

<b>Title</b>	<b>Demonstrate knowledge of seismic restraint of HVAC systems and components</b>		
<b>Level</b>	<b>3</b>	<b>Credits</b>	<b>5</b>

<b>Purpose</b>	<p>This unit standard is intended primarily for use in the training of personnel in the heating, ventilating, and air conditioning (HVAC) industry and covers the principles of seismic restraint.</p> <p>People credited with this unit standard are able to demonstrate knowledge of: the purpose for seismic restraints of non-structural components of a building; the terminology associated with seismic restraint of non-structural components in buildings; and installation requirements and practices for seismic restraint of pipe-works, ducting, and components of HVAC systems.</p>
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<b>Classification</b>	Mechanical Engineering > Heating, Ventilating, and Air Conditioning
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<b>Available grade</b>	Achieved
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## Guidance Information

- References and legislation

The New Zealand Building Code. Available at: <https://www.building.govt.nz/building-code-compliance/building-code-and-handbooks/>.

NZS 4219:2009, *Seismic performance of engineering systems in buildings*. Available at [www.standards.govt.nz](http://www.standards.govt.nz).

Sheet Metal & Air Conditioning Contractors' National Association (SMACNA), *Seismic Restraint Manual: Guidelines for Mechanical Systems, 3<sup>rd</sup> Edition*. ISBN 9781617210754. Available at <https://www.smacna.org/>.

BRANZ, *Seismically Resilient Non-Structural Elements Project Process Fact Sheet 5*. Available at [https://www.branz.co.nz/cms\\_display.php](https://www.branz.co.nz/cms_display.php).

James R. Tauby, Richard Lloyd; *Practical guide to seismic restraint*, 2nd edition. American Society of Heating, Refrigerating and Air-Conditioning Engineers (January 2012). ISBN: 978-1-936504-18-3.
- Definition

*Seismic activity* for the purpose of this unit standard is defined as a sudden movement of the earth's crust or ground caused by earthquakes, earth tremors or vibrations, volcanic activity, or human activity.
- Assessment information

All evidence should be consistent with the references and must meet the requirements set out in the standard listed in the references and legislations section.

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## Outcomes and performance criteria

### Outcome 1

Demonstrate knowledge of the purpose for seismic restraints of non-structural components of a building.

#### Performance criteria

- 1.1 The purpose of restraining non-structural components in a building is described, including how the seismic restraint systems could affect the safety of the occupants of the structure during a seismic event.
- 1.2 The difference between seismic restraint and vibration isolation is described in terms of their function, and fixings and connections.

### Outcome 2

Demonstrate knowledge of the terminology associated with seismic restraint of non-structural components in buildings.

Range examples of terminology – anchor, brace, brittle component, capacity of an element, component, connection, ductility, ducting, earthquake load demand, engineering systems, fastener, fixing, linear component, longitudinal restraint, operating weight, orthogonal directions, proprietary equipment, relative displacement, resilient mount or support, rigid support, seismic restraint, seismic bracing, snubber, support, supporting structure, transverse restraint, thermal expansion, centre of gravity, clearances, transfers of vibration (vibration isolation), flexible connection;  
evidence of knowledge of a minimum of six terminologies is required.

#### Performance criteria

- 2.1 Common terminology associated with seismic restraint of non-structural components in buildings is explained.

### Outcome 3

Demonstrate knowledge of the installation requirements and practices for seismic restraint of pipe-works, ducting, and components of HVAC systems.

Range examples of components – cooling towers; air handling units; cooling and heating coils; fans; furnaces; gas, electric, and oil fired water and steam boilers; pumps; dampers; filters; compressors; condensers; chillers; controllers; sensors; diffusers; evaporators; valves; meters; flues; chimneys; grilles; air drives; fan coil units;  
examples of types of ducting – round, square/rectangular;  
examples of pipe material – copper, steel, plastic (polyvinyl chloride PVC, chlorinated polyvinyl chloride CPVC, cross-linked polyethylene PEX).

evidence of installation requirements for seismic restraint for a minimum of two different HVAC installation projects involving ducting, pipe, and at least four different components is required.

### Performance criteria

3.1 Installation requirements and practices for seismic restraint of pipe-works, ducting, and components of HVAC systems are described.

Range weight of pipes, ducting, and components; pipe material; duct type (round or rectangular); centre of gravity; support configuration of components; location of supports; elevation; clearances; bracing points; and types of supports (resilient, flexible, or rigid).

3.2 Specific requirements for HVAC system installations under section five of NZS 4219:2009 are described.

3.3 The purpose of, and requirements for Construction Producer Statements PS3 and PS4 are described.

<b>Planned review date</b>	31 December 2022
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### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	26 October 2017	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0013
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

### Comments on this unit standard

Please contact Competenz [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.