BS EN 597-1:2015

BSI Standards Publication

Furniture — Assessment of the ignitability of mattresses and upholstered bed bases

Part 1: Ignition source smouldering cigarette

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 597-1:2015. It supersedes BS EN 597-1:1995 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FW/6, Flammability performance and fire tests for furniture.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

Published by BSI Standards Limited 2016

ISBN 978 0 580 85287 9

ICS 13.220.40; 97.140

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2016.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 597-1

December 2015

ICS 13.220.40; 97.140

Supersedes EN 597-1:1994

English Version

Furniture - Assessment of the ignitability of mattresses and upholstered bed bases - Part 1: Ignition source smouldering cigarette

Ameublement - Évaluation de l'allumabilité des matelas et des sommiers rembourrés - Partie 1 : Source d'allumage : cigarette en combustion

Möbel - Bewertung der Entzündbarkeit von Matratzen und gepolsterten Bettböden - Teil 1: Zündquelle: glimmende Zigarette

This European Standard was approved by CEN on 7 November 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword

This document (EN 597-1:2015) has been prepared by Technical Committee CEN/TC 207 “Furniture”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2016 and conflicting national standards shall be withdrawn at the latest by June 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 597-1:1994.

The test is based on EN 1021-1, *Furniture – Assessment of the ignitability of upholstered furniture – Part 1: Ignition source: smouldering cigarette.*

The main changes in relation to EN 597-1:1994 are:

— modification to the specification of the weight of the ignition source;

— modification to the test procedure to allow a third ignition source to be placed on the test sample if either of the two initial ignition sources self extinguish prior to the completion of the test.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is one of a series of standards concerned with the ignitability of mattresses and upholstered bed bases using different ignition sources. The ignition source used in this European Standard is a smouldering cigarette.

When mattresses or bed bases are used or stored on their own, it is desirable to know their ignitability in their own right.

It cannot be assumed that protection against 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 and flaming ignition tests.

WARNING — Attention is drawn to the fact that the tests given in the test report (see Clause 10) are not intended to reproduce the full fire hazards that may be encountered.

1 Scope

This European Standard specifies a test method to assess the ignitability of mattresses, upholstered bed bases or mattress pads when subjected to a smouldering cigarette as an ignition source.

Air mattresses and water beds are excluded from this standard.

The standard contains one annex:

Annex A (informative) Model test report form.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
progressive smouldering
exothermic oxidation, not accompanied by flaming, that is self-propagating, i.e. independent of the ignition source, which may or may not be accompanied by incandescence

2.2
flaming
undergoing combustion in the gaseous phase with the emission of light

2.3
flammability
ability of a material or product to burn with a flame under the specified test conditions

2.4
ignitability
measure of the ease with which a material, product or component can be ignited so as to flame or progressively smoulder

2.5
ignition source
source of energy used to ignite combustible materials or products

2.6
mattress pad
upholstered product that is used in conjunction with, and to complement, a mattress or upholstered bed base

2.7
mattress
upholstered product intended for sleeping upon

2.8
bed base
structure that supports a mattress or the surface(s) of a mattress that support(s) a user

2.9
upper surface
surface of a bed base that supports a mattress or the surface(s) of a mattress that support(s) a user

3 Criteria of ignition

3.1 Progressive smouldering ignition

For the purposes of this European Standard, all the following types of behaviour are considered to be progressive smouldering ignitions:

a) any test assembly that displays escalating combustion behaviour so that it is unsafe to continue the test and active extinction is necessary;

b) any test assembly that smoulders until it is largely consumed within the test duration;

c) any test assembly that smoulders to its full thickness, within the duration of the test;

d) any test assembly that smoulders after one hour from the application of the ignition source;

e) any test assembly that, on final examination (see 9.3), shows evidence of progressive smouldering.

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

3.2 Flaming ignition

For the purposes of this European Standard, a flaming ignition is considered to be the occurrence of any flames initiated by a smouldering source.

4 Principle

To subject a full upper surface or upper surface characteristic features of a mattress, the bed base or the mattress pad to the contact of a smouldering ignition source by using smouldering cigarettes so that all the zones having different characteristics are tested.

5 Health and safety of operators

5.1 General

The test method specified in this European Standard presents a considerable hazard; suitable precautions shall be taken, which may include the provision of breathing apparatus and protective clothing.

5.2 Enclosure

For safety, the test should be conducted in a non-combustible fume cupboard. If such a cupboard is not available, a test enclosure should be constructed (see 6.2) so that the operator is protected from the fumes.

5.3 Extinguishers

Adequate means of extinguishing the assembly should be provided bearing in mind that some combinations may produce severe flaming during the test. A hand and/or fixed water spray which can be directed over the burning area can be useful. Other means such as suitable fire extinguishers, fire blankets and a bucket of water will assist.

In some cases smouldering may be difficult to extinguish completely and complete immersion in water may be necessary.

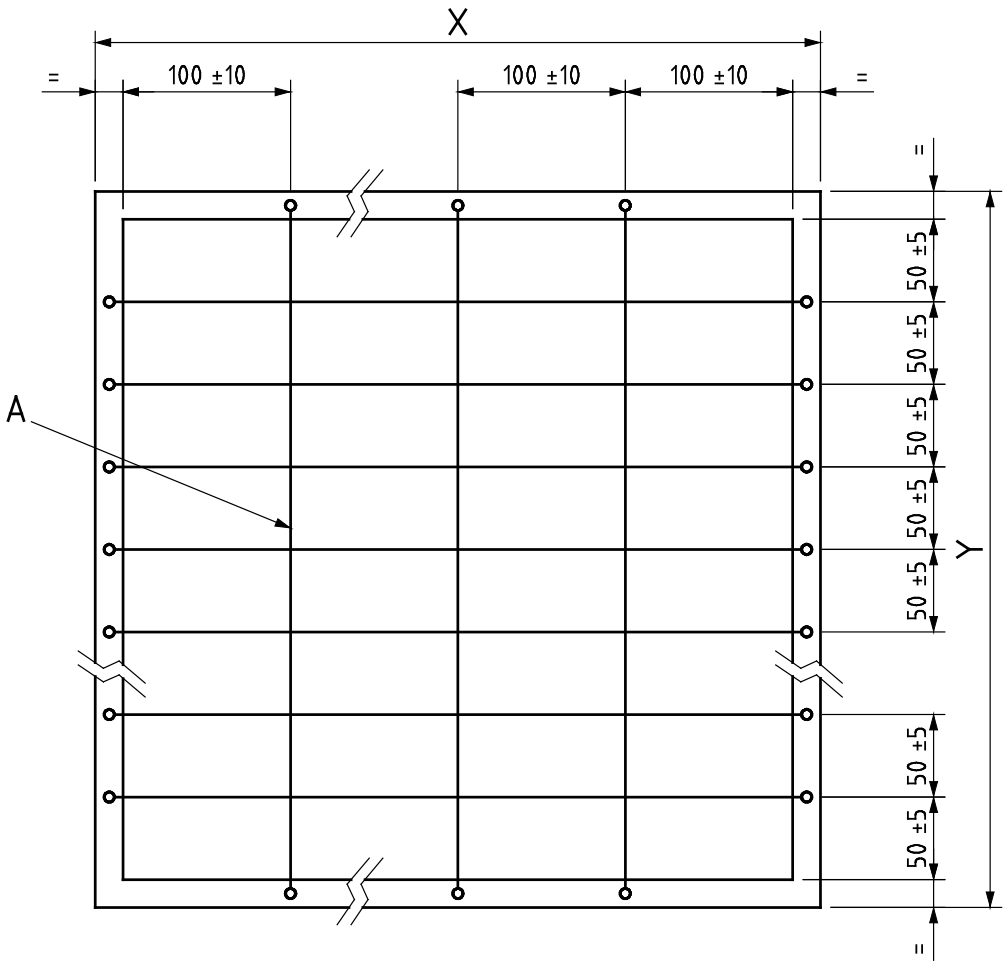
6 Apparatus

6.1 Test rig

Consisting of a platform of expanded steel or open mesh at least 450 mm x 450 mm supported at least 75 mm above a solid base (a suitable test rig mesh is illustrated in Figure 1). The size of the mesh is not critical.

For the tests, the rigs shall be sited within the enclosure (see 6.2) and the testing shall be performed in a basically draught-free environment permitting an adequate supply of air and removal of smoke from the area of the apparatus.

Dimensions in millimetres



Key

A mesh made from wire approximately 2 mm in diameter

X test rig width at least test specimen width

Y test rig length at least test specimen length

Figure 1 — Test rig assembly

6.2 Test enclosure

The test enclosure shall consist of either a room with a volume greater than 20 m^3 (which contains adequate oxygen for testing) or a smaller enclosure with a through flow of air. Inlet and extraction systems providing an air speed rate of less than 0,2 m/s in the locality of the rig provide adequate oxygen without disturbing the burning behaviour.

6.3 Clock

The clock shall be capable of measuring to at least 1 h with an accuracy of 1 s.

6.4 Ignition source smouldering cigarette

An un-tipped cylindrical cigarette complying with the following requirements shall be used:

— length: (68 ± 2) mm;

— diameter: (8 ± 0,5) mm;

— mass: (0,85 ± 0,15) g.

The smouldering rate shall be (7,5 ± 2) min/40 mm, when tested as follows.

Mark the cigarette, conditioned as described in 7.1 at 10 mm and 50 mm from the end to be lit. Light it as described in 9.2.1 and impale it horizontally in air (air speed rate less than 0,2 m/s) on a horizontal wire spike inserted not more than 13 mm into the unlit end.

Record the time taken to smoulder from the 10 mm to the 50 mm mark.

The smouldering rate shall be measured on one cigarette from a batch of 20 cigarettes. The smouldering rate may be measured on two cigarettes at the same time. The distance between cigarettes and between each cigarette and any nearby surface such as the wall or floor of the test enclosure shall be at least 150 mm.

If the cigarette ceases smouldering before reaching the 50 mm mark, the measurement of smouldering rate shall be repeated.

7 Atmospheres for conditioning and testing

7.1 Conditioning

The materials to be tested and the cigarettes shall be conditioned for at least 24 h immediately before the tests in the following atmosphere:

— temperature: (23 ± 2) °C;

— relative humidity: (50 ± 5) %.

7.2 Atmosphere for testing

The test shall be carried out in an atmosphere having a temperature between 10 °C and 30 °C and a relative humidity between 15 % and 80 %.

8 Test specimen

8.1 General

The test assembly materials shall be representative of the components and make-up of the finished mattress, mattress pad or upholstered bed base.

8.2 Small scale

For small scale tests, the test specimen shall be rectangular in shape and have a minimum size of 450 mm x 450 mm x nominal thickness of the finished mattress, mattress pad or upholstered bed base. The type of proposed edge finishing system shall be incorporated, e.g. plain, piped or taped edge. Representative tension shall be maintained in the cover. The proposed mattress, mattress pad or upholstered bed base finish shall be represented in the specimen, e.g. tufted or quilted.

NOTE Representative tension can be maintained in the cover by means of suitable clips if the section is produced by cutting.

8.3 Full size

For full size tests 1:1, the actual product shall form the test specimen.

9 Test procedure

9.1 Preparation

NOTE The application of the ignition source can be within 20 min of removing the test materials from the conditioning atmosphere (7.1). If there is a significant distance between the conditioning room and the room where testing is carried out, the materials can be protected against de-conditioning during transfer between rooms. If possible, the assembly can be prepared inside the conditioning room.

9.1.1 Ensure that means of extinguishing are close to hand (see 5.3).

9.1.2 For a small scale test, place the test specimen in the test rig (see 6.1).

For full size tests:

— bed bases are tested on a horizontal surface (feet of the bed bases may have to be fitted if they exist on the actual product;

— mattresses or mattress pads are tested on a horizontal surface.

9.2 Ignition source application

9.2.1 Within 20 min of removing the materials from the conditioning atmosphere, light two cigarettes and draw air through it until the tip glows brightly. Not less than 5 mm and not more than 8 mm of the cigarette shall be consumed in this operation.

9.2.2 Position the smouldering cigarettes in position on a flat portion of the upper surface of the test specimen so that the cigarette is not less than 50 mm from the nearest edge or marks left by any previous tests, and simultaneously start the clock. Where the test specimen has a piped or taped-edge finish, or is quilted or tufted, position two cigarettes on each feature such as on the taped edge, in the groove of the quilt-line and on the tufts.

9.2.3 Observe the progress of combustion and record any evidence of progressive smouldering ignition (see 3.1 a), b), c) or d)) or flaming ignition (see 3.2) of the test specimen.

NOTE The detection of smouldering can be difficult and is eased by watching for smoke emerging at points at a distance from the cigarette. Smoke is most easily viewed by looking down a rising column by means of a mirror.

9.2.4 If progressive smouldering ignition or flaming ignition of the test specimen is observed, extinguish the test specimen and record this, together with the time elapsed between placing and extinguishing. In these circumstances discontinue testing and complete the test report (see Clause 10).

If progressive smouldering ignition or flaming ignition of the test specimen is not observed and the cigarette smoulders its complete length, record this and carry out the final examination (see 9.3).

If one of the cigarettes fail to smoulder its complete length, record this and repeat the test with a new cigarette placed in a fresh position not less than 50 mm from any previous test damage.

If the progressive smouldering ignition or flaming ignition of the test specimen is observed in this repeat test, extinguish the test specimen and record this, together with the time elapsed between placing and extinguishing. In these circumstances discontinue testing and complete the test report (see Clause 10).

If progressive smouldering ignition or flaming ignition of the test specimen is not observed in this repeat, or if the cigarette fails to smoulder its complete length, record this and carry out the final examination (see 9.3).

9.2.5 For small scale tests (see 8.1), it may be impossible to complete the number of tests required on one specimen. If so, use identical specimens to complete the full number of tests.

9.2.6 If the two surfaces of the test specimen are different in any way, both sides shall be tested.

9.3 Final examination

Cases of progressive smouldering ignition undetected from the outside have been reported. Immediately after completion of the test programme, dismantle the test specimen and examine it internally for progressive smouldering ignition. If this is found, extinguish the test specimen, and record that smouldering ignition has occurred and complete the test report (see Clause 10). For safety reasons ensure that all smouldering has ceased before the rig is left unattended.

If no internal progressive smouldering ignition is found, record non-ignition and complete the test report (see Clause 10).

10 Test report

The test report, of which the form shown in Annex A is an example, shall give the following information:

a) reference to this European Standard, i.e. EN 597-1;

b) description of the mattress, mattress pad or upholstered bed base and any other components, and if necessary, the identification of the tested surface;

c) whether ignition or non-ignition occurred in each test. If ignition occurred with at least one of the cigarette applications, the overall result is taken as ignition;

d) if ignition occurred, whether it was progressive smouldering ignition or flaming ignition, and the measurements or observations relevant to the criteria for ignition;

e) if self-extinguishing of the cigarettes occurred.

The report shall also include the words “The above test results relate only to the ignitability of the combination of materials under the particular conditions of test; they are not intended as a means of assessing the full potential fire hazard of the mattress, mattress pad or upholstered bed base in use.”

Annex A
(informative)

Model test report form

Issuing authority ..... Test No. .....

Sample…….. Date …….. Company ……..

Test report in accordance with EN 597-1 (confidential)

Assessment of ignitability: Ignition source: smouldering cigarette

Materials tested: .....

Surface tested: .....

Test results: (non-ignition, smouldering ignition, flaming ignition): .....

Criteria of ignition	**Cigarette**			**Comments (including position of the failing cigarette)**
	1	2	3	
Smouldering criteria.....	*	*	*	
Unsafe escalating combustion (3.1 a)				
Test assembly consumed (3.1 b)				
Smoulders through thickness (3.1 c)				
Smoulders more than 1 h (3.1 d)				
In final examination, presence of progressive smouldering (3.1 e)				
Flaming criteria				
Occurrence of flames (3.2)				
		*Enter 'YES' if criteria exceeded or 'NO' if criteria not exceeded		

Signed: .....

(Any extraordinary events should be reported overleaf)

The above test results relate only to the ignitability of the combination of materials under the particular conditions of test; they are not intended as a means of assessing the full potential fire hazard of the materials in use.

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™