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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

**ISO RECOMMENDATION
R 1172**

PLASTICS

**DETERMINATION OF THE LOSS ON IGNITION
OF TEXTILE GLASS REINFORCED PLASTICS**

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1172, *Plastics – Determination of the loss on ignition of textile glass reinforced plastics*, was drawn up by Technical Committee ISO/TC 61, *Plastics*, the Secretariat of which is held by the American National Standards Institute (ANSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In July 1968, this Draft ISO Recommendation (No. 1633) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Israel	Sweden
Belgium	Italy	Switzerland
Czechoslovakia	Japan	U.A.R.
France	Netherlands	United Kingdom
Germany	Poland	U.S.A.
Hungary	Romania	U.S.S.R.
India	South Africa, Rep. of	
Iran	Spain	

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1970, to accept it as an ISO RECOMMENDATION.

PLASTICS

DETERMINATION OF THE LOSS ON IGNITION
OF TEXTILE GLASS REINFORCED PLASTICS

1. SCOPE

This ISO Recommendation describes a method for determining the loss on ignition of textile glass reinforced plastics.

- 1.1 If the material to be tested contains only glass and a resin which is completely combustible (under the conditions of this test method), the loss on ignition is equal to the resin content (see Note below). The glass content may be then calculated by difference.
- 1.2 In the case of products which contain non-combustible mineral fillers, other than glass reinforcement, or resins which are incompletely combustible (under the conditions of this test method), the presence of which materials can be recognized or verified by examination of the residue after ignition, this method will only allow determination of the ash content by difference.

NOTE. — The glass used as a reinforcement is usually coated with ancillary products (sizing, finish, etc.) which most often are completely eliminated during calcination and therefore taken into consideration with the loss on ignition.

2. PRINCIPLE OF THE METHOD

Ignition of weighed test specimens at a standard temperature of 625 ± 20 °C to constant mass (see clause 6.2).

For glass reinforcements which cannot resist this temperature, a temperature between 500 and 600 °C, according to the glass specification, or upon agreement, can be chosen. The chosen temperature must be kept constant to ± 20 °C.

3. APPARATUS

- 3.1 *Container* made of an appropriate material and of suitable dimensions (a porcelain or platinum crucible, or porcelain boat may be used).
- 3.2 *Electric muffle furnace* the temperature of which can be varied between 450 and 650 °C and which can be controlled to ± 20 °C.
- 3.3 *Desiccator* containing a suitable drying agent (e.g. silica gel, calcium chloride, phosphorus pentoxide).
- 3.4 *Balance* with an accuracy of 0.1 mg.

4. SAMPLING AND TEST SPECIMENS

The test specimens must collectively form a representative sample of the part or the consignment to be tested. Consequently, the number of test specimens and the sampling plan must be taken as indicated by a particular specification or by previous agreement, taking into account the nature and type of distribution of the reinforcement. However, the following requirements must be taken into consideration :

- (1) At least four test specimens should be taken.
- (2) The mass of each specimen should be at least 2 g.
- (3) The thickness of each specimen should be not more than 5 mm. If the thickness of the product to be tested is greater than 5 mm, either specimens should be reduced in thickness, so as to obtain a remaining thickness equal to or less than 5 mm, or, in the case of products having non-uniform distribution of glass fibre reinforcement over the whole thickness, specimens should be taken over the whole thickness of the product to ensure a representative sample.

If specimens are reduced in thickness, care should be taken that the machining operation does not cause significant variations in the glass content of the specimens.

- (4) The specimens must be prepared in such a manner that edges are smooth and free of all loosely adhering resin and reinforcement particles.

NOTE. - It is often convenient to use specimens obtained from test pieces that have been tested for mechanical properties, such as flexural or tensile strength. In this case the fractured areas of the specimens must be removed.

5. CONDITIONING OF TEST SPECIMENS

In most cases, preconditioning of the test specimens is not necessary. However, if the product in question seems to contain a certain noticeable amount of water, it is advisable to condition the specimens at 50 ± 2 °C in an air ventilated oven. The relative humidity of the air ventilated oven should not be more than 10 %.

The drying operation is complete when the difference in mass before and after 30 minutes of drying is not more than 1 mg.

6. PROCEDURE

6.1 Preparation of the container

Before commencing each series of tests, a test with the empty container (3.1) must be performed, by heating in the muffle furnace (as specified in clause 6.2), to verify that the mass is constant to 1 mg. Otherwise, repeat this blank test until constant mass is achieved.

NOTE. - The weighing of the container must be performed after the container has been cooled to room temperature in a desiccator (3.3).

6.2 Weighing and ignition of test specimens

For each test specimen carry out the following sequence of operations :

- 6.2.1 Weigh the container (3.1) prepared as indicated in clause 6.1. Condition the test specimen in accordance with section 5, if necessary, and weigh together with the container. Heat the container with the test specimen in a flame until the contents ignite. Maintain such a temperature that the specimen burns at a moderate rate until only ash and carbon remain when the burning ceases.
- 6.2.2 Heat the container and residue in the muffle furnace (3.2) at the standard temperature (625 ± 20 °C) or at the chosen temperature, until all carbon has disappeared.
- 6.2.3 Cool the container and the residue in a desiccator (3.3) to room temperature and weigh.
- 6.2.4 Repeat the procedure specified above until the difference in mass on two successive weighings is less than 1 mg.

7. CALCULATION AND EXPRESSION OF RESULTS

For each test specimen, calculate the loss on ignition, expressed as a percentage of the original mass, by the following formula :

$$P = \frac{m_2 - m_3}{m_2 - m_1} \times 100$$

where

- P is the percentage loss on ignition;
- m_1 is the mass of the container;
- m_2 is the initial total mass of the container plus the specimen;
- m_3 is the final total mass, after combustion, of the container and the residue.

Calculate the arithmetic mean of the values obtained for P .

Calculate the estimated standard deviation by the formula given in the Appendix.

8. TEST REPORT

The test report should include the following information :

- (a) complete identification of the product;
 - (b) description of the sampling method, if necessary;
 - (c) number of test specimens used;
 - (d) dimensions of the test specimens;
 - (e) description of the method of machining test specimens thicker than 5 mm;
 - (f) conditioning of the test specimens (if necessary);
 - (g) ignition temperature if it is different from 625 ± 20 °C;
 - (h) ignition loss of each test specimen;
 - (i) arithmetic mean and standard deviation of each homogeneous group of test specimens;
 - (j) observations about any irregularities noted in the physical aspect of the residue, such as, for instance, traces of melting of the glass.
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