



**SLOVENSKI STANDARD**  
**SIST EN 2332:2001**

**01-junij-2001**

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**Aerospace series - Textile glass fibre preimpregnates - Test method for the determination of the resin flow**

Aerospace series - Textile glass fibre preimpregnates - Test method for the determination of the resin flow

Luft- und Raumfahrt - Glasfilament-Prepreg - Prüfverfahren zur Bestimmung des Harzflusses

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Série aérospatiale - Préimprégnés de fibres de verre textile - Méthode d'essai pour la détermination de l'écoulement de résine

<https://standards.iteh.ai/catalog/standards/sist/21328748-a06b-40b0-8328-4d5b87afdcfd/sist-en-2332-2001>

**Ta slovenski standard je istoveten z: EN 2332:1993**

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**ICS:**

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EUROPEAN STANDARD

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English version

**Aerospace series - Textile glass fibre  
preimpregnates - Test method for the  
determination of the resin flow**

Série aérospatiale - Préimprégnés de verre  
textile - Méthode d'essai pour la détermination  
de l'écoulement de résine

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Prüfmethode zur Bestimmung des Harzflusses

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This European Standard was approved by CEN on 1993-03-01. 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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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

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### Foreword

## iTeh STANDARD PREVIEW

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This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

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After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

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 September 1993, and conflicting national standards shall be withdrawn at the latest by September 1993.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard :

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

## 1 Scope

1.1 This standard specifies a method for determining the resin flow of a textile glass fibre fabric preimpregnate, for aerospace use.

1.2 This standard does not give any directives necessary to meet the health and safety requirements. It is the responsibility of the user of this standard to adopt appropriate health and safety precautions.

## 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.

EN 2330 Aerospace series - Textile glass fibre preimpregnates - Test method for the determination of the content of volatile matter

EN 2743 Aerospace series - Reinforced plastics - Standard procedures for conditioning prior to testing<sup>1)</sup>

## 3 Definitions

A textile glass fibre preimpregnate with a thermosetting or thermoplastic resin is a material in the form of a synthetic resin impregnated textile glass fibre unidirectional sheet, tape or woven fabric and used for the manufacture of moulded components.

## 4 Principle

Flow of the resin from a weighed test specimen under agreed conditions of temperature and pressure.

## 5 Apparatus

5.1 Balance with an accuracy of 0,1 mg

5.2 Template of standard specimen

5.3 Ancillary items such as sharp cutting knife and tweezers

5.4 Any mechanical device capable of maintaining the agreed temperature with an accuracy of  $\pm 5^\circ\text{C}$  and the agreed pressure with an accuracy of  $\pm 5\%$

5.5 Metal plates not less than 200 mm  $\times$  200 mm and approximately 1,6 mm thick

5.6 Laboratory timer

5.7 Auxiliary materials

- glass fabric, ca. six plies, 200 mm  $\times$  200 mm, style 181 or similar,
- perforated polyvinyl fluoride (PVF) film, 0,1 mm thickness, 200 mm  $\times$  200 mm,
- glass fabric coated with polytetrafluoroethylene (PTFE), ca. three plies, 200 mm  $\times$  200 mm.

5.8 Template or punch for cutting cured specimen

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1) Published as AECMA pre-standard at the date of publication of this standard

## 6 Atmosphere for conditioning and testing

### 6.1 Conditioning

#### 6.1.1 Conditioning of material stored at ambient temperature

For material stored at ambient temperature, the amount of material required for testing shall be sampled and conditioned in the test atmosphere (see 6.2.1) for a minimum of 2 h, unless otherwise specified.

#### 6.1.2 Conditioning of material stored below ambient temperature

For material stored at temperatures lower than the ambient temperature, the material, suitably packed in an airtight and solvent resistant bag to prevent moisture pick-up, shall be allowed to reach ambient temperature over a period of time according to the mass of the package. This time shall not be less than 8 h and the actual time shall be recorded in the report.

When the material has reached the ambient temperature, the amount required for testing shall be sampled and conditioned in the test atmosphere (see 6.2.1) for a minimum of 2 h, unless otherwise specified.

### 6.2 Testing

#### 6.2.1 Atmosphere for testing

The tests shall be carried out at temperature and relative humidity conditions in accordance with EN2743B.

#### 6.2.2 Time interval between conditioning and testing

After conditioning, the test shall be carried out within 6 h, unless otherwise specified, the specimen being kept in the test atmosphere until the test is carried out.

## 7 Sampling and specimens

### 7.1 Specimen

The specimen, of square shape, shall be made up of at least three plies of preimpregnate and shall have a total mass of at least 12 g.

The dimension of the sides shall be  $(100 \pm 1)$  mm.

The plies shall be assembled by crossing alternatively each layer :

- each fabric layer having its diagonals parallel to the warp yarns.
- each layer of unidirectional sheet or tape having one of its sides parallel to the fibre direction.

Other dimensions of the specimen may be used, subject to agreement between the purchaser and the supplier, but having a surface area of 100 cm<sup>2</sup> with a tolerance of  $\pm 2$  %.

### 7.2 Number and distribution of specimens

At least two specimens shall be used.

The plies from which these are made shall be evenly distributed and cut from the sample diagonally across the width or length, as shown in figures 1 and 2 for woven fabrics and in figure 3 for unidirectional sheet or tape.

## 8 Procedure

Cut the necessary number of plies from the preimpregnate under test, using the appropriate template.

Remove the separating film(s) and carefully superimpose the preimpregnate plies, oriented alternately at 0°/90°, to form a uniform pack and give a specimen of total mass within the range specified in 7.1.

Weigh the specimen to the nearest mg ( $m_0$ ) and then assemble the pack in the mechanical device as follows, starting with the bottom layer :

- one layer PTFE coated glass fabric,
- three layers glass bleeder fabric,
- one layer perforated PVF film,
- specimen,
- one layer perforated PVF film,
- three layers glass bleeder fabric,
- one layer PTFE coated glass fabric.

Locate the assembly between the heated platens of the mechanical device at the temperature (see note below) and apply pressure (see note below) within a maximum of 10 s, then maintain it for the specified period (see note below).

NOTE : Temperature of the platens, pressure applied to the assembly and period of application are those as specified in the relevant material data sheet.

Remove the laminate from the mechanical device.

Remove the release film and bleeder fabric material.

Condition the specimens in the test atmosphere (see 6.2.1) to constant mass.

Cut out a square of length ( $70 \pm 0,7$ ) mm and width of ( $70 \pm 0,7$ ) mm from the centre of the cured laminate and weigh this to the nearest mg ( $m_2$ ). Subject to agreement between the purchaser and the supplier, the option of a circle with a diameter of ( $50 \pm 1$ ) mm may be substituted for the square.

## 9 Calculation and expression of results

### 9.1 Uncorrected resin flow (not corrected for volatiles)

The uncorrected resin flow of the specimen, expressed as a percentage of the original mass, is calculated from the formula :

$$F_1 = \left[ 1 - \frac{m_2 \cdot s_1}{m_0 \cdot s_2} \right] \times 100$$

where :

$F_1$  : the resin flow expressed as a percentage of the original mass,

$m_0$  : the original mass of the specimen, in g,

$m_2$  : the mass of the cut out cured square or circle, in g,

$s_1$  : the area of the original specimen, in mm<sup>2</sup>,

$s_2$  : the area of the cut out cured or circle, in mm<sup>2</sup>.

Calculate the arithmetic mean of the values obtained for  $F_1$ .

## 9.2 Corrected resin flow for volatiles

The corrected resin flow of the specimen, expressed as a percentage of the original mass, is calculated from the formula :

$$F_2 = \left[ 1 - \frac{m_2 \cdot s_1}{m_1 \cdot s_2} \right] \times 100$$

where :

$F_2$  : the resin flow expressed as a percentage of the original mass,

$$m_1 : m_0 \left[ 1 - \frac{V}{100} \right],$$

$m_0$  : the original mass of the specimen, in g,

$V$  : the volatile content, determined by the method given in EN 2330, in %,

$m_2$  : the mass of the cut out cured square or circle, in g,

$s_1$  : the area of the original specimen, in mm<sup>2</sup>,

$s_2$  : the area of the cut out cured square or circle, in mm<sup>2</sup>.

Calculate the arithmetic mean of the values obtained for  $F_2$ .

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## 10 Test report

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[https://standards.iteh.ai/catalog/standards/sist/21328748-a06b-40b0-](https://standards.iteh.ai/catalog/standards/sist/21328748-a06b-40b0-8000-000000000000/sist-en-2332-2001)

The test report shall include the following information [/sist-en-2332-2001](https://standards.iteh.ai/catalog/standards/sist/21328748-a06b-40b0-8000-000000000000/sist-en-2332-2001)

- 10.1 Reference to the type of prepreg, with complete description, including prepreg batch number
- 10.2 Reference to this standard
- 10.3 Description of the sampling method
- 10.4 Number of specimens used, if different from this standard
- 10.5 Dimensions of the specimens, number of plies used and original mass
- 10.6 Atmosphere used for conditioning and testing and actual time used for conditioning.
- 10.7 Curing temperature, pressure and time
- 10.8 Individual values
- 10.9 Arithmetic mean value of the resin flow, expressed as a percentage of the original mass
- 10.10 Observations on any circumstances liable to have influenced the results



Dimensions in millimetres

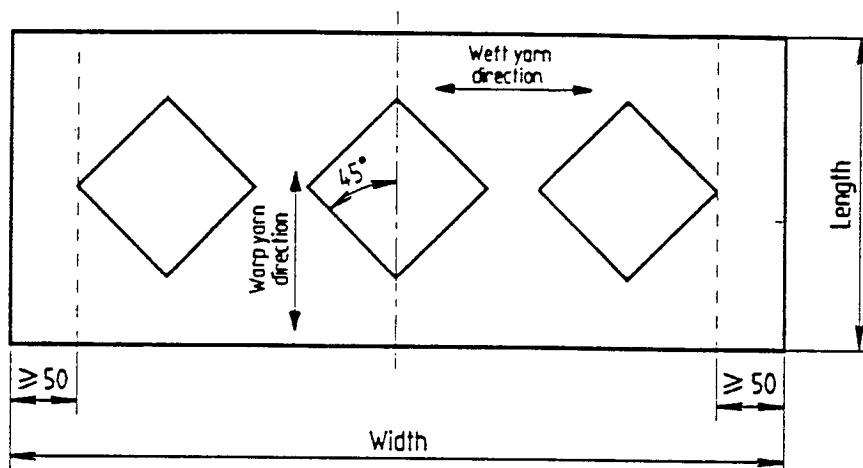


Figure 1 - Example of positioning of plies for a specimen on woven textile glass fibre fabric sample across the width

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Dimensions in millimetres

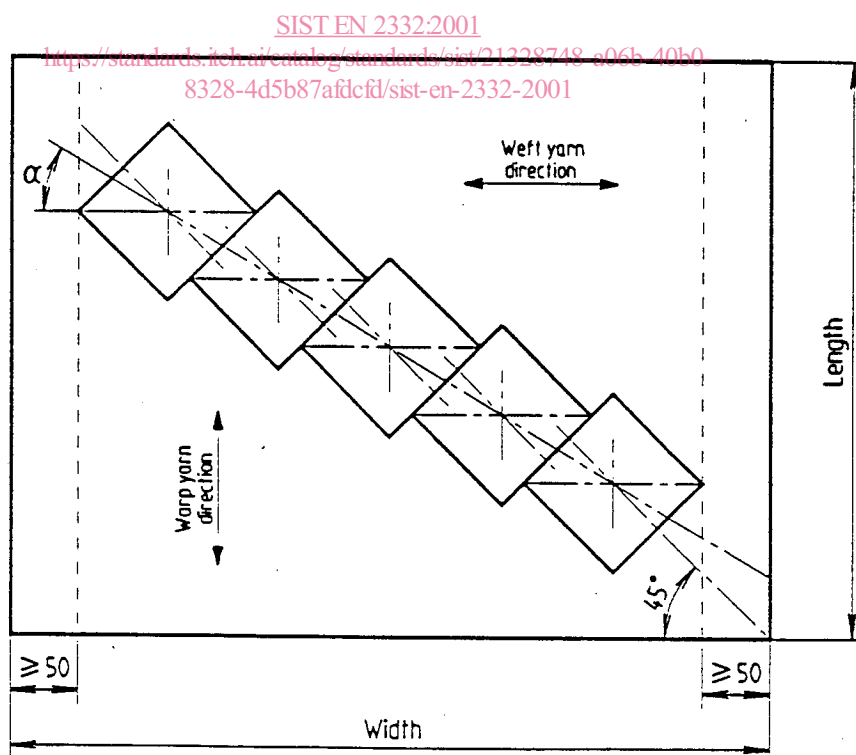


Figure 2 - Example of positioning of plies for a specimen on woven textile glass fibre fabric sample along an axis inclined at an angle  $\alpha$  as close as possible to the weft direction.