



DRAFT TANZANIA STANDARD

Agro textiles - Shade nets for agriculture and horticulture purposes
- Specification - Part 2: Shade Nets made from Mono filament yarns.

Stakeholder's comments

Foreword

This Draft Tanzania Standard is issued to help manufacturers/retailers of shade nets for agriculture and horticulture purpose to come up with products of defined quality. This Tanzania Standard covers the requirements of shade nets made from monofilament yarns.

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

IS 16008 (Part 2): 2016 - Agro textiles — Shade nets for agriculture and horticulture purposes — specification - Part 2: Shade Nets made from Monofilament Yarns.

Stakeholder's comments

1. SCOPE

This Draft Tanzania Standard specifies constructional, requirements, test methods and sampling plan for shade nets manufactured from mono filament yarns for agriculture and horticulture purposes in protecting/increasing crop yield by providing partially controlled climatic conditions for the intended crops.

2. NORMATIVE REFERENCES

The following referenced documents are indispensable for the application 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.

TZS 4: Rounding off numerical values

TZS 21: Textiles — Woven or knitted fabrics — Determination of mass per unit length and per unit area.

TZS 22: Textiles — Woven fabrics — Determination of breaking load and extension.

TZS 40: Textiles — Tests for colour fastness — Colour fastness to light Daylight

TZS 44: Textiles — Woven or knitted fabrics — Determination of length and width

TZS 534: Textiles – Standard atmospheres for conditioning and testing

3. TERMS AND DEFINITIONS

For the purpose of this Draft Tanzania Standard, the following terms and definitions shall apply:

3.1 shading factor

percentage of light not transmitted through shade net.

3.2 shade net

structure enclosed by agro nets or any other woven/knitted material to allow required sunlight, moisture and air to pass through the gaps.

3.3 cover factor

area covered by the yarn and fibre of the structure.

3.4 bundle

package of things wrapped together

4. MATERIALS

4.1 HDPE Monofilament

Monofilament yarn shall be manufactured from HDPE granules, or other forms which shall be UV stabilized by adding suitable UV stabilizer. The width of the tape used in the fabric shall be 1.70 mm and linear density of the tape shall be 10 Tex (100 Denier). As agreed to between the buyer and the seller, coloured monofilament shall be manufactured using colour master batch. The denier of HDPE monofilament used in the manufacture of shade nets shall be subjected to the following tolerances:

4.1.1 The heat shrinkage of the monofilament yarn at 60°C shall not exceed 5 percent and shall not exceed 8 percent at 95°C. For determining the shrinkage, the monofilament shall be subjected to the specified temperature for a period of 10 min in an air circulating oven and hot water bath respectively.

4.2 Fabric

The fabric used in the manufacture of shade nets shall be knitted/woven and shall have a minimum width as per the agreement between the buyer and the seller. A tape of about 1.7 mm width or monofilament yarn of suitable diameter having the name of the manufacture/seller at the end shall be provided for proper identification of manufacture.

4.3 Colour

The colour of the fabric shall preferably be green. However, any other colour or a mixture of colour may be supplied as per the agreement between the seller and the buyer. The colour/shade shall be as specified in the contract or order. In case a sample has been agreed upon and sealed, the supply shall be made in conformity with the sample in such respects.

5. TYPES

Based on the shading factor, the material is classified as follows:

- a) Type I, having shading factor of 35 per cent;
- b) Type II, having shading factor of 50 per cent;
- c) Type III, having shading factor of 75 per cent; and
- d) Type IV, having shading factor of 90 per cent.

6. REQUIREMENTS

6.1 Dimensions and Mass

The monofilament shade nets shall be made to the shade and dimensions as specified in the contract or order. The dimensions shall be determined by the method prescribed in TZS 44. The following tolerance shall be permitted for length, width and mass (g/m²).

| Dimension | Tolerance (Percent) |
|--------------------------|---------------------|
| Length | ±1 |
| Width | ±1 |
| Mass (g/m ²) | ±3 |

Table 1 – Requirements for shade nets Made from Monofilament Yarns

| S/N | Characteristics | Requirements | | | | Method of test |
|-----|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------|-------------|-------------|----------------|
| | | Type I | Type II | Type III | Type IV | |
| 1 | Mass, g/m ² , Min | 70 | 80 | 130 | 170 | TZS 21 |
| 2 | Average breaking strength of shade fabric (Ravelled strip method, 325mm x 70mm), Min, a) Warp way b) Weft way | 280 330 | 280 600 | 420 1500 | 600 4000 | TZS 22 |
| 3 | Shading factor, per cent | 30 - 40 | 45 – 55 | 70 - 80 | 85 - 95 | Annex A |
| 4 | Retention of breaking strength after UV exposure, N, Min | ← 85 percent of original actual value (fabric) → | | | | TZS 22 |
| 5 | Bursting pressure, kgf/cm ² , Min | 9 | 10 | 25 | 35 | Annex B |
| 6 | Colour fastness to artificial light (applicable for coloured shade nets only) | 4 or better | 4 or better | 4 or better | 4 or better | TZS 40 |

6.2 The monofilament shade nets fabric shall confirm to the requirements specified in Table 1.

7. PACKING AND MARKING

7.1 Packing

The monofilament shade nets shall be packed in roll form in length minimum of 50 m or in bundle form or as agreed to between the buyer and the seller.

7.2 Marking

Each fabric roll/bundle shall be marked legibly by fixing a label bearing the following information: -

- a) manufacturer's name or registered trade mark;
- b) type of shade nets and shading percentage;
- c) declared length and width of the shade nets;
- d) mass per unit area (g/m^2) of the shade nets;
- e) batch number and date of manufacture; and
- f) Country of origin.

8. SAMPLING

8.1 Lot

All monofilament shade nets rolls/bundles of same construction and type dispatched to a buyer one dispatch note shall constitute a lot.

8.2 Unless otherwise agreed upon between the seller and the buyer, the number of monofilament shade nets depending on the size of the lot shall be selected at random from the lot. The number of such shade nets shall be as given in Table 3 column 3.

Table 2 Scale of Sampling

| S/N | No. of rolls/bundles in Lot | Sample size | Sub-sample size | Permissible number of Defective rolls/bundles |
|-----|-----------------------------|-------------|-----------------|-----------------------------------------------|
| 1 | Up to 50 | 3 | 2 | 0 |
| 2 | 51 to 150 | 5 | 2 | 0 |
| 3 | 151 to 300 | 8 | 3 | 1 |
| 4 | 301 to 500 | 13 | 5 | 2 |
| 5 | 501 and above | 20 | 5 | 3 |

9. NUMBER OF TEST SPECIMENS AND CRITERIA FOR CONFORMITY

The number of test specimens and criteria for conformity shall be as given in Table 3. Any fabric roll failing to meet one or more of the corresponding requirements prescribes in 6.1 and Table 2 shall be considered as defective, only the Lot shall be accepted if no defective roll/bundle is found.

Table 3 - Number of Test Specimens and Criteria for Conformity

| S/N | Characteristic | Number of rolls/bundles | Criteria for Conformity |
|-----|-----------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------|
| 1 | Material and manufacture, dimensions and mass | According to column 3 of Table 2 | The defective rolls do not exceed the corresponding number in column 5 of Table 2 |
| 2 | All other requirements | According to column 4 of Table 2 | All the test specimens shall pass tests |

ANNEX A

TEST METHOD FOR DETERMINING SHADING PERCENTAGE OF SHADE NETS

A-1 PRINCIPLE

A sample of the shade nets is mounted in Shade-O-Meter tester and the amount of light transmitted or passed through the sample is measured with the help of Photo-synthetically Active Radiation (PAR) sensor, in W/m^2 . The relative measurement of light transmitted with and without sample is considered for calculating the percentage of shade nets.

A-2 SAMPLING

A-2.1 Laboratory Sample

For the laboratory sample take a swatch extending the full width of the product, of sufficient length along the selvage from each sample roll so that the requirements of A-2.2 can be met.

A-2.2 Test Specimens

From the laboratory sample, cut at least 10 samples each having dimensions of 180 mm x 180 mm. Space the specimens along a diagonal on the unit of the laboratory sample. Take no specimens nearer the selvage or edge of the shade nets. The selected test specimens shall not have any creases or folds.

A-3 CONDITIONING

Bring the specimens to moisture equilibrium in the atmosphere for testing shade nets (65 ± 5 per cent relative humidity and $25 \pm 2^\circ C$ temperature). Equilibrium is considered to have been reached when the increase in the mass of the specimen, in successive weightings made at intervals of not less than 2 h, does not exceed 0.1 percent of the mass of the specimen.

A-4 APPARATUS

The instrument used for measurement shall meet the geometric and spectral requirements. The schematic diagram of the apparatus is given in Fig. 1

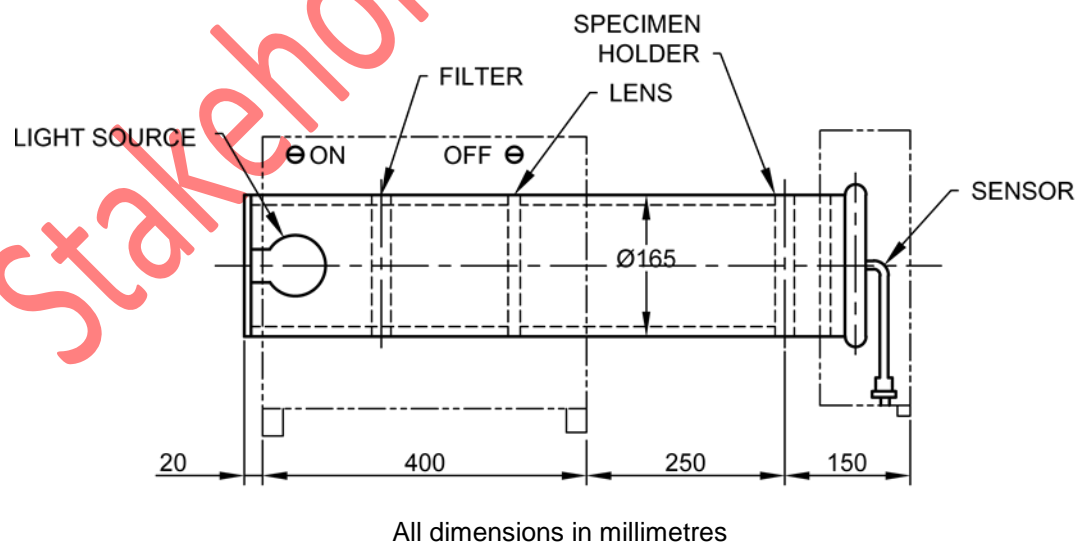


Figure 1. SCHEMATIC DIAGRAM OF SHADE-O-METER

A.4.1 The Shade-O-meter tester shall have a flat base with total approximate dimensions as given below

Length x Diameter x Height = 970 mm x 350 mm x 325 mm.

A.4.2 Apparatus shall consist of a chamber in which arrangement for placement of light source filters, sample holder and sensor shall be provided. The inside surface of chamber shall be painted with black paint and shall be highly reflecting throughout the visible spectrum. The light transmitted through the shade nets sample shall be measured by light sensors.

A-5 TEST PROCEDURE

A-5.1 Instrument shall be switched on and the reading for PAR without sample shall be taken on the sensor. This shall be recorded as T_1 .

A-5.2 Shade nets sample (see **C-2.2**) shall be mounted in the slot of specimen holder. The reading of PAR measurement with sample shall be taken from the sensor. This shall be recorded as T_2 .

NOTE: Test specimen shall be properly mounted in the specimen holder so that it shall not be very tight or very loose in the specimen holder.

A-6 CALCULATION

A-6.1 Shading percentage shall be calculated from the following formula:

$$\text{Shading percentage} = T_1 - \frac{T_2}{T_1} \times 100$$

Where

T_1 = reading of transmitted light, in W/m^2 (without sample); and

T_2 = reading of transmitted light, in W/m^2 (with sample).

A-6.2 Calculate the arithmetic mean of the measured values of shading percentage of ten samples.

ANNEX B

DETERMINATION OF BURSTING STRENGTH AND BURSTING DISTENSION OF FABRICS

DIAPHRAGM METHOD.

B-1 PRINCIPLE

B-1.1 A specified area of the sample of fabric under test is clamped over an elastic diaphragm by means of a flat annular clamping ring, and an increasing fluid pressure is applied to the underside of the diaphragm until the specimen bursts. The operating fluid may be either a liquid or a gas.

B-2 SAMPLING

B-2.1 Samples shall be selected so as to be representative of the lot.

B-2.2 Samples drawn in accordance with the procedure laid down in the material specification or as agreed to between the buyer and the seller shall be taken as representative of the lot.

B-3 TEST SPECIMENS

B-3.1 From the test sample, cut out at least 10 test specimens each 250 x 250 mm or 75 x 75 mm in size, by drawing one test specimen (see Note) from each of the pieces constituting the test sample; these shall constitute the test specimens.

NOTE – More than one test specimen may be cut out of one or more sample pieces to make up for 10 test specimens.

B-3.2 The system of clamping used generally permits tests to be applied without cutting out specimens (which may be resorted to, if desired). The sample of fabric available may sometimes be in one or more pieces but it should be possible to test it at 10 places. The 10 test areas shall be so distributed as to be representative of the sample and avoiding selvedge, creased or wrinkled places, and other such non-representative areas of the sample.

B-4 ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

B-4.1 The conditioning and testing shall be carried out in standard atmosphere at 65 ± 2 percent relative humidity and $25 \pm 2^\circ\text{C}$ temperature.

B-4.2 Prior to evaluation, the test specimens shall be conditioned to moisture equilibrium in the standard atmosphere (see Note).

NOTE: For guidance purposes, it may be noted that, the minimum time required to reach moisture equilibrium for the various types of textile materials having moisture regain less than 5 percent is about 6 hours while the same for those having moisture regain more than 5 per cent is 24 hours.

B-5 APPARATUS

B-5.1 For Test Diameter of 113 mm

B-5.1.1 The bursting strength tester shall have a flat base plate of diameter at least 140 mm, covered by a flat diaphragm of rubber or similar material (of thickness not more than 1 mm). a central hole in the base plate shall allow a controlled increase in fluid pressure to be applied to the underside of the diaphragm, so that the specimen bursts in 20 ± 3 seconds. The rate of flow of fluid through the hole in the base plate shall not vary more than ± 20 per cent throughout the test.

B-5.1.2 A clamping ring of internal diameter 113.00 ± 0.03 mm and of external diameter 140 mm (*Min*) shall be provided with a flat lower surface to hold the specimen firmly against the diaphragm at all points.

B-5.1.3 The lower face of the clamping ring may be lined with a thin layer of cork or other compressible material suitable for the fabric under test; if the face is unlined, its inner edge (or inner periphery) shall have a radius of 0.5 mm.

B-5.1.4 Means shall be provided for applying the clamping ring with sufficient pressure to prevent the fabric specimen from slipping during the test. The specimen shall not be damaged by the action of the clamping ring.

B-5.1.5 Provision shall be made for indicating or recording the pressure under the diaphragm at any point in the range in which the machine is used to an accuracy of ± 0.25 mm.

B-5.2 For Test Diameter of 30.5 mm

B-5.2.1 All conditions shall be the same as **B-5.1.1** to **B-5.1.5** except that the diameter of the base plate shall be at least 55 mm and the internal and external diameters of the clamping ring shall be 30.50 ± 0.05 mm and 55 mm (*Min*); respectively.

B-6 PROCEDURE

B-6.1 Place the test specimen or the area of the sample to be tested over the diaphragm so that it lies in a flat tensionless condition. Clamp it securely by means of clamping ring. Increase the pressure smoothly so that the bursting strength of the fabric is reached in 20 ± 3 seconds.

B-6.1.1 Note the bursting strength and the bursting distention of the specimen. If the specimen bursts close to edge of the clamping ring, record this fact and discard the reading, and carry out another test.

B-6.1.2 Repeat the test with other test specimens or at other places on the test sample, as the case may be, to have at least 10 acceptable measurements.

B-6.2 Diaphragm Correction – With the same rate fluid flow as employed in the above test, distend the diaphragm, without the presence of a specimen, but with the clamping ring in position, and note the pressure required to distend it by an amount equal to the average distention of the specimens. The pressure is the “diaphragm correction”.

B-7 CALCULATION

B-7.1 Calculate the arithmetic mean of the measured values of bursting strength and from this subtract the diaphragm correction.

B-7.2 Express the arithmetic mean of the bursting distention of the specimens selected for the calculation of bursting pressure to the nearest 2 per cent.

B-8 TEST REPORT

B-8.1 The test report shall include the following information:

- a) Mean bursting strength in kilogram force per square centimetre or kilo-newton per square metre
- b) Diaphragm correction;
- c) Mean bursting distention; and
- d) The type and capacity of the machine, the range at which it was operated, and the test diameter of the specimen.