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Flexible cellular polymeric materials — Polyurethane foam for laminate use — Specification

Matériaux polymères alvéolaires souples — Mousse de polyuréthanne pour utilisation sous forme de feuilles pour assemblages — Spécifications

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products other than hoses*.

This third edition cancels and replaces the second edition (ISO 6915:1991), of which it constitutes a minor revision.

The main changes compared to the previous edition are as follows:

— normative reference has been updated

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This corrected version of ISO 6915:2019 incorporates the following corrections:

— in B.6.1, the measurements have been corrected from "250 pm" to "250 µm";

— in B.7.2, the key description for h_3 has been corrected from "the diameter of the test piece [...]" to "the thickness of the test piece[...] ".

Flexible cellular polymeric materials — Polyurethane foam for laminate use — Specification

1 Scope

This document specifies the minimum requirements for flexible polyurethane foams up to and including 20 mm thick intended for combination with suitable substrates such as non-woven, woven or knitted fabrics, to form a laminate.

Three types of flexible polyurethane foam are specified as follows:

— type 1: polyether;

— type 2: polyester with minimum elongation at break of 200 %;

— type 3: polyester with minimum elongation at break of 300 %.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 845, *Cellular plastics and rubbers — Determination of apparent density*

ISO 1798, *Flexible cellular polymeric materials — Determination of tensile strength and elongation at break*

ISO 1923:1981, *Cellular plastics and rubbers — Determination of linear dimensions*

ISO 2440, *Flexible and rigid cellular polymeric materials — Accelerated ageing tests*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Appearance

4.1 The material shall consist of a uniform network of cells and shall be free from any flaws, stains and other defects which might detrimentally affect the serviceability.

4.2 Material of thickness up to and including 6 mm shall lie flat when laid on a flat surface.

4.3 The material shall have no holes more than 3 mm in diameter through the full thickness of the foam. The maximum number of holes of diameter between 1,5 mm and 3 mm in any 60 m2 of material shall be not more than four for material of thickness 2 mm or less, and not more than eight for thicker material.

4.4 The colour shall be reasonably uniform and shall be as agreed between the supplier and the purchaser, having regard to the tendency for polyurethane foam to change colour on exposure to light.

5 Joints

Where it is necessary to join lengths of material together, the joint shall be as strong as the foam itself, and the adhesive or method of joining used shall not be injurious to the foam or to the material to which it is to be laminated. The construction and minimum spacing of joints shall be as agreed between the purchaser and the supplier.

6 Odour

The material shall be free from objectionable odour. The degree of permissible odour shall be agreed between the purchaser and the supplier.

7 Dimensions

7.1 Thickness

The nominal thickness shall be agreed between the purchaser and the supplier.

Tolerances on thickness shall be as given in Table 1.

Table 1 — Thickness tolerances

Values in millimetres

Thickness	Tolerance	
	+	−
Less than 4	0,3	0,2
4 and over	0,5	0,3

Thickness measurement shall be carried out in accordance with ISO 1923:1981, 4.3.

7.2 Width

The width of the material shall be agreed between the purchaser and the supplier.

Tolerances on width shall be as given in Table 2.

Table 2 — Width tolerances

Values in millimetres

Width	Tolerance
Less than 1 200	+40
1 200 and over	+50

7.3 Length

The minimum length of a roll shall be agreed between the purchaser and the supplier.

The length of a roll shall be determined by winding the roll on a slack winding machine.

8 Apparent density

The apparent density of the material, when determined by the method given in ISO 845, shall be within ± 10 % of the nominal value agreed between the purchaser and the supplier.

9 Cell count

The cell count shall be as agreed between the purchaser and the supplier subject to a tolerance of ± 10 %. It shall be expressed in cells per linear 100 mm, and shall be determined by the method described in Annex A.

The cell count method described produces a result representative of the count at a single position. Variations may occur within a sheet of foam and, if necessary, these can be established by agreement be- tween the purchaser and the supplier.

10 Performance requirements

The performance requirements, determined in accordance with the appropriate methods indicated in Table 3, shall be in accordance with the limits stated in the table.

11 Packaging and marking

The product shall be packaged in such a manner as to be protected against possible contamination and deformation. Each product or package shall be marked with the following information:

a) the name and/or distinctive mark of the manufacturer;

b) the batch number of other reference to identify the individual rolls with manufacturing batches;

c) the nominal thickness;

d) the nominal width;

e) the length;

f) the number of this document and type of sheeting.

Table 3 — Performance requirements of flexible polyurethane foams

Property	Type 1	Type 2	Type 3	Method of test
Tensional properties				
Initial values				
Tensile strength (kPa), min.	100	120	160	ISO 1798
Elongation at break (%), min.	200	200	300	ISO 1798
After humidity ageing in accordance with ISO 2440				
(3 h at 105 °C and 100 % relative humidity)				
Tensile strength (% of initial value), min.	80	80	80	ISO 1798
Elongation at break (% of initial value), min.	80	80	80	ISO 1798
After heat ageing in accordance with ISO 2440				
(16 h at 140 °C)				
Tensile strength (% of initial value), min.	80	80	80	ISO 1798
Elongation at break (% of initial value), min.	80	80	80	ISO 1798
Solvent swelling				
Temporary swelling (%), max.	80	15	15	Annex B of this document
Permanent swelling (%), max.	6,5	2,5	2,5	

Annex A
(normative)

Measurement of cell count

A.1 Scope

This annex describes a method for measuring the cell count of cellular material. It is a method of comparing the cell structure of foam materials.

Due to the variation in individual cell size even in uniform cell structures, it is more convenient to report the number of cells per unit length rather than the actual cell size.

A.2 Definition

For the purposes of this annex, the following definition applies.

A.2.1 **cell count**: the number of cells per 100 mm in the cellular material under specified conditions.

A.3 Apparatus

A 25 mm cloth counting glass shall be used.

A.4 Test pieces

Test pieces may consist of any sample of foam material which is free of skin and has a plane surface large enough to accommodate the counting glass.

Surfaces revealing a marked elongation of the cellular structure or striations shall not be measured unless specifically required.

A.5 Conditioning

Test pieces shall not be measured less than 72 h after manufacture. Prior to measurement, the test pieces shall be stored for at least 16 h in one of the following standard atmospheres:

— 23 °C + 2 °C, (50 ± 5) % relative humidity;

Or

— 27 °C + 2 °C, (65 ± 5) % relative humidity.

A.6 Procedure

After conditioning as described in A.5, lay the test piece on a flat, horizontal surface without strain and count the actual number of cells against the counting edge of the glass. Carry out three counts at a given position. Multiply the median value of the three counts by four to provide the count per 100 mm.

Where cell counts along and across the test piece are important, a set of counts shall be made in each direction.

NOTE The process of counting may be eased by lightly marking the surface of the foam with ink in the counting area, to indicate the uppermost layer of cells.

Annex B
(normative)

Measurement of solvent swelling

B.1 Scope

This annex describes a method for measuring the volume swelling of urethane foam after immersion in perchloroethylene under specified conditions. Other solvents may be used by agreement between the parties concerned.

B.2 Test piece

The test piece shall be a die-cut 100 mm diameter disc, the thickness of which shall be measured in accordance with ISO 1923:1981, 4.3.

B.3 Solvent

The solvent shall be of recognized analytical re- agent quality. When using perchloroethylene, fresh solvent shall be used for each test piece.

WARNING — Precautions governing the use of toxic solvents should be observed throughout the test.

B.4 Conditioning

Samples and test pieces shall be tested not less than 72 h after manufacture. They shall be conditioned immediately before testing for a period of not less than 16 h in one of the following standard atmospheres:

— 23 °C ± 2 °C, (50 ± 5) % relative humidity;

Or

— 27 °C ± 2 °C, (65 ± 5) % relative humidity.

B.5 Test temperature

Unless otherwise specified, the test shall be carried out at a temperature of 23 °C ± 2 °C.

B.6 Procedure

B.6.1 Measurement of temporary swelling

Place the test piece in a dish of dimensions approximately 300 mm × 200 mm containing perchloroethylene to a depth of 25 mm to 30 mm. After 5 min, submerge the test piece by covering it with a 200 mm square of wire gauze with a nominal aperture size of 250 µm (“legs” may be formed by bending a 12,5 mm strip on two opposite sides to 90°). After the foam has been in contact with the solvent for a total period of 30 min, remove the wire gauze and lift the test piece from the solvent by means of a fiat wire gauze scoop consisting of a 175 mm square of wire gauze with a nominal aperture size of 250 µm and fitted with a wire frame and handle. Secure the scoop at an angle of 45° and allow