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मानक

IS 14695 (1999): Glass Fibre Base Coal Tar Pitch Outerwrap - [CED 41: Waterproofing and Damp-Proofing]



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### Indian Standard

## GLASS FIBRE BASE COAL TAR PITCH OUTERWRAP — SPECIFICATION

ICS 23.040.01, 75.140

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

#### FOREWORD

This Indian Standard 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 base coal tar pitch outerwraps are extensively used for corrosion protection of buried mild steel pipelines. These are generally used for protecting the inner wraps from damage or in wet conditions.

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 composition of the technical committee responsible for the formulation of this standard is given at Annex B.

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 COAL TAR PITCH OUTERWRAP — SPECIFICATION

#### **1 SCOPE**

This standard covers the requirement for glass fibre base coal tar pitch outerwrap used for corrosion protection of buried mild steel pipelines.

#### **2 NORMATIVE REFERENCES**

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| IS No.           | Title                                 |  |  |
|------------------|---------------------------------------|--|--|
| 460 (Part 1) :   | Test sieves: Part 1 Wire cloth test   |  |  |
| 1985             | sieves (third revision)               |  |  |
| 1203 : 1978      | Methods of testing tar and bitumi-    |  |  |
|                  | nous materials - Determination of     |  |  |
|                  | penetration (first revision)          |  |  |
| 1205 : 1978      | Methods of testing tar and bitumi-    |  |  |
|                  | nous materials Determination of       |  |  |
|                  | softening point (first revision)      |  |  |
| 1217:1978        | Methods of testing tar and bitumi-    |  |  |
|                  | nous materials - Determination of     |  |  |
|                  | mineral matter (ASH) (first revision) |  |  |
| 4905:1968        | Methods for random sampling           |  |  |
| 13826 (Part 1) : | Bitumen based felt Methods of         |  |  |
| 1993             | test: Part 1 Breaking strength test   |  |  |
| 13826 (Part 2) : | Bituminous based felt — Methods       |  |  |
| 1993             | of test: Part 2 Pliability test       |  |  |

#### **3 MATERIALS**

#### 3.1 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.

#### 3.2 Coal Tar Pitch

It shall have a softening point 80°C to 90°C when tested in accordance with IS 1205, penetration of 20 to 30 at 25°C when tested in accordance with IS 1203 and the ash on incineration at 800°C shall not exceed 15 percent by mass when tested in accordance with IS 1217.

#### **Table 1 Requirements of Glass Fibre Tissue**

(Clause 3.1)

| SI<br>No. | Characteristics                     | Requirements   | Method of<br>Test, Ref to |
|-----------|-------------------------------------|--|---------------------------|
| (1)       | (2)                                 | (3)  | (4)                       |
| i)        | Weight per unit<br>area, <i>Min</i> | 40 g per m <sup>2</sup>  | A-l                       |
| ii)       | Nominal thickness                   | $0.50 \text{ mm} \pm 0.1 \text{ mm}$   | A-2                       |
| iii)      | Breaking strength,<br><i>Min</i>    | 45 kgf per 150 mm<br>width in the longitu-<br>dinal direction                  | A-3                       |
| iv)       | Porosity                            | 0.6 mm to 1.9 mm   | A-4                       |
| <b>v)</b> | Temperature<br>resistance           | Shall be unaffected<br>under load in hot<br>bitumen at 280°C for<br>one minute | A-5                       |

#### 3.3 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)].

#### 3.4 Mineral Powder for Surfacing

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

#### 3.4.2 Weight

The weight of the surfacing material shall be as follows:

- a) Mica 1.0 to 1.5 kg/10  $m^2$ ,
- b) Talc powder 2.25 kg/10 m<sup>2</sup>, and
- c) Sand 2.3 kg/10 m<sup>2</sup>.

#### **4 MANUFACTURE**

Outerwraps are made from glass fibre mat coated with plasticized coal tar enamel and dusted with mineral powder to prevent the layers from sticking together when rolled. The finished outerwrap shall have a smooth uniform surface free from visible defects.

#### **5 DIMENSIONS AND WEIGHT**

#### 5.1 Dimensions

Unless otherwise specified, glass fibre base outerwrap shall be supplied in width of one metre and in lengths of 100 m.

#### 5.2 Weight

Weight of the ingredients used in the manufacture of glass fibre base outerwraps for  $10 \text{ m}^2$  shall not be less than those specified in Table 2.

**Table 2 Minimum Weight of Glass Fibre Base** 

| Outerwraps for 10 m <sup>2</sup> |                        |  |  |
|----------------------------------|------------------------|--|--|
| Untreated<br>Base,<br>kg         | Treated<br>Base,<br>kg | Total Weight in Dry<br>Condition Including<br>Surfacing Materials, |  |
| -                                |                        | kg   |  |
| (1)                              | (2)                    | (3)  |  |
| 0.4                              | 4.5                    | 5.5  |  |

#### 5.2.1 Method

For determining the weight, select at random the number of glass fibre outerwrap rolls as indicated in col 2 of Table 4. The randomness of selection is ensured by following the procedure as specified in IS 4905. 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  $10 \text{ m}^2$  computed from this weight.

# 6 OTHER REQUIREMENTS OF GLASS FIBRE OUTERWRAPS

Glass fibre outerwraps when tested in accordance with the appropriate tests shall conform to the requirements given in Table 3.

#### Table 3 Requirements of Glass Fibre Outerwraps

| (Clo | use   | 6) |
|------|-------|----|
| 1000 | and c | ν, |

| Sl<br>No. | Properties   | Requirements   | Method of Test,<br>Ref to IS |
|-----------|--|--|------------------------------|
| (1)       | (2)  | (3)  | (4)                          |
| i)        | Breaking<br>strength, <i>Min</i> ,<br>kg               | <ul><li>a) Wrap 30</li><li>b) Weft 15</li></ul>                              | 13826 (Part 1)               |
| ii)       | Pliability after<br>conditioning the<br>sample for 3 h | a) Roll shall not<br>show cracks on<br>unrolling                             | 13826 (Part 2)               |
|           | at 5°C   | b) Consider any<br>surface rupture<br>exceeding 5 mm<br>in length as failure |                              |

#### 7 SAMPLING AND CRITERIA FOR CONFORMITY

#### 7.1 Sampling

#### 7.1.1 Lot

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

7.1.1.1 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.

7.1.2 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 and col 2 of Table 4.

Table 4 Sample Size and Criteria for Conformity

(Clauses 5.2.1, 7.1.2, 7.1.3.2 and 7.1.4(a)]

| No. of the Roll<br>in the Lot | No. of the Rolls<br>to be Selected<br>in the Sample | Permissible<br>No. of<br>Defective<br>Rolls | Sub-Sample<br>Size No. of<br>Rolls to be<br>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 1000                   | 32  | 2   | 6  |
| 1 001 to 3 000                | 50  | 3   | 8  |
| 3 001 and above               | 80  | 5   | 10   |

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

#### 7.1.3 Test Samples and Number of Tests

**7.1.3.1** All the rolls of selections in **7.1.2** shall be inspected for width, length and visible external defects.

7.1.3.2 The number of rolls to be tested for breaking strength and pliability shall be in accordance with col 4 of Table 4. These rolls shall be taken at random from those inspected under 7.1.3.1 and found satisfactory for dimensions. From each of these rolls, one test sample of 3 m long and the full width of the outerwrap 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.

#### 7.1.4 Criteria for Conformity

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

- a) The number of rolls found defective with respect to any characteristic mentioned in 7.1.3.1 does not exceed the corresponding number given in col 3 of Table 4.
- b) From the observed values of the breaking strength, the average  $\overline{X}$  and the range R are calculated for each direction (that is, wrapway and weftway) separately, and the value of the

expression  $\overline{X} - 0.6R$  is found to be greater

than or equal to the applicable specified value.

#### NOTES

1 Average  $\overline{X}$  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.

3 All the test pieces tested for pliability shall satisfy the conditions of pliability given in Table 3 individually.

#### 8 PACKING

The glass fibre base coal tar pitch outerwrap shall be supplied in tightly wound rolls around a core. The rolls shall be packed to exclude dust and dirt during transportation and handling and shall have cardboard seperators and end shields adequate to prevent roll damage when stacked. The rolls shall be clean, smooth and square cut and shall have no telescoping.

#### 9 MARKING

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

- a) Identification of the source of manufacturer;
- b) Length, width and weight of the roll; and
- c) Batch number in code and date of manufacture.

#### 9.2 BIS Certification Marking

Each package may also be marked with the Standard Mark.

**9.2.1** The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. Details of conditons 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

#### (Clause 3.1 and Table 1)

#### METHODS OF TEST FOR TESTING VARIOUS PROPERTIES OF GLASS FIBRE TISSUE

#### A-1 METHODS OF TEST FOR TESTING WEIGHT OF GLASS FIBRE TISSUE

#### A-1.1 Test Piece

Cut out approximately about 2 m from the roll. Measure and cut a sample exactly  $100 \text{ cm} \times 100 \text{ cm}$ 

#### A-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  $\times$  100 cm may be cut in smaller sizes and weighed together.

#### A-2 METHOD OF TEST FOR DETER-MINATION OF TISSUE THICKNESS

#### A-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<sup>2</sup> exerting a pressure

of 35 g/cm<sup>2</sup> and measuring the deflection in dial gauge having a least count of 0.01 mm (see Fig. 1).

#### A-2.2 Equipment

- a) Stand with glass plate;
- b) Lifting mechanism;
- c) Metallic cylinder, weighing 227 g; and
- d) Dial gauge with clamp.

#### A-2.3 Method

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

A-2.3.2 Cut approximately  $100 \text{ cm} \times 100 \text{ cm}$  across the width.

A-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.

A-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  $35 \text{ g/cm}^2$ .

A-2.3.5 The average of 12 readings are taken as the mean thickness and recorded to the accuracy of 0.01 mm.

#### A-2.4 Calculation

A-2.4.1 Average the total number of readings and record to an accuracy of 0.01 mm.

#### A-3 METHOD OF TEST FOR TESTING BREAKING STRENGTH OF GLASS FIBRE TISSUE

#### A-3.1 Breaking Strength

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

#### A-3.2 Test Pieces

Using a 50.0 cm  $\times$  10.0 cm template, cut samples of tissue with reinforcement along the longer side. Number them 1 to 6 (see Fig. 2).

#### A-3.3 Procedure

A-3.3.1 For each of the samples cut two lengths of adhesive tape measuring approximately  $30 \text{ cm} \times 5 \text{ cm}$ .

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. A-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.

A-3.3.3 Note the breaking load as  $P_1$ .

A-3.3.4 Repeat (A-3.3.1 to A-3.3.3) for the other 5 samples, and record it as  $P_2$ ,  $P_3$ ,  $P_4$ ,  $P_5$  and  $P_6$ .

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

$$P = \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6}{6}$$

#### A-4 METHOD OF TEST FOR TESTING POROSITY OF GLASS FIBRE TISSUE

#### A-4.1 Test Piece

Five specimens, in the size of  $25 \text{ cm} \times 25 \text{ cm}$  representative of the glass fibre tissue mat shall be taken.

#### A-4.2 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 measuing the volume of air flowing through the tissue.

The clamp shall effectively eliminate edge leakage.

#### A-4.3 Procedure

Mount the test specimen between the clamp and the



FIG. 1 ARRANGEMENT FOR MEASUREMENT OF THICKNESS





#### A-5 METHOD OF TEST FOR TESTING TEMPERATURE RESISTANCE OF GLASS FIBRE TISSUE

#### A-5.1 Test Pieces

Three test specimens of dimension  $300 \text{ mm} \times 75 \text{ mm}$  with reinforcement along the longer sides shall be taken.

#### A-5.2 Apparatus

**A-5.2.1** The apparatus required consists of a dish A and 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. 3).

#### A-5.3 Procedure

A-5.3.1 Fill the dish A with hot bitumen approximately temperature  $280^{\circ}$ 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.



FIG. 3 TEMPERATURE RESISTANCE TESTING ASSEMBLY

FIG. 2 TEST SAMPLE FOR TENSILE STRENGTH

–10cm –

5 cm

50 cm

ADHESIVE

TAPE

FIBRE GLASS

TISSUE

GLASS YARN

(10 Nos)

REINFORCEMENT

#### **ANNEX B**

#### (Foreword)

#### **COMMITTEE COMPOSITION**

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