



**SLOVENSKI STANDARD**  
**SIST ISO 5088:1996**

**01-maj-1996**

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**Tekstilije - Trikomponentne mešanice vlaken - Kvantitativna analiza**

Textiles -- Ternary fibre mixtures -- Quantitative analysis

Textiles -- Mélanges ternaires de fibres -- Analyse quantitative

**Ta slovenski standard je istoveten z: ISO 5088:1976**

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**ICS:**

59.060.01 Tekstilna vlakna na splošno Textile fibres in general

**SIST ISO 5088:1996**

**en**

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# INTERNATIONAL STANDARD 5088

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## Textiles — Ternary fibre mixtures — Quantitative analysis

*Textiles — Mélanges ternaires de fibres — Analyse quantitative*

First edition — 1976-12-15

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UDC 677.014.23 : 543.062

Ref. No. ISO 5088-1976 (E)

**Descriptors** : textiles, fibres, ternary systems, chemical analysis, quantitative analysis, separation

**FOREWORD**

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

International Standard ISO 5088 was drawn up by Technical Committee ISO/TC 38, *Textiles*, and was circulated to the Member Bodies in September 1975.

It has been approved by the Member Bodies of the following countries :

Belgium	Hungary	Spain
Bulgaria	India	Sweden
Canada	Israel	Switzerland
Czechoslovakia	Japan	United Kingdom
Denmark	Netherlands	U.S.A.
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Finland	Poland	Yugoslavia
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The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Italy  
New Zealand

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# Textiles – Ternary fibre mixtures – Quantitative analysis

## 0 INTRODUCTION

The methods of quantitative analysis of mixtures of textile fibres are based on two processes : the manual separation and the chemical separation of fibre types.

The method of manual separation should be used whenever possible, since it generally gives more accurate results than the chemical method. It can be used for all textiles whose component fibres do not form an intimate mixture, as, for example, in the case of yarns composed of several elements each of which is made up of one type of fibre, or fabrics in which the warp is of a different type of fibre from the weft, or knitted fabrics capable of being unravelled and made up of yarns of different types.

In general, the methods for quantitative chemical analysis of mixtures of textile fibres are based on the selective solution of the individual components of the mixture. Four variants of this procedure are possible :

– Variant 1 : Using two different test specimens, component (a) is dissolved from the first test specimen and component (b) from the second test specimen. The insoluble residues of each test specimen are weighed and the percentage of each soluble component is calculated from the respective losses in mass. The percentage of the third component (c) is calculated by difference.

– Variant 2 : Using two different test specimens, a component (a) is dissolved from the first test specimen, and two components (a and b) from the second test specimen. The insoluble residue of the first test specimen is weighed and the percentage of the component (a) is calculated from the loss in mass. The insoluble residue of the second test specimen is weighed : it corresponds to component (c). The percentage of the third component (b) is calculated by difference.

– Variant 3 : Using two different test specimens, two components (a and b) are dissolved from the first test specimen and two components (b and c) from the second test specimen. The insoluble residues correspond to the two components (c) and (a) respectively. The percentage of the third component (b) is calculated by difference.

– Variant 4 : Using only one test specimen, one of the components is removed, after which the insoluble residue formed by the two other fibres is weighed and the percentage of the soluble component is calculated

from the loss in mass. One of the two fibres of the residue is dissolved, the insoluble component is weighed and the percentage of the second soluble component is calculated from the loss in mass.

Where a choice is possible, it is advisable to use one of the first three variants. Where chemical analysis is used, take care to choose methods prescribing solvents which dissolve only the required fibre or fibres, and leave undissolved the other fibre or fibres.

By way of example, a table is given in annex B which contains a certain number of ternary mixtures, together with methods for analysing binary mixtures which can, in principle, be used for analysing these ternary mixtures.

In order to reduce the possibility of error to a minimum, it is recommended that, whenever possible, chemical analysis using at least two of the four above-mentioned variants should be made.

Mixtures of fibres used during processing and, to a lesser extent, in finished textiles may contain non-fibrous matter such as fats, waxes or dressings, or water-soluble matter either occurring naturally or added to facilitate processing. Non-fibrous matter must be removed before analysis. For this reason, a method of pre-treatment for removing oils, fats, waxes and water-soluble matter is also given.

In addition, textiles may contain resins or other matter added to confer special properties. Such matter, including dyestuffs in exceptional cases, may interfere with the action of the reagent on the soluble components and/or it may be partially or completely removed by the reagents. This type of added matter may thus cause errors and should be removed before the sample is analysed. If it is impossible to remove such added matter, the methods for quantitative chemical analysis given in annex B are no longer applicable.

Dye in dyed fibre is considered to be an integral part of the fibre and is not removed.

Analyses are conducted on the basis of dry mass and a procedure is given for its determination.

The result is expressed by reference to the dry mass or by reference to this mass after application of the conventional recovery rate.

## ISO 5088-1976 (E)

Before proceeding with any analysis, all the fibres present in the mixture must be identified. In some chemical methods, the insoluble components of a mixture may be partially dissolved in the reagent used to dissolve the soluble component or components. Whenever possible, reagents have been chosen that have little or no effect on the insoluble fibres. If a loss in mass is known to occur during the analysis, the result should be corrected; correction factors are given for this purpose. These factors have been determined in several laboratories by treating, with the appropriate reagent as specified in the method of analysis, fibres cleaned by the pre-treatment. These correction factors apply only to undegraded fibres and different correction factors may be necessary if the fibres have been degraded before or during processing. If the 4th variant, in which a textile fibre is subjected to the successive action of two different solvents, must be used, correction factors must be applied for possible losses in mass undergone by the fibre in the two treatments.

At least two determinations should be made, both in the case of manual separation and in the case of chemical separation.

## 1 SCOPE

This International Standard specifies methods of quantitative analysis of various ternary mixtures of fibres.

## 2 METHODS OF CHEMICAL ANALYSIS

### 2.1 Field of application

The field of application of each method for analysing binary mixtures, specified in ISO 1833, indicates the fibres to which the method is applicable.

### 2.2 Reference

ISO 1833, *Textiles – Binary fibre mixtures – Quantitative chemical analysis*.

### 2.3 Principle

After identification of the components of a mixture, the non-fibrous matter is removed by a suitable pre-treatment, and then one or more of the four variants of the process of selective solution described in the Introduction is applied. Except where this presents technical difficulties, it is preferable to dissolve the major fibre component so as to obtain the minor fibre component as the final residue.

### 2.4 Reagents

**2.4.1 Light petroleum**, redistilled, boiling range 40 to 60 °C.

Other reagents are specified in the appropriate clauses of ISO 1833. These shall be chemically pure.

#### 2.4.2 Distilled or deionized water.

### 2.5 Apparatus

**2.5.1 Filter crucibles and weighing bottles** large enough to contain such crucibles, or any other apparatus giving identical results.

#### 2.5.2 Vacuum flask.

**2.5.3 Desiccator**, containing self-indicating silica gel.

**2.5.4 Ventilated oven**, for drying the specimens at  $105 \pm 3$  °C.

**2.5.5 Analytical balance**, accurate to 0,000 2 g.

**2.5.6 Soxhlet extractor apparatus**, or apparatus giving identical results.

### 2.6 Conditioning and testing atmosphere

Because dry masses are determined, it is unnecessary to condition the specimen. The analysis is carried out in the ambient atmosphere.

### 2.7 Sampling and pre-treatment of laboratory test sample

#### 2.7.1 Sampling

Take a laboratory test sample that is representative of the laboratory bulk sample and sufficient to provide all the test specimens, each of at least 1 g, that are required.

#### 2.7.2 Pre-treatment

Remove the non-fibrous extractable matter in light petroleum (2.4.1) and water, by treating the air-dry sample in the Soxhlet extractor (2.5.6), with light petroleum for 1 h at a minimum rate of 6 cycles per hour. Allow the light petroleum to evaporate from the sample and then soak the sample in cold water (2.4.2) for 1 h, and then in water at  $65 \pm 5$  °C for 1 h, agitating from time to time. Use a liquor ratio of 1:100. Remove the excess water from the sample by squeezing, suction or centrifuging and allow the sample to become air-dry.

Where non-fibrous matter cannot be extracted with light petroleum and water, it should be removed by a suitable method that does not substantially alter the fibre constituents. However, for some unbleached, natural vegetable fibres (for example jute, coir) it is to be noted that normal pre-treatment with light petroleum and water does not



remove all the natural non-fibrous substances; nevertheless, additional pre-treatment is not applied unless the sample does contain finishes insoluble in both light petroleum and water.

In the test report, the methods of pre-treatment used should be described in detail.

## 2.8 Procedure

### 2.8.1 General instructions

#### 2.8.1.1 DRYING

Conduct all drying operations for not less than 4 h and not more than 16 h at  $105 \pm 3$  °C in the ventilated oven (2.5.4) with the oven door closed throughout.

If the drying period is less than 14 h, ensure that constant mass has been obtained. This is considered as having been reached if the variation in mass, after further drying for 60 min, is less than 0,05 %. Avoid handling crucibles and weighing bottles, test specimens or residues with the bare hands during the drying, cooling and weighing operations.

Dry the specimen in a weighing bottle (2.5.1) with its cover beside it. After drying, stopper the weighing bottle before removing it from the oven, and transfer it quickly to the desiccator (2.5.3).

Dry the filter crucible (2.5.1) in a weighing bottle with its cover beside it. After drying, stopper the weighing bottle and transfer it quickly to the desiccator.

Where apparatus other than a filter crucible is used, drying operations should be conducted in the oven so as to determine the dry mass of the fibres without loss.

#### 2.8.1.2 COOLING

Conduct all cooling operations in the desiccator, placed beside the balance, until the cooling of the weighing bottles is complete, and in any case for not less than 2 h.

#### 2.8.1.3 WEIGHING

After cooling, complete the weighing of the weighing bottle or crucible within 2 min of its removal from the desiccator. Weigh to an accuracy of 0,000 2 g.

### 2.8.2 Procedure

Take, from the pre-treated laboratory test sample, specimens weighing at least 1 g. Cut yarn or cloth into lengths of about 10 mm, dissected as much as possible. Dry each specimen in a weighing bottle, cool it in the desiccator and weigh it. Transfer the specimen to the glass vessel specified in the appropriate part of ISO 1833, re-weigh the weighing bottle immediately and calculate the dry mass

of the test specimen by difference. Complete the test procedure as specified in the appropriate part of the method used. After weighing, examine the residue microscopically to check that the treatment has in fact completely removed the soluble fibre or fibres.

## 2.9 Calculation and expression of results

Express the mass of each component as a percentage of the total mass of fibre present in the mixture. Calculate the result on the basis of clean dry mass, to which is applied firstly the agreed conventional recovery rate and secondly the correction factor necessary to take account of loss of matter during pre-treatment and analysis.

### 2.9.1 Calculation of percentages of mass of clean dry fibres, disregarding loss of fibre mass during pre-treatment

#### 2.9.1.1 VARIANT 1

Formulae to be applied where a component of the mixture is removed from one specimen and another component from a second specimen :

$$P_1 = \left[ \frac{d_2}{d_1} - d_2 \times \frac{r_1}{m_1} + \frac{r_2}{m_2} \times \left( 1 - \frac{d_2}{d_1} \right) \right] \times 100$$

$$P_2 = \left[ \frac{d_4}{d_3} - d_4 \times \frac{r_2}{m_2} + \frac{r_1}{m_1} \times \left( 1 - \frac{d_4}{d_3} \right) \right] \times 100$$

$$P_3 = 100 - (P_1 + P_2)$$

where

$P_1$  is the percentage of the first clean dry component (component in the first specimen dissolved in the first reagent);

$P_2$  is the percentage of the second clean dry component (component in the second specimen dissolved in the second reagent);

$P_3$  is the percentage of the third clean dry component (component undissolved in both specimens);

$m_1$  is the dry mass of the first specimen after pre-treatment;

$m_2$  is the dry mass of the second specimen after pre-treatment;

$r_1$  is the dry mass of the residue after removal of the first component from the first specimen in the first reagent;

$r_2$  is the dry mass of the residue after removal of the second component from the second specimen in the second reagent;