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Furniture — Assessment of the ignitability of upholstered furniture —

Part 1: Ignition source: smouldering cigarette

Ameublement — Évaluation de l'allumabilité des meubles rembourrés —

Partie 1: Source d'allumage: cigarette en combustion

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8191-1 was prepared by Technical Committee ISO/TC 136, *Furniture*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Furniture — Assessment of the ignitability of upholstered furniture —

Part 1:

Ignition source: smouldering cigarette

0 Introduction

This part of ISO 8191 is one of a series of standards concerned with the ignitability of upholstered furniture using different ignition sources. The ignition source used in this part is a smouldering cigarette.

It is the intention to publish further parts utilizing a series of flaming ignition sources of increasing severity. Part 2 will use a gas flame representing a match equivalent flame as the first step in the series and it is anticipated that further parts will extend the range by using larger gas flames and either wooden cribs or filled paper bags.

1 Scope and field of application

This part of ISO 8191 lays down a method of test to assess the ignitability of material combinations, such as covers and fillings used in upholstered seating when subjected to a smouldering cigarette as an ignition source.

The tests measure only the ignitability of a combination of materials used in upholstered seating and not the ignitability of a particular finished item of furniture incorporating these materials. They give an indication of, but cannot guarantee, the ignition behaviour of the finished item of furniture.

2 Reference

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*.

3 Definitions

For the purposes of this part of ISO 8191, the following definitions apply.

3.1 progressive smouldering: 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.

3.2 flaming: Undergoing combustion in the gaseous phase with the emission of light.

4 Criteria of ignition

4.1 Progressive smouldering ignition

For the purposes of this part of ISO 8191, 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 requires active extinction;
- b) any test assembly that smoulders until it is essentially consumed within the test duration;
- c) any test assembly that smoulders to the extremities of the specimen, viz upper or lower margins, either side or to its full thickness, within the duration of the test;
- d) any test assembly that, on final examination, shows evidence of charring other than discoloration, for 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 which may 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).

4.2 Flaming ignition

For the purposes of this part of ISO 8191, all the following types of behaviour are considered to be flaming ignitions:

- a) any test assembly that displays escalating combustion behaviour so that it is unsafe to continue the test and requires active extinction;
- b) any test assembly that burns until it is essentially consumed within the test duration;
- c) any test assembly on which any flame front reaches the lower margin, either side or passes through its full thickness within the duration of the test.

5 Principle

Subjecting an assembly of upholstery materials to a smouldering cigarette ignition source. The assembly is arranged to represent in stylized form a junction between a seat and back (or

seat and arm) such as might occur in a typical chair. Determination of the ignitability of an assembly by applying smoker's material such as a cigarette. The test method measures the ignitability of the overall composite of materials, i.e. cover(s), interliner, infill material, etc., as constructed on the test rig. The results shall not be stated as being applicable to the general behaviour of any individual component (see also annex A).

6 Health and safety of operators

6.1 General

The test method specified in this part of ISO 8191 presents a considerable hazard; suitable precautions shall be taken.

6.2 Enclosure

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

6.3 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 a fixed water spray which can be directed over the burning area can be useful. Other means such as fire extinguishers (water and halogenated hydrocarbons), 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.

7 Apparatus

7.1 Test rig

A suitable test rig is illustrated in figures 1 and 2. It shall consist of two rectangular frames hinged together and capable of being locked at right angles to each other.

The frames shall be made from nominal 25 mm × 3 mm steel flat bar and shall securely hold mesh steel platforms set 6 ± 1 mm below the top edge of the frames (mesh size should be such that an open mesh area of approximately 15 to 150 mm² exists).

The internal width and height of the back frame shall be 450 ± 2 mm × 300 ± 2 mm and the width and depth of the base frame 450 ± 2 mm × 150 ± 2 mm. A standard edging section may be used around the mesh steel platform to give protection and greater rigidity.

The sides of the frame shall extend beyond the back of each frame to provide for the hinge holes and to form the back legs. The hinge rod shall be of nominal 10 mm diameter steel, continuous across the back of the rig and its axis $22,5 \pm 0,5$ mm beyond the back member of each frame.

The frames shall be lockable at right angles by a bolt or pin through each of the pairs of members forming the back legs. The front legs may be welded across the front corners of the

base frame. The height of the legs shall be such as to leave a gap not less than 50 mm high between the base and frame and the supporting surface.

For the tests the rig 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.

7.2 Test enclosure

The test enclosure shall consist of either a room with a volume greater than 20 m³ (which contains adequate oxygen for testing) or a smaller enclosure with a through flow of air. Inlet and extraction systems providing air flow rates of 0,02 to 0,2 m/s in the locality of the rig provide adequate oxygen without disturbing the burning behaviour.

7.3 Clock

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

7.4 Ignition source: smouldering cigarette

An untipped cylindrical cigarette complying with the following requirements shall be used:

- length : 70 ± 4 mm
- diameter : $8 \pm 0,5$ mm
- mass : $1 \pm 0,1$ g

The smouldering rate shall be $12,0 \pm 3,0$ min/50 mm, when tested as follows.

Mark the cigarette, conditioned as described in 8.1, at 5 mm and 55 mm from the end to be lit. Light it as described in 10.2 and impale it horizontally in air (draught 0,02 to 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 5 mm to the 55 mm mark.

8 Atmospheres for conditioning and testing

(see also ISO 139)

8.1 Conditioning

The materials to be tested and the cigarettes shall be conditioned for 16 h immediately before the test in one of the following atmospheres:

- a) temperature: 20 ± 2 °C
relative humidity: (65 ± 2) %
- b) temperature: 23 ± 2 °C
relative humidity: (50 ± 5) % } (preferred)
- c) temperature: 27 ± 2 °C
relative humidity: (65 ± 5) %
- d) any other conditioning atmosphere as agreed by the parties concerned.