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Textiles — Chenille yarns — Test method for the determination of linear density

Textiles — Fils chenilles — Méthode d'essai pour la détermination de la masse linéique

Reference number
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Foreword

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ISO 23733 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 23, *Fibres and yarns*.

Introduction

The variation in linear density of chenille yarns is inherently higher than for more conventional yarns covered by ISO 2060. It is expected, therefore, that sampling plans for chenille yarns will involve greater numbers of specimens. To help readers of this International Standard to gain an appreciation of the inherently higher variation level associated with these novelty yarns, Table 1 has been provided. This table was developed from several prominent chenille manufacturers, where yarns of multiple fibre types and linear densities were evaluated. Table 1 is provided as a tool for manufacturers of chenille yarns to gauge the quality of their products relative to the industry average.

Textiles — Chenille yarns — Test method for the determination of linear density

1 Scope

This International Standard specifies a test method for the determination of the linear density of chenille yarns.

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.

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

3 Terms and definitions

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

3.1
chenille yarn
novelty yarn with pile protruding radially from the axis, where the pile fibres are held between a core yarn system

3.2
core yarn
set of yarns that serve as an extended axis to anchor the pile

3.3
moisture equilibrium
condition reached by a sample at a closely defined temperature and relative humidity, when the net difference between the amount of moisture absorbed and the amount desorbed, as indicated by a change in mass, shows no trend and becomes of no practical significance

NOTE See ISO 139.

3.4
pile
raised tufts (cut loops) deliberately emplaced to stand away from the surface of the fabric

3.5
skein
continuous strand of yarn in the form of a collapsed coil

3.6
yarn linear density
mass per unit length of yarn

NOTE The yarn linear density is expressed in tex or its multiples or submultiples.

3.7
yarn number
relative measure of the fineness of a yarn, expressed as mass per unit length

3.8
yarn package
length or lengths of yarn in a form suitable for use, handling, storing, or shipping

NOTE Packages may be comprised of unsupported yarn, such as balls or skeins, or supported yarn, such as cakes, bobbins, cops, cones, spools, tubes or beams.

3.9
sample skein
length of yarn removed from the yarn package, having a suitable length for conducting the prescribed testing

3.10
test skein
small skein (removed from sample skein) which has a prescribed length of yarn, and is used for the determination of linear density

4 Principle

The linear density of chenille yarns is calculated from the length and mass of conditioned skeins. Specimens of suitable length are prepared by reeling test skeins under specified conditions from sample skeins that have been appropriately conditioned.

5 Apparatus

5.1 Reel

5.1.1 General

This is a hand reel or motor driven reel having a perimeter of 1 000 mm. A tolerance of ± 0,25 % is recommended. By prior agreement, reels having a perimeter of between 1,0 and 2,5 m may be used. The reel shall be fitted with a traversing mechanism that will avoid bunching successive wraps of yarn, and with an indicator of the length wound.

5.1.2 Reel circumference

Determine the actual perimeter of the reel by winding a 0,6 cm wide steel measuring tape around the reel. Tension the tape prior to directly reading the circumference of the reel, by attaching a 0,5 kg weight at the end of the bars of the reel, and in the centre. If the circumference at any of these areas is outside the limits of 1 000 mm ± 2,5 mm, adjust the flywheel to bring the measurement(s) within the limits.

5.1.3 Yarn tensioning

The reel shall be fitted with either a positive feed system at a controlled tension of 0,5 cN/tex, or with an adjustable tension device. The length of the skeins should be checked, and variations in length not be allowed to exceed ± 0,25 % (see Annex A).

5.2 Balance

For the determination of the average yarn linear density, a balance of suitable capacity, graduated in grams, with a sensitivity of 1 part in 1 000, should be used. If single skeins are weighed, a balance graduated directly in yarn linear density may be used.

6 Standard atmospheres

Condition sample and test specimen skeins to achieve moisture equilibrium as specified in ISO 139.

Any departure from the standard conditioning atmospheres should be agreed by the interested parties and the temperature and humidity used should be stated in the test report.

7 Sampling

Sampling from the bulk sample will be conducted in such a manner that they are representative of the lot (consignment) to be tested.

The bulk sampling approach shall be carried out in one of the following ways:

a) according to directions, if any, given in the material specification;

b) according to procedures approved by ISO for textile products, if directions on sampling are not included in the material specification;

c) according to the method and guidance given in Annex B.

8 Tension for reeling

8.1 Take two packages from a case selected randomly from the lot. Discard the first 25 m from the beginning of each package to avoid possible damaged portions of a package. When reeling skeins, the yarn shall be taken from the end of the yarn package if this is the normal method of use; otherwise, the yarn shall be taken from the side of the yarn package.

8.2 To establish the required tension for reeling, reel a skein from two packages to check the skein length (see Annex A). If the length of a skein departs from the set length of the reel's circumference and number of turns by more than 0,25 %, adjust the reeling tension and run additional skeins until the skeins fall within the ± 0,25 % tolerance. It may be a useful practice in determining the skein test length, if the skeins are conditioned prior to measurement and before tension adjustments are made. If yarn is supplied in more than one type of yarn package, check skeins from two packages of each type of yarn package, as described above. It may be necessary to use different reeling tensions for each package type.

8.3 Once the correct tension for reeling has been established for each type of yarn package, no additional tension rechecking or verification of skein length is required.

8.4 Reel a sample skein with enough length for unwinding to form the number of individual test specimen skeins required (see 9.3).

9 Test specimens

9.1 The length of a skein for the measurement of linear density shall be 25 m.

9.2 Using the winding tension described in 8.2, unwind the sample skein in such a manner that the yarn traverses the full width permitted by the reel to reduce the superimposition of the subsequent yarn layer. Cut the skein free from the sample skein, tie the ends of the test specimen skein together and cut the loose ends short (less than 2,5 cm). Remove skein to a skein holder or board for weighing.

9.3 Prepare the number of skeins, as directed in a material specification, if applicable. Otherwise, take three skeins from each sample skein.

10 Conditioning

Condition the reeled skeins in the specified atmosphere for conditioning (see Clause 6).

11 Procedure

Weigh on a suitable balance (5.2), in grams, each skein conditioned in the appropriate standard atmosphere for testing.

12 Calculation

12.1 Calculate the linear density, ρ_L, expressed in tex, from the mass and length of the conditioned skein according to the equation:

$$\rho_L = \frac{m_c \times 10^3}{L}$$

where

m_c is the mass, in grams, of the conditioned test skein;

L is the skein length, in metres.

12.2 Calculate the mean of the measured values, rounding to three significant figures.

12.3 If desired, calculate the coefficient of variation of the observed values of linear density by recognized statistical methods, but base the calculation on at least 20 specimens. Rounding of the mean values shall be reported, taking into account the accuracy of the individual length and mass measurements. Table 1 has been provided as guidance. It contains variation levels representative of a wide variety of chenille yarns offered by the industry.

Table 1 — Linear density tolerances for chenille yarns

Number of skeins	1	5	10	25	100
Tolerance (± in %)	20,0	10,0	6,0	4,0	2,0

13 Test report

The test report shall contain the following information:

a) a reference to this International Standard, i.e. ISO 23733:2007;

b) sufficient information for complete identification of the sample tested;

c) the mean linear density, in units of the Tex System;

d) the number of test specimens;

e) the length of yarn in each test skein;

f) the coefficient of variation of the linear density, if determined;

g) the sampling scheme employed;

h) any deviation, by agreement or otherwise, from the procedure specified (for example, deviations in conditioning atmospheres).

Annex A
(normative)

Means for checking the length of yarn in skeins

A.1 Summary of procedure

A skein is mounted under a specified tension between two vertically aligned pegs, one of which is movable. The length of the skein is read directly from a scale, mounted adjacent to the pegs. The length of the skein, the number of wraps in the skein, and the physical dimensions of the apparatus are used to calculate the length of the yarn in the skein.

A.2 Apparatus

The skein gage, for checking the length of a test skein under prescribed conditions of load, consists of two round metal pegs, each about 12,5 mm in diameter, and 50 to 60 mm long, located in the same vertical plane. One of the pegs is fixed to the rigid frame of the apparatus, and the other is carried on the lever of a simple loading system, with a low-friction bearing mounted on the frame acting as a fulcrum for the system. At least one of the pegs shall be free to rotate about its axis. One-half of the length of the skein is indicated on a scale mounted on the frame, by a pointer attached to the lever arm, or by an index on the end of the lever arm.

A.3 Procedure

Taking care to avoid bunching, place the skein around the two pegs, and apply the appropriate load, by hanging a weight on the lever arm, or by moving a sliding weight along the lever arm. Record the length of the skein by reading the distance between the pegs on the scale, with the skein under a tension of 0,5 cN/tex Calculate the length of the yarn in the skein, using the following equation:

$$l = 2(d + 1{,}25\pi) \times n$$

where

l is the length of yarn in the skein, in centimetres;

d is the distance between the axes of the pegs, as registered on the scale, in 0,01 m;

n is the number of wraps in the skein.

If the value of the length of the yarn in the skein falls outside the limits of $\pm$ 0,25 %, prepare a new skein after adjusting the winding tension, check the length of the yarn in that skein, and, if within limits, reel skeins for testing, as necessary, using the new (adjusted) winding tension.

Annex B
(normative)

Guideline for sampling

B.1 Bulk sample (number of cases from a shipment, lot or consignment)

Take a bulk sample of one or more cases as representative of the lot to be tested, according to Table B.1.

Table B.1 — Bulk sample

Number of cases in shipment, or lot consignment	Bulk sample — Minimum number of cases to be selected at random
$\leqslant 3$	1
4 to 10	2
11 to 30	3
31 to 75	4
$\geqslant 76$	5

If any of the selected cases are damaged or damp, they shall be replaced and this fact shall be recorded on the test report (see Clause 13).

B.2 Number of packages in the laboratory sample

B.2.1 The number of packages to be taken depends on the desired precision and probability level of the test results. If these are not given in the material specification, they shall be agreed upon by all interested parties and the required number of specimens calculated according to accepted statistical methods. If, for any reason, it is impractical to test the indicated number of packages, it will be necessary to revise the specified precision, or probability level, or both.

B.2.2 In the absence of material specification or agreement, choose a number of packages which will give a precision (maximum permissible error of the mean) of $\pm$ 3 % at a probability level of 95 %. This number of packages can be calculated as 0,43 CV^2, where CV is the coefficient of variation of the linear density values obtained from individual packages. In obtaining an estimate of CV, the linear density value for each package must be based on the same length of strand as will be used in normal testing. The estimate of CV should preferably be based on long experience with similar materials.

B.2.3 If the CV is not known, test at least 10 packages.

B.2.4 In the absence of material specification, take the required number of yarn packages from the bulk sample, taking, as nearly as possible, the same number of packages from each case. Take packages at random from the top, middle and bottom layers in the cases, and from the middle and the sides of the layers. Take, as nearly as possible, the same number of specimens from each package of the laboratory sample.

Bibliography

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[3] ISO 1130, *Textile fibres — Some methods of sampling for testing*

[4] ASTM D 1907, *Standard Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method*

[5] EN 12751, *Textiles — Sampling of fibres, yarns and fabrics for testing*

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