Installation guide for precast concrete access chambers (manholes)

Compiled 1994

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1. Scope and purpose

1.1 Purpose

This Guide is an aid to the successful installation of access chambers for wastewater systems, using precast concrete components.

Installers should also be aware of the guidelines issued by the manufacturers of precast components. If you require further information about the product in use, contact the manufacturer.Format

1.2 Format

Typical clauses from installation specifications of various Water Authorities are included as a guide.

Following this in a different type style is advice on methods of installation and of achieving the specification requirements.

Please note that this advice is offered to assist with effective construction of precast concrete access systems, but all responsibility for on-site works, and for effective completion of the structure, remains with the installer. No responsibility for failure to meet any test is accepted by the manufacturer, unless failure can be directly attributed to a faulty product.

1.3 Application

This is published as an installation guide only. if the typical clauses contained herein differ from the authority's documentation or drawings, the authority's documentation shall apply.

1.4 Scope

This guide covers the installation of precast access chamber components for wastewater systems up to 300 mm pipeline diameter and up to 6 metres deep.

1.5 Definitions access chamber

A chamber which a person can enter to inspect, test, clear and remove obstructions in safety.

Authority	The water and/or wastewater authority or corporation who will be responsible for operation of the system and under who's jurisdiction the chamber is being constructed.
Benching	Smooth finished area at the bottom of the chamber, through which the charnel is constructed. Benching is graded according to the authority's specification.
Chamber	The completed structure, consisting of all components (shaft, taper, top, cover, lid) fixed in position.
Channel	Waterway through the access chamber base, constructed 'on grad' with the pipeline.
Drawings	Drawings issued by the authority which detail the construction requirements.
Installer	Any person or company who is responsible for the building of access chambers.
Principal	As defined in AS 2124 *General Conditions of Contract*, the principal stated in Annexure of a construction contract.
Superintendent	As defined in AS 2124 *General Condition of Contract*, the person named in the Annexure of a construction contract as the Superintendent or other person from time to time appointed in writing by the Principal to be the Superintendent and notified as such in writing to the construction contractor by the Principal and, so far as concerns the functions exercisable by a Superintendent's representative (includes a Superintendent's representative).

Supplier	A manufacturer or supplier of recast concrete access chamber components.

2. Safety

The installer must ensure the safety of the Installer's employee's and all other people who are on or adjacent to the site.

The Installer must comply with safety legislation including but not limited to:

- Occupational Health and Safety Act
- Dangerous Goods Act
- Mines Act

The Installer must also comply with the safety codes and regulations including but not limited to:

- Code of Practice for Safety Precautions in trenching operations
- Mines Act regulations and statutory rules
- Roadworks signing code of practice
- Explosive codes
- Safe lifting regulations
- Entry to confiner spaces regulations

Lifting of components must be carried out using safe lifting practices.

Note: rubber jointing rings and mastic compounds used in jointing, contain root inhibiting chemicals. Care should be taken to wash hands prior to eating, after handling these items.

3. Materials

Components must comply with the relevant Australian Standard, at this time *Precast Concrete Access Chambers for Sewerage Applications.*

When components and accessories are delivered to the site, they should be checked for damage and omissions to ensure that installation can proceed successfully. Check to ensure that the components are available to enable finishing to the designed cover level. Correct lifting apparatus must be on hand before work can commence. Refer to the component manufacturer for lifting gear specification.

At the time of writing, this Standard is being drafted. Until publication of the Australian Standard, components should comply with the Draft Standard DR 93085.

4. Excavation

Minimum dimensions
The excavation all and ground support must be a minimum 150mm clear of the outside of the component.

Depth below pipe
Refer to Section 5, Base Construction for depth of excavation required.

Over excavation
Where an excavation is deeper than that specified, the Installer must replace the excessive excavation with minimum N20 concrete, crushed rock or stabilized crushed rock, as directed by the Superintendent before proceeding with the installation.

Concrete used for refilling of over excavation must be minimum grade N20 to AS 1379-1991 unless otherwise specified on the drawings.

5. Base construction

Where the Superintendent determines that the natural foundation material is inadequate to support the access chamber, the Installer must remove the unsuitable material and replace as for an over excavation (refer to clause 4).

Concrete used in the base construction process must be type SR, and minimum grade N25 to AS 1379-1991 unless otherwise specified on the authority's drawings.

Flexible joints must be provided on all pipeline connections to access chambers in accordance with the authority's drawings, if not specific, flexible joints must be within 700 min of the outside wall of the chamber.

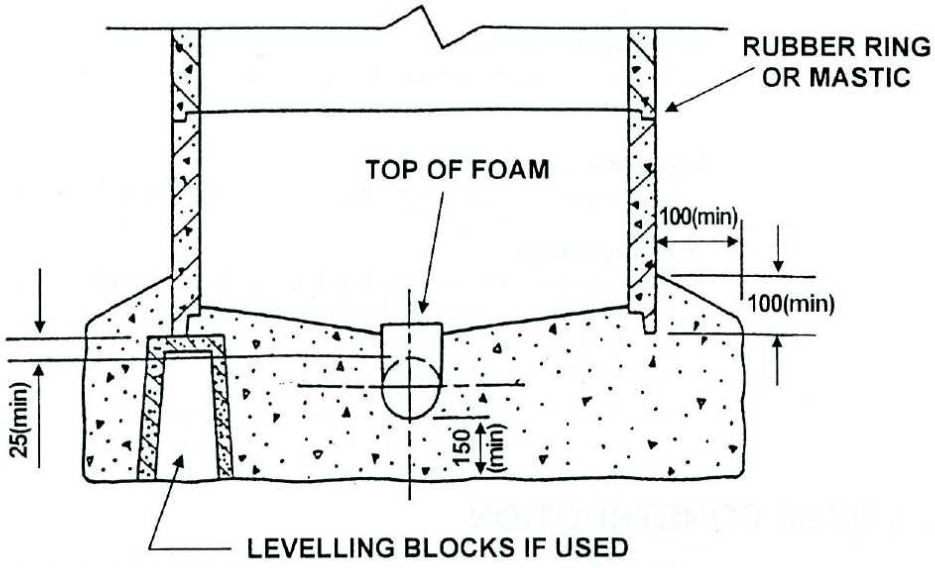
Two methods of base construction are possible. These are the cast-in-situ base and the precast base.

5.1 Cast In Situ base

Where cast in situ bases are to be used, the bottom shaft component must be supported above the excavation bottom and concrete poured around the bottom component leveling blocks, and inlet and outlet pipes, formwork must be used to form the channels required in accordance with the drawings.

The laying of pipes in a continuous length through access chambers for later cutting away and channel forming is not permitted without the specific approval of the authority.

Figure 1 - CAST IN SITU BASE



A minimum of 150 mm of concrete depth must be allowed under the channel through the access chamber the bottom chamber component may be any height, as available, to suit site conditions and Installer's preference.

Method using levelling blocks

The bottom component is cast into in-situ concrete in accordance with Figure 1. Incoming and outgoing pipes are laid and polystyrene foam channel formers are fitted (if desired or if specified by the Authority). Base blocks are placed and levelled and the starter unit is placed into position. Concrete is then placed and vibrated To avoid aggregate segregation, concrete must not be dropped from a height exceeding one metre.

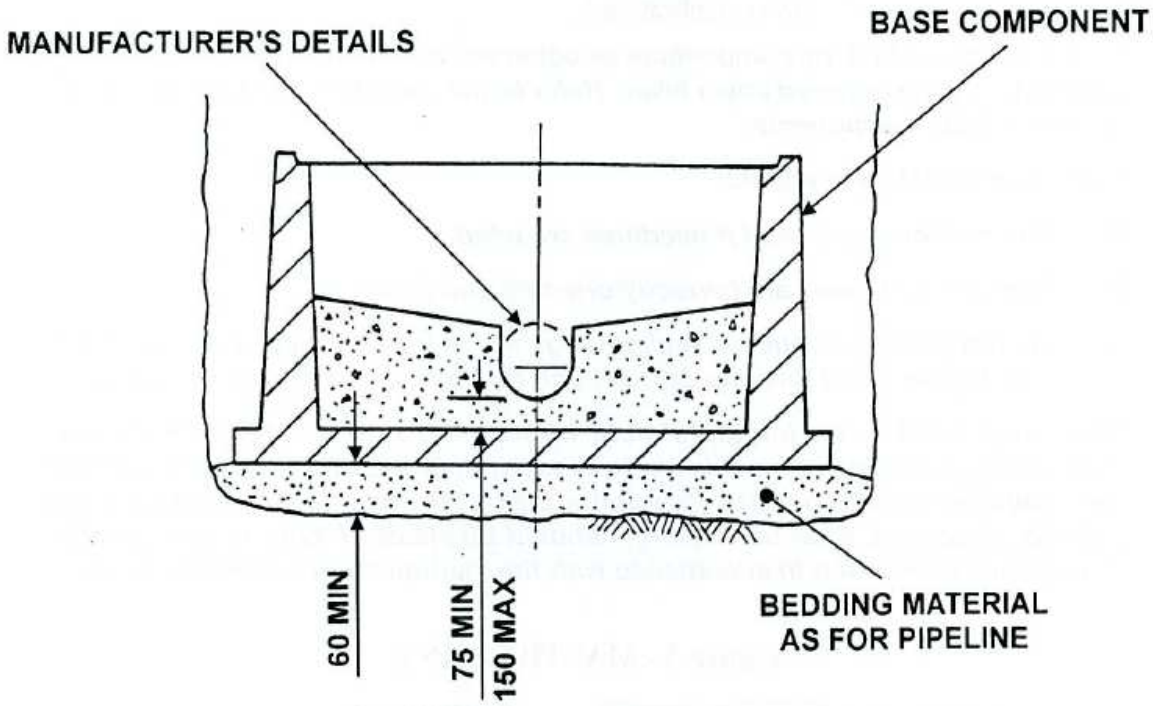
The embedment depth of the base unit must achieve a minimum outside embedment depth and width of 100mm (refer to figure 1).

Nesting method

The incoming and outdoing are laid and polystyrene foam channel formers are fitter (if desired or if specified by the authority). The starter unit is placed on wet in-situ concrete and levelled. Whichever method is used for cast-in-situ base, the in-situ concrete must be allowed to cure adequately prior to placing the remaining components.

5.2 Precast base

Figure 2 - INSTALLATION OF PRECAST BASE



5.2 Precast base

Precast base components may incorporate factory-formed holes or alternatively holes may be core drilled on site using a core drill. Repair of factory-formed holes which are incorrectly located is not permitted.

Where precast bases are to be used, the precast base must be supported on the same material as used for supporting the pipeline, to a minimum thickness of 75mm and a maximum thickness of 150mm.

Jointing of pipelines to the precast base must be either using epoxy mortar or for vitrified clay pipelines of epoxy mortar may be replaced by type SR, grade N25 concrete provided that the concrete fills any void between the component and pipe and extends to the first joint in the pipeline.

6. Assembly of components

The components must be assembled and jointed in accordance with the drawings and the manufacturer's instructions, jointing surfaces must be clean and free of unacceptable defects and damage before making the joint. Acceptable and unacceptable defects are defined in clause 3.3.6 of the Australian Standard for Precast Concrete Access Chambers for Sewer Applications.

Check to ensure that the components selected will result in the installation being completed to the required cover level. Refer to the manufacturer for information as to available components.

Care must be taken to ensure:

- Correct lifting gear and procedures are used
- In step irons (if used) are correctly oriented and in line
- In jointing mastic or rubber sealing rings are placed correctly in accordance with figure 3 or 4 (as appropriate) and the manufacturer's instructions.

The component to be jointed should be lowered into position slowly and deliberately, ensuring contact is made all around, uniformly. It is useful to hold the component to be jointed slightly above the one in position, to allow steadying prior to placement. After placement, it should be checked that the components have joined evenly and in accordance with the manufacturer's specifications.

1. The wedge rubber ring must be clean

Figure 3 - MASTIC JOINT

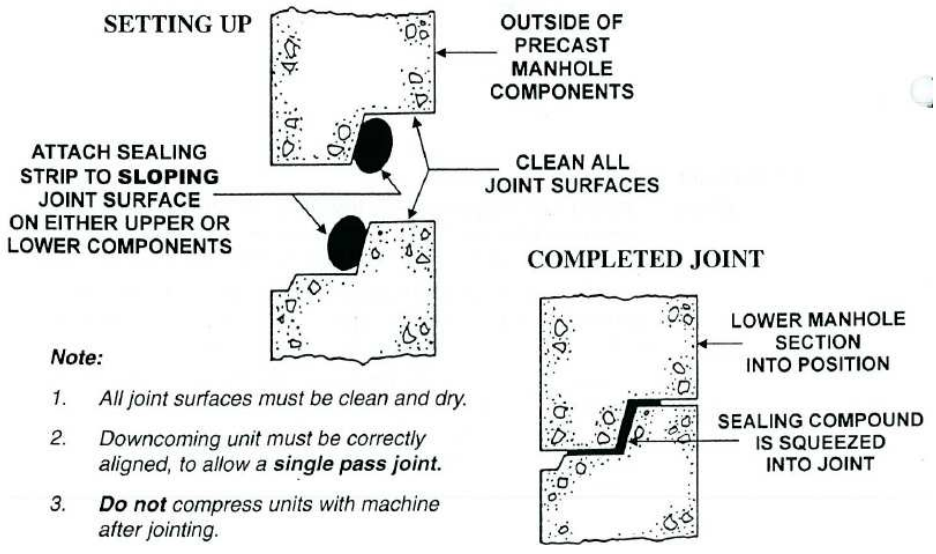
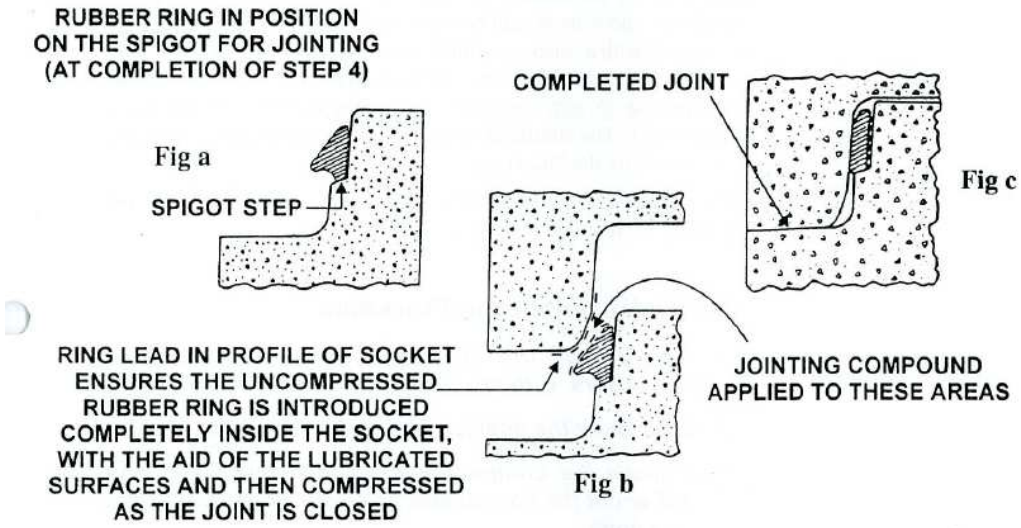


Figure 4 - RUBBER RING JOINT



1. The wedge rubber ring must be clean and free of damage such as cuts, gouges, etc.

2. Place the ring around the spigot with the ribbed side of the ring against the concrete spigot.

3. Insert a smooth rounded objet such as a screwdriver shaft under the ring and run around the spigot circumference two or three times to equalize the stretch in the ring.

4. Push the ring down to ensure it rests firmly against the spigot step (see figure a).

5. Apply a generous quantity of jointing compound to the ring surface and socket lead-in. Avoid getting compound under the ring (see figure b).

6. Align the components to be joined and lower the socketed component ensuring the correct alignment is maintained to engage the rubber ring lead-in of the socket profile (see figure c).

7. The lighted components, such as 350 shaft units, may require a downward push to full close the joint.

8. Additional components must not be installed on top of any joint that is not fully closed (i.e. concrete against concrete).

7. Drop inlets

When drop inlets are required, they must be connected to the components in accordance with the drawings, holes in the wall of chamber components should be made by core drilling or by cutting the components with a concrete cutting saw and must be made by hitting the component with a hammer or any impact tool.

The core drilled holes must be 75mm minimum clear of the near face of any access chamber joint. The internal drop pipe must be assembled and secured in accordance with the drawings.

The inlet must be sealed to the authority's requirements and be capable of passing the required test (refer to section 12).

Drop inlet installation procedure

1. Dry place the component in which the drop inlet occurs, with no rubber ring or mastic in position.

2. Chalk mark the position of the incoming pipe.

3. Remove the component to ground level, and core drill or cut the correct size hole with a concrete saw or core borer.

4. Install the component.

5. Fit the incoming pipe and seal as required. Await curing of sealing material before fitting out the drop structure.

8. Assembly of top components

Covers must be finished at the required level and slop as specified on the drawings or directed by the Superintendent. Make up rings may be used to control the level and slope at which the cover is finished. Epoxy mortar or other approved filling material to the authority's requirements may also be used.

If concrete infilling of covers is required, it should comply to Australian Standard 3996-1992 Metal Access Covers, Grates and Frames. If this differs from the authority's requirements the specifications and drawings of the authority will apply.

9. Step irons and ladders

Step irons or ladders where used, must be located and fixed in accordance with the authority's requirements and drawings. Step irons, where used MUST be installed in components at the factory, installation of step irons in components on site is NOT permitted.

10. Tolerances

The Installer must construct access chambers to the following requirements:

10.1 The invert levels for inlet and outlet pipes must be within the tolerances specified for pipe laying.

10.2 In addition to 10.1 backfill through the channel is NOT acceptable. The channel must be formed evenly between the inlet and outlet pipes avoiding excessive depth within the channel and conforming to the authority's requirements.

10.3 The position of the access chamber centre must be within 75mm of the position indicated on the drawings.

10.4 The variation from plumb must not exceed 10mm in any 3 metres or 20mm in any 6 metres.

10.5 The level if the cover must be within 5mm of the level specified on the drawings or as directed by the Superintendent.

10.6 Step irons, if required are aligned vertically to within 10mm.

10.7 The spacing of step irons does not exceed 350mm nor vary more than 15mm within any one access chamber.

11. Backfilling

The material used for backfilling around the access chamber must be used for backfilling the pipeline except where otherwise shown on the drawings or ordered by the Superintendent. The backfilling material must be placed evenly around the circumference of the access chamber and compacted or sluiced ensuring that the components and joints are not displaced.

Backfilling may be performed either after the cover unit is installed or after each component is installed.

Care must be taken to ensure uniform compaction is achieved around the access chamber. No uneven side loads or construction traffic loads should be allowed to be applied.

The backfilling operation should be completed with the aim of minimal or no subsidence of the fill material after completion of the works.

12. Testing

Access chambers must be capable of passing either a vacuum test or a water test as specified by the authority. The Installer must perform the required test on any access chamber nominated by the Superintendent.

If a vacuum test is required the Installer must perform the vacuum test after backfilling. The maximum allowable loss of vacuum in 3 minutes is 5 kPa after achieving a vacuum of 28 kPa.

If a water test is specified, it may be carried out prior to backfilling. After plugging all pipe opening, the access chamber must be filled with clean water to the lowest point in the top of the access cover frame. Plugs should be positioned in the pipes as near as practicable to the internal face of the access chamber. After allowing an interval for internal absorption, of no less than 15 minutes, the access chamber must be refilled and the water loss measured during the following 30 minutes.

The access chamber passes the test if the drop in water level is less than 3mm for each 1 metre depth of access chamber when measured from the bottom of the access cover recess in the frame to the invert of the outlet from the access chamber.

Access chambers that fail to meet the requirements of the specified test must be remedied.

13. Concluding summary

Providing a few critical steps are observed, precast access chambers will meet the requirements of the authority.

Step 1 Ensure that the components are not damaged when delivered.

Step 2 Replace over excavation with correct.

Step 3 Ensure correct starting level.

Step 4 Do NOT attempt to repair sections.

Step 5 Jointing of chamber components is carried out uniformly and positively.

Step 6 Channel is correctly formed.

Step 7 Ensure that covers comply to AS 3996 or authority specifications as appropriate.

Step 8 Comply with all tolerances.

This document is acknowledged by the following authorities as a guide for installation of precast concrete access chamber systems, for all areas under their jurisdiction.

Barwon Region Water Authority
Central Highlands Water Board
Colac Region Water Authority
Gippsland Water
Melbourne Water
Portland Water Board
Sunraysia Water Board
Tarago Water Board
Campaspe Region Water Authority
City of Warrnambool
Coliban Region Water Authority
Goulburn Valley Region Water Authority
Mid Goulburn Regional Water Board
Rural City of Wodonga
Tambo Water Board

CONSENT – This document is published with the individual written consent of all of the above mentioned. The specification was compiled by a committee comprising Melbourne Water, Barwon Region Water Authority, CSR Humes and Rocla Pipeline Products with the objective of providing a common and unified approach to construction of precast access chambers.