

# Furniture — Strength and stability of furniture —

## Part 7: Methods for determination of strength and durability of storage furniture

ICS 97.140

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- Association of Building Engineers
- Association of Manufacturers of Domestic Appliances
- Association of Suppliers to the Furniture Industry Ltd
- British Coatings Federation Ltd
- British Contract Furnishing Association
- British Furniture Manufacturers' Federation
- British Laminated Plastics Federation
- British Retail Consortium
- British Shops and Stores Association
- British Woodworking Federation
- Castor Manufacturers (UK) Association
- Consumer Policy Committee of BSI
- Department of Trade and Industry
- European Metal Sink Manufacturers' Association
- Federation of the Electronics Industry
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- Furniture Industry Research Association
- Glass and Glazing Federation
- ICE Ergonomics
- Institute of Trading Standards Administration
- Kitchen Specialists Association
- Leisure and Outdoor Furniture Association Ltd
- LHC Building Components and Services
- Mail Order Traders' Association
- National Bed Federation Limited
- Royal Society for the Prevention of Accidents
- Society of British Gas Industries

This British Standard, having been prepared under the direction of the Sector Board for Consumer Products and Services, was published under the authority of the Standards Board and comes into effect on 15 October 1998

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First published 30 September 1985

The following BSI references relate to the work on this standard:  
Committee reference FW/2  
Announced in *Update Standards*  
March 1998

ISBN 0 580 29578 8

## Amendments issued since publication

| Amd. No. | Date | Text affected |
|----------|------|---------------|
|          |      |               |
|          |      |               |
|          |      |               |
|          |      |               |
|          |      |               |

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## Foreword

This part of BS 4875 has been prepared by Technical Committee FW/2. It is a new edition of, and supersedes, BS 4875-7:1985 which is withdrawn. This new edition does not reflect a full review or revision of the standard, which will be undertaken in due course.

This part of BS 4875 does not include safety requirements for domestic storage furniture. These are specified in BS EN 1727:1998, *Domestic furniture — Storage furniture — Safety requirements and test methods*. This new edition was prepared because of the requirement to remove parts conflicting with BS EN 1727.

Tests carried out in accordance with this standard are intended to demonstrate the ability of the storage furniture to give satisfactory service in its intended environment. It should be understood that such tests do not ensure that structural failure will not eventually occur as a result of habitual misuse or after an excessively long period of service.

Annex A gives an explanation of the furniture test levels used in this standard.

The other parts of BS 4875 are as follows:

- Part 1: *Methods for determination of strength of chairs and stools.*
- Part 3: *Methods for determination of strength of settees.*
- Part 5: *Methods for determination of strength of tables and trolleys.*
- Part 6: *Methods for determination of stability of tables and trolleys.*
- Part 8: *Methods for determination of stability of non-domestic storage furniture.*

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

# Methods

## 1 Scope

This part of BS 4875 describes methods for determination of the strength and durability of storage furniture. It does not apply to test methods for determining safety aspects of domestic storage furniture, which are given in BS EN 1727.

This standard does not apply to the structural performance of kitchen furniture, which is covered by BS 6222, nor to office furniture, which is covered by BS 5459-3, nor to educational furniture, which is covered by BS 5873-4.

## 2 Principle

### 2.1 General

The strength and durability of the structure of an article of furniture is determined by applying to various parts loads or force simulating normal functional use, as well as acceptable misuse, according to a graded scale of severity (see annex A).

NOTE 1 A summary of the tests is given in Table 1.

The sequence as a whole determines the following:

- a) static strength and initial damage;
- b) fatigue strength and damage propagation;
- c) ability to withstand acceptable misuse and demonstration of sufficient residual strength.

The severity of loading is graded by varying the number of applications or the magnitude of forces applied.

The test results are valid only for the article tested. If the test results are intended to be applied to other, similar articles the test specimen shall be representative of the production model.

NOTE 2 Information on the scale of sampling to be employed can be obtained from BS 6001.

### 2.2 Static strength tests

The static strength is assessed of the article under the high levels of loading that occur only occasionally.

### 2.3 Wear and fatigue tests

The durability of the component parts of the article under the repeated operations, movement, or applications of loads occurring during daily use is assessed.

### 2.4 Impact strength tests (slam open/slam shut tests)

The impact strength of the article under the rapid rates of loading that occur only occasionally is assessed.

## 3 General requirements for tests

### 3.1 Tolerances

Unless otherwise stated the following tolerances are applicable:

|             |                     |
|-------------|---------------------|
| forces:     | $\pm 5\%$           |
| velocities: | $\pm 5\%$           |
| masses:     | $\pm 0.5\%$         |
| dimensions: | $\pm 1.0\text{ mm}$ |
| angles:     | $\pm 2^\circ$       |

The accuracy for the positioning of loading pads shall be  $\pm 5\text{ mm}$ .

NOTE In certain instances the tests may be carried out by means of loads or forces. For practical purposes a force of 10 N may be taken to be equal to the downward force due to a mass of 1 kg.

### 3.2 Moisture content and conditioning

Before the tests are commenced the article shall be sufficiently old to ensure that all component materials have developed their full strength. At least four weeks in normal conditions shall elapse from manufacture in the case of glued joints in timber, plastics moulded parts, etc.

Parts made of timber products shall be checked with an electric moisture meter to ensure that the moisture content is between 8 % and 12 %. If the moisture content is above 12 % the article shall be allowed to dry out in a warm ventilated room until the moisture content is between 8 % and 12 %.

The tests shall be carried out in indoor conditions but, if during a test the atmosphere temperature is outside the range of 15 °C to 25 °C, the maximum and/or minimum temperature shall be recorded in the test report.

### 3.3 Loading system

The loads specified in Table 2 shall be applied to all parts intended for storage purposes, whilst one part is subjected to test.

The loads specified in Table 3 shall be applied to parts undergoing test.

NOTE The loads specified in Table 2 represent the average load that is applied during normal use. The loads specified in Table 3 represent the maximum load applied during normal use.

If the article tends to overbalance during the tests the load shall be increased until this tendency stops.

If the article tends to slide during the tests the article shall be restrained by stops (5.3).

### 3.4 Setting up of furniture

The articles shall be tested as delivered.

Self-assembly furniture shall be assembled according to instructions supplied with the article. If the article can be combined in different ways the most adverse combination shall be used for each test. This requirement shall also apply to furniture that can be combined with other articles. Articles intended for wall attachment shall be mounted on a wall so that secure attachment is achieved through the mounting positions specified by the manufacturer.

Tighten any assembly fittings before testing. Further retightening shall not take place unless it is specifically required by the manufacturer.

**Table 1 — Summary of test procedures** (see also Tables 2 and 3)

| Title                                          | Description                                | Test level (see annex A) |                     |                     |        |         |
|------------------------------------------------|--------------------------------------------|--------------------------|---------------------|---------------------|--------|---------|
|                                                |                                            | 1                        | 2                   | 3                   | 4      | 5       |
| Strength of top and bottom surfaces test       | force (in N)                               |                          |                     |                     |        |         |
| Top surface:                                   |                                            |                          |                     |                     |        |         |
| height above floor:                            |                                            |                          |                     |                     |        |         |
| — less than 1 000 mm                           |                                            | — <sup>a</sup>           | 600 <sup>a</sup>    | 750 <sup>a</sup>    | 1 000  | 1 250   |
| — 1 000 mm and above                           |                                            | —                        | 125                 | 250                 | 350    | 450     |
| Bottom surface:                                |                                            |                          |                     |                     |        |         |
| wall units                                     |                                            | —                        | 600                 | 750                 | 1 000  | 1 250   |
| floor units, unrestricted headroom             |                                            | —                        | 600                 | 750                 | 1 000  | 1 250   |
| floor units, headroom less than 1050 mm        |                                            | —                        | 250                 | 350                 | 450    | 700     |
| Strength of shelf supports                     | (see 6.2.2)                                | 10 <sup>a</sup>          | 10 <sup>a</sup>     | 10 <sup>a</sup>     | 10     | 10      |
| Deflection of shelves                          | duration                                   | 1 week                   | 1 week              | 1 week              | 1 week | 1 week  |
| Strength of clothes rail supports              | duration                                   | 1 h                      | 1 h                 | 1 h                 | 1 h    | 1 h     |
| Deflection of clothes rails                    | duration                                   | 1 week                   | 1 week              | 1 week              | 1 week | 1 week  |
| Strength of pivoted doors test                 | mass (in kg)                               | 15                       | 25                  | 30                  | 45     | 60      |
| Wear and fatigue of pivoted doors test         | cycles                                     | 10 000                   | 20 000              | 40 000              | 80 000 | 160 000 |
| Slam open/shut of pivoted doors                | force (in N <sub>-0.5</sub> <sup>0</sup> ) | 5                        | 10                  | 15                  | 20     | 30      |
| Wear and fatigue of sliding doors test         | cycles                                     | 10 000                   | 20 000              | 40 000              | 80 000 | 160 000 |
| Slam open/shut of sliding doors test           | mass (in kg)                               | 2.0                      | 2.0                 | 3.0                 | 4.0    | 6.0     |
| Strength of flaps test                         | force (in N)                               | 50                       | 100                 | 200                 | 300    | 500     |
| Wear and fatigue of flaps test                 | cycles                                     | 5 000                    | 10 000              | 20 000              | 40 000 | 80 000  |
| Wear and fatigue of roll fronts test           | cycles                                     | 2 500                    | 5 000               | 10 000              | 20 000 | 40 000  |
| Slam open/shut of roll fronts test             | cycles                                     | 10                       | 20                  | 30                  | 40     | 50      |
| Strength of runners test                       | force (in N)                               | 150                      | 250                 | 300                 | 450    | 600     |
| Wear and fatigue of drawers and runners test   | cycles                                     | 10 000                   | 20 000              | 40 000              | 80 000 | 160 000 |
| Displacement of bottom surface of drawers test | force (in N)                               | 30                       | 40                  | 60                  | 70     | 80      |
| Slam open and slam shut of drawers tests       | velocity (in m/s) at calibration points    |                          |                     |                     |        |         |
|                                                | slam open 5 kg                             | 1.25                     | 1.45                | 1.65                | 1.85   | 2.05    |
|                                                | slam shut 35 kg                            | 0.80                     | 0.95                | 1.10                | 1.25   | 1.40    |
| Strength of carcase and underframe test        | force (in N)                               | 150                      | 250                 | 300                 | 450    | 600     |
| Strength of wall attachment devices            | duration                                   | 1 week <sup>a</sup>      | 1 week <sup>a</sup> | 1 week <sup>a</sup> | 1 week | 1 week  |

NOTE The absence of a value for certain tests at some test levels indicates that the test is not appropriate at that level.

<sup>a</sup> Not applicable to domestic furniture — refer to BS EN 1727.