INTERNATIONAL STANDARD

ISO 10120

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Carbon fibre — Determination of linear density

Fibres de carbone — Détermination de la masse linéique

Reference number
ISO 10120:1991(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 10120 was prepared by Technical Committee ISO/TC 61, *Plastics*, Sub-Committee SC 13, *Composites and reinforcement fibres*.

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Carbon fibre — Determination of linear density

1 Scope

This International Standard specifies a method for determining the linear density (mass per unit length) of carbon fibre yarns.

When the determination of the linear density is carried out on sized fibre, a correction shall be made by calculation based on the size content (see 10.2).

The linear density determined by the method specified in this International Standard does not consider the influence of twist in the yarn.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 1144:1973, *Textiles — Universal system for designating linear density (Tex System).*

ISO 1886:1990, *Reinforcement fibres — Sampling plans applicable to received batches.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 size: All materials applied to fibres to facilitate the handling and use of the fibre and/or to promote the adhesion of a matrix material to the surface of the fibre.

3.2 size content: The mass of the size expressed as a percentage of the mass of the sized carbon fibre filament yarn.

3.3 linear density: The mass per unit length of a carbon fibre yarn, expressed in the tex system (see ISO 1144).

3.4 pre-tension: The tension applied to a specimen when determining the linear density.

4 Principle

The mass per unit length, in grams per kilometre (tex), is determined by weighing a test specimen of known length, the length being measured at a specified pre-tension.

5 Apparatus

5.1 Analytical balance, readable to 0,1 mg.

5.2 Cutting device, for cutting test specimens to the required length, to an accuracy of 1 mm, under the required pre-tension.

5.3 Hot-air oven, capable of being maintained at a temperature of 105 °C ± 5 °C.

5.4 Desiccator, containing calcium chloride or another suitable drying agent.

5.5 Wrap reel, for unwinding the yarn, the reel perimeter being 1 m.

6 Sampling

The sampling plan shall be agreed between the interested parties.

7 Atmosphere for testing

The atmosphere for testing shall be one of those defined in ISO 291.

8 Test specimens

The length in metres of each carbon fibre yarn test specimen shall be selected, according to the expected linear density, in tex, of the sample under test, to give a mass of at least 0,25 g.

Table 1 gives an indication of the carbon fibre yarn lengths required to achieve this.

Table 1

Linear density tex	Length of yarn m
< 50	Sufficient for the mass to exceed 0,25 g
50 to 125	5
125 to 250	2
> 250	1

9 Procedure

9.1 From each package selected in accordance with ISO 1886, discard approximately 2 m of yarn and take three successive test specimens of length as indicated in table 1. Take the specimens by applying a pre-tension of 4 mN/tex to 6 mN/tex (0,4 g/tex to 0,6 g/tex), measuring the length of the specimen to an accuracy of 1 mm and cutting the specimen to the measured length.

9.2 Dry the specimens for 1,5 h at 105 °C ± 5 °C. Allow the specimens to cool in a desiccator.

NOTE 1 This drying procedure may be omitted for types of carbon fibre that do not absorb moisture from the atmosphere, by agreement between the interested parties.

9.3 Weigh each specimen to the nearest 1 mg.

10 Expression of results

10.1 The linear density Tt, in tex, of unsized yarn is given by the equation

$$\mathrm{Tt} = \frac{m \times 10^3}{L}$$

where

m is the mass, in grams, of the test specimen;

L is the length, in metres, of the test specimen.

10.2 The linear density Tt, in tex, of the carbon fibre in sized yarn is given by the equation

$$\mathrm{Tt} = \frac{m \times 10^3}{L} \times \frac{(100 - S)}{100}$$

where

S is the size content (3.2), expressed as a percentage of the mass of the yarn;[1)]

m and L are as defined in 10.1.

11 Precision

The precision of this test method is not known because inter-laboratory data are not available. Inter-laboratory data are being obtained and a precision statement will be added at the next revision.

12 Test report

The test report shall include the following particulars:

a) a reference to this International Standard;

b) the linear density Tt, in tex, of the yarn for each package tested, expressed as the mean of the results obtained on the three test specimens;

c) any details of the techniques employed that may have had a bearing on the results obtained.

1) An International Standard describing the method to be used to determine the size content S will be published at a later date. Until that time the method shall be agreed between the interested parties.