भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDRADS

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भारतीय मानक मसौदा

वस्त्रादि — शीशा और शीशा-पॉलिएस्टर फाइबर वोवन टेप
भाग 2 परीक्षण विधियां

(IS 5352 *का चौथा पुनरीक्षण*)

(Draft *Indian Standard*)

TEXTILES — GLASS AND GLASS-POLYESTER FIBRE WOVEN TAPES
PART 2 METHODS OF TEST

(*Fourth Revision of* IS 5352)

ICS 59.060.30

Technical Textile for Clothtech Application,
Including Narrow Fabric and Braid Sectional Committee,
TXD 39

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FOREWORD
(*Formal clauses will be added later*)

This standard was first published in 1969, and subsequently revised in 1974 ,1988 and 1999. This standard has been revised again to incorporate the following major changes:

a) Title of the standard has been modified;
b) Packaging clause has been modified; and
c) BIS Certification Marking Clause has been updated.

This standard has been revised again and divided into two parts. Part 1 covers requirements for glass and glass-polyester fibre woven tapes and Part 2 covers the methods of test for the requirements included in Part 1.

In the preparation of this standard, assistance has been derived from IEC 1067-2 :1992 ‘Specification for glass and glass fibre woven tapes: Part 2 Methods of test’.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (second revision)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard (Part 2) specifies method for measuring thickness, number of warp ends and weft ends, width, residue on ignition, tensile strength, effect of heating in air and electrical conductivity for glass and glass polyester woven tapes.

2 REFERENCES

The following Indian Standard is necessary adjunct to this standard:

IS No.	*Title*
IS 196: 1966	Atmospheric conditions for testing

3 TESTS

3.1 Determination of Number of Warp Ends

The ends shall be counted across the full width of the tape under room conditions and calculate the number of ends per 10 mm of nominal width.

3.2 Determination of Number of Picks

The picks shall be counted over not less than 20 mm length of the tape under room conditions and the average value shall be calculated from not less than three individual tests made at three different places along the tape.

3.3 Determination of Thickness

3.3.1 *Test Apparatus*

Micrometer having accuracy of 0.01 mm.

3.3.2 *Test Pieces*

Take five rolls of tape selected at random.

3.3.3 *Conditioning*

Condition the tape rolls to moisture equilibrium in an atmosphere of relative humidity of 65 ± 2 percent with a temperature of 27 °C ± 2°C (*see also* IS 196) before testing.

3.3.4 *Test Procedure*

From each roll, measure the thickness of the tape between the selvedges and at the selvedges by means of micrometer. Take two readings for thickness between selvedges and at the selvedges (one on each side).

3.3.5 *Results*

For five rolls, there will be 10 measurements at the selvedges and 10 between the selvedges. The central values of the two sets of 10 measurements are the thickness of the tape at the selvedges and the thickness between the selvedges, respectively.

3.4 Determination of Width

3.4.1 *Test Pieces*

Take five rolls of tape selected at random.

3.4.2 *Test Conditions*

Perform the test under standard ambient conditions as in **3.3.3.**

3.4.3 *Procedure*

Take five rolls selected at random. Unroll the tape and lay it on a smooth surface. Apply no more tension to the tape than is necessary to make it lie straight and flat. Measure the width of the tape by means of a steel rule graduated in millimetres. Take two measurements at random on discrete pieces taken from each of the five selected rolls.

3.4.4 *Results*

Take the average of the two measurements on each roll as the result for the roll. Take the central value of the-five individual results as the width of the tape.

3.5 Determination of Residue on Ignition (Glass Content)

3.5.1 *Precaution*

Observe the usual precautions to prevent loss of specimen mass.

3.5.2 *Test Piece*

Take a piece of tape having mass of not less than 5 g.

3.5.3 *Procedure*

Dry the test piece in an oven at 80°C ± 2°C for 1h. Allow the test piece to cool in a desiccator to room temperature, remove it and immediately determine the mass to within 1 mg. Transfer the test piece to a suitable crucible and place it in a muffle furnace at a temperature of 625°C ± 20°C for 2h to remove the

organic matter. Remove the crucible from the furnace and transfer it immediately to a desiccator. When it has cooled, remove the test piece from the crucible and immediately determine the mass to within 1 mg.

3.5.4 *Results*

Calculate the residue on ignition (glass content) of the tape as a percentage of the mass of the dried specimen.

3.6 Determination of Tensile Strength

3.6.1 *Test Pieces*

Take five test pieces of the sufficient length to allow an unstretched length of 200 mm between the jaws of the tensile testing machine.

3.6.2 *Apparatus*

A machine having a constant rate of traverse shall be used.

3.6.3 *Procedure*

a) *Preparation **of** the ends of the test piece*

Preparation of the ends of the test piece is essential to prevent them from being damaged by the jaws of the testing machine. The following method of preparation has been found to be satisfactory. Lay the test piece on stiff paper; impregnate and coat the ends of the tape and attach them to the paper with a suitable cement, leaving 200 mm uncoated in the middle of the test piece. After the cement has dried, fix the test piece in the jaws of the machine and cut across the middle of the paper.

The following materials have been found satisfactory for impregnating the ends of the test pieces of tape:

a) natural rubber or neoprene solution;

b) polymethyl methacrylate in diethyl ketone, methylethyl ketone or xylene

b) *Application of load*

Apply the load so that the time from the commencement of application of the load to the moment at which the specified minimum load is reached is 30 ± 5 s and continue until the test piece breaks. If the test piece breaks unevenly, or in or at a jaw of the testing machine, discard the result and make a further test using another test piece.

The maximum load shall be recorded.

NOTE - In case, the tape meets the tensile strength requirement without end preparation of samples, end preparation can be avoided as it is time consuming.

3.6.4 *Result*

Express the tensile strength as the central value of the five maximum loads in Newtons per 10 mm of width.

3.7 Determination of the Effect of Heating in Air

3.7.1 *Types 1 and 2*

Specimen of tape taken from the same rolls as those used for tensile strength test shall be heated in air in a loosely coiled state to allow air circulation between them for 24 h at 250 ± 10°C and then subjected to a temperature of between 15°C and 40°C for 1 h. The tensile strength shall then be measured in accordance with **3.6**.

The effect of heating in air shall be expressed as a percentage, that is :

$$\frac{Value\ obtained\ from\ this\ test}{Value\ obtained\ for\ tensile\ strength} \times 100$$

NOTE - The reduction in the breaking strength of the tape is caused mainly by loss of textile size due to the heating, which reduces the lubricating effect of the size, and not to any major change in the glass itself.

3.7.2 *Type* 3

Specimen of the tape taken from the same five rolls as those used for the determination of width shall be heated in air in a loosely coiled state to allow circulation between them for 24 h at 150 ± 5°C and then subjected to a temperature between 15 to 40°C for 1 h. The width shall be then measured in accordance with **3.4**.

The effect of heating in air shall be expressed as the percentage loss in width, that is :

$$100-\left[\frac{Value\ obtained\ from\ this\ test}{Value\ obtained\ from\ determination\ of\ with}\right]X100$$

3.8 Determination of Electric Conductivity of Aqueous Extract

3.8.1 *Test Apparatus*

a) A conductivity cell with known cell constant K.

b) A measuring instrument capable of measuring conductance or admittance to a minimum reading of 1 μS with an accuracy of 5 percent in the frequency range 50 to 3000 Hz. Alternatively, the resistance may be measured with the same accuracy.

c) 250 ml of conical flasks in acid and alkali resistant glass.

3.8.2 *Procedure*

Take a test piece weighing approximately 7g.

The determination is to be made on the material as received. One measurement shall be made on each of three extractions. First a blank test shall be carried out on water which has been boiled for 60 ± 5 m in the flask to be used. If the conductivity of that water is not more than 200 μs/m, the flask may be used. If the conductivity is more than this value, then a fresh portion of water shall be boiled in the flask. If the conductivity of the second test exceed 200 μ/m, another flask shall be used.

The test on the tape shall then be carried out as follows:

Cut the test piece into smaller pieces approximately 20 mm ± 3 mm. Weigh 5 g into a 250 ml glass flask. And add l00 ml off distilled water having a conductivity of not more than 200 us/m. The water shall be boiled gently for 60 ± 5 min and then cooled in the flask to room temperature, it is necessary to take precautions against the absorption of carbon dioxide from the air.

The extract is then decanted into the measuring vessel in order to measure the conductivity immediately. The measuring vessel shall be rinsed twice with the extract.
The measurement of the conductivity shall be made at 23 ± 0.5°C.

3.8.3 *Results*

Calculate the conductivity of extract solution as follows:

$$y = K (G_1 - G_2)$$

where,

y = conductivity of extract solution, expressed in micro-siemens per metre (μS/m);

K = cell constant, expressed in m^2;

G_1= conductance of extract solution, expressed in micro-siemens; and

G_2 = conductance of blank, expressed in micro-siemens.

Report the central value as the result in mS/m (millisiemens/metre).