

[Submit a comment](#)

Proposed Change 1874

Code Reference(s):	NBC20 Div.B 3.1.7.5. (first printing)
Subject:	Combustible Construction — Fire Protection and Safety
Title:	Fire Protection of Seismic Isolation Systems
Description:	This proposed change introduces explanatory Note A-3.1.7.5.(1) to clarify that seismic isolators are subject to the same fire protection requirements as other loadbearing building elements.

This change could potentially affect the following topic areas:

- | | |
|--|---|
| <input type="checkbox"/> Division A | <input checked="" type="checkbox"/> Division B |
| <input type="checkbox"/> Division C | <input checked="" type="checkbox"/> Design and Construction |
| <input type="checkbox"/> Building operations | <input type="checkbox"/> Housing |
| <input type="checkbox"/> Small Buildings | <input checked="" type="checkbox"/> Large Buildings |
| <input checked="" type="checkbox"/> Fire Protection | <input type="checkbox"/> Occupant safety in use |
| <input type="checkbox"/> Accessibility | <input type="checkbox"/> Structural Requirements |
| <input type="checkbox"/> Building Envelope | <input type="checkbox"/> Energy Efficiency |
| <input type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing |
| | <input type="checkbox"/> Construction and Demolition Sites |

Problem

The use of seismic isolation systems is becoming more prevalent in Canada. Particularly, they are being used for the seismic retrofit or upgrade of heritage buildings to improve the buildings' seismic performance.

Seismic isolators are installed at the isolation plane in line with loadbearing elements of the structure that transfer gravity loads. There is confusion within the design community about the extent to which seismic isolators are required to be protected from fire exposure, as well as how to achieve that protection. There are few if any listed methods or systems available.

Clarification is needed in the Code to confirm that seismic isolators are subject to fire protection requirements. Otherwise, they may be damaged by fire and not able to perform as intended in terms of carrying certain loads and isolating others during an earthquake. The consequences of not having fire protection for seismic isolation systems may be severe for the building and its occupants.

Justification

A seismic isolator falls within the definition of a loadbearing building element according to Sentence 1.4.1.2.(1) of the National Building Code (NBC) 2020 by being subjected to or designed to carry loads in addition to its own dead load. Seismic isolators cannot only be considered connections because they also carry gravity loads. Therefore, seismic isolators are subject to the same fire-resistance requirements as other loadbearing building elements and must prevent both fire spread and collapse caused by the effects of fire in accordance with Article 3.1.7.5. and Subsection 3.2.2.

Guidance on the subject states: "All components of an isolation system that are located below a floor assembly required to have a fire-resistance rating must have a fire-resistance rating of no less than that required for the supported floor assembly. The fire-resistance rating of the components must also meet that required for loadbearing walls, columns and other gravity-bearing elements adjacent to the isolation system." [1]

Protecting seismic isolators from fire may be difficult because they move laterally during seismic events, require occasional inspection, and have few if any listed solutions. Despite these challenges, protecting seismic isolators from fire is the intention of the current provisions. The lack of available solutions should not negate the need for fire protection.

Adding an explanatory Note to Sentence 3.1.7.5.(1) would clarify that seismic isolators are subject to fire protection requirements because they carry gravity loads and are thus considered loadbearing building elements.

Reference

[1] "Commentary J: Design for Seismic Effects", *Structural Commentaries (User's Guide - NBC 2015: Part 4 of Division B)*, Canadian Commission on Building and Fire Codes, NRCC-CONST-56529E, 2017.

PROPOSED CHANGE

NBC20 Div.B 3.1.7.5. (first printing)

[3.1.7.5.] 3.1.7.5. Rating of Supporting Construction

- [1] 1)** Except as permitted by Sentence (2) and by Articles 3.2.2.20. to 3.2.2.92. for mixed types of construction, all *loadbearing* walls, columns and arches in the *storey* immediately below a floor or roof assembly required to have a *fire-resistance rating* shall have a *fire-resistance rating* not less than that required for the supported floor or roof assembly. [\(See Note A-3.1.7.5.\(1\).\)](#)
- [2] 2)** *Loadbearing* walls, columns and arches supporting a *service room* or *service space* need not conform to Sentence (1).
- [3] 3)** Except as provided in Sentence (4) and except for *noncombustible* roof assemblies required by Clauses 3.2.2.51.(2)(c) and 3.2.2.60.(2)(c), if an

assembly is required to be of *noncombustible construction* and have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

- [4] 4)** Except for portions of a *building* constructed in accordance with Article 3.2.2.7. that are required to be of *noncombustible construction*, assemblies of *noncombustible construction* in *buildings* or portions of *buildings* permitted to be of *encapsulated mass timber construction* are permitted to be supported by *encapsulated mass timber construction*.

Note A-3.1.7.5.(1) Fire Protection of Seismic Isolators.

Seismic isolators, which are installed not only to allow controlled building movement during seismic events but also to carry gravity loads, should have the same degree of fire protection (i.e., fire-resistance rating) as the loadbearing walls, columns and arches of the building.

Impact analysis

This proposed change would clarify for Code users that seismic isolators must be considered loadbearing elements instead of as connectors. This clarification would improve consistency in interpretation of the Code requirement, which could facilitate its enforcement.

This proposed change is not expected to entail costs not otherwise intended by the current Code provision. However, until there is a full range of options to ensure that seismic isolators are protected from fire, project-specific testing (estimated at \$25,000) may be required to demonstrate that a proposed solution meets the level of performance required by the Code. Otherwise, seismic isolators may not be a workable solution for some projects.

This proposed change could encourage manufacturers to develop fire-protection solutions for seismic isolators, which could benefit the construction industry by fostering innovation and introducing additional paths for Code compliance.

Enforcement implications

Since the proposed explanatory Note would clarify the Code provision, there would be less confusion for and misinterpretation by regulators enforcing the Code requirement. This proposed change would help facilitate the consistent enforcement of the Code.

In some cases, a unique design could result in additional costs and complexity upon review by the authority having jurisdiction because the design may require special analysis as an alternative solution.

Who is affected

Designers, engineers, regulators, manufacturers, testing agencies, builders, contractors, occupants and fire services.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

NBC20 Div.B 3.1.7.5. (first printing)

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[1\]](#) 1) [F04-OS1.3]

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[1\]](#) 1) [F04-OP1.3]

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[2\]](#) 2) no attributions

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[3\]](#) 3) [F04-OS1.3]

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[3\]](#) 3) [F04-OP1.3]

[\[3.1.7.5.\]](#) 3.1.7.5. ([\[4\]](#) 4) no attributions