
INTERNATIONAL STANDARD



3923

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

Metallic powders — Determination of apparent density by the cup and funnel method

Poudres métalliques — Détermination de la masse volumique apparente par la méthode de l'entonnoir

First edition — 1977-01-15

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UDC 621.762 : 531.754.1

Ref. No. ISO 3923-1977 (E)

Descriptors : powder metallurgy, metal powder, physical tests, density measurement, bulk density.

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 3923 was developed by Technical Committee ISO/TC 119, *Powder metallurgical materials and products*, and was circulated to the member bodies in September 1975.

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

Australia	Germany	Spain
Brazil	Italy	Sweden
Bulgaria	Japan	Turkey
Canada	Mexico	United Kingdom
Czechoslovakia	Poland	U.S.A.
Egypt, Arab Rep. of	Portugal	U.S.S.R.
France	Romania	Yugoslavia

No member body expressed disapproval of the document.

Metallic powders – Determination of apparent density by the cup and funnel method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of determining the apparent density of metallic powders under standardized conditions.

The method is intended for metallic powders that flow freely through a 2,5 mm diameter orifice. It may, however, be used for powders that flow with difficulty through a 2,5 mm diameter orifice but flow freely through a 5 mm diameter orifice.

2 PRINCIPLE

Measurement of the mass of a certain quantity of powder, which in a loose condition exactly fills a cup of known volume.

The loose condition is obtained by using, when filling the cup, a funnel placed at a determined distance above the cup.

The ratio between the mass and the volume represents the apparent density.

3 SYMBOLS AND DESIGNATIONS

Symbol	Designation	Unit
ρ_a	Apparent density	g/cm ³
m	Mass of the powder	g
V	Volume of the cup	cm ³

4 APPARATUS

4.1 Funnels, one having an orifice of $25^{+0,2}_0$ mm and the other an orifice of $5^{+0,2}_0$ mm; see figure 1.

4.2 Cylindrical cup, having a capacity of $25 \pm 0,05$ cm³ and an internal diameter of 30 ± 1 mm.

NOTE – The cup and funnel should be made of a non-magnetic material having sufficient wall thickness and hardness to avoid distortion and excessive wear.

4.3 Balance, of sufficient capacity, capable of weighing the test sample to an accuracy of $\pm 0,05$ g.

4.4 Stand and horizontal vibration-free base, to support the cup and funnel, the stand holding the orifice of the funnel 25 mm above the top surface of the cup and coaxially with it; see figure 2.

5 SAMPLING

5.1 The test sample shall be of at least 150 cm³ volume.

5.2 In general the powder should be tested in the as-received condition. In certain instances 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.

6 PROCEDURE

6.1 Pour the powder carefully through the 2,5 mm orifice funnel into the cup until this is completely filled and powder flows over. Level the powder in one operation with a non-magnetic straight-edge without compressing it and take care not to jar or vibrate the cup.

6.1.1 If the powder does not flow through this funnel, use a funnel with an orifice of 5 mm.

6.1.2 If when using a 5 mm orifice the powder still does not flow, it is allowable to attempt to initiate flow by poking once with a 1 mm wire from the top of the funnel. The wire must not enter the cup.

6.2 After levelling the powder, tap the cup to settle the powder in order to avoid spilling it during transport. Make sure that there are no adhering particles on the exterior of the cup.

6.3 Determine the mass of the powder to the nearest 0,05 g. Make three determinations on the test sample.

7 EXPRESSION OF RESULTS

The apparent density is given by the formula

$$\rho_a = \frac{m}{V} = \frac{m}{25}$$

Report the arithmetical mean of the three determinations to the nearest 0,01 g/cm³.

8 TEST REPORT

The test report shall include the following information :

- a) reference to this International Standard;
- b) all details necessary for the identification of the test sample;
- c) the drying procedure, if the powder has been dried;
- d) the nominal diameter of the orifice and the use of a wire, if applied;
- e) the result obtained;
- f) all operations not specified in this International Standard, or regarded as optional;
- g) details of any occurrence which may have affected the result.

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Dimensions in millimetres

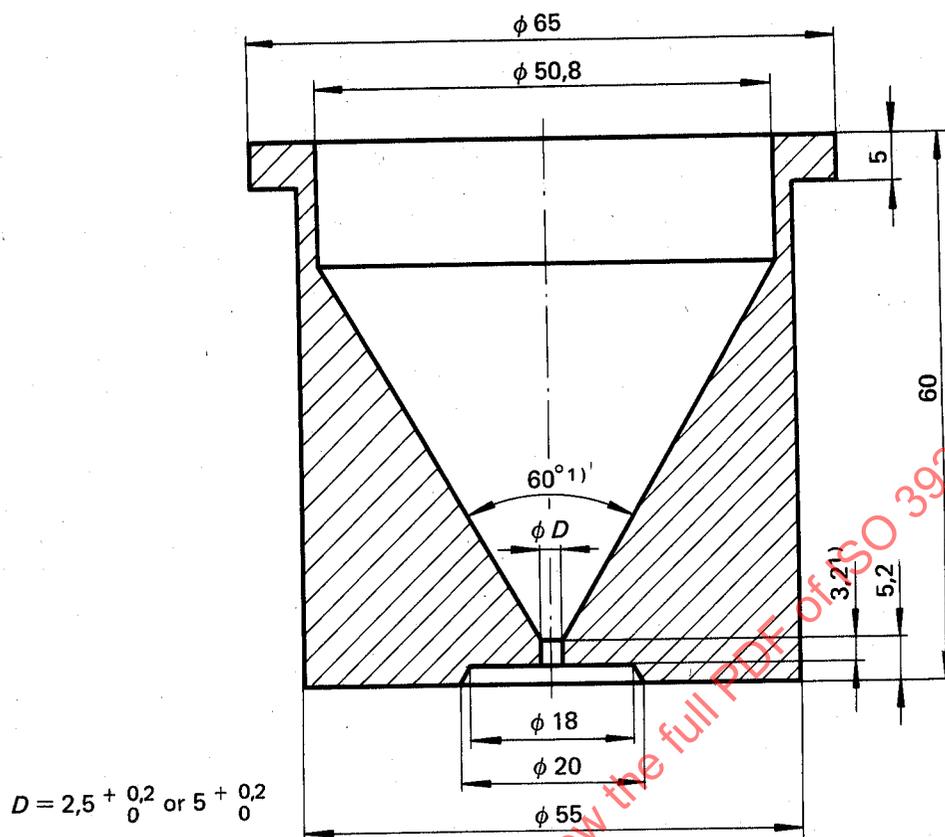


FIGURE 1

Dimensions in millimetres

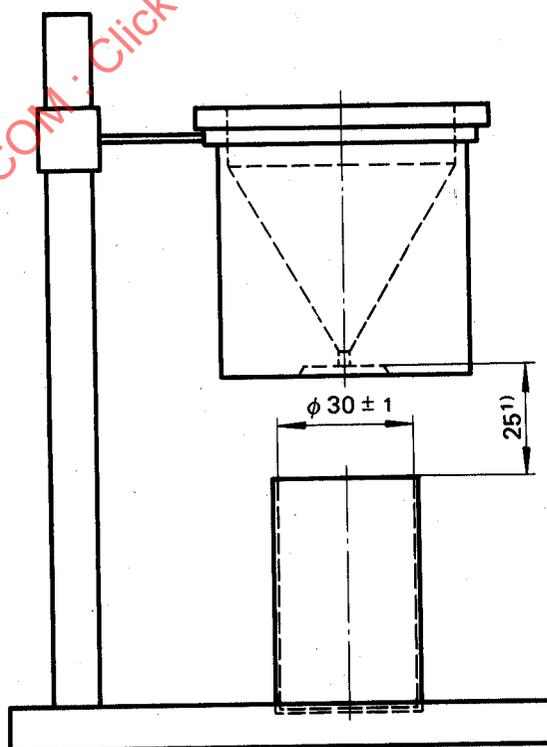


FIGURE 2

1) These values are mandatory.

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