IS : 8477 - 1985

(Reaffirmed 1999)

Indian Standard

METHODS FOR DETERMINATION OF BITUMEN CONTENT IN LAMINATED JUTE BAGS

(First Revision)

UDC 621·798·151 - 419 : 677·13·027·651·32 : 543·869

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

Gr 2

April 1986

Indian Standard

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Indian Standard

METHODS FOR DETERMINATION OF BITUMEN CONTENT IN LAMINATED JUTE BAGS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 15 November 1985, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 Jute bags laminated with craft paper or polyethylene film using bitumen as the bonding material are extensively used these days for packing materials like pesticides, fertilizers, etc. This method was evolved for determining the amount of bitumen used for bonding the liner and the jute fabric as its quantity is important for the performance of the laminated jute bag. The standard has been revised to include a more simplified method based on conditioning of the test specimens in a desiccator containing saturated solution of sodium nitrite.

0.3 Method 1 based on conditioning of the test specimens in a standard atmosphere or in a conditioning chamber is time consuming and requires the use of conditioning chamber. Method 2 based on conditioning of the test specimens in a desiccator containing saturated solution of sodium nitrite is easier and cheaper and does not require a special instrument for conditioning of the test specimens.

0.4 In reporting the result of a test 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*.

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1. SCOPE

1.1 This standard prescribes two methods for determination of bitumen content in laminated jute bags.

*Rules for rounding off numerical values (*revised*).

2. PRINCIPLE

2.1 A specimen of laminated fabric of known mass is taken and the liner is removed by dipping in a suitable solvent and then the fabric portion is extracted in Soxhlet apparatus. From the mass of the initial piece, liner and extracted fabric, the bitumen content is calculated.

3. SAMPLING

3.1 Lot — The quantity of laminated jute bags purporting to be of one definite type and quality delivered to a buyer against one despatch note shall constitute a *lot*.

3.2 The sample shall be so drawn as to be the representative of the lot. The sample drawn in accordance with the procedure laid down in the material specification or as agreed to between the buyer and the seller shall be taken as representative of the lot.

4. PREPARATION OF TEST SPECIMEN

4.1 From the sample, cut four pieces of 100 mm × 100 mm taking one piece from the area near the mouth, the other from the area close to the bottom and two pieces from the middle portions of the bag. The pieces shall be taken in such a way that they contain spot application portion in case the bitumen is applied off-set.

5. METHOD 1

5.1 Conditioning of Test Specimens

5.1.1 Before testing, condition the specimens to moisture equilibrium in standard atmosphere at 27 ± 2°C temperature and 65 ± 2 percent relative humidity (*see also* IS : 6359-1971*).

5.1.1.1 When the test specimens have been left in such an atmosphere for at least 24 hours in such a way as to expose, as far as possible, all portions of the specimens to the atmosphere, they shall be deemed to have reached moisture equilibrium.

5.1.2 In case arrangements are not there for conditioning the test specimens in standard atmosphere, these may be conditioned in a conditioning chamber and mass determined immediately after the removal of the test specimens from the conditioning chamber.

*Method for conditioning of textiles.

5.2 Apparatus and Reagents

5.2.1 *Soxhlet Apparatus*

5.2.2 *Weighing Balance* — with an accuracy up to 1 mg.

5.2.3 *Solvent* — Light petroleum or any other suitable solvent such as trichloroethylene or perchloroethylene.

5.3 Procedure

5.3.1 Take the conditioned test specimens and determine their collective mass to the nearest milligram.

5.3.2 Wash all the specimens with the solvent (*see* **5.2.3**) and carefully separate the liner pieces. Wash the liner pieces with solvent to remove adhering traces of oil and bitumen.

5.3.3 Dry the liner pieces in air and determine their collective mass to the nearest milligram (*see* Note).

NOTE — If the liner pieces are made of craft paper, these shall be conditioned before determining their collective mass.

5.3.4 Take the four fabric pieces obtained after the removal of liner pieces from the test specimens and place them in a thimble of the Soxhlet apparatus. Take about 400 ml of the solvent in the extraction flask. Extract the pieces for $1\frac{1}{2}$ to 2 hours at a rate of about 6 cycles per hour. Take out the fabric pieces and let the solvent evaporate.

5.3.5 Condition the fabric pieces as given in **5.1.1** or **5.1.2** as the case may be, and determine their collective mass to the nearest milligram.

5.3.6 Calculate the quantity of bitumen per square metre as given in **7.1** and **7.1.1**.

6. METHOD 2

6.1 Apparatus and Reagents

6.1.1 *Soxhlet Apparatus*

6.1.2 *Weighing Balance* — With an accuracy up to 1 mg.

6.1.3 *Desiccator* — Suitable size, charged with saturated solution of sodium nitrite at 27 $\pm$ 2°C.

6.1.4 *Solvent* — Light petroleum or any other suitable solvent such as trichloroethylene or perchloroethylene.

6.2 Procedure

6.2.1 Condition all the test specimens (*see* **4.1**) in the desiccator charged with saturated solution of sodium nitrite at 27 ± 2°C for at least 24 hours in such a way that the fabric side of each specimen is exposed to the air inside the desiccator.

6.2.2 Remove all the specimens from the desiccator and immediately determine their collective mass to the nearest milligram.

6.2.3 Wash all the specimens with the solvent (*see* **6.1.4**) and carefully separate the liner pieces. Wash the liner pieces with solvent to remove adhering traces of oil and bitumen.

6.2.4 Dry the liner pieces in air and determine their collective mass to the nearest milligram (*see* Note *under* **5.3.3**).

6.2.5 Take the four fabric pieces obtained after the removal of the liner pieces from the test specimens and place them in the thimble of the Soxhlet apparatus. Take about 400 ml of the solvent in the extraction flask. Extract the fabric pieces for 1½ to 2 hours at a rate of about 6 cycles per hour. Take out the fabric pieces and let the solvent evaporate.

6.2.6 Place the fabric pieces in the desiccator charged with saturated solution of sodium nitrite at 27 ± 2°C for at least 24 hours exposing both sides of each fabric piece as far as possible to the air inside the desiccator.

6.2.7 Remove the fabric pieces from the desiccator and immediately determine their collective mass to the nearest milligram.

6.2.8 Calculate the quantity of bitumen per square metre as given in **7.1** and **7.1.1**.

7. CALCULATION

7.1 Calculate the quantity of bitumen per square metre by the following formula :

$$X = 25 [a - (b + c + d)] \text{ g/m}^2$$

where

X = mass of bitumen per square metre of the laminated fabrics;

a = combined mass of the conditioned test specimens;

b = combined mass of the liner pieces;

c = combined conditioned mass of the extracted fabric pieces; and

d = correction factor for oil content of the fabric.

7.1.1 Calculate the value of d by the following formula:

$$d = \frac{c \times y}{100}$$

where

c = combined conditioned mass of the extracted fabric pieces; and

y = oil content percentage of the fabric as specified in the material specification, on conditioned mass basis (*see* Note).

NOTE — Generally five percent oil content on conditioned mass basis is used for hessian and double-warp thread fabrics made of jute. For other fabrics use the value as given in the material specification based on conditioned mass. Five percent of oil content on conditioned mass corresponds to six percent of oil content on dry de-oiled material basis.

8. REPORT

8.1 The report shall include the following information:

a) Type of material;

b) Bitumen content per square metre; and

c) Method of bitumen application, namely, continuous or off-set bonding.

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