International Standard 1675

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

Plastics — Liquid resins — Determination of density by the pyknometer method

Plastiques — Résines liquides — Détermination de la masse volumique par la méthode du pycnomètre

Second edition — 1985-08-15

UDC 678.6/.7-498.1 : 531.756.4 **Ref. No. ISO 1675-1985 (E)**

Descriptors : plastics, liquid resins, tests, determination, density (mass/volume), pycnometric analysis, pycnometers.

Price based on 2 pages

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1675 was prepared by Technical Committee ISO/TC 61, *Plastics*.

ISO 1675 was first published in 1975. This second edition cancels and replaces the first edition, of which it constitutes a technical revision.

Printed in Switzerland

Plastics — Liquid resins — Determination of density by the pyknometer method

1 Scope and field of application

This International Standard specifies a method for the determination of the density of liquid resins using a pyknometer.

2 Definition

density; mass density : Mass divided by volume. (Definition taken from ISO 31/3.)

It may be expressed in grams per millilitre (g/ml).*

3 Principle

Determination of the mass at 23 °C of resin contained in a pyknometer of known volume.

NOTE — This method is easily applicable to low and medium viscosity resins. Difficulties in the procedure exist for high viscosity resins.

4 Apparatus

4.1 Pyknometer, consisting of a precision graduated flask. The height of the neck above the graduation mark shall not exceed 50 mm.

The graduated volume of the pyknometer at 23 ± 0,1 °C, measured by weighing the mass of distilled water contained in the pyknometer at this temperature, shall be known to within 1 part in 10 000 (see note to clause 6).

The pyknometers normally used have the characteristics given in the following table.

Volume of flask, V	Internal diameter of neck, d
ml	mm
100 ± 0,1	13 ± 1
50 ± 0,05	11 ± 1

* 1 g/ml = 1 000 kg/m^3

4.2 Funnel, whose stem, the internal diameter of which shall be as large as possible, penetrates into the pyknometer exactly down to the level of the graduation mark.

4.3 Balance, accurate to 0,2 mg.

4.4 Water-bath, capable of being maintained at 23 ± 0,1 °C.

4.5 Fine filter paper.

4.6 Transparent conical flask, with wide neck (for example Erlenmeyer), stoppered, of capacity 200 to 600 ml.

5 Procedure

5.1 Preparation of resin

Place at least 150 g of resin in the conical flask (4.6) and inspect the contents of the flask for bubbles. If any bubbles are observed, allow the stoppered flask to stand long enough for all the bubbles to dissipate before or while bringing the flask and its contents to 23 ± 0,1 °C by immersion in the water bath (4.4).

NOTE — To accelerate the release of bubbles, especially any adjacent to the walls of the flask, disturb or detach them using a fine wire inserted through the neck of the flask.

5.2 Measurement of density

Weigh the empty pyknometer (4.1) to the nearest 0,2 mg.

Place the pyknometer in the water-bath (4.4) and fill the pyknometer with resin using the funnel (4.2).

The following points require close attention :

a) bubbles shall not be present in the resin in the pyknometer; if bubbles form, wait for them to disappear, if necessary rubbing the walls of the pyknometer with a fine metal wire, or, better still, empty the pyknometer, clean it and refill;

b) fill the pyknometer exactly to the graduation mark;

c) remove the funnel without letting its stem touch the neck of the pyknometer.

Wait at least 30 min and check that the level in the pyknometer remains at the graduation mark. If necessary, add a few more drops of resin or remove excess resin by means of fine filter paper (4.5), which may be wound around a glass rod.

Weigh the filled pyknometer to the nearest 0,2 mg.

6 Expression of results

The density at 23 °C, ϱ_{23}, expressed in grams per millilitre, is given by the equation

$$\varrho_{23} = \frac{m_1 - m_0}{V} + \varrho_a$$

where

m_1 is the apparent mass, in grams, of the filled pyknometer at 23 °C;

m_0 is the apparent mass, in grams, of the empty pyknometer at 23 °C;

ϱ_a is the density of air at 23 °C ≈ 0,001 2 g/ml (air buoyancy correction);

V is the volume, in millilitres, of the pyknometer at 23 °C.

Give the result to three places of decimals.

NOTE — To check or determine the volume of the pyknometer at 23 °C using distilled water, use the equation

$$V = \frac{m_2 - m_0}{\varrho_e - \varrho_a} = \frac{m_2 - m_0}{0{,}996\,4}$$

where

m_2 is the apparent mass, in grams, of the pyknometer filled with distilled water at 23 °C;

ϱ_e is the density of distilled water at 23 °C = 0,997 6 g/ml.

7 Test report

The test report shall contain the following information :

a) a reference to this International Standard;

b) complete identification of the material tested;

c) the density at 23 °C, ϱ_{23}, expressed in grams per millilitre;

d) details of procedure not specified in this International Standard and any incidents likely to have influenced the results.