

INTERNATIONAL
STANDARD

ISO
10352

Second edition
1997-01-15

**Fibre-reinforced plastics — Moulding
compounds and preregs — Determination
of mass per unit area**

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*Plastiques renforcés — Préimprégnés — Détermination de la masse
surfactive* ISO 10352:1997

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Reference number
ISO 10352:1997(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 10352 was prepared by Technical Committee ISO/TC 61, *Plastics*, subcommittee SC 13, *Composite and reinforced fibres*.

This second edition cancels and replaces the first edition (ISO 10352:1991), which has been technically revised.

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Fibre-reinforced plastics — Moulding compounds and prepregs — Determination of mass per unit area

1 Scope

This International Standard specifies a method for the determination of the mass per unit area of sheet moulding compounds and preimpregnated unidirectional sheet, tape, fabrics and mats.

Unless stated to the contrary in the relevant materials specification, this standard is applicable to prepregs irrespective of which type of reinforcement (aramid, carbon, glass, etc.) or which type of matrix (thermosetting or thermoplastic) is used.

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2 Normative reference

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

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

3 Principle

The mass of a test specimen of known area is determined after conditioning in a specified atmosphere. The result is expressed as the mass per unit area.

Alternative specimens sizes are given for

- Type I materials: sheet moulding compounds, preimpregnated mats and heavy preimpregnated fabrics;
- Type II materials: preimpregnated unidirectional lightweight fabrics (e.g. for aerospace use).

4 Apparatus

4.1 Balance, graduated in tenths of grams and accurate to 0,5 g for type I specimens, or graduated in milligrams and accurate to 5 mg for type II specimens.

4.2 Square template, with the dimensions given in table 1 for the material being tested, with tolerance of $\pm 0,1$ mm on the length of each side.

4.3 Ancillary items, such as a sharp cutting tool and tweezers.

5 Conditioning and testing

5.1 Conditioning

5.1.1 Conditioning of material stored at ambient temperature

For material which has been stored at ambient temperature, the laboratory sample, cut from an elementary unit (roll or packet of sheets), shall be conditioned in a standard atmosphere (see 5.2.1) for a minimum of 2 h, unless otherwise specified.

The laboratory sample shall be kept covered with its protective foils in a solvent-impermeable bag.

5.1.2 Conditioning of material stored below ambient temperature

For material which has been stored at temperatures lower than ambient temperature, the material (generally an elementary unit), suitably packed in an airtight, solvent-resistant bag to prevent moisture pick-up, shall be allowed to reach ambient temperature over a period of time determined by the mass of the package. This time shall not be less than 8 h and the actual time shall be recorded in the test report.

When the material has reached ambient temperature, the laboratory sample cut from the elementary unit shall be conditioned in a standard atmosphere (see 5.2.1) for a minimum of 2 h, unless otherwise specified.

The laboratory sample shall be kept covered with its protective foils in a solvent-impermeable bag.

5.2 Testing

5.2.1 Test atmosphere

The test shall be carried out in a standard atmosphere as specified in ISO 291.

5.2.2 Time interval between conditioning and testing

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

6 Test specimens

6.1 Shape and dimensions

The preferred test specimen is a square with the dimensions given in table 1, which depend on the type of material.

For special applications, rectangular, square or round specimens may be used, upon agreement between the interested parties. The surface area of these specimens should preferably be between 0,04 m² and 0,10 m² for type I materials, and between 0,01 m² and 0,04 m² for type II materials.

Table 1 — Preferred specimen sizes

Specimen type	Type of material	Specimen size m
I	Sheet moulding compounds, preimpregnated mats and heavy preimpregnated fabrics	0,20 × 0,20
II	Preimpregnated unidirectional lightweight fabrics	0,10 × 0,10

6.2 Number

Unless otherwise required by a specification or by the person ordering the test, three specimens shall be taken from each elementary unit.

6.3 Preparation

Test specimens will usually be taken from the laboratory sample cut from an elementary unit comprising a roll or a packet of sheets. If necessary, taking into account the roll dimensions or the number of sheets per packet, an agreement between the interested parties shall define either the size of the laboratory sample to be taken from each elementary unit or other information such as the number of specimens and their location within the laboratory sample.

The specimens shall be taken uniformly across the roll or sheet and cut perpendicularly to the edges of the sheet.

The specimens shall be taken at least 50 mm away from the edges of the roll or sheet and from any folds or creases in the roll or sheet.

Typical cutting plans are shown in figures 1, 2 and 3. However, in practice, the product specification or the person ordering the test shall specify how specimens are to be taken.

7 Procedure

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On completion of conditioning, cut the test specimens from each laboratory sample using the template (4.2) and a suitable cutting tool (see 4.3).

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To ensure consistency in the specimen dimensions, it is important to give the operator precise instructions as to how to carry out the cutting operation.

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Weigh each test specimen, with its protective foil(s), and record the mass (m_1) to the nearest 0,1 g for type I specimens or to the nearest 1 mg for type II specimens.

Remove, then weigh, the protective foil(s) and record the mass (m_2) to the nearest 0,1 g for type I specimens or to the nearest 1 mg for type II specimens. Ensure that the whole foil is removed before weighing.

IMPORTANT — Perform the weighings immediately after cutting out the test specimens, so that the result will not be influenced by loss of volatile matter due to a delay between this operation and the weighings.

If the protective sheets can be removed without taking any of the material with them, the specimens may be weighed directly without their sheets.

8 Expression of results

The mass per unit area ρ_A , expressed in grams per square metre, is given by the equation

$$\rho_A = \frac{m_1 - m_2}{A}$$

where

m_1 is the mass, in grams, of the test specimen with its protective foils;

m_2 is the mass, in grams, of the protective foils;

A is the surface area, in square metres, of the test specimen (see 6.1).

Take as the mass per unit area of each elementary unit the arithmetic mean of the values of ρ_A obtained for the test specimens cut from that particular elementary unit.

9 Precision

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

10 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) all details necessary for the complete identification of material tested;
- c) the sampling method used;
- d) the type of specimen tested and its dimensions;
- e) the standard atmosphere used for conditioning and testing, and the conditioning time used;
- f) the mass per unit area of each elementary unit and, if required, the results obtained for each test specimen;
- g) the date of the test;
- h) any departure from the test method specified in the International Standard, and any incident which may have influenced the results.

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Dimensions in millimetres

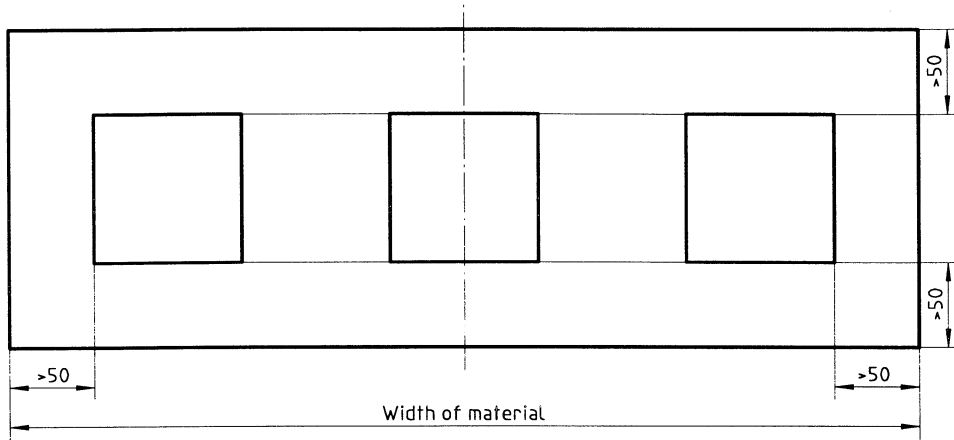


Figure 1 — Example of locations of specimens across the width of the material

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Dimensions in millimetres

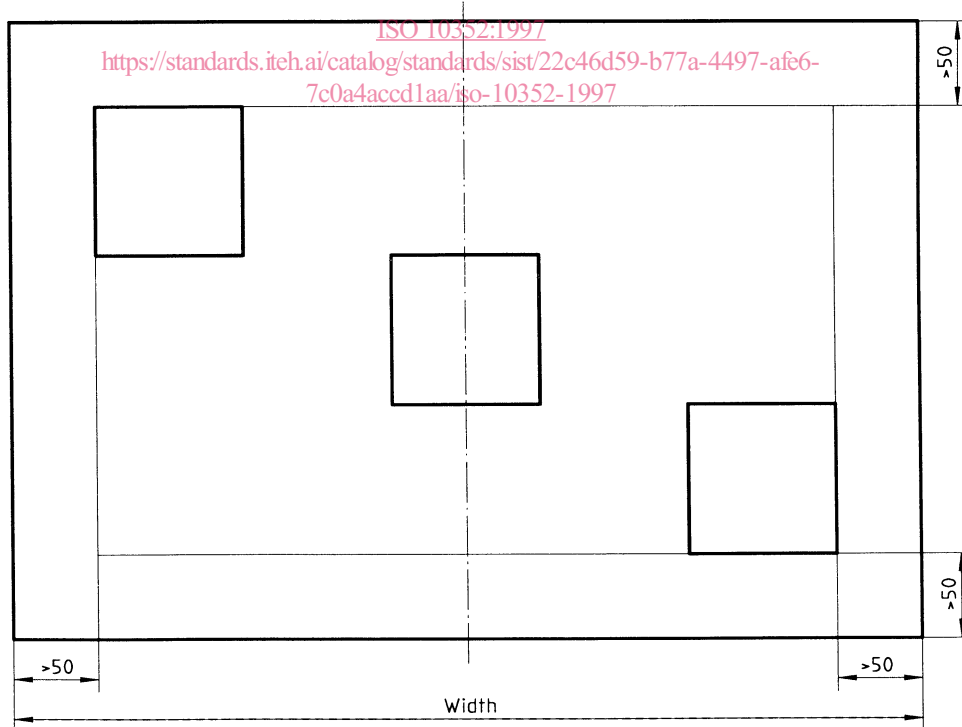


Figure 2 — Example of locations of specimens along an axis inclined at an angle across a preimpregnated fabric

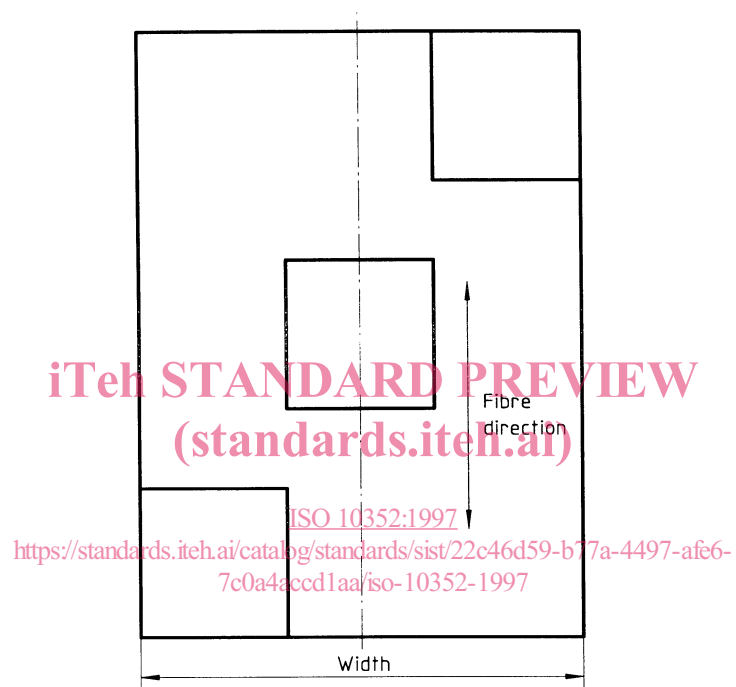


Figure 3 — Example of diagonal positioning of test specimens in unidirectional sheet or continuous tape

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