

Implementation of
ISO 11174:1996

**Workplace air —
Determination of
particulate cadmium
and cadmium
compounds —
Flame and
electro-thermal atomic
absorption
spectrometric method**

ICS 13.040.30

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National foreword

This British Standard reproduces verbatim ISO 11174:1996 and implements it as the UK national standard.

This British Standard is published under the direction of the Health and Environment Sector Board whose Technical Committee EH/2 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

NOTE International and European Standards, as well as overseas standards, are available from Customer Services, BSI, 389 Chiswick High Road, London W4 4AL.

Textual errors. When adopting the text of the international standard, the textual errors listed below were discovered. They have been marked in the text and have been reported to ISO in a proposal to amend the text of the international standard.

1. Clause 6.1.4. The title should read “Portable flowmeter”.
2. Clause 6.2.9. The title should read “Disposable gloves”.
3. Clause 8.2.2. The phrase with “partially cover with a watch” should read “partially cover with a watch glass”.
4. Clause 9.2.1. The term “spiked filters” should read “dosed filters” for consistency with 9.2.1. of BS 6069-3.8.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO title page, page ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

INTERNATIONAL STANDARD

ISO
11174

First edition
1996-04-15

Workplace air — Determination of particulate cadmium and cadmium compounds — Flame and electrothermal atomic absorption spectrometric method

*Air des lieux de travail — Dosage du cadmium particulaire et des composés
particulaires du cadmium — Méthode par spectrométrie d'absorption
atomique dans la flamme et méthode par spectrométrie d'absorption
atomique avec atomisation électrothermique*



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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11174 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

Annexes A and B of this International Standard are for information only.

WARNING — Cadmium and cadmium compounds are toxic and are suspected human carcinogens (see reference [1] in annex B). Avoid any exposure by inhalation. Personal protection (e.g. an effective respirator) must be used in all cases where exposure to cadmium or cadmium compounds is possible.

1 Scope

This International Standard specifies a method for the determination of the mass concentration of particulate cadmium and cadmium compounds in workplace air, using either flame or electrothermal atomic absorption spectrometry.

The sample digestion procedure specified in 8.2.2 has been validated (see reference [2] in annex B) for a selection of cadmium compounds and pigments and glass enamels containing cadmium.

The analytical method has been validated (see reference [2] in annex B) for the determination of masses of 10 ng to 600 ng of cadmium per sample using electrothermal atomic absorption spectrometry, and 0,15 µg to 96 µg of cadmium per sample using flame atomic absorption spectrometry. The concentration range for cadmium in air for which this procedure is applicable is determined in part by the sampling procedure selected by the user. The method is applicable to personal sampling of the inhalable or respirable fraction of airborne particles, as defined in ISO 7708, and to fixed-location sampling.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 648:1977, *Laboratory glassware — One-mark pipettes*.

ISO 1042:1983, *Laboratory glassware — One-mark volumetric flasks*.

ISO 3585:1991, *Borosilicate glass 3.3 — Properties*.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*.

ISO 6955:1982, *Analytical spectroscopic methods — Flame emission, atomic absorption and atomic fluorescence — Vocabulary*.

ISO 7708:1995, *Air quality — Particle size fraction definitions for health-related sampling*.

ISO 8655-1:—¹⁾, *Piston and/or plunger operated volumetric apparatus (POVA) — Part 1: Definitions*.

ISO 8655-2:—¹⁾, *Piston and/or plunger operated volumetric apparatus (POVA) — Part 2: Operating considerations*.

ISO 8655-3:—¹⁾, *Piston and/or plunger operated volumetric apparatus (POVA) — Part 3: Methods of test*.

ISO 8655-4:—¹⁾, *Piston and/or plunger operated volumetric apparatus (POVA) — Part 4: Specifications*.

ISO 8756:1994, *Air quality — Handling of temperature, pressure and humidity data*.

EN 482:1994, *Workplace atmospheres — General requirements for the performance of procedures for the measurement of chemical agents*.

EN 1232:—¹⁾, *Workplace atmospheres — Pumps for personal sampling of chemical agents — Requirements and test methods*.

3 Principle

3.1 Particulate cadmium and cadmium compounds are collected by drawing a measured volume of air through a filter mounted in a sampler designed to collect either the inhalable fraction of airborne particles or the respirable fraction of airborne particles, as appropriate (see note 17).

3.2 A test solution is prepared by treating the filter and collected sample with 5 ml of nitric acid diluted 1 + 1, heating on a hotplate until about 1 ml of concentrated nitric acid solution remains, allowing the solution to cool and then diluting to 10 ml with water.

3.3 The test solution is analysed for cadmium by aspirating into the oxidizing air/acetylene flame of an atomic absorption spectrometer equipped with a cadmium hollow cathode lamp or electrodeless discharge lamp. Absorbance measurements are made at 228,8 nm and results are obtained by the analytical-curve technique (see ISO 6955:1982, subclause 6.1.1).

¹⁾ To be published