INTERNATIONAL STANDARD

ISO 10473

First edition
2000-04-15

Ambient air — Measurement of the mass of particulate matter on a filter medium — Beta-ray absorption method

Air ambiant — Mesurage de la masse des matières particulaires sur un milieu filtrant — Méthode par absorption de rayons bêta

Reference number
ISO 10473:2000(E)

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Printed in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10473 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 3, *Ambient atmospheres*.

Ambient air — Measurement of the mass of particulate matter on a filter medium — Beta-ray absorption method

1 Scope

This International Standard describes a method for the measurement of the mass of particulate matter in ambient air and is based on the absorption of beta rays by the particulate matter.

This method applies to the determination of concentrations ranging from a few micrograms per cubic metre to a few milligrams per cubic metre contained in the atmospheres of urban, rural or industrial areas.

The lower mass detection limit of the method is usually 15 µg to 30 µg of deposited mass per square centimetre of surface area, S, of the filter. This means, for a sampling time t of 3 h and a flowrate q of 1 m^3/h, that the concentration detection limit ranges between 5 µg/m^3 and 10 µg/m^3, computed as follows:

$$\text{Concentration}\left(\mu g / cm^2\right) \cdot \frac{S\,(cm^2)}{q\,(m^3/h)} \cdot \frac{1}{t\,(h)}$$

Sampling techniques are not included in the scope of this International Standard.

NOTE The concentration of particulate matter is calculated by dividing the mass deposited on a filter tape or individual filter, by the known volume of air sampled. However, concentration is dependent on the sampling technique used, for example, the design of the sampling inlet. Normally, for ambient-air particle sampling, large particles are filtered out by means of a size-selective inlet (for example cascade impactor or cyclone filtration). The particle size limit is defined by the characteristics of the sampling head.

2 Term and definition

For the purposes of this International Standard, the following term and definition applies.

2.1
beta ray
radiation emitted by electrons during the nuclear decay of radioactive elements

NOTE In this International Standard, elements such as ^{147}Pm, ^{14}C or ^{85}Kr may be used.

3 Principle

3.1 Description

A known volume of ambient air is drawn through a filter on which the particulate matter is collected. The total mass of the particulate matter is determined by the measurement of absorption of beta rays. This measurement follows the following empirical absorption law:

$$N = N_0 \cdot e^{-km} \quad (1)$$