



SLOVENSKI STANDARD

SIST EN 12751:1999

01-november-1999

Tekstilije - Vzorčenje vlaken, prej in izdelkov za preizkušanje

Textiles - Sampling of fibres, yarns and fabrics for testing

Textilien - Probenahme von Fasern, Garnen und textilen Flächengebilden für Prüfungen

Textiles - Echantillonnage des fibres, des fils et des étoffes en vue des essais

Ta slovenski standard je istoveten z: **EN 12751:1999**

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ICS:

59.080.20	Preje	Yarns
59.080.30	Tkanine	Textile fabrics

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12751

July 1999

ICS 59.060.01; 59.080.20; 59.080.30

English version

Textiles - Sampling of fibres, yarns and fabrics for testing

Textiles - Echantillonnage des fibres, des fils et des étoffes
en vue des essais

Textilien - Probenahme von Fasern, Garnen und textilen
Flächengebilden für Prüfungen

This European Standard was approved by CEN on 7 June 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by 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of an identical text or by endorsement, at the latest by January 2000, and conflicting national standards shall be withdrawn at the latest by January 2000.

It is related to ISO 1130 Textile fibres - Some methods of sampling for testing

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

No single technique of sampling can be devised that will serve in all circumstances. Sampling from a bale of cotton, for example, presents problems quite different from those encountered in sampling from a consignment of yarn packages, while sampling from a card web is again different from either.

The samples are generally taken as the shipping units making up a lot; such as bales of fibre, cases of yarn, rolls of fabric, or cartons of garments or other finished products. Adequate sampling for acceptance testing requires taking into account not only the variability between the laboratory samples but also the variability between the laboratory test samples and between the test specimens.

The objective of sampling may vary with the purpose for which the test method is used. The objective of sampling for acceptance testing is to obtain material which will estimate without bias a property of the lot being evaluated and which allows making a decision on whether to accept or reject a lot with reasonable producers and consumers risks when the acceptable quality level and the limiting quality level are at realistic levels. There are normally many ways to estimate the property of interest to a specified degree of precision. The most economical way to do so will depend on the relative size the sources of variability associated with sampling the laboratory samples.

A selection of methods is therefore presented, illustrating techniques that have been found acceptable in meeting the commoner types of problem encountered in sampling for the assessment of fibre, yarn or fabric quality. Methods peculiar to the requirements of research are not included, nor are such special techniques as have to be used, for example, in sampling of wool from the fleece, or cotton from the seed.

1 Scope

This European Standard specifies several methods for preparing laboratory samples of fibres, yarns or fabrics and presents a limited treatment of the problem of drawing specimens for testing.

The principle of each method is given at the beginning of the clause dealing with the method.

It is not possible for the coverage of each individual procedure to be fully comprehensive; in many instances, the selection of test samples or test specimens is necessarily covered by the appropriate method of test.

The selection of length-biased samples is not within the scope of this standard, nor are particular procedures for determination of commercial weights or moisture content.

Annex A and the tables are given in this standard for general guidance in determining the size of the test sample to be taken in order that the determined sample mean has given confidence limits.

2 Definitions

For the purposes of this standard the following definitions apply:

2.1 laboratory sample: Sample intended to be representative of a large bulk of material, in the state in which it is sent to the laboratory. A convenient size of sample for many types of test involving only small test specimens is about 25 g to 50 g; a larger amount will be required for tests involving relatively large test specimens.

2.2 laboratory test sample: That portion of fibres, yarn or fabrics taken from the laboratory sample in such a way as to ensure its representative character and to provide a quantity small enough to be easily convertible into test specimens.

2.3 test specimen: That part of the laboratory sample (yarns, fibres, fabrics, etc.) which is tested at one time.

2.4 numerical sample: Sample in which all individuals (fibres, yarns or fabrics) in the population have an equal chance of being represented.

2.5 length-biased sample: Sample in which the chance of any fibre of the population being represented is proportional to the length of that fibre.

2.6 individual: Any single specimen of fibre or yarn or fabric that could be taken for the purpose of measurement.

2.7 population: The aggregate of individuals that it is desired to characterize in one or more particulars (for example: fibres contained in a bale of cotton; all the constituent fibres in a set of yarn cops).

2.8 zoning: When the population to be sampled is known to vary from part to part with respect to the property to be investigated, the individuals or groups of individuals in the population are taken at random from within the different parts or zones, chosen so that all variations of the property are represented in due proportion. This operation is known as zoning.

3 Sampling of fibres

3.1 Sampling methods for cotton fibres

3.1.1 General

This clause gives methods for the preparation of numerical laboratory samples.

The methods described in 3.1.2 to 3.1.5 are applicable to bulks of cotton fibres in various forms.

3.1.2 Sampling from a small bulk of raw or blended cotton

If the bulk consists of less than 5 kg of loose raw cotton, spread it out in an even layer. Unless otherwise stated, obtain the laboratory sample by selecting at random a minimum of 100 tufts, each of 0,25 g to 0,50 g.

If the bulk is greater than 5 kg, divide it into a number of equal portions, and take an equal number of tufts (of 0,25 g to 0,50 g each) from each portion such that the total number from all portions exceeds 100.

3.1.3 Sampling from a bulk consisting of a bale of cotton

3.1.3.1 General

There is variation in most fibre properties between and within layers of the same bale of cotton. The values of coefficients of within- and between-layer variation and of the ratio of these coefficients of variation vary according to the fibre characteristics under consideration, and also with the type of cotton.

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3.1.3.2 Procedure

If the bale is open, a suitable laboratory sample may be obtained by selecting 10 tufts at random throughout each of 10 equally spaced layers.

If the bale has not been opened, the above procedure cannot be followed. In this case, the following procedure may be feasible:

Extract the required number of tufts by removing cotton from one or more of the edges that are perpendicular to the layers in the bale, so that the sample includes material from many layers. In taking the tufts, reject any soiled cotton from the outside of the bale (the procedure may be facilitated by cutting one of the end bands round the bale).

NOTE : A less satisfactory sample is yielded by selecting tufts from various places over the upper and lower sides of a bale.

Although this cotton is easily accessible, any laboratory sample obtained in this manner will represent at the most two layers, one on each side of the bale.

3.1.4 Sampling from a bulk consisting of several bales of cotton

3.1.4.1 General

The detailed method of sampling depends on the type of test to be carried out, the number of bales, and the likely variation between the bales.

3.1.4.2 Procedure

The following procedure shall be used unless the specification states otherwise.

3.1.4.2.1 When the number of bales is greater than 10 and the real variation in the bulk is not appreciably greater than the precision required in the test result, make a random choice of 10 % of the bales (or 10 bales if 10 % of the bulk is less than 10 bales); then from the selected bales take a minimum of 100 tufts, taking an equal number of tufts from each layer of each bale.

3.1.4.2.2 Sampling without opening bales

For most commercial purposes, when selecting a sample from a bale of cotton it is impracticable to obtain a representative sample by opening a bale and following the procedure described in 3.1.2 above. Samples prepared by selecting cotton from one or two layers in a bale are acceptable for many purposes for quality classification, and for some forms of testing (for example, determination of micronaire value) when past experience indicates that the feature under consideration varies appreciably more from bale to bale in a commercial lot than between layers in the same bale. Under such circumstances, it is recommended that a sample be prepared in the form of two clumps of cotton, similar in surface area and mass, taken from opposite outer layers of the bale and with the distance to the edges of the bale a minimum of 100 mm. The face of the sample shall be not less than 120 mm x 150 mm and the total mass not less than 150 g. A sample consisting of a clump, of the same surface area and total mass, cut from one outer layer only, is less representative and fulfils the requirements of this Standard only if mutually agreed by the parties concerned.

3.1.5 Preparation of laboratory test samples

3.1.5.1 General

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In certain cases, it may be necessary to have a laboratory test sample, prepared from the laboratory sample.

These laboratory test samples shall be prepared by a method which takes into consideration the test to be performed and the degree of accuracy desired.

In general, fibre blending by a mechanical blender is preferable, particularly when the test specimen is small in size, as is the case in the flat-bundle strength test. However, in some cases, samples prepared by hand are adequate.

When the laboratory sample consists of tufts taken by cutting into the bales, cut fibres shall not be included in the laboratory test sample.

3.1.5.2 Mechanical blending (preferred method)

The mechanical blender is designed to use a certain mass of fibres, for example up to 10 g.

Spread out the laboratory sample so that pinches can be taken from it at any point. Take small pinches of fibre from at least 32 different evenly spaced points in the laboratory sample.

Perform a light drafting action on the pinches before feeding them into the mechanical blender, so as to form as uniform a sheet of fibre as possible. Blend the fibres using the blender so as to produce a practically homogeneous sample, taking care not to damage the fibres.

3.1.5.3 Manual methods

Different methods have been designed for different methods of test, for example "cut-squaring", making hand slivers and making small samples for successive halving and combining. In some cases, it is preferable to prepare test specimens directly from the laboratory sample.

3.2 Sampling method for man-made staple fibres

3.2.1 General

This method gives a numerical sample. It is suitable for most types of man-made fibres in bale form. Unusual consignments of staple fibre and supplies of staple produced from filament waste may require a modified sampling procedure.

3.2.2 Number of bales to be sampled

If the consignment comprises not more than 5 bales, sample all the bales. If the consignment comprises more than 5 but not more than 25 bales, take 5 bales at random. If there are more than 25 bales in the consignment, take 10 bales at random.

3.2.3 Preparation of final sample representative of the consignment

From each bale to be sampled take four handfuls each of about 10 g, taking two of them from different places in the outside zone and two from different places in the inside zone. Keep the four handfuls separate. A bale is considered to consist of an outside zone and an inside zone, the dimensions of the inside zone being equal to 80 % of the corresponding dimensions of the whole bale, so forming about half the total volume.

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From each of the handfuls, take a tuft of about 100 mg and divide it into four parts, each of about 25 mg. Lay out separately the 16 resulting tufts, all derived from the same bale. With each of these tufts combine one of the other sampled bales. In this way prepare 16 tufts, each of which includes about 25 mg of fibres from each bale that has been sampled. Prepare the final representative sample from these 16 tufts by repeated doubling and halving as follows.

Place the first and second tufts together and mix them thoroughly by repeated drawing and doubling. Split the resulting tuft into two equal tufts; retain one tuft and discard the other. In the same way combine and mix the other pairs of tufts (3 and 4; 5 and 6; 7 and 8, etc.), each time retaining only one half of the mixed tuft. Then combine and mix the two tufts derived from 1 and 2, 3 and 4; split the mixed tuft and retain half of it. Continue this mixing of pairs and halving until one tuft is left forming a representative sample. Take care that the drawing is done very gently so as not to stretch or break any fibres. When dividing a tuft in order to discard one half, it is essential to split it in the middle and to separate the parts laterally; do not pull them apart by their ends.

3.2.4 Sampling without opening bales

Use this sampling procedure in cases when it is not possible to obtain a representative sample by opening a bale and following the procedure described in 3.2.3 above. Samples prepared by selecting fibres from one or two layers in a bale are acceptable for many purposes of quality classification, and for some forms of testing when past experience indicates that the feature under consideration varies appreciably more from bale to bale in a commercial lot than between layers in the same bale. Under such circumstances, it is recommended that a sample be prepared in the form of two clumps of fibres, similar in surface area and mass, taken from opposite outer layers of the bale. The distance to the edges of the bale shall be a minimum of 100 mm. The face of the sample shall be not less than 120 mm x 150 mm and the total mass not less than 150 g. A sample consisting of a clump, of

the same surface area and total mass of 150 g, cut from one outer layer only, is less representative and will be deemed to fulfil the requirements of this standard only if mutually agreed by the parties concerned.

3.2.5 Sampling method for man made fibre tows

If the consignment comprises not more than 5 cases, sample all the cases. If the consignment comprises more than 5 but not more than 25 cases, take 5 cases at random. If there are more than 25 cases in the consignment, take 10 cases at random. From each case to be sampled take, after opening the case, from the end of the tow at minimum 1 m by cutting and discard this length.

Take one sample from each case and repeat, if necessary, to give 10 samples in total. The length of the sample shall be at least 1 m. Seal the ends of the tow samples with an adhesive tape. Take care to retain the flat structure of the tow samples and lay them, for transporting purposes, in a case in straight form.

3.3 Sampling methods for wool fibres

3.3.1 General

Methods are given for the preparation of numerical laboratory samples, particularly for the measurement of fibre length.

The method given in 3.3.2 is applicable to wool fibres. The methods given in 4.1 and 4.2 are applicable to all fibres processed on the woollen or worsted systems.

3.3.2 Sampling method for loose fibres - Method of zoning

3.3.2.1 General

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Two typical cases are described and most samples of intermediate size can be dealt with by small modifications to one of the procedures given.

3.3.2.2 Sampling from a bulk consisting of a bag or bale of greasy wool

A typical bag of wool can weigh about 350 kg and can comprise a large number of fleeces or parts of fleeces.

The total variability in fibre length may be considered in the following two parts:

- a) the variability within a fleece or part fleece. This will be termed within-zone variation;
- b) the variability between fleeces or part fleeces. This will be termed between-zone variation.

It cannot be assumed in general that the sackful of wool is homogeneous and it is thus necessary to sort through the whole bulk to obtain a representative sample. Consequently it may be convenient to carry out the following sampling procedure whilst transferring the wool to a hopper, bin, or lattice for the next stage of processing.

3.3.2.2.1 Choice of number of zones

The standard deviation σ of N fibres is given by

$$\sigma = \sqrt{\frac{V_R}{N} + \frac{V_z}{n}}$$

where

V_r is the residual variance within zones;

V_z is the variance between zones;

n is the number of zones;

N is the total number of fibres measured.

Then the average number of measured fibres per zone (which in general is not a whole number) is

$$\frac{N}{n}$$

In measuring mean fibre length, if the values of V_r and V_z typical of the type of wool to be tested are known, table 1 of annex A may be consulted to obtain the approximate values of n and N that will yield a mean length having a standard error of the value required for the immediate purpose. If values of V_r and V_z are not known, use the underlined values of n and N from the same table which correspond to values of V_r and V_z found to be typical of many types of wool.

In deciding N and n , it should be remembered that the time taken to measure a fibre once zoning has been completed is very much less than the time taken to sort a zone.

3.3.2.2.2 Selection of zones

The procedure to be described utilizes the simplest apparatus. Mechanical handling equipment, for example conveyor belts, may possibly be used to speed it up.

When the number of zones and the total number of fibres have been decided on, obtain a box or measure that can hold about 0,5 kg of fibre. If the total mass of the bulk is Q boxfuls, calculate the quotient, Q/n , to the nearest whole number. Let this number be P .

Note: The mass of the bulk in this case is $Q \times 0,5$ kg.

Select the required zones for sampling as follows. Fill the box repeatedly with fibres and empty it until the bulk to be sampled has been transferred, reserving the first boxful and each following boxful that is a multiple of the value of P , and keeping these boxfuls in the order in which they were drawn from the bulk. The contents of each boxful reserved constitutes a zone.

3.3.2.2.3 Sampling the zones

Divide each boxful in turn into halves by hand and discard the left half. Divide the right half into two halves and discard the left half. Continue this process of reduction until, as judged by eye, approximately the number of fibres required per zone, N/n , has been obtained (See A.3). Transfer these fibres to a velvet board and cover them with a small transparent plate. Repeat this process for each selected zone or box. The final representative sample consists of the number, n , of groups of fibre on the velvet board and, to avoid bias, it is essential that all the fibres in each group be measured.

3.3.2.3 Sampling from a bulk consisting of several kilograms of loose wool fibres

This procedure is suitable for samples of wool of mass up to a few kilograms.

Lay out the locks of wool or groups of fibres constituting the sample side by side and parallel on a table so that, as far as possible, equal numbers of fibres occupy the same total length of the table. This can be done by splitting the larger groups into smaller units.

From table A.1, find the total number of fibres required, N , and number of zones required, n .

Take a group of fibres from each of n different points approximately equally spaced along the total length of the table.

Reduce each selected group by repeated halving, as described in 3.3.2.2.3 until the number of fibres required in each zone is obtained.

4 Sampling of fibres from processed materials, yarns and fabrics

4.1 Sampling fibres from sliver or roving

4.1.1 General

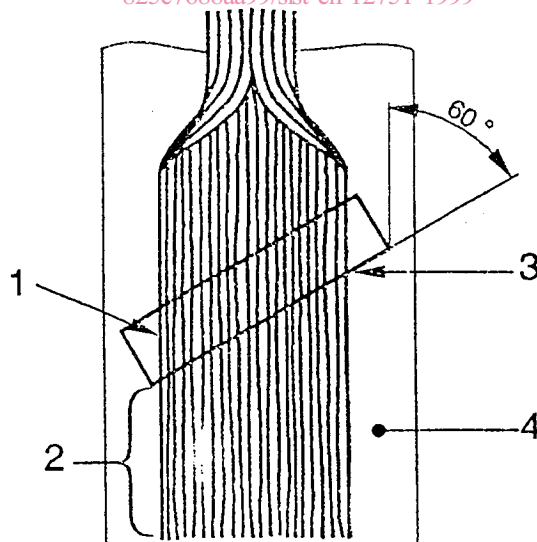
If the bulk consists of many cans or packages each prepared and processed in the same manner, obtain a laboratory sample sufficiently accurate for most purposes by taking equal lengths from a minimum of four cans or packages, chosen from different parts of the bulk. If the number of cans or packages is smaller than four, take equal lengths from each.

4.1.2 Cut square method - Procedure

From the sample under test take at random a length of sliver or roving of at least three times the length of the longest constituent fibre of the sliver. Untwist roving by hand. Lay the sliver or roving spread out on a velvet board and cover it with a transparent glass plate (see figure 1). Then cut the protruding fibres on the front edge of the plate. Move the plate about 2 mm and discard the fibres that project in front of the plate with a pair of forceps, taking not more than 20 fibres at a time with the forceps. Repeat this procedure two times. This procedure is termed squaring. Move the plate once more 2 mm and take the fibres for the sample with the forceps. The number of fibres to be taken depends on the testing method to be applied.

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- 1 Glass plate
- 2 Velvet board
- 3 Cut at edge of glass plate
- 4 Length longer than the longest fibre

Figure 1 Cut square method