

PART 6: WATER SUPPLY

6.1 Scope

6.2 General requirements

6.2.1 Objectives

6.2.2 Referenced documents and relevant guidelines

6.2.3 System review

Add the following new clause 6.2.3

6.2.3 System review

The designer shall undertake a system review to ensure compliance with the requirements of the TA and this Standard and a report to this effect shall be provided.

Compliance shall cover at least the following issues:

(a) Minimum allowable operating (working) pressure can be maintained at all property connections. This may require zoning;

(b) Maximum allowable operating (working) pressure will not be exceeded anywhere in the system;

(c) Pipe class is suitable for the pipeline application (including operating temperature, surge and fatigue);

(d) Maximum and minimum flow velocities meet TA requirements;

(e) Pipe and fittings materials are suitable for the particular application and environment;

(f) Minimal likelihood of water quality problems or water stagnation;

(g) Valve spacing and positioning allow isolation of required areas;

(h) Mains layout and alignment meet TA requirements;

(i) Minimum fire fighting demands.

Control valves and scour systems where required are positioned to give required control of the system.

Commented [SC1]: Sections not deleted, just removal of headings from document

Commented [SC2]: New provision – was contained in 4404:2004, but has been removed from 4404:2010

6.3 Design

6.3.1 Design life

6.3.2 Design tolerance

6.3.3 Impact of consequential damage

6.3.4 Future system expansion

6.3.5 Electrical earthing of water services

6.3.5.2 Network analysis

Add the following new paragraph:

Within the area of Wanganui the developer will provide key design information to allow the Wanganui network model to be analysed, if necessary, at the developer's expense.

Commented [SC3]: Was 6.3.9.2

Add the following new paragraph:

6.3.5.2.1 Impact of consequential change

An assessment and risk analysis shall be conducted to evaluate and address the impact of environmental and property damage in the event of a major water main failure.

AS/NZS 4360 can be used as a guide for this process.

The following aspects should be considered:

(a) Failure mode of the selected pipeline material;

(b) Failure mode of the selected pipeline jointing system;

(c) The topography of the area adjacent to the water main and how it affects the natural flow of surface water;

(d) The capacity of the local drainage system to cater for a water main failure;

(e) The type of property development adjacent to the water main and the impact of a water main failure on below ground developments such as basements, below ground car parks or terraced development;

(f) Impact on community infrastructure;

(g) Clearance from other services and structures to reduce the likelihood of consequential damage; and

(h) The provision for future access for operational purposes.

Commented [SC4]: New provision – this provision was in 4404:2004, but has been removed from 4404:2010

6.3.5.2.1 System test pressure

Add the following paragraph:

The system test pressure is the pressure of hydrostatic testing (static), applied to test the integrity of a pipeline system. The system test pressure generally exceeds the actual design pressure of the system. The excess pressure is accommodated by the inherent design safety factor.

Commented [SC5]: Was 6.3.9.9

6.3.5.3 Peak flows

Add the following sentence to the end of the clause:

Cross check the results from 6.3.5.3 with 6.5.5 (as modified).

Commented [SC6]: Was 6.3.9.3

6.3.5.5 Minimum flows

Replace clause (a) with the following new clause:

(a) 15L/min for normal residential sites;

Commented [SC7]: Was 6.11.4(a)

6.3.5.7 Sizing of mains

Table 6.2 Empirical guide for principal main sizing

Add the following Note to the table:

Note: The “Rural Residential” column does not apply to Wanganui.

Commented [SC8]: Was 6.11.6

6.3.6 Design responsibilities

6.3.6.1 Territorial authority

6.3.6.2 The designer

6.3.7 Pipe selection

6.3.7.1 Sizing of mains

6.3.7.2 Pipe class

6.3.7.2.1 Design pressure (head) – maximum

6.3.7.2.2 Minimum pipe class

6.3.7.2.3 Nominated pipe class

6.3.7.2.4 Pumped mains

6.3.7.3 Pipe material

- 6.3.8 — Fire flow
- 6.3.8.1 — Fire protection services
- 6.3.8.2 — Allowable operating pressures (heads)

6.3.8.8 Rider mains and duplicate mains

6.3.8.8 (g) Rider mains and duplicate mains

Delete clause (g).

Commented [SC9]: Was 6.3.10.7

- 6.3.9 — Hydraulic design
- 6.3.9.1 — General

6.3.9.2 Network analysis

Add the following paragraph:

Within the area of Wanganui the developer will provide key design information to allow the Wanganui network model to be analysed, if necessary, at the developers expense.

Commented [SC10]: Now 6.3.5.2

6.3.9.3 Peak flows

Add the following sentence to the end of the clause:

Cross check the results from 6.3.9.3 with 6.11.4 (as modified).

Commented [SC11]: Now 6.3.5.3, with updated references

- 6.3.9.4 — Head losses
- 6.3.9.4.1 — Hydraulic roughness values

Table 6.1 — Hydraulic roughness values

- 6.3.9.5 — Pressure zones
- 6.3.9.6 — Design (head) requirements

Figure 6.1 Conceptual hydraulic operation of a gravity main

- 6.3.9.6.1 — Design pressure
- 6.3.9.6.2 — Operating pressure/working pressure
- 6.3.9.6.3 — Service pressure
- 6.3.9.7 — Flow velocities
- 6.3.9.8 — Surge analysis
- 6.3.9.8.1 — Maximum allowable operating pressure – trunk mains
- 6.3.9.8.2 — Minimum allowable operating pressure

6.3.9.9 System test pressure

Replace paragraph with the following new paragraph:

The system test pressure is the pressure of hydrostatic testing (static), applied to test the integrity of a pipeline system. The system test pressure generally exceeds the actual design pressure of the system. The excess pressure is accommodated by the inherent design safety factor.

Commented [SC12]: Now 6.3.5.2.1

- 6.3.9.10 — Temperature rating of plastic pipes
- 6.3.10 — Layout of water mains
- 6.3.10.1 — General
- 6.3.10.2 — Mains layout
- 6.3.10.3 — Water mains in easements
- 6.3.10.4 — Types of system configuration
- 6.3.10.5 — Water mains near trees

6.3.10.6 Shared trenching

6.3.10.7(g) Rider mains and duplicate mains

Delete clause:

Commented [SC13]: Now 6.3.8.8

- 6.3.10.8 Contaminated sites**
- 6.3.10.9 Crossings**
- 6.3.10.10 Crossings of creeks or drainage reserves**
- 6.3.10.11 Location marking of valves and hydrants**
- 6.3.11 Structural design**
 - 6.3.11.1 General**
 - 6.3.11.2 Structural consideration**
 - 6.3.11.2.1 Internal forces**
 - 6.3.11.2.2 External forces**
 - 6.3.11.3 Geotechnical investigations**
 - 6.3.11.4 Pipe selection for special conditions**
 - 6.3.11.5 Above-ground water mains**
 - 6.3.11.6 Trenchless technology**
 - 6.3.11.7 Embedment**

6.3.11.7.1 Pipe cover

Add the following paragraph:

Pipe laying depths:

- 900mm min cover for service mains
- 600mm min cover for rider mains in technical specs
- 900mm min cover for road crossings

Commented [SC14]: Now 6.3.12.10.1

6.3.11.7.2 Trench width

Replace clause with the following:

Pipe trench width design considerations shall be based on the minimum side clearances detailed in Appendix A Drawing CM-WDC-017.

Commented [SC15]: Now 6.3.12.10.2

6.3.11.8 Pipeline restraint

- 6.3.11.8.1 Thrust blocks**
- 6.3.11.8.2 Anchor blocks**
- 6.3.11.8.3 Restrained joint water mains**
- 6.3.11.9 Bulkheads**
- 6.3.12 Reservoirs and pumping stations**

6.3.12.10.1 Minimum pipe cover

Add the following paragraph:

Pipe laying depths:

- 900mm min cover for service mains
- 600mm min cover for rider mains in technical specs
- 900mm min cover for road crossings

Commented [SC16]: Was 6.1.11.7.1

6.3.12.10.2 Minimum trench width

Replace clause with the following:

Pipe trench width design considerations shall be based on the minimum side clearances detailed in Appendix A Drawing CM-WDC-017.

Commented [SC17]: Was 6.1.11.7.2

6.3.13 Obstructions and clearances

6.3.13.1 Underground services

6.3.13.2 Clearance from underground services

Table 6.2 Clearances between water mains and underground services

6.3.13.3 Clearance from structures

Table 6.3 Minimum clearance from structures

6.3.13.4 Clearance from high voltage transmission facilities

6.3.13.5 Deviation of mains around structures

6.3.14 Water quality

6.3.14.1 Materials

6.3.14.2 Siting of valves Prevention of back siphonage

Add a new paragraph:

Typical valve installation and chamber details are shown in the standard drawings in Appendix A.

Commented [SC18]: Was 6.4.1

6.3.14.3 Water age

6.3.14.3.2 Branch Mains

Replace first paragraph 1 with the following new paragraph:

Stop valves shall be located on branch mains adjacent to the through water main. The type of joint to be used (Soc-Soc, FI-Soc or FI-FI) shall be based on the required security of the water mains. For supply mains or reticulation mains <DN250, a tee with a flanged branch and flanged valve shall be used (see Appendix A Drawings WS-WDC-001 and WS-WDC-002).

Commented [SC19]: Was 6.4.2.3.1.2

6.3.14.6.1 Installation design criteria

Replace paragraph 4 with the following:

The normal size of the large orifice of air valves shall be DN50 for installation on mains.

Commented [SC20]: Was 6.4.2.5.1

6.3.14.8 Flushing points

Replace paragraph with the following new paragraph:

Flushing points should be installed at dead ends on any main or ridermain (see Appendix A drawing WS-WDC-002). Flushing point can be a fire hydrant.

Commented [SC21]: Was 6.4.2.6.3

6.3.16 Connections

6.3.16 Toby

Add the following new clause:

Tobies to be positioned outside the vehicle crossing, in order to facilitate maintenance.

Commented [SC22]: Was 6.4.3

6.3.16.2 Property service connections

Add the following clause:

See Appendix H for property connection sizes. Where there is a water supply in a Right of Way, WDC ownership is to the boundary of the Right of Way

Add the following clause:

6.3.16.2.1 High risk connection

Specify RPZ Backflow Preventer at road reserve boundary in accordance with Council's Standard detail. See drawing WS-WDC-011 in Appendix A.

Commented [SC23]: Was 6.6.2

6.4 Approval of proposed infrastructure Valves

6.4.1 General

Replace the last paragraph with the following new paragraph:

Typical valve installation and chamber details are shown in the standard drawings in Appendix A.

Commented [SC24]: Now 6.3.14.2

6.4.2 Valve types

6.4.2.1 Gate valves

6.4.2.2 Butterfly valves

6.4.2.3 Stop valves for reticulation mains

6.4.2.3.1 Stop valves — location and arrangements

6.4.2.3.1.1 General

6.4.2.3.1.2 Branch mains

Replace paragraph 1 with the following new paragraph:

Stop valves shall be located on branch mains adjacent to the through water main. The type of joint to be used (Soc-Soc, FI-Soc or FI-FI) shall be based on the required security of the water mains. For supply mains or reticulation mains <DN250, a tee with a flanged branch and flanged valve shall be used (see Appendix A Drawings WS-WDC-001 and WS-WDC-002).

Commented [SC25]: Now 6.3.14.3.2

6.4.2.3.1.3 Pressure zone dividing valves

6.4.2.3.1.4 Secure service connections

Figure 6.2 Branch valve adjacent to main

Figure 6.3 Valve and hydrant combinations for pressure zone dividing valves

Figure 6.4 Secure connection

6.4.2.4 Pressure reducing valves (PRV)

6.4.2.5 Air valves (AV)

6.4.2.5.1 Installation design criteria

Replace paragraph 5 with the following:

The normal size of the large orifice of air valves shall be DN50 for installation on mains.

Commented [SC26]: Now 6.3.14.6.1

6.4.2.5.2 Air valves location

6.4.2.6 Scours and pump-out branches

6.4.2.6.1 Scour sizes

Table 6.4 Minimum scour size

6.4.2.6.2 Scour locations

6.4.2.6.3 Flushing points

Replace paragraph with the following new paragraph:

~~Flushing points should be installed at dead ends on any main or ridermain. (see Appendix A drawing WS-WDC-002). Flushing point can be a fire hydrant.~~

Commented [SC27]: Now 6.3.14.8

6.4.3 Add the following new clause

Tobies

~~Tobies to be positioned outside the vehicle crossing, in order to facilitate maintenance.~~

Commented [SC28]: Now 6.3.16

6.5 Construction Hydrants

6.5 Construction of pipelines

Add the following new paragraphs before 6.5.1.

**Construction shall be in accordance with WDC's specifications.
Water mains shall only be installed by persons who have had the requisite inoculations.**

Commented [SC29]: Was 6.10

6.5.1 General

6.5.2 Hydrants for fire fighting

6.5.3 Hydrant installation

6.5.3.2 Berms

Replace paragraph with the following new paragraph:

Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements of Appendix A Drawing CM-WDC-017.

Commented [SC30]: Was 6.10.3.2

6.5.3.3 Detector tape

Delete clause:

Detector tape is not used by WDC.

Commented [SC31]: Was 6.10.3.3

6.5.3.4 Tracer wire

Add the following new paragraph:

Tracer wire shall be used for all pipe installations.

Commented [SC32]: Was 6.10.3.4

6.5.4 Pressure testing of water mains Hydrants for reticulation system operational requirements

Add the following new sentence to the end of the paragraph:

Pressure test shall be carried out in the presence of an authorised representative of Council.

Commented [SC33]: Was 6.10.4

Add the following correct equation and criteria at the end of the paragraph:

Appendix C Clause 3.7.4 (c) Field Testing of Pipelines

C3.7.4 Air Volume Assessment

Replace the equation in (c) with the following:

$$\Delta V_{max allowable} = 1.2 \times V \times \Delta P \left(\frac{1}{E_w} + \frac{D}{e \times E_s} \right)$$

Add e to the equation criteria:

$\Delta V_{max allowable}$ is the allowable water loss in litres;

V is the volume of the tested pipeline section in litres::

ΔP is the measured pressure loss in kilopascals;

E_w is the bulk modulus of water in kilopascals;

D is the internal pipe diameter in metres;

e is the wall thickness of the pipe in metres;

E_s is the modulus of elasticity of the pipe wall in the circumferential direction in kilopascals;

1.2 is an allowance factor (e.g. for air content) during the main test phase

Commented [SC34]: New. Replaces part of calculation in appendix C. Previous calculation was incorrect, missing component

6.5.5 Hydrants at ends of mains

Add the following new clause

6.6 Rural settlements and areas on restricted water supply

All of the above users are advised to have 24 hours on-site storage.

These supplies generally do not have fire-fighting capability. The flows to the properties are restricted based on land area and land use.

Testable double check backflow preventors are to be installed on each connection and generally supplies are metered.

Each Scheme has its own Rules, Capital Contributions and connection costs.

Connection manifolds and fittings inside the manifolds are the property of Council.

Note:

Rules 16-1 and 16-2 of Horizons One Plan set out the permitted activity limits and conditions that relate to the take and use of surface water and groundwater. If you have any questions regarding water takes please contact Horizons duty consents planner on Freephone 0508 800 800.

Commented [SC35]: Was 6.12

Commented [BO36]: Horizons Feedback to insert the note

Add the following new clause

6.7 Storage

Where storage is required for domestic purposes, a days storage based on 500 litres/head/day shall be provided.

For industry it is recommended that a days water usage be provided as storage.

Commented [SC37]: Was 6.13

Add the following new clause

6.8 **Pump stations**

Requires specific approval with regard to design, operation, maintenance, safety and compatibility.

Pumps shall be Variable Speed Drive controlled.

Each pump station shall have a standby pump in addition to the duty pump/s.

Pumps, control and telemetry system shall be compatible with other pump stations operated by WDC.

Commented [SC38]: Was 6.14

6.6 **Connections**

6.6.1 **Connection of new mains to existing mains**

6.6.2 **Property service connections**

Add the following clause:

See Appendix H for property connection sizes. Where there is a water supply in a Right of Way, WDC ownership is to the boundary of the Right of Way

Add the following clause:

High risk connection

Specify RPZ Backflow Preventer at road reserve boundary in accordance with Council's Standard detail. See drawing WS-WDC-011 in Appendix A.

Commented [SC39]: Now 6.3.16.2

6.7 **Termination**

Figure 6.5 Elimination of termination points

Figure 6.6 Looped and link principal mains

6.7.1 **Permanent ends of water mains**

6.7.2 **Temporary ends of water mains**

6.8 **Bends and tees**

6.9 **System review**

6.10 **Construction of pipelines**

Add the following new paragraphs before 6.10.1:

Construction shall be in accordance with WDC's specifications.

Water mains shall only be installed by persons who have had the requisite inoculations.

Commented [SC40]: Now 6.5

6.10.1 **Excavation**

6.10.2 **Bedding**

6.10.3 **Backfilling and reinstatement**

6.10.3.1 **Carriageways**

6.10.3.2 **Berms**

Replace paragraph with the following new paragraph:

~~Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements of Appendix A Drawing CM-WDC-017.~~

Commented [SC41]: Now 6.5.3.2

6.10.3.3 ~~Detector tape~~

~~Delete clause:~~

~~Detector tape not used by WDC.~~

Commented [SC42]: Now 6.5.3.3

6.10.3.4 ~~Tracer wire~~

~~Add the following new paragraph:~~

~~Tracer wire to be used for all pipe installations.~~

Commented [SC43]: Now 6.5.3.4

6.10.4 ~~Pressure testing of water mains~~

~~Replace paragraph with the following new paragraph:~~

~~Before a new water main is connected to the existing reticulation, a successful pressure test shall be completed. The test shall be carried out as specified in Appendix B, in the presence of the authorised officer.~~

~~The reticulation shall withstand a pressure of 1400kpa measured at the lowest point of the section under test or 1.5 times the working pressure at any point in the system, whichever is greater.~~

~~The pressure shall be maintained for a period of 15 minutes. After 15 minutes the pressure drop shall not exceed 10% of test pressure.~~

Commented [SC44]: Now contained in 4404

~~Pressure test shall be carried out in the presence of an authorised representative of Council.~~

Commented [SC45]: Now 6.5.4

6.10.5 ~~Discharge of testing water from pipelines~~

6.10.6 ~~Disinfection of water mains~~

6.10.7 ~~Discharge of water containing chlorine from pipelines~~

6.11 ~~Means of compliance with this Standard~~

6.11.1 ~~Standard pipe sizes~~

6.11.2 ~~Minimum pipe sizes~~

6.11.3 ~~Allowable operating pressures (heads)~~

Table 6.5 ~~Operating pressure limits~~

6.11.4(a) ~~Minimum flows~~

~~Replace clause (a) with the following new clause:~~

~~(a) 15L/min for normal residential sites.~~

Commented [SC46]: Now 6.3.5.5

6.11.5 ~~Minimum water demand~~

~~Add the following at the end of the clause:~~

~~Refer 6.3.9.3.~~

Commented [SC47]: Deleted

6.11.6 ~~Sizing of mains~~

Table 6.6 — Empirical guide for principal main sizing

Add the following Note to the table:

Note: The “Rural Residential” column does not apply to Wanganui.

Commented [SC48]: Now 6.3.5.7, table number has been updated

Table 6.7 — Empirical guide for sizing rider mains

6.11.7 — Reticulation layout

6.11.8 — Stop valve spacing criteria

Table 6.8 — Stop valve spacing criteria

6.12 — Add the following new clause

Rural settlements and areas on restricted water supply

All of the above users are advised to have 24 hours on-site storage.

These supplies generally do not have fire fighting capability. The flows to the properties are restricted based on land area and land use.

Testable double check backflows are to be installed on each connection and generally supplies are metered.

Each Scheme has its own Rules, Capital Contributions and connection costs.

Connection manifolds and fittings inside the manifolds are the property of Council.

Commented [SC49]: Now 6.6

6.13 — Add the following new clause

Storage

Where storage is required for domestic purposes, a days storage based on 500 litres/head/day shall be provided.

For industry it is recommended that a days water usage be provided as storage.

Commented [SC50]: Now 6.7

6.14 — Add the following new clause

Pump stations

Requires specific approval with regard to design, operation, maintenance, safety and compatibility.

Pumps shall be Variable Speed Drive controlled.

Each pump station shall have a standby pump in addition to the duty pump/s.

Pumps, control and telemetry system shall be compatible with other pump stations operated by WDC.

Commented [SC51]: Now 6.8