

Engineering Construction Specification C25 Pipe Drainage

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This document is a modified version of AUS-SPEC 1352 Pipe Drainage October 2018 version

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1 General

1.1 Responsibilities

1.1.1 General

Requirement: Provide the pipework for the drainage system, as documented.

1.1.2 Performance

Requirements: As shown in the drawings

1.1.3 Design

Design life of pipe drainage system: 120 years useful life (this does not refer to ARI for hydraulic design)

1.2 Cross references

1.2.1 General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- *C01 General requirements (Construction)*
- *C02 Quality management (Construction)*
- *C03 Control of traffic*
- *C14 Subsurface drainage*
- *C23 Stormwater drainage (Construction)*
- *C27 Drainage structures*
- *C28 Auxillary concrete works*
- *Council's Standard Drawings*

1.3 Interpretations

1.3.1 Definitions

General: For the purposes of this worksection the following definitions apply:

- Effective pipe length: The centre-line length dimension specified by the manufacturer and subject to permissible tolerances.

1.4 Submissions

1.4.1 Execution

Invert protection to steel pipes: Submit cement slurry application procedure.

1.4.2 Products and materials

Product conformity: Submit manufacturer's certificate of conformance to the relevant standard for each batch of pipes before dispatch to site. Identify the item, source and record the inspection and test records that verify conformity.

Manufacturer's data and installation recommendations: Submit in conformance with AS/NZS 2041.4 Appendix A and AS/NZS 2041.6 Appendix A, AS/NZS 4058 Appendix B and AS 4139 Appendix A, as appropriate.

Drawings: Manufacturers Drawings

1.4.3 Samples

Components: Submit pipes and fittings.

Pre-treatment: If necessary to represent the condition and grading when compacted and in service, pre-treat samples.

Work-as-executed drawings: include stormwater system information sheets and works. Provide certified work as executed drawings showing plans, longsections, pit schedules with reduced levels of conduit invert at upstream and downstream end of each conduit run (between pits). Provide schedules showing itemised full construction value of each conduit run as well as conduit material type, class and size. Refer to HOLD POINTS.

1.4.4 Tests

Other tests: Submit results, as follows:

- Concrete pipes joint tests.

1.5 Inspections

1.5.1 Notice

General: Give notice so that inspection may be made of the following:

- Additional protective coatings: Field cut and repairs to steel pipes.
- Joints for concrete pipes: Joint testing.
- Pipework installation: Each section of the installed and jointed pipework before commencement of trench backfilling.

2 Materials

2.1 Concrete pipes

2.1.1 Precast reinforced concrete pipes

Requirement: Provide precast reinforced non-pressure concrete pipes to AS/NZS 4058 and the following:

- Pipe class and size, as documented.
- Pipe jacking: Only permitted when specified in the drawings
- Load classes: As documented.
- Jointing type: Provide as follows:
 - Spigot and socket joints: Flexible elastomeric seals to AS 1646.
 - Flush or butt joints: Use only for the first pipe if extending existing pipes.
- Clear cover to reinforcement: For normal environments to AS/NZS 4058 Table 3.1.

Marking: To AS/NZS 4058 clause 1.5.

Durability: Maximum concentration limit for chlorides, sulfates, aggressive CO₂, and pH levels to AS/NZS 4058 Appendix E.

Protective treatment: As shown in the drawings

2.1.2 Fibre reinforced concrete pipes

Requirement: Provide fibre reinforced concrete pipes to AS 4139 and in conformance with the following:

- Strength requirement: As shown in the drawings
- Pipe class and sizes: As documented.

- Load classes and installation conditions: As documented.
- Jointing type: Provide as follows:
 - Double V-ring joints: Flexible elastomeric seals to AS 1646.
 - Other joints: Jointing compound comprising plasticised butyl rubber and inert fillers, conforming to the manufacturer's recommendations.
 - Flush or butt joints: Use only for the first pipe if extending existing pipes.

Marking: To AS 4139 clause 12.

Durability: Maximum concentration limit for chlorides, sulfates, aggressive CO₂, and pH levels to AS 4139 Appendix B.

Protective treatment: As shown in the drawings

2.2 Plastic flexible pipes

2.2.1 General

Requirement: Provide flexible pipes including fitting to AS/NZS 2566.1 with pipe class and size as documented.

Pressure polyethylene (PE): To AS/NZS 4130.

Polyethylene (PE) and Polypropylene (PP): To AS/NZS 5065, such as StormPro (twin wall corrugated polypropylene pipes).

PVC-U pipes: To AS/NZS 1260.

Pressure PVC-U: To AS/NZS 1477.

Plastic flexible pipes: As shown on the drawings

Joint sealant and type: To AS/NZS 2566.2 Appendix F.

Rubber rings for pipe joints: To AS 1646.

Electrofusion jointing for PE pressure pipe: To PIPA POP001.

Butt fusion jointing for PE pipe: To PIPA POP003.

Solvent cement jointing for PVC-U pipe: To PIPA POP102.

3 Execution

3.1 Establishment

3.1.1 General

Excavation: To the *C23 Stormwater drainage (Construction)* worksection.

Excavation drainage: Dewater the excavation to permit the compaction of the foundation, the bedding and backfilling, as documented.

Tolerances dimensions: Provide culverts within 10 mm of the grade line and within 10 mm of the horizontal alignment, as documented.

Subsurface drain location: At the discharge end of culverts terminating at pits and headwalls, provide a 3 m length of 100 mm diameter subsurface drain, as follows:

- Position in the trench 100 mm above the invert level of the pipe.
- Discharge through the wall of the pit or headwall.
- Seal the subsurface drainage pipe at the upstream end and enclose in a seamless tubular filter fabric to the C14 Subsurface drainage worksection.

3.2 Installation

3.2.1 General

Stiffening of culverts: If required by the manufacturer, provide temporary stiffening struts to the interior prior to filling.

In the case of pipes 1,200mm or more in diameter, laid in situations where embankments are to be more than 3m high, measured above the invert of the pipe, pipes shall be stiffened temporarily by the Contractor by interior timber struts, erected before filling is placed. Struts shall be of hardwood measuring at least 100mm by 100mm or 125mm diameter. One strut shall be placed in a vertical position at each pipe joint, then spaced no greater than 1,200mm. Struts shall bear against a sill laid along the invert of the pipe and a cap bearing against the crown of the pipe. Both the sill and the cap shall be continuous throughout the length of the pipe and they shall be of sawn hardwood, of cross section not less than 100mm by 100mm. Struts shall be made to bear tightly by the use of wedges between the top of the struts and the cap. Struts, sills and caps shall be removed on completion of the embankment, unless removal is ordered earlier

3.2.2 Concrete pipes

Standard: To AS/NZS 3725.

Positioning of pipes: Lay pipes as follows:

- Install with the socket end upstream.
- Install pipes with markings indicating the crown or invert in conformance with the markings.

Minimum pipe length: 1.2 m.

Stiffening of pipes: If required by the manufacturer, provide temporary stiffening struts to the interior before back filling.

Lifting holes: Before backfilling, seal lifting holes in all pipes with approved plastic preformed plugs or a 3:1 sand cement mortar.

Bulkhead locations: Construct bulkheads to the *C27 Drainage structures* worksection on all lines where the pipe gradient exceeds 5%.

Anchor blocks: Provide anchor blocks at a maximum spacing of 3 m and at bends or junctions for all stormwater pipes laid on a grade more than 20% and as documented.

3.2.3 Joints for concrete pipes

Joint testing: Test joints, as follows:

- Precast concrete pipes: To AS/NZS 4058 Appendix H.
- Fibre reinforced concrete pipes: To AS 4139 Appendix L.

Skid rings: To the manufacturer's recommendations, including the use of lubricants, if wedge shaped 'skid' rubber rings are required.

Flush or butt joints: Seal the joints with proprietary rubber sleeves to the manufacturer's recommendations.

Other joints: Provide direct side connections to other pipes, as documented.

3.2.4 Flexible plastic pipes

Standard: To AS/NZS 2566.2.

Positioning of pipes: Install pipes with markings indicating the crown or invert, or the direction of flow in conformance with the markings.

Bulkheads: If required, provide bulkheads or trenchstops to AS/NZS 2566.2 Table 5.7 or as documented.

Flotation prevention: To AS/NZS 2566.2 clause 5.5.3.



3.3 Completion

3.3.1 Pipework installation

Progressive inspections: Inspect each section of installed and jointed pipework before commencement of trench backfilling.

4 Annexure

4.1 Annexure – Summary of hold and witness points

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
C25-HP01	SUBMISSIONS Products and materials Product conformity	H	Certificate of conformance of all pipes and fittings.	10 days before delivery	Delivery of pipes
C25-HP02	SUBMISSIONS Samples Conformity of Components (where required)	H	Samples of fittings	10 days before delivery	Delivery of pipes and fittings
C25-WP03	INSPECTIONS, Notice Additional protective coatings	W	Field cut and repairs to steel pipes. Submit cement slurry procedures	3 days	Execution
C25-WP04	INSPECTIONS Notice Joints for concrete pipes	W	Joint testing Elastomeric seal. Check V ring joints	3 days	Precast concrete pipes
C25-HP05	INSPECTIONS Notice Pipework installation	H	Each section of the installed and jointed pipework before commencement of trench backfilling	Progressive, 1 day notice	Execution and installation. For development inspections book through "MyInspect".
C25-HP06	SUBMISSIONS Work as Executed Drawings and Drainage Asset Attribute Schedules	H	Submit certified drawings and schedules	2 weeks after completion of works	Prior to Subdivision Certificate/Occupation Certificate
C25-HP07	CCTV INSPECTION OF PIPELINE	H	Submission of CCTV video and accompanying inspection report	5 days after completion of CCTV inspection	Prior to sealing of road. Inspection and reports as per WSA Code.
	*H = Hold point W = Witness point				

4.2 Annexure - Referenced documents

The following documents are incorporated into this worksection by reference:

AS/NZS 1260	2017	PVC-U pipes and fittings for drain, waste and vent application
AS/NZS 1477	2017	PVC pipes and fittings for pressure applications
AS 1646	2007	Elastomeric seals for waterworks purposes
AS/NZS 2041		Buried corrugated metal structures
AS/NZS 2041.2	2011	Installation
AS/NZS 2041.4	2010	Helically formed sinusoidal pipes
AS/NZS 2041.6	2010	Bolted plate structures
AS/NZS 2566		Buried flexible pipelines
AS/NZS 2566.1	1998	Structural design
AS/NZS 2566.2	2002	Installation
AS/NZS 3725	2007	Design for installation of buried concrete pipes
AS/NZS 3750		Paints for steel structures
AS/NZS 3750.9	2009	Organic zinc-rich primer
AS/NZS 4058	2007	Precast concrete pipes (pressure and non-pressure)
AS/NZS 4130	2009	Polyethylene (PE) pipes for pressure applications
AS 4139	2003	Fibre-reinforced concrete pipes and fittings
AS/NZS 5065	2005	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Austroroads AP-R575	2018	Design of buried flexible pipes
PIPA POP001	2017	Electrofusion jointing of PE pipe and fittings for pressure applications
PIPA POP003	2017	Butt fusion jointing of PE pipes and fittings - recommended parameters
PIPA POP102	2014	Solvent cement welding of PVC pipe
AASHTO M190	2004	Standard specification for bituminous-coated corrugated metal culvert pipe and pipe arches