

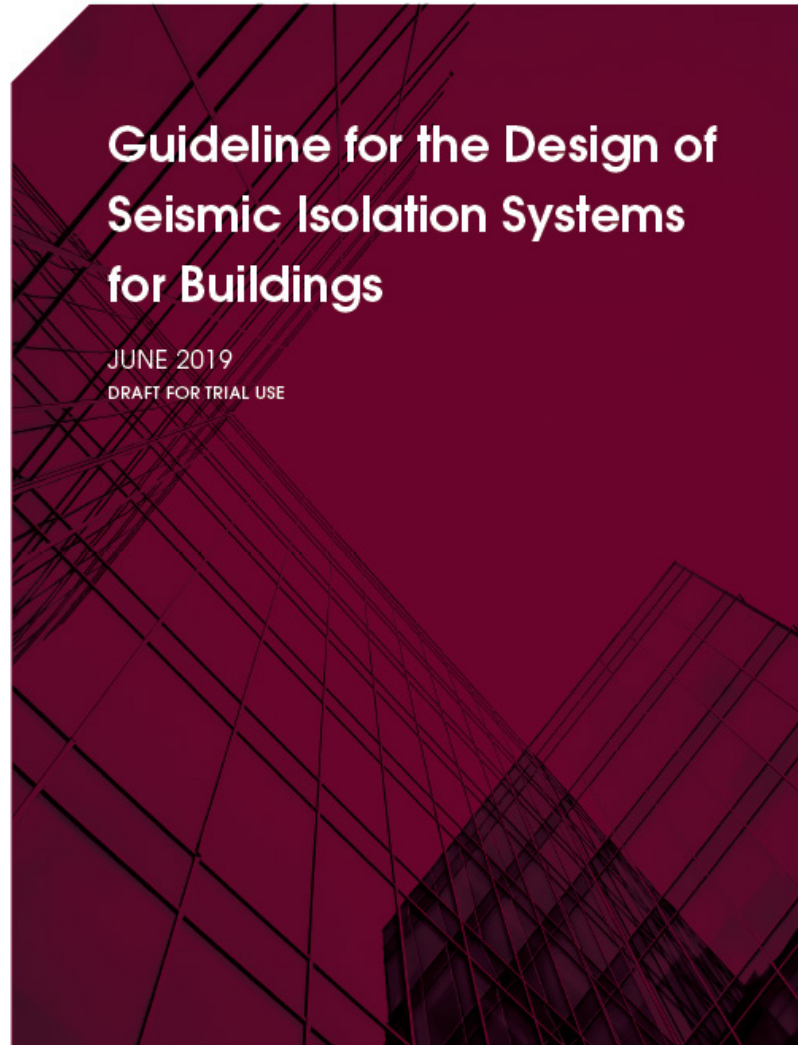


nzsee
NEW ZEALAND SOCIETY FOR
EARTHQUAKE ENGINEERING



Guideline for the Design of Seismic Isolation Systems for Buildings

JUNE 2019
DRAFT FOR TRIAL USE



Guideline for Buildings with Seismic Isolation

<https://www.nzsee.org.nz/wp-content/uploads/2019/06/2825-Seismic-Isolation-Guidelines-Digital.pdf>

- Supplements NZS 1170.5 (Earthquake actions)
- Displacement-based with period elongation and damping
- 4 system types – Simple, General, Complex, Brittle
- Analysis methods: simple SDOF ADRS, Modal Response Spectrum and NLRHA (time history)
- Design actions and step by step procedures for substructure, isolation & superstructure
- Includes inspection & maintenance, purchase specification for isolation system and devices
- Draft for Trial Use – now 5 years old!

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“Parts” of isolated structures

NZS 1170.5:2004

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8.2 DESIGN RESPONSE COEFFICIENT FOR PARTS

When the part is supported directly on the ground floor it shall be designed as a separate structure with design actions derived in accordance with Section 5 using the structural characteristics determined in Section 4.

In cases when the part is supported at level i of a structure, the design response coefficient for parts, $C_p(T_p)$ is the horizontal acceleration coefficient derived for the level of structure that provides support for the part. It shall be determined from Equation 8.2(1):

$$C_p(T_p) = C(0) C_{Hi} C_i(T_p) \quad \dots 8.2(1)$$

where

$C(0)$ = the site hazard coefficient for $T = 0$ determined from Clause 3.1, using the values for the modal response spectrum method and numerical integration time history methods

C_{Hi} = the floor height coefficient for level i , determined from Clause 8.3

T_p = the period of the part

$C_i(T_p)$ = the part spectral shape factor at level i , determined from Clause 8.4

5.8 Analysis of part of a building, and floor response spectra. ©

Parts of an isolated structure, permanent non-structural components and the attachments to them, and the attachments for permanent equipment supported by a structure should be analysed and designed to resist seismic forces and displacements based on the 'parts and components' loading of NZS 1170.5 Section 8 with the site hazard coefficient $C(0)$ modified to equate the peak design acceleration of the base slab just above the isolators for the required limit state (typically SLS and ULS will be required as a minimum).

Comments

- 5 years old ... time to remove “Draft”
- Isolation not the only protective technology
- Isolation + viscous damping - double reduction
- “0.3” Rules of thumb
 - 0.3% drift for onset of drift sensitive elements
 - 0.3g floor acceleration for force sensitive elements

Challenges for EQ Protective Technologies

- Increased seismic risk awareness and expectations
- Updated NSHM has increased seismic hazard estimates
- Limited experience of structural engineers
- Building Code compliance
- Specification, supply and testing of devices
- Earthquake insurance availability
- Sustainability and resilient infrastructure demands

END