Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”


“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartrhari—Nitisatakam
“Knowledge is such a treasure which cannot be stolen”
Indian Standard

TEXTILES — TARPALINS MADE FROM HIGH DENSITY POLYETHYLENE WOVEN FABRIC — SPECIFICATION

( Fourth Revision )

ICS 59.060.20; 59.080.40

© BIS 2011

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

October 2011

Price Group 3
FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Materials Made from Polyolefins (Excluding Cordage) Sectional Committee had been approved by the Textile Division Council.

The tarpaulins manufactured from laminated high density polyethylene (HDPE) woven fabric are in use as these tarpaulins are light weight and have high mechanical strength and long useful life.

This standard was first published in 1976 and revised in 1984, 1995 and 2005. In this standard the varieties covered have been dispensed with and the quality is based on the mass of the fabric used in the manufacture of tarpaulin.

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

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.
1 SCOPE
This standard prescribes constructional and other requirements for tarpaulins made from high density polyethylene woven fabric having minimum mass of 200 g/m².

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 the standards indicated in Annex A.

3 MATERIALS

3.1 HDPE Tapes
Tapes shall be manufactured from HDPE granules (see IS 6192), which shall be UV stabilized by adding suitable UV stabilizer or carbon black. The tape, if manufactured by using carbon black shall contain minimum 2.5 percent of carbon black by mass when tested as per IS 2530 and the finished tarpaulin shall meet the requirements of UV stability and colour fastness to light as given in Table 1.

3.2 HDPE Fabric
Tarpaulins shall be manufactured from HDPE woven fabric (see IS 6899) so that finished tarpaulin meets the requirements given in 5.2, 5.3 and Table 1.

3.3 Laminating Film
3.3.1 The fabric shall be laminated on both sides with the low density polyethylene (LDPE) or suitable combination of LDPE and linear low density polyethylene (LLDPE) melt of coating grade. Coating thickness shall not be less than 25 µm and the film shall be suitably UV stabilized by incorporating UV stabilizer or carbon black. The film, if manufactured by using carbon black, shall contain minimum 2.5 percent of carbon black by mass when tested as per IS 2530 along with colour master batch to get the desired shade such that the finished tarpaulin meets the requirements of UV stability and colour fastness to light as given in Table 1.

3.3.2 In case two or more layers of HDPE fabric are used to manufacture tarpaulins, they shall be joined by sandwich lamination. The lamination as given above shall be such that the finished tarpaulin meets the requirements given in Table 1. The minimum thickness of the sandwich lamination shall be 40 µm.

3.4 Eyelets
Unless otherwise agreed to between the buyer and the seller, metallic eyelets provided with reinforcement pieces conforming to dimensions as per size 28 or 30 of IS 4084 shall be used. Plastic eyelets having similar dimensions may also be used, if agreed to between the buyer and the seller.

3.5 Line/Cord Beading
A line/cord beading of minimum 2.5 mm diameter shall be provided along the length and width of the tarpaulin.

4 MANUFACTURE

4.1 Construction
The tarpaulins shall be constructed by heat sealing laminated pieces of woven fabric of the desired dimensions. The panels shall be flat (lap) joined. The ends and sides of the tarpaulins shall be hemmed by heat sealing or lock type double stitching. The width of the hem shall be minimum 40 mm. Cross joint may be used at the rate of one in every third panel and no piece less than 900 mm in length shall be used for making the panel. The cross-joint shall be made by lap-joint method. A combination of panel width not less than 1 800 mm may be used to obtain the desired width of tarpaulin. Narrow width panels, not less than 250 mm at rate of one per tarpaulin may be used with other panels to obtain the required width. In all cases, the end panels shall be of full width except where the width of the tarpaulin is less than 2 m, in which case one of the end panels may be less than the full width. The alternate short panels for cross-joint shall be in the opposite ends.
4.2 Bonding

If two or more pieces of fabrics are used for the manufacture of tarpaulin, the fabrics shall be bonded together by a suitable heat sealing process keeping an overlap of at least 2.5 cm.

4.3 Fixing of Eyelets

The number and position of metal/plastic eyelets shall be as agreed to between the buyer and the seller. The eyelets shall be provided with the reinforcement pieces. The outer edge of the eyelet shall be as close as possible to the line/cord beading.

5 REQUIREMENTS

5.1 The tarpaulins shall meet the requirements as given in Table 1. Besides the tarpaulins shall also meet the requirements stated in 5.2 and 5.3.

5.2 Dimensions and Mass

The tarpaulins shall be made to the shade and dimensions as specified in the contract or order. The following tolerance shall be permissible for length, width and mass:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance, Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>±1</td>
</tr>
<tr>
<td>Width</td>
<td>±1</td>
</tr>
<tr>
<td>Mass (g/m²)</td>
<td>+5</td>
</tr>
<tr>
<td></td>
<td>on declared mass subject</td>
</tr>
<tr>
<td></td>
<td>−2.5</td>
</tr>
<tr>
<td></td>
<td>to minimum mass of 200 g/m²</td>
</tr>
</tbody>
</table>

5.3 Water Proofness

5.3.1 The fabric and joints of the tarpaulins shall be tested before and after ageing for water repellency by cone test according to IS 7941 and for resistance to water penetration by the pressure head test according to IS 7940 keeping the height of water column as 900 mm and the time of exposure being 1 h. The test specimen shall be so selected that at least one joint is covered. There shall be no leakage when tested by cone test and water does not leak through the tarpaulin when tested for resistance to water penetration by the pressure head test from any test specimen.

5.3.2 The ageing shall be done at 70° for 168 h as per the method given in IS 7016 (Part 8).

6 MARKING

6.1 Each tarpaulin shall be legibly marked with the following information at one corner on one side either with tag or by printing on it with the indelible ink:

a) Name and address of manufacturer;
b) Dimensions and mass;
c) Month and year of manufacture; and
d) Any other information as required by the law in force.

6.2 BIS Certification Marking

The tarpaulins may also be marked with the Standard Mark.

6.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and Rules and Regulations made thereunder. The details of the conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or

---

**Table 1 Requirement of Tarpaulins Made from HDPE Woven Fabrics**

*(Clauses 3.1, 3.2, 3.3.1, 3.3.2 and 5.1)*

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Characteristics</th>
<th>Requirement</th>
<th>Tolerance Percent</th>
<th>Method of Test, Ref to</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>IS No.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(5)</td>
</tr>
<tr>
<td>i)</td>
<td>Mass, g/m², Min</td>
<td>200</td>
<td>+5</td>
<td>IS 1964</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>−2.5</td>
<td>IS 1969</td>
</tr>
<tr>
<td>ii)</td>
<td>Breaking strength before UV exposure, N, Min;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Warp</td>
<td>981</td>
<td>—</td>
<td>IS 13162</td>
</tr>
<tr>
<td></td>
<td>b) Weft</td>
<td>750</td>
<td>—</td>
<td>IS 13162</td>
</tr>
<tr>
<td>iii)</td>
<td>Elongation at break, percent (warp and weft)</td>
<td>20</td>
<td>±5</td>
<td>IS 1969</td>
</tr>
<tr>
<td>iv)</td>
<td>Retention of breaking strength after UV exposure for 150 h, percent, N</td>
<td>85 percent of original value (fabric), that is of Table 1 SI No. (ii)</td>
<td>—</td>
<td>IS 13162</td>
</tr>
<tr>
<td>v)</td>
<td>Welded seam strength before UV exposure, N, Min</td>
<td>65 percent of original value (fabric), that is of Table 1 SI No. (ii)</td>
<td>—</td>
<td>IS 1969</td>
</tr>
<tr>
<td>vi)</td>
<td>Retention of welded seam strength after UV exposure, percent, N</td>
<td>85 percent of original value, that is of Table 1 SI No. (v)</td>
<td>—</td>
<td>IS 13162</td>
</tr>
<tr>
<td>vii)</td>
<td>Tongue tear strength, N, Min</td>
<td>120</td>
<td>—</td>
<td>IS 14293</td>
</tr>
<tr>
<td>viii)</td>
<td>Puncture resistance, N, Min</td>
<td>200</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>ix)</td>
<td>Colour fastness to light (For coloured tarpaulins)</td>
<td>4 or better</td>
<td>—</td>
<td>IS 2454</td>
</tr>
</tbody>
</table>
producers may be obtained from the Bureau of Indian Standards.

7 PACKING
The tarpaulins shall be packed as agreed to between the buyer and the seller.

8 SAMPLING AND CRITERIA OF CONFORMITY

8.1 Lot
The quantity of tarpaulin of same size and mass (g/m²) manufactured under similar conditions and delivered to a buyer against one dispatch note shall constitute a lot.

8.2 Unless otherwise agreed to between the buyer and the seller, the number of tarpaulins to be selected at random from a lot shall be as given in col 3 of Table 2.

8.3 Criteria of Conformity

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. of Tarpaulins/Criteria of Conformity</th>
<th>Test Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions, average mass (g/m²)</td>
<td>According to col 3 of Table 2</td>
<td>The defective tarpaulins not to exceed the corresponding number given in col 5 of Table 2</td>
</tr>
<tr>
<td>Water proofness</td>
<td>According to col 4 of Table 2</td>
<td>All the test specimens shall pass the test</td>
</tr>
<tr>
<td>All other requirements</td>
<td>According to col 4 of Table 2</td>
<td>The test specimens shall meet the requirements as given in Table 1</td>
</tr>
</tbody>
</table>

Table 2 Sampling
(Clause 8.2 and 8.3)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>No. of Tarpaulins in Lot</th>
<th>Sample Size</th>
<th>Sub-sample Size</th>
<th>Permissible No. of Defective Tarpaulins</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>i)</td>
<td>Up to 50</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>ii)</td>
<td>51-150</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>iii)</td>
<td>151-300</td>
<td>8</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>iv)</td>
<td>301-500</td>
<td>13</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>v)</td>
<td>501 and above</td>
<td>20</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

ANNEX A
(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964 : 2001</td>
<td>Textiles — Methods for determination of mass per unit length and mass per unit area of fabrics (second revision)</td>
<td>2530 : 1963</td>
<td>Methods of test for polyethylene moulding materials and polyethylene compounds</td>
</tr>
<tr>
<td>2454 : 1985</td>
<td>Methods for determination of colour fastness of textile materials to artificial light (Xenon lamp) (first revision)</td>
<td>6192 : 1994</td>
<td>Textiles — Monoaxially oriented high density polyethylene tapes — Specification (second revision)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6899 : 1997</td>
<td>Textiles — High density polyethylene (HDPE) woven fabrics — Specification (second revision)</td>
</tr>
</tbody>
</table>
ANNEX B  
[Table 1, SI No. (viii)]

TEST METHOD FOR INDEX PUNCTURE RESISTANCE

B-1 GENERAL

This test method is used to measure the index puncture resistance of tarpaulins.

B-2 PRINCIPLE

A test specimen is clamped without tension between circular plates of a ring clamp attachment secured in a tensile testing machine. A force is exerted against the centre of the unsupported portion of the test specimen by a solid steel rod attached to the load indicator until rupture of the specimen occurs. The maximum force recorded is the value of puncture resistance of the specimen.

B-3 APPARATUS

B-3.1 Tensile/Compression Testing Machine, of the constant-rate-of extension (CRE) type.

B-3.2 Ring Clamp Attachment, consisting of concentric plates with an open internal diameter of 45 ± 0.025 mm capable of clamping the test specimen without slippage. A suggested clamping arrangement is shown in Fig. 1. The external diameter is suggested to be 100 ± 0.025 mm. The diameter of the six holes used for securing the ring clamp assembly is suggested to be 8 mm and equally spaced at a radius of 37 mm. The surfaces of these plates can consist of grooves with ‘o’-rings or coarse sandpaper bonded onto opposing surfaces.

B-3.3 Solid Steel Rod, with a diameter of 8 ± 0.01 mm having a flat end with a 45° × 0.8 mm chamfered edge contacting the test specimen’s surface (see Fig. 2).

B-4 SAMPLING

B-4.1 Laboratory Sample

For the laboratory sample take a swatch extending the full width of the product, of sufficient length along the selvage from each sample roll so that the requirements of B-4.2 can be met.

B-4.2 Test Specimens

Select from the laboratory sample, sufficient number of samples each having a minimum diameter of 100 mm to facilitate clamping. Space the specimens along a diagonal on the unit of the laboratory sample. Take no specimens nearer the selvage or edge of the tarpaulin.

B-5 CONDITIONING

Bring the specimens to moisture equilibrium in the atmosphere for testing tarpaulins (65 ± 5 percent relative humidity and at 27 ± 2°C). Equilibrium is considered to have been reached when the increase in the mass of the specimen, in successive weighings made at intervals of not less than 2 h, does not exceed 0.1 percent of the mass of the specimen.

B-6 PROCEDURE

B-6.1 Select the load range of the tensile/compression testing machine such that the rupture occurs between 10 and 90 percent of the full-scale load.

B-6.2 Centre and secure the specimen between the holding plates ensuring that the test specimen extends to or beyond the outer edges of the clamping plates.

B-6.3 Test at a machine speed of 300 ± 10 mm/min until the puncture rod completely ruptures the test specimen.

NOTE — The rate of testing specified is not an indication of the performance of the specimen for its end use.

B-6.4 Read the puncture resistance from the greatest force registered on the recording instrument during the test.

B-7 CALCULATION

Calculate the average puncture resistance and standard deviation for all tests as read directly from the recording instrument.
Fig. 1 Test Fixture Detail
(Not to Scale)

Fig. 2 Test Probe Detail
(Not to Scale)
## ANNEX C

### (Foreword)

**COMMITTEE COMPOSITION**

Textile Materials Made from Polyolefins (Excluding Cordage) Sectional Committee, TXD 23

### Organization

- Indian Institute of Packaging, Mumbai
- All India Flat Tape Manufacturers Association, Bangalore
- Central Institute of Plastics Engg & Technology (CIPET), Chennai
- Chemical and Petrochemicals Manufacturers Association, New Delhi
- Directorate of Sugar, New Delhi
- Food Corporation of India, New Delhi
- GAIL, New Delhi
- Gujarat Narmada Valley Fertilizers Co Ltd, Narmadanagar
- Haldia Petrochemical Ltd, Kolkata
- Indian Sugar Exim Corporation Ltd, New Delhi
- Indian Sugar Mills Association, New Delhi
- Lamifabs & Papers (P) Ltd, Aurangabad
- Ministry of Consumer Affairs, Food & Public Distribution, New Delhi
- Office of the Textile Commissioner, Mumbai
- Reliance Industries Ltd, Mumbai
- Texel Industries Ltd, Santej (Ahmedabad)
- The Fertilizer Association of India, New Delhi
- VCPL Ltd, Vadodara
- Wopolin Plastics Ltd, Nagpur
- BIS Directorate General

### Representative(s)

- **Prof. N. C. Saha** (*Chairman*)
  - Smt. T. M. Mallik (*Alternate*)
  - Shri Lalit K. Tulsiyan
  - Shri S. Chaudhary (*Alternate*)
  - Dr. S. K. Nayak
  - Dr. Sushil K. Verma (*Alternate*)
  - Dr. E. Sunderasen
  - Dr. T. Gangopadhyay (*Alternate*)
  - Shri Rajiv Ranjan
  - Shri S. C. Ray (*Alternate*)
  - Shri G. P. Pandey
  - Shri N. C. Gautam (*Alternate*)
  - Shri A. K. Ray
  - Shri M. Khandelwal (*Alternate*)
  - Shri Girish M. Patel
  - Shri N. S. Acharya (*Alternate*)
  - Shri Raj K. Datta
  - Shri Suvomoy Ganguly (*Alternate*)
  - Shri Pradeep Mathur
  - Shri V. K. Jain (*Alternate*)
  - Shri K. K. Sharma
  - Shri Kamesh Dhoot
  - Shri Kishori Lal (*Alternate*)
  - Shri Ashok Kumar
  - Dr. Subhash Gupta (*Alternate*)
  - Dr. N. S. Rawat
  - Shri B. B. Bharti (*Alternate*)
  - Dr. U. K. Saroop
  - Dr. Sunil Mahajan (*Alternate*)
  - Shri Shailesh R. Mehta
  - Shri Sushil Pachisia (*Alternate*)
  - Shri R. C. Gupta
  - Dr. R. K. Tewari (*Alternate*)
  - Shri V. Srinivasan
  - Shri Anup Gopalkar (*Alternate*)
  - Shri Vinod K. Bajaj
  - Shri K. N. Baiswar (*Alternate*)
  - Shri P. Bhatnagar, Scientist F & Head (Textiles)
  - [Representing Director General (Ex-officio)]

### Member Secretary

Shri Anil Kumar

Scientist E (Textiles), BIS
Bureau of Indian Standards

BIS is a statutory institution established under the Bureau of Indian Standards Act, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

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 23 (0907).

Amendments Issued Since Publication

<table>
<thead>
<tr>
<th>Amend No.</th>
<th>Date of Issue</th>
<th>Text Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.org.in

Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
          NEW DELHI 110002
          2323 7617
          2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi
          KOLKATA 700054
          2337 8499, 2337 8561
          2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022
          60 3843
          60 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113
          2254 1216, 2254 1442
          2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
          MUMBAI 400093
          2832 9295, 2832 7858
          2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN.
          FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW.
          NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM.
          VISAKHAPATNAM.

Published by BIS, New Delhi