

Australian/New Zealand Standard™

Methods for sampling and analysis of ambient air

Part 1.1: Guide to siting air monitoring equipment



AS/NZS 3580.1.1:2016

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EV-007, Methods for Examination of Air. It was approved on behalf of the Council of Standards Australia on 11 April 2016 and by the Standards New Zealand Approval Board on 20 April 2016.
This Standard was published on 6 May 2016.

The following are represented on Committee EV-007:

Australian Aluminium Council
Australian Bureau of Meteorology
Australian Industry Group
Clean Air Society of Australia and New Zealand
CSIRO
Department of Environment Regulation, WA
Department of Science, Information Technology and Innovation, Qld
Environment Canterbury
Environment Protection Authority, Vic.
Ministry for the Environment, New Zealand
National Association of Testing Authorities, Australia
Office of Environment and Heritage

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 3580.1.1:2015.

Australian/New Zealand Standard™

Methods for sampling and analysis of ambient air

Part 1.1: Guide to siting air monitoring equipment

Originated in Australia as AS 2922—1987.
Originated in New Zealand as AS/NZS 3580.1.1:2007.
Second edition 2016.

COPYRIGHT

© Standards Australia Limited/Standards New Zealand

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 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 10729, Wellington 6011.

ISBN 978 1 76035 471 8

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 3580.1.1:2007 *Guide to siting air monitoring equipment*.

The objective of this Standard is to provide users with a methodology for siting ambient air monitoring equipment. The objective of this revision is to update the Standard according to current practices.

During the preparation of this Standard, the Committee again paid attention to the work of the United States Environment Protection Agency (US EPA), particularly their 'Guideline Series' on air monitoring. Some of the material in this Standard is derived from the USA Code of Federal Regulations, Title 40, Part 58, of the Code of Federal Regulations.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
1 SCOPE	4
2 REFERENCED DOCUMENTS	4
3 OBJECTIVES OF AMBIENT AIR MONITORING	5
4 SPATIAL AND TEMPORAL VARIABILITY OF AIR QUALITY	6
5 SPECIFICATION OF AMBIENT AIR MONITORING DATA	7
6 CLASSIFICATIONS OF AMBIENT AIR MONITORING SITES	7
7 SELECTION OF MONITORING SITES	8
8 POSITION OF SAMPLING INLET	11
9 SITING CRITERIA FOR OPEN PATH ANALYSER MONITORING	18
APPENDIX A NEPC, US EPA AND NZ MFE SITING CLASSIFICATIONS	20

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Methods for sampling and analysis of ambient air

Part 1.1: Guide to siting air monitoring equipment

1 SCOPE

This Standard sets out general guidelines for the siting of ambient air monitoring equipment and specifies a number of siting parameters for individual air pollutants. In practice, an ideal site satisfying all the criteria is rarely achieved.

This Standard includes sampling protocol for fixed point and, where appropriate, open path monitoring equipment.

This Standard is applicable to the siting of an individual monitoring unit for specific purposes or to air monitoring equipment within a network. This Standard does not include the detailed design of a network of monitoring units.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

3580	Methods for sampling and analysis of ambient air
3580.4.1	Method 4.1: Determination of sulfur dioxide—Direct reading instrumental method
3580.5.1	Method 5.1: Determination of oxides of nitrogen—Direct-reading instrumental method
3580.6.1	Method 6.1: Determination of ozone—Direct-reading instrumental method
3580.7.1	Method 7.1: Determination of carbon monoxide—Direct-reading instrumental method
3580.8.1	Method 8.1: Determination of hydrogen sulfide—Automatic intermittent sampling—Gas chromatographic method
3580.9.8	Method 9.8: Determination of suspended particulate matter—PM ₁₀ continuous direct mass method using a tapered element oscillating microbalance analyser

AS/NZS

3580	Methods for sampling and analysis of ambient air
3580.9.3	Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method
3580.9.6	Method 9.6: Determination of suspended particulate matter—PM ₁₀ high volume sampler with size selective inlet—Gravimetric method
3580.9.7	Method 9.7: Determination of suspended particulate matter—Dichotomous sampler (PM ₁₀ , coarse PM and PM _{2.5})—Gravimetric method
3580.9.9	Method 9.9: Determination of suspended particulate matter—PM ₁₀ low volume sampler—Gravimetric method
3580.9.10	Method 9.10: Determination of suspended particulate matter—PM _{2.5} low volume sampler—Gravimetric method
3580.9.11	Method 9.11: Determination of suspended particulate matter—PM ₁₀ beta attenuation monitors

AS/NZS

3580.9.12	Method 9.12:	Determination of suspended particulate matter—PM _{2.5} beta attenuation monitors
3580.9.13	Method 9.13:	Determination of suspended particulate matter—PM _{2.5} continuous direct mass method using a tapered element oscillating microbalance monitor
3580.9.14	Method 9.14:	Determination of suspended particulate matter—PM _{2.5} high volume sampler with size selective inlet—Gravimetric method
3580.9.15	Method 9.15:	Determination of suspended particulate matter—Particulate metals high or low volume sampler gravimetric collection—Inductively coupled plasma (ICP) spectrometric method
3580.10.1	Method 10.1:	Determination of particulate matter—Deposited matter—Gravimetric method
3580.10.2	Method 10.2:	Determination of particulate matter—Impinged matter—Gravimetric method
3580.11.1	Method 11.1:	Determination of methane and non-methane organic compounds in ambient air—Direct-reading instrumental method
3580.12.1	Method 12.1:	Determination of light scattering—Integrating nephelometer method
3580.13.2	Method 13.2:	Determination of gaseous and acid-soluble particulate fluorides—Manual, double filter paper sampling
3580.14	Method 14:	Meteorological monitoring for ambient air quality monitoring applications
3580.15	Method 15:	Determination of gaseous pollutants in ambient air using differential optical absorption spectrometry (DOAS)—Direct-reading instrument method
3580.16	Method 16:	Determination of polycyclic aromatic hydrocarbons (PAH)
3580.17	Method 17:	Determination of gaseous compounds in ambient air—Direct-reading cavity ring-down spectroscopy instrumental method

3 OBJECTIVES OF AMBIENT AIR MONITORING

The reasons for monitoring ambient air are numerous. Most often, monitoring is undertaken to determine air quality in a given location, typically in urban areas. This type of air monitoring is usually based on determining air quality in relation to its potential effects on human health and welfare, i.e. from a pollutant receptor point of view. Monitoring may also be needed to determine the influence of emissions from a specified source, such as a single point source or multiple sources. This type of air monitoring is usually related to the assessment of human activities, i.e. from a pollutant source point of view or as a prerequisite for dispersion modelling.

Such general objectives need to be transformed into specific objectives in order to be more meaningful and practical. Specific ambient air monitoring objectives may include one or more of the following:

- (a) Time trends and patterns.
- (b) Compliance with ambient air quality standards or goals.
- (c) Background concentration data.
- (d) Data for air quality management strategies and policies.
- (e) Data for emergency episode forecasting and control.
- (f) Data to assess the effectiveness of air quality management programs.

- (g) Data for assessing effects of pollutants on human and animal health, materials, vegetation, buildings and other structures.
- (h) Data for specific pollutant research studies.
- (i) Compliance of a specific pollutant source with regulations.
- (j) Data to assess the impact of a proposed or existing pollutant source on air quality.
- (k) Data to assess, validate, calibrate, refine or develop emission dispersion models.
- (l) Data to support enforcement activities.

Whatever the reason for ambient air monitoring, objective(s) need to be determined, clarified and clearly stated before attempting to site air sampling unit(s).

4 SPATIAL AND TEMPORAL VARIABILITY OF AIR QUALITY

4.1 General

Ambient air is a heterogeneous system containing concentrations of pollutants which vary with both space and time. In fulfilling the objective(s) of an air monitoring program, the influence of factors which affect pollutant concentrations shall be considered. These factors also need to be considered in any determination of the type of data and the location at which it should be obtained.

4.2 Meteorology and climatology

Horizontal wind (speed and direction and the vertical distribution of both these components) and vertical mixing (atmospheric stability, mixing height) have profound influences on distribution of ambient pollution concentrations. These meteorological parameters vary significantly over distance (in tens of metres) and time (in hours or less). This variability needs to be taken into account when determining sampling averaging times, siting of monitoring equipment and positioning of the sampling inlet.

Factors like atmospheric stability, precipitation and solar radiation vary over the long term (throughout the year and from year to year) and can influence pollutant levels. Frequency and variability of climatic influences may be especially important in determining trends in pollutant levels and occurrence of 'worst case' episodes. Furthermore, some pollutants are seasonal in their importance, e.g. elevated ozone levels in summer because of increased sunlight, or they exhibit higher levels at particular times of the year, e.g. levels of nitrogen oxides peak in winter. Climatic influences may determine length or intensity of an air monitoring program including the number of sampling sites required. Some types of monitoring may only be required at certain times of the year but will often need to be conducted at a number of sites to obtain the desired data.

If meteorological measurements are being recorded at the site, then consideration to the siting requirements detailed in AS/NZS 3580.14 should be followed where practical.

4.3 Topography

Dispersion of pollutants can be significantly altered by local topographical factors. Valleys tend to channel wind flow along their axes, restrict horizontal dispersion and increase the likelihood of inversion formation. Shorelines tend to produce frequent changes in airflow due to variation in relative temperatures of the air, land and water. Hilly and mountainous terrains tend to introduce complexities into airflows producing a range of effects. The siting and numbers of air monitoring equipment needed for a monitoring program may, for some areas, be especially influenced by these topographical factors. They may increase or decrease the incidence of extreme values measured. They may determine where a sampling unit should be sited and where it may be unnecessary to site air monitoring equipment.