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Safety of toys —

Part 2: Flammability

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Sécurité des jouets —

Partie 2 — Inflammabilité

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Reference number
ISO 8124-2:1994(E)

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8124-2 was prepared by Technical Committee ISO/TC 181, *Safety of toys*.

ISO 8124 consists of the following parts, under the general title *Safety of toys*:

- *Part 1: Mechanical and physical properties*
- *Part 2: Flammability*
- *Part 3: Migration of certain elements*

Introduction

There is very little data concerning the hazards associated with the flammability of toys. There is a lot of concern over perceived risks but little in the way of hard facts.

Over 80 % of deaths of children arising from fires are due to asphyxiation from fumes. ISO 8124 was never intended to address this aspect as it deals strictly with the flammability of materials. In any case, the percentage of combustible materials derived from toys in the child's environment is insignificant compared with that of other household material such as furniture, curtains, beds.

ISO 8124 has been devised to address certain hazards. Virtually all materials burn if exposed for long enough to the right ignition source. It has therefore been decided to address toy items that:

- a) are clothes worn by the child (disguise costumes), especially where capes, flowing dresses and similar articles are included;
- b) a child could enter, such as play tents and play houses;
- c) a child cuddles (filled soft toys);
- d) are worn but take the form of masks, wigs, etc.

The hazards to be addressed in these cases arise because of the intimate contact between the child and the product. If ignited, the materials should burn with a rate of spread of flame which allows the child to remove, drop or get out of the product before serious injury occurs.

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Safety of toys —

Part 2: Flammability

1 Scope

This part of ISO 8124 specifies the categories of flammable materials which are prohibited in all toys and requirements concerning flammability of certain toys when they are submitted to a small source of ignition.

The test methods described in clause 5 are used for the purposes of determining the flammability of toys under the particular test conditions specified. The test results thus obtained cannot be considered as providing an overall indication of the potential fire hazard of toys or materials when subjected to other sources of ignition.

This part of ISO 8124 includes general requirements relating to all toys and specific requirements and methods of test relating to the following toys which are considered as being those presenting the greatest hazard:

- beards, moustaches, wigs, masks and other products worn on the head with pile, hair or other attached material;
- disguise costumes (e.g. cowboy outfits, nurses' uniforms) including the associated headgear, and toys intended to be worn by a child (excluding products covered by 4.2 and paper novelty hats, e.g. those supplied in crackers);
- toys intended to be entered by a child (e.g. toy tents, puppet theatres, wigwams);
- filled soft toys with a pile surface or textile surface but excluding soft-bodied dolls with heads and

limbs made entirely from nontextile polymeric material.

NOTE 1 Additional requirements for the flammability of electrical toys are specified in EN 50088, *Safety of electrical toys*.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8124. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8124 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2431:1993, *Paints and varnishes — Determination of flow time by use of flow cups*.

ISO 6941:1984, *Textile fabrics — Burning behaviour — Measurement of flame spread properties of vertically oriented specimens*.

EN 71-5:1993, *Safety of toys — Part 5: Chemical toys (sets) other than experimental sets*.

3 Definitions

For the purposes of this part of ISO 8124, the following definitions apply.

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

3.2 flaming debris: Material separating from the sample during the test procedure and continuing to flame as it falls.

3.3 self-extinguishing: The representative sample ignites but then subsequently extinguishes before the second marker thread is severed (see 4.4).

3.4 representative sample: Each individual sample as it appears in the toy.

3.5 hair: Hair, including materials designed to represent hair (see 4.2).

3.6 filled soft toy: Toy with body surfaces composed of textile or pile materials which is filled with soft materials (for example, expanded polystyrene beads, polyester fibres or polyurethane foam) allowing compression of the body readily with the hand. This includes clothed and unclothed toys.

3.7 surface flash: Rapid spread of flame over the surface of a material, without combustion of the basic structure at that time.

4 Requirements

4.1 General requirements concerning prohibited materials

The following materials shall not be used in the manufacture of toys:

- celluloid (cellulose nitrate) and materials with the behaviour of celluloid in fire (except when used in varnish or paint);
- materials with a pile surface that produces surface flash on the approach of a flame.

In addition, toys shall not contain flammable gases, extremely flammable liquids, highly flammable liquids, flammable liquids and flammable solids¹⁾, except as specified below:

- flammable liquids in the form of individual sealed containers having a maximum volume of 15 ml per container;
- highly flammable liquids and flammable liquids being entirely retained within a porous material in capillary channels of writing instruments;

— flammable liquids with a kinematic viscosity greater than $260 \times 10^{-6} \text{ m}^2/\text{s}$ corresponding to a flow time of more than 38 s when determined in accordance with ISO 2431 using cup No. 6;

— highly flammable liquids in products specified in EN 71-5.

4.2 Beards, moustaches, wigs, masks and other products worn on the head with hair or other attached materials

4.2.1 Beards, moustaches, wigs, masks and other products worn on the head with hair, pile or other attachments (e.g. paper strands) where the hair, pile or other attached material protrudes 50 mm or more from the surface of the product, when tested in accordance with 5.5, shall have a duration of flaming of not more than 2 s after removing the flame.

In addition, if ignition occurs, the greatest length of pile, hair or other attachments which remains shall be:

- a) not less than 50 % of the greatest initial length, when the initial length was 150 mm or more;
- b) not less than 25 % of the greatest initial length, when the initial length was less than 150 mm.

For wavy hair, the length shall be taken as the straightened length. The article shall be tested as used and in the most onerous conditions, e.g. with plaits unwoven.

4.2.2 Beards, moustaches, wigs, masks and other products worn on the head with hair, pile or other attachments (e.g. paper strands) other than those used for securing, protruding less than 50 mm from the surface of the product, when tested in accordance with 5.6 shall have a duration of flaming of not more than 2 s (after removal of flame) and the maximum dimension of the burnt area shall be not more than 70 mm measured from the point of application of the flame.

Cardboard partial masks with no pile, hair or other attachments (other than those for securing the toys) are excluded, except for those where the distance between the centre of the eyes and the top of the mask is greater than 130 mm.

1) For European Union (EU) countries, these categories are defined in the European Council Directive 79/831/EEC of 18 September 1979 (published in the Official Journal of the EC No. L 259 of 15 October 1979) relating to the classification, packaging and labelling of dangerous substances.

Different legal requirements may exist in non-EU countries.

4.3 Disguise costumes including the associated headgear, and other toys intended to be worn by children (excluding products covered by 4.2 and paper novelty hats)

When these toys are tested in accordance with 5.7, the rate of spread of flame shall be less than or equal to 30 mm/s.

If the rate of spread of flame is between 10 mm/s and 30 mm/s, both the toy and the packaging shall be marked with the following warning:

“Warning! Keep away from fire”

4.4 Toys intended to be entered by a child

When representative samples of these toys are tested in accordance with 5.7, the rate of spread of flame shall be less than or equal to 30 mm/s.

If the representative sample has a rate of spread of flame greater than 20 mm/s there shall be no flaming debris (see 3.2).

If the representative sample is self-extinguishing (see 3.3) the sample is deemed to have passed.

If the rate of spread of flame is between 10 mm/s and 30 mm/s, both the toy and the packaging shall be marked with the following warning:

“Warning! Keep away from fire”

4.5 Filled soft toys

The requirements of this subclause do not apply to toys with a maximum dimension of 150 mm or less.

When filled soft toys (animals, dolls, etc. but excluding dolls with heads and limbs made from nontextile polymeric material) with a pile surface (e.g. velour, plush, imitation fur) or textile surface are tested in accordance with 5.8, the rate of spread of flame on the surface shall be not more than 30 mm/s. A toy shall be tested as supplied, including any clothing present with the toy and, if applicable, with the clothes removed if removal can be accomplished without damage to the clothes or toys.

5 Test methods

5.1 General

Where there is insufficient material to produce a complete test sample 80 mm × 600 mm in size, that material is not tested.

Subclauses 5.2 to 5.4 apply to the test methods described in 5.5 to 5.8.

5.2 Conditioning and test chamber

Before each test, the toys or samples shall be conditioned for at least 7 h in an atmosphere having a temperature of (20 ± 5) °C and a relative humidity of (65 ± 5) %.

To ensure safety of personnel and good test practice, carry out the tests in a test chamber in which the movement of air is less than 0,2 m/s at the start of the test and which is not affected by operation of mechanical apparatus during the test. It is essential that the volume of air in the test chamber is not affected by a reduction in the level of oxygen concentration. When an open-fronted chamber is used for the test, ensure that the test sample is at least 300 mm from the walls of the chamber. Maintain the chamber at 10 °C to 30 °C and a relative humidity of 15 % to 80 % prior to the test being carried out.

Test the samples within 2 min of removal from the conditioning atmosphere.

5.3 Test flame

The test flame is obtained from a burner as described in ISO 6941 operated with butane or propane gas as appropriate. The height of the flame is measured with the burner in the vertical position from the end of the burner tube to the tip of the flame.

5.4 Pretreatment for disguise costumes and for toys intended to be entered by a child

Each test shall be carried out on a new toy as first offered for sale or on a sample obtained from such toys. If the manufacturer

- indicates that the toy is not intended to be washed, it shall not be washed or soaked before testing;
- recommends a method of washing or cleaning, the article shall be treated in accordance with these recommendations;

— gives no information relating to washing or cleaning, the articles shall be treated, before test, as follows. Immerse the toy in tap water (approximately 20 °C) at a ratio of at least 1:20, mass of toy (in grams) to volume of water (in millilitres), and allow it to stand for 10 min. Drain and repeat twice. Rinse by immersing the toy in demineralized water for 2 min. Drain and dry by a method appropriate to the toy and, where appropriate, restore the pile as nearly as possible to its original condition.

5.5 Test relating to beards, moustaches, wigs, masks and other products worn on the head with hair or other attached materials protruding more than 50 mm from the surface of the product

Measure the length of the pile, hair or other attached material. Position the toy so that the largest dimension of the pile, hair or other attachment hangs vertically or as near vertically as possible.

With the burner in a vertical position, apply a (20 ± 2) mm high test flame for 2 s to the lower edge of the pile, hair or other attachment of the toy so that the flame penetrates the element by approximately 10 mm.

If ignition occurs, measure the duration of flaming and the minimum length of the pile, hair or other attachment remaining.

5.6 Test relating to beards, moustaches, wigs, masks and other products worn on the head with hair or other attached materials protruding less than 50 mm from the surface of the product

Position the toy vertically.

With the flame height at (20 ± 2) mm, determined in the vertical position, move the burner to an angle of 45° and apply the test flame to the toy for 5 s so that the flame makes contact at least 20 mm above the lower edge, and the distance between the end of the burner measured in the centre and the surface of the toy is (5 ± 1) mm.

If ignition occurs, measure the duration of flaming and the maximum distance between the upper edge of the burnt area and the point of application of the flame.

5.7 Test relating to disguise costumes and to toys intended to be entered by a child

Cut a representative sample from the costume or toy and test in the orientation as it appears in the toy (e.g. along the length of a costume trouser leg when the child wearing the costume is standing).

The sample holder consists of two U-shaped metal plates of internal dimensions 600 mm × 80 mm. Spread the sample across the first plate, place the second plate on top and fix so as to secure the sample. Then cut the sample so that the material edge is in line with the end of the two legs of the frame (see figure 1). The second or top plate has an attachment point on each leg 50 mm from the open end and a further attachment point on each leg 550 mm from the open end.

Secure one end of a 100 % cotton thread (white mercerized cotton thread having a maximum linear density of 50 tex) to one attachment, then tension across the sample to the other attachment with a device to indicate when the thread is severed. Repeat at the second attachment point with a second marker thread.

NOTE 2 There can be a direct link to a timing device or a visual indication such as falling weights.

The thread shall be within 2 mm of the surface of the sample.

Position the U-frame at $(45 \pm 1)^\circ$ to the horizontal.

With the burner in a vertical position apply a (40 ± 3) mm test flame to the sample edge so that the distance between the edge and the top of the burner is (30 ± 2) mm. Apply the flame for (10 ± 1) s to the most flammable material, as predetermined.

Observe whether surface flash occurs.

Determine the rate of spread of flame from the time interval of the severing of the first marker thread to the second marker thread.

If the material fails to ignite within (10 ± 1) s, discontinue the test; the material is deemed to have passed.

If the material has non-identical surfaces, test both sides.

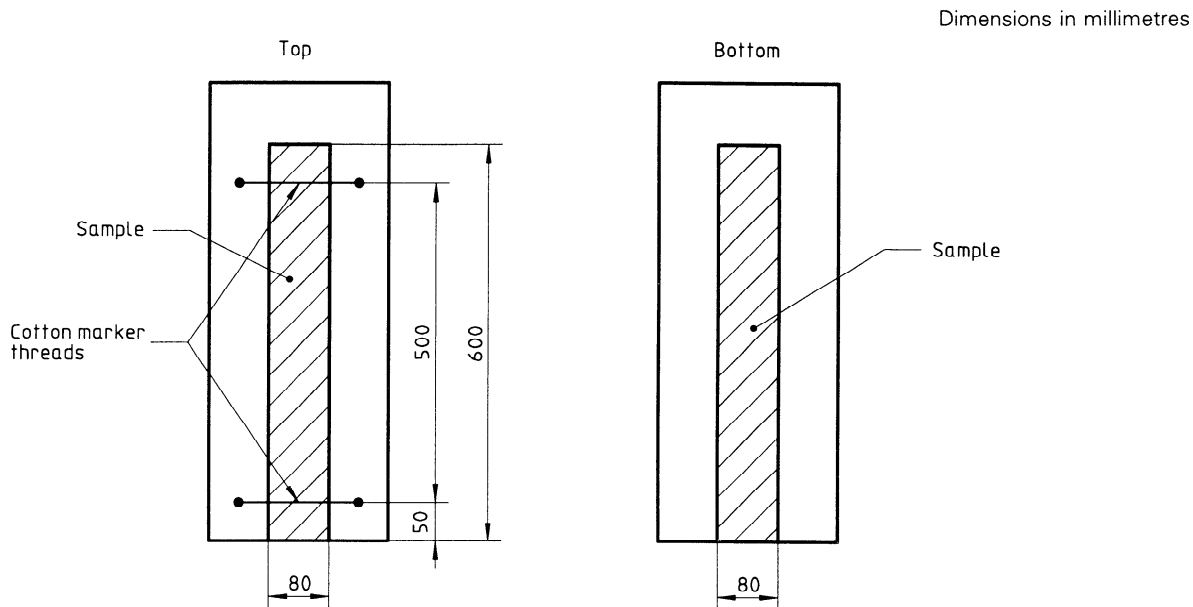


Figure 1 — Test relating to disguise costumes and to toys intended to be entered by a child

5.8 Test relating to filled soft toys

Position the toy vertically, i.e. with the head uppermost.

NOTE 3 If more than one orientation is possible, the most onerous position should be chosen.

With the burner at an angle of 45°, apply a (20 ± 2) mm high test flame to the toy for 3 s so that

the distance between the edge of the burner tube and the toy is approximately 5 mm and the flame makes contact between 20 mm and 50 mm above the lower edge of the most flammable material, as predetermined.

After removal of the flame, measure the time taken for the flame to spread on the surface of the toy over the distance between the point of application of the flame and the upper edge of the toy.