IAQ Consulting

BSI committee EH/002/05 - Emissions to internal environments

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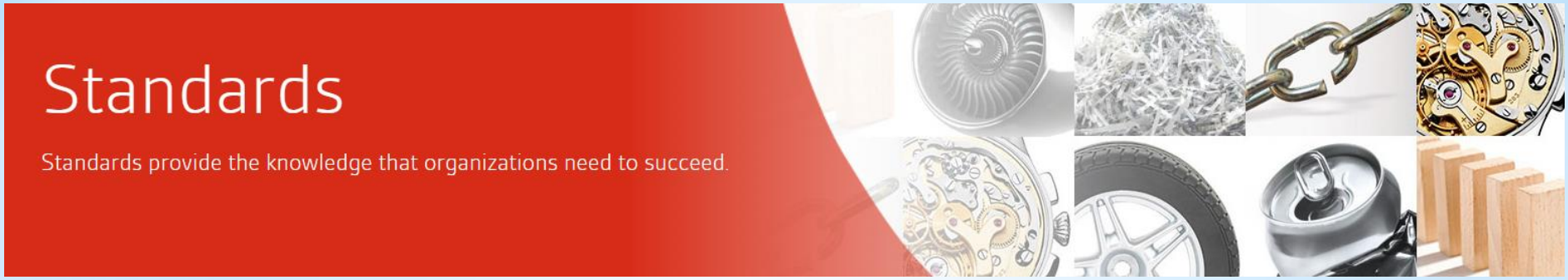
IEH Consulting
The integrated environment and health consultancy

BSI Standards



Standards are agreed ways of doing something, written down as a set of precise criteria so they can be used as rules, guidelines or definitions.

Standards are not the same thing as government regulations, but they're often used in legislation to provide the technical detail.

Standards are put together by groups of industry experts, consumers, research organizations, government departments and more, all working together.

EH2/5 - Technical Committee remit

Under the direction of committee EH/2 (Air Quality), is responsible for the preparation of British Standards in the field of air quality in *internal environments* including emissions from products and their impact on air quality.

It is also responsible for the UK input (as *mirror committee*) to *ISO*/TC 146/SC 6 (Indoor Air), *CEN*/TC 264 (Air Quality) and CEN/PC 421 (air Fresheners) and their working groups with respect to *indoor air.*

Liaison with other BS standard committees; e.g. ambient air (EH2/3), occupational air, aircraft cabins, construction product emissions, healthy buildings, e-cigarettes….

European Standards (CEN)

European Committee for Standardization

CEN's National Members are the National Standardization Bodies (NSBs) of the 27 European Union countries, United Kingdom, the Republic of North Macedonia, Serbia and Turkey plus three countries of the European Free Trade Association (Iceland, Norway and Switzerland).

The scope of CEN/TC 264 (Air Quality) consists of the standardisation of methods for air quality characterisation of emissions, ambient air, indoor air, gases in and from the ground and deposition, in particular measurement methods for air pollutants, meteorological parameters and methods for determination of the efficiency of gas cleaning systems. The scope of CEN/TC 264 also includes climate change aspects, such as determination of Green House Gas emissions.

European Standards Bioparticles

CEN/TS 16115-1:2011 Ambient air quality - Measurement of bioaerosols - Part 1: Determination of moulds using filter sampling systems and culture-based analyses
CEN/TS 16115-2:2016 Ambient air - Measurement of bioaerosols - Part 2: Planning and evaluation of plant-related plume measurements

CEN/TS 16817-1:2015 Ambient air - Monitoring the effects of genetically modified organisms (GMO) - Pollen monitoring - Part 1: Technical pollen sampling using pollen mass filter (PMF) and Sigma-2-sampler
CEN/TS 16817-2:2015 Ambient air - Monitoring the effects of genetically modified organisms (GMO) - Pollen monitoring - Part 2: Biological pollen sampling using bee colonies

EN 16413:2014 Ambient air - Biomonitoring with lichens - Assessing epiphytic lichen diversity
EN 16414:2014 Ambient air - Biomonitoring with mosses - Accumulation of atmospheric contaminants in mosses collected in situ: from the collection to the preparation of samples
(WI=00264194) Bioaerosols and biological agents – Risk assessment of source-related ambient air measurements in the scope of environmental health – Effects of bioaerosol pollution on human health

EN 17359:2020 Stationary source emissions - Bioaerosols and biological agents - Sampling of bioaerosols and collection in liquids - Impingement method
(WI=00264174) Stationary source emissions - Bioaerosols and biological agents - Sampling of bioaerosols and collection in liquids

International Standards

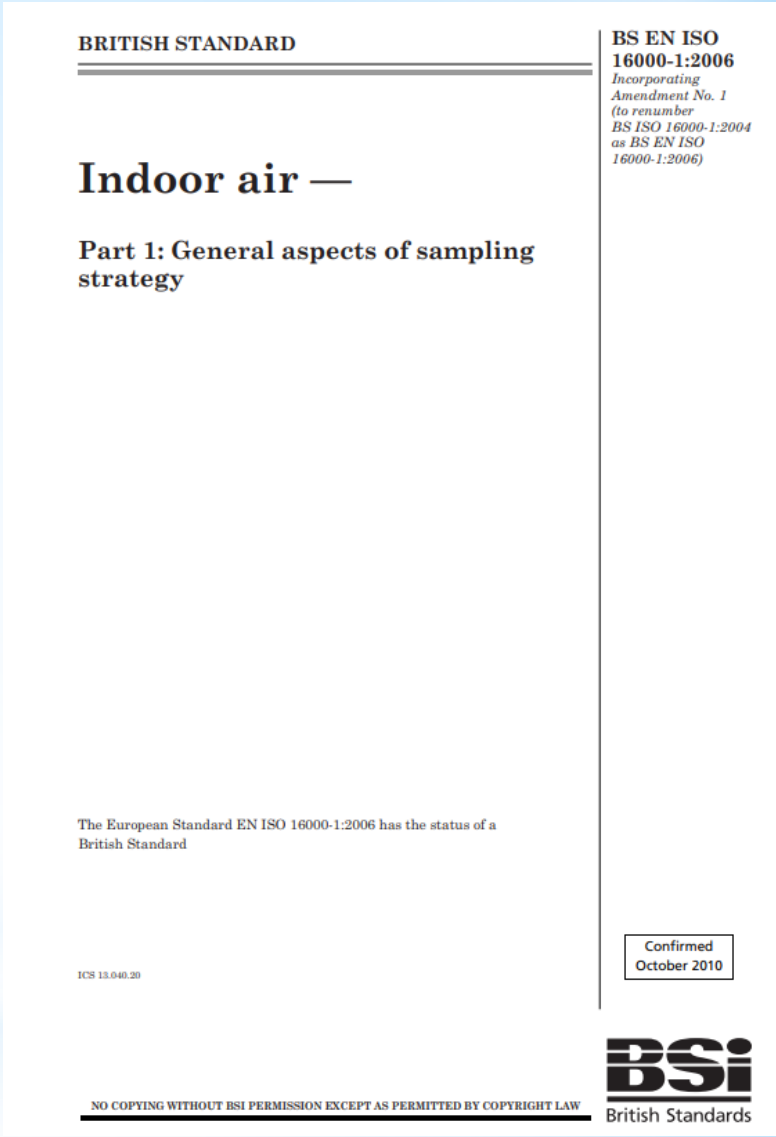
ISO is the leading multi-stakeholder, multi-sector, multi national platform for developing consensus-based international standards. The organization is a network of national standards bodies from 160 countries in all regions of the world.

ISO TC 146 (Air Quality) SC6 (Indoor Air) active working groups

REFERENCE	TITLE
ISO/TC 146/SC 6/WG 3	Determination of volatile organic compounds (VOCs) in indoor air
ISO/TC 146/SC 6/WG 10	Microbial contaminants
ISO/TC 146/SC 6/WG 13	Joint ISO/TC 146/SC 6 - ISO/TC 22 WG: Determination of volatile organic compounds in car interiors
ISO/TC 146/SC 6/WG 17	Sensory testing of indoor air
ISO/TC 146/SC 6/WG 18	Flame retardants
ISO/TC 146/SC 6/WG 20	Determination of phthalates
ISO/TC 146/SC 6/WG 21	Strategies for the measurement of airborne particles
ISO/TC 146/SC 6/WG 22	Brominated flame retardants
ISO/TC 146/SC 6/WG 24	Indoor Air Quality management system
ISO/TC 146/SC 6/WG 25	Testing air cleaners by the assessment of perceived air quality

International Standards

This part of ISO 16000 is applicable to indoor environments such as *dwellings* with living rooms, bedrooms, do-it-yourself rooms, recreation rooms and cellars, kitchens and bathrooms; workrooms or *work places* in buildings which are not subject to health and safety inspections in regard to air pollutants (for example, offices, sales premises); *public buildings* (for example hospitals, schools, kindergartens, sports halls, libraries, restaurants and bars, theatres, cinemas and other function rooms), and also *cabins of vehicles.*



BRITISH STANDARD

BS EN ISO 16000-1:2006

Incorporating Amendment No. 1 (to renumber BS ISO 16000-1:2004 as BS EN ISO 16000-1:2006)

Indoor air —

Part 1: General aspects of sampling strategy

The European Standard EN ISO 16000-1:2006 has the status of a British Standard

ICS 13.040.20

Confirmed October 2010

BSI British Standards

International Standards

ISO TC146 SC6 has published 50 standards including the following on *microbial contaminants*

ISO 16000-16:2008
Indoor air — Part 16: Detection and enumeration of moulds — Sampling by filtration

ISO 16000-17:2008
Indoor air — Part 17: Detection and enumeration of moulds — Culture-based method

ISO 16000-17:2008/COR 1:2009
Indoor air — Part 17: Detection and enumeration of moulds — Culture-based method — Technical Corrigendum 1

ISO 16000-18:2011
Indoor air — Part 18: Detection and enumeration of moulds — Sampling by impaction

ISO 16000-18:2011/COR 1:2011
Indoor air — Part 18: Detection and enumeration of moulds — Sampling by impaction — Technical Corrigendum 1

ISO 16000-19:2012
Indoor air — Part 19: Sampling strategy for moulds

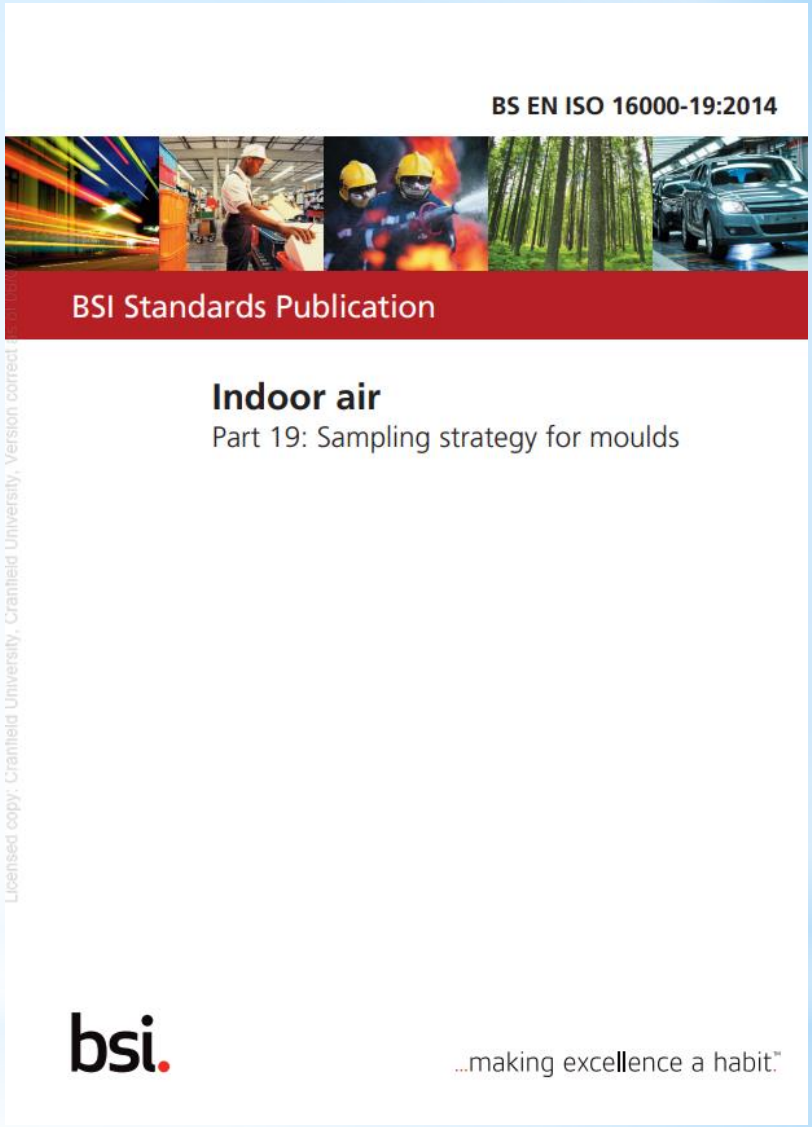
ISO 16000-20:2014
Indoor air — Part 20: Detection and enumeration of moulds — Determination of total spore count

ISO 16000-21:2013
Indoor air — Part 21: Detection and enumeration of moulds — Sampling from materials

BS EN ISO 16000-19

This part of ISO 16000 describes the measurement strategy for the detection of fungi in indoor environments.
It describes suitable sampling and analysis methods together with a description of the applicability and the interpretation of the measurement results to maximize the comparability of the measured data obtained for a given measurement objective.

Note; demonstrates linkages between BS, EN and ISO (via Vienna Agreement).



BS EN ISO 16000-19 Example guidance

Table B.2 — Sampling and analysis methods to determine culturable mould species in indoor air

Collection principle/ sampling system	Recommended sampling time	Sample volume m^3	Collection efficiency or cut-of d_{50}	Sample preparation/ analysis method	Possible range of results cfu/m^3
Filtration: GSP 3,5 with gelatin filter based on BGIA method 9420	1 h	0,2	Collection efficiency for particles > 1 µm: > 95 %	Suspension of gelatine filter in 2,5 ml and plating out of 0,1 ml aliquots[b] of the source suspension and two dilutions (1 × 10,1 × 100)	1 250 to 1 250 000[b]
	3 h	0,6			420 to 420 000[b]
Filtration: GSP 10 with gelatin filter based on BGIA method 9420	1 h	0,6			420 to 420 000[b]
	3 h	1,8			140 to 140 000[b]
Filtration: small filter unit in accordance with ISO 16000-16	1 h	3		Suspension of gelatine filter in 5 ml and plating out of 0,1 ml source suspension and two dilutions	170 to 170 000[b]
	3 h	9			55 to 55 000[b]
Round-hole impactors (flow rate: approx. 100 l/min)	1 min	0,1	Cut-off (0,9 to 1,6) µm	Cultivation on a medium loaded during sampling	100 to 1 000
	2 min	0,2			50 to 500
Round-hole impactors (flow rate: approx. 30 l/min)	approx. 1,5 min	0,05	Cut-off: (0,9 to 2) µm	Cultivation on a medium loaded during sampling	200 to 2 000
	approx. 3 min	0,1			100 to 1 000
	approx. 7 min	0,2			50 to 500
Slit impactors (flow rate approx. 100 l/min	1 min	0,1	Cut-off: 0,8 µm	Cultivation on a medium loaded during sampling	100 to 1 000
	2 min	0,2			50 to 500
Slit impactors (flow rate approx. 30 l/min)	approx. 1,5 min	0,05	Cut-off: (0,8 to 1) µm	Cultivation on a medium loaded during sampling	200 to 2 000
	approx. 3 min	0,1			100 to 1 000
	approx. 7 min	0,2			50 to 500

[a] The measuring range indicated takes into account that an identification to species is only possible on culture plates showing between 10 and 100 colonies/plate after 10 days of incubation. For a semi-quantitative evaluation (4 to 9 colonies/plate), the lower value of the evaluation range decreases by a factor of 2,5. Results outside the ranges indicated allow, at best, a qualitative or orientative statement.

[b] When using filtration methods and concentrations are expected to be low, 0.5 ml may be streaked out on a large plate or several small plates. In this way, the lower limit of the evaluation range can be lowered by a factor of 5.

ISO - SC6 proposed new work items

Indoor air -- Part 22: Detection and quantification of mould by beta- N-acetyl hexosaminidase enzyme activity;

This part of 16000 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 (-N-acetyl hexosaminidase or NAHA). It describes the analytical procedure that can be performed in on site or in a lab and refers to applicable sampling procedures for air and surfaces. This method does not enumerate or differentiate genera or species of fungi.

Indoor air -- Part 43: Standard method for assessing the reduction rate of culturable airborne fungi by air purifiers using a test chamber;

This document specifies a standard method to evaluate airborne fungi reduction capacity of air purifiers used to clean the air in living environments. The test is applicable to any air purifiers which are used in residential spaces. After injecting a constant concentration of target fungi inside the test chamber designed to simulate an actual space and operating air purification products for a certain time, the reduction efficiency is evaluated by comparing the concentration of fungi before/after operation.

Conclusion

British, European and International standards cover the measurement and assessment of bioparticles in indoor, outdoor and industrial stack emissions.

There is an active programme of development to meet standardisation needs of member bodies; both new standards and regular updating of existing standards.

For more information about involvement in this area of standards work contact crumpiaq@btinternet.com

And finally as chair of the network of indoor environment professionals (UKIEG; UK Indoor Environments (ukieg.org)) I look forward to future collaboration with BioAirNet

UK IEG
Indoor Environments Group

References

* Yu C. and Crump D. (2011). Standards for evaluating indoor air. Indoor and Built Environment, 20(4), 389-392.

* Nehr S, Hösen E, Tanabe S (2017). Emerging developments in the standardized chemical characterization of indoor air quality. Environment International, Volume 98, January 2017, 233-237.