PINNACLE

Hynds Pinnacle® Series 4m Diameter Manhole

Technical Guide D4.13

(North Island Only)

Manufactured at our state of the art world leading concrete manufacturing plant in Pōkeno, the 4m Diameter Manhole is capable of taking large diameter pipe connections and comes in 1m high units for ease of installation on site.

Applications

- Stormwater and Wastewater Manholes
- Caisson units
- Pipeline junctions
- Pipeline direction changes
- Catchment inlet structures

Product Attributes

- Strong and durable
- Watertight joint
- Accurate dimensions
- Lid and cover options to suit various load requirements

Approvals/ Standards

- Designed to CPAA guidelines - loads on circular precast manholes

Sustainability

- Available in Hynds LC® low carbon concrete
- Verifiable carbon footprint data available
- Customisable for climate-resilient infrastructure

Quality/Environment/Health & Safety

Hynds management systems are certified to ISO 9001:2015, 45001:2015, and 14001:2018 standards

HYNDS PIPE SYSTEMS

FIG. 1 Photo of 4m Manhole on site.

Introduction

With increasing demands for larger infrastructure, increasing our product range for larger precast has never been more important.

The 4m manhole can be used as a manhole for large diameter pipeline junctions, jacking pits for jacking pipes or for precast pump stations.

They can also be used as caisson shafts. Caissons are precast concrete shafts that are progressively sunk, either under its own weight or with the help of caisson jacks, in a controlled manner from the surface to a predetermined depth. Single caisson units can range in diameter from as little as 2m up to our current diameter of 4m. For larger caissons like 6m, 8m or 10m segmental pieces can be made. For example, a single riser unit would be made up of 2 or more pieces for ease of transport.

The 4m Pinnacle manhole riser is supplied in a single piece for quick installation. It uses the standard 20mm manhole sealant for sealing between riser joints and has a base unit riser that comes with pre-formed holes for casting the insitu flange onsite. It is 4m in diameter internally and comes in 1m high units for easy onsite installation.

The standard manhole lid option has a 710mm diameter hole offset, rated to HN-HO-72 loading and is 375mm thick.

For special project requirements and custom options, see your local Hynds representative.

Standard Range Specifications

Manhole Systems contain a number of components, which all need to be considered before selecting the required manhole system for your job. Consideration needs to be given to: Diameter and Depth, Local Authority Specifications, Loadings and the Durability requirements.

Our Standard range of Pinnacle Manholes are designed to the CPAA Guidance Note (NZ) – Loads on Circular Precast Concrete Manholes and Access Chambers.

Made-to-Order or Custom Product Options

We recognise that every job is different and that our Standard Range of products may not be suitable for your installation. We have a number of product options ready that are made-to-order to suit these installations, and if required we will consider new solutions to meet your needs.

Below are options that fit within the made-to-order or custom product options.

Refer to our Concrete Manhole National Catalogue for more details.

Application	Hynds Options
Higher Strength	Higher strength manholes may be required depending on the site requirements.
Sewer - Some wastewater pipelines and manholes have the potential to produce high concentration of Hydrogen Sulphide (H_2S), leading to biogenic corrosion.	Sacrificial Liner - Increase concrete cover internally by 25mm to act as a sacrificial layer of concrete. Available in some sizes. Lined Manhole - Line the manhole internally with Hyliner High Density Polyethylene (HDPE). This requires site welding of the joints between riser sections and underside of the concrete lid. Refer to Technical Guide D1.12 Hyliner AKS.
Marine - Marine environment as defined in AS/NZS 4058	Marine - Marine grade options with additional cover in Risers as defined in AS/NZS 4058 and HYDURA concrete in bases are available in some sizes. Refer to Technical Support Sheet D1.1A Marine Environment Options and the Concrete Manhole National Catalogue for more detailed information.
Acidic or Acid Sulfate Soil	Increase concrete cover externally by 10mm to act as sacrificial layer or, HYDURA Concrete / 30% Fly Ash or both of the above.
Internal Watertightness	All of our Pinnacle range manholes can offer a hydraulic seal up to an internal pressure of 50kPa. Pressure's greater than this require specific design.
Fabricated specials	Discuss any fabricated manhole requirements you may have.
Other sizes	Hynds can work together with you to investigate and design a specific solution to fit the project need.

Manhole Base

The Manhole Base is only available in a 1m height and is supplied in a single piece for quick installation. This base unit riser comes with pre-formed holes for casting the insitu flange onsite.

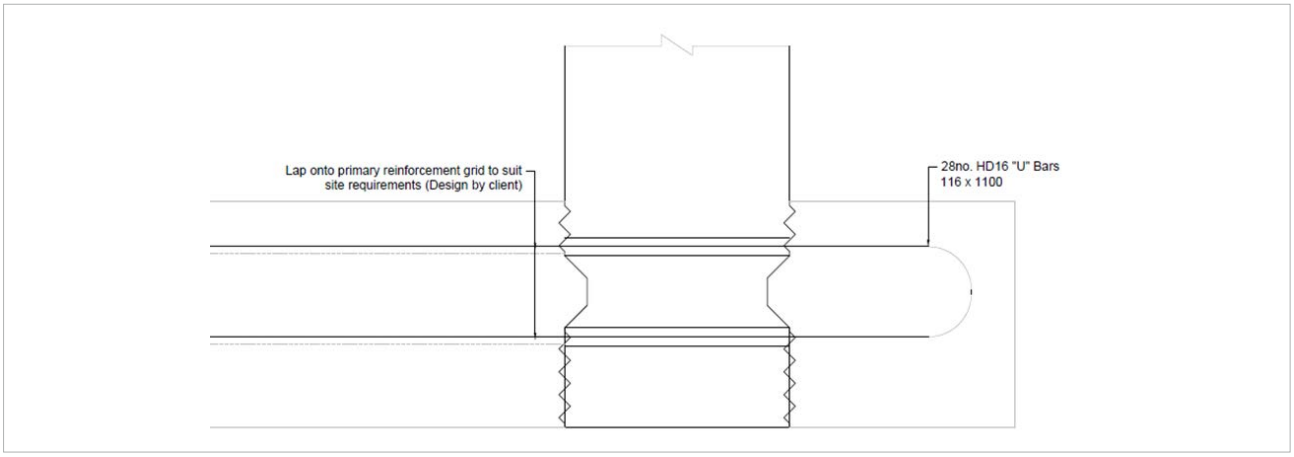


FIG. 2 Cross section of insitu flange reinforcement

Manhole Riser

The 4m Pinnacle Manhole Riser is supplied in a single piece for quick installation. It uses the standard 20mm manhole sealant for sealing between riser joints.

Seal code SM203800

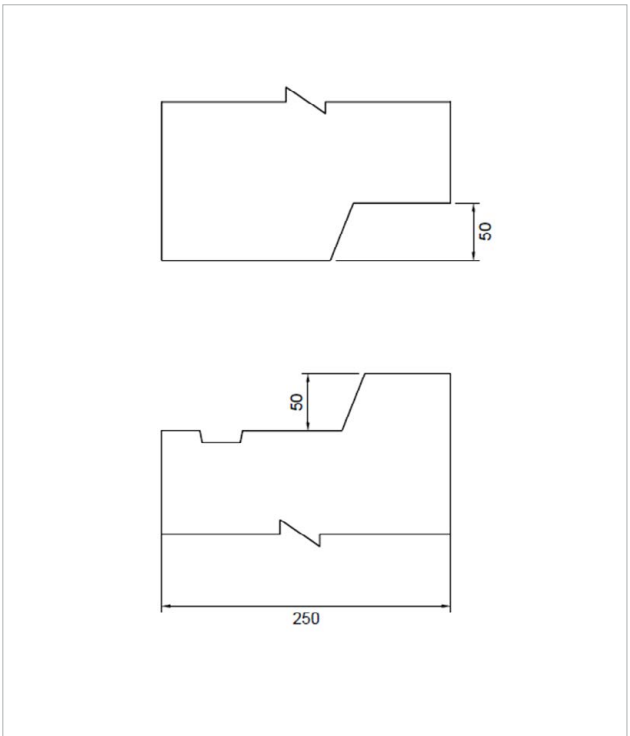


FIG. 3 Riser joint configuration

Manhole Access

The riser section does not come with cast-in inserts for Pinnacle Manhole Steps. A ladder can be purchased and fixed on site to the required location. Alternatively, the manhole can be accessed safely via a tripod and a harness.

FIG. 4 Drilling head for TBM

Manhole Lid

Lids are designed and manufactured in accordance with NZS 3109 and the CPAA Guidance Note (NZ) Loads on Circular Precast Concrete Manhole and Access Chambers. Hynds manufacture a wide range of precast concrete manhole lids to suit manholes from 1050 mm Ø to 4000 mm Ø that are designed for the following specific load ratings:

Load Type	Description	Load Rating (kN)
LD20	Lightly Trafficked Areas – Driveways, light vehicle only	20kN Wheel Load
HD60	Residential and secondary roads where bridge rating design is not required	60kN Wheel Load
HN-HO-72	Bridge Manual loading. Major roads and state highways.	60 – 120kN Wheel Load

The 4m manhole lid is 375 mm thick and comes with an offset 710mm circular opening. The lid is designed to a HN-HO-72 loading.

Custom design manhole lids, and lids with cast–in covers, grates and frames are also available made to order.

Note: *Refer to Table 2 for a full list of Manhole Lids.*

Manhole Covers and Frames

Standard manhole covers and frames are manufactured from strong and durable cast and ductile iron. The cast iron cover and frame is coated with a bituminous protective compound, and the ductile iron cover and frame with a water based non toxic paint. Types include LD (Light Duty) for pedestrian and domestic vehicle use, HD (Heavy Duty) for light commercial up to 7 Tonne wheel load, Extra Heavy Duty for Industrial and Carriageway use.

Note: *For the full range of access safety grilles, covers and frames please contact your local Hynds Branch*

Connections

Pipe connections fitted into the riser wall are made onsite using striking or cutting tools. All Hynds Manhole Risers are reinforced with fabricated steel cages which require removal with bolt cutters only after all holes are punched out. Working from outside the flanged base, punch the smallest possible hole diameter *(pipe O.D. + 50 mm)*

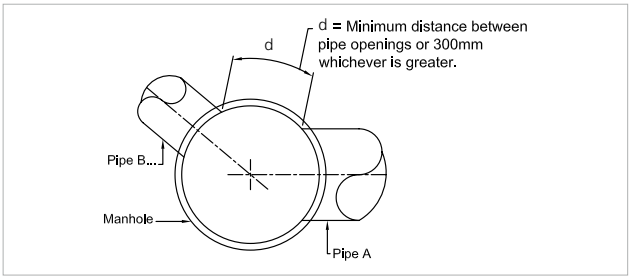


FIG. 5 Manhole/Pipe selection and minimum distance between pipes

General rules for connection sizing and location:

1. Chamber and pipe selection
   - Maximum opening or pipe O.D. = 0.65 x Chamber I.D.
2. Minimum distance between pipes *(d)*
   - When equal sized pipes:
     300 mm or d = 0.75 x pipe O.D.
     (whichever is greater

TABLE 1 Pinnacle® Series Caisson Riser Geometry

Riser Type	Nominal & Internal Diameter (mm)	Nominal Height (mm)	External Diameter (mm)	Internal Height (mm)	Standard Wall Thickness (mm)	Lifting Clutch Size (Tonne)	Mass of Riser (kg)	Hynds Product Code	Standard/ MTO
Standard	4000	1000	4500	1000	250	10	8680	MHR401000NHW	MTO
Special (for in-situ flanged base)	4000	1000	4500	1000	250	10	8680	MHR401000BNHW	MTO

Notes:

- *The load group specifies the maximum lifting capacity or Working Load Limit (WLL) of the lifting clutch expressed in tonnes.*
- *For additional information please refer to Reid Safe Lifting & Propping of Precast/ Tiltup Concrete Panels & Precast Guide.*

TABLE 2 Pinnacle® Series Caisson Lid

Lid Diameter (mm)	Opening Type	Thickness (mm)	Loading	Lifting Clutch Size (Tonne)	Mass of Lid (kg)	Hynds Product Code	Standard/ MTO
4000	Ø710 Hole Offset	375	HN-HO-72	10	15200	MHL40375HN7W	MTO
4000	790x530 Hole Offset	375	HN-HO-72	10	15398	MHL40375HN7X5	MTO

Lifting & Handling

All Pinnacle manhole lids, risers and flanged bases feature certified concrete lifting anchor systems, designed and tested to guarantee safe and secure handling.

Hynds Pipe Systems has designed and manufactured Pinnacle Concrete Manholes with a minimum dynamic factor of 1.2. This dynamic factor requires that all the following conditions are observed when lifting, moving or placing the manholes;

1. Lifting with mobile plant (such as an excavator or similar) where equipment is specifically exempt from the requirements of the PECPR Regulations 1999, subject to the conditions outlined in the New Zealand Gazette, No. 104, September 2015 and
2. Lifting, travelling and placing over rough or uneven ground where anchor failure is not anticipated to cause harm or injury, by adopting procedures such as:
    a. Transporting the element as close as practical to ground level (300mm recommended).
    b. Establishing and maintaining exclusion zones
    c. Transporting only precast concrete elements that are unlikely to topple if they were to hit the ground
    d. Inspecting lifting anchors both after transportation and before final lifting into place
3. Hynds uses both Reids and Ancon lifting anchors which are both designed to *(Haeussler)* specifications and as such are compatible with Reid, Deha or Ancon anchors, clutches, and recess formers of the same load range.

Refer to "Safe work with precast concrete - handling, transportation and erection of precast concrete elements" published by Worksafe New Zealand (October 2018).

Shock loads resulting from travelling with suspended risers or flanged bases over rough terrain and uneven ground may exceed designed dynamic factor load of the lifting systems. It is critical that care is taken during lifting and transporting as additional stresses could result in anchor failure.

Use a spreader between two chains to ensure there is no damage to the top edge of the manhole riser. Ensure the angle between the chains is no more than 60 degrees.

Effective Rigging and Sling Angles

How lifting clutches work:

- The lifting clutch is attached to the lifting anchor by lowering the clutch slot over the anchor and rotating the clutch tab until it rests on the concrete surface.
- The tab is located on the side that will be uppermost when lifting.
- When the load is raised the anchor takes the full load in tension.
- As the load rotates or is lifted with the anchor in shear, the clutch comes into contact with the concrete.
- This transfers the lifting force into the concrete and the anchor prevents the clutch slipping out of the recess.
- Appropriate clutches for anchor sizes should always be used.

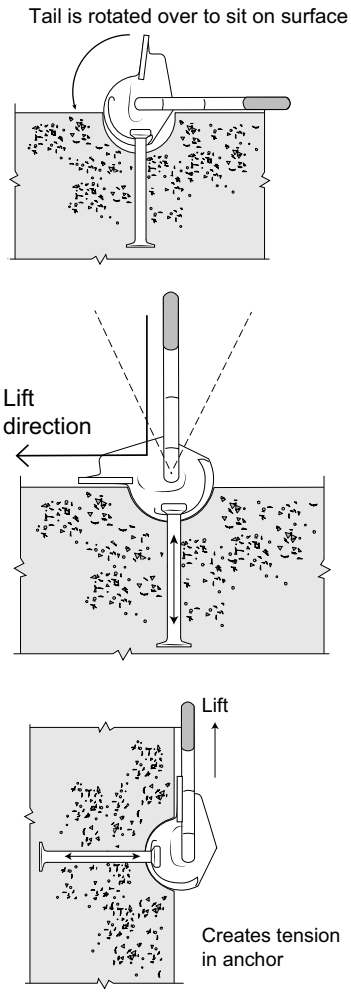


FIG. 7 Lifting Clutch Operation

The larger the sling angle the higher the load on the chains. For example at an included angle of 170° the load on each sling is six times the weight of the actual load being lifted. Do not put more than the recommended safe working load on equipment. Hynds concrete manholes are fitted with lifting inserts, thus providing a safety factor which is well over the industry standard of three, when slung in the correct manner. However, care still needs to be taken when lifting the Hynds concrete manholes, especially over uneven surfaces as shock loading may exceed the designed safety factor.

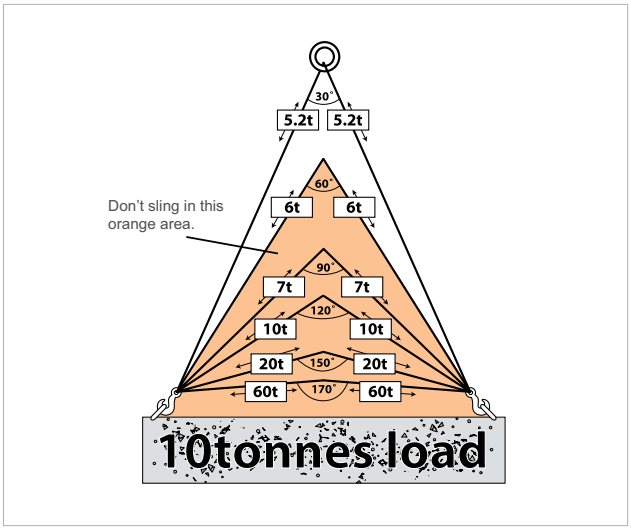
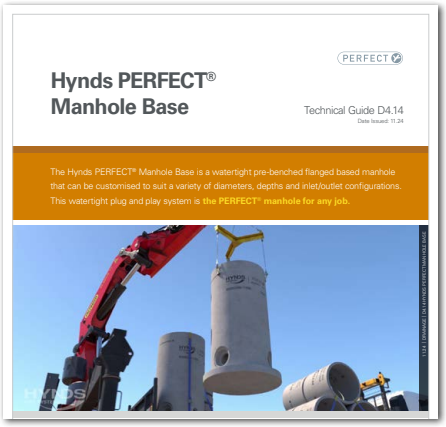


FIG. 6 Sling Angles

Please note: *An insert with a nominal clutch size rating stamped on the head does not necessarily have the same safe working load limit because of the various insert lengths available.*



Also see

- D4.14 Hynds PERFECT Manhole Base
- D4.15 Hynds Pinnacle Manhole Steps
- D4.16 Pinnacle Inspection Chambers
- D4.24 Rotaring 500 Adjustable Levelling Rings
- D4.25 Rotaring 600 Adjustable Levelling Rings
- D5.14 Scruffy Domes
- CPAA Guideline Note - NZ Loads on Circular Precast Concrete Manholes and more. (www.cpaa.asn.au)

Branches Nationwide *Support Office & Technical Services 0800 93 7473*

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.