

Methods of test for

Assessment of the ignitability of mattresses, upholstered divans and upholstered bed bases with flaming types of primary and secondary sources of ignition

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CCM/44, Fire tests for furniture, upon which the following bodies were represented:

- Association of British Health-care Industries
- Association of Consulting Scientists
- Baby Products Association
- Bolton Institute of Higher Education
- Branded Furniture Society
- British Apparel and Textile Confederation
- British Contract Furnishing Association
- British Furniture Manufacturers' Federation
- British Leather Confederation
- British Plastics Federation
- British Rubber Manufacturers' Association Ltd.
- British Textile Technology Group
- Chemical Industries Association
- Chief and Assistant Chief Fire Officers' Association
- Confederation of British Wool Textiles Limited
- Consumer Policy Committee of BSI
- Consumers' Association
- Department of Health
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Federation of the Electronics Industry
- Furniture Industry Research Association
- Home Office
- Institute of Trading Standards Administration
- Institution of Fire Engineers
- Leisure and Outdoor Furniture Association Limited
- National Bed Federation Limited
- National Fillings Trades Association
- National Wool Textile Export Corporation
- Warrington Fire Research Centre
- Wools of New Zealand

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Foreword

This British Standard has been prepared by Technical Committee CCM/44, and is based on procedures developed by the National Bed Federation and the Crown Suppliers. It is a revision of BS 6807:1990 which is withdrawn.

This Standard extends the range of ignition sources provided by BS EN 597-1 and BS EN 597-2.

When different materials and products are placed together the ignitability of the composite arrangement is highly dependent on the interactions between the components. For some end uses the bed assembly is already known, e.g. barracks, married quarters, hospitals and hotels, where the specifier is responsible for all the items which make up the bed assembly. In these cases the mattress, upholstered divan or upholstered bed base and combinations thereof can be tested together with the respective bed covers using flaming ignition sources of differing severities (see section 3).

The tests are to the bare mattress, upholstered divan or upholstered bed base. This will be represented by section 2, and only in the situation where all the components of the complete bed assembly including sheets, etc. are known will section 3 have any significance.

It cannot be assumed that protection against large flaming ignition sources will automatically give protection against smouldering ignition. Users of the standard should therefore recognize the need to submit test specimens to both cigarette tests and flaming ignition tests.

NOTE Regarding the assessment of “Progressive smouldering ignition” described in 1.4.1e, it should be noted that this is not intended to apply in the vertical direction when samples are subjected to a source from the side or from below.

WARNING. These tests only relate to the ignitability of the materials described in the test report (see items b and c of 4.2) and are not intended to reproduce the full fire hazards that may be encountered.

Attention is also drawn to BS 7177 which specifies requirements for the resistance to ignition of mattresses, divans and bed bases in various hazard classifications, when tested in accordance with this standard.

In particular attention is drawn to the following statutory instruments:

Statutory Instrument 1988 No. 1324 The Furniture and Furnishings (Fire) (Safety) Regulations [1];

Statutory Instrument 1989 No. 2358 The Furniture and Furnishings (Fire) (Safety) (Amendment) Regulations [2].

Statutory Instrument 1993 No. 207 The Furniture and Furnishings (Fire) (Safety) (Amendment) Regulations [3].

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Summary of pages

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Section 1. General

1.1 Scope

This British Standard describes methods of test for assessment of the ignitability of mattresses, upholstered divans and upholstered bed bases when subjected to flaming types of primary and secondary ignition sources of differing severities.

NOTE The methods of test described in this Standard should be used in conjunction with BS EN 597-1 and BS EN 597-2 for the complete range of primary and secondary ignition sources.

The following test options are described:

- a) mattress, upholstered divan or upholstered bed base tested with primary ignition sources (section 2);
- b) mattress, upholstered divan or upholstered bed base and combinations thereof, tested with secondary ignition sources composed of known bed covers (section 3).

1.2 References

1.2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

1.2.2 Informative references

This British Standard 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 British Standard, the following definitions apply.

1.3.1

ignition source

source of energy which is used to ignite combustible materials or products

1.3.2

primary ignition source

in a test, the initial heat supply

1.3.3

secondary ignition source

in a test, the combination of primary source and the actual effect of bed covers

1.3.4

progressive smouldering

an exothermic oxidation not accompanied by flaming, that is self-propagating, i.e. independent of the ignition source. It may or may not be accompanied by incandescence

1.3.5

flaming

undergoing combustion in the gaseous phase with the emission of light

1.3.6

ignitability

a measure of the ease with which a material, product or component can be ignited so as to flame or progressively smoulder

1.3.7

bed

a mattress placed on top of an upholstered divan or upholstered bed base with no other bedding items present

1.3.8

bed covers

a general term for all items placed on the bed by a user to provide comfort and warmth. It includes sheets, blankets, bedspreads, valances, continental quilts, quilt covers and mattress covers

1.3.9

made-up bed

a bed prepared for use by covering with bed covers, tucking these between the mattress and upholstered divan or upholstered bed base, positioning pillows with pillowslips and turning down of sheets and blankets at the head end of the bed

NOTE Individual styles vary in detail depending on the user.

1.3.10

bed assembly

a stack of successive layers of mattress and various bed covers, with or without pillow and pillowslip, representing a section through the centre of a made-up bed

1.3.11

mattress

an upholstered product intended for sleeping upon

1.3.12

mattress, upholstered divan or upholstered bed base case (ticking)

a primary covering material which is not intended to be removed

1.3.13

upholstered divan, upholstered bed base

a support surface for the mattress which includes padded covering by ticking

1.4 Criteria of ignition

NOTE The ignition sources used in this standard are the primary range of flaming ignition sources 2 to 7 described in BS 5852 and the cigarette and match flame equivalent sources described in BS EN 597-1 and BS EN 597-2.

1.4.1 Progressive smouldering ignition

For the purposes of this Standard all the following types of behaviour are considered to be progressive smouldering ignition (but see also 4.1).

NOTE In practice it has been found that there is usually a clear distinction between materials that smoulder and char under the influence of the ignition source but that do not propagate further (non-progressive) and those where smouldering develops in extent and spreads (progressive).

- a) Any test specimen that displays escalating smouldering combustion behaviour so that it is unsafe to continue the test and forcible extinction is required.
- b) For all ignition sources: any test specimen that smoulders until it is essentially consumed or that smoulders to the extremities of the specimen, that is to either side or to the full thickness of the specimen, within the duration of the test.
- c) For ignition sources 2 and 3: any test specimen that produces externally detectable amounts of smoke, heat or glowing 15 min after removal of the burner tube.
- d) For ignition sources 4, 5, 6 and 7: any test specimen that produces externally detectable amounts of smoke, heat or glowing 60 min after ignition of the crib.
- e) Any test specimen that, on final examination (see 4.1), shows evidence of charring (other than discoloration) more than 100 mm in any direction, from the nearest part of the original position of the source.

1.4.2 Flaming ignition

For the purposes of this standard, all the following types of behaviour are considered to be flaming ignition.

- a) Any test specimen that displays escalating flaming combustion behaviour so that it is unsafe to continue the test and forcible extinction is required.
- b) Any test specimen that burns until it is essentially consumed within the test duration.
- c) Any test specimen on which any flame front reaches the extremities of the specimen other than the top or passes through the full thickness of the specimen within the duration of the test.

d) For ignition sources 2 and 3: any test specimen that continues to flame for more than 120 s after removal of the burner tube.

e) For ignition sources 4 and 5: any test specimen that continues to flame for more than 10 min after ignition of the crib.

f) For ignition sources 6 and 7: any test specimen that continues to flame for more than 13 min after ignition of the crib.

g) For all sources: any test specimen from which debris causes an isolated floor fire not meeting the requirements of items d), e) or f).

NOTE The times quoted in items e) and f) are essentially 2 min greater than the upper 95 % probable extinction times of wood cribs determined by interlaboratory testing.

1.4.3 Flow diagram

A flow diagram illustrating a systematic method for the detection of ignition throughout a test sequence is given in Figure 1.

1.5 General principle

A test specimen is subjected to a flaming ignition source placed on top of and below the test specimen. The range of intensity of the primary sources has been selected to imitate that of actual sources which might be encountered in various end use environments, while the range of intensity of the secondary sources reproduces the effects of varying amounts and types of bed covers.

NOTE 1 Ignition sources have been selected to supplement those in BS EN 597-1 and BS EN 597-2.

NOTE 2 The tests can be used to assess the ignitability at any level but it is essential that the cigarette ignition specified in BS EN 597-1 is always included.

1.6 Health and safety of operators

NOTE There is a considerable risk with these tests and it is essential that suitable precautions be taken, which may include the provision of breathing apparatus and protective clothing.

1.6.1 Enclosure

For safety, the tests shall be conducted in a suitable fume cupboard or purpose built room so that individuals are not exposed to any fumes (see 1.7.4).

1.6.2 Extinguishers

Readily accessible means of extinguishing the test specimens shall be provided.

NOTE 1 For preference, water should be provided for smouldering fires and a fire extinguisher for flaming fires. Carbon dioxide extinguishers are not suitable for extinguishing test specimens.

NOTE 2 Extinction of test specimens may be difficult and care should be taken that they are only disposed of when completely inert. It may be necessary to immerse smouldering specimens in water, or place them in a sealed non-combustible enclosure. To ensure complete safety other suitable steps may have to be taken.