

Australian/New Zealand Standard™

Structural design actions

Part 2: Wind actions

AS/NZS 1170.2:2002

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD-006, General Design Requirements and Loading on Structures. It was approved on behalf of the Council of Standards Australia on 29 March 2002 and on behalf of the Council of Standards New Zealand on 28 March 2002. This Standard was published on 4 June 2002.

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee, BD-006, General Design Requirements and Loading on Structures, to supersede AS 1170.2—1989, *Minimum design loads on structures*, Part 2: *Wind loads*, and in part Part 5 of NZS 4203:1992, *Code of practice for general structural design and design loading for buildings*.

This Standard incorporates Amendment No. 1 (April 2005). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard is published as a joint Standard (as are also AS/NZS 1170.0 and AS/NZS 1170.1) and it is intended that it is suitable for use in New Zealand as well as Australia. However, NZS 4203, *General structural design and design loadings for buildings* remains current in New Zealand until the publication of all parts (including Part 4: Earthquake action) and for a transition period afterwards.

This Standard will be referenced in the Building Code of Australia by way of BCA Amendment 11 to be Published on 1 July 2002, thereby superseding the previous edition, AS 1170.2—1989, which will be withdrawn 12 months from the date of publication of this Edition.

The objective of this Standard is to provide designers of structures with wind actions for use in the design of structures subject to wind action. It provides a detailed procedure for the determination of wind actions on structures, varying from those less sensitive to wind action to those for which dynamic response must be taken into consideration.

This Standard is Part 2 of the AS/NZS 1170 series *Structural design actions*, which comprises the following parts, each of which will have an accompanying Commentary published as a Supplement:

- Part 0: General principles
- Part 1: Permanent, imposed and other actions
- Part 2: Wind actions
- Part 3: Snow and ice actions
- Part 4: Earthquake action

The Commentary to this Standard is AS/NZS 1170.2 Supp 1, *Structural design actions—Wind actions—Commentary* (Supplement to AS/NZS 1170.2:2002).

The wind speeds provided are based on existing data. At the time of drafting, it was considered that there was insufficient evidence to indicate any trend in wind speeds due to climatic change.

This Standard is based on ISO 4354, *Wind actions on structures*. ISO 4354 gives general format and guidance on detail for the drafting of national Standards on wind actions.

This edition differs from the previous editions as follows:

- (a) The format of ISO 4354 has been adopted except that the effects of exposure are applied to the wind speed to give directional site wind speeds before conversion to pressure (see Note to Clause 2.4).
- (b) Importance factors have been replaced with variable annual probability of exceedance, to enable reliability-based design. Values of wind speed are determined using the annual probability of exceedance (see AS/NZS 1170.0).

- (c) It is a joint Standard intended for use in Australia and New Zealand.
- (d) Average roof height is used to calculate wind pressures for rectangular enclosed buildings.
- (e) Actions determined from wind tunnel tests or other methods are not covered through the ‘deemed-to-comply’ solution given in this Standard, but must be separately established (by a special study; see AS/NZS 1170.0).
- (f) A simplified procedure is not included.
- (g) Wind speeds for permissible stress design are not included (see the Commentary, AS/NZS 1170.2 Supp 1).
- (h) Directional wind speed multipliers have been revised and extended beyond the capital cities in Australia.
- (i) Generally, the clauses have been updated to incorporate the latest research and to improve useability. The following new information has been included:
 - (i) Elevation effect for Tasmania.
 - (ii) Separation zone for crests of steeper slopes.
 - (iii) Combination factor for major structural members.
 - (iv) Parapet reduction factor.
 - (v) Hyperbolic paraboloid roofs.
 - (vi) Methods for open lattice structures and lattice towers (including ancillaries).
 - (vii) Flags and spheres.
- (j) The calculation of dynamic wind response has been simplified and the use of an hourly mean wind speed for dynamic analysis has been replaced with the 3 s gust. When dynamic response is to be determined, a single additional factor is determined.

The Joint Committee has considered exhaustive research and testing information from Australian, New Zealand and overseas sources in the preparation of this Standard. The design wind actions prescribed in this Standard are the minimum for the general cases described.

Particular acknowledgment should be given to Monash University, University of Queensland, James Cook University, Curtin University of Technology, Building Research Association of New Zealand, Bureau of Meteorology (Aust) and National Institute of Water and Atmospheric Research (NZ) for their contributions to the drafting of this Standard.

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 and figures are deemed to be an integral part of this Standard.

Notes to the text contain information and guidance and are not considered to be an integral part of the Standard.

- A1 | Essentially, AS/NZS 1170.2 is independent of the design requirement specified—thus becoming a purely technical document. It may be used to calculate wind speeds, wind pressures and wind forces given *any* annual probability of exceedance. The annual probability of exceedance (P) defines the wind event (in which pressures and forces occur). Thus a major wind storm with an annual probability of exceedance in the range of 1/200 to 1/2500 is used for ultimate limit states, while a much more frequent wind event (say of 1/25) might be used for serviceability limit states.

^{A1} In AS/NZS 1170.2, Table 3.1 gives the regional wind speeds for selected annual probabilities of exceedance and Section 2 sets out the determination of site wind speeds, design wind speeds, design wind pressures and wind actions (forces or loads) that are appropriate for the annual probability specified.

The annual probability of exceedance is not defined in AS/NZS 1170.2, but is set out in AS/NZS 1170.0 [and by further reference for ultimate limit states in the BCA (Table of annual probabilities of exceedance) and in the Guide to the BCA (examples of structures for importance levels)]. AS/NZS 1170.0 gives the annual probability of exceedance for New Zealand structures and for Australian structures not covered by the BCA. Guidance for serviceability events and associated limits is given in an informative Appendix of AS/NZS 1170.0 for loads associated with an appropriate annual probability of exceedance (P) for serviceability.

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S E C T I O N 1 G E N E R A L

1.1 SCOPE

This Standard sets out procedures for determining wind speeds and resulting wind actions to be used in the structural design of structures subjected to wind actions other than those caused by tornadoes.

The Standard covers structures within the following criteria:

- (a) Buildings less than 200 m high.
- (b) Structures with roof spans less than 100 m.
- (c) Structures other than offshore structures, bridges and transmission towers.

NOTES:

1 This Standard is a stand-alone document for structures within the above criteria. It may be used, in general, for all structures but other information may be necessary. Guidance on wind tunnel testing, reliable references and alternative data is given in AS/NZS 1170.2 Supp 1, *Structural design actions—Wind actions—Commentary* (Supplement to AS/NZS 1170.2:2002).

2 Where structures have natural frequencies less than 1 Hz, Section 6 requires dynamic analysis to be carried out (see Section 6).

A1 | 3 In this document, the words 'this Standard' indicate AS/NZS 1170.2, which is regarded as Part 2 of the AS/NZS 1170 series of Standards (see Preface).

1.2 APPLICATION

This Standard shall be read in conjunction with AS/NZS 1170.0.

This Standard may be used as a means for demonstrating compliance with the Requirements of Part B1 of the Building Code of Australia.

A1 | NOTE: Use of methods or information not given in this Standard should be justified by a special study (see AS/NZS 1170.0).

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 4040 Methods of testing sheet roof and wall cladding
- 4040.3 Part 3: Resistance to wind pressures for cyclone regions

AS/NZS

- 1170 Structural design actions
- 1170.0 Part 0: General principles