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Textile glass — Continuous filament yarns and staple fibre yarns — Determination of twist

Verre textile — Fils de silionne et de verranne — Détermination de la torsion

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1890 was prepared by Technical Committee ISO/TC 61, *Plastics*.

This second edition cancels and replaces the first edition (ISO 1890-1975), of which clause 1 has been technically revised.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Textile glass — Continuous filament yarns and staple fibre yarns — Determination of twist

1 Scope and field of application

This International Standard specifies a method for the determination of twist in textile glass continuous filament yarns and staple fibre yarns.

In the case of staple fibre yarns, the results obtained should be regarded as indicative only.

This International Standard does not apply to rovings.

Determination of the twist must take into account the fact that the run-out system may have an influence on the results. When the yarn is run out tangentially, this system does not induce any change in the twist level that was given by the twist frame. On the other hand, if the yarn is run out overhead, the measured twist level is modified, depending first on the winding direction, secondly on the length of wound wrap.

This change in relative value is small when twist is high and wrap length is long.

In practice, the twist found finally in a fabric may be rather different from the twist of wound yarn.

The method specified in this International Standard allows the measurement of intrinsic twist of yarn on the bobin (tangential run out).

If, however, it is required to test by the overhead method, it is necessary to reduce any risk of variation caused, for example, by shelling of wraps. For this reason the bobin must be positioned horizontally.

This International Standard concerns single yarn (one twist operation), folded (plied) and cabled yarns (two or more twist operations).

The method specified provides a measurement for each successive twist step.

If, for folded (plied) or cabled yarns, only the measurement of final twist step is required (general situation) the method specified for single yarn should be followed.

2 References

ISO 2, *Textiles — Designation of the direction of twist in yarns and related products.*

ISO 1886, *Textile glass — Method of sampling applicable to batches.*

ISO 1889, *Textile glass — Continuous filament yarns, staple fibre yarns and rovings in the form of packages — Determination of linear density.*

ISO 2078, *Textile glass — Yarns — Designation.*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval.*

3 Principle

Counting, by means of a twist tester, of the number of turns necessary for the complete untwisting of 500 mm of yarn secured between the clamps of the apparatus, and calculation of the mean of a specified number of measurements.

4 Apparatus

Twist tester, i.e. an apparatus which has two clamps, one fixed and one movable, mounted on a bar, and a means for securely fastening a section of yarn stretched under tension between the clamps. The movable clamp has a means for untwisting the yarn and the tensioning device maintains constant tension on the yarn along its axis. The yarn is untwisted and the number of turns to completely untwist the yarn is counted. The change in length of the yarn may be determined by accurate measurement of the length of yarn before and after the untwisting operation.

Additionally the twist tester shall satisfy the following conditions:

- it shall be capable of yielding results accurate to one turn;
- it shall be possible to set the yarn between clamps under a known and adjustable tension, the initial distance between clamps being 500 mm for yarns of any type;
- the clamps shall not damage the yarn;
- an indicator shall permit measurement with an accuracy of 1 mm of the change in the length of the test specimen between the clamps.

5 Sampling and number of tests

The size of the sample from a given consignment of packages shall be in accordance with ISO 1886.

If the textile glass continuous filament yarns and staple fibre yarns have another origin (fabrics, mats, etc.) refer to the specifications concerning the products from which the yarns come whenever sampling procedures are given. If not, the method for selection of samples shall be decided by previous agreement between the interested parties.

In cases where only a small sample is available, the procedure described in this International Standard may be followed, but the result thus obtained will only be approximate.

5.1 First, untwist the yarn to determine its construction, i.e. the number of individual yarns used.

The aim of this operation is to determine whether yarn is a single, folded (plied) or cabled yarn.

Determine the linear density of the yarn to be tested if it is unknown, and calculate the pre-tension to be used, at the rate of 2,5 mN/tex.

5.2 From each package of the sample, pull off yarn tangentially, allowing the package to revolve.

5.3 Make ten measurements in two series, separated by 100 m, of five measurements as described in the following.

Reject 10 m of yarn, and, without cutting it, make five measurements at random along the yarn, at irregular intervals of not less than 2 m. Wind off about 100 m of the yarn and make a further set of five random measurements at intervals of at least 2 m.

If there is any doubt concerning the regularity of the twist between the beginning and end of the packages, a supplementary series of ten measurements may be carried out at the end of the packages, using the same procedure as in the preceding.

6 Procedure for each twist test

For each test, unwind the yarn from the outside of the package perpendicularly to the axis, and without cutting it, lead it directly from the package to the twist tester and secure it under standard pre-tension between the fixed clamp and the rotatable clamp.

In order to avoid any change in twist before or while securing the yarn in the clamps, it is important

- a) to select a length of yarn slightly greater than the required initial length, so as to necessitate handling the yarn only once before securing it between the clamps;
- b) to adjust the initial length of yarn without the yarn rubbing on any part of the apparatus, for instance against the half-opened jaws of the clamp where the yarn will ultimately be secured.

6.1 Single yarn

Remove the twist completely; this can be checked by passing a needle between the untwisted elements. Record the number of turns necessary for this complete untwisting, as well as the S or Z direction of the twist (see ISO 2).

6.2 Folded yarn

In a folded yarn the standard pre-tension is the sum of the standard pre-tensions found for each of the single yarns constituting the folded yarn. It is useful, in carrying out the test, to apply this pre-tension by means of two masses, the first mass corresponding to the pre-tension of one single constituent yarn, the other mass added to reach the pre-tension of the folded yarn.

Completely untwist the folded yarn. Record the number of turns necessary for this operation as well as the direction of twist in the folded yarn.

Next reduce the pre-tension to the value found for a single constituent yarn by removing the second mass initially added. By cutting close to the clamps, remove all but one of the individual yarns separated by the first untwisting operation. Record the length of the remaining yarn.

Completely remove the twist of the remaining yarn, recording the number of turns necessary as well as the direction of twist.

6.3 Cabled yarn

In a cabled yarn the standard pre-tension is again the sum of the standard pre-tensions found for each constituent single yarn.

Completely untwist the cabled yarn. Record the number of turns necessary for this operation as well as the direction of twist in the last component of the cabled yarn.

Next, single out one of the folded or cabled yarns separated by the previous untwisting operation, in conformity with the procedure described in 6.2. Reduce its pre-tension to the corresponding value by adjusting the weight applied. Then record its length and untwist it by repeating the operation described above in 6.2 or 6.3.

Continue this procedure for each component of the yarn until a single yarn is obtained.

7 Expression of results

7.1 Calculate the twist, T , in turns per metre, of each component of the specimen length of yarn tested by means of the equation

$$T = \frac{N}{L}$$

where

N is the number of turns necessary to untwist each component of the yarn;

L is the length, in metres, under standard pre-tension prior to untwisting.

Thus the twist in single, folded or cabled yarns is expressed as the number of turns per metre of single, folded or cabled yarns, for each component of the yarn.

7.2 Calculate the mean of the ten tests per package, giving the mean twist of the package, for each component of the yarn.

In the case where the twist tests on the outside and inside of packages have been performed separately (see 5.3), also state the average results of outside and inside separately, for each component of the yarn.

7.3 Using the average values, calculate the mean twist of the consignment for the total of the packages (or parts of packages, outside or inside): for folded or cabled yarns calculate the twist in each component of the yarn.

7.4 Determine the standard deviation and 95 % confidence intervals for the means of the results for each component of the yarn, in accordance with ISO 2602. If the tests have been made both on the outside and inside of the packages, determine the confidence interval corresponding to the mean of the values

found on the outside and, similarly, the confidence interval corresponding to the mean of the values found on the inside of the packages.

8 Test report

The test report shall include the following information:

- a) reference to this International Standard;
- b) complete designation of the yarn in accordance with ISO 2078;
- c) sampling procedure applied;
- d) results for each component of the yarn;
- e) variation in results from the inside to the outside of the package;
- f) table of the mean twist in each package and the standard deviation of these measurements for each component of the yarn;
- g) table of confidence intervals for each component of the yarn.

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