



“Unitywater Testing Requirements Summary”

Trench Backfill Compaction Testing

(Water Supply (225mm and greater) and Sewerage)

- The consulting engineer shall be responsible for all compaction testing and shall arrange for the testing to be carried out by a NATA certified Test Laboratory. Modified compaction tests to be used.
- Prior to commencing work the consulting engineer shall prepare test plan showing the number of tests and depths in each zone where tests are to be carried out.
- The Laboratory shall randomly select test locations in each zone. The road authority supervisor may direct the Laboratory to undertake additional tests in any zone. The test locations shall be uniformly distributed over the works.
- Testing shall not be clustered within a zone or at boundaries of a zone. In deep trenches where more than 1 layer is to be tested, the test locations shall, where practicable, be staggered from those layers above or below by at least 5 m for water mains and 2 m for water services.

Trafficable Areas: “Defined as

- The full width of any existing or proposed road carriageway plus shoulders and extending
 - To 1 m beyond the shoulders or kerbs.
 - The full width of any property access driveway and extending 1 m either side.
 - The full length of any constructed footway including, but not limited to, concrete, asphalt
And crushed rock pavements.
 - The full width of any median strip.
 - Any other areas subject to vehicular traffic.
- Conduct one test for each 300mm layer of fill above bedding layer for each:
 - 300m² of trench backfill area or part thereof for water mains
 - 50 lineal metres for sewer mains

Non-Trafficable Areas:

- Conduct one test for each 900mm layer of fill for each:
 - 1200m² of trench backfill area or part thereof for water mains
 - 100 lineal metres for sewer mains

Manholes:

- Conduct one test within each 1m layer depth within 300 mm of each manhole.

General Notes:

- Dynamic Cone Penetrometer Testing (DCP) is not an acceptable test method

Compaction Required:

Material Type	Test Method	Minimum Value (%)	Minimum Value (%)
		Trafficable Areas – Trench Fill & Embedment	Non Trafficable Areas – Trench Fill & Embedment
Non-Cohesive	Density Index (ID) AS 1289.5.6.1	70	60
Cohesive	Dry Density Ratio or Hilf Density Ratio (Appropriate part of AS 1289)	95	90

NOTE: Graded gravels and sands having fines (silts and clays) greater than 5% shall have their compaction determined by the dry density ratio test method



Vacuum Testing (Sewer):

Manholes and sewers are not to be tested or CCTV'd before all earthworks have been completed and large machinery has been removed from site.

Manholes (Water drop testing is not acceptable)

- Apply -34 kPa and record time to drop to -30 kPa.

Maximum time allowed for 1050mm dia. manholes.

Depth	Time in seconds
0 – 2.4m	17
2.4 – 3.0m	21
3.0 – 3.7m	25
3.7 – 4.3m	30
4.3 – 4.5m	34
4.5 – 5.5m	38
5.5 – 6.1m	42

Sewer pipe (Pressure testing is not acceptable):

- Apply -27 kPa for 3 minutes and allow to stabilise. Once stabilised establish -23.6 kPa and record time and drop (not greater than 7kPa).

Minimum time to record vacuum drop:

Length	50 m	100 m	150 m	200 m	250 m	300 m
Dia.						
100mm dia.	2 min.	2 min.	2 min..	2 min.	3 min.	3 min
150mm dia.	3 min.	3 min.	3 min.	5 min.	6 min	6 min
225mm dia.	4 min.	5 min.	8 min.	10 min.	13 min.	15 min
300mm dia.	6 min.	9 min.	14 min.	18 min.	23 min.	29 min

* Timing in table above shall not commence until after initial 3min stabilising period is completed.

Deflection (Ovality) Testing (Sewer):

All flexible sewer pipes are to be deflection tested in accordance with WSAA Sewerage Code of Australia

Do not conduct deflection testing until at least 14 days after completion of placement and compaction of trench and embankment fill material.

Test sewers in sections from maintenance structure (IS, MH, MC, MS or TMS) to maintenance structure.

Pressure Testing (Water):

Shall be done after water services are connected and electrical conduits installed.

- All dead ends lines are to be tested. This may require temporary hydrants or tapping bands. Temporary tapping bands to be cut off when connection to live main occurs.
- Preliminary pressurise the mains to 75% of the test pressure for a minimum of twelve (12) hours.
- Apply test pressure (1200kPa) at the highest point of the water main for four (4) hours.
- Ideally there should be no pressure loss after four (4) hours or alternatively as per below



Volume of makeup water after a 3 hour test is to be not more than:

Length	50 m.	100 m.	200 m.	300 m.	400 m.
Dia.					
100 mm dia.	0.27 L	0.55 L	1.09 L	1.64 L	2.18 L
150 mm dia.	0.41 L	0.82 L	1.64 L	2.46 L	3.28 L
200 mm dia.	0.55 L	1.09 L	2.18 L	3.28 L	4.37 L
250 mm dia.	0.68 L	1.36 L	2.73 L	4.10 L	5.46 L
300 mm dia.	0.82 L	1.64 L	3.28 L	4.91 L	6.55 L
375 mm dia.	1.02 L	2.05 L	4.09 L	6.14 L	8.19 L
450 mm dia.	1.23 L	2.46 L	4.91 L	7.37 L	9.83 L

Chlorination/Disinfection and Bacteriological Testing

Chlorination/disinfection and bacteriological testing **must** be undertaken in accordance with Unitywater's "Procedure for Managing Water Quality during Mains Commissioning".

Water Quality Acceptance Criteria - New Mains

Water Quality Parameters	Units	Water Mains - Quality Limits
PH		>6.5 – <9.2
Apparent Colour	PCU	<15
Turbidity	NTU	<5
EC	uS/cm	<1250
Free Chlorine Residual	mg/L	<3mg/L
Total Chlorine Residual	mg/L	<3mg/L
E.coli. Count	cfu/100mL	<1
Total Coliforms	cfu/100ml	<1 OR <10 ¹
Heterotrophic Plate Count	Cfu/mL	<100

*Sources: Whilst the quoted water quality criteria are compliant with SEQ WSA03 Water Supply Code of Australia and guidance provided in the Australian Drinking Water Guidelines 2011 (ADWG), some minor modifications have been included to simplify this table for easier use as well as accommodate Unitywater specific requirements

Note1: <10 cfu/100mL Total Coliforms will be accepted where total chlorine is greater than 0.5mg/L.

CCTV Inspection Requirements:

Manholes and sewers are not to be tested or CCTV'd before all earthworks have been completed and large machinery has been removed from site.

All sewers and maintenance structures shall be inspected by CCTV after all backfilling operations have been satisfactory completed and all junctions are installed. This inspection is required to ensure that the pipe is without any construction defects, the pipe has no internal flow obstructions and all approved junctions are in right location. Further the inspection will verify the information provided with the 'As Constructed' drawings.

A secondary inspection is also required prior to but not more than two (2) weeks before onsite inspection for off maintenance certification.

The sewers and maintenance structures shall be cleaned prior to the CCTV inspection.

All CCTV inspections in general shall be carried out in accordance with the latest version of the WSAA Conduit Inspection Reporting Code of Australia WSA 05. The operator shall use Appendix F to highlight all unacceptable defects in the CCTV report.

In addition to the WSAA WSA 05 requirements the CCTV surveys shall comply with the following additional requirements:

- All CCTV surveys shall be accompanied by an inclination report in the form of a scaled graph that plots the pipe's altitude over the distance travelled. The inclinometer shall be accurate to +/-1%. The inclinometer reading shall be on screen display at all times during the recording of the CCTV survey.



- b) The CCTV survey shall be carried out from the centre of the start maintenance structure to the centre of the finish maintenance structure. Each maintenance structure shall be fully scanned using the pan/tilt and zoom functions of the CCTV camera and the video footage recorded as part of the overall CCTV survey.
- c) All pipe joints shall be scanned by a 360 degree pan.
- d) Additional welding defects to be coded for PE sewers with electro fusion joints:
 - a. A PE pipe end not cut square in a joint shall be coded as circumferential welding defect (Code WC)
 - b. Visible welding wires in a joint shall be coded as circumferential welding defect (Code WC)
 - c. Partially melted fusion couplings in a joint shall be coded as circumferential welding defect (Code WC)
- e) All changes in horizontal and vertical direction of the pipe along the survey shall be coded using the appropriate WSA 05 codes.
 - a. A number of general photographs shall be taken along the sewer surveyed, as a minimum to satisfy the requirements of this standard:
 - b. one photograph in each maintenance structure showing the condition of the structure above the pipe obvert level
 - c. one photograph each showing the connection point between the maintenance shaft/maintenance hole and the incoming/ outgoing pipes
 - d. a general photograph every 20-25m of the pipe condition not related to any defect over the distance surveyed
 - e. a photograph of each junction installed
 - f. photographs of all welding defects identified

Two copies of the following information shall be provided prior to commissioning of the assets:

- a) A digital video file (MPEG 1 or MPEG 2 format) for each sewer segment (Maintenance shaft/hole to Maintenance shaft/hole),
- b) Digital photographs (JPEG format) of certain defects as stated in Appendix F of WSA 05 and for all the situations mentioned above
- c) One digital file with the asset information, coding information and Inclinator readings (to an acceptable version of the WinCan software or other digital formats stated in future editions of the WSA 05 standard)
- d) Hardcopy of the WinCan report with the coding information including the photographs taken
- e) Hardcopy of the inclination report

All digital files shall be provided as data files on USB drive ('vob' files not acceptable).



Transport and Main Roads Specifications MRTS45 Road Surface Delineation - Technical Specification for hydrant and valve Identification:

SEQ-WAT-1300-1 Note 1 states

6 Material requirements:

6.1 Pavement markings

6.1.2 Paint

Paint shall be suitable for use on roads surfaced with a sprayed seal, hot and cold mixed asphalt and concrete.

Except where specifically shown otherwise on the design documents, paint shall be white, equivalent to or whiter than Y35, Off White as detailed in AS 2700. Where yellow paint is shown on the design documents or otherwise required by the Contract, the colour shall be equivalent to Y14, Golden Yellow as detailed in AS 2700

Paint used shall be water-borne road marking paint conforming to the requirements of AS 4049.3 and having approval under the Australian Paint Approval Scheme – Specification 0041/5.

6.1.3 Reflective glass beads

Reflective glass beads shall comply with the requirements for Type B, C or D glass beads as described in AS 2009. The type to be used shall be as stated in Clause 2 of Annexure MRTS45.1.

6.2 Raised retro-reflective pavement markers

Raised retro-reflective pavement markers shall comply with the requirements of AS 1906.3 and shall be Type A1 bi-directional.

7 Installation of pavement markings:

7.1 Setting out

The Contractor shall carry out all work necessary to establish satisfactory alignment of pavement markings, within the specified tolerances, using any device or method which will not damage the pavement nor conflict with other traffic control devices.

7.2 Weather conditions

Pavement markings shall not be applied when freshly applied pavement markings may become damaged by rain, fog or condensation before they have dried or set. Pavement surfaces shall be thoroughly dry immediately prior to the application of pavement markings.

7.3 Surface preparation

Surfaces which are to receive pavement markings shall be cleaned of all dirt, loose material and other contaminants. Pavement surfaces shall be thoroughly dry immediately prior to the application of pavement markings.

7.5 Application of pavement markings

7.5.1 Procedure

The Contractor shall submit its procedure for application of pavement markings. The procedure shall include details of the materials, application rates, equipment and method, including manufacturer's recommendations, to be used when applying pavement markings.

7.5.2 Paint

7.5.2.1 Mixing

Mixing of paint shall be carried out strictly in accordance with the manufacturer's recommendations.

7.5.2.2 Application equipment

Mechanical means shall be used to apply painted pavement markings.

All equipment used in the application of pavement markings shall produce pavement markings of uniform quality which conform to the requirements of this standard.

Stencils, boards and hand spray equipment shall be used to paint markings. Stencils shall conform to the dimensions shown on the design documents or in the Manual of Uniform Traffic Control Devices.



7.5.2.3 Application of paint and glass beads

All markings shall be of uniform thickness and intensity. Care shall be taken to avoid overspray on to the surrounding area.

Water-borne paint shall not be heated to a temperature greater than 65°C.

Two coats of paint and glass beads shall be applied on longitudinal lines to new surfaces. The first coat shall be cured to 'no pick up time' prior to the application of the second coat.

Glass beads shall be uniformly incorporated in all coats of paint concurrently with the application of the paint.

7.6 Raised pavement markers

7.6.1 Application of retro reflective pavement markers

The use of raised retro reflective pavement markers shall be in accordance with Clause 4.6.3 of the MUTCB

7.9 Tolerances

7.9.1 Pavement markings

Completed pavement markings shall:

- a) be uniform
- b) have clean and well-defined edges without running or deformation, and
- c) conform to the dimensions shown on the design documents or in the Manual of Uniform Traffic Control Devices (Qld)

When completed, pavement markings shall conform to the tolerances. Additionally, arrows and letters shall be placed square to the centreline of the traffic lane. Drips, overspray, improper markings, and paint and thermoplastic material tracked by traffic shall be immediately removed from the pavement surface by methods which do not damage the pavement surface.