Australian/New Zealand Standard™

AS/NZS 3580.9.14:2013

Methods for sampling and analysis of ambient air

Method 9.14: Determination of suspended particulate matter—$PM_{2.5}$ high volume sampler with size selective inlet—Gravimetric method

PREFACE

This Standard was prepared by the joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air. This standard method details with the determination of suspended matter with an equivalent aerodynamic diameter (EAD) of less than approximately 2.5 µm. This is one in a series of Standards for the determination of particulate matter in ambient air.

The procedure described in this Standard involves batch sampling and the gravimetric determination of $PM_{2.5}$. Committee EV-007 acknowledges the assistance of Thermo Fisher Scientific and Lear Siegler Australasia in providing data and illustrations used in this document.

The objective of this Standard is to provide regulatory and testing bodies with a standard method for the determination of suspended particulate matter with an equivalent aerodynamic diameter of less than 2.5 µm in ambient air.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

FOREWORD

Suspended particulate matter measured by this method includes particles with an equivalent aerodynamic diameter (EAD) of less than 2.5 µm, as passed by a size selective inlet ($PM_{2.5}$). $PM_{2.5}$ has been statistically associated with certain human health end points, including daily mortality, hospital admissions and exacerbation of asthma. $PM_{2.5}$ emission sources include industrial processes, fuel combustion, burning of vegetation, incineration and natural causes such as windblown dust and salt laden air. Combustion processes tend to contribute more $PM_{2.5}$ than non-combustion sources. Important anthropogenic sources include domestic wood heaters and motor vehicles (especially diesel fuelled vehicles).

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METHOD

1 SCOPE

This Standard specifies a gravimetric method for the determination of suspended particulate matter in ambient air. The method provides a measure of mean concentration of $PM_{2.5}$ over the sampling period employed.

NOTES:

1 Sampling is normally of 24 h duration to average out the effect of the diurnal variations in particle levels and to enable collection of sufficient mass of particulate matter. Provided that the mass of the filter is determined under carefully controlled laboratory conditions, mean concentrations of 1 µg/m^3 and greater may be determined using a 24 h sampling period.

2 It is possible that some particulate matter, depending upon its hygroscopicity or volatility, may alter in mass from its initial as-sampled state because of the environmental conditions and filter equilibration procedure referred to in Clauses 7.1 and 7.8. The degree of mass change is largely due to the nature of the sampled aerosol and may vary from day to day, site to site and seasonally.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
3580 Methods for sampling and analysis of ambient air
3580.1.1 Part 1.1: Guide to siting air monitoring equipment

ISO/IEC
Guide 98-3: 2008 Uncertainty of measurement—Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)

NATA
Technical Note 13: User checks and maintenance of laboratory balances

US EPA
Code of Federal regulations—Protection of Environment 40CFR, Part 53

3 DEFINITIONS

For the purpose of this standard, the definitions below apply.

3.1 Equivalent aerodynamic diameter (EAD)

The diameter of a spherical particle of density 1000 kg/m^3 which exhibits the same aerodynamic behaviour as the particle in question.

3.2 Measurement uncertainty

A variable associated with the result of a measurement that characterizes the dispersion of the values that could be reasonably attributed to the measurand.

NOTE: The variable may be, for example, a standard deviation (or given multiple of it), or the half-width of an interval having a stated level of confidence. ISO/IEC Guide 98-3 provides a basis of evaluation uncertainty in the output of measurement system.

3.3 $PM_{2.5}$

Atmospheric suspended particulate matter having an approximate EAD of less than 2.5 µm that is passed by a size selective inlet having the dimensions specified in Figures 2 to 5.