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Concrete materials and methods of concrete construction/Test methods and standard practices for concrete

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C.A. Rogers	Beeton, Ontario	
J. Rutherford	Grace Canada Inc., Vancouver, British Columbia	
H.C. Schell	Ontario Ministry of Transportation, Toronto, Ontario	
U. Schutz	Holcim (Canada) Inc., Concord, Ontario	<i>Associate</i>
M. Shehata	Ryerson University, Toronto, Ontario	
F.H. Shrimmer	Golder Associates Ltd., Burnaby, British Columbia	<i>Associate</i>
J. Silvestri	Halsall Associates Ltd., Toronto, Ontario	<i>Associate</i>
F. Strang	New Brunswick Department of Transportation, Fredericton, New Brunswick	
M. Thomas	University of New Brunswick, Fredericton, New Brunswick	

P.R. Trunk	Dufferin Concrete/Aggregate, Concord, Ontario	
S. Updegrave	PCL Construction Management Inc., Calgary, Alberta	<i>Associate</i>
P. Waisanen	exp Services Inc, Brampton, Ontario	
C.M. Wang	Grande Cache Coal, Calgary, Alberta	
T. Wehlend	ESSROC, Italcementi Group, Middlebranch, Ohio, USA	
P.S. Zacarias	Canada Building Materials Company a Division of St. Marys Cement Inc., Toronto, Ontario	
S. McDiarmid	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

Preface

This is the twelfth edition of the combined CSA A23.1/A23.2, *Concrete materials and methods of concrete construction/Test methods and standard practices for concrete*. These Standards are part of the CSA A23 series on concrete and supersede the previous editions published in 2009, 2004, 2000, 1994, 1990, 1977, 1973, 1967, 1960, 1942, and 1929. There have been many technical, editorial, and formatting changes throughout this edition; the most significant technical changes are as follows:

- (a) Inclusion of the ability to use blends of Portland-limestone cement and supplementary cementing materials for sulphate-classes of exposure (S-1, S-2, S-3). Such cementing materials are to be used with well-defined compositional and testing requirements, as outlined in [Clause 4.1.1.6.2](#) and [Tables 2, 3 and 7](#). This change follows upon the introduction of Portland-limestone cements in the 2009 A23.1 edition.
- (b) Refinement of the treatment of residential concrete (R classes of exposure), which is now integrated into the main tables (Tables 1 and 2), and improvements to the requirements of such concretes have been adopted (Table 2). This change follows upon the initial adoption of R class concretes into A23.1 in the 2009 version of this Standard. The reader's attention is drawn to Note 1 of [Clause 9.1](#).
- (c) Clarification of the various responsibilities for those involved in concrete construction are given within [Clause 4](#).
- (d) [Clause 4](#) now includes a provision for the option to optimize the gradation of the entire aggregate component (coarse and fine combined).
- (e) A new [Annex Q](#) outlines a simple method to optimize combined aggregate gradation.
- (f) More specific instructions concerning concrete temperature limits and construction requirements for cold- and hot-weather concreting are contained within [Clause 7](#).
- (g) Within [Clause 8](#), new sections deal with controlled low-strength material and shotcrete.
- (h) Two new exposure-classes of concrete are defined in [Tables 1 and 2](#): N-CF class pertains to interior concrete floors with a steel-trowel finish and A-XL, similar to the C-XL class, is for structurally reinforced concrete exposed to manure or silage gases or both.
- (i) Other significant modifications to the technical requirements of the various exposure classes can be found in [Table 2](#).
- (j) A new [Annex O](#) on aggregates made from recycled concrete for use in hydraulic cement concrete has been added.
- (k) A new [Annex P](#) provides information on the impact of sulphides in concrete aggregates on concrete behaviour.
- (l) A new [Annex R](#) provides guidelines for residential concrete construction. This Annex reinstates much of the construction guidance previously found in the CSA A438 standard, which has been withdrawn.
- (m) For CSA A23.2, there has generally been an extensive review, restructuring, and modernization of this Standard to provide a consistent suite of relevant test methods.
- (n) Two new test methods have been added to CSA A23.2: A23.2-22C, *Scaling resistance of concrete surfaces exposed to deicing chemicals using mass loss*, and A23.2-23C, *Electrical indication of concrete's ability to resist chloride ion penetration*.

The Technical Committee includes representatives from most geographical areas of Canada and from all sectors of the industry: concrete producers, specifying and regulatory authorities, materials consultants, concrete testing laboratories, researchers, and teachers. The Technical Committee intends to review and update these Standards on a continuing basis and to maintain a close liaison with the CSA Technical Committees on Design of Concrete Structures and Cementing Materials.

CSA Group acknowledges that the development of this Standard was made possible in part by the financial support of the Canadian Ready Mixed Concrete Association, Axim Italcementi Group, BASF Canada, Euclid Admixture Canada Inc., Grace Canada Inc., and Sika Canada.

These Standards were prepared by the Technical Committee on Concrete Materials and Construction, under the jurisdiction of the Strategic Steering Committee on Concrete and Related Products, and have been formally approved by the Technical Committee.

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 Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- (3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
- (4) *To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:*
 - (a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
 - (b) *provide an explanation of circumstances surrounding the actual field condition; and*
 - (c) *where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.
- (5) *This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include “Proposal for change” in the subject line:*
 - (a) *Standard designation (number);*
 - (b) *relevant clause, table, and/or figure number;*
 - (c) *wording of the proposed change; and*
 - (d) *rationale for the change.*

A23.1-14
***Concrete materials and methods
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5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6
1-800-463-6727 • 416-747-4044*

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A23.1-14

Concrete materials and methods of concrete construction

0 Introduction

This Standard is intended to be used in its entirety. Caution should be exercised in extracting individual clauses and using them in project specifications, since taking them out of context can change their meaning.

A number of notes and several annexes, inserted for guidance, can in some cases be made mandatory by appropriate references in contract documents.

Many clauses provide alternatives and require choices to be made by the user of this Standard. The actual choices should be clearly identified in contract documents.

1 Scope

1.1 General

This Standard provides the requirements for materials and methods of construction for

- (a) cast-in-place concrete and concrete precast in the field; and
- (b) residential concrete used in the construction of buildings conforming to Part 9 of the *National Building Code of Canada (NBCC)*.

1.2

This Standard does not specify the following:

- (a) requirements for the design of concrete structures, which are provided in CSA A23.3 and CAN/CSA-S6;
- (b) designs of specialty concrete products, which are described in separate CSA Group Standards;
- (c) test methods for concrete, which are provided in CSA A23.2;
- (d) design provisions governing the fire resistance of reinforced concrete structures, which are set out in the *NBCC*;
- (e) requirements for the plant production of precast concrete, which are provided in CAN/CSA-A23.4; and
- (f) use of proprietary materials or methods of construction.

Note: *Proprietary materials or methods of construction may be permitted by the owner under a separate specification, provided that the quality of the resulting construction meets the minimum requirements of this Standard.*

1.3 Precasting of concrete in the field

1.3.1

At the option of the owner, precasting of concrete in the field or in a plant (temporary or permanent) is governed by this Standard or by CSA A23.4, except as limited by [Clauses 1.3.2, 1.3.3, and 1.3.4](#) of this Standard.

Note: *Guidelines for such a choice are provided in CSA A23.4.*