INTERNATIONAL STANDARD 1624

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

Plastics — Vinyl chloride homopolymer and copolymer resins — Sieve analysis in water

Plastiques — Résines d'homopolymères et de copolymères de chlorure de vinyle — Analyse granulométrique par tamisage sous courant d'eau

First edition — 1978-09-01

UDC 678.743-13 : 621.928

Ref. No. ISO 1624-1978 (E)

Descriptors : plastics, homopolymers, copolymers, vinyl chloride, grain size analysis, sieve analysis.

Price based on 4 pages

FOREWORD

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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 1624 was developed by Technical Committee ISO/TC 61, *Plastics*.

It was submitted directly to the ISO Council, in accordance with clause 6.13.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 1624-1970, which had been approved by the member bodies of the following countries :

Austria
Belgium
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Egypt, Arab Rep. of
Hungary
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Iran
Israel
Italy
Japan
Netherlands
Poland
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Romania
South Africa, Rep. of
Spain
Sweden
Switzerland
Turkey
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The member bodies of the following countries had expressed disapproval of the document on technical grounds :

France
Germany

Printed in Switzerland

Plastics — Vinyl chloride homopolymer and copolymer resins — Sieve analysis in water

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of particle size of vinyl chloride homopolymer and copolymer resins by sieve analysis in water.

2 PRINCIPLE

Sieving under a stream of water, using standard aperture sieves[1].

3 REAGENT

Wetting agent, for example 5 to 10 % solution of sodium alkylsulphonate.

4 APPARATUS

4.1 Series of two sieves, diameter 200 to 300 mm, height 30 to 50 mm, having mesh sizes[2] 0,063 and 0,250 mm, and fitted with deflectors to prevent loss by spray of sample. (See the figure.)

4.2 Balance, accurate to ± 0,1 g, range and size sufficient to accommodate the sieves and the filtered resin. [See 5.1 b).]

4.3 Oven, capable of being controlled at 80 ± 2 °C.

4.4 Filter, placed between the supply tap and the apparatus, and intended to exclude impurities in the water supply.

4.5 Sprinkling device, for one or, better, several sieves, designed so that

— the mesh and inside walls of the sieve are thoroughly sprinkled over their entire surface;

— the resin is agitated by the jets, for example by using jet apertures inclined to the screen of the sieve;

— the inclination of the jets is such as to prevent track formation in the resin, for example by crossing of jet directions;

— the sprayed water immediately goes through the screen and no bulk accumulation of water occurs on it during the sieving of resins.

The screening water should finally pass into a dark coloured vessel to check for the absence of resin particles in the water.

The figure shows a schematic apparatus including a rotating sprinkling device for several sieves, and is given as an example meeting the requirements of this International Standard.

4.6 Filter funnel or **filter crucible** with adaptor, 40 mm diameter and pore size 20 to 40 µm mean diameter.

5 PROCEDURE

5.1 Preliminary remark

This International Standard permits several variations, namely :

a) It is possible either

— to conduct a single test using two superimposed screens, provided that a sprinkler device is fitted to each sieve (see the figure) (recommended method), or

— to carry out two tests on two separate test portions, using a different sieve each time.

b) It is possible to dry the residue either

— in a filter funnel or in a filter crucible (recommended method), or

— directly on the sieve. *This method requires the sieves to be resistant to repeated heating and cooling* (for example, they should be constructed from stainless steel).

1) Sieving under a stream of water gives truer results than a dry sieving method in which static electricity interfers. This method is particularly suited to emulsion resins.

2) Other mesh sizes may be used provided that

— the prescribed sieves are also used;

— new sieves are chosen from the series provided in ISO 565.

5.2 Screening

If, at the end of the operation, it is desired to weigh the resin on the sieve, weigh the sieves to the nearest 0,1 g after drying them in the oven (4.3), at 80 ± 2 °C, for 1 h and cooling in a desiccator.

Place the sieve or sieves below the sprinkling device and arrange a container with perforated bottom beneath them to take the water away to a sink. If several superimposed sieves are used, they should be arranged from top to bottom according to decreasing mesh size.

Weigh, to the nearest 0,1 g, approximately 25 g (mass M) of the resin into a 400 ml beaker. Add wetting agent solution (see clause 3)[1] followed by two portions each of approximately 50 ml of water, with careful mixing after each addition.

Set the sprinkler system in operation, take care that the meshes are well moistened; introduce the prepared suspension, in one or several runs, into the upper sieve, and carefully rinse the beaker several times, the washings being poured each time into the upper sieve.

Apply the fastest rate of water consistent with avoiding overflowing or splashing.

Complete the sieving by hand spraying until the drain-off liquid, received in a dark enamelled basin, is found free from particles.

Lift each sieve and, by water jets, transfer the few particles that might have remained adhering to its underside, to the next lower sieve.

5.3 Drying and weighing

5.3.1 *Drying on a filter bed*

Wash the filter funnel or filter crucible, dry at 80 ± 2 °C, and weigh to the nearest 0,1 g.

Transfer the residue on each sieve quantitatively, using water jets, to this funnel or crucible fitted on a vacuum filtering flask.

Dry the funnel or crucible (with the residue from one sieve) at 80 ± 2 °C in the oven (4.3) to constant mass. Weigh to the nearest 0,1 g after cooling in a desiccator.

Calculate the mass of residue by subtracting the mass of the funnel or crucible from the mass of the funnel or crucible plus residue.

5.3.2 *Drying on the sieve*

Place each sieve, with corresponding residue, in the oven (4.3), controlled at 80 ± 2 °C, and dry to constant mass. Weigh to the nearest 0,1 g after cooling in a desiccator.

Calculate the mass of residue by subtracting the mass of the sieve determined as described in 5.2 from the mass of the sieve plus residue.

5.4 Number of determinations

Each determination shall be carried out in duplicate. Do not take the results into consideration unless the following conditions are fulfilled :

a) **Residue (calculated as indicated in clause 6) not less than 5 %**

The two measurements are acceptable if their difference, in absolute value, is less than or equal to 2 %.

b) **Residue (calculated as indicated in clause 6) less than 5 %**

The two measurements are acceptable if their difference, in absolute value, is less than or equal to 1 %.

If these conditions are not fulfilled, further duplicate determinations shall be carried out.

6 CALCULATION AND EXPRESSION OF RESULTS

6.1 If two superimposed sieves are used :

Let

m_1 and m_1' be the masses, in grams, of residue on the sieve with 0,250 mm mesh;

m_2 and m_2' be the masses, in grams, of residue on the sieve with 0,063 mm mesh.

Calculate $M_1 = m_1$ and $M_1' = m_1'$

then $M_2 = m_1 + m_2$ and $M_2' = m_1' + m_2'$

Calculate the arithmetic means $\overline{M}_1$ and $\overline{M}_2$ of these values and round them off according to the usual rules.

6.2 If the procedure of using each of two sieves on separate runs is followed, direct measurement is made of

M_1 and M_1', and of M_2 and M_2', from which $\overline{M}_1$ and $\overline{M}_2$ are obtained directly.

1) IMPORTANT NOTE — The suitable quantity of wetting agent solution depends on the type of resin to be tested. For some resins composed of very fine particles, it may be necessary to add this solution only progressively, mixing it with a glass rod to obtain a paste, which is then diluted gradually before pouring it on the upper sieve, where the resin should no longer form lumps or agglomerates.

6.3 Using the values $\overline{M}_1$ and $\overline{M}_2$ of the means of the residue considered, calculate the percentages of residue from the following formulae :

$$\text{Residue on 0,250 mm sieve (R 250)} = \frac{\overline{M}_1}{\overline{M}} \times 100$$

$$\text{Residue on 0,063 mm sieve (R 63)} = \frac{\overline{M}_2}{\overline{M}} \times 100$$

where $\overline{M}$ is the average mass, in grams, either

— of the two test portions in the case where two sieves are used superimposed in the same test run,

— or of the two test portions (used for each sieve) where the two sieves are used on separate test runs.

6.4 Express the results by giving the values R 250 and R 63 as follows :

a) **For residues greater than or equal to 5 %**

The result, as a percentage, is corrected to the nearest whole number, i.e. without decimal.

NOTE — Experience has shown that results obtained in this way by different laboratories are reproducible within ± 1 %.

b) **For residues less than 5 %**

The result, as a percentage, is corrected to the first decimal place.

NOTE — Experience has shown that results obtained in this way by different laboratories are reproducible within ± 0,5 %.

7 TEST REPORT

The test report shall include the following particulars :

a) reference to this International Standard;

b) full identification of the sample;

c) the individual values and arithmetic mean of the percentage of residue on each sieve.

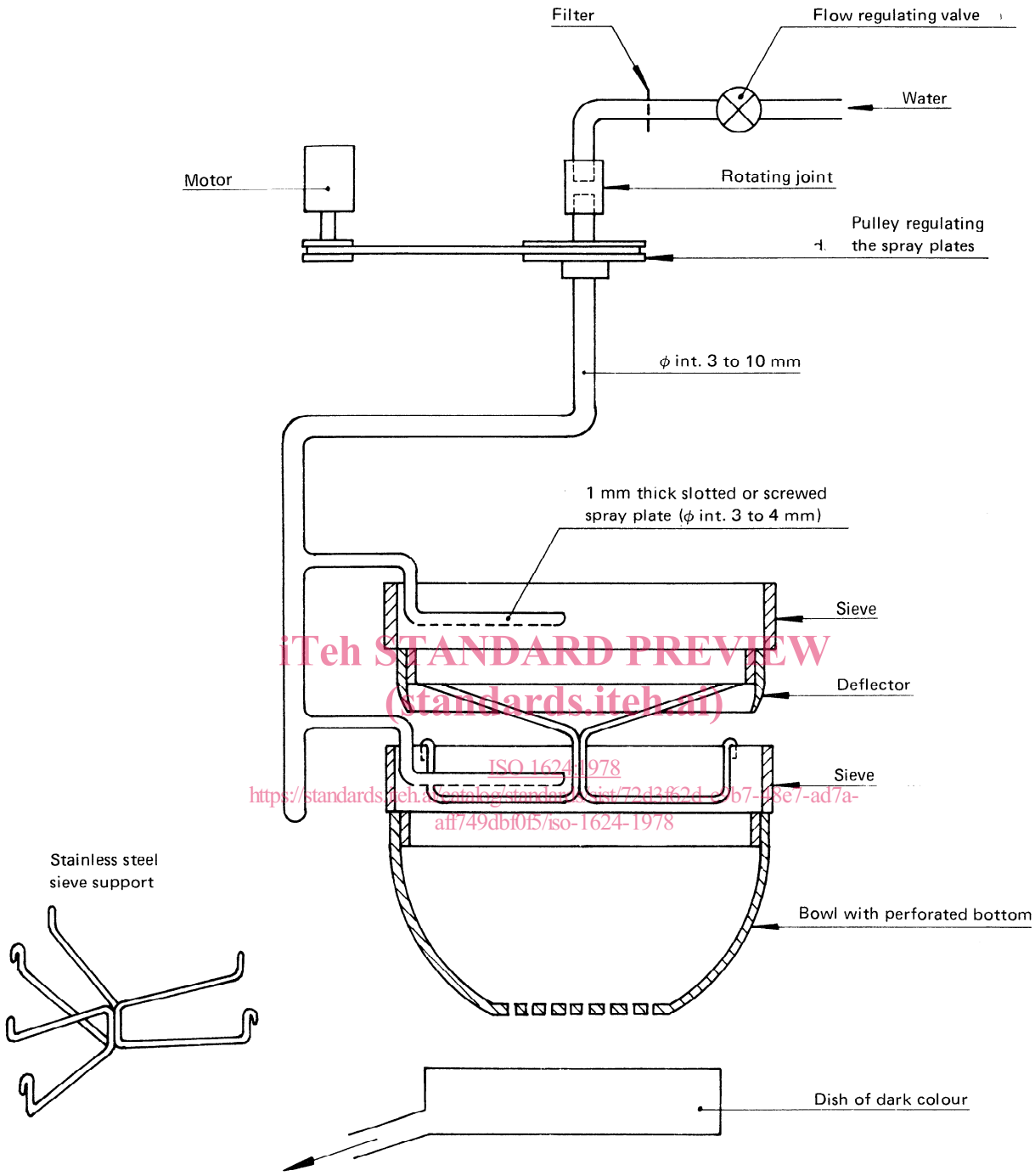

FIGURE – **Sketch of multiple sieve spraying device**

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