

BS EN ISO 2061:2015



BSI Standards Publication

Textiles — Determination of twist in yarns — Direct counting method

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN ISO 2061:2015. It supersedes BS EN ISO 2061:2010 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee TCI/24, Physical testing of textiles.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2015.
Published by BSI Standards Limited 2015

ISBN 978 0 580 84860 5

ICS 59.080.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2015.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

English Version

Textiles - Determination of twist in yarns - Direct counting method (ISO 2061:2015)

Textiles - Détermination de la torsion des fils - Méthode par comptage direct (ISO 2061:2015)

Textilien - Bestimmung der Drehung von Garnen - Direktes Zählverfahren (ISO 2061:2015)

This European Standard was approved by CEN on 20 June 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 2061:2015) has been prepared by Technical Committee ISO/TC 38 "Textiles" in collaboration with Technical Committee CEN/TC 248 "Textiles and textile products" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2016, and conflicting national standards shall be withdrawn at the latest by January 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 2061:2010.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 2061:2015 has been approved by CEN as EN ISO 2061:2015 without any modification.

Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
4 Principle.....	2
5 Apparatus.....	3
6 Standard atmosphere.....	3
7 Sampling.....	3
8 Test specimens.....	4
8.1 Length.....	4
8.1.1 Single spun yarns.....	4
8.1.2 Single multifilament, plied, and cabled yarns.....	4
8.2 Selection.....	4
8.3 Number of test specimens.....	4
9 Procedure 1 — Determination of the direction of twist.....	5
10 Procedure 2 — Determination of the amount of twist.....	6
10.1 Preliminary procedure.....	6
10.2 Single, spun yarn.....	6
10.3 Single, multifilament yarns.....	6
10.4 Plied yarns.....	7
10.5 Cabled yarns.....	7
11 Calculation of results.....	8
11.1 Average twist per specimen.....	8
11.2 Average twist per sample.....	8
11.3 Variation of observations.....	8
11.4 Change in length on untwisting.....	8
11.5 Twist factor (α).....	9
12 Expression of results.....	9
13 Test report.....	9
13.1 General.....	9
13.2 Single yarns.....	9
13.3 Plied yarns.....	10
13.4 Cabled yarns.....	10
Annex A (informative) Suggested procedure for sampling.....	12
Bibliography.....	13

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 38, *Textiles*, Subcommittee SC 23, *Fibres and yarns*.

This fourth edition cancels and replaces the third edition (ISO 2061:2010), which has been technically revised.

Textiles — Determination of twist in yarns — Direct counting method

1 Scope

This International Standard specifies a method for the determination of the direction of twist in yarns, the amount of twist, in terms of turns per unit length, and the change in length on untwisting, by the direct counting method.

This International Standard is applicable to

- a) single yarns (spun and filament),
- b) plied yarns, and
- c) cabled yarns.

Separate procedures are given for each type of yarn. The method is designed primarily for yarns in packages, but, with special precautions, the procedures can be used for yarns taken from fabrics. It is not suitable for the determination of twist in a monofilament.

NOTE See also ISO 1890, which was prepared especially for the needs of glass textile technology, and ISO 7211-4.

This International Standard covers the determination of twist in plied and cabled yarns as follows:

- a) in plied yarns: the final twist of the plied yarns and the original twist of the single yarn before plying;
- b) in cabled yarns:
 - the final cabling twist of the yarn;
 - the original twist of the plied yarn after plying, but prior to the last stage of processing;
 - the twist of the single yarn before plying.

If desired, the twist of single and plied yarn components, as they lie in the final structure, can be determined by the special procedure given in [10.5.7](#).

This International Standard is not applicable, except by agreement, to yarns which stretch more than 0,5 % when the tension increases from 0,5 cN to 1,0 cN per unit linear density of the yarn expressed in tex. Such yarns can be tested under special conditions of tension which are accepted by all parties interested in the test results.

This International Standard is not suitable for products of open-end spinning and intermingled (interlaced) multifilament yarns.

This International Standard is not applicable to yarns which are too large to permit their being placed in the clamps of the testing apparatus without crushing or distortion severe enough to affect the test results.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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 twist

number of turns about the axis of a yarn based on its nominal gauge length before untwisting

Note 1 to entry: Twist should preferably be expressed as turns per metre (turns/m), but it may be expressed as turns per centimetre (turns/cm).

3.2 gauge length

distance between two effective clamping points of the test specimen mounted in the testing equipment

3.3 initial length

length of a test specimen under a specified pretension at the beginning of a test

3.4 change in length on untwisting

increase or decrease in initial length observed when the specimen is untwisted

Note 1 to entry: Expressed as the percentage extension, or contraction, based on the specimen's initial length.

3.5 moisture equilibrium for testing

state reached when the rate of increase in mass of a sample or specimen in a specified (test) atmosphere does not exceed the prescribed rate for the material being tested

Note 1 to entry: See ISO 139.

Note 2 to entry: A textile material is in moisture equilibrium with the ambient atmosphere when it does not exchange water with this atmosphere; its mass then remains constant as long as the experiment is carried out in an unchanged atmosphere. For test purposes, moisture equilibrium is reached by absorption, starting from a relatively low moisture content.

3.6 yarn package

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

Note 1 to entry: Packages may be comprised of unsupported yarn, such as balls, or supported yarn, such as skeins, cakes, bobbins, cops, cones, pirns, spools, tubes, or beams.

3.7 twist factor

measure of the spiralling orientation of the fibres in a spun yarn or of the filaments in a filament yarn

Note 1 to entry: The twist factor is related to the angle which fibres on the surface of the yarn make with the axis of the yarn and is a measure of the hardness of the resulting yarn due to twist.

4 Principle

The twist in a known length of yarn is removed by rotating one end of the specimen with respect to the other until the components of the yarn being tested are parallel. The exact number of turns required to remove the twist is reported in terms of turns per unit length of yarn.

5 Apparatus

5.1 Twist counter, consisting of a pair of clamps, one of which is rotatable in either direction and positively connected to a revolution counter. The position of one or both clamps shall be adjustable to permit testing yarn lengths from 10 mm to 500 mm. There shall be no play in the clamp which might affect the gauge length.

5.1.1 Means shall be provided for applying tension to the specimen and for rapidly determining the specimen length with an accuracy of $\pm 0,5$ mm or ± 2 %, whichever is smaller.

NOTE The limit of 2 % is consistent with the highest accuracy required in counting the number of turns in the specimen.

5.1.2 The counting device shall be capable of recording the number of revolutions of the rotatable clamp.

5.1.3 If the contraction or extension of the untwisted specimen is to be measured, the movable but non-rotatable clamp shall be capable of travelling with essentially no friction.

5.2 Dissecting needle.

5.3 Means for magnifying the specimen being tested.

5.4 Equipment for reeling laboratory sample skeins (optional).

6 Standard atmosphere

6.1 The standard atmospheres for preconditioning, conditioning, and testing shall be as specified in ISO 139.

The amount of twist is not affected directly by changes in relative humidity, but since wide changes in humidity cause changes in the length of some materials, all determinations should be made on samples in equilibrium with the appropriate standard atmosphere.

6.2 Generally, it is not necessary to precondition samples before conditioning for twist tests.

7 Sampling

7.1 Samples shall be taken in one of the following ways:

- a) according to the 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 given in [Annex A](#), if neither a) nor b) is applicable.
 - 1) Bulk samples shall be taken as directed in [A.1](#).
 - 2) Laboratory-sample packages shall be taken from the bulk sample as directed in [A.2](#).

8 Test specimens

8.1 Length

8.1.1 Single spun yarns

The initial length of the specimen shall be as great as possible, but shall be somewhat less than the average length of the staple fibre used to spin the yarn. The initial lengths of specimens listed in [Table 1](#) are commonly used.

Table 1 — Specimen lengths

Type of yarn material	Specimen initial length mm
Cotton	10 and 25
Worsted	25 and 50
Woolen	25 and 50
Bast fibre	100 and 250

8.1.2 Single multifilament, plied, and cabled yarns

8.1.2.1 Take an initial length of 250 mm \pm 0,5 mm if the nominal twist is $>1\ 250$ turns/m.

8.1.2.2 Take an initial length of 500 mm \pm 0,5 mm if the nominal twist is $<1\ 250$ turns/m.

8.2 Selection

8.2.1 Test specimens shall be taken, at the lowest tension practicable, from the end of the package if this is the normal method of use; otherwise, take the yarn from the side of the package. Discard the few metres of yarn at the beginning and end of the package in order to avoid damaged sections.

8.2.1.1 If it is desired to reel laboratory sample skeins, the yarn specimens shall be taken as specified in [8.2.1](#) and shall be representative of the original package.

8.2.2 If two or more test specimens are taken from an individual yarn package, they shall be taken at random intervals of at least 1 m in order to minimize the effects of cyclic variation introduced during the manufacture. If more than two specimens are taken from an individual package, take groups of specimens, not more than five to a group, at intervals of several metres.

8.3 Number of test specimens

8.3.1 Take the number of specimens required in the material specification, when applicable.

8.3.2 In the absence of material specification, take a number of specimens designed to give the precision specified below, following the directions given in [8.3.3](#) or [8.3.4](#), depending on the information available on the variation of twist results in the material being tested.

8.3.3 If information on variation is available, take a number of specimens, n , calculated by the formula given in [Table 2](#), to secure the precision specified at a probability of 95 %.

Table 2 — Formula for number of specimens, n , using information on variation

Type of yarn	Range of twist	Precision	Formula for n ^{a)}
Single multifilament	Less than 40 turns/m	±4,0 turns/m	$0,240\sigma^2$ ^{b)}
Single multifilament	40 turns/m to 100 turns/m	±5,0 turns/m	$0,154\sigma^2$ ^{b)}
All other yarns	—	±5,0 %	$0,154\nu^2$ ^{c)}

a) Where n is the number of tests.
b) Where σ is the standard deviation of individual results, determined from extensive past records on similar materials.
c) Where ν is the coefficient of variation of individual test results, determined from extensive past records on similar materials.

8.3.4 If no information on variation is available or in the case of a dispute, determine the number of specimens as follows.

- Take the number of specimens, n , specified in [Table 3](#), which also indicates the variation assumed to calculate n .
- Calculate the coefficient of variation, ν , or the twist results by normal statistical methods. If the variation is such that the precision with 95 % confidence is greater than 5 %, increase the number of tests. The number of tests required can be calculated as follows:

$$n = \left(\frac{1,96\nu}{5} \right)^2 \quad (1)$$

where

n is the number of tests;

ν is the coefficient of variation of individual test results, determined from extensive past records on similar materials.

Table 3 — Number of specimens, n , in the absence of information on variation

Type of yarn	Range of twist	n	Assumed variation ^a
Single, spun	All	50	$\nu = 18 \%$
Single, multifilament	Less than 40 turns/m	20	$\sigma = 8,0$ turns/m
Single, multifilament	40 turns/m to 100 turns/m	20	$\sigma = 10,0$ turns/m
Single, multifilament	More than 100 turns/m	20	$\nu = 10 \%$
Plied and cabled yarns	All	20	$\nu = 10 \%$

a) Where ν and σ are as defined in [Table 2](#), footnotes ^b and ^c.

9 Procedure 1 — Determination of the direction of twist

9.1 Hold one end of the yarn in such a position that a short length (at least 100 mm) is suspended in a vertical position. Examine the vertical section of the yarn and determine if the slope of the yarn elements (fibres, filaments, or component yarns) conforms to the slope of the central portion of the letters “S” or “Z”.

9.2 Designate the direction of twist as “S” or “Z” as observed, in accordance with ISO 2.

10 Procedure 2 — Determination of the amount of twist

10.1 Preliminary procedure

10.1.1 Bring the laboratory sample packages, or the laboratory sample skeins reeled from the packages (see [5.4](#)), to equilibrium in the standard atmosphere for testing as specified in ISO 139.

10.1.2 Unwind the yarn over the end or from the side of the package, as in normal use of the package and at the lowest practicable tension; care should be taken when unwinding and handling the samples to avoid any change in the original twist. Unwind and discard approximately 5 m of yarn before taking the first specimen.

10.1.3 Mount the specimen in the clamps of the twist counter ([5.1](#)) before cutting it free from the package. If additional specimens are to be taken from the package, hold the free end in a stationary clip or clamp, or under a weight, to prevent loss of twist.

10.2 Single, spun yarn

10.2.1 Set the movable clamp of the twist counter ([5.1](#)) at the distance specified for the nominal staple length of the fibres in the spun yarn being tested, $\pm 0,5$ mm (see [8.1.1](#)). Remove any lateral play in the clamps which might significantly affect the gauge length of the specimen. Verify the gauge length by measuring the clamp separation with an accurate gauge or caliper. Set the revolution counter to zero.

10.2.2 Taking care not to disturb the twist, mount the specimen in the clamps under a pretension equivalent to $(0,5 \pm 0,1)$ cN/tex.

10.2.2.1 If yarns which extend 0,5 % or more under the specified pretension are to be tested, they shall be subjected to a pretension which produces an extension not greater than 0,1 %. The pretension used in these exceptional cases shall be reported and shall be agreed to by all persons interested in the test results.

10.2.3 Remove the twist by turning the rotatable clamp until it is possible to pass a needle ([5.2](#)) from the face of the non-rotatable clamp to the face of the rotatable clamp between the untwisted fibres. Use a means of magnification ([5.3](#)), if necessary, to make sure that all the twist has been removed.

10.2.4 Note the direction of twist as indicated on the revolution counter. Be sure it agrees with the direction determined by inspection of the specimen. (See [Clause 9](#).)

10.2.5 Record the initial length, the direction of twist, and the number of turns (to the accuracy specified in [5.1](#)) in the specimen.

10.2.6 Repeat the operation until the required number of specimens, n , has been tested (see [8.3](#)).

10.3 Single, multifilament yarns

10.3.1 Set the clamps of the twist counter at a distance of 250 mm (or, by agreement, 500 mm) $\pm 0,5$ mm. Remove any lateral play in the clamps that might significantly affect the gauge length of the specimen. Verify the gauge length of the specimen by measuring the clamp separation with an accurate gauge or caliper. Set the revolution counter to zero.

10.3.2 Proceed as directed for single, spun yarns in [10.2.2](#) to [10.2.5](#).

10.3.3 When information on change in length on untwisting is desired, release the mechanism fixing the movable clamp and determine the length of the original specimen after untwisting and under the original tension. Note the change in length and specify increase or decrease in length.

10.3.4 Repeat the operation until the required number of specimens, n , has been tested (see [8.3](#)).

10.4 Plied yarns

10.4.1 Determine the plied twist by the procedures given for single, multifilament yarns in [10.3.1](#) to [10.3.3](#).

10.4.2 After removing the twist from the plied yarn, cut loose and remove all but one of the component yarns to obtain an individual end of the single yarn. It is assumed that all components of the original yarn have the same direction and amount of twist. If this is not known to be so, it shall be verified. If any difference in kind exists, each component yarn shall be tested and reported separately.

If the component yarns are spun yarns, additional specimens will be required, and it is desirable to save the cut-away strands without loss of twist to provide the specimens.

10.4.3 If the single yarn component has been spun from staple fibres, determine the twist in the single yarn in accordance with [10.2](#), but if the single yarn component is multifilament, determine the twist in accordance with [10.3](#).

10.4.4 When information on change in length on untwisting is desired, release the mechanism fixing the movable clamp and determine the length of the original components after untwisting and under the original tension. Note the change in length and specify increase or decrease in length.

10.4.5 Repeat the operation until the required number of specimens, n , has been tested (see [8.3](#)).

10.5 Cabled yarns

10.5.1 Determine the cable twist as directed for single, multifilament yarns in [10.3.1](#) to [10.3.3](#) to obtain the total number of turns of hawser or cable twist in the test specimens.

10.5.2 After removing the cable twist, cut loose and discard all but one of the component yarns to obtain an individual strand of plied yarn. Note the length under the original tension and determine the plied twist as directed for multifilament yarns in [10.3.1](#) to [10.3.3](#) to obtain the total number of turns of the plied yarn component (see [10.4.2](#)).

10.5.3 Cut loose and remove all but one of the component yarns to obtain an individual single yarn (see [10.4.2](#)).

10.5.4 If the single yarn has been spun from staple fibres, determine the single yarn twist in accordance with [10.2](#), but if the single yarn is multifilament, determine the single yarn twist in accordance with [10.3](#).

10.5.5 When information on change in length on untwisting is desired, release the mechanism fixing the movable clamp and determine the length of the original specimen after untwisting and under the original tension. Note the change in length and specify increase or decrease in length.

10.5.6 Repeat the operation until the required number of specimens, n , has been tested (see [8.3](#)).

10.5.7 If it is desired to determine the final twist in the plied and single yarn components, all strands shall be cut free from the original specimen, except for the component to be tested. The strands remaining in the clamps can be tested as directed for spun or single filament yarns in [10.2](#) or [10.3](#).

11 Calculation of results

11.1 Average twist per specimen

Calculate the average twist per test specimen, in turns per metre, using the formula:

$$t_x = \frac{1\,000x}{l} \quad (2)$$

where

t_x is the average twist, in turns per meter;

l is the length of the test specimen before untwisting;

x is the total number of turns observed in the test specimen.

11.2 Average twist per sample

Calculate the average twist per sample, in turns per metre, using the formula:

$$\bar{t}_x = \frac{\sum t_x}{n} \quad (3)$$

where

\bar{t}_x is the average twist per sample;

$\sum t_x$ is the sum of the average twist in all test specimens;

n is the number of test specimens.

11.3 Variation of observations

If the coefficient of variation and 95 % confidence interval of the twist are desired, they shall be calculated by standard statistical methods.

11.4 Change in length on untwisting

11.4.1 If the change in initial length is desired, it shall be calculated according to the following formula and reported as extension or contraction, as appropriate.

$$\Delta l = \frac{l_u - l_t}{l_t} \times 100 \quad (4)$$

where

$|\Delta l|$ is the percentage extension if Δl is a positive value;

$|\Delta l|$ is the percentage contraction if Δl is a negative value;

l_t is the length of the twisted specimen;

l_u is the length of the untwisted specimen.

11.4.2 Values calculated for yarn spun from short fibres are considered very unreliable to be reported.

11.5 Twist factor (α)

11.5.1 If desired, the twist factor can be calculated, as follows:

$$\alpha = t \left(\frac{\rho_t}{1\,000} \right)^{1/2} \quad (5)$$

where

- α is the twist factor;
- t is the twist, in turns per metre;
- ρ_t is the linear density, expressed in text.

11.5.2 The twist factor can also be calculated from the metric count, as follows:

$$\alpha = t \left(\frac{1}{\rho_t} \right)^{1/2} \quad (6)$$

where

- α is the twist factor;
- t is the twist, in turns per metre;
- ρ_t is the linear density, expressed in the metric system.

12 Expression of results

12.1 Report the amount of twist in all yarns, as follows:

- a) turns per metre, preferably, or
- b) turns per centimetre.

12.2 Compute and report the amount of twist separately for all components of plied or cabled yarns.

12.3 If desired, report the increase or decrease in length during untwisting, expressed as a percentage of the initial length for multifilament, plied, or cabled yarns.

13 Test report

13.1 General

The test report shall state that the tests were performed in accordance with this International Standard and should indicate which of any alternative or optional requirements have been met. In addition, it shall give the following information, depending on the type of yarn.

13.2 Single yarns

- a) for each package, the average twist (arithmetic mean) in the yarn, in turns per metre or turns per centimetre;

- b) for all packages, the average twist (arithmetic mean) in the yarn, in turns per metre or turns per centimetre;
- c) 95 % confidence interval (with appropriate dimension);
- d) direction of twist, “S” or “Z”, in the yarn;
- e) average change in length, if required, after removal of the twist, in percent (multifilament yarns only);
- f) form of the material sample (yarn package, warps, fabrics);
- g) sampling scheme used;
- h) number of specimens examined;
- i) average length of the test specimens, in millimetres;
- j) pretension used;
- k) coefficient of variation of twist, if required, in each yarn, in percent;
- l) twist factor, if required.

13.3 Plied yarns

- a) For each package, the average plied twist, in turns per metre or turns per centimetre;
- b) for all packages, the average plied twist, in turns per metre or turns per centimetre;
- c) for each package, the average single yarn twist, in turns per metre or turns per centimetre (specify, if after processing);
- d) for all packages, the average single yarn twist, in turns per metre or turns per centimetre (specify, if after processing);
- e) direction of each twist, “S” or “Z”;
- f) average change in length, if required, after removal of each twist, in percent, and items [13.2 f](#)) to [13.2 k](#));
- g) twist factor, if required.

13.4 Cabled yarns

- a) for each package, the average cable twist, in turns per metre or turns per centimetre;
- b) for all packages, the average cable twist, in turns per metre or turns per centimetre;
- c) for each package, the average plied twist, in turns per metre or turns per centimetre (specify, if after final processing);
- d) for all packages, the average plied twist, in turns per metre or turns per centimetre (specify, if after final processing);
- e) for each package, the average single yarn twist, in turns per metre or turns per centimetre (specify, if after final processing);
- f) for all packages, the average single yarn twist, in turns per metre or turns per centimetre (specify, if after final processing);
- g) direction of each twist, “S” or “Z”;

- h) average change in length, if required, after removal of each twist, in percent, and items [13.2 f\)](#) to [13.2 k\)](#);
- i) twist factor, if required.

Annex A (informative)

Suggested procedure for sampling

A.1 Bulk sample (number of cases from a shipment or lot)

A.1.1 Take a bulk sample of one or more cases as representative of the lot to be tested, according to [Table A.1](#).

Table A.1 — Bulk sample

Number of cases in shipment or in lot	Minimum number of cases, to be selected at random
3 or less	1
4 to 10	2
11 to 30	3
31 to 75	4
76 or more	5

A.1.2 Take care that none of the cases selected for sampling show signs of damage or dampness incurred during transit.

A.2 Number of laboratory sample packages

A.2.1 In the absence of material specification, take 10 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 sides of the layers. Take, as nearly as possible, the same number of specimens from each package of the laboratory sample.

A.2.2 If it is desired to sample woven or knitted fabrics, the samples shall be large enough to furnish a sufficient number of test specimens. The test specimens shall be taken in such a manner that the twist of the yarns is not changed during sampling. When yarns in woven fabric are to be tested, warp specimens shall be taken from different ends and weft yarns shall be taken so as to represent as many cops or pirns as practicable. The specific sampling procedure shall be reported.

Bibliography

- [1] ISO 1890, *Reinforcement yarns — Determination of twist*
- [2] ISO 7211-4, *Textiles — Woven fabrics — Construction — Methods of analysis — Part 4: Determination of twist in yarn removed from fabric*

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services

Tel: +44 845 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 845 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com



...making excellence a habit.™