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Textile glass — Determination of combustible-matter content

Verre textile — Détermination de la teneur en matières combustibles

[Revision of third edition (ISO 1887:1995)]

ICS 59.100.10

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Foreword

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ISO 1887 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforce ment fibres*.

This forth edition cancels and replaces the thard edition (ISO 1887:1995), of which has been technically revised.

Textile glass — Determination of combustible-matter content

1 Scope

This International Standard specifies a method for the determination of the combustible-matter content of products made from textile glass, such as continuous-filament yarns, staple-fibre yarns, rovings, chopped Strands, milled fibres, fabrics, chopped-Strand and continuous-filament mats and other glass reinforcements.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
combustible-matter content
The ratio of the mass of material removed on calcination from a dried textile glass product to the mass of the dried product.

NOTE This ratio is expressed as a percentage in this International Standard. It is equal to the content of size or finish on the textile glass product when the size or finish is completely combustible without significant residue (i.e. primarily organic products).

3 Principle

Test specimens, dried under prescribed conditions, are weighed before and after calcination at a temperature of 625 °C ± 20 °C or, with types of glass which are unstable at this temperature, at a temperature between 500 °C and 600 °C , also kept constant to within 20 °C.

4 Apparatus

4.1 Air-circulation oven, for drying specimens, capable of being maintained at 105 °C + 5 °C or the chosen drying temperature ± 5 °C (see 6.3).

4.2 Muffle furnace, capable of being maintained, with a tolerante of ± 20 °C, at any desired temperature up to 625 °C, the temperature being measured at the centre of the muffle furnace with the door closed.

4.3 Desiccator, containing a suitable desiccant, for example silica gel, Calcium chloride, phosphorous(V) Oxide.

4.4 Specimen holder, made from a material stable at the test temperature, allowing the best possible air circulation around the test specimen and designed to prevent loss of material. The holder may be a porcelain crucible, a basket made of stainless-steel gauze, etc.

4.5 Stainless-steel tongs, for handling test specimens and holders.

4.6 Balance, accurate to 0,l mg.

4.7 Polished-metal templates, for the preparation of test specimens.

4.8 Suitable cutting tool, for cutting mat or fabric, for example a knife, scissors, a cutting disc or a punch.

4.9 Suitable wrap-reel, for taking yarn and roving test specimens.

5 Test specimens

5.1 Selection of test specimens

Unless stated to the contrary in the product specification or by the person requesting the test, the test specimens shall be selected as specified in 5.1.1 to 5.1.4.

5.1.1 Yarns and rovings

Table 1 gives the length of yarn to be taken as a function of the linear density of the yarn. The test specimen shall not be unduly compressed, in order to ensure that the air will circulate as freely as possible and that drying and calcination will therefore be complete.

Table 1 — Length of yarn

Linear density, Tt tex	**Length of yarn** m
Tt ≤ 25	500
25 < Tt ≤ 45	200
45 < Tt ≤ 280	100
280 < Tt ≤ 650	50
650 < Tt ≤ 2 000	10
2 000 < Tt	5

5.1.2 Chopped Strands and milled fibres

Esch specimen shall have a mass of not less than 5 g, but preferably between 15 g et 30 g.

5.1.3 Fabrics

Take a piece of fabric of sufficient size to allow specimens of area 100 cm^2 to be obtained. If the mass of the specimen is less than 5 g, either take larger specimens or use several adjacent 100 cm^2 specimens.

Specimens may have the same dimensions as those used for the determination of the mass per unit area.

Do not take specimens at a distance of less than 10 mm from the edges or selvedges of the fabric. If the specimen has to be folded, this shall not impede good air circulation round the whole specimen. It is recommended that specimens be cut out using a template (4.7) and cutting tool or with a punch (4.8), so as to avoid losing material.

5.1.4 Mats

The test specimen shall have a mass of at least 5 g. The recommended specimen shape is a square measuring 316 mm x 316 mm (0,l m^2). However, other shapes may be used provided that the area is approximately 0,l m^2. In this case, it is necessary to modify slightly the preparation procedure described below.

If it is necessary to use more than one square to achieve the required minimum specimen mass, these shall be taken along the length of the roll, in the same lane.

Cut a Strip of width at least 316 mm from across the whole width of the mat. Using the template (4.7) and the cutting tool (4.8), cut from this Strip:

a) at each end (in the case of mats with trimmed edges, at least 10 mm inside the edges), a test specimen measuring 316 mm x 316 mm;

b) between these end specimens, as many test specimens measuring 316 mm x 316 mm as the remaining width allows (these test specimens shall be evenly distributed).

5.2 Number of test specimens

Unless stated to the contrary or in more detail (i.e. number and location) in the specification or by the person requesting the test, the number of test specimens taken per elementary unit shall be as specified in table 2.

Table 2

Type of product	Number of test specimens
Yarns, roving	1
Chopped Strands, milled fibres	1
Fabrics, mats	3 for each metre of width, repeated regularly across the full width

NOTE The number of test specimens used for each determination of the combustible-matter content may be modified depending on the type of elementary unit, which may come in very different forms. In addition, a determination may have to be repeated at one or more locations in the elementary unit depending on the mass (chopped strands, milled fibre) or the length (fabrics, mats) of the elementary unit being tested. The additional information concerning the number and location of these specimens may be given in the product specification or by the person requesting the test.

6 Procedure

6.1 Precautions to be taken during test

6.1.1 Ensure that the test specimen does not come into contact with the furnace during the carbonization stage.

6.1.2 Always transfer the test specimen plus holder with care to prevent loss of material.

6.1.3 Never tauch the test specimen with the bare hands.

6.2 Weighing the specimen holder

Stabilize the mass of the specimen holder (4.4) by placing it in the muffle furnace (4.2), maintained at 625 °C ± 20 °C or, if the type of glass being tested is unstable at this temperature, at a temperature between 500 °C and 600 °C, also maintained to within ± 20 °C. The temperature between 500 °C and 600 °C shall be chosen either on the basis of the specification for the glass or by agreement between the interested parties.

Allow the holder to cool in the desiccator (4.3), to ambient temperature.

Weigh the holder and note the mass to the nearest 0,1 mg (m_0).

Repeat the heating, cooling and weighing operations until constant mass is reached (See, however, note 6).

6.3 Weighing the dried test specimen plus holder

Place the holder with a specimen in the oven (4.1), maintained at 105 °C ± 5 °C or, in the case of products containing components which are volatile, or susceptible to change, at this temperature, a lower temperature chosen by agreement between the interested parties and also maintained to within ± 5 °C.

NOTE For fabrics and mats, the specimens may be cut and stacked rather than folded, in order to put them in a holder which fits into the apparatus (muffle furnace, balance).

Heat the specimen for at least 30 min.

Remove the holder plus specimen from the drying oven and allow to cool in the desiccator (4.3) for 30 min.

Weigh the holder plus dried specimen and note the mass to the nearest 0,l mg (m_1).

Repeat the heating, cooling and weighing operations until constant mass is reached (See, however, note 6).

6.4 Weighing the calcinated test specimen plus holder

Place the holder plus dried specimen in the muffle furnace (4.2), maintained at 625 °C ± 20 °C or at the chosen temperature between 500 °C and 600 °C (see 6.2).

Allow the specimen to burn for 5 min with the door of the furnace open (see NOTEs 1 and 2). Then close the door of the furnace and heat for a further more than 10 min or, if a temperature lowers than 625 °C is used, for at least a further 1 h.

Remove the holder plus specimen from the furnace and transfer to the desiccator (4.3). Allow to cool to ambient temperature.

Weigh the holder plus calcinated specimen and note the mass to the nearest 0,1 mg (m_2).

Repeat the heating, cooling and weighing operations until constant mass is reached (See, however, NOTE 3).

NOTE 1 The door is left open to allow volatile products to escape from the furnace, thus preventing condensible materials being redeposited on the specimen or on the holder.

NOTE 2 If a ventilated furnace is used, this open-door time is not necessary.

NOTE 3 The test method requires that all weighings be confirmed to be to constant mass by repetition of the drying and calcination stages. In cases in which known materials are being tested regularly, the user of this International Standard is permitted to define, by experimentation, a minimum time for the drying and calcination stages to ensure that constant mass has been obtained.

7 Expression of results

The combustible-matter content of a test specimen, expressed as a percentage by mass of the dried product, is given by the formula:

$$H_1 = \frac{m_1 - m_2}{m_1 - m_0} \times 100$$

where