BRITISH STANDARD

BS 5234-2: 1992

Partitions (including matching linings) —

Part 2: Specification for performance requirements for strength and robustness including methods of test

UDC 692.25.004.15:620.17

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Building Codes Technical Committee (B/209) to Subcommittee B/209/5, upon which the following bodies were represented:

Aluminium Federation
Association of Building Component Manufacturers
Autoclaved Aerated Concrete Products Association
British Board of Agrément
British Precast Concrete Federation Ltd.
Building Employers' Confederation
Cold Rolled Sections Association
Department of the Environment (Property Services Agency)
Department of the Environment (Building Research Establishment)
Department of Health
Federation of Plastering and Drywall Contractors
Flat Glass Manufacturers' Association
Glass and Glazing Federation
Gypsum Products Development Association
Institution of Structural Engineers
Local Authority Organizations
Loss Prevention Council
Partitions Industry Association
Royal Institute of British Architects
Timber Research and Development Association

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Contents

Foreword

This British Standard has been prepared under the direction of the General Building Codes Technical Committee (B/209). BS 5234-2 specifies performance requirements for the strength and robustness of partitions, regardless of the materials and form of their construction, when tested by the methods given. BS 5234-2 is new whereas BS 5234-1:1992 is a complete revision of the 1975 edition, which is withdrawn.

The test methods to determine the effect of large soft body impacts and door slamming are similar to those in ISO 7892 and ISO 7894 respectively. However, it was found that the small hard body impact test method given in ISO 7892 could be hazardous and required too much space to achieve the required energies, so a different apparatus is used in this standard.

Assessed capability. Users of this British Standard are advised to consider the desirability of assessment and registration of a supplier's quality systems against the appropriate Part of BS 5750 by a third party certification body.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard 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 iv, pages 1 to 34, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Section 1. General

1.1 Scope

This Part of BS 5234 specifies the performance requirements for strength and robustness of a sample partition when tested by the methods given in the annexes.

The partition specimen to be tested is defined and includes a doorset and the surface finish of the partition where this is supplied as part of the partition.

Partition grade can be derived when all the relevant tests are applied to the test specimen and, where specified, to the specimen right-angle partition junction.

Performance levels are given for each requirement tested based on the frequency and/or intensity of the loads on the partition.

Methods of test are given for stiffness, hard and soft body impacts, door slamming, crowd pressure and for anchorages for lightweight fittings, wash basins and wall cupboards.

NOTE 1 Tests may be used individually or in combination.

A specimen right-angle junction is required to be tested for surface damage and perforation by a small hard body and for its resistance to damage by impact from a large soft body. Other junctions may be tested by the methods given in this standard but such tests are beyond its scope.

Lightweight and heavyweight anchorage tests specify brackets that are to be used to evaluate the performance level of the partition. Proprietary brackets may not be substituted to demonstrate conformance to this standard. Alternative test brackets may be used but such tests are beyond the scope of this standard.

The requirements tested may be applied to a partition regardless of the materials used in its construction. However, it would be unnecessary and/or inappropriate to apply some tests to some forms of construction; for example, heavyweight anchorage tests on movable partitions, screens or WC cubicles, hard body impact test on the glass of glazed partitions, etc. Masonry partitions should be designed for structural requirements in accordance with BS 5628-1:1978, BS 5628-2:1985 and BS 5628-3:1985. However, the design of some masonry partitions may need modification to achieve some of the performance criteria when tested by the methods given in this Part of BS 5234.

This standard does not include requirements for wind loading.

NOTE 2 If the partition specimen, when tested for crowd pressure as given in Annex G, meets the requirement of 0.75 kN/m this may be sufficient to satisfy the wind loading requirement. (See **8.4** of BS 5234-1:1992.)

1.2 References

1.2.1 Normative references

This Part of BS 5234 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 5234 only when incorporated in it by updating or revision.

1.2.2 Informative references

This Part of BS 5234 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

1.3 Definitions

For the purposes of this Part of BS 5234, the definitions given in BS 5234-1:1992 apply.

1.4 Grades

For the purposes of this standard, partitions are graded according to the level of activity in adjacent spaces and the degree of care likely to be exercised by people in the area (see Table 1); for a partition to be described as having a particular grade it shall pass all the tests for that grade.

1.5 Performance requirements

1.5.1 Grade

For a partition to conform to a particular grade, a specimen partition shall be tested by the methods given in Annex A to Annex F and a specimen partition corner junction shall be tested by the methods given in Annex B, Annex C and Annex D and shall satisfy the corresponding level of performance for that grade given in the corresponding subclause in **1.6**.

NOTE A summary of the requirements and principal test performance levels for each grade is given in Table 2.

1.5.2 Performance

For a partition to conform to an individual performance requirement, a specimen partition and, if specified, a right-angle partition junction shall be tested by the method given in the relevant annex and shall satisfy criteria for test performance that falls within the criteria given in the corresponding subclause in **1.6**.

The performance achieved shall be identified by criteria only without reference to grade, for example:

"BS 5234-2 performance compliance for stiffness: at the applied load of 500 N the maximum deflection was 16 mm and the maximum residual deformation was 2 mm".

NOTE A summary of performance levels for crowd pressure, lightweight anchorages and heavyweight anchorages is given in Table 3.

Table 1 — Partition grades by categories of duty

Grade	Category of duty	Examples
Light duty (LD)	Adjacent space only accessible to persons with high incentive to exercise care. Small chance of accident occurring or of misuse	Domestic accommodation
Medium duty (MD)	Adjacent space moderately used primarily by persons with some incentive to exercise care. Some chance of accident occurring and of misuse	Office accommodation
Heavy duty (HD)	Adjacent space frequently used by the public and others with little incentive to exercise care. Chances of accident occurring and of misuse	Public circulation areas Industrial areas
Severe duty (SD)	Adjacent space intensively used by the public and others with little incentive to exercise care. Prone to vandalism and abnormally rough use	Major circulation areas Heavy industrial areas

Table 2 — Summary of grade requirements and principal test performance levels

Requirement	Units	Grade (see Table 1)				Criteria		Test method
		LD	MD	HD	SD	Clause	Summary	
Stiffness	mm	25	20	15	10	**1.6.1**	Maximum deflection	Annex A
	mm	5	3	2	1		Maximum residual deformation	
Small hard body impact:								
surface damage	N m	3	3	6	10	**1.6.2**	Judgement of indent	Annex B
perforation	N m	—[a]	5	15	30	**1.6.4**	No perforation of facing	Annex D
Large soft body impact:								
damage	N m	20	20	40	100	**1.6.3**	2 mm maximum deformation	Annex C
structural damage	N m	60	60	120	120	**1.6.5**	No collapse or dislocation	Annex E
Door slam	No.	20	20	100	100	**1.6.6**	No damage and 1 mm maximum displacement	Annex F

[a] No requirements for this grade

Table 3 — Summary of tests for crowd pressure, lightweight anchorages and heavyweight anchorages

Requirement	Units	Performance level	Principal criteria		Test method
			Clause	Summary	
Crowd pressure	kN/m	0.75, 1.5 or 3.0	**1.6.7**	No collapse or dangerous damage	Annex G
Lightweight anchorages:					
pull-out	N	100 minimum	**1.6.8**	Shim retained	Annex H
pull-down	N	250 minimum	**1.6.9**	Shim retained and 2 mm maximum displacement	Annex J
Heavyweight anchorages:					
wash basin	N	500 minimum	**1.6.10**	5 mm maximum deflection	Annex K
	N	1 000 to 1 500 range		20 mm maximum deflection	
wall cupboard	N	2 000 to 4 000 range	**1.6.11**	5 mm maximum deflection	Annex L

1.6 Criteria for acceptance

1.6.1 Stiffness

When tested as described in Annex A, there shall be no damage or detachment, loosening or dislodgement of a partition's parts or fixings (cover strips, skirting, etc.), other than superficial cracking of the surface.

The maximum deflection and residual deformation shall not exceed the limits for the grade being tested given in Table 4.

NOTE Only superficial cracks which represent aesthetic damage are acceptable.

Table 4 — Stiffness: applied loads and deflection limits

Grade	Applied load	Maximum deflection	Maximum residual deformation
	N	mm	mm
LD	500	25	5
MD	500	20	3
HD	500	15	2
SD	500	10	1

1.6.2 Surface damage by small hard body impact

The partition and a right-angle junction shall be tested as described in Annex B and shall be subjected to the impact energy for the grade being tested as given in Table 5.

Evidence, including photographs showing the nature and extent of surface damage and, if relevant, extent of damage, depth of indent, etc., shall be provided by the test authority to enable judgement to be made as to whether the damage is acceptable.

NOTE No specific criterion for acceptance is given because the impact damage will vary with different materials and forms of construction; some surface damage may be acceptable because it can easily be repaired.

Table 5 — Small hard body impact test (surface damage)

Grade	Impact energy
	N m
LD	3
MD	3
HD	6
SD	10

1.6.3 Resistance to damage by impact from a large soft body

When tested as described in Annex C the partition and a right-angle junction shall be capable of withstanding the impact energies for the grade being tested as given in Table 6 without sustaining either permanent deformation in excess of 2 mm or any damage. Any local damage that can be easily repaired to regain the partition's original properties shall be permitted.

Table 6 — Large soft body impact test (damage)

Grade	Impact energy N m
LD	20
MD	20
HD	40
SD	100

1.6.4 Perforation by small hard body impact

When tested as described in Annex D there shall be no perforation of the partition, corner junction, or panel of a hollow partition, after being subjected to the impact energies, for the grade being tested, as given in Table 7.

Table 7 — Small hard body impact test (perforation)

Grade	Impact energy N m
LD	—[a]
MD	5
HD	15
SD	30

[a] No requirement for this grade.

1.6.5 Resistance to structural damage by impact from a large soft body

When tested as described in Annex E the partition shall be capable of withstanding the impact energies, for the grade being tested, as given in Table 8, without collapsing or dislocating the partition or its fixings.

Table 8 — Large soft body impact test (structural damage)

Grade	Impact energy N m
LD	60
MD	60
HD	120
SD	120

1.6.6 Door slamming

When tested as described in Annex F, the partition shall not be damaged, nor shall door frame fittings and architraves become detached or loose after the door leaf has been slammed. The number of slams and the mass of the door leaf for the grade being tested shall be as given in Table 9.

Table 9 — Door slam: door leaf weights and number of slams

Grade	Mass of test door leaf kg	Number of slams
LD	35 ± 0.5	20
MD	35 ± 0.5	20
HD	60 ± 0.5	100
SD	60 ± 0.5	100

The closing jamb of the door frame shall not be permanently displaced by more than 3 mm as a result of the preslam test and by more than 1 mm as a result of the main test, from its position at the start of the test, measured at 1.0 m above the bottom of the door leaf.

1.6.7 Crowd pressure

When tested as described in Annex G there shall be no collapse or damage that would render the partition dangerous, due to any of its parts becoming dislodged or shattered, in a manner that could cause injury. The sustained load applied to the timber beam shall be 0.75 kN/m, 1.5 kN/m or 3.0 kN/m.

NOTE For partitions that do not collapse and where the damage is not dangerous, any deflection and any damage reported in the test report is for information only (see **G.5**).

1.6.8 Pull-out of a lightweight anchorage

When tested as described in Annex H, the partition shall withstand the axial load of 100 N without releasing the pull-up shim plate or damaging the partition other than superficial cracking (see note to **1.6.1**).

1.6.9 Pull-down of a lightweight anchorage

When tested as described in Annex J, the partition shall withstand the transverse load of 250 N without releasing the pull-up shim plate or damaging the partition other than superficial cracking and the maximum movement of the pull-down bracket shall not exceed 2 mm. (See note to **1.6.1**.)

1.6.10 Eccentric downward loading of heavyweight anchorages (wash basin)

When tested as described in Annex K, the anchorages shall be capable of withstanding the load selected applied to the two linked brackets without releasing either pull-up shim plate, exceeding the deflection or residual deformation limits given in Table 10 and without loosening, detaching or damaging the partition.

The partition may be locally modified to conform to this criterion and any modification shall be recorded in the test report.

Table 10 — Heavyweight anchorage (wash basin): applied loads and deflection limits

Applied load N	Maximum deflection mm	Maximum residual deformation mm
500 and	5	1
1 000 or 1 250 or 1 500	20	1

1.6.11 Eccentric downward loading of heavyweight anchorages (high level wall cupboard)

When tested as described in Annex L, the anchorages shall be capable of withstanding the load selected applied to two linked brackets without releasing either pull-up shim plate, exceeding the deflection or residual deformation limit, as given in Table 11, and without loosening, detaching or damaging the partition.

The partition may be locally modified to conform to this criterion and any modification shall be recorded in the test report.

Table 11 — Heavyweight anchorage (high level wall cupboard): applied loads and deflection limits

Maximum load applied in 500 N increments N	Maximum deflection mm	Maximum residual deformation mm
2 000 or 4 000	5	1

Section 2. Testing

2.1 General

Testing shall be on specimen partitions and junction assemblies representative of those to be supplied and/or erected in practice (see **2.2**) fitted into a test rig as described in clause **2.3**.

NOTE The methods of test are given in Annex A to Annex L. Each test method includes the apparatus to be used, described as far as possible by general principles, so that the details of its construction are left to the discretion of the test authority.

Unless otherwise given in the test method, loads and forces shall be accurate to within ± 2 %, dimensions ± 1 %, temperatures ± 2 °C and relative humidities ± 5 % of the stated value.

NOTE Dead weights, at a conversion of 1 kg to 10 N, may be used to apply forces specified.

2.2 Partition specimen

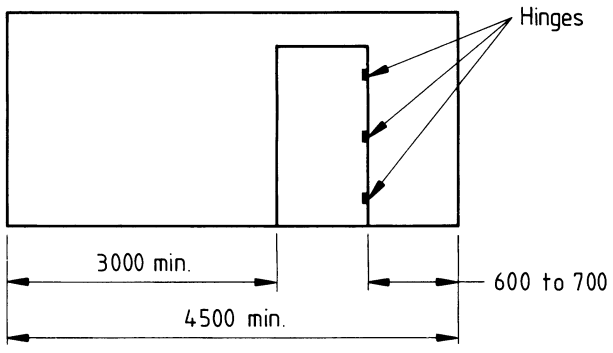
2.2.1 Partition

The specimen shall be a straight run of partition and may have provision for the junction (**2.2.2**), which fully represents the partition system including a doorset and all necessary fittings and fixings complete with joints at the top, bottom, end and intermediate positions. Specimens of partition systems designed to be constructed at lengths greater than 6 m shall be fixed at one end only.

NOTE 1 Partition specimens should include all integral components such as glazed areas, which might otherwise be considered to detract from the performance levels achieved.

The specimen shall be at least 4.5 m in length, shall include a doorset and a 600 mm to 700 mm run of partition flanking one side of the doorset (see Figure 1 and Figure 2). The height of the specimen shall be that set by the sponsor of the test.

NOTE 2 Conformance to the criteria of a test may be claimed only for partitions equal to or less than the height of the specimen tested.



All dimensions are in millimetres.

Figure 1 — Partition specimen dimensions

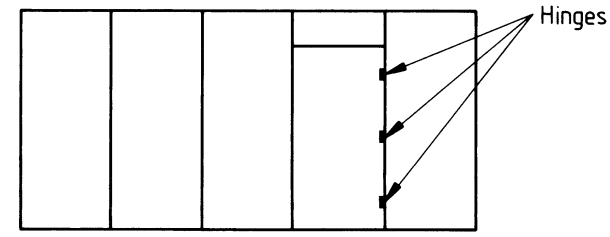


Figure 2 — Partition specimen of panel components

A partition specimen, made up of panel components, shall comprise at least three standard panels and either a panel component with a sponsor's doorset or a door assembly with a separate overpanel; it shall also have an additional panel component adjoining the doorset, as shown in Figure 2.

The doorset, 900 mm wide, may be part of the partitioning systems or, alternatively, a standard door assembly conforming to BS 4787-1:1980 and fixed into a prepared opening measuring 900 mm × 2 100 mm shall be used.

NOTE Doorset details are described in Annex F.

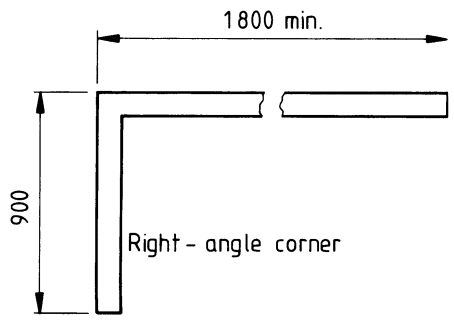
The door shall not be slammed during installation of the partition specimen before the slamming test given in Annex F.

The way in which components are fixed to each other and to the test rig shall reproduce actual conditions of use, particularly with respect to the nature, type and position of the fixings and the distance between them.

2.2.2 Partition junction

Partition junction assembly of a right-angle corner with a minimum return of 900 mm shall be representative of the partition system and shall be the same height as the straight specimen.

The partition junction shall be formed either at the end furthest from the door of the main partition specimen after all tests on the main partition specimen have been completed, or alternatively, at the end of a separate partition that is at least 1 800 mm long (see Figure 3).



All dimensions are in millimetres.

NOTE 1 800 mm minimum length may be the end of the main partition specimen.

Figure 3 — Partition junction

The components of the partition junction shall be fixed to each other and at the head and floor as they would be in use, including the type of fixings and their distance apart. Only the longest length of the partition junction shall be fixed at its end.

NOTE Junction assemblies are required for tests described in Annex B, Annex C, and Annex D.

2.3 Test rig

The test rigs shall be of a size capable of having a partition and junction specimen fitted or constructed to meet the requirements of clause **2.2**.

The rigidity of the rig shall be such that when a frontal force of 2 kN is applied normally to the plane of the frame at the point, which itself may be loaded by the partition specimen, the resulting deflection shall be no greater than 1 mm and the residual deformation shall be no greater than 0.1 mm.

NOTE The 2 kN force is based on ISO 7894:1987 which relates to 100 Pa (N/mm^2) over a specimen size of approximately 20 m^2.

Any additional assembly to permit testing of a junction shall conform to the same rigidity requirements.

The test rig shall be suitably equipped to enable the attachment of the fixing devices or the jointing methods, adjustable to the dimensions of the specimen. This frame shall be able to accommodate the permitted deviations in the dimensions of actual structures, both horizontally and vertically.

2.4 Conditioning

The specimen shall be conditioned and tested in an atmosphere of between 10 °C and 30 °C at between 30 % and 75 % r.h.. The conditioning period shall be agreed between the sponsor and the test authority.

2.5 Sequence of tests

Testing to determine a grade shall follow the same sequence as the test methods given in Annex A to Annex F.

Other tests given in this Part of BS 5234 may be introduced to suit a logical sequence, except where the test specimen requires modification; any test on a modified partition shall be performed after all other tests.

NOTE A series of tests need not necessarily be terminated because of failure in one particular test.

2.6 Test report

2.6.1 Individual test report

Each individual test report shall include the information required for the particular test and the following particulars:

a) number and date of this British Standard and the title of the test (e.g. BS 5234-2:1992, door slamming test);

b) name and address of the test organization;

c) name and address of the sponsor of the test;

d) name or brief descriptive title of the partition system;

e) test reference letter and a cross-reference to other tests carried out as part of a sequence of tests and the order in which these tests were carried out either prior to or subsequent to the individual test;

f) dates of construction and test;

g) dimensions and details of the partition specimen, including modifications for the heavyweight anchorage tests that remain during other tests, method of fixing to the rig and fully detailed specifications and drawings;

h) range of temperatures and humidities of the laboratory during the installation, conditioning and testing and the period of conditioning;

i) description with diagram of the test rig and apparatus together with calibration certificates.

NOTE Calibration certificates need not be included if the testing was done by a NAMAS[1)] accredited laboratory.

2.6.2 Summary of test reports

When more than one requirement has been tested, the test reports shall be summarized showing whether the individual requirements tested passed a particular performance level.

If a grade, satisfying the requirement described in **1.5**, has been achieved this shall be given in the summary of test reports.

Further details and an example of a summary of test reports are given in Annex M.

[1)] National Measurement Accreditation Service of the National Physical Laboratory, Teddington, Middlesex TW11 0LW.

Annex A (normative) Determination of partition stiffness

A.1 Principle

The test is to establish the ability of the partition to withstand persons or ladders leaning against it without causing unacceptable cracking or movement. To simulate this the partition is subjected to a static horizontal load at a set height and the maximum deflection and residual deflection measured, recording surface or structural damage.

A.2 Specimen

The partition specimen shall be as described in **2.2.1**.

A.3 Apparatus

A.3.1 *Test rig* (see clause **2.3**)

A.3.2 *Calibrated loading equipment*, capable of applying a load of 500 N perpendicularly towards the surface of the partition through a circular metal plate 150 mm ± 1 mm in diameter covered with a pad of resilient material 6 mm ± 2 mm thick. The equipment shall apply the load to an accuracy of ± 15 N. The rate of application of the load shall not exceed 50 N/s.

NOTE Closed cell natural sponge rubber with a density between 145 kg/m^3 and 225 kg/m^3 has been found to be a suitable resilient material.

A.3.3 *Measuring instrument*, for measuring the maximum deflection of the specimen to the nearest 0.1 mm.

A.3.4 *Clamps and/or other devices*, that position the measuring instruments and ensure their stability during the test.

A.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**A.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Prepare to record any changes in the specimen observed during the test together with the readings from the measuring instruments (**A.3.3**).

Position the loading equipment (**A.3.2**) to apply a force perpendicular to a solid area of the specimen, with the pad at the surface of the partition, at a height of 1 500 mm ± 10 mm measured from the bottom of the specimen and horizontally where the testing organization considers maximum deflection will occur.

Position the devices for measuring deflection at 125 mm above the centre point of the application of the load, on the load side.

Gradually apply a preload of 100 N.

Allow the loaded specimen to stabilize for 1 min.

Remove the load and allow the unloaded specimen to stabilize for 1 min.

Set the deflection measuring instrument to datum.

Apply a load of 100 N, then pause for approximately 2 min. Examine the specimen and record the deflection. Increase the load in 100 N increments at approximately 2 min intervals to 500 N, recording the deflection at each increment.

At 500 N sustain the load for 2 min.

Record the deflection to the nearest 1.0 mm.

Remove the load and pad.

Record any residual deformation in millimetres to the nearest 0.1 mm when the specimen has fully stabilized or 1 h after completing the test, whichever occurs first.

Thoroughly examine the specimen, and record all damage and defects.

A.5 Test report

The test report shall include the items given in **2.6.1**, together with the following:

a) a drawing showing the position at which the test loading was applied;

b) a record of any changes observed during the test;

c) the maximum deflection;

d) the residual deformation;

e) the condition of the specimen partition tested, e.g. "no damage occurred", or report any crack and damage or detachment, loosening or dislodgment of its parts or fixing, including diagrams or photographs where appropriate.

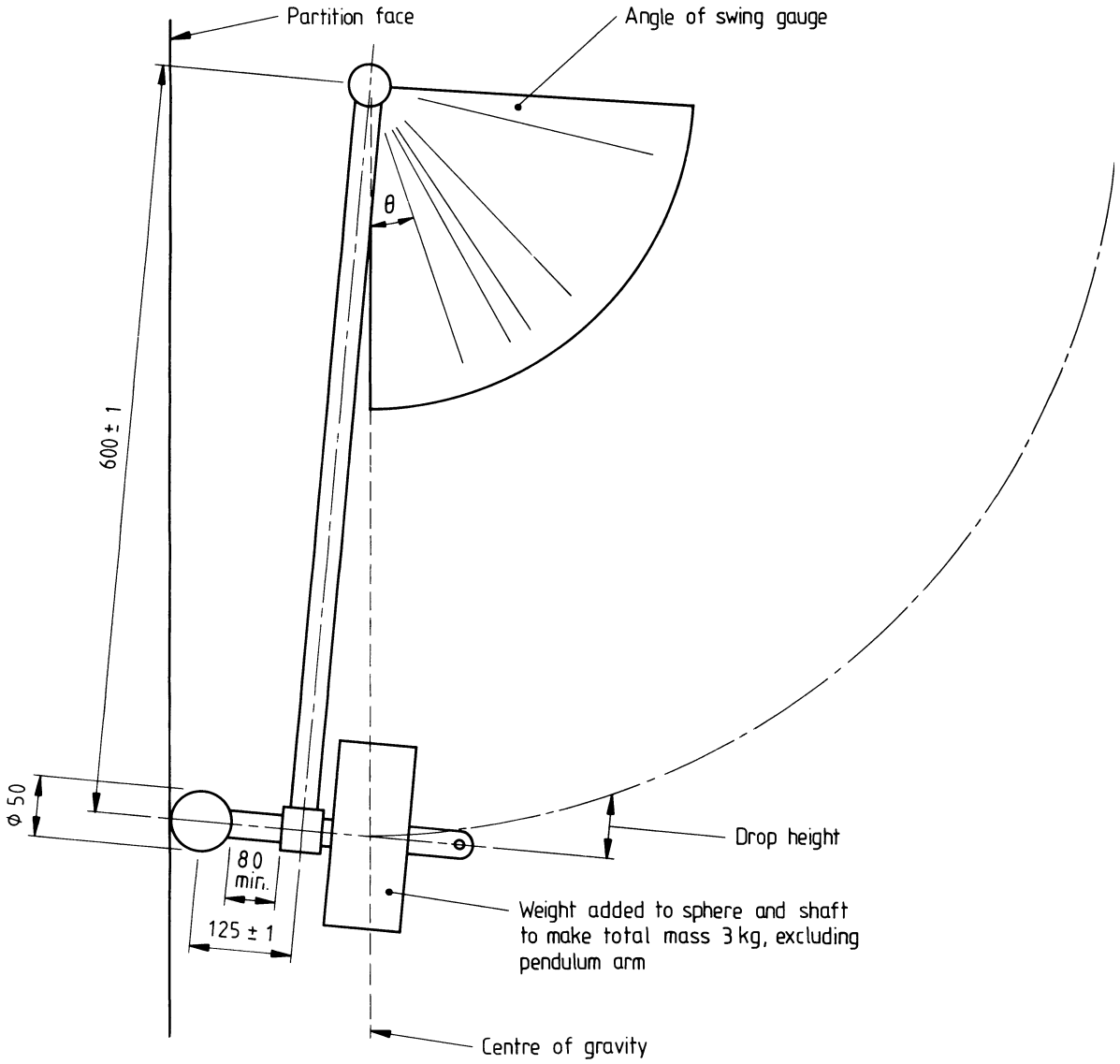
Annex B (normative) Determination of surface damage by small hard body impact

B.1 Principle

The test is to determine the resistance of the partition to damage from impacts by small, hard objects. A 3 kg impactor, with its head being a 50 mm diameter steel sphere, is swung to impact approximately perpendicularly the face of the partition. The nature and extent of any damage to the specimen is recorded.

B.2 Specimen

The partition specimen shall be as described in **2.2.1** together with the partition junction (see **2.2.2**).

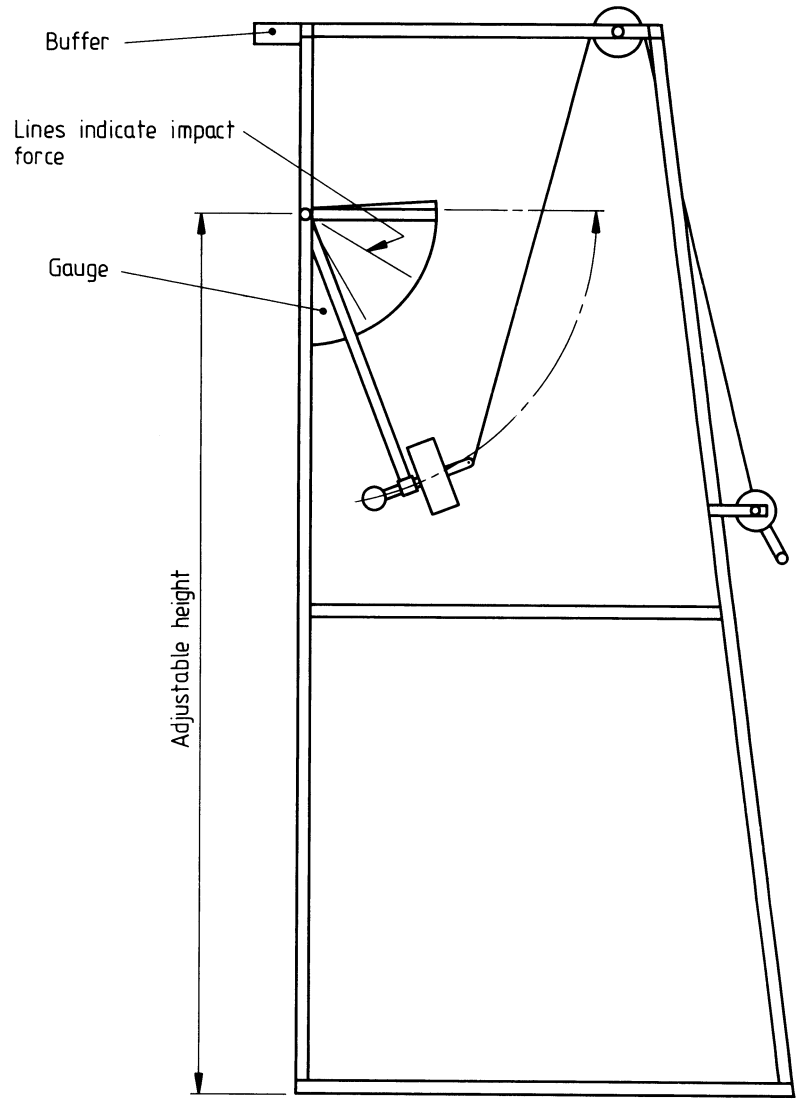


All dimensions are in millimetres.

NOTE When pendulum is at rest, its arm should be not more than 5° from vertical.

a) Impactor

Figure B.1 — Apparatus for small hard body impact test



b) Typical support frame for impactor

Figure B.1 — Apparatus for small hard body impact test *(concluded)*

B.3 Apparatus

B.3.1 *Test rig* (see **2.3**).

B.3.2 *Impactor*, a head comprising a 50 mm diameter steel sphere mounted on a shaft not exceeding 20 mm diameter, weighted to bring the total mass of the impact head to 3 kg. The head shall be mounted as a pendulum 600 mm ± 1.0 mm long, as shown in Figure B.1 a), from a bearing allowing it to swing freely in a vertical plane perpendicular to the plane of the partition, but prevented from sideways movement. The arm of the pendulum shall be in the form of a metal rod or tube of approximate mass 1.3 kg/m length. The centre line of the pendulum arm shall meet the shaft of the impactor head 125 mm from the centre of the 50 mm sphere. At least 80 mm of the shaft of the impactor head, between the sphere and the attachment for the pendulum arm, shall be unobstructed to facilitate penetration.

B.3.3 *Support frame for impactor*, to allow impactor pendulum to be positioned as required for test, to hold pivot of pendulum in position during impact, and incorporating release mechanism to control pendulum's angle of swing. (See Figure B.1 b).)

B.3.4 *Camera*, to photograph impact damage.

B.3.5 *Measuring instrument*, to measure the depth of indentation to the nearest 0.1 mm.

NOTE A convenient instrument for this purpose is a dial gauge mounted in the middle of a reference bar with a flattened knife edge at one end and a single rounded point contact at the other, forming a 100 mm bridge.

B.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**B.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory range of temperatures and humidities during the installation, conditioning and testing of the specimen.

Select 10 positions to be impacted.

NOTE 1 The impact positions should be at the discretion of the testing organization, who should select points that it considers to be most critical.

Set up the test apparatus at the first impact position, so that when at rest the impactor (**B.3.2**) just touches the face of the partition as shown in Figure B.1 a).

Raise the impactor to the angle of swing required for the impact energy being tested as shown in Table B.1.

Table B.1 — Angles of swing for small hard body impact test: surface damage

Impact energy N m	Pendulum head drop height m	Angle of swing °
3	0.1	33.6
6	0.2	48.2
10	0.33	63.6

Release the impactor once only and prevent it from bouncing.

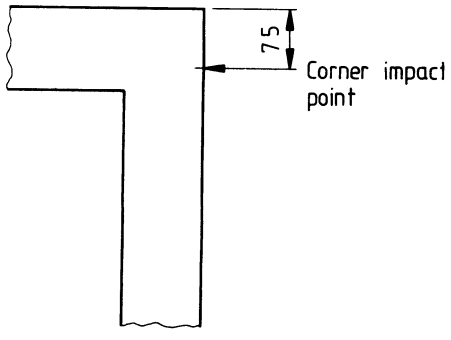
Inspect the specimen for damage, e.g indentation, delamination, fracture of surface, etc. Record and photograph the nature and extent of the damage and, if practicable, measure the depth of indentation to the nearest 0.1 mm.

NOTE 2 Marking the impactor with chalk or inserting a sheet of carbon paper will help to identify the indentation.

NOTE 3 When photographing, having an indication of scale, e.g. a ruler, beside the damaged area will assist in assessing the damage.

Move the test apparatus to the next impact position and repeat the test procedure as before. Continue until a total of 10 impactions has been made.

Set up the partition junction (see **2.2.2**). Select a single impact point less than 1.75 m above the bottom of the partition and at the location indicated in Figure B.2, position the apparatus and repeat the test following the procedure as described above.



Dimension is in millimetres.

Figure B.2 — Impact at partition junction (small hard body)

NOTE 4 The testing organization should select a point to be impacted that it considers to be the most critical.

B.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) drawings showing the positions at which the impacts were applied to the partition specimen and partition junction;

b) the level of impact energy and, if measured, the depth of the indents;

c) for each impacted point, a record of any indentation, distortion, delamination or fracture of the surface;

d) photographic records;

e) the condition of the specimens tested, e.g. "no surface damage occurred", and report any damage or detachment, loosening or dislodgement of its parts or fixings, indicated by diagrams or photographs where appropriate.

Annex C (normative) Determination of resistance to damage by impact from a large soft body

C.1 Principle

The test requires that the partition is subjected to two separate impacts from a soft body impactor in the form of a spheroconical bag capable of being swung at the partition to determine the resistance to damage. The impact is applied by a bag, suspended from the test rig. The bag is positioned so that when at rest it just touches the face of the specimen at the point of intended impact. The permanent deformation and any damage is recorded after each single impact.

C.2 Specimen

The partition specimen shall be as described in **2.2.1** together with the partition junction (see **2.2.2**).

C.3 Apparatus

C.3.1 *Test rig* (see **2.3**).

C.3.2 *Spheroconical bag*, having a mass of 50 kg ± 0.5 kg made of eight sections sewn together. The dimensions of the bag when filled are those of a volume composed of a sphere of 400 mm diameter inscribed in a cone, the top of which is located at a distance of 400 mm from the centre of the sphere. The bottom of the bag is strengthened by a circular piece of leather of 120 mm diameter sewn into it. The top of the bag is slightly truncated in order to make an opening of 80 mm diameter. This opening is strengthened by a leather strip sewn onto the bag, to which are fixed four equidistant rings held together by a suspension ring. The bag is filled with hardened glass beads of nominal 3 mm diameter (see Figure C.1).

NOTE 1 To prevent the glass beads spilling if the seams burst, it is advisable to put them in a heavy duty polyethylene bag.
NOTE 2 The spheroconical bag is identical to the large soft impact body specified in ISO 7892:1988.

C.3.3 *Two pulleys and a suspension line*, with means of attachment to the test rig.

C.3.4 *Winding and release mechanisms*, for suspending the bag (**C.3.2**) at the required drop height.

C.3.5 *Measuring instrument*, capable of measuring, to an accuracy of 0.1 mm, the deformation of the specimen.

C.3.6 *Devices* that position the measuring instrument (**C.3.5**) and ensure its stability during the test.

C.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**C.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Be prepared to record any changes or damage to the partition specimen observed during the test, together with the readings from the measuring instrument (**C.3.5**). In the event of collapse, discontinue the test.

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Select two points at which single impacts shall be applied normal to the solid area of the specimen within the horizontal band 1.2 m and 1.75 m above the bottom of the specimen.

NOTE 1 The impact points should be selected within the defined band where the test is most likely to damage the partition and should be selected by the testing organization.

Position the device for measuring deformation (**C.3.5**) on the back of the specimen or leaf opposite to where the impact will occur.

NOTE 2 In twin leaf construction this would require the leaf not receiving the impact to be perforated.

Set up the test apparatus and raise the bag to the first point selected, as shown in Figure C.2.

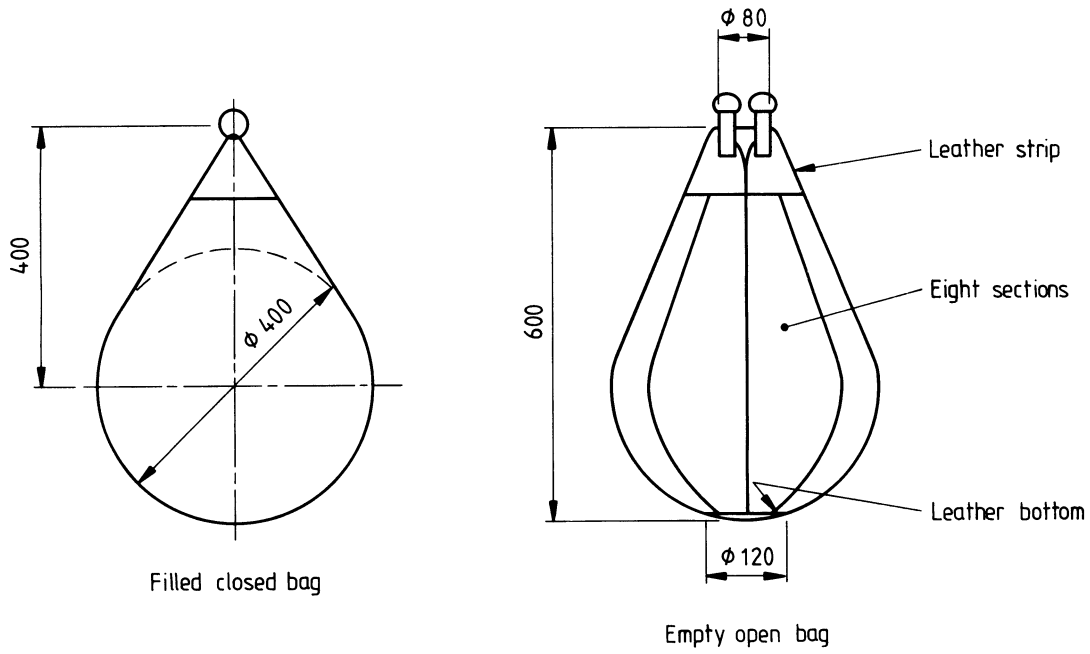
Raise the bag using the winch to give a drop height of 204 mm, 82 mm or 41 mm to produce an impact energy of 100 N m, 40 N m or 20 N m respectively, and secure the line.

The level of impact energy shall be as given in Table 6 for the grade being tested.

NOTE 3 The line needs to be long enough to ensure that its angle to the plane of the partition does not exceed 65°.

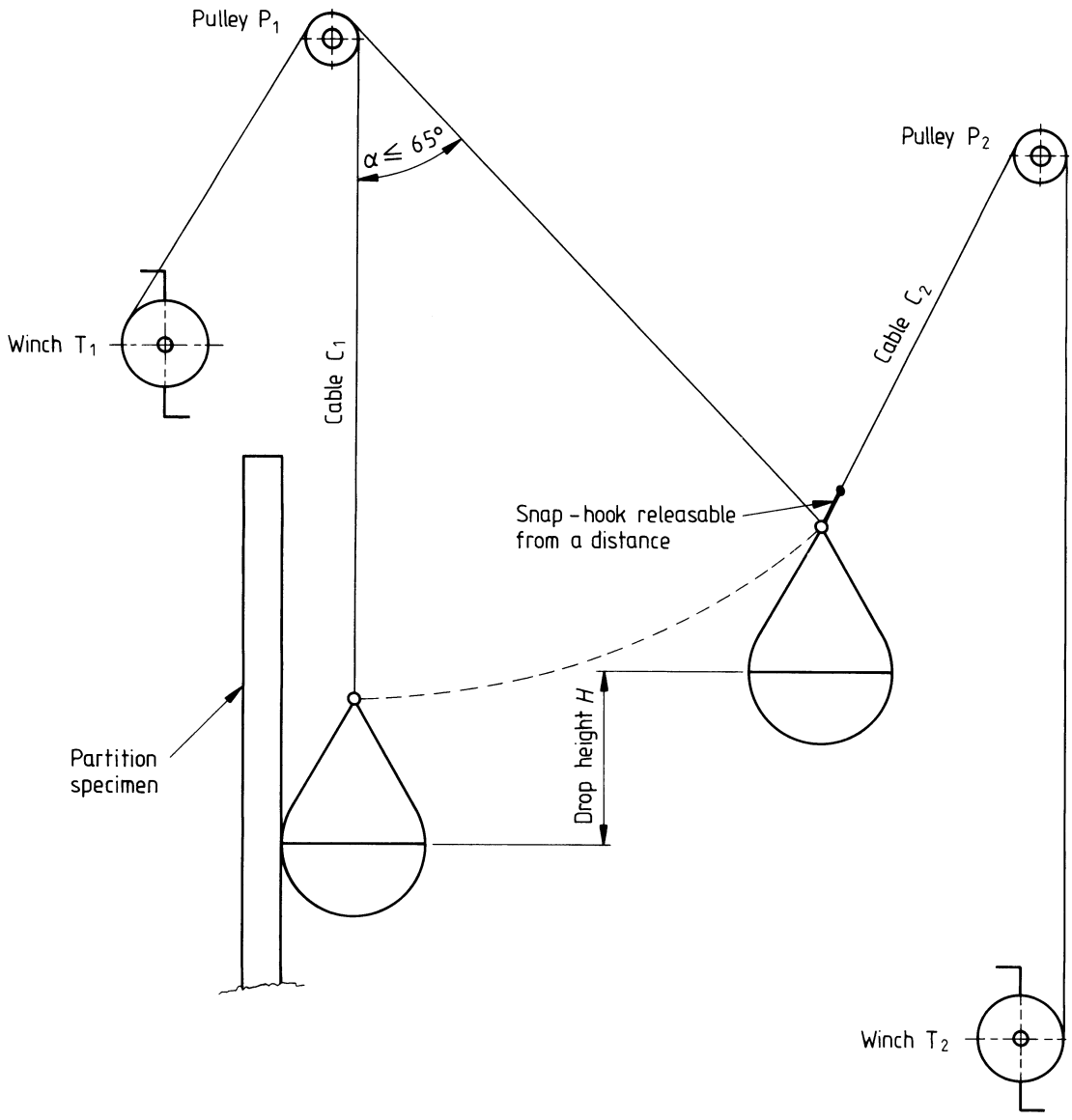
Release the line allowing the bag to impact the partition. Restrain the bag to prevent rebounding.

Allow the partition to stabilize for 5 min.



All dimensions are in millimetres.

Figure C.1 — 50 kg spheroconical bag



NOTE Pulleys shall be in plane, perpendicular to the partition specimen.

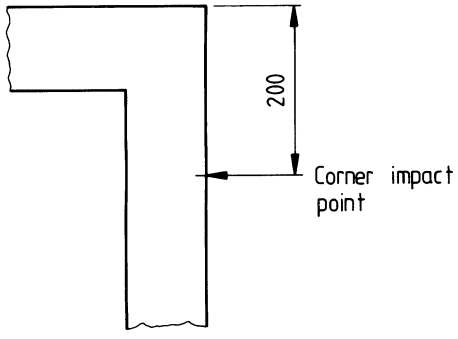
Figure C.2 — Test apparatus for large soft body impact test

Measure and record the permanent deformation to the nearest 0.5 mm.

Relocate the test apparatus to the other selected point on the partition and repeat the procedure.

Examine and record any damage to the specimen.

Set up the partition junction (see **2.2.2**) and repeat the test procedure as before with a single impact, at the position indicated in Figure C.3 within the horizontal band, 1.2 m and 1.75 m above the bottom of the partition.



Dimension is in millimetres.

Figure C.3 — Impact at partition junction (large soft body)

C.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) drawings showing the position at which the impacts were applied to the partition specimen and partition junction;

b) the level of impact energy;

c) any surface or structural damage;

d) the permanent deformation;

e) a record of any changes observed during the test;

f) the condition of the specimens tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate.

Annex D (normative) Determination of resistance to perforation by small hard body impact

D.1 Principle

The test is to determine the resistance of the partition to perforation from impacts by small, hard objects. A 3 kg impactor, with its head being a 50 mm diameter steel sphere, is swung to impact approximately perpendicularly the face of the partition. Surface damage and any perforation of the specimen is recorded.

D.2 Specimen

The partition specimen shall be as described in **2.2.1** together with the partition junction (see **2.2.2**).

D.3 Apparatus

D.3.1 *Test rig* (see **2.3**).

D.3.2 *Impactor*, as described in **B.3.2**.

D.3.3 *Support frame for impactor*, as described in **B.3.3**.

D.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**D.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Select 10 positions to be impacted.

NOTE 1 The selection of the positions to be impacted should be done by the testing organization, who should select points that it considers to be most critical.

Set up the test apparatus at the first impact position, so that when at rest the impactor (**D.3.2**) just touches the face of the partition as shown in Figure B.1.

Raise the impactor to the angle of swing required for the impact energy being tested as shown in Table D.1.

Table D.1 — Angles of swing for resistance to perforation test

Impact energy N·m	Pendulum head drop height m	Angle of swing °
5	0.17	43.8
15	0.5	80.4
30	1.0	131.8

Release the impactor once only.

Inspect the specimen for damage and any perforation, photograph and record.

NOTE 2 When photographing, having an indication of scale, e.g. a ruler, beside the damaged area will assist in assessing the damage.

Move the test apparatus to the next impact position.

Repeat the test procedure as before and continue for the specified number of impacts.

Set up the partition junction and repeat the test procedures as before with a single impact, less than 1.75 m above the bottom of the partition and at the location indicated in Figure B.2.

NOTE 3 The testing organization should select a point to be impacted that it considers to be the most critical.

D.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) drawings showing the positions at which the impacts were applied to the partition specimen and partition junction;

b) the level of impact energy and any perforation of the partition;

c) any surface damage;

d) a record of any changes observed during the test;

e) the condition of the specimens tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, indicated by diagrams or photographs where appropriate.

Annex E (normative) Determination of resistance to structural damage by multiple impacts from a large soft body

E.1 Principle

The test is similar to that described in Annex C except that structural damage is recorded after three impacts of greater impact energy.

E.2 Specimen

The partition specimen shall be as described in **2.2.1**.

E.3 Apparatus

E.3.1 *Test rig* (see **2.3**).

E.3.2 *Spheroconical bag*, as described in **C.3.2**.

E.3.3 *Two pulleys and a suspension line*, with means of attachment to the test rig.

E.3.4 *Winding and release mechanisms*, for suspending the bag (**C.3.2**) at the required drop height.

E.4 Procedure

Proceed as described in **C.4** except for the following.

a) Select an impact energy of either 120 N m or 60 N m (see Table 8). These will require drop heights of 245 mm and 122 mm respectively.

b) Apply three impacts at the two selected points.

NOTE 1 The two selected points should be different from points previously impacted.

c) Examine and record any surface or structural damage to the specimen.

NOTE 2 Deflection is not measured in this test.

E.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) drawings showing the position at which the impacts were applied to the partition specimen and partition junction;

b) the level of impact energy;

c) any structural damage;

d) any collapse or dislocation of component parts such as studs, panels, blocks etc.;

e) a record of any change observed during the test;

f) the condition of the specimens tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate.

Annex F (normative) Determination of the effects of door slamming

F.1 Principle

The test requires that the partition is subjected to an impact from the test specimen door leaf slamming, transmitted through the door frame to the partition. The residual displacement of the door frame is measured and recorded together with any damage to the partition or door frame.

F.2 Specimen

F.2.1 *Partition*

The partition specimen shall be as described in **2.2.1**.

The size of the opening in the partition specimen to receive the doorset or a standard door assembly shall be $2\,100\,^{+5}_{0}$ mm high and $900\,^{+10}_{0}$ mm wide.

NOTE The use of a template to form the opening in masonry is recommended.

F.2.2 *Door frame*

F.2.2.1 *Sizes and construction*

The test door frame shall conform to the dimensional requirements of BS 4787-1:1980 for an internal door frame 2 100 mm high and 900 mm wide coordinated size, into which the test door leaf (**F.2.3**) can be fitted.

The test door frame shall be one of the following:

a) door frame designed as an integral part of the partition including any architraves;

b) door frame specified by the sponsor including architraves;

c) door frame made of European redwood 30 mm × 94 mm with a stop of 13 mm × 45 mm (both finished dimensions). The stop shall be glued and screwed to the frame. Architraves 18 mm × 45 mm shall be fitted at the head and jambs.

F.2.2.2 *Fixing*

The door frame shall be fixed by the method specified by the sponsor allowing for the sponsor's maximum permitted tolerances between the door frame and the partition. This shall include the number, position and sizes of screws, plugs or other fixing devices.

Alternatively the door frame jambs shall be fixed into the partition with screws, plugs or other fixing devices of sizes and in a manner specified by the sponsor and in the positions indicated in Figure F.1.

NOTE In masonry construction, plywood or hardboard packers may be used to position the frame vertically and should be placed at the fixing positions between the door frame jambs and the partition. The size of the packers should be the same width as the jamb, at least 100 mm in height and of a suitable thickness to pack the gap caused by fixing the door frame into an opening of the maximum allowable tolerance.

F.2.3 ***Door leaf***

The test door leaf shall be 2 040 mm high and 826 mm wide, conforming to the dimensional requirements for internal door leaves given in BS 4787-1:1980. The weight of the door leaf shall be either 60 kg ± 0.5 kg or 35 kg ± 0.5 kg, depending on the level of test to which the partition is to be tested. The weight shall be distributed uniformly over the face of the door leaf.

Alternatively, if the 900 mm wide doorset is supplied by the sponsor as part of an integral partition system, the door leaf shall be weighted to meet the same weight and distribution requirements as described above.

The door leaf shall be fixed into the door frame so as to reproduce the actual conditions of use, particularly with respect to the nature, type and position of the fixing. Loose architraves shall be cut away at the point of measurement to allow measurement of the displacement of the frame.

The door shall be hung on $1\frac{1}{2}$ pairs of 100 mm steel butt hinges in the location indicated in Figure F.1 b). The size of the screws for fixing the hinge and frame shall be in accordance with the sponsor's specification. Other types of hinges or pivots may be used, provided they are specified as part of the partitioning system. The door hinges shall be lubricated in accordance with the manufacturer's instructions.

No form of restricting device shall be used on the door leaf, e.g. door-closer, door latch etc.

F.3 Apparatus

F.3.1 *Test rig* (see **2.3**).

F.3.2 *Light strong line*, to transmit the force generated by a falling mass of 15 kg, and a suitable means of attaching the line to the door leaf, such as a brass or steel hook or eye.

F.3.3 *Swivel pulley system*, 100 mm diameter, greased or oiled in accordance with the manufacturer's instructions so that it is free running.

F.3.4 *Weight*, of 15 kg ± 50 g.

F.3.5 *Platform* able to arrest a free falling mass of 15 kg at a predetermined point.

F.3.6 *Measuring instrument*, capable of measuring the residual displacement of the door flame to an accuracy of 0.1 mm.

F.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**F.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity throughout the installation of the specimen and the test.

Be prepared to record any changes observed during the test, together with the readings from the measuring instrument (**F.3.6**). In the event of failure, discontinue the test.

Position the devices for measuring the residual displacement of the door frame on the closing jamb 1 m above the bottom of the door leaf, as indicated in Figure F.2.

Set up the test equipment by assembling the line (**F.3.2**), pulley (**F.3.3**) and weight (**F.3.4**) as shown in Figure F.2, so that the door leaf is closed by the action of the weight falling onto the platform (**F.3.5**). Connect the line to the door leaf 1 m ± 25 mm above the bottom of the door leaf and 50 mm ± 5 mm from lock side; pass the line through the pulley, positioned not less than 400 mm from the door jamb, so that the line is horizontal and approximately normal to the closed door leaf. Attach the line to the weight adjusting its length so that, when the weight strikes the platform and removes the tension in the line, the door leaf is within 20 mm of closing.

Set the displacement measuring instrument to datum.

Open the door leaf to 60° ± 1° and release it. The weight shall fall free and cause the door to slam. Repeat this operation three times as a preslam test.

Record the residual displacement.

Reset the deflection measuring instrument to datum.

Open the door leaf to 60° ± 1° and release it. Repeat this for the required number of slams specified in Table 9.

On completion of the required number of slams, examine the condition of the partition.

Record any damage to the partition and fixings, also any loosening or dislodgement of fittings or trims.

Allow the partition and door frame to stabilize for 5 min.

Measure any residual displacement of the door frame to the nearest 0.1 mm.

F.5 Test report

The test report shall include the items given in **2.6.1**, together with the following:

a) a drawing and full specification of the doorset, or door leaf and frame as appropriate, including the number, position and sizes of fixings used to fix the frame to the partition;

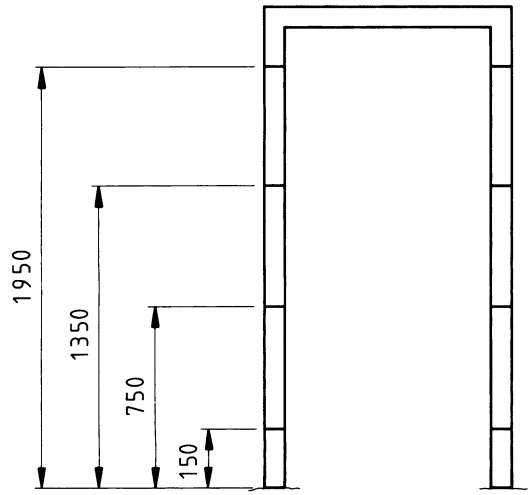
b) the weight of door leaf;

c) the number of times the door was slammed;

d) a record of any changes observed during the test;

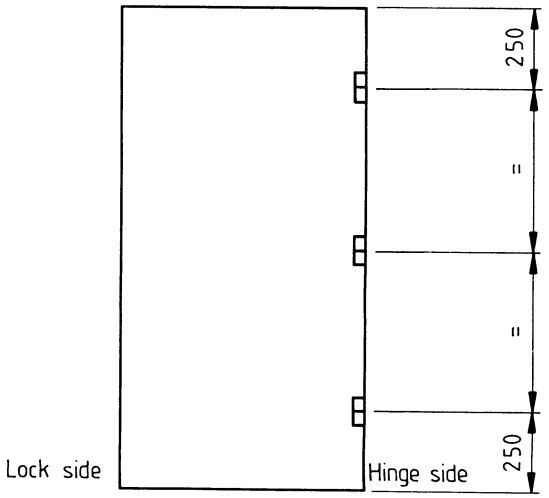
e) the residual displacement of the door frame;

f) the condition of the specimen partition tested, e.g. "no damage occurred", or report any surface or structural damage, detachment, loosening or dislodgement of its parts or fixing, including diagrams or photographs where appropriate.



Dimensions above bottom of door leaf ± 50

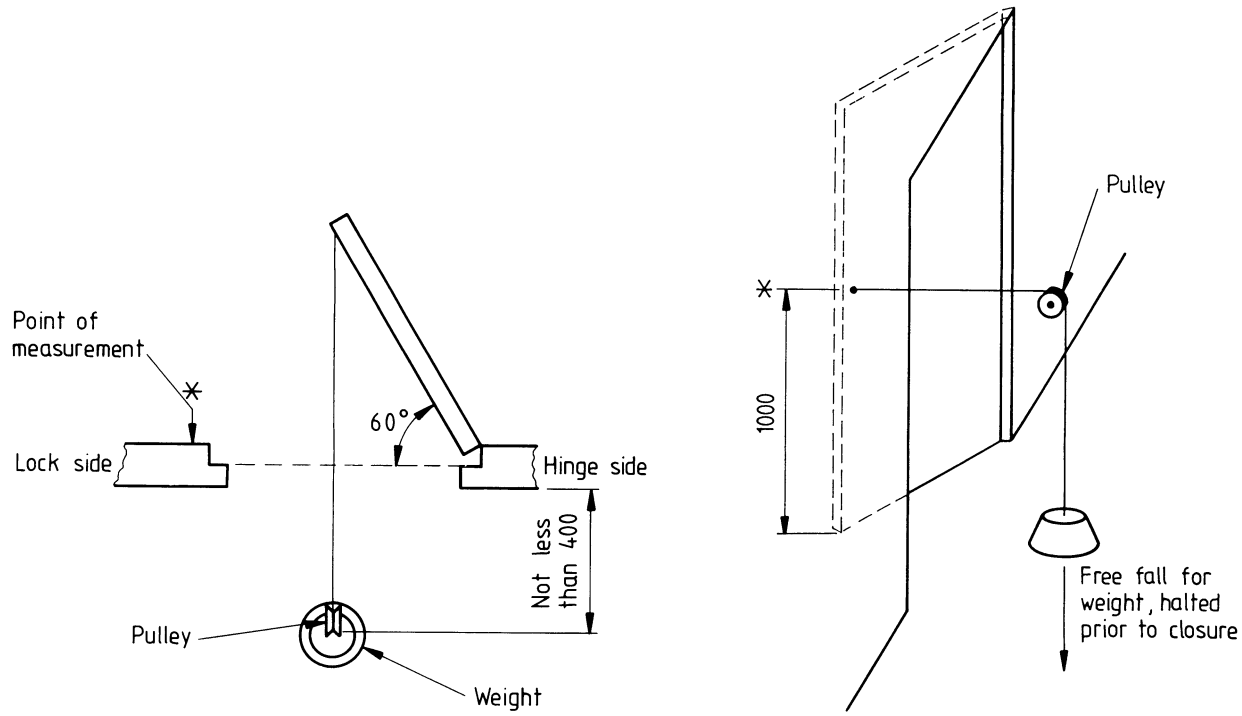
a) Hole positions in timber frame



b) Location of hinges

All dimensions are in millimetres.

Figure F.1 — Fixing positions for standard door frame



All dimensions are in millimetres.

Figure F.2 — Arrangement for door slamming test

Annex G (normative) Determination of resistance to crowd pressure

G.1 Principle

The test requires that the partition is subjected to a continuous load transmitted through a 2.5 m horizontal beam at a set height and the maximum deflection measured. Surface or structural damage is also recorded.

G.2 Specimen

The partition specimen shall be as described in **2.2.1**.

G.3 Apparatus

G.3.1 *Test rig* (see **2.3**).

G.3.2 *Calibrated loading equipment*, capable of applying the specified loads (up to 8 kN depending on the test level selected) perpendicularly towards the surface of the partition through the timber beam. The equipment shall be capable of applying the load to an accuracy of ± 50 N. The rate of application of the load shall not exceed 800 N/s.

G.3.3 *Timber beam*, of strength class not less than SC3 when graded to BS 4978:1988, 225 mm × 100 mm × (2 500 ± 10) mm in length and capable of transmitting the load to the partition.

G.3.4 *Resilient material*, 10 mm ± 2 mm thick to spread the load from the 100 mm face of the timber beam (**G.3.3**) to the partition.

G.3.5 *Calibrated measuring instrument*, for measuring the maximum deflection of the specimen to the nearest 0.1 mm.

G.3.6 *Clamps or other devices*, that position the measuring instruments and ensure their stability during the test.

G.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**G.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Be prepared to record any changes or damage to the partition specimen observed during the test, together with the readings from the measuring instrument (**G.3.5**). In the event of collapse, discontinue the test.

Position the beam (**G.3.3**) with one end 250 mm from the lock side of the door and with the 100 mm face in contact [through the resilient material (**G.3.4**)]with the partition, to apply a force horizontally and normal to a solid area of the specimen at the surface of the partition, 1.2 m measured from the bottom of the specimen; the resilient material shall be in contact with the surface of the partition specimen along the length of the beam.

Position the loading device (**G.3.2**) normal to the face of the partition to apply the load horizontally and to the centre of the timber beam.

Position the instrument for measuring deflection, on the loaded side of the partition, 125 mm above the centre point of the application of the load.

Gradually apply a preload of 200 N to the beam.

Allow the loaded specimen to stabilize for 1 min.

Remove the load.

Allow the unloaded specimen to stabilize for 1 min.

Set the deflection measuring instruments to datum.

Gradually apply and sustain for 2 min load of 0.75 kN, 1.5 kN or 3 kN per metre length of beam.

NOTE The magnitude of the load should be selected by the sponsor.

Examine the specimen and record the deflection.

Remove the load and beam.

Allow the specimen to stabilize for 5 min after completing the test and record any residual deformation to the nearest 0.5 mm.

G.5 Test report

The test report shall include all items given in **2.6.1**, together with either the details of any collapse or:

a) the maximum deflection under load and residual deformation;

b) any collapse or dislocation of component parts such as studs, panels, blocks etc.;

c) a record of any changes observed during the test;

d) the condition of the specimens tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate.

Annex H (normative) Lightweight anchorage pull-out test

H.1 Principle

The test is to establish the ability of the partition to sustain a load at an anchorage point subjected to an axial load transmitted through a pull-out test bracket using a single anchorage and to avoid dislodgement of a shim plate, positioned between the bracket and the surface of the partition.

H.2 Specimen

The partition specimen shall be as described in **2.2.1**.

H.3 Apparatus

H.3.1 *Test rig* (see **2.3**).

H.3.2 *Calibrated loading equipment*, capable of applying a load of 100 N ± 3 N perpendicularly away from the surface of the partition axially with the screw/bolt shank, through the pull-out test bracket anchored to the partition. If a variable loading device is used, the rate of application shall not exceed 10 N/s; if dead weights, they shall be applied without shock.

H.3.3 *Shim plate*, of stainless steel 1 mm ± 0.2 mm thick as shown in Figure H.1 a).

H.3.4 *Device*, capable of applying an upward force of 20 N ± 1 N.

H.3.5 *Anchorage*, of a type specified by the test sponsor.

H.3.6 *Pull-out test bracket*, of steel with a minimum thickness of 3 mm and having a smooth flat surface as shown in Figure H.2 a).

H.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**H.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Fix the pull-out test bracket (**H.3.6**) and the shim plate (**H.3.3**) to the partition with the appropriate anchorage (**H.3.5**).

NOTE The position at which the pull-out bracket is fixed should be at the discretion of the testing organization who should select the location it consider to be the most critical.

Apply the 20 N upward force continuously to the shim plate [see Figure H.2 b)].

Prepare to record any changes observed during the test.

Position the loading equipment (**H.3.2**) and connect it to the pull-out test bracket to apply a load perpendicularly away from the partition, axially with the screw or bolt shank.

Gradually apply a load up to 100 N over a minimum period of 10 s.

At 100 N sustain the load for 1 min.

Record any changes to the specimen.

Remove the load from the pull-out bracket.

If the pull-up shim plate is released the anchorage is deemed to have failed. In the event of failure, discontinue the test.

H.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

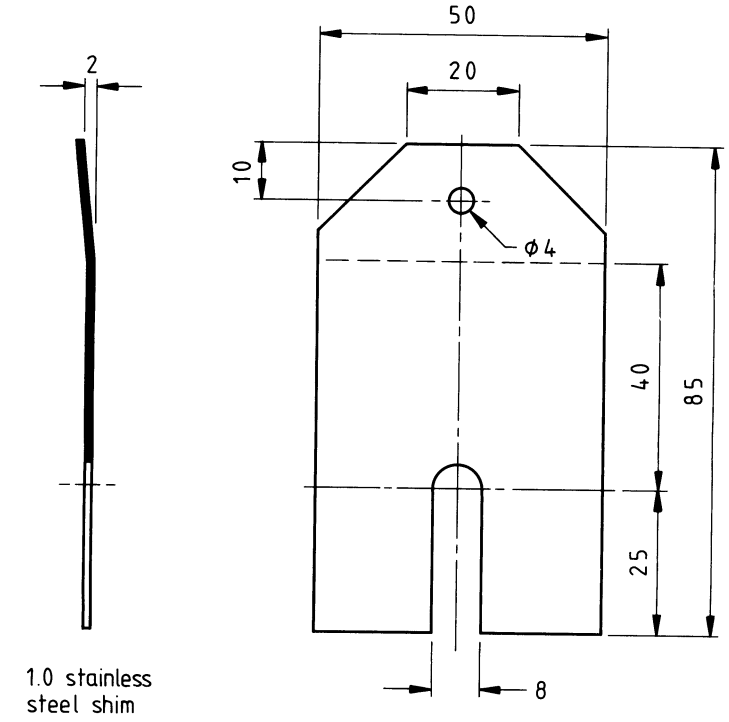
a) a drawing showing the position at which the anchorage was fixed;

b) details of anchorage used in the test;

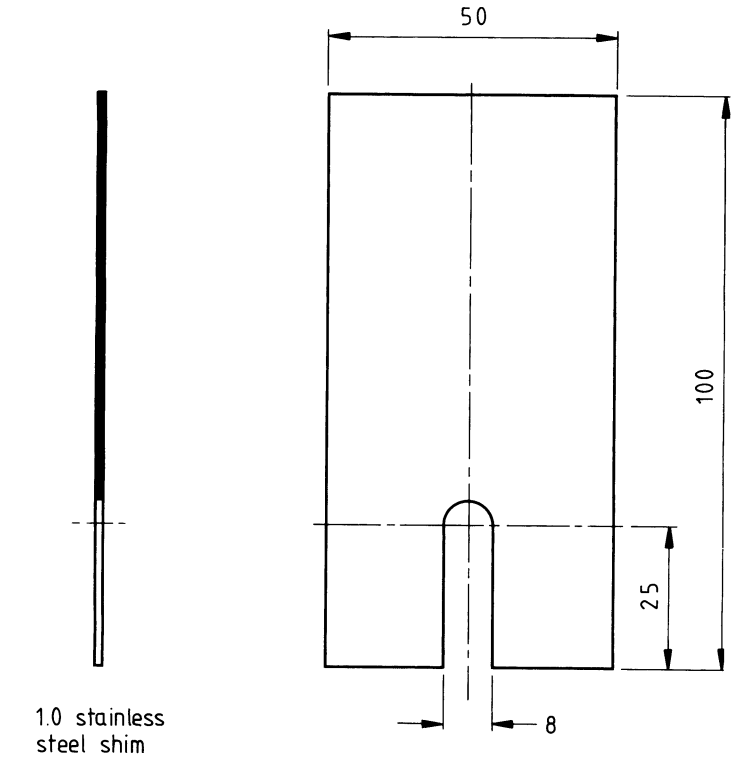
c) the result of the test, i.e. whether or not the pull-up shim plate is released;

d) a record of any changes observed during the test;

e) the condition of the specimens tested, e.g. “no damage occurred”, or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate.



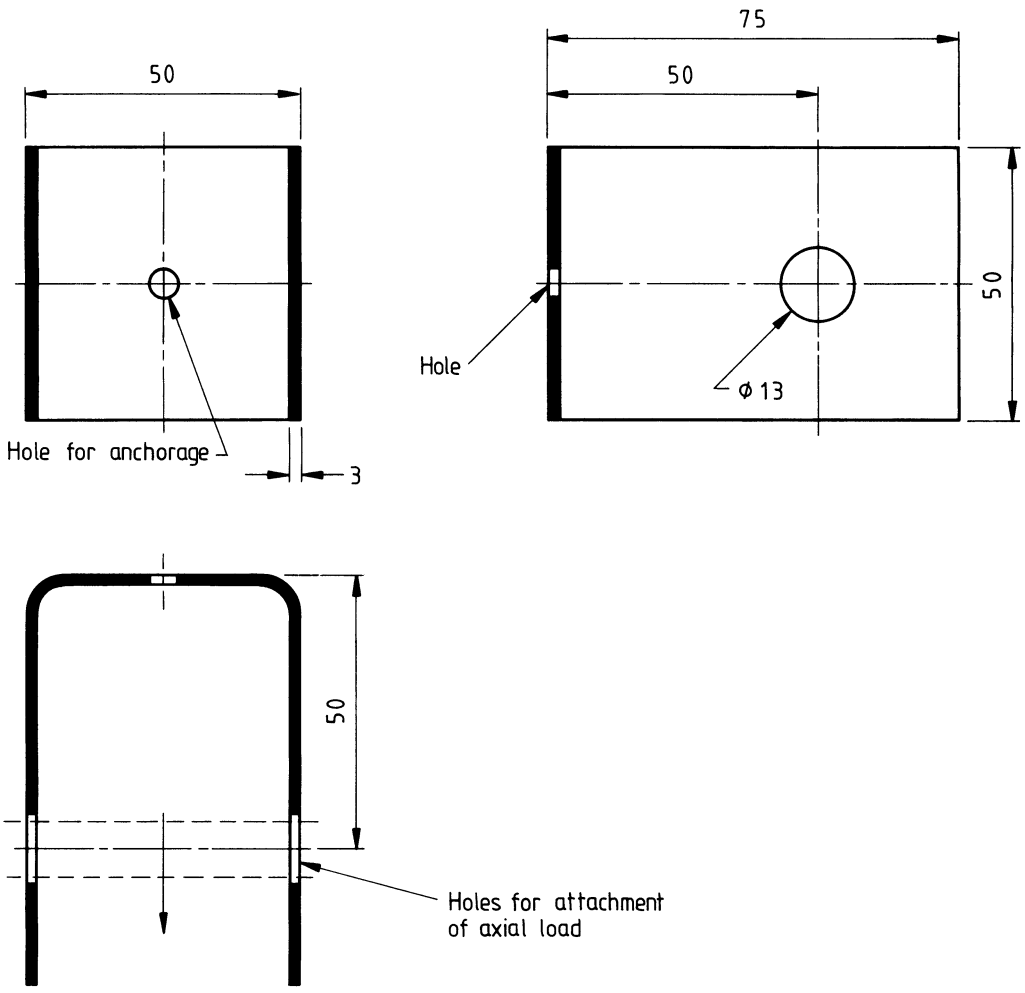
a) Pull-up shim



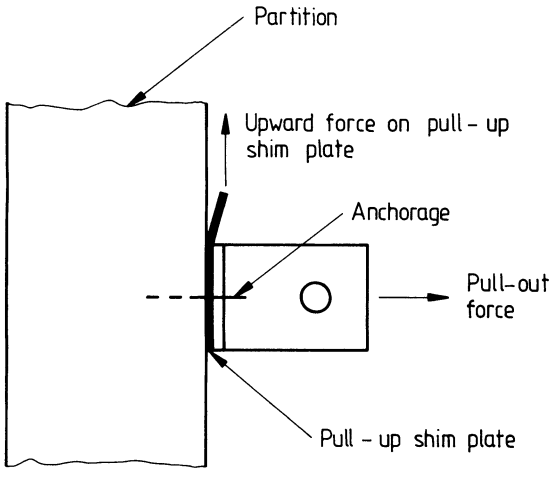
b) Packing shim

All dimensions are in millimetres.

Figure H.1 — Shim plates



a) Pull-out test bracket



b) Arrangement of apparatus

All dimensions are in millimetres.

Figure H.2 — Lightweight anchorage pull-out test

Annex J (normative)
Lightweight anchorage pull-down test

J.1 Principle

The test is to establish the ability of the partitions to sustain a load at an anchorage point subjected to a transverse load transmitted through a pull-down test bracket using a single anchorage, to avoid dislodgement of a shim plate and displacement of the pull-down bracket.

J.2 Specimen

The partition specimen shall be as described in **2.2.1**.

J.3 Apparatus

J.3.1 *Test rig*, (see **2.3**).

J.3.2 *Calibrated loading equipment*, capable of applying a load of 250 N ± 7.5 N vertically downwards through the pull-down test brackets anchored to the partition. If a variable loading device is used, the rate of application shall not exceed 25 N/s; if dead weights, they shall be applied without shock.

J.3.3 *Shim plates*, of stainless steel 1 mm ± 0.2 mm thick as shown in Figure H.1 a) and Figure H.1 b).

J.3.4 *Device*, capable of applying an upward force of 20 N ± 1 N.

J.3.5 *Anchorages*, as described in **H.3.5**.

J.3.6 *Pull-down test bracket*, of steel with a minimum thickness of 3 mm and having a smooth, flat surface as shown in Figure J.1 a).

J.3.7 *Calibrated measuring instrument*, for measuring the movement of the pull-down test bracket to the nearest 0.1 mm relative to the partition face.

J.3.8 *Clamps or other devices*, that position the measuring instrument and ensure its stability during the test.

J.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and test.

Fix the pull-down test bracket (**J.3.6**), the pull-up shim plate and the packing shim plate (**J.3.3**), to the partitions with the appropriate fastener or anchor (**J.3.5**) [see Figure J.1 b)].

NOTE The position at which the pull-down bracket is fixed should be at the discretion of the testing organization who should select the location that it considers to be the most critical.

Position and secure the displacement measuring device (**J.3.7**) above the pull-down bracket.
Apply the 20 N upward force to the pull-up shim plate [see Figure J.1 b)].

Prepare to record any changes observed during the test together with the readings from the measuring instrument.

Position the loading equipment (**J.3.2**) and connect it to the pull-down test bracket (**J.3.6**).

Set the displacement movement measuring instrument to datum.

Gradually increase an applied load from 0 to 250 N over a minimum period of 10 s.

At 250 N sustain the load for 1 min.

Record any displacement and any changes to the specimen.

Remove the load from the pull-down test bracket.

If the pull-up shim plate is released, or the pull-down test bracket is displaced more than 2 mm the anchorage is deemed to have failed.

J.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

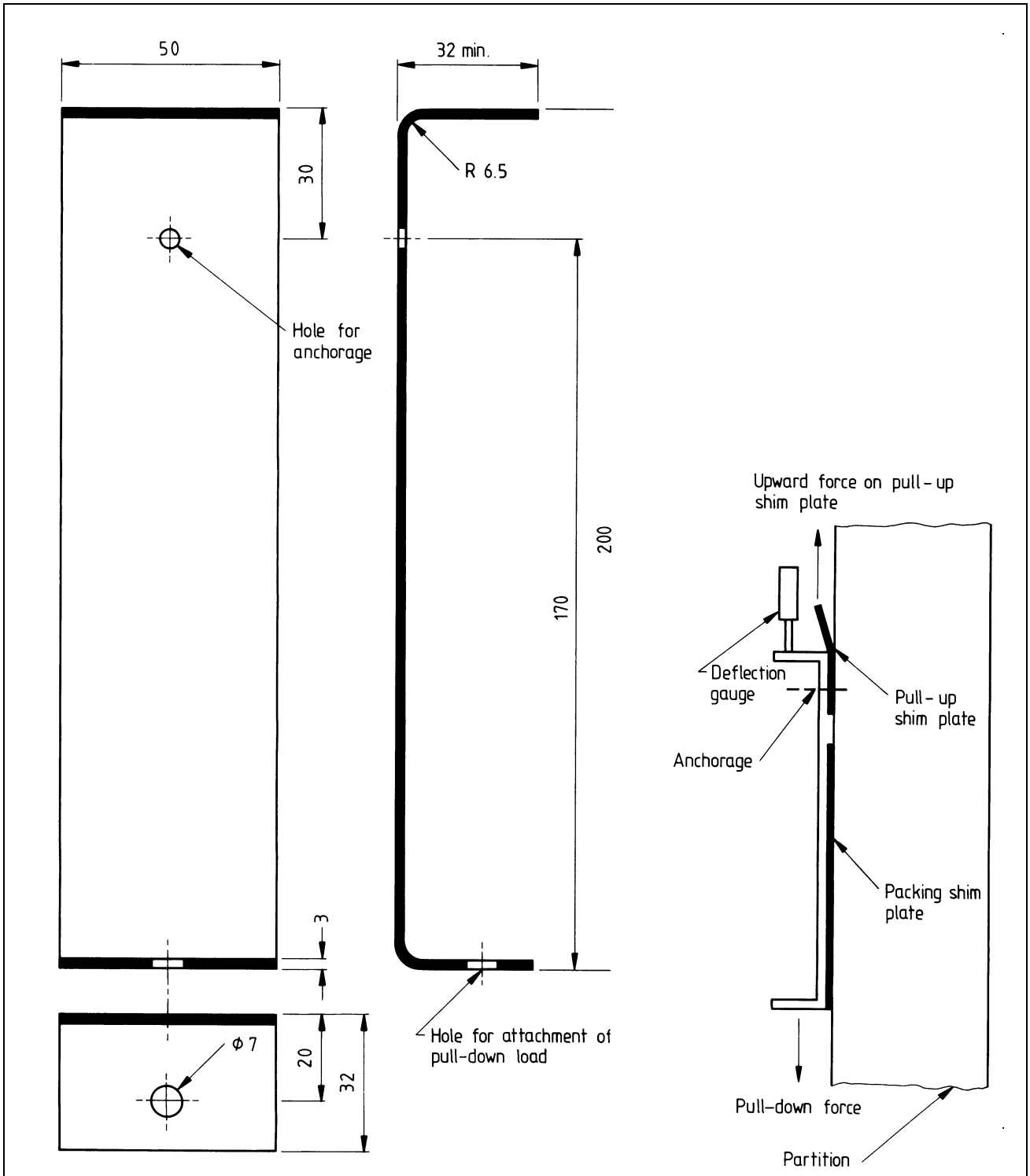
a) a drawing showing the position at which the test anchorage was fixed;

b) details of the anchorage used in the test;

c) the result of the test, i.e. whether or not the pull-up shim plate was released and any displacement of the pull-down test bracket;

d) a record of any changes observed during the test;

e) the condition of the partition specimen tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate.



a) Pull-down test bracket

b) Arrangement of apparatus

All dimensions are in millimetres.

Figure J.1 — Lightweight anchorage pull-down test

Annex K (normative) Heavyweight anchorage (wash basin) eccentric downward loading test

K.1 Principle

The test is to establish the ability of the partition to sustain a load applied through a pair of brackets designed to support a wash basin or similar. The maximum and residual deflection of the partition at specified points is measured and any loosening of the supporting brackets, damage to the partition or anchorage failure is recorded.

K.2 Specimen

The partition specimen shall be as described in **2.2.1**.

NOTE Sponsor's modifications to the specimen to provide additional support may be used.

K.3 Apparatus

K.3.1 *Test rig* (see **2.3**).

K.3.2 *Calibrated loading equipment*, capable of applying the specified loads (up to 1 500 N depending on category of duty) vertically downwards through the mid point of the horizontal member connected to the steel test brackets which are anchored to the partition. The equipment shall be capable of applying the loads to an accuracy of ± 30 N. If a variable loading device is used, the rate of application shall not exceed 150 N/s; if dead weights, they shall be applied without shock.

K.3.3 *Four calibrated measuring instruments*, for measuring the maximum deflection of the specimen to the nearest 0.1 mm.

K.3.4 *Two pairs of shims*, of stainless steel, 1.0 mm ± 0.2 mm thick, as shown in Figure H.1.

K.3.5 *Device or devices*, capable of applying an upward force of 20 N ± 1 N to each pull-up shim plate.

K.3.6 *Wash basin test bracket assembly*, as shown in Figure K.1.

NOTE If an alternative method of securing the wash basin brackets is specified by the test sponsor, provision should be made to modify the details shown in Figure K.1.

K.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**K.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity during the installation of the specimen and the test.

Fix each bracket 500 mm ± 1 mm apart from each other with their tops level and at 800 mm ± 10 mm above the bottom of the test specimen and equidistant from the door frame and the end of the partition, or as close as the partition construction will conveniently permit, using two anchorages per bracket, of the type specified by the test sponsor (see Figure K.1). Insert the shims (**K.3.4**) before finally tightening the anchorages.

Apply 20 N upward force continuously to each pull-up shim plate. Prepare to measure the deflection of the partition on both faces at a mid point between the two brackets and at 1.2 m and 1.75 m above the bottom of the test specimen (see Figure K.2).

Record any changes in the specimen observed during the test together with the readings from the measuring instrument (**K.3.3**).

Gradually apply a preload of 200 N.

Allow the loaded specimen to stabilize for 1 min.

Remove the preload.

Allow the unloaded specimen to stabilize for 1 min.

Set the deflection measuring instruments to datum.

Apply a constant load of 500 N to the bar joining the brackets.

NOTE This load may be by weights totalling 50 kg symmetrically distributed.

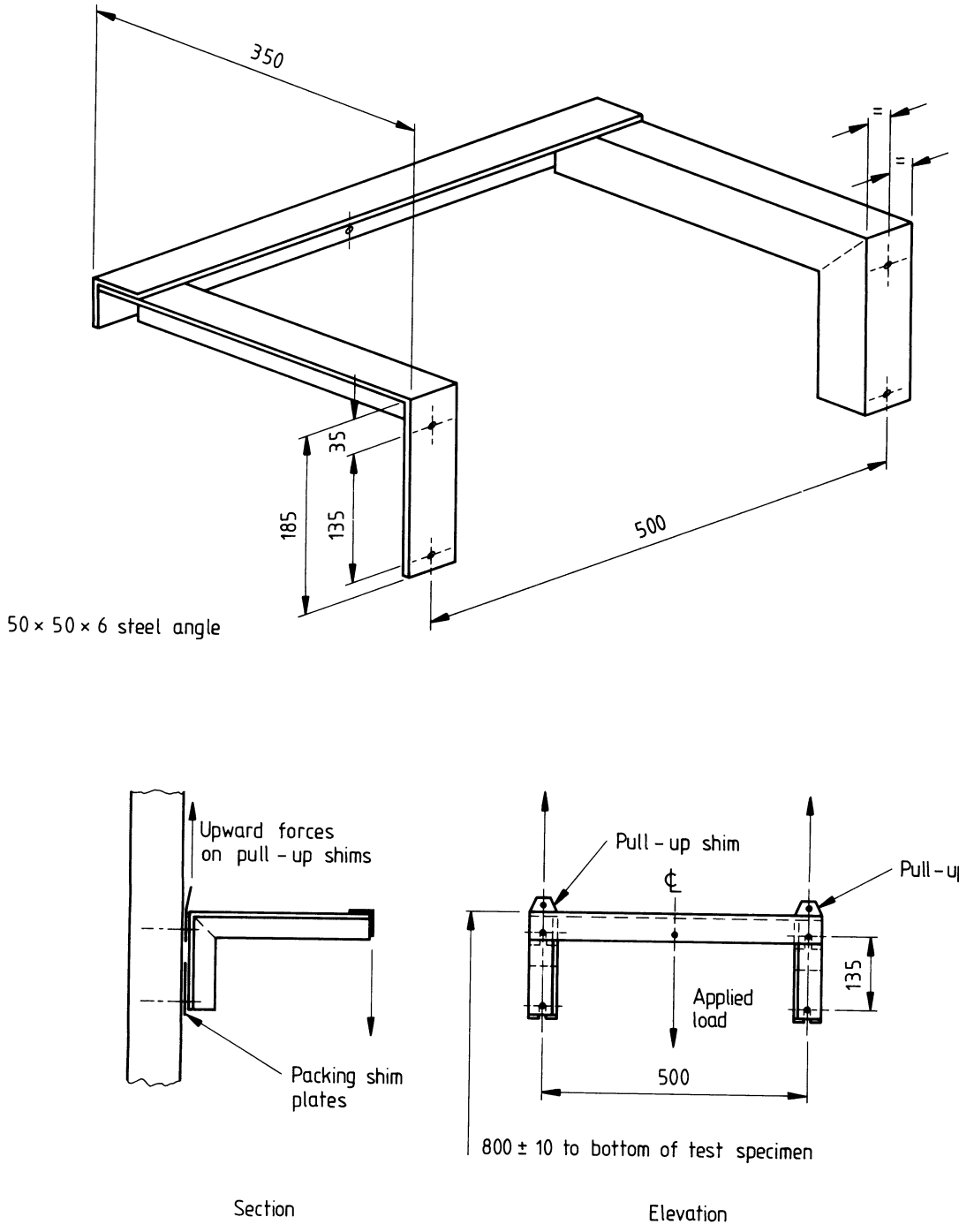
Apply and remove additional loads, at approximately 1 min intervals, in the following sequence: 250 N, 250 N, 500 N, 500 N, 750 N, 750 N, 1 000 N, 1 000 N (see Figure K.3).

If either pull-up shim is released, stop the test. At each load, record the deflections both sides of the partition to the nearest 1.0 mm.

Remove all loads.

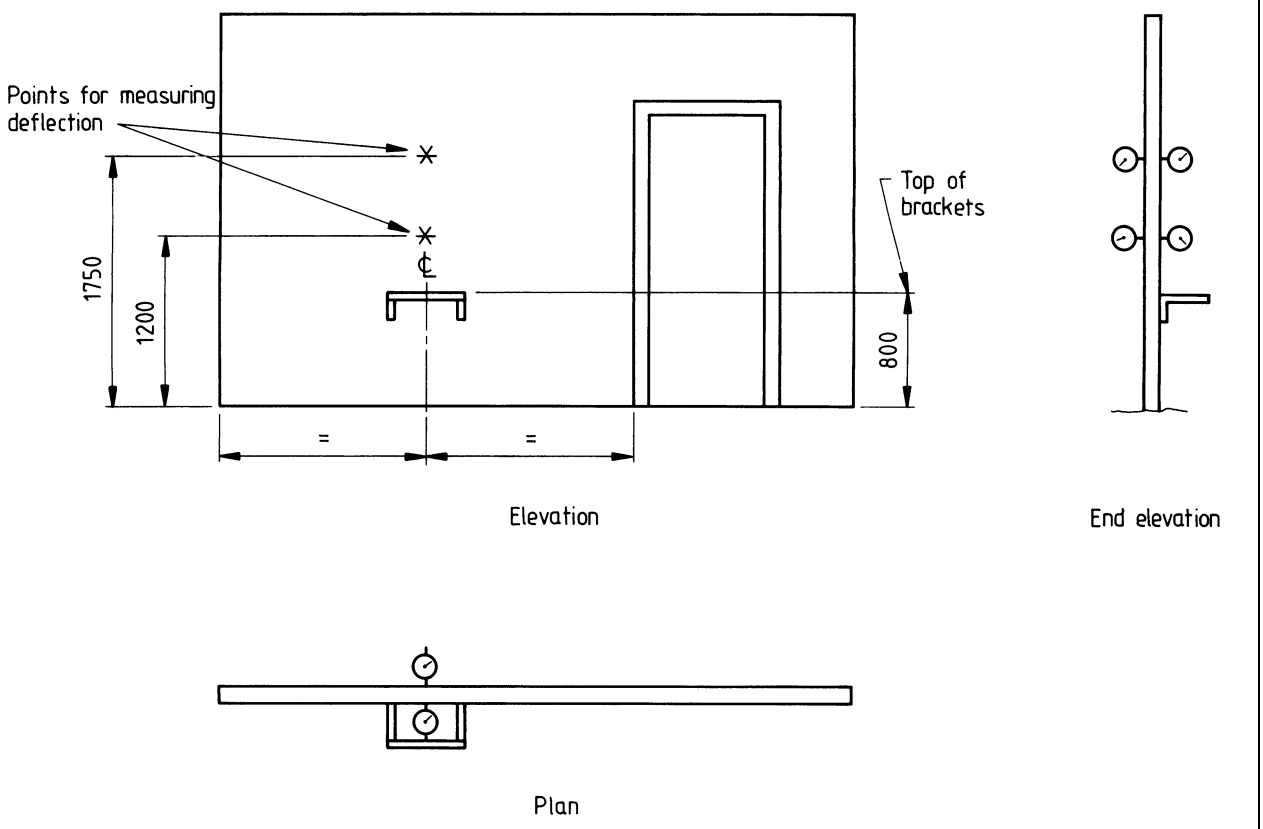
After 5 min measure any residual deformation of the partition to the nearest 0.1 mm.

Record any damage to the specimen or loosening of the fixings.



All dimensions are in millimetres.

Figure K.1 — Heavyweight anchorage (wash basin) test apparatus



All dimensions are in millimetres.

Figure K.2 — Location of wash basin brackets and measuring instruments

K.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) a drawing showing the position at which the test fixings and loadings were applied;

b) the type of anchorages used in the test;

c) a record of any changes observed during the test;

d) the highest load sustained through two cycles without releasing either of the pull-up shim plates;

e) the maximum deflection at each measuring point;

f) the residual deformation at each measuring point;

g) the condition of the partition specimen tested, e.g. “no damage occurred”, or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate;

h) details of sponsor’s modifications to the partition for supporting the (wash basin) test brackets.

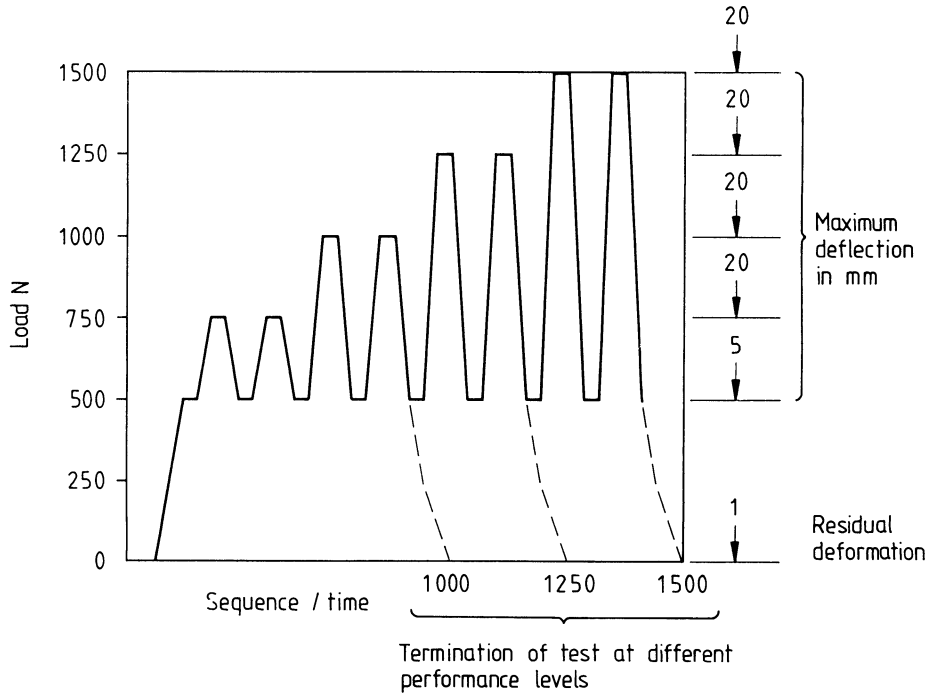


Figure K.3 — Heavyweight anchorage (wash basin) loading sequence

Annex L (normative) Heavyweight anchorage (high level wall cupboard) eccentric downward loading test

L.1 Principle

The test is to establish the ability of the partition to sustain a load applied to a frame designed to simulate a high level wall cupboard. The maximum and residual deflection of the partition is measured and any loosening of the supporting brackets, damage to the partition or anchorage failure is recorded.

L.2 Specimen

The partition specimen shall be as described in **2.2.1**.

NOTE The specimen may be modified to provide additional support.

L.3 Apparatus

L.3.1 *Test rig* (see **2.3**).

L.3.2 *Calibrated loading equipment*, capable of applying the specified loads (up to 4 000 N depending on category of duty) vertically downwards through the mid point of the horizontal member connected to the steel test brackets which are anchored to the partition. The equipment shall be capable of applying the loads to an accuracy of ± 80 N. If a variable loading device is used, the rate of application shall not exceed 400 N/s; if dead weights, they shall be applied without shock.

L.3.3 *Four measuring instruments*, for measuring the maximum deflection of the specimen to the nearest 0.1 mm.

L.3.4 *Two pairs of shims*, of stainless steel, 1.0 mm ± 0.2 mm thick, as shown in Figure H.1.

L.3.5 *Device or devices* capable of applying an upward force of 20 N ± 1 N to each pull-up shim plate.

L.3.6 *Frame*, comprising two brackets joined by a mild steel angle drilled at mid point with a 10 mm hole in one flange as shown in Figure L.1. The two holes in each bracket shall be of a diameter to suit the sponsor's specified fixings.

NOTE If an alternative method of securing cupboards at high level is specified by the sponsor, provision should be made for the conditions of loading indicated in Figure L.1 to be applied.

L.4 Procedure

Check that the specification and drawings provided by the sponsor correspond with the specimen to be tested.

Install the specimen vertically in the test rig (**L.3.1**) and fix it in accordance with the sponsor's instructions.

Allow time for the curing, drying and/or conditioning of certain materials (see **2.4**).

Record the laboratory temperature and humidity throughout the installation of the specimen and the test.

Assemble the frame (**L.3.6**) and fix the brackets to the partition 1 000 mm ± 1 mm apart, their tops level and with the horizontal member 1 500 mm ± 10 mm above the bottom of the test specimen and equidistant from the door frame and the end of the partition, or as close as the partition construction will conveniently permit using anchorages of the type specified by the test sponsor (see Figure L.2). Insert the steel shims (**L.3.4**), before finally tightening the anchorages.

Apply 20 ± 1 N upward force continuously to each pull-up shim plate.

Prepare to measure the deflection of the partition on both faces at a mid point between the two brackets and at 1.2 m and 1.75 m above the bottom of the test specimen (see Figure L.2).

Record any changes in the specimen observed during the test together with the readings from the measuring instrument (**L.3.3**).

Gradually apply a preload of 200 N.

Allow the loaded specimen to stabilize for 1 min.

Remove the preload.

Allow the unloaded specimen to stabilize for 1 min.

Set the deflection measuring instruments to datum.

Apply loads, increased at approximately 1 min intervals (up to a maximum of either 2 000 N or 4 000 N as specified by the sponsor) in the following sequence: 500 N, 1 000 N, 1 500 N, 2 000 N, 2 500 N, 3 000 N, 3 500 N, 4 000 N.

At each load, if either pull-up shim is released stop the test.

At each load, record the deflections both sides of the partition to the nearest 1 mm.

Remove all loads.

After 5 min measure any residual deformation of the partition to the nearest 0.1 mm.

Record any damage to the specimen or loosening of the fixings.

L.5 Test report

The test report shall include all items given in **2.6.1**, together with the following:

a) a drawing showing the position at which the test fixings and loading were applied;

b) the type of anchorages used in the test;

c) a record of any changes observed during the test;

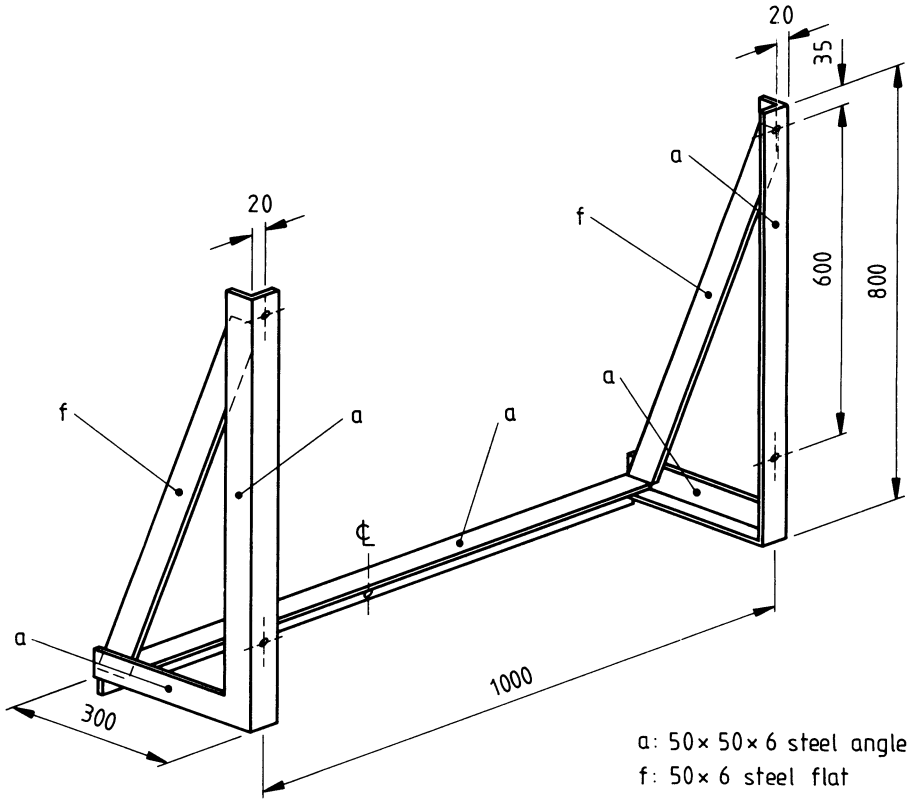
d) the highest load sustained without the release of a pull-up shim;

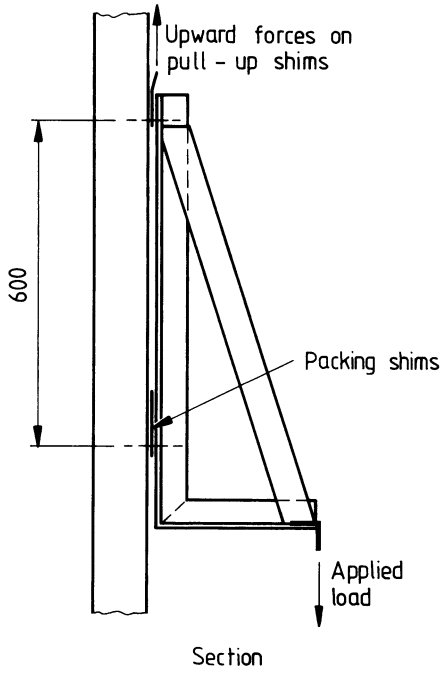
e) the maximum deflection at each measuring point;

f) the residual deformation at each measuring point;

g) the condition of the partition specimen tested, e.g. "no damage occurred", or report any damage or detachment, loosening or dislodgement of its parts or fixings, including diagrams or photographs where appropriate;

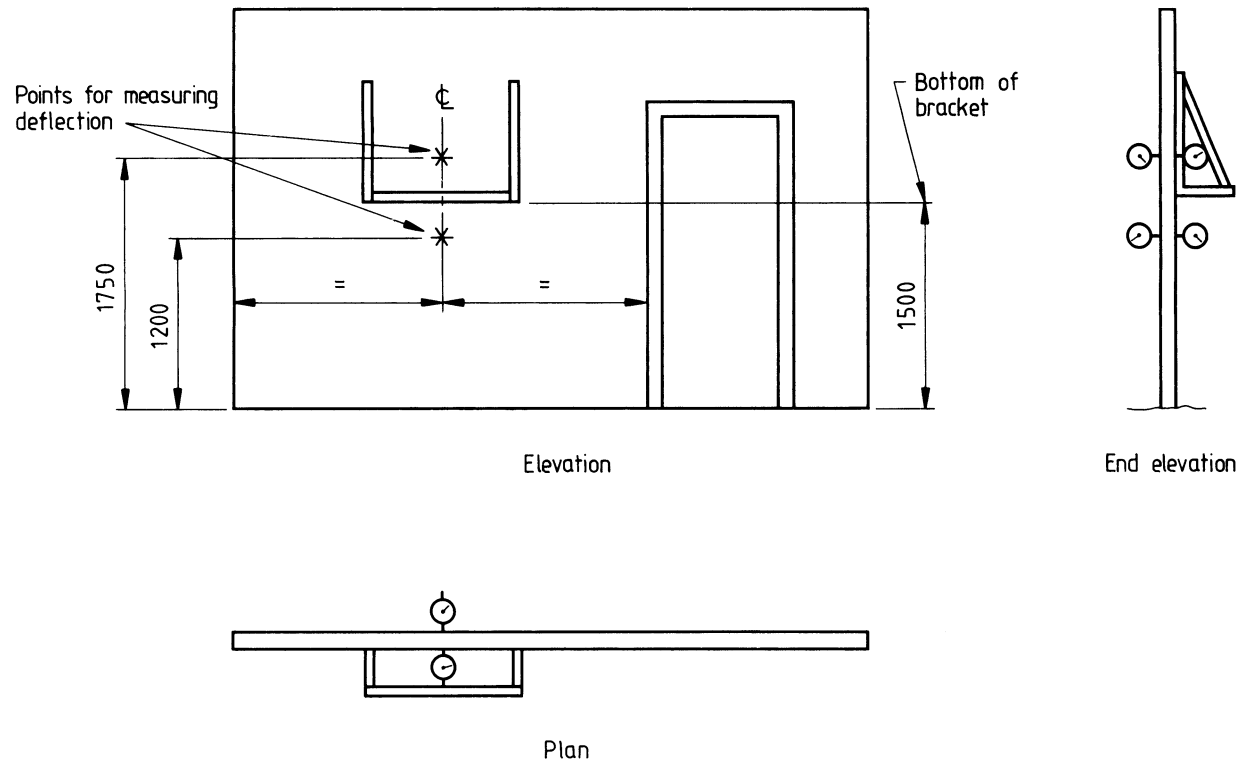
h) details of sponsor's modifications to the partition for supporting the (wall cupboard) test brackets.





All dimensions are in millimetres.

Figure L.1 — Heavyweight anchorage (wall cupboard) test apparatus



All dimensions are in millimetres.

Figure L.2 — Location of wall cupboard brackets and measuring instruments

Annex M (normative)
Summary of test reports

Each individual requirement tested shall have its own test report or section within a report, including the information listed in **2.6.1**. However, information that is common to all the tests carried out at one time may be included as the introduction to the summary of test reports.

The summary of test reports shall show which individual requirements were tested and the performance level achieved.

A grade for the partition shall only be shown in the summary, if the test results comply with the requirements given in **1.5.1**.

An example of a "Summary of test reports" form is shown in Figure M.1.

SUMMARY OF STRENGTH AND ROBUSTNESS TESTS TO BS 5234-2:1992.
(Details of partition specimen and test reports are attached)

TESTS FOR GRADE COMPLIANCE

Requirement tested	Grade performance achieved Pass/Fail			
	LD	MD	HD	SD
Stiffness			Pass	
Surface damage by small hard body impact:[a] Straight partition Right-angle junction		 Tested* Tested*		
Resistance to damage by large soft body impact: Straight partition Right-angle junction		 Pass	 Pass	
Perforation by small hard body impact: Straight partition Right-angle junction		 Pass Pass		
Resistance to structural damage by large soft body impact		 Pass		
Door slamming		Pass		
GRADE ACHIEVED		PASS		

[a] See test reports to ascertain if surface damage is acceptable.
Show "Tested" under grade tested.

SUMMARY OF OTHER TESTS ON PARTITION SPECIMEN

Requirement tested	Performance achieved
Crowd pressure	0.75 kN/m
Lightweight anchorage — Pull-out	Pass
Lightweight anchorage — Pull-down	Pass
Heavyweight anchorages — (Wash basin)	Not tested
Heavyweight anchorages — (Wall cupboard)	2 000 N

Figure M.1 — Example of a "Summary of test reports"

blank

List of references (see 1.2)

Normative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 4787, *Internal and external wood doorsets, door leaves and frames.*
BS 4787-1:1980, *Specification for dimensional requirements.*
BS 4978:1988, *Specification for softwood grades for structural use.*
BS 5234, *Partitions (including matching linings).*
BS 5234-1:1992, *Code of practice for design and installation.*
BS 5628, *Code of practice for use of masonry.*
BS 5628-1:1978, *Structural use of unreinforced masonry.*
BS 5628-2:1985, *Structural use of reinforced and prestressed masonry.*
BS 5628-3:1985, *Materials and components, design and workmanship.*

Informative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 5750, *Quality systems*[2)].

ISO standards publications

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO), Geneva. (All publications are available from BSI Sales.)

ISO 7892:1988, *Vertical building elements — Impact resistance tests — Impact bodies and general test procedures.*
ISO 7894:1987, *Partitions made of components — Test for resistance to wind (static pressure and slamming doors).*

[2)] Referred to in the foreword only.

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