



Technical Support Sheet

Marine Environment Options

Options for Durability of Concrete Pipes, Concrete Manholes and other Precast Concrete Products in a Marine Environment.

GENERAL

This technical support sheet provides options for durability of concrete pipes, concrete manholes and other precast concrete products in a marine environment. For options outside this please contact the Engineering Team at Hynds Pipe Systems.

For more information on Hydura Concrete, please refer to Technical Guide D1.11 Hydura Concrete Pipe and Precast Structures.

TECHNICAL DEFINITIONS

Concrete cover

The thickness, in millimetres, of concrete between any surface of circumferential and longitudinal steel reinforcement, excluding nibs, end spacers and the ends of the longitudinal reinforcement, and the nearest concrete surface of the pipe.

Normal environment

An underground environment having negligible influence on the in-service life expectancy of pipe and having a minimum cover to reinforcement complying with the Standard AS/NZS 4058.

Marine environment

An underground environment for a pipe where the interior surface of the pipeline is also subject to tidal flow (i.e. not openly exposed to direct wave action or wind-driven salt-borne spray).

Other environment

An environment that does not comply with the definitions for either normal or marine environments.

CONCRETE PIPES

The minimum concrete cover to the steel reinforcing internally and externally in the barrel and socket of a spun concrete pipe to be installed in a marine environment, as defined above, is 20 mm for GP concrete (Table 3.1 in AS/NZS 4058 refers) for a design life of 100 years.

Normal environment spun concrete pipe has a minimum cover of 10 mm. Therefore spun concrete pipes for installation in a marine environment will usually require a thicker wall than normal spun concrete pipes of the same class.

In areas where the pipes are in the splash zone or subjected to wind-driven salt-borne spray we recommend marine environment cover and HYDURA Concrete.

Wet cast precast concrete pipes (2100 Ø and above) for a marine environment require 35 mm minimum cover to reinforcement.

CONCRETE MANHOLES (RISERS, FLANGE BASES AND INTERNAL BASES)

All spun concrete manhole risers (>1050 mm Ø) have cover > 20 mm, so can be used in marine environments without any changes.

Precast manhole risers (2300 mm Ø and above) have cover > 35 mm, so can be used in marine environments without any changes.

Flanged and internal bases for marine environments will require the base component to be manufactured with HYDURA concrete. Refer to requirements set out for precast elements below).

There are 2 options for FB and IB Manholes in marine environments:

1. HYDURA base cast on to a HYDURA Riser
2. HYDURA base cast on to a standard riser

Inspection chambers (IC) for a marine environment will always have to be supplied with a 25mm sacrificial layer TW (Thickwall) version.

PRECAST CONCRETE PRODUCTS

NZS3101:Part1:2006 Concrete Structures Standard assigns Type C Exposure Classification to concrete members with surfaces subjected to tidal/splash/spray actions of sea water.

The minimum cover required for a specified intended life of 100 years is 50 mm, and 50MPa HYDURA (65% GBS) concrete or 50MPa FA (30% Fly ash) concrete.

The minimum cover requirement may result in the marine version of some precast concrete element requiring thicker walls, with higher mass and cost.

It is important when to note this difference and to check whether a thicker wall is required for the marine version. Elements that may require a thicker wall are cesspits, wingwalls, standard chambers, etc.

TABLE 1 Summary of Requirements for Marine Environment Pipes, Manholes and Precast Concrete Elements

Product	Minimum requirements	Detail
Spun Concrete Pipe	20 mm cover to reinforcing	Special marine version required
Wet Cast Precast Concrete Pipe	35 mm cover to reinforcing	Special marine version required
Spun Concrete MH Risers	20 mm cover to reinforcing	Standard Riser OK for marine environment
Spun Concrete IC	20 mm cover to reinforcing	TW Inspection Chamber OK for marine environment
Wet Cast Precast Concrete MH Risers	35 mm cover to reinforcing	Standard Riser OK for marine environment
FB or IB with Spun Concrete MH Riser	50 mm cover to reinforcing and 50 MPa HYDURA or FA Concrete for the FB or IB	HYDURA/FA Base with HYDURA Riser OR HYDURA/FA Base with Standard Riser
FB or IB with WET Cast Precast Concrete MH Riser	50 mm cover to reinforcing and 50 MPa HYDURA or FA Concrete for the FB or IB	HYDURA/FA Base with HYDURA Riser OR HYDURA/FA Base with Standard Riser
Precast Concrete Products (e.g. catchpits, wingwalls, chambers)	50 mm cover to reinforcing and 50 MPa HYDURA or 50MPa FA Concrete.	Marine versions may require thicker walls than standard product

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