भारतीय मानक
Indian Standard

IS 17399 : 2020

वस्त्रादि — मेल छंटाई, भंडारण, परिवहन और वितरण के लिए पोलीप्रोपाइलीन (पीपी)/ उच्च घनत्व पोलीइथाइलीन (एच. डी. पी. ई) के परत युक्त बुने हुए बोरे — विशिष्टि

Textiles — Polypropylene (PP)/ High Density Polyethylene (HDPE) Laminated Woven Sacks for Mail Sorting, Storage, Transport and Distribution — Specification

ICS 55.080

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

November 2020 **Price Group 6**

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

FOREWORD

This Indian Standard 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 Textiles Division Council.

Polypropylene and high density polyethylene laminated woven fabric sacks are being used for sorting, storage, transport and distribution of mail parcels. This standard has been prepared taking into consideration the increased consumption of laminated woven sacks for postal services. The advantages of laminated woven sacks are high tensile strength, outstanding durability, good dimensional stability, easy handling, partial waterproofing property, improved barrier to moisture, light weight, good aesthetics and good printability for multicolour graphic images.

The composition of the Committee responsible for the formulation of this standard is given at Annex F.

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

TEXTILES — POLYPROPYLENE (PP)/HIGH DENSITY POLYETHYLENE (HDPE) LAMINATED WOVEN SACKS FOR MAIL SORTING, STORAGE, TRANSPORT AND DISTRIBUTION — SPECIFICATION

1 SCOPE

This standard prescribes requirements of polypropylene (PP) and high-density polyethylene (HDPE) laminated woven sacks for mail sorting, storage, transport and distribution.

This standard defines commonly used terminology, fabric construction details and specification, sack description, sack dimensions, testing and analysis of sacks and, sack performance criteria.

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 definitions shall apply.

3.1 Flat Fabric — Woven fabric in the form of a flat sheet. The flat fabric may be produced by longitudinally cutting the circular woven tubular fabric and subsequent winding of the cut open fabric in flat form on winding roll. Alternately, flat fabrics may also be produced on flat weaving looms.

3.2 Grommet — A ring or edge strip inserted into a hole through fabric. Grommets are generally flared or collared on each side to keep them in place and are often made of metal or plastic.

3.3 Laminated Woven Sack — A flexible container made essentially from woven fabric and coated with a thin film of polymer and closure at bottom end with an open top.

3.4 Lamination — Extrusion coating of thin film of polymer on woven fabric surface to improve barrier to moisture vapour and for better aesthetics.

3.5 Open Mouth Sack — Fabricated sack with closure at bottom end and with an open top end.

3.6 Tubular Fabric — Woven fabric in the form of a cylindrical tube. The tubular fabric may be circular seamless woven fabric produced on a circular weaving loom.

3.7 Unlaminated Woven Sack — A flexible container made essentially from woven fabric, with closure at bottom end and with an open top end.

3.8 UV Stabilization — UV stabilizing is additive treatment of polymer during tape extrusion process to enhance tape performance against degradation of useful properties caused by sunlight during outdoor weathering.

4 TYPES

The sacks shall be categorized under 3 types as Type I, Type II and Type III, based on sack dimensions as given in **5.4.2**, however, the weight carrying capacity for all types of sacks shall be minimum 35 kg. The different sizes of sacks are required for storage and packing of different bulk density parcels.

5 MANUFACTURE

5.1 Raw Materials

Raw materials PP and HDPE used for manufacture of tape shall conform to the requirements specified in IS 10910 or IS 10146, respectively, excluding overall migration.

NOTES

1 As agreed to between the buyer and the seller, the tapes may be UV stabilized to enhance outdoor weatherability resistance.

2 Woven sack manufacturers may use maximum up to 10 percent of reworked inhouse process waste (excluding laminated fabric waste), without compromising the final performance criteria of sack.

3 All materials used for manufacturing of laminated woven sack shall be chosen in such a way that reprocessing is promoted.

5.2 Fabric

The flat fabric used in the manufacture of laminated woven fabric sacks shall be woven from tapes having 2.5 ± 0.2 mm tape width, conforming to IS 11197 for PP tapes and IS 6192 for HDPE tapes. The tapes may be of white colour or any other colour as agreed

between buyer and seller. The linear density of tapes shall be 800 denier and, fabric shall be of 10 × 10 mesh. The denier of tape used in the manufacture of woven fabric shall be subjected to the following tolerances:

a) ± 10 percent on individual value, and

b) ± 5 percent on average.

The construction of fabric shall be as given in Table 1. The unlaminated fabric mass, when tested as per the method given in Annex B, shall be minimum 70 g/m^2.

5.3 Lamination

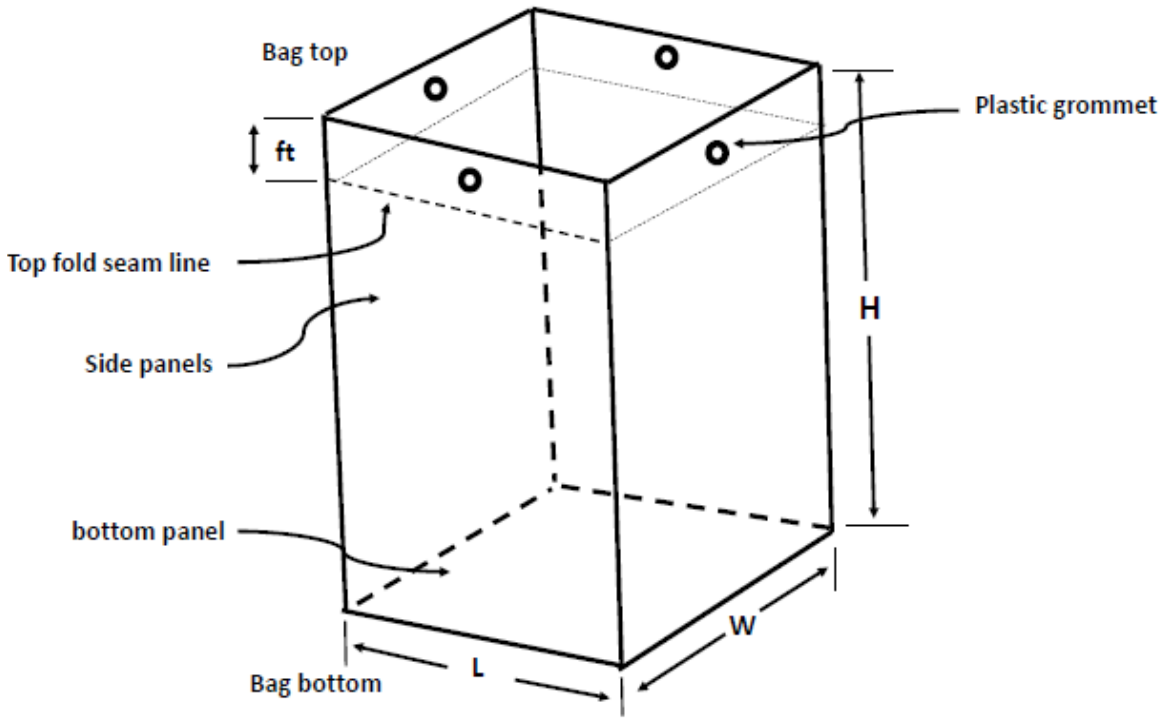
PP/HDPE flat fabric, before converted into sacks shall be laminated on one side with a thin film of polypropylene for PP sacks or linear low-density polyethylene (LLDPE) for HDPE sacks. For improved adhesion and good lamination processability, addition of low-density polyethylene (LDPE) and small quantity of special elastomers in coating formulation may be used.

The coating mass for lamination applied to base fabric shall be minimum 25 g/m^2. The total mass of laminated woven fabric, when tested as per the method given in Annex B, shall be minimum 95 g/m^2.

5.4 Sack Fabrication

The flat laminated fabric shall be cut into desired shape and size to make side panels and bag bottom. The bottom panel shall be of square shape whereas, the four side panels shall be of rectangular shape. The side panels, if required, may be printed before sack fabrication process.

Sacks shall have a shape like hollow cuboid with closed bottom and an open top as shown in Fig. 1. The sack shall be fabricated by assembly of intermediate parts cut from the woven laminated fabric. The side panels are first stitched for top fold (f_t). The top fold height shall be of minimum 30 mm and hemmed to sew down the top edge of side panel. The four side panels shall then stitch together at the longitudinal edges from inner side. The stitch row shall be 20 mm from the edge of the fabric to ensure the durable seam and prevent unravelling of stitches and tampering. Then, the bottom panel shall be securely attached to the bottom edges of the side panel assembly by stitching. Finally, one grommet shall be fitted on top fold at the centre of each side panels. The grommet preferably shall be made of plastic and shall have the inner diameter hole of minimum 12.5 mm for holding the bag by inserting the hook or for channeling of tying cord. Figure 1 shows typical dimensional designations for sack.



KEY

L Length of bottom panel — W Width of bottom panel

H Height of side panel — f_t Top fold height

Dotted line on side panels at top indicate top fold closure seam.

FIG. 1 SCHEMATIC DIAGRAM AND DIMENSIONAL DESIGNATIONS OF SACK

5.4.1 *Seam*

The stitching for assembly of side panels at longitudinal edges and stitching of bottom panel to bottom edges of side panels, both shall be done with lock stich or chain stitch type (*see* IS 10789) or as agreed to between the buyer and the seller. For attaching the bottom panel, the stitching shall be done with single fold over seam, so that the stitches pass through a minimum of four layers of the fabric. For double row stitch, two rows of stitches shall be separated from each other by minimum 5 mm and the outer stitch shall be minimum 8 mm from the folded fabric edge. The number of stitches/dm shall be 12 ± 2. The stitching shall be uniform and without any missing stitch, loose thread or a knot.

The material used for stitching shall be polypropylene multifilament yarn or spun yarn twisted thread suitable for the purpose, having breaking load not less than 90 N (*see* Note). For UV stabilized sacks, the material for stitching shall be UV stabilized.

NOTE — For breaking load testing of stitching thread, the nominal gauge length or the initial distance between the clamps before start of test, shall be 200 mm. The test shall be carried out at the rate of traverse of 300 ± 15 mm/min.

5.4.2 *Sack Dimensions*

The dimensions of PP/HDPE woven fabric sacks of different types used for sorting, storage, transport and distribution of mail parcels shall be as given below:

Dimensions	*Sack Type*		
	Type I	*Type II*	*Type III*
L and W	350 × 350	350 × 350	455 × 455
H	750	1050	1220
NOTE – Refer Fig. 1 for dimensional designation.			

5.5 Capacity

The sack shall have the nominal holding capacity of 35 kg for all sack types.

6 REQUIREMENTS

6.1 Mass of Bale

The mass of a bale of sacks, excluding packing materials, shall be within ± 3 percent of the mass calculated by multiplying the number of sacks with the mass of a sack as specified in Table 1.

6.2 Breaking Strength of Laminated Fabric

The breaking strength and elongation at break of laminated fabric shall be measured in accordance with IS 1969 (Part 1). The average breaking strength of laminated fabric at lengthwise and widthwise shall be determined separately.

For stitch seam strength determination, specimen shall be prepared according to IS 9030. It shall be ensured that the stitch seam portion shall be in the midpoint of the test sample length.

The samples selected for fabric breaking strength and stitch seam strength tests shall be free from defects in visual inspection, dimensions, mesh and mass requirements. The tests shall be carried out on the fabric sample taken from center portion of the sack.

6.3 Ash Content

The laminated sack fabric shall be tested for ash content in accordance with the test procedure given in Annex C and shall meet the requirements as specified in Table 1.

6.4 UV Resistance Test

As agreed to between the buyer and the seller, sacks may be manufactured from UV stabilized raffia fabrics. The UV stabilized woven laminated fabric shall have minimum 50 percent retention of the initial breaking strength when tested after the same has been exposed to UV radiation and accelerated weathering in accordance with the test method given in Annex D.

6.5 The sacks shall also conform to the requirements as specified in Table 1.

7 PRINTING, PACKAGING AND MARKING

7.1 Printing

The side panels may be printed by stencil stamping in mono colour. If desired by buyer, the side panels may also be multicolour printed using offset lithography, flexography, gravure or digital printing process. The sacks shall also be printed with identification mark of the sack manufacturer along with the information as required by the buyer using suitable printing ink.

7.2 Packaging

The sacks shall be packed to form a bale using a wrapping layer of PP/HDPE woven fabric and suitably secured. The bale shall contain 500 sacks or as agreed to between the buyer and the seller.

7.3 Marking on Sacks

7.3.1 The sacks shall be marked with the following information:

a) Name and identification mark of sack manufacturer;
b) Recycling logo;
c) Swachh bharat logo; and
d) Any other information as required by the law in force.

Table 1 Requirements of Laminated Woven Fabric Sacks

(*Clauses* 5.2, 6.1, 6.3 *and* 6.5)

Sl No.	Characteristic	Requirement			Tolerance	Method of Test, Ref to
		Type I	Type II	Type III		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Inside dimensions					
	a) Bottom panel ($L \times W$), mm	350 × 350	350 × 350	455 × 455	$^{+20}_{-10}$ mm	Annex B
	b) Open top ($L \times W$), mm	350 × 350	350 × 350	455 × 455	$^{+20}_{-10}$ mm	Annex B
	c) Height (H), mm	750	1050	1220	$^{+20}_{-10}$ mm	Annex B
ii)	Ends per dm	40	40	40	± 2	Annex B
iii)	Picks per dm	40	40	40	± 2	Annex B
iv)	Mass of laminated sack, g (*see* Notes 1 and 2)	135	180	266	± 6 percent	IS 1964
v)	Breaking strength of laminated fabric (Cut strip method[1]), *Min*, N[2] (kgf):					
	a) Lengthwise	785 (80.1)	785 (80.1)	785 (80.1)	–	IS 1969 (Part 1)
	b) Widthwise	785 (80.1)	785 (80.1)	785 (80.1)	–	
vi)	Seam strength of bottom and side panel seam (Cut strip method), *Min,* N[2], (kgf)	343 (35)	343 (35)	343 (35)	–	IS 9030
vii)	Elongation at break of fabric, percent:					
	a) Lengthwise	15 to 25	15 to 25	15 to 25	–	IS 1969 (Part 1)
	b) Widthwise	15 to 25	15 to 25	15 to 25	–	
viii)	Ash content, *Max*, percent					
	(a) For UV stabilized sacks	2.2	2.2	2.2	–	Annex C
	(b) For non-UV stabilized sacks	6.0	6.0	6.0	–	

NOTES

1 The buyer and the seller may agree to the mass of unlaminated and laminated fabric per square meter other than those specified in **5.2** and **5.3** respectively. However, the mass per square meter of unlaminated and laminated woven fabric shall comply with the minimum specified mass requirements as stated in **5.2** and **5.3**.

2 The buyer and the seller may agree to the sack mass higher than those specified in Table 1, however, tolerances of ± 6 percent as specified in Table 1 shall apply. The mass of such sack shall be calculated as per the method given in Annex E.

[1] Sample width = 50 mm, Gauge length = 200 mm.

[2] 1 N = 0.102 kgf (approximately).

7.3 2 The bale cover shall be marked or labelled with the following information:

a) Name of the manufacturer;
b) Month and year of manufacture;
c) Type of sacks;
d) Number of sacks in a bale;
e) Gross weight;
f) Net weight; and
g) Any other information as required by the law in force;

NOTES

1 Each sack shall be marked with a recycling logo as shown below. While marking the symbol, the respective basic raw material name corresponding to polymer identification number shall be indicated below the symbol in accordance with IS 14534.

2 Each product shall also be marked with swachh bharat logo, clearly visible at bottom of the sack, either compatible with the art work of the buyer or in black colour for printing the sack.

7.4 BIS Certification Marking

The sacks 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 sacks may be marked with the Standard Mark.

7.5 Storage

Finished sacks or bales of sacks shall be stored in a ventilated, cool and dry place, covered warehouse at temperature below 50 °C and protected from direct sunlight, smoke, fumes, open flame and radiation.

8 ATMOSPHERIC CONDITIONS FOR SAMPLE CONDITIONING AND TESTING

Prior to test, the specimens shall be conditioned to moisture equilibrium from dry side in the standard atmosphere of 65 ± 2 percent relative humidity and 27 ± 2 °C temperature as laid down in IS 6359.

9 SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Lot

All the PP/HDPE laminated woven sacks packed in bales of the same construction produced under similar conditions of production and delivered to a buyer shall be grouped together to constitute a lot.

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

9.3 The number of samples to be selected depends on the size of lot and the number of bales to be sampled shall be in accordance with col 2 and col 3 of Table 2. The number of sacks to be selected from the bales sampled shall be in accordance with col 4 of Table 2 for visual inspection, ends and picks per decimeter, laminated fabric mass, sack mass and sack dimensions requirements and col 5 of Table 2 for breaking strength of laminated fabric before exposing to UV-radiation, seam strength and elongation at break requirements. The samples shall be selected in accordance with col 6 of Table 2 for determination of ash content. If applicable, the samples shall also be selected in accordance with col 6 of Table 2 for determination of breaking strength of laminated fabric after UV radiation and weathering test.

9.4 Criteria for Conformity

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

a) The number of defective sacks in case of visual inspections, ends and picks per decimeter, laminated fabric mass and sack dimensions is up to 10 percent of the sample size subject to rounding off the fraction to next higher integer.

b) None of the sack and bale of 500 sacks weighs less than the respective lower specified limit after allowing tolerance of ± 6 percent on an individual sack and ± 3 percent on a bale of 500 sacks, higher weight may be accepted.

c) The average breaking strength of fabric in both lengthwise and widthwise is not less than the value specified and none of the individual sack value is more than 10 percent below the specified value. The test samples selected for breaking strength shall be free from defects in visual inspection, dimensions, ends, picks and mass requirements. The tests shall be carried out on the fabric sample taken from centre portion of the sack.

d) The average seam strength of bottom and side panel seam is not less than the value specified and none of the individual sack value is more than 10 percent below the specified value. The test samples selected for seam strength shall be free from defects in visual inspection, dimensions, ends, picks and mass requirements and test carried on the centre portion.

e) If applicable, none of the sack sample after exposing to UV radiation and weathering shall have breaking strength less than 50 percent of the original value of unexposed samples.

f) None of the sample sack shall have percentage elongation and ash content outside the specified range.

Table 2 Sample Size and Criteria for Conformity

(*Clause* 9.3)

Sl No.	No. of Sacks in a Lot	No. of Bales to be Sampled	Sample Size for Visual Inspection, Ends and Picks per Decimeter, Laminated Fabric Mass, Sack Mass and Sack Dimension Requirements	Sample Size for Breaking Strength of Laminated Fabric, Seam Strength and Elongation at Break Requirements	Sample Size for Ash Content and Breaking Strength of Laminated Fabric after Exposure to UV Radiation and Weathering Test Requirements
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 25 000	3	12	8	1
ii)	25 001 to 50 000	5	20	10	2
iii)	50 001 to 100 000	8	32	13	3
iv)	100 001 to 250 000	12	48	18	4

NOTE — If the number of the bales in a consignment exceeds 500, the same shall be split into number of lots each comprising maximum of 500 bales (1 Bale = 500 sacks).

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1964 : 2001	Textiles — Methods for determination of mass per unit length and mass per area of fabrics (*second revision*)
1969 (Part 1) : 2018	Textiles — Tensile properties of fabrics: Part 1 Determination of maximum force and elongation at maximum force using the strip method (*fourth revision*)
6192 : 1994	Textiles — Monoaxially oriented high density polyethylene tapes — Specification (*second revision*)
6359 : 1971	Method for conditioning of textiles
9030 : 1979	Method for determination of seam strength of jute fabrics including their laminates
10146 : 1982	Specification of polyethylene for its safe use in contact to foodstuffs, pharmaceuticals and drinking water
10789 : 2000	Textiles — Stitch types — Classification and terminology (*first revision*)
10910 : 1984	Polypropylene and its copolymer for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
11197 : 1985	Specification for monoaxially oriented polypropylene tapes
14534 : 2016	Plastics — Guidelines for the recovery and recycling of plastics waste (*first revision*)

ANNEX B

[*Clauses* 5.2, 5.3 *and Table* 1, *Sl No.* (i) *to* (iii)]

METHOD OF TEST FOR SACK DIMENSIONS, ENDS AND PICKS PER DECIMETRE AND FABRIC GSM

B-1 METHOD OF TEST FOR SACK DIMENSIONS

Lay each sack as selected in Table 2, flat on a table. Render it free from fold, creases and wrinkles and measures the inside dimensions for length of bottom panel (L), width of bottom panel (W), height of side panel (H) and top fold height (f_t) about the middle to the nearest 1 mm.

B-2 METHOD OF TEST FOR ENDS AND PICKS PER DECIMETER

Count the ends and picks at two places of each sack as selected in Table 2, with a suitable gauge measuring 100 mm. Care shall be taken to avoid counting same set of warp or weft threads more than once. Determine the average ends/dm and picks/dm of each sack under test.

B-3 FABRIC MASS PER UNIT AREA (GSM)

The mass of unlaminated or laminated fabric per unit area is commonly referred to as GSM, the mass in gram per square meter. To determine the mass of fabric per unit area, lay each fabric sample flat on a table top and render it free from folds, creases and wrinkles. Mark the fabric for 100 × 100 mm square area and precisely cut the test specimen. Specimens may also be cut from fabric using a template with sharp cutter of dimensions 100 × 100 mm. Weigh the cut test specimen in grams by digital balance with an accuracy of 0.1 g. Compute the GSM of the cut test specimen by multiplying the digital balance reading by 100. The mean of 10 readings shall be taken over a length of not less than 2 m and reported as mean fabric mass in grams per square meter.

ANNEX C

[*Clause* 6.3 *and Table* 1, *Sl No.* (viii)]

DETERMINATION OF ASH CONTENT

C-1 PRINCIPLE

The procedure is used to find out the inorganic residue in raffia tape/fabric sample by ashing it in a muffle furnace. A weighed amount of tape/fabric sample is heated to 590 °C. The polymer sample (organic portion) is burnt at 590 °C until constant mass of inorganic matter is obtained. The residue (inorganic matter) is reported in terms of percentage ash content in a given sample.

C-2 APPARATUS

C-2.1 Weighing Balance, accurate to 0.001 g.

C-2.2 Silica Crucibles, sufficient volume to accommodate 3 g of sample in such a way that level of the sample after filling the crucible does not cross half the height of crucible.

C-2.3 Bunsen Burner

C-2.4 Silica Triangle and Tripod

C-2.5 Muffle Furnace, capable of being controlled thermostatically at 590 ± 10 °C.

C-2.6 Desicator, containing an effective drying agent (for example silica gel) that does not react chemically with ash components.

C-2.7 Gloves and Crucible Holder

C-3 SAFETY

C-3.1 Burn the sample in an effectively ventilated hood.

C-3.2 Keep the hood closed and do not inhale the fumes of combustion.

C-3.3 Wear gloves and use sample (crucible) holder, to introduce crucible in the furnace.

C-3.4 Sample should be folded properly to accommodate it in silica crucible

C-4 PROCEDURE

C-4.1 Heat the clean crucible at 590 ± 10 °C for 10 to 15 min and cool it in a desicator.

C-4.2 Weigh the empty crucible to nearest 0.001 g.

C-4.3 Weigh about 3 g of raffia tape/fabric sample in the crucible (nearest to 0.001 g).

C-4.4 Heat the crucible directly on bunsen burner so that the sample burns slowly and loss of ash is avoided. Continue burning until no more smoke is evolved.

C-4.5 Transfer the crucible in the muffle furnace, which is already maintained at approximately 590 °C and keep the crucible inside for about 2 h.

C-4.6 Remove the crucible from the furnace and cool it to the room temperature in a desicator. Weigh it and record the weight to accuracy of 0.001 g.

C-4.7 Keep the crucible in the muffle furnace for another half an hour, cool in a desicator and weigh again. Repeat the procedure until constant mass is obtained.

C-5 CALCULATIONS

$$\text{Percent ash content} = \frac{\text{Weight of ash}}{\text{Weight of raffia or tape sample}} \times 100$$

ANNEX D

(*Clause* 6.4)

UV RESISTANCE TEST

D-1 To determine the effect of UV radiation and weathering on the breaking strength, the HDPE/PP laminated woven fabric shall be exposed as given in **D-2** and **D-3**.

D-2 TEST CONDITION

The test shall be carried out with fluorescent UV-lamp Type B (313 nm or its equivalent).

The duration of the test shall be 192 h (that is, eight days) in continuous mode.

The test cycle shall be: 8 h at 60 ± 3 °C with UV-radiation alternating with 4 h at 50 ± 3 °C with condensation. Irradiance level throughout the test shall be maintained at 0.63 (+0.04/–0) W/m^2.

D-3 TEST PROCEDURE

D-3.1 Determine the original average breaking strength of fabric as per the test method specified in IS 1969 (Part 1).

D-3.2 Expose the specimens alternately to ultraviolet light and condensation in respective test cycle in continuous mode for total 192 h.

The type of fluorescent UV-lamp, the timing of the UV and condensation exposure and the temperature of the UV exposure and condensation shall be as specified in **D-2**.

D-3.3 Determine the average breaking strength of the fabric separately after UV exposure as mentioned above.

D-3.4 Determine the percent retention of original strength as follows:

Retention of original breaking strength, percent =

$$\frac{b}{a} \times 100$$

where

a = average breaking strength before UV exposure as obtained in **D-3.1**, and

b = average breaking strength after UV exposure as obtained in **D-3.3**.

NOTES

1 The UV source is an array of fluorescent lamps (with lamp emission concentrated in the UV range).

2 Condensation is produced by exposing the test surface to a heated, saturated mixture of air and water vapors, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

ANNEX E

(*Table* 1, *Note* 2)

METHOD FOR CALCULATION OF MASS OF SACK

E-1 Total mass of flat sacks with bottom stitch comprises of,

a) Mass of fabric for sack ($M_{sp} + M_{bp}$)

b) Mass of stitching thread (M_t)

E-2 Calculate the mass of sack with the help of the following formula as the case may be:

a) Total mass of fabric for sack = ($M_{sp} + M_{bp}$)

1) *Mass of four side panels (with margin for single fold stitching and top fold)*:

$$M_{sp} = [(2 \times (L + 20 + 20) \times (H + 30 + 20)] + [(2 \times (W + 20 + 20) \times (H + 30 + 20)] \times m \times 10^{-6}$$

2) *Mass of bottom panel (with margin for single fold stitching)*:

$$M_{bp} = [(L + 20 + 20) \times (W + 20 + 20) \times m \times 10^{-6}$$

b) *Mass of stitching tape or thread*:

$$M_t = (L_t \times T) \times 10^{-6}$$

where

M = total mass of sack, in g;

M_{sp} = mass of side panels, in g;

M_{bp} = mass of bottom panel, in g;

m = mass of fabric, in grams per square meter (g/m^2);

L = length of bottom panel, in mm;

W = width of bottom panel, in mm;

H = height of side panel, in mm;

f_t = top fold height, in mm;

M_t = mass of stitching thread, in g;

L_t = length of stitching thread in mm (for top fold stich, bottom stitch and longitudinal stitch as applicable); and

T = linear density of stitching thread, in tex.

NOTES

1 Mass of sack shall be determined considering the sack is made of four separate side panels, bottom panel and an open top.

2 For side panels, stitching margin of 20 mm shall be considered along two longitudinal sides, whereas, stitching margin of 20 mm for bottom stitching and 30 mm margin for top fold with stitching.

3 For bottom panel, stitching margin of 20 mm shall be considered for all 4 sides for single fold stitching.

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

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

Organization	*Representative(s)*
In Personal Capacity (*Flat No. P04, IVY Tower, Papillon Park*, *Nahar Amritshakti, Chandivali, Powai, Mumbai-400072*)	Prof (Dr) N. C. Saha (***Chairman***)
ACC Limited, Mumbai	Shri Rahul Karnik Dr Manish Karandikar (*Alternate*)
All India Flat Tape Manufacturers' Association, New Delhi	Shri K. S. Arora Shri V. Venugopal (*Alternate*)
Cement Manufacturers Association, New Delhi	Dr. S. K. Saxena Shri Saurabh Palsania (*Alternate* I) Shri Shubho Chakravarty (*Alternate* II)
Central Institute of Plastics Engineering & Technology (CIPET), Bhopal	Dr S. K. Jain
Chemical and Petrochemicals Manufacturers Association, New Delhi	Shri Mahinder Singh Shri Subrata Samanta (*Alternate*)
Consumer Guidance Society of India, Mumbai	Dr Sitaram Dixit Dr M. S. Kamath (*Alternate*)
Department of Chemical & Petrochemical, New Delhi	Shri O. P. Sharma Shri R. K. Soni (*Alternate*)
Directorate of Sugar, New Delhi	Shri G. S. Sahu Shri Suresh Chandra (*Alternate*)
FICCI, Chemical and Petrochemical Division, New Delhi	Shri Manoj Mehta Shri Amit Kakkar (*Alternate*)
Food Corporation of India, New Delhi	Shri A. S. Arunachalam Shri A. K. U. B. Singh (*Alternate*)
GAIL, New Delhi	Shri Manish Khandelwal
GEM, New Delhi	Representative
Gujarat Narmada Valley Fertilizers Co Ltd, Narmadanagar	Shri Yogesh N. Patel Shri Rakesh S. Agrawal (*Alternate*)
Gujarat State Fertilizers & Chemicals Limited, Gujarat	Shri Dilip Kumar Bhikhabhai Shah Shri Pujan B. Vaishnav (*Alternate*)
Haldia Petrochemical Ltd, Kolkata	Shri Raj K. Datta Shri T. R. Srikanth (*Alternate*)
HPCL-Mittal Energy Limited, Noida	Shri Vineet Kumar Gupta Shri Alakesh Ghosh (*Alternate*)
IFFCO Limited, New Delhi	Shri Harish Kumar Shri Om Prakash Kumar (*Alternate*)
Indian Institute of Packaging, Mumbai	Dr Tanweer Alam Dr Madhab Chakraborty (*Alternate*)
Indian Oil Corporation Limited, New Delhi	Shri Dhanajay Sahoo Shri Raja Poddar (*Alternate*)
Indian Sugar Mills Association, New Delhi	Shri G. K. Thakur Shri Pankaj Rastogi (*Alternate*)

Organization	*Representative(s)*
Inspection Syndicate of India Pvt Ltd, Kolkata	Shri A. K. Basu Shri Arnab Basu (*Alternate*)
Lamifabs & Papers (P) Ltd, Aurangabad	Shri Kamlesh Dhoot Shri Kishori Lal Dhoot (*Alternate*)
Lohia Corp Ltd, Kanpur	Dr Upender Krishen Saroop Shri Rajeev Kumar Dwivedi (*Alternate* I) Shri Himanshu Shukla (*Alternate* II)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	Shri Ashok Kumar Dr Subhash Gupta (*Alternate*)
National Federation of Cooperative Sugar Factories Ltd, New Delhi	Shri K. Muralidhar Chowdary Shri K. V. Nagaraja Setty (*Alternate*)
Office of the Textile Commissioner, Mumbai	Shri N. K. Gupta Shri U. K. Sharma (*Alternate*)
Plastindia Foundation, Mumbai	Shri Surender Choudhary Dr E. Sundaresan (*Alternate*)
RCF Limited, Mumbai	Dr Vilas Tukaram Bagwe Shri Enoch M. Kathal (*Alternate*)
Reliance Industries Ltd, Mumbai	Dr Sunil Mahajan Shri Raju Venkat (*Alternate*)
Texel Industries Ltd, Halol	Shri Shailesh R. Mehta Shri Bhupendra Mehta (*Alternate*)
The Fertilizer Association of India, New Delhi	Dr D. S. Yadav
Ultratech Cement Limited, Mumbai	Dr Awadhesh K. Singh Shri Sandeep Kadam (*Alternate*)
VCPL, Vadodara	Shri V. Sreenivasan Shri Girish M. Patel (*Alternate*)
Windmoller & Holscher India Pvt Ltd, New Delhi	Shri Anuj Sahni Shri Saurabh Kumar Sharma (*Alternate*)
BIS Directorate General	Shri A. K. Bera, Scientist 'F' and Head (TXD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri J. K. Gupta
Scientist 'D' (TXD), 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 latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: TXD 23 (14975).

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 : 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 : Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019 — 265 0206, 265 0290

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. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi