

Master Specification

Part RD-DK-S1

Supply of Pipes and Culverts

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RD-DK-S1 Supply of Pipes and Culverts

1 General

- a) This Master Specification 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. This includes:
 - i) the documentation requirements, as set out in section 2;
 - ii) the supply of concrete pipes, as set out in section 3;
 - iii) the supply of small box culverts, as set out in section 4;
 - iv) the supply of large box culverts, as set out in section 5;
 - v) the supply of precast drainage structures, as set out in section 6;
 - vi) the Hold Point and Witness Point requirements, as set out in section 7; and
 - vii) the verification requirements and records, as set out in section 8.
- b) The supply of concrete pipes, box culverts must comply with the Reference Documents, including:
 - i) Austroads Technical Specification ATS-2230 Supply of Small Box Culverts;
 - ii) AS 1597.2 Precast reinforced concrete box culverts, Part 2: Large culverts (exceeding 1200 mm span or 1200 mm height and up to and including 4200 mm span and 4200 mm height);
 - iii) AS 1646 Elastomeric seals for waterworks purposes;
 - iv) AS 3610 Formwork for concrete;
 - v) Austroads Technical Specification ATS-2210 Supply of Steel Reinforced Precast Concrete Pipes;
 - vi) AS 4139 Fibre-reinforced concrete pipes and fittings; and
 - vii) AS/NZS ISO 9001 Quality management systems - Requirements.
- c) Concrete pipes, box culverts and precast drainage structures must be manufactured in accordance with a quality system certified to AS/NZS ISO 9001 Quality management systems - Requirements.

2 Documentation

2.1 Design Documentation

In addition to the requirements of PC-EDM1 “Design Management”, the Design Documentation must include evidence of compliance in accordance with section 6.1c) (where applicable).

2.2 Construction Documentation

In addition to the requirements of PC-CN3 “Construction Management”, the Construction Documentation must include evidence that construction loadings have been accounted for, in accordance with section 3.1e).

2.3 Quality Management Records

In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Quality Management Records must include the verification requirements and records specified in section 8.

3 Supply of concrete pipes

3.1 General

- a) Reinforced concrete pipes must comply with Austroads Technical Specification ATS-2210 Supply of Steel Reinforced Precast Concrete Pipes.
- b) All concrete pipes must have rubber ring joints (RRJ) with belled sockets and supplied with rubber rings complying with AS 1646 Elastomeric seals for waterworks purposes, unless otherwise shown on the Design Drawings.
- c) 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).
- d) Fibre reinforced concrete pipes must comply with AS 4139 Fibre-reinforced concrete pipes and fittings. The information pursuant to Appendix A of AS 4139 Fibre-reinforced concrete pipes and fittings is as specified on the Design Drawings.
- e) The Contractor is responsible for ensuring that all concrete pipes, box culverts and precast drainage structures are designed for construction loading, with evidence provided as part of the Construction Documentation.

3.2 Damage to reinforced concrete pipes

Any damage to reinforced concrete pipes will be considered a Non-Conformance and the associated Hold Point set out in PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable) will apply. The Non-Conformance Report must classify the damage in accordance with AS 4058 Precast concrete pipes (pressure and non-pressure) and be subject to assessment in accordance with Austroads Technical Specification ATS-2210 Supply of Steel Reinforced Precast Concrete Pipes.

3.3 Damage to fibre reinforced pipes

Fibre reinforced pipes must 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

Small box culverts must comply with Austroads Technical Specification ATS-2230 Supply of Small Box Culverts.

5 Supply of large box culverts

- a) Large box culverts (i.e. exceeding 1200 mm span or 1200 mm height and up to and including 4200 mm span and 4200 mm height) must:
 - i) comply with the requirements set out in ST-SD-D1 "Design of Structures";
 - ii) comply with AS 1597.2 Precast reinforced concrete box culverts, Part 2: Large culverts (exceeding 1200 mm span or 1200 mm height and up to and including 4200 mm span and 4200 mm height); and
 - iii) be inverted "U" shape (crown and base type) - refer to AS 1597.2 Precast reinforced concrete box culverts, Part 2: Large culverts (exceeding 1200 mm span or 1200 mm height and up to and including 4200 mm span and 4200 mm height).
- b) Concrete, reinforcing, and formwork used for the manufacture of large box culverts must comply with the following Master Specification Parts:
 - i) ST-SC-S6 "Steel Reinforcement";
 - ii) ST-SC-C6 "Formwork";

- iii) ST-SC-S7 "Supply of Concrete";
 - iv) ST-SC-S3 "Precast Concrete Units";
 - v) ST-SC-S4 "Low Pressure Steam Curing of Precast Units" (where applicable); and
 - vi) ST-SC-S5 "Heat Accelerated Curing" (where applicable).
- c) Surface Defects and deviations for large box culverts must not exceed those specified in AS 3610 Formwork for concrete. Tolerances not covered by AS 3610 Formwork for concrete must comply with the following:
- i) the external corners of the end sections must not depart by more than 5 mm in any direction from the corner point location defined by the Design Drawings;
 - ii) the tolerance on the thickness of concrete must be +8 mm, -0 mm at any section; and
 - iii) the end faces of the units must 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.
- d) The Contractor must give at least 7 days prior notice of the commencement of manufacture of the large box culverts, which will constitute a **Witness Point**.

6 Supply of precast drainage structures

6.1 General

- a) If the Principal has provided Design Drawings for drainage structures, the Design Drawings will be based on insitu construction and the use of precast drainage structures must be at the Contractor's risk.
- b) The Contractor is responsible for ensuring that the dimensions, design, and manufacture of any precast drainage structure are suitable for use in the Works.
- c) The Contractor must provide evidence as part of the Design Documentation that the design satisfies the requirements of the Contract Documents, including ST-SD-D1 "Design of Structures", AS 5100 Bridge Design or any other relevant Reference Document.

6.2 Steel reinforced drainage structures

- a) Concrete, reinforcing and formwork used for the manufacture of precast drainage structures must comply with the following Master Specification Parts:
 - i) ST-SC-S6 "Steel Reinforcement";
 - ii) ST-SC-C6 "Formwork";
 - iii) ST-SC-S7 "Supply of Concrete";
 - iv) ST-SC-S3 "Precast Concrete Units";
 - v) ST-SC-S4 "Low Pressure Steam Curing of Precast Units" (where applicable); and
 - vi) ST-SC-S5 "Heat Accelerated Curing" (where applicable).
- b) Precast headwalls may be manufactured from geopolymer concrete complying with ST-SC-S2 "Geopolymer Concrete" in lieu of concrete complying with ST-SC-S7 "Supply of Concrete".

6.3 Fibre reinforced drainage structures

- a) Subject to obtaining prior approval, the Contractor may use fibre reinforced precast concrete drainage structures. Any such request for approval must be accompanied by comprehensive details of:
 - i) the concrete mix design;
 - ii) the reinforcing fibres (including fibre material type and dosage rate);

- iii) structural calculations; and
 - iv) evidence of satisfactory performance of the product, including any previous approval to use the product.
- b) A proposal to use fibre reinforced precast concrete will constitute a **Hold Point**. Fibre reinforced precast concrete must not be used until this Hold Point has been released.

7 Hold Points and Witness Points

- a) Table RD-DK-S1 7-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.
- b) Table RD-DK-S1 7-2 details the review period or notification period, and type (documentation or construction quality) for each Witness Point referred to in this Master Specification Part.

Table RD-DK-S1 7-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
6.3b)	Proposal to use fibre reinforced precast concrete	Documentation	5 Business Days review

Table RD-DK-S1 7-2 Witness Points

Section reference	Witness Point	Documentation or construction quality	Review period or notification period
5d)	Notice of the commencement of manufacture	Construction quality	7 days notification

8 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-DK-S1 8-1 have been complied with.

Table RD-DK-S1 8-1 Verification requirements

Section reference	Subject	Property	Test procedure	Test frequency	Acceptance limits
3	Reinforced concrete pipes: manufacturing requirements	As specified in ATS2210	As specified in ATS2210	As specified in ATS2210	As specified in ATS2210
3	Fibre reinforced pipes: manufacturing requirements	Product certification by a JAS-ANZ accredited certification body that the requirements of AS 4139 Fibre-reinforced concrete pipes and fittings Appendix N are complied with.			
4	Small box culvert manufacturing requirements	As specified in ATS2230	As specified in ATS2230	As specified in ATS2230	As specified in ATS2230
5	Large box culverts manufacturing requirements	Refer to ST-SC-S1 to S7 and ST-SC-C1 to C7 (excl. ST-SC-C4 "Sprayed Concrete Work")	As specified in ST-SC-S1 to S7 and ST-SC-C1 to C7 (excl. ST-SC-C4 "Sprayed Concrete Work")		
6	Precast drainage structures: manufacturing requirements	Refer to ST-SC-S1 to S7 and ST-SC-C1 to C7 (excl. ST-SC-C4 "Sprayed Concrete Work")	As specified in ST-SC-S1 to S7 and ST-SC-C1 to C7 (excl. ST-SC-C4 "Sprayed Concrete Work")		