

JIS

JAPANESE INDUSTRIAL STANDARD

Testing Method for
Polyethylene Foams

JIS K 6767 —1976

Translated and Published

by

Japanese Standards Association

Printed in Japan

Translation without guarantee
In the event of any doubt arising, the original
standard in Japanese is to be evidence

JAPANESE INDUSTRIAL STANDARD

J I S

Testing Method for Polyethylene Foams

K 6767-1976

(Reaffirmed: 1979)

1. Scope

This Japanese Industrial Standard specifies the testing methods for polyethylene foams. The polyethylene foams covered in this standard are defined as the foams which have been manufactured from the ethylene homopolymers, copolymers composed of ethylene as a principal component, or a mixture thereof.

Remark: The units and numerical values given in { } in this standard are in accordance with the International System of Units (SI), and are appended for reference.

2. Sampling Method of Test Pieces

The test pieces shall be sampled from a part which represents the properties of the sample.

3. General Conditions for Tests

3.1 Standard Condition of Testing Place The standard conditions of the testing place shall be category 3 standard temperature and humidity conditions ($20 \pm 2^\circ\text{C}$ in temperature, $65 \pm 5\%$ in relative humidity) specified in 5. of JIS Z 8703. However, when it is impossible to carry out the tests under these temperature and humidity conditions, the temperature and humidity at the time of tests shall be noted in the test report.

3.2 Conditioning of Sample and Test Pieces The sample and test pieces shall generally be placed under the standard conditions of 3.1 for 24 h or over before tests, and they shall be furnished to the tests only after they have reached an equilibrium condition of temperature and humidity.

3.3 Measuring Methods of Dimensions of Test Pieces

3.3.1 Measurements of Length and Width (or Diameter) Unless otherwise specified, the length and width shall be measured by using Type C Grade 1 rule (0.5 mm graduated) specified in JIS B 7516 or the equivalent to it in precision.

3.3.2 Measurement of Thickness Unless otherwise specified, a dial gauge with measuring-head area of 10 cm^2 , 2 gf/cm^2 (0.02 N/cm^2) in measuring-head pressure and the precision of 0.1 mm or finer shall be used for the measurement. For the measurement of thickness of 30 mm or more, Grade 2 vernier callipers [0.05 mm {50 μm } graduated] specified in JIS B 7507 may be used.

Applicable Standards and Reference Standard: See page 15.

2
K 6767-1976

3.4 Test Items, Number of Test Pieces and Expression of Test Results
The test items and number of test pieces to be used for each test items shall be as given in Table 1. The test results shall be obtained to the next beyond the figures given in Table 1. An average of measurements made for each test piece shall be obtained, and shall be rounded off by the rule provided in JIS Z 8401.

Table 1

Test item	Unit	No. of test pieces	No. of figures of test result	Clause
Apparent density	g/cm ³	3 pcs	2 significant figures	5.1
Tensile strength	kgf/cm ² (N/cm ²)	5 pcs	2 significant figures	5.2
Elongation	%	5 pcs	2 significant figures	5.2
Hardness in compression	kgf/cm ² (N/cm ²)	3 pcs	2 significant figures	5.3
Permanent set in compression	%	3 pcs	2 significant figures	5.4
Creep in compression	%	3 pcs	2 significant figures	5.5
Tearing strength	kgf/cm (N/cm)	5 pcs	2 significant figures	5.6
Dimensional change on heating	%	3 pcs	2 significant figures	5.7
Permanent set in repeated compression	%	9 pcs	2 significant figures	Reference I
Water absorption	g/cm ² , g/cm ³	3 pcs	2 significant figures	Reference II

4. Records

Generally there shall be noted the details of the sample (type, presence of skin, etc.), testing temperature and humidity, and other items which are particularly influential on the test results in the test records.

5. Test Methods

5.1 Apparent Density

5.1.1 Test Piece The upper or lower face of test piece shall be parallel with each other, and its shape shall be such that its volume can be calculated easily. Its volume shall be not less than 15 cm³.

5.1.2 Apparatus A dimension measuring instrument specified in 3.3 which is capable of measuring the dimensions and a balance which is capable of measuring mass to precision of $\pm 1\%$ shall be used.

5.1.3 Procedure Measure correctly the required dimensions by the method specified in 3.3, to obtain the volume. Weigh the mass to precision of $\pm 1\%$.

5.1.4 Calculation Calculate the apparent density $D(\text{g/cm}^3)$ by the following equation:

$$D = \frac{W}{V}$$

where W : mass of test piece (g)

V : volume of test piece (cm³)

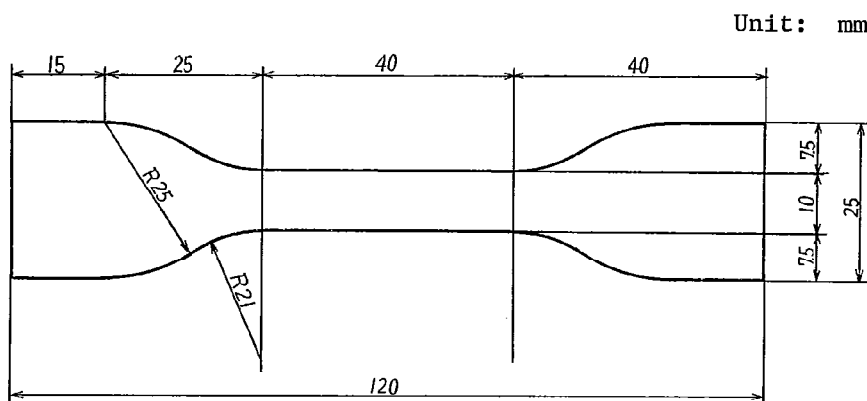
5.2 Tensile Strength and Elongation The test of the tensile strength and elongation shall follow any one method, A or B, of the following:

5.2.1 Method A

- (1) The upper and lower faces of the test piece shall be parallel. The sample 10 mm or less in thickness shall be punched, as it is in original thickness, to No. 1 type dumbbell shape (Fig. 1) specified in 3.2.1 of JIS K 6301, by using the punching dice specified in 3.2.2.

The sample of which thickness exceeds 10 mm shall be sliced to 10 mm, and then shall be punched out in the shape given above.

Fig. 1. Test Piece



In the case where the sample has anisotropic nature, test pieces shall be taken both in longitudinal and lateral directions.

- (2) Apparatus The tensile tester used shall have indicating device of the maximum load, and shall be such that the maximum load at the time of test falls within a range of 15 to 85 % of its capacity.

The tolerance on the relative travelling speed of the test piece grips shall be $\pm 5\%$, and the tolerance on the load scale shall be $\pm 2\%$.

- (3) Procedure Measure the thickness of the test piece at its approx. middle part in accordance with the method specified in 3.3. The inside dimension of the punching dice, as it is, shall be taken as the width of the test piece. Put marked lines correctly and clearly at a distance of 40 mm at the middle of the parallel part of the test piece by an appropriate means.

Attach the test piece correctly to the gripping device so that no distortion and other inconvenience can take place during the test, apply tension to the test piece at a tension speed of 500 mm/min, and, in the mean time, measure the distance between the marked lines at the maximum load and at the time of breakage.

4
K 6767-1976

- (4) Calculation Calculate the tensile strength T (kgf/cm²) {N/cm²} and elongation E (%) by the following equation:

Tensile strength,

$$T = \frac{F}{Wt}$$

where F : maximum load until test piece breaks (kgf) {N}

W : width of test piece (cm)

t : thickness of test piece (cm)

Elongation,

$$E = \frac{l_1 - l_0}{l_0} \times 100$$

where l_0 : distance between marked lines before test (mm)

l_1 : distance between marked lines at time of break (mm)

5.2.2 Method B

- (1) Test Piece The test piece shall be a rectangular parallel piped having parallel upper and lower faces and cut faces in periphery with 50 mm length, 50 mm width and 10 mm or more thickness.
- (2) Apparatus The testing apparatus of 5.2.1 (2) shall be used.
- (3) Procedure After measuring the thickness of the test piece at its middle, interpose the test piece between the jigs, align the centre line of the test piece in those of the jigs so that no distortion and other inconvenience cannot take place during the test, and adhere the both faces with the same adhesives ⁽¹⁾.

After the completion of the adhesion, pull it at a tension speed of 10 mm/min, and measure the maximum load and the elongation until it breaks.

Note ⁽¹⁾ The adhesive to be used at this time shall be greater in tensile strength of the adhesive layer than that of the foam to be tested, in order to prevent the test piece peeling off from the jigs.

The elongation of the adhesive layer shall be so small to an extent that it is negligible in the measurement of the elongation of the test piece.

The adhesive shall be such that does not degenerate various characteristics of the foam products.