



**DUBBO  
REGIONAL  
COUNCIL**

**TECHNICAL SCHEDULE**

**DRC-W209**

**REHABILITATION OF WATER MAINS -  
LINING**

**TECHNICAL SCHEDULE DRC-W209 – REHABILITATION OF WATER MAINS - LINING**

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## **DRC-W209: REHABILITATION OF WATER MAINS - LINING**

### **DRC-W209.1 SCOPE**

This Specification applies to the rehabilitation of existing water supply mains by the insertion of a suitable internal lining system to re-establish the integrity of the water main with minimal excavation (pipe relining.)

The rehabilitated pipe will have an internal diameter smaller than the pre-existing pipe, however this should be minimised as far as possible.

All live connections and property services are to be reinstated.

The work required to be performed under this Contract shall comply with the referenced documents in Clause drC-W209.2, unless specified otherwise herein.

### **DRC-W209.2 REFERENCED DOCUMENTS**

The following documents are referred to in this Specification. The latest version of the document, including any published amendments, shall apply unless noted otherwise. Where the drawings or a project specific specification are in conflict, or inconsistent with these referenced documents, or this Specification then the details on the drawings or project specific specification shall apply.

#### **Australian Standards**

Replacement pipe shall be designed in accordance with the following Codes, Standards and manuals, where relevant:

- AS 2566 Buried Flexible Pipelines
- AS 4020 Testing of Products for Use in Contact with Drinking Water

Works shall also comply with the current versions all relevant Australian Standards.

#### **Water Services Association of Australia Standards**

- WSA01 Polyethylene Pipeline Code
- WSA02 Water Supply Code of Australia
- WSA05 Conduit Inspection and Reporting Code of Australia

### **DRC-W209.3 LABOUR, PLANT AND MATERIALS**

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

#### **DRC-W209.4 WORKPLACE HEALTH AND SAFETY (WHS)**

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the tender price.

The Contractor shall ensure that in the performance of the works, the Contractor's employees, sub-contractors and employees of such sub-contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor's WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor's activities for the duration of the Contract.

The Contractor's Safety Plan shall include, but not necessarily be limited to:

- Safety inductions.
- Identification and accountability of personnel having specific responsibilities for safety and security matters.
- Safety procedures (including confined space entry and fall protection).
- Accident and loss reporting.
- Safety equipment.
- Statutory requirements.
- Safe working incentives and leadership.
- Occupational health and hygiene.
- Fire prevention.
- Storage and issue of materials.
- Confined space entry procedures, with valid confined space permits.
- Fall from heights procedures.
- Emergency procedures and contingency plans.
- Safety disputes procedures.

The Contractor is to conform to the requirements of the Work Health and Safety Act 2011.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his sub-contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held onsite, and be readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor's safety systems onsite. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

#### **DRC-W209.5 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Transport for NSW (TfNSW) manual for *Traffic Control at Work Sites*, AS 1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the Traffic Management Plan to the relevant road authority and the Superintendent at least seven (7) days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, WorkCover Authority requirements, RMS requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

#### **DRC-W209.6 PROTECTION OF THE ENVIRONMENT**

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

#### **DRC-W209.7 NOISE**

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

### **DRC-W209.8 CUSTOMER NOTIFICATION**

If a water supply interruption is necessary under this Contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven days' notice of the proposed work so that the Principal can arrange notification to affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper (and electronic media?) indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

### **DRC-W209.9 ENTRY TO PRIVATE PROPERTY**

If entry to private property is required the Contractor is to advise the property owner a minimum of two clear working days in advance of the work proceeding. This advice is to be in the form of a signed letter which the Principal will supply in this regard. The Contractor shall be responsible for duplication and all associated costs. In addition to this written advice, the Contractor shall also verbally advise the resident on the day that the work is programmed, and the day work is about to commence. If there is not a resident in attendance at the time the Contractor's personnel have arrived onsite, then the Contractor shall proceed with the work provided that the letter of notification had been previously sent the required timeframe in advance of entry to the property.

On completion of work the Contractor shall leave a Calling Card in the letterbox of the property. The Principal shall provide to the Contractor the necessary cards. The Contractor is responsible for all duplication and associated costs.

The Contractor shall not, without prior approval of the Superintendent, enter private property outside the hours of 8.00 am to 5.00 pm Monday to Friday or at any time on public holidays.

### **DRC-W209.10 CUSTOMER COMPLAINTS**

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this Contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within five working days.
- Where a complaint cannot be resolved within five working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within seven working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor's cost.

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, no later than the close of business (5.00 pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date, time, name, address of contact, method of contact, issue raised and actions taken.

#### **DRC-W209.11 DAMAGE TO PROPERTY**

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as a driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

#### **DRC-W209.12 DEALING WITH DOGS**

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.

Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner's advice that "it will be okay".

Where the dog owner is not present to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available, but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal's Animal and Ranger Services to assist.

**DRC-W209.13 WATER SUPPLY**

Water is available for the purposes of this contract from the Principal's hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this Contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.

**DRC-W209.14 ISOLATION OF WATER MAINS**

The Principal shall operate valves to isolate the subject water main prior to the cleaning operation and shall operate valves to recharge the subject water main at the completion of the cleaning operation.

Any single incidence of water supply interruption under this Contract is not to exceed six hours, and is not to occur outside the hours of 9.00 am to 3.00 pm Monday to Friday. The Contractor shall implement a temporary water supply system, or other approved approach, to limit any disruption of the water supply to customers for six (6) hours.

**DRC-W209.15 PROVISION OF INFORMATION TO THE CONTRACTOR**

The Principal will, where available, provide the Contractor with information regarding the water mains selected for rehabilitation, including:

- Location of the water main (plan or map).
- Approximate length of the water main.
- Water main material type.
- Diameter of water main.
- Approximate number of property branches to be reinstated to new lined water main.

**DRC-W209.16 LOCATION OF WATER MAINS**

Recorded water main and surface fitting locations will be shown on the plans supplied by the Principal. The Contractor is responsible for locating the water main and surface fittings onsite.

If work cannot be undertaken by the Contractor due to failure to locate a surface fitting after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal's staff. If the Principal's staff locate the fitting within 2 m and less than 300 mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal's staff time for the location works.



## DRC-W209.17 DESIGN AND SUPPLY OF LINER

The liner to be installed to rehabilitate the water main shall be designed based on either a fully deteriorated or partially deteriorated host pipe.

The liner shall be designed to:

- Have a minimum pressure rating of PN10 or greater where required by the design head of the individual water main being lined.
- Withstand all loadings applied to the existing water main.
- Minimise cross-sectional area loss for water flow.
- Have a certified minimum service life of 50 years.

The lining shall be designed as a flexible pipe and be capable of supporting all imposed loading. Each liner shall be designed to satisfy the critical performance criteria of:

- Vertical deflection
- Strength
- Buckling

The liner shall be comprised of materials which are resistant to chemical, biological and mechanical degradation by domestic and industrial water and corrosive soils and substances generally. The liner shall also prevent the intrusion of tree roots through the lining.

The liner shall be suitable for use and contact with drinking water and be certified as being compliant with the requirements of AS 4020.

The liner thickness shall be calculated by the Contractor to suit the specific job and shall take account of design internal pressure, ground water pressure, soil pressure and structural requirements. The lining system shall not reduce the internal diameter of the existing pipe by more than 10% in lines 500 mm and smaller, nor more than 5% in lines greater than 500 mm diameter.

The Contractor shall submit the following information:

- Full details of the liner material including its physical and chemical properties and standards governing the manufacture of the liner material.
- Full details on the method of liner manufacture, including standards governing the liner manufacture.
- Certification of compliance of liner with AS 4020 and suitability for contact with drinking water.
- Full details on methods of liner installation, including methods of any temporary supply where required.
- List of any defects inherent in the proposed lining system. (Inherent defects are those that commonly occur with the lining system where it is not possible or commercially practical to eliminate because of the inherent nature of the system).

- Full details of methods of reinstatement of junctions and property connection branch water mains. The Contractor should also provide a procedure for cutting a new connection into the rehabilitated pipeline, and for sealing the gap between the host pipe and the liner at the point of connection, if required.
- Full details of liner finishing and effective connections at the ends.

### **DRC-W209.18 DESIGN LOADS**

The loads used in the design of a liner shall be the most severe of any combination of earth pressure, ground water hydrostatic pressure, traffic loading and internal hydrostatic pressure.

Vertical earth pressure shall be calculated as follows:

- Where cover to a deteriorated pipeline is less than 3 m or less than 10 times its nominal diameter – weight of the full height of the prism of soil above the host pipe, without reduction for trench effects;
- Where cover to the deteriorated pipeline is greater than 3 m and greater than 10 times its nominal diameter – calculated in accordance with Clause C4.3 AS 2566.1:1998). Trench material shall be assumed to be soft clay;
- The maximum depth of cover for each pipe shall be used to calculate the earth pressure for that length. The soil unit weight shall be taken as at least 20kN/m<sup>3</sup>. As this is usually the weight assumed for saturated clay, it shall be assumed to include groundwater for the purposes of calculating buckling loads.

Traffic surcharge loads shall be calculated in accordance with Clause 4.7 of AS 2566.1 for the following types of traffic loadings:

- Type A Main Road: Multiple adjacent lanes of Standard T44 or Standard W7 wheel loads;
- Type B Light Road: Single lane of Standard T44 or Standard W7 wheel loads; and
- Type C Field Load: 60% of light road loading.

For each liner, the type of traffic load used for liner design shall be explained in terms of assumptions and communication with the relevant authority. Full consideration of future traffic flows shall also be taken into account.

Hydrostatic loading shall be calculated assuming an internal pressure from water and external hydrostatic loading shall be calculated assuming a water table located at the ground surface, acting in isolation from, or in combination with, any other loads. Hydrostatic loading internally at the full design head for the pipeline shall be calculated, acting in isolation from or in combination with any other loads.

### **Vertical Deflection**

The liner shall be designed with a long term deflection limit of 6% calculated in accordance with Clause 5.2 of AS 2566.1:1998.

The total design load shall be the maximum produced by the combination of vertical earth pressure and traffic surcharge load. The effect of groundwater hydrostatic pressure and internal surcharge shall be ignored.

Liner long term Modulus of Elasticity used in calculating long term ring-bending stiffness of the pipe in equation 5.2(2) of AS 2566.1:1998 shall be as submitted by the Contractor in the Schedule of Technical Data.

The value of soil modulus ( $E'$ ) used in equation 5.2(2) of AS 2566.1 shall be taken as 5.0 MPa unless approved otherwise by the Superintendent.

### **Design for Strength**

The liner shall be designed with a long term flexural strain developed in the wall of the liner under the load or load combination not exceeding the permissible value appropriate for the liner material. This shall be detailed in the Schedule of Technical Data.

The long term flexural strain shall be calculated in accordance with Clause 5.3.1 of AS 2566.1:1998.

### **Design for Buckling Resistance**

The total imposed buckling pressure shall be the maximum produced by the combination of vertical earth pressure, groundwater hydrostatic pressure and traffic surcharge load in accordance with Section 5.4. AS 2566.1:1998. A soil load of not less than 20kN/m<sup>3</sup> shall be assumed. This load should be considered to include groundwater. The effect of internal surcharge shall be ignored.

The total imposed buckling pressure shall be less than the allowable buckling pressure calculated in accordance with equation 5.4(5) of AS 2566.1:1998. The factor of safety shall be 2.5.

### **Local Buckling**

In addition to the requirements of Section 5 of AS 2566.1, the liner shall have a minimum ring bending stiffness in accordance with the local buckling requirements for an intact pipe. It shall be designed to support the external hydrostatic load imposed from a groundwater table located at the ground surface.

The design shall be based on the buckling strength of the liner taking into account the enhancement provided by the existing pipe.

### **DRC-W209.19 MANUFACTURE OF LINER**

The Contractor shall manufacture the liner in accordance with the material, methods and equipment proposed by the Contractor in its tender and accepted by the Principal.

The liner shall be designed and fabricated in a manner that, when installed, will neatly fit the internal circumference and length of the pipe being lined. Where lining technology requires, suitable allowance shall be provided for longitudinal and circumferential stretching of the lining during installation.

The Contractor shall be responsible for measuring the internal diameter of the existing pipeline at both ends of the line, prior to fabrication, to ensure that proper fit is achieved.

The Contractor shall nominate the minimum standards of liner internal surface finishes observed or measured after the liner installation, which the Contractor would consider as the minimum requirement in meeting the Colebrook-White coefficient of friction, that being not more than 1.0 mm. These nominated

minimum standards may take the form of the maximum allowable number of visible wrinkles or ridges per linear metre of liner, etc.

In the event that the liner internal surface finishes do not meet the minimum standards nominated by the Contractor, the liner shall be repaired and defects/irregularities removed by using methods approved by the Superintendent and to the satisfaction of the Superintendent. The cost of such liner repair work shall be borne by the Contractor.

## **DRC-W209.20 PREPARATION OF WATER MAINS FOR LINING**

The Contractor shall clean the water main line prior to insertion of the liner to ensure precise installation of the lining system. The cleaning method employed must not cause further damage to the line. Foreign matter, silt, encrustation and similar must be removed from the line to the satisfaction of the Superintendent and the requirements of the lining method to be used.

Four cleaning runs are to be allowed for in the tendered rate and a CCTV camera is to be used to verify the effectiveness of the cleaning procedure. One cleaning run constitutes cleaning a section upstream and downstream. The Contractor shall ensure that a high pressure water jet cleaning system is used as a minimum, to clean existing water main lines.

Debris and other matter cleaned from the water mains shall be removed appropriately and legally. The Contractor shall not leave debris and other matter onsite. All materials resulting from the cleaning operation shall be trapped in filter socks at the downstream end of the pipes. The Contractor shall remove all trapped materials and dispose of them in a manner acceptable to the Environmental Protection Authority and other relevant local authorities. All costs associated with removal and disposal of the debris and other matter shall be borne totally by the Contractor.

CCTV inspection shall be carried out by the Contractor prior to installation of liners to establish that the pipe is clean and ready to receive the liner.

The Contractor shall confirm which property connections are live prior to lining.

## **DRC-W209.21 INSTALLATION OF LINER**

### **Liner Installation**

All work shall be carried out under the technical direction of a qualified and experienced person who has had suitable training and experience in the installation of the liner, nominated by the Contractor in its tender and accepted by the Principal.

The Contractor shall have submitted with its Tender full details of the installation procedure and the Installation Quality Plan for the lining to the Superintendent for approval based on the proposal made in its tender. These details shall be compatible with the liner design. The Contractor shall provide all the equipment for the safety of its workforce and for installing the lining and shall install the lining in accordance with the procedures approved by the Superintendent.

Where applicable the Contractor shall:

- Install the liner in a continuous operation.
- Ensure that the liners are not over stressed and that the inner and outer surface layer is not damaged.
- Transport the liners and position them inside the water main conduit to ensure that damage to the inner and outer surface layer is prevented.
- Joint liners utilising a suitable jointing system.
- Construct liner transition connection at pipe ends using methods approved by the Superintendent.

Where required by the lining method, the liners shall be transported to the site under controlled environment conditions. The Contractor shall decide when to transport the liners to the site and when to commence liner insertion with regard to the weather conditions.

### **Standard of Finish**

The liner shall have a surface finish free of all defects such as foreign inclusions, dry spots, air bubbles, pinholes, pimples and delamination which may cause obstruction to flow or adversely affect the hydraulic capacity of the water main. The liner shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to the inside of the lined pipe.

Facilities including CCTV cameras and access shall be made available at all times by the Contractor to the Superintendent to enable inspections of the liner to be made. Where the Superintendent determines that any defects shall adversely affect the integrity, structural strength of the liner, or hydraulic capacity of the lined water main, then such defects shall be repaired or the liner replaced at the Contractor's expense.

### **DRC-W209.22 CONNECTION TO EXISTING LINES**

The Contractor shall connect the new liner to existing water mains, at each end of the job and at all live property connections in accordance with Principal's standard specifications using approved fittings and practices to the satisfaction of the Superintendent.

### **DRC-W209.23 RE-ESTABLISHMENT OF EXISTING FITTINGS**

The Contractor shall re-establish all pre-existing hydrants, valves and other fittings on the new MDPE pipe in accordance with the Principals' standard specifications using approved fittings and practices, to the satisfaction of the Superintendent.

### **DRC-W209.24 EXCAVATION**

Should excavation be necessary for any reason, it is to be carried out in accordance with Principal's standard specifications. Particular attention is drawn to the following:

- Prior to the commencement of any excavation, the Contractor is to determine the location of any services in the vicinity of the proposed excavation. The Contractor shall take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service. If the Contractor damages a service the Contractor is to immediately contact the relevant authority or owner and arrange repairs to the satisfaction of the authority or owner. The Contractor is to obtain from the authority or owner a certificate stating that the repair has been carried out to their satisfaction. If the owner of the service cannot be determined the Contractor is to seek further advice from the Superintendent. All costs associated with the location and repair of services are to be borne by the Contractor.
- The Contractor is not to commence any excavation until all materials necessary to make the excavation safe are onsite and available for use. This includes any necessary fencing and barriers as well as trench support systems.
- Excavation is to be kept to the minimum possible to allow efficient execution of the works.
- If excavation of bitumen, asphalt or concrete surfaces is involved the Contractor is to saw cut neat straight lines at the outer limits of the excavation. Any affected pavers, blocks or brick pavements shall be removed by hand, cleaned and set aside for later replacement.
- The Contractor is to adequately support all excavations as the work proceeds to meet the requirements of the WorkCover Authority.
- The Contractor is to promptly remove and dispose of excavated material which is not required for reuse. The material is to be disposed of at a Principal approved tipping site.
- The Contractor is to backfill in accordance with the Principal's standard specifications.

#### **DRC-W209.25 ADDITIONAL ACTIVITIES INCLUDED IN SCOPE**

The following activities are deemed to be included in the scope of work:

- Removal of any obstructions necessary to provide access to any water main and replacement if necessary, following completion of the work.
- Locating, uncovering and 'freeing' of all surface fitting covers such that they are accessible for the carrying out of the works (refer to Clause drC-W209.16 if any surface fitting cannot be located after all reasonable effort).
- Rebuilding of surface fittings where removal of fitting lid, surround or components are necessary during any part of the Contract.
- All existing lines adjacent to the line to be replaced are to be plugged to prevent debris, runoff, etc from entering.

#### **DRC-W209.26 RESTORATION**

The Contractor shall restore all public and private property to a condition equal to that before work onsite commenced. Restoration where possible should be carried out prior to leaving the site.

All restoration works shall be completed within two weeks of the completion of works.

The restoration of pavements is to be in accordance with the appropriate Principal's standard specification to suit original material.

## **DRC-W209.27 TESTING**

At the Superintendent's discretion, the Contractor may be required to carry out inspections and testing of any rehabilitated water main. The Contractor shall provide all labour, materials and equipment required for the testing, inspection and monitoring, including pressure gauges and thermostats certified by an approved authority, and shall prepare and supply all necessary test pieces.

Sample test pieces shall either be cut from the excess sections of the fully installed liner as part of the works for this Contract, or from a liner installed and cured in similar conditions to those installed for the Contract. The samples shall be referenced, and either tested as set out below, or stored until the end of the Defect Liability Period.

The Contractor shall give the Superintendent at least three working days' notice of the date, time and place of the performance tests and provide all facilities required to satisfactorily complete the tests.

A NATA registered laboratory shall carry out all tests, unless otherwise approved by the Superintendent.

Alternative overseas or Australian Standards to those listed may be considered acceptable by the Superintendent for testing purposes provided that the test method specified will provide an accurate measure of the required physical property or aspect of the installation quality.

### **Hydrostatic Pressure Testing**

All relined pipelines greater than 20 m in length shall be hydrostatically pressure tested after any concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of three clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of pressure testing.

Hydrostatic pressure testing shall be conducted in accordance with the method detailed in Clause 2.13 of WSA01-2004.

The test pressure shall be as per WSA03-2011 and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:

- There is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
- There is no visible leakage; and
- The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline, or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within five working days of the completion of testing.

#### **DRC-W209.28 SWABBING**

Swabbing of all relined pipelines shall be undertaken in accordance with WSA03-2011 Clause 18 unless otherwise approved by the Superintendent.

#### **DRC-W209.29 DISINFECTION**

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all replacement pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

#### **DRC-W209.30 PRACTICAL COMPLETION**

A Certificate of Practical Completion will not be issued by the Superintendent until the Superintendent is satisfied that the work complies with the requirements of this Specification and the Contract in all respects (subject to such minor omissions as may be accepted by the Superintendent) and that the Contractor has carried out all of his obligations under the Contract except as regards to their obligations during the Defects Liability Period.