
British Standard Methods of test for
**Assessment of the ignitability of mattresses,
divans and bed bases with primary and
secondary sources of ignition**

Méthode d'essai d'évaluation de l'inflammabilité des matelas, divans et sommiers par des sources primaires et secondaires d'inflammation

Prüfung der Zündfähigkeit von Matratzen und Matratzenauflagen unter Verwendung von Primär- und Sekundärzündquellen

Foreword

This British Standard, prepared under the direction of the Furniture and Household Equipment Standards Policy Committee, is based on procedures developed by the National Bed Federation and The Crown Suppliers and is a revision of BS 6807 : 1986 which is withdrawn.

The major changes in the revision are:

- (a) inclusion of tests for the divan or bed base in addition to the mattress;
- (b) rationalization of the criteria of ignition with those in BS 5852;
- (c) modifications to the position of the ignition source when situated below the test specimen; and
- (d) modifications to the flow diagram.

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, divan or bed base can be tested together with the respective bedcovers using smouldering or flaming ignition sources of differing severities.

On the other hand, the domestic consumer has a wide range of bedding products to choose from whereas the bed manufacturer will have no detailed knowledge of the bed covers which may be used with the mattress. For a test to be usefully related to safety it should be capable of imitating these variables; this is achieved by using smoulderable or non-smoulderable insulation pads.

It cannot be assumed that protection against large flaming 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.

Warning. These tests only relate to the ignitability of the materials described in the test report (see clause 21 (b) and (c)) 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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Amendment No. 1
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Methods of test for assessment of the ignitability
of mattresses, divans and bed bases with primary
and secondary sources of ignition

Revised text

AMD 7551
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Foreword

Delete paragraph 1 and substitute the following.

'This British Standard has been prepared under the direction of the Consumer and Contract Goods Standards Policy Committee and is based on procedures developed by the National Bed Federation and the Crown Suppliers. It is a revision of BS 6807 : 1986 which is not yet withdrawn as it is referred to in legislation.

NOTE. BSI Sales Department will respond to purchase orders for BS 6807 by supplying copies of the 1990 edition. Copies of the 1986 edition may be obtained by quoting this number 'BS 6807/86'.

At the end of the foreword insert the following.

'In particular attention is drawn to the following statutory instruments:

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

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

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Section one. General

1 Scope

This British Standard describes methods of test for assessment of the ignitability of mattresses, divans and bed bases when subjected to smouldering and flaming types of primary and secondary ignition sources of differing severities. The following test options are described:

- (a) mattress, divan or bed base tested with primary ignition sources (section two);
- (b) mattress, divan or bed base, tested with secondary ignition sources composed of known bedcovers (section three);
- (c) mattress, divan or bed base, tested with secondary ignition sources simulating unknown bedcovers (section four).

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the following definitions apply.

2.1 ignition source. Source of energy which is used to ignite combustible materials or products.

2.2 primary ignition source. In a test, the initial heat supply.

2.3 secondary ignition source. In a test, the combination of primary source and the actual or simulated effect of bedcovers.

2.4 progressive smouldering ignition. 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.

2.5 flaming ignition. Undergoing combustion in the gaseous phase with the emission of light.

2.6 flammability. The ability of a material or product to burn with a flame under specified test conditions.

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

2.8 bed. A mattress placed on top of a bed base with no other bedding items present.

2.9 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.

2.10 made-up bed. A bed prepared for use by covering with bed covers, tucking these between the mattress and divan or 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.

2.11 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.

2.12 mattress. A product in the form of a resilient material enveloped by a mattress case, or padding material with steel springs enveloped by a mattress case.

2.13 mattress, divan or bed base case (ticking). A primary covering material which is not intended to be removed.

2.14 mattress cover. A secondary covering material which may be removed for laundering purposes, etc.

2.15 divan, bed base. An upholstered support for a mattress.

3 Criteria of ignition

3.1 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 clause 20).

- (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 ignition source 0 (cigarette):
 - (1) any test specimen that smoulders to the full thickness of the test specimen, or to more than 50 mm from the nearest part of the cigarette, within 60 min of placement of the cigarette;
 - (2) any test specimen that produces externally detectable amounts of smoke, heat or glowing 60 min after placement of the cigarette.
- (c) For all flaming 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.
- (d) For flaming ignition sources 1, 2 and 3: any test specimen that produces externally detectable amounts of smoke, heat or glowing 15 min after removal of the burner tube.
- (e) For flaming 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.
- (f) Any test specimen that, on final examination (see clause 20), shows evidence of charring (other than discoloration) more than 100 mm in any direction, apart from upwards, from the nearest part of the original position of the source.

NOTE. In practice it has been found that there is usually a clear distinction between materials that 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).

3.2 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 source 0 (cigarette): the occurrence of any visible flaming within 60 min of placement of the cigarette.
- (e) For flaming ignition sources 1, 2 and 3: any test specimen that continues to flame for more than 120 s after removal of the burner tube.
- (f) For flaming ignition sources 4 and 5: any test specimen that continues to flame for more than 10 min after ignition of the crib.
- (g) For flaming ignition sources 6 and 7: any test specimen that continues to flame for more than 13 min after ignition of the crib.
- (h) For all sources: any test specimen from which debris causes an isolated floor fire not meeting the requirements of items (d), (e), (f) or (g).

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

3.3 Flow diagram

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

4 General principle

A test specimen is subjected to smouldering and flaming ignition sources placed on top of and/or 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 bedcovers. Normally ignitability is measured by working up through the sources in the sequences indicated in tables 1, 3 and 5.

Alternatively for specific end use requirements the test can be used to assess the ignitability at any level but the cigarette ignition test shall always be included.

5 Health and safety of operators

NOTE. There is 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.

5.1 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 6.4).

5.2 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.

6 Apparatus

6.1 Test rig. A suitable test rig is illustrated in figure 2. It consists of a platform of expanded steel or open mesh supported at least 75 mm above a solid base.

The use of extendable legs is recommended where testing with ignition sources below the test specimen is specified, in which case the platform shall be 380 ± 50 mm above the solid base. The test rig shall be no smaller than 150 mm less than the corresponding dimensions of the test specimen but may be any suitable amount larger than the test specimen.

NOTE 1. When testing a full size mattress it may be necessary to use an actual bed base for ignition from below.

NOTE 2. When testing a divan or bed base it may not be necessary to use the test rig.

The size of the mesh is not critical for top ignition but a rectangular mesh of size 100 ± 10 mm x 50 ± 5 mm as shown in figure 2 is required for ignition from below. Similarly, the angle iron dimensions in figure 2 are critical for ignition from below but not for top ignition.

For the tests, the rig is sited within the enclosure (see 6.4) and the testing is performed in a substantially draught-free environment permitting an adequate supply of air.

6.2 Clock. A stop clock accurate to 1 s.

6.3 Ignition sources. Ignition sources shall be as described in sections 2, 3 and 4.

6.4 Test enclosure. Either a room with a volume greater than 20 m^3 (which contains adequate oxygen for testing) is required, or a smaller enclosure with a through flow of air, equipped with inlet and extraction systems. Air flow rates shall be between 0.02 m/s and 0.2 m/s in the locality of the test specimen position. These limits provide adequate oxygen without disturbing the burning behaviour.

7 Atmosphere for conditioning and testing

7.1 Conditioning

The materials to be tested and the primary and secondary ignition sources shall be conditioned immediately before the test for 72 h in indoor ambient conditions and then for at least 16 h in an atmosphere having a temperature of 20 ± 5 °C and a relative humidity of 50 ± 20 %r.h.

7.2 Testing

For testing, a substantially draught-free environment having a temperature of 23 ± 7 °C and a relative humidity of 45 ± 25 %r.h. shall be used.

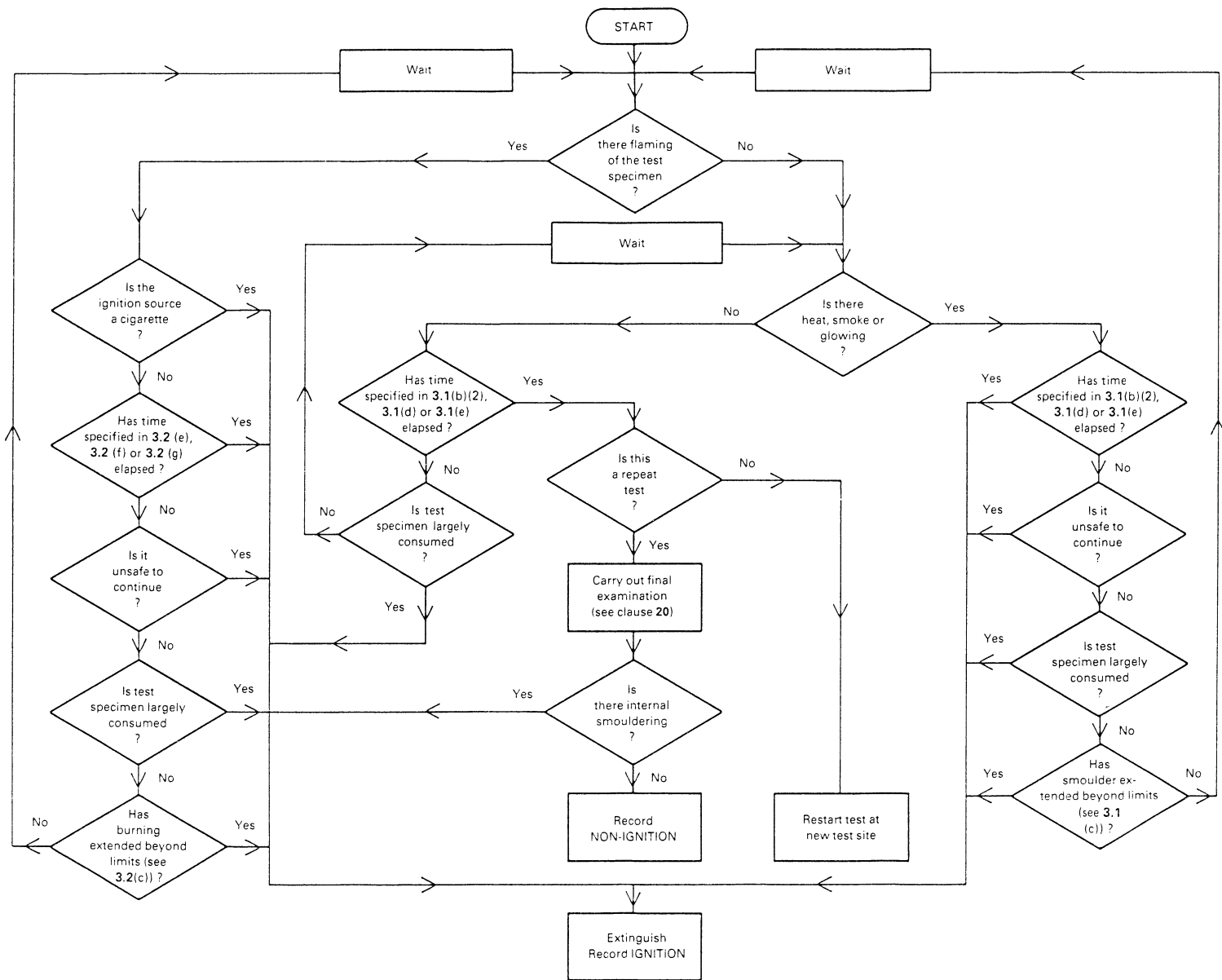


Figure 1. Flow diagram for detection of ignition