भारतीय मानक

Indian Standard

IS 13959 : 2023

वस्त्रादि — पॉलीप्रोपाइलीन सुतली — विशिष्टि

(पहला पुनरीक्षण)

Textiles — Polypropylene *Sutli* — Specification

(First Revision)

ICS 59.080.50

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

December 2023 **Price Group 4**

Cordage Sectional Committee, TXD 09

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft was finalized by the Cordage Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1994. This revision has been made in the light of experience gained since its publication and to incorporate the following major changes:

a) Requirement for identification of material has been incorporated;

b) Marking clause has been modified; and

c) References to Indian standards have been updated.

In the recent years polypropylene *sutli* has been found to be a convenient material for tying of small and light packages, boxes, etc, due to its good breaking load, low elongation and good knotting characteristics. *sutli* is hand woven over the package, knotted and it can be easily removed by means of any sharp edged instruments. Polypropylene *sutli* is used as substitute to jute or cotton twine.

Polypropylene *sutli* is generally produced from homopolymer of polypropylene by extrusion1 technique. Polymer is extruded into tubular film, water quenched by passing through a sizing ring, slit into suitable width, stretched between the two take up units over heated plates or hot air oven, twisted and wound on automatic winders. Normally 1 : 5 stretch ratio is kept. However, higher stretch ratios are also maintained depending upon the end product requirements. Length of *sutli* converted from a kilogram of polymer and its quality depends on the polypropylene grade used and the stretch ratio kept during processing.

Various melt flow index grades of polypropylene are being used for *sutli* production. However, the recommended melt flow index (MFI) value is 3.0.

The composition of the Committee responsible for the formulation of this standard is given in 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 : 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

TEXTILES — POLYPROPYLENE SUTLI — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for *sutli* made out of polypropylene (PP).

1.2 This standard may involve hazardous materials, operations and types of equipment. It does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions 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 these standards.

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS 1670, IS 2828 and IS 3871 shall apply.

4 TYPES

Depending upon the yield per kilogram of the polymer and the strength required for specific end use applications and economics, three types of PP-*sutli* have been identified:

Sl No.	*Type*	*Yield*
(1)	(2)	(3)
i)	I	1 500 metres/kg
ii)	II	2 000 metres/kg
iii)	III	3 000 metres/kg

5 MATERIAL

The material shall generally be of grades PP-HY-95-015 Nat and PP-HY-95-030 Nat conforming to IS 10951.

6 ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTS

The tests shall normally be carried out under prevailing atmospheric conditions. In all cases of dispute, however, the tests shall be carried out on samples that have been conditioned for 24 h in a standard atmosphere at (65 ± 2) percent relative humidity and 27 °C ± 2 °C temperature as prescribed in IS 6359. Where practicable the tests shall be carried out in the standard conditioning atmosphere, otherwise they shall be carried out as quickly as possible but not exceeding 15 min after removal of the test pieces from the conditioning atmosphere.

7 REQUIREMENTS

7.1 Material Identification

The material of *SULTI* that is PP shall be identified by the confirmatory test as specified in IS 667.

7.2 The various types of PP-*sutli* as mentioned in **4** shall meet the requirements given in Table 1.

8 SAMPLING

8.1 Lot

In any consignment all balls, reels, spools of PP-*sutli* of the same grade shall be grouped together to constitute a lot.

8.1.1 Tests for determining the conformity of the lot to the requirements of the specification shall be done on each lot separately. The number of samples of *sutli* balls, reels, spools to be selected for this purpose shall be in accordance with following formula:

$$S = 0.4\sqrt{N}$$

where

S = number of packages of balls, reels, spools to be selected as samples; and

N = size of the lot expressed as a number of packages.

When S as calculated is not a whole number, it shall be rounded off to give a whole number in accordance with IS 2. Sampling shall be as representative as possible of the lot subjected to measurements and tests.

8.1.2 The balls, reels, spools shall be selected at random from the lot. In order to ensure the randomness of selection, procedures given in IS 4905 may be followed.

Table 1 Requirements of Polypropylene *Sutli*

(*Clauses* 7.2 *and* 8.2)

Sl No.	Characteristics	Requirements			Tolerances, Percent	Methods of Test, Ref to IS No.
		Type I	Type II	Type III		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Denier	6 000	4 500	3 000	± 10	7071
ii)	Breaking load, kg, *Min*	24	20	15	—	1670
iii)	Elongation at break, percent, *Max*	25	25	25	—	1670

8.2 Number of Tests and Criteria for Conformity

8.2.1 From each of the packages of balls, reels, spools selected, at least five balls, reels, spools shall be drawn at random for carrying out various tests as prescribed in Table 1. For each test at least two test specimens shall be selected from each ball, reel and spool.

8.2.2 The lot shall be declared as conforming to the requirements of the specification, if the requirements for various characteristics as given in Table 1 are satisfied.

9 PACKING AND MARKING

9.1 Unless otherwise agreed between the buyer and the seller, the PP-*sutli* shall be packed in the form of balls, reels and spools.

9.2 Each package containing *sutli* shall be marked with the following information:

a) Indication of the source of manufacture and its trade-mark, if any; and

b) Name and type of the material;

c) Net mass of the package;

d) Month and year of manufacture; and

e) Any other information as required by the law in force.

NOTES — Each package shall be marked with a recycling logo as shown below. The logo shall be clearly visible on the package's slip.

9.2.1 Any other marking as agreed to between the buyer and the seller may also be given.

9.3 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 each package of PP-*sutli* may be marked with the Standard Mark.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 667 : 1981	Methods for identification of textile fibres (*first revision*)
IS 1670 : 1991	Textiles —Yarns — Determination of breaking load elongation at break of single strand (*second revision*)
IS 2828 : 2019/ ISO 472 : 2013	Plastics — Vocabulary (*second revision*)
IS 3871 : 2013/ ISO 1968 : 2004	Fibre ropes and cordage — Vocabulary (*third revision*)
IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 6359 : 2023	Method for conditioning of textiles (*first revision*)
IS 7071 : 2021/ ISO 2307 : 2019	Fibre ropes — Determination of certain physical and mechanical properties (*second revision*)
IS 10951 : 2020	Specification for polypropylene (PP) materials for moulding and extrusion (*second revision*)

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Cordage Sectional Committee, TXD 09

Organization	*Representative(s)*
Indian Institute of Technology Delhi, New Delhi	PROF (DR) R. CHATTOPADHYAY **(*Chairperson*)**
Azuka Synthetics LLP, Panchkula	SHRI SUSHANT GUPTA SHRI DEVRAJ THAKUR (*Alternate*)
Central Coir Research Institute, Kochi	DR SHANMUGASUNDARAM O. L. SHRIMATI SUMI SEBASTIAN (*Alternate*)
Chhotanagpur Rope Works Private Limited, Ranchi	SHRI SIDDHARTH JHAWAR SHRI ANURAG JHAWAR (*Alternate*)
Central Institute of Petrochemicals Engineering and Technology (CIPET), Bhopal	REPRESENTATIVE
Coast Guard Headquarters, New Delhi	CMDT RAJNEESH DY CMDT SADHANA SINGH (*Alternate*)
Crown Industries, Kolkata	SHRI SANJEEV AGARWAL SHRI G. H. BHUNIA (*Alternate*)
Delta Ropes Manufacturing Company, Kolkata	SHRI ANAND MAJARIA SHRI AAYUSH MAJARIA (*Alternate*)
DGQA (HQ), New Delhi	SHRI R. K. BORUAH SHRI K. I. SINGH (*Alternate*)
Garware Technical Fibres Limited, Pune	SHRI KISHOR J. DARDA SHRI SATISH J. CHITNIS (*Alternate*)
ICAR - National Institute of Natural Fibre Engineering and Technology (ICAR-NINFET), Kolkata	SHRI SURAJIT SENGUPTA DR KARTICK SAMANTA (*Alternate*)
Indian Jute Industries Research Association, Kolkata	MS SOUMIATA CHOWDHURY SHRI PARTH SANYAL (*Alternate*)
Indian Jute Mills Association, Kolkata	SHRI SAMIR KUMAR CHANDRA SHRI BHUDIPTA SAHA (*Alternate*)
Jayshree Fibre Products Limited, Kolkata	SHRI N. K. SOMANI SHRI MANOJ BIYANI (*Alternate*)
Kohinoor Ropes Pvt Ltd, Aurangabad	SHRI VINAY CHANDAK SHRI SUNIL BIHANI (*Alternate*)
Office of the Jute Commissioner, Kolkata	SHRI SOUMYADIPTA DATTA SHRI P K BISWAS (*Alternate*)
Office of the Textile Commissioner, Mumbai	SHRI SANJAY CHARAK SHRI N. K. SINGH (*Alternate*)
Oil and Natural Gas Corporation (ONGC), Mumbai	SHRI AJAY KUMAR KAPSHE MS MANASI SAIKIA (*Alternate*)
Oil India Limited (OIL), Assam	SHRI NAYAN JYOTI GOSWAMI SHRI KRANTIJYOTI DEKA (*Alternate*)
Protherm Engineering Pvt Ltd, Faridabad	SHRI RATNESH DEWAN SHRI SANJEEV KUMAR SHARMA (*Alternate*)

Organization	*Representative(s)*
Shipping Corporation of India Limited, Mumbai	CAPT YOGESH PURI
Thanawala and Company, Mumbai	SHRI HEMAL M. THANAWALA SHRI VIVAAN THANAWALA (*Alternate*)
Tufropes Private Limited, Silvassa	SHRI ANURAG SARIN SHRI SHASHI BHUSHAN NEGI (*Alternate*)
BIS Directorate General	SHRI J. K. GUPTA, SCIENTIST 'E'/DIRECTOR AND HEAD (TEXTILES) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI ASHWANI KUMAR
SCIENTIST 'B'/ASSISTANT DIRECTOR
(TEXTILES), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

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.

This Indian Standard has been developed from Doc No.: TXD 09 (22582).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi