भारतीय मानक
Indian Standard

IS 11652 : 2017
(Reaffirmed 2022)

वस्त्रादि — 50 किग्रा सीमेंट की भराई के लिए उच्च घनत्व पोलीइथाइलीन (एच.डी.पी.ई.) पोलीप्रोपाइलीन (पी.पी.) के बोरे — विशिष्टि

(तीसरा पुनरीक्षण)

Textiles — High Density Polyethylene (HDPE)/ Polypropylene (PP) Woven Sacks for Packaging of 50 kg Cement — Specification

(Third Revision)

ICS 55.080; 65.080

भारतीय मानक ब्यूरो
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November 2017 **Price Group 6**

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

FOREWORD

This Indian Standard (Third 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.

This standard was first published in the year 1986 and subsequently revised in 1992 and 2000. This standard has been revised again to incorporate the following major changes:

a) Requirement for breaking strength of the fabric has been modified.
b) Requirement for breaking strength of the bottom seam has been modified.
c) Requirement for ash content and its test method has been included.
d) Requirement for drop impact strength and its test method has been included.
e) Optional requirement for UV resistance test has been specified.
f) Marking requirements has been modified to include the environment friendly recycling logo on the sacks.
g) Sampling and criteria for conformity has been modified.

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

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 — HIGH DENSITY POLYETHYLENE (HDPE)/ POLYPROPYLENE (PP) WOVEN SACKS FOR PACKAGING OF 50 kg CEMENT — SPECIFICATION

(Third Revision)

1 SCOPE

This standard prescribes the requirements of high density polyethylene (HDPE)/ polypropylene (PP) woven sacks suitable for packaging of 50 kg cement for domestic market.

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 TERMINOLOGY

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

3.1 Flat Sack — A sack manufactured from a flat tube.

3.2 Gusset — A fold inserted in the longitudinal edge of a tube or sack.

3.3 Gusseted Sack — A sack manufactured from a gusseted tube.

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

3.5 Perforation — Holes of appropriate size and layout pierced through the laminated fabric sack walls to facilitate air release during filling of valve sack.

3.6 Plastic Woven Sack — A flexible container made essentially from tubular woven fabric, flat or gusseted, and closed at both end with valve for filling, usually at top corner.

3.7 Tube — Circular woven fabric in the form of a flattened cylinder cut into prescribed lengths.

3.8 Valve — An aperture or a spout, normally situated at top corner of the sack through which the sack is filled, and which, after filling, does not readily allow reverse flow of the filled contents.

4 MANUFACTURE

4.1 Raw Material

The high density polyethylene (HDPE) or polypropylene (PP) used for manufacture of tape shall be virgin and confirm to the requirements specified in IS 10146 or IS 10910, respectively excluding overall migration.

4.2 Fabric

The fabric used in the manufacture of HDPE/PP woven sacks shall be woven as a tube on circular loom from HDPE/PP tapes having width 2.5 mm ± 0.1 mm, and conforming to IS 6192 and IS 11197 respectively, and linear density of 900 denier. The woven fabric shall be of mesh 10 × 10 per inch and 79 g/m^2 weight. The denier of HDPE/ PP 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 particulars of fabric shall be as given in Table 1.

4.3 Sacks

The sacks shall be produced from tubular fabric woven as tube on a circular loom and cut to the required length.

4.4 Seam

The stitching shall be done only at the bottom and at the top of the sack excluding valve. The stitching shall be done with two rows of chain stitches (*see* IS 10789). The 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 outer edge of the sacks. The stitching shall be done with double fold over seam to a depth of minimum 25 mm, so that the stitches pass through a minimum of six layers of the fabric. The number of stitches/dm shall be 14 ± 2. The material used for stitching shall be HDPE/PP tape having minimum 20 percent higher denier than the tapes used in the fabric. Fibrillated thread or multifilament twisted yarn suitable for stitching may also be used. For stitching of UV stabilized sacks, the stitching material shall also

be UV stabilized. The stitching shall be uniform without any missing stitch, loose thread or knot.

4.5 Lamination

If required by the buyer, the fabric woven on circular loom before manufacture into sacks may be laminated by coating with suitable combination of LDPE/LLDPE for HDPE sack and with suitable combination of PP and LDPE for PP sack of adequate thickness. The overhang of lamination coating at both edge of fabric shall be trimmed and the remaining overhang shall not be more than 5 mm after trimming. Laminated valve sacks are usually perforated.

4.6 Capacity

The sack shall have the nominal filling capacity of 50 kg.

4.7 Valve for Filling of Sacks

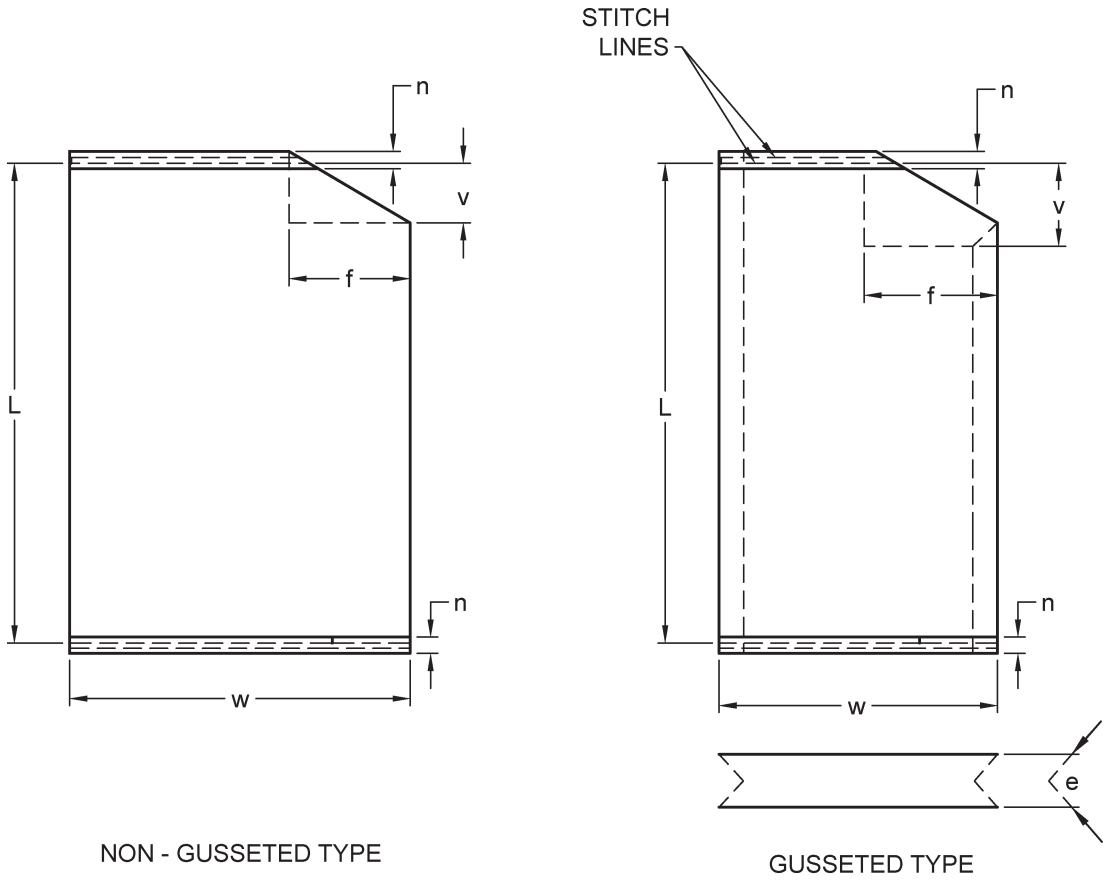
The valve shall be formed at one corner of the top of the sack by folding the corner of the sack inside first (*see* Fig.1). There shall be a double fold at the top seam and then stitching shall be done through six layers.

The depth of the valve (*f*) shall not be less than 2 times the width of the valve (*v*) in case of gusseted sacks and not less than 2.3 times the width of the valve (*v*) in case of non-gusseted sacks.

5 REQUIREMENTS

5.1 Mass of Bale

The mass of 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 sack specified in Table 1.



Keys:

L — Sack Length
W — Sack Width
e — Gusset width
f — Valve Length
v — Valve Sleeve width
n — Fold Length for Stitching

FIG. 1 DIMENSIONAL DESIGNATIONS FOR WOVEN SACK WITH VALVE

5.2 The sacks shall conform to the requirements specified in Table 1.

5.3 Breaking Strength of Fabric

The breaking strength and elongation at break of fabric shall be measured in accordance with IS 1969 (Part 1). The test samples selected for breaking strength shall be free from any defects in visual inspection, dimensions, ends, picks and mass requirements. The test shall be carried out on fabric samples taken from center portion of the sack. The average breaking strength of fabric lengthwise and widthwise shall not be less than the value specified in Table 1.

For seam strength determination, specimen shall be prepared according to IS 9030. It shall be ensured that the seam portion remains in the middle of test sample length. The average seam strength of sack shall not be less than the value specified in Table 1.

5.4 Drop Impact Testing of Filled Sacks

The filled sacks, when tested for drop impact strength, according to the method given in Annex C, shall meet the requirements specified in Table 1.

5.5 Ash Content

The woven sack fabric, when tested for ash content in accordance with the test procedure given in Annex D, shall meet the requirements as specified in Table 1.

5.6 UV Resistance

If agreed to between the buyer and the seller, the sacks shall be manufactured from UV stabilized HDPE/PP fabrics. The UV stabilized woven fabric shall have at least 50 percent retention of the original 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 F.

6 PRINTING, PACKAGING AND MARKING

6.1 Printing

The sacks shall be printed in with identification mark

Table 1 Requirements of HDPE/PP Woven Sacks for Packaging Cement
(*Clauses* 4.2, 5.1, 5.2, 5.3, 5.4 *and* 5.5)

Sl No.	Characteristic	Requirement	Tolerance	Method of Test, Ref to
(1)	(2)	(3)	(4)	(5)
i)	Dimensions, mm (*see* Note)			Annex B
	a) Length of sack, inside (*l*)	710	± 10 mm	
	b) Width of sack (*w*)	480	± 10 mm	
	c) Width of gusset (*e*)	76	± 10 mm	
	d) Width of valve (*v*)	100	+ 10/-5 mm	
	e) Depth of valve (*f*), *Min*	As per **4.7**		
ii)	Ends per dm	40	± 2	Annex B
iii)	Picks per dm	40	± 2	Annex B
iv)	Mass of sack, g (*see* Note)		± 6%	IS 1964
	a) Non-gusseted type	70		
	b) Gusseted type	71		
v)	Average breaking strength of fabric [Ravelled strip method, 325 mm × 70 mm[1)]] *Min,* N[2)] (kgf):			IS 1969 (Part 1)
	a) Lengthwise	900 (91.8)	–	
	b) Widthwise	900 (91.8)	–	
vi)	Breaking strength of top and bottom seam (Ravelled strip method), *Min,* N [2)] (kgf)	400 (40.8)	–	IS 9030
vii)	Elongation at break of fabric (Ravelled strip method), percent :			IS 1969 (Part 1)
	a) Lengthwise	15 to 25	–	
	b) Widthwise	15 to 25	–	
viii)	Drop impact strength	No failure	–	Annex C
ix)	Ash content, *Max,* percent			Annex D
	a) For UV stabilized sacks	2.2	–	
	b) For non-UV stabilized sacks	6	–	

NOTE — The buyer and the seller may agree to dimensions other than those specified above. However, the fabric specification as specified in **4.2** and tolerances as specified in Table 1 shall apply. The mass of sacks with dimensions other than those specified shall be calculated by the method given in Annex E.

[1)] Width after ravelling = 50 mm, Gauge length = 200 mm.
[2)] 1 N = 0.102 kgf (approximately).

of sack manufacturer alongwith the information as required by the buyer using suitable ink by flexography or rotogravure printing.

6.2 Packaging

The sacks shall be packed to form a bale using a layer of HDPE/PP woven fabric and suitably secured. The bale shall contain 500 sacks.

6.3 Marking on Sacks

The bales shall be marked with the following information:

a) Name of the manufacturer,
b) Type and size of sacks,
c) Number of sacks,
d) Gross weight,
e) Net weight,
f) Month and year of manufacture,
g) Identification mark, and
h) Any other information as required by the law in force including recycling Logo.

NOTE — Each sack shall be compulsorily marked with visible recycling logo as given below at a space on bottom of the sack compatible with the art work of the buyer for printing the sack and on the bale.

6.4 BIS Certification Marking

The sacks may also be marked with the Standard Mark.

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

7 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.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot

All the HDPE/PP 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.

8.2 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.

8.3 The number of samples to be selected depends on the size of the 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, dimensions, ends, picks and mass requirements, and shall be in accordance with the col 5 of Table 2 for breaking strength of fabric before exposing to UV-radiation, breaking strength of top and bottom seam and percent elongation at break requirements. The samples shall be selected in accordance with col 6 of Table 2 for determination of breaking strength of fabric after UV-radiation exposure

Table 2 Sample Size and Criteria for Conformity
(*Clause* 8.3)

Sl No.	No. of HDPE/PP Sacks in a Lot	No. of Bales to be Sampled	Sample Size for Visual Inspection, Dimensions, Ends, Picks and Mass Requirements	Sample Size for Breaking Strength of HDPE/PP Fabric before Exposing to UV Radiation, Breaking Strength of Seam and Elongation at Break Requirements	Sample Size for Breaking Strength of HDPE/PP Fabric after Exposing to UV Radiation, Drop Impact Strength and Ash Content
(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).

(if applicable), drop impact strength and ash content.

8.4 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, picks and 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 or bale of 500 sacks weighs less than the respective lower specified limit after allowing tolerance of ± 6 percent on 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 breaking strength of top and bottom 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 sack shall fail in drop impact strength test.

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

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) : 2009	Textiles —Tensile properties of fabrics — Determination of maximum force and elongation at maximum force : Part 1 Strip method (*third 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

ANNEX B

[*Table* 1, *Sl No.* (i) to (iii)]

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

B-1 METHOD OF TEST FOR SACK DIMENSIONS

Lay each sack as selected in Table 2, flat on a table. Render it free from creases and wrinkles and measures the inside length (*l*), width (*w*), gusset width (*e*), valve width (*v*), valve depth (*f*) and fold length for stitching (*n*) about the middle to the nearest 1 mm.

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

Count the ends and picks at two places of each sack as selected in Table 2, with a suitable gauge measuring 50 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.

ANNEX C

[*Clause* 5.4, *Table* 1, *Sl No.* (viii)]

DROP IMPACT TEST FOR FILLED SACKS

C-1 PRINCIPLE

The test procedure is used to determine the drop impact performance of filled sack. This test simulates the sack performance in end-use application such as repeated handing and drop impacting of sack undergoing during loading, unloading and stacking operations.

C-2 FILLING OF SACK FOR TESTING

Sacks shall be filled with material with which they are intended to be used or, if this is not possible, with a similar material to provide the same degree of filling. The bulk density and mass of this similar filling material, if used, shall be within ± 2 percent of the values of the material with which the sack is actually intended to be used.

C-3 DROP IMPACT TESTING OF SACKS

C-3.1 Drop test shall be carried out using suitable sack drop mechanism. Each sack shall be dropped from a height of 1.8 m for the test requirements as specified below:

a) Height of drop = 1.8 m (two times for face side and two times for back side),
b) Height of drop = 1.8 m (one time for left edge and one time for right edge), and
c) Height of drop = 1.8 m (one time for bottom edge and one time for top edge).

C-3.2 As given in Fig. 2, place the sack under test centrally on the platform which is within ± 2 percent of the predetermined drop height as defined by the distance between the lowest point of the sack at the time of drop release and the nearest point of the impact surface.

C-4 CRITERIA FOR PASSING THE TEST

After each drop there shall be no rupture or loss of contents. A slight discharge, for example, from closures or from micro perforations, upon impact shall not be considered a failure of the sack provided that no further leakage occurs after the sack has been raised clear of the ground.

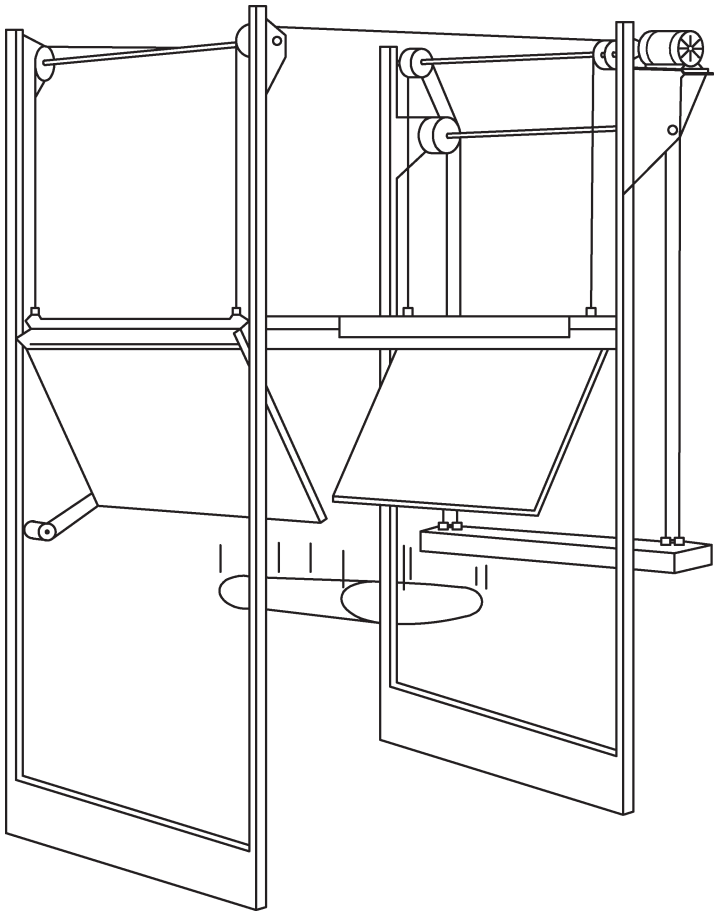


FIG. 2 APPARATUS FOR DROP IMPACT TEST

ANNEX D

[*Clause* 5.5, *Table* 1, *Sl No.* (ix)]

DETERMINATION OF ASH CONTENT

D-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.

D-2 APPARATUS

D-2.1 Weighing Balance, accurate to 0.001 g.

D-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.

D-2.3 Bunsen Burner

D-2.4 Silica Triangle and Tripod

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

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

D-2.7 Gloves and Crucible Holder

D-3 SAFETY

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

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

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

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

D-4 PROCEDURE

D-4.1 Heat the clean crucible at 590 ± 10°C for 10 to15 min and cool it in a desicator.

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

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

D-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.

D-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.

D-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.

D-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.

D-5 CALCULATIONS

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

ANNEX E

(*Table* 1, *Note*)

METHOD FOR CALCULATION OF MASS OF SACKS

E-1 Total mass of sacks comprises of;

a) mass of fabric, and
b) mass of stitching tape or thread.

E-2 Calculation of mass of sack with the help of the following formulae as the case may be:

a) *Mass of tubular fabric*:
   1) For plain, non-gusseted sack;
   $G = [L + (v \times 1.3) + 55 \text{ mm}] \times 2W \times M \times 10^{-6}$
   2) For gusseted sack;
   $G = [L + v + 1/2e + 55 \text{ mm}] \times 2W \times M \times 10^{-6}$

b) *Mass of stitching tape or thread*:
$G_t = L_1 \times T \times 10^{-6}$

where

G = mass of sack, in g;
L = length of sack, in mm (measured for stitch to stitch);
W = width of sack, in mm;
M = mass of fabric, in g/m^2;
v = width of valve, in mm;
e = width of gusset, in mm;
G_t = mass of stitching tape or thread, in g;
L_1 = length of stitching tape or thread, in mm; and
T = linear density of stitching tape, in tex.

ANNEX F

(*Clause* 5.6)

UV RESISTANCE TEST

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

F-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.

F-3 TEST PROCEDURE

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

F-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 **F-2**.

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

F-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 **F-3.1**, and

b = average breaking strength after UV exposure as obtained in **F-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 vapours, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

ANNEX G

(Foreword)

COMMITTEE COMPOSITION

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

Organization	*Representative(s)*
Indian Institute of Packaging, Mumbai	Prof (Dr) N. C. Saha (***Chairman***)
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All India Flat Tape Manufacturers' Association, New Delhi	Shri K. S. Arora Shri Gurdeep Singh (*Alternate*)
Cement Manufacturers Association, New Delhi	Shri V. S. Bajaj Dr S. K. Handoo (*Alternate*)
Central Institute of Plastics Engineering & Technology (CIPET), Chennai	Dr M. Abdul Kader Dr Syed Amanulla (*Alternate*)
Chemical and Petrochemicals Manufacturers Association, New Delhi	Shri Mahinder Singh Shri Subrata Samanta (*Alternate*)
Consumer Guidance Society of India, Mumbai	Representative
DCM Shriram Limited, Kota	Shri Yagnesh K. Gupta Shri Yogesh Agrawal (*Alternate*)
Department of Chemical & Petrochemical, New Delhi	Dr T. K. Chakravarthy Shri A. K. Agarwal (*Alternate*)
DGS & D, New Delhi	Additional Director General, QA
Directorate of Sugar, New Delhi	Chief Director (Sugar) Deputy Director (Sugar Technical) (*Alternate*)
FICCI, Chemical and Petrochemical Division, New Delhi	Shri P. S. Singh
Food Corporation of India, New Delhi	Shri G. P. Yadav Shri K. K. Barua (*Alternate*)
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Gujarat State Fertilizers & Chemicals Limited, Gujarat	Shri S. H. Shah Shri Ajay Sikdar (*Alternate*)
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Indian Institute of Packaging, Mumbai	Dr Sanjay K. Chattopadhyay Dr Tanweer Alam (*Alternate*)
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Indian Sugar Mills Association, New Delhi	Shri G. K. Thakur Shri Pankaj Rastogi (*Alternate*)
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	Shri Ashok Kumar Bhatnagar Shri Rajeev Kumar Dwivedi (*Alternate*)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	Shri Ashok Kumar Dr Subhash Gupta (*Alternate*)

Organization	*Representative(s)*
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Office of the Textile Commissioner, Mumbai	Shri B. B. Bharti Shri Sourabh Kulkarni (*Alternate*)
Plastindia Foundation, Mumbai	Shri Surender Choudhary Shri L. K. Singh (*Alternate*)
RCF Limited, Mumbai	Dr Vilas Tukaram Bagwe Shri Ramesh Krishna Patil (*Alternate*)
Reliance Industries Ltd, Mumbai	Dr Sunil Mahajan Shri Raju Venkat (*Alternate*)
Texel Industries Ltd, Halol	Shri Shailesh R. Mehta Shri Naresh R. Mehta (*Alternate*)
The Fertilizer Association of India, New Delhi	Dr D. S. Yadav Dr R. K. Tewatia (*Alternate*)
Ultratech Cement Limited, Mumbai	Dr Awadhesh K. Singh Shri Sandeep Kadam (*Alternate*)
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BIS Directorate General	Shri Awadh Kishore, Scientist 'E' and Head (TXD) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri J. K. Gupta
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