भारतीय मानक
Indian Standard

IS 17739 : 2024

कच्चे नारियल के रेशों की पिथ — विशिष्टि

(पहला पुनरीक्षण)

Raw Coir Pith — Specification

(First Revision)

ICS 55.040, 59.060.10, 59.080.99

भारतीय मानक ब्यूरो
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Coir and Coir Products Sectional Committee, TXD 25

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Coir and Coir Products Sectional Committee had been approved by the Textile Division Council.

This standard was first published in 2022. This revision has been bought out in the light of experience gained since its publication and to incorporate the following major changes:

a) Test method for determination of '*p*H of coir pith' has been incorporated; and

b) Test method for determination of 'Electrical conductivity of coir pith' has been incorporated.

Coir pith, which is also known as coir dust is the main byproduct from coir fibre extraction industries which is used for agriculture/horticulture applications. The composition and properties of coir pith vary depending on maturity of coconut, method of fibre extraction and processing including environmental factors. Coir pith is normally dumped as agricultural waste and accumulates as heaps of coarse and fine dust. Coir pith is a recalcitrant agro-residue containing high amount of lignin and cellulose resisting decomposition by microorganisms under natural conditions. Coir pith has high water holding capacity upto eight times of its weight. Nutrient content of coir pith varies with the location, method of extraction, rate of decomposition and storage conditions.

The composition of the Committee responsible for the formulation of this standard is given in Annex G.

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.

Indian Standard

RAW COIR PITH — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the various requirements of coir pith extracted from coconut husk by mechanical means.

2 REFERENCES

The standards listed in Annex A 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 edition of these standards.

3 TERMINOLOGY

For the purpose of this standard, the following definition shall apply.

3.1 Raw Coir Pith — Coir pith containing three major constituent that are cellulose, hemi-cellulose and lignin. Coir pith can be biodegraded to composted coir pith, increasing its nutrient status for application in agriculture/horticulture. Washed or Processed coir pith can be used as a growing substrate for horticultural nurseries and soilless cultivation of a wide range of crops.

4 MANUFACTURE, WORKMANSHIP AND FINISH

Coir pith, which is also known as coir dust is the main by-product from coir extraction industries. In the husk, coconut fibres are seen tightly packed along with non-fibrous, fluffy and light weight corky material known as coir pith or coir dust, which constitutes about 50 percent to 70 percent of the husk. The spongy material that binds the coir fibre in the husk is the coir waste or coir pith. During this process of extraction, coir pith is obtained as a by-product which has got diversified applications. In the process of extraction of coir fibre from husk generally about one third of it is obtained as fiber and two third of it is obtained as coir waste.

5 REQUIREMENTS

5.1 Texture

The material shall be clean and free from adulterants such as sand, metallic pieces, weeds and seeds.

5.2 Colour and Odour

The colour of the coir pith shall be golden brown.

5.3 The coir pith shall conform to the requirements as specified in Table 1.

6 ADDITIONAL REQUIREMENTS FOR ECO-MARK (OPTIONAL)

6.1 The product shall meet the requirement specified in this Indian Standard.

6.2 The manufacturer shall produce the consent clearance as per the provisions of Water (*Prevention and Control of Pollution*) *Act*, 1974 and Air (*Prevention and Control of Pollution*) *Act*, 1981 and authorizations, if required under the rules notified under the Environment (*Protection*) *Act*, 1986 and rules made there under as per *Bureau of Indian Standards Act*, 2016 while applying for the Eco-Mark.

6.3 The product(s) or product packaging(s) may display in brief the criteria based on which the product has been labelled environment friendly.

6.4 The material used for product packaging(s) shall be recyclable, reusable or biodegradable.

6.5 The product shall meet the specific requirements as given in Table 2.

7 PACKING

The material shall be packed as agreed to between the buyer and the seller.

8 MARKING

8.1 Each package shall be marked indicating clearly with the following information attached to it:

a) Name of the material;

b) Name of the manufacturer;

c) Gross and net weight in kg;

d) Date of packing;

e) Criteria for which coir pith has been labelled as Eco-Mark (optional); and

f) Any other information as required by the buyer or by the law in force.

8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

Table 1 Requirements of Coir Pith

(*Clause* 5.3)

Sl No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	*p*H	5.0 to 7.0	Annex B
ii)	Electrical conductivity (EC), dS/m	< 3	Annex C
iii)	Cation exchange capacity (CEC), cmol/kg, percent, *Max*	40	IS 2720 (Part 24)
iv)	Nitrogen, percent, *Min*	0.1	IS 6092 (Part 2/Sec 5)
v)	Phosphorus, percent, *Min*	0.01	IS 5305
vi)	Potassium, percent, *Min*	0.5	IS 6092 (Part 4)
vii)	Copper, mg/kg, *Min*	1.5	IS 3025 (Part 42)
viii)	Organic carbon (OC), percent, *Min*	25	IS 2720 (Part 22)
ix)	Carbon : Nitrogen ratio, *Min*	110 : 1	IS 2720 (Part 22/Sec 1) and IS 6092 (Part 2/Sec 5)
x)	Lignin, percent, *Max*	35	Annex D
xi)	Total organic matter (TOM), percent, *Min*	75	IS 2720 (Part 22/Sec 2)
xii)	Moisture, percent, *Max*	20	Annex E
xiii)	Ash content, percent, *Max*	1.5	**6** of IS 199
xiv)	Water holding capacity (WHC), percent, *Max*	800	IS 14765
xv)	Porosity, percent	71 to 78	IS 2720 (Part 17)
xvi)	Sand content, percent, *Max*	2	Annex F

Table 2 Specific Requirements for Eco-Mark (Optional)

(*Clause* 6.5)

Sl No.	Parameter	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Residual pesticides (sum parameter), ppm, *Max*	1.0	IS 15651
ii)	*p*H of aqueous extract	6 to 7	IS 8391 (Part 1)

9 SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Sampling

9.1.1 *Lot*

Quantity of pith manufactured under similar conditions and delivered to a buyer against one dispatch note shall constitute a lot.

9.1.2 The conformity of a lot to the requirements of the standard shall be determined on the basis of the tests carried out on the samples selected from it.

9.1.3 Unless otherwise agreed to between the buyer and the seller, the number of samples to be selected from the lot shall be in accordance with Table 3.

The samples shall be selected at random where 'N' is the lot size and 'n' is the number of samples drawn.

9.2 Criteria for Conformity

The lot shall be considered conforming to the requirements of this standard if the following condition is satisfied:

a) The averages of all the values for all required parameters are in accordance with the applicable value of the relevant grade.

Table 3 Size of Gross Sample and Number of Test Specimen for Each Test

(*Clause* 9.1.3)

Sl No.	Quantity in Lot (N)	Number of Sample (n)
(1)	(2)	(3)
i)	Up to 1 000 kg	2
ii)	1 000 kg to 5 000 kg	3
iii)	5 000 kg and above	5

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 199 : 1989	Textiles — Estimation of moisture, total size or finish, ash and fatty matter in grey and finished cotton textile materials (*third revision*)
IS 2720	Methods of test for soils:
(Part 17) : 1986	Laboratory determination of permeability (*first revision*)
(Part 22) : 1972	Determination of organic matter (*first revision*)
(Part 24) : 1976	Determination of cation exchange capacity (*first revision*)
IS 3025 (Part 42) : 2024	Methods of sampling and test (physical and chemical) for water and wastewater: Part 42 Copper (*second revision*)
IS 5305 : 1969	Method for volumetric determination of phosphorus
IS 6092	Methods of sampling and test for fertilizers:
(Part 2)	Determination of nitrogen,
(Sec 5) : 2004/ ISO 5315 : 1984	Total nitrogen content — Titrimetric method after distillation
(Part 4) : 1985	Determination of potassium (*first revision*)
IS 8391 (Part 1) : 2019	Rubberized coir sheets for cushioning — Specification: Part 1 Curled (*third revision*)
IS 14765 : 2000	Determination of water retention capacity in soils — Method of test
IS 15651 : 2006	Textiles — Requirements for environmental labelling — Specification

ANNEX B

[*Table* 1, *Sl No.* (i)]

METHOD FOR DETERMINATION OF *p*H VALUE

B-1 SCOPE

This test method prescribes the electronic measurement of the *p*H of coir pith material. This method is not applicable to any other material such as soil.

B-2 APPARATUS AND REAGENTS

B-2.1 *p*H Meter — potentiometer equipped with a glass-calomel electrode system. (Follow the manufacturer's instructions for the *p*H meter used.)

B-2.2 Analytical Balance

B-2.3 Carbon Dioxide-free Distilled Water — use water with a *p*H of not less than 6.5 nor more than 7.5 obtained by boiling distilled water for 15 min and cooling under CO_2 free conditions.

B-2.4 Standard Buffer Solution — of *p*H 4, *p*H 7, and *p*H 10

B-3 CALIBRATION OF *p*H METER

Calibrate the *p*H meter using standard buffer solutions as per the manufacturer's instructions.

B-4 SAMPLE PREPARATION

Crush the coir pith block to remove all the lumps. Take a portion of the crushed coir pith block for the estimation of *p*H.

B-5 PROCEDURE

B-5.1 Weigh 10g air-dried finely crushed coir pith and transfer into 500 ml beaker. Add 200 ml of distilled water (*see* **B-2.3**) at 27 °C ± 2 °C.

B-5.2 Mix the test sample thoroughly to ensure that it is homogeneous. Let the coir pith soak for 30 min, with occasional stirring.

B-5.3 Read on *p*H meter.

B-6 EXPRESSION OF RESULTS

B-6.1 Calculate the mean of the three readings that agreed and round to the nearest 0.1 of a *p*H unit.

B-6.2 Otherwise, also specify the temperature at which the test is carried out.

ANNEX C

[*Table* 1, *Sl No.* (ii)]

METHOD FOR DETERMINATION OF ELECTRICAL CONDUCTIVITY (EC)

C-1 APPARATUS AND REAGENTS

C-1.1 Conductivity Meter — fitted with a conductivity cell, equipped with an adjustable measuring range setting and (automatic) temperature correction and having an accuracy of 1 dS/m at 25 °C. Preferably, the conductivity meter should also be equipped with a cell-constant control.

C-1.2 Analytical Balance

C-1.3 Potassium Chloride (0.1 mol/l)

Dissolve 0.745 6 g of potassium chloride (dried for 24 h at 220 °C ± 10 °C) in 100 ml of water. The specific electrical conductivity of this solution should be 12.9 mS/cm.

C-2 CALIBRATION OF CONDUCTIVITY METER

Calibrate the conductivity meter using standard buffer solutions (*see* **C-1.3**) as per the manufacturer's instructions.

C-3 SAMPLE PREPARATION

Crush the coir pith block to remove all the lumps. Take a portion of the crushed coir pith block for the estimation of EC.

C-4 PROCEDURE

C-4.1 Weigh 10g air-dried finely crushed coir pith material and transfer into 500 ml beaker. Add 200 ml water at 27 °C ± 2 °C. Mix the test sample thoroughly to ensure that it is homogeneous. Let the coir pith soak for 12 h, with occasional stirring.

C-4.2 Read on conductivity meter.

C-5 EXPRESSION OF RESULTS

Calculate the mean of the three readings that agreed and round to the nearest 1 dS/m of unit.

ANNEX D

[*Table* 1, *Sl No.* (x)]

METHOD FOR DETERMINATION OF LIGNIN

D-1 SCOPE

This method describes a procedure which can be applied to the determination of lignin in coir pith.

D-2 APPARATUS

D-2.1 Filtration Apparatus — (Fig. 1), consisting of a filtering flask of 2 000 ml, a filtering crucible about 30 ml, an adapter, and a siphon tube. Other types of filtration apparatus may also be used.

Dry the filtering crucibles in an oven at 105 °C ± 3 °C for about 2 h, cool, and weigh before use.

D-2.2 Constant Temperature Bath — to maintain a temperature of 20 °C ± 1 °C

D-2.3 Flasks, Erlenmeyer — 2 000 ml

D-2.4 Reflux Condenser — (optional), to be attached to the flask. If used, flasks and condenser should be equipped with ground glass connectors. If ground glass connectors are not available, a rubber stopper may be used.

D-2.5 Drying Oven — forced circulation type, maintained at 105 °C ± 3 °C

D-2.6 Hot Plate — electric

D-2.7 Other Glassware — burette, 50 ml; beakers, 100 ml; glass stirring rods

D-3 REAGENTS

D-3.1 Sulfuric Acid — 72 percent H_2SO_4 solution, (24 ± 0.1) N, specific gravity of 1.633 8 at 20 °C ± 4 °C, prepared as follows:

a) Carefully pour 665 ml of concentrated Sulfuric acid (95.5 percent to 96.5 percent, specific gravity of 1.84) into 300 ml of water, and after cooling, make up to 1 000 ml. Adjust the strength to (24 ± 0.1) N by titration with a standard alkali, or by measuring specific gravity. A variation of 0.1 percent in the strength of acid at this concentration causes a change of 0.001 2 in specific gravity.

b) Cool the acid solution in a refrigerator or under tap water to 10 °C to 15 °C before use.

D-3.2 Ethanol-benzene Mixture — mix one volume of approximately 95 percent ethanol and two volumes of benzene.

D-3.3 Safety Information

D-3.3.1 Benzene has been identified as a hazardous substance and a confirmed carcinogen (long-term exposure). It must be handled carefully using proper ventilation in an approved fume hood.

D-3.3.2 Sulfuric acid is corrosive and can cause burns to the skin. It must always be cautiously added to water to prevent splashing.

D-3.4 Acetyl Bromide

D-3.5 Glacial Acetic Acid (AA)

D-3.6 Perchloric Acid ($HClO_4$) — 70 percent

D-3.7 Sodium Hydroxide NaOH — 2 M

D-3.8 Standard Lignin (Kraft Lignin)

D-4 SAMPLING

D-4.1 Obtain a sample of about 5 g of extractive-free coir pith.

D-4.2 Extract coir pith with ethanol-benzene. Wash with ethanol and hot water and dry thoroughly in air or in an oven at 60 °C or less.

D-5 TEST SPECIMENS

D-5.1 Allow the sample to reach moisture equilibrium in the atmosphere near the balance, and weigh out two test specimens to the nearest 0.1 mg (about 1 g to 2 g). Place the test specimens in 100 ml beakers.

D-5.2 At the same time weigh another specimen for moisture determination.

D-6 PROCEDURE

D-6.1 Add to the beakers containing the test specimens cold (10 °C to 15 °C) 40 ml of 72 percent sulfuric acid. Add the acid gradually in small increments while stirring and macerating the material with a glass rod. Keep the beaker in a bath at 20 °C ± 1 °C during dispersion of the material.

NOTE — Some coir pith do not absorb the acid and therefore do not disperse readily. In such cases, place the beaker after addition of the acid in a vacuum desiccator for

a few minutes to facilitate wetting and dispersion.

D-6.2 After the specimen is dispersed, cover the beaker with a watch glass and keep it in a bath at 20 °C ± 1 °C for 2 h. Stir the material frequently during this time to ensure complete solution.

D-6.3 Add about 300 ml to 400 ml of water to a flask (*see* D-2.3) and transfer the material from the beaker to the flask. Rinse and dilute with water to 3 percent concentration of sulfuric acid, to a total volume of 575 ml.

D-6.4 Boil the solution for 4 h, maintaining constant volume either by using a reflux condenser or by frequent addition of hot water.

NOTE — Do not use a reflux condenser if the acid-soluble lignin is being determined in the solution.

D-6.5 Allow the insoluble material (lignin) to settle, keeping the flask in an inclined position. If the lignin is finely dispersed, it may require an 'overnight' or a longer period to settle.

D-6.6 Without stirring up the precipitate, decant or siphon off the supernatant solution through a filtering crucible (*see* Note). Then transfer the lignin quantitatively to the filter, using hot water and a rod with rubber policeman.

NOTE — If required, take a portion of the filtrate before dilution with water, for determination of the acid-soluble lignin using the below given method.

D-6.7 Wash the lignin free of acid with hot water.

D-6.8 Dry the crucible with lignin in an oven at 105 °C ± 3 °C to constant weight. Cool in a desiccator and weigh.

D-6.9 Acid soluble lignin using ultraviolet (UV) absorbance.

D-6.9.1 A 4 mg sample was treated with 5 ml solution containing 25 percent (*w/w*) acetyl bromide in glacial acetic acid (AA).

D-6.9.2 0.2 ml of 70 percent Perchloric acid $HClO_4$ was added and the sample was heated at 70 °C for 30 min.

D-6.9.3 The cooled solution was poured into a 50 ml volumetric flask containing 10 ml of 2 M NaOH and 12 ml glacial AA.

D-6.9.4 Finally, the volume was adjusted to 50 ml by glacial AA.

D-6.9.5 The lignin content was determined by ultraviolet (UV) absorbance at 280 nm in a 1 cm quartz cuvette.

D-6.9.6 A blank sample was prepared similarly for background correction.

D-6.9.7 The absorbance was recorded and corrected by subtracting the values of the blank.

D-6.9.8 The amount of weighed lignin in 50 ml solution was plotted against the corrected absorbance.

D-6.9.9 The calibration curves were obtained and the lignin content was calculated with the given equations.

$$M_{ASL} = \frac{(Aextract - Ablank)}{0.360\ 5\ mg}$$

where

M_{ASL} = mass of acid soluble lignin, in g;

$A_{extract}$ = absorbance at 280 nm for the lignin extract/standard; and

A_{blank} = absorbance at 280 nm for the blank.

D-7 CALCULATION

For each determination, calculate the lignin content in the test specimen as follows:

$$\text{Total lignin percent} = (M_{AIL} + M_{ASL}) \times \frac{100}{W}$$

where

M_{AIL} = mass of acid insoluble lignin got after filtration, in g;

M_{ASL} = mass of acid soluble lignin, in g; and

W = oven-dry weight of test specimen, in g.

D-8 REPORT

Report the lignin content as the average of two determinations, to the nearest 0.1 percent.

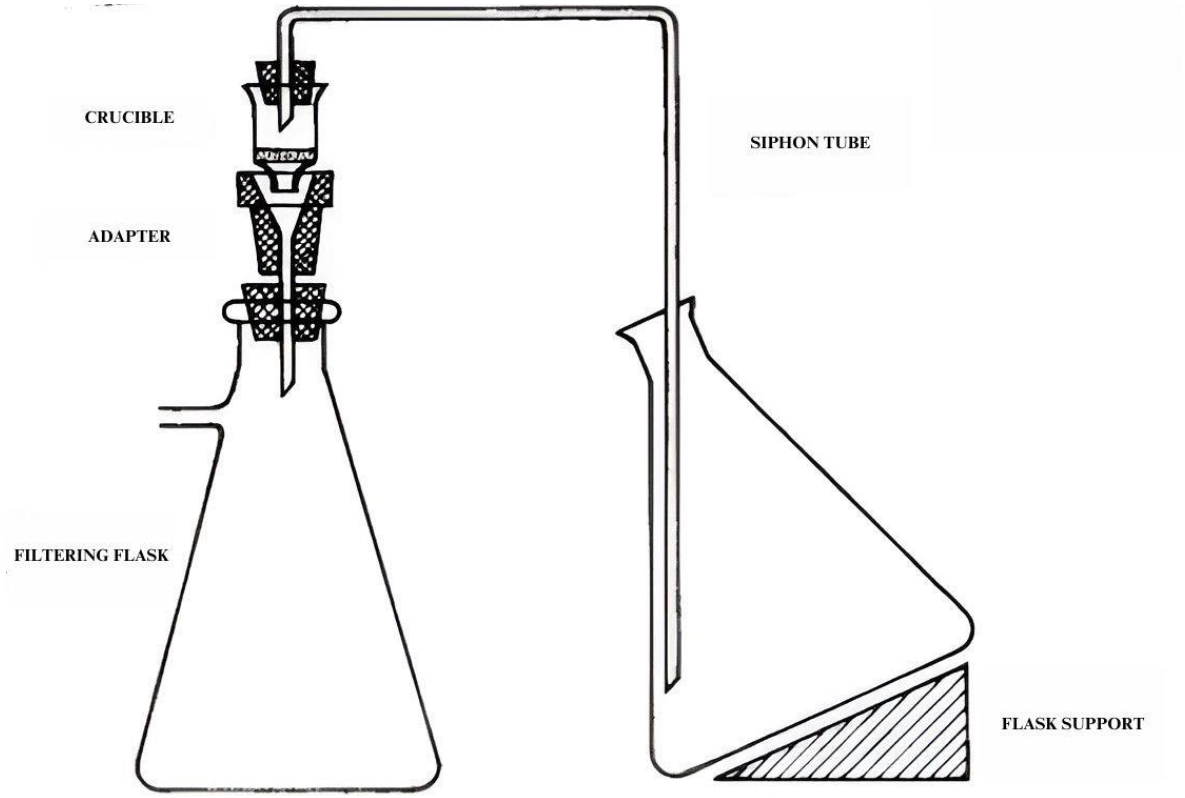

FIG. 1 LIGNIN FILTRATION APPARATUS

NOTE — Various types of filtering crucibles can be used, provided that the filtration is reasonably fast and all of the lignin is retained on the filter, resulting in a clear filtrate. Glass filtering crucibles with a sintered glass disc of a fine (F), or medium (M) porosity can be used for coir pith. Lignin in low-yield sulfite pulps forms a fine dispersion, which often clogs the pores of the sintered glass discs and slows the filtration. A disc of a glass fiber paper, fitted in the crucible, facilitates the filtration. Alundum or porous porcelain crucibles, with a mat of glass fibers, may also be used.

ANNEX E

[*Table* 1, *Sl No.* (xii)]

DETERMINATION OF MOISTURE CONTENT

E-1 APPARATUS

E-1.1 Conditioning Oven — with forced ventilation, provided with positive valve control and capable of maintaining a temperature of 100 °C to 110 °C

E-1.2 Weighing Balance — capability to weigh fibres with an accuracy of 0.5 g

E-1.3 Desiccator

E-2 PROCEDURE

E-2.1 Remove about 50 g of coir pith from the test sample and weigh it correct to the nearest 0.5 g. Place the test specimen in the conditioning oven and dry for six hour at a temperature of 100 °C ± 2 °C and cool the specimen to room temperature in the desiccators and determine its weigh to the nearest 0.5 g. Dry for another 30 min and weigh to the nearest 0.5 g. Provided the loss in mass in drying of the test specimen, as disclosed by the first and second weighings, does not exceed 0.25 percent of the first mass. Take the second mass to be the dry mass of the test specimen. If the loss exceeds 0.25 percent, weigh the test specimen at 30 min intervals till the loss between two successive weighings is 0.25 percent or less.

E-2.2 Calculate the percentage of moisture content by the following formula:

Moisture content, percent by mass

$$= \frac{(m1 - m2)}{m1} \times 100$$

where

m_1 = mass of the original test specimen, in g; and

m_2 = mass of the oven-dried test specimen, in g.

ANNEX F

[*Table* 1, *Sl No.* (xvi)]

METHOD FOR DETERMINATION OF SAND CONTENT

F-1 TEST SPECIMENS

For the purpose of this test, test specimens each weighing about 50 g shall be drawn from the test sample as given in **9.1.3**.

F-2 CONDITIONING OF THE SPECIMENS

Prior to evaluation, the test specimens shall be conditioned in standard atmosphere at 65 percent ± 2 percent relative humidity and 27 °C ± 2 °C temperature (*see* IS 6359) for 48 h.

F-3 PROCEDURE

F-3.1 Immediately after conditioning (*see* **F-2**), weigh one test specimen to the nearest 0.5 g. Burn it in an iron pan (*see* Note) to ash. Put the ash in water and allow the sand to settle. Separate the sand, condition it and weigh it.

NOTE — Kerosine oil may be used to quicken the process of burning.

F-3.2 Calculate the sand content by the following formula:

$$\text{Sand content, percent} = \frac{W_2}{W_1} \times 100$$

where

W_2 = mass, in g, of sand; and

W_1 = mass, in g, of conditioned test specimen.

F-3.3 Determine similarly the sand content, percent, of the remaining test specimens.

F-3.4 Calculate the average and range of all the observations (*see* **F-3.2** and **F-3.3**).

ANNEX G

(*Foreword*)

COMMITTEE COMPOSITION

Coir and Coir Products Sectional Committee, TXD 25

Organization	*Representative*(*s*)
Coir Board, Kochi	SHRI J. K. SHUKLA **(*Chairperson*)**
All India Rubberized Coir Products Manufacturers Association, New Delhi	MS JYOTHI PRADHAN SHRI MATHEW GEORGE (*Alternate*)
Central Coir Research Institute, Kochi	DIRECTOR, RDTE SENIOR SCIENTIFIC OFFICER (*Alternate*)
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Coir on Foam Products, Noida	SHRI PHILIP VARGHESE SHRI HARIRAJ (*Alternate*)
Coir Pith and Allied Products Manufacturers and Exporters Association, Coimbatore	SHRI MAHESH
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(TEXTILES), BIS

Bureau of Indian Standards

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Review 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 website-www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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