TDC3 (6199)P3
First Edition

Textiles – High Density Polyethylene (HDPE)/ Polypropylene (PP) Woven Sacks for packing food grains – Specifications.

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Foreword

This First Edition of this Draft Tanzania Standard has been prepared to specify requirements to be complied with manufacturers producing High Density Polyethylene (HDPE)/Polypropylene (PP) Woven Sacks for Packaging food grains.

This Draft Tanzania Standard describes the construction of the sacks, their dimensions and test methods suitable for ensuring long term storage and transportation of foodstuffs.

In preparation of This Draft Tanzania Standard assistance was derived from;

IS 14887: 2014 Textiles – High Density Polyethylene (HDPE)/ Polypropylene (PP) Woven Sacks for Packaging of 50kg Food Grains – Specifications.

ISO 23560: 2015 Woven Polypropylene Sacks for bulk packaging of foodstuffs.

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1 Scope

This Draft Tanzania Standard prescribes the requirements of two types of HDPE/PP woven sacks suitable for packaging of all types of food grains (wheat, paddy, rice, pulses, millet, etc.).

2 Normative references

The following referenced documents are indispensable for the application of this Draft Tanzania Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

i) TZS 4, *rounding off numerical values*

ii) TZS 20, *Textiles – Woven fabrics – Determination of number of threads per unit length and per unit width.*

iii) TZS 21, *Textiles – Woven or knitted fabrics – Determination of mass per unit length and per unit area.*

iv) TZS 22, *Textiles - Woven fabrics - Determination of breaking load and extension*

v) TZS 44, *Textiles – Woven or knitted fabrics - determination of width and length.*

vi) TZS 834: 2005, *Textiles – Determination of commercial mass consignments of textiles fibres and yarns*.

vii) ISO 13953, *Polyethylene (PE) pipes and fittings -- Determination of the tensile strength and failure mode of test pieces from a butt-fused joint.*

viii) IS 1969: *Textiles - Tensile Properties of Fabrics - Determination of Maximum Force and Elongation at Maximum Force: Part 1 Strip Method.*

ix) ISO 3451 -1, *Plastics -- Determination of ash -- Part 1: General methods.*

3 Terms and definitions

For the purposes of this Draft Tanzania Standard, the following terms and definitions shall apply.

3.1 HDPE/PP Sacks

Container made of woven HDPE/PP fabric closed at one end,

3.2 Liner bag,

Inner bag which is fitted in a sack to provide additional protective properties against air, water vapour migration and effect of light.

3.3 Laminated sacks

Sacks made of superimposed layers of paper, wood or fabric bonded or impregnated with resin and compressed under heat.

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3.4 Ends

Yarns running along the length of and parallel to the sacking selvedge.

3.5 Picks

Yarns running across the width of the fabric and “perpendicular” to the sacking selvedge.

3.6 Sacking

A coarse fabric used for making sacks or bags.

3.7 Bale

A rectangular pressed rigid package containing woven bags covered with protective wrappings that are stitched and/or securely bound.

3.8 Contract – mass (bale)

The mass as obtained by multiplying the nominal mass of a bag by specified number of bags in that bale.

3.9 Lot

All bale containing similar woven bags.

4 Manufacture

4.1 Raw material

The HDPE or PP used for manufacture of tape shall be of the acceptable quality. The raw material composition to be used for manufacturing of the HDPE/PP woven sacks shall be as agreed to between the buyer and seller.

4.2 Fabric – The fabric used in the manufacturing of HDPE/PP woven bags shall be woven on a circular loom from HDPE/PP tapes having not more than 3mm (tolerance of ± 10%) and linear density (600 denier). The denier of HDPE/PP tape used in the manufacturing of woven fabric/sacks shall be subjected to the following tolerances:

a) ± 10% on individual value, and

b) ± 5% on average.

The construction particulars specified are expected to ensure aeration of food grains. The fabric shall be woven with anti – slip pattern (as given in Fig. 1) to avoid oozing of grains out of the sacks and for better stack ability.

4.3 Sack

The sack may be produced from fabric woven as a tube and cut to the required length or converted from woven fabric produced on a flatbed loom. Such converted material may be laminated prior to conversion into sacks. Also sacks shall be produced from tubular fabric woven on a circular loom and cut to the required length.

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Fig 1 – Anti – Slip Weaving Pattern (with 4 shuttle machine)

1	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
2		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
3				x		x				x		x				x		x	Nose Up
4	x		x				x		x				x		x				Nose Up
5	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
6		x		x	x	x		x		x	x	x		x		x	x	x	Nose Up
7				x		x				x		x				x		x	Nose down
8	x		x				x		x				x		x				Nose down
9	x	x	x		x		x	x	x		x		x	x	x		x		Nose Up
10		x		x	x	x		x		x	x	x		x		x	x	x	Nose Up
11				x		x				x		x				x		x	Nose down
12	x		x				x		x				x		x				Nose Up
13	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
14		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
15				x		x				x		x				x		x	Nose Up
16	x		x				x		x				x		x				Nose Up
17	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
18		x		x	x	x		x		x	x	x		x		x	x	x	Nose Up
19				x		x				x		x				x		x	Nose down
20	x		x				x		x				x		x				Nose down
21	x	x	x		x		x	x	x		x		x	x	x		x		Nose Up
22		x		x	x	x		x		x	x	x		x		x	x	x	Nose Up
23				x		x				x		x				x		x	Nose down
24	x		x				x		x				x		x				Nose Up

Fig 2 – Anti Slip weaving pattern (with 6 shuttle machine)

1	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
2		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
3	x		x				x		x				x		x				Nose Up
4				x		x				x		x				x		x	Nose Up
5	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
6				x		x				x		x				x		x	Nose Up
7	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
8		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
9	x		x				x		x				x		x				Nose Up
10				x		x				x		x				x		x	Nose Up
11	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
12				x		x				x		x				x		x	Nose Up
13	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
14		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
15	x		x				x		x				x		x				Nose Up
16				x		x				x		x				x		x	Nose Up
17	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
18				x		x				x		x				x		x	Nose Up
19	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
20		x		x	x	x		x		x	x	x		x		x	x	x	Nose down
21	x		x		x		x		x		x		x		x		x		Nose Up
22				x		x				x		x				x		x	Nose Up
23	x	x	x		x		x	x	x		x		x	x	x		x		Nose down
24				x		x				x		x				x		x	Nose Up

X stands for Warp up, blankcells stand for Warp down

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4.3.1 Bottom Seam

The stitching of bottom seam shall be done with two rows of chain stitch. The two rows of stitches shall be separated from each other by minimum 5mm 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 thread used for stitching shall be UV stabilized HDPE/PP tape or any other UV thread suitable for the purpose. The stitching shall be uniform without any loose threads or knots.

4.3.2 Mouth of the Sack

The completely open mouth of the sack shall be hemmed with a fold of minimum 5 mm and tapes shall not fray.

4.4 Capacity

The sack shall have the Maximum capacity of 100 kg.

5 Requirements

5.1 Mass of bale

The mass of bale of sacks (excluding packaging materials) shall be within ± 3% of the mass calculated by multiplying the number of sacks with the mass of sack specified in Table 1.

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

Table 1 – Requirement of the woven HDPE/PP woven sacks

SN	Characteristics	Requirements	Tolerance	Test Methods
1	Average Breaking strength of fabric, N, min (ravelled strip method, (200mm x 50mm) a) Width wise b) Length wise	 500 500	 - -	 ISO 13934: 1
2	Minimum breaking strength of bottom seam (ravelled strip method), Min, N (kgf)	250	-	IS 9030
3	Average Breaking strength and elongation at break of UV stabilized HDPR/PP fabric after been exposed to UV radiation and weathering, min (kgf).	Not less than 50% of original strength	-	Annex A
4	Elongation at break of fabric (%) i) Lengthwise, (min) ii) Width wise, (min)	 20 20	 -	 IS 1969 (Part 1)

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5	Mass per unit area of the fabric (g/m^2), min	65		TZS 21
6	Number of yarns per Decimetre i) Ends/dm ii) Picks/dm	 40 40	 ± 2% ± 2%	TZS 20
7	Ash content (for UV stabilized fabrics), Max, Percent	2.2	-	ISO 3451- 1: 2008, Method A.

NOTE 1: Requirement no. 3 and 7 are is subjected to the agreement between manufacturer and buyer.

NOTE 2: Depending on the type of grain and weight to be packed, the dimensions will be agreed between manufacturer and buyer. Some dimensions are available with manufacturers.

6 Printing Marking and Packaging.

6.1 Printing on Sacks

The sacks shall be printed with food grade printing inks with identification mark of sack manufacture along with the information as required by the buyer.

6.2 Marking on bales

The bales shall be marked with the following information:

a) The name of the manufacturer;
b) The type and size of sack;
c) The gross mass of the bale;
d) The net mass of the bale;
e) The month and year of manufacture;
f) Any other information required by the buyer;
g) Identification Mark;
h) Number of sack.

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

6.3 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 or multiple thereof.

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7 Sampling and Criteria for Conformity.

7.1 In and consignment, all the sacks of the same construction shall be grouped together to constitute a lot.

7.2 The conformity of the lot to the requirements of this Draft Tanzania Standard shall be determined on the basis of the tests carried out on the samples selected from it.

7.3 The number of samples to be selected depend on the size of the lot and the number of bales to be sampled shall be in accordance with column 2 and column 3 of Table 2.

The number of sacks to be selected from the bales sampled shall be in accordance with 4 of Table 2 for visual inspection, dimensions, ends, picks and mass requirements and shall be in accordance with column 5 of Table 2 for breaking strength of bottom seam and percent elongation at break requirements.

The samples should be selected in accordance with column 6 of Table 2 for determination of ash content and also breaking of fabric after UV radiation exposure.

Table 2 - Sample size and criteria for conformity

No. of HDPE/PP sacks in a lot	Number 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 Breaking Requirements.	Sample Size for Breaking Strength of HDPE/PP Fabric after Exposing to UV Radiation Requirement and Ash Content.
Up to 25, 000	3	12	8	1
25,001 to 50,000	5	20	10	2
50,001 to 100,000	8	32	13	3
100,001 and above	12	48	18	4

7.4 Number of Tests – The number of sacks to be selected for testing dimensions and mass of sacks shall be according to column 3 of Table 2.

7.4.1 The number of sacks to be selected for testing breaking strength and seam breaking strength shall be two per bale selected according to column 2 of Table 2 subject to a maximum of 10 bags.

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7.5 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) Note of the sack or bale of 500 sacks weighs after allowing tolerance of ±6% on individual sack and ±3% on a bale of 500 sacks, higher weight can be accepted.

c) The average breaking strength of fabric in both lengthwise and width wise is not less than the value specified and none of the individual bag value is more than 10% below the specified value. The samples selected for breaking strength tests shall be free from defects in visual inspection, dimensions, ends, picks and mass requirements.

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

e) None of the HDPE/PP sack samples after exposing to UV – radiation and weathering shall have a breaking strength less than 50% of the original value.

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

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ANNEX A

(Normative)

UV RESISTANCE TEST

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

A – 2 TEST PROCEDURE

The test shall be carried out with fluorescent UV – Lamp type B (313 nm or its equivalent).

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

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

A – 3 TEST PROCEDURE

A – 3.1 Determine the original average breaking strength of fabric as per test method specified in IS 1969 (part 1)

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

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 specified in **A**-2.

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

A – 3.4 Determine the percent retention of original strength as follows:

Percentage retention of original breaking strength = $\frac{a}{b}\ x\ 100$

Where

a) a= average breaking strength before UV exposure as obtained in **A** – 3.1
b) b= average breaking strength after UV exposure as obtained in **A** – 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 vapour, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

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