AS/NZS 1170.3 Supp 1:2003

AS/NZS 1170.3 Supplement 1:2003

Structural design actions—Snow and ice actions—Commentary (Supplement to AS/NZS 1170.3:2003)





AS/NZS 1170.3 Supp 1:2003

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PREFACE

This Commentary was prepared by the Joint Standards Australia/Standards New Zealand Committee BD-006, General Design Requirements and Loading on Structures, as a Supplement to AS/NZS 1170.3:2003 *Structural design actions*, Part 3: *Snow and ice actions*. This Commentary supersedes AS 1170.3—1990, *Minimum design loads on structures*—*Snow loads*—*Commentary* (Supplement to AS 1170.3—1990) and, in part, NZS 4203:1992, Code of practice for general structural design and design loadings for buildings (Vol. 2).

The Commentary provides background material and guidance to the requirements of the Standard.

The clause numbers of this Commentary are prefixed by the letter 'C' to distinguish them from references to the Standard clauses to which they directly relate. Where a Commentary to a certain Clause is non-existent, it is because no explanation of the Clause is necessary.

It also provides advice and guidance on certain types of snow loads that cannot at this stage be covered by the Standard requirements (see Appendix CB on avoidance of common problems).

Worked examples that illustrate the application of some of the requirements of the Standard are given in Appendix CD.

ACKNOWLEDGEMENT

Standards Australia wishes to acknowledge and thank the following member who has contributed significantly to this Commentary:

Professor Peter Moss.

The photographs reproduced in Appendix CB of this Commentary were originally published in HB106: *Guidelines for Design of Structures in Snow Areas*, produced by the Institution of Engineers Australia. They are included here courtesy of the Institution of Engineers Australia and the Kosciusko National Parks and Wildlife Service.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard Structural design actions—Snow and ice actions—Commentary (Supplement to AS/NZS 1170.3:2003)

SECTION 1 SCOPE AND GENERAL

C1.1 SCOPE

This Commentary is intended to be read in conjunction with AS/NZS 1170.3:2003 (Ref. 1). The Commentary includes explanations of the provisions of AS/NZS 1170.3 and, in some cases, suggests approaches that may satisfy the intent of the Standard. Commentary Clauses are not mandatory.

Appendices contain additional information on design and worked examples as follows (see also HB 106 (Ref. 3)):

- (a) Appendix CA—background to the loading equations and format of the Standard, including extracts from ISO 4355 (Ref. 2).
- (b) Appendix CB—common problems and their avoidance.
- (c) Appendix CC—methods for determining terrain classification.
- (d) Appendix CD—worked examples.

For assessment of snow action, the Standard considers the uniform snow that accumulates under calm air conditions, the shape of the roof and the snow pattern on the roof caused by windy conditions. For vertical loads on roofs, these influences are described in terms of shape coefficients (μ_i).

Methods are given for use in alpine areas where snow may accumulate for 3 or 4 months and for sub-alpine areas where it only lasts for a few days. Sub-alpine areas are where wind speeds are high and weather conditions are such that all the snow normally melts and clears between individual weather systems.

A load case corresponding to severe imbalances resulting from snow removal, redistribution, sliding, melting, etc. (e.g., zero snow load on specific parts of the roof) should always be considered. Such considerations are important for structures that are sensitive to the form of the load distribution (e.g., curved roofs, arches, domes or other structures).

C1.2 APPLICATION

C1.3 REFERENCED DOCUMENTS

Documents referred to in this Supplement are as follows:

- 1 AS/NZS 1170.3, *Structural design actions*, Part 3: *Snow and ice actions*, Standards Australia.
- 2 ISO 4355, *Bases for design of structures*—Determination of snow loads on roofs, International Organization for Standardization.
- 3 HB 106, *Guidelines for design of structures in snow areas*, Standards Australia.

- 5 ISO 3898, *Bases for design of structures—Notations—General symbols*, International Organization for Standardization.
- 6 AS/NZS 1170.2, Structural design actions Part 2: Wind actions, Standards Australia.
- 7 ISO 12494, *Atmospheric icing of structures*, International Organization for Standardization.
- 8 PHAM, L., Statistical Analysis of Australian Ground Snow Load for Structural Design First National Structural Engineering Conference 1987, Melbourne (conference papers).
- 9 EN 1991-2-3, Basis of design and actions on structures Part 2.3: Actions on structures—Snow loads, European Committee for Standardization.
- 10 McCLUNG, D.M., LARSEN, J.O. and HANSEN, S.B.; Comparison of Snow Pressure Measurements and Theoretical Predictions; Canadian Geotechnical Journal 21, Pages 250-258 (1984).
- 11 LARSEN, J.O., McCLUNG, D.M. and HANSEN, S.B.; *The Temporal and Spatial Variation of Snow Pressure on Structures*; Canadian Geotechnical Journal 22, Pages 166-171 (1985).

C1.4 DETERMINATION OF DESIGN ACTIONS

Where the Standard does not give a specific value for a design parameter or does not cover the particular circumstances of the design, a special study may be carried out. Parameters that may be established by a special study include the following:

- (a) Snow load or ice accumulation (using reliable data on snow depth and density or ice build-up and density at a particular site).
- (b) Values of other parameters (e.g., shape coefficients).

AS/NZS 1170.0 (Ref. 4) gives a procedure for carrying out special studies and on the use of testing. Special studies should be thoroughly documented in order to achieve an equivalent level of confidence in the resulting information as that achieved using the Clauses of the Standard (AS/NZS 1170.3).

C1.5 DEFINITIONS

All the definitions given in the Standard are drawn from ISO 4355 (Ref. 2), except those given for alpine regions and sub-alpine regions. Additional terms used in this supplement are as follows.

C1.5.1 Glaze

Clear high-density ice.

C1.5.2 Rime

White ice with in-trapped air.

C1.6 UNITS

The units used in the Standard are based on the SI units of metres, seconds, newtons and pascals.