International Standard

ISO 697

Surface active agents — Washing powders — Determination of apparent density — Method by measuring the mass of a given volume

Agents de surface — Poudres à laver — Détermination de la masse volumique apparente — Méthode par pesée d'un volume donné

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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 697 was developed by Technical Committee ISO/TC 91, *Surface active agents*, and was circulated to the member bodies in March 1980.

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

Australia	Hungary	Romania
Austria	India	South Africa, Rep. of
Belgium	Italy	Spain
China	Japan	Switzerland
Egypt, Arab Rep. of	Korea, Rep. of	USSR
France	Netherlands	
Germany, F. R.	Poland	

No member body expressed disapproval of the document.

This International Standard has also been approved by the International Union of Pure and Applied Chemistry (IUPAC).

This second edition cancels and replaces the first edition (i.e. ISO 697-1975).

Surface active agents — Washing powders — Determination of apparent density — Method by measuring the mass of a given volume

0 Introduction

The apparent density of a powder can be evaluated either by measuring the mass which occupies a given volume, or by measuring the volume occupied by a given mass. In both cases, the procedure involves transfer of the powder from its original container to that used for the measurement. Owing to the friability of the product, to its flow or caking properties, to the varying geometry of particles of which it is composed, and to the unavoidable compaction resulting from pouring into the container for measurement, the apparent density determined will generally differ from that of the product in its original container or package.

The result of the determination, therefore, gives only a conventional value related to the method used.

1 Scope

This International Standard specifies a method for the determination of the apparent density of washing powders by measuring the mass of a given volume.

2 Field of application

The method is applicable to free flowing powders and, provided that an appropriate funnel is used, to powders which have a tendency to cake.

The method is suitable for other substances in the form of powder or granules.

In the case of powder containing lumps, the method is applicable only if these can be disintegrated readily without breaking down the particles of the powder.

3 References

ISO 607, *Surface active agents and detergents — Methods of sample division.*

ISO 3424, *Sodium perborates for industrial use — Determination of bulk density.*

4 Definition[1]

apparent density : The mass, in grams, of powder which occupies a volume of one millilitre under standardized conditions.

5 Principle

Determination of the mass of powder in a receiver of known dimensions, after filling with the sample from a funnel of specified shape under specified conditions.

6 Apparatus

6.1 Funnel, made of stainless steel, plastics, wood or other suitable material.

All surfaces in contact with the flowing powder shall be smooth and polished and shall not permit a build up of an electrostatic charge by the flow of the powder.

The internal diameter of the orifice shall be 40 mm for use with free flowing powders and 60 mm for use with powders showing a tendency to cake.

6.2 Receiver, of capacity 500 ml, constructed of materials similar to those of the funnel.

The receiver shall be calibrated as described in 8.1 and the volume may, for convenience, be adjusted to 500 ± 0,5 ml by machining the rim.

6.3 Stand, capable of holding the funnel and the receiver in fixed positions relative to each other. The funnel shall be held by locating pins passing through holes in the flange of the funnel and the top plate of the stand. The receiver shall be located centrally beneath the funnel by locating studs or other suitable means.

The stand may incorporate, if desired, a mechanism for mechanical operation of the closure plate.

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1) The gram per millilitre (g/ml) is the unit of density of the CGS system. The unit of density of the International System of Units (SI) is the kilogram per cubic metre (kg/m³) : $1 \text{ kg/m}^3 = 10^{-3} \text{ g/ml}$.

6.4 Closure plate, 110 mm × 70 mm.

This apparatus (see the figure) is identical with that described in ISO 3424, except for the 60 mm orifice funnel the other dimensions of which are : superior diameter 112 mm and height 100 mm.

6.5 Straightedge, of length approximately 150 mm.

6.6 Glass plate, 100 mm × 100 mm × 7 mm.

7 Sampling

The laboratory sample of washing powder shall be prepared and stored in accordance with ISO 607.

8 Procedure

8.1 Calibration of the receiver

Calibrate the receiver (6.1) by establishing its volume in the following manner.

Weigh, to the nearest 0,1 g, the clean, empty receiver and place it on a horizontal surface. Fill it with recently boiled distilled water at 20 °C, and remove any bubbles, which collect during the filling, by gently tapping the walls. Place the weighed glass plate (6.6) horizontally against the edge of the upper rim of the receiver. Gently slide the plate across the water surface and, when it is nearly across, add 1 to 2 ml of distilled water to the receiver and completely cover the receiver with the plate. Dry the exposed underside of the plate and the sides of the receiver with filter paper and weigh to the nearest 0,1 g.

The volume, in millilitres, of the receiver is given by the formula

$$m_2 - (m_0 + m_1)$$

where

m_0 is the mass, in grams, of the empty receiver;

m_1 is the mass, in grams, of the glass plate;

m_2 is the mass, in grams, of the receiver full of water with the glass plate in position.

8.2 Preparation of test sample

Break down any lumps present in the laboratory sample by shaking and rotating the container.

Take care to avoid breaking down the particles of powder.

Render the laboratory sample homogeneous and reduce it by means of a conical divider as described in ISO 607.

8.3 Determination

Place the funnel (6.1) on the stand (6.3). Place the tared receiver (6.2) in position.

Cover the bottom opening of the funnel by means of the closure plate (6.4), holding the plate lightly against the funnel.

Fill the funnel with the sample up to its top rim, then quickly remove the closure plate, thus allowing the contents of the funnel to run into, and overflow from, the receiver.

Remove the receiver and place it on a level surface. Carefully level the powder surface by means of the straightedge (6.5) and clean the outside wall with a dry cloth. Weigh the receiver and its contents to the nearest 0,1 g.

Carry out at least two determinations on different portions of the laboratory sample.

9 Expression of results

9.1 Method of calculation

The apparent density of the powder, in grams per millilitre, is given by the formula

$$\frac{m_3 - m_0}{V}$$

where

m_0 is the mass, in grams, of the empty receiver;

m_3 is the mass, in grams, of the receiver and its contents;

V is the volume, in millilitres, of the receiver.

Take, as the result, the arithmetic mean of the two determinations provided that the requirement for repeatability (see 9.2) is satisfied.

If it is not, repeat the determination.

Express the result to three significant figures as follows :

"Apparent density . . . g/ml".

9.2 Repeatability

The difference between the results of the two determinations, carried out in rapid succession by the same analyst, shall not exceed 5 % of the mean value.

10 Test report

The test report shall include the following particulars :

a) all details required for complete identification of the sample;

b) whether or not lumps were present in the laboratory sample;

c) the reference of the method used;

d) type of funnel used (orifice 40 or 60 mm);

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e) the results and the method of expression used;

f) any unusual features noted during the determination;

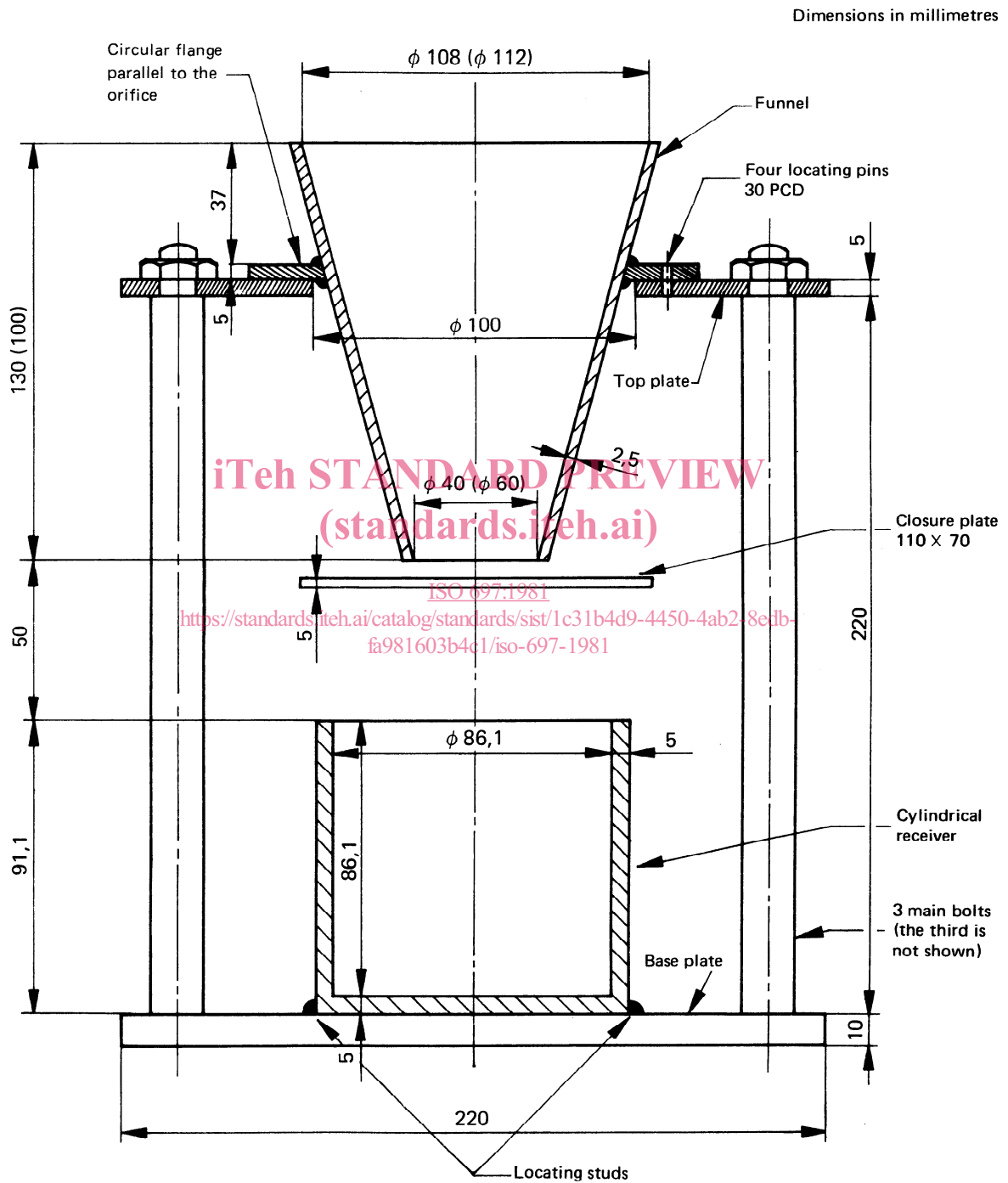g) any operations not included in this International Standard, or regarded as optional.

Dimensions in millimetres

Figure — Apparatus for determination of apparent density of powders or granules