भारतीय मानक

कांच रेशा आधारित बिटुमैन नमदा – विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

GLASS FIBRE BASE BITUMEN FELTS — SPECIFICATION

(First Revision)

UDC 691·165 : 666·198·211

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

July 1994

Price Group 4

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water-Proofing and Damp-Proofing Sectional Committee had been approved by Civil Engineering Division Council.

Glass fibre bitumen felts are suitable for use for water-proofing and damp-proofing in buildings and other situations where penetration of moisture is to be stopped. This standard specifies the requirements for glass fibre base bitumen felts. It is an adjunct to IS 1322 : 1993 Specification for bitumen felts for water-proofing and damp-proofing (*fourth revision*).

This is the first revision of the standard. In this standard testing methods to ascertain the physical properties of glass fibre tissue have been added. All references have also been updated to take care of latest revision of the referred standards.

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.

The committee responsible for the formulation of this standard is given in Annex A.

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 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GLASS FIBRE BASE BITUMEN FELTS — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the requirement for self finished glass fibre base bitumen felts used for water-proofing and damp-proofing.

2 REFERENCES

2.1 The Indian Standards listed in Annex B are necessary adjuncts to this standard.

3 CLASSIFICATION

3.1 Glass fibre base felts shall comprise the following grades:

a) Grade 1 — Talcum, mica or sand surface glass fibre base bitumen felts for water-proofing.

b) Grade 2 — Talcum, mica or sand surfaced glass fibre base bitumen felts for damp-proofing.

4 MATERIALS

4.1 Base Membrane

The fibre glass tissue shall be thin flexible uniformly bonded mat, composed of chemically resistant borosilicate staple glass fibres, distributed in a random open porous structure, bonded together with a thermosetting resin (phenolic type). The physical properties of the membrane shall be as given in Table 1.

Table 1 Requirements of Glass Fibre Tissue

Sl No.	Characteristics	Requirements	Method of Test, Reference
(1)	(2)	(3)	(4)
1	Weight per unit area, *Min*	40 g per/m²	C-1
2	Nominal thickness	0·50 mm ± 0·1 mm	C-2
3	Breaking strength, *Min*	45 kgf per 150 mm	C-3
4	Porosity	0·6 mm to 1·9 mm	C-4
5	Temperature resistance	Shall be unaffected under load in hot bitumen at 280°C for one minute	C-4

4.2 Bitumen

It shall have a softening point of not less than 105°C when tested in accordance with IS 1205 : 1978 and penetration of not less than 7 at 25°C when tested in accordance with IS 1203 : 1978. The constant shall consist of finely divided inert filler. The proportion of mineral inert filler will depend upon the type and the weight of felt manufactured; but shall not exceed 40 per-cent by weight of the coating material.

4.3 Mineral Filler

It shall consist of finely divided suitable inert mineral matter which is insoluble in water and passes through 75 microns IS Sieve [*see* IS 460 (Part 1) : 1985].

4.4 Mineral Powder for Surfacing

4.4.1 Mineral powder shall be powdered mineral matter such as talc or mica passing through 600 microns IS Sieve [*see* IS 460 (Part 1) : 1985]. Sand passing through 250 microns IS Sieve [*see* IS 460 (Part 1) : 1985] may also be used.

4.4.2 *Weight*

The weight of the surfacing material shall be as follows:

a) Mica 1·2 to 2·0 kg/10 m²

b) Talc powder 1·5 to 2·25 kg/10 m²

c) Sand 3 to 5 kg/10 m²

5 MANUFACTURE

The bitumen glass fibre base felt consists of a continuous mat of resin bonded glass fibres treated with bitumen. The coatant shall be uniformly applied. The resultant coated felt shall be given superficial application of mineral powder to prevent the layer of the coated felt sticking together in the roll. This also gives useful protection against the affects of the sun and when laid on roofs does not need further treatment.

6 DIMENSIONS AND WEIGHT

6.1 Dimensions

Unless otherwise specified, glass fibre base felt shall be supplied in widths of one metre and generally in lengths of 1 m, 10 m and 20 m.

6.2 Weight

The weight of the ingredients used in the manufacture of glass fibre felts for 10 m² shall not be less than those specified in Table 2.

Table 2 Minimum Weight of Glass Fibre Base Bitumen Felts for 10 m²

Sl No.	Type of Felt	Untreated Base	Coatant	Total Weight in Dry Condition Including Surfacing Materials
(1)	(2)	(3)	(4)	(5)
		kg	kg	kg
i)	Grade 1	0·4	15·3	18·0
ii)	Grade 2	0·4	22·0	25·0

6.2.1 *Method*

For determining the weight, select at random the number of glass fibre felt rolls as indicated in col 2 of Table 4. The randomness of selection is ensured by following the procedure as specified in IS 4905 : 1968. The average weights of the rolls selected above shall then be taken to represent the weight of the rolls in the consignment and the weight for 10 m² computed from this weight.

7 OTHER REQUIREMENTS OF GLASS FIBRE FELTS

7.1 Bitumen felts when tested in accordance with the appropriate tests shall conform to the requirements given in Table 3.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Sampling

8.1.1 *Lot*

All the rolls of the same type and grade and from the same batch of manufacture, in one consignment shall constitute a lot.

8.1.1.1 The conformity of the lot to the requirements of this standard shall be determined on the basis of the inspection and tests carried out on the samples selected from the lot.

8.1.2 The number of rolls to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 of Table 4.

8.1.2.1 These rolls shall be selected at random from the lot, and in order to ensure randomness of selection, procedures given in IS 4905 : 1968 may be followed.

Table 4 Sample Size and Criterion for Conformity

[(*Clauses* 6.2.1, 8.1.2, 8.1.3.2, and 8.1.4 (a)]

No. of the Roll in the Lot	No. of Rolls to be Selected in the Sample	Permissible No. of Defective Rolls	Sub-Sample Size No. of Rolls to be Selected
(1)	(2)	(3)	(4)
Up to 100	5	0	2
101 to 150	8	0	3
151 to 300	13	0	4
301 to 500	20	1	5
501 to 1 000	32	2	6
1 001 to 3 000	50	3	8
3 001 and above	80	5	10

8.1.3 *Test Samples and Number of Tests*

8.1.3.1 All the rolls of selection in **8.1.2** shall be inspected for width, length and visible external defects.

8.1.3.2 The number of rolls to be tested for breaking strength, pliability, storage sticking, heat resistance, water absorption, and pressure

Table 3 Requirements of Glass Fibre Felts

(*Clause* 7.1)

Sl No.	Properties	Requirements	Reference to
i)	Breaking strength, *Min* kg	a) Warp 50 b) Weft 30	IS 13826 (Part 1) : 1993
ii)	Pliability test	a) Roll shall not show cracks on unrolling b) Consider any surface rupture exceeding 5 mm in length as failure	IS 13826 (Part 2) : 1993
iii)	Storage sticking	The test pieces shall be examined after cooling. After release of load, the layers of felt be capable of being separated without damaging	IS 13826 (Part 3) : 1993
iv)	Pressure head	The test pieces shall show no sign of leakage	IS 13826 (Part 4) : 1993
v)	Heat resistance	The test pieces shall show no sign of melting of bitumen compound	IS 13826 (Part 5) : 1993
vi)	Water absorption	2 percent	IS 13826 (Part 6) : 1993

head, shall be in accordance with col 4 of Table 4. These rolls shall be taken at random from those inspected under **8.1.3.1** and found satisfactory for dimensions. From each of these rolls, one test sample of 3 m long and the full width of the felt shall be cut out for preparing test specimens. Test samples shall not be taken from damaged portion of the roll, if any. The required number of test specimens shall be taken from each of the test sample and subjected to the corresponding tests.

8.1.4 *Criteria for Conformity*

The lot shall be considered to be in conformity with the requirements of the standard if the following conditions are satisfied:

a) The number of rolls found defective with respect to any characteristic mentioned in **8.1.3.1** does not exceed the corresponding number given in col 3 of Table 4.

b) From the observed values of the breakngi strength, the average $\bar{x}$ and the range R are calculated for each direction (that is, warpway and weftway) separately, and the value of the expression $\bar{x} - 0{\cdot}6\ R$ is found to be greater than or equal to the applicable specified value.

NOTES

1 Average $\bar{x}$ is the value obtained by dividing the sum of the observed values by the number of observed values.

2 Range R is the difference between the maximum and minimum in a set of observed values.

c) All the sample rolls tested for water absorption shall satisfy the conditions of water absorption given in Table 3 individually.

d) For all the other characteristics mentioned in **8.1.3.2** (except breaking strength and water absorption), all the test pieces shall satisfy all the requirements of the characteristic individually.

9 PACKING

Unless otherwise specified, glass fibre base bitumen felts shall be securely packed in rolls. The bitumen felts need not be wound on core but shall be securely wrapped in a craft paper of the same width as the fabric. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner that will prevent it from opening out. The ends of the roll need not be covered.

10 MARKING

10.1 Each package shall be legibly and indelibly marked with the following:

a) Identification of the source of manufacture;

b) The country of maufacture;

c) Type and grade of the glass fibre base bitumen felts;

d) Length, width and weight of the roll; and

e) Batch number in code and date of manufacture.

10.2 BIS Certification Marking

Each package may also be marked with the Standard Mark.

10.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Water-Proofing and Damp-Proofing Sectional Committee, CED 41

Chairman

PROF M. S. SHETTY
No. 4, Sapan Baug, Near Empress Garden, Poona-411001

Members	*Representing*
CAPT ASHOK SHASTRY SHRI S. K. BANERJEE (*Alternate*)	Osnar Chemical Pvt Ltd, Bombay
SHRI T. CHAUDHURY SHRI B. MANDAL (*Alternate*)	National Test House (ER), Calcutta
DIRECTOR (DESIGN)	National Buildings Organization, New Delhi
SHRI D. C. GOEL	Central Road Research Institute, New Delhi
SHRI A. K. GUPTA SHRI D. MOUDGIL (*Alternate*)	Engineers India Ltd, New Delhi
SHRI A. K. GUPTA SHRI K. RAJGOPALAN (*Alternate*)	Metro Railway, Calcutta
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BRIG V. K. KANITKAR SHRI C. S. S. RAO (*Alternate*)	Engineer-in-Chief's Branch, Army Headquarters, New Delhi
SHRI M. H. KHATRI SHRI A. BOSE (*Alternate*)	Overseas Water-Proofing Corporation Ltd, Bombay
SHRI Y. P. KAPOOR SHRI V. NATARAJAN (*Alternate*)	Fosroc India Ltd, Bangalore
SHRI H. C. MATAI	Building Materials & Technology Promotion Council, New Delhi
SHRI M. M. MATHAI	Cempire Corporation, Madras
SHRI R. D. NAYAK SHRI P. C. SRIVASTAVA (*Alternate*)	Bharat Petroleum Corporation Ltd, Bombay
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SHRI RAVI WIG SHRI K. K. MADHOK (*Alternate*)	MES Builders Association of India, New Delhi
SHRI T. K. ROY SHRI B. B. BANERJEE (*Alternate*)	STP Ltd, Calcutta
SHRI SAMIR SURLAKER SHRI JAYANT DEOGAONKAR (*Alternate*)	MC-Bauchemic (India) Ltd, Bombay
SHRI R. SARABESWAR	Integrated Water-Proofing Ltd, Madras
SR DEPUTY CHIEF ENGINEER SUPERINTENDING ENGINEER (MADRAS CIRCLE) (*Alternate*)	Public Works Department, Government of Tamil Nadu
SHRI A. SHARIFF	FGP Ltd, Bombay
SHRI J. S. SHARMA SHRI R. S. RAWAT (*Alternate*)	Central Building Research Institute (CSIR), Roorkee
SHRI SRAMAL SENGUPTA SHRI U. R. P. SINHA (*Alternate*)	Projects and Development India Ltd, Dhanbad
SHRI J. VENKATARAMAN, Director (Civ Engg)	Director General, BIS (*Ex-officio Member*)

Secretary

SHRI J. K. PRASAD
Joint Director (Civ Engg), BIS

ANNEX B

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
460 (Part 1) : 1985	Specification for test sieves : Part 1 Wire cloth test sieve (*third revision*)	13826 (Part 3) : 1993	Methods of tests for bitumen based felt : Part 3 Storage sticking test
1203 : 1978	Methods for testing tar and bitumen : Determination of penetration	13826 (Part 4) : 1993	Methods of tests for bitumen based felt : Part 4 Pressure head test
1205 : 1978	Methods for testing tar and bitumen : Determination of softening point	13826 (Part 5) : 1993	Methods of tests for bitumen based felt : Part 5 Heat resistance test
4905 : 1968	Methods for random sampling		
13826 (Part 1) : 1993	Methods of tests for bitumen based felt : Part 1 Breaking strength test	13826 (Part 6) : 1993	Methods of tests for bitumen based felt : Part 6 Water absorption test
13826 (Part 2) : 1993	Methods of tests for bitumen based felt : Part 2 Pliability test	13826 (Part 7) : 1993	Methods of tests for bitumen based felt : Part 7 Determination of binder content

ANNEX C

(*Clause* 4.1 and *Table* 1)

METHODS OF TEST FOR TESTING VARIOUS PROPERTIES OF GLASS FIBRE TISSUE

C-1 METHODS OF TEST FOR TESTING DENSITY OF GLASS FIBRE TISSUE

C-1.1 Test Piece

Cut out approximately about 2 m from the roll. Measure and cut a sample exactly 100 cm × 100 cm.

C-1.2 Procedure

Weigh the sample in a balance having an accuracy of 0·5 g and record the results.

NOTE — For easier weighing, the piece of 100 cm × 100 cm may be cut in smaller sizes and weighed together.

C-2 METHOD OF TEST FOR DETERMINATION OF TISSUE THICKNESS

C-2.1 Principles

The thickness of glass fibre tissue is determined by placing sample on a glass plate, and a metallic cylinder of foot and anvil area both 6·45 cm^2 exerting a pressure of 35 g/cm^2 and measuring the deflection in dial gauge having a least count of 0·01 mm (*see* Fig. 1).

C-2.2 Equipment

a) Stand with glass plate;

b) Lifting mechanism;

c) Metallic cylinder, weighing 227 g; and

d) Dial gauge with clamp.

C-2.3 Method

C-2.3.1 Place the cylinder on glass plate and set the gauge on the cylinder to read zero.

C-2.3.2 Cut approximately 100 cm × 100 cm across the width.

C-2.3.3 Press the clamp to lift the metallic cylinder to allow for insertion of the sample and gently lower the cylinder to rest on the sample.

C-2.3.4 Measure the thickness at 12 equally spaced areas through a dial gauge having a least count of 0·01 mm. The loading given shall be 35 g/cm^2.

C-2.3.5 The average of 12 readings are taken as the mean thickness and recorded to the accuracy of 0·01 mm.

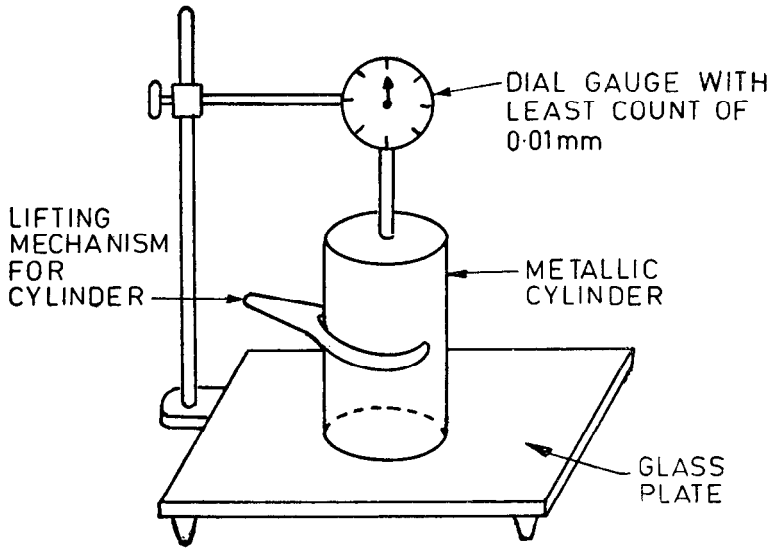

FIG. 1 ARRANGEMENT FOR MEASUREMENT OF THICKNESS

C-2.4 Calculation

C-2.4.1 Average the total number of readings and record to an accuracy of 0·01 mm.

C-3 METHOD OF TEST FOR TESTING TENSILE STRENGTH OF GLASS FIBRE TISSUE

C-3.1 Breaking Strength

The breaking strength is measured along the length of the reinforcement.

C-3.2 Test Pieces

Using a 50·0 cm × 10·0 cm template, cut size samples of tissue with reinforcement along the longer side. Number them 1 to 6 (*see* Fig. 2).

C-3.3 Procedure

C-3.3.1 For each of the samples cut two lengths of adhesive tape measuring approximately 30 cm × 5 cm.

Take sample No. 1, wrap and stick each length of adhesive tape over the 10 cm wide ends. This is a precaution taken for the testing of a membrane material like RP tissue. The tape enables better gripping of the sample in the tensile machine gripping jaws.

C-3.3.2 Apply load along the length of the sample by moving the lower jaws of the testing machine away from the upper jaws at about 250 mm/minutes.

C-3.3.3 Note the breaking load as *P*1.

C-3.3.4 Repeat (**C-3.3.1**) to (**C-3.3.3**) for the other 5 samples, and record it as *P*2, *P*3, *P*4, *P*5 and *P*6.

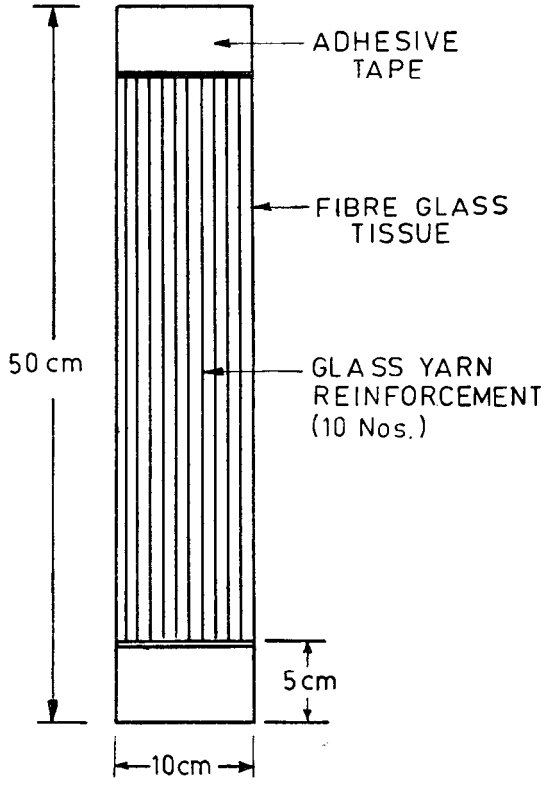

FIG. 2 TEST SAMPLE FOR TENSILE STRENGTH

C-3.3.5 Average breaking load shall be calculated as follows:

$$P = \frac{P1 + P2 + P3 + P4 + P5 + P6}{6}$$

C-4 METHOD OF TEST FOR TESTING TEAR STRENGTH OF GLASS FIBRE TISSUE

C-4.1 Apparatus

Elmendorf type tearing tester as shown in Fig. 3. The machine is provided with two clamps; one fixed and the other movable which is carried on a sector shaped pendulum, suspended from a column by means of a frictionless bearing located near the apex of the sector. A means is provided to hold the pendulum in the raised position and a lever to release the pendulum instantaneously. On releasing the pendulum, the centre tongue of the specimen is subjected to the load of pendulum recorded through a spring loaded friction pointer on the circumferential scale marked on the pendulum.

C-4.2 Test Procedure

C-4.2.1 With a template, cut 10 specimens of size 53 mm long and 63·0 + 0·15 mm wide, taking all the plies to be torn together from a single sheet.

C-4.2.2 Raise the pendulum sector to its initial position and set the point against its stop. Centre the specimen in the clamps with the bottom edge carefully set against the stops. Make the initial slit. Depress the pendulum stop quickly as far as it will go to release the pendulum. Hold down the stop until after the tear is completed and catch the pendulum on the return swing without disturbing the position of the pointer.

C-4.2.3 Make only one test per specimen, each specimen consisting same number of plies. Record the scale readings to the nearest half division, also record the number of plies used in the specimen.

C-4.2.4 Calculate the average tearing force in gram-force to tear a single ply as follows:

If the standard 1 600 kgf instrument with 0-100 scale is used.

$$\text{Average tearing force } (GF) = \frac{16 \times \text{Av. scale reading}}{\text{Number of plies}}$$

C-4.2.5 Report results with tear parallel with the machine direction and tear perpendicular to machine direction.

C-5 METHOD OF TEST FOR TESTING POROSITY OF GLASS FIBRE TISSUE

C-5.1 Test Piece

Five specimens, in the size of the 25 cm × 25 cm representative of the glass fibre tissue mat shall be taken.

C-5.2 Apparatus

The apparatus shall consist essentially of a suction fan for drawing air through a known area of glass fibre tissue, a circular orifice over which the tissue to be tested can be clamped. A means of measuring the pressure drop across the mat, and means of measuring the volume of air flowing through the tissue.

The clamp shall effectively eliminate edge leakage.

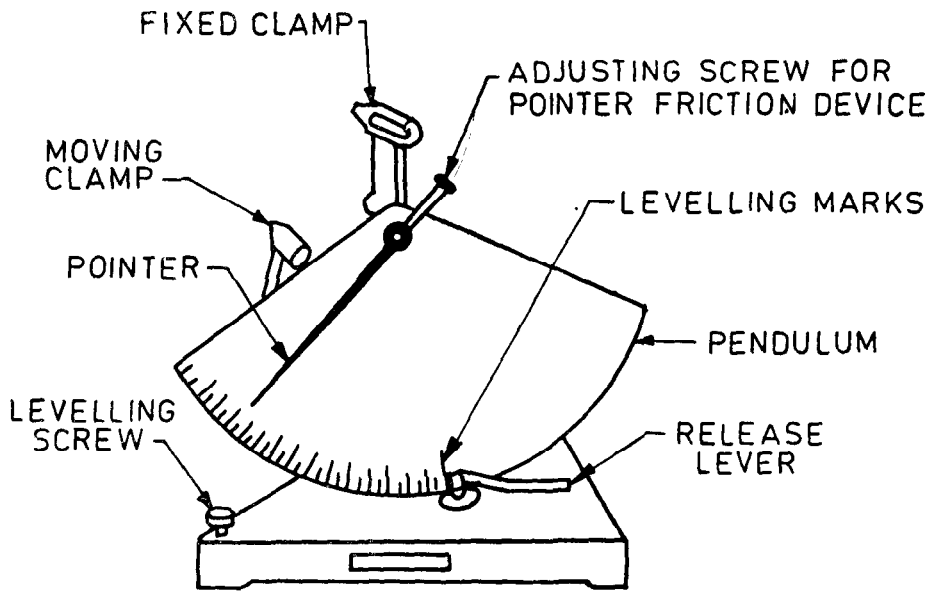

FIG. 3 GENERAL VIEW OF ELMENDORF TYPE TEARING STRENGTH TESTER

C-5.3 Procedure

Mount the test specimen between the clamp and the circular orifice with sufficient tension to draw the unsaturated glass mat smooth. It shall not be distorted in its own plane. Draw conditioned air through the known area of the mat and through the calibrated flow meter at the rate of 1 m/sec and record the pressure drop across the tissue in mm of water. Report the average of the test results for five test specimens.

C-6 METHOD OF TEST FOR TESTING TEMPERATURE RESISTANCE OF GLASS FIBRE TISSUE

C-6.1 Test Pieces

Three test specimens of dimension 300 mm × 75 mm with reinforcement along the longer sides shall be taken.

C-6.2 Apparatus

C-6.2.1 The apparatus required consists of a dish *A* and a loading frame *B*. This carries clamps *C* and *D* attached to a cord which over pulley *P*, carries a mass *M* (200 g). Two cross bars *E* of stainless steel of 10 mm outside diameter are so positioned that they are 10 mm above base levels (*see* Fig. 4).

C-6.3 Procedure

C-6.3.1 Fill the dish *A* with hot bitumen approx temperature 280°C to a level of 20 mm. Clamp 5 mm of one end of the specimen in clamp *C* and the other end in clamp *D*. Attach mass into the free end of cord. Ensure that specimen lies at right angle to cross bars *E*. Place the frame *B* in dish *A*. Observe it for one minute for result.

C-7 METHOD OF TEST FOR TESTING PLIABILITY OF GLASS FIBRE TISSUE

C-7.1 Test Piece

5 pieces of size 25 mm × 203 mm with a long dimension parallel to the length of roll.

C-7.2 Procedure

Immerse the test piece in water at (23°C + 1°C) for 10 minutes. Remove each specimen individually and bend over a 6·4 mm rod/tube through a 90° arc. Examine each specimen for cracks and breaks.

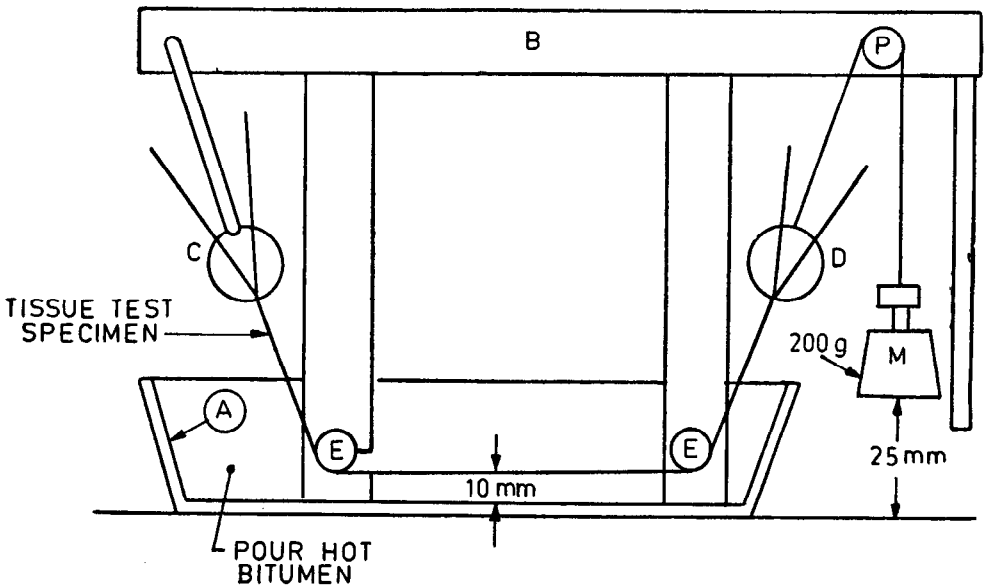

FIG. 4 TEMPERATURE RESISTANCE TESTING ASSEMBLY

Bureau of Indian Standards

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Revision of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'.

This Indian Standard has been developed from Doc : No. CED 41 (5007).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at Printwell Printers, Aligarh, India