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Guidelines for the development of limit states design standards

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Preface

This is the second edition of CSA S408, *Guidelines for the development of limit states design standards.* It supersedes the first edition, published in 1981 under the title *Guidelines for the Development of Limit States Design*.

The limit states design method is based on ISO 2394 and ISO 22111. CSA 408 is intended for individuals developing Canadian limit states design standards and should be read by all structural design engineers practicing in Canada. It provides the basis for understanding the safety and reliability implicit in Canadian and international design standards. The advantages of the limit states design method include the following:

(a) The designer is provided with a better understanding of fundamental performance requirements and of the behaviour of a structure in meeting those requirements. This enables the designer to exercise better judgment in the design and evaluation of structures used for different purposes and subjected to different environmental conditions. It also makes it easier to teach design criteria given in codes and standards.
(b) A consistent approach is provided for civil engineering structural standards and, through this consistency, the design of composite structures made of different materials is simplified.
(c) Reliability is based on the statistical evaluation of loads and resistances, thus avoiding both under- and over-design and resulting in relatively uniform margins of safety for given types of structures.
(d) Life safety and economy are emphasized, thus creating a better basis for comparing different technological criteria.

These Guidelines contain terminology and symbols recommended for use in Canadian structural design codes and standards to coordinate and simplify the development of limit states design standards. These Guidelines do not always follow existing limit states design criteria as contained in the *National Building Code of Canada* or other CSA Standards; they are intended as a common basis for future codes and standards.

Annexes A, B, and C contain additional information on specific aspects of limit states design. Annex A is a commentary to these Guidelines. Annex B describes methods to calculate resistance factors for new materials or new forms of construction and to investigate the reliability of existing or exceptional structures. Annex C provides information on the application of limit states design for durability based on ISO 13823.

CSA gratefully acknowledges the technical contributions received from the following individuals during the public consultation period: A. Agarwal, A. Dalgliesh, D. Gagnon, E. Jones, D. Laird, P. Lepper, Z. Lounis, R. Loov, A. Metten, and M. Wong. Funding for the development and publication of these Guidelines was generously provided by the Canadian Institute of Steel Construction, Canadian Masonry Design Centre, Canadian Wood Council, Cement Association of Canada, and Public Works Government Services Canada.

These Guidelines were prepared by the Technical Committee on the Guidelines for Limit States Design under the jurisdiction of the Strategic Steering Committee on Structures (Design).

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Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Special Publication is stated in its Scope, it is important to note that it remains the responsibility of the users of the Special Publication to judge its suitability for their particular purpose.*

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1 Scope

1.1
These Guidelines provide recommendations for the development of codes and standards used for the design and evaluation of civil engineering structures such as buildings, industrial structures, bridges, earth- and water-retaining structures, towers, chimneys, and poles. These recommendations are intended to ensure the adequate and consistent provision of safety and serviceability, regardless of the type of material, construction, or use of the structure.

1.2
In these Guidelines, "should" is used to express a recommendation or that which is advised but not required; "may" is used to express an option or that which is permissible within the limits of the Guidelines; and "can" is used to express possibility or capability.

2 Reference publications
These Guidelines refer to the following publications, and where such reference is made, it is to the edition listed below, including all amendments published thereto.

CSA (Canadian Standards Association)
A23.1-09/A23.2-09
Concrete materials and methods on concrete construction/Test methods and standard practices for concrete

G40.20-04/G40.21-04 (R2009)
General requirements for rolled or welded steel

CAN/CSA-S6-06
Canadian Highway Bridge Design Code

S6.1-06
Commentary on CAN/CSA-S6-06, Canadian Highway Bridge Design Code

S16-09
Design of steel structures

S478-95 (R2007)
Guideline on durability in buildings

AASHTO (American Association of State Highway and Transportation Officials)
AASHTO Guide for Commonly Recognized Structural Elements, 1998 (Rev. 2002)