SRI LANKA STANDARD 42:1982
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METHODS FOR THE DETERMINATION OF MASS PER UNIT LENGTH AND PER UNIT AREA OF WOVEN OR KNITTED FABRICS

(FIRST REVISION)

BUREAU OF CEYLON STANDARDS

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SLS 42:1982

Gr. 5

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Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

METHODS FOR DETERMINATION OF MASS PER UNIT LENGTH AND PER UNIT AREA OF WOVEN OR KNITTED FABRICS

(FIRST REVISION)

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-11-24 after the draft, finalized by the Drafting Committee on Test Methods for Textiles, had been approved by the Textiles Divisional Committee.

This revision of CS 42:1969 is almost identical to ISO 3801:1977. The original CS 42:1969 consisted of 2 parts, designated as Part 1 and Part 2. Part 1 described methods for determination of weight per unit length and methods for determination of weight per unit area was described in Part 2. In this revision, the designation of parts have been dropped. However, all methods described in the original standard except that for determining mass after oven drying, are included in this revised standard. Other changes relate to the SI units.

The mass per unit length and per unit area of a fabric may be determined in more than one way. For some fabrics, mass per unit length and mass per unit area are related simply by the width of the fabric, but for other fabrics variations in structure (whether in the selvedges or in the body of the fabric) may introduce an important distinction between mass per unit length and mass per unit area. It is important, therefore, to consider all the possible methods and to choose one appropriate to the fabric, and particular attention is drawn to the fact that the size of specimens used in Method 5 may not be sufficient when fabrics with large patterns are being tested. In these instances, this method would not be suitable in case of dispute.

A choice must also be made between test methods suitable for samples or specimens of cloth (i.e. short lengths or cuttings) and those suitable for application to fabric in bulk, i.e. in the piece (the normal unit of production). If a cutting has been taken as a representative sample of a batch of pieces, it may be advisable to use the results of the tests on the sample to correct measurements and masses of the unconditioned pieces.

Circumstances may well call for the use of any of these methods of determining fabric mass; none of them is so much more accurate than the others as to justify it being set up as the sole standard method. Specific circumstances should, therefore, govern choices between mass per unit length and mass per unit area and between a method applicable to samples and a method applicable to pieces.

In the preparation of this standard, the assistance obtained from the publications of the International Organization for Standardization (ISO) is gratefully acknowledged.

1 SCOPE

1.1 This standard specifies methods for the determination of

a) mass per unit length, and

b) mass per unit area,

of woven or knitted fabrics that have been conditioned in the standard atmosphere for testing.

1.2 The methods are applicable to woven or knitted fabrics made up full width or folded down the middle and apply to the determination of the fabrics mass of complete pieces as well as of sample lengths.

2 REFERENCES

CS 16 Standard atmospheres for conditioning and testing

SLS 45 Woven fabrics-determination of length

SLS 46 Woven fabrics-determination of width.

3 PRINCIPLE

3.1 Methods 1 and 3

When the piece or the sample length can be conditioned in the standard atmosphere for testing, the length and the mass of the fabric are determined and the mass per unit length calculated, or the length, width, and mass of the fabric are determined and the mass per unit area calculated, as relevant.

3.2 Methods 2 and 4

When it is impracticable to condition the whole piece in the standard atmosphere for testing, the length (and width) and the mass of the piece are determined after relaxation in the prevailing atmosphere, and the mass per unit length (mass per unit area) is calculated and corrected by application of a correction factor, determined by comparison of the length (and width) and the mass of a specific portion cut from the piece after relaxation, and measured firstly in the ambient atmosphere and then in the standard atmosphere for testing.

3.3 Method 5

When it is required to test a small sample, the mass per unit area is determined by exposing the small samples taken from this sample, to the standard atmosphere for testing textiles until they are in equilibrium with that atmosphere. Specimens of known dimensions are then taken and weighed and the mass per unit area is calculated.

4 APPARATUS

4.1 *Calibrated steel rule,* of length 3 m (or failing this, at least 2 m), graduated in centimetres and millimetres, for Methods 1,2,3 and 4.

4.2 *Device,* to enable a specimen of full width to be cut at right angles to the selvedge, for Methods 1,2,3 and 4.

4.3 *Balance,* capable of determining the mass of pieces or sample lengths (as relevant) to an accuracy of ± 0.2 per cent of the determined mass. For Method 5, an accuracy of 0.001 g is required.

4.4 *Table,* having a smooth flat surface, a width greater than that of the woven fabric to be measured and a length of at least 4 m.

4.5 *Device,* accurate to 1 per cent, to enable a specimen 10 cm x 10 cm to be cut, or a circular cutter of area 100 cm^2, for Method 5.

4.6 *Metal plate,* approximately 9 cm x 9 cm (or 80 cm^2 if a circular plate is used) and 1 cm thick, for Method 5.

5 STANDARD ATMOSPHERE FOR CONDITIONING AND TESTING

The atmosphere for conditioning and testing textiles is that defined in CS 16. This atmosphere has a relative humidity of 65 ± 2 per cent and a temperature of 27 ± 2 °C.

6 PROCEDURE

6.1 Pre-conditioning

Equilibrium shall be approached from the dry side. When the fabric as received is in such a condition that this is not immediately possible, the fabric may be pre-conditioned by exposing it to an atmosphere having a relative humidity between 10 per cent and 25 per cent at a temperature not higher than 50 °C. Consider equilibrium with the pre-conditioning atmosphere to have been reached when the difference between successive weighings, made at intervals of at least 2 h, does not exceed 0. 5 per cent of the final mass of the fabric when conditioned in this atmosphere.

6.2 Selvedges

If the mass per unit length (or area) of the selvedge differs appreciably from the mass per unit length (or area) of the fabric, the mass per unit area shall be determined on a sample from which

the selvedges have been removed along the outermost warp threads of the body and calculation(s) shall be based on the mass of the trimmed sample and its length and width.

6.3 Method 1 Determination of mass per unit length of pieces and of sample lengths that can be conditioned in the standard atmosphere for testing

6.3.1 *Pieces*

Determine the conditioned length of the piece in accordance with SLS 46 and then (without removing it from the standard atmosphere) weigh it. Alternatively, if it is neither possible nor necessary to determine the full length of the piece, use the procedure given in 6.3.2 on a sample having a length of at least 0.5 m but preferably of 3 m to 4 m, taken preferably from the middle of the piece.

6.3.2 *Sample lengths*

6.3.2.1 Ensure that the fabric is cut across the full width of the piece along parallel lines at right angles to the selvedge and that the length of the sample is at least 0.5 m but preferebly 3 m to 4 m.

6.3.2.2 Determine the conditioned length of the sample in accordance with SLS 46 and then (without removing it from the standard atmosphere) weigh it.

6.4 Method 2 Determination of mass per unit length of pieces when it is impracticable to condition them in the standard atmosphere for testing

Determine, in accordance with SLS 46, the length of the piece after relaxation in the prevailing atmosphere, and then weigh it in the prevailing atmosphere. From, preferably, the middle of the piece, cut a full-width sample of length at least 1 m but preferably 3 m to 4 m and determine its length and the mass in the prevailing atmosphere. Determine the mass of the piece and the mass of the sample length in the prevailing atmosphere at the same time in order to minimize the effect of any sudden changes in the temperature and/or humidity of that atmosphere. Then proceed as described in 6.3.2.2.

6.5 Method 3 Determination of the mass per unit area of pieces and of sample lengths that can be conditioned in the standard atmosphere for testing

6.5.1 *Pieces*

Use the procedure given in 6.3.1 and determine the conditioned width in accordance with SLS 45.

6.5.2 *Sample lengths*

Use the procedure given in 6.3.2 and determine the conditioned width in accordance with SLS 45.

6.6 Method 4 Determination of mass per unit area of pieces when it is impracticable to condition them in the standard atmosphere for testing

Use Method 2 and in addition determine, in accordance with SLS 45, the width of the piece after relaxation in the prevailing atmosphere and the width of the sample both after relaxation and after conditioning in the standard atmosphere for testing.

6.7 Method 5 Determination of mass per unit area using small specimens

6.7.1 *Test samples*

Cut five samples (unless otherwise specified) from the fabric, each approximately 15 cm x 15 cm, selected so as to avoid any selvedges or creased areas and so that they represent the fabric as fully as possible. Where the existence of a large pattern involves local areas of appreciably different mass per unit area, select samples containing an integral number of complete repeats of the pattern.

6.7.2 *Procedure*

Pre-condition the sample in accordance with 6.1. Bring the samples into equilibrium with the standard atmosphere for testing by exposing them to this atmosphere in a tension-free condition for at least 24 h. Take each sample in turn and place it on a surface suitable for cutting. Place the metal plate centrally on the sample, position the cutter and cut a square specimen 10 cm x 10 cm (or a circular specimen of area 100 cm^2).

Weigh the specimen to an accuracy of ± 0.001 g, ensuring that no loss of threads occurs.

7 CALCULATION OF RESULTS

7.1 Methods 1 and 3

Calculate the mass per unit length, in grams per metre, and/or the mass per unit area, in grams per square metre, from the following formulae, as appropriate:

$$m_{ul} = \frac{m_c}{l_c}$$

$$m_{ua} = \frac{m_c}{l_c \times w_c}$$

where,

m_{ul} = the mass per unit length, in grams per metre, of the piece/sample (without selvedges, as relevant), after conditioning in the standard atmosphere for testing;

m_{ua} = the mass per unit area, in grams per square metre, of the piece/sample (with/without selvedges, as relevant), after conditioning in the standard atmosphere for testing;

m_c = the mass, in grams, of the piece/sample (with/without selvedges, as relevant), after conditioning in the standard atmosphere for testing;

l_c = the length, in metres, of the piece/sample after conditioning in the standard atmosphere for testing;

w_c = the width, in metres, of the piece/sample (with/without selvedges, as relevant), after conditioning in the standard atmosphere for testing.

Round off the result to the nearest gram.

7.2 Methods 2 and 4

7.2.1 From the data on the relaxed fabric, the relaxed sample, and the conditioned sample calculate, in accordance with SLS 46 the conditioned length of the piece.

7.2.2 When mass per unit area is determined, calculate similarly, but in accordance with SLS 45, the conditioned width of the piece.

7.2.3 Calculate the conditioned mass, in grams, of the piece from the formula

$$m_c = m_r \times \frac{m_{sc}}{m_s}$$

where,

m_c = the mass, in grams, of the piece after conditioning in the standard atmosphere for testing;

m_r = the mass, in grams, of the piece after relaxation in the prevailing atmosphere;

m_{sc} = the mass, in grams, of the sample after conditioning in the standard atmosphere for testing;

m_s = the mass, in grams, of the sample after relaxation in the prevailing atmosphere.

7.2.4 Use the value of m_c calculated as in 7.2.3 to calculate, as in 7.1, the mass per unit length or per unit area, as relevant.

7.2.5 Round off the result to the nearest gram.

7.3 Method 5

From the mass of the specimen, calculate the mass per unit area of the fabric from the formula

$$m_{ua} = m \times 100$$

where,

m_{ua} = the mass per unit area, in grams per square metre, of the fabric after conditioning in the standard atmosphere for testing;

m = the mass, in grams of the specimen.

Calculate the mean of the five values so calculated.

Round off the result to the nearest gram.

8 TEST REPORT

8.1 The test report shall include the following particulars:

a) a statement that the test was performed in accordance with this Sri Lanka Standard;

b) where more than one specimen is tested, the result for each specimen;

c) the date of the test;

d) the mean mass per unit length, in grams per metre, and/or area, in grams per square metre;

e) the Method (1, 2, 3, 4 or 5) by which each result was obtained;

f) whether or not the results include the selvedge; and

g) details of any deviation from the specified test procedure.

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