

# Roads

## Master Specification

### RD-DK-S1 Supply of Pipes and Culverts

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## RD-DK-S1 Supply of Pipes and Culverts

### 1 General

- 1.1 This Part specifies the requirements for the supply of concrete pipes, box culverts (not exceeding 4200 mm span and 4200 mm height) and other precast drainage structures such as junction boxes, side entry pits and headwalls.
- 1.2 Documents referenced in this Part are listed below:
- a) AS 1597.1 Precast reinforced concrete box culverts - Small Culverts (not exceeding 1200 mm span and 1200 mm height).
  - b) AS 1597.2 Precast reinforced concrete box culverts - Large culverts (from 1500 mm span and up to and including 4200 mm span and 4200 mm height).
  - c) AS 1646 Rubber Joint Rings for Water Supply, Sewerage and Drainage Purposes.
  - d) AS 3610 Formwork for concrete.
  - e) AS 4058 Precast Concrete Pipes.
  - f) AS 4139 Fibre Reinforced Concrete Pipes and Fittings.
  - g) AS 9001 Quality management systems – Requirements.
- 1.3 The Contractor is responsible for ensuring that the pipes, culverts and drainage structures are designed for construction loading.

### 2 Quality Requirements

- 2.1 Concrete pipes, box culverts and precast drainage structures shall be manufactured in accordance with a Quality System certified to AS 9001. The Contractor shall give at least 7 days prior notice of the commencement of manufacture of the pipes.

### 3 Supply of Concrete Pipes

- 3.1 Unless otherwise shown on the drawings, all concrete pipes shall have Rubber Ring Joints (RRJ) with belled sockets and supplied with rubber rings complying with AS 1646. If interlocking (flush) joints are specified, the concrete pipes are to be supplied with external rubber bands for jointing (i.e. Humes "EB", Rocla "Sandband" or approved equivalent).
- 3.2 Reinforced Concrete Pipes shall comply with AS 4058. The information pursuant to Appendix B of AS 4058 is as specified on the drawings.
- 3.3 Fibre Reinforced Concrete Pipes shall comply with AS 4139. The information pursuant to Appendix A of AS 4139 is as specified on the drawings.

#### Damage to Reinforced Concrete Pipes

- 3.4 Any damage to reinforced concrete pipes shall be classified in accordance with AS 4058 Clause 3.4 "Workmanship and Finish" and subject to assessment in accordance with Table RD-DK-S1 3-1.

**Table RD-DK-S1 3-1 Acceptability of Defects**

| Defect Type | Pipe Wall                                      | Joint Surface                                  |
|-------------|--|--|
| 1           | Acceptable                                     | Not Applicable                                 |
| 2           | Acceptable after completion of approved repair | Not Applicable                                 |
| 3           | Reject   | Not Applicable                                 |
| 4           | Acceptable after completion of approved repair | Acceptable after completion of approved repair |

| Defect Type | Pipe Wall                                      | Joint Surface                                  |
|-------------|--|--|
| 5           | Acceptable after completion of approved repair | Acceptable after completion of approved repair |
| 6           | Reject   | Reject   |
| 7           | Reject   | Reject   |

#### Damage to Fibre Reinforced Pipes

- 3.5 Fibre reinforced pipes shall be rejected if fractures and cracks wider than 0.1 mm and deeper than 0.3 mm are present.

## 4 Supply of Small Box Culverts

- 4.1 Small box culverts (i.e. not exceeding 1200 mm span and 1200 mm height) shall:
- comply with AS 1597.1;
  - be inverted "U" shape (crown and base type) vide AS 1597.1, Table 1.1; and
  - have plain butt joints.
- 4.2 Culverts shall be provided with a means of attaching lifting gear. The clear distance between reinforcement and the nearest surface of the culvert shall be not less than 25 mm.

## 5 Supply of Large Box Culverts

- 5.1 Large box culverts (i.e. from 1500 mm span and up to and including 4200 mm span and 4200 mm height) shall:
- comply with AS 1597.2;
  - be inverted "U" shape (crown and base type) vide AS 1597.2, Table 1.1; and
  - have plain butt joints.
- 5.2 Concrete, reinforcing and formwork used for the manufacture of large box culverts shall comply with the following Parts of the DPTI Master Specification for Transport Infrastructure:
- ST-SC-S6 "Steel Reinforcement";
  - ST-SC-C6 "Formwork";
  - ST-SC-S7 "Supply of Concrete";
  - ST-SC-S3 "Precast Concrete Units";
  - ST-SC-S4 "Low Pressure Steam Curing of Precast Units" (where applicable); and
  - ST-SC-S5 "Heat Accelerated Curing" (where applicable).
- 5.3 The DPTI Master Specification is available from:  
[https://www.dpti.sa.gov.au/contractor\\_documents/specifications\\_-\\_division\\_CC\\_concrete](https://www.dpti.sa.gov.au/contractor_documents/specifications_-_division_CC_concrete).
- 5.4 Surface defects and deviations shall not exceed those specified in AS 3610, Table 3.4.2. Tolerances not covered by Table 3.4.2 shall comply with the following:
- the external corners of the end sections shall not depart by more than 5 mm in any direction from the corner point location defined by the drawings;
  - the tolerance on the thickness of concrete shall be + 8, - 0 mm at any section; and
  - the end faces of the units shall be square to the roof, walls and floor, when measured with a set square across the thickness of the section with a maximum deviation of 2 mm.

## 6 Supply of Precast Drainage Structures

### General

- 6.1 If the Principal has provided drawings for drainage structures, the drawings will be based on insitu construction and the use of precast drainage structures shall be at the Contractor's risk. The Contractor is responsible for ensuring that the dimensions, design and manufacture of any precast drainage structure are suitable for use in the Works.

### Steel Reinforced Drainages Structures

- 6.2 Concrete, reinforcing and formwork used for the manufacture of precast drainage structures shall comply with the following Parts of the DPTI Master Specification for Transport Infrastructure:
- ST-SC-S6 "Steel Reinforcement";
  - ST-SC-C6 "Formwork";
  - ST-SC-S7 "Supply of Concrete";
  - ST-SC-S3 "Precast Concrete Units";
  - ST-SC-S4 "Low Pressure Steam Curing of Precast Units" (where applicable); and
  - ST-SC-S5 "Heat Accelerated Curing" (where applicable).
- 6.3 Precast headwalls may be manufactured from geopolymers concrete complying with ST-SC-S2 "Geopolymer Concrete" in lieu of concrete complying with ST-SC-S7 "Supply of Concrete".
- 6.4 The DPTI Master Specification is available from: [https://www.dpti.sa.gov.au/contractor\\_documents/specifications\\_-\\_division\\_CC\\_concrete](https://www.dpti.sa.gov.au/contractor_documents/specifications_-_division_CC_concrete).

### Fibre Reinforced Drainages Structures

- 6.5 Subject to obtaining prior approval, the Contractor may use fibre reinforced precast concrete drainage structures. Any such request for approval shall be accompanied by comprehensive details of:
- the concrete mix design;
  - the reinforcing fibres (including fibre material type and dosage rate);
  - structural calculations; and
  - evidence of satisfactory performance of the product, including any previous approval to use the product.
- 6.6 A proposal to use fibre reinforced precast concrete shall constitute a **Hold Point**.

## 7 Hold Points

- 7.1 The following is a summary of Hold Points referenced in this Part:

| Document Ref. | Hold Point  | Response Time  |
|---------------|---|----------------|
| 6.5 & 6.6     | Proposal to use fibre reinforced precast concrete | 3 working days |

## 8 Verification Requirements and Records

- 8.1 The Contractor shall supply written verification that the following requirements have been complied with and supply the verification with the lot package.

Table RD-DK-S1 8-1 Verification Requirements

| Document Ref. | Subject   | Property  | Test Procedure   | Test Frequency   | Acceptance Limits                                      |
|---------------|---|---|--|--|--|
| 3             | Reinforced Concrete Pipes: Manufacturing Requirements   | As specified in AS 4058, Table 4.1  | Appendices to AS 4058                                  | As specified in AS 4058, Section 4   | As specified in AS 4058, Section 4                     |
| 3             | Fibre Reinforced Pipes: Manufacturing Requirements      | Product certification by a JAS-ANZ accredited certification body that the requirements of AS 4139 Appendix N are complied with. |  |  |  |
| 4             | Small Box Culvert Manufacturing Requirements            | Ultimate Load   | AS 1597.1, Section 3                                   | Required in the first instance for each size of box culvert or in the first instance any design change | As specified in AS 1597, Part 1, Section 3             |
|               |   | Water Absorption Test   | -  | Not required (vide AS 1597.1, Clause 1.4)  | -  |
| 5             | Large Box Culverts Manufacturing Requirements           | Concrete Requirements, vide all ST-SC-S and C Parts (excl. St-SC-C4)  | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4) | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4)   | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4) |
| 6             | Precast Drainage Structures: Manufacturing Requirements | Concrete Requirements, vide all ST-SC-S & C Parts (excl. ST-SC-C4)  | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4) | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4)   | As specified in all ST-SC-S & C Parts (excl. ST-SC-C4) |