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Permeable sintered metal materials — Determination of fluid permeability

Matériaux métalliques frittés perméables — Détermination de la perméabilité aux fluides

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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This document was prepared by Technical Committee ISO/TC 119, *Powder metallurgy*, Subcommittee SC 3 *Sampling and testing methods for sintered metal materials (excluding hardmetals)*.

This third edition cancels and replaces the second edition (ISO 4022:1987), of which it constitutes a minor revision with the following changes:

ISO 4022:2018
https://standards.iteh.ai/catalog/standards/iso/64b1158c-4090-478f-a00a-f0e2fcbc7547/iso-4022-2018

— Clause 3 and Clause 4 order reversed, and Clause 3 split into 3.1 and 3.2;

— 3.1.3, 3.1.4, 3.1.5, 3.1.13 and 3.1.14 editorially revised;

— Clause 3: Terminological entries ‘length’ and ‘dynamic viscosity’ removed;

— 6.1.1 and 6.1.2, Figures 1 and 2 and keys editorially revised;

— 7.1.2, first Formula removed and Formula (2) corrected, “l” changed to “1”;

— 8.3, Formula (12) corrected, “ρ” changed to “ϱ”.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Permeable sintered metal materials — Determination of fluid permeability

1 Scope

This document specifies a method for the determination of the fluid permeability of permeable sintered metal materials in which the porosity is deliberately continuous or interconnecting, testing being carried out under such conditions that the fluid permeability can be expressed in terms of viscous and inertia permeability coefficients (see Annex A).

This document does not apply to very long hollow cylindrical test pieces of small diameter, in which the pressure drop of the fluid in passing along the bore of the cylinder might not be negligible compared with the pressure drop of the fluid passing through the wall thickness (see A.5).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2738, *Sintered metal materials, excluding hardmetals — Permeable sintered metal materials — Determination of density, oil content and open porosity*

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3 Terms, definitions, symbols and units

For the purposes of this document, the following terms and definitions apply.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms and definitions

3.1.1
permeability
ability of a porous metal to pass a fluid under the action of a pressure gradient

3.1.2
test area
area of a porous metal normal to the direction of the fluid flow

3.1.3
thickness
dimension of the test piece in the direction of fluid flow

Note 1 to entry: For flat test pieces it is equal to the thickness.

Note 2 to entry: For hollow cylinders it is given by Formulae (2) to (6).

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3.1.4
viscous permeability coefficient
volume flow rate at which a fluid of unit viscosity is transmitted through unit area of porous metal permeated under the action of unit pressure gradient when the resistance to fluid flow is due only to viscous losses

Note 1 to entry: It is independent of the quantity of porous metal considered.

3.1.5
inertia permeability coefficient
volume flow rate at which a fluid of unit density is transmitted through unit area of porous metal permeated under the action of unit pressure gradient when the resistance to fluid flow is due only to inertia losses

Note 1 to entry: It is independent of the quantity of porous metal considered.

3.1.6
volume flow rate
mass flow rate of the fluid divided by its density

3.1.7
upstream pressure
pressure upstream of the test piece

3.1.8
downstream pressure
pressure downstream of the test piece

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3.1.9
mean pressure
half the sum of the upstream and downstream pressures

3.1.10
pressure drop
difference between the pressures on the upstream and downstream surfaces of the porous test piece

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3.1.11
pressure gradient
pressure drop divided by the thickness of the porous test piece

3.1.12
velocity
ratio of the volumetric flow rate to the test area

3.1.13
density
quotient of mass divided by volume of the test fluid at the mean temperature and pressure

3.1.14
apparatus correction
pressure difference observed between the upstream and downstream pressure tappings when the test apparatus is used without a porous test piece in position

Note 1 to entry: The apparatus correction is to be subtracted from the observed pressure drop.

Note 2 to entry: It varies with the flow rate through the apparatus and arises from venturi effects at the pressure tappings and other causes.

3.1.15
mean absolute temperature
half the sum of the temperatures of the fluid at the upstream side and the downstream side of the test piece

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