

Clause	Description	Requirement	Supporting Document
Section 12	Products and Materials PVC pipe DICL pipe and fittings Steel pipe PE pipe	To be as specified by SA Water <i>See also</i> WSAA website- Materials <i>See also</i> WSAA website- Materials <i>See also</i> WSAA website- Materials <i>See also</i> WSAA website- Materials	Pt2 – Sect 12 (Pg 3) Pt2 – Sect 12 (Pg 3) Pt2 – Sect 12 (Pg 4) Pt2 – Sect 12 (Pg 4) Pt2 – Sect 12 (Pg 5)
Section 13	Excavation	Minimum and Maximum cover to be as shown	Pt2 – Sect 15 (Pg 6)
13.11	Foundations and Foundation Stabilisation	Obtain written instructions from the DESIGNER and approval from the Superintendent	
14.1	Trench floor preparation	Para 3 Compact all fill and disturbed areas to not less than 50kPa	
14.2	Bedding Material	Use SA Water Specification TS 4 sand	Refer WSCM
15.1	Pipe Laying and Jointing	To be as specified by SA Water	Pt2 – 15.1 (Pg 6)
15.2.1 15.2.3	Mechanical bending of PVC pipe	SA Water do not allow mechanical bending (deflection) of PVC pipe	
15.8	Property Services	Only the connection pipe and inlet riser are required to be installed at the time of main construction. See WSCM Drg Section E	
15.9/15.10	Trenchstop/Bulkhead	Use only where specified on design drawings or an underground stream or water path is identified during construction	
15.11	Corrosion Protection of Ductile and Cast Iron	To be as specified by SA Water	Pt2 – 15.11 (Pg 6)
15.12	Marking tape	To be laid as detailed :-	Pt2 – 15.12 (Pg 7)
15.18	Location Markers	As shown in SA Water's Water Supply Construction Manual Drawing C14	Pt2 - 15.18 (Pg 7)
Section 16	Embedment Material	To be as specified by SA Water	Pt2 - Sect 16 (Pg 8)
17.1.1	Trench Fill Materials	Sand to TS 4 is also to be used for all trench fill unless project specific approval is given for an alternate material to be used.	Refer WSCM
18	Swabbing	SA Water do not require swabbing of new mains unless specifically specified	
19.3	Compaction Testing	To be as specified by SA Water:-	Pt2 – 19.3 (Pg 8)
19.4	Hydrostatic Pressure Testing	The existing SA Water pressure testing procedure for pressure testing water mains may also be used	Pt2 – 19.4 (Pg 10)
19.7	Water Quality Testing	Water Quality Testing is to be carried out when directed by Superintendents Representative	
Section 20	Disinfection	When specified to be carried out by SA Water	Pt2 – Sect 20 (Pg 11)
20.2	Flushing of Disinfection Water	To be in accordance with the requirements of the Australian and New Zealand Environmental and Conservation Council Guidelines (ANZECC)	

Continued and ADDITIONAL REQUIREMENTS on page 2

Section 21	As-Constructed Tolerances	As shown in code, but with additional SA Water requirements as detailed:-	Pt2 – Section 21 (Pg 11)
Section 22	Connection to existing water mains	To be as specified by SA Water	Pt2 – Sect 22 (Pg 12)
Section 24	Work as Constructed Details	To be as specified by SA Water	Pt2 – Sect 24 (Pg 15)

ADDITIONAL REQUIREMENTS

Description	Supporting Document
Inspection and Test Plans (I&TPs), based on those shown in the WSAA website or a similar format, are to be established for all projects as part of the Civil Contractors Federation's (CCF) Integrated Management System (IMS)	
Training Requirements	Pt2 – AR1 (Pg 18)
Geotechnical / Shoring Responsibilities	Pt2 – AR2 (Pg 18)
Service Connections	Pt2 – AR3 (Pg 21)
Doglegs	Pt2 – AR4 (Pg 23)
Valve and Hydrant (Fireplug) Chambers	Pt2 – AR5 (Pg 23)
"Notice of Intent" Requirements	Pt2 – AR6 (Pg 24)
Issue of "Certificate of Practical Completion"	Pt2 – AR7 (Pg 25)
Constructor's Indemnification requirements	Pt2 – AR8 (Pg 26)
SA Water specifications	Pt2 – AR9 (Pg 26)
Defect Advice Sheet	Pt2 – AR10 (Pg 26)
Corrective Action Request Sheet	Pt2 – AR10 (Pg 26)

ANNEXURES

Annex A	As-Constructed Symbols and Abbreviations (1 page)
Annex B	As-Constructed Mains Reporting Data (3 pages)
Annex C	Typical As-Constructed Drawing (1 page)

ATTACHMENTS

Attachment 1	Defect Advice Sheet (1 page)
Attachment 2	Corrective Action Request Sheet (1 page)

SA Water Supplementary Documentation

Water Supply Code - Part 2 - Construction

Related Requirements

Pt 2 – Section 12 - Products and Materials

Only items authorised by SA Water, and listed in the “Authorised Items for Water Reticulation Systems” (Authorised Items Lists), shall be used in the construction of SA Water’s infrastructure systems. The Authorised Items Lists are available on the SA Water Internet site as shown below.

<http://www.sawater.com.au/SAWater/DevelopersBuilders/NetworkInfrastructureStandards>

Where items are required which are not listed in the Authorised Items List they should be referred to the Superintendent's Representative or the Infrastructure Standards Unit for verification. Minor items, not shown in the catalogue, may be authorised directly by the Superintendent's Representative if they are in accordance with the appropriate Australian Standard and/ or StandardsMark endorsement

Pressure Pipes and Fittings

PVC Pipe

PVC-O and PVC-M shall be handled and laid in accordance with the manufacturer’s requirements for the pipe until specific handling and laying instructions are included in the code.

PVC Pipes more than 2 years old (since date of manufacture) are not to be installed as part of SA Water’s infrastructure network.

Discoloured, deformed or badly faded pipe shall not be used.

Ductile iron or cast iron spigots **shall not** be joined to PVC rubber ring sockets.

PVC pipes shall not be cut within 1.5 m of the socket end of the pipe – in general, the minimum length of PVC pipe to be used shall be 1.5 m.

Reason –

Short lengths of pipe have the potential to compound longitudinally and allow sideways movement of the pipe increasing the potential for spigot / socket disengagement.

Installation at high temperatures

PVC pipes shall not be laid and backfilled while the **ambient temperature adjacent to the pipe is more than 35°C** unless special precautions to cool the pipe (as approved by the Superintendent’s Representative) have been taken.

Pipes that have been laid but not backfilled prior to the ambient temperature adjacent to the pipe reaching 35°C shall be checked after the ambient temperature adjacent to the pipe falls to less than 35°C to ensure that all joints are still homed correctly before embedment and trench fill material are placed.

Ductile Iron Pipes and Fittings

DICL pipes shall not be cut within 1.5 m of the socket end of the pipe¹ - the minimum length² of any piece of DICL pipe in a straight run of pipe shall be 1.5 m.

Reason –

- 1 The outer diameter of DICL pipe varies significantly within this length which can result in incorrect seating/sealing of the rubber ring or the inability to insert pipe into fitting.*
- 2 Short lengths of pipe have the potential to compound longitudinally and allow sideways movement of the pipe increasing the potential for spigot / socket disengagement.*

Ductile iron pipe spigots **shall not** be joined to PVC rubber ring sockets.

FBE Coated Flanged Fittings

FBE coated flanged fittings shall be joined using Grade 316 Stainless Steel bolts, washers and nuts. All SS threads are to be coated with an approved anti-seize compound prior to assembly.

Note: In this configuration the flanges and bolts do not need additional corrosion protection wrapping.

Restrained Joint (e.g. Tyton-Lok) Rubber Seal Ring Joints

Where restrained joints are used on DICL water mains in lieu of concrete thrust or anchor blocks :-

- (1) The joints shall be installed in accordance with the manufacturer's written instructions and the SA Water WSCM Drawings Section B.
- (2) Pipes shall be installed as shown in Section C of the SA Water WSCM Drawings.

To ensure that the rubber ring is located correctly, the joint shall be tested by inserting a feeler gauge to determine conformance with standard depth.

Where restrained joints are used, an authorised pink marking strip shall be placed on top of the overlay sand directly above the pipe (refer SA Water WSCM Drawings Section B), to alert service crews that all future maintenance shall be performed using restrained joints.

Note: Prior to purchasing the restrained rings the individual suppliers will require the design details of the proposed pipeline installation - this enables them to verify that this design will qualify for manufacturer/supplier warranty on their product (provided that the joints have been installed in accordance with the manufacturer / supplier's written instructions).

Steel Pipes and Fittings

Flanged Joints

All flanges and bolts shall be corrosion protected as described in SA Water Specification TS 81.

To prevent damage to flanged joints, all flanged connections shall be tightened evenly, in a sequentially manner, **across** the flange until a torque of 60 Nm for M 16 bolts and 140 Nm for M 20 bolts is reached.

Unless specified otherwise, only hot-dip galvanised bolts, nuts and washers (in accordance with AS 1214) of the appropriate size shall be used for flanged fittings applications located within concrete valve chambers or any above ground installation.

Stainless Steel

Use only Grade 316 or better fittings and fasteners. Where only Stainless Steel fittings and components are used (i.e. no dissimilar metals) NO additional corrosion protection (i.e. Petrolatum Anti-corrosion System) is required.

Stainless Steel products shall not be corrosion protection wrapped and stick on labels shall be removed for buried applications.

Reason - Wrapping or sleeving of stainless steel can promote corrosion rather than prevent corrosion. Stick on labels promote crevice corrosion.

Polyethylene Pipes and Fittings

The male threads of polyethylene connection fittings shall not be screwed directly into pre-tapped connectors or tapping bands. Only DR brass connectors or adaptors shall be used to facilitate the connection of polyethylene pipe to pre-tapped connectors or tapping bands.

Reason – Ground movement etc can cause shearing at the point of weakness created at the thread interface. Removal of the remaining threaded section also creates serious problems during emergency repairs.

Metallic male threads shall not be screwed into unrestrained “plastic” female threads.

Reason – Excessive tightening can split the “plastic” socket or over time the joint can leak due to plastic “creep” in the fitting.

Field butt welding of PE tubing is only permitted when carried out by a qualified installer specifically authorised by SA Water.

SA Water will only accept Electrofusion joints where the ends of the pipes to be inserted into the coupling have been shaved back to virgin material using a commercially available Mechanical Scraper, immediately prior to making the joint.

Minimum radius for bending

The minimum allowable radius for bending is 25 x OD of pipe

Installation at high temperatures

Polyethylene pipe has a high coefficient of linear expansion and therefore shall be cut and installed in a manner which ensures that no stress is placed on the pipe or fitting and which complies with the following:

- (1) Backfilling of the side support and pipe overlay zones (refer SA Water WSCM Drawings Section B) shall not be placed about a PE pipe when the ambient temperature adjacent to the pipe falls outside the range 12-27°C.
- (2) For every metre of measured pipe, the additional length shall be a minimum of 0.18 mm/m/°C above 12°C.

Pt2 –Section 13 - Excavation

Minimum and Maximum Cover

Minimum cover to water mains is to be as shown on SA Water WSCM Drawing B1.

Reason - Minimum cover depth has been determined based on standard valve heights and is designed to maintain a standard depth between adjacent valves which allows the installation of additional branch offtakes without the need to relay a part of the main.

Maximum cover to water mains is to be 1200 mm. Designers are to obtain specific SA Water approval to lay water mains deeper than this maximum depth.

Reason - This standard maximum cover depth has been determined based on maintenance safety requirements.

Water service connections shall be installed at a uniform depth, which is a minimum of 450 mm below final ground surface level.

Pt2 – 15.1 - Pipe laying and Jointing - Installation

Additional Information

Where excavation is in rock, and the main or service connection has the potential to be extended, the trench is to be extended in the direction of the proposed pipeline or service as follows:-

- beyond the end of the water main 1.5 metres
- beyond the end of the service connection 1.0 metres

Pt2 – 15.11 - Corrosion Protection of Ductile and Cast Iron

Fusion Bonded (FBE) Coated Fittings

FBE coated flanged fittings shall be joined using Grade 316 Stainless Steel bolts, washers and nuts.

All fittings and appurtenances coated with fusion bonded coatings shall be inspected, both internally and externally, for coating damage prior to installation and the nominated action shall be taken:

- If the **internal** coating is damaged - fitting shall be removed from site and replaced,
- If the **external** coating has extensive damage (greater than 25 mm x 25 mm)- fitting shall be removed from site and replaced,
- If the **external** coating has minor damage (less than 25 mm x 25 mm) - fitting shall be completely wrapped with Petrolatum Anti-corrosion System in accordance with TS 29 being careful not to wrap any stainless steel assembly fasteners,

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- If there is any doubt concerning coating damage then the Superintendent's Representative shall determine whether the fitting is to be replaced or wrapped with Petrolatum Anti-corrosion System

Fusion bonded coated fittings also require additional corrosion protection in the following circumstances :

- Non SS Bolts used in flanges - wrapped with Petrolatum Anti-corrosion System in accordance with TS 29,
- DR (Dezincification Resistant) brass connectors installed into fitting- wrapped with Petrolatum Anti-corrosion System in accordance with TS 29

Corrosion Protection of Flanges etc

Where the standard DICL polyethylene sleeving system is unsuitable e.g. bolted mixed material flanges and fittings with damaged coatings or steel pipework, corrosion protection in accordance with the following specifications is to be used:-

DICL / CI	SA Water Specification TS 29
Steel pipe and specials	SA Water Specification TS 81

Pt2 – 15.12 - Marking Tapes

Because most water mains are laid in roads, and the service connections are laid at right angles to the main, location marking or detectable tape is not required in these applications. Locating marking tape usage is limited to plastic pipe, generally where it crosses reserves, but it is also required for use on mains and services in cul-de-sacs and keyhole allotments. **Detectable tape** is to be used in these applications.

Where the restrained jointing system is used (DICL pipe only) the specially marked "Restrained Jointing System" marking tape **MUST** be used.

Reason: The restrained joints are used in lieu of thrust blocks and the marking tape is to advise maintenance staff of the requirement to maintain the integrity of the system.

Requirement for use will be specified on the Design Drawings.

Pt2 – 15.18 - Location Markers

The central lid or a 100 mm diam circle in the centre of each fire hydrant streetbox lid is to be painted yellow prior to or during installation.

Fire hydrant posts or reflective markers (as approved) shall be installed adjacent to all hydrants in accordance with the details shown in Section C of the SA Water Construction Drawings and TS 135 Fire hydrant location marking.

Scour signs and posts shall be installed adjacent to all scour valves in accordance with the details shown in the SA Water WSCM Drawings Section C.

In urban areas, where buried fire hydrants are in close proximity to each other, only one reflective marker or fireplug post is required, and in rural areas, either a fire hydrant sign or painted stop valve sign is required (see SA Water WSCM Drawings Section C).

All stop valves signs in rural areas shall have indicator signs installed adjacent to each stop valve as shown in the SA Water WSCM Drawings Section C.

Pt 2 – Section 16 - Pipe Embedment and Support

SA Water have specifically selected **SAND** as the only embedment material to be used for water supply pipe embedment and require it to meet the conditions detailed in SA Water's Specification TS 4 including the Resistivity test requirements.

Compaction of embedment shall be in accordance with the requirements shown in SA Water WSCM Drawings Section B

Pt 2 – 19.3 – Compaction Testing

The Constructor shall be responsible for all compaction testing (including any additional testing, and re-testing for whatever reason) and shall arrange for the testing to be carried out by a NATA certified Testing Agency.

Prior to commencing work, **the Constructor shall, in conjunction with the Superintendent's Representative, develop a test plan** showing zones where compaction tests shall be undertaken, including the number and depths of the compaction tests within each zone in accordance with the frequency criteria detailed below. The zones shall be selected so that the results are representative of the entire works (water mains, water connections and structures).

The Testing Agency shall randomly select the test locations within each agreed test zone and shall coordinate compaction testing with the Constructor's work program.

The Superintendent's Representative may, at his discretion, direct the Testing Agency Staff to undertake additional tests within any zone, and in addition the Superintendent's Representative also reserves the right to carry out an independent audit of the Testing Agency's test procedures and test results.

Testing Frequency

For water mains and water connections, there shall be a minimum of one field density test within each one metre depth of trench fill :-

- (a) for each 50 metre length of water main trench and
- (b) in at least 20% of the trenches for connections, i.e. 1 in each group of 5 connections or part thereof (within the same project), **to be carried out in road pavement up to 300mm behind kerb line or road shoulder to road pavement compaction requirements.**

(c) or as otherwise directed by the Superintendent's Representative.

Under no circumstances shall compaction testing be clustered within a zone or at the boundaries of adjacent zones.

In deep trenches where compaction testing is required for each one (1) metre thick layer of trench fill, the test locations shall be staggered from those in layers above or below by at least 5 metres for water mains and by 2 metres for connection trenches, wherever possible.

The compaction requirements for water main and service connections construction are specified on SA Water's WSCM Drawing B1.

Compaction Test Certificates

Prior to the issue of the Certificate of Practical Completion for the Works, the Superintendent's Representative shall review the individual compaction test record sheets and Certificates of Compliance from the NATA certified Testing Agency confirming that :-

- compaction tests have been undertaken in accordance with the test plan, and
- the frequency of compaction testing and achieved compaction test results are in accordance with the specified requirements.

Non-Compliance of Compaction Testing

If a compaction test fails, further tests shall be carried out as determined by the Superintendent's Representative to determine the full extent of non-compliance. The Constructor shall remove and re-compact the fill from all areas where there is non-compliance and shall repeat the compaction tests at those locations until accepted as satisfactory by the Superintendent's Representative.

If several areas of the fill fail the testing, then the Superintendent's Representative may declare the entire water main run, or water connection run, or around structures etc as unsatisfactory. The Constructor shall remove all trench fill along the declared run, replace the trench fill material, re-compact and re-test it until accepted as satisfactory by the Superintendent's Representative.

Compaction tests shall be repeated at locations nominated by the Superintendent's Representative.

Compaction test failures, which are identified after the bitumen surface has been laid, will require re-opening of the trench(s) in all directions up to the first adjacent successfully tested compaction test point. The failed compacted fill is to be reworked until it meets the specified requirements.

Pt 2 – 19.4 - Hydrostatic Pressure Testing

The Constructor shall be responsible for carrying out hydraulic testing on the water reticulation system including the water connections. This test procedure may be used as an alternate to the procedure detailed in the WSA Code. It is not applicable for testing of PE pipe (see WSA 01-2004). Once the selected test procedure has been commenced it is not permissible to swap to the alternate test procedure.

All pumping and test equipment for hydraulic testing shall be supplied by the Constructor. Pressure gauges shall each have a certificate of calibration issued within the last 12 months by an approved NATA registered laboratory.

Testing of the mains including water connection and fire services shall :-

- be carried out in the presence of the Superintendent's Representative.
- not be carried out until at least 7 days after pouring of concrete anchor/thrust blocks or suitable temporary restraint mechanisms have been installed.
- be carried out after the embedment and trench fill has been completed including the road sub base and base courses, but excluding the wearing course (bitumen surface) or at an earlier stage if directed by the Superintendent's Representative.
- be to a hydrostatic test pressure of 160 metres head of water. This test pressure shall be maintained for a minimum of 30 minutes or for as long as the Superintendent's Representative considers necessary.

In cases where the Superintendent's Representative considers it not suitable to test against a closed valve, a blank flange or paddle must be fitted to test against.

Where the water reticulation system is to be tested in parts the Constructor shall supply and install any necessary temporary plugs, caps or stops to the section of main to be tested and shall ensure that the main is adequately temporarily anchored prior to applying the test pressure. The Constructor shall be responsible for the design and installation of any additional/temporary anchors/thrust blocks necessary to restrain the pipe.

The water reticulation system will be accepted as being satisfactory by the Superintendent's Representative if there are no leaks after the full test pressure has been held for the minimum time as specified above.

All leaks shall be repaired by the Constructor and following the repairs, the testing shall be repeated until approved as satisfactory by the Superintendent's Representative.

All repairs carried out by the Constructor shall be inspected and passed by the Superintendent's Representative before backfilling is continued.

Water Connection Flow Testing

After permanent connection to the active mains and completion of all other common trench work, the Superintendent's Representative will test the flow through water

connections fixed to the newly linked section of main for at least 20% (1 in each group of 5) of the connections.

Where flows are found to be unsatisfactory for any reason the Constructor shall uncover the defective water connection and make good all defects as directed by the Superintendent's Representative.

Pt 2 – Section 20 – Disinfection

When either the complete, or a stage of, the water reticulation system has been newly linked up to active mains it shall be disinfected by the Principal at the Principal's expense prior to that section of the system being put into service.

The Constructor shall give the Superintendent's Representative 'notice of intent' for the disinfection to be carried out. Minimum notification time requirements are detailed in clause AR6 of this document. The Superintendent's Representative will make arrangements for the disinfection of the newly installed reticulation system.

Pt2 – Section 21 - As-Constructed Tolerances (Construction Tolerances)

The construction tolerances for all water mains, water connections and all appurtenances shall be as shown in WSA 03 Section 11 except for the additions / amendments shown below.

21.2.2 Horizontal Tolerances –Property Connections

Consultant shall specify required position of property connection on design drawings.

The tolerances shown in 21.2.2 – **are not to be used in SA**. SA Water specifies the following tolerances :

Property (service) connection shall be at right angles to the main $\pm 2^\circ$.

The tolerance on the dimension for the service connection inlet riser position along the connection pipe shall be ± 100 mm. The lateral tolerance on the nominated location for the service connection inlet riser is ± 100 mm providing a minimum distance from any side boundary of 350 mm is maintained.

21.3.2 Verticality

(a) **10 mm** maximum deviation (from vertical) per metre rise in any direction

21.4 Finished Surface Structures and Fittings

For structures and fittings designed to finish flush with the ground/pavement surface or proud of the surface, apply a vertical tolerance on the finished design surface levels as follows:

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SITUATION	TOLERANCES
In road reserves, including sealed pavements, road verges, driveways, footpaths, pedestrian thoroughfares	+10 mm high, - 5 mm low
Sealed and trafficable areas within private properties (pedestrian and/or vehicular traffic)	+15 mm high, - 5 mm low
In private property including garden areas, unsealed areas, non-trafficable areas or areas of occasional traffic (pedestrian and/or vehicular traffic)	+20 mm high, - 5 mm low

Pt 2 – Section 22 – Connection to Existing Water Mains

Pre-Construction Requirements

The Constructor shall verify, on site, the actual location and level of the link-up point in relation to the existing water reticulation system before work commences. This will ensure that the link-up between the new work and the existing system can be achieved.

If any discrepancy is found between the actual field location and that shown on the Design Drawings, then the Superintendent's Representative and the Designer shall be notified immediately.

Link-Ups by the Constructor

The Constructor shall, where specified/agreed, carry out the link-up of all water mains and water connections to the existing water supply network in accordance with the details specified in this Clause and as on the SA Water WSCM Drawings unless otherwise directed by the Superintendent's Representative. The Link-up shall only be carried out by trained personnel.

The Constructor shall locate all adjacent services.

The Constructor shall give the Superintendent's Representative the required 'notice of intent' in writing prior to carrying out any link-up. (see clause AR7 of this document).

The Superintendent's Representative will arrange for the shutting down and charging up of mains as necessary for the link-up process. The Constructor shall not open or close any valves on active mains.

The Constructor shall ensure that:-

- Where the Contract requires the Constructor to drill or cut into mains they shall ensure this work is carried out under the continuous and direct supervision of a person who has been accredited to carry out link-ups on SA Water's infrastructure network.

- The link-up work is to be carried out only by persons who have been certified by the South Australian Water Corporation as having demonstrated that they are able to satisfactorily perform the link-up operation.

Link-ups forming a branch to an existing main using a stainless steel (wrap around) flanged offtake (or similar),

The Constructor shall:

- expose the active main
- either subcontract to, or employ, a specialist under pressure tapping company authorised by SA Water to carry out the link-up in accordance with the required Standard Practice. If directed by the Superintendent's Representative the link-up is to be carried out in the presence of the Superintendent's Representative.
- lay away from the stop valve in the approved method.

Link-ups forming an extension of an existing main shall be carried out in accordance with the following :

- (a) From a **fire hydrant (fireplug) end fitted with thrust collar, temporary shut off flange and flanged socket**, the Constructor shall :
 - at the commencement of the project, expose the end of the active main and lay away from the existing socket end.
 - when the hydraulic testing of the newly installed main is completed advise the Principal who will then arrange to shut off the main.
 - in the presence of the Superintendent's Representative remove the isolating flange from the fireplug fitting and tighten the flanged joint.
- (b) From a **fire hydrant (fireplug) end fitted with thrust collar and blank flange** the Constructor shall :
 - at the commencement of the project, expose the end of the active main and advise the Principal who will arrange to shut off the main.
 - in the presence of the Superintendent's Representative remove the blank flange, install a shut off flange and flanged socket and tighten the flanged joint.
 - lay away from the socket end and complete the link-up as for part (a) above.
- (c) From a **fire hydrant (fireplug) end** the Constructor shall :
 - excavate to the top of the existing main to check alignment and depth leaving the existing thrust block intact.
 - lay back to the existing main from the new end.
 - when ready to proceed with the link-up advise the Superintendent's Representative who will arrange the shut-off of the main.
 - complete excavation of the existing main and in the presence of the Superintendent's Representative;
 - remove the anchor block and end cap (or stop clip and staple, or blank mechanical coupling) if the existing main has a permanent hydrant end and the hydrant is to remain.

- remove the anchor block and whole hydrant installation if the existing main has a temporary hydrant end or if the hydrant is to be deleted from the system.
- replace the old hydrant with a new hydrant and tee fitting if specified on the Drawings.
- link the new main to the existing main in an approved manner.

Once the link-up pipework is complete including the anchor/thrust blocks, and the main has been hydraulically tested to the satisfaction of the Superintendent's Representative (refer Part 3 – 19.4), the Constructor shall reinstate the excavation to the required standards.

Service connections to existing mains shall be carried out by the Constructor using under pressure drilling equipment authorised by the Superintendent's Representative unless otherwise directed by the Superintendent's Representative.

Link-Ups by SA Water/SA Water's Alliance Partner

At the discretion of the Superintendent's Representative, trained SA Water/SA Water's Alliance Partner personnel may carry out some or all of the link-ups for a fee.

The Constructor shall give the Superintendent's Representative the required 'notice of requirement' to carry out a link-up. (See clause AR6 of this document)

Charge-Up of Mains

The Constructor shall give the Superintendent's Representative the required 'notice of intent' in writing, prior to requiring the charge-up of mains. (See clause AR6 of this document)

When the link-up to a new main has been completed to the satisfaction of the Superintendent's Representative, and upon advice from the Constructor to the Superintendent's Representative that there is adequate anchorage of the new main, the Principal will charge-up the new main. The Constructor shall be responsible for the design and installation of any additional/temporary anchors/thrust blocks necessary to restrain the main.

At the time the charge-up is carried out, unless otherwise agreed by the Superintendent's Representative, the Constructor shall be present on site together with the necessary labour, materials and equipment to immediately repair any failures which may occur in the new mains and water connections upon charge-up.

The Constructor shall remain on site for at least 30 minutes after the new main has been charged-up in case there is a delayed failure.

In the event of a failure in the new main or water connections at charge-up the Principal will shut-down the main and the Constructor shall immediately carry out the necessary repairs to make the works safe. Where the shut-down of the new main necessitates the shut-down of an existing main which supplies consumers, the repair work shall be completed as a matter of urgency to enable the existing main to be recharged as soon as possible in order to minimise the inconvenience to consumers.

Pt 2 – Section 24 – Work-as-Constructed Details

A survey check shall be carried out to ensure the location of all newly constructed water reticulation systems, including (but not limited to) water mains, stop valves, hydrant, main cocks, connection nipples, water connections, branches, bends and any salient feature on the mains etc, have been constructed in accordance with this Code of Practice and the Design Drawings.

All survey checking and recording work shall be done to a standard acceptable to the Superintendent's Representative. The updated original of the Drawings shall incorporate the as-constructed information as detailed below.

Symbols to be used on the "As-Constructed Plan" are shown in Annex A to this document. Additional pipe, valve and ancillary information, as detailed in Annex B, are required to be included on the As-Constructed Plan

An example of a completed "As-Constructed Plan" is attached to this document as Annex C.

Extent of Backfill before Survey Checking

For water mains and water connections, embedment material shall not be placed to cover the pipe joints and fittings until the as-constructed survey checking has been carried out.

Survey Checking

The surveyor shall carry out, or cause to be carried out, a survey check of the locations of the constructed Works. If the locations of the constructed Works are in accordance with this Code of Practice and the Design Drawings, the surveyor shall certify on the drawings that the Works comply.

If the As-constructed works fall outside the tolerances specified below, the Constructor shall notify the Superintendent's Representative of the exact nature of the departure from the Drawings. The Superintendent's Representative shall determine the corrective action to be taken.

Distances (and ties where marked *) shall be checked at all :-

- Valve chambers*
- Water connection inlet risers*
- Water connection off-takes from the water mains

The Superintendent's Representative reserves the right to check the work of the Constructor at any time.

Should there be a difference of opinion regarding the measurements checked, the opinion of the Superintendent's Representative shall prevail.

Measurements

Horizontal measurements shall be surveyed to the accuracy specified in Section 58 of the Regulations under the Surveyors Act 1985 and shown on the Drawings to 0.01 metre. Slope distances shall not be used.

Running measurements shall be recorded along the main starting from a branch or existing fitting, and picking up all stop valves, hydrant, main cocks, connection nipples, boundaries, etc. Where a new connection is installed on an existing main a

distance shall be shown to the new main cock or connection nipple from the nearest fire plug or stop valve.

The surveyor shall record the measurements:

- (i) To locate the start of the new main in relation to existing fittings, that is, from the nearest hydrant or stop valve.
- (ii) To locate each branch, bend, stop valve, hydrant, taper and water connection in relation to allotment boundaries.
- (iii) Where a change in distance from a boundary to the water main occurs.

Preferably, measurements should be recorded perpendicular to water mains or boundaries, however, fittings may be located by recording at least two direct measurements from the road alignment (or boundary) intersection points to the fittings.

The Surveyor shall record pertinent and adjacent land marks such as cadastral data, railway lines, bridges, culverts etc.

At vertical bends, the running measurements shall give the horizontal projection of the water main. The Surveyor shall prepare an enlargement of the vertical bend giving details of the deflection.

Accuracy

The accuracy of all horizontal measurements of completed work shall be :-

- Measured and recorded to 50 mm per 100 metres to two decimal places of a metre, but within 100 mm of true location
- The maximum accumulated error shall not exceed 250 mm.

Compliance with the Design Drawings

Water mains and water connections shall be deemed to comply with the Design Drawings if all of the Works comply with the construction tolerances detailed in Pt 2 Section 21 supplementary information in this document.

Recording As-Constructed Information and Certification

The Consultant, Surveyor or other authorised person shall mark up the 'original' of the latest issue of the Design Drawings with all as-constructed data where there is a variance with the latest Design Drawings.

Details added to the As-Constructed Drawings shall be in accordance with the following :-

- Drawing symbols are to be in accordance with Annex A to this document.
- Mains reporting details are to be in accordance with Annex B.
- An example "As-Constructed Plan" is attached to this document as Annex C.

The As-Constructed Drawings shall be submitted, whether altered or not, to the Superintendent's Representative together with the field survey information.

Certification - The Consultant, Surveyor or other authorised person shall certify the As-Constructed Drawings are correct and include all relevant as-constructed information and the date of completion of the As-Constructed Drawings. The date of completion of construction of the works shall also be shown on these Drawings.

Any errors or deficiencies in the As-constructed information discovered before the issue of the Final Certificate shall be corrected or remedied by the surveyor.

Surveyor Requirements

Private Sector Land Development Contracts

The Consultant shall carry out, or arrange for a suitably qualified surveyor to carry out, the As-Constructed survey checks, record all variances and certify that the As-Constructed Drawings are correct.

These As-Constructed Drawings shall be forwarded to the SA Water Manager responsible for the contract inspection/administration of the project:-

- Principal Engineer, Networks Design (Water) Building H, Thebarton
(for contracts within the Adelaide Metropolitan Area and SA Water's Outer Metro North and Outer Metro South Areas)
- The Manager, 'SA Water Region'
(for contracts within the Country Areas)

The Manager will ensure the information is included on asset management records.

SA Water Administered Contracts

SA Water technical staff shall carry out (or SA Water shall arrange for a suitably qualified surveyor to carry out) the As-Constructed survey checks, record all variances and certify that the As-Constructed Drawings are correct. The original As-Constructed Drawings are to be completed by, or forwarded to, SA Water prior to the issue of the Certificate of Practical Completion. SA Water technical staff shall ensure the information is included on asset management records.

SA Water's Alliance Partner Administered Contracts

SA Water's Alliance Partner technical staff shall carry out (or SA Water's Alliance Partner shall arrange for a suitably qualified surveyor to carry out) the As-Constructed survey checks, record all variances and certify that the As-Constructed Drawings are correct. The certified As-Constructed Drawings are to be completed by, or forwarded to, SA Water's Alliance Partner prior to the issue of the Certificate of Practical Completion. SA Water's Alliance Partner shall forward the information to SA Water for inclusion on asset management records.

SA Water Supporting Documentation

Water Reticulation Code - Part 2 - Construction

Additional Requirements

Part 2 – AR1 Training Requirements

During any construction work on SA Water’s water supply infrastructure network the training requirements for nominated staff are as follows:

Course (or equivalent)	Minimum Requirement	Remarks/Available at
Common Induction Training Course	All	Also called Whitecard / Civil Train SA, CCF
DICL pipelaying	One Person (on site during activity)	Tyco Water (Century Plus)
MSCL pipelaying	One Person (on site during activity)	Tyco Water
PVC pipelaying	One Person (on site during activity)	Civil Train SA
PE pipelaying	One Person (on site during activity)	TAFE
Live Link-up course	One Person (on site during activity)	TAFE
Trenching and Shoring (Excavation and Support)	One Person (on site during activity)	Civil Train SA
Work Zone Traffic Management Course	One Person (on site during activity)	Civil Train SA
Confined Space Awareness Course	Everyone involved in confined space activity (during activity only)	Civil Train SA
OHS Load Slings Competency	Anyone involved in loading activity (during activity)	To meet OHS Regulations/ Civil Train SA

Training available at:

CCF - Civil Contractors Federation, 1 South Road, Thebarton (08) 8111 8000

Civil Train SA - 1 South Road, Thebarton (08) 8111 8001

TAFE - Regency College, School of Plumbing, Regency Park (08) 8348 4311

Tyco Water - Century Plus & MSCL (Contact Tim Paragreen 0414 980 181)

Currency of Training

SA Water requires that all workers nominated as the trained person on site must maintain their proficiency in the required skill. SA Water considers a review of competency for each skill (by an RTO) or retaining every three (3) years as meeting this requirement.

Part 2 – AR2 Geotechnical / Shoring Responsibilities

The Constructor shall be responsible for:

- (a) assessing the geotechnical and groundwater information provided by the Designer on the Design Drawings or other documents and implementing the appropriate actions.
- (b) the design, installation and operation of all groundwater control and dewatering systems necessary to:
 - (i) prevent heave of, or loss of density in the material comprising the floor of any excavation or pipe trench.

[To be used with WSA 03-2011 V3.1]

- (ii) maintain the stability of the walls of all excavations and trenches.
- (iii) maintain “dry” working conditions in all excavations and trenches.
- (iv) preventing flotation of any pipeline or structure during construction and at all other times.

Note: Prior to commencing construction, the Constructor shall obtain any further geotechnical or groundwater information necessary for the design and installation of any of the above mentioned groundwater control and dewatering systems.

- (c) confirming, during excavation, whether the geotechnical conditions found on the site are in accordance with those indicated on the Design Drawings or in accordance with any subsequent investigations undertaken by the Constructor.

Where the actual foundation conditions are found to be as indicated on the Design Drawings or by any subsequent investigations undertaken by the Constructor, then the Constructor may proceed with the Works.

Where the foundation conditions are found to be not as indicated on the Design Drawings or by any subsequent investigations undertaken by the Constructor, the Constructor shall not proceed with the Works, but shall refer the design back to the Designer for appropriate action, and shall immediately inform the Superintendent's Representative of the findings.

Construction work shall only proceed after the appropriate foundation treatment has been specified by the Designer and approved in writing by the Superintendent's Representative.

Groundwater Control and Dewatering of Excavations

If groundwater is encountered, the watertable shall be lowered to below the level of the floor of the excavation or trench (e.g. by wellpointing) **before** further excavation is carried out :-

- (a) there is the possibility that there may be heave of, or loss of density in the material comprising the floor of the excavation or trench, or
- (b) there may be a threat to the stability of the walls of the excavation or trench, or
- (c) it may otherwise not be possible to maintain “dry” working conditions in the excavation or trench.

Observation wells shall be installed to verify and monitor the lowering of the watertable.

The watertable shall be maintained below the level of the floor of the excavation or trench until the excavation or trench has been backfilled, or until such time as there is no danger of flotation of the newly installed structure or pipes.

The reduction in dewatering shall be gradual and progressive until the water table has substantially reached its original level.

The Constructor shall remove any water which may enter or be found in excavations or trenches while the pipes are being laid and while any other works under the Contract are being constructed. The Constructor shall have available at all times sufficient pumping units for this purpose, ready for immediate use.

Where only small quantities of ground water are encountered, provided that there is no possibility that there may be heave of, or loss of density in, the material comprising the floor of the excavation or trench, or a threat to the stability of the walls of the excavation or trench, the Superintendent's Representative may allow the Constructor to stabilise the trench bottom by means of 20 mm aggregate or the installation of underdrains to convey water away from the immediate work place to temporary pump sumps formed in the floor of the excavation. No aggregate will be permitted within 150 mm of the outer surface of the pipes.

Water from groundwater control systems, excavations or trenches shall be disposed of in such a manner that it shall not cause injury to persons or property, to the work completed or in progress, to the surface of the streets, or cause any interference with the use of the streets by the public or be a public nuisance. Dewatering water shall not be discharged into the sewerage system.

Shoring of Excavations

The Constructor shall supply, put in place, and maintain such shoring as may be required to support the walls of excavations and trenches to provide a safe working environment for personnel in and around excavations and to prevent any movement which can in any way injure, or endanger any adjacent pavements, buildings, conduits or other structures.

Notwithstanding any special considerations, the minimum shoring required shall be in accordance with the appropriate OH&S regulations.

If the Superintendent's Representative considers that neither sufficient nor proper shoring has been provided, the Superintendent's Representative may direct that additional shoring be installed. The compliance with such orders shall not release the Constructor from the responsibility for the sufficiency of such shoring.

Care shall be taken to prevent voids outside the sheeting, but if voids are formed they shall be immediately filled, rammed and compacted to the satisfaction of the Superintendent's Representative.

In order to prevent injury to persons or property, the Superintendent's Representative may direct the Constructor to, or the Constructor may himself decide to, leave sheeting and/or bracing in place to be embedded in the backfill. However, sheeting or bracing shall not be left in place within 1.2 metres of the surface without written permission from the Superintendent's Representative.

The right of the Superintendent's Representative to order additional sheeting and/or bracing, or to order any or all of it to be left in place, shall not be construed as an obligation on the Superintendent's Representative's part to issue such orders, and any omission to exercise this right to do so shall not relieve the Constructor of the responsibility for preventing any injury or death of any person, or damage to property, caused by any cave-in or moving of the ground adjacent to the excavation.

All sheeting and bracing which is not to be left embedded in place, shall be removed as the excavation is backfilled in such a manner as not to endanger any personnel, the pipeline or the structure being constructed, or any other adjacent structures, services etc.

Part 3 – AR3 Service Connections

Unless otherwise shown on the Design Drawings or by direction of the Superintendent's Representative, the water meter shall be installed in accordance with SA Water WSCM Drawing D2.

Where a specific position is indicated on the Design Drawings the following criteria applies :

- For new sub-divisions the specified position relates to the position of the Inlet Riser.
- For existing premises the specified position relates to the Outlet Riser.

Pretapped connectors **shall be** used for all water connection offtakes from new 100 mm and 150 mm diameter mains.

Authorised tapping saddles, tapping collars or tapped clamps shall only be used for water connections from existing mains and from 200 mm diameter and above new mains.

Note : On existing mains it is critical to ensure that the tapping saddle is installed and then examined for correct fit **before** the hole is drilled.

Reason - This is because proposed location of the tapping saddle could unknowingly be near the socket end of the pipe where the outer diameter of pipe varies.

Unless approved otherwise by the Superintendent's Representative, water connections shall be laid at right angles to the main.

There shall be **no direct tapping**, of any type of water main, for water connections.

Where Tapping Nipples, Cock Plugs or Main Cocks are used, the tapered ends shall be screwed into the Pretapped Connectors, Tapping Saddles, Tapping Bands, Tapped Collars or Welded on Bosses. To ensure correct sealing Pipe Thread Tape shall be used.

Where double pre-tapped connectors are used (e.g. on boundary of two properties) the service connections shall run parallel until they reach the curb and then separate to line up with the required meter locations.

Water connections are not to be laid using a common trench with either another water connection or any other service e.g. fire service, power, gas, telecommunications etc.

Reason - Maintenance personnel do not expect there to be more than one SA Water facility at a nominal location therefore there is the distinct possibility of damage occurring to the other when maintenance work is being carried out.

The maximum hole diameter shall be 32 mm (these are required for 40 mm and 50 mm water connections only).

Holes shall not be drilled closer than 1500 mm from the socket end of the pipes.

Reason - The outer diameter of the pipe varies significantly within this length which can result in incorrect seating/sealing the tapping saddle.

Holes shall not be drilled closer than 600 mm from the spigot end of the pipes.

Reason – Any closer may interfere with maintenance operations and with some PVC pipe there is the possibility of splits occurring longitudinally down the mains.

Ensure that all Cock Plugs and Main Cocks are turned to **ON** prior to backfilling of trench.

No water connection shall be backfilled by the Constructor until it has been inspected for general workmanship, absence of flattening in the tube and has been passed as satisfactory by the Superintendent's Representative. This inspection shall in no way relieve the Constructor from full responsibility for any leakage or failure which may occur when this connection is later hydraulically tested.

Once approval for backfilling has been given, the Constructor shall backfill the water connection trench in accordance with this Clause, taking particular care to compact the filling in the trench and at the same time to avoid damage to the water connection tube.

The Constructor, at the direction of the Superintendent's Representative, shall seal and turn underground the inlet risers and boundary cocks on those water connections not immediately required and mark the location with a peg. When buried the riser shall be laid horizontally to the left as viewed from the main.

From new mains and from existing mains where the main is drained an authorised plastic nipple shall be screwed into the main and trimmed to outer surface of the pipe prior to attachment of the tapping saddle.

- Nipple sizes for 20 mm and 25 mm water connections are 1" BSP.
- Nipple sizes for 40 mm and 50 mm water connections are 1¹/₂" BSP.

Reason - These nipples prevent corrosion buildup (called tuberculosis) across the inlets to the water connections.

Additional Factors when Using Polyethylene (PE) Tubing for Water Connections

The following factors are in addition to WSA-03 Clause 4.12.

Only DR (Dezincification Resistant) brass End Connectors shall be screwed into pretapped connectors, tapping saddles, tapping bands, tapped collars and direct tapped/threaded holes of welded-on bosses.

Reason - It is considered that "plastic" end connectors have insufficient shear strength at the edge of the metallic fitting to perform satisfactorily.

Where it is not possible to lay the water connection at right angles to the water main (e.g. in cul-de-sacs) an authorised Green Detectable Marker Tape (CAUTION - WATER MAIN BURIED BELOW) shall be buried approximately 150 mm directly above the PE tubing.

The PE pipework connection to the meter inlet riser shall be such that the riser can be removed without cutting of the PE tubing.

Factors when installing Water Connections

Copper connections shall be electrically isolated from DICL and MSCL mains by the use of Insulated Adaptors.

Flared pipe joints -

- The pipe shall be annealed before flaring and installation.
- The flare angle shall be 60° (included angle of 60°).
- Pipe thread tape shall not be used on flared end of flared joints.

For DR (Dezincification Resistant) brass fittings with internal rubber sealing rings (e.g. SA Water's Coupling Tube with Inverted Nuts) the ends of the copper tubing shall be slightly flared to prevent pullout of the tube.

Field brazing of joints shall only be made by appropriately trained personnel.

In-line Cock Plug Assemblies shall be installed on all 40 mm and 50 mm copper and 40 mm and 63 mm PE service connections. See SA Water WSCM Drgs Section E.

Meter Boxes (Access Chambers)

The standard method of installation of water meters is above ground. Use of meter boxes is acceptable in certain cases, but their use shall only occur after written approval has been obtained from SA Water.

Unless directed otherwise, approved meter boxes shall be located **within the road reserve** and have a clearance of 100 mm between the near side edge of the box and the property boundary.

Meter boxes for below ground water meter installations shall be constructed to comply with the appropriate plan in the SA Water WSCM Drawings Section E.

For below ground water meter installations the definition of the location of a water connection is the meter outlet riser.

Part 3 – AR4 Doglegs

The depth of cover to water mains is not to exceed 1200 mm without SA Water approval. If, due to immovable obstructions, the pipe depth must exceed 1200 mm, PE, DICL or MSCL 'dog-legs' as shown on SA Water WSCM Drawings C12 and C13 shall be used.

DICL doglegs using restrained rubber ring joints shall, where necessary, have anchor blocks to restrain vertical and lateral movement and be protected as for DICL pipes and fittings (refer WSA-03 Clause 15.9).

DICL doglegs using bolted flanged joints shall be protected by wrapping with Petrolatum Anti-corrosion System in accordance with TS 29 with the proviso that Cathodic Protection may be required on 200 mm diameter and larger doglegs - the required procedure is shown in the SA Water WSCM Drawings Section H.

MSCL doglegs shall be protected using Bitumen Mastic Tape System as detailed on the plan in the SA Water WSCM Drawings Section H (and in accordance with TS 81) with the proviso that Cathodic Protection may be required on 200 mm diameter and larger doglegs - the required procedure is shown on the previously mentioned plans.

Part 3 – AR5 Valve and Hydrant (Fireplug) Chambers

Unless otherwise directed by the Superintendent's Representative, valve and fireplug chambers shall be installed over all valves and fireplugs in accordance with the details shown in Section C of the SA Water Construction Drawings.

Cast iron (CI) streetboxes shall be used in main roads, or in locations where heavy loads are likely, or if considered necessary by the Superintendent's Representative. In all other situations in improved roads, lightweight (polyethylene) streetboxes may be used.

Where cast iron (CI) streetboxes are used they shall have Linear Low Density Polyethylene (LLDPE) protective sleeving wrapped around the circumference of the streetboxes.

Reason - The sleeving ensures that the casting can be raised at a later date with much less trouble and effort. This is because the sleeving acts as a slip-plane between the casting and the surrounding road material.

Where a two-piece CI lid is used in a fireplug or valve chambers, the small centre lid must be positioned such that the standard spindle key and hydrant will operate without fouling.

Concrete topstones shall be used in non-urban environments (e.g. unmade roads, where main is laid in verge, etc).

Note: In these installations the concrete topstone shall be placed on the top of one or more concrete spacer rings such that the valve spindle (or valve spindle extension, or valve spindle tube) does not protrude into the uppermost topstone.

Reason - This prevents the valve spindle/water main being damaged if the upper topstone is dislocated e.g. by grading of gravel roads etc.

Part 3 – AR6 Notice of Intent

Notification to Department of Transport and/or Councils

Where water mains and water connections are laid in public roads, the Constructor shall notify the authority responsible for the road (local government or Transport SA) a minimum of at least five (5) full working days before commencing work.

Acknowledgment of Intention to Carryout Works

The Constructor shall provide the Superintendent's Representative with written acknowledgment from the authority responsible for the road (local government or Transport SA) of the Constructor's intention to carryout works **before** commencing work.

Commencing Work

The Constructor shall give a minimum of seven (7) days notice in writing to the Superintendent's Representative of the Constructor's intention to commence work on the Contract. The Constructor is to provide a Project Management Plan (PMP) covering the details of the project to be commenced at the time of notification.

Shutting Down Live Water Mains

The Constructor shall give a minimum of 72 hours notice (excluding weekends), in writing, to the Superintendent's Representative of the requirement for the shut-off of the main to carry out any link-up.

Shutting down and charging up of mains will be done only between the hours of 9.00 am to 3.00 pm on Mondays to Fridays inclusive (but excluding Public Holidays) unless otherwise approved by the Superintendent's Representative.

Link-Up to Live Water Mains

The Constructor shall give a minimum of 48 hours notice (excluding weekends), in writing, to the Superintendent's Representative of the Constructor's intention to carry out any link-up.

Link-up by SA Water/SA Water's Alliance Partner

The Constructor shall give a minimum of 14 days notice, in writing, to the Superintendent's Representative of the requirement to carry out a link-up. SA Water/SA Water's Alliance Partner will advise within 7 days if they are able to comply and the required fee.

Charge-Up and Disinfection of Mains

The Constructor shall give a minimum of five (5) full working days notice, in writing, to the Superintendent's Representative requesting the charge-up and disinfection of the non-commissioned water reticulation system.

Testing

The Constructor shall give a minimum of two (2) full working days notice, in writing, to the Superintendent's Representative prior to commencement of any testing.

Access to Easements

Except in emergencies, owners shall be given 48 hours notice, in writing, prior to requiring access to easements on private property.

Part 3 – AR7 Issue of Certificate of Practical Completion

The Superintendent's Representative will issue the Certificate of Practical Completion when all of the following requirements have been met :-

- (1) All of the Works have been completed by the Constructor in accordance with the Drawings and this Code of Practice, including the checking of all stop valves and fire plugs for correct operation, to the satisfaction of the Superintendent's Representative.
- (2) All testing has been successfully completed by the Constructor and all certificates of compliance for trench compaction have been provided to the Superintendent's Representative.
- (3) All As-Constructed information has been provided and certified correct by the Surveyor to the satisfaction of the Superintendent's Representative.
- (4) All the 'common trenching' including installation of electrical, gas and telecommunication apparatus in that trenching has been completed, and any damage to those installations caused by the Constructor's works, or damage to the sewers, connections or pumping mains, water supply mains or water connections, or any other services, caused by the common services work, has been made good to the satisfaction of the Superintendent's Representative and other Authorities.
- (5) The roads in which any water supply mains or water connections etc are laid have been fully constructed or repaired.

- (6) All tools, debris and foreign matter have been removed from the mains and connections.
 - (7) All surplus spoil has been removed from the site and the site cleared and restored.
 - (8) All equipment Guarantees and Operating Manuals have been provided to the Superintendent's Representative.
 - (9) All outstanding debts have been paid.
 - (10) The security has been lodged.
-

Part 3 – AR8 Indemnification

Against Losses Due to Delays

The Constructor shall indemnify the Superintendent's Representative from any losses whatsoever due to any delays in accepting the Works (or part of the Works) due to any failures.

Against Cost of Clean up of Water Mains

Should any tools, debris or foreign matter be left in the water reticulation system by the Constructor, or the Constructor's representatives, or sub-Constructors, the cost of subsequent removal of such objects, and the cost of repair of any damage caused by these objects shall be fully borne by the Constructor.

Part 3 – AR9 SA Water Specifications

SA Water References :-

- | | |
|-------|--|
| TS 4 | Packing Sand (High Resistivity) for use for packing around Sintakote-coated MSCL and Polyethylene Sleeved DICL Pipes. |
| TS 29 | The Protection of Pipework and Fittings in Below Ground Pipelines Using Petrolatum Anti-Corrosion Tapes and Compounds |
| TS 81 | The Protection of Field Joints and Specials and Repair of Coatings on Below Ground Steel Pipelines Using Bitumen Mastic Tapes and Compounds. |

Workcover Requirements

Trenching & Ground Support Systems Handbook

EPA Requirements

Draft Document - "Guideline for discharge of materials produced from the cleaning and maintenance of water supply storage tanks and pipelines".

Australian and New Zealand Environmental and Conservation Council (ANZECC) Guidelines

Pt2 – AR10 Defect Advice Sheet/Corrective Action Request

The Defect Advice Sheet (see Attachment A) is to be used by inspectors, constructors or their staff, manufacturers or any other SA Water or SA Water's Alliance Partner employee to report any non-conforming or defective items or poor quality procedures or services.

One copy of the sheet is to be forwarded to:

Infrastructure Standards Manager
Level 7, 250 Victoria Square, ADELAIDE SA 5000
GPO Box 1751, ADELAIDE SA 5001
Phone (08) 7424 2009 Fax (08) 7003 2009

An additional copy is to be retained by the originator for reference purposes.

All reports will be reviewed and the originator will be advised of the outcome.

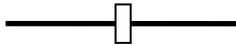
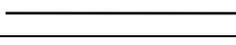
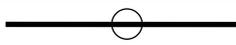
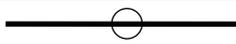
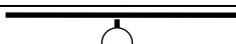
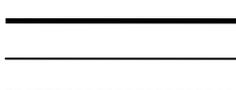
Annexures

Annex A	As-Constructed Symbols and Abbreviations (1 page)
Annex B	As-Constructed Mains Reporting Data (3 pages)
Annex C	Typical As-Constructed Drawing (3 pages)

Attachment

Attachment A	Defect Advice Sheet (1 page)
Attachment B	Corrective Action Request Sheet (1 page)

SYMBOLS AND ABBREVIATIONS FOR DRAWINGS AND AS-CONSTRUCTED AMENDMENTS

ITEM	SYMBOL	TEXT	SIZE
Air Valve		AV	4mm
Bend and angle of deflection		x° Bend (e.g. 45°)	
Boundary Cock		BC	
Branch or Tee		Br or Tee	
Branch with Scour Valve		Sc	4mm
Branch with Stop Valve		SV	4mm
Bypass		BP	
Cathodic Protection Rectifier		CPR	
Cathodic Protection Test Point		CPTP	4mm
Change of Type			
Change of Size - in line - at junction		x dia/y dia Taper x dia/y dia Taper	4mm 4mm
Connection			0.50mm
Connection Nipple		CN	
Cross Over			
Hydrant / Fire Plug		FP	4mm
Hydrant / Fire Plug Air Valve		FPAV	4mm
Hydrant / Fire Plug Scour		FP Sc	4mm
Fire Plug Connector (with thrust block)		FP Con	4mm
Locked Stop Valve		LSV	4mm
Main Cock		MC	
Meter		Meter	
Pillar Hydrant		PH	4mm
Pressure Reducing Valve		PRV	4mm
Reflux Valve		RV	4mm
Stop Valve		SV	4mm
Water Main - new - existing - lifted/abandoned			1.00mm 0.35mm 0.35mm
WATER MAIN - MATERIAL TYPE :- Ductile Iron Concrete Lined Ductile Iron Concrete Lined with 'Tyton-Lok' Jointing Rings PolyEthylene (including type) Mild Steel Concrete Lined PolyVinyl Chloride (including type)		DICL DCTJ PE (80 or 100) MSCL PVC (O or M)	

To be used with WSA 03-2011 V3.1

**AS-CONSTRUCTED MAINS REPORTING DATA
PRESSURE MAINS**

PIPE MATERIAL	PIPE ABBREVIATION	PIPE MATERIAL or TYPE	COATING	OTHER	EXAMPLE PIPE DESCRIPTOR FOR AS-CON DRG	PIPE DIAMETER (DN)	PIPE PRESSURE RATING (PN)	AUSTRALIAN STANDARD
DATA INPUT REQUIREMENT	<i>Standard Symbol</i>	<i>Compulsory -Select as required</i>	<i>As Applicable</i>	<i>As Applicable</i>	<i>Compulsory</i>	<i>Compulsory</i>	<i>Compulsory</i>	<i>Informative</i>
Ductile Iron Cement Lined	DICL	K series (KS) 2100 Series (21)	x	x	DICL - KS	√	√	AS 2280
DICL with Restrained Joint (eg Tyton-Lok)	DCTJ	K series (KS) 2100 Series (21)	x	x	DICL - 21 DCTJ - KS	√	√	Draft Standard AS 2280
Polyethylene (PE)	PE80	Type A (A)	x	x	DCTJ - 21	√	√	Draft Standard
		Type B (B)	x	x	PE80 (A) PE80 (B)	√	√	AS 4130
PVC-M	PE100	PE100	x	x	PE100	√	√	AS 4130
		Series 1 Series 2	x	x	PVC-M (2)	√	√	AS/NZS 4765
PVC-O	PVC-O	Series 1 Series 2						
		Material Classification						
		• 315	x	x	PVC-O (2) (400)	√	√	AS 4441
		• 355						
		• 400						
PVC-U	PVC-U	• 450						
		• 500						
		Series 1 Series 2	x	x	PVC-U (2)	√	√	AS/NZS 1477

To be used with WSA 03-2011 V3.1

AS-CONSTRUCTED MAINS REPORTING DATA PRESSURE MAINS

PIPE MATERIAL	PIPE ABBREVIATION	PIPE MATERIAL or TYPE	COATING	OTHER	EXAMPLE PIPE DESCRIPTOR FOR AS-CON DRG	PIPE DIAMETER (DN)	PIPE PRESSURE RATING (PN)	AUSTRALIAN STANDARD
DATA INPUT REQUIREMENT	Standard Symbol	Compulsory -Select as required	As Applicable	As Applicable	Compulsory	Compulsory	Compulsory	Informative
<i>The following format is to be used where special, project based, approval has been given for the specific pipe system to be installed.</i>								
Glass Reinforced Plastic	GRP	Manufacturer	x	x	GRP	√	√	AS 3571
Mild Steel Cement Lined	MSSL	Jointing system <ul style="list-style-type: none"> • Rubber Ring (RRJ) • Spherical Slip in Joint (SSJ) • Ball and Socket (B&S) • Collars (COL) • Butt Weld (BUTT) • Flanged (F) • Insulated Flanges (IF) 	Coating <ul style="list-style-type: none"> • Sintakote (S) • Inorganic Zinc Silicate (ZS) • Other (O) 	Corrosion Protection (CP)	MSSL (BUTT) (S) Note Omit (CP) marking if CP not installed	Outside Diameter (Show actual OD dimension) Show OD of pipe eg 597 mm	Plate Thickness <ul style="list-style-type: none"> • 5 mm • 6 mm • 8 mm • 10 mm • 12 mm Show plate thickness in PN column eg 6 mm	Various
Acrylonitrile Butadiene Styrene	ABS	• Manufacturer • Tradename Jointing System <ul style="list-style-type: none"> • Solvent Weld (SWJ) • Rubber Ring (RRJ) 	x	x	ABS (Eurapipe) (RRJ)	√	√	AS3518

Legend:

- √ Value to be supplied
- x No information required

For any pipes other than the above provide the following details:
Material, DN, PN, lining, external coating, jointing method, manufacturer

AS-CONSTRUCTED MAINS REPORTING DATA PRESSURE MAINS

Australian Standards pipe identification markings.
Marking details are shown as follows

DICL pipe to AS2280	Manufacturer, DN, Class of pipe or Pressure Rating (PN), Number of Standard e.g. Trade Name 150 K9 AS2280
DICL pipe to T2100	Manufacturer, DN, Class of pipe or Pressure Rating (PN), Number of Standard e.g. Trade Name 150 20 AS2280(Standard being updated)
PE pipe	Manufacturer, DN (as a number only), wall thickness (as a number only), PN, PE Class and Type, Date of manufacture, Factory ID e.g. Trade Name 25 × 1.6 PE80 Type A 04 02 25 F1
PVC-M pipe	Manufacturer, Pipe Series, Pipe material, DN (as a number only), Pressure Class (PN), Angle of deflection, Date of manufacture, Factory ID, Number of Standard e.g. Trade Name S2 PVC-M 150 PN16 MAX DEFL 3° 04.02.25 F1 AS/NZS 4765
PVC-O pipe	Manufacturer, Pipe material and Material Classification, Pipe Series Number, DN (as a number only), Number of Standard, PN (as a number only), Date of manufacture, Factory ID, Angle of deflection. e.g. Trade Name PVC-O 400 Series 2 150 AS4441 PN16 04.02.25 F1 MAX DEFL 3°
PVC -U pipe	Manufacturer, Pipe Series, Pipe material, DN (as a number only), Pressure Class (PN), Angle of deflection, Date of manufacture, Factory ID, Number of Standard e.g. Trade Name S2 PVC 150 PN16 MAX DEFL 3° 04.02.25 F1 AS/NZS 1477
GRP pipe	Manufacturer, DN (as a number only), PN, Stiffness Class (SN), Words “NOT FOR SEWERAGE”, Date of manufacture, Factory ID e.g. Trade Name 200 SN 5000 NOT FOR SEWERAGE 04 02 25 F1
MSCL pipe	No specific Standard details. To be obtained from supplier
ABS Pipe	Manufacturer, Pipe Series, Pipe material, DN, PN, Angle of deflection at socket, Date of manufacture, Factory ID e.g. Trade Name S1 ABS 160 DN450 PN 16 3° 04 02 25 P1

To be used with **WSA 03-2011 V3.1**



DEFECT ADVICE SHEET

This form shall be completed by either the Contractor or SA Water Contracts Inspector as soon as the defect or Unauthorised product has been identified.

This form shall be forwarded to :

INFRASTRUCTURE STANDARDS MANAGER
Level 7, 250 Victoria Square, ADELAIDE SA 5000
GPO Box 1751, ADELAIDE SA 5001
Phone (08) 7424 2009 Fax (08) 7003 2009

REPORTED BY

Contractor / Inspectors Name :

Project and Location :

DEFECT PRODUCT DETAILS

Manufacturers Name :

Suppliers Name (if known) :

Type of Defect found : Tick appropriate box/s

Oversize	<input type="checkbox"/>	Undersize	<input type="checkbox"/>
Broken, split or cracked	<input type="checkbox"/>	Unauthorised product	<input type="checkbox"/>
Does not meet Specifications	<input type="checkbox"/>	Other	<input type="checkbox"/>

Brief description of defect :

.....
.....
.....
.....

Sent back for replacement : Yes No

Signed :----- Date :-----



Reference No.

CORRECTIVE ACTION REQUEST

A Corrective Action Request form shall be completed by the relevant SA Water Contract Administrator for each incidence where a problem or issue has been identified.

Part 1 DETAILS SECTION

Project and Location _____

Contractor _____

Contractors Representative _____

Issued by _____ Date Issued _____

Part 2 WHAT IS THE PROBLEM / ISSUE?

Part 3 HOW CAN THE PROBLEM / ISSUE BE RESOLVED?

HOW CAN THE BUSINESS PREVENT THE PROBLEM / ISSUE RE-OCCURRING

Part 4 HAS THIS PROBLEM / ISSUE BEEN RESOLVED?

Yes No

Signed : _____ Date : _____