

Main Roads Technical Standard

MRTS25

Manufacture of Precast Concrete Pipes

June 09

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Table of Contents

	Page
1 INTRODUCTION.....	1
2 ADMINISTRATION REQUIREMENTS	1
3 MATERIAL	1
4 DESIGN, MANUFACTURE AND SUPPLY	1
5 INFORMATION TO BE SUPPLIED BY THE CONTRACTOR.....	4
5.1 General	4
5.2 Prior to Delivery of Pipes to the Site	4
5.3 With the Delivery of Each Batch of Pipes	5
6 PRODUCT MARKING.....	5
7 CONSTRUCTION	5

Manufacture of Precast Concrete Pipes

1 INTRODUCTION

This Technical Standard applies to the manufacture of unreinforced and reinforced concrete circular pipes used for the conveyance of stormwater which does not place the pipe under internal pressure.

This Technical Standard shall be read in conjunction with MRTS01 *Introduction to Technical Standards*, MRTS50 *Specific Quality System Requirements* and other Technical Standards as appropriate.

This Technical Standard forms part of the Main Roads Specifications and Technical Standards Manual.

2 ADMINISTRATION REQUIREMENTS

Precast concrete pipes shall be manufactured only by a Main Roads registered manufacturer.

For the requirements for registration and information regarding Main Roads' registered manufacturers refer to –

Queensland Department of Main Roads
 Concrete Technology
 GPO Box 1412
 Brisbane Qld 4001

3 MATERIAL

Concrete used in the manufacture of precast concrete pipes shall comply with the requirements of MRTS70 *Concrete*.

Reinforcement used in the manufacture of precast concrete pipes shall comply with the requirements of MRTS71 *Reinforcing Steel*.

4 DESIGN, MANUFACTURE AND SUPPLY

Manufacture and supply of precast concrete pipes shall comply with the requirements of AS 4058.

The design life of precast concrete pipes shall be 100 years. The design life means that 98% of the production of all types manufactured shall remain in a serviceable condition with negligible maintenance for 100 years.

The design loads for concrete pipes shall be based on AS 3725 and road vehicle loads in particular in Clauses 6.5.3.1 and 6.5.3.3 to be W80, A160, SM1600 and HLP400.

Table 4-A – Live Load Pressure for AS 5100 Highway Loads

Depth (m)	Wheel Load Pressure (kPa)	Depth (m)	Wheel Load Pressure (kPa)
0.40	246	2.80	19
0.60	129	3.00	18
0.80	78	3.20	17
1.00	52	3.40	17
1.20	39	3.60	16
1.40	30	3.80	16
1.60	24	4.00	15
1.80	23	4.20	15
2.00	22	4.40	14
2.20	21	4.60	14
2.40	20	4.80	13
2.60	19	5.00	13

Concrete pipes shall be manufactured in accordance with AS 4058 with the following amendments –

- a) Tables 3.1 of AS 4058 shall be deleted and replaced by the following –

The minimum exposure classification shall be B2. Exposure classification C shall be used for tidal or saltwater applications. The cover for spigots and sockets on exposure classification B2 and C shall be 15 mm and 20 mm respectively. Appropriate cover for the barrel is detailed in Table 4-B;

Table 4-B – Required Cover for the Barrel of Spun, Rolled and Roller Compacted Pipes

REQUIRED COVER FOR THE BARREL OF SPUN, ROLLED AND ROLLER COMPACTED PIPES		
Exposure classification	Minimum concrete characteristic compressive strength (f'c) MPa	Cover mm
B2	40	25
	50	20
C	50	30

- b) Table 3.6 of AS 4058 shall be amended that defect types 3, 6 and 7 are not acceptable as detailed in Table 4-C;

Table 4-C – Replacement for Table 3.6 of AS 4058

ACCEPTABILITY OF PIPE WALL AND JOINT SURFACE DEFECTS			
Acceptability and conditions			
Defect type	Pipe Wall	Joint Surface	
	Drainage Pipes	Drainage Pipes Flush joints	Drainage Pipes Rubber Ring Joints
1	Acceptable	Not applicable	Not applicable
2	Acceptable after repair	Not applicable	Not applicable
3	Not acceptable	Not acceptable	Not acceptable
4	Acceptable	Acceptable	Acceptable
5	Acceptable after repair	Acceptable	Acceptable after repair
6	Not Acceptable	Not Acceptable	Not Acceptable
7	Not Acceptable	Not Acceptable	Not Acceptable

- c) Clause 5.2.4 of AS 4058 shall be amended by more specifically defining the frequency of testing as shown in Table 4-D such that under routine testing, one ultimate load test, one water absorption test, one cover check, and one dimensional accuracy check shall be required for each pipe size and class for drainage application produced in any given year or 1 per 1000 units produced which ever gives the most tests for each size and class of pipe manufactured at each factory.

Table 4-D – Replacement for Table 5.1 of AS 4058

SUMMARY OF TEST REQUIREMENTS (See Note)			
Test Name	Appendix / Reference Clause	Pipe Application/Test Purpose	
		Drainage	
		Type testing	Routine testing
Proof load	Appendix C	Required	Required
Ultimate load	Appendix C	Required	Required
Hydrostatic pressure – to (only for rubber–ring jointed pipes)	Appendix D	–	–
90 kPa	–	Only if specified	Only if specified
Specified	–	N/A	N/A
Ultimate	–	N/A	N/A
Water absorption	Appendix F	Required	Required
Cover– (only for reinforced pipes)	Appendix G	Required	Required
Dimensional accuracy	Clauses 3.1, 3.2 and 3.3.1	Required	Required
Joint assembly test– (Only for rubber-ring jointed pipes)	Appendix H	Required	Only if specified

LEGEND:

- Required = test is to be carried out whether specified or not
- Only if Specified = test is carried out only if specified by the Purchaser as a required test
- N/A = test is not applicable

NOTE: As an alternative to performing an ultimate pressure test, the manufacturer may submit for acceptance a calculated test pressure based on the following assumed limiting tensile stress in the materials and a uniform tensile strain through the thickness of pipe wall:

- a) Concrete 2.1 MPa for vertically cast pipes, or 2.8 MPa for spun or roller–compacted pipes; and
- b) Reinforcement 100 MPa for plain bars or 140 MPa for wire and fabric to AS/NZ 4671
- d) The crack load and ultimate load for Class 2 to Class 10 pipes shall be in accordance with AS 4058. Pipes with higher loads than given by AS 4058 shall be in accordance with the requirements of Table 4-E. Unreinforced pipes shall not be used.

Table 4-E – Test Loads for Classes 12MR, 14MR and 16MR

TEST LOADS FOR LOAD CLASSES 12MR, 14MR and 16MR (CIRCUMFERENTIALLY REINFORCED CONCRETE PIPES)						
Crack or ultimate test load (see Note) kN/m						
Size Class	Load class					
	Class 12MR		Class 14MR		Class 16MR	
	Crack.	Ult.	Crack.	Ult.	Crack.	Ult.
375	108	162	144	216	180	270
450	123	183	164	244	205	305

TEST LOADS FOR LOAD CLASSES 12MR, 14MR and 16MR (CIRCUMFERENTIALLY REINFORCED CONCRETE PIPES)						
Crack or ultimate test load (see Note) kN/m						
Size Class	Load class					
	Class 12MR		Class 14MR		Class 16MR	
	Crack.	Ult.	Crack.	Ult.	Crack.	Ult.
525	138	207	184	276	230	345
600	153	228	204	304	255	380
675	165	249	220	332	275	415
750	180	270	240	360	300	450
825	189	282	252	376	315	470
900	201	303	268	404	335	505
1050	228	342	304	456	380	570
1200	258	387	344	516	430	645
1350	285	426	380	568	475	710
1500	309	462	412	616	515	770
1650	330	495	440	660	550	825
1800	351	525	468	700	585	875
1950	375	561	500	748	625	935
2100	396	591	528	788	660	985
2400	435	654	580	872	725	1090
2700	471	708	628	944	785	1180
3000	513	768	684	1024	855	1280

NOTE: The test load for a particular application should be determined in accordance with MRTS 25.

5 INFORMATION TO BE SUPPLIED BY THE CONTRACTOR

5.1 General

The Contractor shall provide to the Administrator the information specified in Clauses 5.2 and 5.3, obtained from the precast concrete pipe manufacturer, in accordance with the times specified.

5.2 Prior to Delivery of Pipes to the Site

The following information shall be provided, if requested by the Administrator, before any pipes are delivered to the Site –

- a) drawings showing complete dimensions, including tolerances, of the pipes and their joints;
- b) an outline of the sampling and test program by which the manufacturer monitors compliance with this standard; and
- c) water absorption and crack load test results for the batch of pipes.

5.3 *With the Delivery of Each Batch of Pipes*

With each batch of pipes delivered to the site and as part of the accompanying delivery docket, the Contractor shall provide a conformance report, issued by the precast concrete pipe manufacturer, confirming that the pipes supplied conform to the requirements of AS 4058 and this standard.

6 PRODUCT MARKING

In addition to the requirements in AS 4058, all pipes manufactured in accordance with this standard will be marked "MRTS25 (06/09)".

7 CONSTRUCTION

The maximum angle of deflection of joints is two (2) degrees.