SLOVENSKI STANDARD
SIST EN 2560:2001

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Aerospace series - Carbon fibre preimpregnates - Determination of the resin flow

Aerospace series - Carbon fibre preimpregnates - Determination of the resin flow

Luft- und Raumfahrt - Kohlenstoffaser-Prepregs - Bestimmung des Harzflusses

Série aérospatiale - Préimprégnés de fibres de carbone - Détermination de l'écoulement de résine

Ta slovenski standard je istoveten z: **EN 2560:1998**

ICS:

49.025.40 Guma in polimerni materiali Rubber and plastics

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English version

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This European Standard was approved by CEN on 15 May 1998.

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.

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 the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has 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of an identical text or by endorsement, at the latest by January 1999, and conflicting national standards shall be withdrawn at the latest by January 1999.

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.

1 Scope

This standard specifies a method for determining the resin flow of carbon fibre preimpregnates for aerospace applications.

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 2558 Aerospace series - Carbon fibre preimpregnates - Determination of the volatile content

EN 2743 Aerospace series - Reinforced plastics - Standard procedures for conditioning prior to testing [1)]

3 Principle

Determination of the difference of the specimen mass per unit area before and after curing under specified conditions of temperature and pressure.

4 Apparatus

4.1 Balance accurate to ± 0,1 mg

4.2 Template of standard specimen

4.3 Ancillary items such as sharp knife and tweezers

4.4 Device capable of maintaining the specified temperature to ± 5 °C and the specified pressure to ± 5 %.

4.5 Metal plates not less than 200 mm × 200 mm and approximately 1,6 mm thick

4.6 Laboratory timer

4.7 Auxiliary materials:

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

4.8 Template or punch for cutting cured specimens.

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

5 Specimens

5.1 Shape and dimensions

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

The dimension of the sides shall be (100 ± 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 specimens may be used, subject to agreement between the user and manufacturer, on condition that they have an area of 100 cm² with a tolerance of ± 2 %.

5.2 Number and distribution

At least two specimens shall be used.

The plies from which these are made shall be evenly distributed and cut along a straight line covering the width of the sample. See figures 1 and 2 for woven fabrics and figure 3 for unidirectional sheet or tape.

Dimensions in millimetres

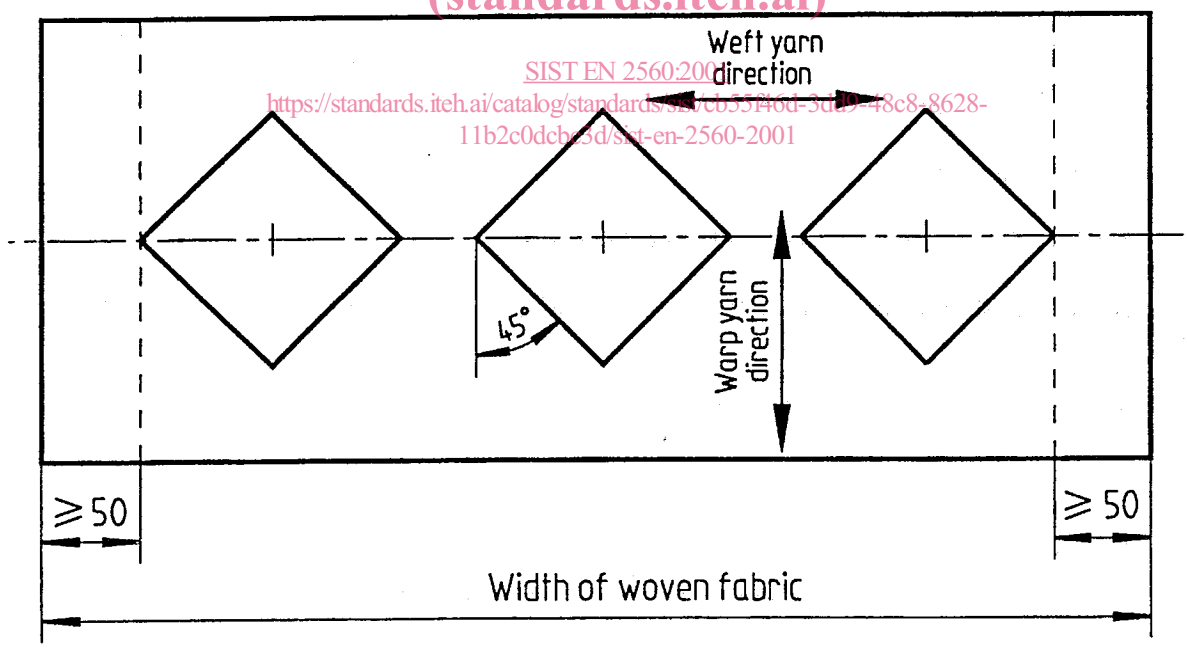

Figure 1: Example of cut-out plan for a three-ply specimen from a fabric sample

Dimensions in millimetres

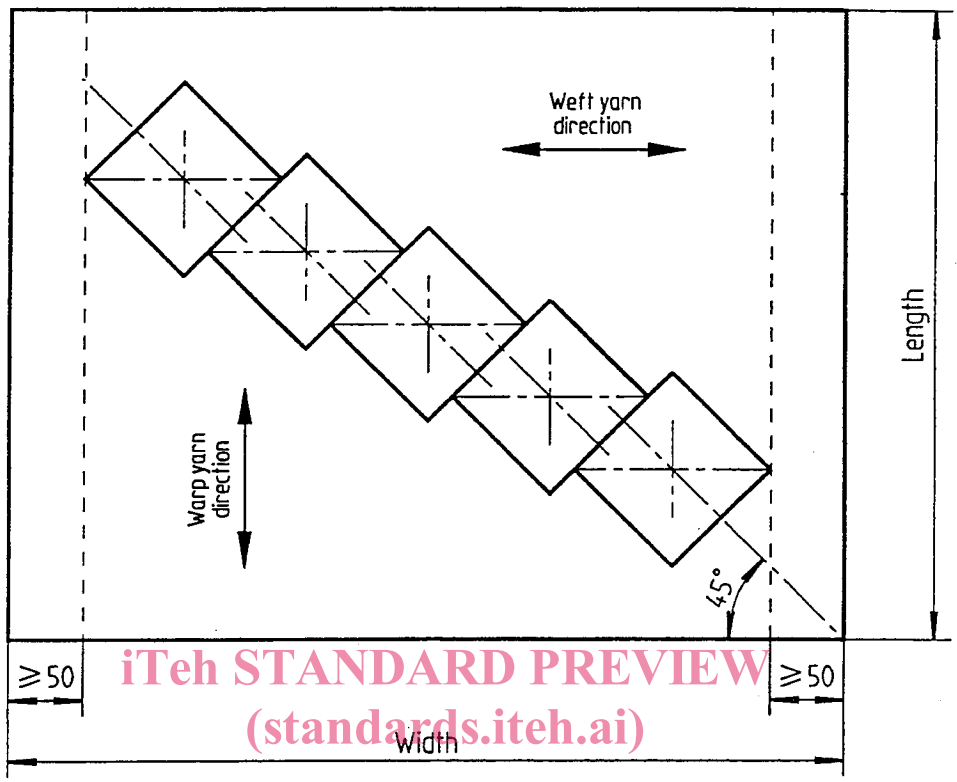

Figure 2: Example of cut-out plan for a five-ply specimen from a narrow fabric sample

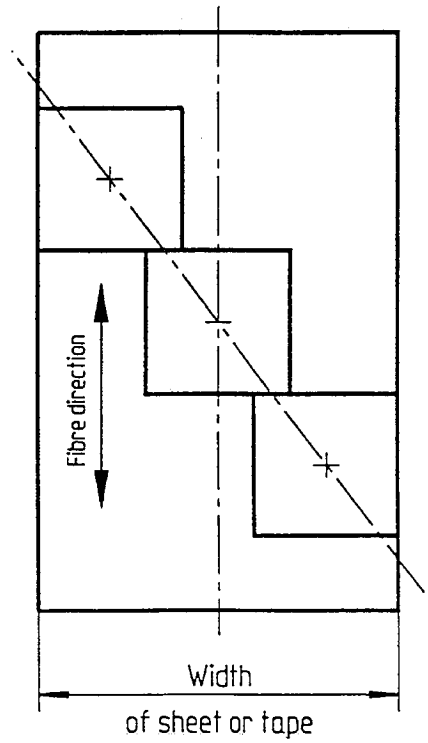

Figure 3: Example of cut-out plan for a three-ply specimen from a sample of unidirectional tape

6 Procedure

6.1 Conditioning

6.1.1 Preimpregnates stored at ambient temperature

The amount of preimpregnate required for testing shall be sampled and conditioned in the test atmosphere (see 6.2) for a minimum of 2 h, unless otherwise specified.

6.1.2 Preimpregnates stored below ambient temperature

The preimpregnate, 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 depending on its mass. This time shall not be less than 8 h.

When the material has reached ambient temperature, the amount required for testing shall be sampled and then conditioned in the test atmosphere (see 6.2) for a minimum of 2 h, unless otherwise specified.

6.2 Test atmosphere

EN 2743-B

6.3 Time interval between conditioning and testing

After conditioning, the sample shall be maintained in the test atmosphere. Unless otherwise specified, tests shall be carried out within 6 h.

6.4 Tests

Cut the necessary number of plies from the preimpregnate, 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 5.1.

Weigh the specimen to ± 1 mg (m_0) and then assemble the pack between the two metal plates (see 4.5), 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 platens of the device (see 4.4) heated at the specified temperature and apply the specified pressure in less than 10 s, then maintain it for the specified period.

> NOTE: Temperature of the platens, pressure applied to the assembly and period of application are specified on the relevant prepreg data sheet.

Remove the assembly from the device.

Allow it to cool down in the test atmosphere (see 6.2).

Remove the perforated PVF films and bleeder fabrics.

Cut out a square of sides (70 ± 0,7) mm from the centre of the cured specimen and weigh this to ± 1 mg (m_1).

Subject to agreement between the user and manufacturer, a circle with a diameter of (50 ± 1) mm may be substituted for the square.

7 Expression of results

7.1 Uncorrected resin flow

$$F_1 = \left(1 - \frac{m_1 \cdot S_1}{m_0 \cdot S_2}\right) \times 100$$

where:

F_1 is the uncorrected resin flow as a percentage of the initial mass,

m_0 is the initial mass of the specimen, in grams,

m_1 is the mass of the square or circle cut out from the cured specimen, in grams,

S_1 is the original area of the specimen, in square millimetres,

S_2 is the area of the square or circle cut out from the cured specimen, in square millimetres.

Calculate the arithmetic mean of the values obtained for F_1.

7.2 Resin flow corrected for volatile content

$$F_2 = \left[1 - \frac{100\, m_1 \cdot S_1}{m_0 (100 - V)\, S_2}\right] \times 100$$

where:

F_2 is the corrected resin flow as a percentage of the initial mass;

m_0 is the initial mass of the specimen, in grams;

m_1 is the mass of the square or circle cut out from the cured specimen, in grams,

S_1 is the original area of the specimen, in square millimetres,

S_2 is the area of the square or circle cut out from the cured specimen, in square millimetres.

V is the volatile content, determined according to EN 2558, in per cent.

Calculate the arithmetic mean of the values obtained for F_2.