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METHOD OF TEST FOR
TENSILE STRENGTH OF ASBESTOS FIBRE

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

METHOD OF TEST FOR TENSILE STRENGTH OF ASBESTOS FIBRE

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Indian Standard

METHOD OF TEST FOR TENSILE STRENGTH OF ASBESTOS FIBRE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 22 December 1969, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A series of standards on testing procedures of asbestos fibre are being formulated so as to provide standard methods for obtaining physical and chemical properties of asbestos fibre which is used for manufacturing various asbestos cement (AC) products like AC sheets, AC pipes, etc. These testing procedures will be useful both for mine owners and the manufacturers of AC products provided they have the facilities to make these tests with reasonable accuracy and the personnel with the required degree of laboratory experience.

0.2.1 This method of test is a qualitative test useful for assessing the suitability of asbestos fibre in the manufacture of asbestos cement products. The applicability of this test to chrysotile asbestos fibres is well known and its applicability to amphibole asbestos fibres available in India is under investigation.

0.3 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by basing the standard on 'Testing procedure for chrysotile asbestos fibre' Second Edition, jointly published by American Textile Institute, Mineral Fibre Products Bureau and Quebec Asbestos Mining Association in 1966.

0.4 This standard is one of a series of Indian Standards on testing of asbestos fibre published so far. Other standards published so far in the series are:

- IS: 3632-1969 Method of test for determination of wet volume of asbestos fibre
- IS: 4844-1968 Method of sampling and preparation of asbestos fibre for laboratory test purposes
- IS: 5328-1969 Method of test for chemical composition of asbestos fibre

0.5 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS: 2-1960*.

1. SCOPE

1.1 This standard covers the method of test for determining the tensile strength of asbestos fibre with minimum fibre length of 10 mm.

2. APPARATUS

2.0 The apparatus shall consist essentially of the parts described in 2.1 to 2.6.

2.1 **Tensile Tester**—shall be of vertical pendulum type with capacity of 5 kg and shall have constant rate of traverse of 300 mm per minute.

2.2 **Balance**—shall be of 10 mg capacity and sensitive to 0.01 mg.

2.3 **Mounting Cards**—shall be constructed of cardboard approximately 0.25 mm thick and shall conform to the design shown in Fig. 1.

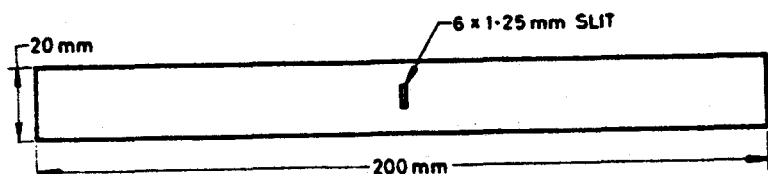


FIG. 1 CARDBOARD MOUNT FOR TENSILE STRENGTH

2.4 **Cutter**—shall consist of two razor blades mounted 10.0 ± 0.2 mm apart.

2.5 **Tweezers**

2.6 **Dissecting Needle**

3. SAMPLING

3.1 The sampling and preparation of sample shall be carried out in accordance with IS: 4844-1968†.

4. PREPARATION OF TEST SPECIMEN

4.1 Forty samples shall be used for the test.

4.2 The weight of the sample used for this test shall be approximately 100 g.

4.3 The sample shall be divided into 8 equal parts and 5 fibre bundles shall be removed from each portion.

*Rules for rounding off numerical values (revised).

†Method of sampling and preparation of asbestos fibre for laboratory test purposes.

4.4 In the evaluation of crudes preferably 10 to 20 pieces of crudes shall be selected and equal number of fibre bundles shall be removed from each so that the total of 40 bundles are obtained.

4.5 The fibre bundles shall be continuous and free of faults, as determined by visual inspection and shall have a length of at least 15 mm and weight at least 1 mg.

4.6 Each of the 40 fibre bundles shall be cut to a length of 10 ± 0.2 mm and shall be dissected until the weight is 0.50 ± 0.05 mg. The length of each specimen shall be checked with a scale and the weight of each specimen shall be recorded to the nearest 0.01 mg.

4.7 Each specimen shall be placed on the mounting card so that it lies across the centre of the slit perpendicular to the long dimension and shall be attached at the ends with adhesive cement up to 1.25 mm. The adhesive cement shall be allowed to cure for a minimum period of 16 hours at room conditions not in excess of 27°C.

4.7.1 Following materials shall be used in the preparation of the adhesive cement:

- a) *Resin*—Solvent free ethoxylene (epoxy) resin.
- b) *Hardener*—A suitable aliphatic polyamine hardener with sp gr of 0.97 to 0.99 at 20°C.
- c) *Clay (China Clay)*—It shall have the following characteristics:
 - i) Average particle size of 5 microns and residue on 45-micron IS Sieve not exceeding 0.15 percent,
 - ii) Moisture content not exceeding 1.0 percent, and
 - iii) Iron (Fe_2O_3) content not exceeding 0.3 percent.

4.7.1.1 To prepare the adhesive cement, three parts of clay [see 4.7.1 (c)] and two parts of resin [see 4.7.1 (a)] shall be mixed well under vacuum to remove moisture and air bubble. One part hardener [see 4.7.1 (b)] and twenty five parts of the above mixture shall be mixed well with further quantity of china clay to form a homogeneous paste of workable consistency. Heating of resin for accelerated curing shall be avoided because heating causes the fibre specimen to become brittle.

5. PROCEDURE

5.1 Each mounted specimen shall be placed between the grips of the tensile tester and the mounting card shall then be cut through the slit on both sides.

5.2 The test shall be conducted at relative humidity of 65 percent and room temperature $27^\circ \pm 2^\circ\text{C}$.

5.3 The tensile tester shall then be set in operation. The breaking load shall be recorded to the nearest 50 g.

6. CALCULATION

6.1 The tensile strength of each of the 40 specimen shall be calculated using the following formula:

$$S = \frac{L}{W}$$

where

S = tensile strength in 'g' per denier,
 L = breaking load of specimen in g, and
 W = denier of the specimen.

NOTE — Denier is weight in grams of 9 000 metres of specimen.

7. REPORT OF THE TEST RESULTS

7.1 The average of the 40 specimens shall be taken for the purpose of determining the test results.

7.2 The value of test results shall be reported to the nearest 0.1 g per denier.

7.3 The following additional information shall be reported along with the test results:

- The description of the way in which the specimen was prepared,
- Identification of the sample including name and location, and
- Data when the sample was taken and trade name, if any.

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	killogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Conversion
Force	newton	N	1 N = 1 kg. 1 m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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