



BSI Standards Publication

Indoor air

Part 22: Detection and quantification of fungal biomass by
fungal β -N-acetylhexosaminidase enzyme activity

National foreword

This British Standard is the UK implementation of ISO 16000-22:2025.

The UK participation in its preparation was entrusted to Technical Committee EH/2/5, Emissions to internal environments.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2025
Published by BSI Standards Limited 2025

ISBN 978 0 539 16699 6

ICS 13.040.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2025.

Amendments/corrigenda issued since publication

Date	Text affected



**International
Standard**

ISO 16000-22

Indoor air —

Part 22:

**Detection and quantification of
fungal biomass by fungal β -N-
acetylhexosaminidase enzyme
activity**

Air intérieur —

*Partie 22: Détection et quantification de la biomasse fongique
par caractérisation de l'activité de l'enzyme fongique β -N-acétyl-
hexosaminidase*

**First edition
2025-02**

Reference number
ISO 16000-22:2025(en)

Full document details: BS ISO 16000-22:2025

© ISO 2025  **Documents**
Document Sharing Hub



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle of enzyme-targeted fluorescent detection	2
5 Apparatus and materials	3
6 Reagents	4
7 Sampling	4
7.1 Surface sampling	4
7.2 Porous materials	4
7.2.1 High-density materials (e.g. cementitious materials, such as concrete, plaster, mortar)	4
7.2.2 Low-density materials (e.g. insulation materials such as glass wool or mineral wool)	4
7.3 Air sampling	5
8 Preparation of the fluorometer	5
9 Analysis	5
9.1 General	5
9.2 Surface samples	5
9.3 Analysis of porous materials (both high- and low-density materials)	5
9.4 Analysis of air samples	6
Annex A (informative) Reaction time and temperature correction and example data interpretation categories	7
Annex B (informative) Activated sampling — Protocol for air sampling	10
Bibliography	12

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

A list of all parts in the ISO 16000 series can be found on the ISO website.

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.

Introduction

Fungi from different taxonomic groups form filamentous cells (mycelium) and asexual spores (conidia). Most spores are in the size range of 2 µm to 10 µm, some up to 30 µm and only few up to 100 µm. Spores of some fungi genera are small and become airborne very easily (e.g. *Aspergillus*, *Penicillium*) while others are bigger and/or embedded in a slime matrix (e.g. *Stachybotrys*, *Fusarium*) and less mobile.

Fungi spores are widely distributed in the outdoor environment and, therefore, also occur in varying concentrations indoors. The growth of fungi in indoor environments, however, is considered to be a hygiene problem because epidemiological studies have revealed that dampness and/or mould growth in homes is closely related to health problems affecting the occupants.

Harmonized methods for sampling, detection and enumeration of moulds, including standards for sampling strategies, are important for the comparative assessment of indoor mould problems. Before doing any measurements, a plan for the measurement strategy (on the basis of ISO 16000-19^[14]) should be made.

This document describes the measurement of fungal material by enzymatic biochemical analysis.

It describes a rapid quantitative method to determine the total fungal material in air, on surfaces or in material samples by measuring a naturally occurring enzyme found in the chitinolytic system of all filamentous fungi (β -N-acetylhexosaminidase or NAHA (EC 3.2.1.52)).^{[1][2][3][4][5][6][7][8][9][10][11]}

It describes the analytical procedure that can be performed on-site or in a laboratory and refers to applicable sampling procedures for air, surfaces and material samples.

This method does not enumerate or differentiate genera or species of fungi such as those found in ISO 16000-17^[12], ISO 16000-18^[13] and ISO 16000-20^[15].

It is a quantitative method used to rapidly assess conditions found in indoor spaces or post-remediation.