

Dear Customer

Please find enclosed Amendment 7, effective 14 February 2014, to the Acceptable Solution and Verification Method for Clause G10 Piped Services of the New Zealand Building Code. The previous amendment to G10 (Amendment 6) was in October 2011

Section	Old G10	February 2014 Amendments to G10
Title pages	Remove title page and document history page 1/2	Replace with new title page and document history pages 1-2B
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**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI

Acceptable Solutions and Verification Methods

For New Zealand Building Code Clauses
G10 Piped Services



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.

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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

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Document Status

The most recent version of this document (Amendment 7), 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 6) 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

G10: Document History			
	Date	Alterations	
First published	July 1992		
Amendment 1	September 1993	pp. vi–vii, References p. 3, 1.0.1 p. 4, Table 1	p. 7, 2.0.1 b) p. 10, Index
Amendment 2	1 December 1995	pp. i and ii, Document History	p. vi–viii, References
Reprinted incorporating Amendments 1 & 2	April 1996		
Amendment 3	28 February 1998	p. ii, Document History p. vii, References	p. 8, 5.0.1
Amendment 4	23 June 2007	p. 2, Document History, Status p. 8, References p. 11, Definitions	p. 13, VM1 1.0.1 p. 20, AS1 5.0, 5.0.1 p. 21, Index
Amendment 5	Published 30 June 2010 Effective from 30 September 2010	p. 2, Document History, Status p. 5, Contents pp. 7–8, References	p. 15, G10/AS1 1.0.1 p. 16, G10/AS1 Table 1 p. 17, G10/AS1 1.3.1
Reprinted incorporating Amendments 3–5	30 September 2010		
Amendment 6	Effective from 10 October 2011 until 14 August 2014	p. 2, Document History, Status pp. 7–10, References	p. 16, G10/AS1 Table 1
Amendment 7	14 February 2014	p. 2A, Document History, Status pp. 7–8, References p. 11 Definitions p. 13 G10/VM1 1.0.1	p. 15 G10/AS1 1.0.1 p. 16 G10/AS1 Table 1 p. 20 G10/AS1 5.0.1
Note: Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.			

References

For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in this Verification Method and Acceptable Solution (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 this Verification Method and Acceptable Solution must be used.

Amend 7
Feb 2014Amend 6
Oct 2011Amend 7
Feb 2014

Where quoted

Standards New Zealand

NZS/BS 21: 1985 Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)
Amend: 1

Amend 5
Sep 2010

AS1 Table 1

Amends 6
and 7

NZS/BS 1387: 1985 (1990) 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: 1

Amend 2
Dec 1995

AS1 Table 1

Amend 5
Sep 2010

NZS 3501: 1976 Specification for copper tubes for water, gas, and sanitation
Amends: 1, 2, 3

Amend 6
Oct 2011Amend 7
Feb 2014

AS1 Table 1

Amend 2
Dec 1995

NZS/BS 3601: 1987 (1993) Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes

AS1 Table 1

		Where quoted		
Amends 5 and 7	NZS 4219: 2009	Seismic performance of engineering systems in buildings	AS1 1.0.1 a)	
Amend 5 Sep 2010	AS/NZS 4331 Part 1: 1995 Part 2: 1995	Metallic flanges Steel flanges Cast iron flanges	AS1 Table 1	
Amends 4, 5 and 7	AS/NZS 5601.1: 2010	Gas installations Part 1 General installations <i>Amend: 1</i>	VM1 1.0.1, AS1 5.0.1	Amend 2 Dec 1995 Amends 1 and 3
Amend 6 Oct 2011	NZS 5807:- Part 2: 1980	Code of practice for industrial identification by colour, wording or other coding Identification of contents of piping, conduit and ducts <i>Amend: 1, 2</i>	AS1 1.0.1	Amend 1 Sep 1993
	NZS 7646: 1978	Specification for polyethylene pipes and fittings for gas reticulation	AS1 Table 1	
British Standards Institution				
Amend 6 Oct 2011	BS 10: 2009	Specification for flanges and bolting for pipe, valves and fittings	AS1 Table 1	
Amend 5 Sep 2010	BS 143 and 1256: 2000	Specification for malleable cast iron and cast copper alloy threaded pipe fittings <i>Amend: 1, 2, 3, 4</i>	AS1 Table 1	
	BS EN 1044:1999	Brazing. Filler metals	AS1 Table 1	
	BS EN 10253-3: 2007	Butt-welding pipe fittings – non-alloy and ferric alloy steels with specific inspection requirements.	AS1 Table 1	
Amend 6 Oct 2011	BS EN 10253-3: 2008	Butt-welding pipe fittings – wrought austenitic and austenitic-ferritic (duplex) stainless steels without specific inspection requirements.	AS1 Table 1	Amend 1 Sep 1993
Amend 5 Sep 2010	BS 2971: 1991	Specification for Class II arc welding of carbon steel pipework for carrying fluids	AS1 1.3.1 a), Table 1	
	BS 3799: 1974 (1994)	Specification for steel pipe fittings, screwed and socket-welding for the petroleum industry	AS1 Table 1	Amend 2 Dec 1995
Amend 5 Sep 2010	BS EN 10241: 2000	Steel threaded pipe fittings	AS1 Table 1	
	BS EN 14324:2004	Brazing. Guidance on the application of brazed joints	AS1 Table 1	

Definitions

Amend 4
Jun 2007

This is an abbreviated list of definitions for words or terms particularly relevant to this Verification Method and Acceptable Solution. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

Amend 7
Feb 2014

Adequate *Adequate* to achieve the objectives of the *building code*.

Amend 4
Jun 2007

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

Hazardous Creating an unreasonable risk to people of bodily injury or deterioration of health.

Intended use in relation to a *building*:

- a) includes any or all of the following:
 - i) Any reasonably foreseeable occasional other use that is not incompatible with the *intended use*; and
 - ii) Normal maintenance; and
 - iii) Activities taken in response to *fire* or any other reasonably foreseeable emergency
- b) but does not include any other maintenance and repairs or rebuilding.

Amend 4
Jun 2007

Regulator A device which automatically regulates the pressure or volume of gas passing through it to a predetermined level.

Safety shut-off system An arrangement of valves and associated control systems which shuts off the supply of gas when required by a device which senses an unsafe condition.

Tailpipe A device placed at the low point of a gas piping system to collect condensate, and from which the condensate may be removed.

Vent line A pipe or tube which conveys gas to a safe place outside the *building* from a gas pressure *regulator* relief valve.

Verification Method G10/VM1

1.0 Soundness Testing

Amend 7
Feb 2014

1.0.1 AS/NZS 5601.1 Appendix E describes acceptable test methods to establish that piping systems will withstand a foreseeable pressure without significant leakage.

Acceptable Solution G10/AS1

It is intended that the New Zealand Building Code will in due course provide acceptable solutions for piping a range of fluids and solids. This acceptable solution is restricted to the reticulation of gas (typically natural or *town gas*), used as an energy source.

For water supply piping, an acceptable solution is given in G12/AS1.

Piping for Gas used as an Energy Source

1.0 Pipework Construction

1.0.1 Pipework installed in *buildings* shall:

- a) Be designed in accordance with B1/MM1, Paragraphs 2.0 and 13.0,
- b) Use materials and jointing techniques complying with Table 1,
- c) Have no plain nipples, square back elbows or long screws, and
- d) Have metal (including spirally wound metal) gaskets with a minimum melting point of 500°C.

COMMENT:

Pipework can be identified using the marking conventions given by NZS 5807.

1.1 Drainage and cleaning provisions

1.1.1 Where condensates can form in a pipeline, they shall be removed by grading the pipe with a fall of 4 mm per metre towards a *tailpipe* (drip), located at the piping low point nearest the outlet side of the meter.

1.1.2 If this is impractical, a single *tailpipe* may be provided at the lowest point in the pipeline, which shall have a fall to that point.

1.1.3 Tailpipes

Tailpipes shall be:

- a) Constructed to provide:
 - i) ready access for cleaning and draining,
 - ii) a trap which on filling will shut off the flow of gas before the condensate can run back to the meter, and
 - iii) protection from frost,

b) Of sufficient capacity for:

- i) the pipes draining into them, and
- ii) the amount of condensate likely to occur, and

c) Installed with a suitable control fitting and plug to allow removal of condensate if the *tailpipe* is below ground.

1.2 Pipework installation

1.2.1 A pipework installation shall have:

- a) Pipes supported in accordance with Table 2,
- b) Pipes separated (by at least 25 mm) from any metallic electrical conduit, or metal armoured or metal sheathed electrical wire,
- c) Pipe risers which are:
 - i) supported by anchors and attachments which are capable of supporting the total weight of the riser and allow for differential expansion,
 - ii) sleeved through floors,
 - iii) not jointed at sleeve locations, and
- d) Pipe bends and offsets which:
 - i) are constructed without buckling, cracks, or physical damage, and
 - ii) give at least the gas-carrying capacity of a standard fitting, and
- e) No piping laid on the ground.

Amend 5
Sep 2010

Amend 7
Feb 2014

Amend 1
Sep 1993

Table 1: Acceptable Standards for Piping Systems
Paragraph 1.0.1 b)

Amend 1
Sep 1993

Amend 5
Sep 2010

Amend 5
Sep 2010

Amend 5
Sep 2010

Amend 6
Oct 2011

Amend 5
Sep 2010

Amends
5 and 7

Amend 5
Sep 2010

Amend 1
Sep 1993

Material	Acceptable piping	Acceptable fittings	Acceptable jointing	Special conditions
Steel	Steel pipe to NZS/BS 1387, NZS/BS 3601, ASTM A53, ASTM A106 or API 5L.	Screwed pipe fittings, malleable cast iron to BS 143 and 1256 or ANSI B16.3. Wrought steel to BS EN 10241, or ANSI B16.11. Socket-welding pipe fittings, sockets to NZS/BS 3799 or ANSI B16.11. Butt-welding fittings to BS EN 10253-2, BS EN 10253-3 or ANSI B16.9. Flanges to BS 10, AS/NZS 4331 ANSI B16.1 and B16.5.	Screwing/socketing to NZS/BS 21. Welding to BS 2971 or API 1104.	<ol style="list-style-type: none"> Black pipe: <ol style="list-style-type: none"> is not permitted below ground unless protected. (Galvanising is not sufficient protection.) is not permitted with wet gas. shall be painted or suitably coated when installed above ground. All joints in locations below ground shall be externally protected against corrosion. Welding shall be by welders certified in accordance with API 1104. Flanged joints may only be used when other jointing methods are impracticable.
Copper	Copper tube to NZS 3501 or AS 1432.	Copper tube expanded with proper forming tools to provide capillary tolerances. Copper and copper alloy capillary fittings to AS 3688. Copper alloy compression fittings to AS 3688 or AS D26.	Brazing in accordance with BS EN 14324 using copper-phosphorous brazing alloy to AS 1167-1 or BS EN 1044, with a nominal silver content of not less than 5% and a melting point in excess of 550°C. Flares formed with proprietary flaring tools.	<ol style="list-style-type: none"> Not for installation below ground, unless in protective ducting.
Plastic	Polyethylene to NZS 7646.	Fittings to NZS 7646.		Below ground use only.

- e) A minimum free ventilation opening of 1/150 of the cross-sectional area of the duct or 50,000 mm² whichever is the greater, is provided, and
- f) Pipes within horizontal ducts are located near the bottom of the duct.

1.5.4 Unventilated ducts

The installation of pipes in unventilated ducts should be avoided, but when it is necessary for a pipe to pass through an unventilated duct or void, either:

- a) The pipes shall be continuously sleeved with the sleeve ventilated at one or both ends into a ventilated space, or
- b) The duct void shall be filled with dry, washed sand.

COMMENT:

Dry, washed sand is acceptable because it is inert, non-combustible and non-corrosive.

2.0 Isolating Valves

2.0.1 Gas piping isolating valves shall:

- a) For emergency shut-down of commercial and industrial installations, have their location clearly identified on a drawing permanently and prominently displayed near the primary meter set.
- b) For appliances, be of the 1/4 turn type with the handle marked to indicate the direction of gas flow.
- c) For domestic and light commercial installations, be provided in an accessible location outside the *building*.

2.0.2 To satisfy Paragraph 2.0.1 b), the meter inlet-valve may be used as an isolating valve in accordance with the requirements of the gas supply authority.

3.0 Corrosion Control

3.0.1 Acceptable solutions for the control of pipework corrosion shall provide for:

- a) The installation of a joint which is electrically non-conducting, where a pipe rises above ground,
- b) The separation of electrochemically incompatible materials in underground locations, by joining with insulated components, and
- c) The painting of black steel pipe as soon as practicable after installation unless it is protected with anti-corrosive wrapping.

4.0 Vent Lines

4.0.1 *Vent lines* shall:

- a) Be fitted to all vented *safety shut-off systems*, gas pressure relief devices, and breather vents, installed within a *building*,
- b) Have the vent pipe discharge point located no closer than:
 - i) 1.0 m in any direction from an opening into a *building*, and
 - ii) 2.0 m from any source of ignition, and
- c) Have *vent line* diameters complying with:
 - i) Table 4 for ventilators, or
 - ii) Table 5 for a vented *safety shut-off system*, and
- d) Have no *vent lines* of different types interconnected,
- e) Have no breather vent connected to a safety system shut-off vent,
- f) Have *vent lines* from the same appliance interconnected for:
 - i) safety shut-off *vent lines*, and
 - ii) breather *vent lines*, and

Amend 1
Sep 1993

- g) Have common *vent lines* with a cross-sectional area equal to or greater than the sum of the cross-sectional areas of the two largest *vent lines* being interconnected, and
- h) Have the *vent line* extended to the outside of the *building* and terminating in a breather vent.

4.0.2 Breather vents may be vented within a room or enclosure if the diameter of the vent outlet does not exceed the value 'd' given by the formula:

$$d = [(0.6 \times V)/P^{0.5}]^{0.5}$$

or if the volume of the room exceeds the value of 'V' given by the formula:

$$V = 7.72 d^2 P^{0.5}$$

where:

d = breather vent orifice diameter (mm).

P = inlet pressure to the vented device (kPa).

V = volume of the room or enclosure housing the *regulator* (m³).

Table 4: Diameters of Vent Lines for Ventilators
Paragraph 4.0.1 c) i)

Length of vent line	Minimum diameter
Less than 10 m	No less than the diameter of the vent connection.
10-30 m	One standard pipe diameter above that of the vent connection.
More than 30 m	Sufficient to prevent excessive back pressure taking into account the effect of <i>regulator</i> , inlet pressure, <i>vent line</i> flow resistance and the capacity of the <i>regulator</i> air relief device.

5.0 Another Acceptable Solution

5.0.1 AS/NZS 5601.1 Sections 1, 3, 4, 5 and 6 and Appendices A – M is another Acceptable Solution for Paragraphs 1.0 to 4.0.

Amend 4
Jun 2007

Amends
3 and 7

Table 5: Vent Line Diameters and Lengths for Vented Safety Shut-off Systems
Paragraph 4.0.1 c) ii)

Minimum nominal diameter of vent valve (mm)	Vent pipe length in metres							
	Nominal diameter of vent line (mm)							
	15	20	25	32	40	50	65	80
6	60	160	400					
8	30	80	200					
10	15	40	100					
15	8	20	50					
20		10	25	64				
25			13	32	80			
32				16	40	100		
40					20	50	130	
50						25	65	160