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Textile glass products — Determination of percentage of combustible matter

Produits en verre textile — Détermination de la perte au feu

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 61 has reviewed ISO Recommendation R 1887 and found it technically suitable for transformation. International Standard ISO 1887 therefore replaces ISO Recommendation R 1887-1971 to which it is technically identical.

ISO Recommendation R 1887 was approved by the Member Bodies of the following countries :

Australia	Greece	South Africa, Rep. of
Austria	Israel	Spain
Belgium	Italy	Sweden
Canada	Japan	Switzerland
Czechoslovakia	Korea, Rep. of	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Romania	U.S.S.R.

No Member Body expressed disapproval of the Recommendation.

The Member Body of the following country disapproved the transformation of ISO/R 1887 into an International Standard :

Canada

Textile glass products — Determination of percentage of combustible matter

1 SCOPE AND FIELD OF APPLICATION

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

2 REFERENCES

ISO/R 291, *Plastics — Standard atmospheres for conditioning and testing*.

ISO 1886, *Textile glass products — Continuous filament yarns, staple fibre yarns and rovings in the form of packages — Sampling of batches or consignments*.

3 DEFINITION

percentage of combustible matter: The mass of material removed from the textile glass product by heating under the conditions prescribed in this International Standard, related to the mass of the calcined product.¹⁾

4 PRINCIPLE

Weighing of test specimens, dried under prescribed conditions, before and after calcination at a standard temperature of $625 \pm 20^\circ\text{C}$.

NOTE — For glasses which are unstable at this temperature, a temperature between 500 and 600°C may be chosen according to the glass specification or upon agreement. The chosen temperature must be kept constant to $\pm 20^\circ\text{C}$.

5 APPARATUS

5.1 Air-ventilated oven, which can be controlled at a temperature of $80 \pm 2^\circ\text{C}$, for drying the test specimens.

5.2 Muffle furnace, capable of maintaining a temperature between 450 and 650°C with an accuracy of $\pm 20^\circ\text{C}$.

5.3 Desiccator containing a suitable drying agent (for example, silica gel, calcium chloride, phosphorus pentoxide).

5.4 Specimen holder made from a heat-stable material, allowing the best possible air circulation around the test specimen. A fixing device must hold the test specimen firmly. This may be a porcelain crucible, a basket made from stainless steel gauze, etc.

5.5 Stainless steel tongs for handling test specimens and holders.

5.6 Balance with an accuracy of $0,1$ mg.

5.7 Template, of polished sheet iron, 300 mm $\times$ 300 mm, for cutting glass mats.

5.8 Suitable tool for cutting glass mat or glass fabric; for example, knife, scissors or disc.

6 SAMPLING AND TEST SPECIMENS

6.1 Glass textile continuous filament yarns, staple fibre yarns and rovings

6.1.1 Sampling procedure

For one batch or consignment of packages, the number of sampled packages shall be the number stated in ISO 1886.

1) The percentage of combustible matter is equal to the quantity of size or finish on the textile glass product when the size or finish is completely combustible without notable residue (i.e. primarily organic products).

6.1.2 Preparation of test specimens

Table 1 gives the quantity of yarn¹⁾ to take (in general the length in metres) as a function of the linear density T_t of the yarn.

TABLE 1

Linear density in tex	Quantity of yarn to take
$T_t < 5$	2 000 m
$5 \leq T_t < 10$	1 000 m
$10 \leq T_t < 50$	500 m
$50 \leq T_t < 200$	100 m
$200 \leq T_t < 500$	50 m
$500 \leq T_t < 1\,000$	20 m
$1\,000 \leq T_t < 2\,500$	10 m
$2\,500 \leq T_t < 5\,000$	5 m
$T_t \geq 5\,000$	length such that the mass lies between 5 g and 25 g

6.1.3 Number of test specimens

Take at least two test specimens from each package.

6.2 Chopped strands — Milled fibres

6.2.1 Sampling procedure

The sampling procedure shall be determined by agreement between customer and supplier.

6.2.2 Preparation of test specimens

Each test specimen shall have a mass of not less than 5 g.

6.2.3 Number of test specimens

Use at least five test specimens per sample.

6.3 Textile glass fabrics

6.3.1 Sampling procedure

The number n of rolls to be tested from a batch or consignment of N rolls is given by table 2.

TABLE 2

Number of rolls in the batch or consignment N	Number of rolls to be picked at random and tested n
3 or less	1
4 to 10	2
11 to 30	3
31 to 75	4
76 or more	5

6.3.2 Preparation of test specimens

The specimens shall be rectangles of 150 mm × 80 mm,²⁾ the edges being frayed out for about 5 mm to avoid any subsequent loss of yarns. Larger rectangles shall be taken from light-weight fabrics to obtain test specimens of mass at least 5 g.

6.3.3 Number of test specimens

Use at least five test specimens per sample.

6.4 Textile glass mat

6.4.1 Sampling procedure

For one consignment of mat, the number of rolls to be tested shall be agreed between customer and supplier.

6.4.2 Preparation of test specimens

Cut a strip of at least 300 mm from the whole width of the mat. By means of the template (5.7) and trimming tool (5.8), cut test specimens from the strip as follows:

- two 300 mm × 300 mm test specimens, one from each end of the strip, i.e. at less than 10 mm from the edges in the case of trimmed edges;
- as many 300 mm × 300 mm test specimens as possible from the remaining length of the strip; the specimens must be evenly distributed and equidistant from each other.

6.4.3 Number of test specimens

The minimum number of test specimens shall be agreed between customer and supplier.

7 PROCEDURE

7.1 Weighing of holder

Stabilize the mass of the holder (5.4) by placing it in the muffle furnace (5.2) controlled at a temperature of $625 \pm 20^\circ\text{C}$, or at the chosen temperature between 500 and 600°C (see clause 4).

Cool the holder in the desiccator (5.3) to standard room temperature (see ISO/R 291).

Weigh the holder with an accuracy of 0,001 g.

7.2 Weighing of dried test specimen plus holder

Place the test specimen flat on the holder.

Put the holder with the specimen in the oven (5.1) at a temperature of $80 \pm 2^\circ\text{C}$. (If the glass product contains any materials that are either volatile or liable to undergo any change under these conditions, a lower temperature may be chosen.) Heat the specimen for at least 1 h.

1) Test specimens used in this test may be used for the determination of the linear density.

2) Or with comparable dimensions compatible with the apparatus (muffle furnace, balance) and which can be handled flat without being removed from the holders.

Remove the specimen with its holder from the drying oven and cool to standard room temperature (see ISO/R 291) in the desiccator (5.3) for 30 min. Weigh the whole (specimen plus holder) to an accuracy of 0,001 g.

Repeat this procedure, heating the specimen plus holder for a further 10 min in the oven, until the results of two successive weighings differ by less than 0,001 g.

7.3 Weighing of calcined test specimen plus holder

Put the test specimen with its holder in the muffle furnace (5.2) controlled at a temperature of 625 ± 20 °C¹⁾ or at the chosen temperature between 500 and 600 °C (see clause 4).

Allow to burn for 5 min with the door of the furnace open.²⁾ Then close the door of the furnace and heat for a further 30 min. If a temperature lower than 625 °C is chosen, the latter heating period should be increased to at least 1 h.

Remove the test specimen and holder from the furnace and transfer to the desiccator (5.3). Allow to cool to standard room temperature (see ISO/R 291).

Weigh the calcined test specimen and holder to an accuracy of 0,001 g.

7.4 Precautions during test procedure

7.4.1 Ensure that the test specimen does not come into contact with the furnace during the heating stage.

7.4.2 Transfer the test specimen plus holder between furnace, desiccator and balance with great care to avoid loss of material.

7.4.3 Never touch the test specimen with the fingers, but use the tongs (5.5).

8 EXPRESSION OF RESULTS

The percentage of combustible matter of each test specimen, expressed as a percentage of the mass of the calcined product, is given by the formula

$$P_i = \left(\frac{m_1 - m_2}{m_2 - m_0} \right)_i \times 100$$

where

m_0 is the mass, in grams, of the holder;

m_1 is the mass, in grams, of the holder plus dried specimen;

m_2 is the mass, in grams, of the holder plus calcined specimen.

The average percentage of combustible matter of the sample is the arithmetic mean of the percentages of combustible matter P_i determined on the individual test specimens.

9 TEST REPORT

The test report shall include the following particulars :

- a) reference to this International Standard;
- b) complete details of the textile glass product which has been tested;
- c) type of specimen holder used;
- d) temperature of muffle furnace if different from the standard value (625 °C);
- e) type of oven used;
- f) sampling procedure applied;
- g) number of specimens tested and their mass if different from the standard mass of 5 g;
- h) result obtained for each test specimen and the mean value for the sample;
- i) any operational details not specified in this International Standard and any other circumstances liable to have had an influence upon the results.

1) This temperature is the temperature measured at the centre of the muffle furnace with the door closed.

2) The door is left open to allow volatile products to escape from the furnace, thus preventing their redeposition on the specimen or the holder.

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