

AS 3580.9.8:2022



STANDARDS
Australia



Methods for sampling and analysis of ambient air

**Method 9.8: Determination of suspended particulate matter — PM₁₀
continuous direct mass method using a tapered element oscillating
microbalance analyser**



AS 3580.9.8:2022

This Australian Standard ® was prepared by EV-007, Methods for Examination of Air. It was approved on behalf of the Council of Standards Australia on 11 February 2022.

This Standard was published on 04 March 2022.

The following are represented on Committee EV-007:

- ACT Health
- Australian Aluminium Council
- Australian Industry Group
- Australian Institute of Refrigeration Air Conditioning and Heating
- Clean Air Society of Australia & New Zealand
- Department of Environment and Science, Qld
- Department of Planning, Industry and Environment, NSW
- Department of Water and Environmental Regulation, WA
- Environment Protection Authority, Vic.
- National Association of Testing Authorities Australia
- RMIT University

This Standard was issued in draft form for comment as DR AS 3580.9.8:2021.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76113 663 4

Methods for sampling and analysis of ambient air

Method 9.8: Determination of suspended particulate matter — PM₁₀ continuous direct mass method using a tapered element oscillating microbalance analyser

Originated as AS 3580.9.8—2001.
Previous edition 2008.
Third edition AS 3580.9.8:2022.

© Standards Australia Limited 2022

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air, to supersede AS 3580.9.8:2008.

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

The objective of this document is to provide regulatory and testing bodies with a standard method for continuously monitoring suspended particulate matter with an equivalent aerodynamic diameter (EAD) of less than 10 μm (PM_{10}) in ambient air, providing near real time measurement of mean particle concentration.

The major changes in this edition are as follows:

- (a) Align with current technology and to ensure consistency and uniformity across the different methods used in other continuous particulate monitoring Standards.
- (b) Provide an essential reference to AS 3580.19.

The requirements for instruments found to be suitable for using the method specified in this document are given in the United States Environmental Protection Agency (US EPA) Code of Federal Regulations, Title 40 Protection of Environment, Part 53 Ambient Air Monitoring Reference and Equivalent Methods (40 CFR 53), Subpart D Procedures for Testing Performance Characteristics of Methods for PM_{10} .

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

Contents

Preface	ii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle	2
5 Apparatus	4
5.1 Monitor	4
5.2 Analytical balance	7
5.3 Sample filter cartridges	7
5.4 PM ₁₀ size selective inlet	7
5.5 Reference flow meter	7
5.6 Reference thermometer	7
5.7 Reference barometer	7
5.8 Zero noise check particle filter	7
6 Sampling	7
6.1 General	7
6.2 Location	8
6.3 Installation	8
6.4 Sampling environment	8
6.5 Flow rate	9
7 Procedure	9
7.1 Instrument operation	9
7.2 Instrument calibration	10
7.2.1 Mass transducer calibration constant (K_0) check	10
7.2.2 Instrument clock check	11
7.2.3 Leak check	11
7.2.4 Flow controller check	11
7.2.5 Ambient temperature sensor check and calibration	11
7.2.6 Pressure sensor check and calibration	11
7.2.7 Flow controller calibration	12
7.2.8 Zero noise check	12
7.2.9 Analogue calibration	12
7.3 Instrument maintenance	13
7.3.1 General	13
7.3.2 Filter replacement	13
7.3.3 Flow system component cleaning	14
7.3.4 Pump reconditioning	14
8 Results and calculations	14
9 Measurement uncertainty	15
10 Quality control and assurance	15
10.1 Instrument and station log	15
10.2 Data acquisition and transfer	15
10.3 Data validation	16
10.3.1 General	16
10.3.2 Handling negative mass data artefacts	16
11 Test report	17
12 Data retention	18
Appendix A (normative) Balance checks and calibrations	19
Appendix B (normative) Thermometer and temperature sensor checks and calibrations	22

Appendix C (normative) Barometer checks and calibrations	25
Bibliography	27

Australian Standard®

Methods for sampling and analysis of ambient air

Method 9.8: Determination of suspended particulate matter — PM₁₀ continuous direct mass method using a tapered element oscillating microbalance analyser

1 Scope

This document sets out a method for the continuous determination of PM₁₀ in ambient air using a tapered element oscillating microbalance (TEOM) without FDMS (for systems including FDMS, refer to AS/NZS 3580.9.16).

NOTE PM₁₀ are particulate matter small enough to pass into the lungs and cause serious health effects. Major PM₁₀ emission sources include industrial processes and natural sources, such as windblown dust and salt-laden air. Important anthropogenic sources include motor vehicles.

The method can provide a measure of mean particle concentration over periods from 10 min to 24 h. The moving 10 min mean is updated every 2 s, whereas the 24 h mean mass concentration is updated every 60 min on the hour. Results are normally reported as 24 h, time-integrated mean values.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents for informative purposes are listed in the Bibliography.

AS 3580.9.9, *Methods for sampling and analysis of ambient air, Method 9.9: Determination of suspended particulate matter—PM₁₀ low volume sampler—Gravimetric method*

AS 3580.19, *Methods for sampling and analysis of ambient air, Method 19: Ambient air quality data validation and reporting*

AS/NZS 3580.1.1, *Methods for sampling and analysis of ambient air, Part 1.1: Guide to siting air monitoring equipment*

AS/NZS 3580.9.6, *Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter—PM₁₀ high volume sampler with size-selective inlet—Gravimetric method*

AS ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

US EPA 40 CFR 53 Subpart D, Code of Federal Regulations, Title 40 Protection of Environment, Part 53 Ambient Air Monitoring Reference and Equivalent Methods, Subpart D Procedures for Testing Performance Characteristics of Methods for PM₁₀