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Wheelchairs - Resistance to Ignition of Upholstered Parts - Requirements and Test Methods

轮椅车 座（靠）垫阻燃性的要求和测试方法

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Wheelchairs - Resistance to Ignition of Upholstered Parts - Requirements and Test Methods

1 Scope

This Standard specifies the test methods to assess the resistance to ignition of upholstered parts in wheelchairs by cigarettes and matches.

This test only measures the resistance to ignition to the materials under test by cigarettes and matches, but it cannot measure the ignitability of the complete wheelchairs. This Test only instructs rather than guarantees the ignitability of the complete wheelchairs.

NOTE: The requirements are minimal. It is advisable that manufacturers, as possible, use the materials with superior resistance to ignition.

2 Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 14729-2000 Wheelchairs – Terms (eqv ISO 6440:1985)

ISO 8191-1:1987 Furniture – Assessment of Ignitability of Upholstered Furniture – Part 1: Ignition Source: Lighted Cigarettes

ISO 8191-2:1988 Furniture – Assessment of Ignitability of Upholstered Furniture – Part 2: Ignition Source: Match Flame Equivalent

ISO 7176-15 Wheelchairs – Part 15: Requirements for Information Disclosure, Documentation and Labelling

3 Definitions

3.1 Progressive [translator: smoldering]

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 Judgment Criteria for Combustion

4.1 Progressive smoldering

This Standard defines any of the following phenomena as progressive smoldering:

a) The smoldering of the test block is gradually upgraded, so that the continued test shall endanger the safety, and the fire-fighting measures are required;

b) The test block is smoldered to substantially exhaust during the test;

c) The test block is smoldered to the upper or lower open edge, either side, or vertically burned out;

d) At the end of the test, the test block is burnt (not only discolored) more than 100mm in any direction except upwards from the burning point.

NOTE: In fact, it shall be found that there are obvious differences between different materials; some materials shall burn under the influence of the combustion source, but it shall not spread (non-progressive smoldering); while the smoldering of other materials shall continue to escalate and spread (progressive smoldering).

4.2 Flaming combustion

This Standard defines any of the following phenomena as flaming combustion:

a) The burning of the test block is gradually upgraded, so that the continued test shall endanger the safety, and the fire-fighting measures are required;

b) The test block is burned to substantially exhaust during the test;

c) During the test, the flame front reaches the lower open edge, either side, or vertically burned out.

5 Principle

The smoldering cigarette or the burning match is applied to the test block of upholstered parts materials. The test block installation is made in a combination of

typical wheelchair seat cushion, back cushion (or seat cushion or armrest); the fire source uses the cigarettes and matches (or equivalent fire source) commonly used by the smokers. This test method only tests the ignitability of the overall test block (including skin, lining, fillers, etc.) on the test frame. The test results are not applicable to the single material in the overall test block.

6 Operation Safety

6.1 General

This Test method may endanger health and safety, so appropriate precautions shall be taken.

6.2 Isolation

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

6.3 Extinguisher

Certain combinations of materials may produce a violent flame during the test; active and/or fixed sprinkler head that can spray water directly into the combustion zone shall be installed. Other equipment such as fire extinguishers, fireproof cloth and buckets shall be prepared.

Sometimes smoldering may be difficult to completely extinguish, it is necessary to completely immerse the test block into water.

7 Apparatus

7.1 Test framework

Figures 1 and 2 show a suitable test framework. It consists of two rectangular boxes that are hinged together; and can be fixed at a vertical angle.

The framework is made of 25mm×3mm steel strip with a steel mesh platform fixed firmly in the middle; such mesh (mesh size is 15~150mm^2) is 6mm±1mm lower than the top edge of the framework.

The inner width and height of the back framework are 450mm±2mm×300mm±2mm; the inner width and depth of the seat framework are 450mm±2mm×150mm±2mm. The surrounding edges of the steel mesh platform has a protection and reinforcement function against the steel mesh.

The cigarette shall be cylindrical with no attachments at both ends, and meet the following requirements:

--- Length: 70mm±4mm;

--- Diameter: 8mm±0.5mm;

--- Mass: 1g±0.19g.

The smoldering rate is 12.0min/50mm±3.0min/50mm; its test method is as follows:

Mark on the cigarette about 5mm and 55mm from the burning end of the cigarette; the cigarette is pretreated as per 8.1; ignite the cigarette as per the requirements of 10.2; then insert and fix the unburned end of the cigarette on the horizontal needle with inserting depth no greater than 13mm, environment air flowrate 0.02~0.2m/s. Record the smoldering time from the 5mm mark to the 55mm mark.

7.4.2 Equivalent fire source of gas flame fire source – match fire source

NOTE: The equivalent fire source shall be designed with the heat output approximately equal to that of burning match.

The burning tube is a stainless-steel tube (with outer diameter 8mm±0.1mm, inner diameter 6.5mm±0.1mm, length 200mm±5mm); it is connected by a hose and a propane or butane bottle. The pipeline is equipped with a flow meter, a fine-tuning valve, an on-off valve (optional) and a pressure regulating valve; the outlet pressure is adjusted to 2.8kPa.

NOTE: If there is no stainless-steel tube of the above size; a similar size of tube can also be used instead; but the latter tube shall be processed as the above size at a length of 50mm from the nozzle.

The flow meter shall be calibrated; the flow rate of propane or butane gas is 45mL/min±2mL/min at 25°C. The hose connecting the flow meter with burning but has a length of 2.5~3m and inner diameter of 7mm±1mm.

7.4.2.1 Gas flow control

The gas must be supplied to the combustion tube at the specified flow rate.

When the cylinder storage temperature is lower than the specified test temperature (it is necessary), or when the cylinder is at a certain distance from the test framework, gas supply and measurement are difficult.

In this case, the pipeline within the test environment (10~30°C) shall be long enough to ensure that the gas reaches the required temperature before flowing to the measuring instrument. One of the effective methods is to ensure that the gas flows

through a metal tube before reaching the measuring instrument; the metal tube shall be immersed into the constant-temperature water at 20°C (the specified temperature of the gas flow); so that ensure that the temperature of gas flow is within the allowed range.

Care must be taken when measuring and setting gas flow rate. The flow meter must be calibrated after installation; it shall be regularly inspected during the test; the inspection method shall accurately measure the flow rate of the gas in the combustion tube. One of the calibration methods is to use a short tube (with inner diameter 7mm) to connect the combustion tube to the soap bubble flowmeter; during a certain period of time, measure the moving length of the bubble meniscus in a glass tube (such as burette), from which the actual flow rate of the gas can be calculated.

8 Pretreatment and Test Environment

8.1 Pretreatment

The materials under test shall be pretreated in any of the following environment for 16h; then they shall be tested immediately after pretreatment:

a) Temperature: 20°C±2°C;

Relative humidity: 65%±2%.

b) Temperature: 23°C±2°C;

Relative humidity: 50%±5% (recommended condition).

c) Temperature: 27°C±2°C;

Relative humidity: 65%±5%.

d) Other pretreatment environments agreed by the relevant parties.

8.2 Test environment

Temperature: 10~30°C;

Relative humidity: 15%~80%.

9 Material Combination

9.1 Overview

The material combination includes skin, filler, lining and other components that may be

smoldering or flaming combustion inside and/or on the skin.

NOTE: The detection of smoldering may be difficult; it is relatively easier to detect the smoldering from the presence of smoke in certain points with some distance from the cigarette. The easiest way to observe the smoke is to look down at the rising smoke column by a mirror.

10.2.1.4 If the progressive smoldering (see 3.1) or flaming (see 3.2) of the upholstered parts is observed within 1h of placing the cigarette, extinguish fire against the test blocks and record the results. In this case, the test can be interrupted and finish the test report (see Clause 12).

If no smoldering or flaming is observed within 1h, or the cigarette can't burn for the total length; record the result; then change another cigarette for retest; the retest position shall be no less than 50mm from the damage area of the previous test. If there is still no smoldering or flaming is observed in the retest period, report the results; and conduct the final inspection.

NOTE: The retest can also be performed simultaneously with the first test.

10.2.2 Fire source of match

10.2.2.1 Ignite the combustible gas flowing out form the combustion tube; adjust the gas flow to the specific flow rate (see 7.4); stabilize the fire for at least 2min.

10.2.2.2 Place the axial direction of the combustion tube along the intersection between the horizontal and vertical test blocks; the distance from flaming to the nearest edge or the mark left in the previous test shall be no less than 50mm; meanwhile, timing begins.

10.2.2.3 The gas is allowed to combust for 20s±1s; then carefully remove the combustion tube from the test block; so that terminate the combustion process.

10.2.2.4 Observe the combustion process; record any evidence of the progressive smoldering and flaming combustion inside and/or on the skin. The flame, ember, fume or progressive smoldering that stop within 120s after the combustion tube is removed can be ignored.

10.2.2.5 If, after removing the combustion tube for 120s, the progressive smoldering (see 3.1) or flaming (see 3.2) of the upholstered parts is observed within 1h; then extinguish fire against the test blocks and record the results. In this case, the test can be interrupted and finish the test report (see Clause 12).

If no progressive smoldering or flaming is observed within 1h, change another position for retest; the retest position shall be no less than 50mm from the damage area of the previous test. If there is still no progressive smoldering or flaming is observed in the retest period, report the results; and conduct the final inspection.

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