INTERNATIONAL STANDARD 4490

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Metallic powders — Determination of flowability by means of a calibrated funnel (Hall flowmeter)

Poudres métalliques — Détermination de l'aptitude à l'écoulement au moyen d'un entonnoir calibré (appareil de Hall)

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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.

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

Australia	Germany	Spain
Austria	Italy	Sweden
Bulgaria	Korea, Rep. of	United Kingdom
Canada	Mexico	U.S.A.
Chile	Poland	U.S.S.R.
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No member body expressed disapproval of the document.

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Metallic powders — Determination of flowability by means of a calibrated funnel (Hall flowmeter)

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for determining the flowability of metallic powders, including powders for hardmetals, by means of a calibrated funnel (Hall flowmeter).

The method is applicable only to powders which flow freely through the specified test orifice.

2 PRINCIPLE

Measurement of the time required for 50 g of a metallic powder to flow through the orifice of a calibrated funnel of standardized dimensions.

3 APPARATUS[1)]

3.1 Calibrated funnel (see clause 4), having the dimensions shown in figure 1.

The funnel shall be made of a non-magnetic, corrosion-resistant metallic material having sufficient wall thickness and hardness to withstand distortion and excessive wear.

3.2 Stand and horizontal vibration-free base to support the funnel rigidly, for example as indicated in figure 2.

3.3 Balance of sufficient capacity, capable of weighing the test portion to an accuracy of ± 0,05 g.

3.4 Stopwatch, capable of measuring elapsed time to an accuracy of ± 0,2 s.

4 CALIBRATION OF THE FUNNEL[1)]

4.1 Reference sample

A sample from an international standard power of − 106 µm Turkish emery shall be used for calibration of the funnel. This powder should be prepared by drying in air at 110 °C for 30 min and cooling in a desiccator. When tested according to this International Standard in the standard funnel, this material gives a flow time of 40,0 s per 50 g.

4.2 Calibration by the manufacturer of the funnel

The flow time of the reference sample shall be determined using exactly the method described in this International Standard. The arithmetic mean value of the results of five determinations shall be stamped on the funnel. This number shall be within 40 ± 0,5 s and the extremes of the results of five determinations shall not differ by more than 0,4 s. The correction factor of the funnel is 40,0 divided by the numerical value stamped on the funnel.

4.3 Calibration by the user of the funnel

The flowability of the reference sample shall be determined by the above method. If the flow time has changed from that stamped on the funnel, the new correction factor will be 40,0 divided by this new value which is recorded.

NOTES

1 It is recommended that the correction factor be periodically verified by the user.

2 It is recommended that before a new correction factor is adopted the cause of the change be investigated. If the flow time has decreased it is probable that repeated use has burnished the orifice and a new correction factor is justified. An increase in flow time may indicate a coating of soft powder on the orifice. This coating should be carefully removed and the calibration test repeated.

3 It is recommended that the use of a funnel be discontinued after the flow time of the reference sample has decreased to less than 37 s.

5 SAMPLING

5.1 The mass of the test sample shall be at least 200 g.

5.2 In general, the powder shall be tested in the as-received condition. In certain cases, and after agreement between supplier and user, the powder may be dried. However, if the powder is susceptible to oxidation, the drying shall take place in vacuum or in inert gas. If the powder contains volatile substances, it shall not be dried.

5.3 Immediately before the test, weigh out a 50 ± 0,1 g test portion.

5.4 The determination shall be carried out on three test portions.

1) Apparatus complying with 3.1 and 3.2, and standard Turkish emery grit can be purchased from Alcan Metal Powder Inc., Box 290, Elisabeth N. J. 07207, U.S.A. Standard Turkish emery grit can also be purchased from Jernkontoret, Box 1721, S-111 87 Stockholm, Sweden.

6 PROCEDURE

Transfer the test portion to the funnel, keeping the discharge orifice closed by a dry finger. Take care that the stem of the funnel is filled with powder. Start the stopwatch when the orifice is opened and stop it at the instant the last of the powder leaves the orifice. Record the elapsed time measured to the nearest 0,2 s.

NOTE — If the powder does not begin to flow when the orifice is opened, one slight tap on the funnel to start flow is permitted. If this has no effect, or if the flow stops during the test, the powder is considered to possess no flowability according to the test method described in this International Standard.

7 EXPRESSION OF RESULTS

Multiply the arithmetic mean of the results of the three determinations by the correction factor of the funnel (see clause 4) and report in seconds per 50 g, rounded to the nearest 0,5 s.

8 TEST REPORT

The test report shall include the following information :

a) reference to this International Standard;

b) all details for identification of the test sample;

c) the result obtained;

d) all operations not specified by this International Standard, or regarded as optional (for example, the drying procedure applied, and whether flow has been induced by tapping the funnel);

e) details of any occurrence which may have affected the result.

Dimensions in millimetres

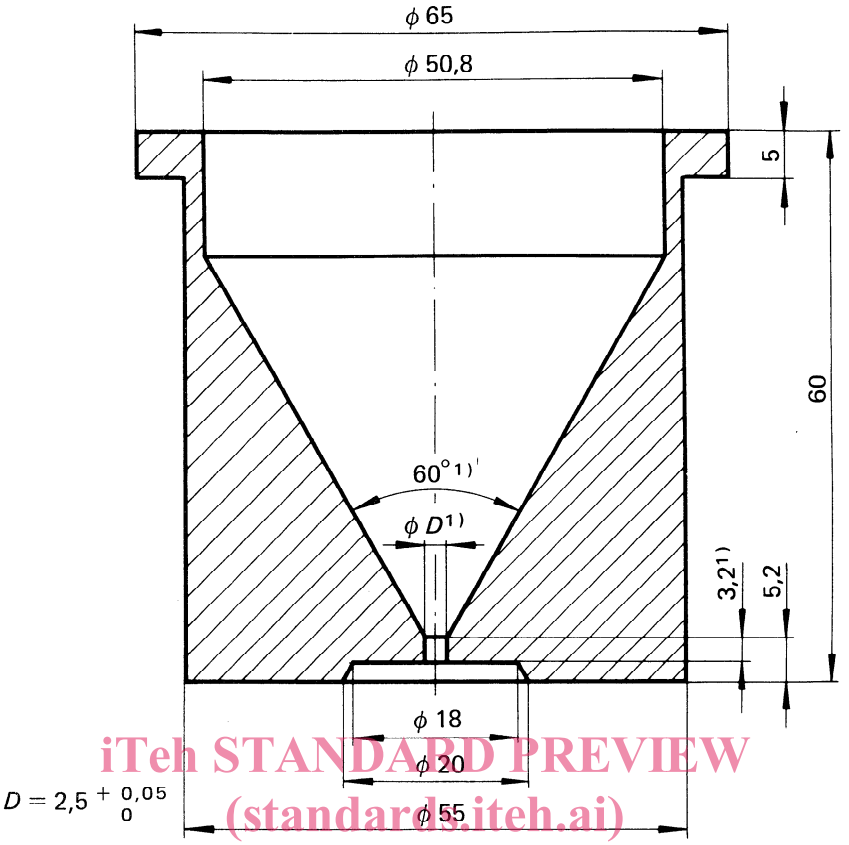

FIGURE 1 — **Calibrated funnel** (Hall flowmeter)

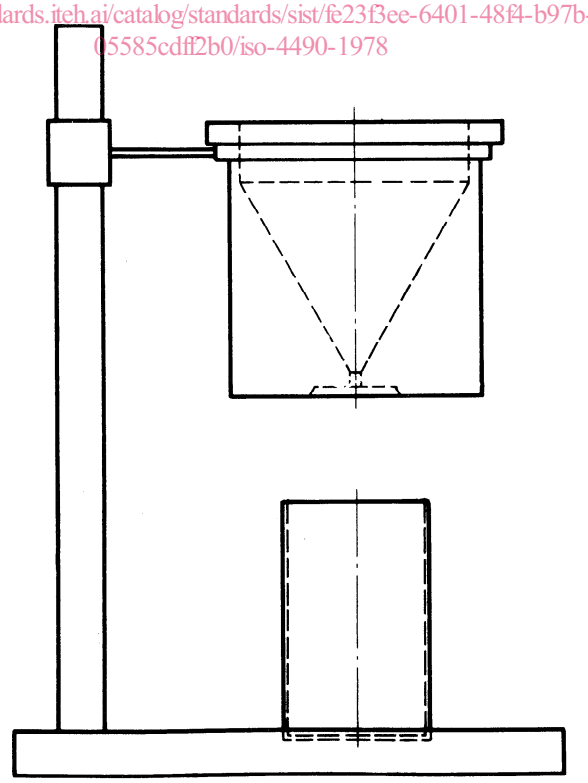

FIGURE 2 — **Arrangement of calibrated funnel and stand**

1) These values are mandatory.

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