MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Dear Customer

Please find enclosed Amendment 9, effective 14 February 2014, to the Acceptable Solutions and Verification Methods for Clause G12 Water Supplies of the New Zealand Building Code. The previous amendment to G12 (Amendment 8) was in October 2011

Section	**Old G12**	**February 2014 Amendments to G12**
Title pages	Remove title page and document history page 1/2	Replace with new title page and document history pages 1–2B
References	Remove pages 7–10	Replace with new pages 7–10
Definitions	Remove page 11/12	Replace with new page 11/12
G12/AS1	Remove pages 17/18 27/28, 39/40	Replace with new pages 17/18 27/28, 39/40
G12/AS2	Remove page 43–50, 63/64	Replace with new page 43–50, 63/64

MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Acceptable Solutions and Verification Methods

For New Zealand Building Code Clause G12 Water Supplies

Third Edition

G12
BUILDING CODE

Status of Verification Methods and Acceptable Solutions

Verification Methods and Acceptable Solutions are prepared by the Ministry of Business, Innovation and Employment in accordance with section 22 of the Building Act 2004. Verification Methods and Acceptable Solutions are for use in establishing compliance with the New Zealand Building Code.

A person who complies with a Verification Method or Acceptable Solution will be treated as having complied with the provisions of the Building Code to which the Verification Method or Acceptable Solution relates. However, using a Verification Method or Acceptable Solution is only one method of complying with the Building Code. There may be alternative ways to comply.

Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the status of Verification Methods and Acceptable Solutions and explains alternative methods of achieving compliance.

Defined words (italicised in the text) and classified uses are explained in Clauses A1 and A2 of the Building Code and in the Definitions at the start of this document.

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Verification Methods and Acceptable Solutions are available from www.dbh.govt.nz

New Zealand Government

Document Status

The most recent version of this document (Amendment 9), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 14 February 2014 and supersedes all previous versions of this document.

The previous version of this document (Amendment 8) will cease to have effect on 14 August 2014.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any Verification Method or Acceptable Solution at any time. Up-to-date versions of Verification Methods and Acceptable Solutions are available from www.dbh.govt.nz

G12: Document History

	Date	Alterations		
First published	July 1992			
Amendment 1	September 1993	pp. vi–viii, References p. ix, Definitions p. 15, Table 4 p. 16, 4.5.1, 4.5.3	p. 19, 5.2.2 b) p. 22, Table 7 p. 26, Index	
Amendment 2	19 August 1994	pp. i and ii, Document History p. v, Contents p. viii, References p. 3, 2.2.1 e)	p. 6, 2.6, 2.6.1 p. 19, 4.13.1, 4.14, 4.14.1 p. 26, 29, Index	
Amendment 3	1 December 1995	p. ii, Document History pp. vi–viii, References	p. 5, Table 1 p. 6, 2.5.2	
Second edition published July 2001	Effective from 1 October 2001	Document revised – Second edition issued		
Amendment 4	6 January 2002	pp. 3–5 Code Clause G12		
Amendment 5	25 February 2004	p. 2, Document History p.7, Contents pp. 9–11 References	pp. 23-38, 3.7.1, 3.7.4, 4.1, 6.2.1, 6.3.2–6.15, Figure 13 pp. 43-45 Index	
Amendment 6	23 June 2007	p. 2, Document History, Status pp. 9 and 11, References	p. 13, Definitions p. 15, VM1 1.0.1	
Third edition published October 2007	Effective from 1 December 2007	Document revised – Third edition issued	G12/AS1 amended: p. 27, Table 5 p. 32, 6.5.1 p. 35, 6.9, 6.10 p. 36, 6.11.5	p. 37, 6.14.3 p. 38, 6.15 (deleted) p. 40, 7.5.2 New Acceptable Solution G12/AS2 included
Amendment 7	Published 30 June 2010 Effective from 30 September 2010	p. 2, Document History, Status pp. 3 and 4, Code Clause G12 pp. 7–10, References	p. 17, G12/AS1 2.1.2, Table 1 p. 27, G12/AS1 Table 5 p. 32, G12/AS1 Table 6	p. 41, G12/AS1 9.3.2
Amendment 8	Effective from 10 October 2011 until 14 August 2014	p. 2, Document History, Status pp. 7–10, References p.12, Definitions p. 21, G12/AS1 3.6.1	p. 23, G12/AS1 3.7.2 p. 41, G12/AS1 9.3.2 p. 43, G12/AS2 1.1.1	
Amendment 9	14 February 2014	p. 2A, Document History, Status pp 7, 8, 10 References p. 11 Definitions	p. 17 G12/AS1 2.1.2 p. 27 G12/AS1 Table 5 p. 40 G12/AS1 7.5.2	pp. 44–47, 49–50, 64, G12/AS2 2.1.4, 3.1.1, 3.2.1, 3.6.1, 3.6.2, 7.2.3, Tables 1, 2 and 3

Note: Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.

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References

For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in these Verification Methods and Acceptable Solutions (primary reference documents) must be the editions, along with their specific amendments, listed below. Where these primary reference documents refer to other Standards or documents (secondary reference documents), which in turn may also refer to other Standards or documents, and so on (lower-order reference documents), then the version in effect at the date of publication of these Verification Methods and Acceptable Solutions must be used.

Amend 9 Feb 2014

Amend 8 Oct 2011

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		Where quoted
Standards New Zealand		
Amend 8 Oct 2011 NZS/BS 1387: 1985	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or screwing to BS 21 pipe threads Amend 7 Sep 2010 *Amend: 1*	AS1 Table 1
NZS 3501: 1976	Specification for copper tubes for water, gas, and sanitation *Amends: 1, 2, 3*	AS1 Table 1
Amend 8 Oct 2011 NZS 3604: 2011	Timber framed buildings	AS2 1.1.1
NZS 3604: 1999	Timber framed buildings	AS2 1.1.1
NZS 3604: 1990	Timber framed buildings	AS2 1.1.1
NZS 4203:1992	Code of Practice for general structural design and design loadings for buildings	AS2 1.1.1
NZS 4602: 1988	Low pressure copper thermal storage electric water heaters *Amend: 1*	AS1 Table 5
NZS 4603: 1985	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems) *Amend: 1*	AS1 6.9.1, 6.11.5
NZS 4606:	Storage water heaters	
Part 1: 1989	General requirements *Amends: 1, 2, 3*	AS1 Table 5
Part 2: 1989	Specific requirements for water heaters with single shells *Amend: A*	AS1 Table 5
Part 3: 1992	Specific requirements for water heaters with composite shells *Amend: A*	AS1 Table 5
NZS 4607: 1989	Installation of thermal storage electric water heaters: valve-vented systems	AS1 6.10.1
NZS 4608: 1992	Control valves for hot water systems	AS1 Table 6
NZS 4613: 1986	Domestic solar water heaters	AS2 7.2.3

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			Where quoted
	NZS 4614: 1986	Installation of domestic solar hot water heating systems *Amend: 1 (1986) Erratum*	AS2 4.2.2
Amend 9 Feb 2014			
	NZS 4617: 1989	Tempering (3-port mixing) valves	AS1 6.14.2 b)
	NZS 5807: 1980	Code of practice for industrial identification by colour, wording or other coding	
	Part 2: 1980	Identification of contents of piping, conduit and ducts *Amends: 1, 2*	AS1 4.3.1
	NZS 6214: 1988	Thermostats and thermal cutouts for domestic thermal storage electric water heaters (alternating current only)	AS1 6.5.1
Amend 7 Sep 2010			
Amend 8 Oct 2011			
Amend 7 Sep 2010			
	NZS 7601: 1978	Specification for polyethylene pipe (Type 3) for cold water services	AS1 Table 1
	NZS 7602: 1977	Specification for polyethylene pipe (Type 5) for cold water services *Amend: 1*	AS1 Table 1
	NZS 7610: 1991	Specification for blue polyethylene pipes up to nominal size 63 for below ground use for potable water *Amends: 1, 2, 3*	AS1 Table 1
Amend 7 Sep 2010			
	British Standards Institution		
	BS EN 1490: 2000	Building valves. Combined temperature and pressure relief valves. Tests and requirements.	AS1 Table 6
	BS EN 1491: 2000	Building valves. Expansion valves. Tests and requirements	AS1 Table 6
	BS EN 1567: 1999	Building valves. Water pressure reducing valves and combination water reducing valves. Requirements and tests.	AS1 Table 6
	BS 6920	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water	
	Part 1: 2000	Specification	AS1 2.1.2
	Part 2: 2000	Methods of tests	AS1 2.1.2
Amend 7 Sep 2010	Part 3: 2000	High temperature tests	AS1 2.1.2

			Where quoted
	Standards Australia		
	AS 1308: 1987	Electric water heaters – Thermostats and thermal cut-outs *Amend: 1*	AS1 6.5.1
	AS 1357:	Water valves for use with unvented water heaters	
	Part 1: 2009	Protection valves *Amend: 1, 2*	AS1 Table 6
	Part 2: 2005	Control valves *Amend: 1, 2*	AS1 6.14.2 b), Table 6
Amend 7 Sep 2010	AS 2845:	Water supply – Mechanical backflow prevention devices	
	Part 3: 1993	Field testing and maintenance *Amend: 1*	AS1 3.6.1 b), 3.7.2
Amend 8 Oct 2011			
Amend 7 Sep 2010	**Australia/New Zealand Standards**		
	AS/NZS 1170:	Structural Design Actions	
	Part 0: 2002	General principles *Amend: 1, 2 and 4*	AS2 1.1.1
	Part 1: 2002	Permanent, imposed and other actions *Amend: 1*	AS2 1.1.1
	Part 2: 2002	Wind Actions *Amend: 1*	AS2 1.1.1
	Part 3: 2003	Snow and ice actions *Amend: 1*	AS2 1.1.1
Amend 8 Oct 2011	NZS 1170: Part 5: 2004	Earthquake design actions – New Zealand	AS2 1.1.1
	AS/NZS 1477: 2006	PVC pipes and fittings for pressure applications *Amend: 1*	AS1 Table 1
Amend 7 Sep 2010	AS/NZS 2032: 2006	Installation of PVC pipe systems *Amend: 1*	AS1 7.4.1, 7.5.2
	AS/NZS 2642:	Polybutylene pipe systems	
Amend 8 Oct 2011	Part 1: 2007	Polybutylene (PB) pipe extrusion compounds	AS1 Table 1
	Part 2: 2008	Polybutylene (PB) pipe for hot and cold water applications	AS1 Table 1
Amend 8 Oct 2011	Part 3: 2008	Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications *Amend: 1*	AS1 Table 1

			Where quoted
Amend 9 Feb 2014	AS/NZS 2712: 2007	Solar and heat pump water heaters – design and construction *Amend: 1, 2*	AS2 3.1.1, 3.6.1
Amend 8 Oct 2011	AS/NZS 2845: Part 1: 2010	Water supply Materials, design and performance requirements	AS1 3.6.2
Amend 9 Feb 2014 Amend 7 Sep 2010	AS/NZS 60335.2.35: 2004	Safety of household and similar electrical appliances – Particular requirements – Instantaneous water heaters *Amends: 1, 2*	AS1 Table 5
Amend 9 Feb 2014 Amend 9 Feb 2014	AS/NZS 3500: Part 1: 2003 Part 4: 2003	Plumbing and drainage Water services *Amend: 1, 2* Heated water services *Amend: 1, 2*	VM1 1.0.1 a), AS1 3.5.2 VM1 1.0.1 b) AS1 6.15.1, AS2 1.1.1, 4.2.2, 5.0.1
	AS/NZS 4020: 2005	Testing of products for use in contact with drinking water	AS1 2.1.2
	AS/NZS 4129: 2008	Fittings for polyethylene (PE) pipes for pressure applications	AS1 Table 1
Amend 7 Sep 2010	AS/NZS 4130: 2009	Polyethylene (PE) pipes for pressure applications *Amend: 1*	AS1 Table 1
	AS/NZS 4692: Part 2: 2005	Electric water heaters Minimum Energy Performance Standards (MEPS) requirements and energy labelling	AS2 3.1.2
Amend 7 Sep 2010	AS/NZS 5000.1 2005	Electric cables – Polymeric insulated – For working voltages up to and including 0.6/1 (1.2) kV *Amend: 1*	AS1 9.3.2
Amend 8 Oct 2011	AS/NZS 5000.2 2006	Electric cables – Polymeric insulated Part 2: For working voltages up to and including 450/750 v.	AS1 9.3.2
	New Zealand Regulations		
	Gas Regulations 1993		AS1 Table 5
	Master Plumbers, Gasfitters and Drainlayers NZ Inc and Water New Zealand		
Amend 8 Oct 2011	NZ Backflow testing standard 2011	Field testing of backflow prevention devices and verification of air gaps	AS1 3.6.1 b), 3.7.2

Definitions

This is an abbreviated list of definitions for words or terms particularly relevent to these Verification Methods and Acceptable Solutions. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

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Adequate *Adequate* to achieve the objectives of the *Building Code.*

Air gap The vertical distance through air between the lowest point of the water supply outlet and the *flood level rim* of the equipment or the *fixture* into which the outlet discharges.

Amenity means an attribute of a *building* which contributes to the health, physical independence, and well being of the *building's* users but which is not associated with disease or a specific illness.

Backflow The unplanned reversal of flow of water or mixtures of water and *contaminants* into the *water supply system*. See *back-siphonage* and *back-pressure.*

Backflow prevention device A device that prevents *backflow*.

Back-pressure A *backflow* condition caused by the downstream pressure becoming greater than the supply pressure.

Back-siphonage A *backflow* condition caused by the supply pressure becoming less than the downstream pressure.

Building has the meaning ascribed to it by sections 8 and 9 of the Building Act 2004.

Check valve A valve that permits flow in one direction but prevents a return flow and is part of a *backflow prevention device.*

Cladding The exterior weather-resistant surface of a *building*.

COMMENT:
Includes any supporting substrate and, if applicable, surface treatment.

Contaminant includes any substance (including gases, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat

a) When discharged into water, changes or is likely to change the physical, chemical, or biological condition of water, or

b) When discharged onto or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged.

This is the meaning ascribed to it by the Resource Management Act 1991.

Cross connection Any actual or potential connection between a *potable water* supply and a source of contamination.

Diameter (or bore) The nominal internal *diameter*.

EPDM (Ethylene Propylene Diene Monomer) A thermosetting synthetic rubber used as a resilient part of a sealing washer, or as a roof *membrane*.

Fixture An article intended to remain permanently attached to and form part of a *building*.

Flashing A component, formed from a rigid or flexible *waterproof* material, that drains or deflects water back outside the *cladding system.*

Flood level rim The top edge at which water can overflow from equipment or a *fixture*.

Framing Timber members to which *lining*, *cladding*, flooring, or decking is attached; or which are depended upon for supporting the structure, or for resisting forces applied to it

Free outlet (push through) In the context of *storage water heaters* means a *water heater* with a tap on the cold water inlet so designed that the hot water is discharged through an open outlet.

Household unit

a) means any *building* or group of *buildings*, or part of a *building* or group of *buildings*, that is:

i) used, or intended to be used, only or mainly for residential purposes; and

ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than one household; but

b) does not include a hostel, boarding house or other specialised accommodation.

Masonry tiles Clay or concrete tile roof *cladding*.

Membrane A non-metallic material, usually synthetic, used as a fully supported roof *cladding*, *deck* surface or, in conjunction with other *claddings*, as gutters or *flashings*.

Network utility operator means a person who—

a) undertakes or proposes to undertake the distribution or transmission by pipeline of natural or manufactured gas, petroleum, biofuel, or geothermal energy; or

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b) operates or proposes to operate a network for the purpose of—

i) telecommunication as defined in section 5 of the Telecommunications Act 2001; or

ii) radiocommunications as defined in section 2(1) of the Radiocommunications Act 1989; or

c) is an electricity operator or electricity distributor as defined in section 2 of the Electricity Act 1992 for the purpose of line function services as defined in that section; or

d) undertakes or proposes to undertake the distribution of water for supply (including irrigation); or

e) undertakes or proposes to undertake a drainage or sewerage system.

Non-return valve A valve that permits flow in one direction but prevents a return flow and is part of a hot or cold water system.

Open vented storage water heater A *water heater* incorporating a *vent pipe* which is permanently open to the atmosphere.

Potable (and potable water) Water that is suitable for human consumption.

Purlin A horizontal member laid to span across *rafters* or trusses, and to which the roof *cladding* is attached.

Rafter A *framing* timber, normally parallel to the slope of the roof, providing support for sarking, *purlins* or roof *cladding*.

Sanitary appliance An appliance which is intended to be used for *sanitation*, but which is not a *sanitary fixture*. Included are machines for washing dishes and clothes.

Sanitary fixture Any *fixture* which is intended to be used for *sanitation*.

Sanitation The term used to describe the activities of washing and/or excretion carried out in a manner or condition such that the effect on health is minimised, with regard to dirt and infection.

Specific design Design and detailing of a proposed *building* or parts of a *building*, demonstrating compliance with the building code, that shall be provided to the building consent authority for assessment and approval as part of the *building consent* process.

Buildings, or parts of *buildings*, requiring *specific design* are beyond the scope of this Acceptable Solution.

Storage water heater A *water tank* with an integral *water heater* for the storage of hot water.

Toxic environment An environment that contains *contaminants* that can contaminate the water supply in concentrations greater than those included in the New Zealand Drinking Water Standard 1995.

Valve vented storage water heater (Also known as an unvented *storage water heater*.) A *storage water heater* in which the required venting to the atmosphere is controlled by a valve.

Acceptable Solution G12/AS1

1.0 Scope

1.0.1 This acceptable solution applies to below ground and above ground piped *water supply systems*.

2.0 Materials

2.1 Water quality

2.1.1 Components of the *water supply system* shall not contaminate *potable water*.

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2.1.2 Water supply materials and components shall comply with:

a) BS 6920 if non-metallic, or

b) AS/NZS 4020 if metallic or non-metallic.

2.2 Pipe materials

2.2.1 Pipe materials shall comply with Table 1.

2.2.2 All pipes and pipe fittings used for the piping of water shall be:

a) Suitable for the temperatures and pressures within that system,

b) Compatible with the water supply and environmental conditions in the particular location, and

c) Where installed in an exposed situation, resistant to UV light.

Note: Where fire hose reels are served by the above ground cold *water supply system* the pipe system shall comply with NZS 4503 as referenced in C/AS1 Table 4.1.

Table 1: Pipe Materials for Hot and Cold Water
Paragraphs 2.1.2, 2.2.1 and 6.7.2

Material	Relevant Standard
Hot and Cold	
Copper	NZS 3501
Galvanised steel	NZS/BS 1387
Polybutylene	AS/NZS 2642: Parts 1, 2 and 3
Cold Only	
PVC-U	AS/NZS 1477
Polyethylene	NZS 7601 for pressures up to 0.9 MPa (Type 3) NZS 7602 for pressures up to 1.2 MPa (Type 5) NZS 7610 for pressures up to 1.2 MPa AS/NZS 4129 for fittings
	AS/NZS 4130 for pressures up to 2.5 MPa

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3.0 Protection of Potable Water

3.1 Drawn water not to be returned

3.1.1 Water drawn from the *water main* shall be prevented from returning to that system by avoiding *cross connections* or *backflow*.

3.2 Cross connections prohibited

3.2.1 The *water supply system* shall be installed so that there is no likelihood of *cross connection* between:

a) A *potable water supply system* and a non-*potable water supply system*,

b) A *potable water supply system* connected to a *water main*, and any water from another source including a private water supply,

c) A *potable water supply system* and any bathing facilities including swimming, spa or paddling pools, and

d) A ***p**otable water supply system* and pipes, *fixtures* or equipment (including boilers and pumps) containing chemicals, liquids, gases or other non-*potable* substances.

3.3 Cross Connection Hazard

3.3.1 High hazard

Any condition, device or practice which, in connection with the *potable water supply system*, has the potential to cause death.

COMMENT:
High hazard may include but not necessarily be limited to:

a) Autoclaves and sterilisers

b) Systems containing chemicals such as anti-freeze, anti-corrosion, biocides, or fungicides

c) Beauty salon and hairdresser's sinks

d) Boiler, chiller and cooling tower make-up water

e) Car and factory washing facilities

f) Chemical dispensers

g) Chemical injectors

h) Chlorinators

i) Dental equipment

j) Direct heat exchangers

k) Fire sprinkler systems and fire hydrant systems that use toxic or hazardous water

l) Hose taps associated with High hazard situations like mixing of pesticides

m) Irrigation systems with chemicals

n) Laboratories

o) Mortuaries

p) Pest control equipment

q) Photography and X-ray machines

r) Piers and docks

s) Sewage pumps and sump ejectors

t) Sluice sinks and bed pan washers

u) Livestock water supply with added chemicals

v) Veterinary equipment

Note: The examples given are not an exhaustive list. Where there is doubt comparison must be made to the hazard definitions.

3.3.2 Medium hazard

Any condition, device or practice which, in connection with the *potable water supply system*, has the potential to injure or endanger health.

COMMENT:
Medium hazard may include but not necessarily be limited to:

a) Appliances, vehicles or equipment

b) Auxiliary water supplies such as pumped and non-pumped fire sprinkler secondary water

c) Deionised water, reverse osmosis units and equipment cooling without chemicals

d) Fire sprinkler systems and *building* hydrant systems

e) Hose taps and fire hose reels associated with Medium hazard

f) Irrigation systems with underground controllers

g) Irrigation without chemicals

h) Livestock water supply without added chemicals

i) Untreated water storage tanks

j) Water and steam cleaning

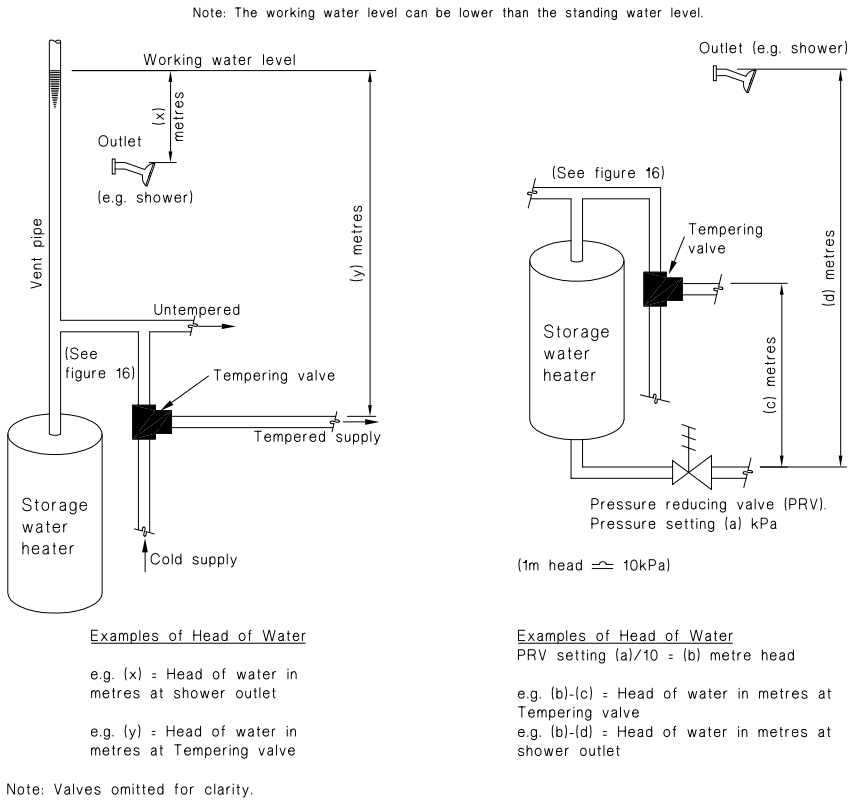
k) Water for equipment cooling

l) Drink dispensers with carbonators

m) Swimming pools, spas and fountains

Note: The examples given are not an exhaustive list. Where there is doubt comparison must be made to the hazard definitions.

Figure 5: Head of Water Available
Paragraph 5.3.2



6.0 Hot Water Supply System

6.1 Water heaters

6.1.1 *Water heaters* shall comply with Table 5.

6.1.2 Hot *water supply systems* are given in Figures 6 to 11. (Note: Pipe insulation is not shown for clarity.)

6.2 Water supply to storage water heaters

6.2.1 *Storage water heaters* shall be supplied with cold water at a pressure not exceeding their working pressure by means of a:

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a) *Water tank,*

b) Pressure reducing valve,

c) Pressure limiting valve, or

d) Mains pressure supply.

Table 5: Water Heaters
Paragraph 6.1.1

Water heater type	Standard/Regulation
Electric low pressure copper *storage water heater*	NZS 4602
Electric *storage water heater*	NZS 4606: Parts 1, 2 and 3
Electric instantaneous *water heater* (Amend 7 Sep 2010)	AS/NZS 60335.2.35 (Amend 9 Feb 2014)
Gas *storage water heater*	Gas Regulations
Gas instantaneous *water heater* (Amend 7 Sep 2010)	Gas Regulations
Solar *storage water heater*	NZS 4613 (see G12/AS2) (Third Edition Dec 2007) AS/NZS 2712 (see G12/AS2)

6.2.2 *Storage water heaters* supplied by other than a *water tank* shall include a *non-return valve* as shown in Figures 7, 8, 9 and 10 to prevent the *storage water heater* emptying and hot water flowing into the cold water supply and thence from the cold water taps.

6.2.3 Filters or strainers shall be installed upstream of any valves that could be damaged or malfunction due to solids in the water supply.

6.3 Operating devices

6.3.1 Electric and gas *storage water heaters* shall have their temperature controlled by a thermostat on each heating unit.

6.3.2 *Open vented storage water heaters* shall have a *vent pipe* complying with Paragraph 6.8.

6.3.3 Valve vented (unvented) systems shall have:

a) An expansion control valve

b) A vacuum relief valve to prevent collapse of the *storage water heater* where it is not designed to withstand a full vacuum, and

c) Valves complying with Table 6.

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Figure 6: **Open Vented Storage Water Heater System – Water Tank Supply**
Paragraphs 6.1.2, 6.8.2

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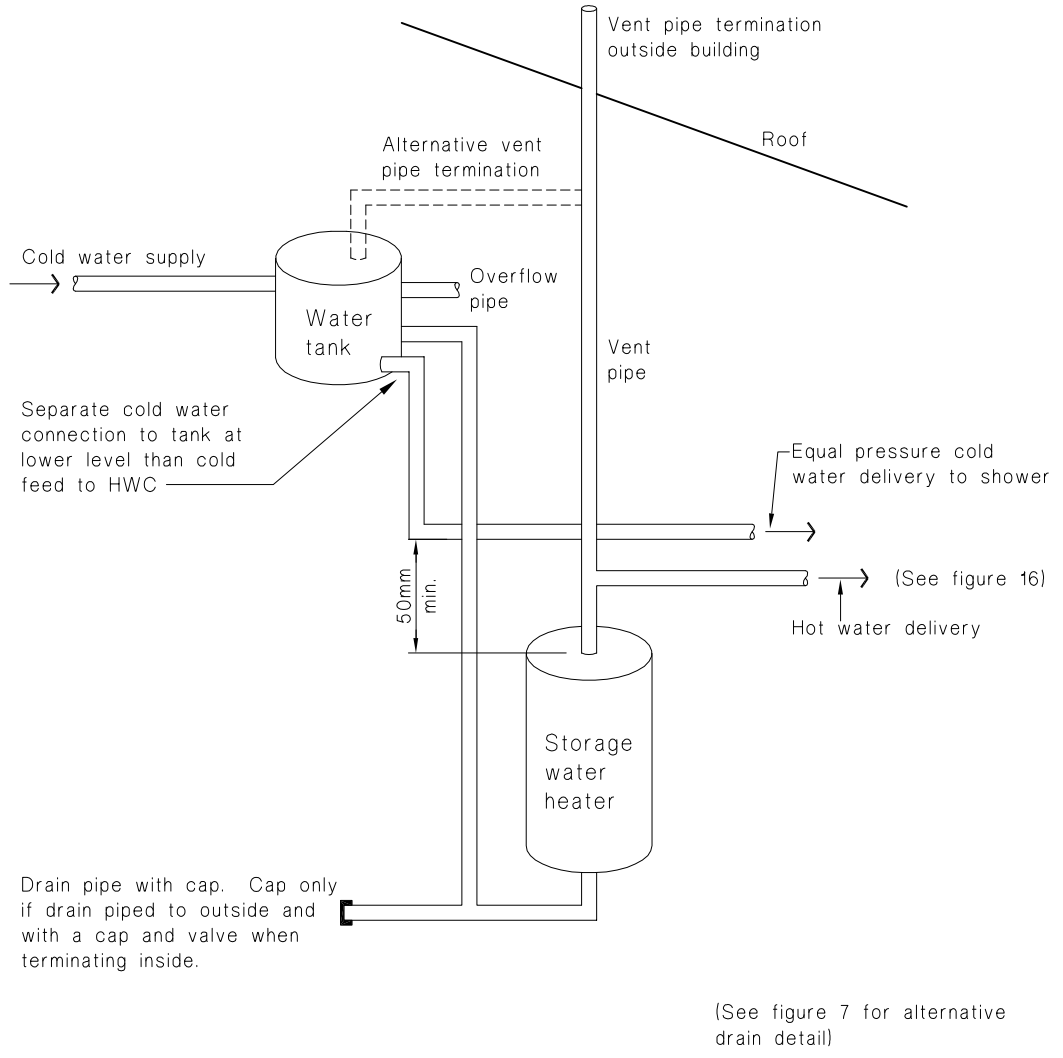
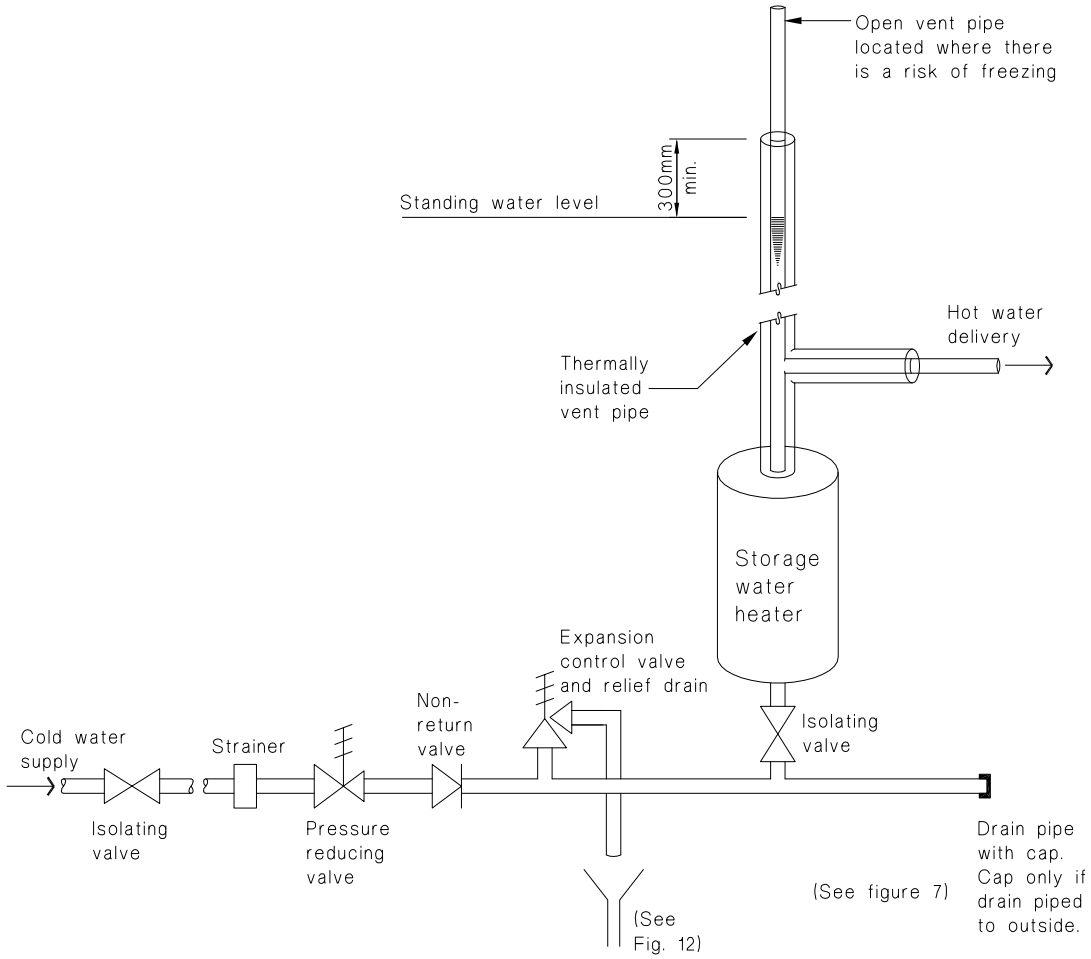


Figure 17: **Open Vented Storage Water Heaters in Climates Subject to Freezing**
Paragraphs 7.2.1 c) and 7.2.2



7.3 Protection from damage

7.3.1 Water supply pipes shall be protected from the likelihood of damage.

7.3.2 Pipes below ground level

An acceptable method of protecting water supply pipes is to provide the minimum covers given below:

Cover	Location
600 mm	Residential driveways and similar areas subjected to occasional heavy traffic
450 mm	Gardens, lawns or other areas not subjected to traffic

7.3.3 Movement in concrete or masonry

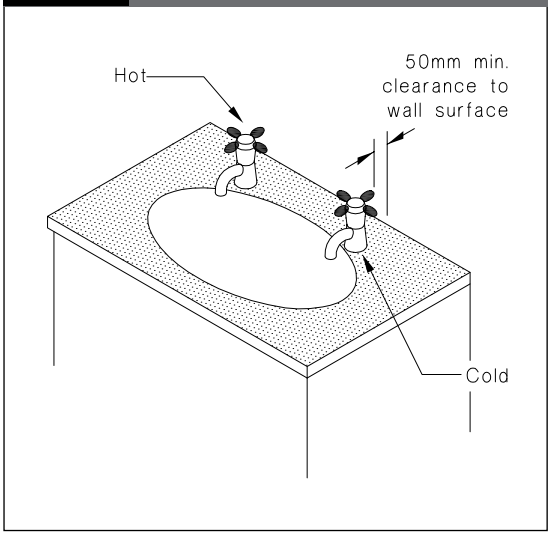
Pipes penetrating concrete or masonry elements shall be either wrapped with a flexible material, or passed through a sleeve or duct, to permit free movement for expansion and contraction.

Pipework in or under a concrete slab must be installed in a manner to achieve a 50 year durability.

7.4 Installation of uPVC Pipes

7.4.1 An acceptable method of installing uPVC pipe is given in NZS 7643.

Figure 18: **Usable Water Taps**
Paragraph 8.0.1



7.5 Watertightness

7.5.1 The *water supply system* shall be tested to ensure watertightness. An acceptable testing method is to:

a) Subject the hot and cold system to a pressure of 1500 kPa for a period of not less than 15 minutes, and

b) Inspect the system to ensure that there are no leaks.

COMMENT:

1. Testing should be carried out before concealing pipework behind interior linings, flooring or within concrete, or before backfilling trenches.

2. All *fixtures*, appliances, *water tanks, storage water heaters* and other equipment, which may be damaged during pressure testing, should be isolated before testing.

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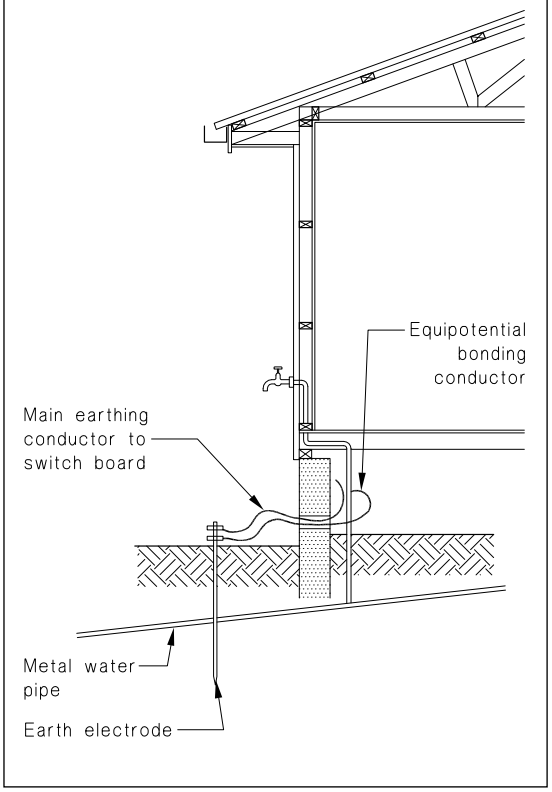
7.5.2 Another acceptable solution for testing PVC-U water piping systems is given in Section 7 of AS/NZS 2032.

8.0 Usable Facilities for People with Disabilities

8.0.1 Where taps are likely to be used for personal hygiene or the washing of utensils by *people with disabilities*, they shall have (see Figure 18):

Figure 19: **Equipotential Bonding of Metallic Water Supply Pipe**
Paragraph 9.2.1 a)



a) Lever or capstan handles,

b) 50 mm clearances to wall surfaces, and

c) The hot tap located to the left of the cold tap.

COMMENT:

This requirement does not apply to Housing, Outbuildings, Ancillary *buildings*, and Industrial *buildings* employing fewer than 10 people.

9.0 Equipotential Bonding

9.1 General

9.1.1 NZBC G9 requires any electrical installation within a *building* to be constructed to protect users from the dangers of contact with parts of the *building* that may become live during fault conditions.

9.1.2 Equipotential bonding is required where all of the following conditions are likely to exist:

Acceptable Solution G12/AS2 Solar Water Heaters

1.0 Scope

1.0.1 This Acceptable Solution applies to solar *water heaters* installed in or on *buildings*.

1.0.2 To comply with this Acceptable Solution solar *water heaters* must also comply with the appropriate requirements of G12/AS1. This Acceptable Solution meets the requirements of NZBC Clauses B1, B2, E2, G12 and H1.

1.0.3 Text boxes headed '**COMMENT**' occurring throughout this document are for guidance purposes only.

1.1 Structural support limitations

1.1.1 Where a *building* has not been specifically designed to support a solar *water heater*, this Acceptable Solution can be used for the support and fixing of a solar collector on *buildings* that meet the structural requirements specified in any one of the following:

- NZS 3604: 1990
- NZS 3604: 1999
- NZS 3604: 2011 (Amend 8 Oct 2011)
- NZS 4203
- AS/NZS 1170: Parts 0, 1, 2, 3 and NZS 1170: Part 5.

But only when all of the following requirements are met:

a) the weight of solar collector, including frames, fittings, and heat transfer fluid, has a combined weight of no more than 22 kg per square metre (based on the gross area of the solar collector), and

b) the hot water storage tank is not installed on or above the roof, and

c) where the hot water storage tank is located within a roof it has a maximum size of:

   i) 200 litres when installed in accordance with NZS 3604: 1999 Section 14, or

   ii) 450 litres when installed in accordance with AS/NZS 3500 Part 4: 2003 Section 5, and

d) the roof has a pitch no steeper than 45°, and

e) the *building* is in a *wind zone* where wind speeds do not exceed 50 m/s (VH *wind zone* defined in NZS 3604: 1999), and

f) the solar collector has an area no greater than 4 m^2, and

g) the design ground snow loading for the building is less than:

   (i) 0.5 kPa as determined by NZS 4203, or NZS 3604: 1990 or NZS 3604: 1999 Section 15, or

   (ii) 1.0 kPa as determined by AS/NZS 1170 or NZS 3604: 2011, Section 15, and (Amend 8 Oct 2011)

h) either:

   i) the solar collectors are installed parallel to the roof *cladding*, or

   ii) where solar collectors are installed at a different pitch to the pitch of the roof:

      – the pitch of the solar collector is not greater than 45° to the horizontal, and

      – the *building* is in a *wind zone* where wind speeds do not exceed 44 m/s (H *wind zone* defined in NZS 3604: 1999), and

      – the solar collector faces in the same compass direction as the section of roof the solar collector is installed on.

COMMENT:

1. The limitations described in Paragragh 1.1.1 are necessary, because roofs are likely to have limited capacity to support additional loads.

1.1.2 When any of the requirements described in Paragraph 1.1.1 are not met, specific engineering design is required.

COMMENT:

Specific engineering design will require a structure assessment to be completed. This may result in either an assessment that the roof structure is sufficient to support the additional load or details of how to strengthen the roof structure to support the additional load.

1.2 Exclusions

1.2.1 If the solar *water heater* includes connection to an application such as underfloor heating, a swimming pool or any similar application, this Acceptable Solution applies only to the solar *water heater* and its components and not to the application.

2.0 Materials

2.1 Material selection

2.1.1 All material used to install the solar *water heater* must:

a) meet the *durability* requirements of NZBC Clause B2, and

b) be suitable for their use, location and environment as shown in Table 1, and

c) be compatible with adjoining materials as shown in Table 2, and

d) be compatible with materials subject to run-off as shown in Table 3 (except as described in Paragraph 2.1.2).

2.1.2 Table 3 states that "butyl/EPDM" to "steel, galvanized unpainted" is "not permitted"; however, water flow from small areas of ***EPDM*** will not significantly affect the *durability* of the roofing. Therefore it is acceptable to use unpainted ***EPDM*** boots with unpainted galvanised steel roofing if:

a) the boots are small (for 60 mm pipe diameter or smaller), and

b) there are no more than 10 boots used for the solar *water heater* installation, and

c) the boots contain no greater than 15% carbon black.

2.1.3 If the requirements described in Paragragh 2.1.2 are not met then either the ***EPDM*** boots or the galvanised roofing must be painted with a suitable protective coating.

2.1.4 Table 2 shows that galvanized fixings must be used rather than stainless steel when in contact with galvanized *cladding* and zinc-aluminium-magnesium (combinations) coated *cladding*. (This includes mounting brackets and straps.)

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Table 1: **Material selection (reproduced from E2/AS1 Table 20)**
This table shall be read in conjunction with Tables 2 and 3 and Paragraphs 2.1.1, 2.1.2, 2.1.3 and 2.1.4

Material	Exposure(1)(2)(4)(6) NOTE: Consider all walls as 'Sheltered' for steel based claddings(8)	Type	Acceptable Exposure Zones as per NZS 3604 – Section 4 (3)(4)(6) 15 years	50 years for hidden elements(2)(9)
CLADDINGS AND FLASHINGS				
Aluminium, zinc	Hidden(2)		B,C,D,E	B,C,D,E
	Exposed		B,C,D,E	
	Sheltered		B,C,D,E	
Copper, lead, or stainless steel	Hidden(2)		B,C,D,E	B,C,D, E
	Exposed		B,C,D,E	
	Sheltered		B,C,D,E	
Factory painted				
Aluminium-zinc-magnesium (combinations) coated or galvanised steel, to AS 1397 and AS/NZS 2728 with AM100, ZM274, and AZ150 minimum coatings	Hidden(9)	Type 4	B,C,D,E	B,C,D
	Hidden(9)	Type 6	B,C,D,E	B,C,D,E
	Exposed(8)	Type 4	B,C,D	
	Exposed(8)	Type 6	B,C,D,E	
	Sheltered	Type 4	B,C	
	Sheltered	Type 6	B,C,D	
Pressed metal tiles coated to minimum AZ150 or AM100 to AS 1397, AS/NZS 2728 or with post-form factory painting to cl 8.3.4.2.	Exposed	Type 6	B,C,D,E	
	Sheltered	Type 6	B,C,D	
Non-factory painted				
Aluminium-zinc-magnesium (combinations) coated steel, to AS 1397 with AZ150 or AM125 minimum coatings	Hidden(9)		B,C,D,E	B,C,D
	Exposed(8)		B,C	
	Sheltered		B	
Galvanised steel Z450 to AS 1397	Hidden(9)		B,C,D	B,C
	Exposed(8)		B,C	
	Sheltered		B	
Non-metallic				
Bituminous material, or uPVC	Hidden		B,C,D,E	B,C,D,E
	Exposed (uPVC only)		B,C,D,E	
	Sheltered (uPVC only)		B,C,D,E	
Butyl rubber	Hidden		B,C,D,E	B,C,D,E
	Exposed		B,C,D,E	
	Sheltered		B,C,D,E	
FIXINGS(7)				
Aluminium, bronze, and stainless steel (Types 304 and 316)(10)	Hidden		B,C,D,E	B,C,D,E
	Exposed		B,C,D,E	
	Sheltered		B,C,D,E	
Nails – Hot-dip galvanised steel to AS/NZS 4680	Hidden(5)(9)		B,C,D	B,C
	Exposed		B,C,	
	Sheltered		B	
Screws – galvanised steel, painted or unpainted, to AS 3566: Part 2	Hidden(5)(9)	Class 3	B,C,D,E(3)(4)	B,C,D,E
	Exposed	Class 4	B,C,D	
	Sheltered	Class 4	B,C	

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Table 1: Material selection – continued

Note:

1) Refer to manufacturer's information for maintenance requirements in Exposed and Sheltered locations.
2) The term "hidden" means concealed behind another element such that no part is visible. Hidden elements require a 50 year *durability* under the *NZBC*. The term "exposed" means having surfaces exposed to rain washing. The term 'sheltered' means being visible, but not rain washed. For diagrammatic outline, refer NZS 3604 Figure 4.3(a). Exposed and sheltered elements require a 15 year *durability*. Where an element can be categorised as both 'sheltered' and 'exposed', the 'sheltered' condition will apply.
3) AS/NZS 2728 lists atmospheric classes derived from ISO 9223 for Australia and New Zealand, determined by exposure to wind-driven sea-spray. NZS 3604 references atmospheric classes B (Low), C (Medium) and D (High). E2/AS1 references atmospheric zones B,C,D,E. For the purposes of *cladding* selection, Zone E (Severe marine classified as breaking surf beach fronts) has been included. Designers must consult metal supplier's information for specific *durability* requirements of sites in Zone E.
4) The geographic limits of atmospheric classes in NZS 3604 and AS/NZS 2728 may vary. Table 1 uses the limits outlined in NZS 3604.
5) Includes fixings protected by putty and an exterior paint system of primer, undercoat and two top coats of paint.
6) Microclimates based on evidence from adjacent structures of corrosion caused by industrial or geothermal atmospheres are outside the scope of this Acceptable Solution.
7) Refer to Tables 2 and 3 for compatibility of fixings with metal *claddings*.
8) *Roof* only. Coated steel *wall claddings* must be considered as 'sheltered'.
9) Hidden steel coated elements in ventilated cavities in zones D and E (exposure to salt air) must be considered as 'sheltered'
10) The use of stainless steel fixings is not recommended by steel manufacturers for use with coated steel in severe marine and industrial environments, as they are considered to cause deterioration.

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Table 2: Compatibility of materials in contact
This table must be read in conjunction with Tables 1 and 3 and Paragraphs 2.1.1., 2.1.2, 2.1.3 and 2.1.4

	Aluminium, anodised or mill-finish	Aluminium, coated (1)	Butyl rubber & EPDM	CCA-treated timber (2)	Cedar	Cement plaster (uncoated)	Ceramic tiles (cement grout)	Clay bricks (cement mortar)	Concrete old (unpainted)	Concrete green (unpainted)	Copper/brass	Glass	Glazed roof tiles	Lead (including lead-edged) unpainted	Plastics	Stainless steel	Steel, galvanised coil-coated	Steel, galvanized (unpainted)	Zinc	Zinc-aluminium-magneisum (combinations), coated (1)	Zinc-aluminium-magnesium (combinations), (unpainted)
Aluminium, anodised or mill-finish	✓	✓	✓	✘	✓	✘	✘	✘	✓	✘	✘	✓	✓	✘	✓	B	✓	✓	✓	✓	✓
Aluminium, coated (1)	✓	✓	✓	B	✓	✘	✘	✘	✓	✘	✘	✓	✓	B	✓	B	✓	✓	✓	✓	✓
Butyl rubber & EDPM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CCA-treated timber (2)	✘	B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	B	✘	✘	B	✘
Cedar	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✘
Cement plaster (uncoated)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✓	✓	✓	✓	✓	✓	✘
Ceramic tiles (cement grout)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
Clay bricks (cement mortar)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
Concrete old (unpainted)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Concrete green (unpainted)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✓	✓	✘	✘	✘	✘	✘
Copper/brass	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	B	✓	B	✘	✘	✘	✘	✘
Glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Glazed roof tiles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lead (including lead-edged) unpainted	✘	B	✓	✓	✓	✘	✓	✓	✓	✘	B	✓	✓	✓	✓	B	B	B	B	B	✘
Plastics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stainless steel	B	B	✓	✓	✓	✓	✓	✓	✓	✓	B	✓	✓	B	✓	✓	B	✘	✘	B	B
Steel, galvanised coil-coated	✓	✓	✓	B	✓	✓	✓	✓	✓	✘	✘	✓	✓	B	✓	B	✓	✓	✓	✓	✓
Steel, galvanized (unpainted)	✓	✓	✓	✘	✘	✓	✓	✓	✓	✘	✘	✓	✓	B	✓	✘	✓	✓	✓	✓	✓
Zinc	✓	✓	✓	✘	✘	✓	✓	✓	✓	✘	✘	✓	✓	B	✓	✘	✓	✓	✓	✓	✓
Zinc-aluminium-magenesium (combinations), coated (1)	✓	✓	✓	B	✓	✓	✓	✓	✓	✘	✘	✓	✓	B	✓	B	✓	✓	✓	✓	✓
Zinc-aluminium-magnesium (combinations) (unpainted)	✓	✓	✓	✘	✘	✘	✘	✘	✓	✘	✘	✓	✓	✘	✓	B	✓	✓	✓	✓	✓

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LEGEND:

✓ Materials satisfactory in contact.

✘ Contact between materials is not permitted. Minimum gap of 5 mm is required to prevent moisture bridging.

B Avoid contact in sea-spray zone or corrosion zone D.

NOTES:

(1) Coated – includes factory-painted, coil-coated and powder-coated.

(2) Includes copper azole and copper quaternary salts.

Table 3: **Compatibility of materials subject to run-off**
This table must be read in conjunction with Tables 1 and 2 and Paragraphs 2.1.1., 2.1.2, 2.1.3 and 2.1.4

Material that water flows from \ Material that water flows onto	Aluminium, anodised or mill-finish	Aluminium, coated (1)	Butyl rubber & EPDM	CCA-treated timber (2)	Cedar	Cement plaster (uncoated)	Ceramic tiles (cement grout)	Clay bricks (cement mortar)	Concrete old (unpainted)	Concrete green (unpainted)	Copper/brass	Glass	Glazed roof tiles	Lead (including lead-edged) unpainted	Plastics	Stainless steel	Steel, galvanised coil-coated	Steel, galvanized (unpainted)	Zinc	Zinc-aluminium-magneisum (combinations), coated (1)	Zinc-aluminium-magnesium (combinations), (unpainted)
Aluminium, anodised or mill-finish	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Aluminium, coated (1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✘
Butyl rubber & EDPM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✘
CCA-treated timber (2)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✘	✘	✘
Cedar	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✘
Cement plaster (uncoated)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✘	✓	✓	✓	✘	✘	✓	✘
Ceramic tiles (cement grout)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✘	✘	✓	✘
Clay bricks (cement mortar)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✘	✘	✓	✘
Concrete old (unpainted)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓
Concrete green (unpainted)	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✘	✓	✓	✘	✘	✘	✘	✘
Copper/brass	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✘	✘	✘
Glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Glazed roof tiles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Lead (including lead-edged) unpainted	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
Plastics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Stainless steel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Steel, galvanised coil-coated	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Steel, galvanized (unpainted)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zinc	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zinc-aluminium-magenesium (combinations), coated (1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓
Zinc-aluminium-magnesium (combinations) (unpainted)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘	✘	✓	✓

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LEGEND:
✓ Materials satisfactory with water run-off as indicated.
✘ Water run-off is not permitted as indicated.
A Etching or staining of glass may occur with run-off.

NOTES:

(1) Coated – includes factory-painted, coil-coated and powder-coated.

(2) Includes copper azole and copper quaternary salts.

3.0 Solar Water Heater Requirements

3.1 Solar water heaters and components

3.1.1 Solar *water heaters* must comply with AS/NZS 2712

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3.1.2 Tanks installed as part of a pumped solar *water heater* where the tank is separately mounted from the collector must comply with the minimum tank insulation requirements of AS/NZS 4692.2.

COMMENT:
AS/NZS 4692.2: 2005 specifies Minimum Energy Performance Standard (MEPS) requirements for electric *water heaters.* Clause 1.4 of this Standard excludes solar *water heaters*. Paragraph 3.1.2 of this Acceptable Solution modifies this exclusion so that hot water tanks mounted separately from solar collectors used in a solar *water heater* must now comply with the MEPS requirements specified in AS/NZS 4692.2: 2005.

3.2 Solar controller

3.2.1 Where a solar *water heater* has a controller, the controller must meet the requirements specified in AS/NZS 2712: clause 6.3.

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3.2.2 The controller or the solar *water heater* design must minimise the use of supplementary heating while meeting the requirements described in Paragraph 3.5.

3.2.3 A solar *water heater* which meets the requirements described in Paragraphs 3.2.1 and/or 3.2.2 satisfies NZBC Clause H1.3.4.

3.3 Sizing of systems

3.3.1 Solar *water heaters* must have a minimum of 50 litres of hot water storage per square metre of collector area.

COMMENT:
The sizing requirement described in Paragraph 3.3.1 is to prevent overheating of the system. The capacity of the tank should not be less than one day's expected use. For most houses the expected hot water consumption is 40–60 litres per person per day when stored at 60°C.

3.4 Operating and safety devices

3.4.1 Storage tanks in solar *water heaters* must have operating and safety devices that meet the requirements of G12/AS1 Paragraph 6.

3.4.2 Water from the installed system must not discharge onto the roof. *Vent pipes* and outlets from pressure relief valves must be plumbed to a suitable drain point.

3.5 Protection from Legionella bacteria

3.5.1 To prevent the growth of Legionella bacteria, solar *water heaters* must either:

a) have a continuously energised heating element fitted within 55% of the bottom of the *water tank* (by volume) and a thermostat set to 60°C or higher, or

b) be controlled so that the water above the element is heated to 60°C once a day, and the element is in the bottom 20% of the *water tank* (by volume) and no more than 150 mm from the bottom of the tank, or

c) be controlled so that all of the stored water is heated to 60°C or higher, once a week for not less than 1 hour. The temperature must be measured by a probe in the bottom 20% of the *water tank* (by volume) and no more than 150 mm from the bottom of the water tank. For open loop systems the stored water includes the water in the solar collector and water must be circulated through the collector during the heating period.

3.5.2 Where the solar *water heater* stores potable water and is used as a pre-heater for an instantaneous *water heater*, either:

a) the hot water storage tank connected to the solar collector must be fitted with supplementary heating and a controller operating to meet the conditions outlined in Paragraph 3.5.1, or

b) the instantaneous *water heater* must heat all water passing through it to not less than 70°C.

3.5.3 Where the solar *water heater* supplies inlet water to a *storage water heater* with an element in the bottom 20% of the water tank (by volume) and no more than 150 mm from the bottom of the tank with a thermostat set to no less than 60°C, no additional Legionella control is required.

COMMENT:

Paragraph 3.5 of this Acceptable Solution provides ways to demonstrate that the NZBC Clause G12.3.9 (i.e. "A hot water system must be capable of being controlled to prevent the growth of Legionella bacteria") is satisfied. This is a heat disinfection method which is considered the most effective method to control Legionella.

The heating required to control the growth of Legionella does not necessarily have to be achieved using supplementary electric heating; it could also be achieved using gas, solar or wood as a heating fuel.

3.6 Protection from frosts

3.6.1 For protection from freezing, collectors installed in climate zones 1 and 2 (as shown in Figure 1) must:

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a) pass the level 1 test described in AS/NZS 2712 Appendix E, or

b) have an automatic drain-down system.

3.6.2 For protection from freezing, collectors installed in climate zone 3 (as shown in Figure 1) must:

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a) pass the level 2 test described in AS/NZS 2712 Appendix E, or

b) have an automatic drain-down system.

Figure 1: **New Zealand climate zones for frost protection**
Paragraph 3.6

Figure B1 – Climate zones

Zone 3 includes all of the South Island, Stewart Island and the Chatham Islands
Figure B1 from NZS 4218: 2004 is reproduced with permission of Standards New Zealand under Licence 684.

4.0 Location of Solar Water Heaters

4.1 Location

4.1.1 Solar *water heaters* must be located away from the edge of a gable roof structure outside the high pressure *wind zone* shown in Figure 2.

4.2 Solar orientation and inclination

4.2.1 Solar collectors must face within +/- 90 degrees of geographic north (ie between east and west) to satisfy the requirements of NZBC Clause H1.3.4(a).

Figure 2: **High pressure wind zone**
Paragraph 4.1

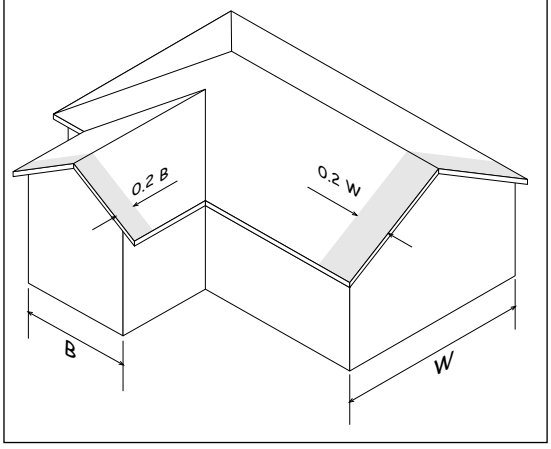
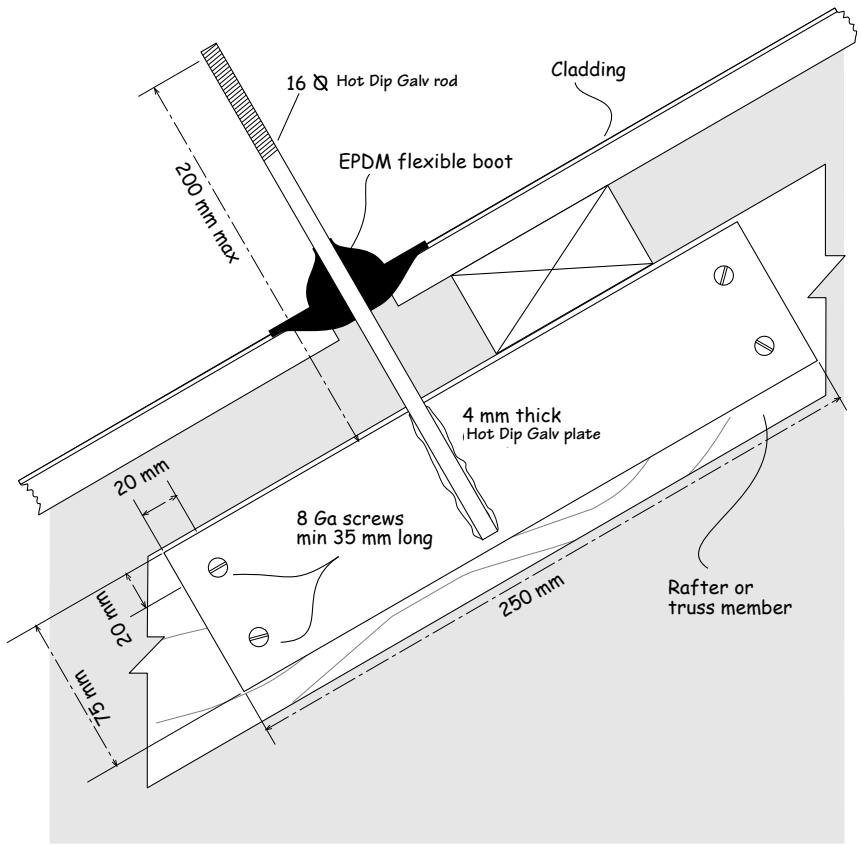


Figure 20: **Stud fixing for panels at different pitch**
Paragraph 6.6.2 c)



6.6.3 The edge of the panel elevated above the roof plane is to be supported by hot dip galvanized steel or stainless steel angle struts which are:

a) 25 x 25 x 3 mm angle for struts up to 1.0 m long

b) 30 x 30 x 3 mm angle for struts up to 1.4 m long, or

c) 40 x 40 x 3 mm angle for struts up to 2.4 m long.

Cuts or holes made in steel after galvanizing are to be protected from corrosion.

6.6.4 A diagonal is to run from within 50 mm of the top of one strut to within 50 mm of the bottom of the other strut. It must be the same size as the struts.

6.6.5 Connections between the struts, the diagonal and support rails are to be:

a) for hot dip galvanized steel, one M8 hot dip galvanized Class 4.8 bolt with nut and washers at each intersection, or

b) for stainless steel, one M8 stainless steel bolt with nut and washers at each intersection, or

c) fully welded – any mild steel that is welded must be hot dip galvanized after welding.

6.6.6 Connections between the upper ends of the struts and the collector must be of equivalent strength to the those of Paragraph 6.6.5

6.6.7 Alternatively, proprietary elevated frames can be used which:

a) meet the requirements described in Paragraphs 6.6.1 and 6.6.2

b) are subject to specific engineering design

c) result in the load on each collector support rail being evenly distributed over each of the four fixing points.

7.0 Maintenance and Durability

7.1 Maintenance

7.1.1 A permanent label must be fixed to a prominent part of the system which includes all markings required in the appropriate Standard identified in Paragraph 3.1.1.

COMMENT

1. Solar *water heaters* should be installed so that they can be easily maintained and owners should be provided with adequate instructions on the maintenance requirements.
2. Maintenance should be carried out to achieve the required:
   a) system performance, and
   b) *durability* of the solar *water heater* and any affected *building* components and junctions.
3. The maintenance required is dependent on the:
   a) type of solar *water heater*,
   b) materials and components used in the system manufacture and installation,
   c) manufacturer's recommendations,
   d) position of the solar *water heater* on the *building*,
   e) geographical location and specific site conditions.

COMMENT:

Washing by rain removes most accumulated atmospheric contaminants from roof *cladding*, but sheltered areas below solar collectors may be protected from the direct effects of rain and therefore may require regular manual washing. High pressure water must not be directed at sensitive junctions such as penetrations and other *flashings*. Care must be taken to avoid water being driven past anti-capillary gaps and *flashings*.

7.2 Durability

7.2.1 Solar *water heaters* and their components must meet the *durability* requirements specified in NZBC Clause B2.

7.2.2 A solar *water heater* is easy to access and moderately difficult to replace and therefore the *durability* requirement is 15 years.

7.2.3 Some components of the system will require maintenance and/or replacement. Components requiring maintenance or replacement before 15 years must be clearly identified in the owner's manual.

COMMENT:

NZS 4613:1986 states that:

"All materials used in the construction of solar equipment must have an expected in-service life of at least 15 years unless specifically excluded by the manufacturer" (Clause 103.2), and

"Collectors must have an expected service life of at least 15 years with no loss of fitness for purpose or rapid degradation during this period" (Clause 104.1).

NZS 4613: 1986 has been incorporated by reference in the Acceptable Solutions for G12 since October 2001.

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