AS 1668.2—2002
(Incorporating Amendment Nos 1 and 2)

Australian Standard™

A2

The use of ventilation and airconditioning in buildings

Part 2: Ventilation design for indoor air contaminant control (excluding requirements for the health aspects of tobacco smoke exposure)

Standards Australia

This Australian Standard was prepared by Committee ME-062, Ventilation and Airconditioning. It was approved on behalf of the Council of Standards Australia on 29 April 2002 and published on 10 June 2002.

The following are represented on Committee ME-062:

Air Conditioning and Mechanical Contractors Association of Australia

Air Conditioning and Refrigeration Equipment Manufacturers Association of Australia

Australasian Fire Authorities Council

Australian Building Codes Board

Australian Institute of Building Surveyors

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PREFACE

This Standard was prepared by Standards Australia Committee ME-062, Ventilation and Airconditioning, to supersede AS 1668.2—1991, *The use of mechanical ventilation and air-conditioning in buildings*, Part 2: *Mechanical ventilation for acceptable indoor-air quality*.

*This Standard incorporates Amendment No. 1 (*November 2002*) and Amendment No. 2 (June 2003). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

In accordance with the philosophy of adopting a performance approach to building regulations, the main technical change to the Standard is the introduction of Dilution Indices (DI). Within that approach the structure of the Standard has been revised to include mandatory simple but conservative requirements complemented by optional and more complex analytical and performance approaches. The main technical changes are summarized as follows:

(a) A methodology for the classification of systems by Dilution Indices has been included.

(b) Minimum outdoor airflow rates have changed.

(c) Requirements for natural ventilation systems have been included.

(d) Outdoor airflow rate calculations have been presented as prescriptive and engineered procedures.

(e) Minimum requirements for air filtration have been included.

(f) Requirements for kitchen exhaust hood design have been rationalized.

(g) Equations used for calculation of total airflow rates in car parks have been presented as prescriptive and engineered procedures.

(h) Requirements for staffed car parks have been included.

Consideration has been given to the incorporation of the Standard in building regulations. In its preparation consideration was given to many international and national Standards, design guides, technical papers, manuals and other publications.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to Tables are deemed to be requirements of this Standard.

This Standard incorporates a Commentary on some clauses. The Commentary is set directly following the relevant clause and is designated by ‘C’ preceding the clause number and printed in italics in a panel. The Commentary is for information only and does not need to be followed for compliance with the Standard.

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FOREWORD

Requirements for the design of natural ventilation systems have been included in this document. This will allow building regulations to reference a single Standard for virtually all aspects of the ventilation of buildings. Where possible, this Standard is performance based and calculations are presented as prescriptive and performance procedures.

This Standard sets minimum permissible ventilation rates having consideration to health and ventilation amenity. Minimum ventilation rates specified are intended to maintain general contaminants (e.g., body odours, volatile organic compounds and the like) at concentrations below exposures that have the potential to cause adverse health effects to a substantial majority of occupants. Minimum ventilation rates specified may not ensure that specific contaminants (e.g., environmental tobacco smoke, fumes from unflued gas-fired devices and other fumes) are maintained at concentrations below exposures that have the potential to cause adverse health effects. When specific contaminants are present, alternative or additional control measures, other than dilution, may need to be implemented to achieve an equivalent level of health and amenity (see Clause 1.3).

A simple method of calculating ventilation rates to meet the minimum requirements is included. The method is based on a default multiple enclosure factor, with a design check step to verify that the underlying assumptions are incorporated. The Standard also includes a mechanism for designing ventilation systems that provide different levels of ventilation amenity above the minimum requirements. Its use will allow the rating of buildings, both new and existing, in terms of the amenity provided by the ventilation system. This rating system allows a Dilution Index (DI) to be calculated for any mechanical or natural ventilation system. Appropriate DI ratings for specific occupancies are suggested.

The sections on kitchen exhaust and car park ventilation have been revised in line with the general performance philosophy. A new section on health care enclosures has been developed. Air filters are now a mandatory requirement for most air-handling systems.

It is recognized that this Standard is likely to be used for occupational health and community health purposes thus its provision have been designed, to the extent possible, to community health criteria promulgated by peak health bodies. Implicit in this recognition is the possibility that the provisions of the Standard may, at least in part, be excessively conservative when applied in an occupational health context. The Standard has used a three-part approach to the setting of ventilation rates for health purposes, which comprises a general approach, a more specific approach where particular information is available and a particular approach to ventilation of enclosures in which smoking is not prohibited.

The principal health basis of the ventilation requirements for enclosures in which smoking is prohibited is in essence taken from previous editions of the Standard—editions prior to 1991. In smoking prohibited occupancies, minimum ventilation rates are generally lower than those given in the 1991 edition of the Standard. The 1991 edition did not discriminate between the requirements of smoking and non-smoking occupancies This represents acceptance with ventilation rates long in use in Australia for health purposes remain valid in circumstances where available information does not allow a more specific or scientific approach. Where there is reasonably predictable pollutant generation information and an authoritative community health exposure limit, then that information is used to set ventilation rates.

The Standard sets ventilation rates for enclosures in which smoking is not prohibited based on the amenity effects of environmental tobacco smoke (ETS). The Standard does not address the health aspects of ETS exposure.

Health authorities advise that ETS is associated with serious adverse health effects including ischaemic heart disease and lung cancer.

Users of the Standard are advised to consult relevant Government authorities for details of legislation that deals with public health and occupational health aspects of ETS exposure.

Users wanting to calculate an estimate of some of the health risks to occupants of an enclosure where smoking is not prohibited may also consult Appendix A of the Supplement to this Standard, AS 1668.2 Supp 1.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out design requirements for natural ventilation systems and mechanical air-handling systems that ventilate enclosures. It sets minimum requirements for ventilation and specifies a methodology whereby enclosures served by air-handling systems may be assigned a Dilution Index (DI). Dilution Indices are based on needs for the control of odours and particulates. This Standard does not prescribe other requirements associated with comfort, such as temperature, humidity, air movement or noise. This Standard does not include requirements for the maintenance of ventilation and air-handling systems.

NOTE: A grading system for Dilution Indices is suggested in Appendix A.

This Standard includes requirements for the ventilation of car parks. Road tunnels are outside the scope of this Standard. This Standard does not address the health aspects of exposure to environmental tobacco smoke.

C1.1 *This Standard addresses the ventilation of buildings. Fire and smoke control aspects of air-handling systems are covered in* AS/NZS 1668.1. *Requirements for system design in respect of microbial control are given in* AS/NZS 3666.1

It is recommended that air-handling systems be designed, constructed and installed so that their use does not give rise to a noise or vibration nuisance. For guidance on noise and vibration control see AS 1055.1 *and* AS 2107. *Information on thermal comfort conditions is given in* ISO 7730.

1.2 APPLICATION

1.2.1 General

This Standard is intended for use by regulatory authorities, building services designers, architects, equipment manufacturers and suppliers, installers, managers, owners and operating staff responsible for designing, air-handling systems. System selection (mechanical or natural) shall be in accordance with Section 2. Figure 1.1 provides a flow chart on the application of this Standard.

C1.2.1 *It is intended that this Standard be applied to new buildings at the design stage. Its application to some existing buildings may be inappropriate and in such instances alternative designs and solutions may be necessary.*

1.2.2 Ventilation system application

This Standard sets out design requirements for ventilation systems as follows: