

Specification for Sewer Lining and Patch Repair

Pr9774



Unitywater



Pr9774 - Specification for Sewer Lining and Patch Repair

Documents Details

This document is only valid on the day it was printed.

Document Sponsor	Infrastructure Technical Standards Committee
Document Author (Owner)	Manager Asset Knowledge & Performance
Subject Matter Expert	Infrastructure Standards Manager, AKaP
References	Refer to Section 3 of this document

Version Review

Revision	Reviewed by	Approved by	Date approved	Revision type
1.0	B. Maule D. Fillmore	I. Beirne	28/01/2020	Original issue



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1. Purpose

The purpose of this Specification is to detail Unitywater's minimum requirements for rehabilitation of existing sewer network pipelines up to and including 1000 mm internal diameter and up to 10 m depth.

Unitywater will consider new and innovative technologies for the successful completion of these services.

2. Scope

- 2.1.1 The services described in this Specification are referred to as the Works in this Specification.
- 2.1.2 The Works encompass the minimum requirements for the rehabilitation of Unitywater's sewer network inclusive of gravity mains, pressure mains and house connection branches.
- 2.1.3 Generally the works shall encompass:
- Design of lining system;
 - Preparation works;
 - Rectification of faults that may impede lining works;
 - Installation of liners and patches;
 - Rehabilitation of house connection branches;
 - Final conduit inspection and testing;
- 2.1.4 Additional works may include:
- Replacement and/or raising of Inspection Openings;
 - Replacement of house connection branches.

3. References

3.1. Applicable Standards

- 3.1.1 Unless specifically amended by this Specification, the applicable standards shall be:
- ISO 11296 Plastics piping systems for rehabilitation of underground non-pressure drainage and sewerage networks;
 - AS2566 Buried flexible pipelines;
 - AS3500 Plumbing and Drainage.
- 3.1.2 Unitywater's Technical Specifications:
- Pr10661 – Specification for Sewer Temporary Pumped Bypass
- 3.1.3 No deviations from this Specification shall be made without prior consultation and written approval by Unitywater.

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- 3.1.4 Where there is a conflict between this specification and the product manufacturer's requirements, Unitywater will require a written undertaking from the product manufacturer that the product will achieve the specified service life.
- 3.1.5 Unitywater reserves the right to approve deviations from the standards based on the product manufacturer's requirements.

3.2. Applicable Legislation and Regulation

At least the following legislation and related regulation shall apply:

- a. *Work Health and Safety Act 2011 (Qld)*
- b. *Work Health and Safety Regulation 2011 (Qld)*
- c. *Water Supply (Safety and Reliability) Act 2008 (Qld)*
- d. *Plumbing and Drainage Act 2018 (Qld)*
- e. *Plumbing and Drainage Regulation 2019 (Qld)*
- f. *Environmental Protection Act 1994 (Qld)*
- g. *Queensland Building Services Authority Act 1991*

3.3. Codes of Practice (ratified by Legislation)

- 3.3.1 The following Work Health and Safety Queensland Codes of Practice apply:
- Confined Spaces Code of Practice 2011
 - Excavation Work Code of Practice 2013
 - First aid in the Workplace code of practice 2013
 - How to Manage and Control Asbestos in the Workplace Code of Practice 2011
 - How to Manage Work Health and Safety Risks Code of Practice 2011
 - Managing Noise and Preventing Hearing Loss at Work 2011
 - Managing Risks of Falls at Workplaces Code of Practice 2011
 - Scaffolding Code of Practice 2009
 - Traffic Management for Construction or Maintenance Work Code of Practice 2008
 - Work Health and Safety consultation, Co-operation and Co-ordination Code of Practice 2011
- 3.3.2 SEQ Water Supply and Sewerage Design and Construction Code (SEQ WS & S D & C Code)

3.4. Codes of Practice (not ratified by Legislation)

Code	Title
WSA 01	Polyethylene Pipeline Code
WSA 02	Gravity Sewerage Code of Australia
WSA 05	Conduit Inspection Reporting Code of Australia

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Code	Title
POP205	Water Jet Cleaning of Plastic Pipes

3.5. International and Australian Standards

Standard	Title
AS/NZS 1260	PVC-U pipes and fittings for drain, waste and vent application
AS/NZS 2566	Buried Flexible Pipelines – Structural Design
AS3500	Plumbing and drainage
AS 3571.1	Plastic piping systems – Glass reinforced thermo setting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pressure and non-pressure drainage and sewerage (ISO 10467:2004 Mod)
ISO 10467	Plastics piping systems for pressure and non-pressure drainage and sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin
ASTM F1216	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
ASTM F1697	Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Strip for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduit
ASTM F1741	Standard Practice for Installation of Machine Spiral Wound Poly (Vinyl Chloride) (PVC) Liner Pipe for Rehabilitation of Existing Sewers and Conduits
ASTM F1743	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
ASTM F1947	Standard Practice for Installation of Folded Poly (Vinyl Chloride) (PVC) Pipe into Existing Sewers and Conduits
ASTM F2019	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)

4. Definitions/Abbreviations

The following definitions are largely based on the Guidelines produced by the International Society for Trenchless Technology (ISTT) with some modification to suit Australian conditions and practices. More information on particular techniques can be found at www.istt.com. For the purposes of this Specification the following definitions shall apply.

Term	Meaning
Cement mortar lining	Placement of a cement mortar lining (CML) (usually by spraying) on to the inside surface of the host pipe. Such linings are generally considered to be non-structural depending on the thickness of the lining.

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Term	Meaning
CIPP lining	Cured in place pipe (CIPP) lining - insertion of a resin impregnated felt tube into the host pipe which is then expanded (by inflation usually) against the inside surface of the host pipe and then cured in place.
Close fit lining	Insertion of a thermoplastic material that is temporarily deformed (either by folding or by compression or tension) prior to placement which then expands to provide a close fit inside the host pipe.
Epoxy and Polyurethane linings	Placement of epoxy or polyurethane lining (usually by spraying) on to the inside surface of the host pipe. Such linings are generally considered to be non-structural depending on the thickness of the lining.
Fully deteriorated	A pipeline that does not have the required structural integrity to resist forces exerted on the pipe.
Host pipe	The existing pipeline that is to be rehabilitated.
House connection branch	The connection point of the lateral drain to the sewer.
Inspection opening	Covered and sealed holes in sewer pipes which are finished at ground surface to allow access downstream to the lateral drain and upstream to the house drain. At the ground surface an IO is to be protected by a concrete surround to ensure no traffic or structural loads can be transmitted to the drain.
Lateral Drains	A pipeline from the house connection branch connection on the sewer to the property's inspection opening.
Lining	A material that is placed on the inside of the host pipe to rectify a defect(s) and prolong its life.
Lined pipe	The existing pipeline after installation of the lining.
Maintenance Structure	Any structure with a removable cover constructed on a conduit (pipeline) that provides access to personnel and/or equipment. <i>(Includes maintenance holes, maintenance chambers, maintenance shafts, terminal maintenance shafts, inspection shafts, inspection openings)</i> . Also known as access structures and manholes.
Pipe bursting	Insertion of a new pipe inside the host pipe by either splitting or bursting the host pipe to make room for the new pipe. The remains of the host pipe remain in the ground. Not to be used for Asbestos Cement Pipes.
Product Manufacturer	The supplier or manufacturer of coating whose name appears on the product container, data sheets and the Material Safety Data Sheets (MSDS).
QA/QC	A combination of quality assurance - the process used to measure and assure the quality of the product - and quality control - the process of ensuring products and services meet customer expectations.

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Term	Meaning
Rehabilitation	All measures for restoring or upgrading the performance of existing utility systems including renovation, replacement or repair to overcome problems related to any aspect of performance.
Renovation	Methods of rehabilitation that incorporates all or part of the original fabric of a host pipe to improve the performance of the pipe.
Replacement	Construction of a new pipe or underground utility located on or off the line of the existing systems, which serves the same function as the old system.
Repair	Trenchless construction procedures to restore or improve the structural integrity and/or performance of the host pipe.
Service life	A manufacturer's product expected in-service lifetime.
Slip lining	Insertion of a new pipe inside the existing host pipe. The outside diameter of the new pipe needs to be less than the inside diameter of host pipe and the annulus between the two pipes then needs to be grouted.
Spiral wound lining	Insertion of a strip of material that is wound into the shape of the host pipe in a winding machine that causes interlocking of the strip and advances the lining through the length of the host pipe. In some cases the lining is then expanded out to be in contact with the host pipe or is wound as a fixed diameter. If it is a fixed diameter the annulus between the lining and the host pipe needs to be grouted.

The following abbreviations are used in this Specification:

Term	Meaning
ISTT	International Society for Trenchless Technology
AC	Asbestos cement
CCTV	Closed circuit television
DICL	Ductile iron cement lined
HCB	House connection branch
GRP	Glass reinforced plastic
IO	Inspection opening
ITP	Inspection and Test plan
NATA	National Association of Testing Authorities, Australia
PE	Polyethylene
PVC	Polyvinyl chloride
RCP	Reinforced concrete pipe
RPEQ	Registered Professional Engineer of Queensland
VC	Vitrified clay
WSA	Water Services Australia

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5. Technical Details

5.1. Skills and Qualifications

5.1.1 Personnel must be appropriately qualified to perform the required works.

Pipe Lining and Patch Repairs

5.1.2 The Contractor shall be licensed by the product manufacturer as an installer of the product.

5.1.3 Personnel employed to install the manufacturer's product shall be appropriately trained and qualified in the installation of the product.

Lateral Drains and Inspection Openings

5.1.4 The rehabilitation and reconstruction of lateral drains, including the raising of buried inspection openings, shall be carried out by a drainer licensed in accordance with the Plumbing and Drainage Act and Plumbing and Drainage Regulation.

Conduit Inspections

5.1.5 Operators of condition assessment equipment are required to have a certificate of attainment in NWP331A Perform Conduit Evaluation.

5.2. General Requirements

5.2.1 The Contractor shall be responsible for:

- Locating all assets and performing the specified services on each asset;
- design, cleaning, installation and pre and post conduit inspection of pipe rehabilitation;
- Management of sewage and site conditions at each asset;
- Re-sealing of any removed maintenance structure lids using a Unitywater approved water proof manhole grease; application of the grease shall be in accordance with the manufacturers specification;
- restoration of all surfaces and fixtures (including buildings, fences, gardens, walls, paved surfaces, paths and other structures, grass and trees and other property) impacted by the work; sites shall be reinstated:
 - To a condition as close to equal to that existing prior to the commencement of works;
 - To the satisfaction of Unitywater;
 - Immediately following completion of pipeline rehabilitation works.

5.3. Design Requirements

5.3.1 Unitywater will generally nominate the application technique to be employed.

5.3.2 In situations where this is not specified the Contractor shall determine the most appropriate application technique.

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- 5.3.3 The Contractor shall ensure that design calculations are made available to Unitywater on request.
- 5.3.4 The selection of the rehabilitation material and application technique shall be fit for purpose and satisfy an expected service life of not less than 50 years.
- 5.3.5 Unless otherwise specified by Unitywater, all pipes shall be classified as fully deteriorated and be rehabilitated to structural integrity.

5.4. Preparation Works

Locating Assets

- 5.4.1 Unitywater will provide details of all assets requiring rehabilitation through:
- Issuing of Orders;
 - Supporting maps showing the location of assets provided through the ArcGIS Collector application.
- 5.4.2 The Contractor shall locate and identify any Inspection Openings that require raising to the surface level or replacement due to damage.
- 5.4.3 The Contractor shall identify any sewer dead ends that do not have a terminal maintenance shaft.

Pipeline Pressure Cleaning

- 5.4.4 The Contractor shall be required to undertake pressure cleaning of each length of nominated pipeline.
- 5.4.5 Cleaning shall be conducted from downstream to upstream direction unless otherwise approved by Unitywater.
- 5.4.6 Cleaning shall be completed by water jetting or other method approved by Unitywater to remove all fat deposit, encrustations, corrosion products, silts, grease, roots and loose material to the satisfaction of Unitywater. (refer [POP205 Water Jet Cleaning of Plastic Pipes](#) for maximum recommended pressure at nozzle for pipes in good condition)
- 5.4.7 Pipeline cleaning shall be sufficient to enable installation of the pipe liner or patch repair.
- 5.4.8 Attention is drawn to the fact that the subject pipelines may be in an advanced state of deterioration.
- 5.4.9 The Contractor shall use techniques that do not compromise the integrity of the existing pipelines. If the method used for cleaning pipelines is having a deleterious effect on the pipelines, work shall cease immediately. No further cleaning of sewers by the initial method shall be undertaken by the contractor or their sub-contractor. The Contractor shall submit a proven alternative method of cleaning pipelines that ensures the integrity of the pipeline is sustained during the progress of works. This method must be approved by Unitywater.
- 5.4.10 If it is necessary that additional cleaning is required due to build-up of material in the sewer main to ensure a satisfactory level of cleanliness can be achieved, then this is to be undertaken at the approval of Unitywater.

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- 5.4.11 The Contractor is to consider that some sites can present difficult site conditions that impede accessibility to maintenance structures and may require a remote setup to enable the completion of cleaning to be achieved.

Disposal of Debris

- 5.4.12 All solid material dislodged from the sewer during cleaning shall be prevented from passing to the downstream sewer and shall be collected, removed and disposed of by the Contractor.
- 5.4.13 The Contractor is responsible for disposal of all waste material removed as a result of the works including payment of all associated fees.
- 5.4.14 Disposal of this material shall comply with the requirements of the Environmental Protection Act and other relevant legislation.

Pressure Surcharges

- 5.4.15 Contractors shall nominate the methodology for pressure cleaning to avoid pressure surcharges in house connection branches.

Initial Conduit Inspection

- 5.4.16 The Contractor shall perform conduit inspections that identify faults or inadequate cleaning that may impede or prevent the installation of liners or patches.

5.5. Rectification of Faults

- 5.5.1 The Contractor shall, during preparation works, identify any faults that may impede or prevent the installation of liners or patches.

Examples include but not limited to:

- Pipe displacement
- Pipe out of round
- Obstructions within pipe
- Protruding house connections

- 5.5.2 Where the rectification works requires excavation, realignment or sectional replacement of the pipeline, the Contractor shall perform repairs in accordance with the SEQ WS&S D&C Code.

- 5.5.3 Where sewer mains \leq DN225 end, and no terminal maintenance shaft exists, these should be constructed in accordance with SEQ D&C Code Standard Drawing SEQ-SEW-1314-1.

5.6. Installation of Liners and Patches

- 5.6.1 The installation of liners and patches shall be in accordance with the applicable standards and the product manufacturer's requirements.
- 5.6.2 Where entering or exiting an access chamber, the lining shall form a permanent watertight seal against the access chamber structure.
- 5.6.3 Linings shall transition smoothly into access chambers so as to produce a conduit surface of even grade.

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- 5.6.4 Where linings enter maintenance structures they are to have rounded nosing on inlet and outlet pipe to prevent damage to jetting equipment and Inspection equipment and cables.
- 5.6.5 The rehabilitation shall not result in localised discontinuities that have the potential to impede flow, cause additional flow turbulence, or promote the deposition of solids.

5.7. Rehabilitation of House Connection Branches

Cutting and Sealing

- 5.7.1 The installation of seal to lateral drain shall be in accordance with the applicable standards and the product manufacturer's requirements.
- 5.7.2 All openings of HCB's shall coincide exactly with the existing branch line and cut edges shall be smooth and bevel-free.
- 5.7.3 The Contractor shall ensure there is a permanent and effective seal between the sewer liner and the lateral drain.

Lateral Drains and Inspection Openings

- 5.7.4 Unitywater will nominate whether a lateral drain is to be relined or replaced.
- 5.7.5 The Contractor shall rehabilitate lateral drains as far as and including the first inspection opening in the respective property.
- 5.7.6 Where an inspection opening is damaged it shall be replaced, and where buried shall be extended to surface.
- 5.7.7 Where entering an inspection opening, the lining shall form a permanent and smooth watertight seal.

5.8. Final Conduit Inspection and Testing

- 5.8.1 The Contractor shall conduct sufficient inspection and testing work (and subsequent repair work where necessary) in order to be satisfied that works performed on each asset complies with the Specification.
- 5.8.2 All work governed by this Specification shall be inspected and documented by the Contractor in accordance with approved ITP's.
- 5.8.3 For the purposes of this specification, the minimum requirement for final conduit inspection shall be by CCTV inspection in accordance with WSA 05 - Conduit Inspection Reporting Code of Australia.
- 5.8.4 Where pressure mains have been lined they must be pressure tested in accordance with the SEQ D&C Code.
- 5.8.5 Unitywater may request to witness nominated activities on the ITP's.

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6. Quality Management

Inspection & Testing

- 6.1.1 The Contractor shall conduct sufficient inspection and testing work (and subsequent repair work where necessary) in order to be satisfied that work performed on each asset complies with the Specification.
- 6.1.2 The Contractor shall notify Unitywater of any QA/QC testing scheduled for each asset in order to verify that acceptance criteria have been met and that the relevant documentation is completed accurately.
- 6.1.3 All work governed by this Specification shall be inspected and documented by the Contractor in accordance with approved ITP's.
- 6.1.4 Where pipe liners or patches have been installed they must be inspected and tested for effectiveness. The ITP's should detail the methods to be employed including, but not limited to:
- visual inspection;
 - CCTV Inspection;
 - other techniques as required by product manufacturers;
- 6.1.5 Unitywater may request to Witness nominated activities on the ITP's.

Ad-Hoc Conduit Inspections

- 6.1.6 At the request of Unitywater, the Contractor shall perform ad-hoc conduit inspections for assets that have been lined or patched. These will be completed in accordance with this Specification.
- 6.1.7 The Contractor will provide Unitywater with copies digital video footage and summary asset condition reports from ad hoc conduit inspections in a format and delivery method acceptable to Unitywater.