भारतीय मानक
Indian Standard

IS 17739 : 2022

कच्चे नारियल के रेशों की पिथ — विशिष्टि

Raw Coir Pith — Specification

ICS 55.040; 59.060.10; 59.080.99

भारतीय मानक ब्यूरो
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February 2022

Price Group 5

FOREWORD

This Indian Standard 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 Textiles Division Council.

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 a high water holding capacity of 8 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 E.

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

RAW COIR PITH — SPECIFICATION

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 editions of the standards indicated in Annex A.

3 TERMINOLOGY

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

3.1 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.

4 MANUFACTURE, WORKMANSHIP AND FINISH

Coir pith, which is also known as coir dust is the main byproduct 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 50-70 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.

Table 1 Requirements of Coir Pith

(*Clause* 5.3)

Sl No.	Characteristics	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	*p*H	5.0-7.0	IS 2711
ii)	Electrical conductivity, (µS/cm)	< 3	IS 14767
iii)	Cation exchange-capacity (meq/100 gm), 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, ppm, *Min*	1.5	IS 3025 (Part 42)
viii)	Organic carbon, 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 B
xi)	Total organic matter, percent, *Min*	75	IS 2720 (Part 22/Sec 2)
xii)	Moisture, percent, *Max*	20	Annex C
xiii)	Ash content, percent, *Max*	1.5	IS 199
xiv)	Water holding capacity, percent, *Max*	800	IS 14765
xv)	Porosity, percent	71 to 78	IS 2720 (Part 17)
xvi)	Sand content, percent, *Max*	2	Annex D

6 ADDITIONAL REQUIREMENT 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 authorization's, 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 Ecomark.

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

Table 2 Specific Requirements for Ecomark (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	6-7	IS 8391 (Part 1)

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 labeled as Ecomark (optional); and
f) Any other information as required by the buyer or by the law in force.

8.2 BIS Certification Marking

The coir pith 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 coir pith may be marked with the Standard Mark.

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.

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)
i)	Upto 1000 kg	2
ii)	1000 kg to 5000 kg	3
iii)	5000 kg and above	5

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

9.2 Criteria for Conformity

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

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

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
2 : 1960	Rules for rounding off numerical values (*revised*)
199 : 1989	Textiles — Estimation of moisture, total size or finish, ash and fatty matter in grey and finished cotton textile materials (*third revision*)
2711 : 1979	Specification for direct reading *p*H meters (*second revision*)
2720 (Part 17) : 1986	Methods of test for soils: Part 17 Laboratory determination of permeability (*first revision*)
2720 (Part 22) : 1972	Methods of test for soils: Part 22 Determination of organic matter (*first revision*)
2720 (Part 24) : 1976	Methods of test for soils: Part 24 Determination of cation exchange capacity (*first revision*)
3025 (Part 42) : 1992	Methods of sampling and test (physical and chemical) for water and wastewater: Part 42 Copper (*first revision*)
5305 : 1969	Method for volumetric determination of phosphorus
6092 (Part 2/Sec 5) : 2004	Methods of sampling and test for fertilizers: Part 2 Determination of nitrogen, Section 5 Total nitrogen content — Titrimetric method after distillation
6092 (Part 4) : 1985	Methods of sampling and test for fertilizers: Part 4 Determination of potassium (*first revision*)
8391 (Part 1) : 2019	Rubberized coir sheets for cushioning — Specification: Part 1 Curled (*third revision*)
14765 : 2000	Determination of water retention capacity in soils — Method of test
14767 : 2000	Determination of the specific electrical conductivity of soils — Method of test
15651 : 2006	Textiles — Requirements for environmental labelling — Specification

ANNEX B

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

METHOD FOR DETERMINATION OF LIGNIN

B-1 SCOPE

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

B-2 APPARATUS

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

B-2.1.1 Dry the filtering crucibles in an oven at 105 ± 3 °C for about 2 h, cool, and weigh before use.

B-2.2 Constant Temperature Bath, to maintain a temperature of 20 ± 1 °C.

B-2.3 Flasks, Erlenmeyer, 2 000 ml

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

B-2.5 Drying Oven, forced circulation type, maintained at 105 ± 3 °C.

B-2.6 Hot Plate, electric.

B-2.7 Other Glassware, burette, 50 ml; beakers, 100 ml; glass stirring rods.

B-3 REAGENTS

B-3.1 Sulfuric Acid 72 percent H_2SO_4 solution, 24 ± 0.1*N*, sp. gr 1.6338 at 20°/4 °C, prepared as follows:

B-3.1.1 Carefully pour 665 ml of concentrated H_2SO_4 (95.5 to 96.5 percent, sp gr 1.84) into 300 ml of water, and after cooling, make up to 1000 ml. Adjust

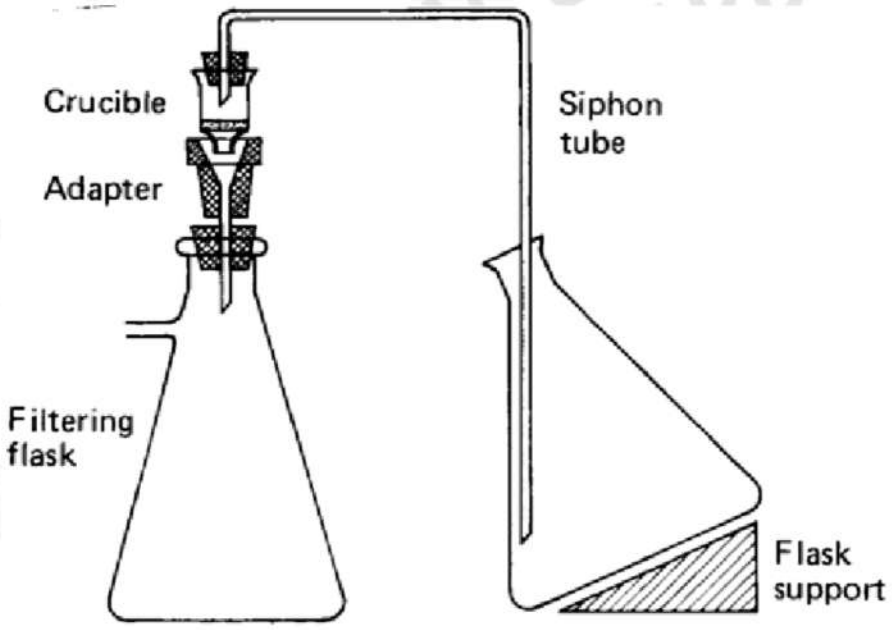

FIG. 1 LIGNIN FILTRATION APPARATUS

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.

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 0.0012 in specific gravity.

B-3.1.2 Cool the acid solution in a refrigerator or under tap water to 10 to 15 °C before use.

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

B-3.3 Safety Information

B-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.

B-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.

B-3.4 Acetyl Bromide

B-3.5 Glacial Acetic Acid (AA)

B-3.6 Perchloric Acid ($HClO_4$) — 70 percent.

B-3.7 Sodium Hydroxide NaOH — 2 M.

B-3.8 Standard Lignin (Kraft Lignin)

B-4 SAMPLING

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

B-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.

B-5 TEST SPECIMENS

B-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 to 2 g). Place the test specimens in 100 ml beakers.

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

B-6 PROCEDURE

B-6.1 Add to the beakers containing the test specimens cold (10 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 ± 1 °C during dispersion of the material.

NOTE — Some coirpith 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.

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

B-6.3 Add about 300 to 400 ml of water to a flask (*see* **B-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.

B-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.

B-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.

B-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.

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

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

B-6.9 Acid Soluble Lignin using ultraviolet (UV) absorbance

B-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).

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

B-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.

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

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

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

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

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

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

$$M_{ASL} = (A_{extract} - A_{blank})/0.3605 \text{ mg}^{-1}$$

where

M_{ASL} = Mass of acid soluble lignin;

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

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

B-7 CALCULATION

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

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

where

M_{AIL} = Mass of acid insoluble lignin got after filteration;

M_{ASL} = Mass of acid soluble lignin; and

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

B-8 REPORT

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

ANNEX C

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

METHOD FOR DETERMINATION OF MOISTURE CONTENT

C-1 APPARATUS

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

C-2 PROCEDURE

C-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 one hour and weigh to the nearest 0.5 g. Dry for another 15 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 1 percent minute intervals till the loss between two successive weighing is 0.25 percent or less.

C-2.2 Calculate the percentage of moisture content by the following

$$\text{Moisture content, percent by mass} = \frac{m_1 - m_2}{m_1} \times 100$$

where

m_1 = mass of the original test specimen; and

m_2 = mass of the oven-dried test specimen.

ANNEX D

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

METHOD FOR DETERMINATION OF SAND CONTENT

D-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**.

D-2 CONDITIONING OF THE SPECIMENS

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

D-3 PROCEDURE

D-3.1 Immediately after conditioning (*see* **D-2.1**), 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.

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

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

where

W_2 = weight of sand in g; and

W_1 = weight of conditioned test specimen, in g.

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

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

ANNEX E

(*Foreword*)

COMMITTEE COMPOSITION

Coir and Coir Products Sectional Committee, TXD 25

Organization	*Representative(s)*
Coir board, Kochi	Shri M. Kumara Raja (***Chairman***)
All India Rubberized Coir Products Manufacturers Association, Tirunelveli	Ms Jyoti Pradhan Shri Mathew George (*Alternate*)
Central Coir Research Institute, Kalavoor	Director Rdte Shrimati Sumi Sebastian (*Alternate*)
Central Institute of Coir Technology, Bengaluru	Joint Director Senior Scientific Officer (*Alternate*)
Charangathu Coir Mats and Matting Unit, Charangathu	Shri C. R. Devraj Shri Atulraj (*Alternate*)
Coimbatore District Coir Manufacturer's Association Coimbatore,	Shri Gowtham Shri Selvaraj (*Alternate*)
Coir board, Kochi	Director Joint Director (*Alternate*)
Coir Mats and Mattings Association,	Shri V. A. Joseph Shri Pavithran (*Alternate*)
Coir on Foam Products, Coimbatore	Shri Harirajan Shri Philip Varghese (*Alternate*)
Coir Pith and Allied Products Manufacturers and Exporters Association, Coimbatore	President Secretary (*Alternate*)
Coir Shippers' Council, Cherthala	Shri K. S. Sanjeev Shri Sajan B. Nair (*Alternate*)
Federation of Indian Coir Exporters' Associations, Alleppey	Shri Jospaul Mathew Shri Sajan B. Nair (*Alternate*)
Hindustan Coir, Coir Board Complex Alappuzha	Weaving Master Senior Scientific Officer (*Alternate*)
ICAR-Indian Institute of Horticultural Research, Bengaluru	Dr G. Selvakumar Dr D. Kalaivanan (*Alternate*)
Indian Institute of Technology, Chennai	Prof K. Rajagopal
Indian Plywood Industries Research and Training Institute, Bengaluru	Dr D. Sujatha
Karnataka State Coir Development Corporation Ltd, Bengaluru	Dr Arun Kumar Shri Ramesh (*Alternate*)
Kerala Organic Manure and Fertilizer	Shri G. Rajesh
Kerala State Coir Corporation Ltd, Alappuzha	Shri G. Sreekumar Shri N. Sunuraj (*Alternate*)
Kerala State Small Scale Coir Manufacturer's Federation, Alappuzha	President Secretary (*Alternate*)
Kerala State Coir Marketing Federation	Shri Suresh Kumar

Organization	*Representative(s)*
Kurlon Enterprises Limited, Bengaluru	Shri Narendra Kudva Shri P. Anil (*Alternate*)
National Coir Research and Management Institute (NCRMI), Thiruvanthapuram	Dr K. R. Anil Shri C. Abhishek (*Alternate*)
National Coir Training and Design Centre, Alappuzha	Assistant Director Regional Officer (*Alternate*)
Natural Green Tech (P) Ltd,	Shri Tommy Mathew Shri Abhishek Thomas (*Alternate*)
Rubber Board, Kottayam	Dr J. Thomas Dr James Jacob (*Alternate*)
SFURTI (Coir Cluster)	Shri Shiju Nesamony Shri Nagarajan
Shaa Pith Media Co, Coimbatore	Shri S. Prabhu Shri Ramesh (*Alternate*)
Travancore Coconut Private Limited, Kerala	Nomination Awaited
BIS Directorate General	Shri A. K. Bera, Scientist 'F' and Head (Textiles) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri P. N. Murali
Scientist 'D' (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 latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: TXD 25 (14980).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi