INTERNATIONAL STANDARD ISO 4003

Permeable sintered metal materials — Determination of bubble test pore size

Matériaux en métal fritté perméable — Détermination de la dimension des pores — Méthode bulloscopique

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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 4003 was developed by Technical Committee ISO/TC 119, *Powder metallurgical materials and products,* and was circulated to the member bodies in December 1975.

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

Australia	Japan	Spain
Austria	Mexico	Sweden
Canada	Poland	United Kingdom
France	Portugal	U.S.A.
Germany	Romania	U.S.S.R.
Italy	South Africa, Rep. of	Yugoslavia

No member body expressed disapproval of the document.

Permeable sintered metal materials — Determination of bubble test pore size

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method, known as the bubble test method, for the determination of the pore size of permeable sintered powder metallurgical materials, i.e. filters, porous bearings, porous electrodes and other parts with interconnected porosity.

NOTE — The bubble test shall be considered as a quality control test and not as a test for defining filter grades or determining exact pore size and pore size distribution.

2 REFERENCE

ISO 2738, *Permeable sintered metal materials — Determination of density and open porosity.*

3 PRINCIPLE

Impregnation of a test piece with a test liquid. Immersion of the test piece in the test liquid and introduction of a gas (usually air) into the test piece at gradually increasing pressure. Determination of the pressure at which bubbles are emitted from the surface of the test piece. Evaluation of the equivalent bubble test pore size by means of a mathematical formula.

4 DEFINITION

bubble test pore size : The maximum equivalent capillary diameter in the test piece which is calculated from the measured minimum pressure required to force the first bubble of gas through the test piece (under standardized conditions) impregnated with a liquid.

The first bubble of gas will form at the pore having the greatest throat, the throat being the narrowest section of this pore.

For calculation purposes, it is assumed that this bubble forms at the end of a capillary tube of circular cross-section which is initially filled with the same liquid of known surface tension.

For a circular capillary, the diameter is related to the bubble pressure by the equation :

$$d = \frac{4\,\gamma}{\Delta p} \qquad \ldots (1)$$

where

d is the capillary diameter corresponding to the bubble test pore size, in metres;

γ is the surface tension of the test liquid, in newtons per metre;

Δp is the differential pressure, in pascals, across the test piece under static conditions, i.e.

$$\Delta p = p_g - p_l \qquad \ldots (2)$$

p_g being the gas pressure, in pascals;

p_l being the pressure in the liquid at the level of bubble formation, in pascals :

$$p_l = 9,81 \times \rho_l \times h \qquad \ldots (3)$$

where ρ_l is the density of the test liquid, in kilograms per cubic metre;

h is the height of the surface of the test liquid, in metres, above the highest throat in the test piece.