CSA Group

CSA N287.3:14
(reaffirmed 2019)

Design requirements for concrete containment structures for nuclear power plants

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Preface

This is the fourth edition of CSA N287.3, *Design requirements for concrete containment structures for nuclear power plants*. It supersedes the previous editions, published in 1993, 1982, and 1978 under the title *Design requirements for concrete containment structures for CANDU nuclear power plants*. The title has been changed to reflect a change in scope, from addressing only CANDU® reactors to including all types of nuclear power plants.

Note: *CANDU (CANada Deuterium Uranium) is a registered trademark of Atomic Energy of Canada Limited (AECL).*

This Standard specifies requirements for the design of concrete containment structures and addresses their beyond design basis assessment.

The CSA N-series of Standards provides an interlinked set of requirements for the management of nuclear facilities and activities. CSA N286 provides overall direction to management to develop and implement sound management practices and controls, while the other CSA nuclear Standards provide technical requirements and guidance that support the management system. This Standard works in harmony with CSA N286 and does not duplicate its generic requirements; however, it might provide more specific direction for those requirements.

The Standards in the CSA N287 series of Standards were initiated in response to a recognition by the utilities and industries concerned with nuclear power plant structures in Canada of a need for consistent standards for the design, construction, and testing of concrete containment structures for nuclear power plants.

The CSA N287 series of Standards consists of seven Standards. The objectives of each Standard are summarized as follows:

a) CSA N287.1-14 , *General requirements for concrete containment structures for nuclear power plants,* specifies general requirements for the design, construction, testing, and commissioning of concrete containment structures for nuclear power plants designated as class containment and is directed to the owners, designers, manufacturers, fabricators, and constructors of the concrete components and parts;
b) CSA N287.2-08, *Material requirements for concrete containment structures for CANDU nuclear power plants,* specifies requirements for materials used in concrete containment structures;
c) CSA N287.3-14, *Design requirements for concrete containment structures for nuclear power plants,* specifies requirements for the design of concrete containment structures;
d) CSA N287.4-09, *Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants,* specifies construction, fabrication, and installation requirements that apply to concrete containment structures of a containment system designated as class containment components, parts, and appurtenances for CANDU® nuclear power plants;
e) CSA N287.5-11, *Examination and testing requirements for concrete containment structures for nuclear power plants,* specifies examination and testing requirements that apply to the work of any organization participating in the construction, fabrication, or installation of parts or components of concrete containment structures for nuclear power plants;
f) CSA N287.6-11, *Pre-operational proof and leakage rate testing requirements for concrete containment structures for nuclear power plants,* specifies requirements for proof by demonstration, before first criticality, that the design and construction of a concrete containment structure are satisfactory with respect to quality and performance as demonstrated by achieving the specified requirements of CSA N287.6, including commissioning leakage rate target; and

g) CSA N287.7-08, *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants,* specifies uniform requirements whereby, through systematic and periodic examination, the structural and leak-tight integrity of concrete containment structures can be assessed as demonstrated by achieving the specified requirements of CSA N287.7, including the operational leakage rate target.

In general, the design of concrete containment structures is governed by the applicable requirements of CAN/CSA-A23.3, *Design of concrete structures*. CSA N287.3 gives the additional or modified requirements that are specific to concrete containment structures.

Users of this Standard are reminded that the design, manufacture, construction, commissioning, operation, and decommissioning of nuclear facilities in Canada are subject to the provisions of the *Nuclear Safety and Control Act* and its supporting Regulations. Thus, requirements additional to those specified in this Standard might be imposed by the Canadian Nuclear Safety Commission.

This Standard was prepared by the Subcommittee on Design Requirements for Concrete Containment Structures for Nuclear Power Plants, under the jurisdiction of the Technical Committee on Concrete Containment and Safety-Related Structures and the Strategic Steering Committee on Nuclear Standards, and has 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 periodic review five years from the date of publication, and 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.*

CSA N287.3:14
Design requirements for concrete containment structures for nuclear power plants

1 Scope

1.1

This Standard provides requirements for the design of concrete containment structures of a containment system, designated as "class containment" components and parts as defined in CSA N287.1, and addresses their beyond design basis assessment (BDBA).

Note: *This Standard is applicable to new nuclear power plants' concrete containment structures to be built in Canada. Application of the Standard to concrete containment structures to be built outside Canada is subject to approval of the authority having jurisdiction (AHJ). The application of the Standard to existing or operating nuclear power plants is as agreed upon by the owner/operator and the AHJ.*

1.2

In this Standard, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (nonmandatory) to define their application.

① 2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

CSA Group

A23.1-14/A23.2-14
Concrete materials and methods of concrete construction/Test methods and standard practices for concrete

A23.3-14
Design of concrete structures
Note: *Any reference to "CAN/CSA-A23.3" in this Standard should be replaced by "CSA A23.3".*