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DRAFT EAST AFRICAN STANDARD

Tarpaulin for agricultural use — Specification

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 061, Textiles, textile products and accessories.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Introduction

A tarpaulin used for post-harvest handling of agricultural produce such as grains is a large sheet of flexible, water-resistant or waterproof material.

Development of this standard was necessitated by the need to protect farmers and users of tarpaulins mainly used as drying sheets for post-harvest handling of grains from substandard products and safety aspect in terms of heavy metal contamination used as printing inks and microbial contamination as a result of production and product handling. In most cases harvested agricultural produce have high moisture content for safe storage, that may result in migration of pigments, organic pollutants from tarpaulins during drying

Tarpaulins are sold to food value chains with users benefiting from lower post-harvest losses, maintain qualities of stored commodities and leading to Increased food security, income, nutrition and health.

As the market for tarpaulins expands, there is a risk of substandard products being imported or manufactured locally and hence undermine proper storage of dry food commodities and their derived product.

Tarpaulins for agricultural use — Specification

1 Scope

This Draft East African Standard specifies requirements, sampling and test methods for tarpaulins used for agricultural purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 105-C10, *Textiles — Tests for colour fastness — Part C10: Colour fastness to washing with soap or soap and soda*

ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

ISO 248-1, *Rubber, raw — Determination of volatile-matter content — Part 1: Hot-mill method and oven method*

ISO 811 *Textile fabrics -Determination of resistance to water penetration -Hydrostatic pressure test*.

ISO 1421, *Rubber- or plastics-coated fabrics - Determination of tensile strength and elongation at break*

ISO 2286-1, *Rubber- or plastics-coated fabrics - Determination of roll characteristics -Part 1: Methods for determination of length, width and net mass*

ISO 2286-2, *Rubber- or plastics-coated fabrics — Determination of roll characteristics — Part 2: Methods for determination of total mass per unit area, mass per unit area of coating and mass per unit area of substrate*

ISO 4674-1, *Rubber-or plastics-coated Fabrics-Determination of tear Resistance-Part 1: Constant rate of tear methods*

ISO 4892-3:2016, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ISO 13934-1, *Textiles -- Tensile properties of fabrics -- Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO 14362-1, *Textiles — Methods for determination of certain aromatic amines derived from azo colorants — Part 1: Detection of the use of certain azo colorants accessible with and without extracting the fibres*

ISO 14362-3, *Textiles — Methods for determination of certain aromatic amines derived from azo colorants — Part 3: Detection of the use of certain azo colorants, which may release 4-aminoazobenzene*

ISO 16373-1, *Textiles — Dyestuffs — Part 1: General principles of testing coloured textiles for dyestuff identification*

ISO 16373-2, *Textiles — Dyestuffs — Part 2: General method for the determination of extractable dyestuffs including allergenic and carcinogenic dyestuffs (method using pyridine-water)*

ISO 16373-3, *Textiles — Dyestuffs — Part 3: Method for determination of certain carcinogenic dyestuffs (method using triethylamine/methanol)*

ISO 22958, *Textiles — Water resistance — Rain tests: exposure to a horizontal water spray*

ISO 24153, *Random sampling and randomization procedures*

3 Terms and definitions

For the purposes of this document, the following terms and definitions shall apply.

3.1
grain
small hard dry seed with or without an attached hull or fruit layer harvested for human or animal consumption

3.2
food grade material
packaging material, made of substances which are safe and suitable for the intended use and which will not impart any toxic substances or undesirable odour or flavor to the products.

3.3
base fabric
inner material between the coatings.

3.4
agricultural produce
product or commodity from cultivated plants or animals intended for human or animal consumption

4 Requirements

4.1 General requirements

4.1.1 The base fabric shall be woven from either high density polyethylene (HDPE) tapes of virgin resin or polyester

4.1.2 The base fabric shall be coated on both sides. For HDPE, it shall be coated with LDPE and for polyester base, the coating shall be virgin polyvinyl chloride (PVC).

4.1.3 All raw edges of the tarpaulins shall be heat sealed or hemmed to prevent fraying

4.1.4 On visual examination, the coating of the material shall be uniformly applied and shall be free from cracks, flaws and any other defect that may impair the serviceability of the tarpaulins

4.1.5 The tarpaulins shall be treated with UV stabilizers

4.2 Specific requirements

4.2.1 Dimensions

When tested in accordance to ISO 2286-1 the nominal dimensions of the tarpaulins shall be as declared subject to a tolerance of ± 2 % of the declared dimensions

4.2.2 Welding

The Tarpaulin shall have a maximum of 1 welding along the middle

4.2.3 Performance requirements

Tarpaulins shall conform to the performance requirements specified in Table 1 and Table 2.

Table 1 — Performance requirements for high density polyethylene tarpaulins for agricultural use

Parameter		Requirement	Test method
Total mass per unit area, g/m^2, min.		140	ISO 2286-2
Loss of volatile matter, %, max.		5	ISO 248-1
Resistance to water penetration (hydrostatic test) cm head of water, min.		150	ISO 811
Water resistance, Rain test, g, max.		1	ISO 22958
Breaking strength (N), min.	Warp	700	ISO 1421 (type C machine)
	Weft	690	
Tear strength (N) (use a specimen measuring 200 mm × 150 mm)	Warp	130	ISO 4674 method A2
	Weft	130	
[a]Retention of breaking strength after UV exposure, min.	Warp	85 percent of original actual value of the tarpaulin	ISO 1421
Colourfastness to light		5	ISO 105-B02
Colourfastness to washing, min.	Change in colour	4	ISO 105-C10
	Staining	4	
Colourfastness to rubbing, min.	Dry	3-4	ISO 105-X12
	Wet	3-4	
[a] UV exposure is done for a minimum of 1 500 hours UV under ISO 4892-3 (UVB 313 nm peak)			

Table 2 — Performance requirements for PVC Tarpaulins for agricultural use

Parameter	Requirement	Test method
Total mass per unit area, g/m^2, min.	300	ISO 2286-2
Coating mass per unit area, g/m^2, min	200	ISO 2286-2
Loss of volatile matter, %, max	5	ISO 248-1

Retention of breaking strength after UV exposure ,min	Warp	85 percent of original actual value of the tarpaulin	Annex A
	Weft		
Resistance to water penetration (hydrostatic test) cm head of water, min.		150	ISO 811
Water resistance, Rain test, g max		1	ISO 22958
Breaking strength, N, min.	Warp	600	ISO 1421
	Weft	600	
Tear strength, N, min.	Warp	150	ISO 4674-1[a] Trouser shape Annex B
	Weft	150	
[a] If any threads slip out of the fabric the test specimens shall be prepared in accordance with annex B of ISO 4674-1 and hemmed at the outside edges			

4.3 Food grade requirements

4.3.1 Overall migration

When tested in accordance with Annex B the tarpaulin shall comply with the overall migration maximum limits of 60 mg/kg of the foodstuff.

4.3.2 Heavy metals

When sample is prepared using extraction solvents as indicated in Annex B, followed by analysis using any form of spectrophotometry, the heavy metal content shall not exceed the limits specified in Table 3.

Table 3 — Limits of heavy metals in tarpaulins used for agricultural purposes

S/N	Heavy metals and aromatic amines	Limits, mg/kg, max.
i	Lead	0.01
ii	Arsenic	0.005
iii	Mercury, (soluble in N/10 HCI)	0.005
iv	Cadmium	0.10
v	Zinc	0.20
vi	Selenium	0.01
vii	Barium	0.01
viii	Chromium	0.025
ix	Antimony	0.025

4.4 Restricted colourants and aromatic amines

When tested in accordance with ISO 14362:1, ISO 14362:3, ISO 16373-2 and ISO 16373-3, tarpaulins shall be free from restricted colorants listed and shall have total aromatic amines not exceeding 0.05 mg/Kg.

Colourants shall be identified and classified in accordance with ISO 16373-1.

5 Packaging

Tarpaulins shall be packed in materials that protect them from being damaged and/or contaminated during handling, storage and transportation

6 Labelling

Tarpaulins shall be legibly and indelibly labelled either in English, Kiswahili or French or in combination with the following information:

a) manufacturer's name, address and/or registered trade mark;

b) dimensions of the tarpaulin;

c) batch number;

d) the words, "Tarpaulin for agricultural use";

e) instruction for correct use and disposal;

f) instruction for storage; and

g) country of manufacture.

7 Sampling

Sampling shall be done in accordance with ISO 24153

7.1 Lot

7.1.1 The quantity of the same type and quality delivered to one buyer against one dispatch note shall constitute a lot.

7.1.2 The conformity of the lot to the requirements of this Standard shall be determined on the basis of tests carried out on the samples selected from the lot

7.1.3 The number of pieces to be selected at random from a lot shall be in accordance with Table 4.

Table 4 — Sampling size and permissible number of non-conforming pieces

Number of pieces in the lot	Sample size for visual inspection	Permissible number of nonconforming pieces	Sub-sample size for testing
Up to 25	3	0	2
26 – 50	5	0	2
51 – 150	8	0	3
151 – 300	13	1	3
301 – 500	20	1	5
501 – 1 000	32	2	5
1 000 and above	50	3	8

Annex A
(normative)

UV resistance test

A.1 Test specimens

The test specimens for breaking strength shall be cut from the sample as specified in ISO 13934 (Part 1).

A.2 Test conditions

A.2.1 The test shall be carried out with Fluorescent-B lamp (313 nanometer or its equivalent).

A.2.2 The duration of the test shall be 144 h (that is 6 days).

A.2.3 The test cycle shall be 8 h at 60 ± 3°C with UV radiation alternating after 4 h at 50 ± 3°C with condensation.

A.2.4 Irradiation level throughout the test shall be maintained at 0.63 +0.03 W/m².

A.3 Procedure

A.3.1 Determine the original average breaking strength of fabric specimens separately as per the test Specified in ISO 13934 (Part 1).

A.3.2 Expose the specimens alternately to ultraviolet light alone and to condensation in one respective cycle.

A.3.3 The type of fluorescent UV lamp, the timing of the UV exposure and the temperature of condensation shall be as specified in A.2

A.3.4 Determine the average breaking strength of the specimens separately after UV exposure as mentioned above

A.3.5 Determine the percent retention of original strength as follows:

$$Percent\ retention\ of\ original\ breaking\ strength = \frac{b}{a} \times 100$$

Where

a = average breaking strength before UV exposure as obtained in A.3.1; and

b = average breaking strength after UV exposure as obtained in A.3.4.

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.

Annex B
(normative)

Determination of heavy metal content

B.1 General

This annex specifies the method of analysis for determination of overall migration of constituents of single or multi-layered heat-sealable films.

B.2 Simulants and test conditions

Determination of migration is carried out using the following simulants at 40 ^{0}C for 10 days:

a) Simulant 'A' – Distilled water or water of equivalent quality

b) Simulant 'B' – 10 % ethanol (*v/v*) in aqueous solution

B.3 Method

B.3.1 Apparatus

A.3.1.1 **Electric oven/water bath**, equipped with thermostat to maintain the desired temperature within ± 1 ^{0}C accuracy

B.3.1.2 **Electric hot plate**, with temperature control regulator

B.3.1.3 **Analytical balance**, with a sensitivity of 0.1 mg

B.3.1.4 **Glass beakers**, Pyrex of 1 000 ml capacity or equivalent

B.3.1.5 **Stainless steel evaporating dish** of 100 ml capacity

B.3.1.6 Stainless steel tongs

B.3.2 Selection of samples

Minimum triplicate samples representing the lot/batch shall be selected. The representative sample shall be of sufficient size to convert into two pouches of size 125 mm width and 200 mm length (inner dimension excluding seal area) with 1 000 cm^2 surface area coming in contact.

B.3.3 Preparation of test specimen

The pouches used shall be carefully rinsed with water at 25 ^{0}C - 30 ^{0}C to remove extraneous materials prior to the actual migration test.

B.3.4 Simulant quantity

Equal to at least 1 m/cm^2 of contact area.

Glassware, laboratory apparatus which come into contact with simukants and/or the sample during the test shall be thoroughly washed and dried prior to the test.

B.3.5 Procedure

Fill the pouch to its filled capacity with preheated simulant at test temperature and close it. Exclude air as much as possible before sealing and expose the filled pouch to a specified temperature maintained in oven/water bath/pressure cooker/autoclave for the specified duration of time. After exposure for the specified duration, remove the pouch and transfer the contents immediately into a clean Pyrex beaker along with three washings of the specimen with small quantity of the fresh stimulant.

B.3.6 Determination of amount of extractive

Evaporate/distill the contents in Pyrex beaker to about 50 ml – 60 ml and transfer into a clean tared stainless steel dish along with three washings of Pyrex beaker with a small quantity of fresh stimulant and further evaporate the concentrate in the dish to dryness in an oven at 100 ^{0}C ± 5 ^{0}C. Cool the dish with extractive in a desiccator for 30 minutes and weigh to the nearest 0.1 mg till constant weight of residue is obtained. Calculate the extractives in mg/Kg of the foodstuff with respect to the capacity of pouch to be used.

Carry out the blank test using the same procedure.

$$Amount\ of\ extractive\ (Ex) = \frac{M}{V} \times 1000$$

Where

M is the mass in milligrams of residue minus balnk value;

V is the total volume in millilitres of simulant used in each replicate

B.3.7 Method for tarpaulins in repeated contact with dried food commodities

The migration test(s) shall be carried out three times on the same sample one after the other in accordance with the conditions laid down already using fresh simulant(s) in each occasion, following any one of the methods applicable to it described earlier. Its compliance shall be checked on the basis of the level of the migration found in the third test. However, if there is conclusive proof that the level of migration does not increase in the second and third tests and if the migration limit(s) is/are exceeded on the first test, no further test is necessary.

B.4 Evaluation of results

The materials and articles are regarded as conforming to the specifications if in the migration tests for each simulant used, the average of at least three results does not exceed the value of overall migration limit.

NOTE Before carrying out the test, ensure that the sample is free from all traces of dust, fats and other impurities. If necessary, it should be thoroughly wiped with filter paper. The sample should be handled carefully to avoid any contamination.

B.5 Colour migration

In the case of coloured tarpaulins, colour migrated to simulant or dried food products shall not be apparent to the naked eye. If the colour migrated is clearly visible, such tarpaulins are not suitable for food contact applications, even though the extractive value is within the limit.

Bibliography

KS 2923-1:2020, Tarpaulins for post-harvest handling of agricultural produce — Specification —Part 1: Woven High density Polyethylene

