International Standard 871

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Plastics — Determination of temperature of evolution of flammable gases (decomposition temperature) from a small sample of pulverized material

Plastiques — Détermination de la température d'émission de gaz inflammables (température de décomposition) d'un petit échantillon de matériau pulvérisé

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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.

International Standard ISO 871 was developed by Technical Committee ISO/TC 61, *Plastics*, and was circulated to the member bodies in September 1977.

It has been approved by the member bodies of the following countries :

Australia	Iran	Romania
Austria	Israel	South Africa, Rep. of
Belgium	Japan	Spain
Brazil	Kenya	Sweden
Canada	Korea, Rep. of	Switzerland
Egypt, Arab Rep. of	Mexico	Turkey
Finland	Netherlands	USSR
France	New Zealand	USA
Hungary	Peru	Yugoslavia
India	Poland	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Czechoslovakia
United Kingdom

This International Standard cancels and replaces ISO Recommendation R 871-1968, of which it constitutes a technical revision.

Plastics — Determination of temperature of evolution of flammable gases (decomposition temperature) from a small sample of pulverized material

1 Scope and field of application

This International Standard specifies a method for determining the temperature at which plastics begin to decompose appreciably to flammable gaseous products.

The method is one of a number of methods of use in evaluating the resistance of plastics to the effects of high temperatures.

The test provides an assessment of the evolution of combustible gases from a small sample of a pulverized material when exposed to high temperatures for 5 min. It does not, however, give a direct measure of the flammability or rate of burning of a material or any definition of the safe upper limit of temperature for the plastics in use.

WARNING — This test must not be used to assess the potential fire hazards of a material in use.

2 Definition

For the purposes of this International Standard, the following definition applies :

decomposition temperature : That temperature at which flammable gases in sufficient concentration to sustain a flame for at least 5 s are evolved from a material under specified test conditions.

3 Principle

A specimen taken from a pulverized sample of the material is heated in a container at a predetermined temperature, and a small igniting flame is directed across the top of the container. The procedure is repeated at regularly increasing temperatures with fresh specimens. The decomposition temperature is taken as the lowest temperature at which application of the igniting flame causes gases evolved from the specimen to ignite and burn for at least 5 s.

4 Apparatus (see the figure)

4.1 Cylindrical block, of copper or aluminium, having a diameter of approximately 100 mm and a height of approximately 100 mm, provided with a thermometer hole and holes for the insertion of the specimen containers (4.3).

NOTE — Insulation of the block makes it easier to maintain a precise and uniform temperature.

4.2 Gas or electrical heating system (preferably the latter), capable of maintaining the temperature of the block (4.1) at a preselected value between 150 and 400 °C with an accuracy of ± 2 °C.

4.3 Specimen containers, of stainless steel, provided with lids having nozzle-shaped openings for gases to escape.

4.4 Device for applying an igniting flame, similar to that used for determining flash point (flame 3,5 ± 0,5 mm in diameter).

The device may be of any suitable type but it is suggested that the tip be approximately 1,6 mm in diameter at the end, and that the orifice be 0,8 mm in diameter. The device is mounted in such a manner that the centre of the orifice swings in a plane not more than 2 mm above the plane of the lid opening of the container.

4.5 Thermometer

NOTE — It is recommended that a short-stem thermometer with a bulb that will fit completely in the hole in the block be used in order to reduce the need for a stem correction.

4.6 Small hammer-mill, or similar device, for pulverizing the test sample.

5 Preparation of sample

Pieces of the material to be tested shall be pulverized by means of the hammer-mill or equivalent device (4.6). For some coarsely ground thermoplastic materials, this process can be assisted by mixing the material with solid carbon dioxide (dry ice) before grinding. The material used for the test shall be screened to consist of particles of diameter between 0,5 and 1 mm.

6 Procedure

6.1 Conduct the test in an environment essentially free from draughts to avoid extinction of the initial small flame and suitably vented to avoid danger to personnel.

6.2 Heat the metal block (4.1) and maintain it with an accuracy of ± 2 °C, at a temperature close to the expected decomposition temperature.

6.3 Place 1 g of the powdered material to be tested (see clause 5) in a specimen container (4.3) and place the container in one of the holes in the block. Cover the container with its lid (which has been previously heated on top of the block).

6.4 Pass the igniting flame (see 4.4) over the opening of the lid. If during the first 5 min, no flame lasting at least 5 s burns from the nozzle, the decomposition temperature has not been reached.

6.5 Repeat the test, using a fresh 1 g specimen each time, at different temperatures in increasing increments of 10 °C; note the decomposition temperature as the lowest temperature at which a flame is observed lasting at least 5 s.

NOTE — Thermoplastic materials may melt and foam; if this interferes with the test, reduce the specimen mass to 0,5 g. If excessive foaming still occurs, the decomposition temperature cannot be determined by this test.

7 Test report

The test report shall include the following particulars :

a) reference to this International Standard;

b) complete identification of the sample, including type, source, manufacturer's code number and preparation of the sample;

c) mass of the test specimen;

d) decomposition temperature rounded off to the nearest 10 °C, or a statement that it cannot be determined by this method;

e) observations about the behaviour of the specimen during the test (way of igniting, formation of soot or smoke, excessive foaming, etc);

f) the following statement :

"These test results relate only to the behaviour of test specimens under the particular conditions of the test. They are not intended to be used, and must not be used, to assess the potential fire hazards of a material in use."

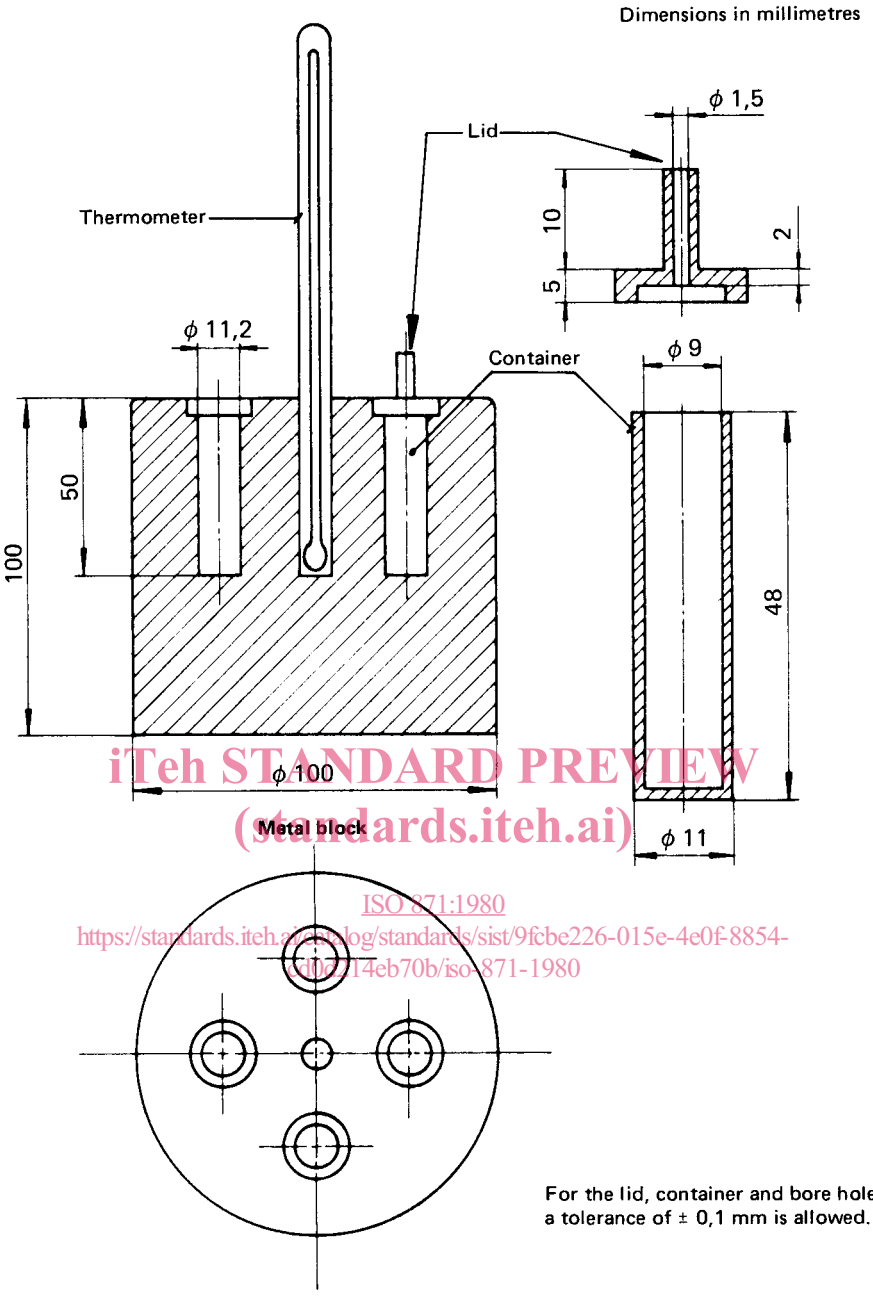

Figure — Apparatus for the determination of the temperature of evolution of flammable gases