DRAFT TANZANIA STANDARD

Foreword

This Draft Tanzania Standard has been prepared to help the users and traders of leno woven bags in proper packaging and storage of food stuffs.

In preparation of this Draft Tanzania Standard assistance was derived from the following:

IS 16187: 2014 Textiles — High Density Polyethylene (HDPE)/ Polypropylene (PP) Leno Woven Sacks for Packaging and Storage of Fruits and Vegetables —

Acknowledgement is hereby made for the assistance derived from these sources.
1. SCOPE
This Draft Tanzania Standard specifies the specific requirements and test methods for High Density Polyethylene (HDPE)/Polypropylene (pp) (excluding cordage) woven sacks for packaging and storage of various fruits and vegetables.

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 amendment) applies.

TZS 4, Rounding off numerical values
TZS 26, Textiles – Determination of the conductivity, pH, water soluble matter, chloride and sulphate in aqueous extracts
TZS 44, Textiles – Woven fabrics- determination of length and width of woven or knitted fabrics.
TZS 138, Textiles – Method for determination of colour fastness of textile material to rubbing.
TZS 21, Textiles - Textiles – Woven or knitted fabrics- determination of mass per unit length and per unit area
IS 9833, List of Colorants for Use in Plastics in Contact with Foodstuffs and Pharmaceuticals.
IS 10910, Polypropylene and its copolymer for its safe in use in contact with foodstuffs, pharmaceuticals and drinking water.
IS 7328, High density Polyethylene materials for moulding and extrusion.

3. TERMS AND DEFINITIONS
For the purpose of this Draft Tanzania Standard, the following terms and definitions shall apply:

3.1 Weave
form (fabric or a fabric item) by interlacing long threads passing in one direction with others at a right angle to them.

3.2 Leno Weave
is a weaving pattern in which adjacent warp tapes are twisted around consecutive weft tapes to form a spiral pair, effectively locking each weft in place.

3.3 Leno Bags/leno sacks
bags/ Sacks made from Leno weave fabric.

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.

4. CONSTRUCTION OF PP LENO BAGS
PP Leno bags are constructed using plain weave in which two warp yarns are twisted around the weft yarns to provide a strong yet sheer fabric. The standard warp yarn is paired with a skeleton or ‘doup’ yarn; these twisted warp yarns grip tightly to the weft which causes the durability of the fabric. Leno weave produces an open fabric with almost no yarn slippage or misplacement of threads. The paired warp tapes look like figure ‘8’ as shown schematically in Fig. 1.
5. Manufacture.

5.1 Raw material.
The tape shall be manufactured from virgin food grade High Density Polyethylene (HDPE)/Polypropylene (PP) of the required quality. If required by buyer, the tapes shall be manufactured from combination of HDPE/PP with Linear Low Density Polyethylene (LLDPE)/Low Density Polyethylene (LDPE) to get desired softness. The tapes can also be manufactured by using only Polypropylene. Tapes shall also be manufactured from UV stabilized HDPE/PP if desired by the buyer.

5.2 Fabric
The fabric used in the manufacture of HDPE/PP leno woven sacks shall be woven as a tube on a circular loom from the HDPE/PP tapes having width 3mm; Linear density 850 denier (weft) and width 2mm; Linear density 600 denier (warp). If manufactured from the combination of PP tapes and HDPE multifilament strands, the PP tapes shall have a width 3mm; linear density 850 denier (weft) and the weft shall have two strands of HDPE filaments with a linear density of 450 deniers.

The denier of HDPE/PP tape used in the manufacture of leno woven fabric/sacks shall be subjected to the following tolerances:

a) 10 percent (%) on individual value, and
b) 5 percent (%) on average.

The fabric shall be woven in accordance with leno weave with low weave density. The constructional particulars of fabric are given in Table 1.

5.3 Sack

5.3.1 Seam
Leno sacks fabricated out of woven fabric shall have seam at the bottom and/or side. The stitching shall be done with two rows of either lock stitch or chain stitch. The two rows of stitches shall be separated from each other by about 5 mm and the outer row of stitching shall be approximately 8 mm from the outer edge of the sack. The stitching shall be done with single fold or double fold over seam to a depth of 25 mm, so that the stitches pass through a minimum of four or six layers of the fabric respectively as the case may be. The number of stitches/dm shall be 14 ± 2.

5.3.2 Stitching Thread
The material used for stitching shall be HDPE/PP tape or any other thread suitable for the purpose, compatible to the product being packed in the sack. The tape or thread used for stitching shall have at least 20 percent higher denier than that used for making of the sack. The stitching shall be uniform without any loose thread or knot.
5.3.3 Bag Mouth
The completely open mouth of the sack shall be hemmed with a fold of minimum 25 mm and tapes shall not fray. Leno woven sacks shall be made available with a drawstring if required by the buyer. The drawstring shall be made of HDPE/PP narrow woven tapes or flat braided cords.

5.3.4 Bag Dimensions and Carrying Capacity
Type 1, sacks shall have nominal holding capacities of 25 kg and Type 2, sacks shall have nominal holding capacities of 50 kg as given in Table 1. The dimensions of the leno woven sack shall be as agreed to between the buyer and the seller depending on shape, size and bulk density of the fruit or vegetables to be packed.

6. REQUIREMENTS
6.1 Sack Specifications
The leno sacks shall conform to the requirements specified in Table 1.

6.2 UV Resistance
As agreed to between the buyer and the seller, the leno bags shall be made from UV stabilized HDPE/PP. The leno woven fabric or sacks made out of UV stabilized material shall have at least 50 percent of the original breaking strength when tested after exposure to UV radiation as per the method given in Annex B.

6.3 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 average mass of sack specified in Table 1 or as agreed to between the buyer and seller.
Table 1 – Requirements for PP Leno Bags.

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Requirements</th>
<th>Tolerance</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mass per unit area (g/m²), min</td>
<td>≥45</td>
<td>±2cm</td>
<td>TZS 21</td>
</tr>
<tr>
<td>2</td>
<td>Dimensions and capacity</td>
<td>As agreed to between the buyer and seller but the capacity of the bag shall not exceed 100kg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Mesh size, min</td>
<td>5 x 5</td>
<td>-</td>
<td>TZS 20</td>
</tr>
<tr>
<td>5</td>
<td>Seam strength (both bottom and/or side seam), N, min</td>
<td>≥295</td>
<td>-</td>
<td>IS 9030: 1979</td>
</tr>
<tr>
<td>6</td>
<td>Ash content (for UV stabilized fabrics), Max, Percent</td>
<td>≤2.2</td>
<td>-</td>
<td>ISO 3451-1: 2008, Method A</td>
</tr>
<tr>
<td>7</td>
<td>Average Breaking strength and elongation at break of UV stabilized HDPE/PP fabric after being exposed to UV radiation and weathering, min (N).</td>
<td>Not less than 50% of original strength</td>
<td>-</td>
<td>Annex B.</td>
</tr>
</tbody>
</table>

7. MARKING AND PACKING.

7.1 Marking on Sacks
The identification mark of the manufacturer, along with any information required by the buyer, shall be printed on the sacks, using ink or another suitable method that will ensure legibility during use.

7.2 Packing
The sacks shall be packed to form a bale using a covering layer of plastic woven fabric and suitably secured. The bale shall contain sacks as agreed to between the buyer and the seller preferably 500 and in multiples of 100 thereafter.

7.3 Marking on Bales
The bales shall be marked with the following information:

a) Name of the manufacturer,
b) Type and size of sacks,
c) Gross weight of the bale,
d) Net weight of the bale,
e) Month and year of manufacture,
f) Any other information required by the buyer, and;
g) Recycling logo as given below for HDPE/PP sacks.

Fig 2. Recycling Logo.
8. SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot
All sacks of the same construction in a consignment shall be grouped together to constitute a lot.

8.2 Lot Conformity
The conformity of the lot to the requirements of the standard shall be determined on the basis of the test carried out on the samples selected from it.

8.3 Sample Size
The number of samples to be selected depends on the size of the lot and 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. The number of sacks shall be in accordance with col 5 of Table 2 for breaking load of fabric and seam strength requirements. The number of sacks to be selected for breaking strength of sacks after exposure of UV radiation shall be in accordance with col 6 of Table 2.

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 inspection, 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 bales of sacks weighs less than the respective lower specified limit after allowing tolerance of ±6 percent on individual sack and ± 3 percent on the bale (6.3).

c) The average seam strength is not less than the value specified and none of the individual value is more than 10 percent below the specified value.

d) None of the samples after exposure to UV radiation and weathering shall have breaking strength less than 50 percent of the original breaking strength.

Table 2 Sample size and criteria for conformity

<table>
<thead>
<tr>
<th>SN</th>
<th>No. of PP/HDPE Sacks in a Lot</th>
<th>No. of Bales to be Sampled</th>
<th>Sample Size for Visual Inspection, Dimensions, Ends, Picks and Mass Requirements</th>
<th>Sample Size for Breaking Strength of PP/HDPE Fabric before Exposing to UV Radiation and Breaking Strength of Seam Requirements</th>
<th>Sample Size for Breaking Strength of PP/HDPE Fabric after Exposing to UV Radiation Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Up to 12 500</td>
<td>3</td>
<td>13</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>ii</td>
<td>12 501 to 25 000</td>
<td>5</td>
<td>20</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>iii</td>
<td>25 001 to 50 000</td>
<td>8</td>
<td>32</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>iv</td>
<td>50 001 and above</td>
<td>12</td>
<td>50</td>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>
ANNEX A
(Informative)
METHOD FOR CALCULATION OF MASS OF SACKS

A-1 CALCULATION OF MASS OF LENO SACKS

A.1.1 Total mass of sacks comprises of:
   a) Mass of fabric;
   b) Mass of stitching tape or threads

A.1.1.1 Calculate the mass of sacks with the help of the following formula as the case may be:
   a) Mass of tubular fabric:
      1) Single fold stitching = \((L + 30 \text{ mm} + 25 \text{ mm}) \times 2W \times M \times 10^{-6}\)
      2) Double fold stitching = \((L + 55 \text{ mm} + 25 \text{ mm}) \times 2W \times M \times 10^{-6}\)
   b) Mass of flat fabric:
      3) Single fold stitching = \((L + 30 \text{ mm} + 25 \text{ mm}) \times 2 (W + 30 \text{ mm}) \times M \times 10^{-6}\)
      4) Double fold stitching = \((L + 55 \text{ mm} + 25 \text{ mm}) \times 2 (W + 55 \text{ mm}) \times M \times 10^{-6}\)
   c) Mass of stitching tape = \(L_1 \times T \times 10^{-6}\)

or thread where:
\(L\) = length of sack, in mm;
\(L_1\) = approximate length of stitching tape or thread, in mm (top and bottom stitch);
\(W\) = width of sack, in mm;
\(M\) = mass of fabric, in g/m² and \(T\) = linear density of stitching tape, in tex.
ANNEX B
(Normative)
UV RESISTANCE TEST

B – 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.

B – 2 TEST PROCEDURE
The test shall be carried out with fluorescent UV – Lamp type B (313nm 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°C ± 3°C with UV – radiation alternating with 4h at 50°C ±3°C condensation. Irradiance level throughout the test shall be maintained at 0.63 (+0.04/-0) W/m².

B – 3 TEST PROCEDURE
B – 3.1 Determine the original average breaking strength of fabric as per test method specified in IS 1969 (part 1)
B – 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.
B – 3.3 Determine the average breaking strength of the fabric separately after UV exposure as mentioned above.
B – 3.4 Determine the percent retention of original strength as follows:

Percentage retention of original breaking strength = \( \frac{a}{b} \times 100 \)

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.