Australian/New Zealand Standard™

Methods for sampling and analysis of ambient air

Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV-007, Methods for the Examination of Air to supersede AS 2724.3—1984, *Ambient air—Particulate matter,* Part 3: *Determination of total suspended particulates (TSP)—High volume sampler gravimetric method*. 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 TSP and is based on the United States Code of Federal Regulations, Title 40, Chapter I, Part 50, Appendix B—*Reference method for the determination of suspended particulate matter in the atmosphere (High-volume method)*.

AS 2922—1987, *Ambient air—Guide for the siting of sampling units*, is referenced frequently in this Standard. AS 2922 is currently being revised by the Committee and will be renumbered and published as AS/NZS 3580.1.1. When this occurs this Standard will be amended.

The objective of this Standard is to provide regulatory and testing bodies interested in the sampling and monitoring of ambient air with a standard method for the determination of total suspended particulate matter in ambient air.

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

Total suspended particulate matter (TSP), as measured by this method, generally includes particles with an equivalent aerodynamic diameter (EAD) of less than 50 μm. Sources of TSP particles include the combustion of fuels, industrial processes, motor vehicles, burning of vegetation, incineration and natural causes such as windblown dust.

Small particles are of concern to health and may affect visibility. Larger particles are a source of nuisance as they soil property.

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METHOD

1 SCOPE

This Standard specifies a gravimetric method for the determination of suspended particulate matter in ambient air. Generally, the particles collected are of equivalent aerodynamic diameter (EAD) of less than 50 μm. The upper size limit of particles collected depends upon sampling conditions, especially wind velocity and direction.

The method provides a measure of mean concentration of TSP 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, concentrations of 1 $\mu g/m^3$ 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
2922 Ambient air—Guide for the siting of sampling units

ISO Guide to the expression of uncertainty in measurement (ISO GUM)

NATA
Technical Note 13 Users check of balance calibration

U.S. EPA US Code of Federal Regulations—Environmental Protection Agency, 40 CFR, Chapter I, Part 50 Appendix B

3 DEFINITIONS

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

3.1 Total suspended particulate matter (TSP)

Atmospheric suspended particulate matter having an approximate EAD of less than 50 μm.

3.2 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.

3.3 U95

A measurement uncertainty at a confidence interval of 95% according to ISO GUM.

4 PRINCIPLE

Ambient air is drawn at a known flow rate through a prepared filter via a TSP inlet, which effectively acts as a hood to prevent precipitation and debris from falling onto the filter.

The TSP is collected on a prepared filter mounted in the high volume sampler filter holder and subsequently weighed (Gravimetric Method). The sample volume is calculated from the average flow rate and sample duration. The TSP concentration is then calculated.