

**CODE OF PRACTICE FOR CITY INFRASTRUCTURE &
LAND DEVELOPMENT**

ENGINEERING STANDARDS MANUAL

SECTION 6

WATER SUPPLY

Water Supply

SECTION 6.0 WATER SUPPLY

6.1 SCOPE

This Section of the Engineering Standards Manual covers the engineering requirements for water supply associated with land development projects and provides:

- a) The relevant criteria for performance
- b) Methods for design and construction
- c) Specifications for materials and structures
- d) Standard details.

6.2 PERFORMANCE CRITERIA

Where provided, a water supply network shall:

- a) Meet all relevant standards and criteria of the District Plan
- b) Provide potable water to design quantities
- c) Provide potable water meeting Ministry of Health requirements
- d) Provide for fire fighting requirements
- e) Provide a connection point for each allotment
- f) Be compatible with connecting networks
- g) Withstand design pressures and loads
- h) Be watertight
- i) Maximise the expected design life of the system and minimise the long term maintenance costs.

6.3 DESIGN REQUIREMENTS

6.3.1 Capacity

All water supply networks shall have sufficient capacity to provide water for both demand (general consumption) and for fire fighting purposes.

6.3.1.1

The minimum capacity shall be the greater of either:

- a) The fire flow plus 1.7 x the average demand with a minimum pressure of 100 kPa at any point in the system.
or
- b) The peak demand with a minimum pressure of 250 kPa at any point in the system.

6.3.1.2

The fire flows and average demand shall be determined as follows:

		Reticulated Water Supply		
Fire Classification	Water	Required Water Flow Within a Distance of 135m	Additional Water Flow Within a Distance of 270m	Maximum Number of Fire Hydrants to Provide Flow
FW1		450 L/min 7.5 L/s (See Note 4)	-	1
FW2		750 L/min (12.5 L/s)	750 L/min (12.5 L/s)	2
FW3		1500 L/min (25 L/s)	1500 L/min (25 L/s)	3
FW4		3000 L/min (50 L/s)	3000 L/min (50 L/s)	4
FW5		4500 L/min (75 L/s)	4500 L/min (75 L/s)	6
FW6		6000 L/min (100 L/s)	6000 L/min (100 L/s)	8
FW7		As calculated		
Note: 1. FW1 Single family home with a sprinkler system installed to an approved Standard. 2. FW2 All other structures (apart from single family homes) with a sprinkler system installed to an approved Standard OR Non-sprinklered housing; including single family dwellings, multi unit dwellings, but excluding multi-storey apartment blocks. 3. FW3 to FW7 depends on fire hazard category and floor area of the largest fire cell of the building. (refer SNZPAS: 4509:2008) 4. Where houses have a sprinkler system installed to an approved Standard, the distance to a fire hydrant or alternative water supply may be negotiated by agreement with the Fire Region manager Table contents extracted from SNZ PAS:4509:2008.				

6.3.1.3

Network analysis may be required for larger developments or where residual pressures are marginal. The Water Operations Engineer will supply available data on the existing district networks.

6.3.2 Watermain categories

- Trunk Main – Generally 200, 225 or 300mm dia
- Principal Main – Generally 100mm or 150mm dia
- Rider Main – Generally 50mm dia

6.3.3 Layout

6.3.3.1

A watermain shall:

- be provided on both sides of all streets to service all fronting allotments. In general a principal main with hydrants shall be provided on one side and a rider main on the other side;
- connect at road intersections in general accordance with SD 6.01;
- be provided within right-of-ways to service each allotment where 3 or more dwellings are being serviced where more than 10 household units are serviced from a jointly owned accessway, dual reticulation is required, i.e. as for (a) above (except with the approval of the Water Operations Engineer).
NOTE: In an existing 'built-up' area a rider main is not required in a right-of-way where less than five properties are to be serviced. A ridermain is optional where more than five properties are serviced from the rider main. Refer SD 6.07.3;
- be provided where required to provide fire coverage.

Water Supply

6.3.3.2

Watermains shall be located in the rear berm area at a distance of 1.4 metres from the road reserve boundary in accordance with SD 3.02 and SD 6.01. The maximum out of alignment tolerance acceptable is 50mm on straights and 100mm on bends for open cut installation (refer also to Clause 6.3.7).

Trunk mains shall be subject to specific approval.

In areas with non-standard berms or with difficult terrain or where there is conflict with other services or structures or natural features, the positions may be varied subject to specific approval.

6.3.3.3

The minimum cover to trunk and principal mains shall be 600mm. The minimum cover to rider mains shall be 450mm. The minimum cover under roads shall be 900mm. The maximum cover shall not exceed 1000mm except in exceptional circumstances and with the approval of the Water Operations Engineer.

Details of the proposal must be submitted for approval showing clearances from adjacent services. In general terms the horizontal clearance required from a watermain will be 250mm, and the services adjacent to the watermain (within 600 either side) may not be located above the watermain, i.e. have less cover > refer clause **6.3.3.2** also.

6.3.3.4

Careful consideration is to be given to the position of new watermains during the design and construction stages, when connecting to existing non-standard systems.

6.3.3.5

Principal mains are required along both sides of principal roads (4 lanes) and along both sides of roads in areas classified as Class A, B or C by the New Zealand Fire Service (NZFS).

6.3.3.6

Special Provisions for Medium Density Development (Lots less than 350m²).
Due to the intense nature of development associated with medium density housing, the normal requirements relating to servicing rear units/properties accessed by a right-of-way (ROW) (Clause 6.3.3.1(c)) will not apply.

The individual metering of units, whether unit title or freehold title, is required at the road reserve boundary for all units where the length of private service pipe does not exceed 60 metres. For other than frontage units, meters are to be grouped together at one or more locations. Refer SD6.07.4.

Where the length of private line exceeds 60 metres, consideration will be given to allowing a 'Council owned' ridermain within the site. If a ridermain is to be provided, an easement in favour of Council will be required to allow future maintenance of the pipes, fittings and meters. If a fire hydrant is required on the site (to meet the 135 metre requirement) then a fire main and hydrant is to be provided to Council standards (with an easement) with provision for metering of all units as above. Refer SD6.07.4.

Where a group of proposed meter connection points are required at one location within the site, a manifold should be provided (with valves but no meters) as shown in SD 6.06.5. For groups of meters located at the road reserve boundary, the manifold will be provided by Council at the time the water meters are installed.

It is recommended that ducting be provided to facilitate possible future repair or replacement of individual service pipes under non permeable driveways & for rider mains under new vehicle crossings.

Security of supply to medium density developments will be checked by the Water Operations Engineer who will advise regarding metering arrangements, valving, possible new road crossings/reticulation required in order to provide an acceptable level of security. The Water Operations Engineer will also take into consideration water circulation and water quality issues when confirming the general reticulation layout and whether additional reticulation is required.

6.3.3.7 Special provisions for multi-storey apartment buildings

For multi-storey apartment buildings, individual meters are required for each apartment. In buildings where pumping is not required (typically less than four stories), meters are to be located at the base of the building in an accessible location for meter reading. For buildings which require pumping, a bulk water meter is required at the boundary and individual meters are also required for each apartment to facilitate user-charging by the building management.

6.3.3.8 Separate Meters

All Minor dwellings, factory units and individual shops must be separately metered.

6.3.4 Regulatory requirements

Where water mains are to be located within private property they shall be protected by an easement in gross giving Council right to reticulate water, right of access for maintenance and replacement work and right to protect against interference from other works. Where water mains are to be located within driveways the right of way easement shall also include the right to reticulate to future additional dwellings serviced by the driveways.

Note: Contact the Water Operations Engineer for documentation.

6.3.5 Watermains

6.3.5.1

Trunk mains shall generally be 200mm dia and over and shall be used for the transmission of water to or through a reticulated area.

Trunk mains may be used for the fire fighting purposes whereby fire hydrants shall be provided.

Supply connections to trunk mains shall not generally be permitted.

Trunk mains shall be subject to specific design.

6.3.5.2

Principal mains shall generally be 150mm dia. However, 100mm dia mains may be approved for use in cul de sacs and right of ways.

6.3.5.3

All rider mains shall be 50mm dia and shall be connected to principal mains at both ends, other than when located in accessways serving up to 10 household units.

The maximum number of household units that shall be serviced by a rider main is 40 for a double end feed.

6.3.5.4 Road crossing pipes

Road crossing pipes shall not be less than 150mm diameter. CLMS or PE pipe only are approved for road crossings. Where 'in line' road crossings are proposed, PE may not be used in conjunction with non PE systems.

6.3.5.5

All watermain pipes shall comply with the following dimensions and pressure ratings.

Category	Nominal Diameter mm	Bore mm	External Diameter (mm)	Minimum Pressure Rating (bar)
Connections	20 PE	15	20	12
	25 PE	20	25	12
	32 PE	25	32	12
Rider Mains	63 PE	50	63	12 (SDR 11 PE 80B)
	63 PE	50	63	16 (SDR 11 PE 100) Trenchless installation
Principal Mains	125 PE	100	125	12.5 (SDR 11 PE 80B)
	180 PE	150	180	12.5 (SDR 11 PE 80B)
	150 Steel (CLMS)	150	177	4.8mm steel wall thickness

Note:

In areas such as South Titirangi, Laingholm, Parau and Huia Village the working pressure may be greater than 12 bar and the Water Operations Engineer may specify PE100 pipe which has a pressure rating of 16 bar.

PVC pipe may be permitted by the Water Operations Engineer in exceptional circumstances.

6.3.5.6

Watermains behind retaining walls shall be one continuous length of ducted PE pipe, without any fittings.

6.3.5.7

An approved "detectable" warning tape shall be installed with all watermain pipe, whether installed by open cut or using trenchless technology. (Boddingtons WAVELAY Detectatape 50mm wide blue with stainless steel wire available from Apex Safety Products New Plymouth is approved. Wavewater Detectable Tape, a similar product supplied by Humes is also approved).

6.3.6 Specifications

6.3.6.1 PVC systems (where permitted)

Where installation of PVC pipe is permitted, pipes shall be to AS/NZS 1477: 2006 and shall have socket and spigot type joints with Z type rings.

Connections to fittings shall be by flange adapter or by flanged gibault adapter (plain fittings are not to be used).

Bends are required if pipes are to be laid on a curve of radius less than 300 times the nominal diameter of the pipe (45m radius for 150mm pipe).

Large radius PVC bends fabricated from PN 15 (min) pipe shall be permitted for PVC mains up to and including 150mm diameter. However, flanged cast iron bends must be used adjacent to a flanged fitting.

When non-standard bends are required and/or additional strength is necessary, flanged bends shall be fabricated from concrete lined mild steel pipe (CLMS).

6.3.6.2 Polyethylene (PE) systems

PE pipes shall be to AS4130:2003 : PE pipes, pressure applications and shall be blue in colour unless permitted otherwise by the Water Operations Engineer for above ground use. Up to three black longitudinal stripes up to 5mm in width will be accepted as a trademark.

All fittings shall comply with WIS 4-32-04/1998.

Jointing shall be carried out in accordance with the manufacturer's recommendations as follows:

- i. **Butt Welding:** shall be permitted only when the pipes and spigot fitting either side of the same dimensional SDR (wall thickness) and are not misaligned. All welding is to be carried out by welding operators certified in accordance with the UNITEC/Australian National Plastics and Rubber Industry Training Council, or similar approved certification. All welds are to be stamped with the identification of the certified welder. The name and number the certified welder shall be notified in writing for Council approval prior to any welding being done. All welding shall be carried out under controlled conditions, i.e. use of a tent is required. Upon request a welded joint (selected at random) will be provided at no cost to Council for testing. If the test is unsatisfactory, additional joints will be tested and all costs associated with the testing and reinstatement will be met by the developer. Only butt welding equipment capable of providing a printout of individual weld parameters shall be used.
- ii. **Electrofusion:** couplers and fittings shall comply with the international 39.5 volt system and shall be manufactured to comply with WIS 4-32-06 1989. Electrofusion welded tapping bands are not permitted.

IMPORTANT NOTE: The maintenance period for all PE electrofusion and butt welded joints shall be FIVE YEARS and any problems with welded joints experienced during this period shall be rectified at no cost to Council

- iii. **Mechanical Jointing Systems:** For 63mm diameter PE pipe or smaller, Pushlok fittings are approved as a pipe to pipe jointing system. For larger diameter PE pipe, mechanical jointing systems such as system 2000 should not be used for new construction – they are approved for temporary or repair work only..

Joints between lengths of PE pipe greater than 63mm diameter must be butt welded.

Bends are required if PE pipes are to be laid on a curve of radius less than 22 times the nominal diameter of the pipe.

PE bends (to be butt welded or joined with couplers) and bends with built in electrofusion couplers are approved and must be used to achieve the correct alignment within the tolerances stated in Clause 6.3.3.2.

6.3.6.3 Steel/iron systems

Ductile iron pipes (greater than 150mm) and steel pipes shall be concrete lined (or other approved lining such as epoxy) and shall comply with AS/NZS2280: 2004 and NZS4442: 1988 respectively. Steel pipes shall be wrapped in black or blue jacket polyethylene (for in ground use) or epoxy/enamel coated (for out of ground use) or wrapped with the Denso Petrolatum System (or similar approved protection system) should ground conditions require – refer SD 6.09.

All bolted systems and exposed surfaces shall also be wrapped with the Denso Petrolatum System (or similar approved protection system) – refer SD 6.09.

6.3.7 Bedding and backfill

6.3.7.1 Open cut methods

All watermains shall be bedded, haunched and covered in accordance with SD 6.02. Open cut methods across paved or sealed areas will not generally be permitted.

NOTE: Where use of PVC is permitted, a maximum of two 6m lengths of PVC pipe (Z ring jointed) may be inserted into a horizontally thrust or drilled section. The provision of Clause 6.3.7.2 will apply with regards to voids and alignment.

NOTE: COMMON TRENCHING

If a common trench is proposed for water and other services, then the following provisions shall apply:

- a) the provisions of Clauses 6.3.3.3 must be adhered to with regards the location and depth of watermains.
- b) Only PE pipe may be used.
- c) Details of the proposal must be submitted for approval showing clearances from adjacent services. In general terms the horizontal clearance required from a watermain will be 250mm, and the services adjacent to the watermain (within 600 either side) may not be located above the watermain, i.e. have less cover > refer clause 6.3.3.2 also.
- d) Out of alignment tolerances will be closely monitored to ensure clearances from adjacent services are achieved. Substandard clearances will not be accepted. For coiled pipe pegging of the main at intervals (five metres maximum) using timber stakes will be required to hold the pipe in its correct alignment.
- e) Where services in a common trench are arranged vertically, such as in a ROW situation, the watermain shall be located above all other services and the minimum vertical clearance to any other service from the water pipe shall be 100mm

6.3.7.2 Trenchless methods

Voids greater than 50mm around horizontally thrust or drilled watermains shall be backfilled and sealed with bentonite grout (or similar approved material). Only PE pipe may be used with trenchless laying methods and watermains shall not vary more than 150mm from the intended horizontal alignment. Watermains at depths greater than 1000mm cover may be rejected (refer also to Clause 6.3.3.3 re minimum cover). 63PE pipe laid by trenchless methods shall be PE100 material (refer 6.3.5.5) Refer also to Clause 6.3.5.7 regarding the provision of detectable warning tape.

6.3.8 Anchor blocks

For non-continuous pipelines cast in situ concrete anchor blocks shall be provided at all points where an unbalanced thrust occurs on mains exceeding 50mm diameter. This shall include all bends, tees, valves, hydrants and at any other position as may be required. Anchor blocks shall be poured against natural ground and the inner face of the block shall not be of a lesser thickness than the diameter of the fittings and shall be so constructed as not to impair access to the bolts on the fittings or access to adjacent joints or fittings. Concrete shall have a minimum compression strength of 17.5 mPa at 28 days.

A protective membrane (such as denso tape) to protect against abrasive damage to the watermain shall be provided between the pipe (irrespective of the pipe material) and the concrete anchor or thrust blocks.

All anchor blocks shall be left exposed for inspection before backfilling over.

Cast in situ anchor blocks are not required where a total PE system has been installed. This only applies where all pipes adjacent to a fitting to be anchored are continuous PE pipes. Precast concrete blocks should be used to support valves and hydrants however. If mechanical PE joint is used at a fitting, then a conventional anchor block must be constructed.

6.3.9 Fittings

All joints, bends, tees, crosses, tapers, risers, connections, blank caps and other fittings shall be manufactured, designed and constructed to withstand 16 bar working pressure.

All cast iron fittings shall be nylon or epoxy coated.

PE tees and hydrant tees are not permitted, whether these are flanged or plain (welded) type.

Galvanised bolts used with flanged connections must be fully protected using the DENSO APPLICATION SPECIFICATION detailed in SD 6.09 or an equivalent. The use of the primer and the common denso tape liberally applied is a minimum requirement.

Backing rings associated with PE stub flanges must be nylon or epoxy coated.

Galvanised bolts must not be used in conjunction with tapping bands.

The following fixtures and fittings standards are acceptable

- PE-AS 4130: 2003, WIS 4-32-04: 1998, BS 6572: 1985, NZS 7610: 1991
- Ductile Iron – AS 2280: 2004 (protected accordingly)
- Welded Steel – NZS 4442: 1988 (protected accordingly)
- Cast Iron – BS 1452: 1990 (grade 220) or AS 1830: 2007 and BS 4622: 1970 or AS 2544: 1995 and BS 24894 (rubber rings) and BS 10 Table D (for drilled flanges)
- Stainless steel (nuts and bolts etc.) grade 316
- Galvanised Mild Steel (nuts and bolts etc.) grade 4.6 (protected accordingly – refer SD 6.09)

Denso tape (or an approved equivalent) must be fully applied to all galvanised bolts and fittings. This includes the entire wrapping of the galvanised backing ring associated with PE stub flange.

6.3.10 Fire hydrants and New Zealand Fire Service Requirements

6.3.10.1 General requirements

All principal and trunk mains shall be provided with fire hydrants. Hydrants shall be spaced at intervals not exceeding 90m in commercial and industrial areas and 135m in urban areas.

Furthermore, a hydrant must be provided within 90 metres for lots within an industrial or commercial area, or within 135 metres of the furthestmost portion of any lot in an urban area. The distance to the furthestmost portion of any lot may exclude the bush-protected area of the land. Where there are four or more lots serviced by a right-of-way then a hydrant must be provided at the entrance to the right-of-way.

Hydrants must be readily accessible for fire appliances and should generally be positioned near street intersections and not less than 6m from any building or proposed building.

The hydrant shall comply with NZS/BS 750:1984 and shall be of the clockwise closing, tall (regular) pattern, streamline screw down type 75mm diameter, and the flange drilled on the inlet shall be for and 89mm diameter flange and have slotted holes.

Hydrants shall be nylon or epoxy coated to AS/NZS 4158:2003.

Hydrants must be supported to prevent any sideways movement on the line of the main. Hydrants shall be mounted on an approved type of hydrant tee with hydrant risers, if necessary, so that the top of the hydrant spindle is within the range of 100mm to 250mm of the finished surface level. The hydrant tee shall be supported by the concrete anchor block sufficient in size to take all the hydraulic thrust exerted when the hydrant is in operation. Z ring hydrant tees are permitted on 150mm PVC mains. All other hydrant tees shall be flanged steel or DI. Hydrants must be placed within 5° of vertical.

Each hydrant shall be covered with an approved type hydrant box and lid, the final visible surface of which shall be painted with road marking paint. The approved colour of hydrant markings is Transit New Zealand M7 road marking yellow. Each hydrant is also to be marked with a blue RPM installed (by Council) at the centre line of the carriageway. Markings (and posts, if required) shall be provided in accordance with SD6.08. Boxes and surrounds shall be provided in accordance with SD6.04.

Any proposed extension of the reticulation network outside of the urban fire district shall be as advised by the Water Operations Engineer.

6.3.10.2 New Zealand Fire Service Requirements

The New Zealand Fire Service Fire Fighting Water Supply Code of Practice SNZ PAS 4509:2008 allows for the use of sprinkler systems (domestic included) in determining fire fighting requirements from the public water supply. In addition, storage of water can be provided in lieu of fire hydrant supply (refer NZFS Code of Practice for storage options).

6.3.10.3 Rural Areas

In rural areas and in large lot or right-of-way properties the use of a sprinkler system is the recommended option for meeting fire-fighting requirements. Drg SD.6.20 indicates four recommended options for meeting the Fire Service Code of Practice requirements for a residential property. If on-site storage tanks for fire fighting are to be provided, the necessary hard standing area and fire service connections will be required.

6.3.10.4 Domestic Sprinkler Systems

The designer of any domestic fire sprinkler system to be supplied from a council main shall confirm the static water pressure at the nearest water reticulation main and shall design the diameter of the service pipe accordingly. The average value of the static water pressure shall be obtained from the Water Operations Engineer.

Where domestic sprinkler systems are to be installed in lieu of fire hydrants, a Consent Notice will be required on the title of the property informing owners of the requirement to install and maintain a sprinkler system. All legal costs associated with Consent Notices are to be met by the developer. The information will also be registered on Council's Hazard Register and be listed on LIM enquiries.

6.3.11 Valves

6.3.11.1 15mm-50mm valves

15mm, 20mm and 25mm valves on service connections shall be Acuflo diaphragm valves having a blue handle. All valves shall be clockwise closing. Ball valves are not permitted. Gate valves on rider mains shall be resilient seated (Hawle or equivalent) and shall be installed in accordance with SD 6.03 and SD 6.04 (Ali-Bronze or LG2 50mm valves are not permitted). Markings (and posts, if required) shall be provided for 50mm valves in accordance with SD 6.08. Boxes and surrounds shall be provided in accordance with SD 6.04.

6.3.11.2 Sluice valves

Sluice valves on principal and trunk mains shall be Class 1 resilient seal, epoxy or nylon coated to AS/NZS 4158:2003 and 16 bar pressure rated to NZS/BS 5163:1986 and shall be anti-clockwise closing. All sluice valves shall be flanged to BS10 Table

D. Markings (and posts, if required) shall be provided in accordance with SD 6.08. Boxes and surrounds shall be provided in accordance with SD 6.04.

Note: Valves less than 200mm need not comply with the Clause in NZS/BS5163:2003 relating to in service serviceability, however, valves greater than, or equal to 200mm may need to comply at the direction of the Water Operations Engineer.

6.3.11.3 Air release and scour valves

These shall generally be provided by locating a fire hydrant at either the most elevated position or the lowest point of mains on roads with significant gradients. Where the Water Operations Engineer confirms that scouring is likely to be a frequent operation, a connection to the stormwater system shall be provided from scour points. Automatic air release valves shall be provided when required and positioned so that ground water cannot enter the main at negative pressure.

6.3.11.4 Positioning of valves

A valve shall be placed on each branch of each tee such that no more than 3 valves need to be closed to isolate any part of the reticulation system. A valve is required on each road crossing. Valves shall be installed at connecting points and elsewhere as necessary to separate the principal main or rider main into sections supplying not more than 25 customers for sluice valves on principal mains, or 12 customers for gate valves on rider mains.

6.3.11.5 Markings, posts and boxes

All valves shall be provided with markings accordance with SD 6.08 and with boxes and surrounds in accordance with SD 6.04.

6.3.12 Service connections

Each allotment shall be provided with an individual service connection.

A standard service connection shall consist of:

- a) a tapping band and ferrule on the principal or rider main;
- b) a 20mm PE (nominal 15mm bore) service pipe from the ferrule to a point 300mm inside the private property boundary;
- c) a terminating 15mm female/female valve in accordance with SD 6.06.1 and SD 6.06.2 using approved fittings and materials.

NOTE:

Case 1. Right-of-way lots with no ridermain

For lots accessed by a right-of-way where a rider main has not been provided (refer Clause 6.3.3(c)), a 25mm PE (nominal 20mm bore) service connection shall be provided at the road reserve boundary for each lot, as this is where the water meters are to be located. Private water lines, typically 25PE pipe, are also to be laid by the subdivider from the proposed meter location (with a 50mm overlap) to a point 300mm into the body of each lot. These private water lines shall not be connected to the service connection, but shall be installed as future private water lines, to be connected by the person activating a Building Consent on the lot, in conjunction with a water connection application.

Where re-subdivision of a right-of-way (with no ridermain) occurs, the subdivider is to provide a private water line as outlined above, with the meter to be located at the road reserve boundary at a later date. The service connection will be installed by Council at the time the water meter is installed. This work will occur generally when a Building Consent is activated for the lot at which time a water connection application is received and payment of fees made.

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Case 2. Right-of-way lots with a public ridermain or fire main

For lots accessed by a right-of-way where a rider main has been provided (refer Clause 6.3.3(c), a 20mm PE (nominal 15mm bore) service connection shall be provided 300mm into the body of each lot as this is where the water meters are to be located. If the length of the service line is more than 5 metres, then 25PE is to be used.

Where re-subdivision of a right-of-way lot (with ridermain or fire main) occurs, the subdivider is to provide a new service connection for each new lot. This new service connection is to be installed by the subdivider under Council supervision. Where the distance from the public main to a point 300mm into the body of the lot exceeds 5 metres, the developer shall install a 25PE service connection up to 5 metres in length (to allow for a meter to be installed within 5 metres of the tapping band) and also a private water line (generally 25PE) from the proposed meter location into the body of the lot. A meter will be installed by Council at a later date when a water connection application is received and fee payment made.

General

Pressure testing of future private lines is not required. The subdivider is responsible for all reinstatement work associated with the subdivision.

6.4 TESTING, STERILISATION AND INSPECTION

6.4 Testing, Sterilisation and Inspection

6.4.1

All water mains, together with all associated fittings and service lines shall be pressure tested. The fire hydrants connected are to be fitted with temporary caps and be tested in the open position. The test shall be carried out and all necessary apparatus supplied by the contractor. An "As-Built" plan of the new water reticulation works prepared in accordance with the Council's Code Of Practice, Quality Release Manual must be provided prior to pressure testing and sterilising.

6.4.2 Testing –PVC and steel pipes

The lines to be tested shall be filled with water and all air discharged. Concrete lined pipes shall be soaked for at least 12 hours before testing.

The reticulation shall withstand a pressure of 1400 kPa or 1.5 times the working pressure, whichever is the greater and shall be measured at the lowest point of the section under test. The pressure shall be maintained for a period of 15 minutes.

6.4.3 Testing – PE pipes

For new PE water mains up to 1 kilometre in length the procedure used shall be as for PVC and steel mains with the exception that the test pressure shall be 1000 kPa or the working pressure, whichever is the greater. The pressure shall be maintained for a period of not less than 15 minutes.

For sections of watermain longer than 1 kilometre, alternative procedures will be specified.

6.4.4 Sterilisation

Before the new main is commissioned the following procedure shall be undertaken:

6.4.4.1 Low chlorine sterilisation of new water mains

Sequence of events:

- a) Provide as-built drawings
- b) Pressure test

- c) Flush immediately after the connection work is completed. Refer to SD 6.11 for flushing procedure. The water from flushing must appear clear (in a glass) (less than 5 NTU turbidity).

Note:

- a) *All test and sampling methods and procedures are to conform with the requirements of the New Zealand Drinking Water Standards 2008.*
- b) *Testing laboratory to be accredited by the Ministry of Health for drinking water analyses.*
- c) *The testing laboratory is to provide documentation of all test results, including an 'As-Built' plan showing the location of sampling points, to the contractor and the Waitakere City Council.*

- d) Drain the main and open all service line valves.
- e) Chlorination:
Fill the main with HTH solution or liquid chlorine used in accordance with the manufacturers guidelines. Supervision by laboratory staff is required.

Requirements:

The solution must have a free available chlorine (FAC) level between 5.0 ppm and 7.0 ppm. The service line valves are to be shut off systematically as the chlorine solution arrives at each point. Sufficient points are required to ensure that the chlorine solution reaches all parts of the system and that all high points can be adequately bled. Dosing is to be carried out using a tanker and FAC level checked by laboratory staff prior to filling main.

Note: Water supplied to the tanker must be clear (less than 5 NTU). The tank must be clean and suitable for storing potable water. PH must also be between 6 and 8.

- f) Contact time:
Hold for 48 hours and then test for FAC and turbidity.

Notes: The purpose of this procedure is to ensure the sterilisation of new water mains, not the water the mains contains. Safety of the water is ensured by the water treatment process and a residual free available chlorine (FAC). The accepted means of achieving sterilisation of a water pipe is by ensuring an adequate contact time (CT) for FAC at a given concentration. Bacteriological sampling is principally a means of checking that the chlorine has been effective and is not in itself a sure guarantee that the main has been sterilised. Accordingly, great emphasis needs to be placed on meeting the FAC criteria for low chlorine sterilisation to provide a high degree of confidence that the CT achieved has sterilised the main.

- g) Testing and Sampling:
To be carried out by laboratory staff only – refer to CI 6.4.4.2 re sampling locations.

Requirements:

FAC to be greater or equal to 0.5 ppm. If FAC is less than 0.5 ppm reject and return to step c). Turbidity to be less than 1.5 NTU. If the turbidity is greater than 1.5 NTU then reject and return to step c).

If FAC and turbidity tests are satisfactory then bacteriological samples are to be taken.

- h) 24 hour hold for bacteriological test results:
Requirements:
Zero (0) E-Coli/100mls required in all samples, otherwise reject and return to step c).

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- i) Discharge criteria:
Discharge to sanitary sewer or remove by tanker. Discharge to stormwater systems is not permitted unless expressly permitted by the Water Operations Engineer in exceptional circumstances.
- j) Final flush of main.
- k) Provide an As-Built plan showing sampling points locations. Refer note below.

NOTES:

- (a) The testing laboratory must be accredited by the Ministry of Health for drinking water analysis
- (b) The testing laboratory is to provide documentation of all test results, including an 'As-Built' plan showing the location of sampling points, to the contractor and the Waitakere City Council.

6.4.4.2 Sampling requirements**Sampling locations**

Water samples for water quality testing shall be taken from every hydrant (generally at 135m intervals) and from the ridermain via a service connection, approximately opposite every hydrant. In addition, a sample shall be taken from the end service pipe where there is a ridermain down a ROW. If the line is less than 100 metres in length, then one sampling point at each end is sufficient.

Microbiological sample collection

Samples are to be transported to the laboratory as quickly as possible after collection and are to be kept cool and dark during transport. If transport times exceeds one hour, the samples are to be maintained at below 4° Celsius but not frozen. Samples should be tested within six hours of collection. Samples more than 24 hours old are to be discarded.

Free available chlorine

The measurement of FAC is to be performed on site in the field immediately upon collecting the test sample. The test method of choice for the measurement of FAC is APHA 4500 Cl F DPD, ferrous ammonium sulphate titrimetric method. Other generally accepted field methods, e.g. DPD tablets or powder in foil, and amperometric techniques are also acceptable as long as they are *calibrated against the referee method at least once every six months*. The analyst/sampler performing the test must be familiar with the test method and possible causes of inaccuracies.

Turbidity

Turbidity should preferably be tested on site in the field. However, samples may be transported back to the laboratory for testing, in which case the analysis must be performed within 36 hours of sample collection.

The nephelometric technique is to be used.

The turbidity meter utilised requires to possess a limit of detection of 0.01 NTU or better.

NOTE:

All test and sampling methods and procedures are to conform with the requirements of the New Zealand Drinking Water Standards 2008.

6.5 APPROVED VALVES AND FITTINGS**6.5.1 Tapping valves and fittings**

- Milnes tapping bands
- Talbot (Winchester) self tapping ferrule

- Obe tap – self tapping ferrule strap
- Iplex Quik Tapp self tapping swivel tee and bands
- Giltech tapping bands
- EasiTap with 2" outlet by Viking Johnson
- EasiTap with 1" drilled & Tapped outlet by Viking Johnson
- EasiClamp by Viking Johnson

Note: Securer type (with round knurled head) or S'LON type ferrules are not acceptable
Ali-bronze tapping bands are not acceptable.
Galvanised bolts must not be used in conjunction with tapping bands. Only stainless steel bolts may be used.
Electrofusion welded tapping bands are not permitted.
Note: Plasson and sapphire fittings are not acceptable

6.5.2 Service pipe connections

- Pushlok fittings
- Easy grip fittings
- Philmac BSP threaded fittings (50mm dia (nom) and below only)
- Alprene A16 Easygrip Fitting
- Georg Fischer Mechanical Compression fittings by Alprene S.R.L (40mm dia and below only)

Large diameter connections using CTS (under pressure tapping) methods are approved for use. The Asset Engineer is to be advised of each installation.

6.5.3 15mm – 50mm valves

- 15MM-25MM Acuflo diaphragm valve (blue handle)
- Hawle 50mm resilient seat gate valve, any configuration
- Norcast 50mm resilient seat gate valve

6.5.4 Requirements for sluice valves

- 16 Bar pressure rating
- Flanges BS10: table D
- Anti-clockwise closing
- Resilient seated
- Epoxy coated (or equivalent) – refer SD 6.10.

Approved valves:

- Blakeborough
- Elypso
- Aqua gas
- Johnvalves
- Norcast
- Keystone- manufactured by Humes
- Tubeline series 500
- Tyco Fig 500 RS Valve

NOTE: Flanged Combi tee/valve(s) (Hawle) up to 150mm are acceptable only when PE pipe is used on all branches.

6.5.5 Flanged adaptors

The following are acceptable:

- Pushlock flange adaptors
- Aquafast by Viking Johnson

- System 2000 flange adaptors
- Aquagrip by Viking Johnson
- Georg Fischer WAGA Multi/Joint 3000 couplings by Asmuss Plastic Systems Ltd.

Note: Supagrip flange adaptors are not acceptable.

6.5.6 Hydrants and hydrant tees

Z-ring tee acceptable up to and including 150mm for PVC mains. Hydra valve hydrants are approved for use.

PE tees (for use with PE mains) are not permitted – flanged steel or DI hydrant tees must be used.

Note: PE hydrant tees are not acceptable.

6.5.7 Hydrants

Approved hydrants:

- Hydra valve – available from Mico-Crevet
- Gilles screw down hydrant.
- Tyco Fig F502 Fire Hydrant (Tall)
- Humes Industries AVK Series – 29 Tall Hydrant

6.5.8 Backflow Devices

Approved devices:

- 15mm, 20mm and 25mm RMC DualCV

6.6 CONNECTION OF NEW WATERMANS

- Only contractors with experience in watermain construction will be permitted to carry out connection work for either subdivision, watermain renewal or upgrading work.
- Shutting down supply and reinstatement of the supply with associated flushing shall only be carried out by Council's maintenance contractor.
- The new watermain shall be pressure tested and sterilised before connection is permitted.
- The connection work will be supervised by a representative of EcoWater.
- As an alternative to the above (for subdivision only), Council may provide a quotation for the work. There may also be standard charges for some items of work. Payment for such work must be made prior to the work being carried out.

NOTE:

1. 'Under pressure' connection methods using stainless steel bands are approved. The Water Operations Engineer is to be advised of each installation.
2. Where PE systems interface with existing PVC systems, flange-gibault adaptors must be used, i.e. plain flange adaptors used in conjunction with a standard gibault joint are not permitted. The PVC pipe must extend fully into the flange gibault adaptor to allow maximum length for pull out movement

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caused by the PE pipe. For interfacing with AC pipe a flange adaptor used with a maxifit or supra-coupler must be used. Any repair costs resulting from poor workmanship or the use of standard gibaults in this application within the maintenance period will be passed onto the developer.

6.6.1 Shutting down of supply

Council's maintenance contractor shall be responsible for notifying affected consumers, shutting off the supply, reinstating the supply and flushing (to remove either dirty water and/or air), and also for keeping Council's Call Centre fully informed of progress, i.e. commencement, completion, or if any problems occur resulting in an extension of the notified shutdown period.

At least four working days notice of the shutdown is required so that letter drops can be arranged. The developer (or the developer's contractor) should contact the Council's maintenance contractor directly.

The contractor shall carry out excavation work to fully determine the extent of the connection work and to fully prepare for the event so that the shutdown period can be accurately assessed. The shutdown period (advised to consumers via letter drop) should be a realistic estimate for the time required to complete the connection work and to reinstate the supply and shall not exceed the hours of 9.30am to 3.30pm Monday to Thursday (excluding public holidays).

6.6.2 Contractors carrying out connection work

Only contractors with suitable experience and currently working in watermain construction shall be permitted to carry out connection work. Contractors (staff or equipment) performing any work on drainage or wastewater services are not permitted to work on the water supply network. Note: this is a requirement of public health.

At the development prestart meeting, the developer shall provide details of any contractors working on watermains. Contractors who fail to meet an acceptable standard of work for any of the reasons listed below may be excluded from any future connection work.

Reasons for disqualification:

- Failure to adequately prepare for shutdown
- Failure to notify EcoWater four days in advance of the shutdown
- Poor workmanship
- Use of non-approved valves and fittings
- Failure to complete work within the period advised or within a reasonable timeframe
- Failure to reinstate berm to a high standard
- Failure to maintain adequate communication with Council staff or representatives in relation to the shutdown.
- Failure to comply with Public Health Standards (both documentation and /or practice).

6.6.3 Supervisor

The supervisor for subdivision connections will be nominated in the engineering approval.

The supervisor for construction work connections will be the contract supervisor.

6.6.4 Cost

A fee will be charged to cover shutdown and supervision costs. Currently \$50.00 plus GST per connection point.

6.7 AS-BUILT INFORMATION

As-Built information shall be provided as outlined in Section 4.2 of the Quality and Release Section of the Code of Practice Manual.