

AON SPRINKLER CERTIFICATION



Aon New Zealand

Aon Sprinkler Certification
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Aon Sprinkler Certification Technical Note		
Note Number: 09-04	Issue: 2	Date: 6 October 2010
Subject	Water Storage Tanks - Seismic Design	
Notice: Aon Sprinkler Certification Technical Notes provide guidance notes which may be used in certification of sprinkler installations by Aon New Zealand. If sprinkler installations are being certified by any other Sprinkler System Certifier, these Technical Notes may not apply.		

Following a review of a number of fire sprinkler system water storage tank failures in the Christchurch Region, Aon Sprinkler Certification provides the following advice on the installation of water storage tanks.

Aon visited a number of sites on 9 September. Both timber tanks and lined bolted steel tanks had been displaced by the earthquake (by up to 4m) which caused liner failure and in some cases, collapse.

A separate review of these failures is being carried out by a number of parties, including an engineer contracted by the Fire Protection Association to write a report on this earthquake.

Aon reinforces the need for all tanks to comply with the seismic provisions of the current edition of the Sprinkler Standard (NZS4541:2007) and the New Zealand Building Code.

NZS4541 states that *all components of the sprinkler system shall be designed and installed so as to remain operational at the earthquake loadings specified in NZS 1170.5 having regard to the seismic design of the building elements which support, or are connected to, the system.*

AS/NZS1170.0 sets importance levels for various buildings, based on the consequences of failure. This standard then sets the allowable annual probability for exceeding the ultimate limit state for an earthquake based on the building's design working life. Therefore, the tank supplier's engineer needs to be provided with the building's importance level and design life before they can correctly select the design intensity of the earthquake for the specific tank design. Reference should be made to AS/NZS 1170.0:2002 Table 3.2¹ to establish importance levels for various building types.

Aon is aware that some parties may consider that the tank is a separate structure to the building itself, and needs only to comply with the requirements for the performance level of a tank itself. This is incorrect, as under section 8 of the Building Act 2004, the building includes systems such as fire protection systems.

It must be noted that the owner, in consultation with their insurers and/or risk advisors may require a higher level of design than the minimum standard called up in AS/NZS1170. This is especially pertinent given that indications following the Christchurch earthquake are that the cost differences between Level 2 tanks (1 in 500 year event based on a 50 year design life) and Level 4 tanks (1 in 2500 year event based on a 50 year design life) may be negligible.

¹ Standards New Zealand has authorised the use of the extract from AS/NZS 1170.0:2002 Table 3.2 appended to this document

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For any work that Aon is involved with as a Sprinkler System Certifier, Aon will expect a statement from a Chartered Professional Engineer stating that this the seismic design provisions of NZS4541, AS/NZS1170.5 and the New Zealand Building Code have been met for all aspects of the tank installation, including the tank and site specific foundation design. This design statement should take cognisance of all features of the tank, including suction infill pipe and test return connections. This statement needs to be effectively a Producer Statement for Construction Review.

This may require coordination with the main contractor at an early stage of the project, especially if the tank or its foundations are not included within the fire contract.

A handwritten signature in black ink, appearing to read "Chris Mak", is positioned above the name and title. The signature is fluid and cursive.

Chris Mak
Sprinkler Certification Manager

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TABLE 3.2
IMPORTANCE LEVELS FOR BUILDING TYPES—NEW ZEALAND STRUCTURES

Importance level	Comment	Examples
1	Structures presenting a low degree of hazard to life and other property	Structures with a total floor area of <math><30\text{ m}^2</math> Farm buildings, isolated structures, towers in rural situations Fences, masts, walls, in-ground swimming pools
2	Normal structures and structures not in other importance levels	Buildings not included in Importance Levels 1, 3 or 4 Single family dwellings Car parking buildings
3	Structures that as a whole may contain people in crowds or contents of high value to the community or pose risks to people in crowds	Buildings and facilities as follows: (a) Where more than 300 people can congregate in one area (b) Day care facilities with a capacity greater than 150 (c) Primary school or secondary school facilities with a capacity greater than 250 (d) Colleges or adult education facilities with a capacity greater than 500 (e) Health care facilities with a capacity of 50 or more resident patients but not having surgery or emergency treatment facilities (f) Airport terminals, principal railway stations with a capacity greater than 250 (g) Correctional institutions (h) Multi-occupancy residential, commercial (including shops), industrial, office and retailing buildings designed to accommodate more than 5000 people and with a gross area greater than 10 000 m ² (i) Public assembly buildings, theatres and cinemas of greater than 1000 m ² Emergency medical and other emergency facilities not designated as post-disaster Power-generating facilities, water treatment and waste water treatment facilities and other public utilities not designated as post-disaster Buildings and facilities not designated as post-disaster containing hazardous materials capable of causing hazardous conditions that do not extend beyond the property boundaries
4	Structures with special post-disaster functions	Buildings and facilities designated as essential facilities Buildings and facilities with special post-disaster function Medical emergency or surgical facilities Emergency service facilities such as fire, police stations and emergency vehicle garages Utilities or emergency supplies or installations required as backup for buildings and facilities of Importance Level 4 Designated emergency shelters, designated emergency centres and ancillary facilities Buildings and facilities containing hazardous materials capable of causing hazardous conditions that extend beyond the property boundaries
5	Special structures (outside the scope of this Standard—acceptable probability of failure to be determined by special study)	Structures that have special functions or whose failure poses catastrophic risk to a large area (e.g. 100 km ²) or a large number of people (e.g., 100 000) Major dams, extreme hazard facilities