INTERNATIONAL STANDARD

ISO 3597-2

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Textile-glass-reinforced plastics — Determination of mechanical properties on rods made of roving-reinforced resin —

Part 2:
Determination of flexural strength

Plastiques renforcés verre textile — Détermination des propriétés mécaniques sur joncs de stratifils —

Partie 2: Détermination de la résistance en flexion

Reference number
ISO 3597-2:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3597-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Sub-Committee SC 13, *Composites and reinforcement fibres*.

This first edition, together with the other parts of ISO 3597, cancels and replaces ISO 3597:1977, which has been technically revised.

ISO 3597 consists of the following parts, under the general title *Textile-glass-reinforced plastics — Determination of mechanical properties on rods made of roving-reinforced resin*:

— *Part 1: General considerations and preparation of rods*

— *Part 2: Determination of flexural strength*

— *Part 3: Determination of compressive strength*

— *Part 4: Determination of apparent interlaminar shear strength*

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Textile-glass-reinforced plastics — Determination of mechanical properties on rods made of roving-reinforced resin —

Part 2:
Determination of flexural strength

1 Scope

This part of ISO 3597 specifies a test method for determining the flexural strength of composite rods of circular cross-section made of roving-reinforced resin.

This test may be carried out on as-made rods, or on rods that have been pretreated by immersion in boiling water for a specified time.

This test is intended for inspection and quality control of rovings. The results obtained are not intended for the generation of design data.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3597. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3597 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 178:1993, *Plastics — Determination of flexural properties.*

ISO 291:1977, *Plastics — Standard atmospheres for conditioning and testing.*

ISO 1172:1975, *Textile glass reinforced plastics — Determination of loss on ignition.*

ISO 3597-1:1993, *Textile-glass-reinforced plastics — Determination of mechanical properties on rods made of roving-reinforced resin — Part 1: General considerations and preparation of rods.*

3 Apparatus

3.1 Flexural testing apparatus, as specified in ISO 178, but having the following additional characteristics.

a) The load applicator and supports shall be steel rods waisted in the middle to ensure specimen alignment. An example, suitable for a test specimen 4 mm in diameter, is shown in figure 1.

   For other specimen diameters, the radius of the notch (dimension A in figure 1) in both supports and load applicator shall be equal to the radius of the test specimen so as to assure contact on half the circumference of the test specimen.

b) The span shall be 16 times the diameter of the test rod.

3.2 Micrometer.

4 Preparation and conditioning of the test specimens

Prepare a given number of rods in accordance with the method given in ISO 3597-1. For each rod test condition (as-made or pretreated), the required number of specimens is 10. The required specimen length is 25 times its diameter, e.g. 100 mm ± 2 mm for a rod 4 mm in diameter.

For the as-made test (no pretreatment), the specimens are conditioned for 24 h in accordance with

ISO 291. The specimens which have been pretreated in boiling water shall be tested for compressive strength within 6 h after pretreatment.

5 Test procedure

NOTE 1 The test procedure assumes that a loss on ignition test has been run first to verify that the glass content of the rod meets the requirement of 65 % (*m/m*) ± 3 % (*m/m*). With experience, the operator will be capable of adjusting rod manufacture so as to obtain the right glass percentage. In case of doubt, verification by a loss on ignition test should first be carried out (see 5.3).

5.1 Before carrying out the flexural strength test, with the micrometer (3.2) measure, to the nearest 0,01 mm, the diameter at two points located 90° apart around the rod circumference at the centre of each test specimen. Use the average of these measurements in the calculation of results.

5.2 Carry out the flexural strength test on the specimens in accordance with ISO 178, modified as specified in 3.1, in the same standard laboratory atmosphere as that used for specimen conditioning. The standard speed of the load applicator shall be 10 mm/min.

5.3 Verify the glass content of a minimum of three specimens that were used for the as-made flexural test by an ignition test in accordance with ISO 1172. If, for each specimen, the glass content is not within the range 62 % (*m/m*) to 68 % (*m/m*), prepare new rods for testing.

6 Expression of results

For each test specimen, calculate the flexural strength σ_f, expressed in megapascals, using the equation

$$\sigma_f = \frac{8Fl}{\pi d^3}$$

where

F is the breaking force, in newtons;

l is the span, in millimetres;

d is the diameter, in millimetres, of the test rod.

For each set of test conditions (as-made or pretreated), calculate the average of 10 results and report it as the flexural strength.

7 Precision of the method

The precision of this test method is not known because interlaboratory data are not available. When such data are obtained, a precision statement will be added at the next revision of this part of ISO 3597.

Dimensions in millimetres

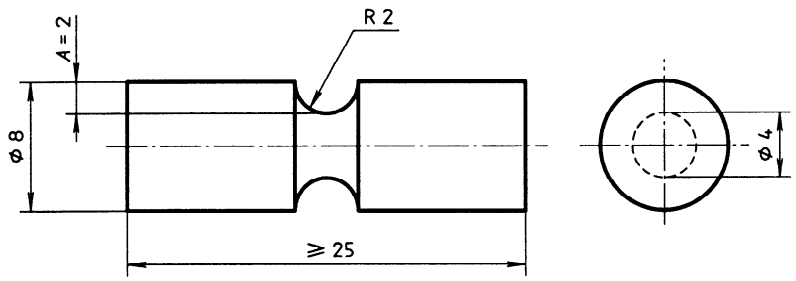

Figure 1 — Example of supports and load applicator for testing rods 4 mm in diameter