

Australian Standard®

Methods for sampling and analysis of ambient air

Method 9.10: Determination of suspended particulate matter—PM_{2.5} low volume sampler—Gravimetric method

AS 3580.9.10:2017

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air, to supersede AS/NZS 3580.9.10:2006.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide regulatory and testing bodies with a standard method for determining suspended particulate matter with an equivalent aerodynamic diameter of less than 2.5 µm utilizing a low volume sampler and size selective inlet.

This Standard deals with the determination of suspended particulate matter with an equivalent aerodynamic diameter (EAD) of less than approximately 2.5 µm (PM_{2.5}). 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}, and is based on the United States Code of Federal Regulations, Title 40, Chapter 1, Part 50 Appendix L, Reference method for the determination of fine particulate matter as PM_{2.5} in the atmosphere.

The term 'normative' has been used in this Standard to define the application of the appendix to which it applies. A 'normative' appendix is an integral part of a Standard.

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 wind blown 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).

METHOD

1 SCOPE

This Standard sets out a gravimetric method for determination of PM_{2.5} in ambient air utilizing low volume sequential and non-sequential samplers equipped with size selective inlets. The method provides a measure of mean concentration of PM_{2.5} in units of micrograms per cubic metre ($\mu\text{g}/\text{m}^3$), normally sampled over a 24 h period. This method may be used to collect particle samples for subsequent physical or chemical analysis.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS ISO/IEC

17025 General requirements for the competence of testing and calibration laboratories

AS/NZS

3580 Methods for sampling and analysis of ambient air

3580.1.1 Part 1.1: Guide to siting air monitoring equipment

3580.9.14 Part 9.14: Determination of suspended particulate matter—PM_{2.5} high volume sampler with size selective inlet—Gravimetric method

3760 In-service safety inspection and testing of electrical equipment

ISO/IEC

Guide 98 Uncertainty of measurement

Guide 98-3 Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)

EN

12341 Ambient air—Standard gravimetric measurement method for the determination of the PM₁₀ or PM_{2.5} mass concentration of suspended particulate matter

ASTM

E563 Standard Practice for preparation and use of an ice point bath as a reference temperature

US EPA

US Code of Federal Regulations—Environmental Protection Agency 40 CFR, Chapter I, Part 50, Appendix L

US Code of Federal Regulations—Environment Protection Agency 40 CFR, Chapter I, Part 53

3 DEFINITIONS

For the purposes of this Standard the following definitions apply.

3.1 Equivalent aerodynamic diameter (EAD)

The diameter of a spherical particle of unit density ($1 \text{ g}/\text{cm}^3$), which exhibits the same aerodynamic behaviour as the particle in question.

3.2 Field blank filter

A filter not used for sampling, which has been taken into the field. The filter is handled as a sample filter, including placing it in the sampler filter holder, and removing it, except the sampler is not in operation during this time. A field blank filter is used to assess the effect of field conditions, transport conditions and field operator technique on the weighing procedure.