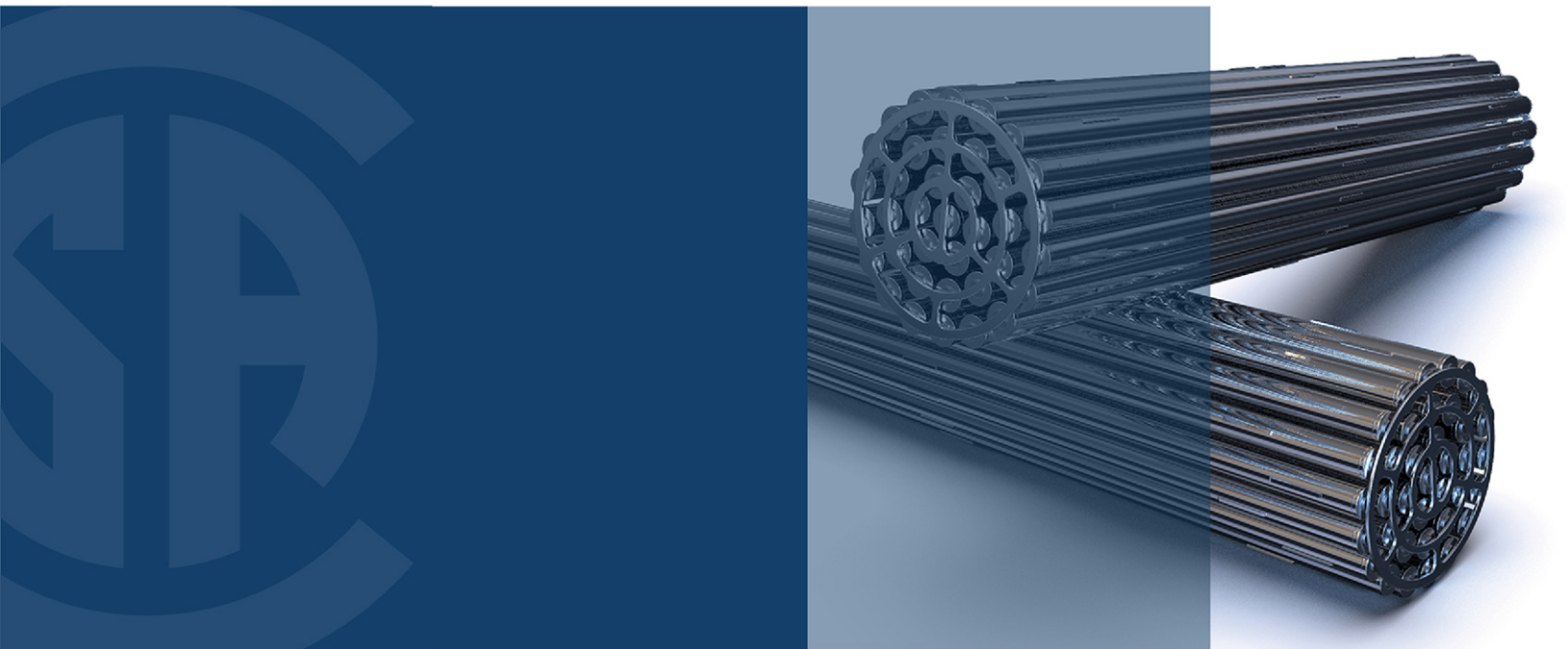




General requirements for seismic design and qualification of nuclear power plants



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Contents

Technical Committee on Seismic Design for Nuclear Power Plants	3
Subcommittee on General Requirements for Seismic Design and Qualification of CANDU Nuclear Power Plants	6
Preface	8
1 Scope	10
1.1 General	10
1.2 Application	10
1.3 Seismic hazard level for NPPs	10
1.4 Application to other nuclear facilities	10
1.5 Terminology	10
1.6 Additional terminology	11
2 Reference publications	11
3 Definitions and abbreviations	17
3.1 Definitions	17
3.2 Abbreviations	21
4 Application of the CSA N289 series of Standards	22
4.1 General	22
4.2 Application	22
4.3 Other Standards and specifications	23
5 General seismic requirements	23
5.1 General	23
5.2 Seismic classification	23
5.2.1 General	23
5.2.2 Safety functions	24
5.2.3 Basis for seismic categorization	25
5.2.4 Earthquake level	25
5.2.5 Selection of seismic category and earthquake level	25
5.2.6 Application of seismic ground motion to engineering design	26
5.2.7 Load combinations	26
5.3 Seismic qualification	27
5.3.1 General	27
5.3.2 Seismic qualification by analysis	28
5.3.3 Seismic qualification by testing	28
5.3.4 Seismic qualification by combined analysis and testing	28
5.3.5 Seismic qualification by similarity	29
5.3.6 Experience-based approach	29
5.3.7 Maintaining seismic qualification	30
5.3.8 Design modifications of seismically qualified SSCs	31
5.3.9 Readiness for beyond design basis seismic event	32
5.4 Seismic evaluation of plants	32

5.4.1	General	32
5.4.2	Seismic demand	33
5.4.3	Seismic capacity evaluation	33
5.4.4	Special requirements	33
5.4.5	Seismic margin assessment (SMA) methodology	34
5.4.6	Seismic probabilistic safety assessment (SPSA) methodology	34
6	Responsibilities and duties	34
6.1	Nuclear power plant operating organization	34
6.2	Manufacturer of nuclear power plant equipment and components	35
6.3	Architect/engineer of nuclear power plant structures	35
6.3.1	General	35
6.3.2	Qualification of seismic capability engineers	35
6.4	Installer of nuclear power plant systems and components	35
6.5	Operator response to seismic events	36
6.5.1	Post-seismic plant operations manual	36
6.5.2	Assessment of seismic shaking level	36
6.5.3	Immediate response	36
6.5.4	Earthquake notifications	36
6.5.5	Continued successful operation	36
6.5.6	Post-seismic recovery	37
6.5.7	Required operator actions	38
6.6	Documentation	39
7	Quality assurance	39

Annex A (informative)	— Sample seismic classification list	40
Annex B (informative)	— Ground motion representation for seismic qualification and evaluation	47
Annex C (informative)	— Seismic evaluation beyond design basis to demonstrate seismic ruggedness	52
Annex D (informative)	— Guidelines for seismic qualification by similarity and experience-based methods	66
Annex E (informative)	— Seismic design good practices	75
Annex F (informative)	— Readiness for beyond design basis seismic events	81

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Preface

This is the fourth edition of CSA N289.1, *General requirements for seismic design and qualification of nuclear power plants*. It supersedes the previous editions, published in 2018, 2008, and 1980.

The major changes to this edition include the following:

- methods of seismic qualification revised to include experience-based approach;
- definitions updated for consistency with other CSA Standards;
- Clause [C.4.3.2.6](#) updated to align with EPRI 3002010665;
- “a seismic event close to...the seismic design basis” clarified in Clause [6.5.6.1](#);
- Clause [5.3.7](#) p) revised to reference CSA N290.20 and address the operating organization’s aging-related degradation measures to assess the possible impact on seismic behaviour/qualification of safety-related structures, systems, and components (SSCs) during their seismic evaluation;
- new provisions added for addressing post-earthquake planning and response;
- requirements for seismic qualification by similarity enhanced to ensure that the method is adequately addressed in the Standard to be consistent with its use by industry; and
- guidelines for seismic qualification by similarity and earthquake experience-based methods clarified and expanded to document recognized, acceptable methodologies for seismic qualification and capability.

This Standard acts as an introduction to the CSA N289 series of Standards and supplements the Standards in this series with seismic qualification concepts and methodologies. Methods for evaluation of the seismic capacity of NPP safety-related structures, systems, and components (SSCs) are also described. In addition, this Standard incorporates methods developed for demonstrating that NPP safety-related SSCs possess seismic capacity with low probability of exceedance.

The CSA N289 series of Standards covers general requirements for seismic hazard evaluation, seismic design, qualification, evaluation, and testing and monitoring. This Standard is used in conjunction with the following CSA N289 series of Standards:

- CSA N289.2, *Ground motion determination for seismic qualification of nuclear power plants*;
- CSA N289.3, *Design procedures for seismic qualification of nuclear power plants*;
- CSA N289.4, *Testing procedures for seismic qualification of nuclear power plant structures, systems, and components*; and
- CSA N289.5, *Seismic instrumentation requirements for nuclear power plants and nuclear facilities*.

Note: *Automatic shutdown is not a seismic design requirement of the CSA N289 series of Standards; however, sufficient seismic monitoring instrumentation of high reliability, as specified in CSA N289.5, is needed to collect data in order to facilitate decision-making regarding continued safe operation. The data could also be used in conjunction with other indicators to trip a reactor.*

The CSA N289 series of Standards provides general requirements for safe response to earthquake ground motions by monitoring ground motions, quantifying effects, and initiating operator actions, and by requiring seismic qualification and design of nuclear safety-related SSCs.

Concrete containment structures (covered in the CSA N287 series of Standards), safety-related structures (covered in CSA N291), pressure-retaining systems and components (covered in CSA N285), and other systems and components required to safely shut down, cool, contain, and monitor the plant following a major earthquake should be seismically qualified using the CSA N289 series of Standards. The seismic requirements of the *National Building Code of Canada (NBC)* may be used for those parts of NPPs that have no effect on nuclear safety, though the operating organization may elect to use the CSA N289 series of Standards in place of the *NBC*.