AS 3580.9.8—2008
Reconfirmed 2018

Australian Standard®

Methods for sampling and analysis of ambient air

Method 9.8: Determination of suspended particulate matter—PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air, as an Australian Standard to supersede AS 3580.9.8—2001.

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 continuously monitoring suspended particulate matter changes of particles less than 10 micrometres in ambient air, providing near real time measurement of mean particle concentration.

The objective of this revision was to clarify the error allowed in the measurement of flow rates, especially flow audit checks, and to better define noise check requirements.

FOREWORD

This Standard sets out the operational requirements for the continuous determination of suspended particulate matter in ambient air using a tapered element oscillating microbalance (TEOM) analyser. To minimize the contribution of liquid water to measured particle mass, the TEOM analyser conditions the incoming sample aerosol to 50°C prior to and during its measurement. This procedure provides constant sampling conditions.

At sampling locations with a high proportion of volatile and semi-volatile particulate species, the correlation between measurements using the time-integrated TEOM analyser and a co-located manual gravimetric filter method (e.g. AS 3580.9.6, *Methods for sampling and analysis of ambient air*, Method 9.6: *Determination of suspended particulate matter—PM_{10} high volume sampler with size-selective inlet—Gravimetric method*) may vary.

Variations between instruments, depend on the volatility of the particulate species collected, and variations in the ambient temperature and prevailing humidity during sample collection. In the case of AS 3580.9.6, this also applies after collection of the sample. Variations are expected to be greater in cooler climates that experience elevated concentrations of volatile species. This may be due in part to differences between the methods in the retention of volatile species, particle-bound water and gas-to-particle conversion.

STANDARDS Australia

The TEOM analyser offers continuous operation, providing near real-time measurements for assessment and study of the temporal changes in ambient suspended particulate matter.

Fine airborne particles are of concern to the health and amenity of urban communities. Several major epidemiological studies have shown them to be associated with an increase in human mortality and morbidity (Dockery *et. al*, 1993; US EPA, 1996)*. The particle fractions considered to be of most relevance to human health are those with an aerodynamic diameter less than 10 micrometres (μm) (PM_{10}). Studies have shown that these particles can penetrate the thoracic region of the human body (Dockery *et. al*, 1993; US EPA, 1996)*.

METHOD

1 SCOPE

This Standard sets out a method for the continuous determination of suspended particulate matter in ambient air using a tapered element oscillating microbalance (TEOM) analyser. The method can provide a measure of mean particle concentration over periods from 10 minutes to 24 hours. The moving 10-minute mean is updated every 2 seconds, whereas the 24-hour mean mass concentration is updated every 60 minutes on the hour. Results are normally reported as 24-hour, time-integrated mean values.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

3580 Methods for sampling and analysis of ambient air

3580.1.1 Method 1.1: Guide to siting air monitoring equipment

3580.9.6 Method 9.6: Determination of suspended particulate matter—PM_{10} high volume sampler with size-selective inlet—Gravimetric method

EN

12341 Air quality—Determination of the PM_{10} fraction of suspended particulate matter—Reference method and field test procedure to demonstrate reference equivalence of measurement methods

US EPA

Code of Federal Regulations—Protection of Environment 40 CFR, Part 53, Subpart D

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 1 g/cm^3 which exhibits the same aerodynamic behaviour as the particle in question.

3.2 PM_{10}

Suspended particulate matter consisting of particles having an EAD of less than 10 μm, which is passed by a size classifier having performance characteristics as defined in US EPA *Code of Federal Regulations*: *40 CFR 50*, Part 53, Subpart D.

NOTE: One of the performance characteristics referred to is that there is a 50% collection efficiency of particles of 10 ± 0.5 μm EAD.

