Dear Customer

Please find enclosed Amendment 6, effective 1 January 2017, to the Acceptable Solutions and Verification Methods for Clause G13 Foul Water of the New Zealand Building Code. The previous amendment to G13 (Amendment 5) was in February 2014.

<table>
<thead>
<tr>
<th>Section</th>
<th>Old G13</th>
<th>January 2017 Amendments to G13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title pages</td>
<td>Remove title page and document history pages 1-2B</td>
<td>Replace with new title page and document history pages 1–2B</td>
</tr>
<tr>
<td>References</td>
<td>Remove page 7/8</td>
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<td>G13/AS1</td>
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<td>G13/AS2</td>
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Acceptable Solutions and Verification Methods

For New Zealand Building Code Clause

G13 Foul Water
**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.building.govt.nz

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**New Zealand Government**

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**Document Status**

The most recent version of this document (Amendment 6), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 1 January 2017 and supersedes all previous versions of this document.

The previous version of this document (Amendment 5) will cease to have effect on 30 May 2017.

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.building.govt.nz

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**G13: Document History**

<table>
<thead>
<tr>
<th>Date</th>
<th>Alterations</th>
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<tr>
<td>First published</td>
<td>July 1992</td>
</tr>
<tr>
<td>Amendment 1</td>
<td>September 1993, pp. vii–viii, References, p. xi, Definitions, p. 25, Figure 3</td>
</tr>
<tr>
<td>Reprinted incorporating Amendment 1</td>
<td>October 1994</td>
</tr>
<tr>
<td>Amendment 2</td>
<td>1 December 1995, p. viii, References</td>
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<td>Amendment 1</td>
<td>Published March 2007, Effective from 23 June 2007, p. 2, Document History, Status, p. 6, Contents, pp. 7–8, References, pp. 9–10, Definitions, p. 52A, AS1 8.0, 8.1</td>
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<tr>
<td>Erratum 1</td>
<td>Effective from 23 June 2007, pp. 5–6, Contents, pp. 33–34, AS1 8.0, 8.1</td>
</tr>
<tr>
<td>Amendment 2</td>
<td>Effective from 21 June 2007, p. 2, Document History, Status, pp. 3, 4, 4A, Building Code Clause, p. 6, Contents, p. 8, References, p. 52A, VM4, p. 54, Index</td>
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<tr>
<td>Amendment 3</td>
<td>Published 30 June 2010, Effective from 30 September 2010, p. 2, Document History, Status, pp. 7–8, References, p. 11, G13/VM1 1.0.1, p. 13, G13/AS1 Table 1, p. 32, G13/AS1 6.1.1, p. 33, G13/AS1 6.2.2, 6.3.1, 6.3.2, 7.1.2, Table 7, p. 37, G13/AS2 Table 1, p. 42, G13/AS2 5.1.2, p. 50, G13/AS2 6.1.2, p. 51, G13/AS3 1.0.1, pp. 54–55, Index</td>
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<tr>
<td>Amendment 4</td>
<td>Effective from 10 October 2011 until 14 August 2014, p. 2, Document History, Status, p. 8, References, p. 10, Definitions, p. 37, G13/AS2 Table 1</td>
</tr>
<tr>
<td>Amendment 5</td>
<td>14 February 2014 until 30 May 2017, p. 2A, Document History, Status, pp. 7–8, References, p. 9, Definitions, p. 35, G13/VM2 1.0.1, p. 44, G13/AS2 5.6.1, p. 51, G13/SA2 1.03, p. 52A, 1.1.2</td>
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<tr>
<td>Amendment 6</td>
<td>Effective 1 January 2017, p. 8, References, p. 31 G13/AS1 5.8.2, 5.8.3, p. 33 G13/AS1 6.4.1, p. 37 G13/AS2 Table 1, p. 51 G13/AS3 2.0.1, 2.0.2</td>
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**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 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.

Standards New Zealand

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

NZS 3604: 2011 Timber framed buildings

NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design

NZS 4442: 1988 Welded steel pipes and fittings for water, sewage and medium pressure gas

British Standards Institution

BS 437: 2008 Specification for cast iron drain pipes, fittings and their joints for socketed and socketless systems


Standards Australia

AS 1579: 2001 Arc welded steel pipes and fittings for water and waste water

AS 1589: 2001 Copper and copper alloy waste fittings

AS 1646: 2007 Elastomeric seals for waterworks purposes

AS 2887: 1993 Plastic waste fittings


Where quoted

AS1 Table 1, AS2 Table 1
AS2 Table 1
AS2 Table 1
AS2 Table 1
AS2 Table 1
AS2 Table 1
AS1 Table 1
AS2 Table 1
AS1 Table 1
AS2 Table 1
Australian/New Zealand Standards

AS/NZS 1260: 2009 PVC-U pipes and fittings for drain, waste and vent applications
Amends: 1, 2

AS/NZS 1547: 2012 On-site domestic wastewater management

AS/NZS 2032: 2006 Installation of PVC pipe systems
Amend: 1

AS/NZS 2033: 2008 Installation of polyethylene pipe systems
Amend: 1, 2

AS/NZS 2280: 2014 Ductile iron pipes and fittings
Amend: 1

AS/NZS 2566.2: 2002 Buried flexible pipelines – installation
Amend: 1

AS/NZS 3500:- Part 2: 2015 Sanitary plumbing and drainage

AS/NZS 3518:2013 Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications

AS/NZS 4058: 2007 Pre cast concrete pipes (pressure and non pressure)

AS/NZS 4130: 2009 Polyethylene (PE) pipe for pressure applications
Amend: 1

AS/NZS 4401: 2006 High density polyethylene (PE-HD) pipes and fittings for soil and waste discharge (low and high temperature) systems inside buildings

AS/NZS 4936: 2002 Air Admittance valves for use in sanitary plumbing and drainage systems.

AS/NZS 5065: 2005 Polyethylene and polypropylene pipe and fittings for drainage and sewerage applications
Amend: 1

European Standards

EN 12380: 1999 Air admittance valves for drainage systems – Requirements and test methods

American Society of Sanitary Engineers

ASSE 1050: 1991 Performance requirements for air admittance valves for plumbing DWV systems stack type devices
ASSE 1051: 1992 Performance requirements for air admittance valves for plumbing drainage systems

References G13/VM1/VM2/VM4 & AS1/AS2/AS3

Where quoted

AS2 Table 1

AS1 Table 1
AS2 Table 1

VM4 1.1.2

AS1 6.1.1, 6.2.2, 6.3.1, 7.1.2
AS2 5.1.2, 6.1.2, 7.0.1, Table 1
AS3 1.0.1

AS1 Table 1

AS2 Table 1

AS1 7.1.3, 8.0.1, 8.0.2, 8.1,
VM2 1.0.1 Comment,
AS2 6.1.3, 7.0.2, 7.1
AS3 1.0.2

AS2 Table 1

AS2 Table 1

AS2 Table 1

AS2 Table 1

AS1 5.8.2, Table 1

AS2 Table 1

AS1 5.8.2, Table 1

AS1 5.8.2, Table 1
5.6 Discharge stack and relief vents

5.6.1 The discharge stack vent, if also acting as a drain vent pipe shall have a diameter of not less than 80 mm. Where not acting as a drain vent the discharge stack vent pipe shall have a diameter of not less than that required in Table 6.

5.6.2 Every discharge stack serving sanitary fixtures or sanitary appliances from 3 floors within a building shall include a relief vent pipe as shown in Figure 7.

5.6.3 Relief vent pipes shall:
   a) Connect to the bottom of the discharge stack at no less than 300 mm below the lowest discharge pipe served, and at an angle of 45°, as shown in Figure 7,
   b) Be extended upwards at a gradient of no less than 1:80 to connect to the discharge stack vent, as shown in Figure 7, or extend separately to the atmosphere as an open vent,
   c) Have a diameter of no less than that given in Table 6.

5.7 Termination of open vent pipes

5.7.1 Open vent pipes shall terminate outside the building in accordance with Paragraphs 5.7.2 and 5.7.3 or 5.7.4.

5.7.2 Vent pipes shall terminate outside the building and:
   a) Be at a height of not less than 50 mm above the overflow level of the highest sanitary fixture they serve, and
   b) Incorporate a means to prevent the entry of birds and vermin and shall have an open area not less than 80% of the cross-sectional area of the vent pipe they serve.

5.7.3 Open vent pipes serving discharge pipes directly connected to the foul water drainage system shall terminate no closer to building elements than (see Figure 12):
   a) Ground level – 3.0 m above,
   b) Windows and other openings – 600 mm above, and 3.0 m below and horizontally,
   c) Roofs – 150 mm above,
   d) Decking having pedestrian access – 3.0 m above, below and horizontally,
   e) Eaves or parapets – 600 mm above, below and horizontally, and
   f) Air intakes – 5.0 m in any direction.

COMMENT:
These requirements reduce the likelihood of foul air from the foul water drainage system entering the building.

5.7.4 Fixture vent pipes serving waste pipes discharging to a gully trap shall:
   a) Terminate outside the building and be not less than 900 mm from any opening to the building, and
   b) Be vented to the atmosphere independently of any vent pipe system connected directly to the foul water drainage system.

COMMENT:
1. The location of the outlet of the vent pipe serving a waste pipe is less restrictive than the requirements for vent pipes serving discharge pipes connected directly to the drain. This is permitted because a waste pipe is not connected directly to the foul water drainage system, and hence a source of foul air.
2. An independent vent pipe system for waste pipes is needed to avoid the risk of sewer gases escaping through a waste pipe to a gully trap.

5.8 Air admittance valves

5.8.1 General
Air admittance valves may be used as venting where specified in accordance with Table 5.

5.8.2 Air admittance valves shall be manufactured to ASSE 1050, ASSE 1051, EN 12380 or AS/NZS 4936.

5.8.3 Size of air admittance valves
The air admittance valve shall have a diameter no less than that given in Table 6, and be no smaller in diameter than the vent pipe that it serves.

Air admittance valves that form an integral part of a fixture trap shall only be used as a trap vent.
5.8.4 Location

*Air admittance valves* shall be installed in an upright (vertical) position at least 100 mm above the weir of the fixture trap and in a location (see Figure 10 (c)):

a) Accessible for maintenance and inspection,

b) Where the valve is unlikely to become frozen,

c) Protected from likely damage, and

d) Where *adequate* air can enter the valve.

Ventilated openings shall be provided for *air admittance valves* installed within a wall space. The free area of the openings shall be not less than 1.5 times that of the *vent pipe*.

**COMMENT:**
A significant amount of ventilating pipework and roof penetrations may be avoided with the use of *air admittance valves*. However the pipework sizing, whether for individual fixture vents or branch vents, should follow the requirements of this Acceptable Solution. *Air admittance valves* are intended for anti-siphon situations and may not protect the *water seals* of traps in positive pressure situations.

6.0 Installation

6.1 Jointing methods

*6.1.1* Jointing methods for PVC-U pipe shall comply with AS/NZS 2032.
6.2 Pipe supports

6.2.1 Pipes shall be supported at centres not exceeding those in Table 7.

6.2.2 For PVC-U pipes carrying discharges of greater than 60°C, support for the pipe shall be in accordance with Paragraph 6.3.2 of AS/NZS 2032.

COMMENT:
Supports are required to ensure that the pipe gradient does not fall below minimum values given in Paragraph 4.2.1.

6.3 Thermal movement

6.3.1 The plumbing system shall accommodate without failure the expected longitudinal movement in pipes resulting from temperature changes. All copper and PVC-U pipes shall incorporate expansion joints. The provisions described in Section 6.4 of AS/NZS 2032 shall be used for PVC-U pipes.

6.3.2 At supports, and at wall and floor penetrations not incorporating expansion joints, movement shall be accommodated using pipe sleeves or a durable and flexible lagging material.

COMMENT:
1. Thermal expansion will cause a 10 m length of PVC-U to extend 0.8 mm for each 1°C rise of pipe temperature.
2. Provision for thermal movement by correctly locating expansion joints, with fixed and sliding supports, prevents damage to pipes and fixtures.

7.0 Watertightness

7.1 Test methods

7.1.1 All above ground sanitary plumbing pipework shall be tested by water test or air test to verify that the system is watertight.

7.1.2 Water test: The method described in AS/NZS 2032 may be used for ensuring watertightness of above ground sanitary plumbing pipework.

7.1.3 Air tests may be carried out in accordance with either clause 12.3.2 of AS/NZS 3500.2.2 or Paragraph 8.3 of E1/VM1.

Table 7: Distances Between Supports

<table>
<thead>
<tr>
<th>Material</th>
<th>Pipe diameter (mm)</th>
<th>Maximum distance between supports (m)</th>
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<td>Vertical pipe</td>
</tr>
<tr>
<td>Copper pipes</td>
<td>32 to 50</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>greater than 50</td>
<td>3.5</td>
</tr>
<tr>
<td>PVC-U pipes</td>
<td>32 to 50</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>65 to 100</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>greater than 100</td>
<td>1.8</td>
</tr>
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</table>
Acceptable Solution G13/AS2

Drainage

1.0 Scope

1.0.1 This Acceptable Solution is for below ground non-pressure (gravity flow) foul water drains having a diameter of no greater than 150 mm.

1.0.2 It does not apply to foul water drainage systems where it is necessary to dispose of industrial liquid wastes, chemical or toxic wastes and other wastes which cannot be discharged to a sewer without pre-treatment. See G14/VM1.

2.0 Materials

2.0.1 Materials for drainage pipes and joints shall comply with the appropriate standards shown in Table 1.

2.1 Fill materials

2.1.1 Fill materials, as shown in Figure 7, shall be:

a) Bedding material of clean granular non-cohesive material with a maximum particle size of 20 mm,
b) Selected fill of fine-grained soil or granular material that is free from topsoil and rubbish and has a maximum particle size of 20 mm, or
c) Ordinary fill of excavated material.

3.0 Design

3.1 Bends

3.1.1 To reduce the risk of blockages, the foul water drainage system shall:

a) Have a simple layout that incorporates the least number of changes of direction,
b) Use bends having a radius of the practical maximum, and
c) Be laid only in straight lines between bends or junctions (both horizontally and vertically).

3.2 Junctions

3.2.1 Any connection to a drain, excluding vent pipe connections, shall be made by means of sweep or oblique junctions. The angle that the branch makes at the point of entry with the main drain, shall be no greater than 60° (see Figure 1).

<table>
<thead>
<tr>
<th>Material</th>
<th>Manufacturing Standard</th>
<th>Installation Standard</th>
</tr>
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<tbody>
<tr>
<td>Cast iron</td>
<td>BS 437</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>AS/NZS 4058</td>
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</tr>
<tr>
<td>Steel</td>
<td>NZS 4442, or AS 1579</td>
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<tr>
<td>PVC-U</td>
<td>AS/NZS 1260</td>
<td>AS/NZS 2032</td>
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<td>Polyethylene</td>
<td>AS/NZS 4130, AS/NZS 5065</td>
<td>AS/NZS 2033</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>AS/NZS 5065</td>
<td>AS/NZS 2566</td>
</tr>
<tr>
<td>Ductile iron</td>
<td>AS/NZS 2280</td>
<td></td>
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<tr>
<td>ABS</td>
<td>AS/NZS 3518</td>
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<tr>
<td>Copper</td>
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<td>GRP</td>
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<td>FRC</td>
<td>AS 4139</td>
<td></td>
</tr>
<tr>
<td>Elastomeric rings</td>
<td>AS 1646</td>
<td></td>
</tr>
</tbody>
</table>
3.3 Gully traps

3.3.1 All gully traps shall be constructed to prevent the ingress of surface water and foreign bodies likely to cause a blockage, shall be located within the legal boundary of the land on which the building is erected, and shall have (see Figures 2 and 3):

a) The overflow level of the gully dish no less than:
   i) 25 mm above paved surfaces, or
   ii) 100 mm above unpaved surfaces,

COMMENT:
It is imperative that the waste pipe connections to the gully trap remain watertight to prevent the ingress of ground/surface water.

b) A grating that will allow surcharge,

c) A minimum outlet pipe diameter of 100 mm,

d) A water seal depth of at least 65 mm,

e) At least one discharge pipe discharging to the gully trap to avoid water seal evaporation,

f) Waste pipes that discharge to the gully trap arranged to permit easy cleaning of the gully trap,

g) Waste pipe outlets located at least 20 mm above water seal level, and at least 20 mm below the grating,
Acceptable Solution G13/AS3

Plumbing and drainage

1.0 Installation of PVC-U pipe

1.0.1 AS/NZS 2032 is an Acceptable Solution for the installation of PVC-U pipe and fittings, but may exceed the performance criteria of NZBC G13.

2.0 AS/NZS 3500.2

2.0.1 AS/NZS 3500.2, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13, as modified by Paragraph 2.0.2, is an Acceptable Solution for plumbing and drainage.

2.0.2 Modifications to AS/NZS 3500.2

Clause 2.2 Delete and replace with “Materials and products shall comply with NZBC B2 and G13/AS1 Paragraph 2.0 Materials”.

Section 3.19 Delete section.

Section 4.4 Replace “inspection shafts” with “access point” in this section.

Clause 4.6.6 This applies only to Housing.

Clause 5.6 Delete and replace with “Drains in other than stable ground shall be subject to specific design.”