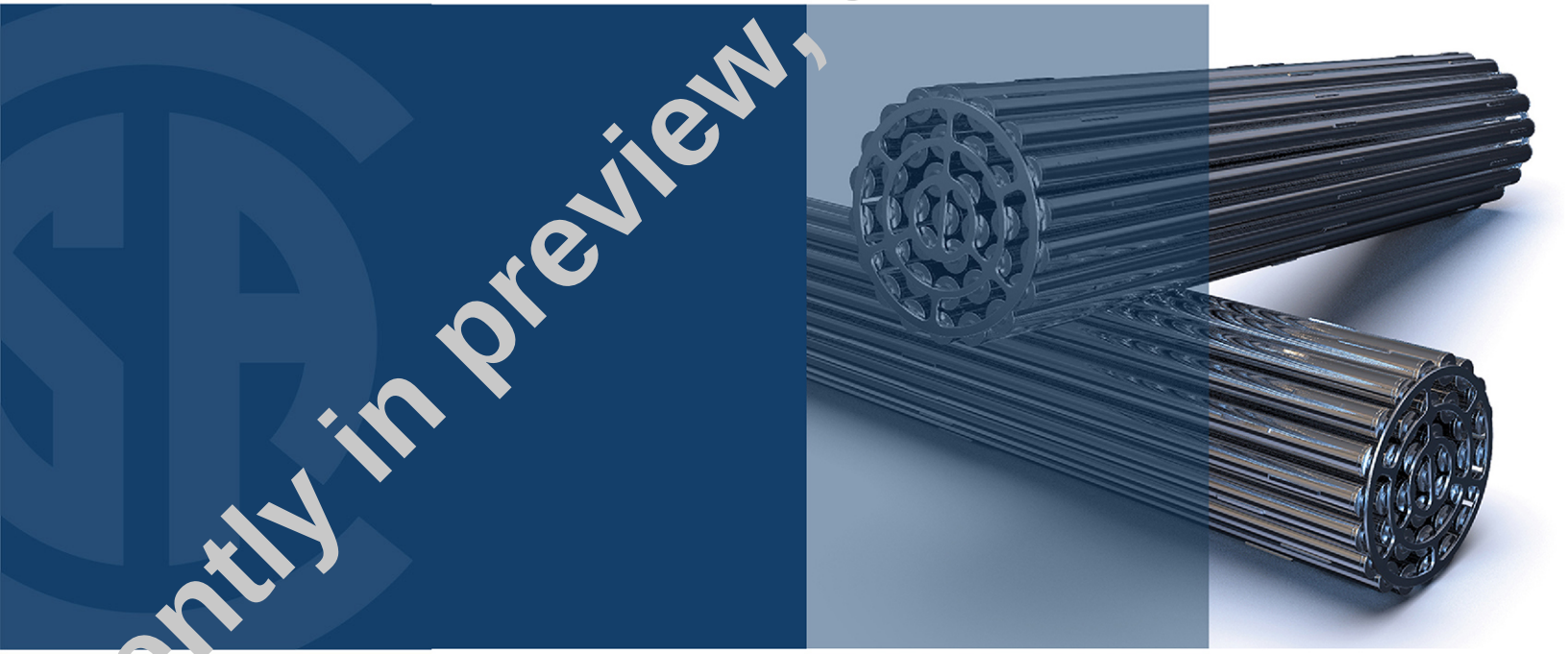
CSA N289.1:23

General requirements for seismic design and qualification of nuclear power plants



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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*.