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METHOD FOR DETERMINATION OF COMMERCIAL MASS (WEIGHT) OF CONTINUOUS FILAMENT RAYON YARN AND ACETATE YARN AND THEIR MIXTURE

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BUREAU OF CEYLON STANDARDS

METHOD FOR DETERMINATION OF COMMERCIAL MASS (WEIGHT) OF CONTINUOUS FILAMENT RAYON YARN AND ACETATE YARN AND THEIR MIXTURE

S.L.S. 257 : 1973

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BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO 3.

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.

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SRI LANKA STANDARD METHOD FOR DETERMINATION OF COMMERCIAL MASS (WEIGHT) OF CONTINUOUS FILAMENT RAYON YARN AND ACETATE YARN AND THEIR MIXTURE

FOREWORD

This Sri Lanka Standard has been prepared by the Drafting Committee on Test Methods for Textiles. It was approved by the Textiles Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 5th December, 1973.

All quantities and dimensions specified in this standard are given in the International System of Units (SI). In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with C.S. 102 : Ceylon standard on presentation of numerical values.

In the preparation of this standard, considerable assistance derived from publications of the Indian Standards Institution is gratefully acknowledged.

1. SCOPE

This standard prescribes a method for determination of commercial mass* of continuous filament rayon yarn and acetate yarn, and their mixture. This method is generally applicable to continuous filament rayon yarns and acetate yarns or their mixture which have been treated with readily removable lubricants and sizes. The method is inapplicable if the yarns have received a special treatment such as synthetic resin or anti-swelling treatment.

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* The term 'weight' is strictly related to force. However, this standard deals with the quantity 'mass'. As the term mass is unfamiliar in this context, the term 'weight' is being included for an interim period.

2. PRINCIPLE

The commercial mass is obtained by removing in a prescribed manner the normal finish and any special lubricant or size that may be present from a sample of the yarn of known mass and adding to the oven-dry mass of the washed sample, a percentage (the conventional allowance) to cover moisture and normal finish. If the yarn is specially lubricated or sized, a further addition may be made to cover the special lubricant or size.

3. DEFINITIONS

For the purpose of this standard the following definitions shall apply.

3.1 Acetate - Fibres and filaments consisting wholly or mainly of cellulose acetate.

Note:- The term acetate is now generally accepted as referring to the approximately five-sixths acetylated cellulose soluble in acetone and referred to formerly as diacetate.

3.2 Lot - All the rayon yarn, acetate yarn or their mixture of one definite type and grade, despatched, transported and delivered together and packed in one type of package.

3.3 Oven-dry mass - The mass of textile material obtained by drying it at a temperature of 105° to 110° C.

3.4 Package - A general term for bobbin, pirn, cone, cake, hank etc. of yarn. Yarn is put up in such forms for convenience in transporting it and processing it further.

3.5 Rayon - A fibre consisting wholly or mainly of regenerated cellulose.

3.6 Tare - The sum of the masses of all the wrappers and containers, such as cases, sacking and yarn support material.

4. PROCEDURE FOR RAYON YARN OR ACETATE YARN

4.1 Determination of mass of lot of yarn - Determine the net mass of the yarn in each case, bale or beam making up the lot of

yarn to be tested before taking samples. Determine the mass of each unit intact to 0.1 per cent of its mass and deduct the manufacturers' tare.

4.2 Sampling–If the number of packages in the laboratory bulk sample is 25 or less, sample all the packages. If the number exceeds 25, select 25 packages at random. If the tex of the yarn is t, and the number of packages selected from the laboratory bulk sample is n, the length of yarn from each package to give a 10 g laboratory sample is $10^7/nt$ mm. If nt is high, eg. more than 2000, wind a heavier skein and cut it across in two places to make a tow of suitable mass. Withdraw the appropriate continuous lengths from each package either by winding skeins of the same number of turns on a wrap reel, or by some other means. Unite the lengths side by side either as a single skein or as a tow to form the laboratory test sample, ensuring that there are equal lengths from each package in the skein or tow. Pre-treat the laboratory test sample if required by the test method to be used and ensure that the ends of any sample in the form of tow are securely tied before treatment.

Take specimens of the appropriate mass from the laboratory test sample by cutting a bunch of threads of equal length from the skein or tow and comprising all the threads in it, ensuring that the test specimens are taken from a place remote from the tie bands.

4.3 Transfer 100 g of the test specimen to a tared stoppered vessel and determine the mass of the vessel with the specimen correct to one milligramme. From the masses of the vessel with and without the test specimen, find by subtraction the mass of the test specimen.

4.4 Follow the procedure prescribed in Clause 4.5 or 4.6.

4.5 Put the test specimen in a muslin bag (previously boiled several times of known oven-dry mass; the size of the bag being such that the yarn will not be compressed. Depending upon the

condition of the yarn in the lot, treat the test specimen according to the one applicable sub-clause out of 4.5.1, 4.5.2, 4.5.3 and 4.5.4 taking care not to damage the specimen.

4.5.1 If the yarn in the lot is without size, but has been treated with normal finish or with a special lubricant and the supplier has not indicated the agents and the method for removing the special lubricant, immerse the bag with the specimen in a solution (having a mass 25 times the mass of the bag and its contents) containing 5 g of neutral soap (toilet soap conforming to C.S.34:1968* may be used) per litre of soft water (maximum hardness: 0.5 part of $CaCO_3$ per 100 000 parts, by mass, of water) at 70° to 75°C. Allow the bag to remain in the solution for 30 minutes and add soft water heated to 70°C until 25 per cent of the solution overflows. Remove the bag from the bath and centrifuge it. Rinse it for 15 minutes, twice in soft water at 85°C, and once in distilled water at 40°C, centrifuging the bag after each rinse.

4.5.2 If the yarn in the lot is sized with a water insoluble size, and the supplier has not indicated the agents and the method for removing the size, immerse the bag with the specimen in a solution (having a mass 40 times the mass of the bag and its contents) containing 10 g of a neutral soap (toilet soap conforming to C.S. 34* may be used) per litre of soft water (maximum hardness: 0.5 part of $CaCO_3$ per 100 000 parts, by mass, of water) and heat the solution to 30° C. Add dilute caustic soda or dilute sulphuric acid solution and adjust the pH between 9.5 and 10.0. Allow the solution to cool and keep the bag in it for at least 12 hours. At the end of this period, raise the temperature to 85°C in 30 minutes, keep the solution at this temperature for 2 hours and the bag in motion all the while. Remove the bag and centrifuge it. Rinse it for 15 minutes, twice in soft water at 85°C, and once in distilled water at 40°C, centrifuging it after each rinse.

* C.S. 34:1968 – Toilet Soap.

4.5.3 If the yarn in the lot is sized with a water - soluble size containing starch and the supplier has not indicated the agents and the method for removing the size, immerse the bag with the specimen in a solution (having a mass 40 times the mass of the bag and its contents) containing 2 g of diastase per litre of soft water (maximum hardness: 0.5 part of $CaCO_3$ per 100 000 parts, by mass of water). Heat the solution to 50°C and allow the bag to remain in the solution for at least 12 hours at approximately 40°C. Remove the bag and transfer it to a bath containing 5 g of a neutral soap (toilet soap conforming to C.S. 34:1968* may be used) per litre of soft water at 85°C. Keep the solution at 85°C for one hour and the bag in motion all the while. Remove the bag and centrifuge it. Rinse it for 15 minutes, twice in soft water at 85°C and once in distilled water at 40°C, centrifuging it after each rinse.

4.5.4 If the yarn in the lot is sized with a water-soluble size not containing starch and the supplier has not indicated the agents and the method for removing the size, immerse the bag with the specimen in a solution containing 5 g of a neutral soap (toilet soap conforming to C.S. 34* may be used) per litre of soft water (maximum hardness: 0.5 part of $CaCO_3$ per 100 000 parts, by mass, of water) at 85°C. Keep the solution at 85°C for one hour and the bag in motion all the while. Remove the bag and centrifuge it. Rinse it for 15 minutes, twice in soft water at 85°C and once in distilled water at 40°C, centrifuging it after each rinse.

4.6 Extract the specimen in a thimble with dichloromethane (methylene chloride) (see Note) in a soxhlet apparatus for at least 3 hours at a rate of 6 cycles per hour and allow the entrained solvent to evaporate. Put the specimen in a muslin bag (previously boiled several times) of known oven-dry mass. Wash the specimen well by alternate immersion in running hot water

* C.S.34:1968 - Toilet Soap.

and wringing by hand 12 times. Immerse in a 0.5 per cent solution of an active concentrated malt extract at 50°c using liquor to specimen ratio of 20 to 30:1, and wring by hand repeating the process three times. Return the specimen to the solution, heat to 70°C, maintain at that temperature for 15 minutes. Wash thoroughly in hot distilled water, squeeze, mangle or centrifuge, and dry at room temperature. For removal of gelatine and oxidizable oils, treat the specimen in a solution containing one per cent of a non-ionic wetting agent* by mass, one per cent of an anionic detergent** by mass, and one per cent of ammonia (relative density 0.88), by mass, for 1½ hours at 50°C and treat further for a period of 1½ hours in the same bath at 70° to 75°C. Wash thoroughly and dry at room temperature.

Note: If the test specimen is acetate yarn, extract it with petroleum ether (b.p. 40° to 60°C) instead of dichloromethane.

4.7 Place the bag (with its contents) in a ventilated oven or other suitable drying enclosure with a positively induced air current maintained at 105° to 110°C and dry it to constant mass.

The determination of mass shall be done in the oven with the air flow stopped.

If the oven has no built-in balance, transfer the bag (with its contents) quickly to a tared vessel already in the oven, close the vessel immediately, and allow it to cool; before determining mass momentarily lift the stopper to ensure that the air inside is at atmospheric pressure.

Note: The mass shall be taken to be constant when the difference between two consecutive mass determinations at an interval of 20 minutes is less than 0.05 per cent of the first of the two determinations.

---

* Lissapol N has been found satisfactory

** Lissapol C has been found satisfactory

4.8 Calculation of oven-dry mass of specimen

Find the oven-dry mass of the specimen by the following formula:-

$$m_3 = m_2 - m_1$$

where

m_3 = oven-dry mass, in g, of the specimen,

m_2 = oven-dry mass, in g, of the bag with the specimen, and

m_1 = oven-dry mass, in g, of the bag.

4.9 Calculation of oven-dry mass of consignment

Calculate the oven-dry mass of the consignment from the formula:-

$$C = M \times \frac{m_3}{m_0}$$

where

C = oven-dry mass of the consignment,

M = the mass of the consignment as determined at the time of sampling,

m_0 = the original mass of the specimen, and

m_3 = oven-dry mass of the specimen.

4.10 Calculation of commercial mass

Calculate the commercial mass of the consignment as follows:

$$\text{Commercial mass} = \frac{C \times (100 + A + B)}{100}$$

where

C = oven-dry mass of the consignment,

A = moisture regain, commercial, and

B = further addition (if any) for special lubricant or size.

Note 1: For regenerated cellulose rayon yarn, the moisture regain, commercial, is 11 per cent of oven-dry mass and for cellulose acetate rayon yarn, it is 6 per cent.

Note 2: The addition for special lubricant or size shall be as agreed upon between the buyer and the seller.

5. PROCEDURE FOR MIXTURE OF REGENERATED CELLULOSE RAYON YARN AND ACETATE YARN

5.1 Follow the procedure prescribed in Clause 4.1 to 4.8 and determine the oven-dry mass of the specimen.

5.2 Take a portion of the oven-dry test specimen and treat it according to the method prescribed in C.S. 173:1972*

From the per cent cellulose acetate content of the oven-dry specimen obtained, calculate the expected oven-dry mass, in grammes of the oven-dry test specimen when free from cellulose acetate.

Note:- The difference between the masses obtained as in Clauses 5.1 and 5.2 would thus give the oven-dry mass of the acetate yarn in the specimen.

5.3 Calculate the oven-dry mass C_1 of the cellulose acetate in the consignment from the formula:-

$$C_1 = \frac{M \times (m_1 - m_2)}{m_0}$$

and the oven-dry mass C_2 of the regenerated cellulose rayon in the consignment from the formula:-

$$C_2 = M \times \frac{m_2}{m_0}$$

* C.S. 173:1972 Method for quantitative analysis of binary mixtures of secondary cellulose acetate and certain other fibres.

where

m_1 = oven-dry mass of the test specimen,

m_2 = oven-dry mass of the specimen free from normal finish lubricant, size, moisture and cellulose acetate,

M = the mass of the consigment as determined at the time of sampling, and

m_0 = the original mass of the specimen.

5.4 Calculation of commercial mass

Calculate the commercial mass of the consignment as follows:-

$$\text{Commercial mass} = C_1 \frac{(100 + A_a + B_a)}{100} + C_2 \frac{(100 + A_c + B_c)}{100}$$

where

A_a = per cent moisture regain, commercial, for acetate yarn,

A_c = per cent moisture regain, commercial, for regenerated cellulose rayon yarn,

B_a = further per cent addition for special lubricant or size for acetate yarn, and

B_c = further per cent addition for special lubricant or size for cellulose rayon yarn.

Note 1: For regenerated cellulose rayon yarn, the moisture regain, commercial, is 11 per cent of oven-dry mass and for acetate rayon it is 6 per cent.

Note 2: The addition for special lubricant or size shall be as agreed upon between the buyer and the seller.

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