted at ground level with the outer frame flush with the outer face of the test apparatus.

When carrying out the mechanical test the test apparatus shall be provided with the means of applying the loads, parallel and perpendicular to the plane of the test sample, to within a measured accuracy of $\pm 2\%$ and controlled to an accuracy of $\pm 5\%$.

NOTE Typical loading configurations are shown in Figures A.1 to A.4.

The test apparatus shall provide sufficient support so that the in plane movement and perpendicular to plane movement of the sample's sub frame is not more than 2 mm or 1/800 of the length of the support edge, whichever is the greater, measured at the centre of the supported edge, when subjected to a 4.5 kN load.

A suitable bracket, as shown in Figure A.5, shall be used to apply the loads.

The apparatus shall provide frame support to prevent perpendicular to the plane movement of the sample's outer frame with respect to the timber sub-frame. The supported area shall be a minimum of 200 mm in length and $7.5 \text{ mm} \pm 2.5 \text{ mm}$ wide measured from the outer edge of the profile as shown in Figure A.6.

The apparatus shall also provide support to prevent movement of transoms and mullions when the perpendicular to plane load is applied to locking points adjacent to the transom or mullion. The supported area shall be sufficient to prevent significant indentation of the frame material.

6.2 Mechanical load test

For the mechanical load test the perpendicular to plane load shall be applied via a loading pad with a nominal area of 1 000 mm² with a minor dimension of not less than 25 mm as shown in Figure A.7.

NOTE 1 Where this size of loading pad is impracticable, a pad with a minor dimension of not less than 15 mm and a nominal area of 1 000 mm² may be used.

In all cases the line of action of the applied load shall be applied to the geometric centre of the loading pad. When hardware is mounted on the face of the leaf in a position to prevent the use of the loading pad within the radial tolerance a loading bridge shall be used. This bridge shall apply the load simultaneously at two points to the leaf with the force line as close as possible to the contact area of the locking point within a radial tolerance of 50 mm. The two loading points of the bridge shall be equally spaced about the force line with a maximum span of 300 mm. The total loading area shall be nominally 1 000 mm² with a minor dimension of not less than 20 mm.

NOTE 2 A suitable bridge is shown in Figure A.8.

The method of attaching the loading pad(s) shall not detrimentally affect the sample under test.

6.3 Infill medium removal test

For the infill medium removal test the perpendicular-to-plane load shall be applied via an articulated pad secured to a nominal 150 mm × 150 mm plywood block of 25 mm minimum thickness.

6.4 Soft body impact test

The soft body impact energy shall be applied by the pendulum fall of a leather spheroconical bag of approximately 350 mm diameter filled with fine dry sand to a total mass of 30 kg ± 0.05 kg (this corresponds to a sand density of 1 500 kg/m³ and a grain size of <2 mm). The impactor shall be suspended by a cable of at least 1.5 m in length, such that the movement of the impactor is in a vertical plane perpendicular ±5° to the impacted face of the component (a typical impact apparatus is illustrated in Figure A.9).

6.5 Hard body impact test

The hard body impact energy shall be applied by the pendulum fall of a cylindrical steel block having a mass of 50 kg ± 0.05 kg. The nose of the impactor shall be 50 mm ± 0.5 mm in diameter and 175 mm ± 35 mm in length. The overall length of the impactor shall be 820 mm ± 10 mm.

The impactor shall be arranged to swing in an arc normal to the plane of the door and its longitudinal axis shall be horizontal at the moment of impact. The impactor shall be suspended by a cable or cables of at least 1.5 m.

NOTE A typical impact apparatus is illustrated in Figure A.10.

7 Enhanced security performance requirements

When a door assembly is tested in accordance with the test methods in annex A it shall not be possible to gain entry under the conditions of A.4, A.5, A.6, A.8, A.9, A.10 and A.11.

8 Design and general performance requirements

8.1 General

All door assemblies shall meet the requirements of PAS 23-1.

8.2 Glazing

Where doors contain glazing they shall be glazed in accordance with BS 6262.

Glazing installed in doors that do not require the use of a removable key to release the hardware from the inside shall be laminated glass.

NOTE Attention is drawn to BS 6262-4 which requires safety glass in most door assemblies.

8.3 Sidelights and fanlights

Dummy vents and opening lights shall meet the requirements of BS 7950. Full height sidelights shall be fixed lights.

8.4 Letter plates

Where a letter plate is included in the door assembly it shall either:

- a) be positioned a minimum of 400 mm from the internal locking point; or
- b) meet the requirements of BS 2911 which specifies a maximum aperture of 250 mm × 38 mm.

8.5 Cylinders for locks

Where a cylinder falling within the scope of BS EN 1303 is used within the door assembly the cylinder shall meet the requirements of key related security (digit 7) grade 5 as detailed in BS EN 1303:2005. In addition it shall also meet the requirements of BS EN 1303:2005, **4.9.1**, Resistance to drilling security grade 2.

9 Installation instructions

The manufacturer shall supply with each door assembly full instructions for assembly, installation and maintenance.

10 Marking

Each door assembly shall be permanently marked, in a position that is not visible when the door is closed, with the following information:

- a) the number and date of this Product Assessment Specification, i.e. PAS 24-1:1999¹⁾;
- b) the date of manufacture of the door assembly;
- c) the name or trade mark of the manufacturer or other means of identifying the manufacturer.

¹⁾ Marking PAS 24-1:1999 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the Product Assessment Specification. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification, which may also be desirable.