
INTERNATIONAL STANDARD



1675

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

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

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[ISO 1675:1975](https://standards.iteh.ai/catalog/standards/sist/b5ce0ec6-e823-4b73-b1eb-5ea3123c5d96/iso-1675-1975)

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Descriptors : plastics, polymers, density (mass/volume), measurement, pycnometric analysis.

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 1675 and found it technically suitable for transformation. International Standard ISO 1675 therefore replaces ISO Recommendation R 1675-1970 to which it is technically identical.

<https://standards.iteh.ai/catalog/standards/sist/b5ce0ec6-e823-4b73-b1eb-15a123166795>

ISO Recommendation R 1675 was approved by the Member Bodies of the following countries :

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

No Member Body expressed disapproval of the Recommendation.

The Member Body of the following country disapproved the transformation of ISO/R 1675 into an International Standard :

Canada

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.¹⁾

2 DEFINITION

density of a material : The mass of unit volume of the material.

It is expressed in grams per millilitre (g/ml).

3 PRINCIPLE

Determination of the mass at 20 °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 holding a volume of V ml, its neck having an internal diameter of d mm, the height of the neck above the graduation mark not exceeding 50 mm.

The graduated volume of the pyknometer at $20 \pm 0,1$ °C, measured by weighing the mass of water contained in the pyknometer at this temperature, must be known to within 1 part in 10 000 (see note in clause 6).

The pyknometers normally used have the following characteristics :

V	d
$100 \pm 0,1$ ml	13 ± 1 mm
$50 \pm 0,05$ ml	11 ± 1 mm

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 within 0,2 mg.

4.4 Water bath controlled at a temperature of $20 \pm 0,1$ °C.

4.5 Fine filter paper.

4.6 Conical flask, with wide neck (Erlenmeyer), stoppered, capacity 200 to 600 ml.

5 PROCEDURE

5.1 Preparation of resin

Before being poured into the pyknometer, the resin must be brought to the test temperature and be free of bubbles.

The resin will normally be already free of bubbles, but if this is not the case, bubbles can be removed by allowing the resin to stand in the stoppered conical flask (4.6) and, if necessary, by detaching bubbles on the walls of the vessel by rubbing with a fine metal wire. In general, not more than a few hours will be required.

Finally, bring the entire mass of resin to the temperature of $20 \pm 0,1$ °C, checked with a thermometer. To do this, immerse the conical flask (4.6) containing 150 to 500 ml of resin in the water bath (4.4) for a sufficient time.

5.2 Measurement of density

Weigh the empty pyknometer (4.1) to within 1 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 :

- bubbles must 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;
- fill the pyknometer exactly to the graduation mark;
- remove the funnel without letting its stem touch the neck of the pyknometer.

1) For reference, see also ISO/R 758, *Method for the determination of density of liquids at 20 °C*.

Wait at least half an hour 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, which may be wound round a glass rod.

Weigh the filled pyknometer to within 1 mg.

6 EXPRESSION OF RESULTS

Calculate the density ρ_{20} in grams per millilitre at 20 °C by the formula

$$\rho_{20} = \frac{m_1 - m_0}{V} + \rho_a$$

where

m_1 is the apparent mass, in grams, of the filled pyknometer at 20 °C;

m_0 is the apparent mass, in grams, of the empty pyknometer at 20 °C;

ρ_a is the density of air $\approx 0,001\ 2$ g/ml (air buoyancy correction);

V is the volume, in millilitres, of the pyknometer at 20 °C.

Give the result to the third decimal place.

NOTE – To check or determine the volume of the pyknometer at 20 °C using distilled water, apply the formula

$$V = \frac{m_2 - m_0}{\rho_e - \rho_a} = \frac{m_2 - m_0}{0,9970}$$

where

m_2 is the apparent mass, in grams, of the pyknometer filled with water at 20 °C;

ρ_e is the density of water at 20 °C = 0,998 2 g/ml.

7 TEST REPORT

The test report shall include the following particulars :

- a) reference to this International Standard;
- b) the density ρ_{20} in grams per millilitre at 20 °C.

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