Doc: No. TXD 25 (20685)

भारतीय मानक

कच्चे नारियल के रेशों की पिथ ब्लाक – विशिष्टि

Indian Standard

COIR PITH BLOCK — SPECIFICATION

ICS 65:020:20

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September 2024 **Price Group**

Coir and Coir Products Sectional Committee, TXD 25

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 Textile Division Council.

Coir pith, which is also known as coir dust is the main byproduct from coir fibre extraction industries in double the quantity of coir fibre during extraction of fibre from coconut husk. Coir pith blocks of different Electrical Conductivity (EC) and with varying packaging dimensions and weight needs to be standardized and certified for its reliable use in 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 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 of six to eight times of its weight. Nutrient content of coir pith varies with the location, method of extraction, rate of decomposition and storage conditions. Sunlight, air, water and nutrients are the basic requirements for healthy plant growth. However, a good plant growth medium is a vital link essential for the proper utilization of nutrients and water. Coir pith is converted in to the form of blocks for its easy transportation and storage which can be used in agri/flori/horticulture.

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 Standards

COIR PITH BLOCK — SPECIFICATION

1 SCOPE

This standard prescribes the various requirements of widely and commonly used coir pith blocks made from dried and sieved 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 listed in Annex A.

3 TERMINOLOGY

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

3.1 Coir Pith — The coir pith is light weight, elastic, granular material having uniform, cylindrically opened cells, with foam like structure. Due to its porosity, it also gives buoyancy to the coconut fruit during its transport in water while falling from the tree. The coir fibre is embedded in the matrix of coir pith and during the extraction of coir fibres nearly the double the quantity of coir pith is obtained. Besides being rich in lignin, the coir pith has high water holding capacity up to 800 percent.

3.1.1 Coir pith is lignocellulosic in nature, brown colored, lightweight corky dust, particle size varies from 100 microns to 300 microns with porous structure. The pores are responsible for allowing good aeration around the roots of plants and retain water content in the pores for rewetting when dry. Coir pith has readily available nutrients like nitrogen, phosphorus and potassium suitable for plant growth. The organic matter content of soil/substrate is an indicator to its fertility and nutrient availability and coir pith has a higher organic matter content as compared to peat moss.

3.1.2 Coir pith containing three major constituents like cellulose, hemicellulose and lignin.

3.2 Coir Pith Blocks — The Coir pith block is the material in which the loose coir pith particles were converted into blocks of different dimensions and weight. The conversion of coir pith into coir pith blocks have been accomplished by mechanical means using hydraulic pressure by suitable machinery.

3.3 Electrical Conductivity (EC) — Electrical conductivity of a material is the ability to allow the transport of an electric charge and expressed in dS/m.

4 GRADES

4.1 The coir pith blocks shall be graded on the basis of Electric Conductivity as given in Table 1 and the test of Electric conductivity is to be carried as per the method prescribed in Annex B.

Table 1 Grading of Coir Pith
(*Clause* 4.1)

Sl. No	Grade	EC, dS/m
(1)	(2)	(3)
i)	**Grade I** (Low EC)	< 0.5
ii)	**Grade II** (Medium EC)	0.5 to 0.8
iii)	**Grade III** (High EC)	> 0.8

5 MANUFACTURE, WORKMANSHIP AND FINISH

5.1 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 to 70 percent of the husk. In the process of extraction of coir fiber from husk generally about one third of it is obtained as fiber and two third of it is obtained as coir pith. After the coir fibre is extracted from the husk the pith can be collected and processed to enter the supply chain for the production of Agri/ horticultural grade material. The process for the production of coir pith block for Agri/horticultural grade material follows a number of steps depending on the requirement as agreed between the buyer and the seller.

5.2 Washing and Buffering of Coir Pith (Optional)

The Coir pith is washed with water to further reduce the salt content. Washing is important to remove the additional salt content that cause high electrical conductivity of the media. Washing removes all the water-soluble elements such as sodium and potassium and thereby reduces the electrical conductivity. Due to the strength of some of the bonds made between the ions and the media, washing cannot eliminate all of the salt which may present in the coir pith. For which buffering may be done if agreed between the buyer and the seller. The pith can be buffered using the same process as washing by mixing a solutions of calcium nitrate and or magnesium nitrate as required, followed by a further washing step. Buffering balances the naturally occurring sodium and potassium in coir pith and prevents the unwanted lock out of calcium and magnesium and avoids sodium toxicity issue. Sodium, Magnesium, Potassium and Calcium will all be absorbed at different rates even if they were all introduced into a solution at the same concentrations. Calcium and Magnesium are absorbed at double the rate due to them having a double-positive charge while Potassium and Sodium have a single-positive charge (Ca^{2+}, Mg^{2+}, K^{+} , Na^{+}). Buffering products that have high levels of Calcium and Magnesium have a slower buffering rate but they help to effectively create a lower Potassium and Sodium percentage on the exchange and offer beneficial Magnesium to the Cation exchange capacity (CEC).

5.3 Coir Pith Blocks

5.3.1 The washed coir pith is then dried and subjected to sieving/mixing process. The resultant pith is fed into the compacting machine in which the pith is converted into blocks of different weight such as 650 g, 5000 g. Coir pith has a unique ability to withstand high compaction force without leaving its beneficial structure. Then the blocks are packed and then dispatched to sales.

5.3.2 When wrapped, it is highly compressed but can be expanded by sprinkling water. Hydrate the blocks slowly by using required amount of water and allow the moisture to be fully absorbed. And the material is ready to use it to improve the potting soils or use as a 100 percent soil-less growing medium. It is a perfect growing media for flower and vegetables cultivation as well for soil conditioning.

6 REQUIREMENTS

6.1 Texture

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

6.2 Colour and Odour

The colour of the coir pith shall be golden brown and have no foul odour.

6.3 Dimensions and Weight

The coir pith blocks may be supplied in fabricated shapes such as square or rectangular forms or as agreed between the buyer and seller.

6.3.1 The dimensions of the pith block can be measured using a steel rule nearest to 1 mm shall be as agreed between the buyer and the seller.

6.3.2 The weight of the coir pith block when measured using an electronic balance to the nearest 0.1g subject to the tolerance given below in Table 2 for coir pith blocks of weight 650 g and 5 kg. Any other suitable weight as per the agreement between buyer and seller shall be manufactured.

Table 2 Tolerance for Weight of Coir Pith Blocks

(*Clause* 6.3.2)

Sl. No	**Particulars**	**650 g Block**	**5000 g Block**
(1)	(2)	(3)	(4)
1	Weight tolerance, g	± 20	± 100

6.4 The coir pith blocks shall comply with the requirements given in Table 3 when tested according to the methods prescribed in col 5 of Table 3.

Table 3 Requirements of Coir Pith Block

(*Clause* 6.4)

Sl No.	Characteristics	Requirements for Coir Pith Block of 650 g	Requirements for Coir Pith Block of 5000 g	Method of Test, Ref to
(1)	(2)	(3)	(4)	(5)
i)	*p*H	5.0 to 7.0	5.0 to 7.0	Annex C
ii)	Moisture, percent, *Max*	20.0	20.0	Annex D
iii)	Sand content, percent, *Max*	2.0	2.0	Annex E
iv)	Hydration volume / Expansion volume on hydration, l/kg, *Min*	10.0	15.0	Annex F
v)	Particle size less than 1mm, percent, *Max*	20.0	35.0	Annex G
vi)	Fibre content, percent, *Max*	3.0	3.0	Annex G

6.5 If agreed between the buyer and seller, the requirements for nitrogen percent, phosphorus percent, potassium percent, ppm of copper, organic carbon percent, lignin, carbon-nitrogen ratio, total organic matter, ash content, Water holding capacity, porosity percent, sand content percent of the coir pith block shall conform as per IS 17739.

7 ADDITIONAL REQUIREMENTS FOR ECO-MARK (OPTIONAL)

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

7.2 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 ECOMARK.

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

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

7.5 The product shall meet the specific requirements as given in Table 4.

Table 4 Specific Requirements for Eco Mark

(*Clause* 7.5)

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	Annex C

8 PACKING

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

9 MARKING

9.1 Each bag shall be marked indicating clearly with the following information attached to it:

a) Name and type of the material;
b) Name of the manufacturer;
c) Grade;
d) Gross and net weight in kg;
e) Shape;
e) Date of packing;
f) Criteria for which coir pith has been labeled as Ecomark (optional); and
g) Any other information as required by the buyer or by the law in force.

9.1.1 *BIS Certification Marking*

The coir pith block(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 coir pith block(s) may be marked with the Standard Mark.

10 SAMPLING AND CRITERIA FOR CONFORMITY

10.1 Sampling

10.1.1 *Lot*

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

10.1.2 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.

10.1.3 Unless otherwise agreed to between the buyer and the seller, the number of coir pith block samples to be selected from the lot shall be in accordance with Table 4.

Table 4 Size of Gross Sample and Number of Test Specimen for Each Test
(*Clause* 10.1.3)

Sl No.	**Lot Size** (N)	**No. of Sample** (n)
(1)	(2)	(3)
i)	Up to 1 000 kg	2
ii)	1000 kg to 5 000 kg	3
iii)	5000 kg and above	5

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

10.2 CRITERIA FOR CONFORMITY

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

a) Texture, color and odour, dimensions and weight shall satisfy the requirements as specified in 6.1, 6.2 and 6.3.
b) The observed values for all required parameters shall be in accordance with the applicable value of the relevant grade as specified in Table 3.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 460 (Part 1) : 2020	Test sieves — Specification Part 1 Wire cloth test sieves (*fourth revision*)
IS 6359 : 2023	Method for conditioning of textiles (*first revision*)
IS 15651 : 2006	Textiles — Requirements for environmental labelling — Specification
IS 17739 : 2022	Raw coir pith — Specification

ANNEX B

(*Clause* 4.1)

METHOD FOR DETERMINATION OF ELECTRICAL CONDUCTIVITY (E.C)

B-1 APPARATUS AND REAGENTS

B-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 mS/m at 25 °C. Preferably, the conductivity meter should also be equipped with a cell-constant control.

B-1.2 Analytical Balance

B-1.3 Potassium Chloride (0.1 mol/l)

Dissolve 0.7456 g of potassium chloride (dried for 24 h at 220 °C ± 10 °C) in 100 ml water. The specific electrical conductivity of this solution should be 12.8 mS/cm.

B-2 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.

B-3 CALIBRATION OF CONDUCTIVITY METER

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

B-4 PROCEDURE

B-4.1 Weigh 10g air-dried finely crushed coir pith material and transfer into 500 ml beaker. Add 200 ml of water at (27 ± 2) °C. Mix the test sample thoroughly to ensure that it is homogeneous. Let the coir pith soak for 6 h, with occasional stirring.

B-4.2 Read on Conductivity meter.

B- 5 EXPRESSION OF RESULTS

B- 5.1 Calculate the mean of the three readings that agreed and round to the nearest 1 dS/m of unit.

ANNEX C

[*Table* 3, *Sl No*. (iii) and *Table 4*, *Sl No*. (iii)]

METHOD FOR DETERMINATION OF *p*H VALUE

C-1 APPARATUS AND REAGENTS

C-1.1 *p*H meter – Potentiometer equipped with a glass-calomel electrode system. Follow the manufacturer's instructions for the *p*H meter used.

C-1.2 Analytical balance

C-1.3 Carbon dioxide-free water distilled water. Use water with a *p*H of not less than 6.5 nor more than 7.5 obtained by boiling distilled water 15 min and cooling under CO_2 free conditions.

C-1.4 Standard buffer solution

*p*H of 4, 7, and 10.

C-2 CALIBRATION OF *p*H METER

Calibrate the *p*H meter using standard buffer solutions 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 *p*H.

C-4 PROCEDURE

C-4.1 Weigh 10g air-dried finely crushed coir pith block or equivalent moist material into 500 ml beaker. Add 200 ml of water, so as to maintain a material to water ratio of 1:20. Mix the test sample thoroughly to ensure that it is homogeneous. Let soak for 60 min, with occasional stirring.

C-4.1 Read on *p*H meter.

C- 5 EXPRESSION OF RESULTS

C- 5.1 Calculate the mean of the three readings that agreed and round to the nearest 0.1 of a *p*H unit.

C- 5.2 Otherwise, also specify the temperature at which the test is carried out.

ANNEX D

[*Table* 3, *Sl No*. (iii)]

METHOD FOR DETERMINATION OF MOISTURE CONTENT

D-l APPARATUS

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

D-2 PROCEDURE

D-2.1 Remove about 50 g of coir pith from the test sample (*see* **10.1.3)** 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 30 minutes 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 weighing's, 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 weighing is 0.25 percent or less.

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

$$\text{Moisture content, percent by mass} = \frac{m1 - m2}{m1} \times 100$$

where

m_1 = mass of the original test specimen; and

m_2 = mass of the oven-dried test specimen.

ANNEX E

[*Table* 3, *Sl No*. (iii)]

METHOD FOR DETERMINATION OF SAND CONTENT

E-1 TEST SPECIMENS

E-1.1 For the purpose of this test, test specimens each weighing about 50 g shall be drawn from the teat sample as given in **10.1.3**.

E-2 CONDITIONING OF THE SPECIMENS

E-2.1 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.

E-3 PROCEDURE

E-3.1 Immediately after conditioning (*see* **E-2.1**), weigh one test specimen to the nearest 0.5g. 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.

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

$$\text{Sand Content, percent} = \frac{W2}{W1} \times 100$$

Where

W_2 = weight of sand in g, and
W_1 = weight of conditioned test specimen in g.

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

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

ANNEX F

[*Table* 3, *Sl No*. (iv)]

DETERMINATION OF HYDRATION/EXPANSION VOLUME

F-1 TEST SPECIMENS

F-1.1 For the purpose of this test, test specimens each weighing about 100 g shall be drawn from the test sample as given in **10.1.3.**

F-2 CONDITIONING OF THE SPECIMENS

F-2.1 Prior to evaluation, the test specimens shall be conditioned in standard atmosphere at 65 ± 2 percent relative humidity and (27 ± 2) °C temperature for 48 h.

F-3 PROCEDURE

F-3.1 Immediately after conditioning (*see* **F-2.1**), break and crush the block by hand into dust particles. Remove the fibre by rubbing between the palms. Weigh one test specimen to the nearest 0.5 g and add to a large tub. To the dust slowly mix water until completely expand all the coir pith particles. Measure the volume of the loose expanded fluffy coir pith without compacting on a litre by litre basis. The number of litres multiplied by 10 gives the expansion or hydration volume corresponds to 1 kg of coir pith.

ANNEX G

[*Table* 3, *Sl No*. (v) and (vi)]

DETERMINATION OF PARTICLE SIZE LESS THAN 1 MM AND FIBRE CONTENT

G.1 APPARATUS

G-1.1 Balance

Sensitive to 0.1 percent of the mass of sample to be weighed.

G-1.2 Sieves

The following Indian Standard Sieves conforming to IS 460 (Part 1) 4.75 mm, 2.36 mm, 2 mm, 1.00 mm, 600 microns, 425 microns, 300 microns, 150 microns and 75 microns. Sieves should be periodically checked up for aperture sizes.

G-1.3 Receiving pan (with cover)

G-1.4 Brushes

sieve brushes and a wire brush or similar stiff brush.

G-1.5 Mechanical sieve shaker

G-2 PROCEDURE

Clean the sieves of sieve shaker using cleaning brush if any particles are struck in the openings. Record the weight of each sieve and receiving pan. Weigh approximately 100 g (W) of representative dry sample. Assemble the sieves in an order such that each lower sieve has smaller openings than the one above. Carefully pour the coir pith sample into the top sieve and place the cap over it. Place the sieve stack in the mechanical shaker and shake for 10 minutes in a mechanical sieve shaker. Remove the stack from the shaker and carefully weigh and record the weight of each sieve with its retained sample. In addition, remember to weigh and record the weight of the bottom pan with its retained sample. Obtain the mass of sample retained on each sieve by subtracting the weight of the empty sieve from the mass of the sieve + retained sample, and record this mass as the weight retained on the data sheet shown in Table 1. The sum of these retained masses should be approximately equals the initial mass of the coir pith sample. A loss of more than two percent is unsatisfactory.

G-3 CALCULATION

G.3.1 Determination of Particle size less than 1 mm

Calculate the percent retained on each sieve by dividing the weight retained on each sieve by the original sample mass. Calculate the cumulative percentage retained (X) on each sieve by adding the percentage of sample retained on that sieve and all the sieves above it. Calculate the percent passing (or percent finer) by starting with 100 percent and subtracting the cumulative percent retained on each sieve. Make a semi logarithmic plot of particle size vs percent finer. The percentage finer corresponding to 1 mm particle size is then determined.

Particle size less than 1 mm = Percentage finer corresponding to 1 mm

Table 5 Data Sheet for Calculation

Sl No.	**Sieve Size, mm**	**Weight of Sieve, M_1, g**	**Weight of Sieve + Retained Sample (M_2) g**	**Weight of sample retained (M_2 - M_1), g**	**Retained, percent $\frac{(M2-M1)}{W} \times \frac{}{100}$**	**Cumulative percent retained (X)**	**Cumulative percent passing or percent finer (100- X)**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	4.75						
ii)	2.36						
iii)	2.00						
iv)	1.00						
v)	0.600						
vi)	0.425						
vii)	0.300						
viii)	0.150						
ix)	0.075						
x)	Pan						

G.3.2 Determination of Fibre Content

Separate the fibres from the sample retained on each sieve and total weight of the fibres were determined correct to the nearest 0.5 g.

$$\text{Fibre content, percent} = \frac{\text{Total weight of the fibre retained in the sieves}}{\text{Weight of sample taken for test}} \times 100$$

ANNEX H
(*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*)
Central Institute of Coir Technology, Bengaluru	JOINT DIRECTOR (TECH) SENIOR SCIENTIFIC OFFICER (*Alternate*)
Charankattu Coir Manufacturing Corporation Private Limited, Shertallay	SHRI C R DEVARAJ SHRI C D ATHUL RAJ (*Alternate*)
Coimbatore District Coir Mnaufacturer's Association, Coimbatore	SHRI P SUDHAKAR SHRI N ANBURAJ *(Alternate*)
Coir Board, Kochi	DIRECTOR MARKETING JOINT DIRECTOR *(Alternate*)
Coir on Foam Products, Noida	SHRI PHILIP VARGHESE SHRI HARIRAJ *(Alternate*)
Coir Pith and Allied Products Manufacturers and Exporters Association, Coimbatore	SHRI MAHESH
Coir Shippers Council, Cherthala	SHRI K J JOSEPH SHRI SAJAN B NAIR *(Alternate*)
Coir and Coir Mattings Association, New Delhi	SHRI V A JOSEPH
Federation of Indian Coir Exporters Associations, Alappuzha	SHRI JOHN CHACKO
Hindustan Coir, Coir Board Complex	WEAVING MASTER
ICAR - Indian Institute of Horticultural Research, Bengaluru	DR. G SELVAKUMAR DR. D KALAIVANAN *(Alternate*)
Indian Institute of Technology, Chennai (Andhra University)	PROF. K RAJGOPAL
Indian Plywood Industries Research and Training Institute, Bengaluru	DR. SUJATHA D
Karnataka State Coir Development Corporation Limited, Bengaluru	SHRI VENKATESH
Kerala State Coir Corporation Limited, Alappuzha	SHRI G SREEKUMAR SHRI N SUNURAJ *(Alternate*)
Kerala State Coir Marketing Federation Limited, Thiruvananthapuram	SHRI SURESH KUMAR
Kurlon Enterprise Limited, Bangalore	SHRI V RAVI PRASAD SHRI P Anil *(Alternate*)
National Coir Research and Management Institute (NCRMI), Thiruvananthapuram	DIRECTOR NCRMI SHRI RINU PREMRAJ *(Alternate*)
National Coir Training and Design Centre, Alappuzha	ASSISTANT DIRECTOR

Natura Green Tech (P) Ltd, Bengaluru	SHRI TOMMY MATHEW SHRI ABHISHEK THOMAS *(Alternate)*
Rubber Research Institute of India, Rubber Board, Kottayam	DR. SHERA MATHEW DR. SIBY VARGHESE *(Alternate)*
SFURTI (Coir Cluster)	SHRI SHIJU NESAMONY SHRI NAGARAJAN *(Alternate)*
Travancore Cocotuft Private Limited, Cherthala	SHRI P MAHADEVAN
BIS Directorate General	SHRI J. K. GUPTA, SCIENTIST 'E'/DIRECTOR and Head (Textiles) [Representing Director General (*Ex-officio*)]

Member Secretary

SHRI TANISHQ AWASTHI
SCIENTIST 'B'/ASISTANT DIRECTOR
(Textiles), BIS