AS/NZS 1170.2:2021

STANDARDS NEW ZEALAND
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STANDARDS Australia

Australian/New Zealand Standard™

# Structural design actions

## Part 2: Wind actions

AS/NZS 1170.2:2021

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 19 July 2021 and by the New Zealand Standards Approval Board on 2 June 2021.

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Australasian Wind Engineering Society
Australian Building Codes Board
Australian Steel Institute
Bureau of Steel Manufacturers of Australia
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Concrete Masonry Association of Australia
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Australian/New Zealand Standard™

# Structural design actions

## Part 2: Wind actions

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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/NZS 1170.2:2011.

The objective of this Standard is to provide 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 are to be taken into consideration.

The objectives of this revision are to remove ambiguities, and to incorporate recent research and experiences from recent severe wind events in Australia and New Zealand.

This Standard is Part 2 of the *Structural design actions* series, which comprises the following parts:

AS/NZS 1170.0, *Structural design actions, Part 0: General principles*

AS/NZS 1170.1, *Structural design actions, Part 1: Permanent, imposed and other actions*

AS/NZS 1170.2, *Structural design actions, Part 2: Wind actions*

AS/NZS 1170.3, *Structural design actions, Part 3: Snow and ice actions*

AS 1170.4, *Structural design actions, Part 4: Earthquake actions in Australia*

NZS 1170.5, *Structural design actions, Part 5: Earthquake actions — New Zealand*

The wind speeds provided are based on analysis of existing data. The major changes in this edition are as follows:

(a) Definitions and notation have been moved to Clauses 1.4 and 1.5 respectively and new definitions and notation added. Appendices C to G have been re-labelled as Appendices A to E.

(b) Structures covered by and excluded from this Standard have been clarified in Clause 1.1.

(c) The aerodynamic shape factor is now denoted as $C_{shp}$ (in previous editions it was $C_{fig}$).

(d) A climate change multiplier ($M_c$) has been included (Equation 2.2 and Clause 3.4), with a current value of 1.05 for cyclonic regions. The uncertainty factors $F_C$ and $F_D$ for cyclonic regions have been removed.

(e) The ground level datum for buildings on sloping or excavated sites has been clarified. Average roof height for buildings with two or more roofs has been clarified.

(f) Windborne debris impact speeds when the impacted surface is not vertical or horizontal have been provided (Clause 2.5.8).

(g) New regional boundaries for Australia and New Zealand have been defined with new Regions A0, B, B2, NZ1, NZ2, NZ3, and NZ4 [Figures 3.1(A) and 3.1(B)].

(h) Interpolation between boundaries, according to distance from the coastline, is allowed in Regions C and D [Table 3.1(A)]. Regional wind speeds for New Zealand have been revised [Table 3.1(B)].

(i) Wind direction multipliers ($M_d$) have been revised for all regions in Australia and New Zealand. The wind direction multiplier ($M_d$) has been set to 1.0 for circular or polygonal chimneys, tanks and poles.

(j) Terrain Category 1.5 has been removed. Terrain Category 1 has been re-defined to include all over-water surfaces. The description of Terrain Category 2.5 has been revised (Clause 4.2).

(k) Terrain-height multipliers ($M_{z,cat}$), and turbulence intensities, for Terrain Category 1 have been reduced to reflect observed values of gust factors and turbulence intensities for over-water winds.

(l) Terrain-height multipliers for Region A0 have been revised to reflect measured wind gust profiles measured in convective downdrafts.

(m) The shielding multiplier ($M_s$) has been set to 1.0 for buildings greater than 25 m in height, and for buildings on steep slopes.

(n) The topographic multiplier ($M_t$) has been reduced in Region A0.

(o) New lee effect multipliers and zones have been defined for New Zealand.

(p) A new clause (Clause 5.3.4) has been added for an open area/volume factor. This allows some reduction in peak internal pressure for buildings with large internal volumes and small opening areas.

(q) Values of area reduction factor ($K_a$) have been included for windward and leeward walls (Clause 5.4.2).

(r) The reference area $a$ for local pressure factors has been changed for roofs of large low-rise buildings. A new local pressure case (RC2) has been introduced for the windward end of high-pitched gable roofs (Clause 5.4.4).

(s) Further clarification of the applicability of Section 6 has been given in Clause 6.1. Highly dynamically wind-sensitive structures are excluded.

(t) New methods are provided for the dynamic response factor for the along-wind response of poles or masts with headframes, and for long span horizontal structures.

(u) The equations for the crosswind force spectrum coefficient ($C_{fs}$) for tall buildings with rectangular cross-sections have been revised (Clause 6.3.2.3). A new more accurate method for the crosswind response of chimneys, poles and masts of circular cross-section has been introduced (Clause 6.3.3).

(v) A new method for the combination of along-wind and crosswind base moments has been introduced (Clause 6.4.1).

(w) Some alternate values of external pressure coefficient ($C_{p,e}$) for saw-tooth roofed buildings have been included (Clause A.2).

(x) The external pressure coefficients for curved roofs have been revised (Table A.3).

(y) New net pressure coefficients ($C_{p,n}$) have been provided for conical canopies (Clause B.3.3), and for arrays of inclined ground-mounted solar panels.

(z) New Notes have been added in Appendix C for determination of wind loads on complex, porous industrial plants, and warnings regarding crosswind response of rectangular sections.

(aa) New informative Clauses have been added to Appendix E for rotational velocities (Clause E.4), peak torsional accelerations (Clause E.5) and combined peak accelerations (Clause E.6).

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

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.

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

# Contents

**Preface** ..... **ii**

**Section 1 Scope and general** ..... **1**
1.1 Scope ..... 1
1.2 Application ..... 1
1.3 Normative references ..... 2
1.4 Terms and definitions ..... 2
1.5 Notation ..... 7
1.6 Determination of wind actions ..... 14
1.7 Units ..... 15

**Section 2 Calculation of wind actions** ..... **16**
2.1 General ..... 16
2.2 Site wind speed ..... 16
2.3 Design wind speed ..... 16
2.4 Design wind pressure and distributed forces ..... 19
2.4.1 Design wind pressures ..... 19
2.4.2 Design frictional drag force per unit area ..... 20
2.5 Wind actions ..... 20
2.5.1 General ..... 20
2.5.2 Directions ..... 20
2.5.3 Forces on surfaces or structural elements ..... 20
2.5.4 Forces and moments on complete structures ..... 21
2.5.5 Number of stress exceedances produced by wind loading ..... 21
2.5.6 Performance of cladding elements sensitive to low-cycle fatigue ..... 22
2.5.7 Deflections of dynamically wind-sensitive structures ..... 22
2.5.8 Impact loading from windborne debris ..... 23

**Section 3 Regional wind speeds** ..... **24**
3.1 General ..... 24
3.2 Regional wind speeds ($V_R$) ..... 24
3.3 Wind direction multiplier ($M_d$) ..... 26
3.4 Climate change multiplier ($M_c$) ..... 27

**Section 4 Site exposure multipliers** ..... **30**
4.1 General ..... 30
4.2 Terrain/height multiplier ($M_{z,cat}$) ..... 30
4.2.1 Terrain category definitions ..... 30
4.2.2 Determination of terrain/height multiplier ($M_{z,cat}$) ..... 30
4.2.3 Averaging of terrain categories and terrain-height multipliers ..... 31
4.3 Shielding multiplier ($M_s$) ..... 32
4.3.1 General ..... 32
4.3.2 Buildings providing shielding ..... 33
4.3.3 Shielding parameter ($s$) ..... 33
4.4 Topographic multiplier ($M_t$) ..... 33
4.4.1 General ..... 33
4.4.2 Hill-shape multiplier ($M_h$) ..... 34
4.4.3 Lee multiplier ($M_{lee}$) ..... 36

**Section 5 Aerodynamic shape factor** ..... **40**
5.1 General ..... 40
5.2 Evaluation of aerodynamic shape factor ..... 41
5.3 Internal pressure for enclosed rectangular buildings ..... 42
5.3.1 Internal pressure ..... 42
5.3.2 Openings ..... 43
5.3.3 Internal walls and ceilings ..... 44
5.3.4 Open area/volume factor, $K_v$ ..... 46
5.4 External pressures for enclosed rectangular buildings ..... 47

5.4.1 External pressure coefficients ($C_{p,e}$) 47
5.4.2 Area reduction factor ($K_a$) for roofs and walls 51
5.4.3 Action combination factor ($K_c$) 52
5.4.4 Local pressure factor ($K_\ell$) for cladding 53
5.4.5 Permeable cladding reduction factor ($K_p$) for roofs and side walls 56
5.5 Frictional drag forces for enclosed buildings 56

**Section 6 Dynamic response factor 58**
6.1 Introduction 58
6.2 Structures for which $C_{dyn}$ = 1.0 58
6.3 Other structures 58
6.4 Along-wind response 59
6.4.1 Dynamic response factor ($C_{dyn}$) for tall buildings and free-standing towers 59
6.4.2 Dynamic response factor for towers, poles and masts with head frames ($C_{dyn}$) 61
6.4.3 Dynamic response factor for horizontal slender structures ($C_{dyn}$) 62
6.5 Crosswind response 62
6.5.1 General 62
6.5.2 Crosswind response of tall enclosed buildings and towers of rectangular cross-section 63
6.5.3 Crosswind response of cantilevered chimneys, masts and poles of circular cross-section 67
6.6 Combination of along-wind and crosswind response 68
6.6.1 Combination of base moments 68
6.6.2 Combination of load effects 69

**Appendix A** (normative) **Additional pressure coefficients for enclosed buildings 70**

**Appendix B** (normative) **Freestanding walls, hoardings, canopies and solar panels 77**

**Appendix C** (normative) **Aerodynamic shape factors for exposed structural members, frames and lattice towers 92**

**Appendix D** (normative) **Flags and circular shapes 106**

**Appendix E** (informative) **Accelerations and rotational velocities for wind-sensitive structures 108**

**Bibliography 112**

# Australian/New Zealand Standard

## Structural design actions

## Part 2: Wind actions

## Section 1 Scope and general

### 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 and towers less than or equal to 200 m high.

(b) Structures with unsupported roof spans of less than 100 m.

(c) Offshore structures within 30 km from the nearest coastline.

(d) Other structures apart from: offshore structures more than 30 km from the nearest coastline, bridges, windfarm structures and power transmission and distribution structures, including supporting towers and poles.

NOTE 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.

NOTE 2 If a tall building has a natural frequency less than 1 Hz, Section 6 requires dynamic analysis to be carried out. For other structures, such as lighting poles, dynamic analysis may be required even if the first-mode frequency exceeds 1 Hz (see limits in Clause 6.1).

NOTE 3 For structures excluded by (a) and (b), specialist techniques, including wind-tunnel testing, are required. Further advice, which may include wind-tunnel testing, also should be sought for roofs with unusual geometries or support systems, or the roofs of podiums at the base of tall buildings.

NOTE 4 For structures excluded by (c), wind loads are specified by other Australian or New Zealand Standards (bridges and power transmission and distribution structures), or by international standards (structures more than 30 km offshore, and windfarm structures). These may draw on this Standard for some aspects of wind load determination.

NOTE 5 Structures on any island territory of Australia and New Zealand, and offshore structures within 30 km of the shoreline of any of those territories, are covered by this Standard.

NOTE 6 In this document, the words "this Standard" indicates AS/NZS 1170.2, which is Part 2 of the AS/NZS 1170 series (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 conformance with the requirements of Part B1 of the National Construction Code (Australia).

NOTE Use of methods or information not given in this Standard should be justified by a special study (refer to AS/NZS 1170.0, Appendix A).