



# SLOVENSKI STANDARD

## SIST EN 14020-2:2003

01-maj-2003

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a YrcXY]b`gd`c`ybY'nU hYj Y

Reinforcements - Specification for textile glass rovings - Part 2: Methods of test and general requirements

Verstärkungsfasern - Spezifikation für Textilglasrovings - Teil 2: Prüfverfahren und allgemeine Anforderungen

Renforts - Spécification des stratifils (rovings) de verre textile - Partie 2: Méthodes d'essai et exigences générales

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**ICS:**

59.100.10      Materiali iz steklenih vlaken      Textile glass materials

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14020-2**

December 2002

ICS 59.100.10

English version

## Reinforcements - Specification for textile glass rovings - Part 2: Methods of test and general requirements

Renforts - Spécification des stratifils (rovings) de verre  
textile - Partie 2: Méthodes d'essai et exigences générales

Verstärkungsfasern - Spezifikation für Textilglasrovings -  
Teil 2: Prüfverfahren und allgemeine Anforderungen

This European Standard was approved by CEN on 7 November 2002.

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 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 Management Centre 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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This document (EN 14020-2:2002) has been prepared by Technical Committee CEN /TC 249 "Plastics", the secretariat of which is held by IBN.

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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This document is one part of EN 14020 which is structured as follows:

- Part 1: *Designation*
- Part 2: *Test methods and general requirements*
- Part 3: *Specific requirements*

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## EN 14020-2:2002 (E)

### 1 Scope

This part of this European Standard defines test methods to be used to determine designated and specified properties given in Part 1 and 3, respectively. It defines general requirements applicable to the specification of all types of glass fibre rovings falling within the scope of this specification as defined in Part 1 of the standard.

### 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 472:2001, *Plastics - Vocabulary (ISO 472:1999)*.

EN ISO 1889, *Reinforcement yarns - Determination of linear density (ISO 1889:1997)*.

EN ISO 2078, *Textile glass - Yarns - Designation (ISO 2078:1993)*.

EN ISO 3344, *Reinforcement products - Determination of moisture content (ISO 3344:1997)*.

EN ISO 9163, *Textile glass - Rovings - Manufacture of test specimens and determination of tensile strength of impregnated rovings (ISO 9163:1996)*.

EN ISO 14130, *Fibre-reinforced plastic composites - Determination of apparent interlaminar shear strength by short-beam method (ISO 14130:1997)*.

ISO 1887, *Textile glass - Determination of combustible matter content*.

ISO 1888, *Textile glass - Staple fibres or filaments - Determination of average diameter*.

ISO 3341, *Textile glass - Yarns - Determination of breaking force and breaking elongation*.

ISO 3597-4, *Textile-glass-reinforced plastics - Determination of mechanical properties on rods made of roving-reinforced resin - Part 4: Determination of apparent interlaminar shear strength*.

ISO/DIS 15039, *Textile-glass rovings - Determination of solubility of sizing*.

### 3 Terms and definitions

For the purposes of this part of this European Standard, the terms and definitions given in EN ISO 472:2001 apply with the following additions:

#### 3.1 characteristic properties

properties of the glass fibre roving that are not normally subject to the planned quality control in the production process

#### 3.2 controlled properties

quantitative properties of the glass fibre roving that are subject to the planned quality control in the production process

### 4

### 3.3

#### visual properties

qualitative properties of the glass fibre roving that are not necessarily subject to routine quality control in the production process

## 4 Visual appearance

### 4.1 General

Rovings showing any of the following defects may be subsequently be found to cause processing problems at customers premises.

Roving products should be checked visually during the production process against internally defined acceptance standards. The quality system shall be determined by the manufacturer to ensure products of marketable quality, suitable for the intended processing systems and conforming to, where applicable, customer acceptance requirements.

**4.2 Shape Deviations:** The shape of a roving bobbin may show deviations as compared to a perfect cylindrical shape with prescribed dimensions. First of all the dimensions (bobbin height, external diameter and internal diameter) may deviate from the prescribed dimensions. Moreover the shape may be not perfectly cylindrical. Typical shape deviations for roving bobbins are: round corners, barrel shape, double convex shape, telescoped shape and dog-bone shape.

**4.3 Other defects originating from the production process:** The most current are the filamentation of the bobbin (short single filaments protruding from the surface of the bobbin) and the yellow discolourisation of the bobbin (generally seen as a sign of migration or oxidation of the seizing).

## 5 Application performance

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### 5.1 General

Application performance may be described by either quantitative or qualitative properties that determine the processability of the glass fibre roving in the specific application for which it is intended. In the same way as for visual defects, roving products should be checked during the production process against internally defined acceptance standards.

**5.2 Unwinding:** The action of taking the roving from the roving bobbin. This can be done either from the inside (internal) or from the outside (external). Most products are made for internal unwinding, which necessarily results in a twist in the roving after every turning. Rovings that are made for external unwinding generally are made on a cardboard tube and can be taken off tangentially (by having the bobbin rotate around its axis), thus not resulting in a twist in the roving.

**5.3 Falling windings:** Can be described as the falling of the roving from the bobbin, building up a disorderly set of roving loops (coils) on the bottom.

**5.4 Ribbonisation:** Can be regarded as the opposite of split. It is the tendency of a roving to appear as a non-split entity. Also split products can show ribbonisation, specially of the roving directly after leaving the bobbin. However, for these split products this ribbonisation must disappear during the process (specially after passing of the roving of guiding pins, tension bars and the chopper).

**5.5 Catenary:** Is the phenomenon that different bundles or strands in a roving (either in split products or in rovings that show false split) have different lengths, resulting in different displacements of these bundles when the roving is suspended.

**5.6 Abrasion resistance (filamentation and sizing deposit):** Is the capability of the roving to move over guiding pins or inside guiding tubes without showing changes in roving appearance or in appearance of the guiding

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devices. Changes in roving appearance are mainly the formation of loose filaments on the roving: 'filamentation' or 'fuzzing'. The changes in the appearance of the guiding devices can be the deposit of sizing at the location where the roving makes contact, the deposit of loose filaments or the wear of the guiding device.

**5.7 Split, split efficiency and false split:** Split is the phenomenon that a roving falls apart into several bundles. This can be done on purpose e.g. for applications where the roving is chopped. These so-called split-products are made in such a way that after chopping the roving falls apart in a multiple strands. The ratio of the number of strands that appear after chopping the roving and the theoretical amount of strands that should appear is called the "split efficiency". Rovings that are not meant to fall apart into several bundles (e.g. rovings for weaving, filament winding or pultrusion) sometimes show split, which is called "false split".

**5.8 Chopping and mat forming:** Are aspects of importance for rovings for chopping purposes. A defect during chopping can be a static related behaviour of the chopped fibres due to the fact that they are charged electrically (resulting in chopped strands that jump away or stick to parts of the cutting device). Another defect during chopping can be that the roving is not chopped completely, resulting in multiples of the cutting length (double lengths, triple lengths, etc.). Mat forming can be characterised by the thickness of the mat, the coarseness of the mat (connected with strand tex), mat irregularity (connected with a low split efficiency) and the occurrence of "tapes", which are chopped rovings that are practically non-split and form thick pieces in the mat.

**5.9 Impregnation:** Is the ability of the roving to be wetted by the resin. A division should be made between non-split rovings and split products (for chopping). For non-split rovings impregnation can be defined as the process of penetration of the resin throughout the bundle. Generally refractive indices of resin and glass are the same so that a complete impregnation can be observed as the roving becoming transparent in the resin. For split products two stages of impregnation are defined. Because of the fact that these products generally are chopped to form a mat that is impregnated from the outsides of the mat, the wetting throughout the mat with resin does not imply that the chopped strands in it are completely wetted. Therefore both 'macro impregnation' ('wet through': wetting throughout the mat with resin) and 'micro impregnation' ('wet out': wetting of the individual chopped strands) are defined.

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## 6 List of test methods

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The list of properties with the applicable test method shall be considered as a guide for the selection of the properties and limits for which will be applicable to be the technical specifications given in part 3 of this standard. Some of the properties apply to all roving products independent of the application, while others are limited to specific applications.

**Table 1 — Controlled properties, mandatory for all rovings**

Property	Test method
Loss on ignition (size content) (%)	ISO 1887
Linear density (tex)	EN ISO 1889
Moisture content (%)	EN ISO 3344

**Table 2 — Controlled properties, optional for specific applications**

Property	Test method	Indicative application(s)
Tensile strength (cN/tex)	ISO 3341	Weaving
Acetone solubility (%)	ISO/DIS 15039	Spray-up, SMC
Impregnated strength (MPa)	EN ISO 9163	Pultrusion, filament winding
Impregnation and composite characteristics (ILSS) (MPa)	ISO 3597-4 or EN ISO 14130	Weaving, pultrusion, filament winding



**Table 3 — Characteristic properties (not normally subject to planned quality control), for all rovings**

Property	Test method or classification
Filament diameter ( $\mu\text{m}$ )	ISO 1888
Glass type (-)	EN ISO 2078

## 7 Sampling

The samples shall be taken using statistical techniques agreed between the interested parties and, if required, reference made to ISO statistical standards.

NOTE Suitable ISO statistical standards include ISO 2859 and ISO 3951.

## 8 General requirements

### 8.1 Packaging and storage

The packaging shall protect the product during handling, storage and transportation, provided prescribed storage conditions are met. Textile glass roving must be kept dry. Optimal conditions for storage be at a temperature of 10-35 °C and a relative humidity of less than 85 %. Direct sunlight or heat sources must be avoided. To avoid problems with humidity or static electricity the glass fibre product should be conditioned in the working area prior to use. If the contents of a packaging unit is only partly used, the packaging should be closed again. A first-in/first-out stock control system is not strictly necessary, but will help to minimize the influence for adverse storage problems.

### 8.2 Labelling

Each pallet shall be clearly identified with: [SIST EN 14020-2:2003](https://standards.iteh.ai/catalog/standards/sist/220e6df0-6c54-48c0-83e1-95797e66f1f/sist-en-14020-2-2003)

**8.2.1** Designation of the product according to Part 1 of this standard EN 14020.

**8.2.2** Manufacturer's name, its production and traceability reference, and (if not yet included) date of manufacturing.

**8.2.3** Weight of product (net).

**8.2.4** Any special handling/storage instructions.